NYC Taxi & Limousine Commission

Charged Up!

TLC's Roadmap to Electrifying the For-Hire Transportation Sector in New York City

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Letter from the Chair

“Creating a better world starts with imagining it, then bravely taking concrete, perseverant steps forward.”

A decade ago, imagining a fully electric TLC fleet seemed far out of reach. In early 2012, only 441 electric vehicles (EVs) were registered across the five boroughs, not much more than one for every 19,000 residents. None of them were TLC-licensed vehicles. Today, nearly 17,000 NYC-registered EVs traverse the city’s roads, and one out of every hundred TLC vehicles is an EV. Now we can not only imagine a fully electric fleet, we are already building it. This report is the beginning of a roadmap, with a goal nothing short of electrifying the vast majority of TLC vehicles by the end of this decade.

Never has it been more important for our city and our nation to embrace EVs. According to the most recent data from the National Oceanic and Atmospheric Administration, October 2022 marked the 454th consecutive month with global temperatures above the 20th-century average. Greenhouse gas emissions are at an all-time high. Data from the United Nations and the World Meteorological Organization indicate that climate and weather-related disasters have increased five-fold over the last 50 years. Unless we reduce carbon emissions quickly and decisively, we and our children face a world of constant, catastrophic natural events with all the destabilizing social repercussions. If there is any world we don’t want to imagine, that’s up there at the top.

Creating a better world starts with imagining it, then bravely taking concrete, perseverant steps forward. At TLC, the future we are imagining and moving towards is exciting and real: one in which the world has come together to not only reverse humanity’s effect on global warming, but one where this agency has directly contributed to a more livable and enjoyable city. When you step out to hail a cab or a for-hire vehicle in 2030, the air you breathe will have the lowest levels of air pollution in the city’s recorded history. The streets will also be cleaner, safer, and quieter.

That future is latent in our past too. You’ll learn later in this report that the first EV in NYC was actually a taxi. I find incredible inspiration in that. The solution was there 125 years ago, waiting for us! We are embracing it with determination, optimism, and a firm vision.

David Do, Chair
New York City Taxi and Limousine Commission

Executive Summary

The New York City Taxi & Limousine Commission (TLC) is committed to transitioning the vast majority of its licensed fleet to electric vehicles (EVs) by 2030 as part of global and local efforts to address climate change and improve air quality.* **Charged Up!** is TLC's roadmap to support this movement, outlining ways to support TLC's EV drivers, incentivize more EVs, and support the for-hire industry's charging needs.

According to TLC estimates, TLC-licensed vehicles produced around 600,000 tons of CO2 in Fiscal Year 2022 while on-shift, representing roughly 4% of total emissions for New York City's transportation sector. EV adoption by TLC-licensed industries would have a profound impact on reducing New York City's greenhouse gas (GHG) emissions.

New York City's for-hire transportation landscape presents distinct challenges to electrification, with high daily mileage driven due to high trip volumes, drivers living in the outer boroughs and in environmental justice communities, as well as the various charging needs of industry stakeholders. Given these considerations, the report identifies policy levers and formulates the following recommendations to address three major barriers that currently impede the expansion of for-hire EVs:

Cost

TLC recommends exploring more robust financial incentives targeting the for-hire transportation sector, including tax deductions, grants and an EV driver pay standard. To address electric vehicle supply equipment (EVSE) construction costs, TLC recommends pursuing federal EVSE grants, exploring mechanisms to fund EVSE construction and the creation of a Charging Accelerator program that streamlines the process for TLC-licensees seeking to install charging equipment such as assisting with grant application, securing permits and providing technical assistance.

The upfront cost of an EV is a challenge for some TLC licensees due to fewer available models than internal combustion engine (ICE) vehicles and a limited used vehicle market. However, ICE to EV price parity may come within the next 2-6 years, and EVs offer lower maintenance costs, reduce fuel expenses, and have access to financial incentives. The cost of installing EV charging equipment is also a barrier for businesses and owner-drivers despite existing incentives such as the Con Edison PowerReady program.**

* The TLC intends to electrify the entirety of the high-volume sector, which represents approx. 80% of its current fleet, along with a significant portion of its taxi fleet by 2030.

** Owner-drivers are defined as TLC-licensed drivers who own and operate their own for-hire vehicles regardless of vehicle license type.

Charging Coverage

To provide TLC licensees with charging coverage reflective of industry needs, TLC recommends developing partnerships with key stakeholders and advocating for strategic placement of charging stations that minimize interruption to drivers' business hours.

Currently, there are limited publicly accessible fast charging stations near areas with high trip volumes, including in neighborhoods adjacent to the Manhattan core and at or near the city's airports. The neighborhoods where most owner-drivers live are also underserved by Level 2 chargers. This includes Eastern Queens, Southeast Brooklyn, and the Bronx. Drivers who live in New York City are less likely to have access to at-home charging, underscoring the importance of Level 2 chargers in these neighborhoods.

EV-Centric Regulations

To support electrification through regulations that target EVs, TLC recommends exploring GHG emission reduction standards for high-volume for-hire service companies (HVFHS),* adding limited numbers of all-electric vehicle licenses and expanding approved EV taxi models.

As a regulatory agency, TLC can create a favorable environment for EV adoption and broaden its rules to accommodate more EV models. This includes issuing new licenses for EVs to facilitate EV growth.** Other jurisdictions have already implemented GHG reduction standards for the for-hire industry that could serve as a model for New York City.

Targeted outreach and engagement are also important in supporting TLC licensees to navigate the dynamic EV market. Many TLC-licensed drivers remain apprehensive about electrification despite data showing no substantial difference in trips and earnings between EVs and ICE vehicles operating for hire in New York City.

Charged Up! envisions TLC's electrification as a collaborative effort, with its analysis informed by engagement with industry stakeholders and partner agencies, including the City Department of Transportation (DOT) and Department of Citywide Administrative Services (DCAS), Con Edison, New York Power Authority (NYPA), and the U.S. Department of Energy's Clean Cities Coalition, Empire Clean Cities (ECC). Implementing the recommendations in this plan will require TLC to continue close coordination with other organizations and industry members so that we can work towards a clean for-hire transportation sector powered by electric vehicles.

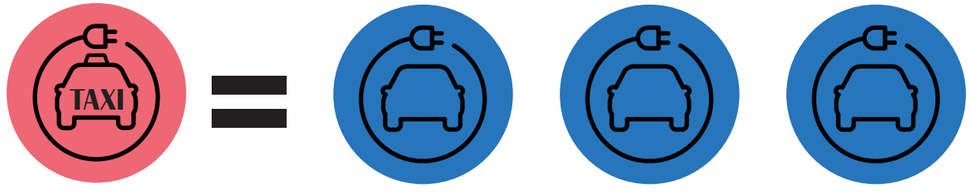
* High-volume for-hire service is a license category for TLC-licensed FHV bases that dispatch more than 10,000 trips per day. Currently, Uber and Lyft are in this category.

** In 2018, TLC paused the issuance of new for-hire vehicle licenses with an exemption for wheelchair accessible vehicles and for drivers in lease-to-own agreements. In October 2022, TLC lifted the for-hire vehicle license pause to allow 1,000 new licenses for EVs.

Why Electrification?

Before the advent of gasoline-powered vehicles, electric taxis were the norm in New York City.* Over a century later, TLC is committed to transitioning the vast majority of its licensed fleet to EVs by 2030. Electrification of the for-hire transportation sector reduces GHG emissions and curbs the impacts of climate change. In fiscal year 2022, TLC-licensed vehicles conducted approximately 250,700,000 trips that transported passengers across New York City and beyond.** Of these trips, ICE vehicles produced at least 600,000 metric tons of carbon dioxide, which represents about 3.75% of the total emissions of New York City's transportation sector.*** The transportation sector as a whole represents nearly 30% of New York City's total emissions.**** Due to their substantial road time and mileage, it is estimated that the emissions reduction impacts of electrifying one rideshare vehicle is akin to electrifying three personal vehicles.***** At such magnitude, widespread adoption to EVs from the for-hire transportation sector will greatly reduce GHG emissions and improve air quality for New Yorkers.******

"...it is estimated that the emissions reduction impacts of electrifying one rideshare vehicle is akin to electrifying three personal vehicles."



TLC's electrification goals align with a host of legislation and initiatives at the local, state, and federal levels aimed at reducing greenhouse gas emissions. At the state and city level, various plans and laws have been put forth, including "OneNYC 2050" plan published pursuant to Local Law 84 of 2013, and the New York State Community Leadership and Climate Protection Act.* In addition, in September of 2022, Governor Kathy Hochul announced that all new vehicles sold in New York State will need to be zero-emission by 2035.**

For TLC-licensed drivers, shifting to an EV brings long term financial benefits. The recent spike in gas prices increased driver expenses, reducing their take-home pay. Furthermore, as the auto industry increases production of EVs complemented by regulatory policies curbing the presence of ICE vehicles on the road, it is likely that a robust used EV market will develop, providing drivers with affordable vehicle options. The abundance of fiscal incentives combined with the anticipated growth of the used EV market creates an opportune time for EV adoption.

* "The Electric Taxi Company You Could Have Called in 1900", Madrigal A.

** Calculation includes the taxi, street hail livery (green cab), and for-hire vehicle sectors.

*** Total emissions for the New York City transportation sector were calculated based on a study from the Citizen's Budget Commission: TLC GHG emissions were calculated for all taxi, HVFHV and street-hail liveries by linking driver trip data to each vehicle's CO2 emissions based on vehicle type and MPG. Only emissions from trips conducted within NYC and while drivers were on-shift were accounted for.

**** See: "Curbside Level 2 Charging Project FAQ", NYC DOT

***** "Emissions Benefits of Electric Vehicles in Uber and Lyft Services", Jenn A.

****** Studies estimate that traffic pollution from ICE vehicles is responsible for 17% of emissions of fine particulate matter (PM2.5) in New York City, the leading urban air pollutant.

* The New York State Climate Leadership and Community Protection Act (CLCPA) has an overarching goal for NYS to reduce GHG emissions by 85% by 2040. New York City has also committed to reducing greenhouse gas emissions by 80 percent by 2050, reflected in Local Law 66 of 2014 and various sustainability plans, including New York City's Roadmap to 80 x 50.

** https://www.governor.ny.gov/news/governor-hochul-drives-forward-new-yorks-transition-clean-transportation

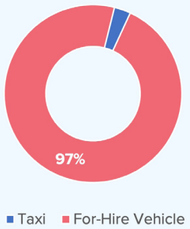
State of the Industry

1 OUT OF EVERY 100

TLC-licensed vehicles is an EV

15

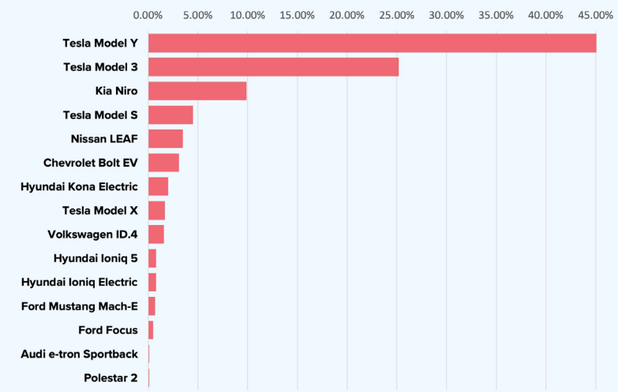
Types of EV makes and models registered with TLC



Breakdown of EV by Industry

Most of TLC-licensed EVs are in the for-hire industry with a small percentage of EVs in the taxi industry.

Breakdown of TLC-Licensed EVs by Make and Model



$14,000 - $60,000

The range in salary earned by the core of TLC-licensed drivers

60%

Of TLC-licensed drivers are full-time*

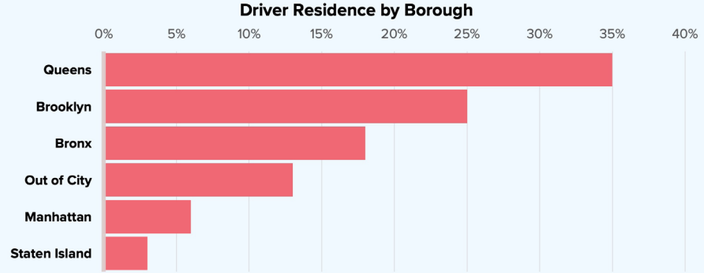
96

Average daily miles driven by a fulltime TLC-licensed driver

Queens

has the highest number of TLC-licensed drivers by count

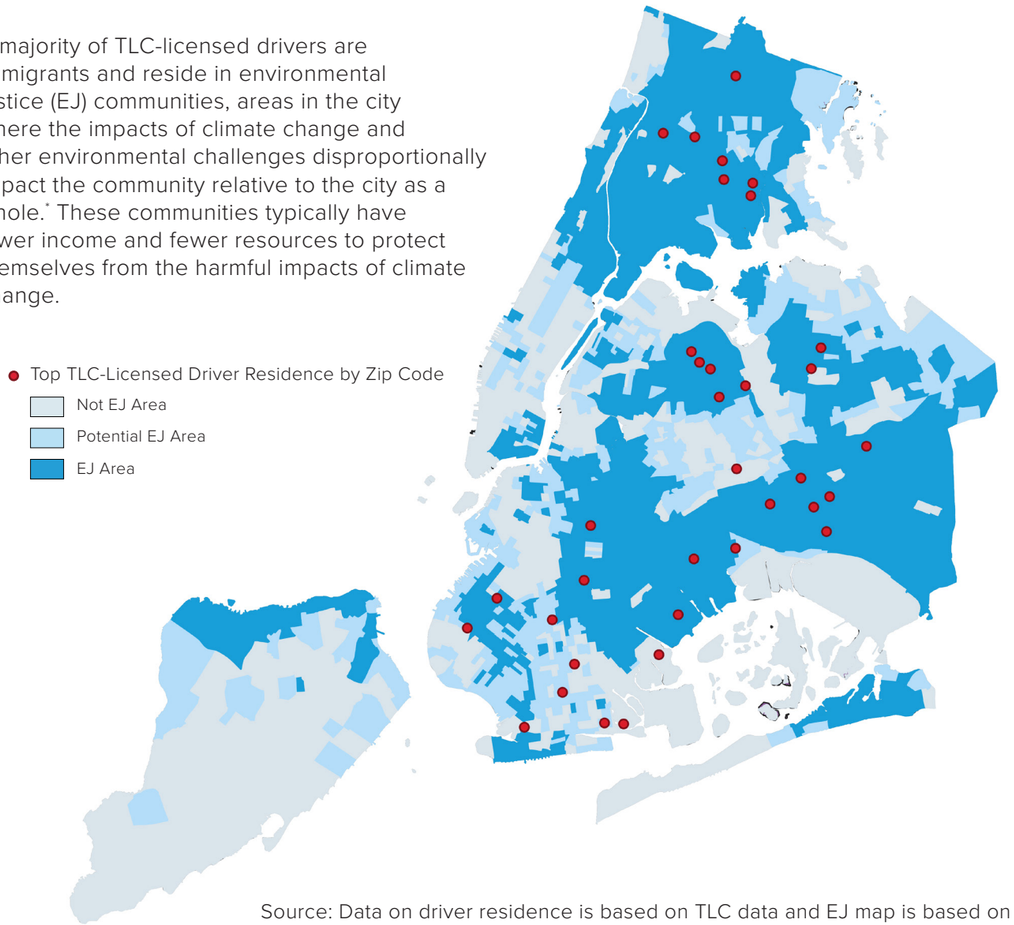
Driver Residence by Borough



*We define full-time as 30 working hours or more per week, which include trip hours and breaks and aligns with the full-time definition used by the Internal Revenue Service.

Figure 1: Environmental Justice Communities and Top TLC-Licensed Driver Residence by Zip Code

A majority of TLC-licensed drivers are immigrants and reside in environmental justice (EJ) communities, areas in the city where the impacts of climate change and other environmental challenges disproportionally impact the community relative to the city as a whole.* These communities typically have lower income and fewer resources to protect themselves from the harmful impacts of climate change.

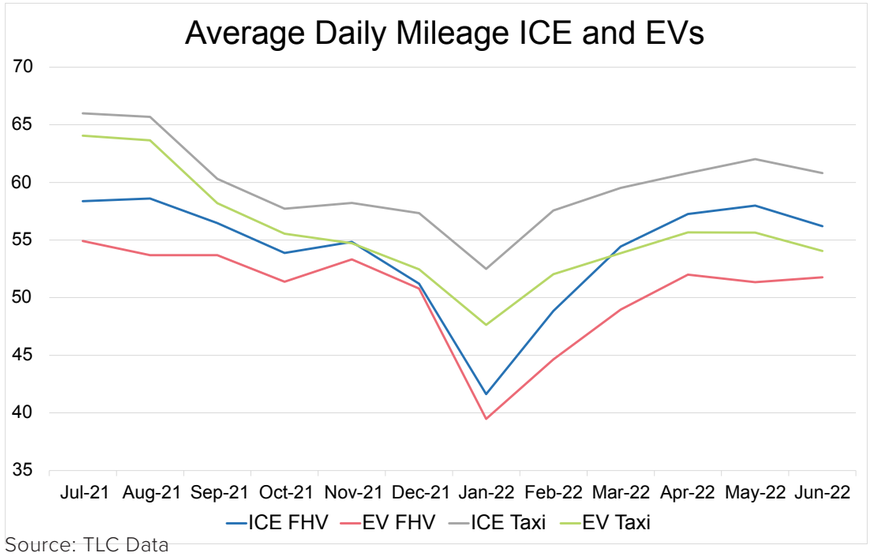


Source: Data on driver residence is based on TLC data and EJ map is based on environmental justice area census tract designation

* An Environmental Justice Area (EJ Area) ais a low-income community located in the city or a minority community located in the city. The thresholds for determining low-income and minority communities were set in local law 64 of 2017 and based on US Census data.

TLC-licensed EVs currently operate similarly to TLC-licensed ICE vehicles. Additionally, TLC-licensed EV drivers earn similar wages, drive similar mileage, and have mostly similar trip lengths as their ICE-driving counterparts (Figure 2 and 3).* This applies to both taxis and for-hire vehicles (FHVs).

Figure 2: Comparison of ICE Vehicles and EVs by Average Daily Mileage Driven



Source: TLC Data

Figure 3: ICE Vehicles and EV Comparisons by Industry

EV FHVs

Average Trip Length	Average Trip Duration	Average Fare
EV: 5.6 miles	**EV: 20 minutes**	**EV: $27.05**

ICE FHVs

Average Trip Length	Average Trip Duration	Average Fare
ICE: 5.4 miles	ICE: 19 minutes	ICE: $27.05

EV Taxis

Average Trip Length	Average Trip Duration	Average Fare
EV: 3.9 miles	**EV: 15 minutes**	**EV: $15.62**

ICE Taxis

Average Trip Length	Average Trip Duration	Average Fare
ICE: 4.2 miles	ICE: 16 minutes	ICE: $16.56

Source: TLC Data

* Analysis is based on trip data from July 2021 to June 2022.

Understanding EV Charging Time and Uses:

DC Fast Charging (DCFC)

- 100 to over 200 miles of battery range gained from 30 minutes of charging.
- Energy outputs vary but DCFC technology is improving and will allow for vehicles to charge even faster.
- DCFC allows for charging directly before or after the shift and even during, without drastically changing operations.
- DCFC is best installed in off-street parking facilities.
- DCFC requires substantial electrical grid capacity and costs substantially more than L2 charging.

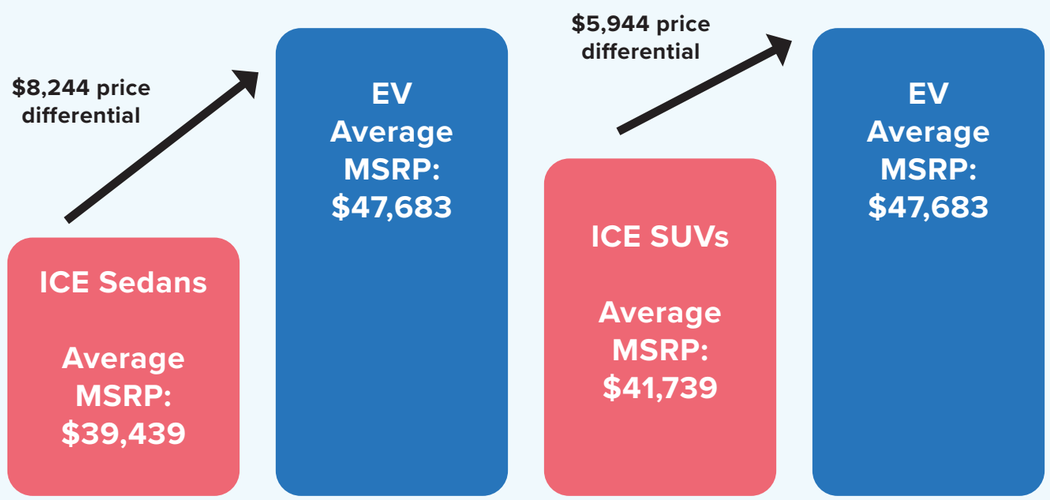
Level 2 (L2)

- 25 miles of battery range gained from 1 hour of charging assuming 6.6 kW charging power.
- A full-time TLC driver needs to charge at least 6 hours per Level 2 use to gain 150 miles.
- L2 is a good option for off-shift charging.
- L2 charging equipment is installable on curbsides, commercial sites, and residential buildings.

Costs of Electrification

EVs are more expensive than comparable ICE vehicles due to limited vehicle model availability and the absence of a robust used EV market. A closer look at the manufacturer suggested retail prices (MSRPs) of TLC-licensed vehicles shows an average price difference of $6,000 - $8,000 between EVs and ICE vehicles (Figure 4).

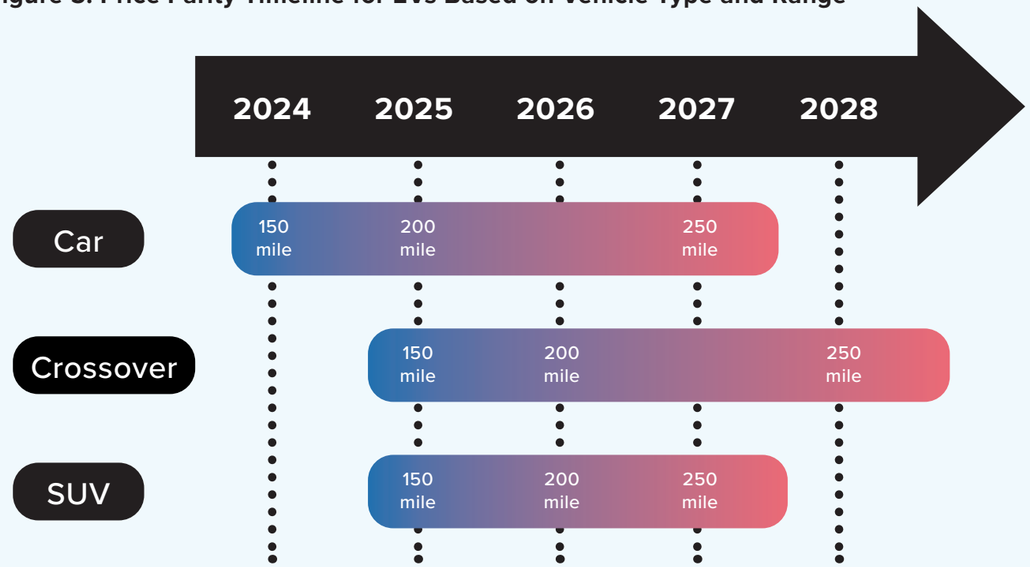
Figure 4: ICE and EV Price Differential*



* Analysis is based on TLC-licensed vehicles and referencing their MSRPs on Kelley Blue Book's website.

For TLC drivers who drive full-time, a long battery range is a critical point of consideration as it minimizes charging needs. Based on research conducted by the International Council on Clean Transportation, longer range vehicles will reach price parity with their ICE counterparts around 2028 (Figure 5).

Figure 5. Price Parity Timeline for EVs Based on Vehicle Type and Range*



* The graphic was created from report by the International Council on Clean Transportation. Representative models for cars are Ford Fusion, Honda Accord, Nissan Altima; for crossovers, Ford Escape, Honda CR-V, Toyota RAV4; and for SUVs, Ford Explorer, Honda Pilot, and Toyota Highlander.

EV-Specific Savings

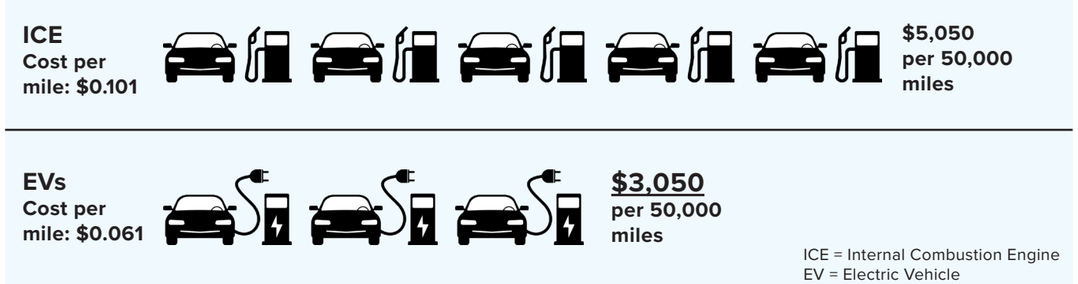
Maintenance

Although EVs are currently more expensive to acquire, maintenance expenses and fuel costs are lower compared to ICE vehicles because EVs do not pay for routine expenses like oil changes and annual emissions tests. According to a June 2021 study from the Office of Energy Efficiency & Renewable Energy, EVs have a Total Scheduled Maintenance Cost per mile of $0.061 compared to $0.101 for ICE vehicles, amounting to a 40% reduction (Figure 6).”*

“Maintenance expenses and fuel costs are lower compared to ICE vehicles.”

Fueling

Figure 6. Comparison of Total Scheduled Maintenance Cost per Vehicle Type



EV fueling costs vary widely depending on charging equipment used (Level 1, 2 or DC fast charging), location, time-of-use, utility rate, and energy consumption.

For FHVs and taxis, a DC fast charger’s speedy charging time minimizes interruption to a driver’s operating hours. In New York City, the average price of DC fast charging is currently $0.39/kWh, which amounts to around $18 per charge.** The cost of Level 2 charging is cheaper relative to DC fast charging. In partnership with Con Ed, New York City’s Department of Transportation (DOT) currently operates Level 2 chargers at curbside and municipal garage locations where drivers pay $2.50 per hour between 6 a.m. and 9 p.m. and $1 per hour for overnight charging. With Level 2 charging sessions usually lasting between 4-6 hours, typical cost per charge can go from $4 to $15 depending on length and time of day.***

* “Battery Electric Vehicles Have Lower Scheduled Maintenance Costs than Other Light-Duty Vehicles”
** Cost per charge is measured under the assumption that a driver typically charges their battery from 20% to 80% each session. DC fast charging costs are based on public information reported by the following service providers in New York City: New York City Department of Transportation, Revel, EvGo, Electrify American, Blink Charging, and AeroVironment.
*** https://www1.nyc.gov/html/dot/downloads/pdf/curbside-level-2-charging-pilot-faq.pdf. Note that off-street Level 2 charging is cheaper than curbside.

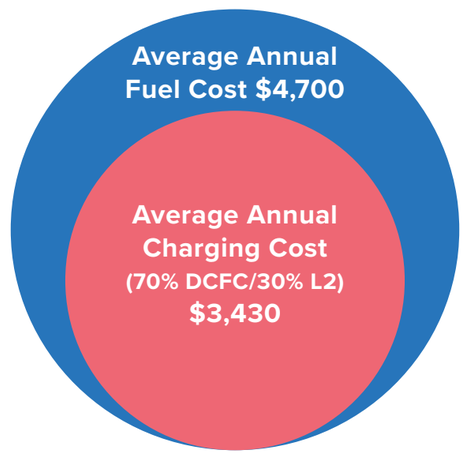
Using the following set of assumptions, a full-time TLC driver is projected to pay approximately $3,430 in EV charging costs annually:

- Drives 35,000 miles a year.
- Uses DC fast charging for 70% of annual charging needs and Level 2 charging for the remainder (30%).****
- Has a car with approximately 253 miles in range with an efficiency rate of 31 kWh per 100 miles.
- Pays an average utility price of $0.39/kWh for DC fast charging.
- Pays $1/hour for overnight Level 2 charging.
- Does not pay an additional parking fee.*****

If the same set of assumptions is applied to an ICE vehicle with 30 MPG and the current gas price of $4.00 per gallon*, fuel cost is estimated to be $4,700 annually, a 37% difference (Figure 7). The projected fuel cost difference is likely to be much greater than 37% when accounting for incentives such as Con Edison’s SmartCharge program and the 15% discount for TLC-drivers at publicly accessible city-owned charging stations.**

Furthermore, a 2020 Consumer Reports examined the nine most popular EVs on the market and compared their long-term costs to the most popular ICE vehicles. The examination found that over the course of a vehicle’s life, when accounting for repair and maintenance costs, fuel costs, and federal incentives, EVs can offer savings of $6,000 to $10,000.***

Figure 7. Annual Fuel Expenses Between ICE and EV

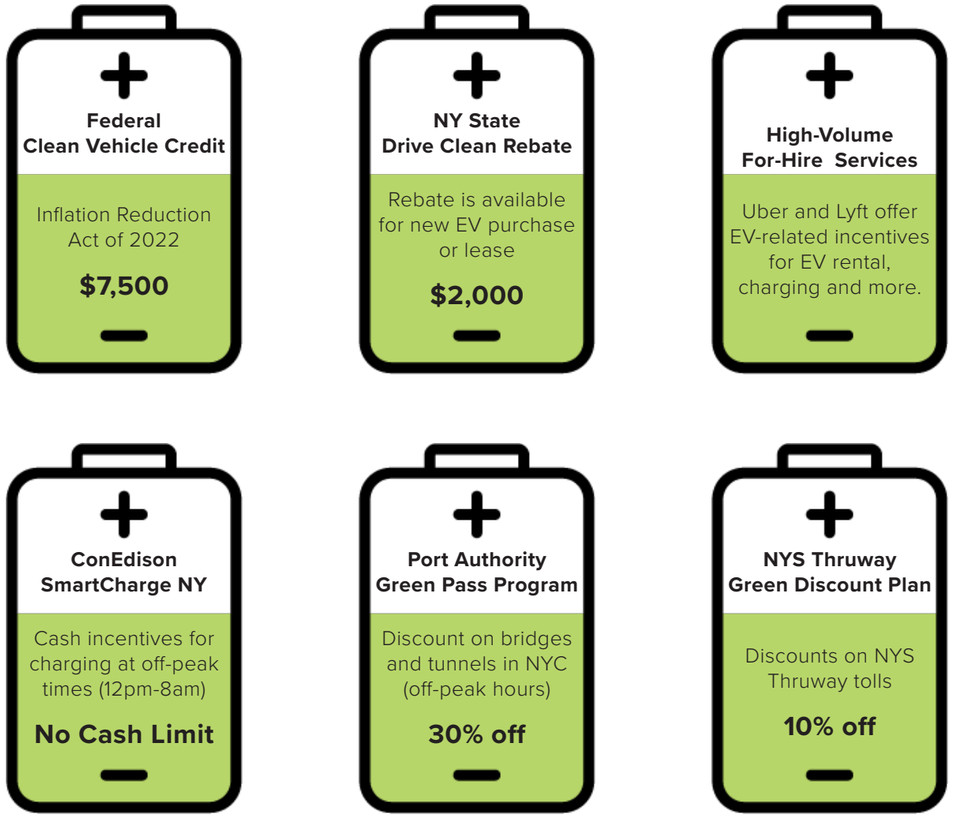


* $4.00 is the average weekly gas price in New York City from January 2022 to mid-October 2022 according to data from the U.S. Energy Information Administration
** SmartCharge New York
*** “Electric Vehicle Ownership Costs: Today’s Electric Vehicles Offer Big Savings for Consumers,” Harto
**** Note that each Level 2 use warrants about 6 hours of charging time to gain 150 miles.
***** Certain parking garages in New York City charge additional parking fee in addition to using their charging plugs.

Existing Incentives for EVs

Various incentives are available to help offset some costs associated with purchasing and operating an EV. For TLC-licensed drivers living in New York City, these include vehicle acquisition, reduced tolling, and charging incentives (Figure 8).

Figure 8: Current EV Incentives



Note that New York State currently has a tax credit for electric wheelchair accessible vehicles (WAVs). However, as discussed in more detail below, there are currently no WAV EVs available in the U.S.*

The newly signed Inflation Reduction Act of 2022 makes significant expansions and revisions to the federal tax credit for purchasing EVs. The following provisions significantly impact TLC-licensed drivers and the for-hire sector at large:

Used EVs are now eligible for a tax credit, up to $4,000 or 30% of the purchase price, whichever is less.

The credit cannot be used for a sedan priced over $55,000, or a van, SUV, or pickup truck priced over $80,000.**

The credit is now transferable to a car dealer, at point of sale, and buyers do not have to claim it on their tax return.

Current federal tax incentives provide credits to individuals purchasing certain EVs whose manufacturers have not yet sold 200,000 models and begin phasing out the tax credit after that threshold. Starting in 2023, the 200,000-vehicle cap will be lifted, and eligibility will be restored for large manufacturers that were otherwise ineligible (Tesla, GM, Toyota, etc.).

To receive the full amount of the credit, final assembly of the EV must be done in North America.

* New York State Tax Law Section 606.
** At the time of writing this report, 87% of TLC-licensed EVs are makes and models that are eligible for this credit. The Tesla Model S and X are not eligible because their MSRPs are over $80,000.

Recommendations

To address the higher upfront EV costs and build upon existing incentives for EV purchasing, TLC recommends the following:

1. Work with state and federal partners to advocate for robust financial incentives aimed at for-hire transportation sector drivers and owners, including through tax deductions, rebates, and discounts.

2. Explore the development of a grant program for owner-drivers that would provide financial assistance for the purchase of EVs, which could be funded through a surcharge on trips or from direct financial assistance from the federal, state, or city government.

3. Assess driver pay for EV drivers to ensure there is adequate compensation for charging time, recognizing that EV charging takes significantly longer than fueling ICE vehicles.

4. Work with Port Authority to explore priority treatment of EVs at airports.

5. Work closely with Empire Clean Cities (ECC) and other key partners to host events that educate drivers and licensees on electrification and provide drivers the opportunity to get behind the wheel and pump of EVs and EV supply equipment (EVSE).

6. Support EV adoption with targeted outreach to owners and other industry members. This could include information on grant and subsidy opportunities, connecting emerging EV start-ups with industry leaders, and facilitating opportunities for partnership between for-hire and taxi businesses and electrification research and technology firms.

EV Supply Equipment (EVSE) Installation & Purchasing Cost

A dilemma in the current EV market is the tension between drivers' concern for lack of charging availability and developers' apprehension to build charging infrastructure without a strong market demand. Like the cost of EVs, the installation of EVSEs can also be prohibitively expensive.

DC fast charging and Level 2 charging are both useful for vehicle owners, each serving a distinct purpose depending on charging needs. Within the for-hire transportation sector, the construction of DC fast charging stations will be most relevant to bases and garages whose fleet size and vehicle usage warrant faster charging speed and a need for powerful electrical grid.

On the other hand, the development of Level 2 chargers will be most relevant for owner-drivers with access to private parking as they can use these chargers during off-shift hours.

In New York State, several incentives exist for building charging infrastructure (Table 1).

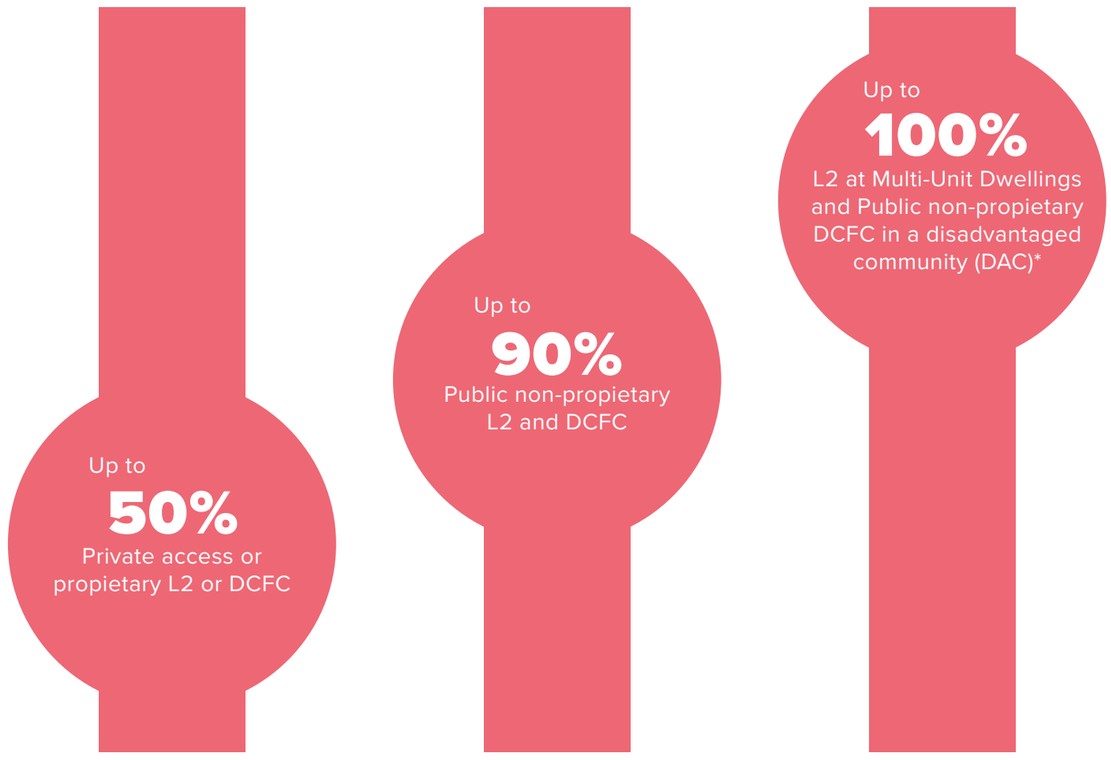
Table 1: Current EVSE Funding Programs

Program	Support Granted	Qualifying Entities
Alternative Fuels and EV Recharging property credit*	Credit of 50% of installation costs; maximum credit of $5,000	Entities who install EV charging stations
Department of Environmental Conservation ZEV Infrastructure Grant**	Maximum of $250,000 per location & $500,000 per municipality to cover equipment, site preparation and other costs	Municipal entities
Con Edison PowerReady program***	Between 50%-100% of L2 and DCFC installation costs covered	Public or private entities installing EV charging stations
National Electric Vehicle Infrastructure (NEVI) program****	$175M over 5 years for charging stations along designated highway corridors in NY State	Federal funding awarded to NYS DOT

* "Alternative Fuels and Electric Vehicle Recharging Property Credit," New York State Department of Taxation and Finance
** "2022 Zero-emission Vehicle Infrastructure Grants for Municipalities," New York State Department of Environmental Conservation
*** PowerReady Electric Vehicle Program, ConEd
**** National Electric Vehicle Infrastructure (NEVI) Program, New York State Energy Research and Development Authority

For entities such as fleet operators seeking to install EV charging stations at their businesses or owner-drivers seeking to install chargers at their homes, the most comprehensive and relevant incentive is the PowerReady program, especially given that the vast majority of New York City is considered a Disadvantaged Community (DAC) according to Con Edison (Figure 9).*

Figure 9: Portion of Costs covered by PowerReady Program**



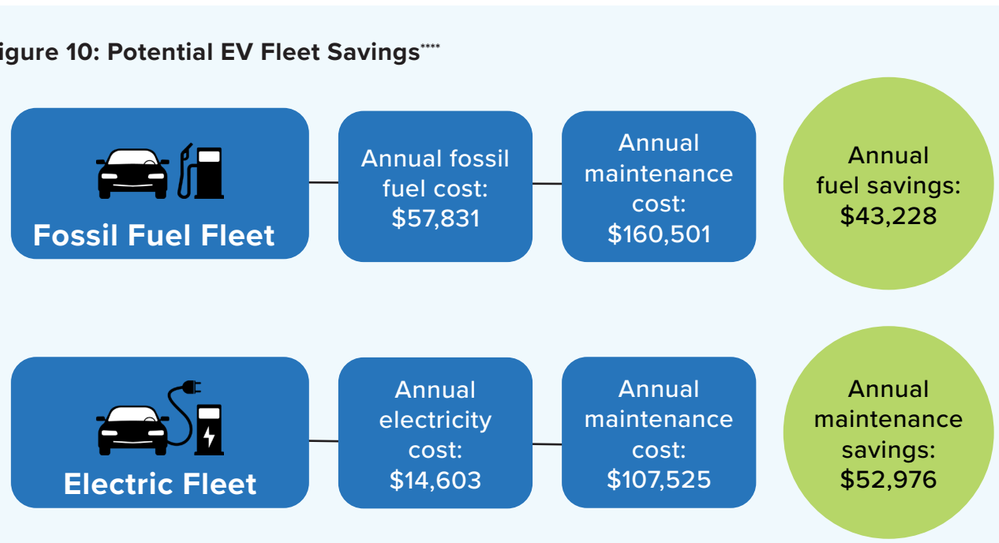
* https://www.coned.com/en/about-us/media-center/news/20210629/electric-vehicle-charging-superhub-opens-in-brooklyn-with-support-of-con-edison-incentives; For a visualization of DAC in NY State, see 'EV Charging Capacity' in the Con Edison Hosting Capacity Web Application
** Note that only certain components of EVSE construction costs are eligible under the PowerReady program. Costs related to the EV charger itself, which can include maintenance, station installation or the station purchasing cost are not eligible. Eligible costs include, among other things, any grid updates to the utility transformer (handled by the utility) outside of the property line.

DC Fast Charging Station Costs

Given the PowerReady program's criteria and much of New York City's DAC classification, a TLC-affiliated entity seeking to install a publicly accessible DC fast charger would need to cover the cost of the purchase and setup of the EV charger, as well as any customer and utility side infrastructure upgrade costs not covered by the PowerReady program.* A portion of the installation required to handle the additional load generated by an EV charger, such as upgrades to the panel or permitting costs, would be covered by PowerReady. DC fast charger station costs can vary widely depending on the model – for example, a mid-range ChargePoint model costs $52,000.** Estimates of DC fast charger hardware costs range from $28,401 for a networked 50kW charger to $140,000 for a networked 350kW charger.***

While the cost of installing a DC fast charger is steep, fleet electrification can provide savings when compared to relying on fossil fuels. Con Edison's fleet savings calculator gives some insight into potential fuel savings (Figure 10).

Figure 10: Potential EV Fleet Savings**



The savings that electrification can bring to fleet owners who choose to install DC fast chargers merit consideration when thinking about the cost of charging station construction. Although fuel costs are currently typically borne by drivers, and not fleet owners, fuel savings from electrification could benefit both parties in the long term.

* Charger installation costs vary widely, but generally range between $50,000 and $100,000. While PowerReady funding for DACs is currently exhausted, it is expected that more funding for projects that meet this criteria will become available in the future.
** ChargePoint Express 250 CPE250, Smart Charge America
*** "Estimating Electric Vehicle Charging Infrastructure Costs Across Major U.S. Metropolitan Areas," Nicolas M. Due to recent increases in the costs of metals and items necessary to build DC fast chargers, charger costs can be volatile.
**** The savings estimates are calculated for a 10x Passenger Sedan fleet, with an average mileage of 96 miles a day (the average mileage for a TLC-licensed vehicle) and assumes a gasoline price of $4.00 per gallon and 24/7 fast charger availability for the fleet-specific chargers.

Level 2 Charging Station Costs

For the purchase and installation of Level 2 charging stations, the cost considerations are somewhat different. Among TLC's licensees, the owner-driver population will be able to make the greatest use of these chargers. They can benefit from the following incentives:

For Level 2 chargers built in multi-unit dwellings that are within DAC, the PowerReady program will cover up to 100% of eligible costs. For publicly accessible plugs, the PowerReady program will cover up to 90% of eligible costs.

For individual owner-drivers seeking to install private L2 chargers at their residence, the PowerReady program will cover up to 50% of eligible costs.

In terms of station costs, Level 2 chargers are less expensive than DC fast chargers, but prices can vary widely depending on certain factors:

Hardware Cost

Depending on the model purchased, a Level 2 charging station typically costs between $1,000 and $4,000 per port.

Installation Cost

Depending on what upgrades may be needed to an electrical panel, installation costs can go from $2,000 to $10,000.*

* Installing a Charging Station, NYSERDA

Recommendations

To address the high upfront cost of charging station hardware and allow entities seeking to install chargers to make use of existing incentives for charging stations, TLC recommends the following:

1 Create a Charging Accelerator program that streamlines the charging installation process for TLC licensees seeking to install charging equipment, including assistance with grant application, securing a charging permit, and providing technical assistance to fleet garages and owner-drivers.

2 Explore the development of a surcharge on trips to fund the construction of charging infrastructure and EVSE.

3 Conduct an in-depth scan of federal, state, and NGO grant programs to fund research and entrepreneurial opportunities for charging infrastructure. TLC will coordinate with DOT, DCAS, ECC and the Mayor's Office for support and collaboration in applying for these programs.

Charger Coverage

Given the high mileage TLC-licensed drivers travel each day, strategic placement of a robust DC fast charging and Level 2 charging network is critical in supporting EV drivers.

- DC fast charging is vital in all parts of New York City because of their quick charging time, including **in areas of high trip volumes, residential neighborhoods where TLC drivers live, and near major highways.** Drivers can use DC fast chargers before, during, or after their shift.
- Level 2 chargers are more meaningful when placed in neighborhoods where drivers live and at fleet facilities to allow for overnight charging.

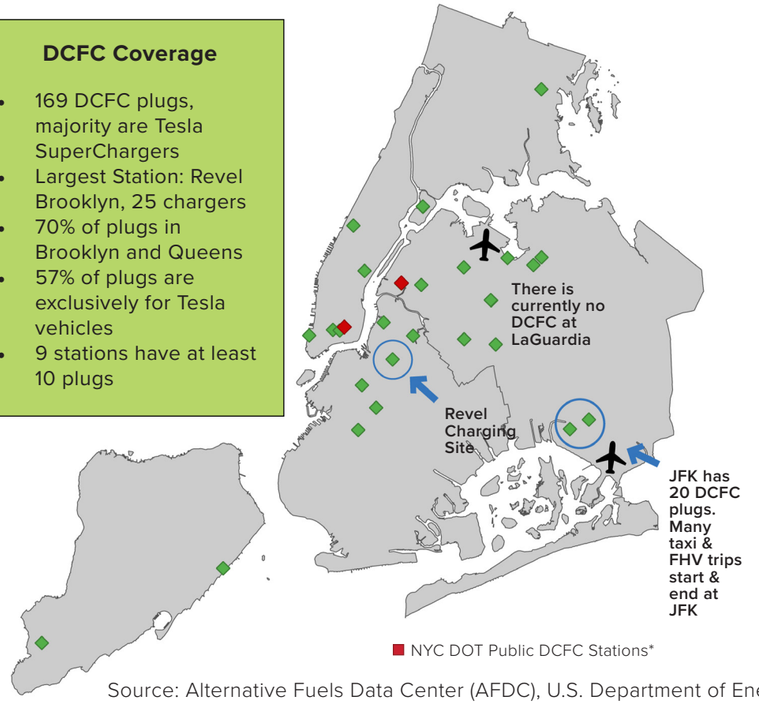
Current State of DC Fast Charging in NYC

Figure 11. Current State of DC Fast Charging in New York City

Even though DC fast charging is currently concentrated in the outer boroughs, there is a gap between the existing charging infrastructure and drivers' charging needs.

DCFC Coverage

- 169 DCFC plugs, majority are Tesla SuperChargers
- Largest Station: Revel Brooklyn, 25 chargers
- 70% of plugs in Brooklyn and Queens
- 57% of plugs are exclusively for Tesla vehicles
- 9 stations have at least 10 plugs



Source: Alternative Fuels Data Center (AFDC), U.S. Department of Energy

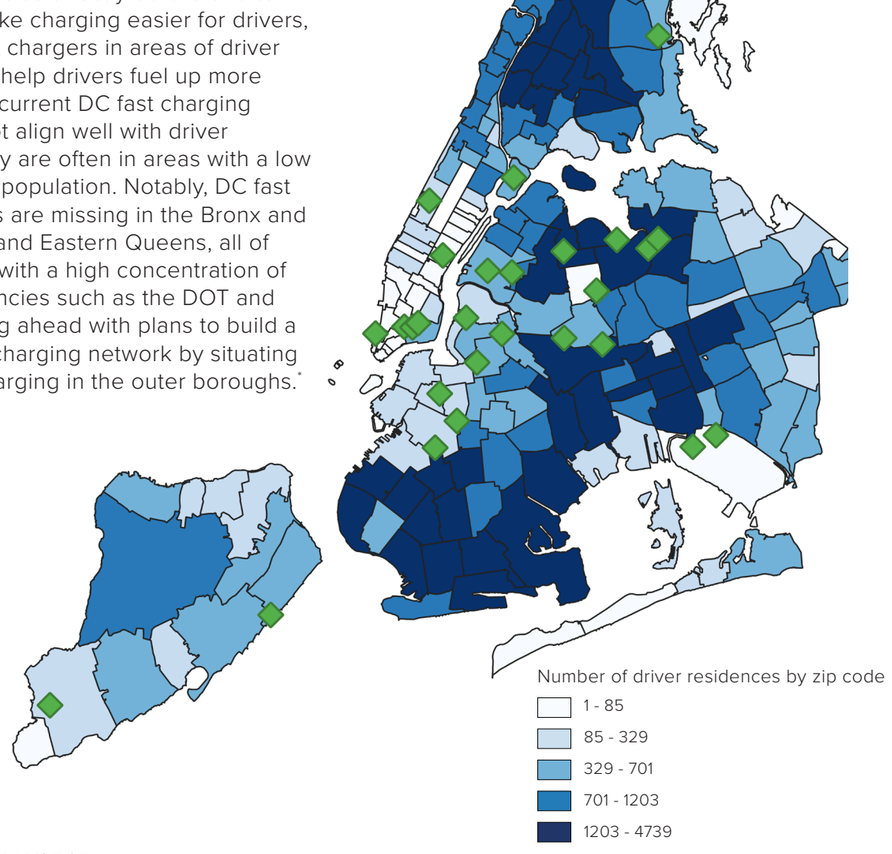
* TLC-licensed drivers are eligible for a 15% discount at NYC DOT Public DCFC Stations.

DC Fast Charging & Driver Residence

Figure 12: TLC-Licensed Driver Residence and DC Fast Charging Stations

Driver Residence by Zip Code and DCFC Stations

Many TLC-licensed drivers who operate EVs charge their vehicles directly before or after their trips. To make charging easier for drivers, installing DC fast chargers in areas of driver residence could help drivers fuel up more seamlessly. The current DC fast charging network does not align well with driver residence as they are often in areas with a low density of driver population. Notably, DC fast charging stations are missing in the Bronx and south Brooklyn, and Eastern Queens, all of which are areas with a high concentration of drivers. City agencies such as the DOT and DCAS are moving ahead with plans to build a more equitable charging network by situating more DC fast charging in the outer boroughs.*



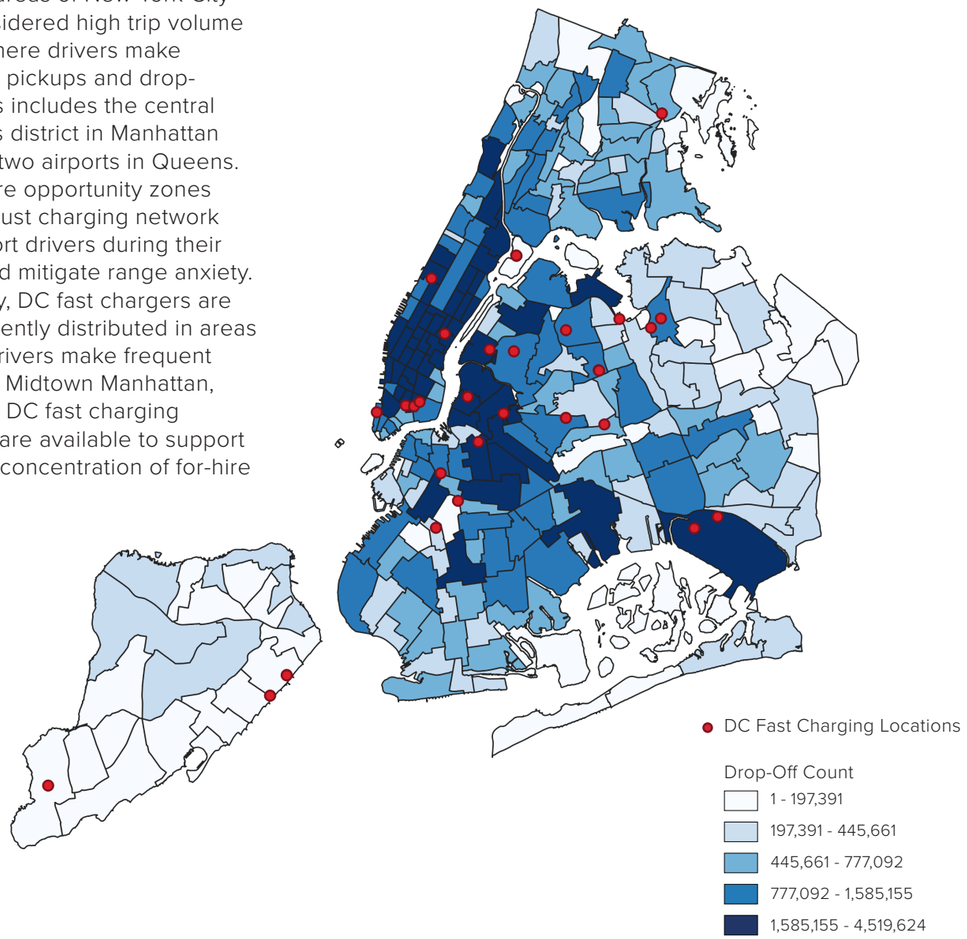
Source: TLC Data and Alternative Fuels Data Center (AFDC), U.S. Department of Energy

* "Electrifying New York", NYC DOT

DC Fast Charging in High-Volume Trip Areas

Figure 13: TLC Drop-Off Count by Taxi Zones and DC Fast Charging Stations

Certain areas of New York City are considered high trip volume areas where drivers make frequent pickups and drop-offs. This includes the central business district in Manhattan and the two airports in Queens. These are opportunity zones for a robust charging network to support drivers during their shifts and mitigate range anxiety. Currently, DC fast chargers are not efficiently distributed in areas where drivers make frequent stops. In Midtown Manhattan, only two DC fast charging stations are available to support a heavy concentration of for-hire trips.



Source: TLC Data and Alternative Fuels Data Center (AFDC), U.S. Department of Energy

DC Fast Charging at JFK & LaGuardia Airport

JFK and LaGuardia Airport are two locations where TLC drivers conduct consistent and frequent trips. Since the pandemic, airport trips by the FHV sector and the taxi industry have steadily increased as travel demand has picked up. In the first half of 2022, JFK and LaGuardia had a combined monthly average of 291,347 pickups and 334,408 drop-offs per airport.

Currently, TLC EV drivers heavily utilize DC fast charging at JFK. Due to the nature of the for-hire industry, drivers are unlikely to station at the airport for several hours using a Level 2 charger, making DC fast charging more suitable at airports. While there are two DC fast charging stations with 22 plugs at JFK, LaGuardia has not yet opened a DC fast charging station. DC fast charging at LaGuardia is a priority given that for-hire trip numbers for LaGuardia and JFK are similar, especially among FHVs, despite JFK handling roughly twice as many passengers as LaGuardia annually.*

Port Authority has committed to new airport development including closely working with NYPA to expand charging at both New York City airports.**

Table 2: Current Charging Plug Counts by Airport

Airport	Level 2 Plugs	DC Fast Charging Plugs
LaGuardia	9	0
JFK	10	24

Source: Alternative Fuels Data Center (AFDC), U.S. Department of Energy

* https://www.panynj.gov/airports/en/statistics-general-info.html
** "Clean Air - Environmental Initiatives: Port Authority of New York and New Jersey"

Criteria for Future Development of DC Fast Charging

As the number of TLC-licensed EVs grows, New York City's DC fast charging network must evolve accordingly to meet the demand. To maximize usage of DC fast chargers for TLC licensees, future charger placement should consider the following elements:

Proximity to highways: DC fast chargers should be easily accessible from highways to facilitate transit to and from areas of high trip volumes.

Driver residence: To improve ease of access, chargers should be in or near major residential neighborhoods where drivers live.

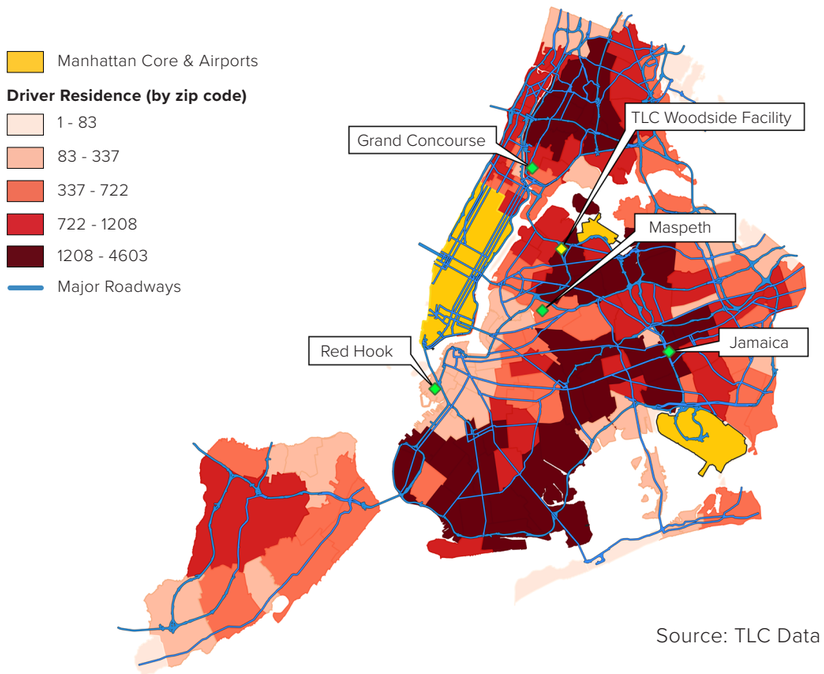
Grid capacity: Certain areas have the electrical load capacity to handle additional chargers without the need for extensive infrastructure upgrades, making EVSE installation easier and avoiding prolonged installation time.*

Close to high-volume trip areas: Trips conducted by TLC-licensed drivers are concentrated around the Manhattan core (below W 110th and E 96th St.) and airports. DC fast chargers in or adjacent to these areas would be most useful for drivers.

* For an overview of EV charging capacity, see the Con Edison Hosting Capacity Application

Currently, TLC's Woodside Inspection Facility meets these criteria and is the potential site for a publicly accessible fast charging station built with TLC-licensed drivers in mind. Based on the three elements mentioned above, this report has identified additional examples of areas that would be suitable for future DC fast charging stations (Figure 14). All these areas have existing EV charger hosting capacity according to Con Edison's Hosting Capacity Portal, with some already being targeted for private investment from companies like Revel:

Figure 14: Ideal Future DC Fast Charging Locations



Source: TLC Data

Red Hook, Brooklyn: Midway between areas of high driver residence in South Brooklyn and the Manhattan core, easily accessible via major roadways, former industrial area with existing grid capacity for charger installation.*

Grand Concourse, The Bronx: Excellent connection to expressways including proximity to I-87 which will receive NEVI program EVSE funding, connections to Manhattan and LaGuardia, near neighborhoods where many drivers live.

Maspeth, Queens: Excellent highway access, concentration of taxi garages and bases, industrial hub with minimal congestion from private vehicles.

Jamaica, Queens: Easy access to JFK via Van Wyck Expressway and proximity to neighborhoods where many drivers reside.

* Revel Transit recently received a NYS Clean Transportation prize for their plans to build EV charging in Red Hook. "Governor Hochul Announces Ten Grand Prize Winners in the $85 Million New York Clean Transportation Prizes Program".

Level 2 Charging

While DC fast charging is the most effective charging solution for the for-hire sector, public Level 2 charging is also valuable for drivers when placed strategically in areas of high demand for off-shift charging. The presence of Level 2 is of particular importance as it can offset the need for DC fast charging and divert traffic away from fast charging to Level 2 during times of high utilization.

TLC licensees who own and operate their vehicle would benefit from Level 2 chargers located close to their homes. These vehicles are likely to be parked at or near drivers' homes, as opposed to garages or other large lots owned by fleet operators.

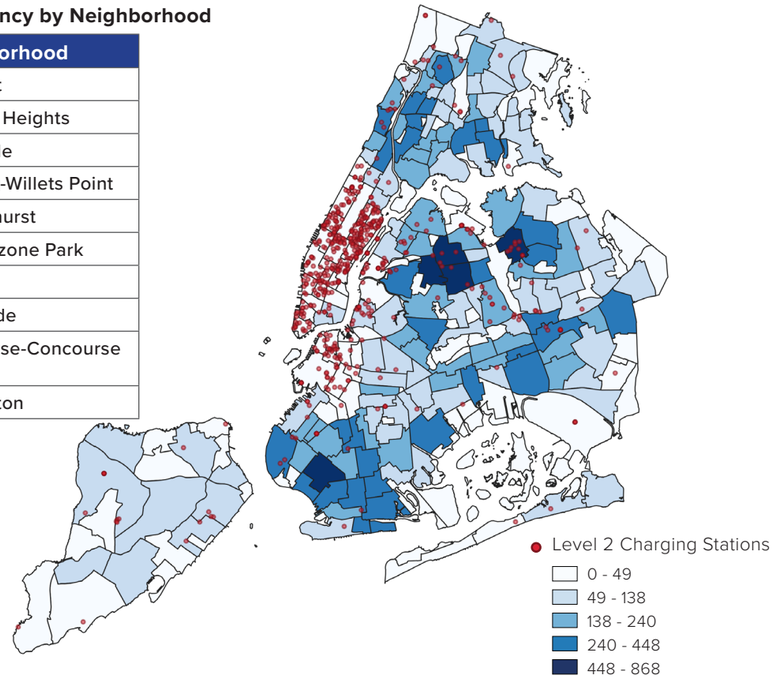
Currently, there is a mismatch between Level 2 charging infrastructure located heavily in central and lower Manhattan, while owner-drivers are concentrated in Queens, Brooklyn, and the Bronx (Figure 15). There are current efforts underway by NYC DOT to expand public Level 2 charging outside of Manhattan. This will improve Level 2 charging access for drivers as currently 59% of all Level 2 chargers are located in Manhattan, many of which are in Midtown and Downtown. Outside of Manhattan, Brooklyn hosts 20% of the city's Level 2 charging followed by 15% in Queens, which has the greatest number of TLC owner-drivers, while the Bronx only has 3%.*

Figure 15: Current Level 2 Charging Stations and Owner-Driver Concentration by Neighborhood

Top 10 Owner-Driver Residency by Neighborhood

Borough	Neighborhood
Queens	Elmhurst
Queens	Jackson Heights
Queens	Woodside
Queens	Flushing-Willets Point
Brooklyn	Bensonhurst
Queens	South Ozone Park
Queens	Jamaica
Queens	Sunnyside
Bronx	Concourse-Concourse Village
Brooklyn	Kensington

Source: TLC Data



Source: TLC data on driver residence and the Alternative Fuels Data Center for Level 2 charging locations

* Based on data from the Alternative Fuels Data Center

Recommendations

1. Advocate on behalf of TLC-licensees for the construction of a robust fast charging network by partnering with city agencies, Port Authority, Con Edison, NYPA, and industry licensees to install driver-friendly chargers in easily accessible locations where drivers make frequent trips and take rest breaks, to minimize disruption to drivers' work schedules.

2. Build publicly accessible charging at the new Woodside Inspection Facility, which represents a point of congregation with easy access to the BQE for all TLC drivers, as well as being in an area that many drivers call home.

3. Support the strategic deployment of Level 2 charging in neighborhoods with high owner-driver concentrations. This affordable charging option allows for areas with TLC-licensees who own their cars to utilize curbside charging when not working.

4. Ensure that drivers have access to affordable and reliable charging by continuing to build partnerships with NYC DOT, DCAS, NYPA, and private EVSE providers and make information on charging readily available to drivers.

5. Inform and educate drivers, technology firms, and industry leaders on the availability of charging and potential grant opportunities.

EV-Centric Regulations

In regulating the for-hire and taxi industry, TLC can maximize its regulatory powers and work with other public stakeholders to encourage vehicle owners towards electrification. Several policy issues will need to be addressed to ensure TLC licensees can convert to EVs.

Expanding types of EVs used by TLC licensees: TLC will need to closely follow emerging EV technology. The agency began this process with the Battery Electric Vehicle (BEV) Taxi Pilot and will continue to adjust its rules to accommodate new EVs and new technology, including WAV EVs.

Issuing new EV licenses: To promote EVs while ensuring a competitive FHV market, TLC will prioritize EV applications in its issuance of new licenses.

Setting electrification targets for High-Volume For-Hire Services: In line with commitments made by rideshare companies aiming to achieve full electrification in the US by 2030, TLC will explore GHG reduction plans.

Expand Types of EVs In Use

2021-2022 TLC BEV Taxi Pilot

In 2021, TLC established a BEV Pilot Program to allow for a greater number of EV models to be used as taxis. Prior to this pilot, medallion owners were limited to one option for EVs that met TLC vehicle specifications, the Tesla Model 3.

The Pilot successfully showed the viability of EVs as taxis – no crashes or major infractions were reported for any of the participating vehicles. The smooth ride and increased comfort of the vehicles proved attractive for both drivers and passengers.

Driver participants expressed their reliance on public fast charging to refuel their vehicles, notably Revel's Brooklyn facility and fast chargers at JFK airport. However, they also highlighted the lack of a comprehensive fast charging network in New York City as a major challenge.

Based on the results of the pilot evaluation, TLC is actively working to adopt new rules that will allow for a greater number of EV make and model options for taxi owners to ensure flexibility as the industry transitions to all EV.

Accessibility of EVs

TLC is committed to ensuring accessible for-hire transportation for all New Yorkers. One significant challenge to achieving an all-EV licensed fleet is the lack of an accessible EV model in the U.S.* In order for the TLC-licensed fleet to transition to electric vehicles, wheelchair accessible EVs must be available.

As part of the agency's efforts, TLC has engaged in conversations with auto manufacturers about their plans to produce an accessible EV that can be used as a licensed vehicle in New York City. Several companies have cited their interest in and development of an EV capable of conversion to an accessible vehicle. However, several challenges to large -scale adoption include:

- Modifications to current EVs would require major changes that could ultimately result in the research and development of an entirely new model.
- Manufacturers have indicated that the vehicle would ideally be used for accessible for-hire transportation and for the delivery of goods.
- Many of the newest all-electric makes and models are geared towards the luxury market, which typically does not include mini-vans, which are the most appropriate vehicle class for conversion to a wheelchair accessible vehicle.
- The earliest reports of these types of vehicles entering the market is 2024, but the timeline may be much longer.

* In Europe, the Nissan eNV200 and the Renault Kangoo ZE are both available as electric models. The Kangoo ZE is already in use as a taxi in Switzerland, while the eNV200 has been adopted as an accessible taxi in Great Britain.

FHV Licensure Pause & Impact of EV-Specific Licenses

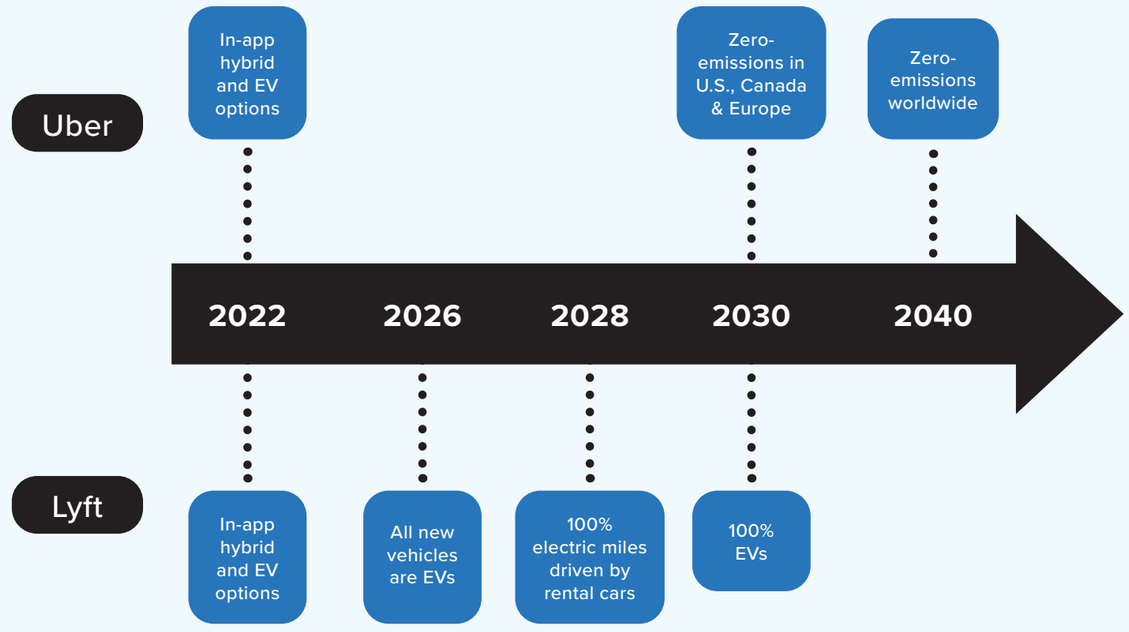
To promote the use of electric vehicles and foster the demand for EV charging, TLC will focus its issuance of new FHV licenses on EVs. TLC has already committed to issuing up to 1,000 new FHV licenses beginning in early 2023 that will be limited to use with electric vehicles. Based on interviews in January of 2021 with FHV owner-drivers who received EV-restricted licenses under the previous EV exemption to the FHV license pause, in most instances the pause exemption was their reason for obtaining an EV rather than an ICE vehicle.

However, even after the EV pause exemption was no longer in effect, TLC-licensed EVs continued to increase, showing promising signs of ICE to EV conversion as well. TLC EV drivers largely depend on publicly accessible DC fast chargers. DC fast charging stations are expensive to install, and with limited electric vehicle adoption in New York City, many charging equipment firms are discouraged from entering the market because of a potential lack of demand. By allowing all-electric FHV licenses, TLC will likely see continued growth in EV adoption and increased demand for fast charging. New York City DOT and NYPA are expanding their own public fast charging networks to make the business case for charging infrastructure in New York. TLC can do its part to encourage charger installation by creating demand through the issuance of limited numbers of EV-only FHV licenses.

Uber and Lyft's Electrification Commitments

Uber and Lyft have both publicly announced their commitments to electrification (Figure 16).* Their electrification plans show regional variation, often reflecting policies enacted at the state or local level in the respective operating region.

Figure 16: Uber and Lyft Electrification Timeline



Relative to policies in the U.S., Uber has a more robust electrification plan in certain European countries or cities as a result of targeted government policies. For example, in London, Uber launched its Clean Air Plan in 2019 to make every car on Uber's app electric by 2025.** As part of the initiative, a Clean Air fee is collected from each trip, which is then made available to help drivers transition to an EV.

* "Climate Assessment and Performance Report", Uber and "The Path to Zero Emissions: 100% Electric Vehicles by 2030", Lyft
** Additional information on Uber's "Clean Air Plan"

Electrification In Other Jurisdictions

Legislation targeting EVs in for-hire transportation has increased in recent years. In the U.S., states and localities are developing and implementing more robust electrification programs (Figure 17).

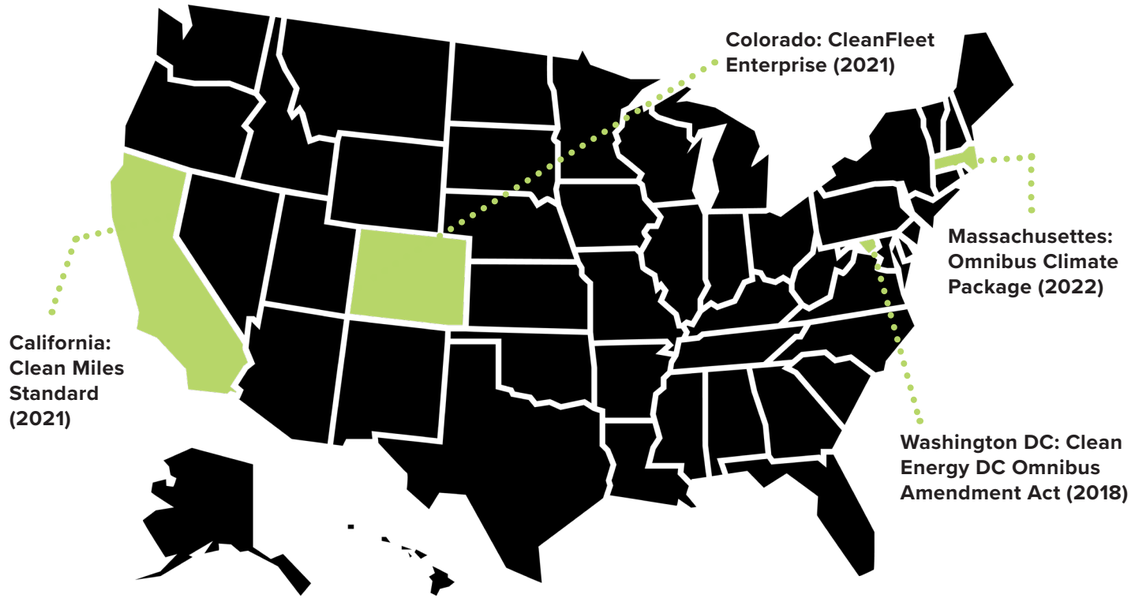
The climate legislation adopted by these jurisdictions imposed various requirements targeting transportation network companies (TNCs) such as Lyft and Uber to force them to electrify, including fees, surcharges, and GHG emission reduction plans

As enacted in California, the Clean Miles Standard (CMS) requires extensive data reporting from TNCs, and TLC is already a national leader in data collection, as one of the first jurisdictions to require TNCs to provide trip records, including driver income data, to the agency. Using TNC data, TLC could report on the number of passenger miles which is already collected, by a vehicles' make, model, and fuel economy. Additional components of the CMS encourage TNCs to utilize shared rides, reduce deadheading and increase utilization, and allow regulatory compliance credits for TNCs that make connections to active transportation and transit.*

The CMS encourages TNCs to lead electrification efforts, while introducing regulations to ensure that current and future TNCs are held to a standard. TLC already has many of the regulations to enforce some of these policies, including a specific license class that would be regulated under these standards due to the high trip counts it generates.**

* "Proposed Clean Miles Standard Regulation"
** "High Volume For-Hire Services", NYC TLC

Figure 17. Electrification Legislation in Different U.S. Jurisdictions



California's Clean Miles Standard requires TNCs operating in California to accomplish two key items by 2030: 1) reduce GHG emissions to zero grams per passenger mile traveled and 2) ensure 90% of all vehicle miles traveled (VMT) are completed by EVs, gradually increasing the targets until this point.*

Washington D.C. adopted wide-ranging climate legislation in 2019, with an element specifically focused on TNCs.** By 2045, all commercial motor carriers, limousines, and taxis certified to operate in the District must be 100% zero-emission vehicles (ZEVs). TNCs are also required to develop and submit a GHG emission reduction plan to the District every two years.

Massachusetts adopted an omnibus climate package, which included its own focus on TNC electrification.*** Under the law, Massachusetts will develop a program to reduce greenhouse gas emissions from TNCs, including setting requirements for electrification and emissions.

Colorado established the Clean Fleet Enterprise in 2021 to incentivize the adoption of EVs by private and public vehicle fleets, specifically naming TNCs.**** The state imposes fees on prearranged rides of 30 cents per ride, reduced to 15 cents per ride in a carshare or ZEV, with the proceeds used to help TNCs and other owners or operators of vehicle fleets electrify by reducing up-front costs of acquiring EVs among other initiatives.*****

* To reduce GHG emissions, Uber and Lyft are allowed to utilize a variety of mechanisms beyond just electrifying their fleet. This includes reducing distances driven without passengers - also known as "deadhead miles," increasing the number of passengers carried per trip, or investing in public transportation infrastructure. See "Clean Miles Standard - California Air Resources Board"
** Clean Energy DC Omnibus Amendment Act of 2018. See also DC ST § 50-741.
*** Chapter 179 of the Acts of 2022, §47 - https://malegislature.gov/Laws/SessionLaws/Acts/2022/Chapter179
**** Colo. Rev. Stat. Ann. § 25-7.5-103
***** Id. See also Prearranged Ride Fee | Department of Revenue - Taxation (colorado.gov) last accessed Sep. 1, 2022.

Recommendations

1. Develop regulatory interventions to support EV transition, including the exploration of GHG emission reduction standards, the feasibility of a Clean Miles Standard (CMS) in New York City, vehicle technology standards and charging interventions.

2. Expand the adoption of EVs through TLC-specific incentives and the limited release of FHV licenses for EVs.

3. Expand the list of approved EV models for taxis.

4. Continue to work with original equipment manufacturers and advocate for the development of a wheelchair accessible electric vehicle.

5. Collaborate with state and city authorities to ensure that TLC licensees are provided the support to convert to electric as mandates and other electrification policies are enacted in the coming decades.

6. Dedicate TLC resources to support the agency's electrification initiatives to ensure that TLC has strong technical expertise and regulatory knowledge to dynamically respond to the emerging EV industry.

Conclusion

Outreach Efforts & Electrification Commitments

TLC recognizes that drivers need continuous support navigating the fast-growing EV industry as technology evolves, and the agency is committed to the inclusion of drivers and businesses that will be most impacted by electrification in the planning and policy development process. As more EV-related policies and initiatives are steadily enacted across all levels of government, TLC's EV outreach and engagement efforts are critical in furthering EV adoption. TLC will join interagency projects that benefit drivers, educate drivers on EV incentives and benefits, and address concerns stemming from misconceptions many drivers may have.

TLC-licensed vehicles and drivers are an integral part of New York's transportation fabric and creating an all-electric future will require a coordinated and collaborative effort between other city and state agencies, as well as private companies and non-profit organizations. New York City DOT, DCAS, Port Authority, NYPA, NYSERDA, Empire Clean Cities, and many others will be vital partners in building a charging network, creating a strong regulatory framework, incentivizing electrification and innovation, and engaging and educating new EV drivers and businesses.

Charged Up! provides an electrification blueprint as the industry embarks on the conversion of over 100,000 vehicles to all electric. This includes short-term actionable items for TLC that are beginning now and soon, as well as long-term policy levers and initiatives to be more closely examined and evaluated before implementation.

In the short-term, TLC commits to:

1. Issuing FHV licenses for EVs. In the September 2022 FHV Licensing Pause Report, TLC announced that 1,000 FHV licenses would be made available to all-electric vehicles.

2. Passing rules that make vehicle specifications in the BEV Taxi Pilot permanent. The agency presented the findings and Pilot evaluation to the Commission in November 2022.

3. Collaborating with Empire Clean Cities to host a "Ride and Drive" event that will allow TLC drivers to get behind the wheel of an electric vehicle and speak with EV industry leaders. Additionally, TLC will work with ECC to establish a strong online resource page for TLC licensees regarding electrification.

4. Continuing to work closely with partners at New York City DOT to promote their agency's EVSE implementation and connect TLC drivers to their affordable and discounted charging.

In the long-term, TLC commits to:

1. Exploring strategic policy levers that could push for increased electrification including a GHG reduction plan and policy for HVFHV companies, an EV purchase grant program, and pilot programs for advanced EV technology.

2. Engaging with emerging technology companies, EVSE firms, and TLC licensees. TLC will apply to grant programs and other funding opportunities to allow for pilot programs or other innovative solutions combatting EV barriers.

At TLC, the agency commits to:

1. Opening publicly accessible DC fast chargers at the Woodside inspection facility.

2. Electrifying TLC's fleet of agency vehicles. TLC has already purchased several Ford Mach-E vehicles for the enforcement fleet. TLC will work closely with NYPD, which has already begun using the Mach-E, to evaluate the effectiveness of EV police cars and devise a plan to implement more of these vehicles into the agency's licensed fleet. TLC's current fleet of 116 vehicles will convert to all electric in the future, as DCAS has committed to procuring 4,000 EVs between 2021 and 2025 to replace outgoing city vehicles.*

3. Install extensive charging at the Woodside Inspection Facility to support future EV agency fleet vehicles and provide a convenient fast-charging station for TLC-licensees.

The profound impact of reducing the industry's GHG emissions through vehicle electrification cannot go unrecognized. Through coordination and collaboration with electrification partners, strategic policy initiatives, and strong driver engagement, TLC will be able to support our licensees in the dramatic shift towards a clean for-hire transportation sector powered by electric vehicles.

* "2021 Clean Fleet Update", NYC DCAS.

Acknowledgments

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