Europe's giant 'taxi' company: is Uber part of the problem or the solution?

Europe's giant 'taxi' company: is Uber part of the problem or the solution?

Summary

Uber has been expanding rapidly in Europe. New evidence suggests that Uber is adding extra vehicle trips to urban roads which are overwhelmingly diesel-powered. Data on the number of Private Hire Vehicle (PHV) licences delivered in at least two major EU cities - the legal category Uber drivers fall into in most European countries - shows that the availability of ride-hailing apps like Uber has been accompanied by a rapid increase in the number of PHV drivers.

Today taxi services account for between 10% and 20% of urban traffic in cities despite only representing a few percent of the number of vehicles[i]. Historically the number of taxis in European cities was limited due to the licensing system. But in only a few years, Uber has revolutionised the sector. It has attracted tens of thousands of *partner drivers* who offer passengers rides through the app in large urban areas. The data indicate most of these drivers are new drivers, meaning the stellar increase in Uber drivers has not been offset by a similar reduction in taxi licences. Based on available data Uber market entrance did not accelerate the reduction of car trips in London and Paris. For instance, recent PHV registration data from Paris and London point to an increase of about 10 000 and 25 000 licences respectively in the past five years. In parallel, since the arrival of Uber in London car trips and the number of taxi licences remained more or less stable. This indicates that the convenience of door-to-door, app-based trip booking makes travelling by (hired) cars in cities more and more popular, risking a reversal of a 15 year trend of reducing car trips in cities.

The uptake of ride-hailing services across EU cities also poses a risk to the fight against pollution and climate changing emissions. Based on PHV fleet composition in the country, T&E estimates that Uber operations in the urban areas of London, Paris, and Brussels combined contribute around 525 kt CO_2 per year - as much as a quarter of a million average cars[1], which runs counter the cities' ambitions to reduce their climate footprint. Worse, these extra kilometres have mostly been added by diesel cars. In France, 90% of private hire vehicles are diesel powered[ii] exacerbating air quality problems, as evidence has shown that internal combustion engines are sources of harmful pollution[iii]. Only in London, where it is mandatory, Uber is making an effort to shift to cleaner, electric-powered vehicles.

Uber recently went through its initial public offering (IPO) and valued at $49bn in October 2019.[iv] It is not currently profitable but investors expect Uber to grow rapidly and to become profitable by increasingly monopolising taxi and associated mobility services. In its initial public offering (IPO) documentation Uber announced it seeks in the near term to capture a market of 4.7 trillion miles globally, a 20% increase compared to its current market share. Of the six key markets it plans to expand it, three are European (Spain, Italy and Germany)[v].

If Uber continues its current business practice of adding more combustion engine cars and fossil-powered kilometres in our cities, it is an obstacle to the transition to green and sustainable cities in Europe. But Uber could also "do the right thing" as it promised in its IPO and choose to become part of

---

[1] The average car in the EU emits 1.8 t/CO_2 year. Car CO_2 Emissions from cars: the facts (2018). Page 15 Figure 10. Available:
https://www.transportenvironment.org/sites/te/files/publications/2018_04_CO2_emissions_cars_The_facts_report_final_0_0.pdf

the solution. This would require it to stop adding fossil-fuelled cars to city roads and to rapidly electrify its existing fleet. Given that hundreds of affordable plug-in models are coming to the market, and that there's an excellent business case for ultra-high mileage (60 000km/year) cars this is eminently feasible. In exchange cities should rapidly roll out dedicated fast charging infrastructure for Ubers and Taxis. But Uber should also genuinely start contributing to a reduction in car travel in cities, offering and promoting shared/pooled rides, sharing (real time) data and closely integrating its services into existing public transport networks rather than competing with them as it announced it would in its IPO.

1. Introduction

Since Uber began operating in Europe, it has been the centre of media attention and has raised a lot of questions and concerns about their business model and the social impacts of the company, including workers' rights. Less in the spotlight, the rapid growth of Uber and of transportation network companies (TNCs) more generally around the world, has also led to increased scrutiny about their impact on congestion and emissions. A mounting set of evidence that document the negative effects of Uber on emissions and congestion in the US is already available[vi]. However, similar data has so far lacked in a European context, which this briefing brings to light.

This briefing draws on the Uber experience in Europe so far - looking especially at the company's biggest markets Paris and London - to estimate the company's impact on kilometres driven and associated CO_2 emissions. Since Uber indicated that it intends to expand into several new and existing markets, notably in cities in Germany, Italy, and Spain, the paper provides insights on the potential impacts for other European cities in Uber's sight should they and their competitors significantly scale up there.

2. Regulation of taxi and private hire vehicles (PHVs) in EU Member States - an overview

To best assess the impact of Uber rides in European cities, it is important to understand the regulatory environment in which the company operates. While in the US - where regulations are less restrictive on TNC operations - the most popular way of taking an Uber is UberPoP, the company has suspended this service in many EU countries following a backlash with national regulators that often set higher social, vehicle, and operational standards. UberPoP allows private individuals to provide ride hailing services, without any specific licensing obligations.

Table 1 provides an overview of the different requirements that drivers working for services such as Uber must comply with, highlighting the fragmented situation across countries compared to other markets, such as the US.

Table 1: Details of PHV service restrictions in several EU countries[2]

Country (Region)	Restriction of service	Vehicle requirements
Belgium (Brussels)	Return to garage obligation	High end vehicles (min. price ~€30 000, min engine power)
Germany	Return to garage obligation, whereby vehicle has to come back to garage before starting a new trip. To avoid returning to garage, a new trip must be accepted during current trip.	Vehicles size requirements
Spain	1 PHV per 30 taxi ratio (enforcement can vary regionally)	Length, capacity, and age of vehicle
Italy	Return to garage obligation	
France	Return to garage obligation	Vehicle size and minimum engine power requirements

Uber's most common service in Europe is UberX, whereby enlisted drivers must be registered as licensed professionals. This legal obligation means that in Europe - despite steady growth - the supply of Uber drivers is more limited than in the US.

Transport Network Companies' (TNC) business models, or Uber-like services, in Europe are closest to the PHV category that exists in many in Member States' alongside the taxi category. TNC services are pre-booked door-to-door transport services, with flexible fares that are indicative at the time of booking. However, TNCs and PHVs also differ in particular with regards to the employment relationship between drivers and the PHV operator or TNC: as illustrated in the Figure 1, TNC drivers are considered as independent partners, whereas PHV drivers are mostly employed. In Europe, the so-called TNC partner drivers are often either self-employed, or employed by a PHV company working with the Uber app. In some cases such as in Torino, Italy[vii], or in Germany[viii], the Uber app can be used to match customers with traditional taxi drivers.

Taxi and PHV regulation confer specific privileges to each category. Taxis must typically have a dedicated taxi license (or medallion) to operate in a given city and can wait for customers at taxi stands or be hailed on the streets, a privilege that is not shared with PHVs. On the contrary, PHVs don't need a taxi license but must be booked in advance by the client – via the app in the case of Uber.

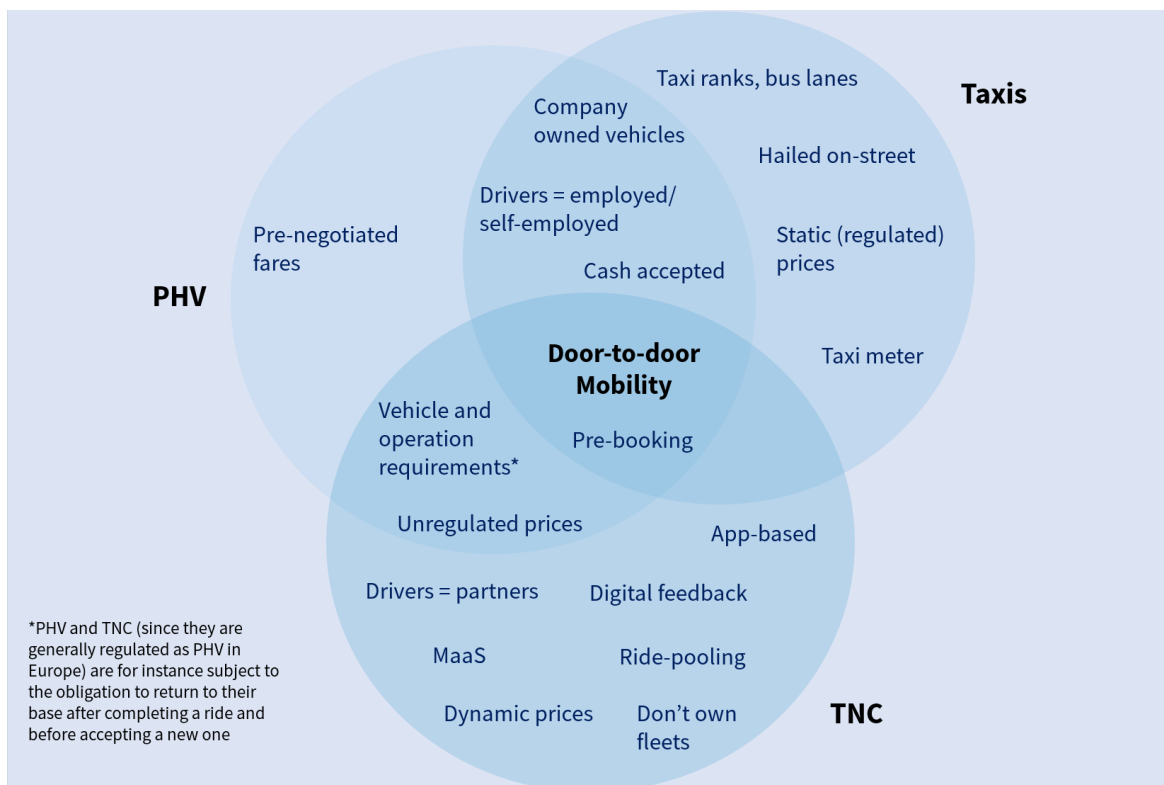
[2] See Appendices for sources.

Figure 1. Legal and operational differences between door-to-door mobility providers by passenger vehicles.

UberX is not the only door-to-door service available on the Uber app in Europe. Additional services include UberPool, enabling customers to share rides with strangers. This service is widely available in the US but less so in Europe, because of the national and local rules of operations (e.g. it is for the moment not available in Germany, the Netherlands, or Belgium). The complexity of regulations framing Uber's operations in Member States is illustrated by a recent court case in Germany. Despite a judgement by the Court of Cologne forbidding the use of UberX over infringement of the German passenger transportation act (Personenbeförderungsgesetz), the company is still providing its services in the country[ix].

Uber is not the only TNC app available in Europe, but its popularity in cities such as Paris and London indicates the company's overwhelming success. Based on a sample data for January 2019, the number of times different TNC apps were opened in Paris was used as a proxy to estimate the most popular ride hailing app. The survey showed that participants opened the Uber app more than 8 times the competitor apps such as Heetch, Bolt, or Kapten.[3] This should serve as a warning for what could happen to urban mobility systems if one TNC were to reach a near monopolistic position. There is a risk that users booking trips for all their mobility needs through one app would only access a curated mobility offer - so-called walled gardens - that don't necessarily reflect the most sustainable or cost-effective available option. Companies like Uber integrate many services in their app, ranging from personal mobility (JUMP) to food delivery (UberEats), which could exacerbate the 'walled garden' phenomenon.

---

[3] Survey of 25 000 people. Report on the results of the survey available:
https://www.journaldunet.com/economie/transport/1423222-vtc-qui-a-la-plus-grosse-audience-en-france/

3. EU evidence: Increase in number of PHV licences since Uber entered EU markets

T&E commissioned market research firm Euromonitor to compile evidence of taxi and PHV operators, including Uber, from publicly available information. One of the findings of this study, is that the available information is often fragmented and not available in general city or country wide traffic or taxi statistics. This seems to indicate that many European cities themselves cannot fully appreciate the impact of Uber and other new PHV services on their streets. The study indicates that Uber is a key player in all the markets analysed. London and Paris have significantly more available data on PHV operations. This section draws on data from these cities and reflects on the best available data found from other markets.

<u>Uber's impact on new licences</u>

In the largest EU markets for Uber - London and Paris - the number of PHV licences delivered since Uber has been operating over the past 7 years has significantly increased. The London case is illustrated in Figure 2 below:
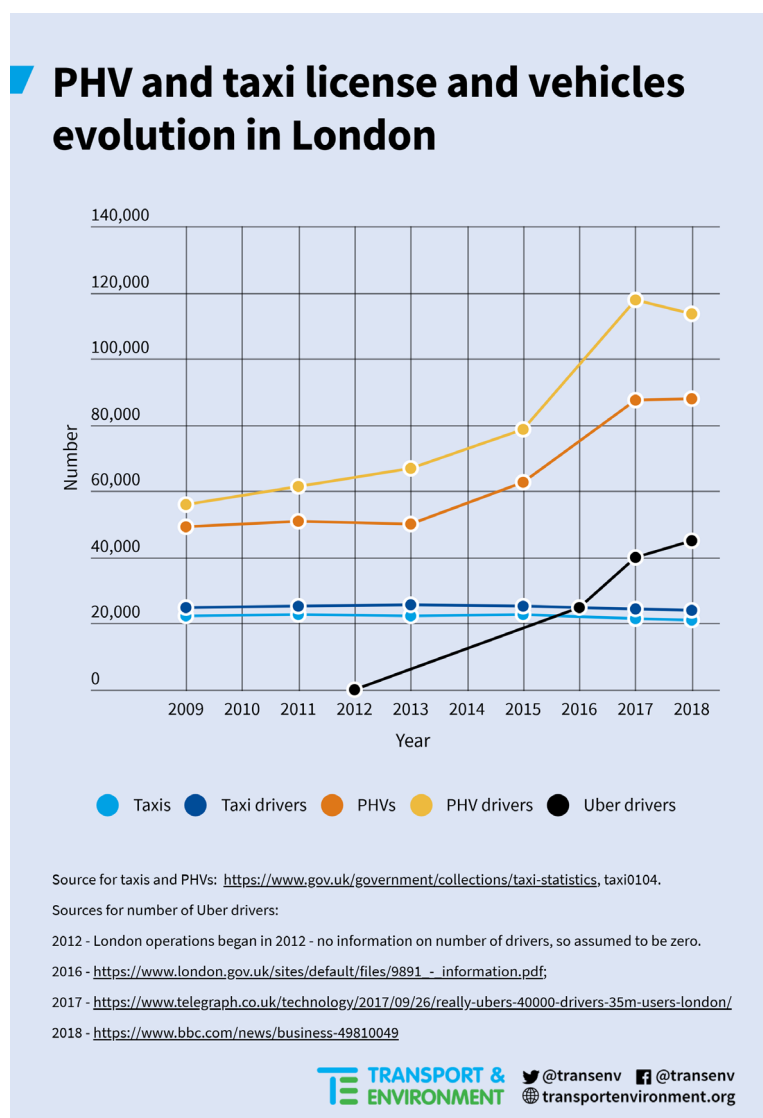

Figure 2: Evolution of the PHV and licences in London before and after the arrival of Uber

Despite the increase in the numbers of cars, the UK department of transport's data on PHV operators in London[x], including Uber, shows a recent decrease in the number of register private-hire vehicles operators (anyone who invites or accepts bookings for private hire vehicles, including 'booking agent' businesses which accept bookings

and then sub-contract them) from 3 200 in 2013 to 2 200 in 2019, hinting to a consolidation of the market. The case of London is a good proxy to track the growth of Uber. The total PHV vehicle licence volume almost doubled from 49 854 to 88 113 between 2013 and 2018. At the end of 2018, it was reported that Uber had 45 000 drivers in the British capital city[xi], roughly half the total PHV vehicle licence number, highlighting that the growth in the PHV market has been mostly the result of Uber operations and is not the result of one substituting the other.

The same evolution can be observed in the greater Paris region, where taxi licences have remained stable at around 17 000 between 2016 and 2018[xii]; in the meantime, the number of PHV licences nearly doubled from around 10 000 to close to 20 000. But the latter figure is disputed by the French taxi association, which speaks of around 40 000 PHV drivers in Paris only[xiii]. This illustrate the opacity regarding the actual number of PHV drivers working with the Uber app in Paris. In Table 3, we estimate that there are 20 000 Uber drivers in Paris, using the split oh PHV drivers between Paris and the rest of France, applied to the total reported number of Uber in January 2019. This in no way implies that all PHV drivers in Paris work with the Uber app.

The strong correlation between Uber's entry in the market and the rise in the PHV licence volume indicates that the vast majority of newly registered PHV drivers did so in order to work for Uber. In the meantime, taxi licences have remained more or less stable because their number is regulated, so there is no significant displacement from traditional taxi services to the new more disruptive TNCs, although in terms of trips, clients and revenue such a shift may well have occurred. Uber's rapid expansion (Figure 2) has made Uber one of the largest taxi-like services in London (3.5 million users reported in 2018[xiv]) and France (2.7 million users in 2017[xv]).

Similar findings hold true for other cities such as Brussels, where the number of partner drivers working with the app more than tripled between 2017 and 2019, from 500 to 1800 drivers[xvi]. Similarly, in the Netherland's Randstad region[4], the overall number of PHV licences increased from about 5 **800 to 8 000 between 2015 and 2018**[xvii]. In Madrid, which chose not to regulate the PHV sector as strictly as other Spanish cities like Barcelona[5], 1700 newly regulated PHV licences were delivered between January and September 2019, a 26% growth. Today's PHV market in Madrid is half the size (8 **264) of the taxi market (15** 630)[xviii].

In markets where TNCs struggle to operate due to various requirements limiting their operations (some cities in Germany, Italy and Spain for instance), Uber's growth has been more moderate compared to the London or Paris examples.

Uber's impact on car trips and urban mobility systems

Since the company's creation in 2009, Uber has repeatedly stated the company's objective to directly compete with car ownership[xix], reducing congestion in cities[xx]. Uber's vision consists of unbundling transport and vehicle ownership in order to offer an on-demand service, accessible to users only when needed. This is however in stark contrast with the reality of their operations in the US[xxi], and appears to be the case in the EU as well from the available data (as detailed herein). Car trips in Greater London and the greater Paris region have not decreased faster since the arrival of Uber and other TNCs or PHVs. The dominating trend in these two urban areas for the last 15-20 years has been a steady but slow decrease in car trips.

In London, the number of car trips went from 6.7 million per day in 2000 down to 5.8 million in 2019, due to a mix of attractive public transport offer and the introduction of the congestion charge[xxii]. The arrival of Uber in 2012 did not accelerate this trend, as car trips in 2012 had already been reduced to 5.9 million. In 2016, Transport for London (TfL) reported that about 18 000 Private Hire Vehicles entered the congestion zone every day[xxiii]. And similar TfL data show an increase in PHV and taxi trips between 2012 and 2017 of around 25%[6]. TfL suggests that

---

[4] Area encompassing cities between Amsterdam, The Hague, Rotterdam, and Utrecht.

[5] The Catalan government an obligation for rides to be delayed 15 minutes after being booked, which led Uber and Cabify to suspend their operations in August 2019.

[6] Travel in London report, 11, table 2.1, p.25: http://content.tfl.gov.uk/travel-in-london-report-11.pdf. TfL kindly provided higher resolution data on request for the number of taxi and PHV trips, however owing to the data sample sizes these data can only be indicative only.

the increase in total traffic flows in the London central cordon *has seen an increase of 5 per cent since 2012. This could be a result of an increase in private hire vehicles over this time period rather than private cars*[xxiv].

In the case of Paris, the traffic volume (measured in vehicle*km/h)[7] has been steadily decreasing since 2002[8], without a significant change in the trend from 2011[xxv], the year Uber was introduced in Paris[xxvi] (see Table 2). The average speed in the city has decreased more rapidly since 2011. A reduction in average speed is often used as a metric for congestion as it increases a given journey time (or delay), for example the TomTom Congestion Index[9], but it can also be the result of speed limit changes or a reduction in lanes. What is clear is that the average speed and thus journey time in Paris has certainly not been improving since the arrival of Uber and other PHV services.

Table 2: Traffic statistics in Paris[xxvii]

Traffic volume and average speed in Paris

Year	Traffic volume (veh*km/h)	Change in traffic volume per year	Average speed (km/h)	Change in average speed per year	Period of change
2002	1187		16.6		
2011	935	-2.4%	15.8	-0.5%	2002 - 2011
2017	781	-2.7%	14.1	-1.8%	2011 - 2017

Source: Le Bilan des Déplacements en 2017 à Paris (2017) L'Observatoire des déplacements à Paris. See p20.
Available: https://www.api-site.paris.fr/paris/public/2018%2F11%2FParis_ra2017_web.pdf

TRANSPORT & ENVIRONMENT @transenv @transenv
transportenvironment.org

---

[7] Speed multiplied by number of cars gives a measure of how many vehicles can pass through an area in a given time.

[8] Since 2001, Paris has been engaged in a long-term strategy to reduce emissions, including from traffic, through e.g. traffic restrictions, increasing bus lanes, cycling infrastructures, etc. See: https://www.paris.fr/pages/les-actions-de-la-ville-pour-une-meilleure-qualite-de-l-air-7103

[9] https://www.tomtom.com/en_gb/traffic-index/about/: "*The TomTom Traffic Index figures are based on speed measurements from TomTom's historical traffic database. These speed measurements are used to calculate travel times on individual road segments and entire networks.*"

4. Uber adds to traffic and emissions in cities

Unlike in the US no comprehensive studies into the mobility and traffic impacts of Uber have been undertaken in Europe. However the limited available evidence suggests suggest these findings are confirming that EU cities face similar challenges to US ones, such as New-York[xxviii], San Francisco[xxix], Boston[xxx], and Chicago[xxxi], where Uber and Lyft have been shown to exacerbate congestion. Indeed, the market entry of Uber in London has coincided with an increase in PHV licences, while at the same time taxi licences and car trips remained comparatively stable. In other words, this correlation suggests that contrary to TNCs' narrative, ride hailing companies are currently generating additional car trips to city centres, where public policy has been trying for years to limit their number and contain their impact. Coupled with the above quantitative assessment of the increase in PHV licences, a qualitative analysis presented below allows to estimate the impact of surging number of private hire drivers on CO_2 emissions. This necessitates a number of assumptions as explained below.

Taxi and PHV **fleet renewal rates** are higher than for the average private vehicle fleet, because of higher mileage and minimum vehicle requirements imposed by national or local regulations. This directly impacts the age of vehicles used for this type of services, which differs significantly depending on countries and cities but tend to be newer than the private fleet. For instance in London, taxis should not be older than 15 years[xxxii], and their estimated average age is 7 years[10]. In France, the average age of taxis is 3.7 years (2.6 for Paris), while private hire vehicles are usually 3.4 years old[xxxiii].

Most PHVs in London are 4 years old or younger (53%)[xxxiv]. This compares to 7 years for traditional taxi companies, and 8.8 years[xxxv] for the private car fleet. Looking at the most popular vehicles used by PHV drivers, it appears that almost one third of them are driving hybrid models such as the Toyota Prius (by far the most popular model)[xxxvi]. Data collected by TfL in 2018 reveal that almost half of the Priuses are 5 years or older (45%)[xxxvii].

In terms of **powertrain** composition, in Paris, and France more generally, the PHV fleet is mostly comprised of diesel vehicles. Government data indicate that on 31 December 2017, the French PHV fleet composition was 90% diesel vehicles[xxxviii]. This is an issue in particular because of diesel's high pollutant emissions in real-world conditions. Real-world data on pollutant emissions collected in London by the TRUE initiative show Euro 5 and Euro 6 diesel cars' nitrogen oxide (NOx) emissions are 6 times higher than the standard[xxxix].

In several cities across Europe, including London and Paris, Uber has introduced its 'Uber Green' service, where users can choose to ride an EV instead of a conventional vehicle. Unfortunately, the number of EVs available via these services remains low, meaning longer waiting time for users and thus a less attractive service overall. Services like Uber Green are certainly a step in the right direction, but the experience also shows that ramping up EV offer among PHV and taxi companies in coming years is key to zero emission service uptake. Only this will allow the development of a competitive zero-emission door-to-door mobility offer.

PHV and taxi **mileage** is up to five times higher than the average private fleet. According to data published by the sector, an average taxi and PHV driver completes about 48 000 km a year in the UK, or around 120 miles (190 km) per day[xl]. This figure is low compared to other countries like France (58 000 km for PHVs and 69 000 km for taxis[xli]), the Netherlands (61 000 km[xlii]), and Belgium (31 250 km[11]).

Based on the above assumptions, Table 3 shows a summary of how much CO_2 Uber services in several countries have added to CO_2. We assume that for PHV drivers who share a vehicle, they are both driving the same average distance in a year. Likewise, the composition and individual mileage of the Uber fleet of vehicles is not known, so we assume (generously) that the Uber fleet of cars has emissions equivalent to the real world emissions of new vehicles sold in 2018 in the respective country[xliii]. In the case of London where one third of vehicles are reportedly

---

[10] Assuming an even distribution of vehicles by age.

[11] TML (2018) E-Taxi's - Eindrapport. See Figure 2 page 11. Taxis used as a proxy for PHV activity, although taxis can wait at taxi ranks. 50% of Brussels taxis complete 125 km/day; at 250 working days per year, yearly mileage approximated to be 31 250 km/year. Report available: https://www.bondbeterleefmilieu.be/sites/default/files/files/180522_e-taxis_eindrapport_finaal_tml_v4.pdf

Priuses, we have updated the emission factor accordingly[xliv]. Table 3 shows that the annual mileage of taxi and PHV services in London and Paris is 4 to 5 times more than the average EU motorist, who covers 12 000 km/year[xlv].

Table 3. Estimated CO2 emissions[xlvi] from Uber in London, Paris, and Brussels, based on respective country fleet average CO2 emissions

Estimated CO2 emissions from Uber

City	Estimated mileage [km/yr]	Number of drivers (year last available data)	Estimated emissions [kt CO2]
London	48 000	45 000 (2018)	335
Paris	58 000	20 000 (2019)	180
Brussels	31 250	1 800 (2019)	10
Total			525

TRANSPORT & ENVIRONMENT @transenv @transenv transportenvironment.org

UK wide statistics show that taxi and taxi like service emissions have increased from 2.77 Megatonnes CO_2 in 2012 to 3.42 Mt CO_2 in 2017, an increase of 23% or 655 kilotonnes CO_2.[xlvii] This evolution is contrary to the UK's climate target of -37% CO_2 from Effort Sharing Regulation targets[xlviii], which covers road transport, or indeed its long term target to reach zero emissions by 2050[xlix]. Figure 3 shows the evolution of taxi, PHV, and Uber drivers with the increase of CO_2 emissions from taxi and PHV services in the UK, which shows that the increase in PHV licenses is strongly correlated with more emissions from the sector, but there is no correlation with taxi licenses which flat-lined over this period. Over the same period of time, total car emissions in the UK decreased by 581 kt CO_2[l]; as taxi and PHV emissions are included in these UK wide figures, the reduction of emissions of cars is only half of what it could be had the increase of PHV emissions not taken place.
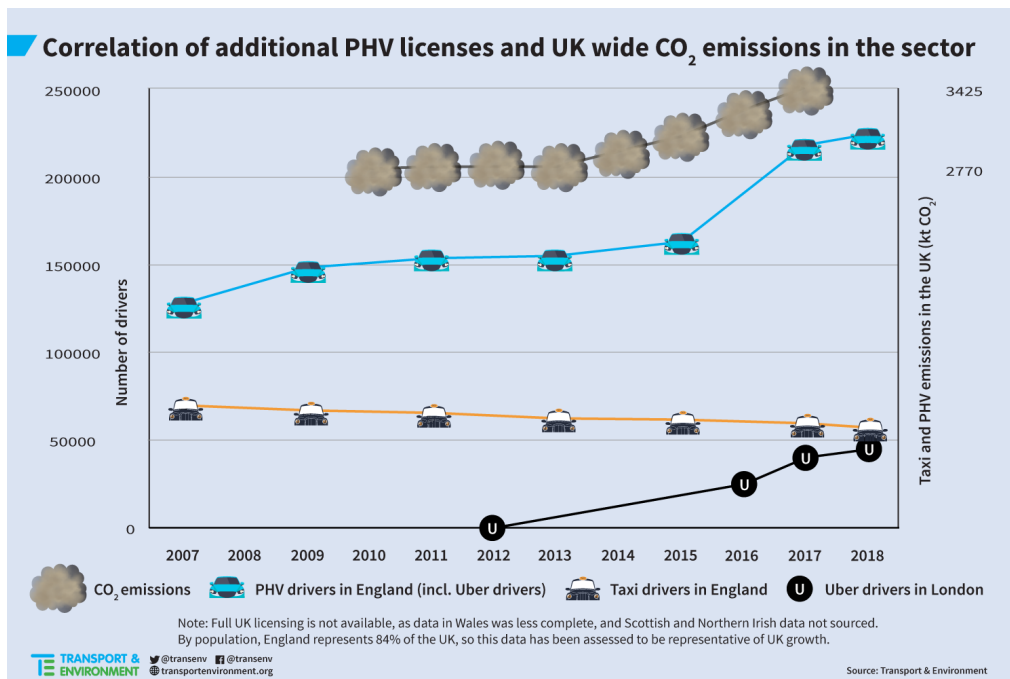

Correlation of additional PHV licenses and UK wide CO_2 emissions in the sector

Note: Full UK licensing is not available, as data in Wales was less complete, and Scottish and Northern Irish data not sourced. By population, England represents 84% of the UK, so this data has been assessed to be representative of UK growth.

TRANSPORT & ENVIRONMENT @transenv @transenv transportenvironment.org   Source: Transport & Environment

Figure 3: Evolution of taxi drivers, PHV drivers (England), and Uber drivers (London) compared to taxi and PHV CO2 emissions (UK)[li]

In addition to the CO_2 being emitted as a result of their operations, the impact of conventional vehicles in taxi and PHV fleets is putting a heavy burden on city air quality. The 2019 air quality in Europe report from the European Environmental Agency shows that the majority of member states in the EU still register NO_2 exceedances in cities, which are caused primarily by motor vehicle emissions.[lii]

T&E conducted measurements on taxi particulate number emissions in eight different cities and found that on average, across all samples, 4% of total diesel Euro 5-6 taxis recorded abnormally high concentrations of particulate emissions.[liii] This figure is unusually high when considering Euro 5-6 new cars have been fitted with mandatory diesel particulate filters (DPF) since the 2011 round of Euro 5 standards. This discrepancy between what should be expected of Euro 5-6 diesels and our sample results is likely due to these vehicles being driven with tampered or dysfunctional DPFs. According to Frank Kelly, professor of environmental health at King's College London, the removal of a DPF causes up to 20 times higher PN emissions than with an effectively operating filter.[liv] This means just 4% of cars with ineffective DPF increase fleet emissions by 75%. Moreover, data from the True initiative project shows London cabs' pollutant emissions are also substantially high: euro 5 London taxi NOx emissions are on average three times higher than those of other euro 5 diesel cars.[lv] This puts the health of taxi and PHV drivers themselves at risk, as studies show they are over-exposed to dangerous levels of air pollution, especially black carbon.[lvi]

This paper can only estimate the potential CO_2 impact of Uber operations since an accurate assessment of emissions induced by Uber and other TNCs is only possible if (anonymised) trip data collected by these services are more transparent and shared publicly. Likewise, knowing the number of drivers using TNC apps in specific cities, as well as the type of vehicles they drive and their mileage, would give a more granular picture of what their impacts on European cities are. However, a recent case in the UK shows that there is still a long way to go when it comes to sharing data: upon request to access his data - which the General Data Protection Regulation allows, a former Uber driver was only sent a limited data sample by the tech giant. He now has rallied more than 100 other drivers to jointly ask for access to data generated by their work.[lvii]

5. Ride hailing and taxi companies must go zero emissions by 2025 in large cities

Taxi services account for between 10% and 20% of urban traffic[lviii]. In London, taxi and PHV vehicles were responsible for 12% of traffic during working days[lix], despite making up only 4% of registered vehicles[lx]. The rapid increase in ride-hailing services such as Uber means that door-to-door services have a disproportionate impact on traffic, CO2 and air pollution emissions[12]. Taxis and PHVs are high mileage vehicles and compared to privately owned vehicles, tend to be newer, meaning they have a higher renewal rate.

For these reasons, **taxi and Uber-like services should rapidly transition their fleets to zero emission vehicles.** Electric vehicle models on the market have the required range and performance to undertake taxi and PHV services. Some best practices examples in the sector already exist, such as zero emission ride pooling company Clevershuttle[lxi], or ViaVan's commitment to convert all its locations to full electric fleets by 2025[lxii]. The observed increase in the number of private hire vehicles will jeopardize cities' and the EU's climate objectives if they are not electric. Currently, the EU 2030 CO_2 targets are being revised to be -50% to 55% reduction compared to 1990 emissions, as set out in president elect Van der Leyen's programme[lxiii].

European cities have great leverage to steer TNC toward electrification, as large urban areas constitute priority potential markets for door-to-door transport companies. For this reason, we expect that TNCs would be quick to adapt to new regulations in place as doing so will be a prerequisite to provide their services. The electrification of TNCs would lead to a race to the top between them and their competitors - the incumbent taxi industry in Europe.

---

[12] Inner and outer London private car registration total 2.66 million while taxis and PHVs number 108 000, or 4%. TfL states in Travel in London 9 report that they account for 12% of London traffic during the working day. https://data.london.gov.uk/dataset/licensed-vehicles-type-0 ; http://content.tfl.gov.uk/travel-in-london-report-9.pdf

This has been best illustrated with the case of London and the introduction of the ultra-low emission zone, to which Uber reacted by setting up a clean air fund helping their drivers to switch to zero-emission vehicles. This commitment is unique to London, where strong policy measures have led to this. A commitment to zero-emission makes perfect sense for TNCs in the EU, where there are an increasing number of low and zero emission zones[lxiv] coupled with some cities and member states announcing their intention to ban ICEs in the 2030s.

On the other hand, cities should enable zero emission pooling. Currently, collecting several passengers connected by an application is not allowed in many European cities. This means services such as UberPool can't be accessed, limiting load factor optimisation. Shared ride hailing has the potential to maximise vehicle utilisation by riders. US evidence indicates that in some cities 20% of rides are booked using UberPool[lxv]. Specific uptake data of the UberPool service in European countries in not available, but would be welcome to assess the propensity of Uber and other TNC users to share rides.

Many local governments already impose vehicle requirements for PHVs (see Table 1). Such requirements should be extended to environmental criteria, including **a mandatory obligation to provide up to 100% zero-emission operations in large cities by 2025**. On top of this, considering the total cost of operation, it makes economic sense for TNC drivers to switch to EVs earlier than the rest of the fleet. The ICCT[lxvi] estimates cost parity between EVs (assuming most of the charging occurs at home during the night) and hybrids by 2023. Research from fleet management company Leaseplan shows ZEV TCOs are better for medium car segments (typically C & D where many affordable EV models are being introduced such as VW ID.3) and particularly as mileage increases due to the lower energy cost[lxvii]. As a result, minimum vehicle size criteria for PHV that exist in some countries today should be lifted. In parallel, strategic partnerships between TNCs and car manufacturers on zero-emission vehicles would be mutually beneficial. Upfront costs of buying or leasing EVs would go down for drivers, whereas the carmakers would be able to use large fleets such as taxi or TNC services to sell more ZEVs and reach their 2020/21 CO_2 targets more easily.

Requirements to electrify TNCs and taxi companies should be flanked with adequate public charging infrastructure roll out, with dedicated and privileged access for these services. As a priority, these charging points should be deployed at strategic locations such as train stations, hotels, and airports. But the backbone of everyday charging will remain slow home charging, as it offers more affordable rates than fast public charging. To this extent, the current national efforts to ramp up residential charging points will also help Uber drivers switch to EVs. Charging at home is the best solution for TNC drivers as they can choose to do this as off-peak hours and have enough range to complete their shift, which are less than 230 km a day on average[13]. In parallel, TNCs can also partner with charging point operators to speed up charging infrastructure roll out and better match their drivers' needs, as is already happening between Uber and EVGO in the US[lxviii].

Finally, to avoid the risk of monopoly by one app-based mobility provider, regulation needs to adapt to the reality of diverse and dynamic new mobility services and to ensure access to open data and exchange between public and private mobility providers. For TNCs, these data should include the number of trips, trip origin and destination, time and duration of trips, trip distance, the number of vehicles available in the service, the number of drivers available in the service, and the number of users.

Conclusions and recommendations

Transportation network companies have a great value proposition of slashing private car ownership and arguably lead to a genuine improvement of the incumbent taxi service in many cities. But as this paper shows, there is a gap between vision and reality. The real-world data suggests that today Uber-like services bring more emissions and congestion, and an incentive for people who did not use cars before to do so. While cities like London and Paris have been pursuing the objective over the past 15 years of reducing car trips, the arrival of Uber and the increase in the number of taxi-like PHV services have done little to reduce car activity in cities and the uptake of Uber licenses coupled with the requirements for relatively new high mileage cars suggests that additional car trips

---

[13] Calculation based on average annual mileage of PHV operations in Paris (see Table 3); with estimated number of working days 250.

have been added to the city streets where they operate. We estimate that only in three cities, the emissions of Uber services could be as high as half a megatonne of CO_2, equivalent to the emissions of a quarter of a million privately owned cars. In the UK, taxi and taxi-like services CO_2 emissions have grown 23% since 2012.

The arrival of TNCs in Europe has led to a *de facto* convergence across markets between similar door-to-door services that used to be regulated differently such as taxis and PHV. These services' legal definition should therefore be revamped to reflect market reality and give local authorities consistent regulatory powers.

Most importantly, TNCs, PHVs, and taxis should all be zero-emission by 2025 - i.e. use electric motors only - at the latest in large European cities. Vehicle and battery technology and the economics of door-to-door transportation services make a transition to zero-emission by 2025 realistic and commercially viable.

Ultimately, more transparency on trip data as well as the disclosure by TNCs of the exact number of drivers and type of vehicle driven is needed. Up-to-date (and where relevant real-time) data on new mobility services should be made available to public authorities, as a prerequisite for their operations. This is a crucial step towards better monitoring and management of TNC and new mobility services in general.

Further information

Yoann Le Petit
Clean Vehicles and New Mobility Officer
Transport & Environment
yoann.lepetit@transportenvironment.org
Tel: +32(0)2 851 02 08

Thomas Earl
Modelling and Data Analysis Manager
Transport & Environment
thomas.earl@transportenvironment.org

November 2019

Appendices

Sources on Table 1

Belgium	https://www.brusselslimo.be/vtc-tout-sur-la-reglementation-et-les-types-de-vehicules-utilises/
Brussels	https://mobilite-mobiliteit.brussels/sites/default/files/20070329_arrete_grbc_taxis_limos_maj20190404fr.pdf
Germany	https://www.welt.de/wirtschaft/gruenderszene/article186359938/Carsharing-So-hebeln-Mobility-Start-ups-die-deutschen-Gesetze-aus.html. In addition to the return to garage rule, trip requests can only be accepted at a place of business - so it is in theory not possible to jump into a car directly. This rule is often circumvented in practice. See: https://ngin-mobility.com/artikel/mobilitaet-gesetz/
Spain	https://techcrunch.com/2018/08/02/spanish-anti-uber-taxi-strike-ends-after-government-agrees-new-regulation/
Italy	https://it.businessinsider.com/uber-si-arrende-con-la-nuova-legge-sugli-ncc-meno-auto-e-tempi-dattesa-piu-lunghi-ci-spiace/

Sources and assumptions on Table 3

City	Estimated mileage [km/yr]	Number of drivers (year last available data)
London	London taxi driver mileage on assumed to be 120 miles per day. Assuming a 250 day working year, this is 48 000 km year, per driver. See: https://www.levc.com/tx-electric-taxi/	https://www.bbc.com/news/business-49810049
Paris	http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0088/Temis-0088166/23855.pdf	In 2019, there were 28 000 Uber drivers in France. https://www.capital.fr/entreprises-marches/uber-les-salaires-de-ses-chauffeurs-francais-reveles-1325098 Using PHV driver distribution as a proxy, there were 71.8% in Paris. From p16 table 3 of: http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0088/Temis-0088166/23855.pdf
Brussels	TML (2018) E-Taxi's - Eindrapport. See Figure 2 page 11. Taxis used as a proxy for PHV activity, although taxis can wait at taxi ranks. 50% of Brussels taxis complete 125 km/day; at 250 working days per year, yearly mileage approximated to be 31 250 km/year. Report available: https://www.bondbeterleefmilieu.be/sites/def	https://www.standaard.be/cnt/dmf20190902_04588146?articlehash=AC943C2E327D2CD98624D02AB51C800267CDFD3969C442EF413BBF1F047551EF220FCCD2A7D82B58963521B67CB8992CB80EB81D1B918B86EAD64F19EE73A1A4

	ault/files/files/180522_e-taxis_eindrapport_finaal_tml_v4.pdf	

For emissions data for each country, see Transport & Environment (2019) Mission Possible. Page 14, with real world factor of 39% added to NEDC value. Available: https://www.transportenvironment.org/publications/mission-possible-how-carmakers-can-reach-their-2021-co2-targets-and-avoid-fines

Endnotes

[i] https://www.iru.org/taxi

[ii] http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0088/Temis-0088166/23855.pdf

[iii] https://www.transportenvironment.org/publications/cars-engines-can-they-ever-be-clean

[iv] https://www.cnbc.com/2019/10/01/uber-closes-at-record-low-worth-less-than-50-billion.html

[v] https://www.sec.gov/Archives/edgar/data/1543151/000119312519103850/d647752ds1.htm

[vi] See for instance New York, Boston, Chicago, and San Francisco, where Uber and Lyft have been shown to exacerbate pollution and congestion, respectively: https://www1.nyc.gov/assets/tlc/downloads/pdf/fhv_congestion_study_report.pdf http://www.mapc.org/wp-content/uploads/2019/07/Growing-Carbon-Footprint-of-Ride-hailing-in-MA.pdf https://www.chicago.gov/content/dam/city/depts/mayor/Press%20Room/Press%20Releases/2019/October/TNPCongestionReport.pdf https://advances.sciencemag.org/content/advances/5/5/eaau2670.full.pdf

[vii] https://torino.repubblica.it/cronaca/2018/11/26/news/uber_taxi_sbarca_in_in_italia_l_app_a_torino_entro_fine_anno_ma_i_tassisti_annunciano_gia_battaglia-212689643/

[viii] https://www.uber.com/de/newsroom/faqhamburg/

[ix] https://www1.wdr.de/nachrichten/rheinland/urteil-gegen-uber-in-deutschland-100.html

[x] TAXI0102 data set: https://www.gov.uk/government/organisations/department-for-transport/series/taxi-statistics

[xi] https://www.bbc.com/news/business-49810049

[xii] http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0088/Temis-0088166/23855.pdf

[xiii] https://www.francetvinfo.fr/france/greve-des-taxis/taxi-les-chauffeurs-ont-perdu-30-a-40-de-leur-chiffre-daffaire-avec-le-developpement-des-vtc-selon-la-chambre-syndicale_2039899.html&sa=D&ust=1571042178948000&usg=AFQjCNG5O7dV_qbHU6Q-Okfiwmiq_Qowkg

[xiv] https://www.businessofapps.com/data/uber-statistics/

[xv] http://www.leparisien.fr/economie/heetch-prend-un-nouveau-virage-03-03-2018-7588134.php

[xvi] https://www.tijd.be/ondernemen/transport/uber-ziet-aantal-gebruikers-in-brussel-verdubbelen/9952258.html ; https://www.standaard.be/cnt/dmf20190902_04588146?articlehash=AC943C2E327D2CD98624D02AB51C800267CDFD3969C442EF413BBF1F047551EF220FCCD2A7D82B58963521B67CB8992CB80EB81D1B918B86EAD64F19EE73A1A4

[xvii] https://www.cbs.nl/nl-nl/nieuws/2017/43/aantal-kleine-taxibedrijven-blijft-groeien ; https://www.ad.nl/binnenland/hoe-veilig-ben-je-als-vrouw-in-een-nederlandse-ubertaxi~aafafbb2/

[xviii] https://www.onlinemarketplaces.com/articles/29068-VTC-drivers-shoot-up-26-in-Madrid-and-fall-5-4-in-Barcelona

[xix] https://www.cnbc.com/video/2019/05/10/uber-ceo-says-that-ubers-competition-is-car-ownership.html

[xx] https://www.theguardian.com/technology/2015/sep/17/uber-well-ease-the-transition-to-self-driving-cars

[xxi] See footnote VI.

[xxii] https://consultations.tfl.gov.uk/policy/private-hire-charge-exemption/user_uploads/changes-to-congestion-charge-scheme-integrated-impact-assessment.pdf

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

[xxiv] Travel in London report, 11, p.139: http://content.tfl.gov.uk/travel-in-london-report-11.pdf

[xxv] Le Bilan des Déplacements en 2017 à Paris (2017) L'Observatoire des déplacements à Paris. See p20. Available: https://www.api-site.paris.fr/paris/public/2018%2F11%2FParis_ra2017_web.pdf

[xxvi] https://www.lemonde.fr/economie/article/2014/02/04/a-paris-uber-veut-changer-les-particuliers-en-taxis_4359694_3234.html

[xxvii] Le Bilan des Déplacements en 2017 à Paris (2017) L'Observatoire des déplacements à Paris. See p20. Available: https://www.api-site.paris.fr/paris/public/2018%2F11%2FParis_ra2017_web.pdf

xxviii https://www1.nyc.gov/assets/tlc/downloads/pdf/fhv_congestion_study_report.pdf

xxix https://advances.sciencemag.org/content/advances/5/5/eaau2670.full.pdf

xxx http://www.mapc.org/wp-content/uploads/2019/07/Growing-Carbon-Footprint-of-Ride-hailing-in-MA.pdf

xxxi

https://www.chicago.gov/content/dam/city/depts/mayor/Press%20Room/Press%20Releases/2019/October/TNPCongestio nReport.pdf

xxxii https://tfl.gov.uk/info-for/taxis-and-private-hire/emissions-standards-for-taxis

xxxiii http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0088/Temis-0088166/23855.pdf

xxxiv http://content.tfl.gov.uk/taxi-and-phv-fleet-with-age.pdf

xxxv See graph page 53: https://www.acea.be/uploads/publications/ACEA_Pocket_Guide_2019-2020.pdf

xxxvi http://content.tfl.gov.uk/taxi-and-phv-fleet-with-age.pdf

xxxvii http://content.tfl.gov.uk/taxi-and-phv-fleet-with-age.pdf

xxxviii http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0088/Temis-0088166/23855.pdf

xxxix https://www.trueinitiative.org/data/publications/remote-sensing-of-motor-vehicle-emissions-in-london

xl https://www.levc.com/tx-electric-taxi/

xli http://temis.documentation.developpement-durable.gouv.fr/docs/Temis/0088/Temis-0088166/23855.pdf

xlii https://www.knv.nl/wp-content/uploads/2019/06/Kerncijfers-taxi-en-zorgvervoer-2016-KNV.pdf

xliii Transport & Environment (2019) Mission Possible. Page 14, with real world factor of 39% added to NEDC value. Available: https://www.transportenvironment.org/publications/mission-possible-how-carmakers-can-reach-their-2021-co2-targets-and-avoid-fines

xliv According to www.spritmonitor.de, petrol powered non-plug-in Priuses average 5.13 l/100km.

xlv https://www.odyssee-mure.eu/publications/efficiency-by-sector/transport/distance-travelled-by-car.html

xlvi See Appendices for sources and assumptions

xlvii https://www.statista.com/statistics/486067/co2-emission-of-taxi-services-uk/

xlviii http://data.consilium.europa.eu/doc/document/ST-13224-2017-INIT/en/pdf, page 26

xlix https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law

l UK reporting of GHG inventories to the UNFCCC. https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2019

li Taxi and PHV licenses from TAXI0104 data set for England: https://www.gov.uk/government/organisations/department-for-transport/series/taxi-statistics. Sources for Uber drivers see sources in Figure 2. CO2 emissions for the taxi and PHV industry in the UK available at: https://www.statista.com/statistics/486067/co2-emission-of-taxi-services-uk/. Note that license data in Wales was less complete, and Scottish and Northern Irish data not sourced, thus information on full UK licensing is not available. By population, England represents 84% of the UK, so this data has been assessed to be representative.

lii https://www.umweltbundesamt.de/themen/neun-fragen-antworten-diesel

liii https://www.transportenvironment.org/sites/te/files/publications/2018_09_TE_Dieselgate_report_final.pdf

liv BBC News, 'Thousands' driving without crucial diesel filters, October 2017

lv https://www.trueinitiative.org/data/publications/remote-sensing-of-motor-vehicle-emissions-in-london

lvi https://airqualitynews.com/2019/10/01/taxi-drivers-face-highest-level-of-black-carbon-exposure/

lvii https://workerinfoexchange.org/

lviii https://www.iru.org/taxi

lix http://content.tfl.gov.uk/travel-in-london-report-9.pdf

lx In 2018, 2.66 million cars registered in inner and outer London. See: https://data.london.gov.uk/dataset/licensed-vehicles-type-0

lxi https://www.clevershuttle.de/en/

lxii https://www.electrive.com/2019/10/26/viavan-launches-fully-electric-fleet-in-milton-keynes/

lxiii https://ec.europa.eu/transport/sites/transport/files/themes/strategies/doc/2011_white_paper/white-paper-illustrated-brochure_en.pdf

lxiv https://www.transportenvironment.org/sites/te/files/publications/2019_09_Briefing_LEZ-ZEZ_final.pdf

lxv http://www.schallerconsult.com/rideservices/automobility.pdf

lxvi https://theicct.org/sites/default/files/publications/EV_ridehailing_policy_approaches_20190108.pdf

lxvii https://www.leaseplan.com/en-ix/global-fleet-insights/tco-ev/

lxviii https://www.electrive.com/2019/10/01/uber-evgo-partner-to-encourage-switch-to-electric-cars/