CPRG-I FREIGHT 2030:
Facilitating Regional Equity by Implementing Green Healthy Transportation

Technical Appendix

In support of the New York City Department of Transportation's Climate Pollution Reduction Program Grant Application

April 2024

TECHNICAL APPENDIX

SUMMARY

The Appendix provides the New York City Department of Transportation's (NYC DOT) methodology and assumptions for developing the estimated greenhouse gas (GHG) emission reductions in this application. Each section describes one of the four proposed key measures.

COMMERCIAL CARGO BIKE INCENTIVE PROGRAM

This measure would achieve GHG emission reductions by supporting last mile delivery operators to shift modes from motorized vehicles such as small trucks, vans, and cars through an up-front cargo bike subsidy. NYC DOT would primarily target this measure towards small businesses that provide goods and services, as opposed to logistics carriers that are in the business of making deliveries.

GHG Reduction Estimate Method and Models / Tools Used

This measure would reduce GHG through VMT avoidance. The incentive payments would enable businesses to shift modes from motorized delivery vehicles to cargo bikes, eliminating VMTs. To calculate GHG reduction, NYC DOT estimated the number of new cargo bikes that the grant would fund and the number of VMTs that each would replace. This calculation is the average daily vehicle mileage divided by the vehicle to bike replacement ratio (i.e., the number of cargo bikes a business needs to replace each vehicle, assumed as 1:1). After calculating the avoided VMTs, DOT applied cargo van GHG emissions rates from the DOE/Argonne National Laboratory's Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Online web tool to calculate GHG reduction.

Measure Implementation Assumptions / Activity Data

NYC DOT proposes this measure to provide a 50% incentive towards the cost of a new cargo bike. At a $20k cost per professional cargo bike, the grant will incentivize purchases of approximately 2,000 bikes. NYC DOT will target the measure towards a range of operators including small businesses (food services, retailers, independent contractors, etc.) and parcel delivery carriers. These businesses represent a spectrum of delivery use cases with varying payload requirements, route lengths, and duty cycles. NYC DOT assumes that the average vehicle being replaced is a cargo van that accrues 20 VMT per day, based upon feedback from the initial NYC DOT cargo bike pilot evaluation report. This methodology assumes that participating businesses would find the overall utility of properly outfitted cargo bikes to be on par with the vehicles being replaced. These businesses should achieve a roughly even ratio in replacing vehicles with cargo bikes. Businesses that operate larger vehicles such as box trucks that are not able to approach an even replacement ratio may find the payload of cargo bikes to be too limiting not economically viable as labor is typically the largest cost component of delivery operations, surpassing the costs of vehicles or cargo bikes.

To calculate annual VMTs, NYC DOT assumes that each van replaced by a cargo bike would have operated six days per week, or 313 days per year. This is a midpoint between the traditional five-day business week and the increasing numbers of businesses that operate and deliver seven days per week. Using this assumption, each cargo bike eliminates 6,260 annual VMTs per replaced van.

GHG Reference Case / Reduction Estimate Assumptions

The AFLEET tool was used to calculate the reference annual GHG emissions eliminated for each van replaced by a cargo bike. The model was set to New York State and the "Light Commercial Truck – Gasoline" type to represent cargo vans. The annual mileage was set to the above estimated annual VMTs per van.

This measure would subsidize cargo bikes that business owners would phase onto the streets through the end of 2028. NYC DOT anticipates 500 bikes during the 2025 ramp year, 1,000 bikes in 2026, and

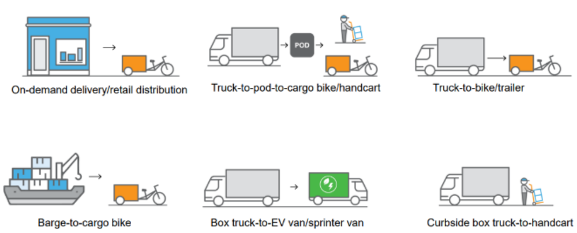
1,500 in 2027, with full benefits (2,000 bikes) achieved in 2028. NYC DOT and its partners anticipate that cargo bike usage will flourish in NYC, with GHG reduction benefits sustaining through 2050 and beyond.

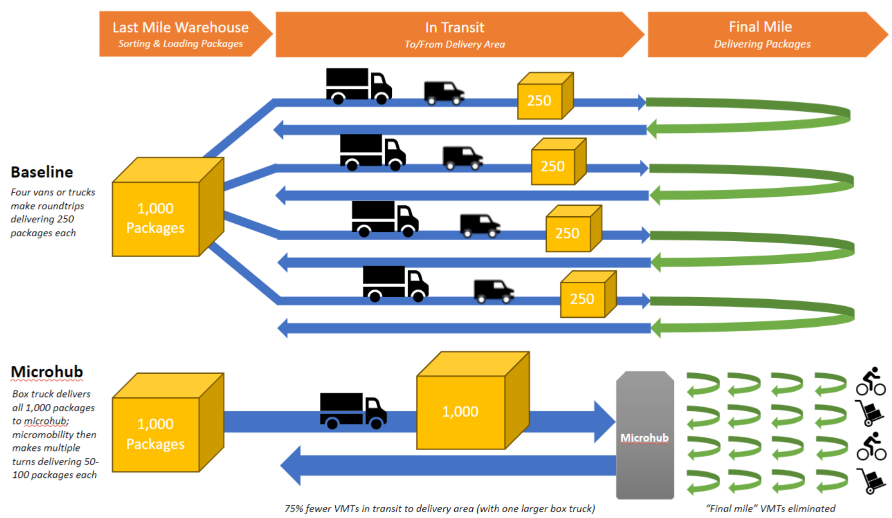
GHG Emissions Reduced

Year (end)	Cargo Bikes	Annual Truck VMT Reduction (miles)	Cumulative GHG Emission Reduction (MTCO2e)
2030	2,000	12,520,000	46,449
2050	2,000	12,520,000	252,888

MICROHUBS EXPANSION

This measure would achieve GHG reductions by shifting last mile delivery operations from motorized vehicles (i.e., small trucks, vans, cars) to micromobility (i.e., cargo bicycles, walkers.) The microhub concept would provide a location for inbound freight vehicles to transload freight to various micromobility options to complete the final mile. Microhubs could optionally incorporate secured package lockers that would enable customers to retrieve their own packages, avoiding the need for any delivery company to make the final mile trip and minimizing re-deliveries due to theft. While there are several use cases and configurations for microhubs, the GHG modeling is based around a typical use case in which electric box trucks deliver freight from last mile warehouses to microhubs, where freight is then transloaded to cargo bikes or hand carts for delivery.

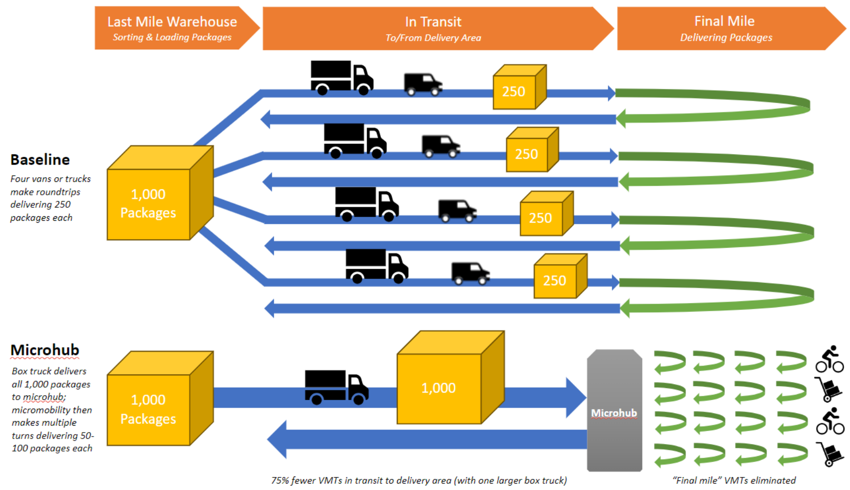




GHG Reduction Estimate Method and Models / Tools Used

This measure would reduce GHG through VMT avoidance. Microhubs enable a modal shift towards micromobility, with corresponding elimination of VMTs. Additional VMT reduction would be derived by consolidating freight inbound to microhubs in fewer, larger trucks. For example, a single box truck could transport freight that would have otherwise been spread across four last mile delivery vans.

To calculate GHG reduction, NYC DOT estimated the number of new microhubs that the grant will fund. By applying an estimate of average daily equivalent van payloads of freight to each microhub, the methodology supports the calculation of VMT avoidance attributed to micromobility replacement and freight consolidation. The micromobility benefit is the number of equivalent van payloads, multiplied by the average "final mile" route length that one of these vans would have travelled (i.e., between the microhub site and all its delivery stops.) The freight consolidation benefit is the product of the number of equivalent van payloads, multiplied by a consolidation factor, multiplied by the typical on-road distance between last-mile warehouses and microhubs. After calculating the avoided VMTs, NYC DOT applied cargo van and box truck GHG emissions rates from the AFLEET Online web tool to calculate GHG reduction.



Measure Implementation Assumptions / Activity Data

NYC DOT is requesting funding for five new microhubs envisioned at off-street locations. This build-out supports a larger NYC goal to reach 50 microhubs in 2030 and 100 microhubs in 2040. On average, twelve electric box trucks would deliver freight to each microhub daily, with each truck carrying the equivalent of four cargo vans of freight. Trucks from different operators could arrive sequentially at separate times throughout the day, sharing a footprint of 2-3 truck parking spots. Two Level 3 DC fast chargers will also be provided at each site to enable truck charging. The configuration and scale of each microhub will vary depending upon site-specific constraints and commercial requirements. NYC DOT is evaluating potential sites against several criteria, including access to high density mixed land-use areas, proximity to public transit, on- and off-street geometry, and freight operator RFEI feedback.

Empirical data about the movement of last mile delivery vans is commercially sensitive and not readily available. However scientific modeling provides a useful approximation. To develop these assumptions about last mile delivery VMTs, NYC DOT references a 2023 paper from the C2SMART center at NYU, titled “A large-scale analytical residential parcel delivery model evaluating greenhouse gas emissions, COVID-19 impact, and cargo bikes” and published by the International Journal of Transportation Science and Technology. This report estimated the average daily parcel delivery mileage per truck trip for several final mile delivery operators, with the average value across UPS, FedEx, and Amazon being 12.28 miles. This estimated average trip length is adopted here and subdivided between 1) the “final mile” portion of the route, where deliveries are being made, and 2) the segments between the last mile warehouse and the delivery area (i.e., where the microhub would be situated.) This subdivision is not specifically addressed in the research paper and varies widely in practice. Anecdotally, due to NYC density, vans frequently make all deliveries for their route in a dozen or fewer blocks (i.e., ~2 miles.) Conversely, there is wider variability in the distances between last mile warehouses and delivery areas. Some last-mile warehouses are in or adjacent to the neighborhoods they serve while in other cases, vans traverse multiple boroughs to reach their delivery areas (e.g., from New Jersey to Manhattan, or Staten Island to Brooklyn.) Taking the average 12.28-mile daily VMT and subdividing out the 2.00 miles of "final mile" deliveries leaves 10.28 miles of roundtrip travel between the last mile warehouse and the delivery area. For GHG calculations, this means that every van equivalent of freight processed at the microhub translates to 2.00 miles of van VMT avoidance due to freight being shifted from vans to micromobility. Secondly, every four van equivalents of freight results in 41.12 avoided van VMTs (10.28 miles x 4 vans) replaced by 10.28 electric box truck VMTs due to consolidation of freight between the last mile warehouse and the microhub.

To calculate annual VMTs, the methodology assumes that microhubs operate an average of six and a half days per week, or 339 days per year. This is a midpoint between the traditional six-day USPS last mile model and newer last mile operations that function seven days per week (e.g., Amazon). With the trend towards faster deliveries, the proportion of seven-day last mile operations is likely to increase.

GHG Reference Case / Reduction Estimate Assumptions

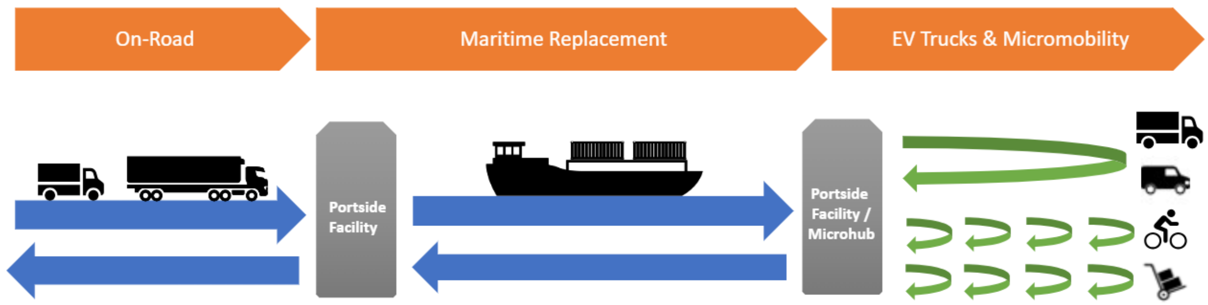
The NYC DOT microhub pilot reported that over 80% of New Yorkers receive a package at home each week, while 18% receive packages on four or more days. This underscores the vast amount of addressable last mile freight that can be transloaded through microhubs to micromobility. The AFLEET tool calculates the annual GHG emissions reduction for each cargo van taken off the road and the offsetting GHG emissions generated by each electric box truck delivering freight to microhubs. The model is set to New York State with the Light Commercial Truck – Gasoline type representing a cargo van, the Single Unit Long-Haul – Electric type representing a box truck, and the annual mileage set to the corresponding annual VMTs per van or box truck. NYC DOT proposes to phase the microhubs into operation by the end of 2027. Half of the benefit is achieved during the 2027 ramp up year (between 2-3 sites,) with the full benefit (five sites) achieved in 2028. Microhub usage is anticipated to flourish in NYC, with GHG reduction sustaining through 2050 and beyond.

GHG Emissions Reduced

Year (end)	Microhubs	Benefits from Freight Consolidation	Benefits from Introduction of Micromobility	Total Benefit
		Cumulative GHG Reduction (MTCO2e)	Cumulative GHG Reduction (MTCO2e)	Cumulative GHG Reduction (MTCO2e)
2030	5	2,132	470	2,602
2050	5	14,050	3,153	17,203

BLUE HIGHWAYS

Blue Highways site activations will enable maritime freight transport within the NY/NJ metropolitan area. It replaces on-road river-crossings with a "maritime bridge." Typical use cases include last mile freight en route to delivery and middle mile freight traveling between distribution centers and warehouses. This measure achieves GHG emission reductions by shifting freight from trucks to marine vessels. A towboat-hauled Roll-on Roll-Off (Ro-Ro) barge solution will be implemented. Additional GHG and VMT reductions are achieved by enabling arriving freight to depart the portside in EV trucks and micromobility. Where necessary, arriving freight can be transloaded at on-site microhub facilities. Blue Highway sites supporting EV box truck operations will also include Level 3 DC Fast Chargers.



Portside microhubs enable arriving freight to be transloaded to EVs and micromobility

Blue Highways will also enable electrification of port equipment, mitigating GHG emissions compared to existing diesel equipment. Cargo Handling Equipment (CHE) Charging Infrastructure will be subsidized, enabling separately funded purchases of electric port equipment. Electrification measures at NYNJ Rail Facilities will directly subsidize electric locomotives, forklifts, and associated charging equipment.

GHG Reduction Estimate Method and Models / Tools Used

To calculate GHG reduction, NYC DOT estimated the number of new Blue Highway freight terminals that the grant will fund, then estimated the number of daily Blue Highway trips that the new freight terminals will support, and the average payload of each trip. The payload is expressed in number of trailer equivalents. There is an assumed baseline split of 25% freight volume that would have been transported by Class 8 diesel combination trucks and 75% share that would have been transported by diesel box trucks. Skewing the split towards box trucks reflects the comparatively low volume of Class 8 trucks in NYC, which was confirmed through analysis by NYS DOT traffic counts in 2022 along corridors proximate to planned Blue Highway sites. Class 8 operations are inhibited by the tight confines of many NYC streets and restrictions imposed by Section 385 of the Vehicle & Traffic Law. Each trailer equivalent of freight corresponds to one avoided Class 8 combination truck trip or 2.5 avoided box truck trips, based upon typical carrying capacity. NYC DOT then took the total count of avoided on-road trips of each type and multiplied the average avoided on-road mileage to calculate avoided VMTs.

The second set of benefits accrues from enabling EV trucks and micromobility. For each facility, a split was assumed between volume share of freight departing via EV trucks and share departing via micromobility. For the share departing via micromobility (typically last mile freight), the NYC DOT baseline assumed that freight would have otherwise been carried by cargo vans. Each trailer equivalent of freight transloaded to micromobility converts to 10 equivalent van payloads (1 trailer: 2.5 box trucks x 1 box truck: 4 vans.) Each trailer equivalent of freight transloaded to micromobility converts to 10 equivalent van payloads (1 trailer: 2.5 box trucks x 1 box truck: 4 vans). VMT avoidance was calculated as the number of equivalent van payloads, multiplied by the average final mile route length that each cargo van would have travelled making deliveries. The remaining share of freight (typically middle mile freight) is modeled as departing on EV box trucks. We again assumed a baseline split of 25% freight volume that would have been transported by Class 8 combination trucks and 75% share that would have been transported by diesel box trucks. Each trailer equivalent of freight corresponds to one avoided Class 8 combination truck trip or 2.5 avoided box truck trips. NYC DOT then took the total count of avoided on-road trips of each type and multiplied the estimated avoided roundtrip on-road delivery mileage to calculate avoided VMTs.

To calculate annual VMTs, NYC DOT assumes that freight operators utilizing the Blue Highway operate six days per week, or 313 days per year, which is a midpoint between the traditional five-day business week and the increasing numbers of businesses that operate and deliver seven days per week.

NYC DOT used the AFLEET Online tool to determine avoided over-road GHGs. Maritime GHG emission factors are applied to the maritime distance of Blue Highway trips to calculate newly generated GHG. The difference between the avoided over-road GHGs and new maritime GHGs is the net GHG reduction.

For CHE Charging Infrastructure, recent (2022) engineering estimates of comparable charging infrastructure projects were used to define the scope, consisting of 48 DC fast chargers, with ¼ mile 13.2 kV electrical service extensions (71% overhead, 29% underground,) and associated switchgear and metering. At a typical 2 equipment: one fast charger ratio, this scope supports electrification of 96 pieces of CHE, modeled as 24 electric rubber-tired gantry cranes, 40 electric terminal tractors, and 32 heavy duty tractors. For Electrification measures at NYNJ Rail Facilities, the scope comprises three switcher locomotives, which may be electric conversions or newly purchased with electric traction, plus two electric forklifts for freight transloading and associated electrical infrastructure to enable charging.

Measure Implementation Assumptions / Activity Data

NYC DOT proposes to use the grant allocation to fund four new Blue Highway freight facilities. The configuration and scale of each Blue Highway site will vary depending upon site-specific constraints and commercial requirements. NYCEDC received significant feedback from the freight community in its recent Blue Highways RFEI, which will inform site and service development. The following table summarizes key assumptions for Blue Highway services enabled by the new facilities:

Site	2030 Daily Trailer Volume	2040 Daily Trailer Volume	% Departing on Micromobility	% Departing on EV Box Trucks
Pier 92	288*	576*	40%	60%
Southwest Brooklyn	159	288	20%	80%
Lower Manhattan	24	24	100%	0%
Midtown Manhattan	12	12	100%	0%

Note: Volume at Pier 92 is projected to arrive 50% via marine vessels and 50% on-road

Volumes are based upon projections and discussions NYCEDC has conducted with industry stakeholders. Additionally, Pier 92 and Southwest Brooklyn volumes would ramp up over the initial 10 years of operation. The smaller Lower Manhattan and Midtown Manhattan sites are dedicated to last-mile and geographically constrained, so volume would remain fixed. Based upon RFEI feedback, NYC DOT envisions a deck barge solution with typical dimensions of 260’ x 80’ x 16’ and capable of carrying 24 trailer equivalents of freight. The table below summarizes key journey distances associated to each site. For micromobility, the same 2-mile delivery loop assumption carries over from the microhub measure. For micromobility, the same two-mile delivery loop assumption carries over from the microhub measure. For middle mile-focused EV truck operations, longer roundtrip distances are assumed to transport freight further into Manhattan (Pier 92) or Brooklyn. The Brooklyn estimate is particularly conservative, as the Southwest Brooklyn facility could be a gateway for deliveries reaching further into Queens or Long Island.

Site	On-Road Roundtrip Distance from Bayonne, NJ (miles)	Maritime Roundtrip Distance from Bayonne, NJ (nautical miles)	Micromobility Delivery Loop Distance (miles)	EV Truck On-Road Roundtrip Distance (miles)
Pier 92	37.2	14.1	2.0	6.0
Southwest Brooklyn	38.0	4.4	2.0	12.0

Lower Manhattan	22.2	7.5	2.0	N/A
Midtown Manhattan (East)	26.5	14.1	2.0	N/A

Note: *Bayonne, NJ used as representative origin for Blue Highway freight;* ***Sources:*** *Truckdrivingdirections.com (on-road distances); Google Earth (maritime distances)*

For CHE Charging Infrastructure and Electrification measures at NYNJ Rail Facilities, baseline annualized port equipment diesel emissions data were taken from the EPA Diesel Emissions Quantifier (DEQ) and Emission Resource Integrated Database (eGRID), with baseline diesel emissions being compared to electrified emissions.

GHG Reference Case / Reduction Estimate Assumptions

The AFLEET tool calculates the annual GHG emissions reductions for VMTs eliminated by each type of Blue Highway service. The model is set to New York State with Combination Long Haul Truck - Diesel representing Class 8 trucks, Light Commercial Truck – Gasoline type representing cargo vans, and Single Unit Long-Haul – Diesel or Electric representing conventional or EV box trucks. The annual mileages are set to the corresponding annual VMTs calculated per truck or van. NYC DOT uses the methodology employed in the 2022 Multi-Facility Emissions Inventory commissioned by the Port Authority of NYNJ to calculate GHG emissions that Blue Highway vessels would generate:

- E = EF x Power x LF x Act x FCF, where
- EF = emission factor, grams of pollutant per unit of work, g/kW-hr
- Power = rated power of the engine, kW
- LF = load factor, the ratio of average load used during normal operations to full rated power
- Act = vessel’s engine(s) activity, hr./year
- FCF = fuel correction factor to reflect changes in fuel properties that have occurred

NYC DOT incorporated key input parameters from the 2022 Multi-Facility Emissions Inventory and a 2015 US Army Corps of Engineers study. The methodology assumes that towboats connected to barges will operate Regional Marine Services and Intra Harbor Services and ferries will operate Last Mile services. Key assumptions are EF = 687 g/kW-hr and main engine power = 1,520 kW. Load factor is 0.68 for towboats. For operations to Midtown and Lower Manhattan sites, the load factor is reduced by 40% to reflect carrying 12 vs. 24 trailer equivalents per barge. Vessel main engine activity calculations are based upon trip lengths and frequencies, with an average speed of 15 knots. FCF = 1.

NYC DOT and its partners will launch the first three proposed Blue Highway services by 2029, with Pier 92 commencing operations in 2030. Service volumes at Pier 92 and Southwest Brooklyn are projected to double over the first ten years of operation. NYC DOT anticipates Blue Highway usage to flourish in NYC, with GHG reduction benefits sustaining through 2050 and beyond.

For CHE Charging Infrastructure and Electrification Measures at NYNJ Rail Facilities, baseline annualized port equipment diesel emissions data was taken from the EPA Diesel Emissions Quantifier (DEQ) and Emission Resource Integrated Database (eGRID). Electrified emissions were quantified based upon annualized equipment electricity consumption levels, and blended emissions factors for 50% NY/50% NJ electrical grid regions.

GHG Emissions Reduced

Blue Highways: Site Activation

Year (end)	Pier 92	Southwest BK	Lower Manhattan	East 34th St Ferry	Total
	(MTCO2e)	(MTCO2e)	(MTCO2e)	(MTCO2e)	(MTCO2e)

2030	8,584	18,359	1,587	829	29,359
2050	314,926	337,558	17,457	9,120	679,060

Blue Highways: Electrification Measures at NYNJ Rail Facilities and CHE Charging Infrastructure

Year (end)	Electrification measures at NYNJR Facilities	CHE Charging Infrastructure	Total
	(MTCO2e)	(MTCO2e)	(MTCO2e)
2030	2,445	68,887	71,333
2050	18,359	757,761	772,432

Blue Highways: Total

Year (end)	Total
	(MTCO2e)
2030	100,692
2050	1,451,492

TRUCK ELECTRIFICATION AND PARKING

NYC DOT is targeting the proposed Truck Electrification and Parking measure towards the needs of delivery vehicles such as box trucks and vans that spend most of their time in NYC. This measure will also provide support for charging and parking larger Class 8 tractor trailers providing first- and middle-mile deliveries. The project would include the construction of truck charging hubs in Industrial Business Zones (IBZs) and along key truck routes. NYC DOT and NYCEDC will select from and apply from three available charging hub concepts based upon the suitability of each site:

Fast-Charging Hubs: Fast charging hubs have proven successful for charging personal EVs and livery vehicles in NYC (i.e., Tesla Superchargers, Revel Superhubs). Vans and box trucks will use the proposed hubs to rapidly recharge in approximately 45 minutes. The hubs will typically comprise 12 to 16 Level 3 (DC Fast) chargers, each capable of peak charging at 150-250kW. The hubs may also feature powerful Megachargers in the 500 – 1,000+ kW range, designed for Class 8 trucks. Drivers would need to attend to their trucks and be ready to move when done charging. Correspondingly, the hubs can feature amenities including convenience retail, Wi-Fi, and restrooms. These amenities can provide revenue streams to attract private sector capital. Fast-charging hubs can be expensive to develop given their need for multiple-MW electrical service and complex DC Fast chargers.

Parking-Charging Hubs: Parking-charging hubs have proven successful by large fleet operators in NYC, who are installing slower Level 2 (AC) chargers in their parking lots to recharge trucks overnight. The proposed hubs will provide capability to park and charge over several hours of unattended downtime. These hubs will typically comprise several dozen parking spaces, each fitted with a Level 2 (AC) charger capable of sustained charging at 6-12 kW and possibly a limited number of Level 3 (DC Fast) chargers for trucks needing a rapid charge. As parking is limited in NYC, this model can incorporate different pricing and reservation models ranging from "drive-up" access to reserving a spot for a single charging session or extended period. The capital cost is typically lower than that of Fast-Charging Hubs due to the simplicity of installing AC chargers and lower aggregated electrical load. This concept could be scaled to a large multi-level facility with several hundred parking spots, as some logistics companies have constructed. Parking provides a revenue stream that can attract private sector capital.

Hybrid Charging Hubs: Hybrid charging hubs blend the above concepts, with a mix of charger types. For example, this hub could contain 12 Level 2 (AC) chargers and eight Level 3 (DC fast) and/or Megacharger chargers, providing truck operators with the flexibility to choose the charging option that best suits their needs. The hybrid concept is well suited to sites that are large enough for two dozen or more parking spots and have a multi-MW electrical supply. Given the limited number of Level 2 (AC) spaces, a drive-up or per-charging session reservation basis would be an appropriate model. Long-term reservations (e.g., monthly) are best suited to parking-charging hubs with larger numbers of spots. Hybrid sites can generate multiple revenue streams such as convenience retail and reserved parking to attract private sector capital.

GHG Reduction Estimate Method and Models / Tools Used

This measure will reduce GHG by supporting truck electrification, as each electrified truck reduces GHG compared to the diesel/gas truck that it replaces. While electrified trucks do not directly emit GHGs, there are emissions attributed to generating the electricity required for charging. To calculate the number of trucks to be electrified, NYC DOT estimates the number of charging hubs that the grant can fund, including the average all-in cost for delivering each Level 2 and Level 3 charge port and site work/paving costs. The methodology then calculates the number of electric trucks that these charging hubs can sustain. The calculation is a product of the charging cycle inherent to each of the three charging hub concepts and the forecasted charging needs of typical electric trucks operating in NYC. The AFLEET tool calculates the GHG emissions reduction from electrification using the total count of electrified trucks and typical annual mileage.

Measure Implementation Assumptions / Activity Data

The exact number, type, and charger count of each charging hub will vary depending upon site-specific needs and constraints such as lot size and electrical utility feed. This methodology assumes average charging session durations of 45 minutes for Level 3 (DC Fast) charge ports and 12 hours for Level 2 (AC) charge ports. The Level 2 assumption accounts for trucks that may dwell in parking spots longer than needed to charge; for example, in reserved monthly spots at parking-charging hubs. The range of electric trucks is continuously improving, and duty cycles vary widely among operators. As a guideline, NYC DOT estimates that trucks will need to charge every other day on average, typified by atypical box truck with a working range of 100 miles (maintaining battery in 20% - 80% state of charge) and 50 miles daily driving. The NEVI program requires a minimum threshold of 97% charger availability. With this level of uptime, each Level 3 port sustains 62 electrified trucks, and each Level 2 port sustains 4 electrified trucks. To calculate annual VMTs, NYC DOT assumes that freight operators utilizing the charging hubs operate six days per week, or 313 days per year, which is a midpoint between the traditional five-day business week and the increasing numbers of businesses that operate and deliver seven days per week. This methodology assumes average daily VMTs as 200 miles for Class 8 trucks, 50 miles for box trucks, and 30 miles for cargo vans.

GHG Reference Case / Reduction Estimate Assumptions

The grant will fund 13 charging hub sites, providing a total of 120 Level 3 (DC Fast) and/or Megacharger charge ports and 168 Level 2 (AC) charge ports. This aggregate charging capacity can enable electrification of 8,101 trucks. The AFLEET tool calculates the annual GHG emissions reductions due to truck electrification supported by these charging hubs. The model is set to New York State and the reference case vehicle types are blended at 10% Combination Long Haul - Diesel, 40% Single Unit Long-Haul Truck- Diesel (Box truck) and 50% Light Commercial Truck - Gasoline (Van). The reduced GHG case uses the same vehicle types with EV powertrains. Annual VMTs are based on 200 miles for Class 8 trucks, 50 miles for box trucks, and 30 miles for cargo vans and 313 annual operation days.

NYC DOT will phase the proposed truck charging hubs into operation through the end of 2028. During the period that charging hubs come online, this proposal anticipates 25% benefits in 2027 (3-4 charging hubs), 50% benefits in 2028 (6-7 charging hubs), and full benefits (13 charging hubs) to be achieved in 2029. NYC DOT and its partners anticipate that truck charger usage will flourish in NYC, with GHG reduction benefits sustaining through 2050 and beyond.

GHG Emissions Reduced

Year (end)	# of Charging Hubs Operating	# Truck sustained Total	Cumulative GHG Avoided (MTCO2e)
2030	13	8,101	631,090
2050	13	8,101	5,240,099

Low-Income and Disadvantaged Communities (LIDAC) Identification Methodology

For this application's purpose, compliant with the NOFO, LIDACs have been defined as any census tract identified as disadvantaged by the Climate and Economic Justice Screening Tool (CEJST) and/or any census block group that is at or above the 90th percentile for any of EJScreen's Supplemental Indexes. The proposed measures will benefit 1,196 LIDAC census tracts, which make up 46% of total tracts. The measures will also benefit 316 additional LIDAC census block groups.

The impact area for the **Commercial Cargo Bike Incentive Program** was generated by creating a two-mile buffer around the center of Business Improvement Districts in New York City, the predicted service area of deployed cargo bikes. This initiative will benefit 1,132 LIDAC census tracts (CEJST) and 276 additional LIDAC census block groups (EJScreen). The impact area for **Microhubs Expansion** was generated by selecting five target geographies for microhubs and taking a two-mile buffer around the center of each of these geographies. This two-mile buffer represents the service area of a microhub. Geographies included Williamsburg, Clinton Hill, Morningside Heights, Long Island City, and Hunts Point. This initiative will benefit 498 census tracts. This initiative will benefit 227 LIDAC census tracts (CEJST) and 93 additional LIDAC census block groups (EJScreen). The impact area for **Blue Highways** was generated by creating two-mile buffers around Pier 92 and three other potential Blue Highways geographies: Lower Manhattan, Southwest Brooklyn, and Midtown East, as well as the PANYNJ facilities potentially impacted by CHE Charging Infrastructure and Electrification measures at NYNJ Rail Facilities. This initiative will benefit 200 LIDAC census tracts (CEJST) and 120 additional LIDAC census block groups (EJScreen). The impact area for **Truck Electrification and Parking** was generated by creating a two-mile buffer around Industrial Business Zones that are likely sites for charging depots based on the site selection criteria. This initiative will benefit 557 LIDAC census tracts (CEJST) and 116 additional LIDAC census block groups (EJScreen).

In addition, for both Blue Highways and Truck Electrification and Parking, benefits will extend beyond the immediate area, removing trucks from regional freight corridors or transitioning them to electric trucks, respectively. To account for these downwind impacts, a 600-foot buffer around regional fright corridors was applied. This is based on EPA guidance through [the Office of Transportation and Air Quality report] that states, "research findings indicate that roadways generally influence air quality within a few hundred meters, about 500-600 feet downwind from the vicinity of heavily traveled roadways."

The numbers above reflect the number of LIDACs impacted by each initiative. Since many of the impact areas overlap, all duplicates have been removed from the grand total of benefiting census tracts and block groups.