GREATER**LONDON**AUTHORITY

[redacted]
(By email)

Our ref: MGLA150520-1875

Date:

Dear [redacted]

Thank you for your correspondence dated 15 May 2020 to the Mayor regarding our plans for electric vehicles in London. I am responding to your requests. Please accept my apologies for the delay in responding.

I have answered each of your points in turn, below.

1: Could you please identify the amount of money TfL has spent and plans to spend on roadside and other EV charging points.

TfL aims to install 300 rapid charge points by the end of 2020. The value of work done as of the first quarter, April 2020, is £14,113,041. The estimated final cost is £17,244,025. This is all externally funded through the Department for Transport and the Office for Low Emission Vehicles.

2: How much congestion charge has been avoided by not charging electric vehicles.

The estimation of income avoided for the volumes of vehicles settled against the Cleaner Vehicle Discount for the year between Feb 19 and Feb 20 is £7.6m. This income includes enforcement income estimates net of a bad debt provision. The debt is incurred from the penalty charges that are not yet paid. As funds are still being collected (i.e. from debtors) many months after issuing the penalty charge notices, we cannot say exactly how much of that income generated until up to two years afterwards. TfL accounts this as an operating cost rather than a reduction to reported income. The gross income avoided is £9.9m.

3: How much on average each roadside EV charging point costs.

Slower charging residential charge points are considerably lower in cost than rapid charge points. In Table 4 of our Electric Vehicle Infrastructure Delivery Plan[1], we noted the approximate cost of £4,000 - £6,000 for a fast charger (up to 22kw) and as low as £1,000 for a slow, lamppost charger. TfL deploys rapid charge points which are approximately £50,000 to install. Again, these are funded externally via the Department for Transport and the Office for Low Emission Vehicles.

[1] http://lruc.content.tfl.gov.uk/london-electric-vehicle-infrastructure-taskforce-delivery-plan.pdf

4: How much CO2 does TFL London think it has saved by using electric vehicles. Note electric vehicles require incremental electricity consumption and therefore the additional electricity typically comes from either gas or coal (fossil fuel) power generation and thus EVs have little or no benefit versus a modern gasoline or diesel car in terms of CO2 pollution.

London has 34,000 electric vehicles, 3,500 zero emission capable taxis and Europe's largest electric bus fleet. However, electric vehicles still make up a small percentage of London's vehicles (battery electric vehicles make up ~0.4%; plug in hybrids make up ~0.75%; non plug in hybrids make up ~4%). Transport for London are yet to undertake analysis of the CO_2 savings delivered solely by electric vehicles.

Switching to electric vehicles delivers substantial CO_2 emissions savings. A recent study concluded that a battery electric car over its lifetime produces 50% less CO2 emissions than an average car today.[2]

There are multiple studies that investigate lifecycle emissions of electric vehicles. For example, *Understanding the life cycle GHG emissions for different vehicle types and powertrain technologies: Final Report for LowCVP* (1 August 2018). Ricardo report RD18-001581-2.

For passenger cars, recent original equipment manufacturer (OEM) life cycle analyses (LCA) studies cited in the Ricardo report suggest lifecycle CO_2e is approximately 20-40 tonnes, depending on vehicle segment and lifetime mileage. For example, comparing a Mercedes-Benz B180 diesel car (internal combustion engine) with a B-Class electric vehicle (battery electric vehicle) over the same vehicle lifetime (distance driven) of 100,000 miles, the life cycle CO_2e from the internal combustion engine is 29.8t and from the battery electric vehicle is 22.6t (25 percent reduction). The assumptions around grid carbon intensity is unknown; however, the UK has been on a downward trajectory for many years and is currently <200g/kWh. This is a reduction of 60% from 2010 (500g/kWh) and current forecasts suggests reaching <100g/kWh by the mid-late 2020s.

The same Ricardo report suggests that embodied carbon emissions from vehicle manufacturing (including all components and their supply chains), is approximately 20-25% of lifecycle emissions for internal combustion engine and circa 40-50% for battery electric vehicle. The in-use emissions of low-carbon electricity are what result in an overall lower lifecycle impact from battery electric vehicles. As grid carbon intensity reduces and battery recycling and re-use/ e-purposing systems are developed and scaled up, the in-use end-of-life carbon emissions from electric vehicles will further reduce.

Conversely, since an earlier Ricardo LCA report also for LowCVP ('**Preparing for a Lifecycle CO_2 Measure'**, 2011), emissions from battery electric vehicle manufacturing have reduced as battery manufacturing increases and becomes more efficient, and for internal combustion engine vehicles a combination of heavier vehicles such as SUVs and the increasingly complex technology to control exhaust pollutants, increases emissions. That report estimated an approximately 20% reduction in lifecycle carbon emissions (CO_2e) from a battery electric vehicle compared with a similarly-sized internal combustion engine – and that assumed a grid carbon intensity of 500g/kWh.

While there is an emissions impact from shipping battery packs from plants which may be based on different continents from where vehicle manufacturing takes place, this component is a relatively small contribution to overall whole-life emissions (Ricardo, 2011). Moreover, battery supply chains

[2] https://www.transportenvironment.org/what-we-do/electric-cars

are not only being scaled up significantly worldwide, but regional manufacturing is reducing the distance and time to transport them to the final assembly plants.

5: If only new modern cars Euro 6 and above specification were allowed in London how much would that dramatically cut particulate and NOX pollution. Compared to say 10% EVs and 90% the existing fleet. Note EVs are typically manufactured outside the UK and therefore require a tremendous import cost from countries like China that manufacture of the batteries, dramatically affecting the balance of payments and trade.

TfL has run a number of emission scenarios for the Mayor's Transport Strategy, and based on this, if all cars were Euro 6 or beyond (including hybrid and plug-in hybrid vehicles), we estimate that savings would be around 50% of NOx emissions and 10% of PM10 emissions. The much lower savings in PM10 is due to the facts that there would still be significant non- exhaust emissions. The savings if we had 10% of electric cars in the fleet is not a scenario that has been tested by TfL. Replacing 10% of the current fleet by EVs would lead to very different savings depending on which vehicles were replaced. The emissions reductions would depend on a number of factors including vehicle age, EV affordability and the impact of policy to target specific vehicles.

6: The annual amount of road fuel tax and VAT that is avoided by EVs and therefore is unavailable to support road infrastructure in London.

TfL does not receive fuel duty and therefore does not hold this data. Please submit this question to the Department of Transport here: https://forms.dft.gov.uk/contact-dft-and-agencies/

7: If TfL was so keen on reducing emissions why are the new electric taxis hybrids? Note inside the cabs they say there are zero emission, but this is not the case when using the gasoline engine range extender.

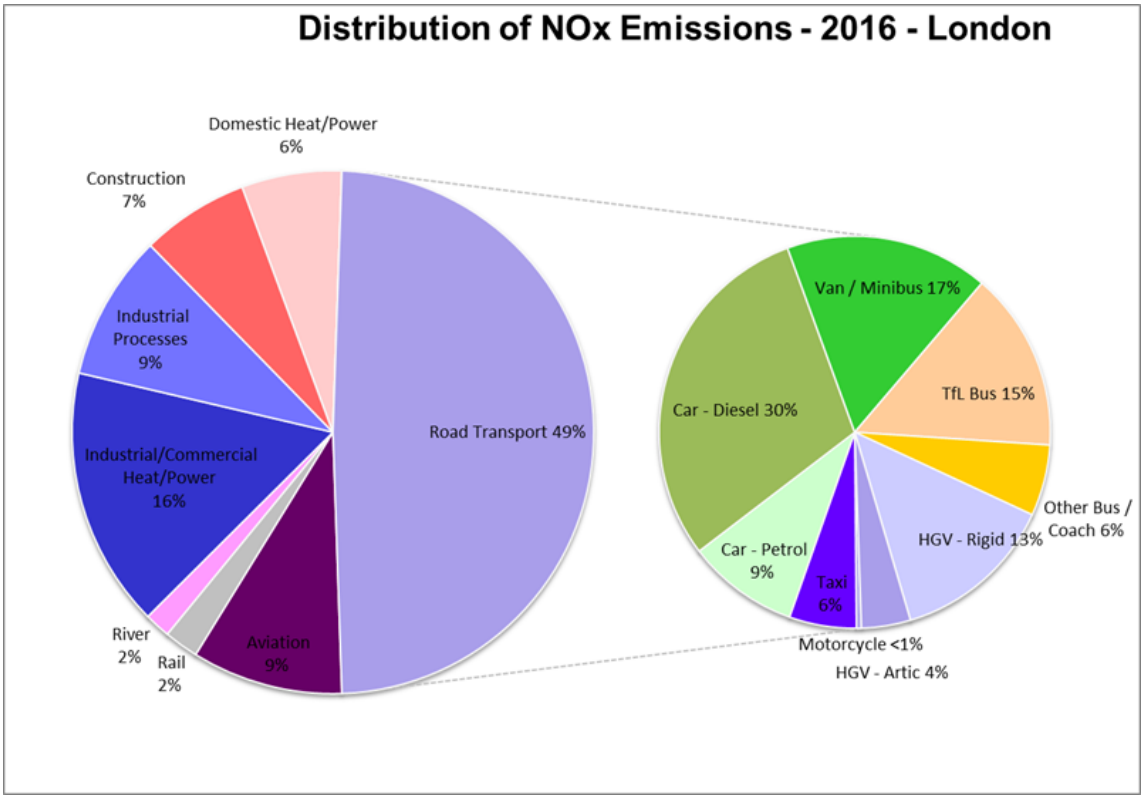
The new zero emission standards for taxis was introduced on 1 January 2018. At that time, there were no full zero emission models for taxi use. The LEVC TX vehicle can officially run on electric mode for 81 miles, which presents a much longer electric range than most hybrids. These vehicles are referred to as Zero Emission Capable (ZEC). There is currently only one fully zero emission taxi (launched at the end of 2019) which is the Nissan Dynamo Electric Taxi.

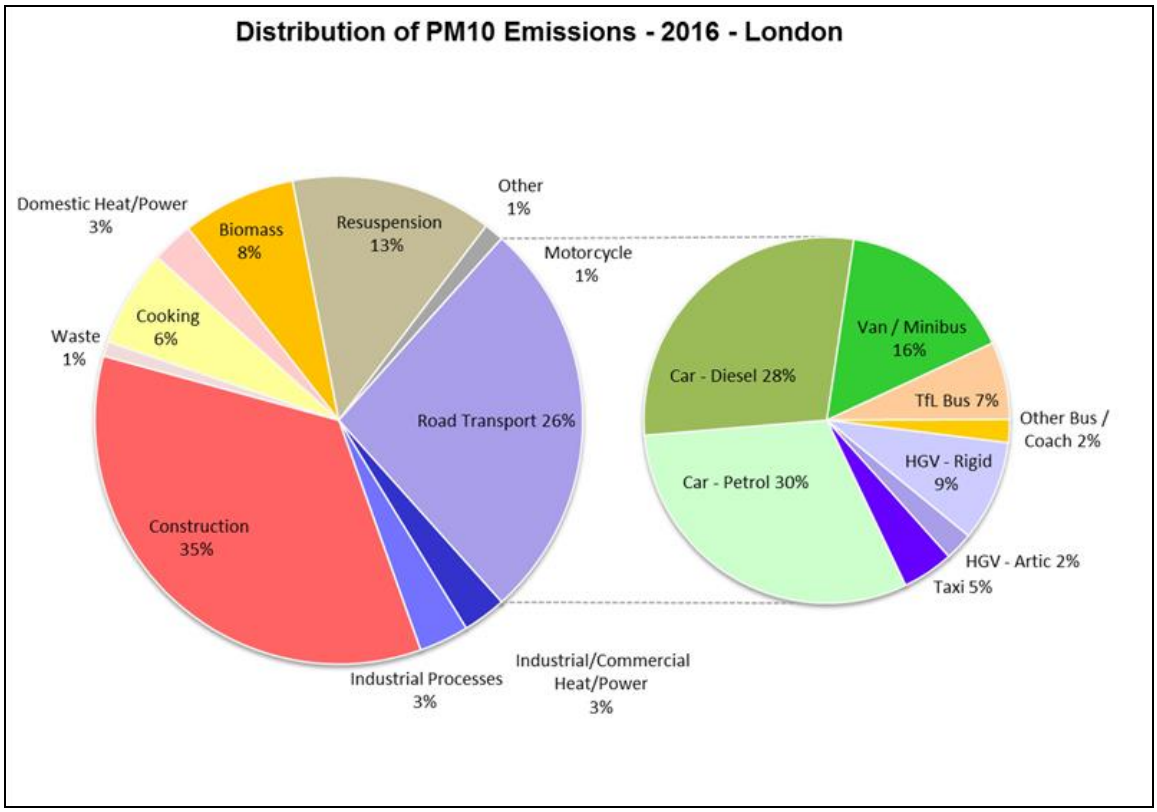
8: Compare the annual particulate and NOX emissions from transport in London versus emissions from domestic, commercial heating and industrial from gas, coal and oil.

The London Atmospheric Emissions Inventory (LAEI) is updated and published roughly every 2 years – and the latest version, the LAEI 2016 is available online at:
https://data.london.gov.uk/dataset/london-atmospheric-emissions-inventory--laei--2016

There is various data available, including emissions by borough, London Zone, and totals across London by source type (transport, industry, domestic, other) for a number of pollutants (including NOx and particulate matter). Data is available for download as Excel or GIS files.

The pie charts below show the proportion of emissions for NOx and PM10 across London for the base year 2016. These charts are not directly downloadable on the website, but I have created them using the published Excel files.





The following dashboards could be of particular interest and are available on the website https://data.london.gov.uk/download/london-atmospheric-emissions-inventory--laei--2016/df1bb6e9-f67c-49e3-976e-cb143e0ded4a/LAEI_2016_Emissions_Summary_Dashboard.zip

based on the same underlying data but with actual emissions in tonnes/year (not percentages), and also include bar charts with data from 2010, 2013 and 2016 to show the overall trend.

The LAEI will be updated this year with new data for 2019, but this won't be available before the end of the year.

9: compare the total cost of electric vehicles including additional power generation transmission distribution and charging points versus other methods of reducing particulate and NOX emissions.

TfL has not conducted these analyses.

If you have any further questions relating to this matter, please contact me, quoting the reference MGLA150520-1875.

Yours sincerely

[redacted]
Information Governance Officer

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