Economic impacts of the Metropolitan Transportation Authority's 2020-2024 Capital Investment Strategy

Prepared for The Partnership for New York City (PFNYC)

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1 Introduction and key findings

This study examines the potential economic impacts of the Metropolitan Transportation Authority's (MTA) preliminary 2020-2024 Capital Investment Strategy on New York State (NYS) and its 10 economic regions.

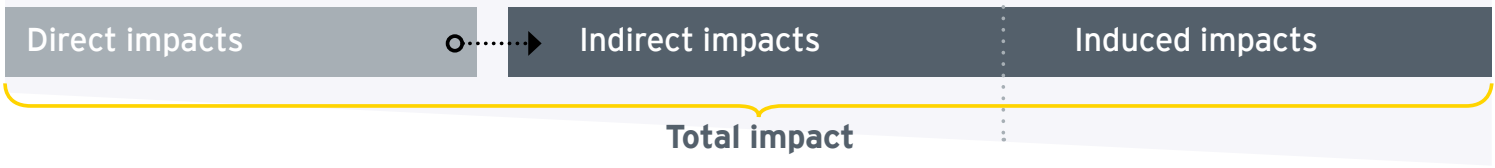
The MTA's preliminary and estimated $44 billion capital expenditure would be projected to generate $62 billion of statewide economic output over 5 years and support an average of 57,400 jobs during that period.

The scope of our analysis includes estimating potential impacts on employment, income, gross domestic product (GDP), and economic output supported through the following economic effects:

Direct impacts of MTA labor and capital spending and purchases from NYS vendors,

Indirect impacts supported through the MTA and vendor supply chain, and

Induced impacts related to household spending derived from direct and indirect employee labor income.



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Economic impacts of the MTA's 2020-2024 Capital Investment Strategy

The Partnership for New York City (PFNYC) engaged Ernst & Young Infrastructure Advisors, LLC[1] (EY) to prepare an analysis of the potential economic impacts of the Metropolitan Transportation Authority's (MTA) preliminary 2020-2024 Capital Investment Strategy, on New York State (NYS) and its regions.[2]

This analysis does not quantify any potential positive or negative externalities, such as those arising from changes in transit service or reliability, as a result of the MTA 2020-2024 Capital Investment Strategy, that may be quantified as part of a benefit-cost analysis.

89%

Share of spend sourced or performed in NYS

$62b Total economic output
$39b Direct economic output

$25b Total labor income
$16b Direct labor income

$33b Total GDP (value added)
$19b Direct GDP

Source: EY analysis based on data provided by MTA management and the IMPLAN input-output economic model of New York.

286,800
Worker years (direct, indirect, and induced jobs lasting one year each)

161,400
Direct worker years

$102,000
Direct labor income per worker

57,400
Avg number of total jobs per year

32,300
Avg number of direct jobs per year

1.8x
Employment multiplier (total jobs per direct job)

7,300
Total jobs (direct, indirect, and induced) per $1 billion direct NYS spend

The MTA's Capital Plan will generate economic value for the nine New York regions outside of NYC including:

$6.67b
of value added for regions outside NYC

Nearly 1 in 4
jobs to occur outside NYC

1 Ernst & Young Infrastructure Advisors, LLC is a member firm of the EY global organization.
2 This report summarizes the analysis approach and estimated results aligned to this scope, conducted by EY's Quantitative Economics and Statistics (QUEST) and Valuation, Modeling, and Economics practices.

2 Capital Investment Strategy overview

The MTA operates the largest transportation network in North America – averaging 2.6 billion riders annually across its subway, bus, and commuter rail systems. The MTA network serves one-third of all mass transit users in the United States and two-thirds of all US commuter rail passengers.

Background to the MTA

New York City Transit (NYCT) and MTA Bus Company provide bus and subway service within New York City. MTA Staten Island Railway provides train service on Staten Island. Together, NYCT, MTA Bus, and Staten Island Railway carry an average of over 8.1 million weekday riders on 27 Subway lines, 317 bus routes, and one commuter rail line. The Long Island Rail Road (LIRR) has an average weekly ridership of more than 350,000 passengers and is the busiest commuter railroad in North America.[1] The Metro-North Railroad (MNR) has 123 stations on its five active lines, and has an average weekly ridership of 300,000 passengers.[2] MTA Bridges and Tunnels (B&T) operates seven toll bridges and two tunnels in New York City, and carries more than 300 million vehicles annually.[3]

The investment need

The MTA regularly prepares a Twenty-Year Needs Assessment (TYN) after completing a system-wide inventory and condition assessment to determine State of Good Repair (SGR) needs and reviewing changes in regional travel patterns, demographics, and economic trends. This effort considers the addition, replacement, and/or removal of assets through the latest Capital Investment Strategy, while gathering key information for assets such as location, quantity, age, and useful life. The TYN proposes long-term investment strategies to address these findings.

In its prior TYN (2015-2034), the MTA found that NYCT ridership had reached its highest level since 1950 – 1.65 billion trips annually.[4] The MTA attributed this increased usage to historical investments focused on reducing delays and improving subway reliability. The MTA's investments in major capital projects such as Second Avenue Subway, East Side Access (ESA), Third Track, Penn Station Access and ongoing station accessibility improvements are intended to address capacity limitations of the existing system and further increase ridership.

Since 2015 the MTA is responsible for the awarding of $1 billion in Capital Projects to NYS certified Minority and Women-owned Business Enterprises (MWBEs). In addition during New York State Fiscal Year 2017/18, the MTA was ranked number one within New York State in dollars paid to NYS-certified MWBEs.[5]

As part of the TYN, each MTA agency identifies investment levels required in each of four 5-year periods as part of the overall long-term strategy for asset restoration, replacement, and modernization.

This analysis estimates the potential economic impacts related to MTA's Capital Investment Strategy for the first five years (2020-2024) of the 2020-2039 TYN.

The Capital Investment Strategy for 2020-2024 outlined in this report uses an estimate that reflects the lower end of the MTA's potential capital investment. This is a conservative estimate, from which the economic impact results are derived. The agency allocations were assumed to be approximately proportional to the agency allocations in the current MTA Capital Program. The final 2020-2024 Capital Plan and specific allocations will be subject to the MTA Capital Planning process and legislative approval.

1 American Public Transportation Association. Public Transportation Ridership Report: Fourth Quarter 2016. PDF file. https://www.apta.com/resources/statistics/Documents/Ridership/2016-q4-ridership-APTA.pdf

2 Metropolitan Transportation Authority. "The MTA Network: Public Transportation for the New York Region." mta.info. http://web.mta.info/mta/network.htm

3 Ibid.

4 Metropolitan Transportation Authority. Twenty-Year Capital Needs Assessment 2015-2034. PDF file. October 2013. http://web.mta.info/mta/capital/pdf/TYN2015-2034.pdf.

5 Metropolitan Transportation Authority management

3 Estimated economic impacts

The MTA Capital Investment Strategy will result in on-site construction and engineering services, as well as purchases of New York-manufactured equipment. This activity will support jobs, incomes, and business sales throughout NYS.

Based on the analysis of past spending distributions, historic vendor locations, and vendor survey results, the estimated overall in-state spending associated with the plan is $39.3 billion – **89% of planned expenditures.**

Statewide results

Table 1 shows the estimated statewide economic impacts of the 2020-2024 Capital Investment Strategy from the 2020-2039 TYN over the five-year investment period. Based on data provided by MTA management and historical industry-level data in the IMPLAN economic model, the analysis estimated that MTA's $39.3 billion of spending with NYS vendors would support an average of 32,300 direct jobs per year – or one direct job for every $244,000 of spending (direct economic output per worker). Over five years, the capital program will require 161,400 direct worker years. These employees will earn an average of more than $100,000 each in annual total labor income (wages and benefits) – totaling $16.4 billion of direct labor income over five years.

Direct spending includes $12.7 billion of capitalized construction services and materials for work performed by the MTA. Based on average payroll data provided by MTA management, this spending will require an average of nearly 7,000 direct jobs per year. This is included in the overall direct impact reported in Table 1.

Indirect and induced economic impacts will be supported throughout NY as MTA's vendors purchase additional business inputs to meet MTA's demand and as employees spend their incomes at businesses in their local communities. In total, the MTA Capital Investment Strategy will support 286,800 worker years over five years and produce $62 billion in total economic output (approximately business sales) in New York. Of the total economic output impact, $34.1 billion will be New York GDP (value added), including $25.4 billion of employee labor income. For every $1 billion of direct spending, the Capital Investment Strategy will support nearly 7,300 New York jobs through the direct, indirect, or induced economic effects.

To the extent that the MTA Capital Investment Strategy budget may be scaled up or down, retaining the same mix of investment activity by asset category, the corresponding impacts could be scaled to approximate the related impacts.

89%

Estimated in-state planned expenditures

Table 1. Statewide economic impacts related to MTA's 2020-2024 Capital Investment Strategy from the 2020-2039 TYN

Billions of nominal dollars; Total number of full- and part-time jobs

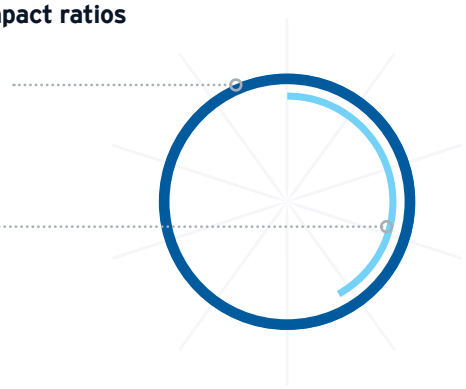
Statewide impacts	Direct impacts	Indirect & induced	Total, Statewide
Average employment	32,300	25,100	57,400
Worker years (5-year total)	161,400	125,400	286,800
Labor income (5-year total)	$16.39	$8.97	$25.36
GDP (5-year total)	$19.42	$14.70	$34.13
Economic output (5-year total)	$39.31	$22.64	$61.95

Note: Figures may not appear to sum due to rounding.
Source: EY analysis based on data provided by MTA management and the IMPLAN input-output economic model of New York.

Figure 2. Statewide impact ratios

$244,000
Direct economic output per worker

42%
$102,000
Direct labor income per worker



7,300
Total jobs (direct, indirect, and induced) per $1 billion direct NYS spend

1.8x
Employment multiplier (total jobs per direct job)

Source: EY analysis based on data provided by MTA management and the IMPLAN input-output economic model of New York.

Regional results

The Capital Investment Strategy will support direct, indirect, and induced jobs throughout the state reflecting vendor facility locations and supply chain networks.

The analysis estimated the potential economic impacts on the state's 10 economic development regions.[1]

The majority of the direct impacts are supported in the NYC, Long Island, and Hudson Valley regions – primarily reflecting the location of construction and maintenance services performed on-site.

22%

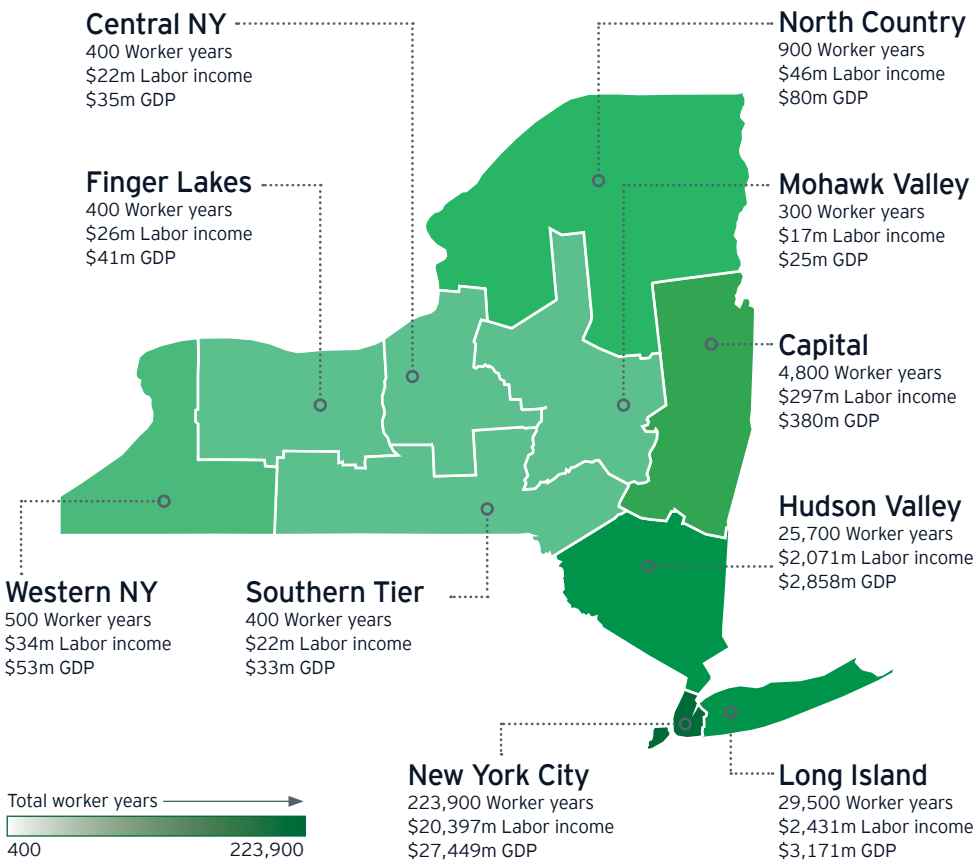
Nearly 1 in 4 jobs estimated to occur outside of New York City

Additional impacts from new vendor facilities

As part of the vendor survey, key MTA vendors were asked if they had established new production facilities in New York as a result of MTA contracts. Of the surveyed companies, seven indicated that they had relocated or opened new facilities within the state to meet MTA demand. Of these, four vendors responded that the facility maintained additional production capacity beyond that used for servicing MTA contracts – one located in Westchester County, two in Clinton County, and one in NYC. The average additional capacity across these vendors was 50% – with one vendor in NYC responding that only 7% of facility capacity was used to serve MTA contracts. This additional production capacity in the state of New York generates additional economic impacts – both in terms of direct jobs at these facilities and additional supply chain impacts – not captured within the scope of this study. Based on historical spending with these vendors, this reported additional capacity could total more than $700 million in additional New York business sales annually by these companies that may otherwise not have located in the state.

Figure 3. Total statewide economic impacts related to MTA's 2020-2024 Capital Investment Strategy from the 2020-2039 TYN

Total number of worker years by work location; Millions of nominal dollars



1 This analysis uses the 2018 Labor Market Regions (LMRs) as defined by the New York State Department of Labor. https://labor.ny.gov/stats/lsgeog.shtm

The five boroughs of New York will capture $31.4 billion of the direct Capital Investment Strategy spend (80% of estimated in-state expenditures) – supporting approximately 132,700 direct worker years and an average of 26,500 direct jobs per year over the five-year investment period. Including indirect and induced effects supported within the region and captured as a result of direct spending in other regions, the NYC job impact will total 223,900 worker years (44,780 average jobs) from 2020-2024.

Long Island has the next largest total job impact, with 29,500 total worker years over five years, as well as $3.0 billion of direct spending and $5.5 billion in total economic output. The largest category of spending in Long Island is $2.5 billion of construction spending, related to LIRR improvements of passenger stations and track infrastructure.

The Hudson Valley Region has the second-highest level of direct spending at $4.2 billion. This region is home to the Kawasaki Plant in Yonkers (Westchester County), a major equipment supplier to the MTA. In total, spending in the Hudson Valley Region is estimated to support approximately 25,700 worker years (5,200 average jobs per year).

Significant direct impacts are also supported in the Capital region from an estimated $300 million of direct spending on engineering, design, and related services.

Table 2. Estimated economic impacts, MTA's 2020-2024 Capital Investment Strategy from the 2020-2039 TYN, by development region

Total number of worker years by work location; Billions of nominal dollars

	Worker years 5-year total	Labor income 5-year total	GDP 5-year total	Economic output 5-year total
Region	**Total impact**	**Total impact**	**Total impact**	**Total impact**
Capital	4,800	$0.30	$0.38	$0.70
Central New York	400	0.02	0.04	0.08
Finger Lakes	400	0.03	0.04	0.09
Hudson Valley	25,700	2.07	2.86	6.54
Long Island	29,500	2.43	3.17	5.45
Mohawk Valley	300	0.02	0.02	0.07
New York City	223,900	20.40	27.45	48.33
North Country	900	0.05	0.08	0.46
Southern Tier	400	0.02	0.03	0.10
Western NY	500	0.03	0.05	0.13
New York	**286,800**	**$25.36**	**$34.13**	**$61.95**
Multipliers	**1.8**	**1.6**	**1.8**	**1.6**

Note: Figures may not appear to sum due to rounding.
Source: EY analysis based on information provided by MTA management and the county-level IMPLAN input-output economic models of New York.

MTA agency results

The analysis estimated the impacts separately by MTA agency, based on the proportional agency allocation in the current MTA Capital Program. The distribution of direct New York spending by agency was estimated based on information provided in the current Capital Investment Strategy and historical procurement by asset category and vendor. NYCT accounts for the highest share of the overall budget, with 88% estimated to occur in-state. In general, agencies with a higher proportion of spending attributed to construction have a higher share of spending sourced or performed in NYS.

Table 4 shows how this direct NYS spending translates to direct job requirements, by agency, and the related indirect and induced job impacts. The values shown in this table are the total number of worker years over the five-year plan. Spending by NYCT is estimated to require 96,300 direct worker years in New York State, or 19,300 average jobs per year, earning on average over $100,000 per year. NYCT accounts for 60% of the total employment impact in the state and will support 170,800 total direct, indirect, and induced worker years over the five-year investment period. Spending by LIRR has the highest estimated employment multiplier – supporting nearly 2 total jobs (1 direct + 1 indirect & induced) for every direct job. This is driven by purchases of more capital-intensive inputs such as rolling stock ($300m) and a higher level of average labor income per worker ($120,000), which drives increased induced effects.

Table 3. 2020-2024 Capital Investment Strategy from the 2020-2039 TYN direct capital spend, by MTA agency
Billions of nominal dollars

MTA agency	Share sourced or performed in NYS
NYCT, SIRTOA, and MTA Bus	87%
New York City Transit (NYCT)	88%
Staten Island Railway (SIRTOA)	97%
MTA Bus	61%
Long Island Rail Road (LIRR)	91%
Metro-North Railroad (MNR)	90%
MTA Capital Construction (MTACC)	96%
MTA Bridges & Tunnels (B&T)	99%
Total, 2020-2024	89%

Note: Figures may not appear to sum due to rounding. Source: EY analysis based on information provided by MTA management on planned expenditures, by agency and asset category and historical expenditures by agency, asset category, and vendor.

Table 4. Direct employment impact, by MTA agency, 2020-2024
Number of worker years, 5-year total

MTA agency	Direct impacts	Indirect & induced impacts	Total impacts
NYCT, SIRTOA, and MTA Bus	99,800	77,200	177,000
New York City Transit (NYCT)	96,300	74,500	170,800
Staten Island Railway (SIRTOA)	1,800	1,300	3,100
MTA Bus	1,700	1,400	3,100
Long Island Rail Road (LIRR)	15,100	15,100	30,200
Metro-North Railroad (MNR)	13,700	10,900	24,600
MTA Capital Construction (MTACC)	16,600	13,700	30,300
MTA Bridges & Tunnels (B&T)	16,100	8,500	24,600
Total, 2020-2024	161,400	125,400	286,800

Note: Figures may not appear to sum due to rounding. Source: EY analysis based on information provided by MTA management and the county-level IMPLAN input-output economic models of New York.

Appendix:

Technical description of data and limitations

Technical details on study methodology

The estimated economic impacts presented in this study are based on information regarding MTA's investments and operations provided by MTA management or estimated by EY. The state and regional economic contributions related to this activity were estimated using the county-level IMPLAN I-O economic models, which describe relationships between businesses, households, and governments within each region and throughout the state of New York. This model follows financial flows as purchases of local goods by companies and employees support sales, jobs, and labor income. IMPLAN is used by the public sector, as well as private-sector businesses and other researchers and is based on widely accepted methodology for estimating these types of economic linkages.

The magnitude of each economic effect is described in terms of an economic multiplier. The multipliers in the IMPLAN model are based on the Leontief matrix, which estimates the total economic requirements for every unit of direct output in a given industry using detailed inter-industry relationships documented in the input-output model. The input-output framework connects commodity supply from one industry to commodity demand by another. The multipliers estimated using this approach capture all of the backward linkages related to an industry's production by attaching technical coefficients to expenditures. These output coefficients (dollars of demand) are then translated into dollars of GDP, labor income, and number of employees based on industry averages. A static I-O model is based on observed historical relationships, and therefore does not account for supply-side constraints, price changes, labor-capital substitution, or other market dynamics.

The three types of effects estimated by the IMPLAN model — direct, indirect, and induced effects — describe the nature of the economic "ripple" effects generated by the MTA Capital Investment Strategy in the state economy.

- **Direct effects** include jobs at construction contractors and equipment manufacturers in NYS as direct result of MTA expenditures (MTA suppliers and vendors, including in-house capitalized labor). For example, MTA's purchase of construction services from a NY vendor would support direct construction employment.
- **Indirect (supply chain) economic effects** are the result of purchases by MTA's vendors from its in-state suppliers and the subsequent rounds of supplier purchases in the state economy (NY supply chain). For example, the construction services supplier must purchase concrete to be used in the construction process from a supplier. This supplier, in-turn, must purchase gravel, sand, and water from suppliers to produce concrete.
- **Induced (employee spending) economic contributions** are related to employee household spending. Employees in the direct and indirect economic impact use a portion of their incomes to purchase goods and services from local businesses. These transactions support employment at businesses such as retailers, restaurants, and service companies.

To model the economic contributions related to MTA's diverse business activities, EY assigned each capital expenditure to a specific industry within the IMPLAN economic model. By using separate industries, EY is better able to reflect the different types of supplier purchases (operating inputs) required by MTA and its contractors. Industries were assigned based on historical MTA capital spending, by project and task.

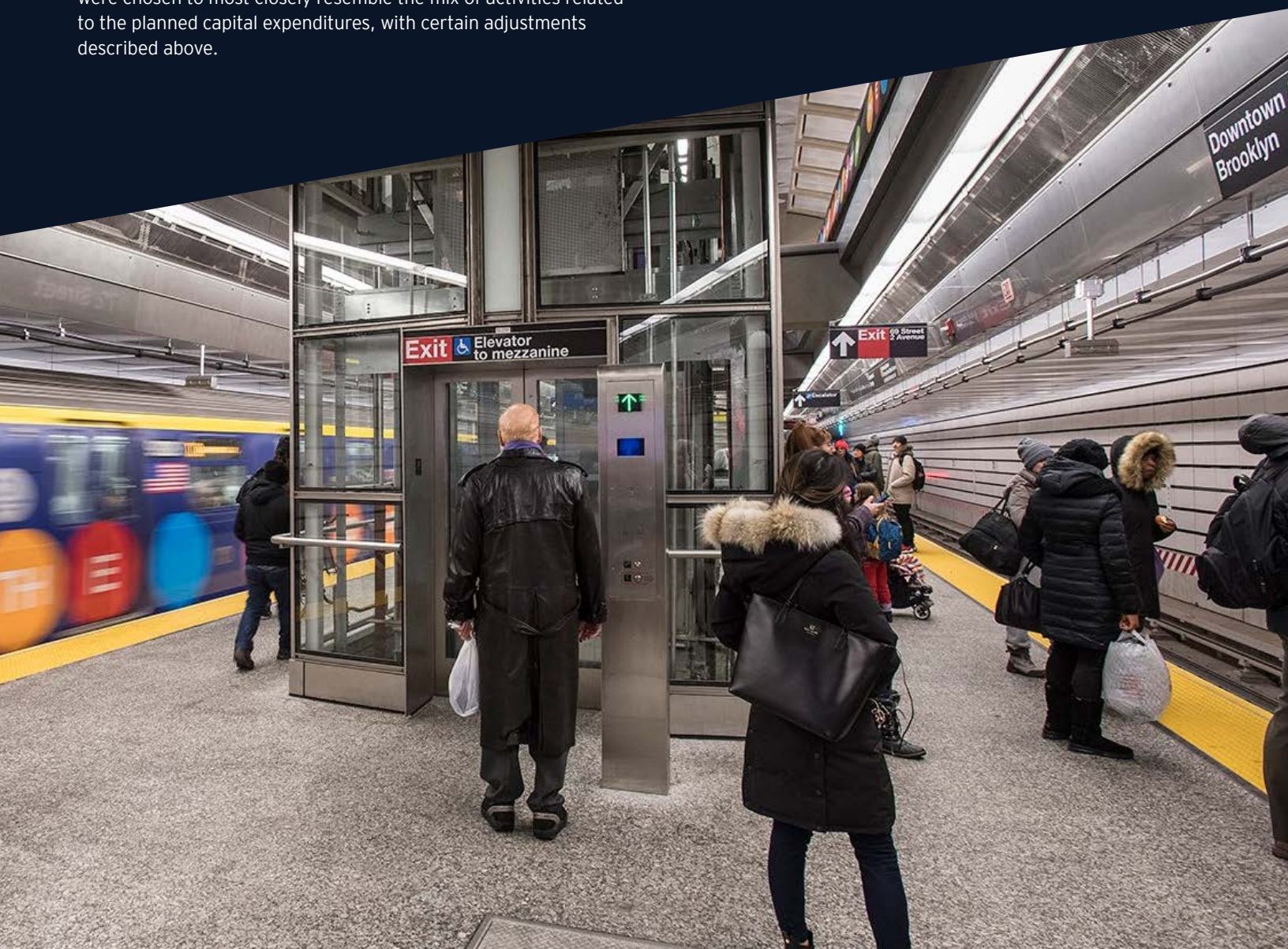
Indirect and induced effects are driven by (1) purchases of business inputs; (2) the percentage of each type of commodity that is purchased from within each region; and (3) household consumption profiles for employees (purchases of household inputs).

County models were aggregated into 10 economic regions. Results were estimated using a Multi-Regional Input-Output (MRIO) approach, which captures the inter-region trade flows and allows direct impacts in one region to support indirect and induced effects in another. In the subsequent rounds of indirect contribution, supplier purchases are higher for each round of contributions in the linked regional models due to the capture of purchases between and among regions. In the individual region models, once a purchase has left the region, it does not create additional contributions. For example, by using the MRIO approach, the model captures purchases by a company in New York City from a company in Long Island (first round indirect effects), and the subsequent purchases of additional business inputs by the Long Island supplier from businesses in New York City or other regions (additional rounds of indirect effects).

Study limitations

The reader should be aware of the following model limitations and assumptions when interpreting the results:

- The potential economic impacts presented in this study (including employment and labor income) reflect the work location. These are jobs that will be based in a given state and could be filled by residents or non-residents.
- The indirect and induced economic contributions are estimated using a static input-output economic model reflecting historical purchasing relationships.
- Indirect economic impacts were estimated based on relationships in the IMPLAN input-output model, which describe the mix of locally supplied goods and services, by industry, based on historical purchasing relationships. The IMPLAN industry models were chosen to most closely resemble the mix of activities related to the planned capital expenditures, with certain adjustments described above.
- The economic impacts presented in this report quantify the economic activity supported by MTA's investments and purchases. In some cases, the indirect and induced jobs may not be new to the state, but are temporarily supported by MTA's expenditures.
- This analysis does not quantify any potential positive or negative externalities as a result of the MTA 2020-2024 Investment Strategy from the 2020-2039 TYN that may be quantified as part of a benefit-cost analysis.



Data sources and modeling approach

This section details the steps taken to identify and develop inputs necessary for the effective application of the IMPLAN model to the MTA's 2020-2024 Capital Investment Strategy from the 2020-2039 TYN. In some cases, assumptions were necessary regarding model inputs, and the reasoning for those assumptions is included herein.

Historical spending

The MTA provided the estimated budget allocated to each asset category for the five-year period 2020-2024 and details of MTA's historical capital spending from 2010 through 2019. A key component of developing the IMPLAN inputs is identifying the share of the Capital Investment Strategy allocated to different supplier and industry sub-sectors. To inform the share of the budget allocated to different suppliers and industries, MTA provided a list of prime vendors and project-related task expenditures from the 2010-2014 and 2015-2019 capital plans as a basis for future procurement activity. Historical spending by sub-asset category was used as a basis to estimate the spending detail within the asset categories for 2020-2024, given that the latter is still being determined.

The historical spending was also used to estimate the share of goods and services that would potentially be sourced from within New York State, based on historical vendor spend. The analysis allocated total spending by MTA agency and broad asset category to detailed spending categories based on historical project and task-level expenditures. The analysis then used historical detail on vendor billing addresses to allocate detailed spending to NYS regions and other states.

Vendor surveys

MTA identified the top 50 vendors associated with the 2010-2014 and 2015-2019 capital plans. These 50 vendors covered 77% of the MTA's capital spending incurred in the 2010-2019 period. A vendor survey was designed to obtain additional information about the labor/capital split at these vendors, materials sourcing, as well as the use and location of subcontractors to deliver on MTA contracts.

Based on our analysis of the survey responses, adjustments to the New York State share of spending were made to account for the proportion of the contract value that would be sourced to prime or sub-contractors in New York. EY calculated the overall share of the contract value that was performed by NYS companies, looking through the prime contract (i.e. accounting for the prime vs. sub-contracted value and location).

The survey was further used to validate the model's key impact multipliers, as well as assumptions related to the construction sector employment and material sourcing. In general, the analysis determined that MTA's contractors aligned with model-predicted labor-capital split and materials sourcing.

Spending associated with the Capital Investment Strategy includes goods and services from across a number of different industries. The largest proportion of spending is in the construction sector (60%), with $26.9 billion of planned expenditures. Based on vendor surveys and the nature of construction projects, which must take place in a specified location, this analysis assumes that 100% of all spending for construction takes place in New York State. This is unlike manufactured products and capitalized services which can be performed remotely. For these capital expenditure categories, the vendor's location, as well as estimates of subcontracted work derived from the vendor survey, were used to estimate the location where the work was performed.

Data analysis and assumptions

This section outlines the steps and guidance received from the MTA in using its data to develop the IMPLAN inputs.

1

Project descriptions in the 2010-2014 and 2015-2019 MTA capital plans were used to assign North American Industry Classification System (NAICS) codes to each project.

2

Within each asset category, the share of expenditure incurred in a particular NAICS code and county was calculated based on historical data on MTA vendors. In-state and out-of-state suppliers were identified based on billing address for MTA prime contractors in the 2010-2014 and 2015-2019 capital plans. The scope of this study was limited to NYS impacts.

3

To identify which region within NYS the economic activity occurred, billing address zip code information for in-state vendors was mapped to specific counties, using the zip code to county crosswalk on the website of the U.S. Department of Housing and Urban Development's (HUD's) Office of Policy Development and Research (PD&R). [1]

1 See https://www.huduser.gov/portal/datasets/usps_crosswalk.html.

4

Once the share of expenditure within each asset category was calculated for NAICS codes and counties, averages of the 2010-2014 and 2015-2019 shares were taken to calculate the historical average distribution of spending across each Agency-Asset-NAICS-County combination. This distribution was then applied to the 2020-2024 Capital Investment Strategy from the 2020-2039 TYN to estimate the NAICS and county shares within each Agency-Asset spending line item.

5

For the spending mapped to IMPLAN constructions sectors (IMPLAN industries 58 and 62) 100% of spending was placed in the region in which the construction project is expected to take place. As construction project locations are predetermined and can only take place on-location the impacts of these projects are also likely to take place in the general vicinity of the project location. As a result, while some construction contractors may be headquartered elsewhere, the impacts of the MTA spending are more accurately attributed to the project location. For this reason 100% of MTA construction spending is mapped to project location.

6

Further adjustments to the mapping of in-state spending were made based on information gathered in the vendor survey. Based on our analysis of the survey responses, three adjustments to the New York State share of spending were made to account for the share of contract value that would be sourced to prime or sub-contractors in New York. EY calculated the overall share of contract value that was performed by NYS companies, looking through the prime contract (i.e. accounting for the prime vs. sub-contracted value and location).

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