



Seizing the Opportunity: A Vision for CBD Tolling in New York City

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Executive Summary

This report summarizes the findings and recommendations resulting from the Fall 2019 Decongesting New York Studio at the University of Pennsylvania. The semester-long studio was convened to advise the Metropolitan Transportation Authority (MTA) and New York City Department of Transportation (NYC DOT) on the design and implementation of a new tolling program set to launch in Manhattan in 2021. The studio focused on strategies to ensure that the Central Business District Tolling Program would achieve its primary outcome of achieving a legislated revenue target of \$1 billion per year. The team also investigated ways to pursue additional benefits for the City of New York and the broader metropolitan region, as well as maximize public support ahead of the program's launch.

The studio team, led by Professors Marilyn Jordan Taylor and Robert D. Yaro, included 12 second-year graduate students in the Master of City and Regional Planning Program at the University of Pennsylvania Weitzman School of Design. Students concentrate in the areas of Sustainable Transportation and Infrastructure Planning, Public Private Development, Smart Cities, and Community and Economic Development.

Covid-19 Disclaimer

This studio's research was completed in December 2019, and a draft of this report was completed for a meeting with MTA Chairman Pat Foye and NYC DOT Commissioner Polly Trottenberg and their senior staffs on February 8, 2020. As this report was being finalized, the world and New York were turned upside down by the pandemic and the economic aftermath caused by the ensuing shutdown. As of now, more than 16,000 New York City residents, and nearly 40 thousand residents of the Tri-state region have lost their lives, and hundreds of thousands more have been hospitalized or made seriously ill by the virus. We regret these tragic losses.

The economic losses have been equally catastrophic. As a result of the shutdown, transit ridership has plummeted by as much as 95%, and city streets have been emptied of both vehicular and

pedestrian traffic. More than 900,000 —or one in five— New Yorkers are expected to lose their jobs by June, and tens of thousands of small businesses will close, many of them permanently.

As it has in the past, we are convinced that New York will come back stronger and better than ever, particularly if we make the right choices now, if the city focuses on improving its quality of life, decongesting its streets, expanding public spaces, and improving its transit network. These outcomes can be realized if the MTA continues to invest in its five-year capital program, and if capital funds now proposed to be diverted from the CBD Tolling Program into the Authority's operating budget are replaced with equivalent revenues.

The City can also move immediately to improve its quality of life by accelerating the transfer of space now devoted to vehicles —but presently devoid of traffic— into spaces permanently devoted to pedestrians, cyclists, and public spaces. Other world cities, from Barcelona to Boston, and including London, Paris, and Milan, are now converting streets to these new uses. New York can do likewise during this period of reduced traffic. Proceeding with successful implementation of New York's CBD Tolling Program will be essential to achieving both an improved transit system and an improved public realm. We implore the MTA and DOT to persevere in fully implementing this essential program and utilizing resulting revenues to complete the MTA's five-year capital program.

Chapter 1. Introduction

In April 2019, the NYS Legislature, with support from Governor Andrew Cuomo and NYC Mayor Bill de Blasio, approved language in the State's Fiscal Year 2020 Budget to authorize the creation of a congestion pricing system. The Traffic Mobility Act within the budget established the CBD Tolling Program for Manhattan south of 60th Street. The MTA's Triborough Bridge and Tunnel Authority (TBTA) division will be responsible for designing and operating the cordon-based system using a design/build/operate/maintain (DBOM) contract, which will charge drivers entering the CBD beginning no earlier than 2021.

The MTA aims to raise \$1 billion annually from the congestion charge to be capitalized into \$15 billion in bonds for the Capital Plan. Tolls will go into an independent "capital lockbox fund" whose revenues will be allocated first to capital and operating costs associated with the CBD Tolling Program. The remaining funds will cover debt payments and other MTA capital project costs, with 80 percent dedicated to NYCT and the MTA Bus Company (MTA Bus) agency for the subway and bus systems, respectively, and ten percent each for the MTA's two commuter rail systems, the Long Island Railroad (LIRR) and Metro North Commuter Railroad Company (MNR).¹

Cities worldwide have increasingly turned to congestion pricing to control severe and worsening traffic congestion, resulting from the combination of rising travel demand, inadequate roadway capacity, and limited potential for transit expansion. Population increases and job growth have exacerbated the problem, along with the impacts of popular package delivery fleets and shared mobility services, such as those provided by Uber and Lyft. In the United States, the annual cost of time and fuel wasted due to traffic congestion increased from \$75 billion to \$179 billion between 2000 and 2017.² As the first congestion pricing scheme in the country, New York's program has the potential to transform the way people move around the City, in addition to setting a precedent for other cities nationwide. While the program's legislated goal is to raise \$1 billion annually for the MTA Capital Plan, the program must also bring about significant and measurable decreases in

¹ New York State Senate. "Powers of the Authority." nysenate.gov/legislation/laws/PBA/553.

² Schrank, David, et al. "2019 Urban Mobility Report." The Texas A&M Transportation Institute. Aug. 2019. static.tti.tamu.edu/tti.tamu.edu/documents/mobility-report-2019.pdf.

congestion to sustain public support.

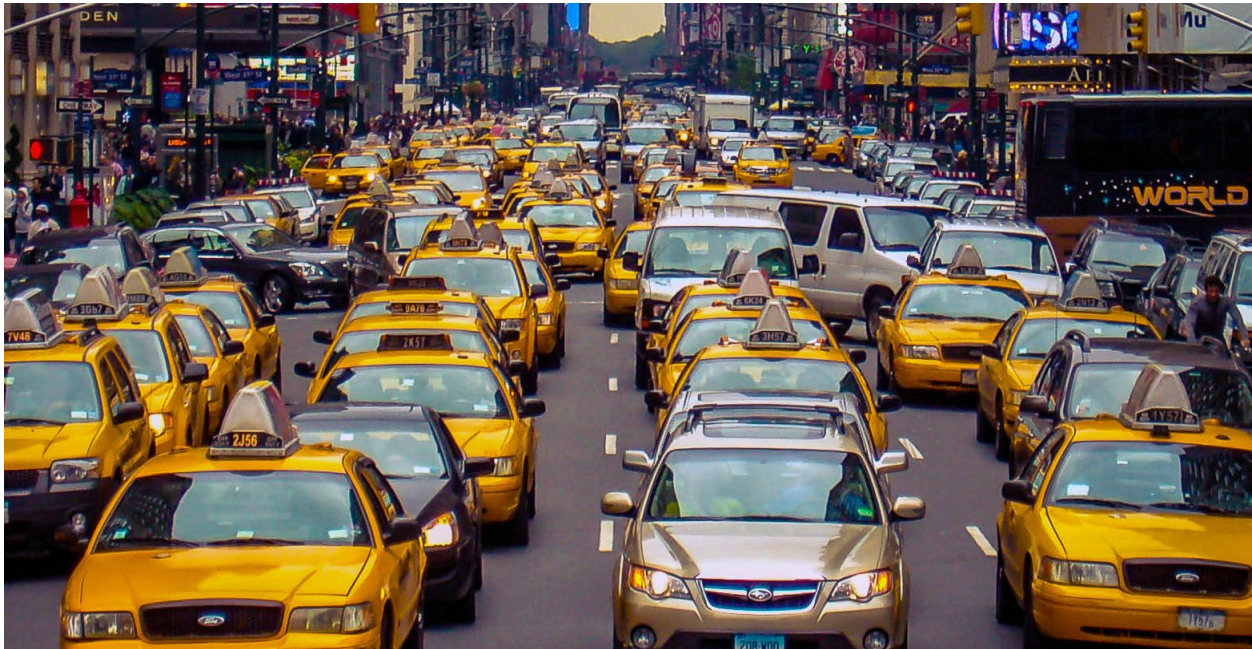


Figure 2 For-hire vehicles dominate the roads of New York. They contribute to congestion even when they do not have a passenger. Image credit: Craebby Crabbson³

Proposals for congestion pricing (also known as congestion charging) – imposing a congestion charge on motor vehicles – are not new to New York. The program follows more than two decades of efforts to implement a tolling system for entry into Manhattan. While the MTA’s critical funding needs drove the recent legislative process, the idea initially emerged as a response to rapidly growing traffic congestion, which is a product of market failures resulting from the free private use of limited public road space.

Congestion pricing originated from the work of Columbia University Professor William Vickrey, who proposed electronic tolling for the Washington, D.C. metropolitan region to a Congressional committee in 1959, “long before E-ZPass was a twinkle in a planner’s eye.”⁴ Vickrey received the

³ Crabbson, Craebby. Grist.org. "The NYC Trafic Guru Who Coined the Term Gridlock Has a Plan to Fix It." November 29, 2016. <https://grist.org/cities/the-nyc-traffic-guru-who-coined-the-term-gridlock-has-a-plan-to-fix-it/>

⁴ Gross, Daniel. “What’s the Toll? It Depends on the Time of Day.” The New York Times. Feb. 11, 2007. [nytimes.com/2007/02/11/business/yourmoney/11view.html](https://www.nytimes.com/2007/02/11/business/yourmoney/11view.html).

1996 Nobel Prize in Economic Science for his contributions, including the conception of variable charging rates as a public policy tool to reduce roadway congestion.⁵

That same year, the Regional Plan Association (RPA), a venerable nonprofit think tank and advocacy group for the New York metropolitan region, proposed a system of congestion pricing for bridges and tunnels entering Manhattan in its Third Regional Plan.⁶ The Citizens Budget Commission, a nonprofit organization focused on the financial and organizational efficacy of both NYC and NYS governments, put forth regional transportation funding proposals for the MTA in both 2004 and 2006, with congestion charging suggested among other strategies.⁷ The Partnership for New York City, the City's leading business group, also proposed congestion charging and other types of road user fees in its 2006 report, which presented an economic argument for mitigating city and regional traffic congestion.⁸

In 2007 NYC Mayor Michael Bloomberg, announced, as part of his administration's environmentally-focused, PlaNYC strategic planning initiative, a proposal to charge vehicles crossing 86th Street in either direction during weekday hours.⁹ When the NYS Legislature could not reach consensus, a 17-person commission was formed to study the matter further.¹⁰ At the time, Governor David Paterson strongly supported the proposed charge, as did the MTA, NYC Council, a coalition of over 170 stakeholder groups, former Governor Eliot Spitzer, and President George W. Bush.¹¹

Although then-Lieutenant Governor (and former MTA Chairman) Richard Ravitch recommended

⁵ Arenson, Karen W. "Vickrey's Zeal Remembered at Columbia Memorial Service." The New York Times. Oct. 26, 1996. nytimes.com/1996/10/25/nyregion/vickrey-s-zeal-remembered-at-columbia-memorialservice.html.

⁶ Yaro, Robert D. and Tony Hiss. "A Region at Risk: The Third Regional Plan for the New York-New Jersey-Connecticut Metropolitan Area." Regional Plan Association. Island Press: Washington, D.C. 1996 library.rpa.org/pdf/RPA-Plan3-A-Region-at-Risk.pdf.

⁷ Citizens Budget Commission. "Financing Transportation Services in the New York Region." Mar. 2004. cbcny.org/sites/default/files/report_transportation_03292004.pdf.

⁸ Partnership for New York City. "Growth or Gridlock? The Economic Case for Traffic Relief and Transit Improvement for Greater New York." Dec. 2006. pfny.org/reports/Growth%20or%20Gridlock.pdf.

⁹ NYC Mayor's Office of Sustainability. "One NYC." <https://www1.nyc.gov/site/sustainability/onenyc/onenyc.page>.

¹⁰ Confessore, Nicholas. "Congestion Pricing Plan Dies in Albany." The New York Times. Apr. 7, 2008. cityroom.blogs.nytimes.com/2008/04/07/congestion-pricing-plan-is-dead-assembly-speaker-says/.

¹¹ Ibid.

another plan in 2008 at the request of Governor Paterson, another major push did not take place until the 2013 launch of Move NY, a local campaign initiated by former City Traffic Commissioner Sam Schwartz, economist Charles Komanof, and environmental advocate Alex Matthiessen, alongside RPA and other civic and interest groups.¹² The coalition's 2015 Move NY Fair Plan proposed specific toll amounts – including new tolls on some bridges and reduced tolls on others– for entry into Manhattan with the goal of redistributing demand and reducing “toll shopping,” or driving to free crossings to avoid tolls.¹³ The proposal lacked support from Governor Andrew Cuomo until the effects of long-deferred subway maintenance reached a breaking point.¹⁴

Congestion pricing, previously championed to reduce and redistribute traffic and mitigate negative environmental impacts, would reemerge as an answer to NYC's transit funding crisis.

Since the early 1980s, the MTA has relied on five-year capital programs funded by various fees and taxes. But over time, the agency's investments in “state of good repair” and regular replacement projects have fallen short of projected needs, resulting in a worsening of service in recent years.



Figure 3 After 2017's "Summer of Hell", Governor Cuomo addressed the subway. Source: Moon, Jeenah.¹⁵

¹² Miller, Stephen. “Could congestion pricing save the subway?” City & State. July 28, 2017. cityandstateny.com/articles/policy/infrastructure/could-congestion-pricing-save-the-subway.html.

¹³ Fix NYC Advisory Panel. “Fix NYC Advisory Panel Report.” Jan. 2018. [scribd.com/ document/369529810/Fix-NYC-Panel-Report](https://www.scribd.com/document/369529810/Fix-NYC-Panel-Report). Move NY. iheartmoventy.org/.

¹⁴ Miller, Stephen. “Could congestion pricing save the subway?”

¹⁵ Moon, Jeenah. New York Times. “Commuting Delays and Cancellations.” July 8, 2019. [https:// www.nytimes.com/2019/07/08/nyregion/newyorktoday/nj-transit-delays-cancellations.html](https://www.nytimes.com/2019/07/08/nyregion/newyorktoday/nj-transit-delays-cancellations.html)

In 2017 capital investments on new projects made up less than two percent of the MTA’s budget.¹⁶ The MTA has experienced financial distress for years, but the system’s deteriorated condition came into sharp relief in June 2017, following several train derailments and other serious subway system failures in the spring. The Governor declared a state of emergency during what he termed the “Summer of Hell” due to the compounding issues of an ailing subway and the need for significant track work on the MTA’s commuter rail lines.¹⁷

In 2018, after more than 25 years of growth, subway ridership declined for the first time, driven partly by weekday on-time performance falling below 70 percent. At the same time, bus ridership had plummeted amidst slowing bus speeds. The MTA lost millions of dollars of projected revenue in 2018 and 2019. In May 2018, the MTA corrected course by launching the Fast Forward Plan, a ten-year, \$40 billion initiative to modernize and increase the accessibility of the subway and buses.¹⁸

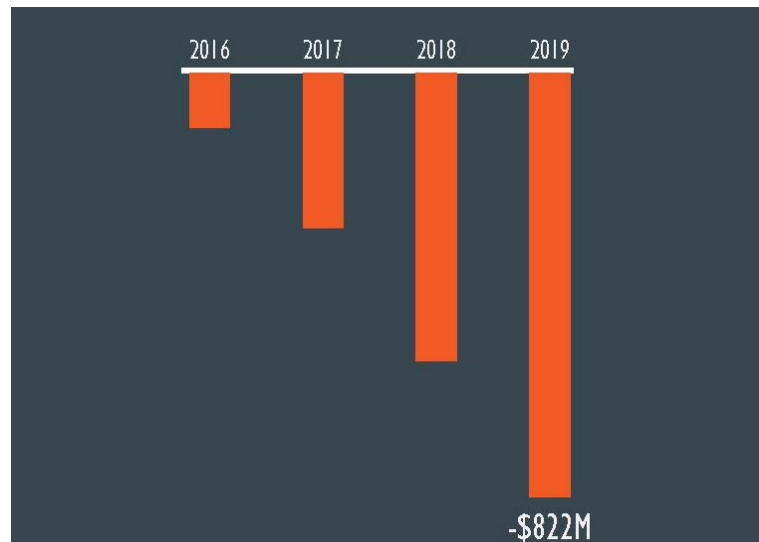


Figure 4 MTA revenue is decreasing drastically, necessitating a financial infusion.

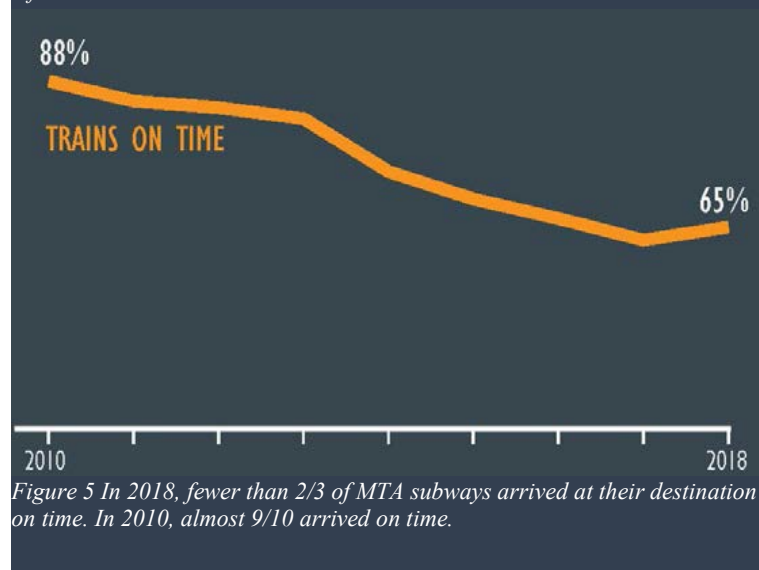


Figure 5 In 2018, fewer than 2/3 of MTA subways arrived at their destination on time. In 2010, almost 9/10 arrived on time.

¹⁶ DiNapoli, Thomas P. "Financial Outlook for the Metropolitan Transportation Authority Report 8-2019." Office of the New York State Comptroller. Oct. 2018. osc.state.ny.us/osdc/rpt8-2019-mta-financialoutlook.pdf.

¹⁷ Fitzsimmons, Emma G. "Cuomo Declares a State of Emergency for New York City Subways." The New York Times. Jun. 29, 2017. [nytimes.com/2017/06/29/nyregion/cuomo-declares-a-state-of-emergency-for-the-subway.html](https://www.nytimes.com/2017/06/29/nyregion/cuomo-declares-a-state-of-emergency-for-the-subway.html)

¹⁸ Metropolitan Transportation Authority. "Fast Forward: The Plan to Modernize New York City Transit." May 2018. fastforward.mta.info/.

In October 2017 after the Summer of Hell, the Governor convened the FixNYC Advisory Panel to find solutions to Manhattan’s CBD congestion and subway funding gap.¹⁹ The 15-member panel’s January 2018 report proposed a three-stage implementation plan that would include a phased “zone pricing program,” consisting of:

- A 24-month planning and implementation period
- For-hire vehicle (FHV, i.e., both taxis and app-based ride services) surcharge within Manhattan below 60th or 96th Street
- Charge for trucks entering the CBD, defined as Manhattan below 60th Street, during peak hours
- Charge on all private vehicles entering the CBD²⁰

For the last step, the panel proposed several pricing options, including variable and dynamic pricing schemes and vehicle miles traveled (VMT) within the CBD.²¹ The panel’s recommendations, backed by the Governor, gave the NYS Legislature the green light to enact a FHV surcharge for Manhattan south of 96th Street during its 2018 Session.²² The Legislature also established the Metropolitan Transportation Sustainability Advisory Workgroup as part of the State’s FY 2019 Budget to make further recommendations to meet regional transportation needs and propose sustainable funding sources for the MTA.²³ The Workgroup convened in September 2018 and strongly supported congestion pricing as “the most promising option” for sustainable financing.²⁴

The NYS Legislature eventually enacted congestion pricing in 2019 as part of the State’s FY 2020 Budget. The Traffic Mobility Act established the CBD Tolling Program to generate revenue for the MTA while conditioning the agency’s budget appropriation upon specific

¹⁹ Fix NYC Advisory Panel. “Fix NYC Advisory Panel Report.” Jan. 2018.

²⁰ Ibid.

²¹ Schaller, Bruce. “Making Congestion Pricing Work for Traffic and Transit in New York City.” Schaller Consulting. Mar. 7, 2018. schallerconsult.com/rideservices/makingpricingwork.pdf.

²² Department of Taxation and Finance. “Congestion Surcharge.” Tax.ny.gov/bus/cs/csidx.html.

²³ “Metropolitan Transportation Sustainability Advisory Workgroup Report.” Dec. 2018. pfnyc.org/wp-content/uploads/2018/12/2018-12-Metropolitan-Transportation-Sustainability-Advisory-Workgroup-Report.pdf.

²⁴ Ibid.

provisions.²⁵ ²⁶ The budget appropriated an additional \$100 million for program planning and development. In June 2019, the MTA and DOT signed a Memorandum of Understanding outlining the roles and responsibilities of each agency with respect to program implementation.

²⁵ New York State Senate. “Article 44-C: Central Business District Tolling Program.” nysenate.gov/legislation/laws/VAT/T8A44-C

²⁶ New York State. “FY 2020 Mid-Year Update.” budget.ny.gov/pubs/archive/fy20/enac/fy20fp-en-myu.pdf. New York State. “S.1509/A. 2009.” Jan. 18, 2019. assembly.state.ny.us/2019budget/budget/A2009c.pdf.

Chapter 2. The CBD Tolling Program

2.1. Program Components

As proposed, the program consists of a charge, daily for passenger vehicles and not yet defined for commercial vehicles. The program will exempt vehicles passing through the city using the Franklin Delano Roosevelt (FDR) Drive and West Side Highway without entering the CBD.

Residents of the CBD earning less than \$60,000 annually will be entitled to a tax credit equal to the amount paid for tolls. Exemptions currently exist for emergency vehicles and vehicles transporting disabled persons. The fee will be charged electronically, most likely through an expansion of the E-Z Pass system used for cashless tolling at bridges and tunnels.

A six-person Traffic Mobility Review Board (TMRB), comprising five gubernatorial appointees and one mayoral appointee and including representatives for the LIRR and MNR service areas, will outline further details. The TMRB will advise the MTA's TBTA on the program's pricing structure and rates; operating hours; other exemptions, credits, and discounts; considerations for FHVs; performance metrics; and technologies, all of which are unknown at this time. The system may or may not use dynamic pricing, whereby toll amounts would be proportional to traffic congestion.

The TMRB is to present its recommendations no earlier than 30 to 45 days before the program launch, although the TBTA is not bound to follow them. Ultimately the TBTA will determine the official start date and program details. The legislation mandates several key processes for developing the program, namely a 30-day test period, a 60-day public outreach period, and a traffic study ahead of launch, as well as a parking study following implementation.²⁷

The program will support revenue generation for the MTA's 2020-24 Capital Plan, released in September 2019.²⁸ The proposal is incredibly ambitious and calls for raising \$51.4 billion to support the agency's infrastructure needs over the next five years. Specifically, tolls will go into

²⁷ Slevin, Kate and Alex Matthiessen. "WEEKEND READ: Every Last Detail About Congestion Pricing...Explained!" StreetsBlog. Apr. 5, 2019. nyc.streetsblog.org/2019/04/05/weekend-read-everylast-detail-about-congestion-pricing-explained/.

²⁸ Metropolitan Transportation Authority. "2020-2024 MTA Capital Program." [New.mta.info/capital/2020CapitalProgram](https://new.mta.info/capital/2020CapitalProgram).

a lockbox, with 80 percent dedicated to NYC Transit for the subway and bus systems, and ten percent each for the MTA’s two commuter rail systems, the Long Island Railroad (LIRR) and Metro North Railroad (MNR). CBD Tolling is expected to cover \$15 billion of the Capital Plan.

Table 1 Items included in the Traffic Mobility Act (TMA). The TMA is still unclear on several points, including major concerns like the cost of the toll.

TBTA responsible for implementing and maintaining	MOU between NYC and MTA
30-day testing period and 60-day public info campaign	Zone residents earning under \$60K receive tax credit equal to charges
TMRB provides recommendations between 11-15-20 and 12-31-20, or 30 days prior to start	Passenger cars charged once daily
\$100M from State budget for tolling tech and infrastructure	Revenue placed in lockbox; 80% to NYC subways, buses, and SIRT; 10% to LIRR; 10% to Metro-North
Exemptions for emergency vehicles and disabled passengers	Annual revenue must be sufficient to bone \$15B in capital spending for the 2020-2024 MTA Capital Plan

2.2. Existing Conditions

NYC’s economy is thriving, and its residential, employee, and visitor populations are growing. In 2016 the CBD attracted 3.9 million people on an average weekday – an increase of almost nine percent since 2006.²⁹ Of the nearly four million people entering the CBD, two million commute for work, while the rest arrive for other purposes including commercial, educational, and cultural activities.³⁰ Overall, Manhattan is responsible for one-quarter of the region’s economic output.³⁷ Manhattan is experiencing ever-greater congestion levels due to its rising population, job, and visitor density, in addition to several other emerging trends.

²⁹ New York Metropolitan Transportation Council. “Hub Bound Travel Data 2016.” Dec. 2017. nymtc.org/Portals/0/Pdf/Hub%20Bound/2016%20Hub%20Bound/DM_TDS_Hub_Bound_Travel_2016-FINAL.pdf.

³⁰ Ibid.



Figure 6 New York City's population is expected to grow another 500,000 people

2.2.1. Congestion Drivers

The number of app-based trips by Transportation Network Companies (TNCs), namely Uber, Lyft, and Via, has grown three-fold since 2015, and as a result, FHV (including taxi) trips increased 80 percent across the city between 2013 and 2017. The number of FHV's registered grew 144 percent to more than 100,000 between 2010 and 2017.³¹ As people increasingly prefer FHV's over the less reliable subway, these customers are impacting the reliability and on-time performance of buses. E-commerce delivery has also exploded, with more than 1.5 million packages delivered in the city daily in 2019.³² Considerable traffic congestion is attributable to delivery vehicles that double-park in active lanes, in addition to using lane and sidewalk areas for unpacking and sorting.

Delivery vehicles, which received almost 500,000 parking violations in 2018, often factor these charges into the cost of doing business. The four largest delivery companies accrued \$27 million in parking violations in 2018, a 24-percent increase

³¹ Ibid.

³² Haag, Matthew and Winnie Hu. "1.5 Million Packages a Day: The Internet Bring Chaos to N.Y. Streets." The New York Times. Oct. 28, 2019. [nytimes.com/2019/10/27/nyregion/nyc-amazon-delivery.html](https://www.nytimes.com/2019/10/27/nyregion/nyc-amazon-delivery.html).



Figure 7 Package deliveries are one of the leading causes of congestion, both on the street and on the sidewalk.

from 2013.³³ Meanwhile, the total number of trucks on tolled crossings into and within the city rose 9.4 percent in 2018 to approximately 35.7 million.³⁴ Given the fact that only ten percent of all retail transactions nationwide occurred online in the first quarter of 2019, the potential for even greater delivery traffic is cause for alarm.³⁵ Another factor related to escalating commercial traffic needs is the more than 2 million square feet of new warehouse space recently developed in the city.³⁶

³³ Ibid.

³⁴ Ibid.

³⁵ "U.S. Census Bureau News." U.S. Department of Commerce. Nov. 19, 2019. [census.gov/retail/mrts/www/data/pdf/ec_current.pdf](https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf).

³⁶ Weiss, Lois. "Demand for New York City warehouse is surging." Jan. 18, 2019. New York Post. nypost.com/2018/01/18/demand-for-new-york-city-warehouses-is-surging/.

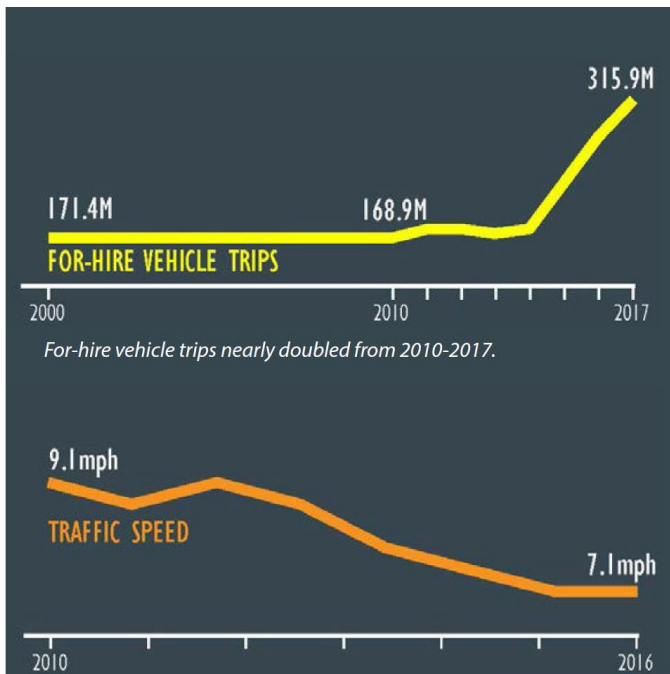


Figure 8 Traffic speed in New York City dropped 2mph from 2010-2016.

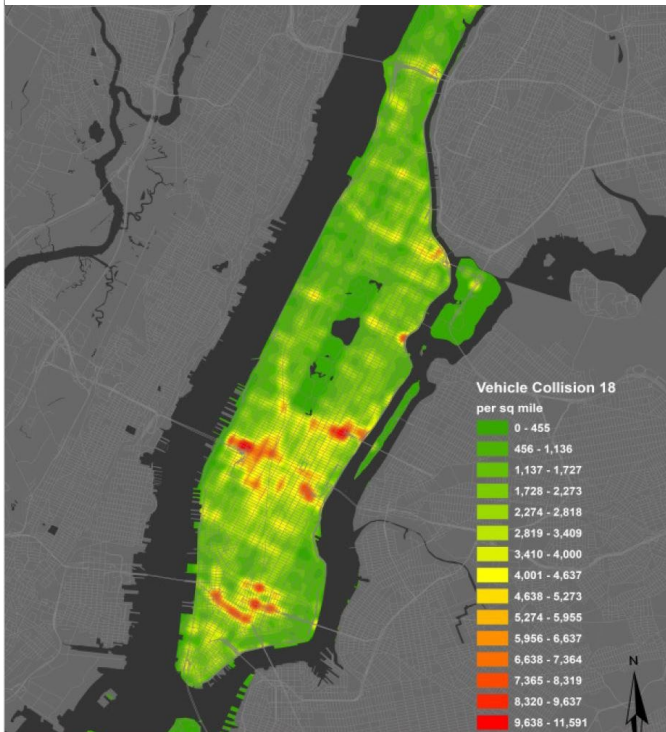


Figure 9 Vision Zero is working to eliminate fatal crashes. Canal Street was one.

2.2.2. Impacts of Congestion

The impacts of congestion on Manhattan and the metropolitan region more generally are significant: Vehicle and bus speeds below 60th Street have decreased consistently since 2012 because of higher traffic volumes. Average vehicle speeds dropped to 7.1 miles per hour in 2017.³⁷ Congestion in the CBD has reached a level that threatens to damage local and regional economic activity. In 2018 the Partnership for NYC estimated that for Manhattan employees, the economic loss due to congestion was nearly \$1,900 per commuter, as compared with \$767 on average across the metropolitan area.³⁸

NYC's Vision Zero safety campaign seeks to eliminate all traffic-related deaths and serious injuries by 2024. While overall travel speeds have declined, vehicle crashes in Manhattan have increased over the past five years, reaching 44,000 in 2018.³⁹ 2018 high incidence locations were the Queensboro Bridge, Lincoln Tunnel, and Canal Street. In 2019 the City experienced 28 cyclist fatalities and 243 pedestrian fatalities.⁴⁰

NYC's congestion is heavily polluting the air. While asthma rates in the CBD are relatively low, the Bronx and Brooklyn have higher rates in comparison to city and national averages. Recent

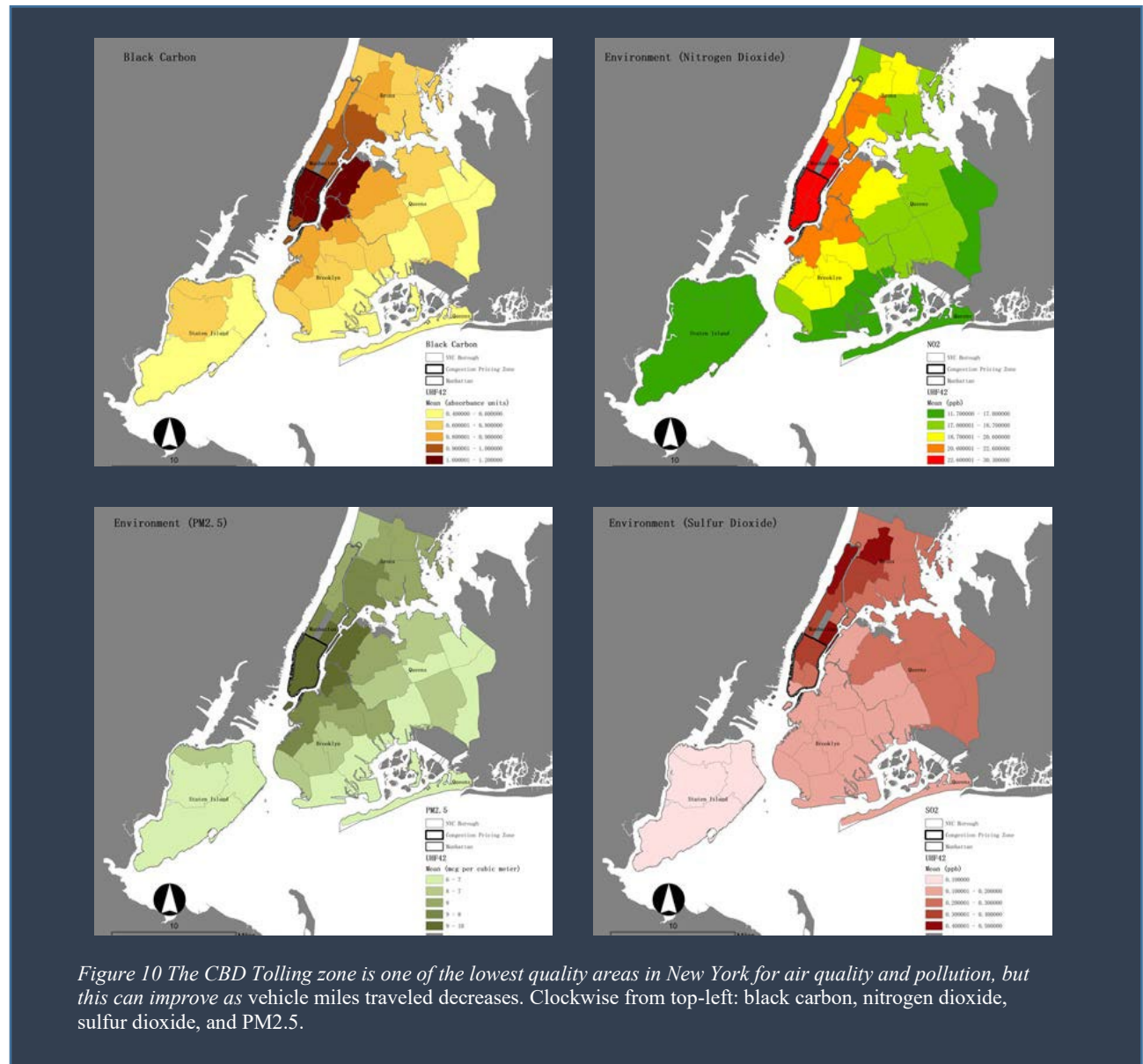
³⁷ NYC Department of Transportation. "New York City Mobility Report."

³⁸ Partnership for New York City. "\$100 Billion Cost of Traffic Congestion in Metro New York."

³⁹ New York City Police Department. "Motor Vehicle Collisions - Crash." Dec. 12, 2019. data.cityofnewyork.us/Public-Safety/Motor-Vehicle-Collisions-Crashes/h9gi-nx95.

⁴⁰ Ibid.

research highlights the adverse health impacts of PM 2.5, very small particulates produced by cars and trucks. Reductions in vehicle congestion and emissions would reduce pollution around public housing in CBD neighborhoods including the Lower East Side and West Chelsea. Reducing congestion thus has considerable potential to improve the lives of New Yorkers living in and outside the CBD.



2.2.3. Socioeconomic Context

Income inequality in Manhattan, particularly within the CBD, is severe. In 2010 the wealthiest fifth of Manhattanites earned 40 times more than the poorest fifth. CBD households are among both the city's wealthiest and poorest.⁴¹ 27.3 percent of Lower East Side residents were below the poverty level in 2017 compared to 17.9 percent citywide.⁴² Yet the CBD is also holds six percent of the wealthiest US neighborhoods.⁴³

Despite concerns regarding potential regressive effects of congestion charges on low-income drivers, data suggest they will have a relatively small impact. According to the Fix NYC Panel, employed outer-borough residents represent just four percent of those commuting into Manhattan by vehicle.⁴⁴ Half of these commuters are higher-income, while just four percent are considered low-income.⁴⁵ Streetsblog reports that in 2015, incomes of outer-borough drivers were on average 34 percent higher than those of public transit riders.⁴⁶ Thus, a far greater proportion of low-income New Yorkers entering the CBD rely heavily on public transit for their commutes than on private vehicles.

⁴¹ O'Leary, Amy. "What is Middle Class in Manhattan?" The New York Times. Jan. 18, 2013. nytimes.com/2013/01/20/realestate/what-is-middle-class-in-manhattan.html.

⁴² NYU Furman Center. "New York City Neighborhood Data Profiles." furmancenter.org/neighborhoods/view/lower-east-side-chinatown.

⁴³ Manskar, Noah. "These NYC ZIP Codes Are Among Most Expensive in U.S., Report Says." Patch. Nov. 26, 2018. patch.com/new-york/new-york-city/these-nyc-zip-codes-are-among-most-expensive-u-s-report-says.

⁴⁴ Fix NYC Advisory Panel. "Fix NYC Advisory Panel Report." Jan. 2018. scribd.com/document/369529810/Fix-NYC-Panel-Report.

⁴⁵ Ibid.

⁴⁶ Miller, Stephen. "The Complete Guide to the Final Move NY Plan." Streetsblog. Feb. 17, 2015. nyc.streetsblog.org/2015/02/17/the-complete-guide-to-the-final-move-ny-plan/.

Chapter 3. Findings

This report sets forth a series of recommendations to help New York achieve a broader set of outcomes for its CBD Tolling Program. The studio team sought to answer the following question: How can the CBD Tolling Program achieve New York State’s stated revenue goals, while also building and sustaining public and political support for the program? Also, how can the program deliver broader congestion reduction, quality of life, public health, and climate benefits across New York City and the metropolitan region?

To help answer these questions, the team reviewed extensive literature on congestion pricing to gather insights from the experiences of numerous international efforts and apply lessons to New York’s program design and implementation. The studio studied existing programs in London, Singapore, Stockholm, Gothenburg, Bergen, Oslo, and Milan, as well as Seattle’s proposed program. The team focused on the first three as “gold standard” cities widely cited for their successful programs. Lessons learned from these precedents, as well as thoughtful discussions with advisors in the US and UK, informed the team’s subsequent research and development of proposals for implementing the CBD Tolling Program and laying the groundwork for positive long-term outcomes.

3.1. Learning from London, Singapore, and Stockholm

The programs in these three cities differ from New York’s in critical ways. New York is rather unique given the number of CBD residents, almost twice that of Stockholm and four times that of London. New York also aims to raise \$1 billion annually, far more revenue than its peers. Revenue generation is not a major driver for the three precedent programs, whose net annual revenue ranges from \$100 to \$200 million dollars per year. Instead, the other cities have strived to achieve a broader set of outcomes to accompany congestion reduction.

The team’s week-long charrette in London extensively informed the report, as studio members obtained insights about Transport for London’s (TfL) experience with congestion charging from top TfL agency staff and professionals in areas such as planning, transit, public health, and design. These discussions suggested the following as key drivers of a successful program:

- Evaluation of a broad set of congestion-related and quality of life measures (e.g. traffic reduction, air quality, public realm improvements)
- Ongoing data collection and public tracking of such measures
- Robust citizen communications and stakeholder engagement by TfL and the Mayor's Office to introduce the concept and seek feedback ahead of program launch;
- Reallocation of road space to facilitate mode shift in highly visible ways (e.g. dedicating former vehicle lanes to permanent bicycle infrastructure)
- Inducing behavioral changes using both carrots (e.g. enhanced public realm, convenient payment process) and sticks (e.g. steep late fees for unpaid charges)
- Implementing high-quality public realm improvements (e.g. re-engineering major roundabouts in Central London to create pedestrian-friendly spaces and redirect traffic)
- Pursuing both near-term wins and longer-term measures
- Expanding goals to limit emissions by establishing an Ultra Low Emission Zone (ULEZ)
- Prioritizing public transit reliability and customer service

	 London 1,569 sq km	 Singapore 725 sq km	 Stockholm 188 sq km	 New York City 784 sq km
CP Zone Area	21 sq km	21 sq km	35 sq km	24 sq km
Population	8.9M	5.8M	1M	8.6M
Population Inside Zone	150,000	5.8M	330,000	620,000
Year Implemented	2003	1975	2007	Expected 2021
Net Annual Revenue (USD)	\$230M	\$100M	\$150M	Expected \$1B
Data Collection Technology	Automatic license plate recognition cameras	- Transponder - In-vehicle units with GPS (VMT)	Automatic license plate recognition cameras	- EZ-Pass - Cameras
Revenue Allocation	- Increase bus capacity - Street safety - Roads and bridges - Walking and cycling	- Increase bus capacity - Park and ride - Street safety - Transit-oriented dev.	- Increase bus capacity - Street safety - Improve rail - Construct highway	- 80% subway/bus - 10% LIRR - 10% MNR - Capital expenses only
Public Campaign	- Mayoral mandate - Information campaign - Monitoring and reporting	- Information campaign - Seven month trial and polling - Municipal referendum	- Information campaign - Seven month trial and polling - Municipal referendum	- 60 day outreach - 30 day testing - Expressed commitment to public hearings

Figure 11 New York City expects to raise more than four times as much net annual revenue as London, and ten times as much as Singapore. London, Singapore, and Stockholm all prioritized bus capacity and safety.



Figure 12 As part of its reallocation of street space, London has prioritized bike lanes and developed a network of bicycle highways. Image credit: Sarah Rich.⁴⁷

In summary, New York's Tolling Program will succeed to the extent that it incorporates strategies based on the following lessons learned from Singapore, Stockholm, and London:

3.1.1. Provide a Broad and Measurable Set of Benefits and Outcomes

The peer programs have achieved success by pursuing complementary goals and outcomes with mutual benefits. For example, Stockholm's program was the result of both an environmental campaign to improve the city's air quality and a fiscal campaign to fund highway infrastructure improvements.⁴⁸ With the reduced traffic, Stockholm residents appreciate the enhanced air quality as much as improved traffic conditions. Singapore, whose program dates back to 1975, sought not only to restrict the number of vehicles entering the CBD, but also to disincentivize automobile ownership. Pedestrian-only zones have been created in Singapore's Downtown area, as have pilot programs for car-free streets.

TfL indicated that a key driver of congestion charging in London was the Greater London

⁴⁷ Rich, Sarah. Fast Company. "Riding London's Bicycle Superhighways." July 20, 2010. <https://www.fastcompany.com/1661935/riding-londons-bicycle-superhighways>

⁴⁸ Lehe, Lewis. "Downtown congestion pricing in practice." Transportation Research Part C. 2019.

was the Greater London Authority's (GLA) City's desire to revive economic activity in the commercial downtown. Another critical outcome in London and Singapore was successfully reallocating road space away from cars to reshape the public realm. The goals were two-fold: to encourage mode shifts and to create visible improvements for the public to see the program in action. TfL dedicated progressively more street space to permanent bicycle infrastructure and pedestrian safety improvements.

The cities also invested heavily in research and analysis prior to implementation, as well as monitoring results. They created real-time data and performance measures to inform the public and track progress. London conducted research for years and began initial program design in 2000, three years prior to launch. TfL sought to establish baseline data to measure subsequent outcomes and continues to conduct regular assessments. The City of Stockholm, in coordination with county and national counterparts and consultants, published monthly reports during an initial trial, followed by summary and topic-specific assessments



Figure 13 London prioritized bus performance upon implementation of a congestion charge. Source: "London to Introduce Three New Low-Emission Bus Zones." April 24, 2019.



Figure 14 Stockholm established a thorough public engagement process. Source: Nilsson, Susanne. *The City Fix*. "Toward Car Free Cities: Stockholm Shows the Sometimes Bumpy Road to Congestion Charges." June 21, 2017.



Figure 15 Singapore used the platform of congestion pricing to catalyze transit. Source: *The Best Singapore*.

concerning air quality, traffic patterns, and equity.⁴⁹ The City deliberately provided results months ahead of the citizen referendum that eventually approved the plan.⁵⁰ In Singapore, two studies in the eight years prior to implementation increased support for reduced car usage.⁵¹ In addition, the World Bank conducted analysis of Singapore's program and began data collection prior to program implementation in 1975.⁵² By establishing baseline data and holding themselves accountable through regular reporting, cities underscored their long-term commitment and credibility.

3.1.2. Cultivate Broad and Deep Political Support

Key distinctions in governance structures affect each city's ability to deliver change. Singapore's centralized government structure avoided the political challenges that blocked legislation in New York for so many years. The Land Transport Authority met with little to no resistance as it prepared and carried out its program. Because the national Swedish Transport Agency manages Stockholm's program, it is well-resourced with efficient central operations. On the other hand, the congestion charge resulted from careful negotiations between the national Social Democratic and Green Parties and between local and national governments to secure infrastructure funding.⁵³

Individual political champions are also crucial to program efficacy. London's mayor benefits from his office's narrow legal mandate to oversee the city's transportation and land use exclusively. Implementation of congestion pricing in 2003 because the law establishing the expressly GLA and the Mayor's Office required creation of this program. The GLA's first Mayor, establishing the mayoral position, beginning with Ken Livingstone, brought enthusiasm to this mandate to prepare for, execute, and monitor the program thereafter. As it turned out, Livingstone benefited from the assistance of Bob Kiley, former Chair of the MTA and of the RPA's Third Regional Plan, who had championed the issue in New York before coming to London to help lead TfL. Livingstone and his successors, Boris Johnson and now Sadiq Khan, were and are singularly accountable to voters for maintaining high-quality transit.

⁴⁹ Stockholm Stad. "Facts about the Evaluation of the Stockholm Trail." stockholmsforsoket.se/upload/Hushall_eng.pdf.

⁵⁰ Quigley, John M. and Björn Hårsman. "Political and Public Acceptability of Congestion Pricing: Ideology and Self-Interest." *Journal of Policy Analysis and Management*. Vol. 29, No. 4. Fall 2010.

⁵¹ Watson, Peter L. and Edward P. Holland. "Congestion pricing - the example of Singapore." *Ekistics*. Vol. 42, No. 248. TRANSPORTATION. July 1976.

⁵² Ibid.

⁵³ Lehe.

3.1.3. Prioritize Public Buy-In

All three cities carefully prepared public information campaigns to educate the public ahead of program implementation. TfL attributes the success of its program in large part to speaking with the public in formal and informal settings, beginning with London's strategic transportation plan and continuing with the congestion charging program.⁵⁴ The initial scheme changed substantially because of this public engagement. The City's subsequent failure to secure public buy-in led to defeat of the Western Extension effort in 2010.⁵⁵ Stockholm tested its program for seven months and carried out four opinion polls before and during the trial.⁵⁶ Earlier information campaigns, including a year of public education and assessment, facilitated Singapore's program adoption in the 1970s.⁵⁷ Its 1998 transition from an Area License Scheme to Electronic Road Pricing also followed testing, a short trial, and information dissemination.⁵⁸ London and Stockholm also both prioritized customer service with dedicated websites for payment and questions, while Singapore's program provides information to drivers in real time.⁵⁹ In all cases, informing the public about the process in advance of and throughout implementation has contributed greatly to acceptance.



Figure 16 To address the impact of transportation upon climate, London established an Ultra-Low Emissions Zone that incurs an additional fee to the congestion charge. Image from Getty.⁶⁰

⁵⁴ Transport for London. "Impacts Monitoring - Fifth Annual Report." Jun. 2007.

transportation.org.il/sites/default/files/pirsum/-central-london-congestion-charging-impacts-monitoring-part-2_0.pdf.

⁵⁵ Mulholland, Helene. "Boris Johnson axes London Congestion charge extension." *The Guardian*. Nov. 27, 2008. theguardian.com/politics/2008/nov/27/congestioncharging-london.

⁵⁶ Quigley, John M. and Björn Hårsman. "Political and Public Acceptability of Congestion Pricing: Ideology and Sell-Interest." *Journal of Policy Analysis and Management*. Vol. 29, No. 4. Fall 2010.

⁵⁷ Watson, Peter L. and Edward P. Holland. "Congestion pricing - the example of Singapore." *Ekistics*, Vol. 42, No. 248. TRANSPORTATION. Jul. 1976.

⁵⁸ Lehe.

⁵⁹ Transport for London. "Congestion Charge." <https://tfl.gov.uk/modes/driving/congestion-charge>.

⁶⁰ ULEZ Zone: Getty Image, "ULEZ covers central London." inews. Accessed Dec. 13th, 2019. <https://inews.co.uk/news/ulez-ultra-low-emissions-zone-vehicles-35-per-cent-627525>

3.1.4. Boost Multimodal Transit

The cities also had strong transit systems but sought to bolster them to accommodate mode shifts necessary for their programs to succeed. London added 300 extra buses upon the launch of congestion charging to account for desired shifts from private vehicle use to public transit.⁶¹ Congestion reduction in central London subsequently advanced the effort thanks to improved bus trip reliability and travel times. (Soon after program launch, Kiley reported to one of our faculty that a big challenge—or opportunity—facing the agency was the rapid improvement in bus speeds and reliability after introducing the congestion charge.)

Stockholm and Singapore both encouraged use of park-and-ride options outside the core.⁶² Singapore also supplied shuttle buses for park-and-ride commuters, began operating commuter buses, and created a more comprehensive metro system.⁶³ Stockholm secured national funding for rail improvements in addition to providing more buses, new express routes, and improvements to existing lines.⁶⁴ The cities subsequently reinvested revenue collected from the charge to improve transit efficiency, road quality, and pedestrian/bicyclist safety. While New York is currently working on a comprehensive bus network redesign, a similar expansion of bus service does not appear to be included as part of the CBD Tolling Program. And as previously discussed, London and Singapore further encouraged mode shifts by redistributing road space to promote walking and bicycling through safety improvements and permanent bicycle infrastructure.

3.1.5. Build in Program Capacity to Support Adaptation and Evolution

Congestion pricing has become fully integrated into daily life and part of the cultural identity of the three cities. Nonetheless, the cities continue to improve upon their programs and respond to new challenges and opportunities.

Singapore undertook the additional step of aggressively limiting private cars by issuing a finite set of owner certificates. Singapore continues to promote employment outside of the CBD to target

⁶¹ “Congestion taxes in Stockholm and Gothenburg.” Transport Styrelsen. transportstyrelsen.se/en/road/Congestion-taxes-in-Stockholm-and-Goteborg/ “First congestion fines to go out.” BBC News. Feb. 18, 2013 news.bbc.co.uk/2/hi/uk_news/england/2774271.stm.

⁶² Watson and Holland

⁶³ Ibid.

⁶⁴ Quigley and Hårsman.

congestion, as well as to invest in infrastructure to support commercial growth outside the core.⁶⁵ At the same time, it hopes to promote walking and public transit use by encouraging residential development downtown and near major transit stations.⁶⁶ Following London's example, Singapore is also looking to create a "transit-priority corridor" giving preference to buses, bicyclists, and pedestrians.⁶⁷

London, seeing increasing traffic pressure from FHV's and e-commerce, is evaluating adjustments to its program. London has also more recently led global efforts to reduce emissions by establishing its phased ULEZ program, which levies an additional fee on top of the congestion charge for older, less efficient, and heavily polluting vehicles. Lastly, the cities are all considering or in the process of upgrading their schemes to dynamic pricing.

3.2. The New York Difference

Of course, the CBD Tolling Program must be designed according to the unique challenges and assets of NYC. In contrast to the precedent cities, New York's program will roll out under the direction of separate city and state agencies, necessitating a high level of inter-agency coordination in a relatively short period of time. As of early January 2020, members of the TMRB had yet to be appointed, raising further concerns about the short timeframe ahead of program implementation. Support for the initiative remains unclear, with virtually no public input to date and mixed support from City and State legislators. The program will also affect a large residential population rather than an exclusively commercial district. Moreover, New Yorkers will only sustain support for the program by observing a significant reduction in congestion and/or an improved transit experience not long after implementation.

A related question is whether existing bus and subway lines have sufficient capacity to accommodate the expected shift from single-occupant vehicles. MTA staff have assured the studio

⁶⁵ Savills. "Evolution, not revolution for Singapore's CBD." Jun. 30, 2019. [savills.com/prospects/cities-singapore-cbd.html](https://www.savills.com/prospects/cities-singapore-cbd.html).

⁶⁶ "URA Draft Master Plan to boost mixed-use properties in CBD." Singapore Business Review. Mar. 28, 2019. [sbr.com.sg/commercial-property/in-focus/ura-draft-master-plan-boost-mixed-use-properties-in-cbd](https://www.sbr.com.sg/commercial-property/in-focus/ura-draft-master-plan-boost-mixed-use-properties-in-cbd).

⁶⁷ Ibid.

team that these systems do have capacity. But unlike London, the MTA is not planning to add to its bus feet to accommodate increased demand.

The precedent cities offer a template for the MTA and DOT to take advantage of this once-in-a-generation opportunity by rolling out a program to achieve a much broader set of public benefits. New York should look to the other cities as examples to boost public acceptance while working to achieve the two primary outcomes of revenue generation and congestion reduction.

In the long run, a successful CBD Tolling program can also create momentum for New York to advance wider-reaching strategies. The program also presents opportunities for the City to advance exciting initiatives, such as its Green Wave cycling plan, DOT's Plaza Program, and an off-hour delivery program, through complementary and mutually beneficial efforts.

Finally, the many groups advocating for environmental, public transit, pedestrian safety, and other improvements in NYC would be a significant support base. The transportation community alone is substantial, including the Fix Our Subway Coalition, Bus Turnaround Campaign, Tri-State Transportation Campaign, StreetsPAC, Riders Alliance, Straphangers Campaign, and Transportation Alternatives. Many of these organizations have already pushed for congestion charging and other relevant reforms to enhance the program's efficacy.

3.3. Achieving Program Goals in the Near- and Long-Term

While the CBD Tolling program has a clearly defined cordon and revenue generation goal, its potential impact and influence extend well beyond its physical boundaries and capital program timetable. The studio has outlined how the current program can achieve the dual benefits of revenue generation and congestion reduction and set the stage for geographically broader, longer-term outcomes.

The studio's recommendations focus first on ensuring the success of the current program within the CBD in a section titled "Inside the Zone." A second set of recommendations focuses on the broader geography of the city and region, in a section titled "Outside the Zone." A third set of longer-term recommendations comprise the section called "In the Future."

Inside the zone objectives must work to 1. increase transit and bike share; 2. manage delivery vehicle traffic and curb use; and 3. extend the public realm.

Outside the zone, the key challenges will be to 1. ensure sufficient capacity to capture mode shift away from private vehicles; 2. identify opportunities to improve trips through the CBD; and 3. manage parking more effectively just outside the cordon, where drivers may park to avoid the congestion charge.

In the future, the program should be designed so that it can be expanded to the rest of the city and region. The program presents an enormous opportunity for New York to capture the current momentum to advance efforts that bring about more enduring and farther-reaching benefits. Near-term recommendations may be incorporated incrementally at the same time as planning for longer-term policies that address regional issues of climate adaptation, air quality and carbon production, equitable mobility, and sustainable financing.

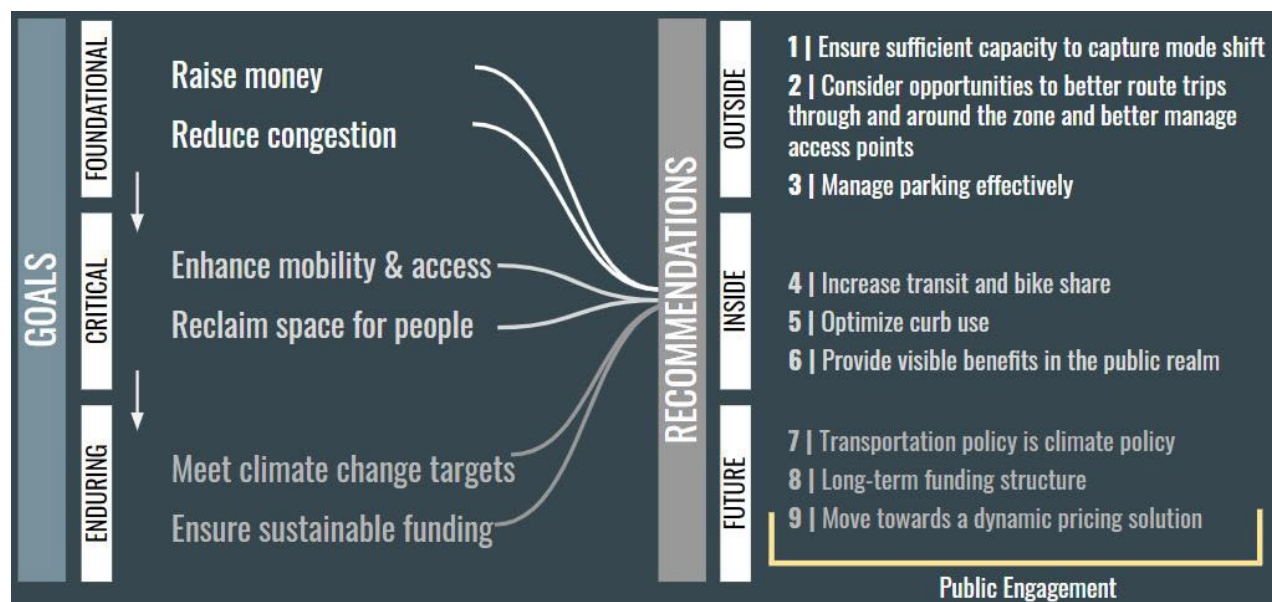


Figure 17 Goals and recommendations are both geographic and temporal in nature. Foundational goals are part of the existing act; additional programs would need to be incorporated as part of an agency initiative or with new state enabling legislation.



Chapter 4. Recommendations

4.1. Inside the Zone

CBD Tolling will almost certainly drive reductions in vehicle travel within the CBD, which in turn will free up street space. Near-term recommendations call for the City and MTA to take proactive steps to repurpose this space. If they fail to act, other entities – whether delivery trucks or FHV – will likely occupy it themselves.

NYC is already on its way to implementing public transit and realm improvements, with the City Council having recently adopted the progressive, \$1.7 billion Streets Master Plan.⁶⁸ Some of the plan’s major action items include constructing 250 miles of protected bike lanes and 150 miles of protected bus lanes; adding one million square feet of new pedestrian space; and enforcing stricter regulations at commercial loading zones.⁶⁹ The legislation complements the Mayor’s \$58.4 million “Green Wave” plan, which calls for installing 30 miles of protected bike lanes annually.⁷⁰

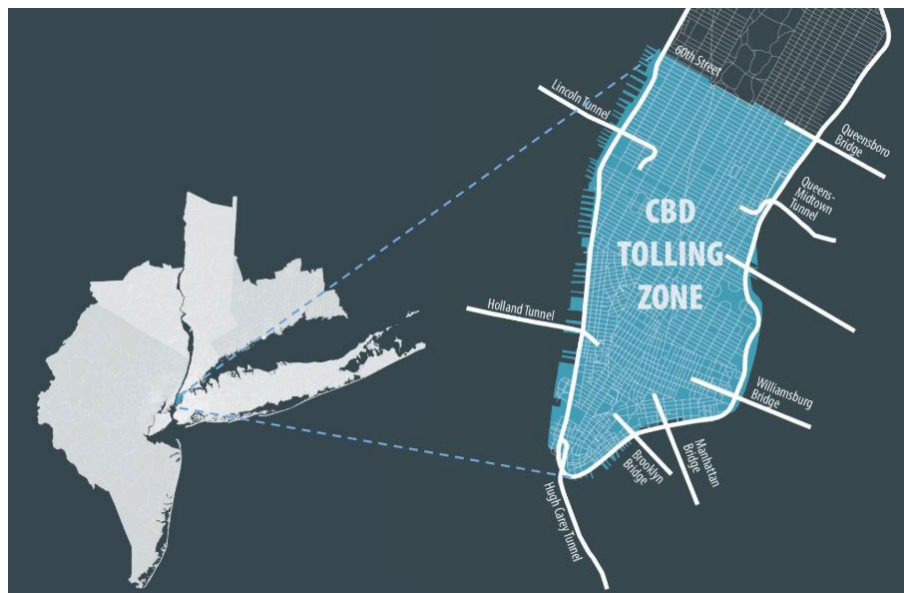


Figure 18 The “Inside the Zone” recommendations are in Manhattan, below 60th Street.

⁶⁸ Spivack, Caroline. “City Council passes \$1.7B plan to ‘revolutionize’ NYC streets.” Curbed New York. Oct. 30, 2019. ny.curbed.com/2019/10/30/20940184/city-council-passes-master-street-safety-plan

⁶⁹ New York City Council. “Five-year plans for city streets, sidewalks, and pedestrian spaces.” Nov. 19, 2019. legistar.council.nyc.gov/LegislationDetail.aspx?ID=3954291&GUID=D37BA0B0-9AB6-434B-A82E-E49A7895A1A4&Options=&Search=.

⁷⁰ New York City Department of Transportation. “Green Wave: A Plan for Cycling in New York City.” Jul. 2019. <https://www1.nyc.gov/html/dot/downloads/pdf/bike-safety-plan.pdf>.

The City can work to achieve these objectives in part through symbiotic efforts that also facilitate tolling program rollout.

4.1.1. Increase Transit and Bike Share

International congestion pricing precedents have typically improved bus networks and services prior to and during program launch. London introduced 300 new buses and increased bus service by 23 percent for the start of the program.⁷¹ Stockholm also increased bus capacity by introducing 14 express lines, purchasing 197 new buses, and improving 18 existing lines. With no known plans to increase bus service, the MTA may miss a substantial opportunity to improve bus frequency, reliability, and on-time performance by capitalizing on reduced vehicle volumes to dedicate and expand bus priority lanes.

The arrival of congestion charging even required TfL to produce new bus schedules to reflect reduced travel times, increased reliability, and growing ridership. The MTA should anticipate similar changes, particularly given

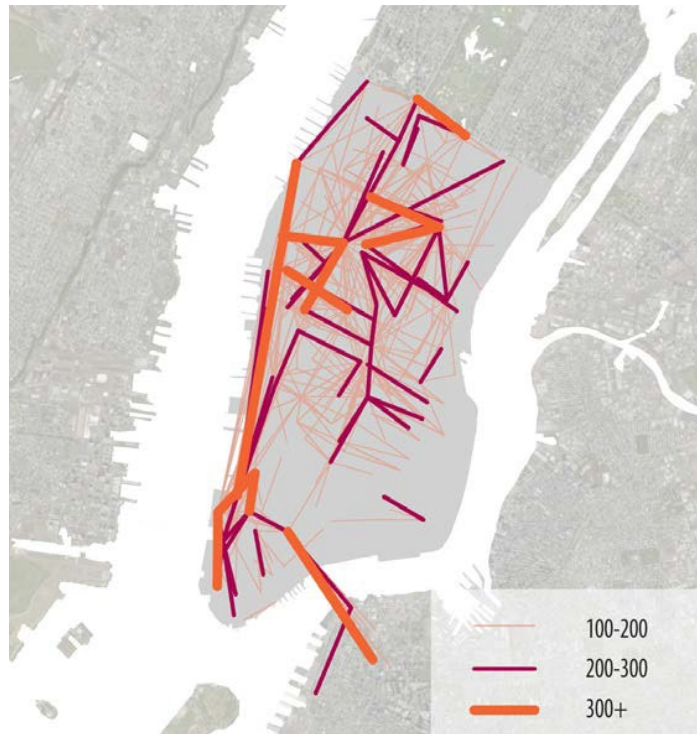


Figure 19 Daily origin-destination pairs for Citi bikeshare rentals

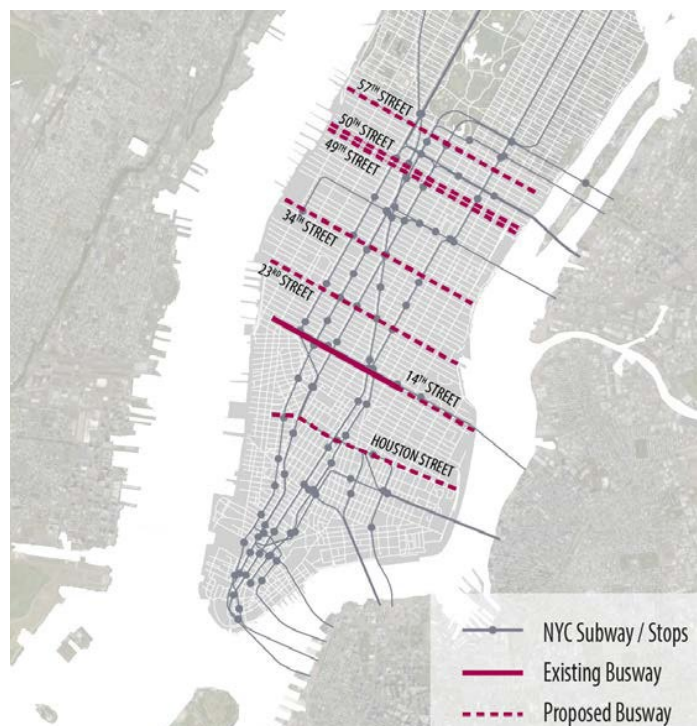


Figure 20 By adding more east-west busways, on-time performance is likely to improve

⁷¹ Transport for London. "Congestion Charging Central London: Impacts Monitoring Second Annual Report." Apr. 2004.

substantially greater ridership and service quality resulting from the 14th Street Transit and Truck Priority Project since its launch in October 2019. The M14 route’s weekday performance has seen a 22 percent increase in ridership and 33 percent improvement in average trip speeds.⁷² The project’s success should motivate DOT to prioritize busways on other major crosstown routes, particularly along 23rd and 34th Streets. Improving these corridors will enhance connections to the subway to create a more integrated and balanced transit system.

Similar benefits may result from accelerating investments in bike infrastructure. The City’s OneNYC strategic plan calls for increasing bike mode share from one percent in 2015 to ten percent by 2050, and for 90 percent of New Yorkers to live within a quarter mile of the bike network by 2022.⁷³ The City could reach these ambitious goals earlier by taking advantage of newly freed road space, particularly along network pinch points like bridges, to develop safer connections between bike routes. Safer infrastructure has implications not only for reducing congestion and pollution, but also for promoting access for people currently underrepresented in the cycling community.

4.1.2. Manage Delivery Vehicle Traffic and Curb Use

Inefficient curbside use is a major source of congestion in NYC and the CBD as e-commerce retailers pledge ever-shorter delivery windows. Curbside management, a set of techniques for more effectively utilizing finite curb space, is also critical for deterring unsafe freight-related practices such as double parking in travel lanes or blocking bicycle lanes. A lack of enforcement and reluctance to charge drivers to use its streets inhibit the City’s ability to address this increasingly severe problem. Given the limited impact to date of parking fines, with companies already factoring parking tickets into the cost of doing business, delivery vehicles are likely to remain inelastic with respect to tolling. Alternative approaches will therefore be necessary to balance competing interests and ensure continuous traffic flows.

Continuing to encourage alternative delivery windows is essential to mitigating traffic pressures.

⁷² Colon, Dave. “SMILE! M14 Ridership Is Up As More Camera Enforcement Comes to the Busway.” StreetsBlog. Nov. 21, 2019. nyc.streetsblog.org/2019/11/21/smile-m14-ridership-is-up-as-more-cameraenforcement-comes-to-the-busway/.

⁷³ OneNYC. “Efficient Mobility.” Vol. 8 of 9. May 2019. onenyc.cityofnewyork.us/wp-content/uploads/2019/05/OneNYC-2050-Efcient-Mobility.pdf.

DOT's Of-hour Deliveries Program (OHD) shifts commercial deliveries from peak to off-peak hours (7:00 pm to 6:00 am).⁷⁴ Since the pilot's launch in 2009, it has received praise from recipients, carriers, and truck drivers alike for improving efficiency and yielding economic benefits.⁷⁵ NYC DOT can increase the program's efficacy by educating more companies about alternative delivery window options and working to resolve communities' after-hours noise concerns by identifying and suggesting certain delivery equipment and regularly surveying noise levels.

DOT should seize on this momentum by undertaking a comprehensive curb inventory to inform potential interventions and pilot project sites. Documenting curb locations; regulations for parking, loading, and bus-only lanes; signage regarding specific hours of enforcement; existing infrastructure (e.g. meters, cameras, bike lanes); and current uses can provide the data necessary to create effective street management policies. For example, DOT can refer to the inventory to consider the needs of diverse constituencies, such as people with disabilities, and implement changes that make curbs more functional and user-friendly. DOT can also utilize the data to employ innovative technologies for managing use of curb space. Washington, DC is testing the CurbFlow mobile application, which provides real-time information about curb space availability. Individual users could use this app to locate legal loading spaces more quickly, while decreased driving time would contribute to street safety and reduce carbon emissions.

The City should also strongly consider implementing pricing mechanisms that place a premium on shorter delivery windows. Like the congestion charge, an additional fee levied on consumers who require same-day deliveries would help correct the market imbalance brought on by free on-demand services provided by online retailers. Earlier this year, Brooklyn Assembly Member Robert Carroll proposed a uniform \$3-per-package delivery fee with proceeds directed to transit service improvements.⁷⁶ In addition to limiting delivery times and volumes to address congestion

⁷⁴ New York City Department of Transportation. "Of-Hour Deliveries Overview." [nyc.gov/html/dot/downloads/pdf/of-hours-delivery-overview.pdf](https://www1.nyc.gov/html/dot/downloads/pdf/of-hours-delivery-overview.pdf).

⁷⁵ US Department of Transportation. "Integrative Freight Demand Management in the New York City Metropolitan Area." Sept. 30, 2010. <https://www1.nyc.gov/html/dot/downloads/pdf/ohd-fnal-report.pdf>.

⁷⁶ "Brooklyn Pol: Let's Charge \$3 per Amazon Package - And Other Way to Raise MTA Cash." StreetsBlog. Feb. 5, 2019. nyc.streetsblog.org/2019/02/05/brooklyn-pol-lets-charge-3-per-amazon-package-and-other-ways-to-raise-mta-cash/.



Figure 21 Freight and package deliveries are a leading cause of congestion, not only for cars but also for bicyclists and pedestrians. Curbside management is an integral part of decongesting New York City. Image credit: Brad Lander.⁷⁷

in central Paris, Mayor Anne Hidalgo recently proposed a surcharge on sellers for every delivery order.⁷⁸ Customers would ultimately shoulder the fee as an appropriate concession for the privilege of faster deliveries.

Beyond freight, NYC DOT must be sure to address other major actors impeding efficient curb use. TNCs typically offer their services at an operating loss using pricing schemes that do not reflect actual costs. Ride-hailing services impose sufficient strain on the road system to merit additional user fees within the CBD and provide further incentive to prefer public transit.

4.1.3. Extend the Public Realm

Improvements to the public realm provide an opportunity to showcase visible benefits of the

⁷⁷ Lander, Brad. Twitter. "This is W. 52nd St. right now..." December 4, 2019, 12:38pm. <https://twitter.com/bradlander/status/1202281279825293312>

⁷⁸ O'Sullivan, Feargus. "Paris to Amazon: No Free Delivery for You." Citylab. Nov. 27, 2019. citylab.com/environment/2019/11/amazon-delivery-online-shopping-environmental-impact-paris/ 602674/.



Figure 22 Reallocation can accomplish different goals. Clockwise from top-left: a car-oriented street, create a bike lane from parking, slow traffic to make a shared street, car-free street, loading zones to minimize conflict, and a busway.

CBD Tolling program, leveraging existing marginal space as well as space made available by reduced congestion. Public realm enhancements provide an opportunity to create neighborhood amenities and inform and update the public about the program.

London used its Congestion Charge program to reclaim 30 percent of its road space for sustainable transportation modes and public realm.⁷⁹ New York should prioritize a similar transformation by setting a target – perhaps one third of curb space, for building transit priority corridors, protected bike lanes, pedestrian walkways, and public realm improvements. Converting a third of New York’s existing street space would provide an area equivalent to 705 acres of space added to the public realm space. Under this approach, for example, Park Avenue South could support dedicated transit lanes, as well as a wide and comfortable two-way bike highway and wide sidewalks for

⁷⁹ De Cani, Richard. “Rethinking our approach, to pricing roads.” Presentation to Studio Oct. 2019.

pedestrians. Additionally, underutilized space under the Williamsburg Bridge can be transformed into social, cultural, and athletic amenities for adjacent neighborhoods on the Lower East Side.

This report recommends the consideration of five typologies for public realm projects, including gateways, plazas, peninsularization, under elevated, and bike/ped corridor improvements. The map on the next page identifies several sites throughout Midtown and Lower Manhattan where these public realm improvements should be made. Each of these can be addressed in phases, with a temporary improvement followed by a capital improvement.

Extensions of the successful pedestrianization projects on Broadway are recommended throughout the Central Business District. Familiarity with this type of project will facilitate its implementation. These extensions should be done immediately upon implementation of CBD Tolling to illustrate to the public the connection between tolling and an improved public realm. Examples such as the temporary closing of Broadway show how a street can be pedestrianized with little financial and political risk. Temporary measures like this also allow traffic impacts to be studied before committing to a permanent change.

The report identifies a long-term pedestrianization project in the Wall Street area of Lower Manhattan. By restricting vehicle access to the area, except for emergency vehicles and some time-restricted deliveries, the area will be cleaner, safer, and less crowded. Over time, extended pedestrian-only areas like this will be possible throughout more of the CBD Tolling area.

In addition to a balance of short-term and long-term public realm improvements, the report recommends a socio-economic balance. Some types of improvements are geographically restricted, but it is crucial to provide amenities to people throughout the CBD Tolling zone. Although Midtown and Lower Manhattan are predominantly wealthy, there are some areas, such as the Lower East Side, that have lower median incomes. Several sites for new plazas and improvements that utilize spaces under bridges are clustered in this area so that new amenities are distributed more evenly.

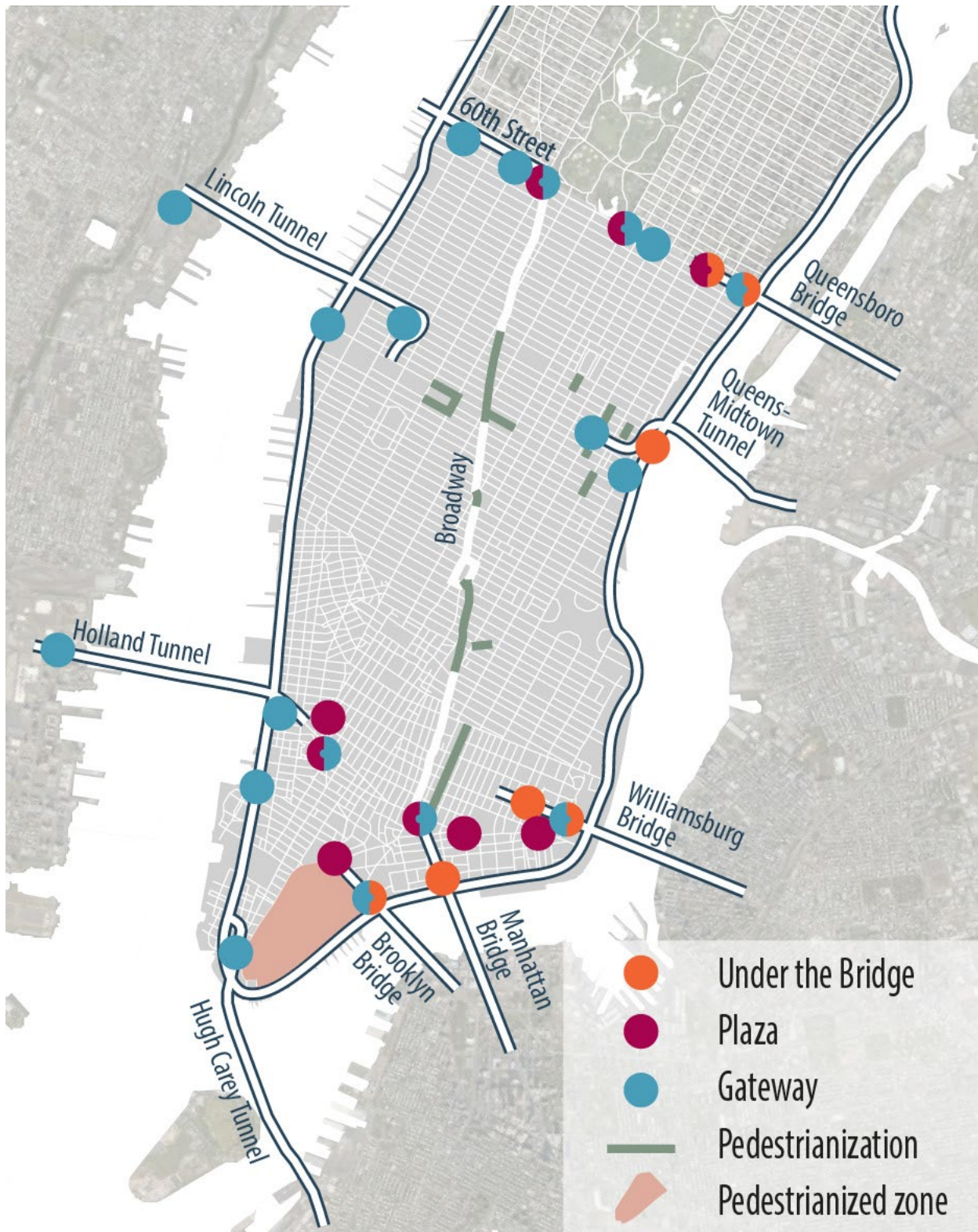


Figure 23 The different types of public realm improvements can occur throughout the CBD zone. There is a focus on the Lower-East Side to address the current disparity in public realm amenities.

The public realm is for everyone. All residents, workers, and visitors should have access to safe, clean, enjoyable spaces and public amenities. By reducing space needed for vehicles, CBD Tolling will result in the availability of space that can be reallocated to the public realm. Rather than being used only by motorists and contributing to pollution and dangerous road conditions, this space will be clean, safe, and open to everyone.

4.1.4. Plazas

Plazas transform entire segments of underutilized streets into shared streets with minimal car presence and a focus on pedestrians. They are already being implemented across the city through DOT's Plaza Program, but the effort can be significantly expanded as a benefit of the Program. As congestion is reduced, some streets and travel lanes will no longer be necessary for vehicle traffic, and they can be transformed to provide valuable public realm amenities for residents.

One of the greatest advantages of plazas is that they are scalable. As seen in the example on the previous page from Putnam Triangle, a street can be closed temporarily with large planters, bollards, or concrete barriers. This can be done for a weekend to raise awareness of the potential public realm improvement and gain the support of residents and businesses. Once more money is available and a private partner is established to sponsor and maintain the plaza, a longer-term installation can be created. Plantings, public art, and regular programming like markets, food, and entertainment are all possible ways to provide public realm amenities to the people who live and work in the plaza's neighborhood.

After appropriate funding and partnerships are established, a capital project can be carried out to make the plaza a permanent public realm improvement. To ensure long-term successes like this for the public realm, the Program should provide funding for plazas. A fraction of the expected \$1B per year revenue would make a widespread positive impact.

4.1.4. Spaces Under Elevated Infrastructure

Spaces under elevated infrastructure are often underutilized in NYC. In Lower Manhattan, a number of these spaces are adjacent to low-income areas on the Lower East Side, for example along FDR Drive underpasses and below bridge portals. By transforming these spaces into

amenities for their neighborhoods, quality of life can be improved for residents and workers. In lieu of the unused spaces, neighborhoods should instead benefit from social amenities like athletic courts, market spaces for local merchants and craftspeople, and public art installations that feature local artists. Complementary measures like air pollution and carbon reduction can also be addressed by adding trees and planters and installing impervious surfaces.

The photograph to the right shows a space under the I-93 overpass in South Boston, which is a similar height to the bridges on the Lower East Side. The space is used for regular programming events like markets and food trucks. By providing a safe and enjoyable space for residents and workers to go to, a positive social amenity is added to the public realm.

NYC has several opportunities to take advantage of these conditions. One example is below the Manhattan Bridge, next to the Baruch Houses neighborhood. There are a few underutilized parcels below the elevated infrastructure that can become amenities for the residents. By clarifying the connection with the CBD Tolling Program, spaces like this can help maximize public buy-in for the program by improving the perception of the Program.



Figure 24 Spaces under bridges are often overlooked and blighted, but they should be transformed into neighborhood amenities like this one in Boston. Image from Underground at the Inkblock.⁸⁰

4.1.5. Peninsularization

Peninsularization is a new concept pioneered in the United Kingdom, where many cities are looking to change traditional intersections into roundabouts or places where pedestrians cross intersections without crossing vehicular traffic. Many cities with heavy traffic roundabouts cut off valuable pieces of the public realm, rendering them unusable. To give these types of spaces back to the public, one segment of a roundabout can be severed from the road systems to create a peninsula that is easily accessible to pedestrians.

This condition could potentially apply to several places in NYC, such as Hudson Square and Columbus Circle, which are along the cordon line where traffic patterns might need to be changed anyway, thereby making peninsularization a more viable option for public realm improvement, both financially and in terms of increasing public buy-in. The next image shows the result of peninsularization applied to the Holland Tunnel exit. The existing condition, inset in the top left corner, shows the wasted, inaccessible space in the middle of the circle created by the tunnel exit

⁸⁰ Unknown. Underground at the Inkblock via Curbed. February 13, 2018. <https://www.curbed.com/2017/1/9/14183876/freeway-underpass-park-public>



Figure 25 This recommendation for peninsularization at the Holland Tunnel can double as a Gateway to the city.

roundabout. By removing one segment of the roundabout and one segment of adjacent street, the central space becomes an easily accessible park that contributes to public realm, offering a green outdoor space to residents and workers. Another benefit of this example of peninsularization is that the entry to the city from the tunnel would be adjacent to a vibrant park space rather than an unused plot of land. Due to traffic pattern adjustments and construction costs, peninsularization is a long-term capital project rather than an improvement that can be made prior to implementation.

4.1.6. Gateways

Gateways are located along the cordon line at iconic locations, such as Columbus Circle and Grand Army Plaza and establish a positive visual connection with the Program at the point where motorists are thinking about the program most directly – the payment gantries. The public realm is an ideal place to communicate with the public, because it allows people to directly associate the benefits and outcomes of CBD Tolling with their actions.

The image below shows the approach to Columbus Circle, moving southbound on Broadway. At this point, drivers will reach the cordon line of the tolling zone. In addition to being the point of payment, this is also an iconic and memorable place in the city that will augment the impact of communication and messaging efforts.

Gateways will provide an opportunity to inform the public about complementary issues like the air quality and pollution. The image includes an electronic sign that is mounted at a gantry point. The message on the sign provides real-time feedback on vehicle counts and air quality to inform motorists of the impact of CBD Tolling now they are being charged for driving into the Zone, thereby encouraging motorists to consider the impact of their choices. By showing comparative data, motorists can track program outcomes.

By providing real-time data on important complementary issues, gateways will ensure a certain level of accountability for the stated goals of CBD Tolling. This supports the public engagement process and contributes to public buy-in by establishing trust.



Figure 26 Gateways like Columbus Circle are an ideal opportunity to engage the public and encourage them to connect CBD Tolling to improved air quality and other complementary results of reduced congestion.



Figure 27 The "Outside the Zone" recommendations extend throughout the metropolitan area indicated above.

4.1.7. Outside the Zone

Congestion is impacted as much by activities within the CBD as it is a product of mobility demands beyond the cordon. The agencies cannot effectively carry out the program without considering regional traffic patterns and identifying specific external pressure points, which may continue to strain the city's capacity should they go unaddressed. In addition, implementing the program without attention to the metropolitan area may yield severe unintended consequences that exacerbate traffic flows or disproportionately burden infrastructure elsewhere.

The studio team's analysis of these trends indicates that the program's efficacy will also depend on near-term strategies that aim to capture mode shift, improve trips through the CBD, and manage parking just outside the cordon. Recommendations followed from insights into motor vehicle and transit trips into the CBD.

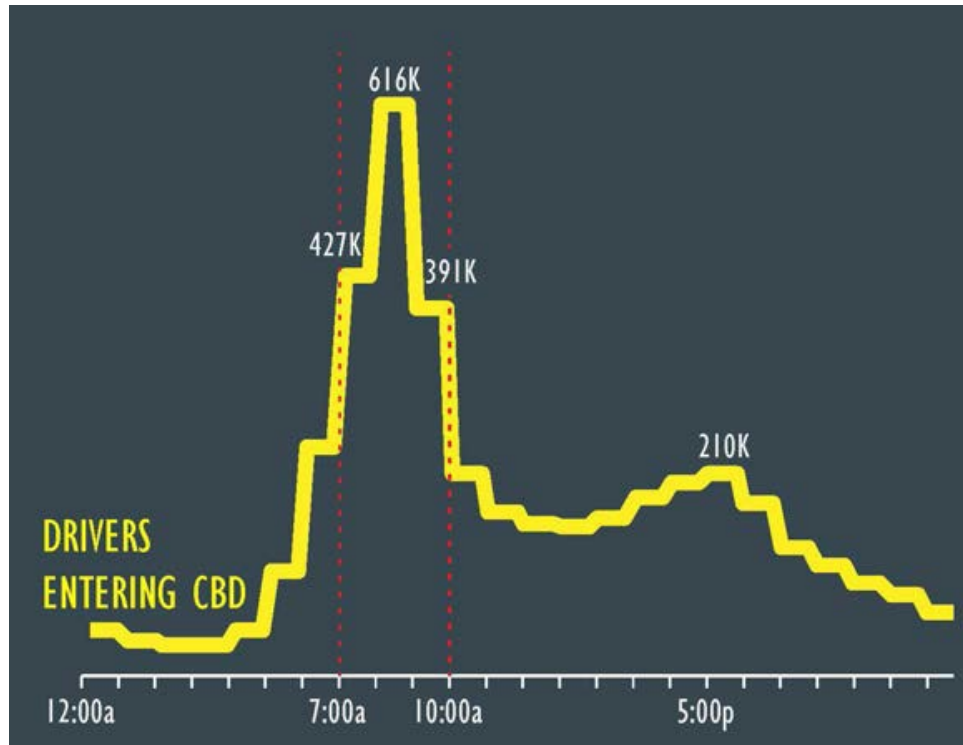


Figure 28 The sharp increase in drivers entering the CBD in the morning peak indicates potential benefits of dynamic pricing.

4.1.8. Motor Vehicle Trips into the CBD

In 2017, for all trips, approximately 900,000 people entered the CBD by motor vehicle on an average workday, with 1,434,000, or 37 percent, entering during the morning peak period between 7:00 am and 10:00 am.⁸¹ Approximately 616,000 people entered between 8:00 am and 9:00 am, comprising 16 percent of the total daily volume.

Most motor vehicle travel into the CBD is from within NYC. 2010 origin-destination data indicate that of all motor vehicle trips,

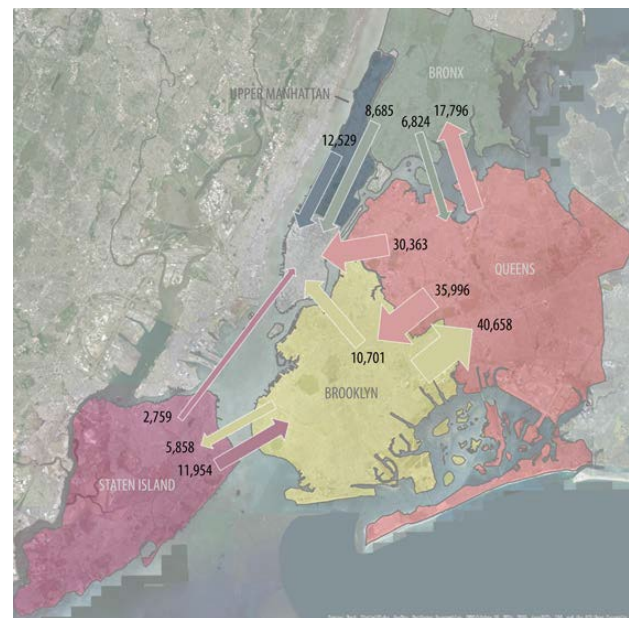


Figure 29 Daily interborough vehicle flows reveal that traffic is not evenly balanced between boroughs; drivers are likely taking certain routes to avoid bridge and tunnel tolls.

⁸¹ New York Metropolitan Transportation Council. "Hub Bound Travel Data 2017." [Nymtc.org/Data-and-Modeling/Transportation-Data-and-Statistics/Publications/Hub-Bound-Travel](https://nymtc.org/Data-and-Modeling/Transportation-Data-and-Statistics/Publications/Hub-Bound-Travel).

including but not limited to commutes, just 20 percent originated from outside the city (i.e. New Jersey (NJ) suburbs, Long Island, and portions of Downstate New York and Connecticut (CT) included in the metropolitan area).⁸² Origins are dispersed throughout the metropolitan region, with travel patterns extending outward in all directions and volumes of motor vehicle travel decreasing with distance from the CBD.

At the same time, in 2017 nearly 44 percent of all private vehicles (including cars, taxis, commuter vans, and trucks) crossed the CBD boundary in either direction at 60th Street. The remaining 56 percent were more evenly distributed, with 25 percent of vehicles arriving from Brooklyn, 18 percent from Queens, and 13 percent from NJ.⁸³ Travel volumes are also evenly balanced, with comparable in- and outflows, among motor vehicles entering the CBD from NJ, Brooklyn, Staten Island, Queens, and Upper Manhattan.

The flow volume suggests the importance of travel not just to, but also through, the CBD. While travel to Brooklyn has grown significantly, 60th Street remains the most popular crossing, indicating a need to focus on managing trips across this part of the cordon.⁸⁴ Arguments involving equity concerns for low-income drivers may be unfounded. Whereas the national trend for car ownership is at least two vehicles per household, most NYC households (55 percent) do not own a vehicle, and the median income of households with vehicles came out to more than double that of households without cars.⁸⁵ Moreover, a nine percent increase in citywide car ownership between 2010 and 2017 is likely associated with growth in the outer boroughs, which are seeing both population and median household incomes climb.⁸⁶

⁸² Best Practice Model Data 2010. Methodology: OD datasets with Congestion Pricing Zone as a destination were trimmed and total number of vehicle trips by TAZ (Transportation Analysis Zone) was calculated. Datasets imported to ArcMap were visualized as a dot density map. It should be noted that data may be at the sample, rather than population, level. The reader is encouraged to focus on the takeaways and trends, rather than specific numbers.

⁸³ New York City Department of Transportation. "New York City Mobility Report." New York Metropolitan Transportation Council. "Hub Bound Travel Data 2017." Methodology: based on 2017 Hub Bound data, calculated percentage of vehicles and percentage change between 2015-17 crossing into the zone from NJ, 60th Street, Queens, and Brooklyn. Calculated percentage of vehicle counts by five classifications: private vehicles, FHV's, taxis, trucks, and others.

⁸⁴ The total number of vehicles entering the CBD has decreased since 2010, but the number entering Brooklyn has increased by four percent since 2015.

⁸⁵ 2017 5-Year ACS Estimates. 2015 1-Year ACS Estimates via Tri-State Transportation Campaign, "How Car-Free is NYC?" Apr. 2017. blog.tstc.org/wp-content/uploads/2017/04/how-car-free-is-nyc.pdf

⁸⁶ Colon, Dave. "More Rich People Means More Traffic Problems for NYC." Streetsblog. Aug. 28, 2019. nyc.streetsblog.org/2019/08/28/more-rich-people-means-more-traffic-problems-for-nyc/

Rather than disproportionately affecting poorer New Yorkers, the toll may help address congestion compounded by new wealthier outer-borough residents who opt not to use public transit.

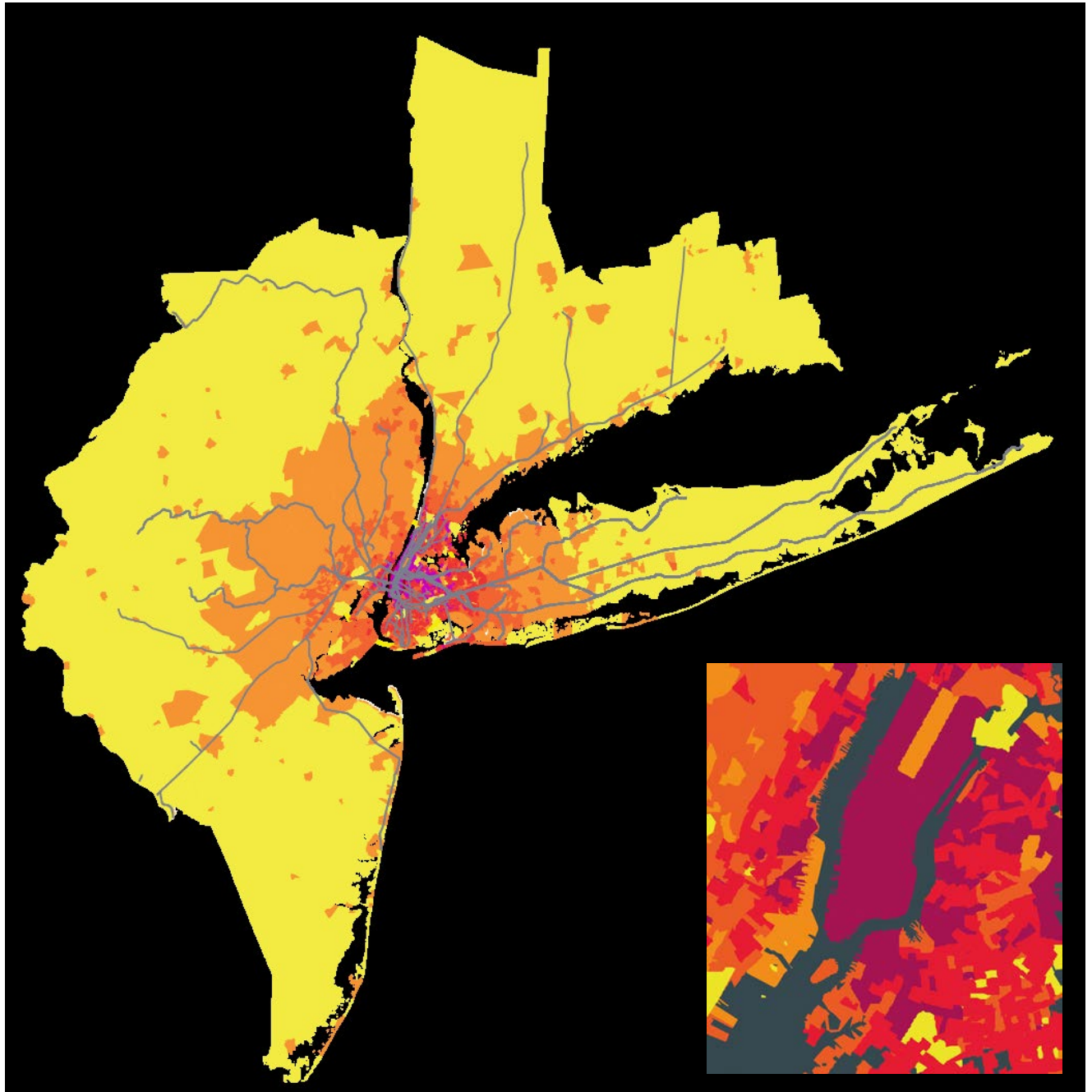


Figure 30 The mapped origins of all origin-destination pairs in the New York metropolitan area show that Manhattan is generating the most

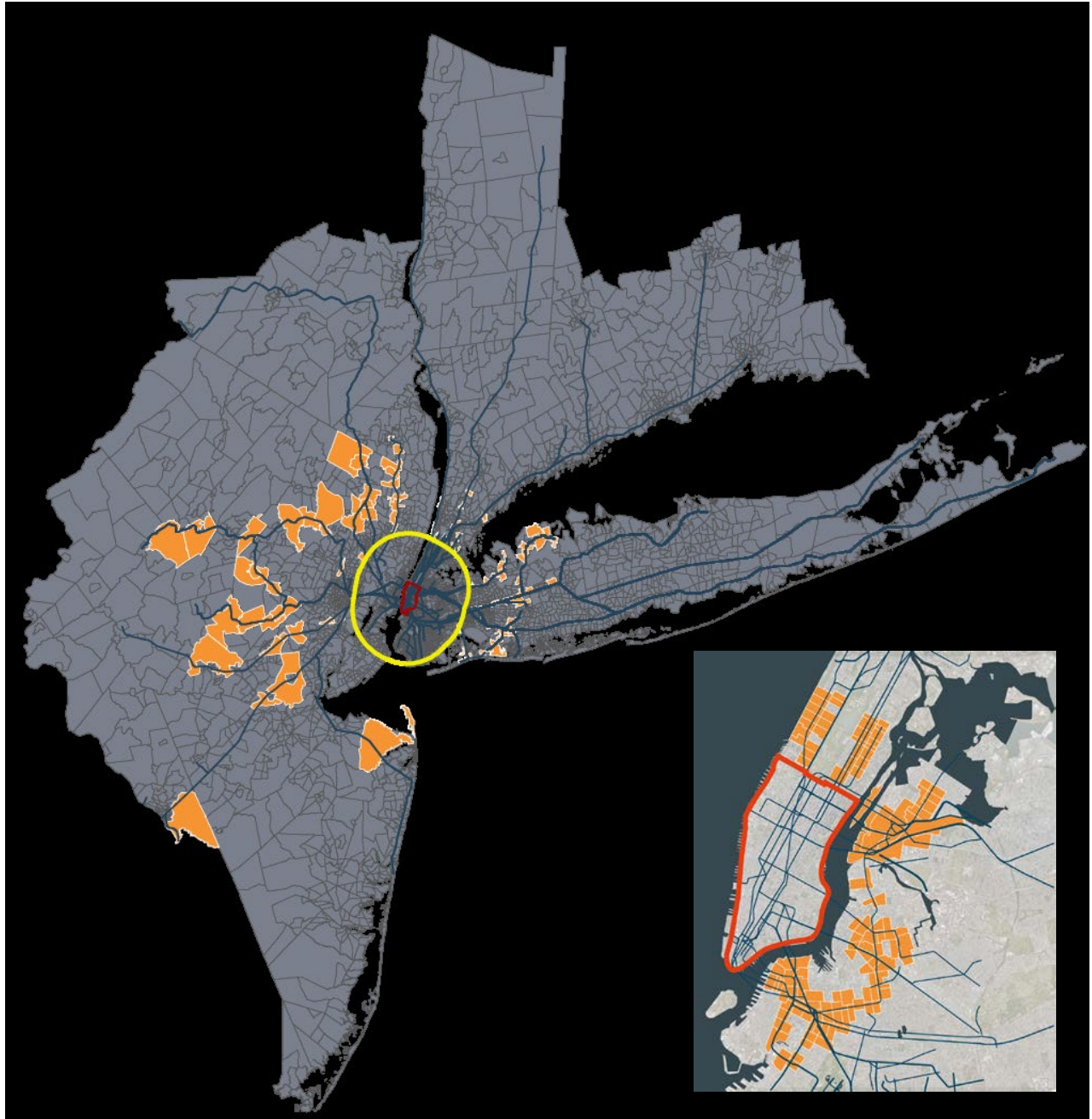


Figure 31 One major concern about behavior change is that people might begin driving to subway and commuter rail stations and parking thereby overflowing parking structures. These census tracts are most susceptible, as they have transit stations with parking within 1/4 mile.

4.1.9. Transit Trips into the CBD

Commuter rail – namely the MTA’s LIRR and MNR, as well as NJ Transit (NJT) – heavily supports the region. These three systems, which serve Downstate NY, NJ, and CT, comprise 29

lines, 423 stations, and 1,646 miles.⁸⁷ The City of New York is also served by its Subway system—one of the most extensive systems of its kind in the world. In 2017 approximately 3.9 million people crossed the CBD boundary via public transit, more than four times the number using private vehicles. Nearly 84 percent of all express bus passengers into the CBD came from NJ by way of the Lincoln and Holland Tunnels. Counter to typical morning peak inflows to Manhattan, approximately 24 percent of those crossing the CBD reverse commuted, 61 percent of whom traveled by subway.⁸⁸ This comprehensive regional network can help absorb some of the mode shift following the introduction of tolling, as can the subway in the outer boroughs.

System operations must therefore be capable of responding to significant changes in ridership. The MTA believes that it can accommodate the anticipated increase in transit demand on its existing commuter rail, subway, and bus networks. However, the Port Authority’s PATH rail and NJ’s Trans-Hudson rail lines and bus routes to Manhattan are currently operating at crush loads, and many subway lines are already overcrowded during peak travel times. These routes may not be able to accommodate additional passengers until completion of the Gateway Tunnels and expansion of the Port Authority Bus Terminal. The MTA will need to work closely with the Port Authority and NJ Transit, for example by identifying potential bottlenecks and making operational changes to service frequency and fares, to ensure sufficient absorption capacity.

4.1.10. Parking Demand

Parking demand will likely change dramatically due to the impact of the CBD Tolling Program on driving behavior. Communities just outside the CBD or near subway stations may be vulnerable to upticks in parking by non-residents avoiding the toll. If not appropriately managed, the program could lead to residential parking shortages in these neighborhoods, and DOT-issued residential parking permits might ultimately be necessary to address this challenge. The map to the left shows Census tracts likely to be impacted by increased parking demand based on proximity to subway stations and to the CBD itself.

⁸⁷ NYC Map 360. “New York City Train Map.” nycmap360.com/nyc-train-map#.XfUE0uhKhPY.

⁸⁸ New York Metropolitan Transportation Council. “Hub Bound Travel Data 2017.”



Figure 32 Signage on transit will strengthen communication and engagement efforts.



Figure 33 Engaging the public in decisions creates buy-in. Image from NYCDOT.

Government – NY, NJ, CT • MTA (TBTA, Buses, NYC Transit) • NYS Assembly/Senate • Port Authority of NY & NJ • NYC DOT, Planning, EDC • Borough Presidents • NJ Transit, Turnpike Authority • NYC City Council	Freight-Related Entities • Trucking Associations • Shipping/Delivery Cos. (UPS, FedEx) • Transit/Transport Workers Unions
Business Interests • Business Improvement Districts • Chambers of Commerce • Real Estate Board of New York • NY Building Congress • Partnership for NYC	Media Outlets
For-Hire Vehicles • Rideshare/TNCs (Uber, Lyft, Via) • Taxis • NYC TLC • Other shared transit (e.g. scooters)	Private Foundations
	Advocacy Groups involved with: • Land Use/Planning (e.g. RPA) • Environment • Vision Zero/Transit • Watchdog Groups
	Community-Based Organizations • Community Boards • Neighborhood Associations • Settlement Houses • Social Service Providers • Religious Institutions • Political Groups

Figure 34 High-interest, high-power stakeholders should be the focus of public

urban Census tracts with high car origin volumes and near outlying commuter rail stations offer an opportunity to limit motor vehicle trips altogether. The MTA might-should work with NJT to prevent parking closer to the CBD by alleviating parking pressures in NY and NJ suburbs with existing rail stations. The agencies should prioritize providing more parking near those stations while advertising for ridesharing and carpooling. The agencies might also sponsor new bicycle and pedestrian routes to stations or offer guidance to improve transit connectivity.

4.1.11. Public Engagement and Inclusion

The success of the CBD Tolling Program will hinge on the quality of public outreach and engagement efforts to secure public understanding and acceptance. For this reason, design and implementation of a public information and engagement program cannot be a last-minute effort.

Given the short timeframe ahead of the project's launch, the transit agencies must focus pre - implementation efforts on informing the broader public. People must understand the program ahead of launch for it to operate smoothly and with public support from the start. London, Stockholm, and Singapore all established effective communication campaigns well in advance of implementation familiarize people with the concept of congestion pricing.

The MTA and DOT must actively anticipate and address concerns to build trust and manage expectations. By alleviating fear of the unknown, helping New Yorkers understand what to expect from day to day can mitigate resistance to change and facilitate the transition process. People require advance notice about practical matters such as potential changes to their commuting patterns, and drivers will only change modes by learning about alternative transit methods.

Drivers must also know methods for paying the charge and resources for more information, future updates, and customer support. Explaining the range of anticipated results and outcomes will also help place the program in the context of people's lives. To gain traction, the program must not only feel personally relevant, but also clearly demonstrate that tolling revenue will improve New Yorkers' quality of life.

To communicate their message to 8.5 million New Yorkers, the agencies must use a range of channels and media. Among other strategies, Stockholm and London published FAQ pages, dedicated websites, and how-to videos to describe their respective programs. Strategically placed messages on buses and subways and at CBD entry points can reach a broad audience while establishing clear connections to the program. These visual cues will be essential for introducing congestion charging into people's daily routines. The agencies would also benefit from partnering with the NYC-based Center for Urban Pedagogy, which produces graphic pamphlets intended to describe technical policy issues in layperson terms.

This initiative, called Making Policy Public, has taken on dozens of complicated topics to assist advocacy groups with explaining regulations to their members and other audiences.⁸⁹ MTA and DOT must keep in mind the need to provide advance notice of future program changes as well.

⁸⁹ See welcometocup.org/Projects/MakingPolicyPublic for more information.

For example, TfL invested heavily in a poster campaign to advertise London's Western Extension effort and later the ULEZ now in place.

Executing high-impact engagement requires thoughtful preparation to reach a diverse cross-section of the population. Interfacing with communities necessitates attention to the languages spoken and specific concerns. Introducing the program to community boards in all five boroughs is vital to achieving a consistent, equitable, and inclusive rollout. Attention to these nuances, as well as to geographic scope, is critical to maximizing the potential impact of public outreach. Forums for in-person information sessions are also crucial for demonstrating transparency.

The agencies will secure and sustain broad support using appropriate messaging and prioritizing public perception. Cohesive branding, creative marketing materials, proactive engagement with news outlets, and public realm pilot projects would allow the agencies to control the public narrative, demonstrate concrete results, and convey competence. The responsible MTA and DOT divisions should also strongly consider co-locating to facilitate joint communication and media approaches and demonstrate a willingness to collaborate.

The agencies should also aim for accessibility and convenience by facilitating easy payment processes online and in person, perhaps at convenience stores or pharmacies, as well as providing call centers as Stockholm did. These measures will be especially important in supporting out-of-town visitors and low-income customers without EZ Pass or credit card accounts. As TfL explained, the imposition of congestion charging on the public necessitates high-quality customer service.

While substantive engagement prior to implementation will be difficult, the program could incorporate a trial period as part of its 2021 launch. The agencies look to Singapore, Stockholm, and London, which reevaluated the program and invited feedback after an initial period. In all three cities, public acceptance increased tremendously over time following initial program exposure, and post-implementation feedback was largely positive as a result. Requesting and incorporating public feedback will be integral to bolstering the trust and credibility necessary for long-term program viability.

In addition to ensuring broader public awareness, the agencies must dedicate time both to building coalitions of supporters and engaging directly with more skeptical groups and individuals, particularly those with greater interest in and influence on the issue. Delivery companies are high-interest and -influence stakeholders since they will be significantly impacted by CBD Tolling, and the agencies can make the case that greater efficiency will make the increased cost of business worthwhile.

Environmental advocacy groups may seek commitments to reduced air pollution and carbon emissions, while media outlets have a critical role in conveying program benefits or costs to New Yorkers and shaping the overarching public narrative. By tailoring messaging to these stakeholders' needs and concerns, the agencies can respond more effectively and thoughtfully than a generic campaign would allow. The agencies should approach every stakeholder as a crucial partner, because issue-based groups (e.g. climate, public health, and safety advocates) and influential spokespeople can facilitate the creation of a larger coalition of supporters.

A post-implementation engagement strategy is equally critical to demonstrating the agencies' long-term commitment and willingness to adapt to New Yorkers' needs. As Singapore, London, and Stockholm have demonstrated, open lines of communication and a visible agency presence must remain priorities to sustain long-term acceptance. Above all, a successful program will require the agencies to commit to ongoing feedback and reporting mechanisms and transparent and rigorous evaluation metrics. Integrating accountability mechanisms will be essential for the agencies to promote public trust now and in the future.

Regular reporting of performance measures and provision of real-time open data have proved highly effective in the precedent cities and elsewhere; for example, Chicago's Array of Things Program tracks a wide range of performance measures including vehicle traffic, pollutants, and noise from hundreds of points citywide. New York's LinkNYC kiosks could both measure and display such performance outcomes on a continual basis as a measure of transparency to inform the broader public and gain credibility while also establishing metrics to compare performance over time.

Performance Measures to Consider

Goal	Target	Source
Public realm	11% (1/3 of reallocated space)	CP Studio
Deliveries	Fees for curb usage, designated loading zones, limited hours	CP Studio
For-hire vehicles	Fees for usage, designated loading zones	CP Studio
Parking	50% reduction in on-street parking by 2050, permits for residential	CP Studio
Predictable trip times	95% accuracy	CP Studio advisors
Mode shift	80% sustainable trips by 2030	OneNYC
Bike trips	1 in every 10 trips by bike by 2050	Green Wave
Bike lanes	50 miles of protected lanes per year	Let's Go
All electric buses	100% of routes by 2040	MTA (Andy Byford)
Bus lanes	30 miles of lanes per year	Let's Go
Reallocated street space	33% (London reallocated 30%)	TfL
Safety	Vision Zero by 2024	NYCDOT
Carbon reduction	Net-zero carbon by 2050	OneNYC
Air quality	20% reduction in PM2.5 by 2030, 50% reduction in SO2 by 2030	NYC Office of Sustainability

These performance metrics address the major goals of the report and prioritize people over cars.

Chapter 5. Seizing the Future



Figure 35 Bicycles are the most likely sustainable mode to increase by 2050.

Although the MTA and DOT are presently focused on a 2021 launch for implementation, the program must be designed with the flexibility necessary to evolve into a broader, more regional road pricing and emissions reduction program. New York faces significant challenges to manage congestion and emissions throughout the metropolitan region, and CBD Tolling alone will not solve these challenges. However, if designed well, the program can grow and evolve quickly and systematically to help the region prepare for a more sustainable and resilient future. In particular, the MTA can work with DOT and regional partners to address the growing threat of climate change, sustainable transportation funding, and institutional reform.

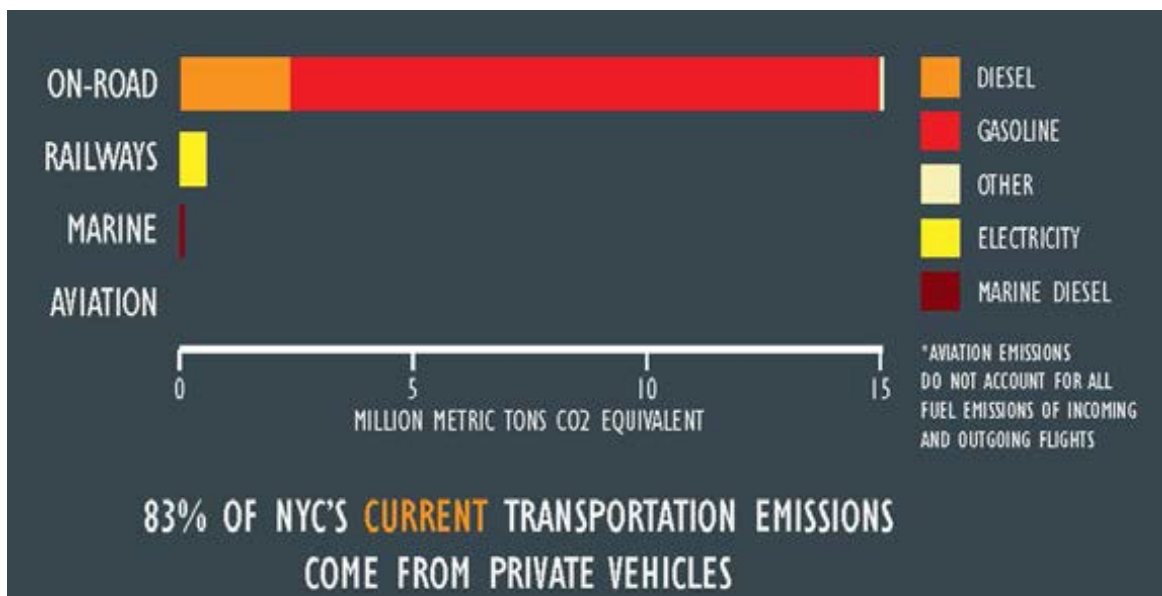


Figure 36 Cutting down gasoline can through reduced vehicle miles traveled will notably decrease transportation emissions.

5.1. Treat Transportation Policy as Climate Policy

New York has already experienced substantial climate change impacts. Superstorm Sandy wreaked havoc on the subway system and caused \$5 billion in damage to the MTA alone.⁹⁰ Extreme weather events – including not only storm surges, but heat waves, extreme rainfall events, droughts, and other climate-related phenomena – will only become more frequent and severe over time, and New York must build resilient transportation infrastructure that can withstand future climate impacts. The MTA is already preparing to use “Flex-Gate” flood barriers, which allow the agency to seal off a subway entrance in response to heavy flooding.⁹¹ The City and State also have a responsibility to meet ambitious carbon reduction goals they have set for themselves, including achieving carbon neutrality and 100 percent clean electricity by 2050, in part by powering public transit using renewable energy sources.⁹² The transportation sector is the second largest greenhouse gas (GHG) contributor in New York, and over 80 percent of transportation emissions come from private vehicles.⁹³

Academic, government, and nonprofit studies indicate that large-scale reductions in GHG pollution by the transportation sector are technically possible within the next several decades. However, municipal decisions made today will impact cities’ ability to reduce carbon pollution in the future. A 2016 report by the Frontier Group urges that elimination of GHG emissions from urban transportation systems will be achieved only through transformative institutional changes and a departure from the incremental policies of the past.⁹⁴ Such an undertaking requires coordinated strategies for shared mobility, vehicle electrification, smart road pricing, sustainable uses of space, mode shifts, and smart technologies integration to enable behavioral modifications.

⁹⁰ Hinds, Kate. “Totaling Sandy Losses: How New York’s MTA Got to \$5 Billion.” WNYC. Nov. 27, 2017. wnyc.org/story/286877-totalling-sandy-losses-how-new-yorks-mta-got-to-5-billion/.

⁹¹ Meyer, David and Natalie O’Neil. “MTA completely floods subway station entrance to test new water blocking gate.” New York Post. Nov. 21, 2019. nypost.com/2019/11/21/mta-completely-foodssubway-station-entrance-to-test-new-water-blocking-gate/.

⁹² OneNYC. “A Liveable Climate.” Vol. 7 of 9. Apr. 2019. onenyc.cityofnewyork.us/wp-content/uploads/2019/04/G_OneNYC_2050_Interior_r5_v3_ALivableClimate_190422_web.pdf.

⁹³ EPA. “Fast Facts on Transportation Greenhouse Gas Emissions.” Green Vehicle Guide. 2017. <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>

⁹⁴ Dutzik, Tony and Alana Miller. “A New Way Forward: Envisioning a Transportation System without Carbon Pollution.” Frontier Group. May 24, 2016. frontiergroup.org/reports/fg/new-way-forward.

Shifting to electric vehicles powered by renewable energy, while essential, will take time. The average lifespan of a private automobile ranges from eight to 15 years.⁹⁵ And although NYC's power grid is becoming cleaner, only 23 percent of electricity generated today comes from renewable sources.⁹⁶ New York cannot achieve carbon neutrality without a substantial move away from private automobile dependence. City and State policies should also incorporate requirements for reporting on climate change goals as part of all future planning efforts. Evaluation of all infrastructure investments should factor in climate impacts. Projects should be required to prioritize smart land-use policies that unlock potential for low-carbon transportation. For example, implementation of RPA's "T-REX" proposal to expand and modernize regional rail would support sustainable future growth through transit-oriented development.



Figure 37 CBD Tolling can be augmented by projects like T-REX. Image from the Regional Planning Association.⁹⁷

⁹⁵ Consumer Reports. consumerreports.org/.

⁹⁶ New York State Department of Environmental Conservation. "How New York Uses Renewable Energy." dec.ny.gov/energy/83070.html.

⁹⁷ Regional Plan Association via Railway Age. "T-REX: New Plan to Integrate Dinosaur NYC Transit Systems." April 20, 2018 <https://www.railwayage.com/passenger/t-rex-new-plan-to-integratedinosaur-nyc-transit-systems/>

Once the congestion charge is in place, New York should act further on bold climate policy by following the example of London's ULEZ. Launched in April 2019, it doubles the existing congestion toll for all vehicles that do not meet London's emissions standards to disincentivize driving further, specifically by discouraging use of polluting vehicles. Just one month after implementing ULEZ, the City discovered that on average 9,400 fewer vehicles had entered London than the previous month, and nearly 75 percent of vehicles entering the zone complied with new pollution limits.⁹⁸ The policy currently applies to London's CBD but will expand to cover a much broader geography beginning in October 2021.

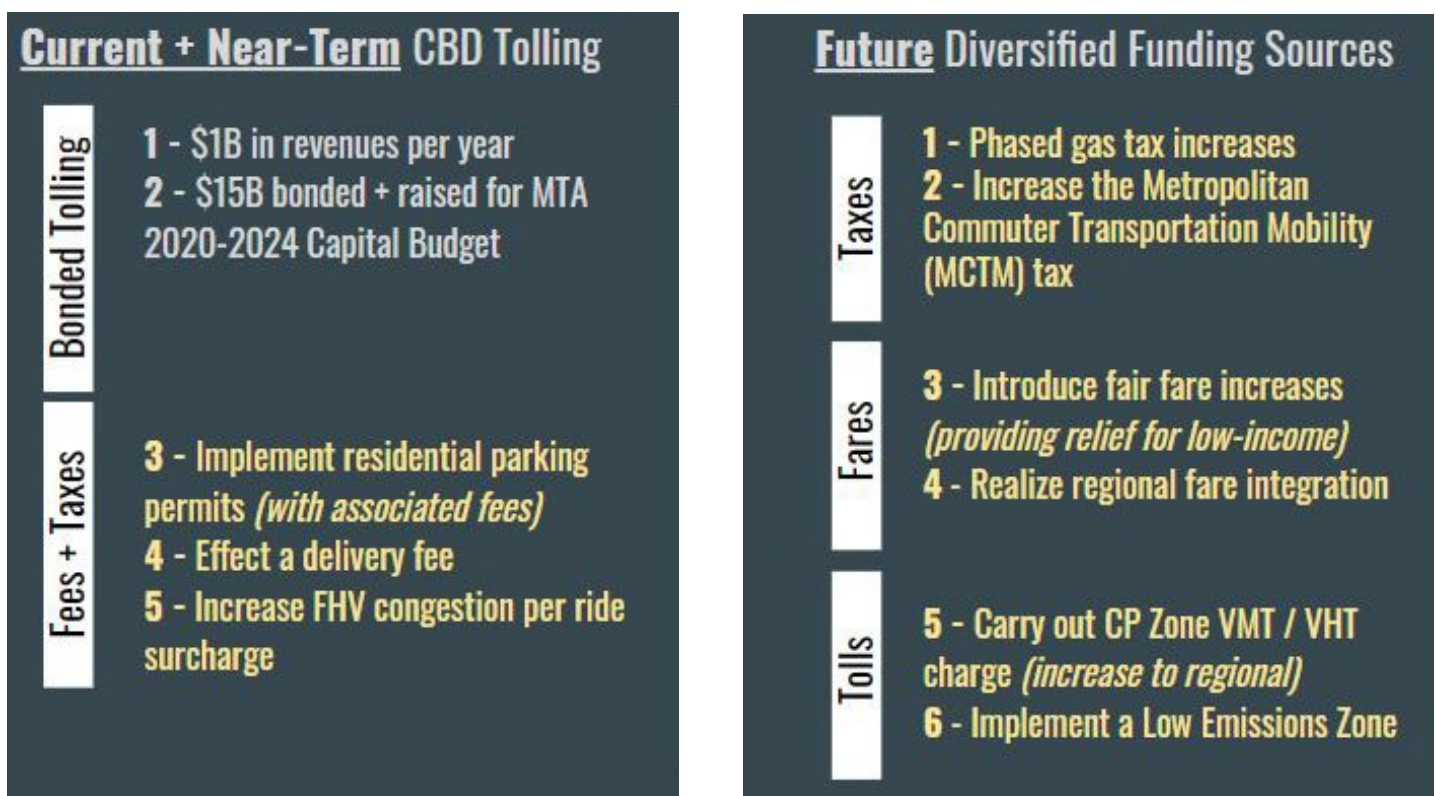


Figure 38 Funding options must address both short- and long-term needs while utilizing each of the different mechanisms: tolls, taxes, fares, and fees.

⁹⁸ Taylor, Matthew. "ULEZ cuts number of worst polluting cars in central London." The Guardian. May 16, 2019. [theguardian.com/uk-news/2019/may/16/ulez-cuts-number-of-worst-polluting-cars-in-central-london](https://www.theguardian.com/uk-news/2019/may/16/ulez-cuts-number-of-worst-polluting-cars-in-central-london).

5.2. Build a Sustainable Transportation Funding Model

The CBD Tolling Program resulted from the need to close a \$15 billion gap in the MTA's capital program, most of which will be devoted to deferred maintenance and normal replacement activities on the existing subway system. The MTA has suffered from declining service levels in recent years partly due to its inability to finance these investments.

The next capital program will inevitably suffer from an even larger financing gap. Numerous programs to create capacity and serve new and growing markets are being undertaken, including Phase 2 of the Second Avenue Subway, Penn Station Access, East Side Access, the LIRR Main Line Expansion and Double Track, CBTC Installation, and extensive bus improvements and expansion. Although it is beyond the scope of this study, the studio strongly believes that the State and City should prioritize creation of a sustainable, long-term financing strategy for the MTA and its capital needs. Virtually all of New York's global competitors are engaged in programs to sustain, modernize, and expand their regional transit networks, and New York needs to do likewise to remain competitive. However, work cannot begin until the MTA has secured the funding not just for the next five years, but rather decades.

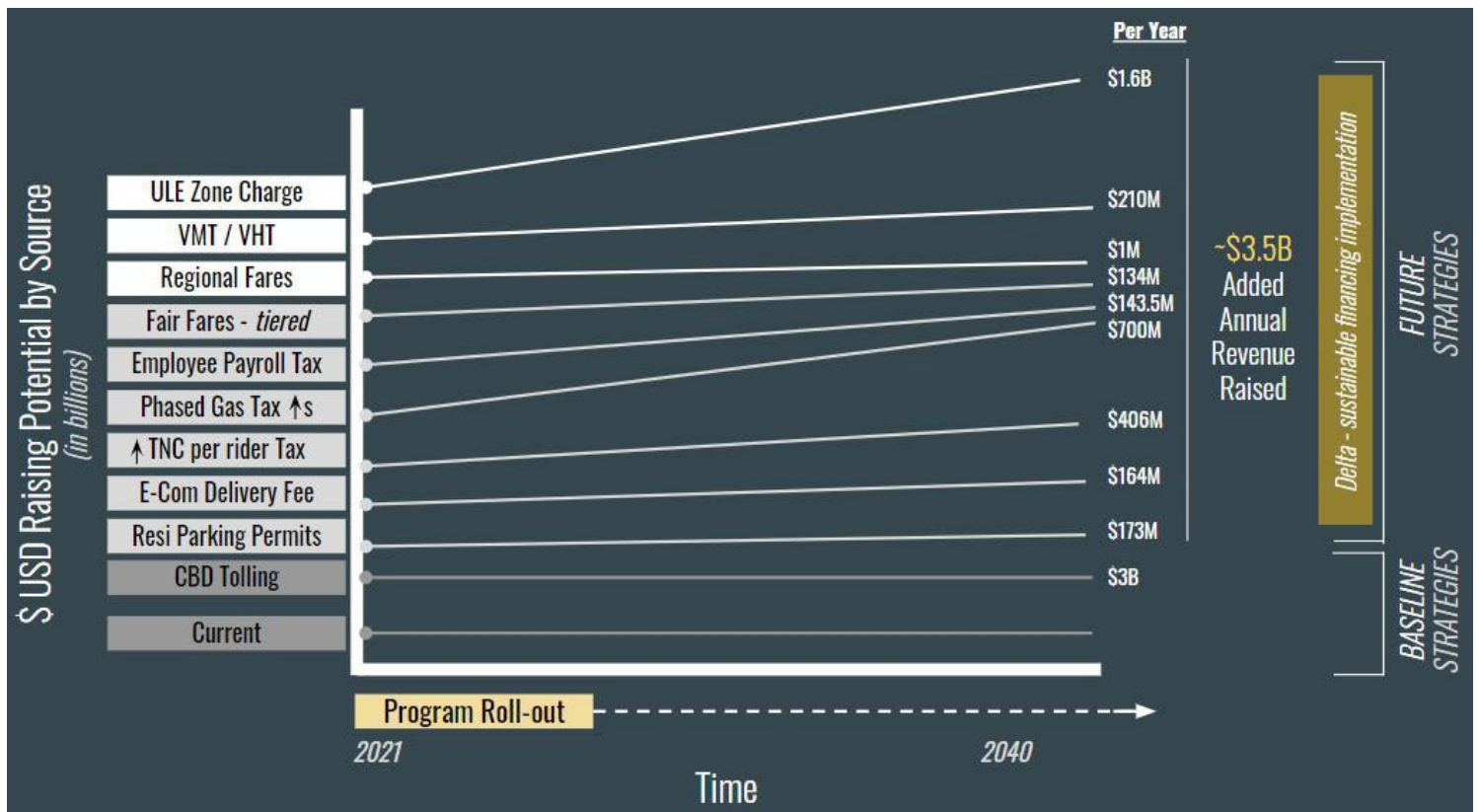


Figure 39 CBD Tolling should be part of a wider strategy for a fiscally sustainable MTA. By 2040, an Ultra-Low Emissions Zone charge could potentially earn an additional \$1.6B per year, on top of CBD Tolling's \$3B per year.

Identification of long-term financing strategies was beyond the scope of the studio's work. For this reason the studio did not conduct a comprehensive survey of alternative financing programs but has identified preliminary sources of short- and long-term funding for the MTA. As discussed earlier, congestion pricing provides the opportunity to collect additional fees by offering residential parking permits, while fees for shorter delivery windows and higher FHV fees should be considered both as funding sources and curbside management tools:

- Residential Parking Permits: The concept has remained of the table indefinitely for NYC. However, as previously noted, without parking protections neighborhoods including Brooklyn Heights, Fort Greene, Williamsburg, Long Island City, the Upper East Side, and the Upper West Side will likely be inundated with additional vehicles.⁹⁹ The City should

⁹⁹ "Subway Stations Data." NYC Open Data. Aug. 2019.

also consider permits that allow residents within the CBD to access of-street parking at a discount.

- E-Commerce Delivery Fees: As described in the curb management section, the convenience of on-demand deliveries is directly related to greater congestion problems, the City should explore a potential fee for same- and one-day delivery windows.
- FHV Congestion Fees: After a 90-percent increase in FHV trips from 2010 and 2018, given their outsized impact on congestion, the City might increase the current surcharge on FHV trips.¹⁰⁰ Long-term funding diversification should come through new or expanded taxes, fees, and regional tolls. Options include:
 - Metropolitan Commuter Transportation Mobility Tax.¹⁰¹ This regional payroll tax was enacted in 2009 to close a gap in the 2010-14 MTA Capital Plan. It currently taxes employers in the region 0.034 percent (just over 3/10 of one percent) of their payroll to support the MTA's activities. Even a modest increase in this tax could provide tens of billions of dollars to cover capital costs.
 - Vehicle Miles Traveled Fees: Gasoline taxes have not kept pace with rising transportation construction costs or fuel efficiency.¹⁰² Gas tax revenues are expected to decline as vehicles become more efficient and are replaced by electric vehicles. In the short-term, an increase in gas

¹⁰⁰ New York City Taxi and Limousine Commission. "Congestion Surcharge for Taxicab and For-Hire Vehicle Trips." Nov. 28, 2018. rules.cityofnewyork.us/content/congestion-surcharge-taxicab-and-hirevehicle-trips. Plitt, Amy and Valeria Ricciulli. "New York City's streets are 'more congested than ever': report." Curbed. Aug. 15, 2019. ny.curbed.com/2019/8/15/20807470/nyc-streets-dot-mobility-report-congestion.

¹⁰¹ NYS Department of Taxation and Finance, tax.ny.gov/bus/mctmt/default.htm

¹⁰² Thorndike, Joseph. "The Federal Gas Tax is Old - and Broken." Forbes. July 7, 2017. forbes.com/sites/taxanalysts/2017/06/07/the-federal-gas-tax-is-old-and-broken/#5f6121952171.

- taxes could be phased out and replaced by a “VMT” fee on drivers based on distance traveled.

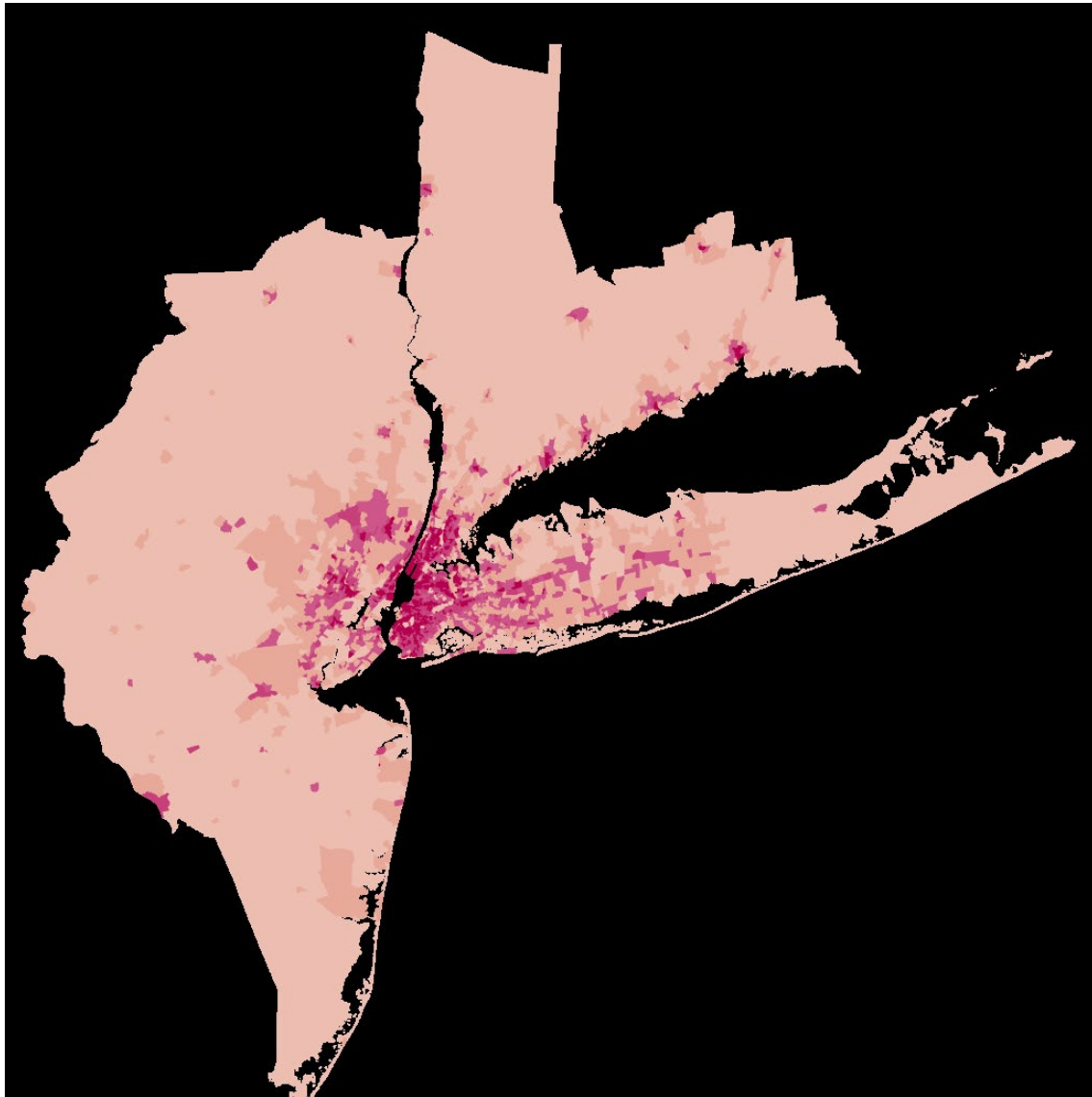


Figure 40 This map of the destination end of origin-destination pairs within the New York metropolitan region reveals that Brooklyn, Queens, the Bronx, and New Jersey are all attracting drivers. Therefore, it is important to consider the traffic that is driving through Manhattan in addition to the traffic that is driving to or from Manhattan.

- **Dynamic Road Pricing:** In the future, the congestion pricing program could be expanded beyond the CBD to other heavily congested areas of the city or region.¹⁰³ Instead of using a fat fee, the charge would more accurately reflect the degree of

¹⁰³ US Department of Transportation Federal Highway Administration. “Mileage-based User Fees (VMT).” Center for Innovative Finance Support. fhwa.dot.gov/ipd/tolling_and_pricing/study_reports/auto_use_costs.aspx.

congestion and time of day to discourage peak period use of the most congested roads. A study of Washington, DC found that a \$0.10-per-mile fee equated to a 14-percent mileage decline.¹⁰⁴ If applied to a large area or congested routes, this fee could generate tens of billions of dollars for the MTA capital program.

- Ultra-Low Emission Zone: The City or region could adopt its own version of London's ULEZ, which surcharges heavily polluting vehicles and will soon be expanded to cover all Greater London. Depending on the charge, a ULEZ zone in New York could direct billions of dollars towards the MTA, while also achieving a significant reduction in the most damaging pollutants.

In addition to pursuing new financing, the MTA should expand its efforts to reduce exorbitant infrastructure construction costs. The MTA pays a significant multiple cost in over peer cities, with tunneling and labor costs higher than in other global cities. Although cost control is complicated and multifaceted, the MTA could consider changes to permitting procedures, project design, procurement strategies, work practices, and external consultant hiring.

5.3. Broaden the Geographic Benefits with Dynamic Pricing

Outside the CBD, growing economic and residential hubs like Downtown Brooklyn and Long Island City are also facing increased traffic congestion. And if the cost of doing business in NYC increases, jobs may move elsewhere. Already three of every four jobs in the metropolitan region are located outside Manhattan.¹⁰⁵ Given current volumes of motor vehicle trips throughout the region, future population growth may require additional solutions for congestion well beyond the CBD. The efficacy of a static, cordon-based congestion charge has major geographic limitations.

Distance or time-based dynamic road pricing is a viable solution for anticipating future congestion. Dynamic road pricing is a mechanism for charging drivers in proportion to distance or time traveled. It more accurately reflects impacts of individual journeys using GPS, cloud computing,

¹⁰⁴ Puentes, Robert and Adie Tomer. "The Road...Less Traveled: An Analysis of Vehicle Miles Traveled Trends in the U.S.." Metropolitan Policy Program at Brookings. Dec. 2008. [brookings.edu/wp-content/uploads/2016/06/vehicle_miles_traveled_report.pdf](https://www.brookings.edu/wp-content/uploads/2016/06/vehicle_miles_traveled_report.pdf).

¹⁰⁵ 2017 ACS

smart phones, and other technologies. London, Stockholm, and Singapore are all considering adopting dynamic road pricing models. The UK Parliament Transport Committee also indicated it would start a conversation about national road pricing.¹⁰⁶ The independent research group Centre for London has also put forth a proposal for dynamic road pricing in London by the end of the 2020-24 mayoral term.¹⁰⁷ Beyond providing a new long-term revenue source, dynamic pricing would offer a congestion solution for the entire region. The MTA could plan for its own long-term performance by beginning discussions with other transit authorities and regional partners to consider establishing dynamic pricing across the region, perhaps in the medium-term.

In addition to having a greater geographic reach, dynamic road pricing would address excessive driving within the CBD. The surge in FHV and on-demand deliveries show no signs of slowing down. In fact, these factors have contributed to an increase in total vehicle miles traveled in London since the congestion charge.¹⁰⁸ The congestion charge will charge vehicles once daily without account for time spent cruising the CBD. Drivers may easily take advantage of the policy by remaining in the CBD and continuing to contribute to congestion. Dynamic pricing would impose a charge within the CBD for impacting traffic based on time of day and location and disincentivize driving in the CBD altogether.

5.4. Implementation and Institutional Responsibility

The MTA and DOT must work together to ensure the successful implementation of CBD Tolling. The adjacent page shows an implementation matrix that assigns responsibilities to the agencies for each recommendation outlined in this report.

Institutional barriers impede inter-agency collaboration. The MTA and DOT answer to different executives and rely on distinct funding streams. This political and geographic fragmentation impedes their ability to align priorities. They do not sit together within an umbrella agency or share another supervising entity and have little experience working together on mutually relevant issues.

¹⁰⁶ Centre for London. “Next Generational Road Pricing.” July-April 2018. centreforlondon.org/project/road-user-charging-london/.

¹⁰⁷ Ibid.

¹⁰⁸ De Cani, Richard.

Additional difficulties result from the lack of coordination among multiple state jurisdictions comprising the metropolitan region.

Together the MTA and DOT must build institutional capacity to drive coordinated, comprehensive transportation policy and investment. London has benefited from the creation of TfL as a regional agency with broad power devolution granted by the national government. TfL's ability to bring all of London's transit services together allows for more effective coordination and planning. Madrid and Paris have achieved similar results by creating systems to organize disparate institutions without requiring total operational integration. In the meantime, the MTA and DOT must make a concerted effort to communicate regularly, and the earlier suggestion to co-locate related divisions would facilitate their collaboration.



Figure 41 For this report's strategy to be successful, the MTA and NYCDOT need to work together to implement the plan. A balance between near- and long-term solutions and a financially sustainable model are integral. Public engagement, climate policy, funding streams, and dynamic pricing all will be possible with cooperation between the two agencies.

Chapter 6. Conclusion

The CBD Tolling Program offers an enormous opportunity for New York that extends beyond raising funds and curbing Manhattan's farce congestion. It also represents a chance to increase equity by offering greater transit access and new public spaces, among other benefits. With cities across the US eagerly watching, New York can lead the way forward for American transportation policy.

The primary program goal is to raise \$1 billion in annual revenue for subway and commuter rail improvements. This report outlines additional recommendations for New York to achieve a broader set of outcomes, including opportunities to reclaim road space for buses, bicyclists, and pedestrians; provide visible public realm improvements; and further reduce congestion through curbside management.

Experiences in other cities demonstrates that achieving these goals will require seamless rollout and effective communications to build support. Public buy-in will depend in part on the agencies' ability to produce visible and tangible benefits associated with revenue raised. Creating metrics, regularly tracking program performance, and reporting results are essential to sustaining public trust. While the program's success may catalyze future investment, its failure could seriously constrain future transportation policy efforts in New York and elsewhere.

New York's future relies not only on the program's success, but also its ability to facilitate wider change. The CBD Tolling Program must therefore be designed with the flexibility necessary to evolve into a broader road pricing and emissions reduction program. The metropolitan region faces complex challenges that cannot be solved by congestion pricing alone, and it must move away from a dependence on cars in favor of more sustainable transportation choices. A time- and/ or distance-based road pricing and emissions reduction program could play an important role in achieving critical climate and mobility goals. The MTA also needs a sustainable, long-range financing strategy to underpin the region's success for decades to come. Policymakers and stakeholders should continue to pursue all these issues moving forward. The MTA and DOT must

balance future needs against the very real demands of the present program to deliver the sustainable transportation future that New Yorkers need and deserve.

Summary of objectives and recommendations

Objectives

Foundational: raise money and reduce congestion

Critical: enhance mobility and access, and reclaim space for people

Enduring: meet climate change targets and ensure sustainable funding

Near-Term Recommendations

Increase transit and bike share

Manage delivery vehicle traffic and curb use

Extend the public realm

Shift mode distribution away from cars

Engage the public

Set performance goals

Long-Term Recommendations

Incorporate transportation in climate policy

Build a sustainable transportation funding model

Implement dynamic pricing

Implement institutional reform

