Transport Action Network
Stop the Silvertown Tunnel Coalition
Speak Out Woolwich
Extinction Rebellion Greenwich

The Silvertown tunnel is in a hole, so

STOP DIGGING

June 2020

Campaigners against the Silvertown Tunnel – with masks to show the air pollution it would cause – at City Hall, June 2019

Executive Summary

The proposed Silvertown tunnel would be a twin-bore road tunnel under the River Thames in east London, linking Silvertown with the Greenwich peninsula, near to the existing twin-bore Blackwall Tunnel. A contract to design, build, finance and maintain the tunnel, widely reported to be worth £1.2 billion, was awarded by Transport for London (TfL) in November 2019 to the RiverLinx consortium, comprising Aberdeen Standard Investments, BAM group, Cintra (a subsidiary of Ferrovial), Macquarie Capital and SK Engineering & Construction.[1]

The tunnel is the largest current infrastructure project supported and ultimately funded by the Greater London Authority (GLA), of which TfL is a statutory body, and the Mayor of London, who has political authority over it. The GLA claims that the tunnel will reduce traffic congestion around the Blackwall tunnel; reduce the number of closures and incidents in and around the tunnel; and provide for improved public transport links including cross-river bus services. It says that the tunnel will reduce the environmental impact of traffic congestion, and produce economic effects such as improving journey times, "improving access to new markets and new homes" and "creating opportunities for new jobs".[2]

Opposition to the tunnel project has been voiced by residents' groups, political parties and others, before and during public consultations in 2014-15, on the grounds that there were better ways to support public transport, and that it could worsen, rather than alleviate, traffic congestion and air pollution problems. The borough councils of Lewisham, Southwark, Newham and Hackney have opposed the scheme.

The scheme has come under fresh scrutiny for two reasons:

First, in December 2018 the Mayor of London, along with other local authorities and the UK parliament, declared a "climate emergency". Local groups opposed to the tunnel demanded that the tunnel project be reappraised in the light of this emergency.[3] The Mayor, the GLA and supporters of the project responded by saying it would have a neutral, or even positive, effect on London's greenhouse gas emissions.

Second, the Covid-19 pandemic has produced unprecedented changes in transport practices during the lockdown, an unprecedented shake-up of transport policy at government and local level, and now requires a revision of projections of future transport trends.

This report starts with an introduction, summarising policy issues arising from the Covid-19 pandemic, which reinforce the case for cancelling the Silvertown tunnel. The report also:

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[1] TfL published on line a redacted version of the project agreement in May 2020. <https://tfl.gov.uk/corporate/publications-and-reports/silvertown-tunnel-project-agreement>. TfL raised the estimated cost of the tunnel from £1 billion to £1.2 billion in the Contract Award Notice, published on 5 March 2020. <https://ted.europa.eu/udl?uri=TED:NOTICE:114879-2020:TEXT:EN:HTML&src=0>

[2] <https://tfl.gov.uk/travel-information/improvements-and-projects/silvertown-tunnel>; Silvertown Tunnel: the case for the scheme (April 2016), pp. 47-73. The documents cited in this report are those drawn up by Transport for London to support the proposed scheme, available on its web site. There was an inquiry into the project by the Infrastructure Planning Inspectorate, completed in April 2017. The inspectorate required some minor amendments to the scheme, and approval was then given by Chris Grayling, the transport secretary, in May 2018. Documents submitted to the inquiry by TfL, and by groups opposing the scheme, are stored on the inspectorate's web site: <https://infrastructure.planninginspectorate.gov.uk/projects/london/silvertown-tunnel/>.

[3] <https://www.theguardian.com/uk-news/2018/dec/11/london-mayor-sadiq-khan-city-climate-emergency>, <https://stopsilvertowntn.com/>

■ Examines the evidence of the tunnel project's probable effect on greenhouse gas emissions and air pollution; and finds that the tunnel would likely increase, rather than decrease, greenhouse gas emissions, and would also likely, at best, redistribute air pollution rather than decrease it (part 1);

■ Examines the GLA's argument, central to its case for the tunnel, that it would not cause 'induced traffic' (the effect, analysed in transport research, that more roads produce more traffic), and finds this claim to be false (part 2);

■ Shows, with reference to research conducted at the Tyndall Centre for Climate Research, that the tunnel project is incompatible with the targets for climate action associated with the 2015 Paris accords, a finding that potentially puts the scheme at odds with the recent Appeal Court ruling on Heathrow Airport expansion (part 3);

■ Reviews the GLA's transport and environment strategies, which form the policy context for the tunnel project, and argues that these need to be strengthened with investment in public transport and non-car modes, not weakened with big road projects (part 4);

■ Shows that the tunnel project, like many big road projects, would widen, rather than narrow, social inequalities (part 5);

■ Argues that the tunnel project is incompatible with the GLA's claim that London is leading internationally on climate change, and that the project manifests double standards on climate policy (part 6); and

■ Points out that the assumptions on traffic demand growth that are key to the tunnel project need to be re-examined in the light of the Covid-19 pandemic (part 7).

The report concludes with recommendations that the tunnel project be scrapped, and transport policies be directed to effectively reducing greenhouse gas emissions and helping Londoners on lower incomes enjoy the best possible mobility.

Introduction: Covid-19 has changed the transport policy outlook

In April, during the lockdown, UK road traffic volumes were down by more than 60%; in London, bus usage fell by more than 80% and underground train usage by more than 90%.[4] Bicycle usage soared – in some places by 70%, the government estimated.

The government and the Mayor of London reacted with short-term measures to support walking and cycling. On 9 May the government announced a £250 million "emergency active travel fund" to support pop-up bike lanes, wider pavements and safer junctions, part of a larger £5 billion programme announced in February. The Mayor of London announced a Streetspace plan "to accommodate a possible ten-fold increase in cycling and five-fold increase in walking when lockdown restrictions are eased".[5]

Both government and the GLA acknowledge this as an opportunity to change transport policy long-term. Grant Shapps, the Transport Secretary, stated, in a preface to updated statutory guidance for local authorities:[6]

> We recognise this moment for what it is: a once in a generation opportunity to deliver a lasting, transformative change in how we make short journeys in our towns and cities.

At the same time, the Department for Transport has started a consultation on decarbonising the transport sector. Its report, published in March, acknowledged for the first time that reductions in traffic will be needed; it designates as a priority supporting fewer car trips "through a coherent, convenient and cost-effective public network".[7]

However, there is an enduring contradiction in transport policy. These measures, which could reduce car use, especially in some city locations, run alongside other policies that could *increase* car use overall. At London level, City Hall is pressing on with the Silvertown Tunnel project. At government level, the second phase of the Road Investment Strategy, which provides for £27.4 billion of infrastructure spending between now and 2025, was launched in March: a legal challenge to it is being prepared by the Transport Action Network, using the precedent of the recent Court of Appeal decision against the Heathrow airport expansion.[8]

Covid-19 has brought the transport system to a crossroads: which way is taken depends on policy. Specialist transport researchers have made this point as the scale of opportunity opened up by the pandemic has become clear. Professor Phil Goodwin, one of the UK's leading transport researchers, has written that Covid 19 had boosted both "a return to the

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[4] Cabinet Office Briefing Rooms presentation, 26 April, slide on Transport Use Change

[5] "Back to work: 'capacity of transport network will be down by 90%", *The Guardian*, 9 May 2020; "Mayor's bold new Streetspace plan will overhaul London's streets", GLA web site, 6 May 2020

[6] <https://www.gov.uk/government/publications/reallocating-road-space-in-response-to-covid-19-statutory-guidance-for-local-authorities/traffic-management-act-2004-network-management-in-response-to-covid-19>

[7] Department for Transport, *Decarbonising Transport: setting the challenge* (March 2020)

[8] Department for Transport, *Road Investment Strategy 2: 2020-2025*. Presented to parliament pursuant to section 3 of the Infrastructure Action 2015 (March 2020); <https://transportactionnetwork.org.uk/ris2-legal-action/>

local provision of [transport] services, and great attention to short distance travel", and also "car dependence" and illusions about "a large expansion of road capacity":[9]

> So we are living in the middle of the largest, swiftest changes in travel behaviour ever seen, and that has opened up futures of simultaneous inconsistent trends. [...] This does not mean that we are uncertain about whether one or the other direction will be taken. The near certainty is that they both will. The uncertainty is which will win, and where, and that is about policy, not forecasting.

The contention of this report is that Silvertown tunnel construction, like the government's road investment strategy, would help reinforce car dependence, potentially undoing the effect of measures to encourage cycling and walking.

The pandemic has had two other results that require the Silvertown tunnel project to be rethought. First, it has triggered an economic recession that will oblige government at all levels to reconsider investment priorities. Second, the rapid changes in work and transport practices during the lockdown are counteracting economic drivers towards car dependence. Some demand for car journeys, for road space, and for cars, will be permanently reduced.

This has already resulted in calls for the government's road programme to be scrapped. Chris Stark, chief executive of the UK Committee on Climate Change, has said that traffic volumes are likely to decline over the long term, and that "I would spend the roads budget on fibre", to improve the broadband network. Edmund King, president of the AA, has also said that infrastructure funds might be better spent on broadband to support home working, as the AA now predicts a permanent reduction in demand for road travel.[10]

These arguments for diverting funds away from road infrastructure may also be applied to the Silvertown tunnel.

[9] Phil Goodwin, "Transport appraisal and planning in a time of imperatives", *TransportXtra*, 15 May 2020. For other relevant views from transport specialists see: Matthew Taylor, "A new normal: how coronavirus will transform transport in British cities", *The Guardian*, 18 May 2020

[10] "Climate change: switch road cash to broadband, adviser says", BBC News, 21 April 2020; Roger Harrabin, "Coronavirus will transform UK work and travel, says AA", BBC News, 3 April 2020

1. The tunnel would increase, not decrease, greenhouse gas emissions and air pollution

The GLA and the London Mayor's office have said repeatedly that the tunnel project is (i) compatible with "zero carbon" goals, and would not cause an increase in carbon emissions, and (ii) would result in "an overall improvement in air quality". These claims are demonstrably false.

The GLA's arguments were set out by Heidi Alexander, Deputy Mayor for transport, in a letter to Victoria Rance of the Stop the Silvertown Tunnel coalition.[11] The Deputy Mayor argued that construction of the Silvertown tunnel, and its use by buses, would ensure that:

> [C]ongestion [in and around the Blackwall and Silvertown tunnels] will effectively be eliminated. [...] The user charges will ensure overall traffic volumes and associated carbon emissions do not increase, and air quality will actually be improved overall. [...]

Further on she wrote:

> Addressing climate change is a clear priority for the Mayor and TfL. We are doing everything in our power to address the climate emergency and achieve our zero carbon goals across a range of policy areas. By radically improving traffic conditions and effectively eliminating congestion, the delivery of the Silvertown Tunnel will see *no increase in carbon emissions* and *an overall improvement in air quality* [my emphasis, SP]. [...]

In response to campaigners' proposals that a new carbon impact assessment of TfL's transport policy was needed, in the light of the climate emergency, Deputy Mayor Alexander wrote:

> London's 1.5C trajectory has been developed using detailed bottom up modelling of the carbon emissions from transport and buildings and other sectors, and takes into account planned developments such as the Silvertown tunnel and London wide policies such as ULEZ.
>
> The new user charging scheme being introduced will ensure that the Silvertown tunnel does not result in increased operational carbon emissions as the total number of vehicles crossing the Thames is not forecast to increase. Silvertown tunnel *will not undermine the overall carbon reduction required* across the wider transport sector from either direct emissions or when factoring in embodied carbon.

The claim that the scheme will not increase carbon emissions has been repeated by other supporters of it. For example, Greenwich Labour councillor Denise Scott-McDonald has stated, in answer to a public question, that the tunnel would relieve congestion at peak times, and that:

> This queuing traffic emits significantly more pollution and greenhouse gas. By smoothing traffic flow, it is anticipated that the new tunnel *will reduce emissions*. This

[11] Letter from Heidi Alexander to Victoria Rance, 30 May 2019. Reference MGLA140519-2589. The full correspondence is available from the Stop the Silvertown Tunnel Coalition on request

> effect will be combined with user charging, to stop the tunnel generating unnecessary new trips.[12]

These statements ignore four possible effects of increasing road capacity through the construction of the scheme.

1. Construction of the tunnel would have a considerable carbon impact. The materials required would have embodied greenhouse gas emissions, estimated in the project's Environmental Impact Statement at 82,077 tonnes of CO2 equivalent – around the same as 7000 trips of 900+ km each by a Boeing 737-400.[13] To this should be added the emissions impact of transportation and waste during construction,[14] and of other construction associated with the tunnel, such as additional road construction, lorry parks, and so on.

2. If the tunnel becomes operational, the overwhelming body of evidence indicates that it would contribute to an overall increase in car usage, and traffic volumes, in London. The confidence with which the Deputy Mayor asserts that "user charges *will ensure* overall traffic volumes and associated carbon emissions do not increase", "the new user charging scheme [...] *will ensure* that the Silvertown tunnel does not result in increased operational carbon emissions" is not justified by TfL's forecasting, which neither takes proper account of induced traffic, nor deals with the larger context by which the total volume of traffic is determined (see section 2 below).

3. The modelling to which the Deputy Mayor refers, on which London's 1.5deg C trajectory is based, falls short of any meaningful interpretation of the 1.5 degree target, as is shown by research conducted at the Tyndall Centre for Climate Change Research (see section 3 below). The urgency highlighted by the Tyndall centre – that, if emissions continue at the 2017 rate, Greater London's "carbon budget" (the amount of carbon it can emit while helping to avoid dangerous global warming) will be entirely exhausted by 2027 – is absent from the GLA's approach. The GLA's transport strategy implicitly rejects a robust effort to reduce the number of cars and car journeys, and the overall volume of traffic. This point is developed in section 4 below.

4. By adopting a "climate emergency", the GLA has made a commitment to urgent action to tackle climate change. To proceed with a £1.2 billion project that, in the very best case, will cause significant greenhouse gas emissions – and in the worst case, will contribute to a spiral of more roads and more traffic that is a key driver of rising emissions – is not in keeping with this commitment. The arguments made in support of the tunnel feed in to a political discourse that responds to the climate emergency with rhetoric while continuing with business as usual policies.

The GLA's arguments on local air pollution are similar to those on greenhouse gas emissions. There are differences, because of the local, as opposed to global, nature of the problem. Construction of a second tunnel nearby the Blackwall tunnel *could, at least temporarily*, reduce the volume of slow-moving traffic at the Blackwall tunnel's entrances. This *could, at*

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[12] Royal Borough of Greenwich, Public Questions to council meeting of 26 June 2019, question from Matt Browne, SE10. See minutes, pp. 7-8

[13] *Silvertown Tunnel Environmental Statement* (April 2016), Table 13-12, pp. 13-44 and 13-45. According to the Carbon Independent web site, a Boeing 737-400 would use about 3.61 tonnes of fuel making a 926-km flight; this would produce 11.37 tonnes of CO2 equivalent in emissions. <https://www.carbonindependent.org/22.html>

[14] *Silvertown Tunnel Environmental Statement*, section 13.7 deals with these issues but without giving carbon emissions estimates

least temporarily, reduce the severe air pollution in one location. Even here there are doubts, though, because, as research at Portland State University has shown, "congestion mitigation does not inevitably lead to reduced emissions", and that smoother-moving traffic can *increase* the level of pollutant emissions.[15]

Beyond that, because the Silvertown project is likely to stimulate induced traffic, it is likely that it will also, inevitably, aggravate London's air pollution problem. This at a time when Newham and Greenwich, boroughs directly affected by the tunnel, have among the highest level of PM2.5 particulates in the UK. The impact on Newham should be of particular concern: it has among the highest proportions of black, Asian and minority ethnic people, and among the highest levels of poverty, in the UK. Research supported by the British Heart Foundation showed that – shortly prior to the Covid-19 lockdown, which temporarily reduced pollution – levels in Newham were highest in the country, and Newham and Greenwich were among the boroughs where the levels exceeded legal limits.[16]

Possible impact of Heathrow judgement

It is possible that the role of major road projects in adding to the UK's greenhouse gas emissions could be tested in court. Following the Court of Appeal decision against Heathrow airport expansion, on the grounds that aviation planning policy had failed to take climate targets into account, transport campaigners have been consulting with lawyers about whether a similar challenge could be mounted to the National Networks National Policy Statement, the policy framework for road schemes. After the judgement, the Transport Action Network stated:

> We think the NNNPS is challengeable on the same grounds as Heathrow. Whilst we have an outdated NNNPS and a biased appraisal process, we will see more roadbuilding and rising emissions from road transport. It is critical that the NNNPS and the Department for Transport's appraisal system are both updated to reflect the government's commitment to net zero emissions by 2050, and the importance the public attach to tackling climate change.[17]

It is clear that the transport policy context in which the Silvertown Tunnel was approved has changed, and is changing further. The Silvertown Tunnel decision is certainly out of date and probably flawed. For this reason, the GLA should pause and review the decision.

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[15] A. Bigazzi and M. Figliozzi, "Congestion and emissions mitigation: a comparison of capacity, demand and vehicle based strategies", *Transportation Resarch Part D: Transport and Environment* 17:7 (October 2012), pp. 538-547

[16] "Newham has 'most toxic air in the UK', study finds", *The Londonist*, 3 February 2020; "Research highlights 2019 – December: effect of air pollution likened to smoking", BHF web site <https://www.bhf.org.uk/what-we-do/news-from-the-bhf/news-archive/2019/december/research-highlights-2019>

[17] Transport Action Network, "The road to tackling climate change", 2 March 2020

2. The tunnel, if built, will cause induced traffic

In order to sustain the claim that the Silvertown tunnel project will not add to London's greenhouse gas emissions, the GLA and Mayor of London claim that it will not add to the city's total volume of traffic. This contradicts a substantial body of research, conducted over many decades in various countries, on the "induced traffic" effect: simply put, that more roads produce more traffic.

The GLA's political leaders say that the proposed user charge will cancel out "induced traffic". But the research conducted by TfL does not support this conclusion. Firstly, TfL has presented its modelling of scenarios, in which the tunnel would not substantially increase traffic volumes, with numerous caveats. Secondly, the modelling uses assumptions that appear to have perversely minimised the induced traffic effect. Thirdly, no account has been taken of the real experience of other projects that use road charges.

Given the body of research on induced traffic, the limited help provided by the modelling, the real experience of other projects with road charging, and the climate emergency, confident assertions that the project will not add to London's total volume of traffic are foolhardy.

In this section, (a) "induced traffic", (b) other projects with user charges, and (c) the GLA's research, and claims based on it, are reviewed.

(a) Induced traffic

Historically, the largest body of research on induced traffic has been in the USA, where large-scale car use and traffic jams emerged in the 1940s, decades ahead of the rest of the world. One recent summary of the research stated:

> [W]hen more lane-miles of roads are built, more miles are driven, even more so than might be expected by 'natural' increases in demand, like population growth. In other words, the new lanes may immediately bring relief to those who wanted to use the highway before, but they will also encourage those same people to use the highway more […] and they will bring new drivers onto the highway, because they suddenly find it a better deal.[18]

Research on induced traffic has shown that new road projects, designed to minimise congestion, release "latent demand", i.e. journeys that would not otherwise have been made. As a group of US researchers wrote:

> Since the real constraint on driving is traffic, not cost, people are always ready to make more trips when the traffic goes away. The number of latent trips is huge – perhaps 30% of existing traffic. Because of latent demand, adding lanes is futile, since drivers are already poised to use them up.[19]

A further complexity relates to the Braess paradox, a mathematical formula: adding a new road can actually produce not only more traffic, but more congestion. [20] This is because if

[18] Tom Vanderbilt, *Traffic* (London: Allen Lane, 2008), p. 155

[19] Andres Duany, Elizabeth Plater-Zyberk and Jeff Speck, *Suburban Nation: the rise of sprawl and the decline of the American Dream* (New York: North Point Press, 2000), p. 91

[20] Vanderbilt, *Traffic*, p. 159

more roads are built, it becomes individually more time-saving for people to use them, even going longer distances.

In 1994, the UK government commissioned a study to verify the induced traffic effect and consider its consequences. It concluded:

> [I]nduced traffic can and does occur, probably quite extensively, though its size and significance are likely to vary widely in different circumstances.[21]

A further study, published in 1998, confirmed not only that more roads produce more traffic, but also that the opposite is true: fewer roads reduce the amount of traffic, an effect named "disappearing traffic". Follow-up research recommended ways of reducing road space and re-using it for a range of policy objectives.[22]

The authors of this study made significant comments on how "induced traffic" and "disappearing traffic" are analysed. They cautioned, first, that a range of social, economic and behavioural factors had to be taken into account that defy simple analysis; and, second, that "simple before-and-after aggregate traffic counts, separated by a few months" could not satisfactorily detect these phenomena, because behavioural changes triggered by changes in the road network continued over lengthy time periods.[23] These are exactly the sort of errors that appear to have been made by TfL in assessing the likely impact of the Silvertown tunnel.

Twenty years later, in 2018, the Department for Transport commissioned a report by the consultants WSP and Rand[24] to test the conclusions of these earlier reports in the light of new evidence. This report concluded that "induced demand continues to occur and may be significant in some situations"; the evidence reviewed "supports the findings of the SACTRA (1994) report that induced traffic does exist, though its size and significance is likely to vary in different circumstances".

The 2018 report said it "was not possible to obtain any qualitative understanding about the composition of induced traffic in terms of new trips, redistributed trips, transfers between modes and trips associated with new developments". This caution strikes a contrast with TfL's claims that the Silvertown Tunnel would evade the induced traffic effect. Moreover, among the report's "tentative conclusions" was: "Induced demand is likely to be higher for capacity improvements in urban areas or on highly congested routes." This throws further doubt on the claim that the Silvertown Tunnel would not produce induced traffic.

(b) The effect of user charges

TfL's modelling has assumed that the application of a user charge to the Silvertown and Blackwall tunnels can reduce traffic flows.[25] But no account has been taken of real-life examples of user charges, which suggest that, while they can delay the induced traffic effect, it may well cancel out their effect over longer time periods. Three examples are:

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[21] The Standing Advisory Committee on Trunk Road Assessment (SACTRA), *Trunk Roads and the Generation of Traffic* (London: HMSO, 1994)

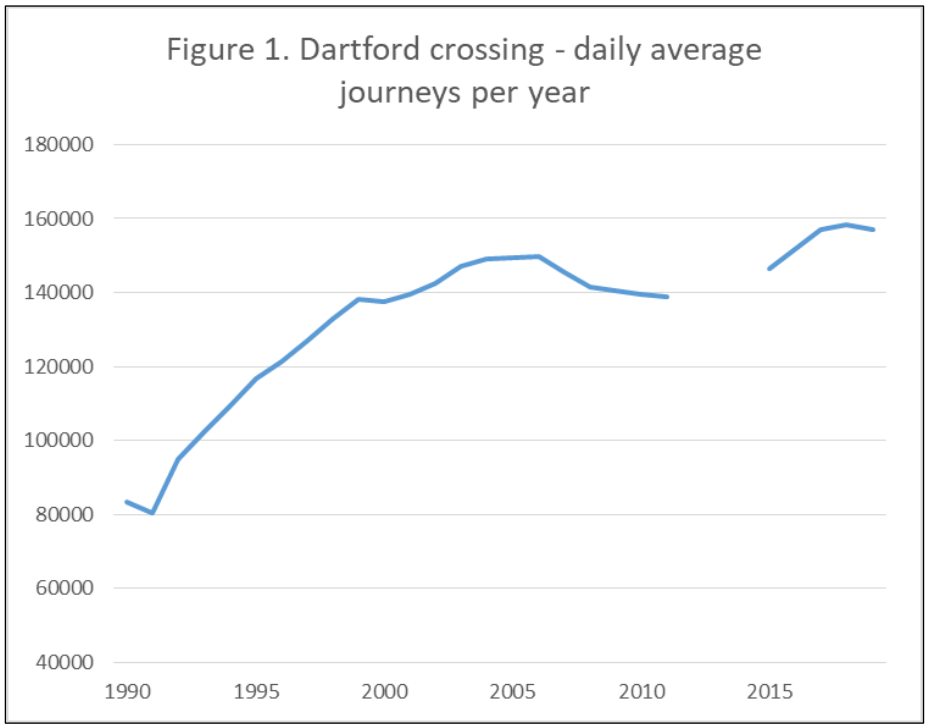
[22] Sally Cairns, Carmen Hass-Klau and Phil Goodwin, *Traffic Impact of Highway Capacity Reductions: assessment of the evidence* (London: Landor Publishing, 1998); S. Cairns et al, "Disappearing traffic? The story so far", *Proceedings of the Institution of Civil Engineers*, 2002:1, pp. 13-22

[23] Cairns et al, *Traffic Impact of Highway Capacity Reductions*, p. 4 and pp. 52-54

[24] Department for Transport, *Latest Evidence on Induced Travel Demand: An Evidence Review* (Project no. 1-396), May 2018

[25] There is no publicly available information about the assumptions made on elasticity of demand for road space to the user charge (i.e. the extent to which the level of demand would change in response to a user charge).

■ *The Dartford crossing*. The crossing opened in 1963 as a single tunnel; a second tunnel was added in 1980 and the Queen Elizabeth Bridge in 1991. There has been a user charge since the crossing opened. The total traffic volume, and congestion on the crossing and adjoining roads, seem to have been impervious to increases in the charge. Traffic volumes have risen relentlessly, together with those on the entire M25 ring road, of which the crossing forms part. The volume of traffic rose steadily and peaked in 2006, at a daily average of 149,602 crossings. It then fell slightly for five years in succession, in the context of an overall reduction in traffic volumes. In 2009, daytime charges were increased and night-time charges abolished; it is difficult to say what difference these changes made. In 2012 the charge was increased, and in 2014 toll booths were taken away and a free-flow scheme used, under which drivers pay the charge electronically. Traffic volumes increased, regardless: by 2015 the daily average of journeys had risen to 146,292. It soon returned to, and surpassed, the level of 2006. In 2016 it surpassed 150,000 (compared to a design capacity of 135,000) for the first time. It has risen every year since, reaching 157,023 in 2019. The government expects average traffic flow to hit 160,000 by 2025.[26] See Figure 1.[27]



Source: Highways Agency records in the National Archives web archive (up to 2012); Dart Charge Data Table (2015-19)

■ *The M6 toll road*. This 27-mile privately financed tolled motorway, which runs around the north west of Birmingham, opened in 2003 and was intended to relieve congestion on the busiest section of the M6, by providing an alternative route. Initially, congestion was reduced

[26] Kent On Line, "Department of Transport figures reveal Dartford Crossing will be operating at 120% capacity", 11 December 2016

[27] The data in figure 1 are from: for 1990-2011 the National Archives <https://webarchive.nationalarchives.gov.uk/20121102232734/http://www.highways.gov.uk/our-road-network/managing-our-roads/highways-agency-areas/area-teams/area-5/the-dartford-thurrock-river-crossing/traffic-flow/> (accessed 25 May 2020); for 2015-2019, Dart Charge Data Table <https://www.gov.uk/government/publications/dart-charge-data-table> (accessed 25 May 2020). Requests to Highways England for a complete set of historical data were referred to the Data Charge Data Table web page, which displays only incomplete information

as traffic diverted on to the toll road, but by 2008 the Highways Agency found that traffic flows on the M6 "appear to have returned to near pre-M6 Toll opening levels". The total volume of traffic on the toll road and the parallel M6 increased, and peak-time traffic at junctions on either side of the toll increased. A report by the Campaign for Better Transport, which monitored the project, concluded that: "the only example of a private toll motorway in the UK, the M6 Toll, has been a colossal and expensive failure. Any initial benefits were soon eclipsed by rising traffic levels, and [...] journey times have scarcely improved".[28]

■ *The London congestion charge*. The charge, introduced in 2003, is widely considered as one of the most successful such charges. By 2006, the volume of traffic in the area covered was down by 15%, and the levels of congestion by 30%. But by 2007, congestion levels were the same as they had been in 2002. More recently, traffic volumes have been boosted by rapid increases in the number of taxis and private for-hire vehicles in the congestion zone.[29] The long-term effect of the congestion charge on air pollution has also been shown to be very limited by a number of academic studies.[30]

All road projects are different, and none of these projects are exact analogies of the Silvertown tunnel. But some key trends are evident. Two road charges, introduced with the primary objective of reducing congestion – on the Dartford tunnel and the M6 Toll road – failed to do so. The London congestion charge, which covered a much wider area rather than one specific route, achieved some success, but traffic volumes then moved towards their previous levels. These examples suggest that not only do more roads produce more traffic, but also that road charging does not reverse this trend, and at best slows it down a little.

(c) Likely induced traffic resulting from the Silvertown tunnel

The Preliminary Transport Assessment by TfL for the Silvertown Tunnel stated that:

> [T]he 'induced traffic' effects [...] could operate both ways – it is plausible that the scheme will result in no net additional traffic, possibly even an overall reduction.[31]

Three reasons were given for this assessment: (1) that a "powerful demand management tool", the user charge, would be available; (2) that public transport would be improved by "dedicated bus lanes"; and (3) that "the scheme is being built in a congested urban environment where capacity is constrained on the surrounding network".

Reason (2) is frail at best. The "dedicated bus lanes" referred to would not be bus lanes at all. There would be one such lane, described in TfL's Case for the Scheme as "a dedicated bus, coach and goods vehicle lane"[32] – that is, it would be open to goods vehicles as well as buses. (See also section 4 below.) Reason (3) is a tautology: as the M6 and other road projects has

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[28] Highways Agency, *Post Opening Project Evaluation: M6 Toll Five Years After Study* (London: Highways Agency, 2009); Campaign for Better Transport, *The M6 Toll, five years on: counting the cost of congestion relief* (London: CBT, 2010); Campaign for Better Transport, *The M6 Toll – ten years on* (London: CBT, 2013)

[29] Nicole Badstuber, "London congestion charge: what worked, what didn't what next", The Conversation, 2 March 2018; S. Beevers et al, "Traffic management strategies for emissions reduction: recent experience in London", *Energy and Emission Control Technologies* 2016:4, pp. 27-39

[30] *The Mayor's Transport Strategy*, p. 89; Frank Kelly et al, "The Impact of the Congestion Charging Scheme on Air Quality in London" (Health Effects Institute, 2015) <https://www.londonair.org.uk/london/reports/HEI_Congestion_Charging_Report_2011.pdf>; Colin Green et al, "Did the London Congestion Charge Reduce Pollution?" (Lancaster University Management School Economics Working paper Series 2018/007)

[31] *Silvertown Tunnel Preliminary Transport Assessment* (London: TfL, 2015), p. 265

[32] *Silvertown Tunnel: Case for the Scheme* (7.1) (London: TfL, 2015), p. 29

shown, when expansion of a main road puts pressure on the surrounding network, political pressure builds for further expansion of the surrounding network. That is how the "induced traffic" effect works.

That leaves reason (1), the user charge. The experience of the Dartford tunnel, M6 Toll and London congestion charge shows that road charges, far from being a "powerful demand management tool", at best only delay the induced traffic effect. While it is theoretically possible for user charges to counter the induced traffic effect, in practice it has not happened. In the case of the Silvertown project, the level of the charge is a political decision in the hands of the Mayor, who could in future decide to reduce it in line with other policy objectives.

Despite the large body of research on the importance and complexity of, the induced traffic effect, TfL conducted its computer modelling of the tunnel project using assumptions that perversely minimised this effect. In particular, it was assumed that the total number of trips made across the Thames would not be changed by the construction of the tunnel (see box). This naturally produced modelling outcomes that minimised induced traffic effects. With these in hand, TfL was able in its Transport Assessment to present conclusions, hedged with numerous caveats, that the total traffic volume would not increase, in particular:

> [I]t has not been possible to isolate the precise impact of any one factor individually on highway demand with any degree of accuracy. However, the available evidence indicates that the overall impact of the [Silvertown tunnel] Scheme is a reduction in daily traffic demand on the road network in the study area, and in particular a reduction in and a moderating regulation of cross-river highway demand.[33]

Important evidence – the accumulated experience of numerous other road schemes – has not been considered. The evidence base for the tunnel project is TfL's computer models. These should clearly be re-run, with a wider set of assumptions in relation to induced traffic.

In the climate emergency, simply replacing the vehicle fleet with ultra low carbon vehicles will not be sufficient. This is partly because of other emissions associated with vehicles and road use, and partly because, even if the sale of new petrol and diesel cars is ended by 2035, there will still be some highly emitting vehicles in use. One study shows that, if 50% of new car sales are electric by 2030, it will be necessary for car mileage to be cut by 60% over that period for emissions reductions to stay on track, and even if the new car fleet is completely electrified by 2030, car mileage would still need to be reduced by 20%.[34] The reduction of total traffic volume and car mileage, and not only electrification, must therefore be an overriding objective of transport policy. Without a scheme appraisal that takes this into account, and only vague assertions on subsequent traffic volumes, the Silvertown tunnel is unlikely to contribute to this aim.

How TfL's models deal with induced traffic

The assumptions about induced traffic used in modelling the Silvertown tunnel project are set out in Appendix B to the *Silvertown Tunnel Preliminary Transport Assessment* (London: TfL, 2015), on pages 265-268. Induced traffic is broken down into five phenomena: ***Continued ...***

[33] *Silvertown Tunnel Transport Assessment* (London: TfL, 2016), paragraph 7.2.6, p. 229

[34] <https://policy.friendsoftheearth.uk/insight/radical-transport-response-climate-emergency>

Trip generation "concerns whether the Scheme will change the overall number of trips that a user will make over the whole day, regardless of their mode of transport, location, and route taken." The PTA says there is "some evidence suggesting that this is dependent on the personal characteristics and situation of the individual making the journey", and that therefore the total number of trips is assumed in TfL's modelling to be "fixed for a given level of population and employment". In other words, *it is assumed a priori that the existence of an additional tunnel will not influence the number of trips.*

Trip redistribution covers users who change the origin or destination of a trip because of the additional route available. The PTA claims that "trip redistribution involves the relocation of an existing trip and so does not result in any additional traffic", and that the modelling, undertaken according to government guidelines, "suggests that this effect is not significant due to the estimated impact of charging and provision of an enhanced bus network".

Modal shift concerns travellers who switch between transport modes (e.g. between cars and public transport). The modelling appears to have been based on assumptions that the combination of the user charge and improved cross-river bus connections will produce reductions in traffic that will counter any increases caused by extra road space.

Route choice. The PTA says that if a driver chose to use the Silvertown tunnel instead of e.g. the Blackwall tunnel or Rotherhithe tunnel, this would not alter the total number of trips on the wider network, and that the models cover a wide enough area for this to be taken into account.

Time of day effects concern the potential for drivers to change the time at which they make trips. These effects are not considered in TfL's models as induced traffic.

The assumptions on trip generation, trip redistribution and modal shift used here appear to be restrictive and to take insufficient account of the theoretical body of knowledge on induced traffic, and the practical experience of other schemes. Even with these restrictions, the models support conclusions that there will be no induced traffic hedged with numerous caveats. This is too shaky a basis for a £1.2 billion project.

3. The London Mayor's targets for cutting greenhouse gas emissions are way behind what is needed, and building the tunnel will make things worse

The Silvertown tunnel project would be likely to contribute significantly to London's greenhouse gas emissions, both during construction and when operating (see sections 1 and 2). The Mayor and other GLA political leaders have claimed repeatedly that this contribution has been taken into account in drafting the city's decarbonisation strategy, which aims at "zero carbon" (actually, net zero carbon, i.e. requiring negative emissions technologies[35]) by 2050. But this begs two questions:

1. The carbon budgets (i.e. the quantities of carbon that may be released into the atmosphere, without breaching internationally agreed targets) that the GLA has set itself are far greater than those calculated by the Tyndall Centre for Climate Research, one of the UK's leading centres of research on decarbonisation. So the GLA's emissions trajectories (i.e. forecasts of the volume of greenhouse gas emissions in future years) fall far less steeply than would be required to remain in line with the goal of limiting global warming to 1.5 degrees above pre-industrial temperatures. This means that, in the transport sector – which after electricity and heat systems, and buildings, is London's largest source of emissions – plans to move away from motorised transport are such that they would contribute to missing the Paris targets by a long way.

2. London's transport policy, while including many measures to encourage non-motorised transport, nevertheless retains pride of place for cars and trucks for the indefinite future, and relies heavily on imperfect technologies (e.g. electric cars and hydrogen cars) to reach its (inadequate) decarbonisation goals. It is this insistence on retaining large volumes of road traffic that may undermine decarbonisation efforts, and form the context for carbon-heavy projects such as the Silvertown tunnel. Furthermore, the policy is predicated on assumptions about traffic demand that are now in doubt, in the light of the Covid-19 pandemic and the changes in work and transport practices it has caused.

This section of the report looks in more detail at decarbonisation scenarios. The next section comments on the transport strategy.

In November 2019, in response to campaigners' claims that the Silvertown tunnel would undermine decarbonisation efforts, Sadiq Khan, the Mayor of London, stated:

> London's 1.5C trajectory takes the Silvertown Tunnel into consideration as it is based on modelling of London's entire transport system. London's carbon reduction pathway is in line with the Committee on Climate Change's pathway and IPCC trajectories that are consistent with a limited probability of overshooting 1.5C warming.[36]

Heidi Alexander, Deputy Mayor for transport, stated, similarly:

> London's 1.5C trajectory has been developed using detailed bottom up modelling of the carbon emissions from transport and buildings and other sectors. [...] The trajectory has

[35] See Mayor of London, *Zero carbon London: a 1.5 deg compatible plan* (2018), p. 17; *London Environment Strategy*, p. 208

[36] Letter from Sadiq Khan to Victoria Rance of Stop the Silvertown Tunnel Coalition (SSTC), 21 November 2019 (reference MGLA071019-4151)

> been independently assessed by C40 [the C40 cities climate leadership group] to be in line with the advice of the Intergovernmental Panel on Climate Change on the level of carbon emission reduction required to put us on track to staying within 1.5C global warming.[37]

The C40 assessment actually does no more than to confirm that London's policies are in line with a C40 check-list (see section 6 below). Here we focus on the assertion that London's emissions trajectories are based on detailed modelling, and are in line with CCC and IPCC trajectories.

First, let us recall that all emissions trajectories, and the models on which they are based, are only educated guesses about the possible outcomes of different policies. Second: none of the three trajectories published in the London Environment Strategy reach the Mayor's declared goal of a 100% reduction compared to 1990 levels.

The trajectories are: (i) reflecting "existing policies [...] at a UK and city level", which might achieve a 35% reduction; (ii) assuming "additional electricity and gas grid decarbonisation" as a result of government (not GLA) policies, which might achieve a 65% reduction, and (iii) assuming both government action and "increased action at city level", which might achieve a 90% reduction. The GLA assumes that the final 10% can be "achieved" by negative emissions technologies or carbon offsetting.[38]

The inherent risks – which, if we are to give meaning to the phrase "climate emergency" are very grave risks – are obvious. Government policy may not work in the desired direction. Both government and GLA policies aimed at the desired targets might not – as with all policies, in every sphere – hit the targets, for reasons as yet unclear.

But a further, more serious, shortcoming is in the Mayor's claim that London's trajectories are "consistent with a limited probability of overshooting 1.5C warming". The Mayor argues that the trajectories are in line with those of the IPCC and the CCC. This does not tell us very much. The IPCC, an advisory body, produces a wide range of trajectories reflecting a multitude of scenarios. The CCC produces trajectories associated with the UK government's climate policy, that is itself inadequate for achieving the goal of limiting global warming to 1.5 degrees.

The value of the Tyndall Centre's carbon budgets – which it has calculated for all local authority areas in the UK – is that they are worked out independently, and are linked directly to the global temperature targets ("well below 2degC and pursuing 1.5deg C) and the equity principles (i.e. principles of equity between developed nations and poorer nations) enshrined in the UN Paris agreement.[39]

There are two key differences between Tyndall's carbon budgets and the CCC's. First, the equity principles of the Paris agreement are explicitly and quantitatively applied, an approach which allocates a smaller share of the global carbon budget to rich countries such as the UK, and also includes global "overheads" for land use, land use changes and forests, and cement process emissions related to poorer countries' development. Second, the Tyndall carbon budgets do not include negative emissions technologies and carbon offsets, which form a

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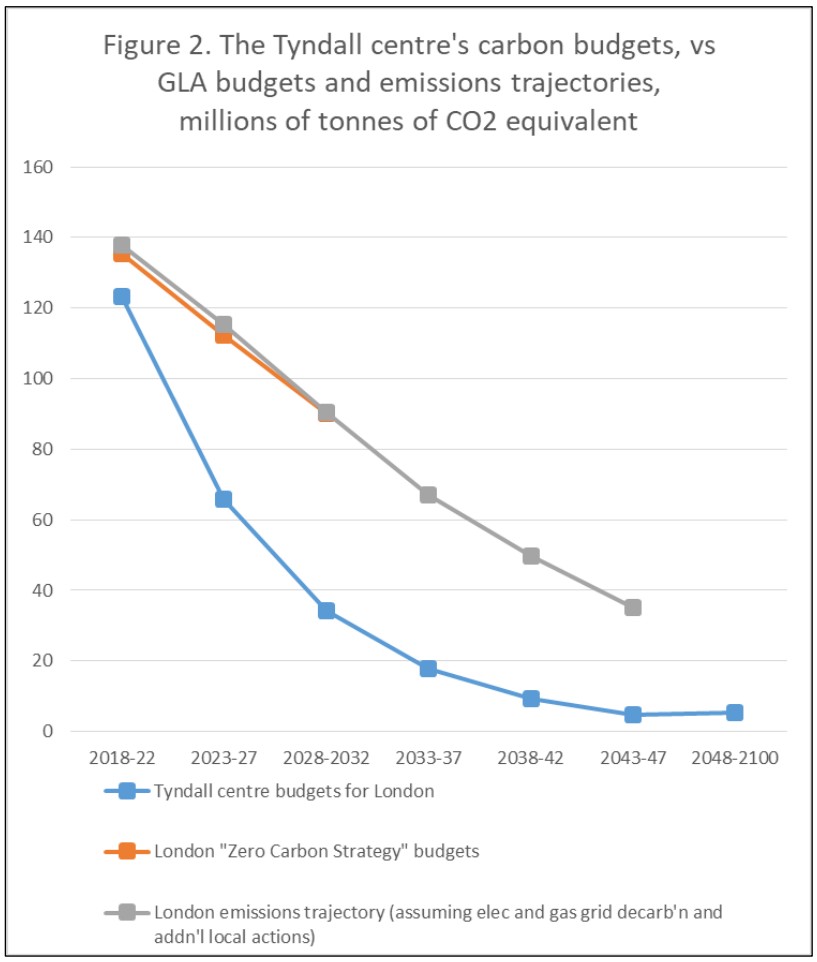
[37] Letter from Heidi Alexander to Victoria Rance (SSTC), 20 September 2019 (reference MGSL070819-9567)

[38] *Zero carbon London: a 1.5 deg compatible plan*, pp. 16-17; *London Environment Strategy*, pp. 207-208.

[39] The Tyndall Carbon Budget Tool for local authorities is at <https://carbonbudget.manchester.ac.uk/reports/>. For more background on the Tyndall global carbon budget, see <https://www.tyndall.ac.uk/ideas-and-insights/carbon-budgets>

significant part of the CCC's trajectories. The researchers specify that they regard their UK carbon budget as "at the upper end of the range" aligned with the Paris agreement's objectives.

The Tyndall Centre has defined carbon budgets for Greater London covering five-year periods, starting with 2018-22, which is associated with an emissions reduction rate of minus12.2% per year.[40] The gap between these budgets, and those used by the GLA, is shown in Figure 2.



Note. The GLA's emissions totals for five-year periods are based on the London Zero Carbon Pathway model (downloadable at https://data.london.gov.uk/dataset/london-s -zero-carbon-pathways-tool).

In their conclusions, the Tyndall Centre's researchers state that:

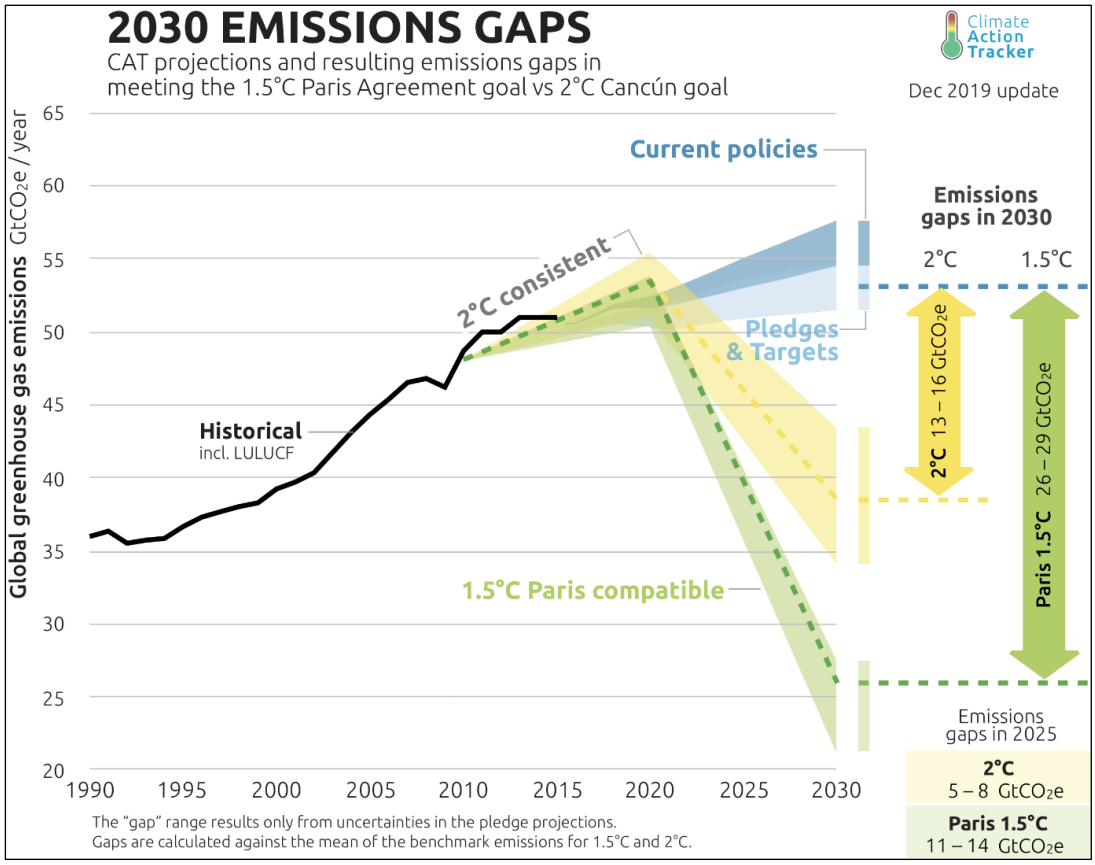
> [F]or Greater London to make its fair contribution to delivering the Paris agreement's commitment to staying "well below 2degC and pursuing 12.5degC" global temperature rise, then an immediate and rapid programme of decarbonisation is needed. *At 2017 CO2 emission levels, Greater London will exceed the recommended budget available within seven years from 2020*. To stay within the recommended carbon budget Greater

[40] J. Kuriakose et al, *Setting Climate Commitments for Greater London: quantifying the implications of the UN Paris Agreement for Greater London* (Manchester: Tyndall Centre, 2019). To access this document, go to <https://carbonbudget.manchester.ac.uk/reports/combined/>, click the tab "London", and select all the local authorities listed (which are the boroughs that make up Greater London). This will generate a copy of the document, including carbon budgets and commentary.

> London will, from 2020 onwards, need to achieve average mitigation rates of CO2 from energy of around minus 12.2% per year. This will require that Greater London rapidly transtions away from unabated fossil fuel use.

The importance of taking the Tyndall Centre research into consideration may be illustrated with reference to the gaps, at the global level, between (i) emissions trajectories directly related to the 1.5 degrees target, (ii) trajectories related to a 2 degrees target, and (iii) those correlated with the commitments made by national governments, including the UK's, at the Paris conference and subsequent international climate negotiations, which would lead to a 2.8 degree warming if unchanged. This is illustrated by the "emissions gaps" graph, published and regularly updated by Climate Action Tracker (Figure 3).

Figure 3.



Source: <https://climateactiontracker.org/global/cat-emissions-gaps/>

In July 2019, the GLA agreed, for the first and so far only time, to meet with representatives of the local campaign opposing the Silvertown tunnel. The gap between the Tyndall Centre's carbon budgets was explained in preparatory documentation and at the meeting itself.[41] Furthermore, the campaigners pointed to a major anomaly in TfL's operational assumptions and the GLA's emissions trajectories (let alone e.g. the Tyndall Centre's trajectories), as follows:

The GLA's Zero Carbon Pathways model projects that emissions from London's transport sector will fall from 8.22 million tonnes of CO2 equivalent (mtCO2e) in 2015 to 3.97 mtCO2e in 2036, a reduction of more than half. But the Silvertown tunnel environment

[41] SSTC memorandum "The case against Silvertown Tunnel", July 2019 (available from SSTC on request); author's notes of the meeting

statement projects that transport emissions in the area covered by the modelled regional network (smaller than the entire GLA area) will fall from 5.63 mtCO2e in 2012 to 5.16 mtCO2e in 2036 if the tunnel is not built, and 5.19 mtCO2e in 2036 if it is built – that is, a reduction of less than one tenth.[42] So while the GLA claims that its strategy will make it possible to reduce emissions from the transport sector by half, TfL is working, and presumably taking executive and investment decisions each day, on the basis that carbon emissions from transport will be reduced by less than one tenth.

In other words, not only do London's carbon budgets fall far short of what is needed to tackle global warming, but TfL's working assumptions fall far short of London's carbon budgets.

When the GLA, like parliament and many other local authorities, declared a climate emergency in 2019, it would have been logical to review climate policies overall; the institutional changes that they will require; and projects that will affect them, such as the Silvertown tunnel. In 2020, such a review is even more urgent.

[42] The Zero Carbon Pathways model is here: <https://data.london.gov.uk/dataset/london-s-zero-carbon-pathways-tool>. The *Silvertown Tunnel Environmental Statement* contains estimates of future emissions of Nitrogen oxides, particulate matter and Carbon Dioxide, in line with its assessment of the regional road network, in paragraphs 6.6.57 to 6.6.63, on pages 6-131 and 6-132. Table 6-25 on page 6-131 displays the estimates: the "reference case 2036" reflects a scenario in which the tunnel is not built; the "assessmed case 2036" reflects a scenario in which it is built. For this report, the figures have been rounded to two decimal places

4. The GLA's transport strategy falls far short of what is needed to stop dangerous global warming: the proposed Silvertown Tunnel is part of this larger problem

The Silvertown tunnel is presented in the Mayor's Transport Strategy as, principally, a public transport project. This is a gross exaggeration of the likely role public transport would play. Even TfL's optimistic projections suggest that, if the tunnel were to be built and all the planned bus routes to operate, the proportion of person trips in private vehicles would only fall to 73%, from the current 89% through the Blackwall tunnel, while the total traffic volume would rise.[43]

The larger problem, though, is that – while the Mayor's Transport Strategy includes measures to encourage modal shift away from cars towards walking and cycling – it is based on assumptions that cars and other motorised transport will remain the central, dominant feature of the transport system. The Strategy endeavours to reconcile this motor-transport-centred vision with decarbonisation, by making exaggerated claims for electric and hydrogen vehicles. The Covid-19 pandemic has created an opportunity to call a halt to this car-centred vision, in London and more broadly, that must not be missed.

This section will look first at the claim that the Silvertown project supports public transport, and then at the underlying problem with the persistent role of motor transport.

Public transport and the Silvertown tunnel

Leading GLA politicians have stated repeatedly that the Silvertown tunnel will make room for 37.5 buses per hour (7.5 via the Blackwall tunnel, 30 via the Silvertown tunnel) – estimated in the Case for the Scheme as "a five-fold increase over the current cross-river service". But the reality would probably be less impressive. The "dedicated bus lanes" to which some documents refer, would, according to TfL's planning, also be used by goods vehicles. The Development Consent Order, the legal framework for the tunnel project, requires only "provision of not less than 20 buses per hour *during peak periods* in each direction", *for the duration of the three-year initial monitoring period*.[44]

The danger is that, once the tunnel is built, relentless pressure from ever-expanding traffic will take up available road space before public transport providers deliver on their pledges.

This is exactly what has just happened with the new Queensferry Crossing across the River Forth north of Edinburgh. This bridge was opened in 2017 to replace the Forth Road Bridge. Scottish ministers had pledged that incremental journeys would be made by public transport. But in the year to October 2019, 27.73 million vehicles had crossed the bridge, compared to 26.68 million in the year to October 2018, and 26 million across the Forth Road Bridge in 2014. The director of Transport Scotland admitted at parliamentary hearings that the increase in private vehicle traffic was "not the direction we would want to go in". Transform Scotland, a transport policy campaign group, reported in January 2020 that, of 18 commitments made

[43] *The Mayor's Transport Strategy*, p. 236 and pp. 238-239; *Silvertown Tunnel Transport Assessment*, p. 239 and p. 288

[44] *Silvertown Tunnel: The Case for the Scheme* (London: TfL, 2016), pp. 149-150; Infrastructure Planning statutory instrument no. 574 (2018): The Silvertown Tunnel Order 2018, pp. 68-69

by Public Transport Scotland to ensure better quality public transport across the Forth, seven were incomplete and the status of five was unclear.[45]

At a minimum, the GLA could inquire into why public-transport-oriented policy with respect to the Queensferry Crossing has failed, and why the Queensferry Crossing project – in spite of intentions at political level that it should support public transport – did not do so sufficiently, and at the same time produced induced traffic.

Aims of the Mayor's Transport Strategy

The Mayor's Transport Strategy (henceforth, the Strategy), published in 2018, includes many proposals to move away from motor transport, and a headline policy aim that, by 2041, 80% of all trips should be made by foot, cycle or public transport, up from 63% at present. But the Strategy does not seek to remove cars and lorries from their dominant, central role in the city's transport system. Instead, it bases itself on scenarios that rely heavily on the substitution of petrol vehicles by electric and hydrogen vehicles – which are more carbon-intensive than often supposed, and have not yet been shown to work practically at large scale.

This motor-vehicle-centred transport policy forms the context for the Silvertown tunnel project. The Strategy's commitment to expand the road network – and thus make room for more traffic – does not stop at Silvertown; there is also a pledge to consider further road crossings across the Thames.

The Strategy states that, once the Silvertown tunnel, the government's proposed Lower Thames Crossing further east, and the extension of the Docklands Light Railway (DLR) to Thamesmead are complete, the Mayor would "give consideration to the case for further road crossings of the river in east London". Proposed crossings should be "consistent with the Mayor's overall vision for a healthy city", with "relevant environmental limits" and that "legal limits for air quality are met" – but no reference to global warming, the most serious environmental threat.[46]

The Strategy's view of future transport modes is a double-edged sword. On one hand, it commits to "addressing car dependency" and increasing the number of journeys made on foot, bicycles or public transport.[47] On the other, it says little about the potential for avoiding trips all together. The growth of home working and other changes during the Covid-19 lockdown should push this issue to the top of the policy agenda.

The Strategy projects that the number of car journeys will fall from 9.88 million in 2015 to 6.6 million in 2041 – a 33% reduction, but far from adequate in terms of the climate emergency. The expected reduction in traffic overall – i.e. the total number of vehicle-km per year – if the Strategy is successfully implemented, is estimated to be only 10-15% by 2041.[48]

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[45] "New bridge brings a million extra journeys", *The Scotsman*, 1 December 2019; "Transport chiefs admit unwanted Queensferry Crossing traffic increase", *Edinburgh Evening News*, 8 January 2020. For details of the commitments made, and not fulfilled, on public transport, see: Transform Scotland, *Queensferry Crossing Public Transport Strategy Briefing*, 6 January 2020, and Transform Scotland, *Forth Replacement Crossing Public Transport Strategy*, 30 January 2018.

[46] *Mayor's Transport Strategy*, p. 243

[47] *Mayor's Transport Strategy*, pp. 20-22 and 94-98

[48] *Mayor's Transport Strategy*, p. 22; author's extrapolation from Figure 2, *Mayor's Transport Strategy*, p. 21; Element Energy, *London's Climate Action Plan: WP3 Zero Carbon Energy Systems* (Cambridge: Element Energy, September 2018), p. 31

(This implies that the Strategy is based on models that assume there will be many fewer short car trips, but a gentler reduction in long car trips.)

The GLA's Zero Carbon London plan envisages that annual greenhouse gas emissions from the transport sector will fall from 8.22 mtCO2e in 2015 to 2.82 mtCo2e in 2041. If traffic volumes fall by 10-15%, that will account for 0.82-1.23 mtCO2e/year of this reduction, leaving a gap of 4.17-4.58 mtCO2e/year to be bridged by other means – within two decades, or sooner if the GLA was to revise its decarbonisation targets in line with the requirements of climate science.

Judging by the Mayor's Transport Strategy and the GLA's decarbonisation strategy documents, the GLA intends to make this saving by substituting petrol and diesel vehicles with electric and hydrogen vehicles. In these documents, the GLA risks further confusion by referring to electric and hydrogen vehicles as "zero emission vehicles". This could imply that they operate without greenhouse gas emissions. In reality, they generally have no exhaust-pipe emissions, but substantial life-cycle carbon footprints.

The decision to focus on these technologies – rather than policies with certain decarbonisation effects, including cheap and free public transport, support for cycling and walking, and the reduction of road space – is very high risk, from a decarbonisation point of view.

Firstly, the life-cycle carbon emissions of urban transport systems may not be reduced substantially by substituting petrol and diesel cars with electric cars. The emissions from road and parking-space construction is unchanged; the manufacturing emissions for electric cars are usually around one-and-a-half times higher. The larger problem, though, is that, if the car runs on electricity generated from fossil fuels, the greater efficiency of the electrical engine is largely cancelled out by the inherent inefficiency of fossil-fuelled power generation.

A recent comparative study showed that, although an electric car in Paraguay or Iceland (where electricity is almost entirely produced from hydro) might produce one third of a diesel car's emissions, in coal-heavy China and India, electric cars produce *more* carbon emissions than comparable petrol and diesel cars. That study, published in 2013, showed that electric cars in the UK – where the prime source of electricity is gas-fired power stations, although renewables' share of electricity generation is growing – are around one-eighth less carbon-intensive than diesel cars on a life-cycle basis. Another recent paper showed that plug-in hybrid vehicles, which currently account for three out of every four electric vehicles in the UK, perform little better carbon-wise than the most efficient diesel cars.[49]

The carbon performance of electric vehicles in the UK will improve to the extent that the electricity network is decarbonised. Electric cars can also make a vital contribution to reducing local air pollution, and have some features that will enhance future integrated urban energy systems, such as the contribution their batteries can make to energy storage.[50] Nonetheless, reducing the number of car journeys overall is a safer, easier and cheaper route to decarbonisation.

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[49] Lindsay Wilson, Shades of Green: electric cars' carbon emissions around the globe (London: Shrink That Footprint, 2013); P. Plotz et al, "Empirical fuel consumption and CO2 emissions of plug-in hybrid electric vehicles", *Journal of Industrial Ecology* 22: 4 (2017), pp. 773-784

[50] See, for example, R. Hanna et al, *Unlocking the Potential of Energy Systems Integration. An Energy Futures Lab Briefing Paper* (London: Imperial College, 2018) <https://www.imperial.ac.uk/news/185893/carbon-future-needs-integrated-energy-system/>

The technological problems surrounding hydrogen cars are greater still. In order for these to be diffused at a large scale, the problem of producing hydrogen at a reasonable cost has to be solved. There are two methods: electrolysing water, which at present is prohibitively expensive; or using chemical processes to extract the hydrogen from natural gas – which leaves the problem of where to store the waste carbon, a problem that hydrogen vehicle technology shares with carbon capture in industrial processes.[51]

Given the risk that electric and hydrogen vehicles may not yield the results in terms of decarbonisation often attributed to them, more direct and safer means of decarbonisation – avoiding journeys, and shifting to walking, cycling and cheap or free public transport – should be the policy priorities.

Aspirations vs actual policy decisions

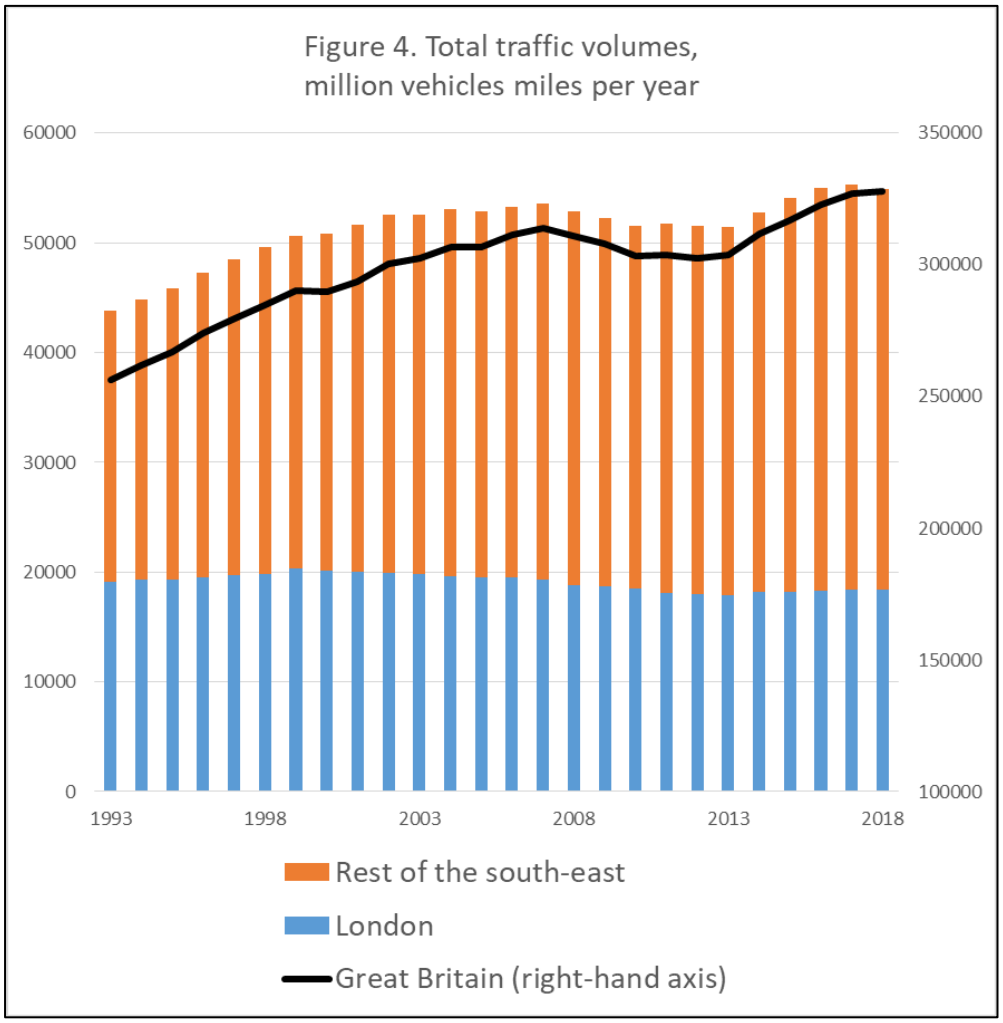
While the Mayor's Transport Strategy heralds decarbonisation, the GLA's practical steps reinforce the position of motor vehicle transport. The decision to build the Silvertown tunnel was effectively a decision not to put resources – financial, management and human – into the shift to other modes. The planned Westway cycle "superhighway" in west London has been abandoned and replaced with the far more modest cycle route between Acton and Wood Lane. The proposed construction of a pedestrian and cycle bridge between Rotherhithe and Canary Wharf was dropped in 2019 because it "would cost more than we could afford right now", in TfL's words.[52]

The reason to halt the Silvertown tunnel project is not only to avoid the carbon emissions associated with it – although that would be reason enough – but also to bring about a deeper-going change in transport policy. A decision to stop the Silvertown tunnel could be followed by a moratorium on all road projects, to stay in place until substantial progress is made on decarbonisation.

The Covid-19 pandemic has produced an unprecedented opportunity to rethink transport policy in these bold terms (see Introduction, above). If this opportunity is not grasped, at both London and national level, the danger is that traffic, measured in vehicles-miles per year, will soon resume its inexorable rise, as it did after the hiatus caused by the 2008-09 financial crisis. In 2012-18, small gains made in reducing traffic in London were cancelled out by increases in traffic in the rest of the south-east, and nationally, as shown in Figure 4. Such a renaissance of car-centred transport must not now be repeated.

[51] A standard introduction to the technological issues is: R. Heinberg and D. Fridley, *Our Renewable Future: laying the path for one hundred percent clean energy* (Washington: Post Carbon Institute, 2016), pp. 81-94 on transport, including pp. 89-90 on hydrogen.

[52] <https://tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/rotherhithe-canary-wharf-crossing>,<https://www.standard.co.uk/news/london/plans-for-a-westway-flyover-cycle-superhighway-axed-by-sadiq-khan-a3604561.html>, <https://tfl-newsroom.prgloo.com/news/tfl-press-release-construction-of-new-cycle-route-between-acton-and-wood-lane-set-to-start-next-month-1>



Source: Department of Transport statistics (www.gov.uk/government/organisations/department-for-transport/series/road-traffic-statistics)

5. The tunnel, like most major road projects, would increase, not reduce, social inequalities

Supporters of the Silvertown tunnel project claim that it would reduce social inequalities. In fact, since – like any major road project – it would subsidise commercial and private vehicles at the expense of society as a whole, it would do the opposite. This danger will be increased during the economic recession that has been triggered by the Covid-19 pandemic.

Greenwich Labour councillor Matthew Morrow, a supporter of the tunnel project, has argued:

> People who go to work on our road networks earn on average less than those who go by train. [...] Many of the people who tell me they oppose Silvertown [Tunnel] seem to have good jobs that they reach by train and therefore simply don't value the improvements road users need.[53]

This claim about the income levels of people who travel by different modes would be difficult to prove. But there is no doubt about the overall relationship between income and car ownership: the higher people's income level, the more likely that they will own a car, and the more likely they will own two or more cars. The correlation applies throughout all ten income groups surveyed by the government, as Figure 5 shows. Any road or parking space construction effectively transfers wealth away from households that have no car, which are concentrated in lower income groups, towards car owners concentrated in higher income groups.

Figure 5. Percentage of UK households with cars, by income group

	One car/van, %	Two cars/ vans, %	Three or more cars/vans	All with cars/ vans, %
All households	43	27	8	78
Gross income decile group				
Lowest ten per cent	33	2	0	35
Second decile group	47	6	0	54
Third decile group	58	12	0	71
Fourth decile group	58	19	2	80
Fifth decile group	58	21	4	83
Sixth decile group	51	30	4	85
Seventh decile group	42	43	6	91
Eighth decile group	33	48	13	94
Ninth decile group	27	47	19	94
Highest ten per cent	24	43	26	93

Source: Office for National Statistics, Table A47. Covers the UK in financial year ending 2018

[53] 853: public interest journalism for Greenwich and SE London, "Stop backing Silvertown tunnel, Greenwich Labour members tell council", 31 July 2019. Councillor Morrow also stated the case for the tunnel in similar terms at a public meeting on the tunnel in July 2019, organised by Speak Out Woolwich

National statistics are of limited value in explaining class and income differences in London, whose population differs markedly from the country as a whole. But not that markedly, as a recent survey of transport users by TfL showed. The Classification of Londoners survey grouped the city's households in to nine categories, to try to ascertain their transport habits. A summary of the results are shown in Figure 6.

Figure 6. TfL's Transport Classification of Londoners

	Share of London population, %	Annual average household income	No car	One car	Two or more cars	
City living	7%	62,000	47%	45%	8%	High incomes; high PT esp tube/active travel; average level of change
Detached retirement	21%	55,700	19%	53%	29%	"Empty nest"/retired; very high car; very low low levels of change
Educational advantage	6%	45,400	74%	24%	1%	Well educated, high income; high PT/active, low car; higher level of change
Students & graduates	13%	43,200	58%	36%	6%	Students & young grads; low car, high bus/walk; avg level of change
Suburban moderation	19%	40,700	36%	47%	17%	Families with children; high car, some bus; avg level of change
Urban mobility	11%	39,500	57%	38%	5%	Young workers, good incomes; low car, high cycle/PT; above avg change
Affordable transitions	11%	39,500	57%	38%	5%	New jobs & families; low car, high bus, walk, cycle; highest level of change
Settled suburbia	9%	36,400	35%	47%	18%	Lower income families; high car; below avg level of change
Family challenge	7%	31,500	50%	41%	9%	Low income families; high bus, avg others; higher level of change

Source: TfL, Transport Classification of Londoners - Presenting the Segments <http://content.tfl.gov.uk/transport-classification-of-londoners-presenting-the-segments.pdf>

It is difficult to draw definitive conclusions from this interesting survey, but three issues stand out.

First: the lower-income groups with the highest levels of car ownership ("suburban moderation" and "settled suburbia") comprise families with children. Councillor Morrow's argument implies that the best way of serving these groups' transport needs is a £1.2 billion tunnel project to ease congestion for motorway users crossing the Thames. Surely their needs could be better served by many, many other policy choices.

Second: lower income groups with lower levels of car ownership and families ("affordable transitions" and "family challenge") probably include many households who simply can not afford to run a car and live in Greater London. If £1.2 billion were spent on public transport, cycling and walking provision, this would subsidise such groups at others' expense.

Third: while there are indeed higher income groups with low levels of car ownership, many of whom do not have young families ("educational advantage" and "students and graduates"), there is also a large group of better-off retired households, comprising more than one fifth of all households ("detached retirement"), who not only have a high level of car ownership, but include a US-style proportion of two-car households.

Different road projects support different types of drivers. If support for low-income car drivers was judged a priority, the Silvertown tunnel would not be the way to deliver it. As TfL has stated, it is business users – not low-income car drivers – who would benefit most from

the project. In answer to questions on the tunnel's socio-economic impact, during planning hearings, and summarising points set out in the scheme's Economic Assessment Report, a TfL representative stated:

> Commercial traffic is expected to receive significant net economic benefits from the Scheme. [...] These benefits are available to be reinvested by businesses, supporting economic growth. [...] [P]oor reliability at the Blackwall Tunnel is a serious disadvantage for businesses using the crossing, with 70% of Business Survey respondents stating that the unpredictability of journey times when crossing the River Thames at the Blackwall Tunnel is a disruption or constraint to the operation of their businesses.[54]

The Silvertown tunnel might be of some benefit to businesses, in that it would – temporarily, pending assertion of the induced traffic effect – ease congestion around the Blackwall tunnel and reduce journey times. This report has shown that this consideration is completely outweighed by the contribution that the project would make to London's greenhouse gas emissions and to London missing climate-science-based targets for emissions reduction. This section further shows that, like most major road projects, the tunnel would exacerbate social inequalities.

[54] TfL, *Silvertown Tunnel Development Consent Order Application: response to ExA's first written questions* (London: TfL, 2016). Answer to question SE.3, p. 19

6. The tunnel project undermines London's claims to be setting an example internationally on climate change, and encourages double standards

There is a striking disconnect between the GLA's claim to be taking global leadership in combating global warming, and its practical actions on the Silvertown tunnel project and other transport policies that reinforce a carbon-intensive, motor-vehicle-centred system. This disconnect is part of a broader trend for political leaders to claim in words that they are tackling climate change, while pursuing policies that do the opposite. Reviewing and reversing the decision on the Silvertown tunnel could help to reverse this trend globally, and find ways to bridge the gap between words and deeds.

The Mayor of London claims to be a leader on climate policy. In October 2019, when a group of city leaders declared a "global Green New Deal", he said:

> The stark reality is we are running out of time to stop the worst impacts of climate change. Cities around the world are united in our frustration over a lack of global government action and I am pleased to join my fellow mayors in calling for a Global Green New Deal. [...] We now need governments to match this ambition.[55]

Along with the Mayors of Paris and New York, the London Mayor has been active in developing the C40 Cities Climate Leadership Group, which – based on the sound recognition that most of the world's greenhouse gas emissions come from cities, rather than the countryside – has developed proposals for city decarbonisation.

On 7 May, the Mayors in the C40 Cities group issued a statement about their joint strategy in the light of the Covid-19 epidemic.[56] This strategy would be guided by principles, including that the recovery "should not be a return to 'business as usual'"; the recovery "must be guided by an adherence to public health and scientific expertise"; the recovery "must address issues of equity [...] laid bare by the impact of the crisis"; and the recovery must improve cities' resilience, and therefore "investments should be made to protect against future threats – including the climate crisis – and to support those people impacted by climate and health risks".

To go ahead with the Silvertown tunnel would clearly imply a return to "business as usual", and take no account of the changes in the economy, and in work and transport practices, triggered by the Covid-19 epidemic (section 7 below). To go ahead with the tunnel project would mean ignoring scientific expertise, both on induced traffic (section 2 above) and on climate change (section 3 above). And it would ignore issues of equity (section 5 above).

[55] C40 press release, "Mayors Announce Support For Global Green New Deal; Recognize Global Climate Emergency", October 2019 <https://www.c40.org/press_releases/global-gnd>

[56] "No return to business as usual: mayors pledge on Covid-19 economic recovery", C40 Cities web site, London, 7 May 2020

C40 has not assessed London's progress towards zero carbon

Leading London politicians, including Heidi Alexander, Deputy Mayor, and Len Duvall, Labour group leader in the London Assembly, have claimed that C40 Cities has assessed the GLA's climate policies and confirmed that they are in line with keeping global warming to 1.5C.

This is a poor public relations exercise that ignores climate science and distorts the significance of the C40 Cities research. In reality, C40 Cities have confirmed that London's policies conform with its own Climate Action Planning Framework (CAPF), a list of policy recommendations to city authorities on decarbonisation, drawn up in 2018.

The recommendations feature a "contraction and convergence approach", that "assumes that, by a certain date, a city's per capita emissions will converge to be equal to emissions per capita for the rest of the world". C40 Cities employed the engineering consultancy Arup to assess the extent to which member cities' climate policies conformed with the CAPF.

Arup examined GLA policy documents and submitted to C40 a report, comprising a check-list showing that the GLA had met "essential criteria" conforming with the CAPF. Arup's three-sentence "final assessment" contains a basic arithmetical error, stating that GLA policy documents "detail how the GLA will deliver, partner and collaborate to achieve net zero emissions on 1990 levels by 2050". (Emissions become "net zero" depending on their aggregate level, not on any comparison with 1990.) The assessment was only made public in October 2019, after a Freedom of Information request by the author of this report.

It is unfortunate that London politicians have made use of C40 Cities to fend off criticism of the Silvertown Tunnel and the dangers it poses to climate policies. In doing so they have ignored work by climate scientists, and relied on policy analysis by Arup, which did not and could not explain the possible outcome of policies in terms of the 1.5C target.

Note. Deputy Mayor Alexander referred to C40's assessment of London's 1.5C policies in correspondence with the Stop the Silvertown Tunnel coalition, see section 3 above. Councillor Duvall claimed in February this year that a letter from Mark Watts of C40 Cities to Mayor Sadiq Khan showed that "London's 1.5C trajectory takes the Silvertown Tunnel into consideration" and that both the trajectory and the tunnel were therefore compatible with 1.5C goals. <https://twitter.com/len_duvall/status/1233085320859656192?s=21>

Note. C40 Cities Climate Leadership Group, London 'Paris-compatible' Climate Action Plan: Final Climate Action Plan Assessment (London: Ove Arup and Partners, 2018), p. 1. See "Related documents" on the "London Environment Strategy" page of the GLA web site. <https://www.london.gov.uk/what-we-do/environment/london-environment-strategy>

7. While the climate emergency requires that the tunnel project be cancelled, a key assumption on which the case in favour of it rests – that traffic demand will increase – is now in doubt

The assumption that the volume of traffic in east London, and elsewhere, will continue to rise, runs through all the arguments by the GLA and TfL in support of the tunnel project. The Case for the Scheme states at the outset that "further substantial growth in population and employment" is expected in London in the next 15 years.

> Despite huge increases in the availability and use of public transport, traffic at the Blackwall Tunnel has grown steadily over the last 20 years. [Investment in public transport and sustainable mode share continues.] However, the scale of growth forecast in east London means that the trend of increasing traffic will continue.[57]

But the Covid-19 pandemic has brought about the biggest change in transport use in a generation (see Introduction, above). From organisations as diverse as the Committee on Climate Change and the AA, forecasts are being made of a permanent reduction in traffic demand.

The danger for the GLA is not only that the Silvertown Tunnel cuts across efforts to tackle dangerous climate change, but that the increase in traffic demand it is assumed to cater for may not take place. To go ahead without a re-assessment of the comparative risks is surely not an option.

[57] *Silvertown Tunnel: The Case for the Scheme*, p. 24

Conclusions

We recommend to the GLA and the Mayor of London:

■ The Silvertown tunnel project should be cancelled, and the financial, management and other resources freed up directed primarily to projects that support reducing the number of trips required, and modal shift;

■ Review and amend the modelling used for the London Environment Strategy, using a range of alternative tools, including the SCATTER tool developed by the Tyndall Centre for Climate Research;

■ Review the London Environment Strategy in the light of these models;

■ Review the Mayor's Transport Strategy with a view to redirecting resources towards reducing the number of trips and modal shift, rather than reliance on electric, hydrogen and hybrid vehicles to achieve decarbonisation.

To local communities, campaign groups and political parties:

■ Continue to campaign for the cancellation of the tunnel project, and for the re-direction of resources to policies that will effectively tackle global warming.

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■ This report is published by the Transport Action Network, Stop the Silvertown Tunnel Coalition, Speak Out Woolwich and Extinction Rebellion Greenwich

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■ These organisations and individuals support the conclusions of this report

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East London SERA/Labour's Environment Campaign

Eltham Enviros

Extinction Rebellion Newham

Extinction Rebellion Tower Hamlets

Greenwich & Bexley Trade Union Council

Mums for Lungs

National Education Union, Greenwich District

New Economics Foundation

Red Green Labour

South East London Labour for a Green New Deal

Unite the Union, Greenwich branch

Waltham Forest Labour for a Green New Deal

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Alan Haughton, Stop City Airport

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Jenny Jones (Baroness Jones of Moulsecoomb), Green Party, former London Assembly member

Professor Frank Kelly, Director, Environmental Research Group, Imperial College London

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John McDonnell MP (Labour, Hayes and Harlington)

Ivis Williams, Woolwich Common Ward

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John Whitelegg, Professor of Sustainable Transport, Liverpool John Moores University

Ivis Williams, Woolwich Common Ward

Christian Wolmar, writer and broadcaster on transport, shortlisted as Labour candidate for London mayoral election 2016

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