



NYC Electric Vehicle Infrastructure Assessment for For-Hire Vehicles

FEBRUARY 2023

HR&A + Uber

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GLOSSARY

FHV	For-Hire Vehicle
HVFHS	High-Volume For-Hire Services
EV	Electric Vehicle
BEV	Battery Electric Vehicle
PHEV	Plug-in Hybrid Vehicle
ZEV	Zero Emission Vehicle
ICE	Internal Combustion Engine Vehicle
EVSE	Electric Vehicle Supply Equipment
(EV) Chargers	Publicly accessible chargers, excluding private chargers at home (unless specified otherwise)
Level 2 (or L2)	Charger using a 208-240v power source to recharge an EV battery. An average 25 miles of battery range are gained from 1 hour of charging, assuming 6.6 kW charging power.
DCFC	Direct Current Fast Charger. Charger using high voltage systems to replenish a battery in a shorter time, since it does not require the onboard AC battery charger. 100 to over 200 miles of battery range are gained from 30 minutes of charging.
Private Charging Stations	EV chargers not available for public use (e.g., those in residential buildings)
Publicly Available or Non-Private Charging Stations	EV chargers available for public use
NY-NJ MSA	New York-New Jersey Metropolitan Statistical Area
ConEd	Consolidated Edison, Inc.
NYSERDA	New York State Energy Research and Development Authority
NREL	National Renewable Energy Laboratory
Justice40	New York State Disadvantaged Communities Criteria required by the Climate Leadership and Community Protection Act
TLC	Taxi & Limousine Commission
TRIE Neighborhoods	New York City neighborhoods with the highest impact of COVID-19, in addition to communities that have a high percentage of other health and socioeconomic disparities, as defined by the Taskforce on Racial Inclusion & Equity
DMV	Department of Motor Vehicles, or equivalent
NYC	New York City



1 | Executive Summary

1. THE EV TRANSITION IS A KEY PIECE IN THE RACE TO REDUCE EMISSIONS AND FIGHT CLIMATE CHANGE.



The climate crisis is an existential issue for NYC. Without action to drastically cut greenhouse gas (GHG) emissions, climate risks and their impacts are projected to increase in severity and frequency, disproportionately impacting low-income residents and residents of color. By 2050, NYC is committed to reaching carbon neutrality, decarbonizing its transportation sector, and making sure all New Yorkers can breathe clean air.

EV adoption is a main pillar of the City's framework to reach a carbon neutral future. The transportation sector is responsible for nearly 30% of the city's GHG emissions (MOCEJ, 2019 & 2021 numbers). By 2050, approximately 75% of light-duty vehicles need to be electrified to cut GHG emissions from the transportation sector by up to 85%.

Note: Represents vehicles not in storage

The FHV sector is fundamental to making the green transition effective. Due to their substantial road time and mileage of nearly active 96,000 TLC-licensed vehicles*, it is estimated that the emission reduction impacts of electrifying one rideshare vehicle are akin to electrifying three personal vehicles (UC Davis quoted in TLC Charged Up).

The High Volume For Hire Services (HVFHS) industry is committed to the EV transition. Uber and Lyft, platforms representing about 75% of the TLC-licensed vehicles in the city, have both publicly announced their commitments to electrification, with analogous goals of reaching a zero-emissions, 100% EV fleet in the U.S., Canada, and Europe, and support for Mayor Adams' goal for a transition in New York by 2030. However, their ability to meet these goals depends on conducive state and local policies and the availability of charging infrastructure in the cities in which they operate. To date, cities such as San Francisco, San Diego, and London have made progress with charging infrastructure and conducive policies that far outpace New York.

2. NYC IS LAGGING OTHER U.S. AND GLOBAL CITIES IN THE EV TRANSITION, AND THE FHV INDUSTRY IS NO EXCEPTION.



There are nearly 26,000 EVs in NYC, just over 1% of the 2-million light-duty vehicle stock. EV ownership is concentrated in Midtown, Lower Manhattan, East Harlem, Downtown Brooklyn-Red Hook-Park Slope, Williamsburg, Steinway, Elmhurst, and Little Neck, as well as Long Island City, where many EV fleets are located.

EV registrations in the city have grown rapidly over the last 5 years. BEVs have started to lead the charge, compared to the early years when PHEVs used to make up a bigger share of the EV sales. The EV sales in 2021 and 2022 are almost double that of 2019 and 2020, reaching 9,000 in 2022.

However, even at the recent growth rates, adoption rates fall significantly short of those needed to meet the City's carbon neutrality commitments. As noted in the City's Pathways to Carbon-Neutral NYC (2021) report, the pace of light-duty EV adoption must be very high, reaching 375,000 vehicles (18% of all light-duty vehicles) by 2030 and 1.5 million vehicles by 2050

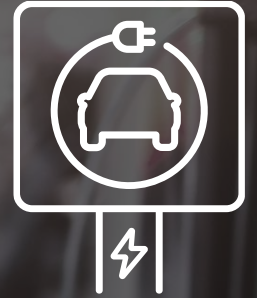
(74% of all light-duty vehicles). Current trends, even considering the recent acceleration, would result in about half of the EV numbers the City envisions by 2030 and 2050 respectively.

EV adoption in NYC is also lagging other U.S. cities. EV adoption in cities on the West Coast is 3 to 5 times faster than in NYC, with EVs constituting approximately 3%-5% of all vehicles, compared to NYC's 1%. If current trends continue, the gap between NYC and other U.S. cities is set to increase. While EVs make up almost 4% of light-duty vehicles sold in NYC, across the U.S. EVs now surpass 10% of all light-duty vehicles sold, with California's rates close to 20%.

The NYC FHV industry has seen similarly low EV adoption rates. Fewer than 1% of the 95,700 FHV (71,000 affiliated with HVFHS) in NYC are EVs. As a result, fewer than 1% of the miles traveled by FHV affiliated with HVFHS in NYC are on BEVs, compared to roughly 8% in Los Angeles, 5% in Chicago and Boston, and 4% in Washington DC (in Q3 2022)*.

Note: Based on data on the drivers on the Uber platform.

3. TO EMBRACE EVS, FHV DRIVERS NEED AFFORDABLE VEHICLES AND THE RIGHT BALANCE OF OFF-SHIFT AND FAST CHARGING INFRASTRUCTURE.



Although FHV drivers are aware of the benefits of EVs, the high upfront costs of EVs compared to ICE vehicles remains the biggest perceived barrier to EV adoption, followed by concerns related to charging. While price parity may be achieved in the future, EVs are generally more costly than comparable ICE models today, due to fewer available models, a limited used vehicle market, and the elevated cost of batteries. Uber is committed to alleviating this challenge in the short term and has teamed up with Hertz Global to make 50,000 Tesla vehicles available to rent to drivers on the Uber platform in cities across the U.S.

To transition to EVs, most ride-hailing drivers will need access to overnight/off-shift charging at or near their homes, which is currently a challenge for many drivers who rent their homes or live in multifamily housing. Currently, while most FHV drivers use on-street parking, FHV drivers with EVs tend to park in garages at their residences, indicating that EVs may be a less feasible option if drivers use on-street parking. Affordable and easier-to-deploy, L2

chargers that provide a full charge within 5 to 6 hours are a good option for overnight/off-shift charging. For drivers without access to overnight/off-shift charging, the additional cost from both the price of DCFC charging and the foregone revenue due to charging during on-shift hours can amount to around 20% of the daily earnings of an average FHV driver.*

In addition, FHV drivers will require affordable and convenient access to fast charging. 71% of FHV EV drivers need to charge their batteries multiple times a day. Ample access to low/no entry fee DCFC charging, especially near where FHV drivers work (e.g., Midtown, Lower Manhattan, airports, etc.), is crucial to minimize the driver's opportunity cost of charging and reduce range anxiety.

* Source: HR&A analysis in p. 62 in Section 3 Impact on FHV Drivers.

4. THE EV CHARGING INFRASTRUCTURE IN NYC FAILS TO MEET FHV DRIVERS' NEEDS AND HINDERS THE EV TRANSITION THE CITY HAS ENVISIONED.



NYC has an insufficient amount of both L2 and DCFC chargers. NYC has about 1,800 L2 and 200 DCFC chargers, at a ratio of 16 EVs per charger. It lags, in relative terms, behind most major U.S. cities and even in absolute numbers, lags peer cities such as Chicago, San Francisco, Los Angeles, Boston, Washington DC, and Seattle.

The growth in EVs is outpacing the build-out of charging infrastructure. Annual EV registrations are growing faster than EV charger development, with only about 1 L2 charger added for every 100 EV registrations (down from 1 L2 charger per 6 EV registrations in 2016) and one DCFC charger added for every 400 EV registrations in 2022.

Chargers are inconveniently located for most FHV drivers. Most of the 1,800 L2 chargers, appropriate for off-shift charging, are located in Manhattan, Long Island City, and Downtown Brooklyn, away from the residential neighborhoods where most FHV drivers reside, hindering opportunities for overnight and off-shift charging.

Most public chargers in the city are behind a paywall, making charging affordability a major issue for drivers. It is estimated that between 70 to 90% of the L2 chargers and 50 to 60% of the DCFC chargers in NYC are behind paywalls, either in parking garages that require paid access and/or cater to monthly customers who pay high fees, or in areas restricted to customers or members of certain establishments that may require incurring costs.

5. NYCDOT AND TLC ARE AWARE OF THE ISSUES DRIVERS FACE AND HAVE STARTED TO MOBILIZE. HOWEVER, THEIR PLANS SO FAR ARE LIMITED, LACKING SPECIFICITY AND RESOURCES.



The City has set ambitious targets for EV adoption, as well as L2 and DCFC charging infrastructure. The Electrifying New York Plan, released in September 2021 by the Department of Transportation (DOT), lays out the City's goals for a fully electrified transportation system, as part of the City's commitment to become carbon neutral by 2050. By 2030, when the Adams' administration will expect the FHV industry to be 100% zero-emissions, the City projects a scenario where 400,000 vehicles are EVs, up from 15,000 in 2021 when the City developed its EV adoption goals. To serve these EVs, the City will need 40,000 publicly accessible L2 and 6,000 publicly accessible DCFC chargers. By 2050, the City expects 1.6 million EVs, which will be served by 160,000 L2s (a 4X increase) and 60,000 DCFCs (a 10X increase).

Despite bold adoption targets, the published City plan has limitations. While the City L2 and DCFC infrastructure targets are on par with global best practices to accommodate the EV growth envisioned, the Plan has limitations, including a lack of detail on how it will be implemented, funded, and resourced.

The City expects to build 80 DCFC chargers by 2025 and 10,000 curbside L2 chargers by 2030 as well as community L2 charging lots at DOT garages, with the remaining number of needed chargers expected to be built by the private sector. Other limitations include where the infrastructure will be deployed, and how the City will ensure that the private sector has the right incentives and tools to fill the large share that is expected of them in building out a ubiquitous network of L2 chargers and hubs of DCFC chargers to serve 1.6 million EVs by 2050.

The Taxi and Limousine Commission (TLC) has echoed some of these issues and concerns. In the recent Charged Up! TLC report, the agency accurately identifies the issues that FHV drivers face to convert to EVs and includes a broad list of recommendations. However, the TLC has limited ability to propel the transition with the necessary direct investment and incentives for lowering the costs of accessing EVs and expanding the availability and affordability of charging infrastructure in adequate locations. These tasks will require coordination and bold actions from a broad range of City agencies, utilities, impacted communities, and private sector actors.

6. THIS STUDY OUTLINES A SERIES OF POLICY RECOMMENDATIONS FOR HOW TO ADDRESS THESE CHALLENGES AND ACCELERATE THE PACE OF EV ADOPTION.

OPTIMIZE LOCATIONS AND INCENTIVES

● ○ ○ SHORT TERM

1. Identify **high-need neighborhoods** that overlap with **where FHV drivers live** to prioritize **L2 and DCFC deployment support**.

In order to support the adoption of EVs among FHV drivers in the short term, the City should prioritize the deployment of its 1,000 public L2 chargers via the DOT program in areas of the City where FHV drivers live – namely, Queens, Southern Brooklyn, and parts of the Bronx. In the long term, the City should support the deployment of residential DCFC infrastructure to enable drivers to quickly charge during off-shift hours.

● ● ○ MID TERM

2. Work with Con Edison to identify **high-volume pick up and drop off areas** in which the grid currently has **capacity to support new DCFCs**.

Areas of the City where FHV drivers require fast charging and where the grid can absorb this demand are optimal locations for lower-lift DCFC deployments and fleet hubs. TLC's Charged Up! report identifies Red Hook, Grand Concourse, Maspeth, and Jamaica, as ideal locations for future DCFC deployment. The City can work with Con Edison to evaluate grid capacity in these areas and engage with private deployment partners to install DCFC charging infrastructure.

● ● ● LONG TERM

3. Develop a **comprehensive EV infrastructure deployment plan** to strengthen coordination with Con Edison, optimizing the City's ability to achieve their **emission reduction and environmental equity goals**, and electrify the FHV fleet.

The lack of an integrated use plan that encapsulates projected locations of EV charging needs makes it difficult for Con Edison to plan for future upstream and downstream upgrades. It is an opportune time to look at the City's planning processes and incorporate evaluation of EV charging needs into such processes.

4. Leverage the new **federal funding opportunities** to direct investment to **target neighborhoods**.

There is a significant overlap in areas where FHV drivers live and those that are eligible for Justice40 programs.

6. THIS STUDY OUTLINES A SERIES OF POLICY RECOMMENDATIONS FOR HOW TO ADDRESS THESE CHALLENGES AND ACCELERATE THE PACE OF EV ADOPTION.

STREAMLINE DEPLOYMENT PROCESSES

● ○ ○
SHORT TERM

5. Streamline permitting for EV charging as part of the City's ongoing efforts to improve building processes.

The City is in the process of improving its approvals and permitting processes, as outlined in the Get Stuff Built report, announced in December 2022. The City may consider changes that have been implemented in other parts of the U.S. that are further along with EV adoption, such as California.

● ● ○
MID TERM

6. Leverage real estate assets owned/managed by public or mission-driven entities.

The City is already leveraging municipal parking lots but can expand to additional public assets including but not limited to underutilized land, rights-of-ways, streetlights, and assets of mission-driven institutions.

● ● ●
LONG TERM

7. Explore land use incentives for private developers such as additional floor-area ratio (FAR) and transferable development rights (TDRs) for new development in exchange **for low/no entry fee public chargers.**

The City could offer larger premiums for chargers that are publicly available and do not apply parking fees. The City could also use this as a lever to expand the number of chargers in high-need neighborhoods, through new developments in those areas.

6. THIS STUDY OUTLINES A SERIES OF POLICY RECOMMENDATIONS FOR HOW TO ADDRESS THESE CHALLENGES AND ACCELERATE THE PACE OF EV ADOPTION.

SUPPORT CHARGING AFFORDABILITY

● ○ ○ SHORT TERM

- 8.** Continue **targeted outreach and engagement** specific to the FHV industry.

Deeper engagements with FHV drivers are needed to better understand their charging experiences and transition concerns, as well as to effectively communicate information about EV incentive opportunities.

● ● ○ MID TERM

- 9.** Develop **driver-centric incentives** to reduce charging during peak load times, and support EV charging operators in **communicating the status of electricity prices** and charger availability with drivers.

The lack of real-time price information make costs difficult to budget for, both for EVSE operators and FHV drivers. Information about the price of electricity, as well as the incentives available to offset that price, would be beneficial to FHV drivers by helping them optimize their daily revenue, as well as provide more demand predictability for operators.

● ● ● LONG TERM

- 10.** Develop a **new pricing structure** for charging operators.

The electric vehicle industry has widely recognized that the current pricing structure for electric vehicle charging does not effectively incentivize adoption. Further collaborative analysis by stakeholders within the NYC EV ecosystem will be required to strategically and meaningfully alter pricing structures.



2 | Challenges to the EV Transition

THE CLIMATE CRISIS IS AN EXISTENTIAL THREAT FOR NYC.

Without action to drastically cut greenhouse gas (GHG) emissions, climate risks and their impacts are projected to increase in severity and frequency.

Air pollution disproportionately impacts low-income residents and residents of color. A draft of the Environmental Justice NYC Report, to be released in 2023, defines Environmental Justice Areas as those that “have been and continue to be more vulnerable to potential environmental injustices due to factors including history of systemic racism and inequitable resource distribution.” Residents of these communities are more likely to be exposed to truck routes, highways, and industrial areas, resulting in rates of respiratory illnesses that are far higher than the rest of the City.

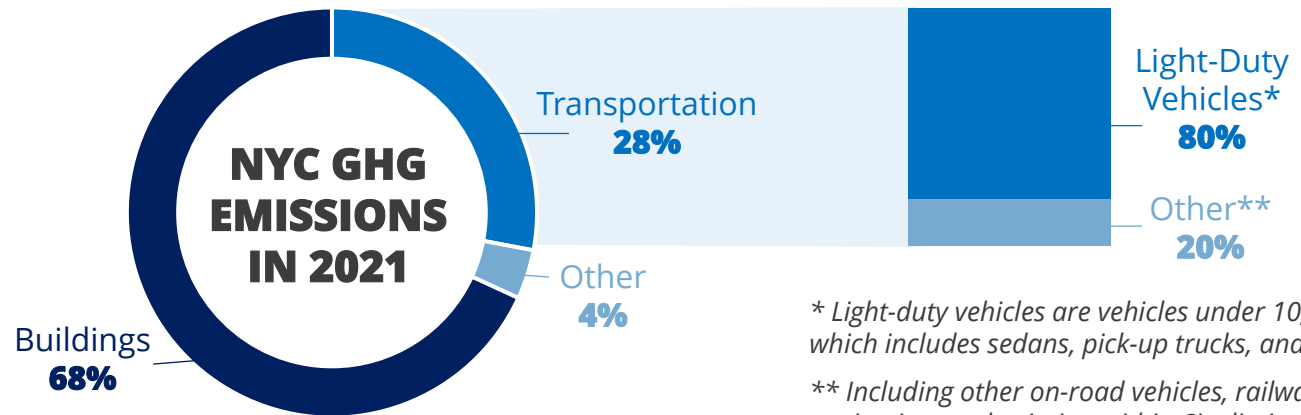
Respiratory illnesses caused by traffic-related particulate matter are estimated to kill 1,400 residents of the NYC metropolitan area each year.

Note: An updated Environmental Justice Area map is [scheduled to be released in 2023](#).

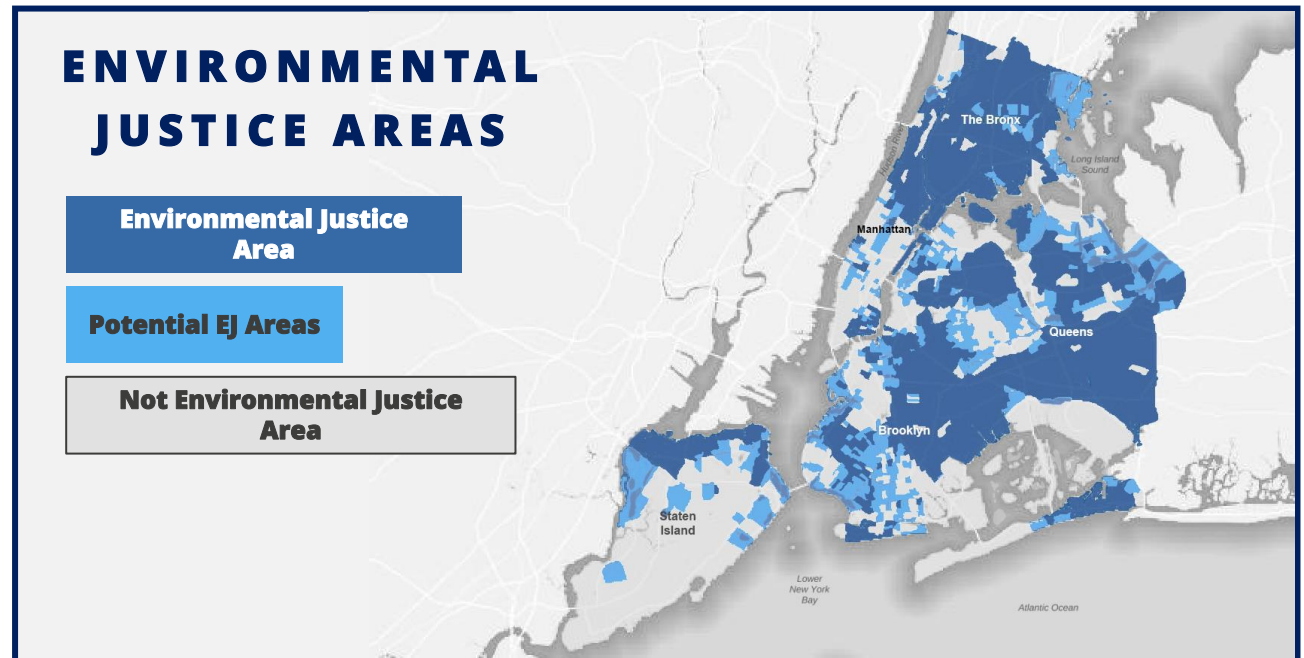
Source: Electrifying NYC (2021); TLC Charged Up (2022); [Map](#): NYC Mayor’s Office Climate and Environmental Justice (2022).

TRANSPORTATION EMITS ROUGHLY 30% OF NYC’S GHG EMISSIONS...

...AND LIGHT-DUTY VEHICLES ACCOUNT FOR 80% OF THE TRANSPORTATION EMISSIONS



* Light-duty vehicles are vehicles under 10,000 lbs., which includes sedans, pick-up trucks, and minivans.
 ** Including other on-road vehicles, railways, marine navigation, and aviation within City limits



NYC HAS SET THE GOAL OF REACHING CARBON NEUTRALITY BY 2050. EV ADOPTION IS A MAIN PILLAR OF THE CITY'S ROADMAP TO REACH THIS GOAL.

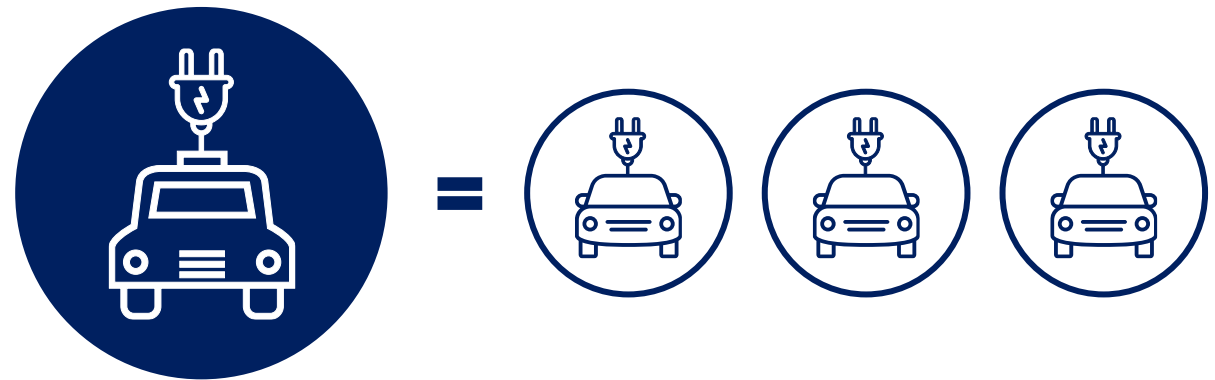
Approximately 1.5 million vehicles need to be electrified in the next three decades to cut GHG emissions from the transportation sector by 85%, while enhancing equitable access to mobility and building a stronger and fairer city.

EV ADOPTION IN THE FOR-HIRE VEHICLE (FHV) INDUSTRY CAN HELP NYC REACH CARBON NEUTRALITY FASTER.

Due to their substantial road time and mileage, it is estimated that the emissions reduction impacts of electrifying 1 rideshare vehicle is akin to electrifying 3 personal vehicles.

Source: Electrifying NYC (2021); TLC Charged Up (2022); NYC Mayor's Office Climate and Environmental Justice (2022).

TO REACH A CARBON NEUTRAL NYC BY 2050, 1.5 MILLION VEHICLES—**3 OUT OF EVERY 4 REGISTERED VEHICLES**—MUST BE REPLACED BY EVS.



FHVS HAVE AN OUTSIZED IMPACT. ELECTRIFYING 1 FHV IS AKIN TO ELECTRIFYING 3 PERSONAL VEHICLES.***

*** Data point from TLC Charged Up! (December 2022).

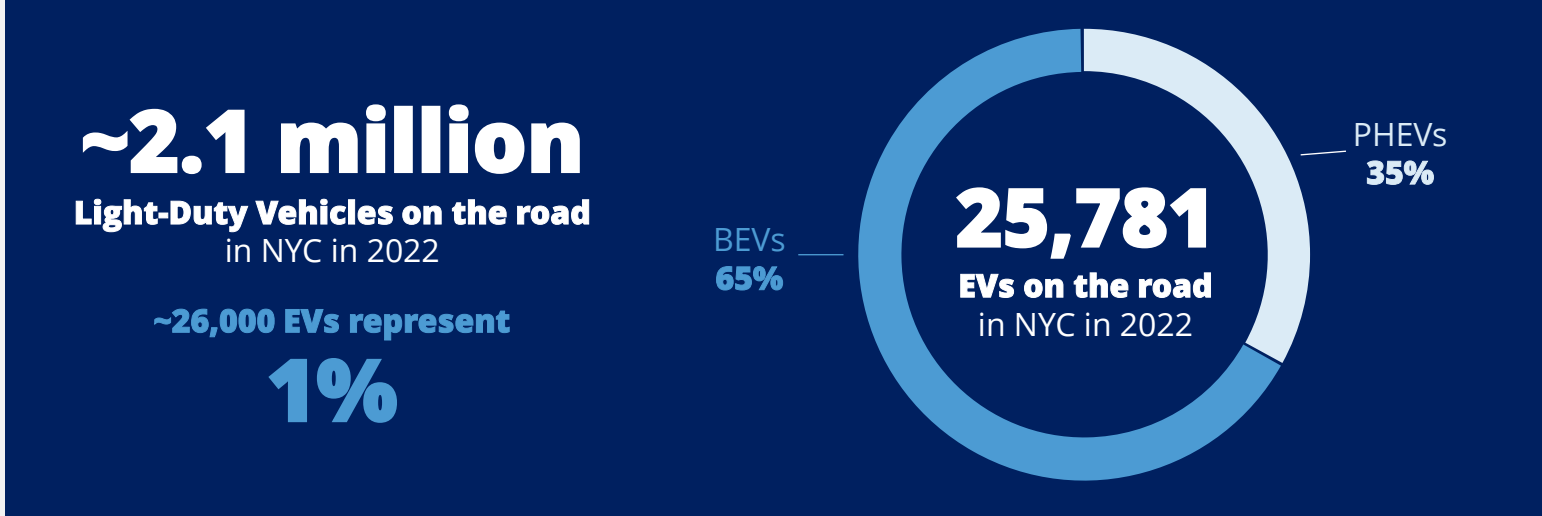
THERE ARE NEARLY
26,000 EVs IN NYC.
 THIS REPRESENTS **1%**
 OF THE NYC VEHICLE STOCK.

NYC is home to roughly 2 million light-duty vehicles.* Of these, a little over 1%, or 26,000 vehicles, are EVs as of 2022.**

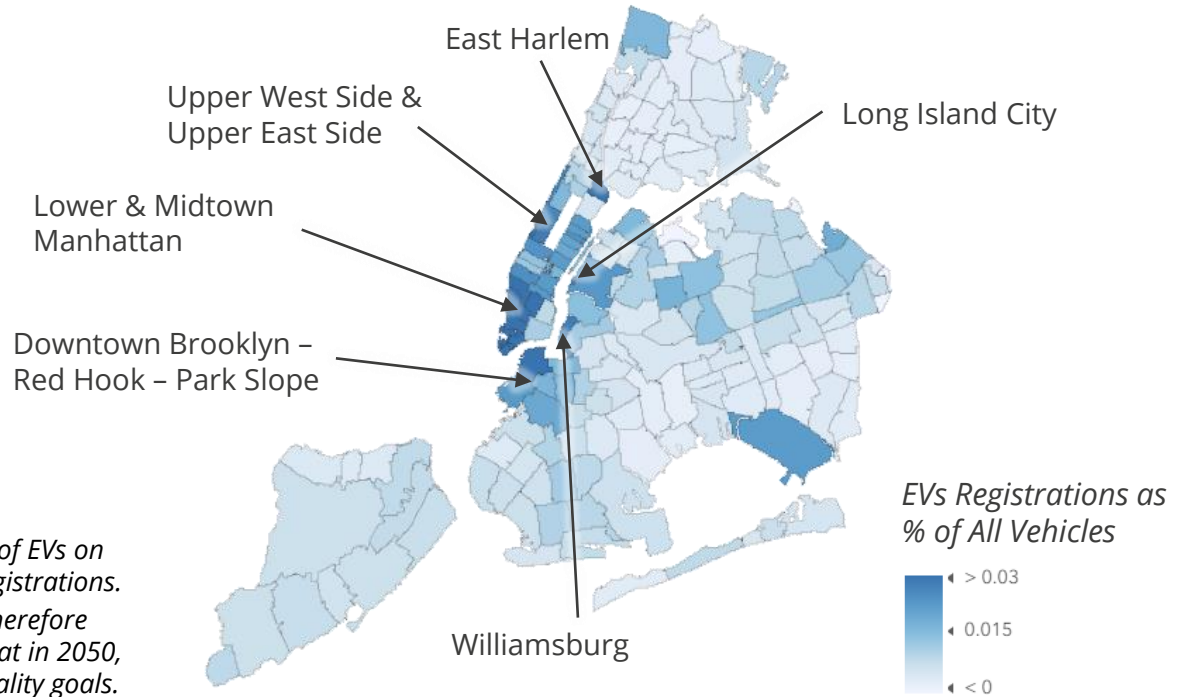
The two most common types of EVs are battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV). Almost two thirds (65%) of all EVs in NYC are BEVs, with the rest being PHEVs. In this report, the term “EV” refers to both BEVs and PHEVs, unless stated otherwise.***

EV ownership is concentrated in Midtown and Lower Manhattan, East Harlem, Downtown Brooklyn-Red Hook-Park Slope, Williamsburg, and Steinway, Elmhurst, Little Neck, as well as Long Island City – where many EV fleets are located.

*Note: * As stated in Pathways to Carbon-Neutral NYC (2021) and Electrifying NYC (2021) reports.
 ** EValuateNY uses a methodology based on DMV and external sources to estimate the number of EVs on the road. While EV registrations is one data input, EVs on the road may not be the same as EV registrations.
 ***Both BEVs and PHEVs are eligible for New York State’s Zero Emission Vehicle Credit and are therefore considered zero-emission vehicles by the City and State. The Pathways (2021) report estimates that in 2050, 60-63% of all vehicles in NYC will be BEVs and 11% will be PHEVs, to fulfill the City’s carbon neutrality goals.
 Source: Atlas Public Policy EValuateNY (December 2022 update); NY DMV data (2022).*



EVs Registrations as % of All Vehicles



EV ADOPTION IN NYC IS ACCELERATING, BUT FROM A VERY LOW BASE.

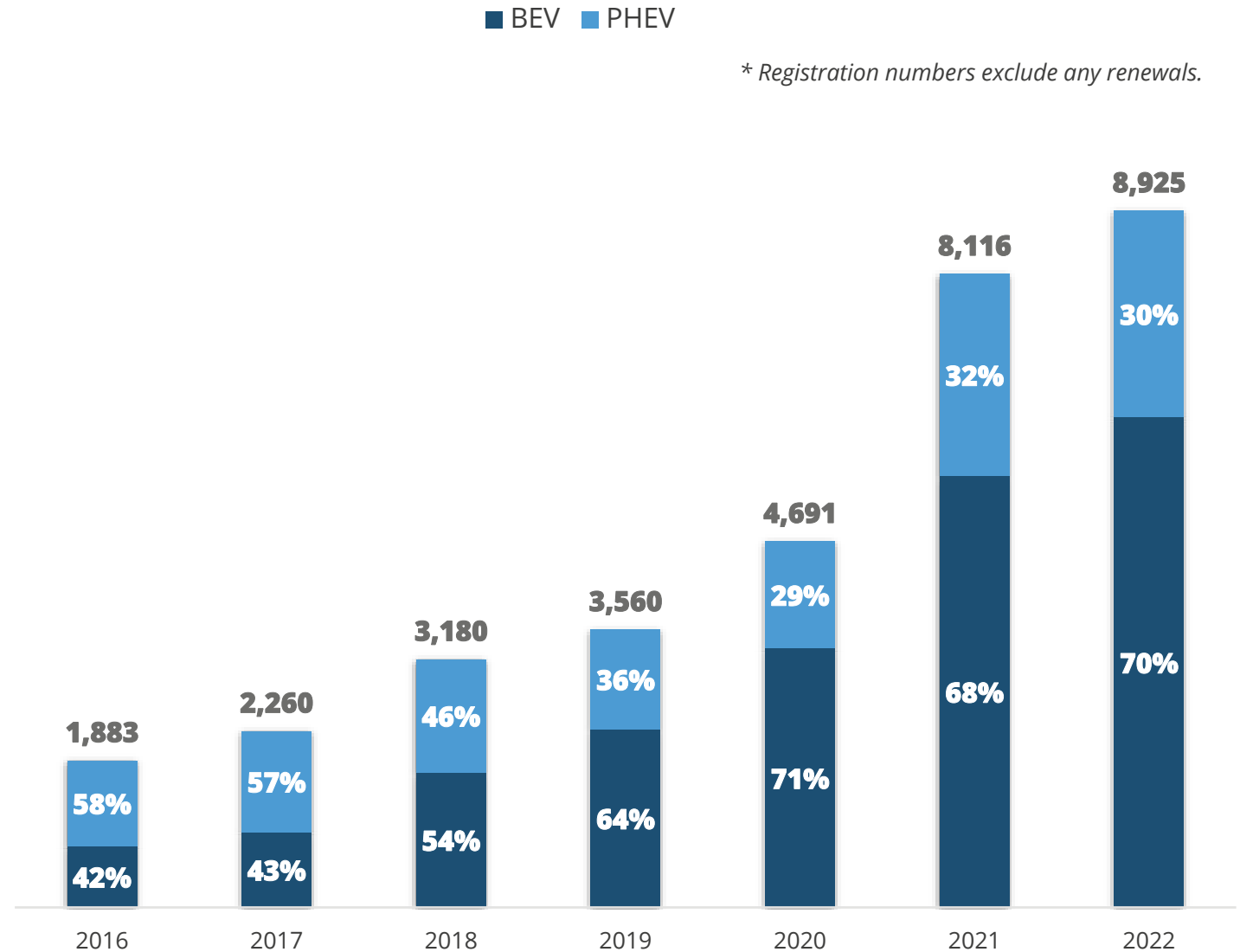
The yearly registrations of EVs in NYC have grown rapidly over the last five years, which demonstrates an accelerated pace of EV adoption. BEVs have started to lead the charge, compared to earlier years when PHEVs made up a larger share of EV sales. The EV sales in 2021 and 2022 are almost double that of 2019 and 2020.

While it is difficult to identify reliable trends in recent years due to the pandemic and the fact that EVs are a relatively nascent vehicle class, the increasing trend in sales can be attributed to a variety of factors, such as reduction in cost of buying an EV, as well as new policies and incentives at the City, State, and federal levels.

Note: Registrations are limited to light duty passenger vehicles and exclude any renewals.

Source: Atlas Public Policy EValuateNY (December 2022 update).

New Annual EV Registrations in NYC (2016-2022)*



HOWEVER, THERE IS AMPLE ROOM FOR EV ADOPTION TO GROW TO REACH NYC'S CARBON NEUTRALITY GOALS.

The share of new annual EV registrations with respect to all active vehicle registrations has grown by a factor of 10 over the last 6 years. However, when compared to all active vehicle registrations, EVs comprise only 1% of NYC's vehicle stock.

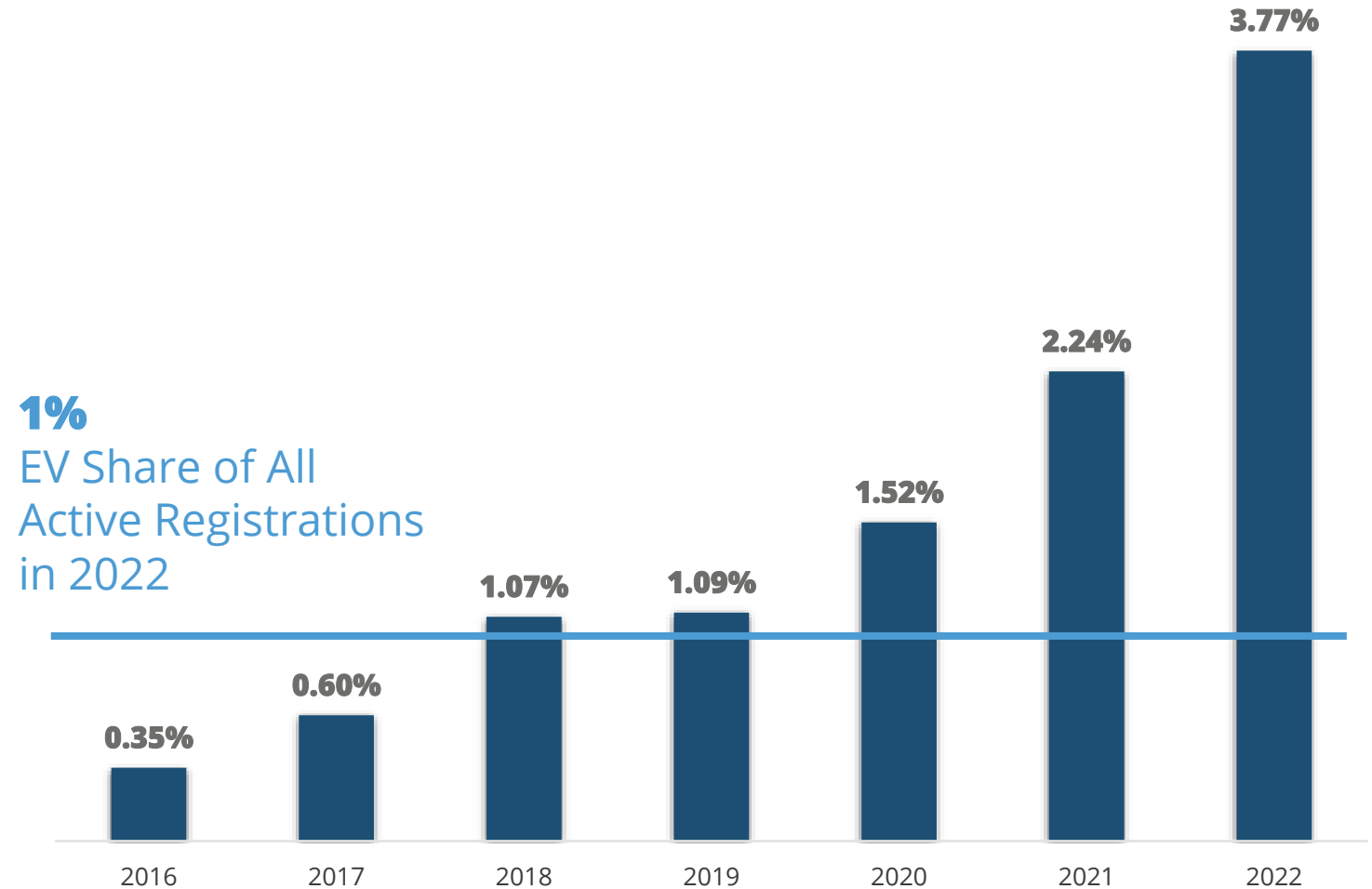
As noted in the City's Pathways to Carbon-Neutral NYC (2021) report, the pace of light-duty EV adoption must be very high, reaching 375,000 vehicles (18% of all light-duty vehicles) by 2030 and 1.5 million vehicles by 2050 (74% of all light-duty vehicles).

The current EV adoption rates fall significantly short of the rates needed to meet the City's carbon neutrality commitments. Even at the accelerated registration growth rates of the last years, the total active EVs in NYC by 2030 and 2050 would be about half of what the City envisions.

Source: Pathways to Carbon-Neutral NYC; Atlas Public Policy EvaluateNY (December 2022 update).

EV Share of New Registrations in NYC (2016-2022)*

* Registration numbers exclude any renewals.



1%
EV Share of All
Active Registrations
in 2022

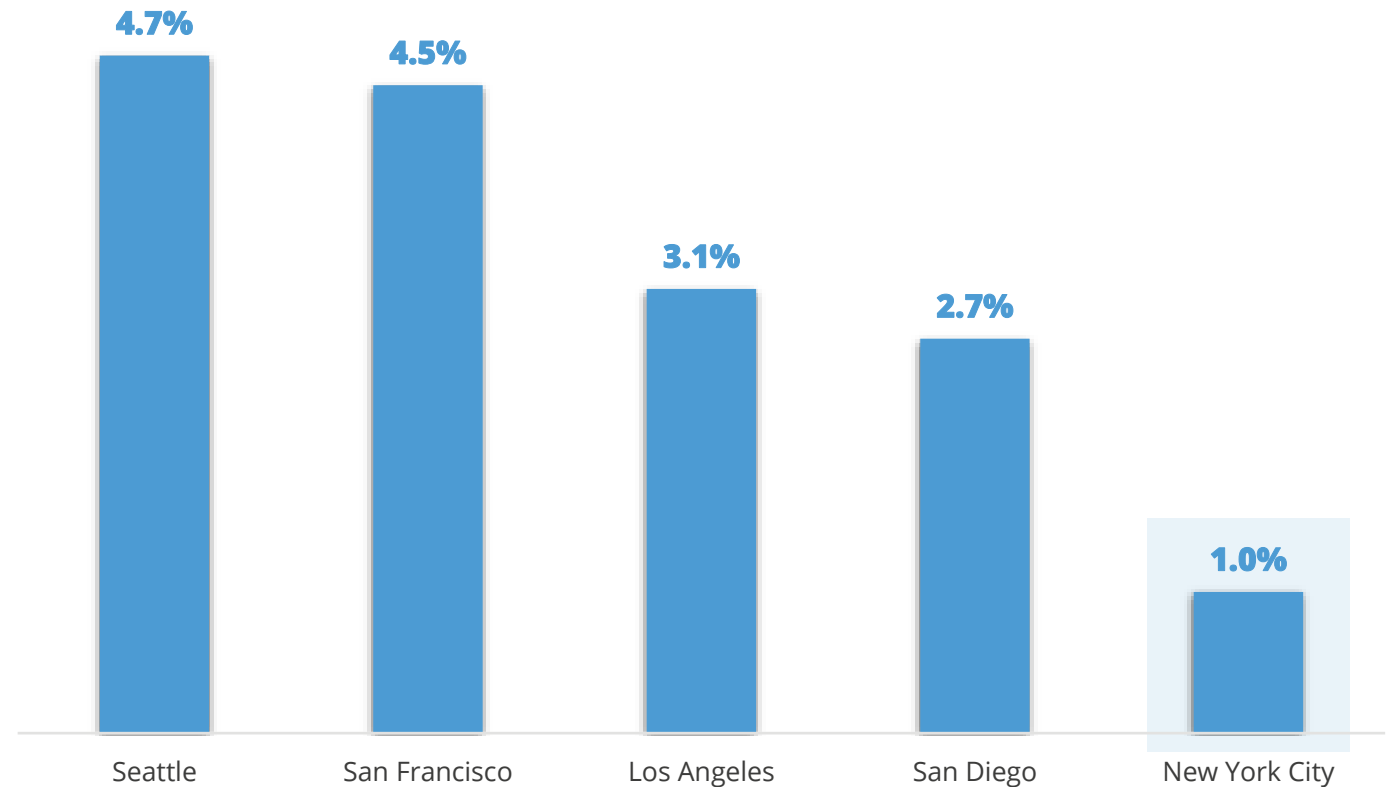
NYC IS LAGGING IN EV ADOPTION COMPARED TO OTHER U.S. CITIES.

In addition to the fact that the pace of EV adoption in NYC is inadequate to reach the City's short- and long-term carbon neutrality goals, NYC is also slower than its peer cities in the U.S.

EV adoption in cities on the West Coast is 3 to 5 times higher than in NYC, with EVs constituting approximately 3%-5% of all vehicles in those cities, compared to NYC's 1%.

If current trends continue, the gap between NYC and other U.S. cities is set to increase. While EVs make up almost 4% of light-duty vehicles sold in NYC (as described in the previous page), EV sales now surpass 10% of all light-duty vehicles across the U.S. In California, zero-emission vehicles made up almost 18% of new vehicles sold from January through September 2022.

EVs' share of all Active Vehicle Registrations in West Coast Cities and NYC (2022)*



Source: [U.S. Energy Information Administration](#); [California Energy Commission](#); [Center for Sustainable Energy](#); CA, NY and WA DMV data.

* The city boundaries at ZIP code level used for data aggregation are summarized in the Appendix. These cities are selected based on data availability. Registrations are limited to light duty passenger vehicles and exclude any renewals.

EV ADOPTION IN NYC'S FOR-HIRE VEHICLE (FHV) INDUSTRY IS EVEN SLOWER THAN THE CITYWIDE RATES.

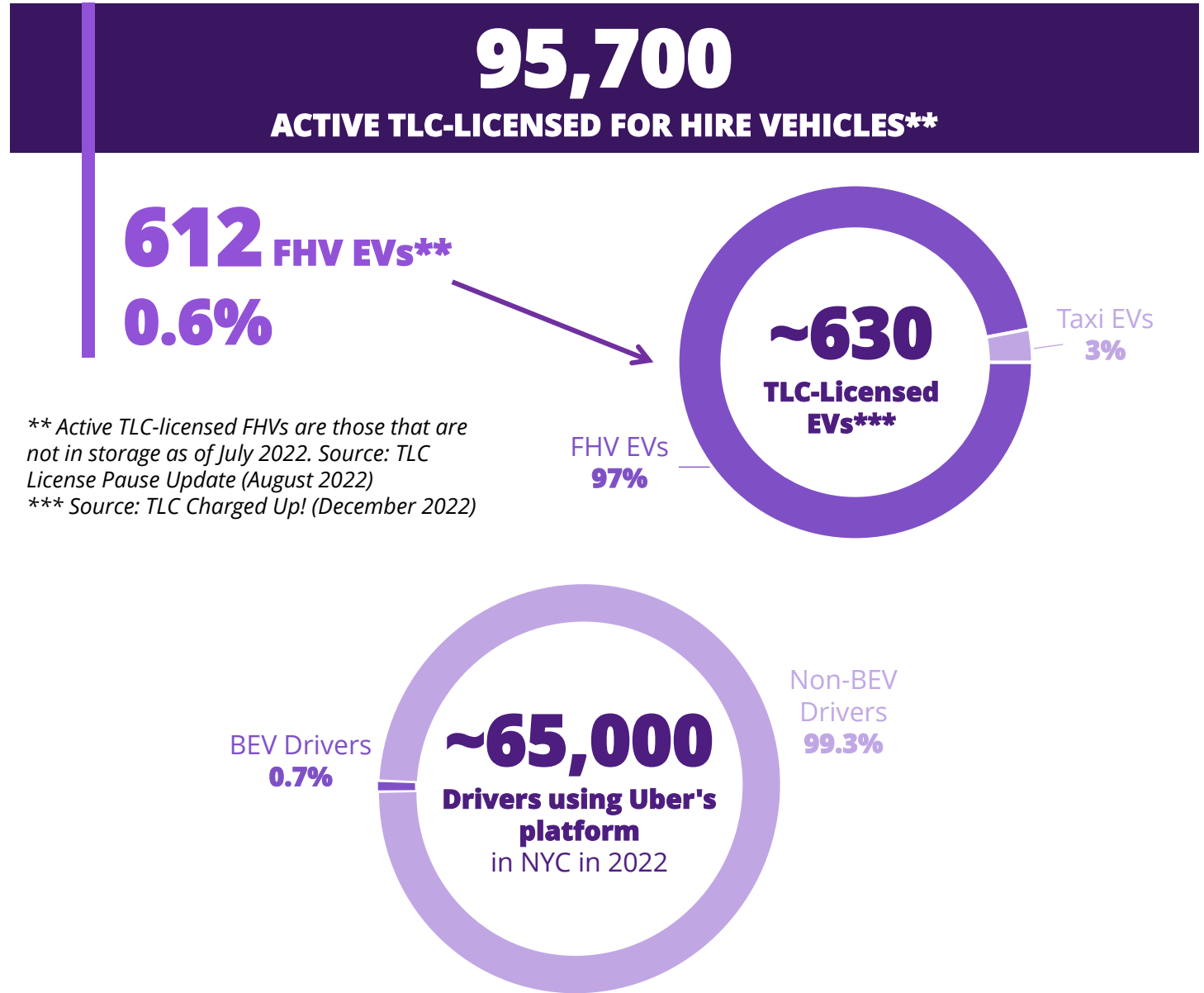
In 2022, there were approximately 95,700 active TLC-licensed FHVs in NYC*, of which less than 1%, or 612, are EVs. The 612 TLC-licensed FHV EVs constitute 97% of all TLC-licensed EVs, with the remaining 3% in the taxi industry.

With an EV adoption rate of less than 1%, the FHV industry is lagging the already slow EV adoption rate of NYC.

Uber's data on drivers on the Uber platform also confirms similar trends regarding FHV drivers: fewer than 1% of the drivers on the Uber platform in NYC use EVs.

**There are four classes of FHV service in NYC: Community Cars (aka Liveries), Black Cars, Luxury Limousines, and High Volume For-Hire Services (HVFHS). HVFHS businesses are those that currently dispatch or plan to dispatch more than 10,000 FHV trips in NYC per day under a single brand, trade, or operating name. The two HVFHS companies in NYC are Uber and Lyft. As of May 2022, there are 71K active HV FHVs licensed under TLC.*

Source: TLC License Pause Update (August 2022); TLC Charged Up! (December 2022); Uber data (2022).



NYC HAS THE LOWEST SHARE OF VEHICLE MILES TRAVELED USING EVS ON UBER'S PLATFORM OF MAJOR U.S. CITIES.

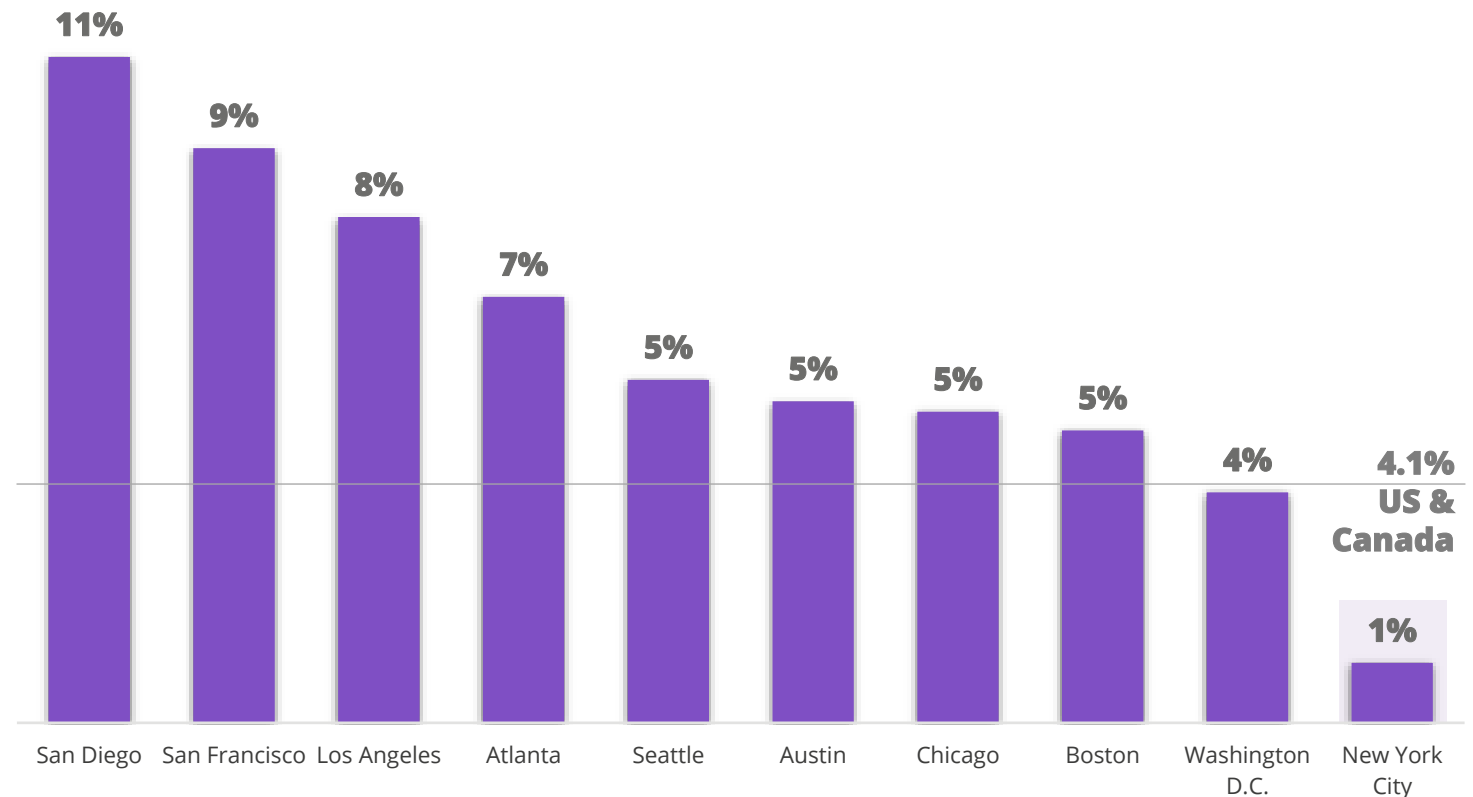
Californian cities have almost 10 times more share of Uber miles on BEVs compared to NYC.

As part of its commitments to zero-emissions by 2030, Uber teamed up with Hertz Global in 2021 to make 50,000 Tesla vehicles available to rent to drivers using the platform in cities across the U.S. by 2023, as well as 25,000 in Europe. The program has resulted in a significant increase in the use of EVs by drivers in the Uber platform in those cities where Tesla vehicles are available. Given TLC license restrictions, this program is not yet available for drivers in NYC.

Note: The chart includes drivers with residence (as per their driver's licenses) in respective cities in Q3 2022.

Source: Uber (2022).

BEV Miles as Share of all Vehicle Miles on Uber trips, by Cities (Q3 2022)





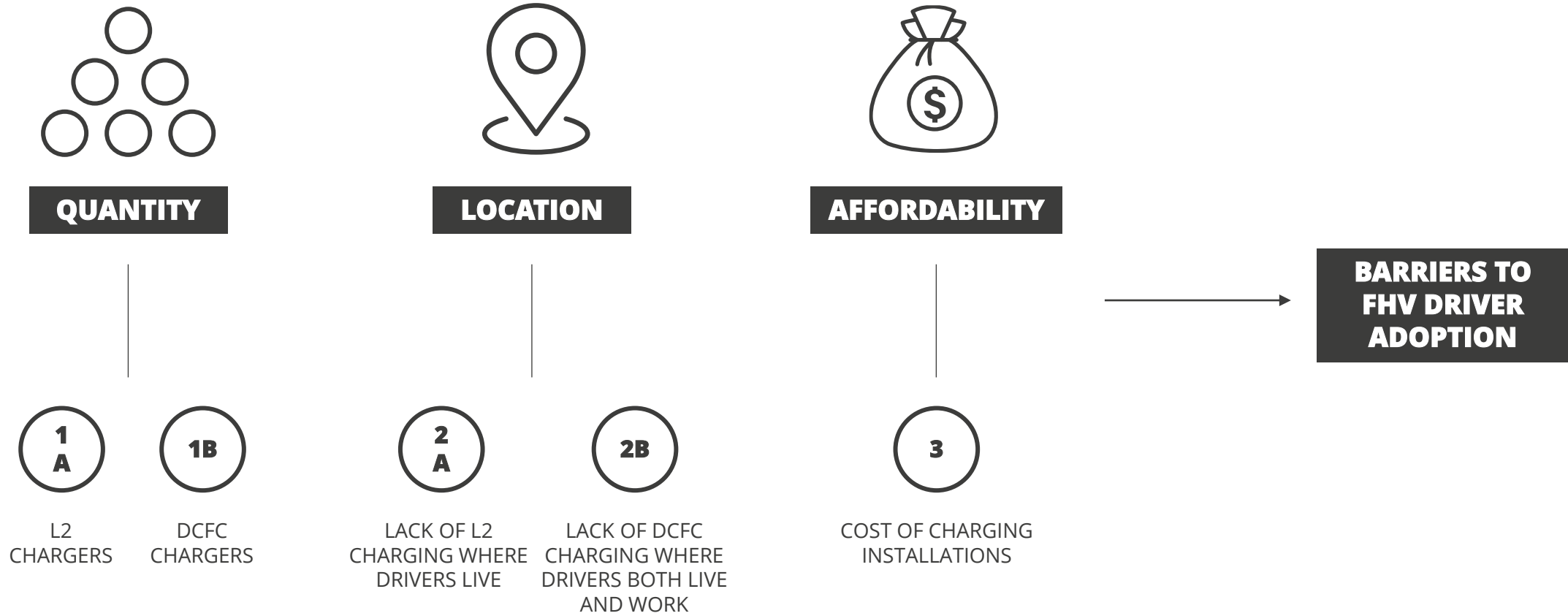
ACKNOWLEDGING THAT ACCESS TO VEHICLES IS A PIVOTAL COMPONENT TO THE EV TRANSITION, THIS REPORT WILL FOCUS ON INFRASTRUCTURE-BASED BARRIERS TO AND RECOMMENDATIONS FOR THE EV TRANSITION AMONG FHV DRIVERS.

EVs and EV charging infrastructure are highly dependent on one another. As the number of EVs increases, the demand for EV charging infrastructure increases, amortizing the cost of installation as well as the cost of electricity.

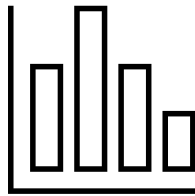
Policy measures directly addressing the needs of FHV drivers who are considering transitioning to EVs (such as upfront financing and range requirements), will be a crucial component to electrification. Specific incentives and policies supporting vehicle adoption should be explored and analyzed within the NYC context.

An important consideration to FHV drivers specifically is whether they own (or lease-to-own) or whether they rent the vehicle used for work. The impact of this difference in ownership is detailed in the appendix of this report but will not be centered in the analysis of driver considerations. The report will instead focus on infrastructure-based impacts on drivers.

A BROAD TRANSITION TO EVs BY THE FHV INDUSTRY IN NYC IS HINDERED BY SEVERAL CHALLENGES WITH THE CITY'S EV CHARGING INFRASTRUCTURE.

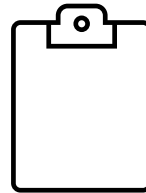


THIS REPORT DRAWS ON THREE PRIMARY SOURCES OF INFORMATION FOR DISCUSSION AND RECOMMENDATION.



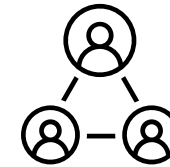
DATA &

Publicly available data and reports on the EV ecosystem and EV adoption, as well as data from Uber about their fleet and drivers on their platform, inform the status quo and identify infrastructure-based challenges for transitioning to EVs.



UBER SURVEY

Uber launched an Electric Vehicle survey in December 2022 for all drivers in NYC using Uber's platform, which was used to understand specific issues that EV FHV drivers face, as well as the concerns of non-EV drivers considering transitioning to an EV.



INTERVIEWS

HR&A conducted interviews with key stakeholders in NYC that influence or are influenced by the EV transition. The interviews focused on understanding the policies required to support EV transition among FHV drivers.



2.1 | Challenges : Quantity

EVS ARE SUPPORTED BY TWO MAIN TYPES OF CHARGERS, LEVEL 2 (L2) AND DIRECT CURRENT FAST CHARGING (DCFC), EACH WITH DIFFERENT USE CASES.



LEVEL 2 CHARGING (L2)

Charge Time and Range

150 miles of range in 5-6 hours of charging time (i.e., almost all BEVs can fully charge overnight)

Use Cases

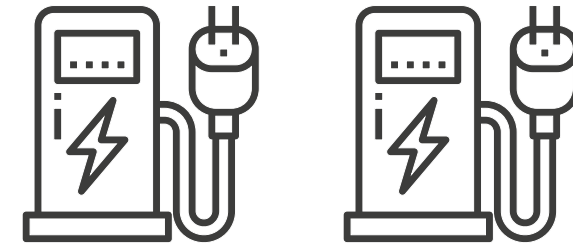
General: At/near home or work, or public destination.
FHV: Off-shift, and particularly overnight parking, near driver's homes.

Location

Home, work, curbsides, parking lots, and public destinations where extended parking is possible

Electricity Needs and Cost

Requires 240V (residential) or 208V (commercial) outlets, the same as standard clothes dryers. Does not put substantial pressure on the electrical grid beyond regular residential or commercial use.



DC FAST CHARGING (DCFC)

150 miles of range in 15-60 minutes (varies depending on the kW rating of the DCFC and the EV's charging capabilities)

General: Fast charging to top off. Crucial to reduce range anxiety.
FHV: Charging during shift with minimal opportunity cost. Charging directly before or after the shift (if EV is leased). Primarily needed at bases and garages, and where drivers work. Also needed where drivers live or park.

Commercial destinations, parking lots, along highways, airports

480V DC electrical connection, generally requiring substantial electrical grid capacity (and DCFC installations may require grid upgrades). Costs substantially more than L2s, which makes them exclusively commercial options.

NYC SIGNIFICANTLY LAGS BEHIND OTHER CITIES IN THE QUANTITY OF PUBLICLY AVAILABLE EV CHARGERS.*

NYC has about 1,800 L2 and 200 DCFC chargers, at a ratio of 16 EVs per charger. It lags, in relative terms, behind most major U.S. cities and even in absolute numbers, it lags peer cities such as Chicago, San Francisco, Los Angeles, Boston, Washington DC, and Seattle.

* Unless stated otherwise, the term “EV chargers” in this report is used to refer to “publicly available EV chargers” and excludes private EV chargers (including at-home L2 chargers).



QUANTITY



LOCATION

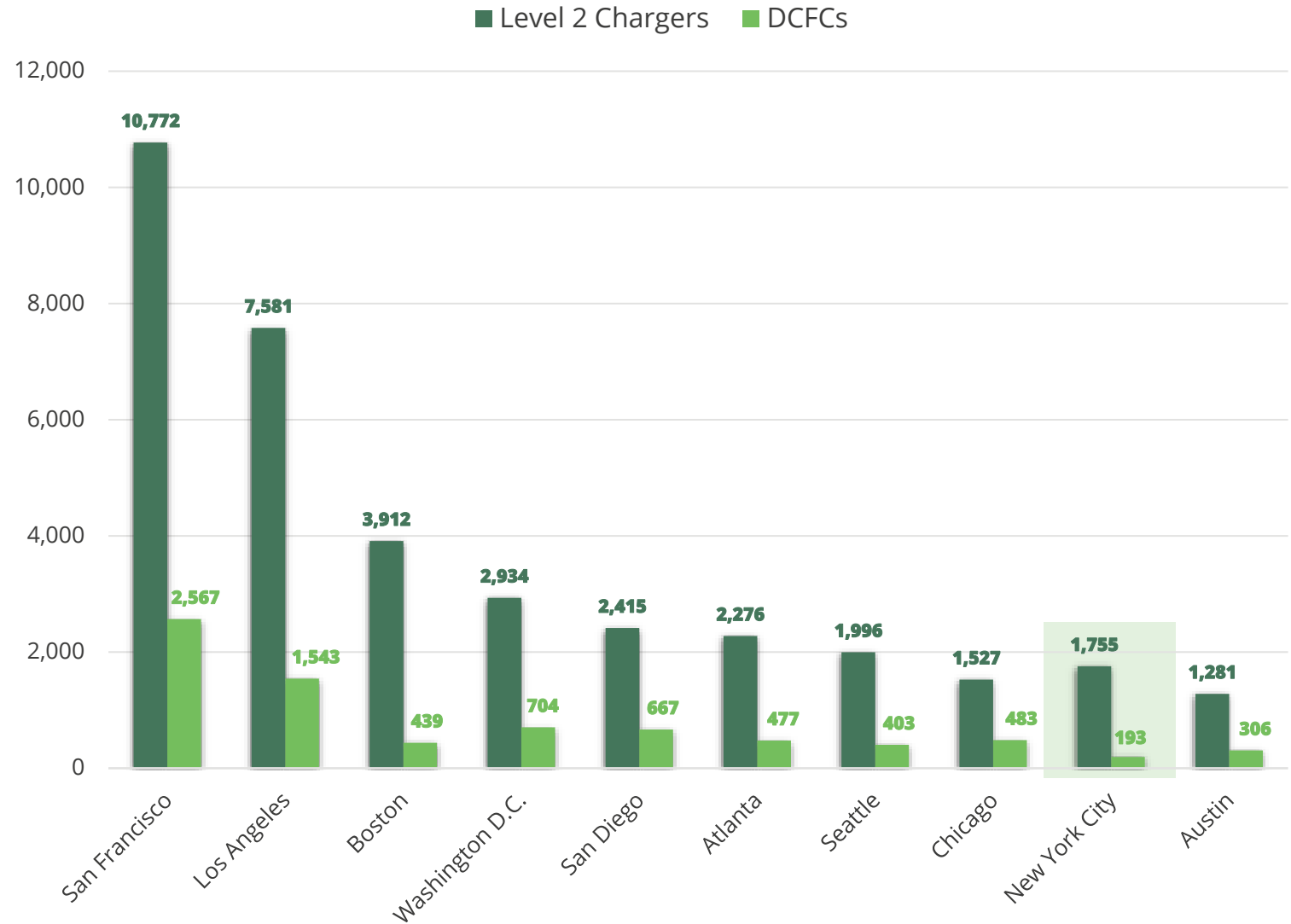


AFFORDABILITY

Note: The city boundaries at ZIP code level used for data aggregation are summarized in the appendix.

Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations (December 2022).

Publicly Available EV Chargers in U.S. Cities (2022)



NYC ALSO LAGS BEHIND IN THE RATIO OF EV CHARGERS TO ALL VEHICLES.

If all the vehicles in NYC were to become electric, there will be only 1 charger to support about 1,250 vehicles. This ratio is almost 3 times that of San Francisco and 2.5 times that of Seattle.

This is the opposite of the vehicle ownership trend in these cities. NYC has one of the lowest vehicle ownership rates in the country: there are about 0.6 vehicles per household. In comparison, there are 0.9 vehicles per household in Seattle, 1.8 in San Francisco, and 1.9 in both San Diego and Los Angeles.



QUANTITY



LOCATION



AFFORDABILITY

Note: Registration are limited to light duty passenger vehicles and exclude any renewals.

Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations (December 2022), CA, NY and WA DMV data, American Community Survey 5-year estimates (2021)

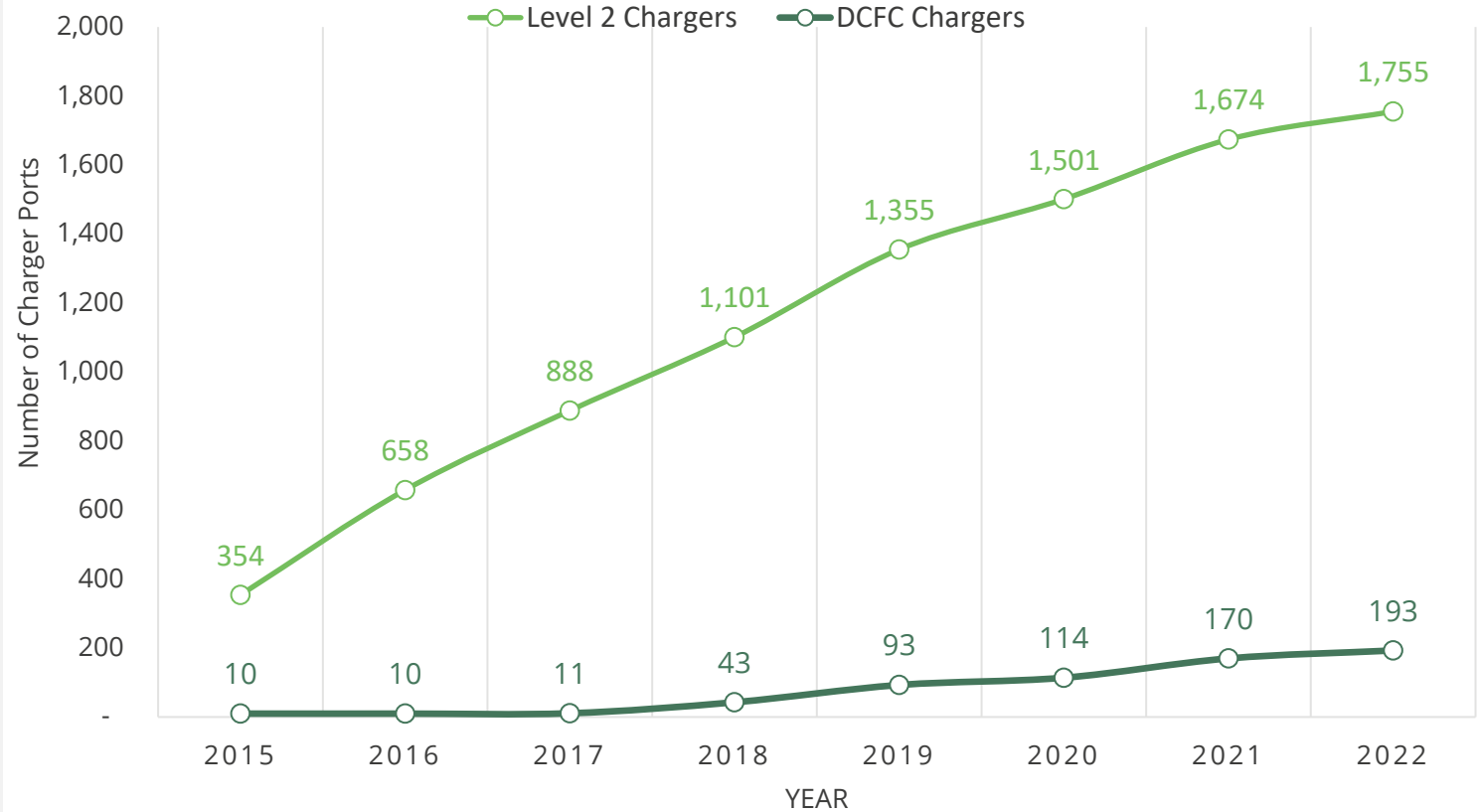
Active Vehicle Registrations (all fuel types) per EV Charger in West Coast Cities and NYC (2022)



THE NUMBER OF EV CHARGERS IN NYC IS INCREASING.

Over the last 5-years, the amount of L2 chargers has doubled, and the amount of DCFC chargers has grown from 11 to 193 (a 17.5x increase), bringing the total L2 chargers count close to 1,800 and the DCFC amount close to 200.

Growth of EV Chargers in NYC (2015-2022)



QUANTITY



LOCATION



AFFORDABILITY

Note: EValuateNY data is updated less frequently compared to the NREL data, hence the 2022 numbers are derived from NREL.

Source: Atlas Public Policy, EValuateNY (December 2022 update), National Renewable Energy Laboratory (NREL), Alternative Fuel Stations (December 2022).

A NATIONAL RENEWABLE ENERGY LABORATORY (NREL) STUDY FOUND THAT ~1,000 DCFC PORTS ARE NEEDED TO SUPPORT 21K EV FHVS IN NYC IN 2025

Based on projections of FHV trip demand and EV adoption, the study assumes for calculation purposes a fleet of 21,000 FHV EVs in NYC by 2025 (22% of the current total of FHVs). It then demonstrates that these FHV EVs will need DCFC ports for drivers to charge during shifts, even with overnight charging near or at homes.

This estimation of 21,000 FHV EVs is a less ambitious target for fleet electrification than the goals communicated by both the City and HVFHS companies. Thus, the estimated charger numbers in this report are illustrative of the relationship between quantities of charger types, rather than the amount of charging needed to achieve a higher level of fleet electrification.



QUANTITY



LOCATION



AFFORDABILITY

NREL analyzed the need for publicly-accessible DCFC charging for the FHV industry and found that DCFC charging needs change given the amount of available overnight charging*. Given different levels of access to home overnight charging, the HVFHV industry would need between 367 and 1,054 DCFC chargers located in areas with the highest trip density – namely, Midtown and Downtown Manhattan. The most optimistic scenario, Home Charging for All, requires 367 DCFC chargers, 171 more than the 193 chargers that exist in NYC today (not accounting for the non-FHV demand on DCFC chargers).

DCFC charging network size necessary to accommodate 21,211 FHVs affiliated with HVFHS in NYC

Scenario	Share of Vehicles with Overnight Charging Access	Number of L2 Chargers	Number of DCFC Ports Needed
Business-as-Usual	15%	3,176	1,054
Residential Investment	45%	9,540	806
Home Charging for All	100%	21,121	367

Note: *This study assumes that in the Home Charging for All scenario, all home chargers are at private residences. The analysis is meant to focus on the relationship between overnight access, generally, and DCFC needs.

Source: National Renewable Energy Laboratory (NREL), *Electrifying New York City Ride-Hailing fleets: An examination of the need for public fast charging* (2022)

PUBLICLY AVAILABLE EV CHARGERS IN NYC ARE SUBJECT TO DIFFERENT FEE STRUCTURES, LEADING TO VARYING DEGREES OF ACCESSIBILITY.

70% OF CHARGING STATIONS IN NYC ARE BEHIND HIGH PAYWALLS.

EV chargers behind paywalls, such as high parking fees, are often not feasible options for FHV drivers. Of the 601 EV charging stations in NYC, 66% are privately owned* and usually charge expensive parking fees on top of power usage fees. In our analysis, such privately owned chargers are considered “high entry fee”.

For all the non-private chargers in NYC, whose ownership and pricing information was largely unavailable from the AFDC data, we used PlugShare’s crowdsourced data on usage fees. Most non-private chargers are behind relatively low or no parking fees and are considered “low/no entry fee” in our analysis**. The small portion of chargers whose fee and price information was not available on PlugShare is assumed to be similar to other non-private chargers.



QUANTITY



LOCATION

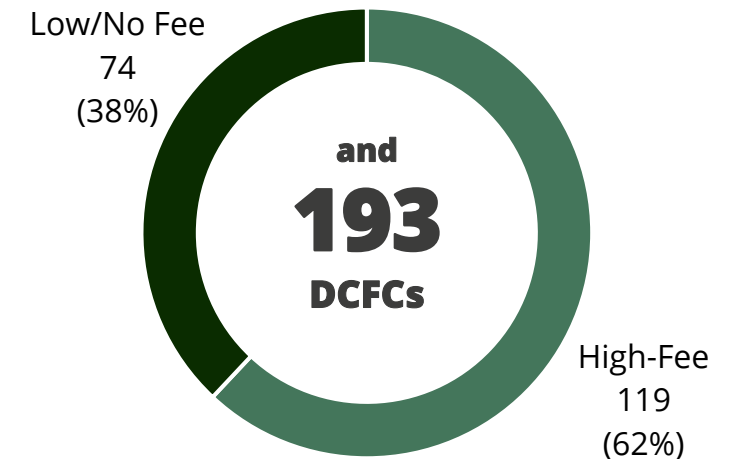
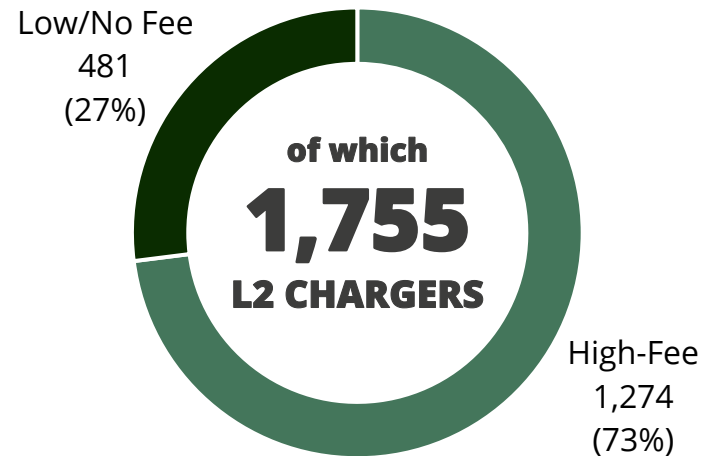
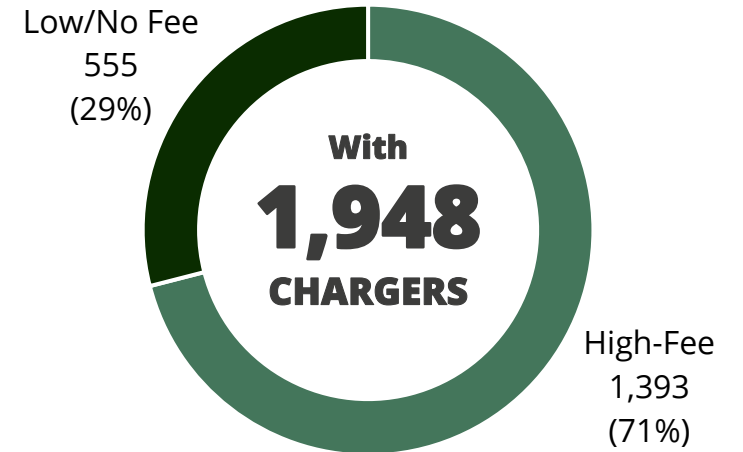
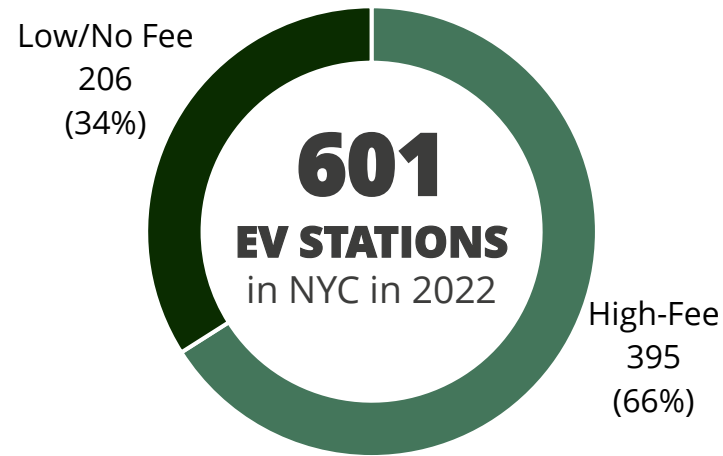


AFFORDABILITY

Note: * See Appendix for details on ownership.

** The cut off point for low fee vs. high entry fee was determined based on the parking fees in NYC DOT garages.

Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (2022); Plugshare (2022).





2.2 | Challenges : Location

WHAT DO FHV DRIVERS NEED FOR EV ADOPTION?

Affordable access to charging during off-shift hours – To transition to EVs, ride-hailing drivers will need access to L2 overnight/off-shift charging at or near their homes, which is the most affordable charging method, but a challenge for many drivers who rent their homes or live in multifamily housing. Currently, while most FHV drivers use on-street parking, most FHV drivers with EVs park in garages at their residences, indicating that EVs may be a less feasible option if drivers use on-street parking.

Affordable and convenient access to fast charging – 71% of FHV EV drivers need to charge their batteries multiple times a day. Access to low/no entry fee DCFC charging near where FHV drivers work (e.g., Midtown, Lower Manhattan, airports), and where rental fleets are stored, is crucial to minimize the driver's opportunity cost of charging and reduce range anxiety. DCFCs near driver residences are also important for pre- and post-shift charging.

Affordable access to EVs – Although FHV drivers are aware of the benefits of EVs, the high upfront costs remain the biggest perceived barrier to EV adoption, followed by concerns related to charging.

A LACK OF CONVENIENT ACCESS TO LOW/NO ENTRY FEE CHARGERS IS THE BIGGEST CONCERN AMONG BEV FHV DRIVERS.

- The convenience of charging is the most important factor among current BEV FHV drivers, indicating that the location of low/no entry fee charging stations plays a significant role in their workdays. Creating more publicly accessible low/no entry fee charging stations near where drivers live and work, would reduce the amount of logistical planning needed for an FHV driver to use an EV.
- The importance of the time needed to charge also indicates that the convenience of low/no entry fee fast chargers is particularly important to this group of FHV drivers.



QUANTITY



LOCATION

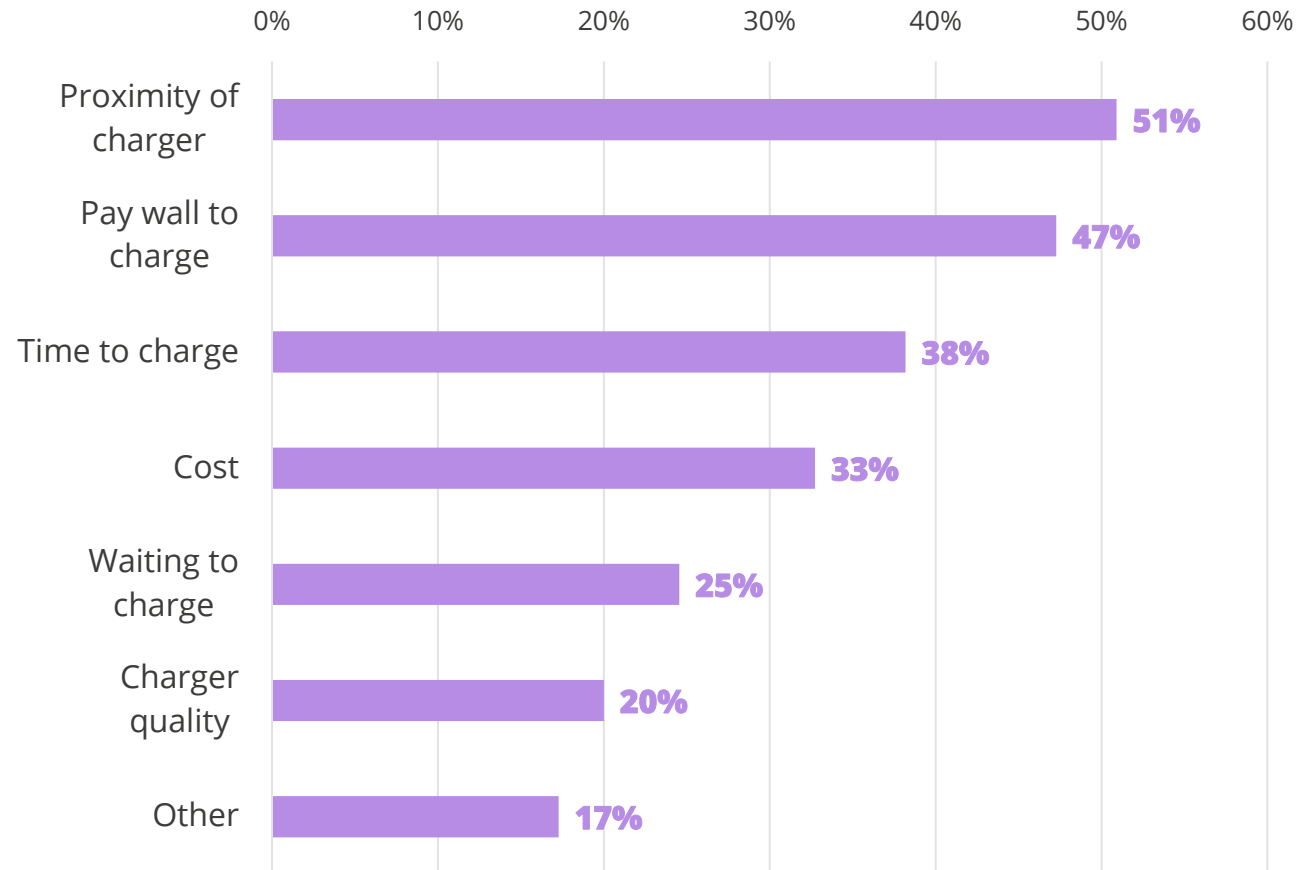


AFFORDABILITY

Source: Uber survey (2022).

Note: The survey sample size consists of 110 EV drivers and 2,666 non-EV drivers in NYC.

What do you care most about when charging?
(BEV drivers, Select all that apply)



WHILE THE MAJORITY OF FHV DRIVERS USE ON-STREET PARKING, MOST FHV DRIVERS WITH EVs PARK IN GARAGES AT THEIR RESIDENCE.

- The portion of FHV drivers who use their residential driveways, garages, and parking lots is larger among BEV drivers than non-BEV drivers. This shows that the existing BEV drivers, who can be considered early adopters, are likely relying on overnight charging at their residences, which may not be as easily available for those who use on-street parking.
- The fact that the majority of non-BEV FHV drivers use street parking indicates that curbside L2 charging, especially in neighborhoods with a large concentration of FHV drivers, is essential for widespread EV adoption within the FHV industry.



QUANTITY



LOCATION

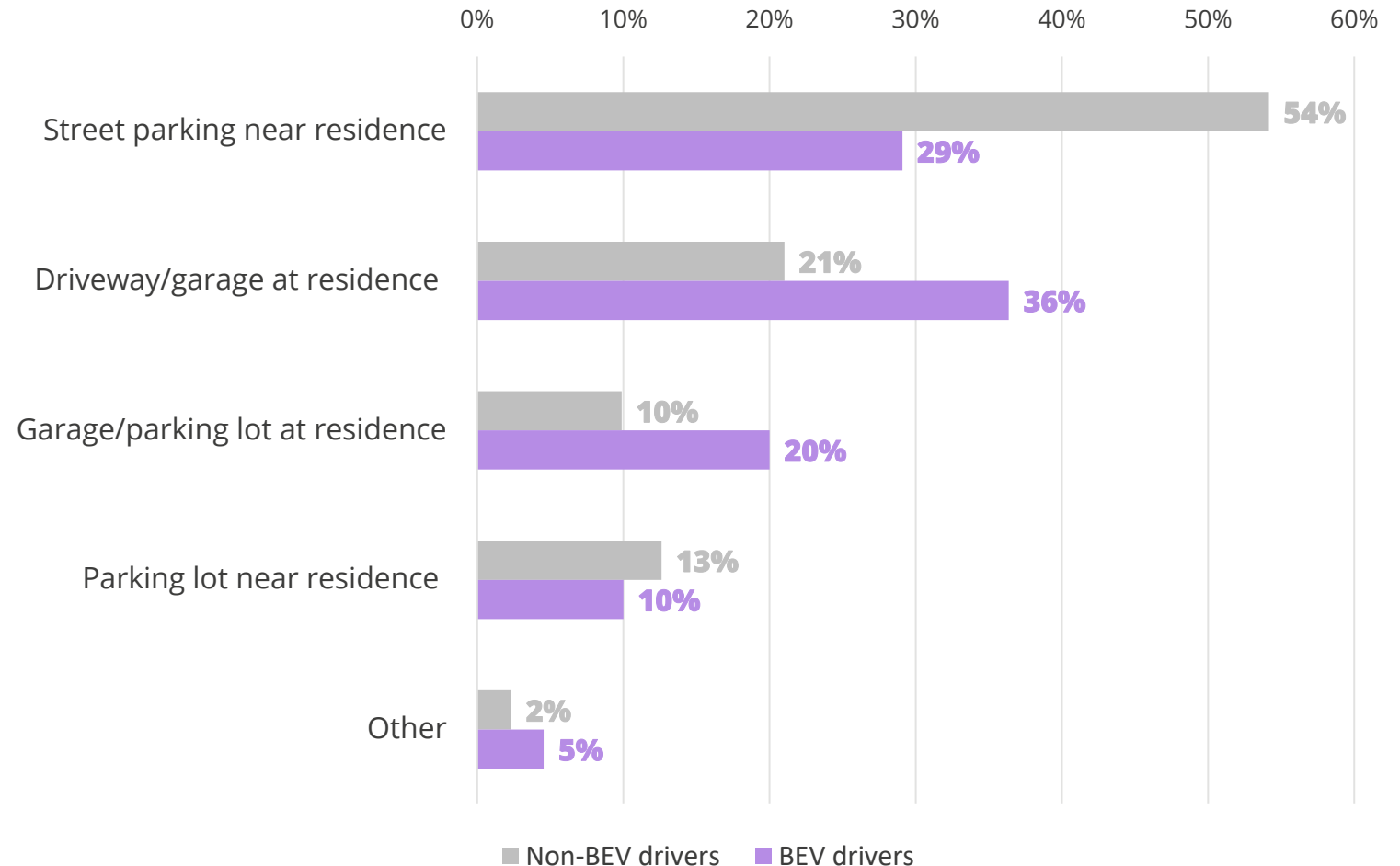


AFFORDABILITY

Source: Uber survey (2022).

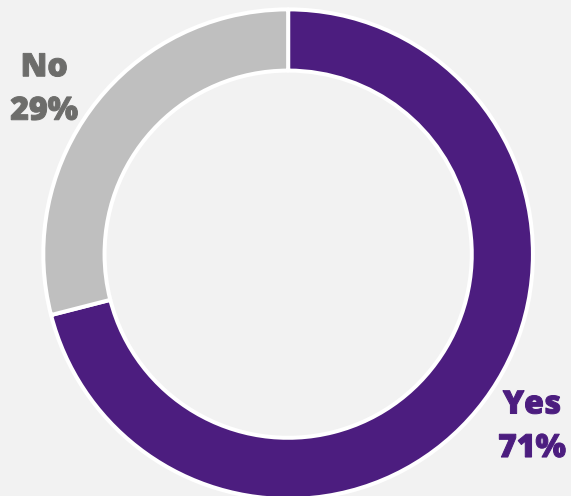
Note: The survey sample size consists of 110 EV drivers and 2,666 non-EV drivers in NYC.

Where do you primarily park your vehicle at night?



71% OF FHV BEV DRIVERS NEED TO CHARGE THEIR BATTERIES MULTIPLE TIMES A DAY. THE MAJORITY (54%) RELY ON DCFCs AS THEIR PRIMARY CHARGING OPTION, FOLLOWED BY LEVEL 2 AT HOME.

Do you need to charge your battery more than once a day?



QUANTITY



LOCATION

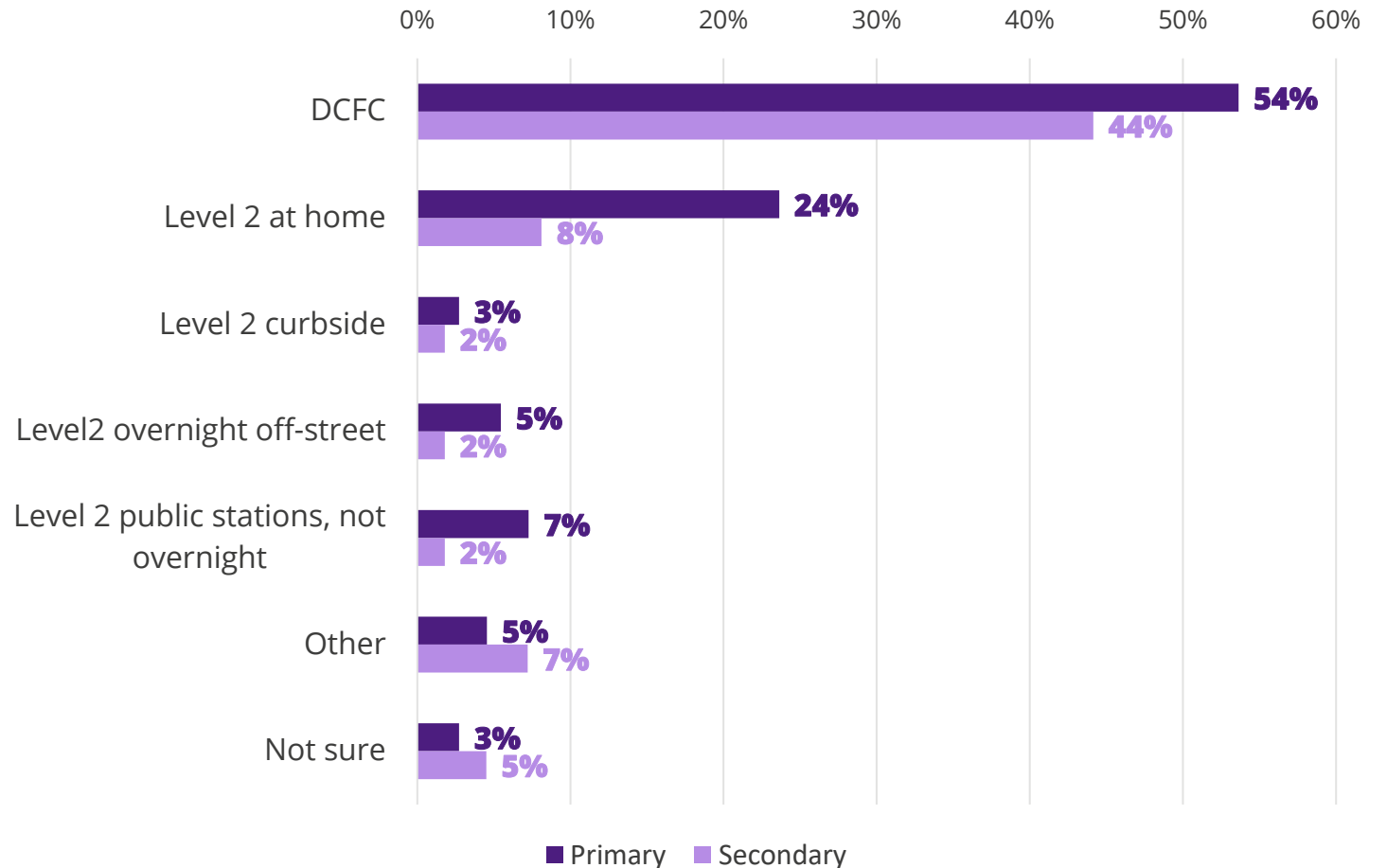


AFFORDABILITY

Source: Uber survey (2022).

Note: The survey sample size consists of 110 EV drivers and 2,666 non-EV drivers in NYC.

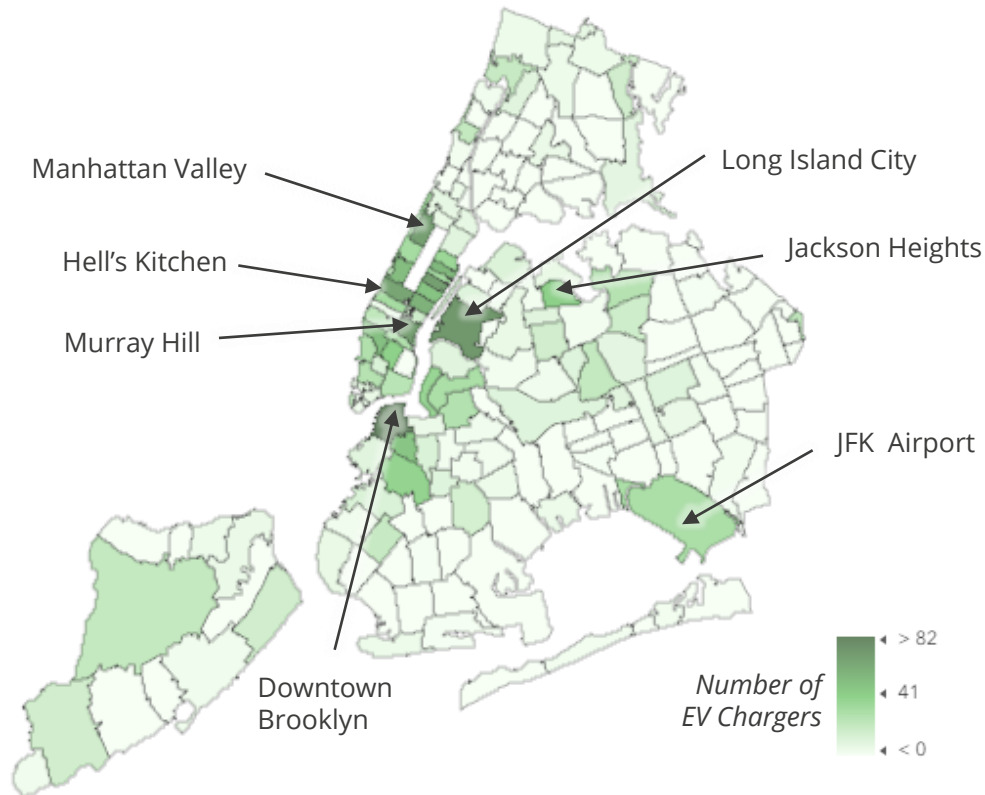
How do you charge your EV? (BEV drivers)



NOT ALL PUBLICLY AVAILABLE CHARGERS ARE FEASIBLE OPTIONS FOR FHV DRIVERS.

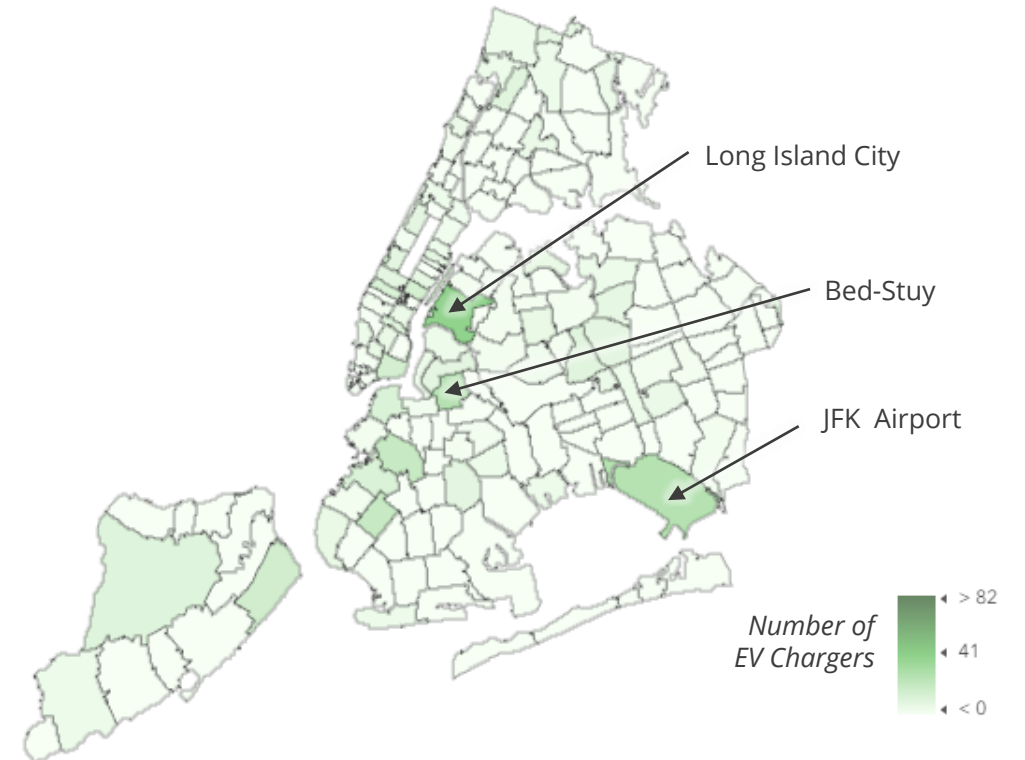
“Publicly available” chargers behind a high entry fee paywall are typically not feasible options for FHV drivers. While there are approximately 2,000 publicly available EV chargers in NYC, only close to 30% of them are low/no entry fee. Manhattan has the majority (more than half) of NYC’s publicly available EV chargers (see left map). However, Manhattan does not have many options for low/no entry fee chargers (see right map). low/no entry fee chargers are concentrated in Long Island City, JFK, and Western Brooklyn.

EV Chargers by ZIP



Chargers with Low/No Entry Fee by ZIP

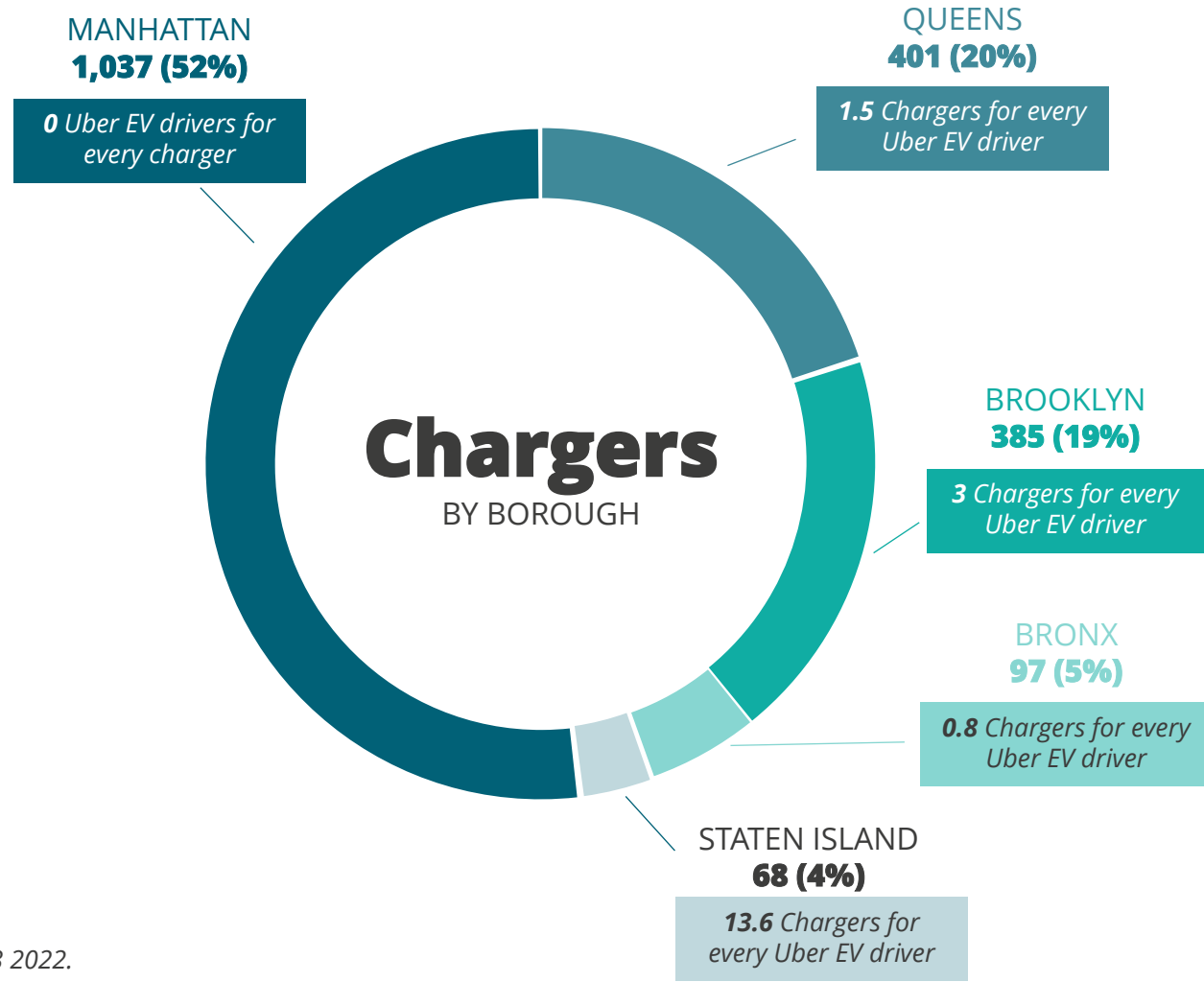
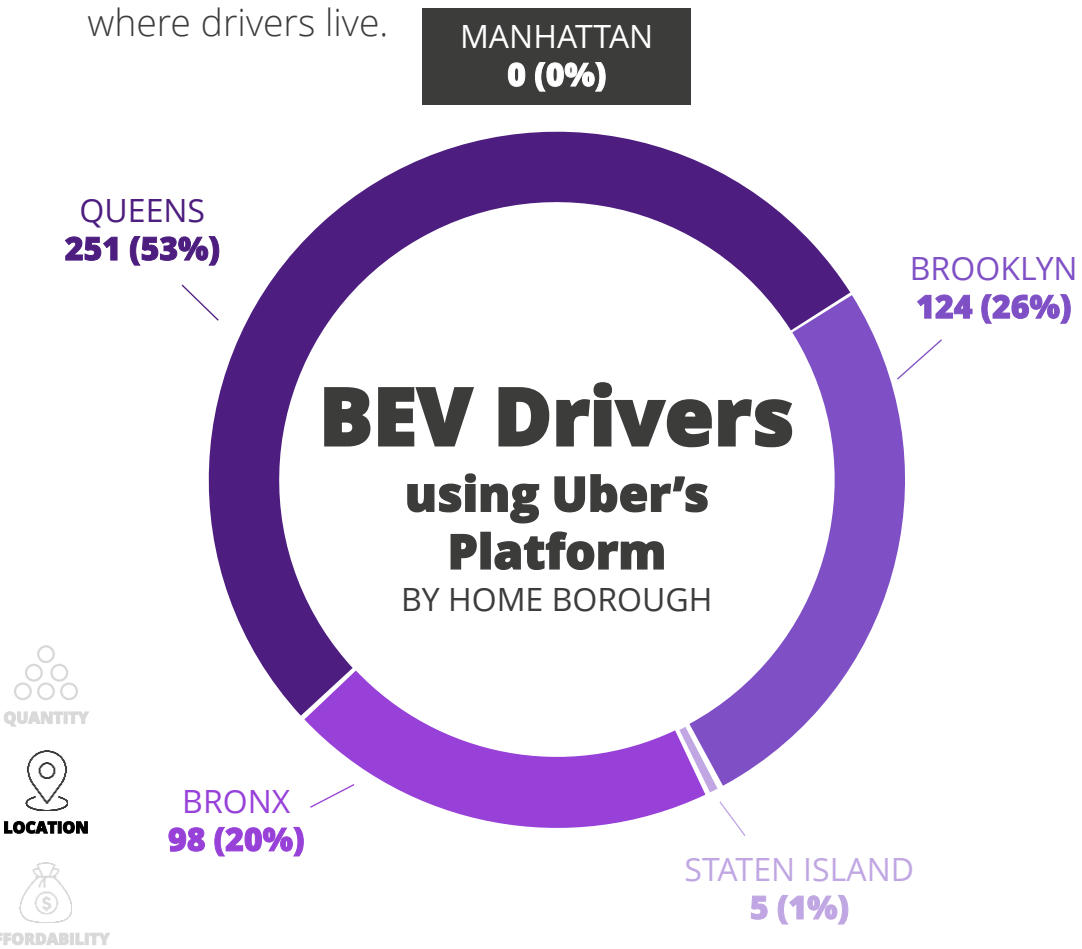
(Total 29% of all EV chargers in NYC)



Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

THE CURRENT DISTRIBUTION OF CHARGERS DOES NOT SERVE AREAS IN WHICH FHV EV DRIVERS LIVE.

Manhattan has more than half of NYC's publicly available EV chargers. However, no FHV EV drivers using the Uber platform live there. Queens has more than 50% of FHV EV drivers, but only 20% of the City's EV chargers- which are not necessarily in the neighborhoods where drivers live.

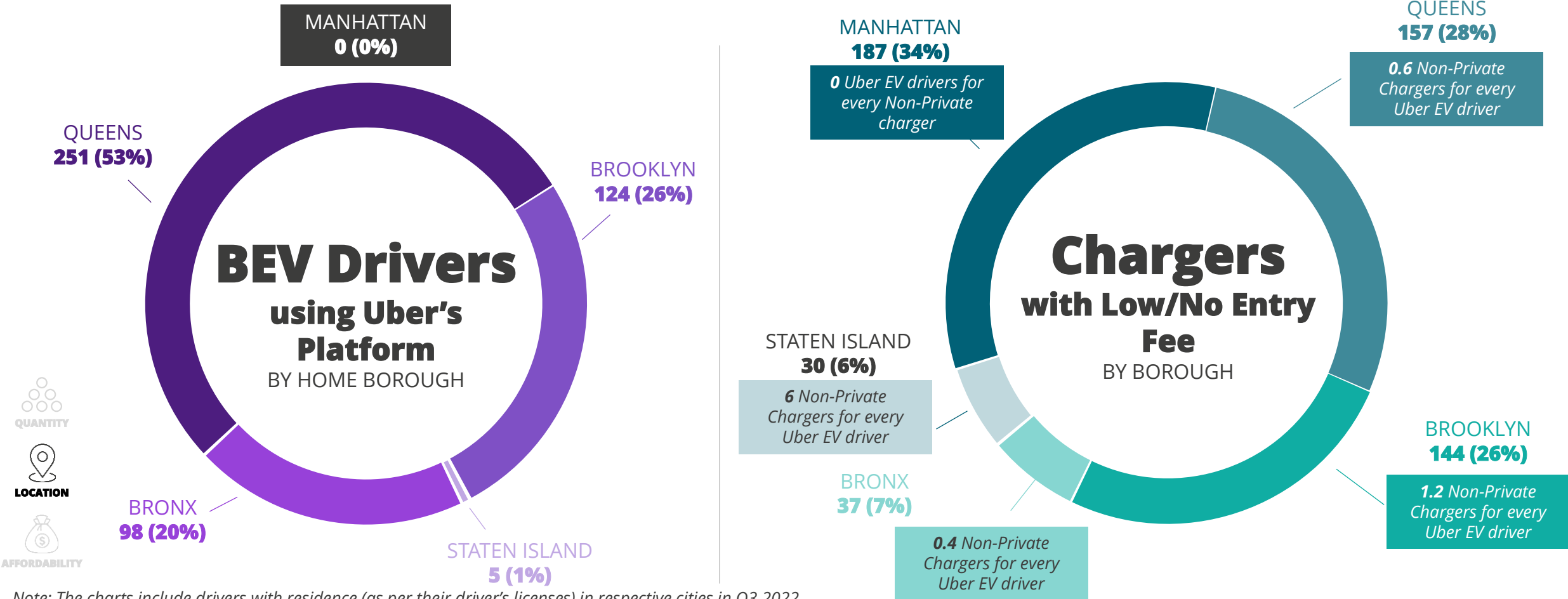


Note: The charts include drivers with residence (as per their driver's licenses) in respective cities in Q3 2022.

Source: Uber (2022), National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

THE CURRENT DISTRIBUTION OF LOW/NO ENTRY FEE CHARGERS DOES NOT SERVE AREAS IN WHICH FHV EV DRIVERS LIVE.

The situation is even more dire when analyzing low/no entry fee chargers. There is less than one low/no entry fee charger per EV driver on the Uber platform in almost all boroughs except for Staten Island, showing that drivers do not have low/no entry fee charging options, and must either go out of their way logistically or financially to be able to charge when they need to.



Note: The charts include drivers with residence (as per their driver's licenses) in respective cities in Q3 2022.

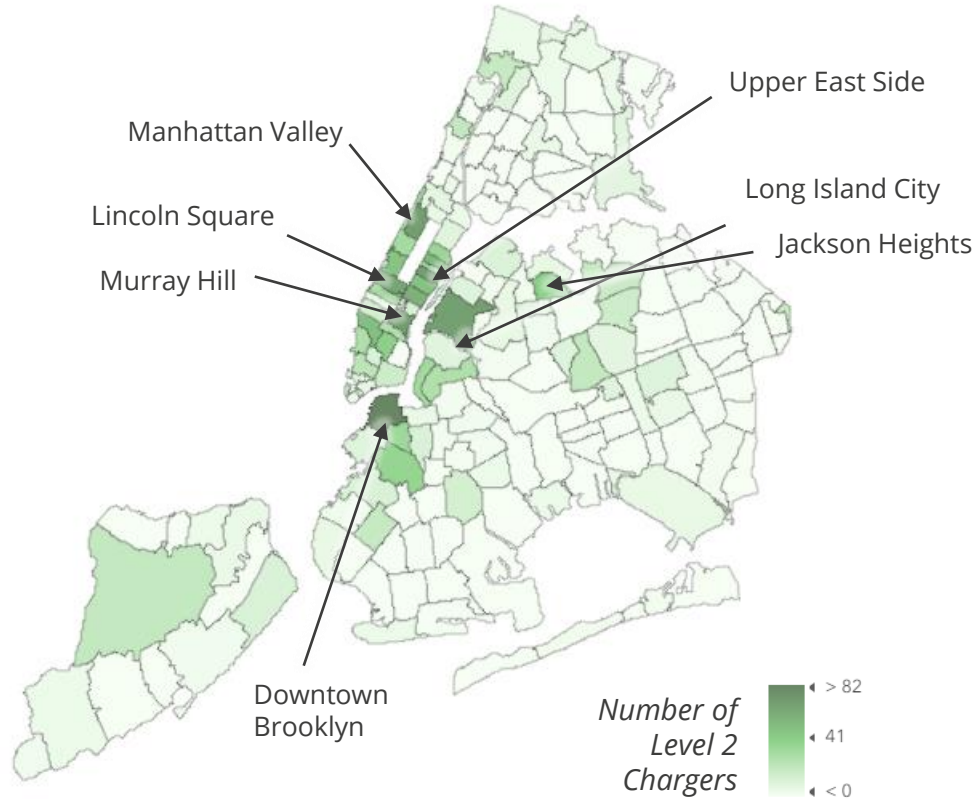
Source: Uber (2022), National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

L2 CHARGERS ARE CONCENTRATED IN MORE AFFLUENT RESIDENTIAL AND COMMERCIAL AREAS.

Manhattan, Long Island City, and Downtown Brooklyn have the greatest number of Level 2 chargers, likely due to the high density of mixed-use developments and parking garages that cater to monthly tenants. Many of the chargers in Long Island City are also low/no entry fee chargers.

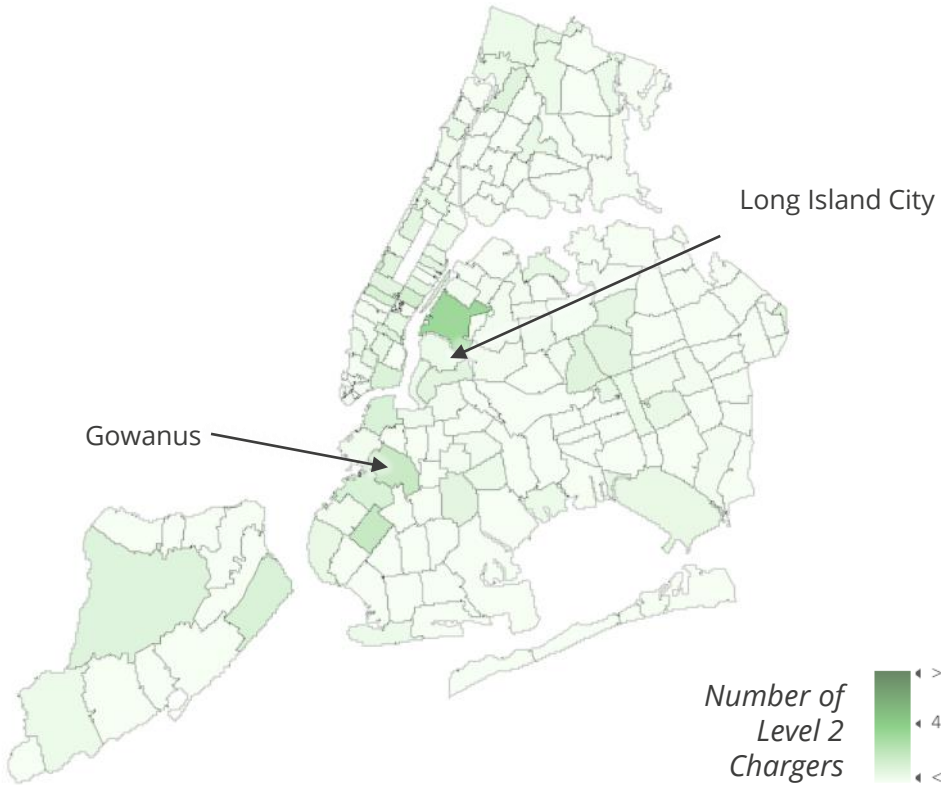
Level 2 Chargers by ZIP

(Total 91% of all EV chargers in NYC)



Level 2 Chargers with Low/No Entry Fee by ZIP

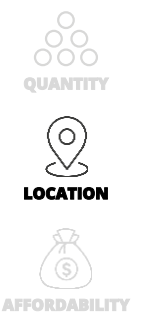
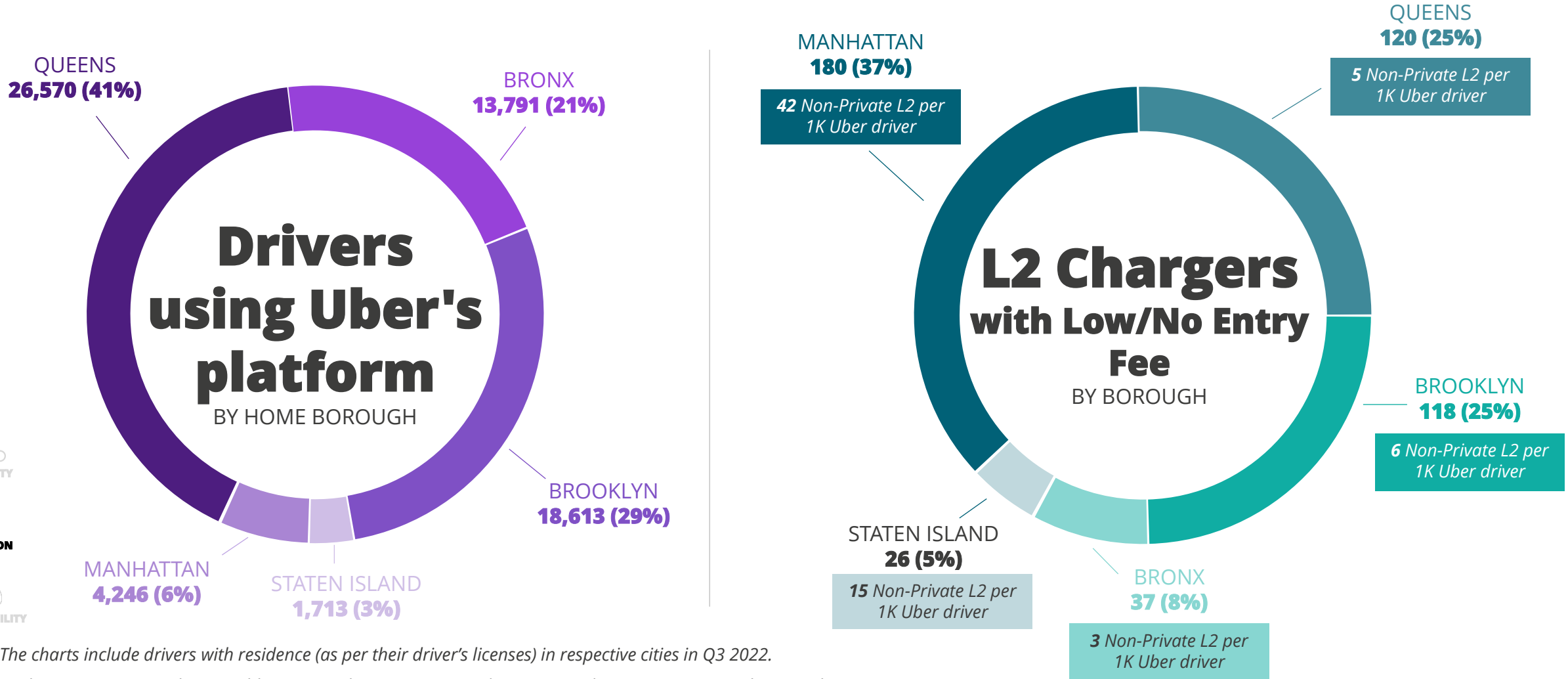
(Total 30% of all Level 2 chargers in NYC)



Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

ACCESS TO LOW/NO ENTRY FEE L2 CHARGING OVERNIGHT IS CRITICAL TO INCENTIVIZE EV TRANSITION.

While Manhattan has more than half of the City's EV chargers, only 6% of drivers using Uber's platform live there. The lack of accessible overnight charging is a barrier to the transition of current drivers to BEVs.



Note: The charts include drivers with residence (as per their driver's licenses) in respective cities in Q3 2022.

Source: Uber (2022), National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

L2 CHARGERS ARE NOT EVENLY DISTRIBUTED WITHIN BOROUGHES EITHER, OFTEN BEING CONCENTRATED IN PARTICULAR AREAS. ONLY A LIMITED NUMBER OF THESE AREAS OF CONCENTRATION OVERLAP WITH WHERE MOST OF THE FHV DRIVERS LIVE.

The unavailability of L2 charging near their residences limits the FHV drivers' options to either parking their vehicles far from their homes or investing in private charging, which is not always an option due to either cost constraints, or not having access to a private driveway.



QUANTITY



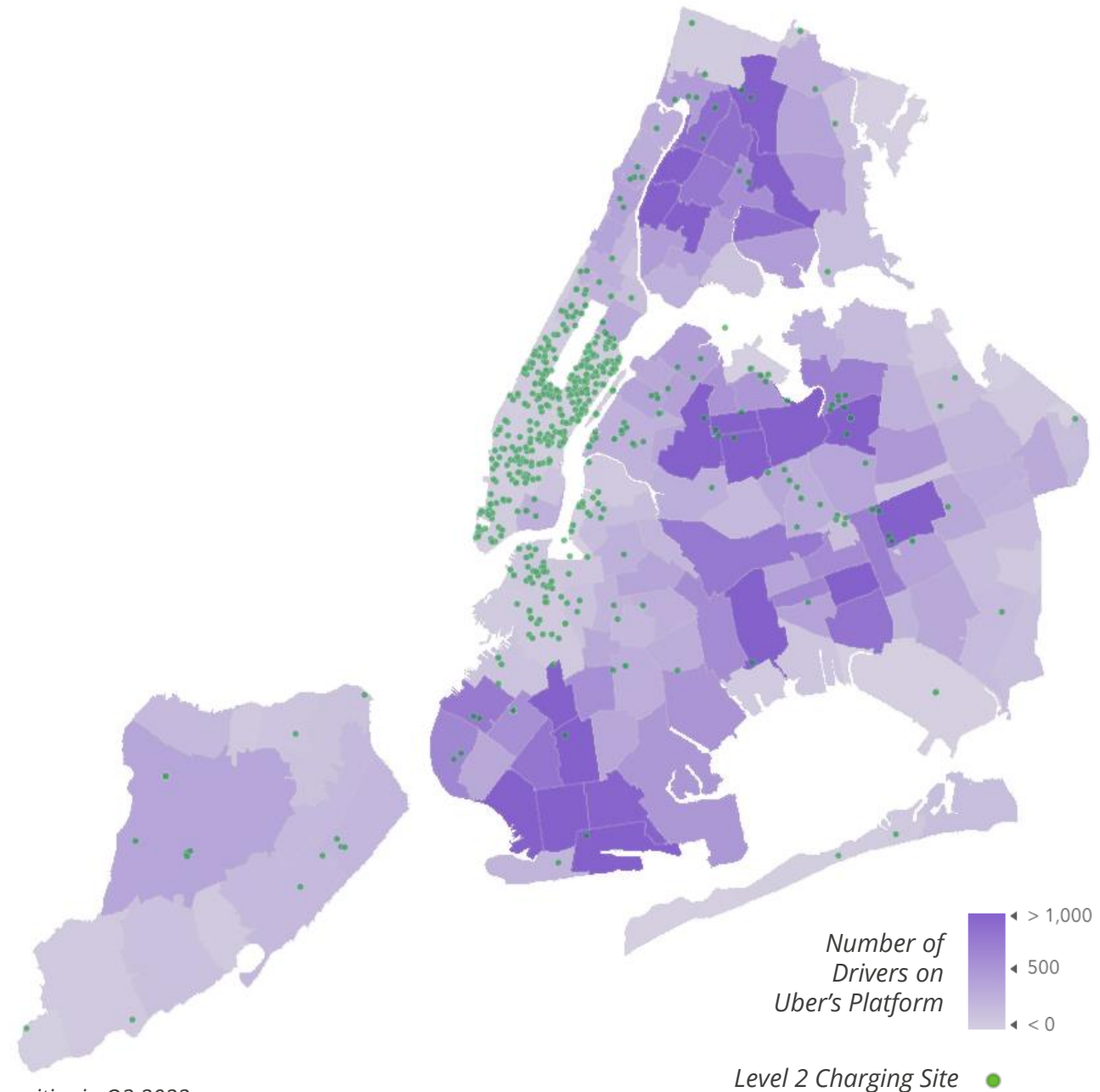
LOCATION



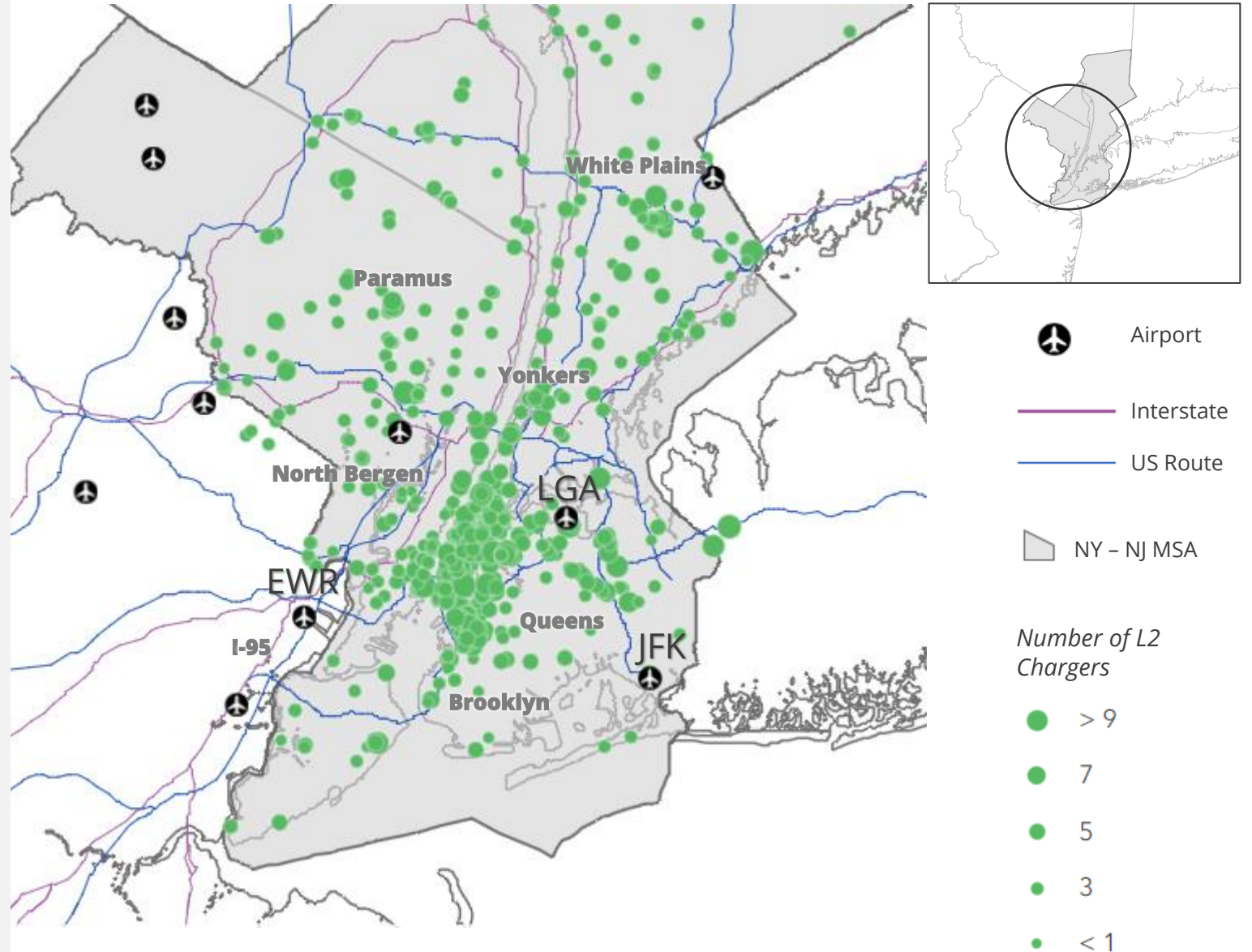
AFFORDABILITY

Note: The charts include drivers with residence (as per their driver's licenses) in respective cities in Q3 2022.

Source: Uber (2022), National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)



L2 CHARGING STATIONS ACROSS THE BROADER NY-NJ METROPOLITAN STATISTICAL AREA (MSA) FOLLOW A SIMILAR PATTERN OF BEING LOCATED IN RESIDENTIAL AREA (AS OPPOSED TO ALONG TRANSIT CORRIDORS).



QUANTITY

LOCATION

AFFORDABILITY

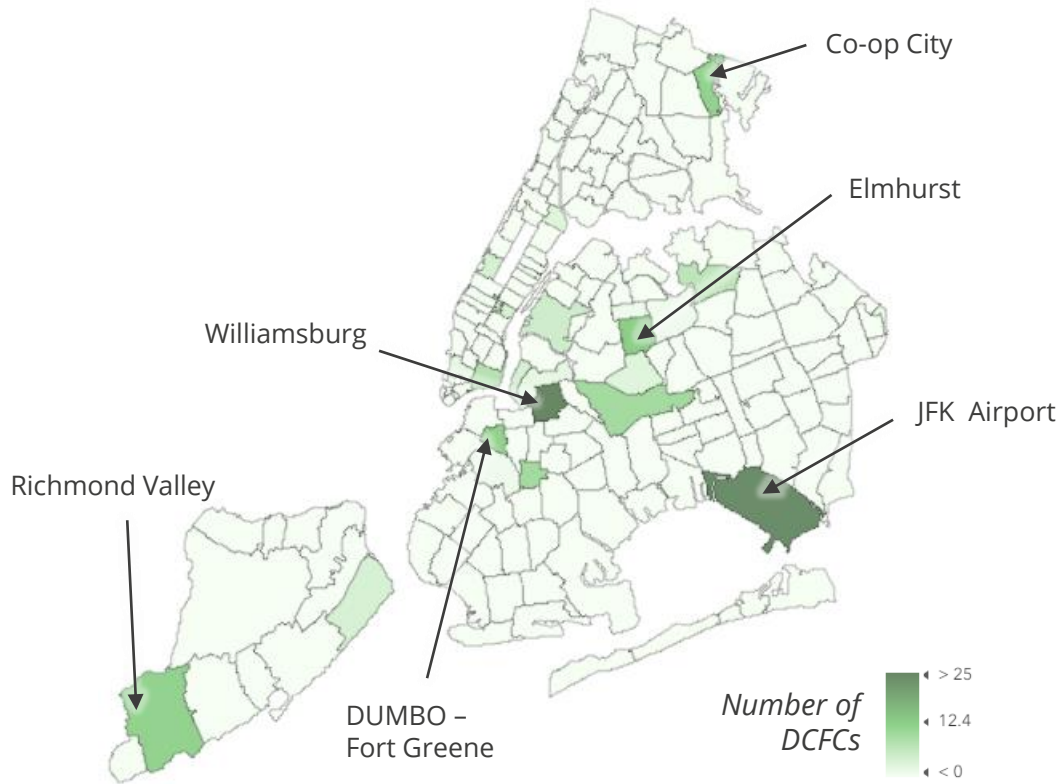
Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

DCFCS ARE CONCENTRATED IN NON-RESIDENTIAL AREAS.

DCFCS are scattered across the City, mostly in non-residential areas. Given that FHV drivers rely on DCFCS as their primary option for on-shift charging, DCFCS are needed in high-volume trip areas, as well as where drivers live for pre-and post shift charging. As highlighted in the TLC’s BEV Pilot evaluation report, drivers most commonly used the low/no entry fee charging options at JFK, Revel Superhub, and the Brooklyn Museum.

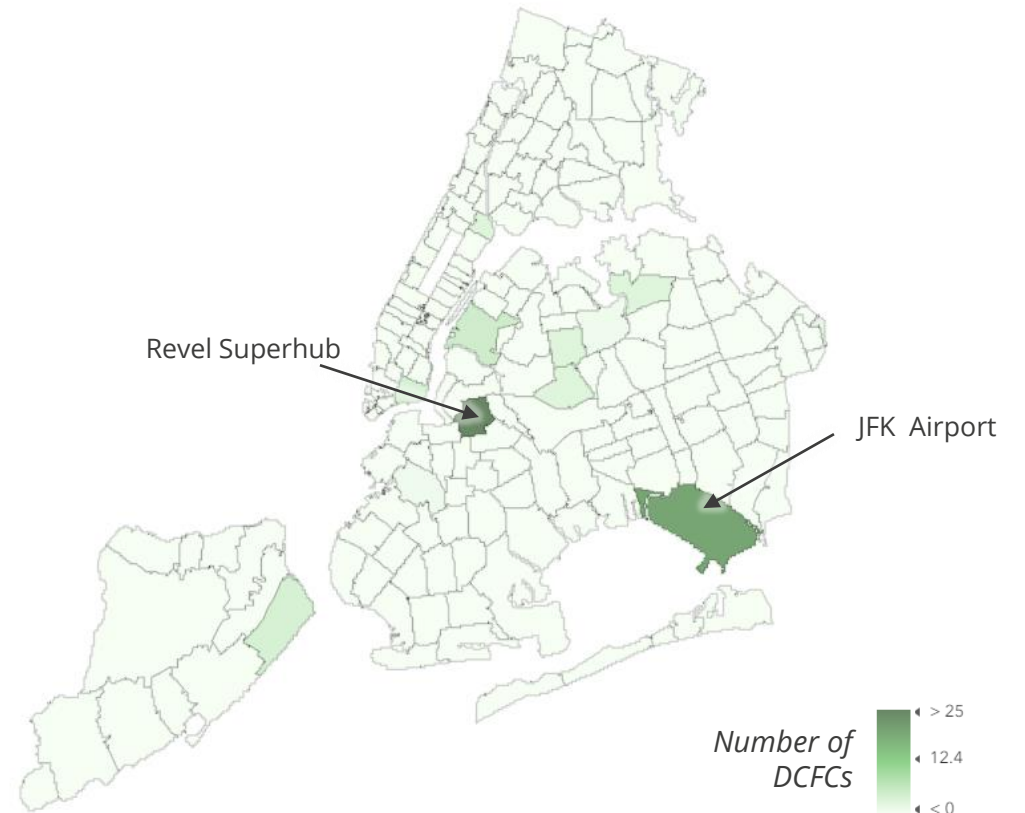
DCFCS by ZIP

(Total 9% of all EV chargers in NYC)



DCFCS with Low/No Entry Fee by ZIP

(Total 51% of all DCFCS in NYC)*



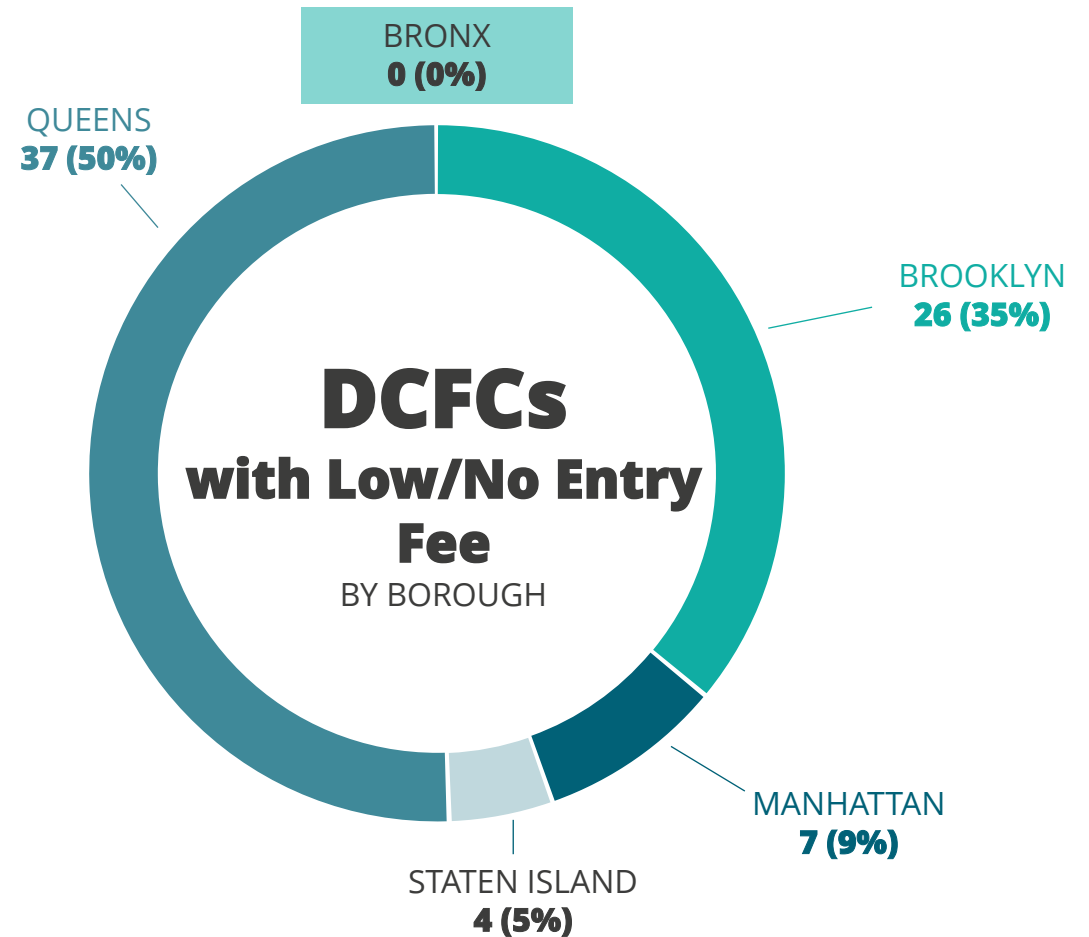
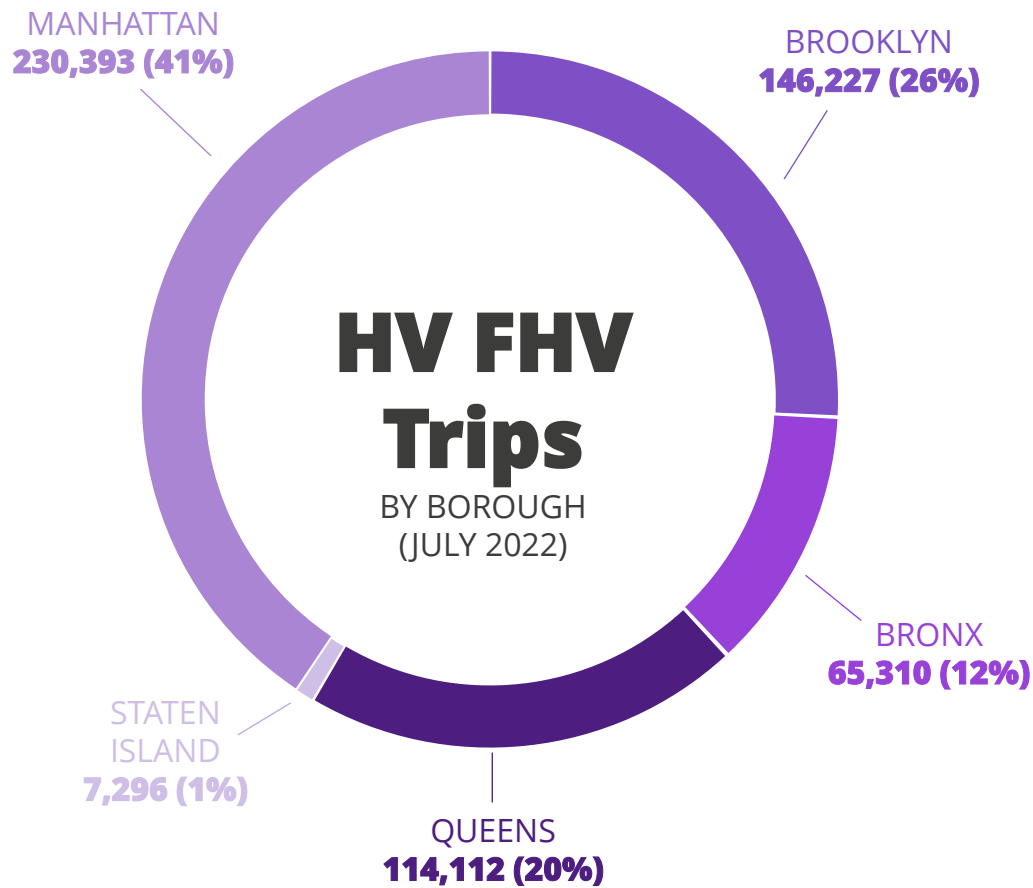
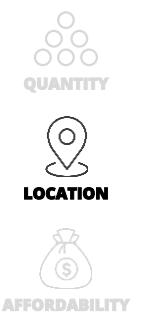
QUANTITY
 LOCATION
 AFFORDABILITY

Note: With Revel's future opening of a new 60-stall DCFC hub in Maspeth, Queens, the total percentage of DCFC chargers with low/no entry fees will increase to over 60%

Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022), TLC Battery Electric Vehicle Taxi Pilot (2022)

THERE IS A LIMITED NUMBER OF LOW/NO ENTRY FEE DCFCs IN MANHATTAN, WHERE MOST FHV TRIPS AFFILIATED WITH HVFHS OCCUR.

DCFC charging is necessary in high volume trip areas for on-shift charging for drivers without incurring high opportunity costs due to driving to chargers and waiting for charging. However, in Manhattan, where 41% of the FHV trips affiliated with the HVFHS occur, there are only 7 low/no entry fee DCFCs that FHV drivers can use, meaning that drivers need to drive outside of Manhattan if they need on-shift charging. DCFCs are also needed where drivers live. The Bronx experiences a significant gap in this regard, as it currently has 0 low/no entry fee DCFC chargers.



Source: TLC For-Hire Vehicle License Review (August 2022), National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

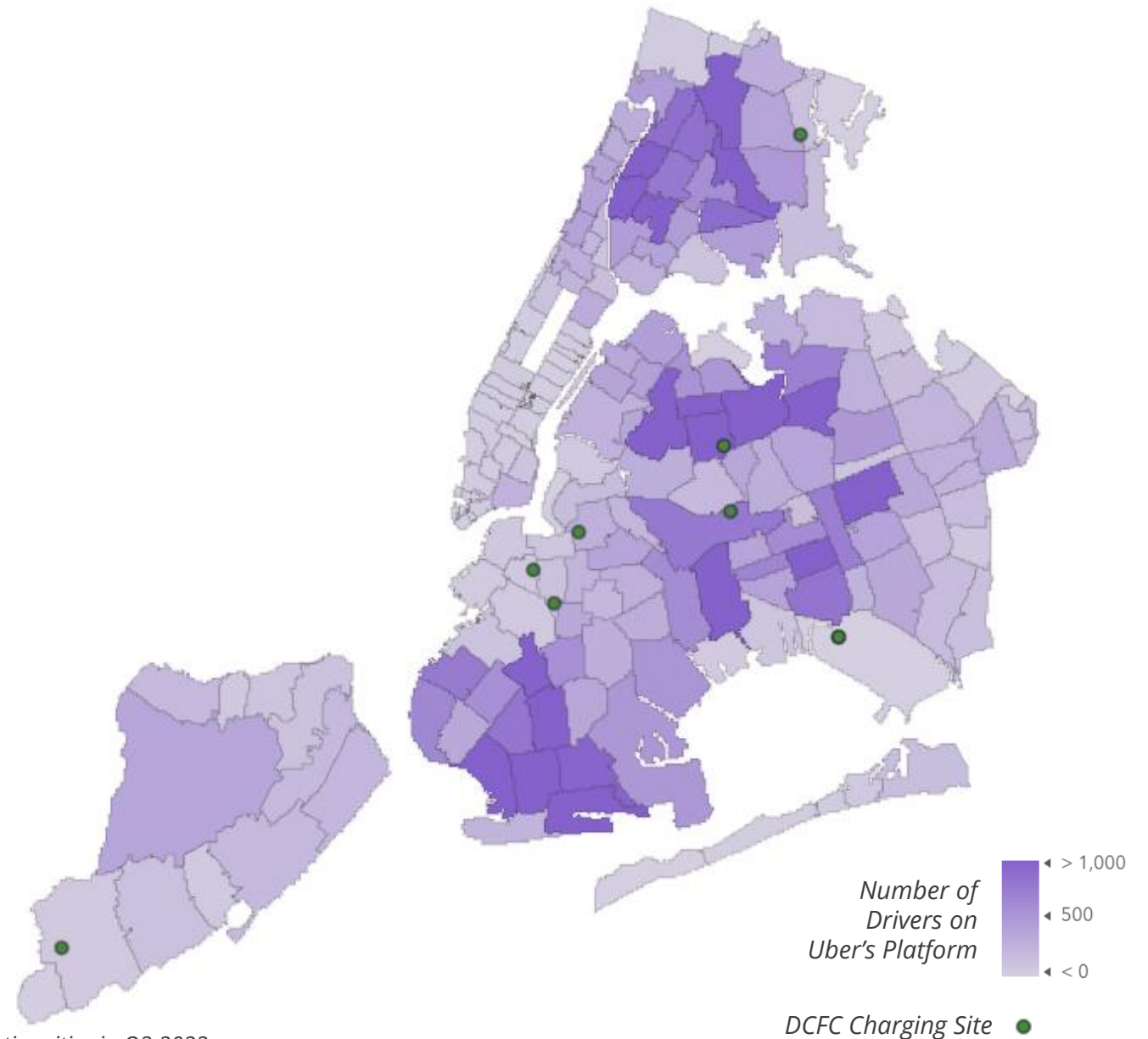
DCFCS ARE ALSO LIMITED IN AREAS WHERE DRIVERS LIVE.

As described in the aforementioned NREL study, even in the most optimistic scenario where there is widespread availability of L2 charging at residences, there is still a need for DCFCS in areas where FHV drivers live. However, the number of DCFCS are currently limited throughout NYC, and especially so in areas where FHV drivers live.

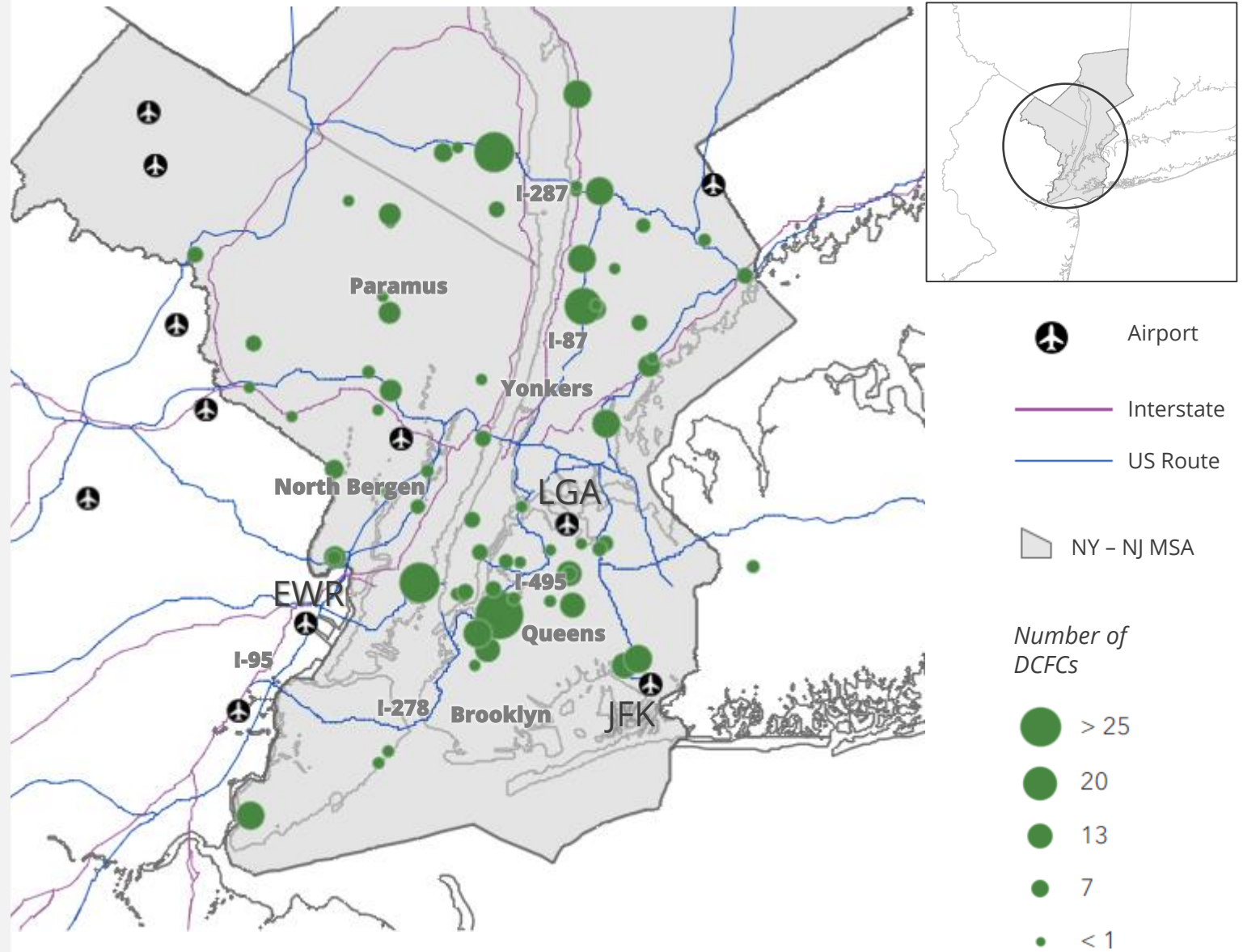


Note: The map include drivers with residence (as per their driver's licenses) in respective cities in Q3 2022.

Source: Uber (2022), National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)



DCFCs IN THE NY-NJ MSA ARE CONCENTRATED AROUND MAJOR TRANSIT CORRIDORS - SUPPORTING ON-SHIFT CHARGING, BUT NOT OFF-SHIFT CHARGING NEAR RESIDENCES.



QUANTITY
 LOCATION
 AFFORDABILITY

Source: National Renewable Energy Laboratory (NREL), Alternative Fuel Stations in New York (December 2022)

THE CITY HAS AN OPPORTUNITY TO DIRECT INVESTMENTS IN AREAS WITH CITY, STATE, AND FEDERAL DESIGNATIONS, WHICH ARE ALSO WHERE FHV DRIVERS LIVE.

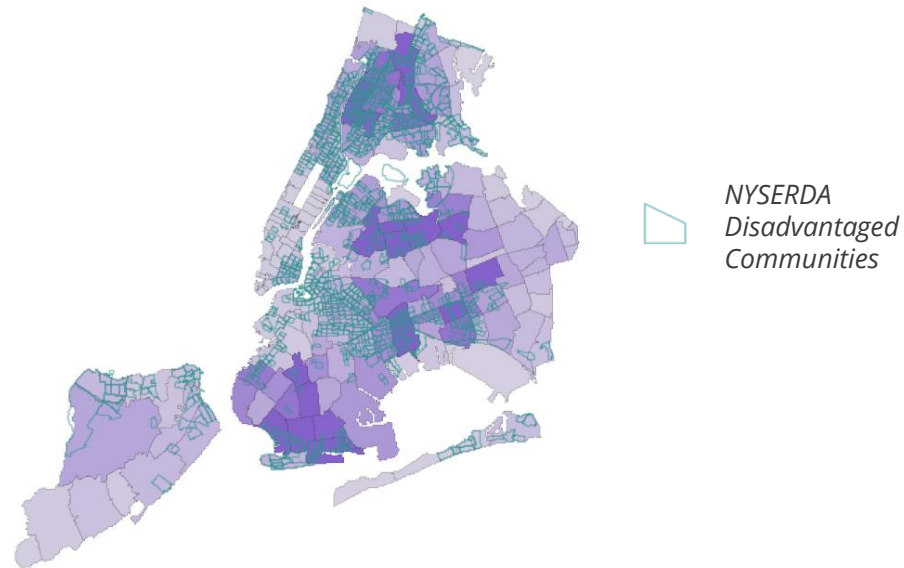
The City can direct public and private investment to "high-need neighborhoods" that are not positioned to receive private investment without City intervention. These neighborhoods are areas that are underinvested in charging infrastructure, are not seeing much EV adoption, and also have larger share of FHV residents, as seen in previous maps.

The high-need neighborhoods correspond with those that are disadvantaged from a socioeconomic and public health standpoint (such as Justice40 communities).

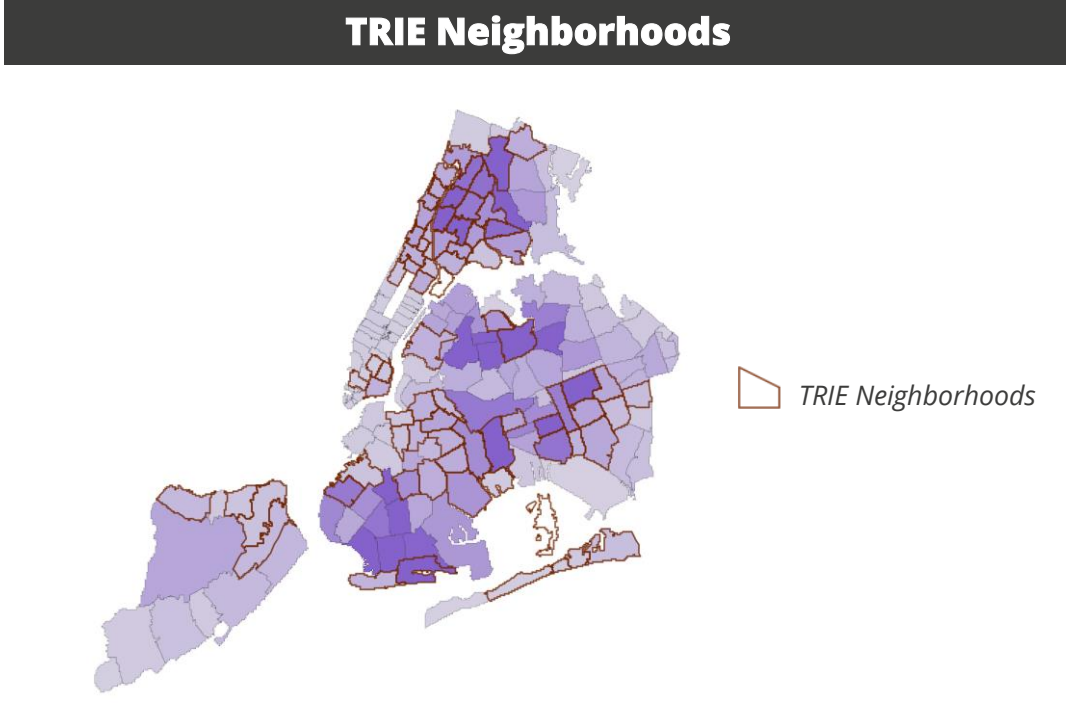
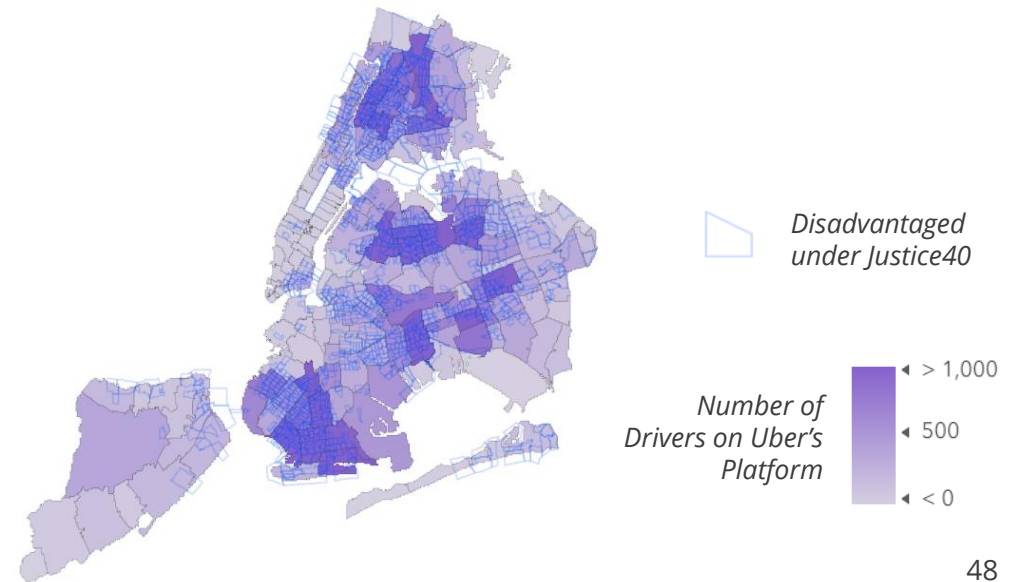
Source: Uber (2022), NYC Taskforce on Racial Inclusion & Equity (TRIE), NYSERDA, Justice40 initiative.



NYSERDA Disadvantaged Communities



Justice40 Communities





2.3 | Challenges : Affordability

INSTALLATION AND OPERATION

THE ECONOMICS OF BUILDING AND OPERATING PUBLICLY AVAILABLE CHARGERS ARE FUNDAMENTALLY DIFFERENT ACROSS L2S AND DCFCs.

In general, DCFCs are significantly more costly than L2s. While an average commercial L2 charger may cost between \$2,500-\$7,200, a DCFC charger may cost up to \$150,000, depending on its power rating.

Unlike L2, DCFC requires specialized high-power equipment. The high-power demand and the technological sophistication of DCFCs mean that the costs of deployment and operating may be high.

There is great variability in estimating the average cost of build-out at a site. If either type of charger triggers grid upgrades, which is much more common for DCFCs, significant additional costs may be added to support grid upgrades, such as installing a new transformer, which could cost anywhere between \$35,000 to \$173,000.

This section delves into the affordability issues related to developing L2 and DCFC chargers.



QUANTITY



LOCATION



AFFORDABILITY

Ranges of costs for charging infrastructure components. Image source: Rocky Mountain Institute

COST ELEMENT	LOWEST COST	HIGHEST COST
Level 2 residential charger	\$380 (2.9 kW)	\$689 (7.7 kW)
Level 2 commercial charger	\$2,500 (7.7 kW)	\$4,900 (16.8 kW); outlier: \$7,210 (14.4 kW)
DCFC (50 kW)	\$20,000	\$35,800
DCFC (150 kW)	\$75,600	\$100,000
DCFC (350 kW)	\$128,000	\$150,000
Transformer (150–300 kVA)	\$35,000	\$53,000
Transformer (500–750 kVA)	\$44,000	\$69,600
Transformer (1,000+ kVA)	\$66,000	\$173,000
Data contracts	\$84/year/charger	\$240/year/charger
Network contracts	\$200/year/charger	\$250/year/charger
Credit card reader	\$325	\$1,000
Cable cost	\$1,500	\$3,500

Note: L2 and DCFC costs refer to equipment and development costs, which are described in detail later in this section.
Source: [Rocky Mountain Institute \(2019\)](#); [EVgo \(2020\)](#); [TLC Charged Up! \(2022\)](#); [Con Edison](#)

L2 COSTS ARE RELATIVELY LOW, BUT SITE-SPECIFIC FACTORS MAY INTRODUCE VARIABILITY.

Given their low power rating, L2 costs are significantly lower and more predictable than those for DCFC. In most cases, L2s do not require utility upgrades, as they can be supplied by a regular 240V outlet (same as a household clothes dryer).

While a residential L2 is much cheaper (\$380-\$700 per charger, as it can be wall-mounted in a garage), the commercial L2 costs are higher (\$1,000-\$4,000 per charger, and \$2,000-\$10,000 for installation), reflecting the additional cost items such as weatherproofing, mounting style, durability, networking & communications, and labor.

NY State conducted an analysis of state-funded L2 costs and usage between 2012-2021.* The full cost of deploying a single Level 2 port was found to be ~\$6,500. On average, installation and equipment costs contributed about half of the total cost.



QUANTITY



LOCATION



AFFORDABILITY

Findings from NYS State-Funded (PON and Charge Ready NY) L2 Installations*

Installation costs are responsible for most of the variation in project costs, and it is unclear whether significant installation cost reductions are possible. Installation costs are driven by site factors, such as distance to electrical service, need to upgrade panels, as well as geographic factors such as prevailing labor rates.

Siting considerations include but are not limited to:

- **Upgrading electrical panels:** The NYSERDA report found that the most common value for electrical panel upgrades is zero, meaning that most L2 installations did not require electrical service upgrades. However, when such upgrades are needed, costs may increase significantly.
- **Street typologies:** The type of parking available (left side, angled), physical constraints such as bus lanes and curb cuts, and maintenance accessibility
- **Subsurface conditions:** The presence of underground infrastructure
- **Minimum clearances:** E.g., 15' from the open side of a subway entrance

Design considerations include but are not limited to:

- Maintaining sightlines to major parks and public spaces
- Maintaining views of artwork or landmarked structures
- Minimizing street clutter by aligning with street planting and furniture

*As part of the State's Program Opportunity Notice (PON) 2301 demonstration project (2012–2016) and Charge Ready NY (2018–2021) program.
Source: [NYSERDA and Atlas Public Policy \(2021\)](#); [Rocky Mountain Institute \(2019\)](#); [EVgo \(2020\)](#); [TLC Charged Up! \(2022\)](#)

HIGH COSTS OF DCFCs ARE DRIVEN BY 3 FACTORS:

- 1) UTILITY UPGRADES;
- 2) PERMITTING & PROCESS;
- 3) POWER PROCUREMENT.

Across the three major cost categories of DCFC deployment, i.e., equipment, development, and operations; utility upgrades, permitting, and power procurement drive up project costs. The following three pages expand on these cost drivers.

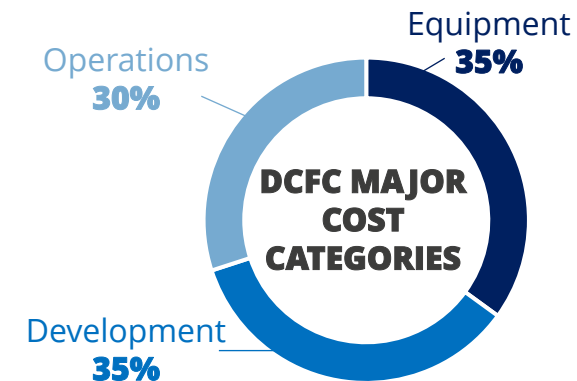
High demand for power can drive up costs if grid upgrades are required to expand system capacity. Upgrades to grid infrastructure can be costly and time intensive. High demand can also lead to increased expenses in power procurement to support peak energy consumption and ensure all customers have access to needed utilities. Finally, given the complexities of siting, constructing, and operating, DCFC deployments require expertise to secure permitting and approvals, and often multiple revisions, leading to increased costs.

Source: [EVgo \(2020\)](#); [Rocky Mountain Institute \(2019\)](#)



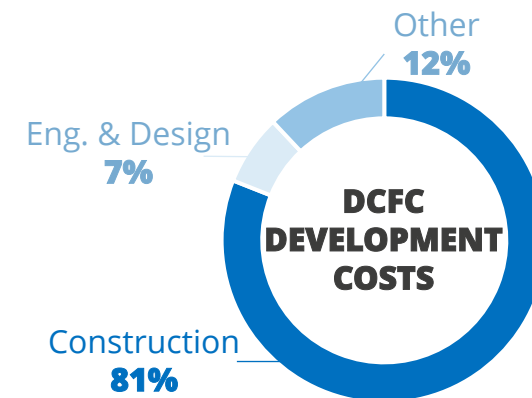
DCFC Major Cost Categories

DCFC cost components can be organized in three major categories: equipment, development, and operations. More detail is provided below on development and operational costs. For equipment, charger hardware constitutes the vast majority (84%) of the costs. Direct incentives such as Con Edison’s DCFC station program may help address equipment costs.



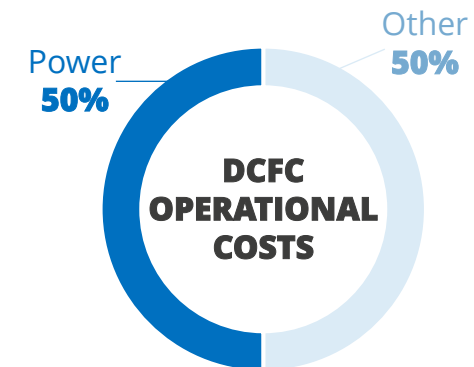
DCFC Development Costs

Construction comprises the vast majority of development costs at 81%. Utility upgrades and permitting-related costs are classified under this sub-category: As described later, significant costs may be incurred if utility upgrades are needed. Moreover, permitting-related soft costs are perhaps the least understood costs and can amount to up to 60% of project hours.



DCFC Operational Costs

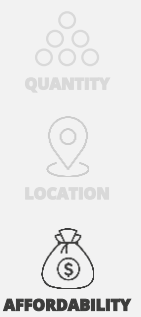
Power procurement is by far the largest (50%) of operational costs. It includes utility bills with fixed, variable, and demand chargers. In New York City, usage during peak demand hours may lead to exorbitant demand charges, pushing the power procurement costs well above 50% of operational costs.



UTILITY UPGRADES MAY TRIGGER SIGNIFICANT COSTS, ESPECIALLY FOR DCFC SITES. CURRENTLY, THERE IS A LACK OF CENTRAL PLANNING.

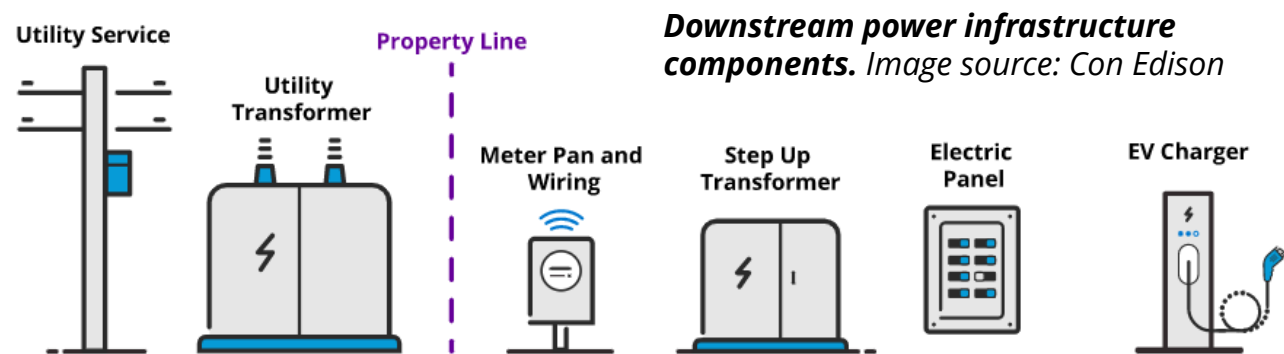
Power grid capacity may need to be upgraded when a site's power demand is high, which is usually the case with DCFCs. Interventions may range from upgrading a distribution transformer at or near the site, to triggering upstream upgrades that the utility may need to be able to deliver power. Therefore, for DCFCs (and in some cases for L2s) utility upgrades may lead to high costs and delays.

Currently, requests for grid upgrades to Con Edison are done on an ad hoc basis, as charging infrastructure is introduced in different parts of the grid. The lack of central planning on location and timeline of new charging infrastructure with high power demand reduces the ability of the utility to plan upstream and address the City's charging infrastructure needs in a timely and effective manner. Utility upgrades may take from several months to up to two years, depending on the level of upstream upgrades needed.



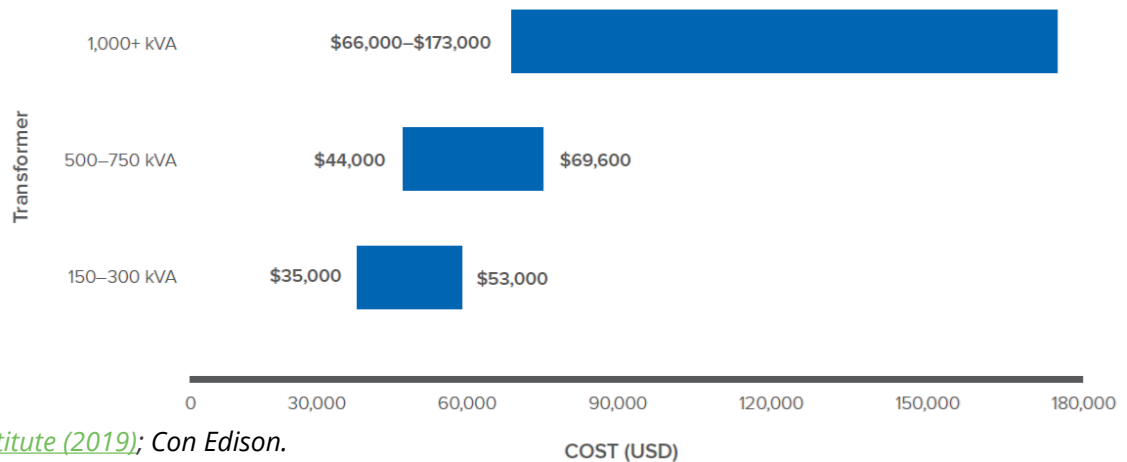
Downstream upgrades: May include adding transformers at or near the site, or laying new conduit based on proximity to electric panels. Depending on the power needs of the site, the components within the property line may take up to 25% of the site. With even a small transformer costing about \$15,000, with labor costs of an additional \$8,000, the lowest capacity transformer costs are between \$35,000 and \$53,000, according to the Rocky Mountain Institute.

Upstream upgrades: As noted by the Rocky Mountain Institute, there is wide variability in utility upgrade costs. Examples include Southern California Edison's Charge Ready Pilot Program, where the utility-side infrastructure alone in Q2 2019 cost \$2,452,656 for 75 sites, or \$32,702 per site. For higher-powered sites and remote sites, utility-side infrastructure costs can be upwards of \$1 million per site.



Downstream power infrastructure components. Image source: Con Edison

Range of transformer upgrade costs. Image source: Rocky Mountain Institute (2019)



Source: [Rocky Mountain Institute \(2019\)](#); Con Edison.

THE PERMITTING PROCESS FOR DEPLOYING CHARGERS CAN TAKE UP TO 24 MONTHS, INTRODUCING SIGNIFICANT SOFT COSTS.

According to the Rocky Mountain Institute’s (RMI) industry research, “soft costs” are one of the biggest and least understood cost drivers for installing charging infrastructure in the U.S., sometimes even more so than hardware costs.

Charging companies are required to work with utilities and local and state governments to secure approvals, permits, and reviews, and request utility upgrades. Multiple cycles of back-and-forth between stakeholders results in additional costs to projects. Such soft costs can amount to 60% of the project hours during a station’s development.

In New York City, the NYC DOT has the jurisdiction to site and authorize the installation of chargers in the public right of way. The permitting process also includes the Public Design Commission (PDC), the Department of Buildings (DOB) and numerous other agencies depending on the site.

Source: [WXY Curb Enthusiasm](#); [Rocky Mountain Institute \(2019\)](#); [EVgo \(2020\)](#); [WXY, NYSDOT, NYS DOT, NYC DOT \(2018\)](#)



QUANTITY



LOCATION



AFFORDABILITY

REPRESENTATIVE PERMITTING TIMELINE FOR A CHARGER ON A PUBLIC SITE. TOTAL: 18-24 MONTHS

1 | PDC Design Approval
Minimum 12 Weeks

2 | NYC DOT Permitting
Undetermined

3 | Utility Upgrade
Undetermined
**If needed, longest pole in the tent*

NYCDESIGN



4 | Non-NYCDOT Permitting – *Undetermined*. *The site selection may trigger a combination of the following permitting processes.*

Has the Community/Borough Board approved the site?	Community/Borough Board
Will the installation require power other than DOT metered utility power?	NYC Department of Buildings
Is my proposed installer an NYC-certified electrician?	
Will any street trees or tree pits be affected?	NYC Parks
Will any water or sewer lines be affected?	NYC Department of Environmental Protection
Is the site within a Historic District?	NYC Landmarks Preservation Commission
Is the site under a viaduct?	New York State Department of Transportation
Will there be construction within 200’ MTA property?	Metropolitan Transit Authority

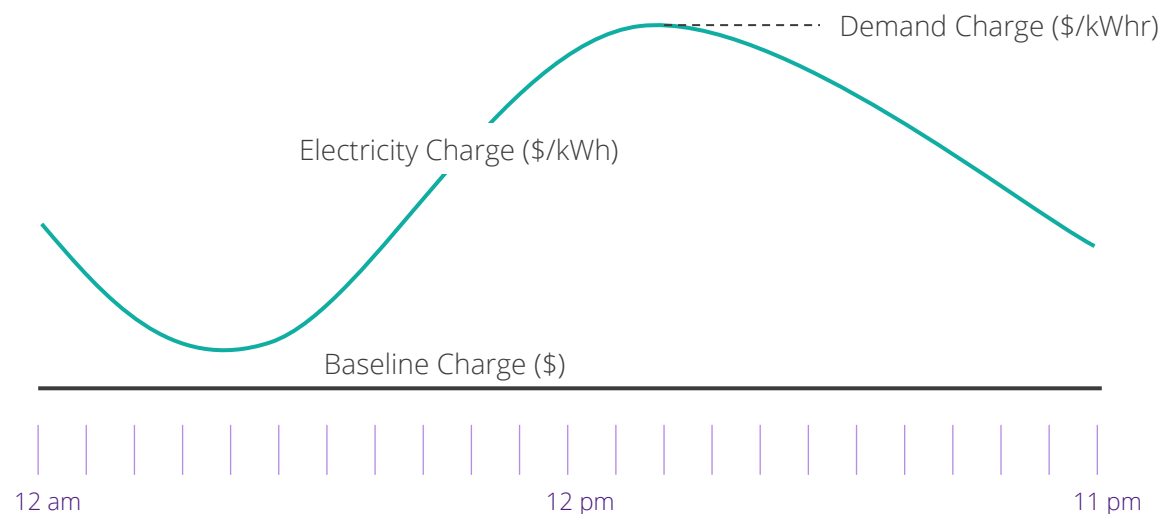
ONCE INSTALLED, DEMAND CHARGES PRESENT A CHALLENGE TO THE PROFITABILITY OF ELECTRIC VEHICLE INFRASTRUCTURE DUE TO THE VARIABILITY OF ELECTRICITY DEMAND.

A demand charge is a fee from a utility that reflects the intensity and regularity of demand pressure a customer puts on the grid. Demand charges were initially designed to account for unusual use patterns from large industrial and commercial users and allow utilities to ensure delivery and grid safety. High power utilization over short periods of time at irregular intervals-- as in the case with the use of EV infrastructure -- often results in high demand charges. Demand charges can represent over 30% of a total energy bill for an EVSE operator.

Note: * DCFC charger is assumed to be located in NYC with one port that is used between 8am and 6pm.

Source: [ConEdison](#); [Duke Energy](#); [Great Plains Institute](#); [NREL](#); [ConEd EV rate calculator](#)

In NYC, ConEd measures energy consumption in 15-minute intervals – the highest peak demand recorded for one 15-minute interval determines the demand charge for that billing statement.



The total electricity delivery charges for a 160kW DCFC charger* would have a monthly bill similar to:



A LARGE INCREASE IN THE UTILIZATION OF DCFC CHARGING STATIONS CREATES A REDUCTION IN OVERALL OPERATING COST, AS THE DEMAND CHARGE IS AMORTIZED OVER MORE KWHs

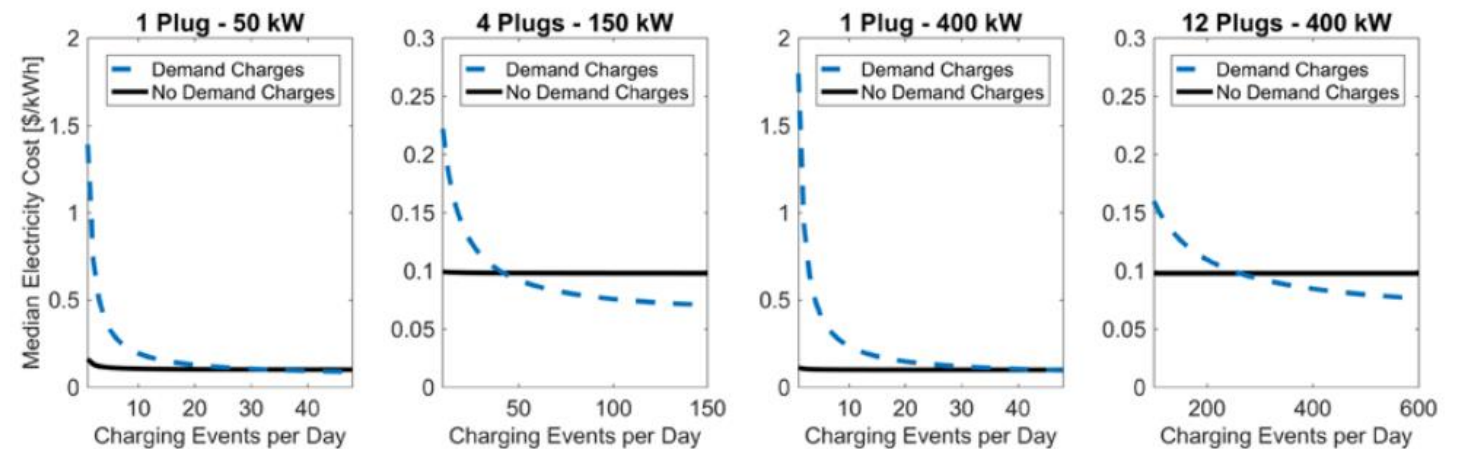
The higher the utilization of the EVSE, the less impact the demand charges have on the overall cost of the installation. However, without sufficient use, it is almost impossible for DCFC infrastructure owners to break even, let alone profit from, the charging station. DCFC chargers consume much more electricity much more quickly than L2 chargers, resulting in a high demand charge.

In the case of low utilization, demand charge costs are often passed onto the consumers. It becomes cheaper for drivers to charge at lower power levels to minimize the “passed-on” demand charges, as will be further discussed in the following section.

Note: [National Renewable Energy Laboratory, 2019](#)

*Source: [ConEdison](#); [Duke Energy](#); [Great Plains Institute](#); [NREL](#); [ConEd EV rate calculator](#)

The impact of the number of charging events per day on the median cost of electricity for four types of DCFC charging stations. Image source: National Renewable Energy Laboratory (NREL).



QUANTITY



LOCATION



AFFORDABILITY

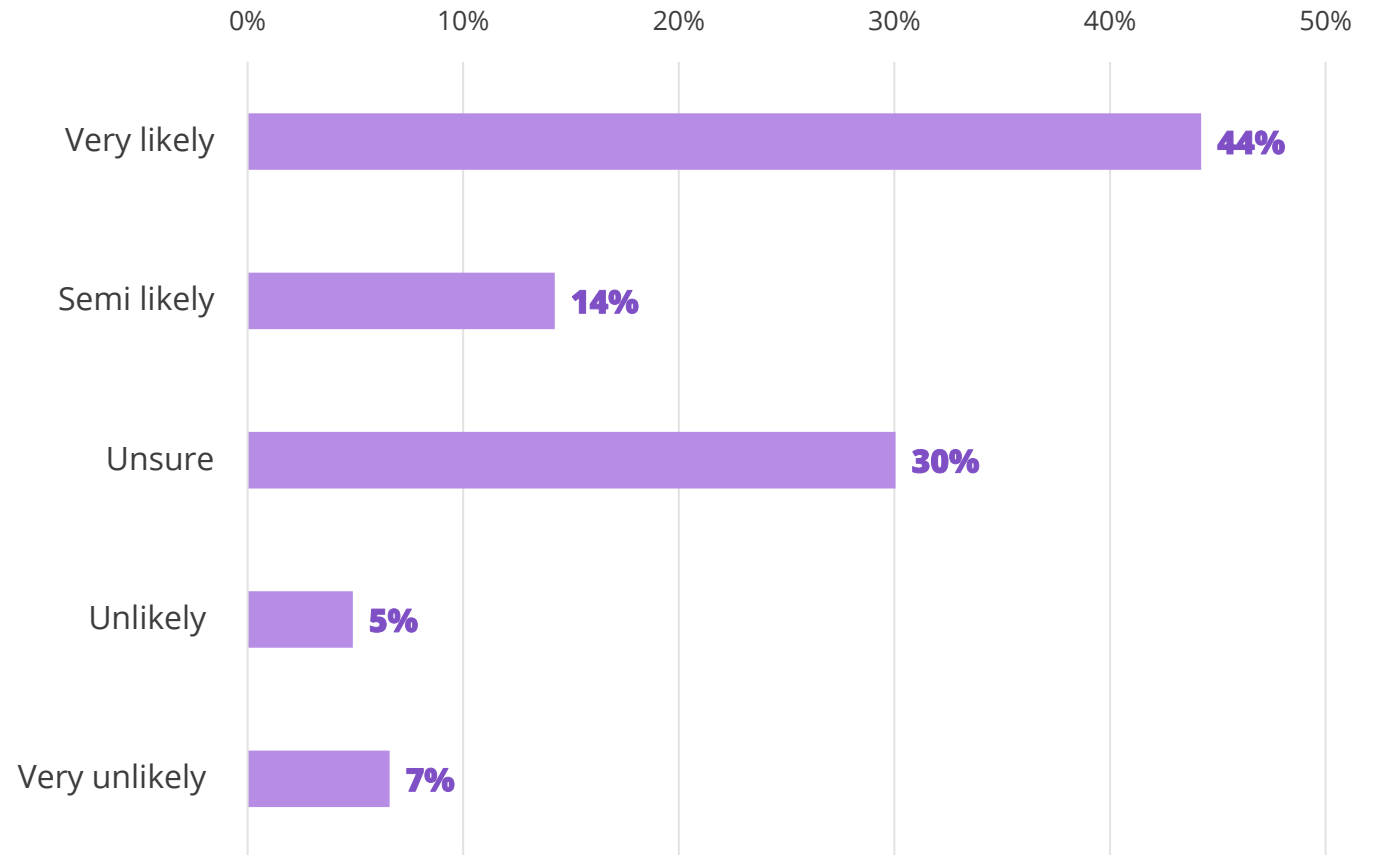


3 | Impact on FHV Drivers

A LARGE PORTION OF FHV DRIVERS AFFILIATED WITH HVFHS ARE LIKELY TO SWITCH TO A BEV IN THE NEXT 5 YEARS, BUT WILL REQUIRE SIGNIFICANT INFRASTRUCTURE TO DO SO.

- The FHV industry is positioned to be a significant driver of EV adoption and demand for EV charging infrastructure.
- Assuming the survey results represent the preferences of the 71,000 FHV drivers in NYC affiliated with HVFHS, **approximately 42,600 drivers** could be expected to switch to an EV within the next 5 years.
- The large number of **drivers who are unsure about switching to EVs** indicate a need for further targeted outreach and engagement on EV adoption.

**What is the likelihood of you purchasing or leasing a battery electric vehicle within the next 5 years?
(Non-EV drivers)**



Source: Uber survey (2022).

Note: The survey sample size consists of 110 EV drivers and 2,666 non-EV drivers in NYC.

THE UPFRONT COST OF AN EV AND CONCERNS ABOUT ACCESS TO CHARGING ARE THE MAIN BARRIERS TO EV ADOPTION AMONG FHV DRIVERS.

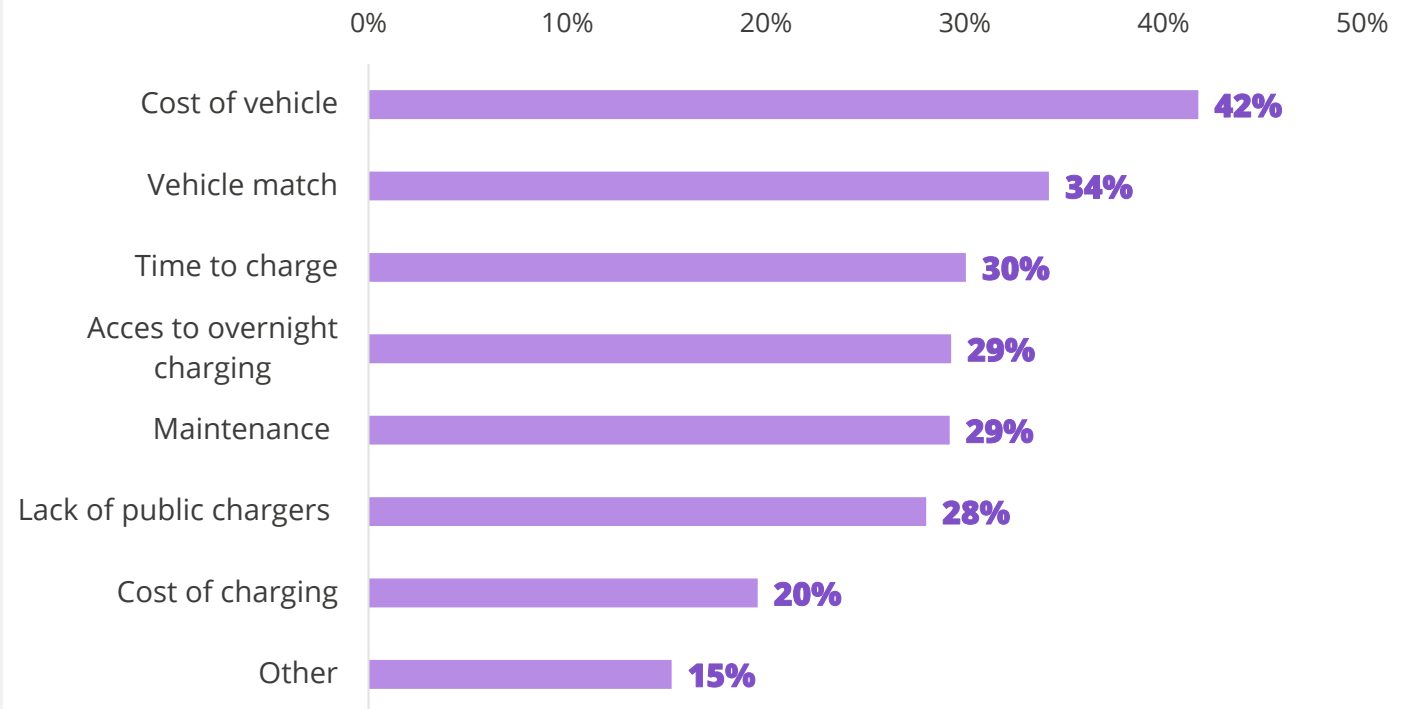
- 54% of respondents listed issues relating to charging as a top concern when considering transitioning to an EV.*
- Concerns about the lack of accessible chargers (both at the times and locations needed) indicate the need for a comprehensive, user-based approach to the siting and deployment of infrastructure development. This could increase trust in and awareness of EV charging infrastructure among FHV drivers.

Source: Uber survey (2022).

Note: The survey sample size consists of 110 EV drivers and 2,666 non-EV drivers in NYC.

* This data point comes from calculating the share of respondents who selected at least one of the following answer choices: time to charge, access to overnight charging, lack of public chargers, or cost of charging. Due to overlap in answer choices, the chart on right does not illustrate this data point.

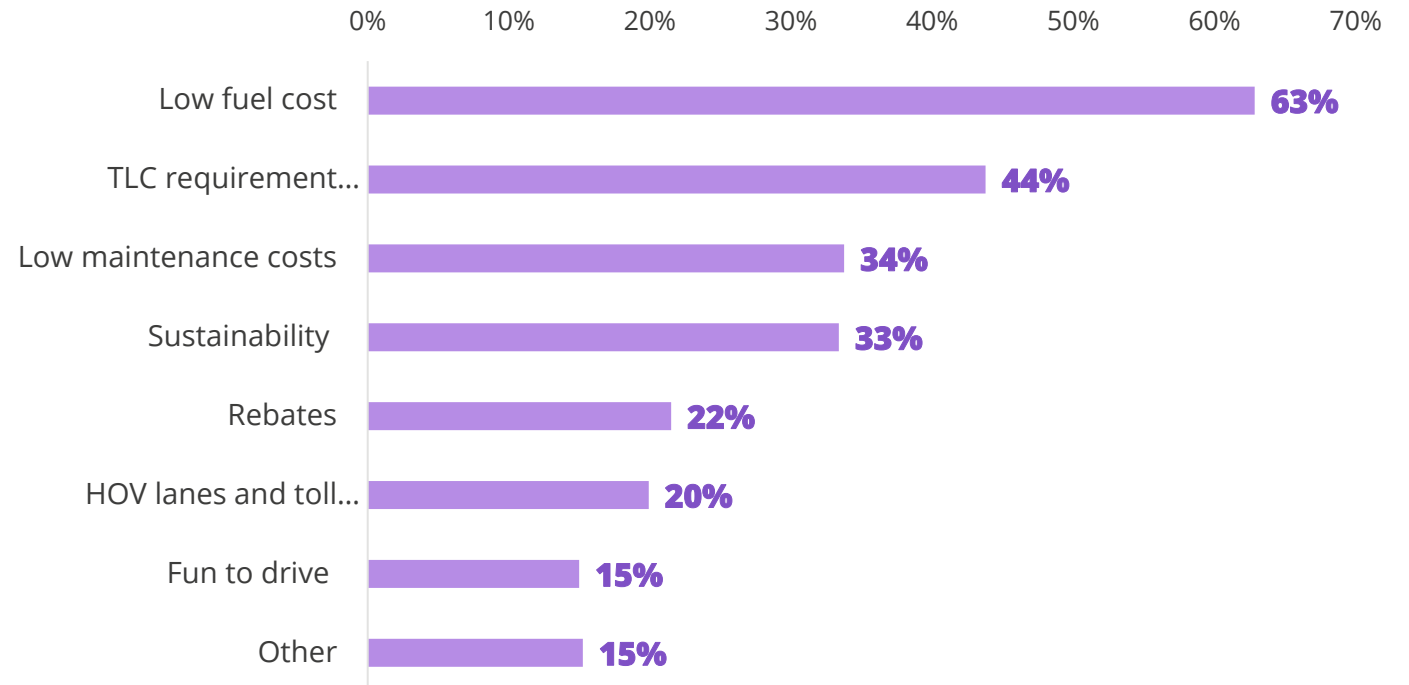
When considering purchasing or leasing an electric vehicle, what are your top concerns?
(Non-BEV drivers, Select all that apply)



63% OF FHV DRIVERS LIST LOW FUEL COST AS A FACTOR THAT WOULD LEAD THEM TO TRANSITION, A BENEFIT OF EV USE THAT IS HIGHLY DEPENDENT ON THE AVAILABILITY OF L2 AND DCFC CHARGING INFRASTRUCTURE.

- Ensuring low fuel costs is one of the most important factors in incentivizing drivers to transition to EVs, but as this section will show, the cost of charging in NYC is dependent on the presence of fees, electricity costs, and time spent traveling to and using EVSE.

**What factors would lead you to consider purchasing or leasing a battery electric vehicle?
(Non-EV drivers, Select all that apply)**



Source: Uber survey (2022).

Note: The survey sample size consists of 110 EV drivers and 2,666 non-EV drivers in NYC.

TRANSITIONING FROM AN ICE TO AN EV IS FINANCIALLY SOUND FOR FHV DRIVERS ONLY IF THEY HAVE ACCESS TO OVERNIGHT L2 CHARGING.

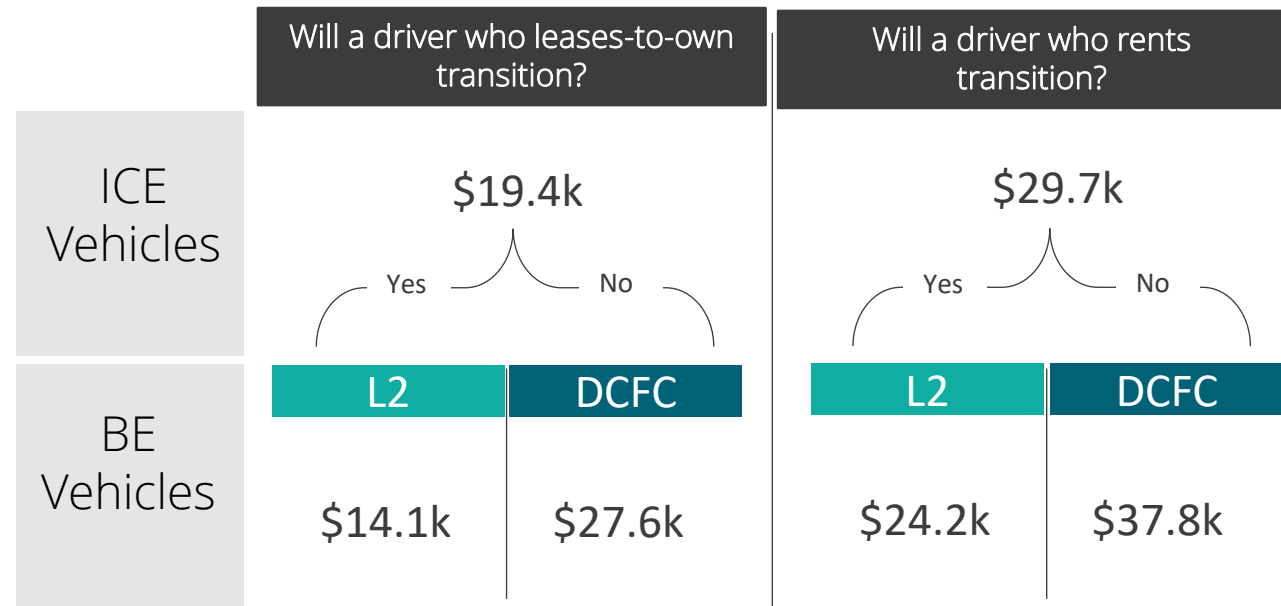
Based on NYC cost data, FHV drivers who rent EVs and rely on public fast charging face the highest vehicle and electricity costs, and the prospect of forgone income when charging during working hours.

Regardless of vehicle ownership status, the total annual costs that drivers face only justify converting to an EV if they have access to off-shift L2 charging. This is in part due to the convenience of charging during non-working hours – the electricity rates are much lower, and there is no opportunity cost of spending time charging.

Even though most rental costs are inclusive of maintenance, the lower cost of EV maintenance compared to ICE maintenance results in savings for non-renters. The average lifetime maintenance costs of ICE vehicles are \$0.10/mile, compared to \$0.06/mile for BEVs. However, there are fewer maintenance service options for BEVs compared to ICEs, which causes hesitation among drivers. This analysis will focus on the charging-related cost considerations for drivers. Details on rental vs lease-to-own costs can be found in the appendix.

Source: Please see slides 95 and 96 for a full table of sources and calculations.

Note: *Public overnight L2 charging or public DCFC fast charging.



Annual Driver Costs by Type of Vehicle and Type of Vehicle Tenure, and by the Primary Type of Charger Used*

AN FHV DRIVER WHO RELIES ON PUBLIC DCFC CHARGING DURING THE DAY CAN FORGO UP TO 14% OF THEIR DAILY REVENUE ON TIME SPENT CHARGING OR TRAVELING TO A CHARGER.

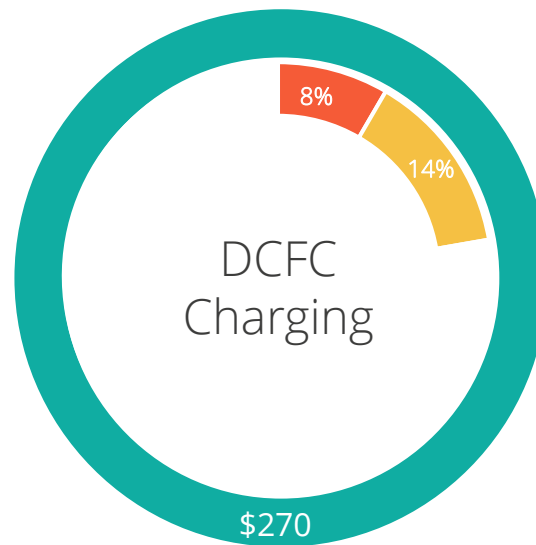
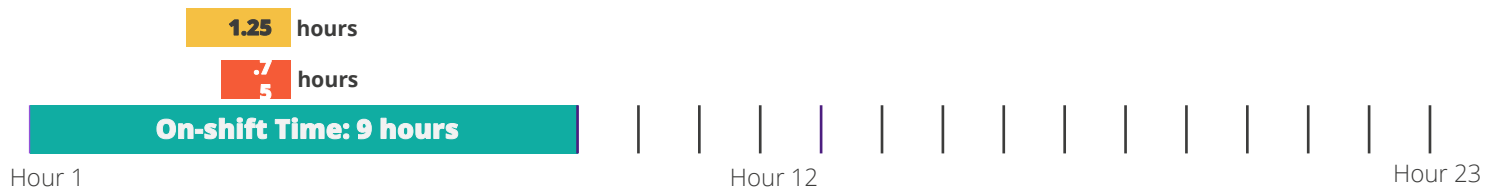
A driver who uses a DCFC charger once during their shift loses driving time due to the time spent charging, the time spent commuting to a charger, and potentially the time spent waiting for an available charger.

Driver Experiences:



It takes too much time to charge [an EV] and **charging stations are not available everywhere like gas stations.** You know, when you're driving commercial you don't know where your next customer is going [...].

Unlike regular (gas, hybrid) cars, **lots of mechanics can't work on them.** In time I know mechanics and parts will get better but it's not good just yet



Daily Net Income:

Opportunity Cost	\$37.4
Charging Cost	\$22.7
Earnings	+\$270
Total	\$209.9

Source: Uber survey (2022). Please see slides 95 and 96 for a full table of sources and calculations.

A DRIVER WHO USES OVERNIGHT CHARGING INCREASES THEIR DAILY NET INCOME BY AVOIDING THE OPPORTUNITY COST OF CHARGING DURING DRIVING HOURS, AS WELL AS SAVING IN CHARGING COSTS.

A driver who charges off-peak doesn't spend working hours charging and saves on electricity costs. The average charging cost per mile is \$0.02 for L2 off-peak charging and \$0.09 for DCFC on-peak charging in NYC*. The combination of removing the opportunity cost of charging during the day, the cheaper electricity costs, and low maintenance costs best supports the earning potential of FHV EV drivers.

Source: Uber survey (2022). Please see slides 95 and 96 for a full table of sources and calculations.

Note: *At some DCFC charging sites, the cost of the first hour of parking is deducted from the cost of their charging session.

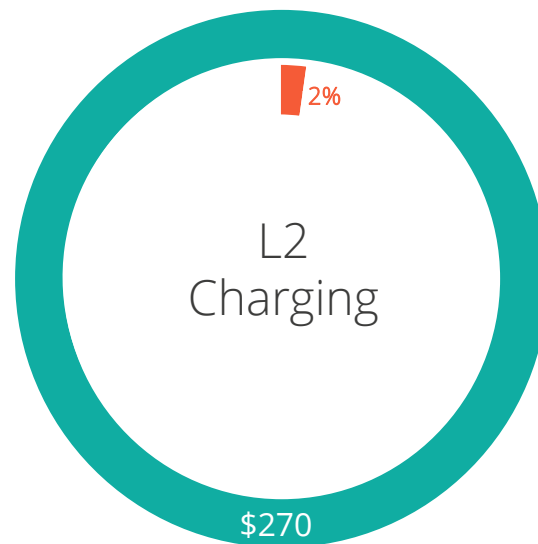
Driver Experiences:

“

I wish my landlord would help putting **charging infrastructure on the building's parking lot.**

If I get a **new charging station**, my home is good for me.

”



Daily Net Income:

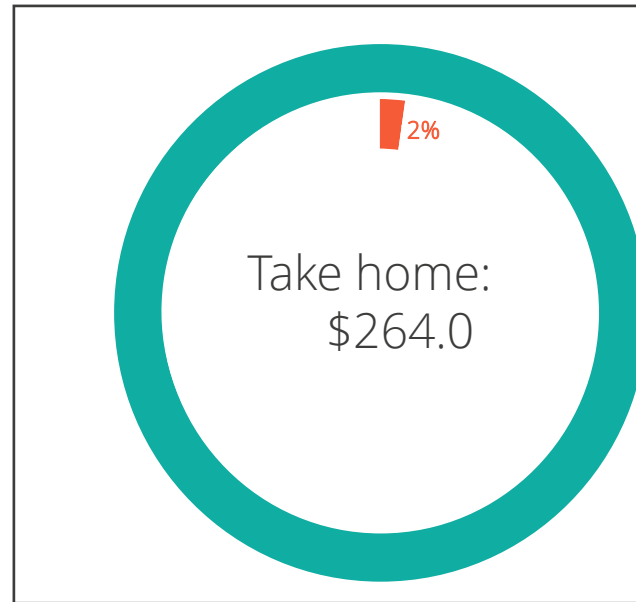
Opportunity Cost	\$0
Charging Cost	\$6
Earnings	+\$270
\$264	

THE AVAILABILITY OF OVERNIGHT L2 CHARGING HAS THE POTENTIAL TO INCREASE DAILY PROFITS BY 20%.

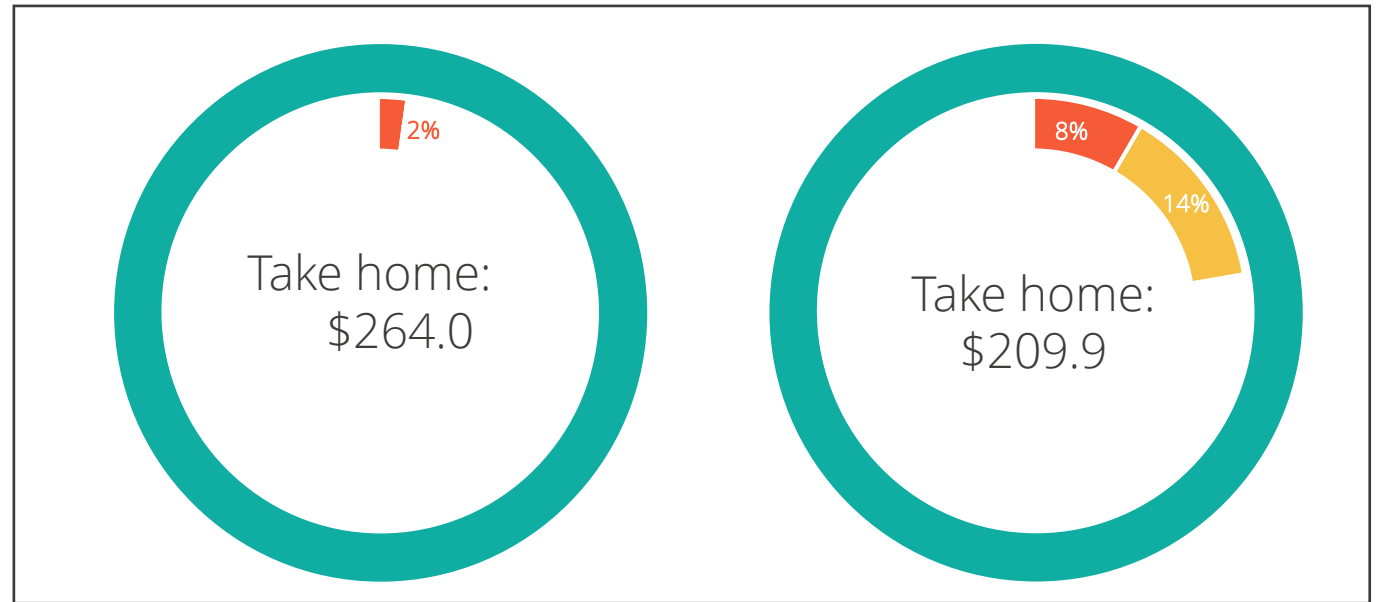
As demonstrated, public L2 charging stations are not located near driver residences. This infrastructure constraint reduces the amount of net earnings FHV EV drivers can expect to make, disincentivizing drivers to make the transition.

- Daily Earnings = \$270
- Charging Cost
- Opportunity Cost

Using Overnight L2



Using Public DCFC



Source: Please see slides 95 and 96 for a full table of sources and calculations.

VEHICLE REGISTRATION LIMITATIONS ENCOURAGE DRIVERS TO RENT FROM A MARKET OF PREDOMINANTLY COMBUSTION VEHICLES, INCREASING THEIR OVERALL VEHICLE COSTS IN THE LONG RUN AND IMPEDING EMISSIONS GOALS.

In order to drive an FHV in NYC, drivers must have a TLC license and either rent or own a TLC licensed vehicle. Many drivers rent a TLC licensed vehicle from companies like DriveSally or Buggy, instead of registering their vehicle, partially due to the **TLC FHV license pause implemented in 2018**. **34% of ICE drivers** on the Uber platform and **24% of BEV drivers** on the Uber platform rent their work vehicle.

The process of determining how many new licenses to administer is complex and weighs many factors, as detailed on the right. As discussed earlier, 3 out of 4 registered vehicles in the City need to be electrified to achieve carbon neutrality. This implies that **transitioning existing TLC licenses to EVs** is likely the larger lever for electrifying the FHV fleet, with administering new licenses for BEV FHV being a complementary tactic to encourage new TLC drivers to use BEVs.

Driver Experiences:

“

“I need a TLC plate because I’m already paying so much money on rental [and with] **any possibility of TLC giving me a number plate I’ll buy a new EV.**”*

”

The **TLC FHV license pause**, with exceptions for wheelchair accessible vehicles and for drivers in lease-to-own agreements, also required that each six months the TLC assess the license pause through the lens of its impact on **traffic congestion, FHV attrition rates, traffic safety, vehicle emissions, FHV ridership, driver income, electrification goals, and the availability of outer-borough service.**

Through these analyses, in October 2022, the TLC determined that the market could absorb new licenses and proposed an amendment to the for-hire vehicle license pause to allow **1,000 new licenses for EVs** beginning in 2023. This will “help to **electrify the TLC-licensed fleet**, drive the demand for and the **development** of more public and private **charging infrastructure**, and allow drivers to avoid the volatility and **high costs of gasoline.**”

The proposed amendment would also change the length of the TLC’s license pause review **from six months to twelve months**, after the next review in February 2023. This review will include an analysis of how the 1,000 EV licenses impacted the TLC ecosystem.

Note: * 74 out of 824 driver comments indicated similar sentiments on the impact of the TLC license restriction on their willingness to transition to an EV.
Source: TLC License Pause Reports, [TLC Proposed Rules Amendment](#), [Uber Driver Requirements – NYC](#), [TLC August 2022 For-Hire Vehicle License Review](#)



4 | Electrifying NYC Vision

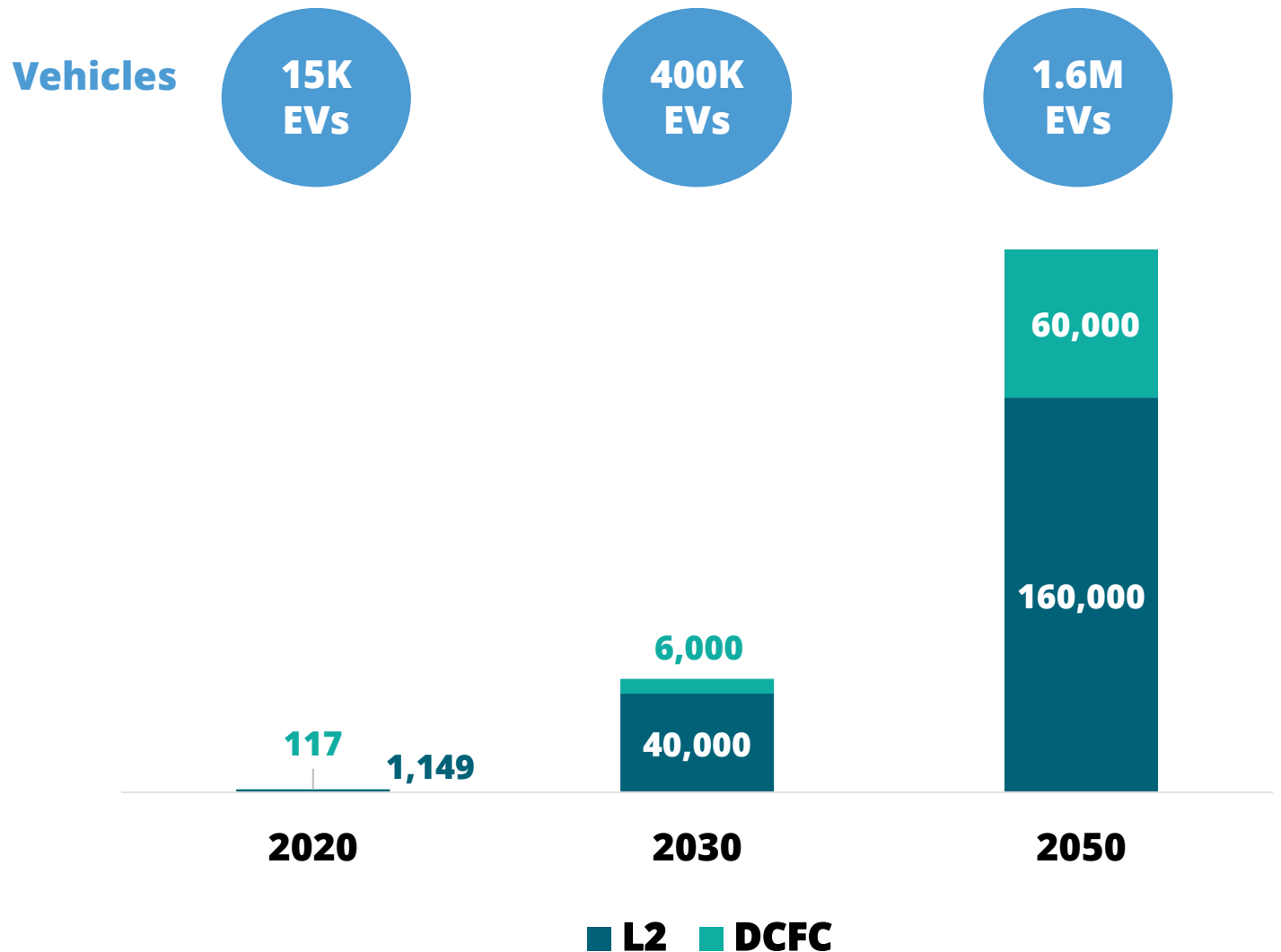
THE ELECTRIFYING NEW YORK PLAN IS THE CITY'S CURRENT ROADMAP TOWARDS ACCELERATING EV ADOPTION IN NYC AND A DRAMATIC EXPANSION OF THE CITY'S EV CHARGING NETWORK.

The *Electrifying New York Plan*, released in September 2021, lays out the City's goals for a fully electrified transportation system, as part of the City's commitment to become carbon neutral by 2050.

The Plan is rooted in the City's climate adaptation and environmental justice needs and goals. Understanding that transportation is a major source of greenhouse gas (GHG) emissions, the Plan sets ambitious yet reasonable targets for EV adoption, as well as L2 and DCFC charging infrastructure, to go beyond the baseline projections outlined in the 2021 Pathways Report.

By 2030, the City estimates that 400,000 vehicles* are needed to switch to EVs, up from 15,000 today. To serve these EVs, the City will need 40,000 publicly accessible L2 (33x increase) and 6,000 DCFC chargers (51x increase). By 2050, the City expects 1.6 million EVs*, which will be served by 160,000 L2s and 60,000 DCFCs.

ELECTRIFYING NEW YORK - GOALS



Note: The total number of light-duty vehicles in NYC is approximately 2 million. The City expects the total to stay roughly the same through 2050, i.e., the increase in the number of EVs by 2030 and 2050 will be due to existing ICEs being replaced by EVs. Source: Electrifying NYC, Pathways to Carbon Neutral NYC

TO ACHIEVE THE CITY'S AMBITIOUS TARGETS FOR EV ADOPTION AND TO SPUR INVESTMENT IN AND EQUITABLE DISTRIBUTION OF CHARGING INFRASTRUCTURE THROUGHOUT THE FIVE BOROUGHS, THE PLAN OUTLINES 8 INITIATIVES.

The Plan recognizes that to reach the City's ambitious goals to support 1.6 million EVs with a network of 160,000 L2 and 60,000 DCFC chargers by 2050, and to do so equitably, the City should "seed the market that the private sector will then take over."

The 8 initiatives in the Plan describe the City's role in two categories: **building out a portion of the targeted amount of L2 and DCFC charging and providing advocacy and engagement to facilitate the market for the private sector to build the rest.**

This section provides a deeper dive into the City's 8 initiatives and evaluates them from the perspective of the three barriers to EV adoption in the FHV sector that this report is organized by, namely, Quantity, Location, and Affordability.



INFRASTRUCTURE BUILDOUT

1. Grow the city-operated fast charging network to over **80 plugs by 2025.**
2. Equip **20% of all spaces** in municipal public parking lots and garages with level 2 chargers **by 2025**, increasing to **40% by 2030.**
3. Create a network of **1,000 curbside charge points** across the five boroughs by 2025, increasing to **10,000 by 2030.**
4. Develop a **level 2 and level 1 user-supplied cord charging system** that integrates with existing street infrastructure.



ADVOCACY AND ENGAGEMENT

5. Advocate for **funding and supportive policies** from the federal government.
6. Work with **utilities and regulators** to make it easier and cheaper to install EV chargers
7. Engage with EV stakeholders to **better understand** evolving EV market, technology, and charging needs through an industry day.
8. Increase **public awareness** of EVs and charging opportunities through the PlugNYC marketing program.

Source: Electrifying NYC

THE ELECTRIFYING NEW YORK PLAN SETS FUTURE TARGETS FOR THE NUMBER OF L2 AND DCFC CHARGERS ON PAR WITH GLOBAL BEST PRACTICES.

The Plan's targets are based on a minimum ratio of one public charger for every 10 EVs*, which is also the benchmark in Europe and China. The Plan aims for one public L2 charger per 10 EVs, with one public DCFC charger per 67 EVs by 2030 and 27 EVs by 2050.

Achieving this goal would place NYC above the one charger per 10 EV benchmark, leading to one public charger per 9 EVs by 2030, and 7 EVs by 2050. In addition to public charging, the City expects 780,000 private, residential L2s to support the 1.6 million EVs by 2050.

While the City's overarching targets are within global best practices, there are several questions the City should consider, including potential needs for higher ratios of public charging per EV in areas with high-density multifamily housing (which may be less likely to have private residential chargers), and finding the right ratio of DCFC to L2 ratios.

*Note: *The total number of EVs includes battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs). The Pathways to Carbon-Neutral NYC report estimates that, by 2050, 60-63% of the light-duty vehicles will be BEVs, while 11% will be PHEVs, reaching a total of 1.6 million EVs. ** This point on DCFC/L2 elasticity was also supported by the NREL study covered earlier in this report.*

Source: Electrifying NYC, Pathways to Carbon Neutral NYC, ICCT, European Federation for Transport and Environment

BEST PRACTICES AND TARGETS

- **One public charger per 10 EVs is a globally accepted minimum ratio.** In 2014, the European Union (EU) set a target of a maximum of 10 EVs per one public charging point. In 2021, the EU-wide ratio was approximately 7.5 EVs per one public charging point.
- **Countries may choose to rely on a large number of public L2 chargers.** The Netherlands has one of the highest public charger per EV ratios, at ~4 EVs per public charger, because most EV drivers rely on publicly-built chargers on public premises (such as curbside L2s) that are used regularly (almost like a private charger) by only 1-2 EV drivers.
- **A larger share of DCFCs could reduce the number of total public chargers needed.**** In most countries, DCFCs represent 10% to 20% of charger deployment. In countries – such as the Netherlands, Belgium, and Germany – that rely on a larger number of L2s, DCFCs constitute less than 10% of the charging points. On the other end of the spectrum, China, Japan, and Finland have the highest share of fast chargers, with 25% to 45%. Finland has roughly 15 EVs per public chargers, placing Finland below the EU's guideline. However, since public DCFCs and ultra-fast chargers are prevalent, the pressure on each charger is reduced.

QUESTIONS FOR NYC

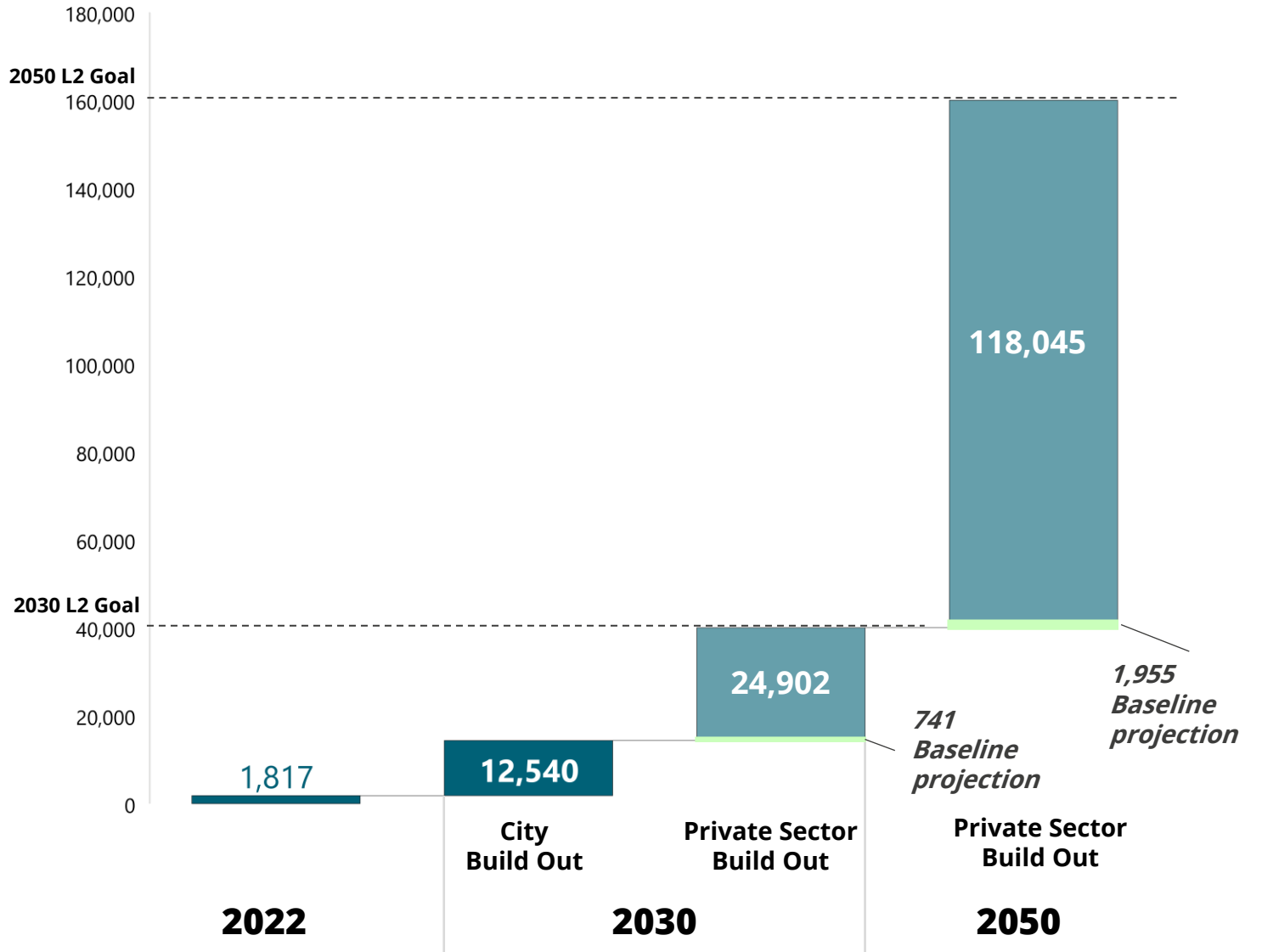
Approximately 50% of private vehicles use on-street parking ([DOT](#)). Thus, as most households lack access to private overnight charging, NYC may need to rely more on public charging above the baseline guidance of one public charger per 10 EVs. Although it is estimated that there are more on-street parking spaces available than needed by cars ([Source](#)) and L2s put less pressure on the electricity grid, building a large number of L2s may present physical challenges in high-density neighborhoods. NYC may choose to incentivize a larger share of DCFCs to reduce the number of total chargers needed, following the necessary electricity grid updates.

THE PLAN'S INITIATIVES ON INFRASTRUCTURE BUILDOUT WILL RESULT IN A TOTAL OF 12,540 L2 CHARGERS BY 2030 - LEAVING ROOM FOR OVER 24K L2 CHARGERS TO BE BUILT BY THE PRIVATE SECTOR.

The Electrifying NYC Plan's initiatives demonstrate that the City expects the public sector to build a small but catalytic portion of chargers by 2030, 12,540, with the remainder being filled by the private sector.

Based on a linear regression of past growth trends, a total of 741 additional L2 chargers are expected to be built** by the private sector by 2030- much lower than the amount needed to reach their stated goal of 40,000 L2 chargers by 2030.

While it is not possible to quantify the number of chargers that the public sector is planning to build between 2030-2050, as that is beyond the timeline scope of the Plan, it is reasonable to assume a similar or larger share of the L2 chargers will be expected to be built by the private sector.



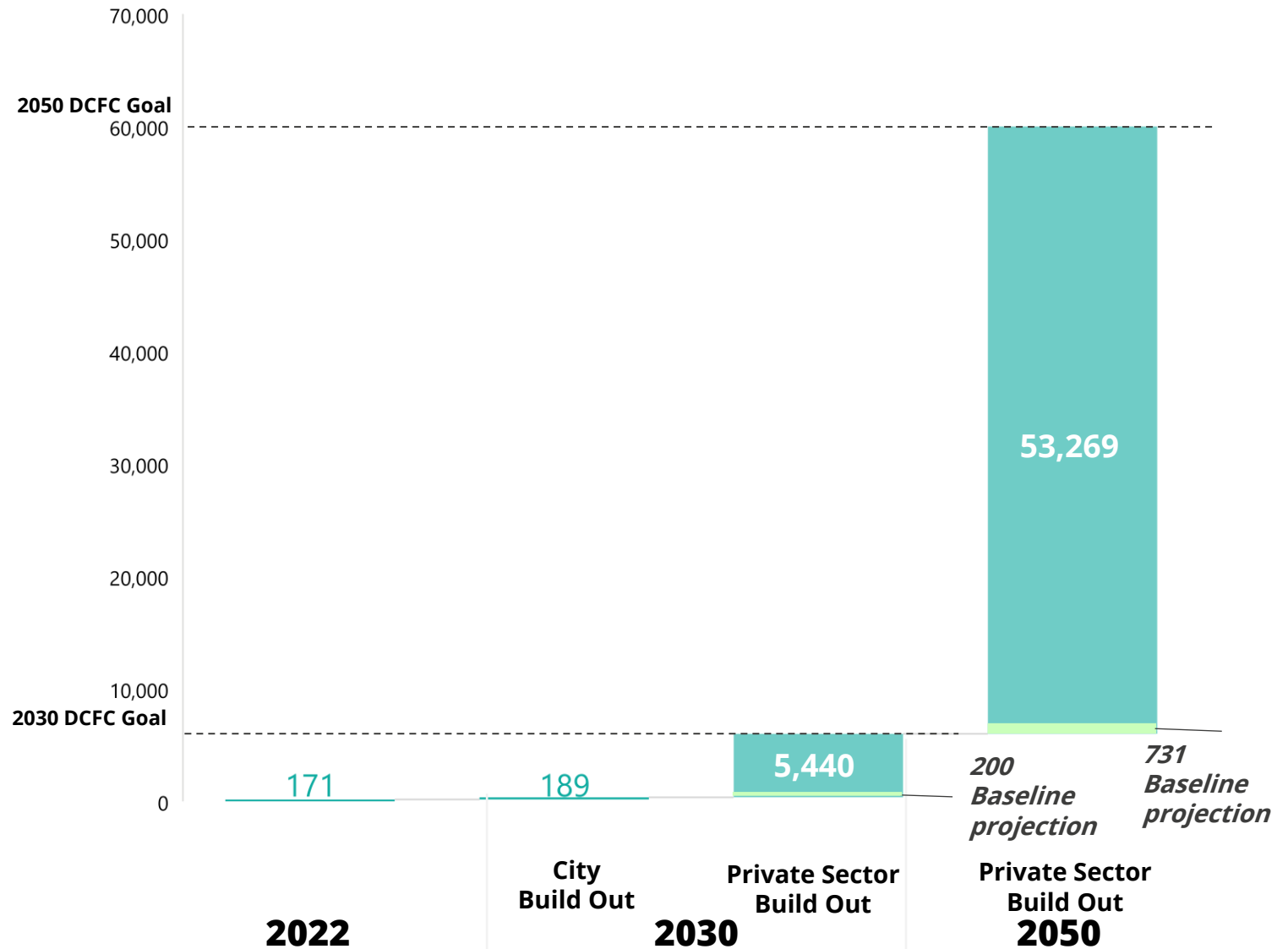
Note: *Initiative #3 is estimated to lead to 1,270 L2 chargers by 2025 and 2,340 L2 chargers by 2030. ** The majority of these L2 chargers are expected to be built in the public right of way.

Source: Electrifying NYC

SIMILARLY, THE INITIATIVES INDICATE 189 PUBLIC DCFC CHARGERS TO BE DEPLOYED BY 2030, WITH CURRENT GROWTH TRENDS PROJECTING 200 TO BE BUILT BY THE PRIVATE SECTOR.

Based on a linear regression of DCFC growth since 2015, a total of 200 additional L2 chargers are expected to be built by the private sector by 2030— much lower than the amount needed to reach the 2030 goal of 6,000 DCFC chargers.

The 931 DCFC chargers forecasted to be built by 2050 is similarly much lower than the total private sector deployment needed to achieve 60,000 DCFC chargers.



Note: *Initiative #3 is estimated to lead to 1,270 L2 chargers by 2025 and 2,340 L2 chargers by 2030.

Source: Electrifying NYC



5 | Scenarios and Recommendations

The initiatives outlined in the Electrifying NYC report were developed to **ensure the City surpasses the baseline policy scenario outlined in the 2021 Pathways Report**, which assumes new policies and actions are not taken to address carbon neutrality.

Electrifying NYC, in fact, targets higher levels of EV adoption than specified in the more optimistic Pathways scenarios.

The recommendations included in this section are intended to bring additional specificity and direction to the ecosystem of stakeholders with control over the deployment of EVSE, and the adoption of EVs by FHV drivers.

They seek to increase the likelihood of achieving the City's vision for electrifying light duty vehicles, as well as achieving carbon neutrality, in part by strategically engaging the private sector for EVSE deployments.

The next few years represent a critical opportunity to accelerate EV adoption. New York City can fill this need by providing and incentivizing the development of EV charging infrastructure, seeding a market that the private sector can then accelerate.

RECOMMENDATION SUMMARY

OPTIMIZE LOCATIONS AND INCENTIVES

1. Identify **high-need neighborhoods** that overlap with **where FHV drivers live** to prioritize swift **L2 and DCFC deployment support**.

● ○ ○
SHORT TERM

2. Work with Con Edison to identify **high-volume pick up and drop off areas** in which the grid currently has **capacity to support new DCFCs**.

● ● ○
MID TERM

3. Develop a **comprehensive EV infrastructure deployment plan** to strengthen coordination with Con Edison, optimizing the City's ability to achieve their **emission reduction and environmental equity goals**, and electrify the FHV fleet.

● ● ●
LONG TERM

4. Leverage the new **federal funding opportunities** to direct investment to **target neighborhoods**.

● ● ●
LONG TERM

STREAMLINE DEPLOYMENT PROCESSES

5. **Streamline permitting** for EV charging as part of the City's ongoing efforts to improve building processes.

● ○ ○
SHORT TERM

6. **Leverage real estate assets** owned/managed by public or mission-driven entities.

● ● ○
MID TERM

7. Explore **land use incentives** for private developers such as additional floor-area ratio (FAR) and transferable development rights (TDRs) for new development in exchange **for low/no entry fee public chargers**.

● ● ●
LONG TERM

SUPPORT CHARGING AFFORDABILITY

8. Continue **targeted outreach and engagement** specific to the FHV industry.

● ○ ○
SHORT TERM

9. Develop **driver-centric incentives** to reduce charging during peak load times, and support EV charging operators in **communicating the status of electricity prices** and charger availability with drivers

● ● ○
MID TERM

10. Develop a **new pricing structure** for charging operators.

● ● ●
LONG TERM

RECOMMENDATION #1:**IDENTIFY HIGH-NEED NEIGHBORHOODS THAT OVERLAP WITH WHERE FHV DRIVERS LIVE TO PRIORITIZE FAST L2 AND DCFC DEPLOYMENT SUPPORT**

As demonstrated, public overnight L2 access is an important factor in determining FHV EV driver earnings. L2 deployments generally require less intensive grid upgrades and have shorter deployment timelines.

In order to support the adoption of EVs among FHV drivers in the short term, the City should prioritize the deployment of its 1,000 public L2 chargers by 2025 via the DOT program in areas of the City where FHV drivers live. As noted in TLC's Charged Up! report, drivers who own and operate their vehicles would benefit from L2 chargers near their homes. TLC's analysis show that "owner-drivers" are concentrated in Queens (Elmhurst, Jackson Heights, Woodside, Jamaica & South Ozone Park), Southern Brooklyn (Bensonhurst and Kensington), and parts of the Bronx (Concourse and Soundview). As mentioned previously, large portions of these areas fit into the environmental justice designations at the federal, state, and city levels.

In the long term, the City should support the deployment of residential DCFC infrastructure to enable drivers to quickly charge during off-shift hours.

PRECEDENTS

- Con Edison's PowerReady Program provides incentives for the installation of L2 and DCFC chargers by reducing the costs associated with grid upgrades and the electricity service itself, with greater subsidy available for "Disadvantaged Communities"—a designation that covers most of NYC. The DCFC program is already oversubscribed, with a waitlist of 500 applicants, and the L2 program is nearing to oversubscription as of January 2023.
- LA Dept. of Water and Power Commercial EV Charging Station Rebate Program for up to \$4,000 per L2 charging station for multiunit building owners, which rises to \$5,000 in disadvantaged communities.
- British Columbia's CleanBC program where residents of multiunit buildings can jointly apply through their utility for rebates on the creation of a professional EV-ready building plan, upgrades to electrical infrastructure, and the purchase and installation of a charger.

POTENTIAL NYC STRATEGIES

- Leverage current federal and state incentives for EV charging infrastructure targeted at private real estate owners, such as the IRA EV Charging Station Credit, the NYS Tax Credit for commercial and workspace charging, and NYSERDA's multifamily installation incentives.
- Offer incentives to developers who include EV charging in new housing, especially multiunit buildings in identified target areas, eventually requiring it for all new residential parking.
- NYC should also continue exploring the potential for pole mounted chargers in residential areas.

ADDITIONAL CONSIDERATIONS

- How many FHV drivers reside in high need communities? What is the optimal quantity of L2 chargers based on their needs?

Source: TLC Charged Up! (2022), [Con Edison Power Ready Incentive Dashboard](#) (Jan 6, 2023)

RECOMMENDATION #2:

WORK WITH CON EDISON TO IDENTIFY HIGH-VOLUME PICK UP AND DROP OFF AREAS IN WHICH THE GRID HAS ENOUGH CAPACITY TO SUPPORT NEW DCFCs

DCFC charging installations often require substantial grid upgrades, meaning utility providers such as Con Edison need to expend a large amount of time and resources before the charger becomes functional. Some areas of the City are already equipped with the capacity to handle additional DCFC charging stations.

High-volume trip areas are in Midtown, Lower Manhattan, Western Queens and Brooklyn, and near airports. However, there isn't always enough DCFC charging easily accessible during driving hours, leading to opportunity costs in the form of time spent searching or waiting for a charger.

Areas of the City where FHV drivers require fast charging and where the grid can absorb this demand are optimal locations for lower-lift DCFC deployments and fleet hubs.

TLC's Charged Up! report identifies Red Hook, Grand Concourse, Maspeth, and Jamaica, as ideal locations for future DCFC deployment. The City can work with Con Edison to evaluate grid capacity in these areas and engage with private deployment partners to install DCFC charging infrastructure.

STAKEHOLDER INTERVIEW FINDINGS

- Large charging hubs with high power demands trigger significant grid upgrades that need to be built ahead of demand and could take years. The location of where these station installations will be would be valuable information.
- Successful fast charging hubs have an anchor rideshare "tenant".

PRECEDENT

- bp pulse in the UK, which operates fast charging hubs for fleet vehicles and offers access and discounts to FHV drivers.

POTENTIAL NYC STRATEGIES

- Expand the PowerReady program
- Work with FHV fleet owners to develop partnerships, establishing DCFC demand and FHV EV charging discounts
- Support the ability of charging station operators to share data—such as aggregated charger usage patterns and anonymized real-time charging usage—with governments, utilities, and/or other ride-hailing companies to optimize the use of charging stations, including by FHV drivers

ADDITIONAL CONSIDERATIONS

- Where are the overlapping areas of grid capacity and FHV fleet needs?
- How have anchor tenant partnerships operated in the past, and what learnings could be brought to a fleet anchor tenant at a DCFC charging hub?

Source: TLC Charged Up! (2022)



LONG TERM

OPTIMIZE LOCATIONS AND INCENTIVES

RECOMMENDATION #3:

DEVELOP A COMPREHENSIVE EV INFRASTRUCTURE DEPLOYMENT PLAN TO STRENGTHEN COORDINATION WITH CON ED, OPTIMIZING THE CITY'S ABILITY TO ACHIEVE THEIR EMISSION REDUCTION AND ENVIRONMENTAL EQUITY GOALS, AND ELECTRIFY THE FHV FLEET

Currently, grid upgrade requests to Con Edison are on a one-off basis, by individual entities, when they are building EV charging infrastructure.

A lack of an integrated use plan that encapsulates projected EV charging needs in an area makes it difficult for Con Edison to plan for future upstream and downstream upgrades.

Such projections should include agreed-upon forecasts around vehicle adoption in different boroughs.

It is an opportune time to look at the City's planning processes and incorporate evaluation of EV charging needs into such processes, as the City's is looking to improve its building approvals and permitting processes, through the *Get Stuff Built* initiative (explained further under Recommendation #5).

STAKEHOLDER INTERVIEW FINDING

- Electric utilities should be consulted in the development of an integrated electric vehicle plan, the same way they are in zoning and housing plans. This consistency of thought would allow for better projections of vehicle and load needs.

POTENTIAL NYC STRATEGIES

- Leverage a data-sharing tool similar to SharedStreets, a project of the National Association of City Transportation Officials (NACTO), to share electrification rates with relevant planning agencies

Relevant NYC Stakeholders:

DOT, NYSEDA, Electric Utilities, NYC MOCEJ, Private EVSE Actors, FHV Fleet Owners

Source: [Wired](#) (2018)



LONG TERM

OPTIMIZE LOCATIONS AND INCENTIVES

RECOMMENDATION #4:

LEVERAGE THE NEW FEDERAL FUNDING OPPORTUNITIES TO DIRECT INVESTMENT TO TARGET NEIGHBORHOODS

The Inflation Reduction Act (IRA) provides new federal funding opportunities for which investments in EV charging infrastructure are eligible. This provides an opportunity for the comprehensive siting plan to not only align with broader environmental equity and emission reduction goals, but also align with other infrastructure funding opportunities.

There is a significant overlap in areas where FHV drivers live and those that are eligible for Justice40 programs. These programs could both facilitate direct public investment in EV infrastructure (such as the Alternative Fuel Vehicle Refueling Property Credit) and may also potentially be designed to incentivize private deployment (such as the competitive grants under the Greenhouse Gas Reduction Fund).

Greenhouse Gas Reduction Fund

The \$27 billion Greenhouse Gas Reduction Fund, which will be administered by the Environmental Protection Agency, will fund green and energy efficient projects across three areas, effectively functioning as a “green infrastructure bank”:

- \$11.9 billion for competitive grants for financial and technical assistance for both direct and indirect investments into qualified projects that reduce or avoid greenhouse gas emissions or other forms of air pollution. Electric vehicle charging infrastructure projects are eligible.
- \$8 billion for competitive grants for financial and technical assistance for both direct and indirect investments specifically in low-income and disadvantaged communities for qualified projects that reduce or avoid greenhouse gas emissions or other forms of air pollution. Electric vehicle charging infrastructure projects are eligible.
- \$7 billion for zero emission technologies available to states, municipalities, tribal governments, and eligible recipients for zero emission technologies.

Alternative Fuel Vehicle Refueling Property Credit

IRA extends the alternative fuel vehicle refueling property credit – which expired in 2021 – through 2032. The credit applies to the cost of the installation of alternative fuel vehicle refueling property at a business or private residence. The IRA also expands the credit by establishing a new base credit rate of 6% and increasing the credit limit from \$30,000 to \$100,000. There is also a bonus credit rate of 30% if certain prevailing wage and apprenticeship requirements are met. Further, the credit is only available for property installed in a low-income or rural census tract. **The IRA allows local governments, among other tax-exempt entities, to elect for direct payment in lieu of the credit.**

RECOMMENDATION #5:**STREAMLINE PERMITTING FOR EV CHARGING AS PART OF THE CITY'S ONGOING EFFORTS TO IMPROVE BUILDING PROCESSES**

The City is in the process of improving its approvals and permitting processes, as outlined in the *Get Stuff Built* report, announced in December 2022. The report presents the City's three-pronged strategy to address the affordable housing crisis, by accelerating new construction approval processes by half.

Among the 111 recommendations in the report, there are some that will also be helpful for deploying charging infrastructure, such as expanding authority of licensed professionals, identifying work types that do not need permits (which would require pre-approving standard details for EV charging infrastructure by DOB), and focusing reviews on safety in an effort to reduce reviews needed.

However, to address the specific permitting-related needs of charging operators, the City may consider changes that have been implemented in other parts of the U.S. that are further along with EV adoption, such as California. California has introduced targeted legislation to reduce permitting layers, rounds of revisions, and to constrain the timeline of project application completion and approvals.

PRECEDENT: California Assembly Bills 1236 and 970 - EV Charging Permit Streamlining

California has adopted two pieces of legislation to streamline permitting for deploying EV charging infrastructure: 1) AB 1236 (in 2015), which requires all California cities and counties to develop an expedited, streamlined permitting process, and scores cities for the completion of the required ordinance and checklist; 2) AB 970 (in 2021), which introduces specific binding timelines to review periods, based on the size of the project and clarifies parking requirements.

Combined, AB 1236 and AB 970 are intended to speed up and reduce the uncertainties of the permitting processes for applicants, and give better information to the cities and counties, and establish best practices for permitting and communication requirements.

As part of AB 1236, cities and counties must adopt the following: a streamlining ordinance for expedited EV charging infrastructure permitting process, permitting checklists online for L2 and DCFC charging, administrative approval, approvals being limited to only health & safety review, electronic signature acceptance, no association approval, and only one complete deficiency notice if the application is not complete.

In terms of binding timelines, AB 970 enforces that an application is deemed complete after if the city or county does not have feedback after 5 business days for 1-25 station projects on a site, and 10 business days for 26 or more station projects. Applications are approved without feedback from the city or county after 20 and 40 business days after being deemed complete, respectively, for 1-25 station projects and 26 or more station projects.

Source: [City of New York Get Stuff Built \(2022\)](#); [California Governor's Office of Business and Economic Development: Rocky Mountain Institute \(2019\)](#)

RECOMMENDATION #6:**LEVERAGE REAL ESTATE ASSETS FROM THE PUBLIC AND PRIVATE SECTOR.**

Another way to reduce development costs could be to leverage the assets that are owned and/or managed by the City, as the City is already doing with municipal parking lots and rights-of-way (ROW). Other potential assets that could be leveraged include but are not limited to:

- Any size of underutilized building and/or land, which may be used to build full chargers, or components needed for downstream grid upgrades such as new transformers or electric panels, which take up valuable real estate on project sites (up to 25%);
- Streetlights, which may be used to deploy L2 chargers attached to the poles without the need for utility upgrades (as piloted by the DOT).

Besides public assets, places where the “natural dwell time” is 10-60 minutes are ideal settings for public DCFC stations. In addition to private entities like grocery stores, retail outlets, restaurants, and others, such places could also include parking lots of mission-driven institutions, such as churches and schools.

Lastly, private real estate owners who may have assets that are underutilized from a power grid perspective may explore opportunities to build EV chargers as a new revenue stream (as was the case with the Revel Hub in Brooklyn, which was built on a former pharmaceutical plant and required no grid upgrades).

PRECEDENT: NYC Broadband City Assets Task Force

- As part of the development of the NYC Internet Master Plan (published in January 2020), the City established the Broadband City Assets Task Force (BCATF) in August 2018, an internal team to coordinate the use of City assets for broadband infrastructure deployment. The BCATF is comprised of representatives from seventeen City agencies that collectively control approximately 11,000 City facilities and other potential broadband-related infrastructure assets across the city. The list of assets was publicly made available as part of the Universal Solicitation for Broadband, issued in April 2021, and is still available on NYC Open Data.

PRECEDENT: Charging Infrastructure Deployment by Mission-Driven Owners

- Charge Infrastructure and the Baltimore-Washington Conference of The United Methodist Church announced in November 2022 their partnership for the strategy and development of EV charging stations and related services. Charge will work as the preferred provider to evaluate the prospect of EV charging stations for the more than 600 churches in the BWC. The company will provide seamless EV charging infrastructure strategy, charging installation and engineering solutions, as well as ongoing monitoring and maintenance services to any member church.



LONG TERM

STREAMLINE DEPLOYMENT PROCESS

RECOMMENDATION #7:

EXPLORE LAND USE INCENTIVES FOR PRIVATE DEVELOPERS SUCH AS ADDITIONAL FLOOR-AREA RATIO (FAR) AND TRANSFERABLE DEVELOPMENT RIGHTS (TDRs) FOR NEW DEVELOPMENT IN EXCHANGE FOR LOW/NO FEE PUBLIC CHARGERS.

This is a new practice that could help expand the number of chargers throughout NYC. Other cities and states in the US have begun exploring this option.

There is an established process in NYC to leverage land use bonuses such as FARs and TDRs to provide certain public amenities through new private development.

New development (especially large developments in dense areas of the city) usually requires extensive electricity grid upgrades, which could help accommodate power needs of new EV chargers.

The City could offer larger premiums for chargers that are publicly available and do not apply parking fees.

The City could also use this as a lever to expand the number of chargers in high-need neighborhoods, through new developments in those areas.

PRECEDENT: City of Minneapolis, MN

- In October 2022, the City of Minneapolis amended its zoning ordinance to incentivize building EV chargers in new development. ([Source](#))
- The amendment provides an option for a floor-area or height premium that would be awarded only when a certain percentage of the project's parking spaces include EV chargers, and a certain percentage are EV-ready to accommodate chargers in the future.

PRECEDENT: Washington State

- Adopted in 2019, Washington State law requires any new construction that includes parking to dedicate 10% of parking spaces to accommodate EV charging and to dedicate an additional 25% to spots that are EV-ready.
- Seattle local ordinance: Requires that multifamily development with shared parking garages or shared surface parking lots provide at least 20% of the spaces as EV-ready, with higher requirements for smaller parking facilities;
- Requires that parking facilities for non-residential uses include a minimum of 10% of the spaces as EV-ready.

RECOMMENDATION #8:

CONTINUE TARGETED OUTREACH AND ENGAGEMENT SPECIFIC TO THE FHV INDUSTRY (DRIVERS AND FLEET OPERATORS).

As reported earlier, the survey of drivers on Uber's platform reveals that almost 1 out of 3 drivers describe themselves as "unsure" about their likelihood of switching to an EV in the next 5 years. The fact that this group did not state any positive or negative preference signifies that deeper engagement is needed to inform the drivers' decisions.

The TLC Charged Up! report highlight the need for further outreach and engagement with FHV drivers and industry stakeholders, and provide some recommendations, which are aligned with best practices. Their relevant recommendations focus on two areas:

- **Information about incentive opportunities for purchasing an EV** - Informing and educating drivers on available grant and tax credit opportunities to assist with the upfront costs of purchasing an EV, as well as installing L2 chargers at the residences of owner-drivers who have access to personal driveways or garages.
- **EV riding and charging experience through "Ride and Drive" days** – TLC suggests working with Empire Clean Cities and other partners to host events provide drivers the opportunity to get behind the wheel of EVs and use chargers.

PRECEDENT: RIDE AND DRIVE DAYS

- Ride and Drive days are popular outreach and engagement events that help educate potential users about the benefits and experience of driving and EV. For many different audiences, such events provide the opportunity of test driving an EV in a safe, fun, and information environment. For example, **NJ Department of Environmental Protection** partnered with a national nonprofit and a state car retailer to organize ride and drive events throughout the state, as well as attending public outreach event such as fairs and town festivals, to explain the benefit's of EVs and respond to question on clean transportation.

STAKEHOLDER SPOTLIGHT: EMPIRE CLEAN CITIES

- Empire Clean Cities (ECC), a national non-profit organization based in NYC, has been promoting the financial and environmental benefits of EVs to ordinary citizens and policymakers. ECC has provided reliable information about alternative fuels, latest research, and green transportation practices that reduce emissions in NYC and the Lower Hudson Valley. ECC have developed **Mission Electric**, a one-stop shop for learning about the benefits and purchasing process related to EVs.
- As the designated local U.S. Department of Energy supported **Clean Cities Coalition**, Empire Clean Cities is also part of a national network of nearly 100 coalitions dedicated to advancing the nation's economic, environmental, and energy security by reducing petroleum consumption in the transportation sector.

RECOMMENDATION #9:

DEVELOP DRIVER-CENTRIC INCENTIVES TO REDUCE CHARGING DURING PEAK LOAD TIMES, AND SUPPORT EV CHARGING OPERATORS IN COMMUNICATING THE STATUS OF ELECTRICITY PRICES AND CHARGER AVAILABILITY WITH DRIVERS.

As part of group of programs aimed at reducing utility bills for commercial EV charging, in January 2023 the Public Service Commission (PSC) directed NYS utilities* to implement commercial managed charging programs to provide “use-case specific incentives, as well as value-based bill credits that provide operating costs relief for EV charging stations that are able to avoid charging during the costliest times for the grid.”

This kind of time-based incentive has the potential to reduce charging costs for both EVSE operators and EVSE consumers but requires pricing communication to consumers. The current lack of real-time price information makes charging costs difficult to budget for among FHV drivers. Information about the price of electricity and the incentives available to offset that price would be beneficial to FHV drivers and help optimize their daily revenue and be more grid-friendly. For example, if drivers can see that chargers in Fort Greene are peaking, they could decide to go to a Clinton Hill charger instead.

Relevant NYC Stakeholders:

DOT, Electric Utilities, Private EVSE Actors, FHV Fleet Owners

PRECEDENT: SMARTCHARGE NEW YORK

Con Edison developed a consumer-facing demand response rebate program that drivers can link to their vehicles on-board telematics of specific EV models. The program offers a rebate of \$0.10/kWh when drivers charge within the Con Edison service area during off-peak hours (12am-8am).

POTENTIAL NYC STRATEGIES

- The PSC-directed commercial managed charging programs is a promising model for reducing grid demand but should be paired with a mechanism to communicate real-time network pricing (as impacted by specific incentives and bill credits) to drivers, allowing consumers to adjust their use accordingly. ChargePoint, for example, is an EV operator that communicates day-ahead and hourly pricing to users via an app. Charging operators in NYS and NYC can develop a similar tool in coordination with utilities and the PSC.
- Recommendation 2 calls for the creation of FHV DCFC charging hubs in areas of the City with high pick up and drop off volume. These hubs can also facilitate real-time information sharing on pricing and availability, as well as the ability for drivers to reserve chargers, thus reducing the uncertainty of on-shift charging availability.

Note: National Grid, Central Hudson Gas & Electric Corp., New York State Electric and Gas Corp., (NYSEG) and Rochester Gas & Electric Corp. (RG&E), and for public direct current fast charging (DCFC) at Consolidated Edison Company of New York, Inc. (Con Edison) and Orange and Rockland Utilities, Inc. (O&R)

Source: [SDG&E, PSC Press Release \(2023\)](#), [SmartCharge New York](#)



LONG TERM

SUPPORT CHARGING AFFORDABILITY

RECOMMENDATION #10:

DEVELOP A NEW PRICING STRUCTURE FOR EV CHARGING OPERATORS.

Demand charges were initially designed to account for unusual use patterns from large industrial and commercial users and allow utilities to ensure delivery and grid safety. However, the unusual use patterns from public EV chargers are smaller in magnitude and also operated by much smaller entities. The industry has widely recognized that the current pricing structure for electric vehicle charging does not effectively incentivize EVSE installation, particularly in the near-term when EV demand is growing.

To address this issue, the PSC directed NYS utilities* to develop alternative solutions to traditional demand-based rates. One of the solutions is for utilities to develop a demand charge rebate that provides “a 50 percent demand charge credit for all commercial EV charging use-cases.” This reduces the cost of demand charge to EVSE operators, which is an important interim measure and one already being deployed by ConEd as detailed on the right but does not address the demand charge structure itself. Another option presented by the PSC is to create a phase-in rate, while gradually transitioning the station to a “more sustainable and cost reflective rate design in the long run.” Further collaborative analysis by NYC EV ecosystem stakeholders will be required to strategically and meaningfully alter pricing structures to be “sustainable and cost reflective.”

Relevant NYC Stakeholders:

DOT, Con Edison, Private EVSE Actors

PRECEDENT

- Con Edison’s commercial managed charging program offers relief from demand chargers before a charger gets to 20% utilization. As the charger utilization increases past 20%, the available incentives decrease, as does the electricity rate. This structure is meant to reflect the variability of charger demand in the near-term. This is similar to the EV phase-in rate proposed in the PSC’s staff whitepaper, which is expected to “result in driver costs that are at least 30 percent less expensive than the equivalent cost of gasoline.”
- Revel introduced a Vehicle-to-Grid (V2G) pilot at its Red Hook warehouse, in which its Nissan LEAF vehicles will send electricity from their batteries back into Con Edison’s grid as they charge during non-use hours. Revel receives revenue from this electricity transfer.

POTENTIAL NYC ACTIONS

- Conduct a study leveraging expertise from PSC, NYC utilities, and EVSE operators to design the desired “sustainable and cost reflective” rate plan for both L2 and DCFC charging that keeps costs affordable for EVSE operators, and predictable for FHV drivers.
- Scale the Vehicle-to-Grid (V2G) pilot from Revel’s Red Hook warehouse to other fleet hubs in which vehicles are connected to non-DCFC chargers. A longer-term expansion would require wider adoption of cars that are compatible with V2G use cases, and eventually, exploring options for V2G cost savings being passed to individual FHV EV owners.

Note: National Grid, Central Hudson Gas & Electric Corp., New York State Electric and Gas Corp., (NYSEG) and Rochester Gas & Electric Corp. (RG&E), and for public direct current fast charging (DCFC) at Consolidated Edison Company of New York, Inc. (Con Edison) and Orange and Rockland Utilities, Inc. (O&R)

Source: [CleanTechnica](#) (2022), [Smart Electric Power Alliance](#) (2018), [PSC Press Release](#) (2023)



Appendix

ACKNOWLEDGEMENTS

The **NYC Electric Vehicle Infrastructure Assessment for For-Hire Vehicles** was prepared by **HR&A Advisors, Inc.** in partnership with **Uber Technologies, Inc.**

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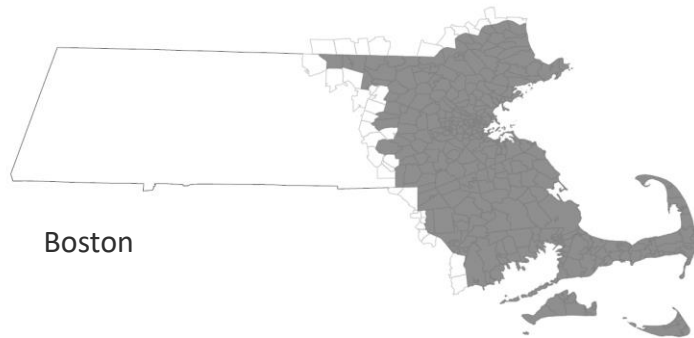
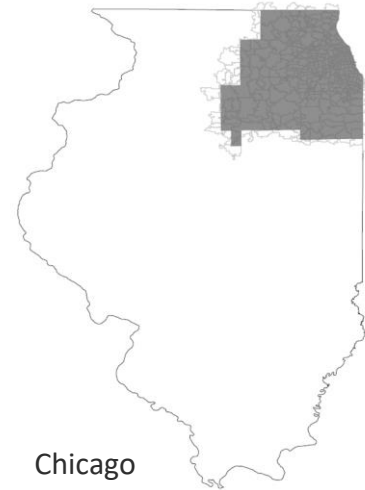
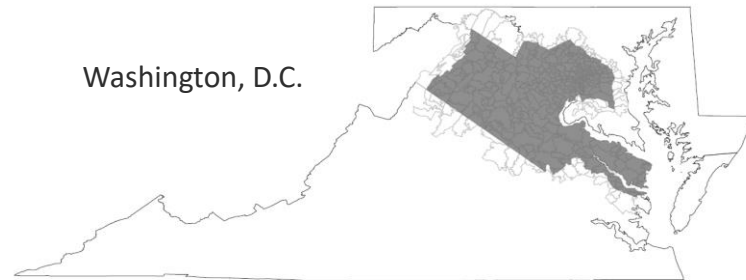
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- **Voyager Global Mobility**

CITY BOUNDARIES



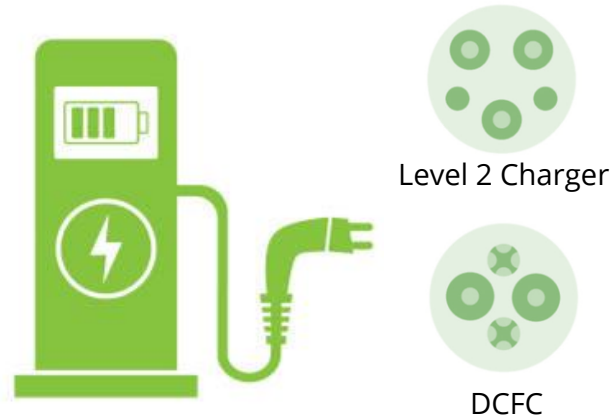
Note: The solid fill represents the actual city boundary as defined by Uber. However, since most datasets used in this study are at ZIP code level, we used extended city boundaries for data collection and aggregation purposes to include all ZIPs that fall within the solid fill. The extended city boundaries are shown by the ZIP boundaries surrounding the solid fill.

EV CHARGING BASICS

To recharge an EV battery, the driver will require accessing a **plug** – but this connection comes in different shapes.



The most common way to charge an EV is using a **port** (also called an **ESVE**) that can replenish a battery in 30 minutes – but it can also take all night long.

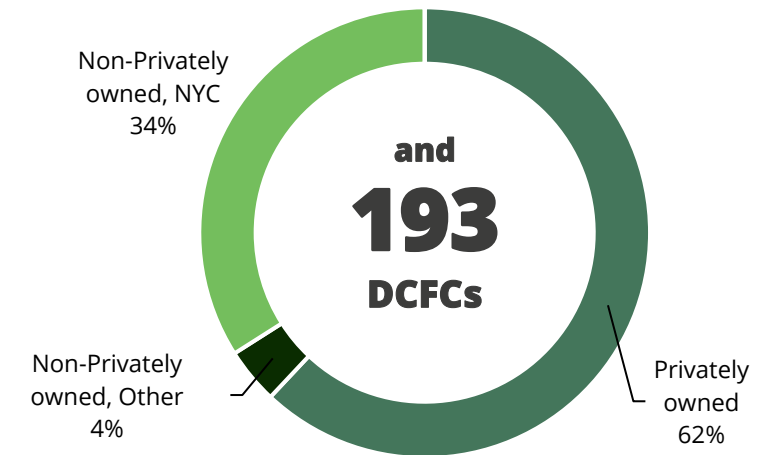
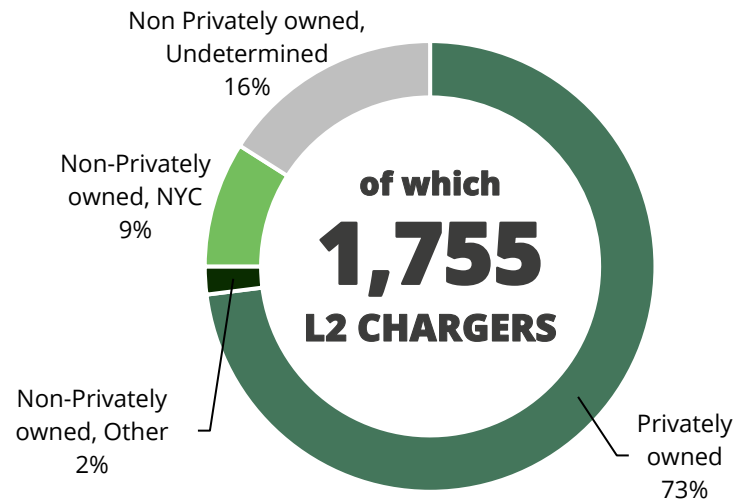
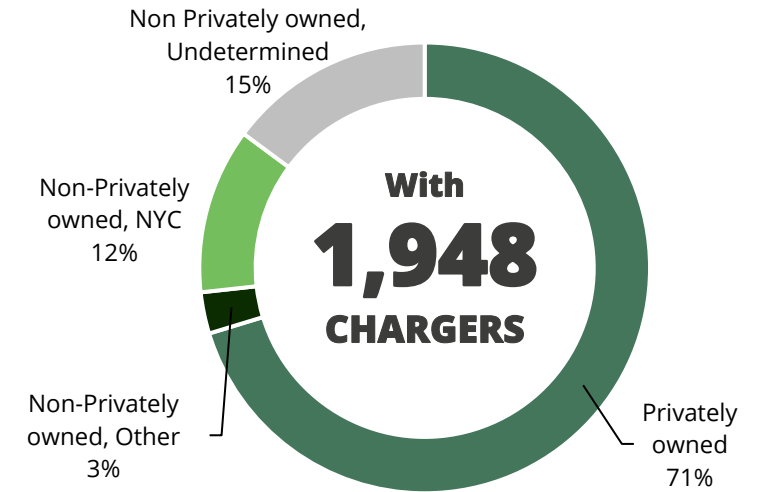
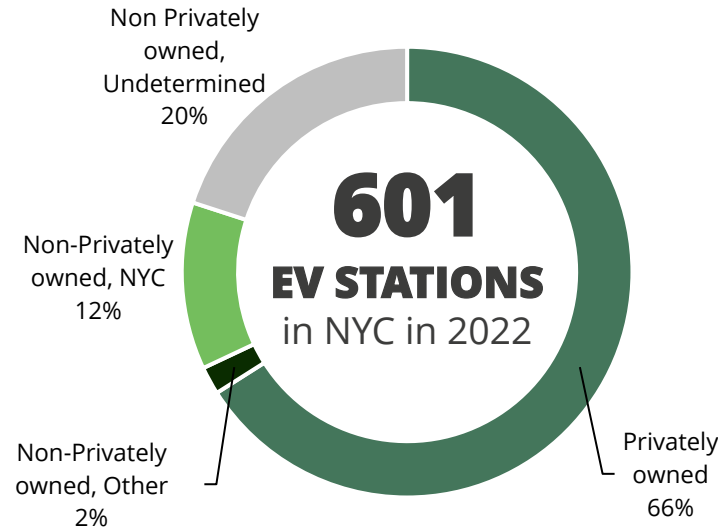


These ports are part of networks and are often available in **charging stations**, making it easier for drivers to use them.



CHARGER OWNERSHIP

Ownership is defined by the type of organization that owns the fueling infrastructure. In this report, we are using private chargers as a proxy for “high entry fee chargers” and non-private chargers as a proxy for “low/no entry fee chargers.” Most non-private chargers are connected to a few networks that provide a reliable pricing structure. The small percentage of undetermined priced chargers can be reasonably estimated to be similar to other non-private chargers based on this information. There is also a small percentage of non-private chargers within residential building parking lots that follow the same principle.



MAP OF FUTURE CHARGERS TO BE DEVELOPED ON CITY-OWNED PARKING LOTS, OVERLAID WITH WHERE DRIVERS WHO USE THE UBER PLATFORM LIVE.

6,351

Total Municipal Parking Spaces in NYC municipal garages.

By 2025, 20% of these, i.e.,

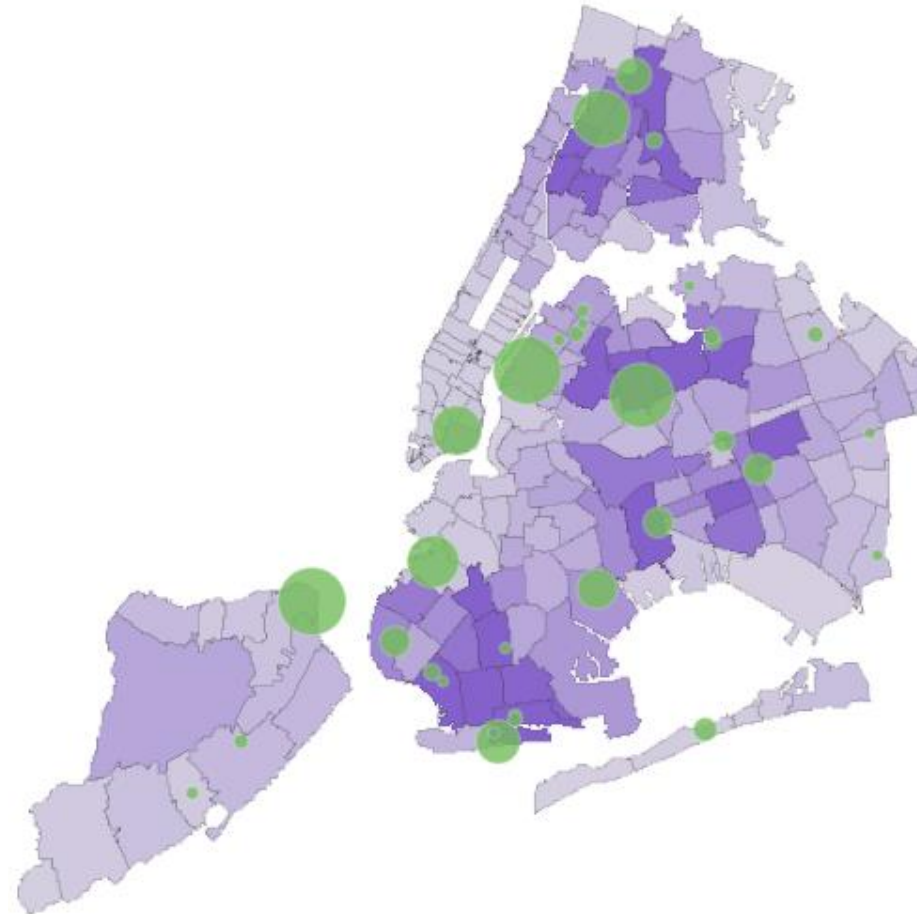
1,270

spaces will be electrified.

By 2030, 40% of these, i.e.,

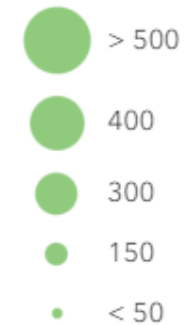
2,540

spaces will be electrified.

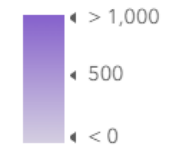


Drivers using Uber's platform & Municipal Parking Facilities

Number of Municipal Parking Spaces



Number of drivers



Source: Electrifying NYC, Uber (2022), NYC DOT.

UBER NYC DRIVER SURVEY (DECEMBER 8 -13, 2022)

Summary: Survey to all active New York City (NYC) Taxi and Limousine Commission (TLC) drivers

- Active drivers = Licensed NYC TLC non-Taxi drivers who have taken at least 1 trip between July 1, 2022 and September 30, 2022
- The survey sample size consists of 110 EV drivers and 2,666 non-EV drivers in NYC. The survey had a response rate of 10.8% for EV drivers and 3.2% for non-EV drivers.

Disclaimer: Participation in this survey is voluntary. We may use your responses to better understand our users and improve the Uber experience. We may also contact you in the future in relation to your responses to this survey. Your responses will be treated according to our Privacy Notice <https://privacy.uber.com/policy>.

Survey Questions:

Question 1: What kind of vehicle do you currently drive when doing TLC trips? (single select)

- Gasoline Engine (non-Hybrid)
- Hybrid
- Plug-In Hybrid
- Battery Electric Vehicle (fully electric)

Question 2: Which best describes the relationship with the vehicle you operate? (single select)

- I own my TLC-licensed vehicle
- I lease my TLC-licensed vehicle (long-term lease or lease-to-own)
- I rent my TLC-licensed vehicle (weekly or monthly flexible rental)
- I work for a Fleet Company or another TLC-licensed driver and drive their TLC-licensed vehicle
- Other

Question 3: What is the address where you currently reside? Please include the street address, city, state, and zip code.

- Free form text field

Question 4: Where do you primarily park your vehicle at night? (single select)

- Driveway or garage at my house (single-family home, brownstone, duplex, triplex)
- Garage or parking lot at my apartment/condo (part of my building)
- Parking lot near my house/apartment (not part of my building)
- Street parking near my apartment/condo/house
- Other

If Battery Electric Vehicle, move to EV survey questions (below). If ICE move to section 2.

UBER NYC DRIVER SURVEY CONTINUED - EV QUESTIONS

EV Survey Questions:

Question 5: On a scale of 1 to 5, how is your EV charging experience? (single select)

- 1- Terrible
- 2- Not good
- 3- Satisfactory
- 4- Good
- 5- Great

Question 6: What do you care most about when charging? You may select multiple options. (multiple choice)

- The cost
- Whether there are parking/gate fees to access charging stations
- How close the charging station is
- Whether there's a line / wait time at the charger
- The time it takes to charge
- How well the charger works / charger maintenance issues
- Other

Question 7: How do you primarily charge your EV? (single select)

- Level 3 (Public DC Fast): Tesla Supercharger
- Level 3 (Public DC Fast): CCS/CHAdeMO Networks (e.g., EVgo, Electrify America, NYC DOT Garages, NYSEDA JFK, Brooklyn Revel Hub)
- Level 2 (240V) charging in my home
- Level 2 (240V) charging in my overnight off-street spot (parking garage or lot etc.)
- Level 2 (240V) charging at public stations where I don't park at night
- Level 2 (240V) curbside public charger
- Level 1 (110V standard outlet)
- I'm not sure
- Other

UBER NYC DRIVER SURVEY CONTINUED - EV QUESTIONS

EV Survey Questions:

Question 8: *If you need to charge your battery more than once a day, is there a secondary type of charger you typically use? (single select)*

- *I don't typically have to recharge my battery more than once a day*
- *Level 3 (Public DC Fast): Tesla Supercharger*
- *Level 3 (Public DC Fast): CCS/CHAdEMO Networks (e.g., EVgo, Electrify America, NYC DOT Garages, NYSEERDA JFK, Brooklyn Revel Hub)*
- *Level 2 (240V) charging in my home*
- *Level 2 (240V) charging in my overnight off-street spot (parking garage etc.)*
- *Level 2 (240V) charging at public stations where I don't park at night*
- *Level 2 (240V) curbside public charger*
- *Level 1 (110V standard outlet)*
- *I'm not sure*
- *Other*

UBER NYC DRIVER SURVEY CONTINUED - NON-EV QUESTIONS

2. If ICE / Hybrid / Plug-in Hybrid

Question 5: What is the likelihood of you purchasing or leasing a battery electric vehicle within the next 5 years? (single select)

- Very Likely
- Semi-likely
- Unsure
- Unlikely
- Very Unlikely

Question 6: When considering purchasing or leasing an electric vehicle, what are your top concerns? You may select multiple options. (multiple select)

- Cost of vehicle
- Finding a vehicle that fits my needs
- Access to overnight charging
- Maintenance costs / battery degradation
- Cost of charging
- Lack of public charging infrastructure (outside of home)
- Time it takes to charge (if charging outside of home)
- Other

Question 7: Do you have any other concerns about purchasing or leasing an electric vehicle?

- Free form text

Question 8: What factors would lead you to consider purchasing or leasing a battery electric vehicle? You may select multiple options. (multiple choice)

- Lower cost of fuel (saving on gas)
- Fun to drive
- Lower maintenance costs
- Sustainability / being good for the environment
- HOV lane access and discounted tolls
- Additional rebates / incentives for vehicle and charger purchases
- Future potential TLC requirement

ANNUAL DRIVER COSTS

This table shows six different driver categories across vehicle and tenure types, as well as the primary kind of charging used within the EV group. The sources used for these calculations can be found on the following slide.

DRIVER GROUP			ANNUAL COSTS* (% TOTAL COSTS)				
Vehicle Type	Tenure	Primary Type of Charger Used	Vehicle Cost	Fuel	Maintenance	Opportunity Cost	Total Costs
ICE	Lease-to-own	-	\$8,972 (46%)	\$6,378 (33%/21%)	\$4,065 (21%)	-	\$19,416
	Rent	-	\$23,400 (79%)	-	-	-	\$29,778
BEV	Lease-to-own	Public overnight charging (L2)	\$10,848 (77%)	\$830 (6%)	\$2,455 (17%)	-	\$14,133
		Public fast charging (DCFC)	\$10,848 (39%)	\$3,138 (11%)	\$2,455 (9%)	\$11,220 (41%)	\$27,661
	Rent	Public overnight charging (L2)	\$23,400 (97%)	\$830 (3%)	-	-	\$24,230
		Public fast charging (DCFC)	\$23,400 (62%)	\$3,138 (8%)	-	\$11,220 (30%)	\$37,758

ASSUMPTIONS DRIVER COST ANALYSIS

Category	Input	Assumption	Source	Notes
ICE Vehicle	TLC Licensed ICE Sedan MSRP avg	\$39,439	NYC Taxi & Limousine Commission: Electrification Report 2022	
	ICE MPG	22 miles per gallon	Toyota: 2023 Camry Specifications	<i>Assuming vehicle build for Toyota Camry 2023 XSE V6</i>
	ICE Maintenance	\$0.11615/mile	Consumer Reports: Electric Vehicle Ownership Costs (October 2022)	<i>Adjusted for 2020 to 2022 inflation</i>
BEV Vehicle	TLC Licensed EV Average MSRP	\$47,683	NYC Taxi & Limousine Commission: Electrification Report 2022	
	Avg BEV battery capacity	64.8 kWh	Kia: 2023 Niro EV Wind Specifications	
	BEV MPGe	253 miles per gallon	Kia: 2023 Niro EV Wind Specifications	
	Time to charge on L2	6 hours	Edmunds: 2023 Kia Niro EV Is Bigger, Bolder and Faster-Charging (April 2022)	
	Time to charge on DCFC	0.75 hour	Kia: 2023 Niro EV Wind Specifications	
	BEV Maintenance	\$0.07015/mile	Consumer Reports: Electric Vehicle Ownership Costs (October 2022)	<i>Adjusted for 2020 to 2022 inflation</i>
Fueling	Regular gasoline price	\$4.009/gallon	American Automobile Association: New York Metro Average Gas Prices	
	Price of charging at public L2 (day)	\$2.5/hour	NYC Department of Transportation: Curbside Level 2 Charging Project FAQ	
	Price of charging at public L2 (night)	\$1/hour	NYC Department of Transportation: Curbside Level 2 Charging Project FAQ	
	Price of charging at public DCFC	\$1/kWh	NYC Department of Transportation: DC Fast Charger Program	
Financing	APR on vehicle loan	5.19%	Bank of America: Auto Loan Rates, New York State	
	NPER on vehicle loan	5 years	Bank of America: Auto Loan Rates, New York State	
	FHV rental cost	\$450/week	NYC Taxi and Limousine Commission: August 2022 For-Hire Vehicle License Review	
FHV Specific	Driver earnings	\$1200/week	NYC Taxi and Limousine Commission: August 2022 For-Hire Vehicle License Review	
	Time spent driving to DCFC	20 mins	DCFC driveshed analysis	<i>20 min driveshed covers all of the city.</i>
	Time spent waiting at DCFC site	10 min	Assumption	
	Avg VMT for FHV in NYC	35000 miles/year	NYC Taxi & Limousine Commission: Electrification Report 2022	



NYC Electric Vehicle Infrastructure Assessment for For-Hire Vehicles

FEBRUARY 2023

HR&A + Uber