# Annual Performance Metrics Report

## Calendar Year 2022

## Metropolitan Transportation Authority

Contents

# Context

The Metropolitan Transportation Authority (MTA) relies on performance measurement and benchmarking to help assess how effectively it is achieving its overall mission of providing safe, reliable, efficient public transportation services. Benchmarking allows the MTA to compare its performance to those of peer agencies and determine whether new industry best practices might be emerging that could help improve its operations and cost structure.

Public performance measurement and benchmarking are cornerstones of the MTA's commitment to transparency, in keeping with its public mission. A wide array of performance metrics are publicly reported on the MTA's website, Open Data portal, and social media channels, as well as during its public meetings. These and other metrics are also submitted to government oversight agencies such as the Federal Transit Administration (FTA) for inclusion in the National Transit Database (NTD).

This report, which fulfills the MTA's obligation under Public Authorities Law (PAL), Section 1276, is another key component of that public reporting. By comparing New York City Transit's (NYCT) and MTA railroads' (Long Island Rail Road and Metro-North Railroad, collectively "railroads") performance to peer agencies, the MTA demonstrates its dedication to continuous improvement. While some ridership trends and cost drivers are influenced by broader national and regional economic and demographic factors and are therefore beyond the control of a single transit operating agency, others - described in this report – can be and are actively managed.

# Summary findings on 2022 performance

## NYCT summary

- NYCT is more efficient than domestic peers as measured by operating cost per passenger and average operating cost per revenue vehicle mile. Moreover, the MTA improved its cost per unlinked trip by 22% over 2021.
- After controlling for the US's unique labor market conditions of employers paying fully for healthcare and pension contributions, NYCT operating expenses are better than the average of global peers in average cost per revenue vehicle mile, and 15% more expensive to the average of global peers on cost per passenger
- Maintenance costs are relatively high by comparison to domestic and international peers, which is primarily attributable to facility and infrastructure maintenance costs incurred due to the age and complexity of our system. Additional focus is being applied to improve the efficacy and productivity of our maintenance activities.
- Additional areas of opportunity receiving focus in 2023 include: on-time performance, mean distance between failure, and staff days lost to accidents

## MTA Railroads summary:

- Both railroads are less expensive than domestic peers on an operating cost per passenger basis. When looking at operating cost per vehicle mile, MNR is at parity with its domestic peers, while LIRR is about 16% more expensive.
    - Labor rates are a key cost driver, linked to existing labor agreements: LIRR has more expensive hourly wages than domestic peers, explaining roughly half of per-trip cost difference to typical domestic peer

- Relevant international comparisons are limited, but both RRs exceed the operating costs benchmarked by ~50% per revenue vehicle mile and by >70% per passenger journey
    - Crucially, both MNR and LIRR are forced by US's comparatively high wages and employer healthcare contributions to pay more for labor than international peers; accounting for this would reduce MTA railroad operating costs by 20-30%
- Maintenance costs are broadly more expensive than domestic and international peers, even after accounting for labor wage/benefit differences above. Reducing the gap on maintenance and vehicle metrics is a focus of 2024 savings plans.
- Operational metrics lead peers; compared domestically and internationally, MTA railroad passengers can count on more on-time trains and fewer mechanical breakdowns when riding the rails
- Safety opportunities remain to further protect MTA employees. This is especially true for LIRR, which lags peers in injuries and staff availability

# New York City Transit: Subways

## Background

**International peers**

To compare New York City Transit's (NYCT) performance to its international peers, this report uses data collected by the Community of Metros (COMET), an international benchmarking group owned and steered by its members and led by the Transport Strategy Centre at Imperial College London. COMET, of which NYCT is a member, is composed of large and medium size metros and provides NYCT with a network to share experiences, identify best practices and learn from other agencies in a confidential environment. COMET collects annual performance indicators and publishes case studies on key challenges facing the members to support decision making and establish best practices. NYCT is also a member of IBBG (International Bus Benchmarking Group), also managed by the Transport Strategy Centre at Imperial College.

All COMET activities are carried out within a framework of confidentiality, to ensure open and honest information exchange among the member metros. Any information that is released externally is therefore anonymized. The international metros included in the comparison are:

- Barcelona TMB
- Bangalore Namma Metro
- Bangkok MRT
  Beijing MRT
- Berlin U-Bahn
  Brussels STIB
- Buenos Aires Emova
- Delhi DMRC
- Dubai RTA
- Guangzhou Metro
- Hong Kong MTR
- Istanbul Metro
- Jakarta MRT
- Kuala Lumpur SPNB
- Lisbon Metro
- London Underground
- Madrid Metro
- Mexico City STC
- Montreal STM
- Nanjing Metro
- Newcastle Tyne and Wear Metro
- New York City Transit
- Oslo Sporveien
- Ottawa OC Transpo
- Paris Metro
- Paris RER
- Metro Rio
- Santiago Metro
- Sao Paulo Metro
- Seoul Metro
- Shanghai Metro
- Shenzhen Metro

- Singapore SMRT
- Sydney Metro
- Sydney Trains
- Taipei TRTC
- Tokyo Metro
- Toronto TTC
- Vancouver SkyTrain

To align with the confidentiality framework, the charts developed for this report have been anonymized and absolute values for these metrics are not reported. Each chart is indexed to an average value for the relevant period (i.e., 2019, 2021, 2022) and each metro is represented by a letter. To maintain the anonymization, the lettering is unique to each chart. The most recent year for which comparable data is available is 2022, so only metros with data for 2022 in each respective metric are shown. While this report uses similar benchmarks to those used for domestic metrics with labeled values, NYCT's international and domestic metric values are typically not identical due to nuances in calculation methodology.

**National peers**

To compare NYCT to domestic, comparable heavy rail systems, this report uses operating and financial data collected by the Federal Transit Administration (FTA) for its annually updated National Transit Database (NTD). In this report, NYCT data is compared to the following peer systems:

- MARTA (Atlanta, GA)
- CTA (Chicago, IL)
- MBTA (Boston, MA)
- LA Metro (Los Angeles, CA)
- SEPTA (Philadelphia, PA)
- BART (San Francisco Bay Area, CA)
- WMATA (Washington, DC)

BART and WMATA are also COMET members with data from 2022 but are excluded from the international comparisons as they are included in the domestic comparisons. As a result, all comparisons to international peers exclude any national peer, so all international index values are composed entirely of data from transit systems outside the U.S. (along with NYCT).

## Costs

Crucial to evaluating relative cost structures and cost-based productivity metrics is an understanding of differing global labor markets. NYCT wages are on par with domestic peers (see chart 1) but are significantly above average in the global context (~44% above international peer set). This is due to factors beyond the control of NYCT management, as the US is an unusually rich country with high prevailing wage rates.[1] If NYCT's wages per hour were average in the international context, overall NYCT operating costs would be 16.5% lower in 2022.

NYCT also faces distinctive fringe benefit payouts compared to global peers due to the United States' regulations and labor market. Almost 1/3rd of NYCT's labor expenses are healthcare, pension, or social security costs; these expenses are all higher than the average international

[1] OECD, Real Average Annual Wages. https://stats.oecd.org/Index.aspx?QueryId=124081
US wages are 3rd highest globally; US wages are 3rd highest globally; the two higher wage countries (Iceland, Luxembourg) do not have transit systems in benchmarks.

peer (see chart 2 for comparison). Healthcare is the largest driver of the set. In the US, healthcare is atypically expensive and paid for by employers. in many countries, only one or neither is true. Furthermore, pensions or social security equivalents are frequently covered by governments of international peers. If NYCT's non-wage labor costs per hour were average in the international context, overall operating costs would be 10.9% lower in 2022.

In sum, the obligation for NYCT to pay for health care and pension costs where our global peers do not account for a meaningful amount of the apparent 'inefficiency' in the NYCT figures that follow. To have a more accurate comparison of the real productivity gap, one should reduce the NYCT international operating cost figures by ~27% (see discussion of chart 2 for data; relevant for charts 4 and 6), which strips out the impact of labor factors generally beyond the scope of NYCT's authority: the United States' high prevailing wages, high and employer-provided healthcare costs, and employer-provided pension. For the purposes of visual clarity, only the submitted data (i.e., not normalized for labor differences) is shown on all provided graphs; however, this new baselining helps to better identify and quantify on which metrics NYCT may have a real productivity gap to other systems.

**Chart 1: Average hourly wage (domestic peers)**

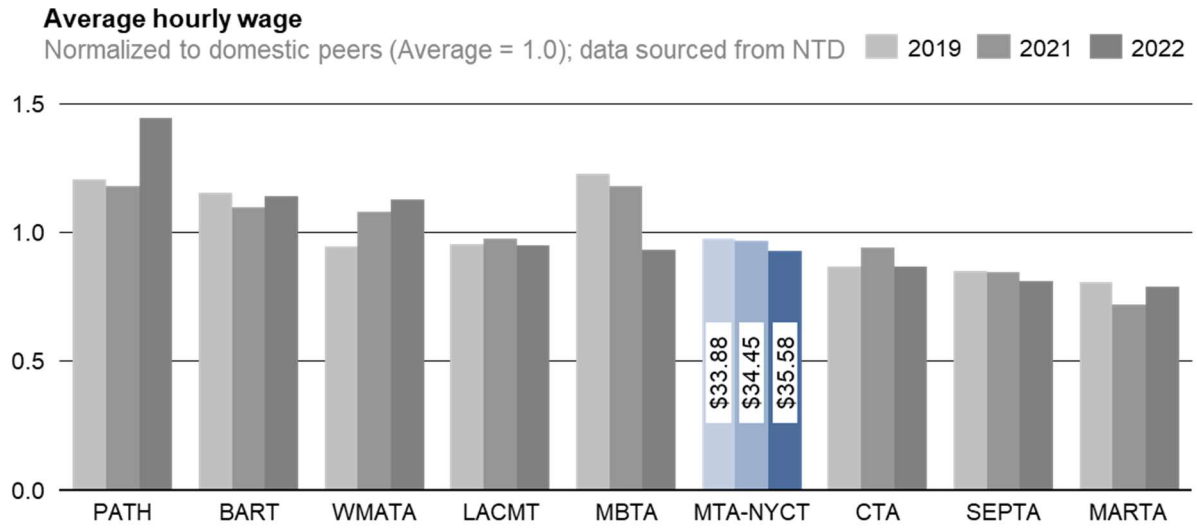
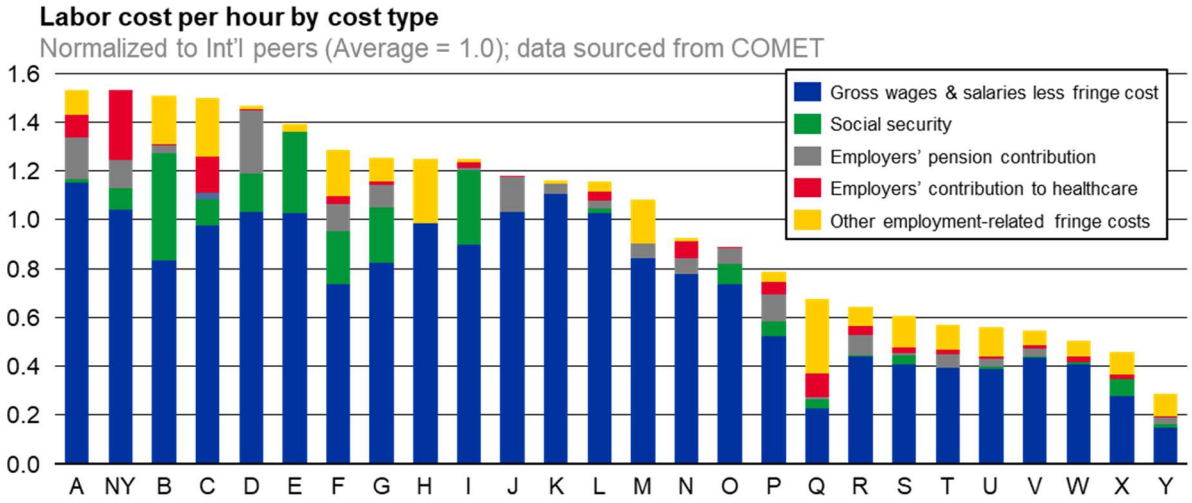


**Chart 2: Labor cost per hour by cost type**

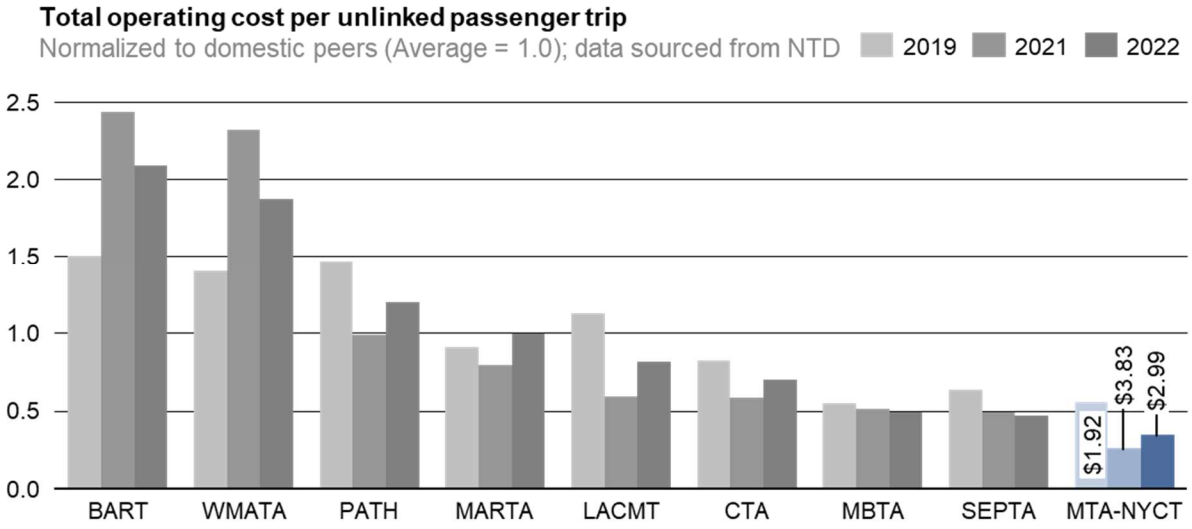



With that context in mind, the first metric NYCT uses to measure efficiency is operating cost per passenger trip. Operating cost includes all core transit functions: service operations, maintenance, and administrative costs. These costs comprise wages and benefits for vehicle operators, vehicle and rail maintainers, and administrative personnel; fuel, tires, and other materials and supplies; utilities; casualty and liability; taxes; and purchased transportation.

Among national peers, NYCT remained the most cost-effective performer per unlinked trip in 2022 (see Chart 3).[2] NYCT's improved performance over 2019 – from 56% of domestic average costs to 35% of domestic average costs – reflects in part NYCT's better ridership recovery. According to NTD submissions, NYCT has recovered 66% of 2019 passenger trips in 2022, while other domestic peers averaged 46% recovery. Note NYCT also reduced its operating costs per unlinked passenger by 22% from 2021.

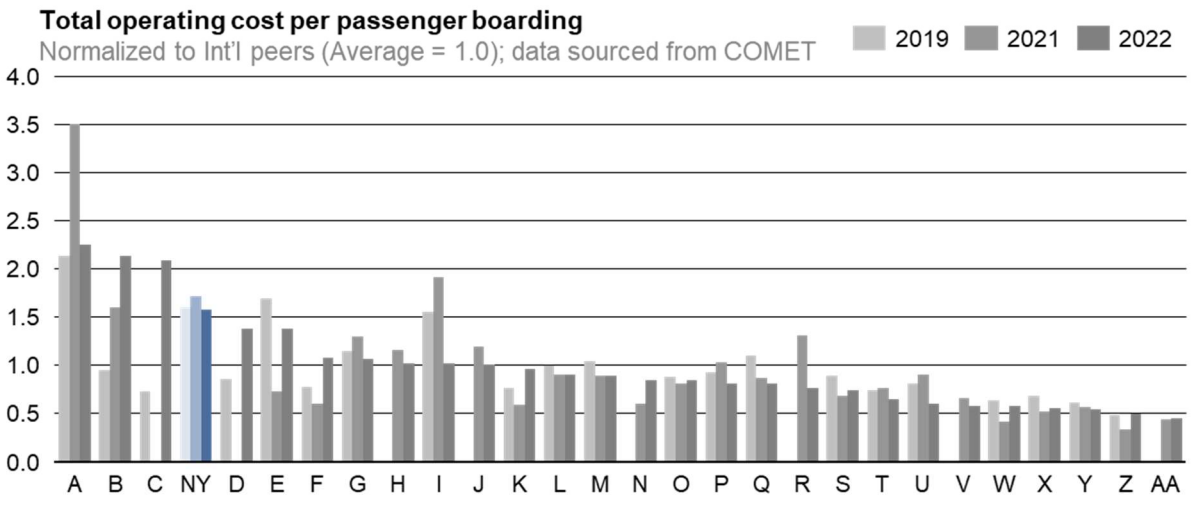
[2] Unlinked trips are total boardings on an individual vehicle, as opposed to linked trips which measure total number of trips from origin to destination. Unlinked trips attempt to measure transfers as separate trips. In the NYCT context, this includes transfers between lines. Unlinked trip data may not match other MTA published data, which often counts transfers as part of single trip.

**Chart 3: Total operating cost per unlinked passenger trip (domestic peers)**




COMET collects data for passenger boardings, which differs slightly from NTD's unlinked passenger trips metrics. NYCT is the 4th most expensive system compared to international peers. In 2022, performance improved relative to peers, though it remained 58% above the international average. Normalizing NYCT's costs to account for labor cost differences outside NYCT's control would leave NYCT 15% above the global average. Labor productivity explains some of the apparent NYCT cost premium; for example, NYCT primarily runs two-person train crews compared to one-person train crew or driverless trains used elsewhere. Another source of the productivity gap comes from higher maintenance costs incurred due to NYCT's age, complexity, and service patterns (to be discussed more in later sections).

**Chart 4: Total operating cost per passenger boarding (international peers)**



To add context to cost per passenger, NYCT also benchmarks operating cost per vehicle mile (Chart 5). This normalizes costs to reflect the length of the track network and the frequency of service run. NYCT outperforms the domestic average and is near the international average (just 7 percentage points above average). Given the above analysis on labor costs, Chart 6 suggests that NYCT would operate 22% cheaper than average international peers on a per-mile basis, if not for the US's atypical operating conditions of high prevailing wage rates, pension contributions, and employer-provided healthcare.

**Chart 5: Total operating cost per vehicle mile (domestic peers)**

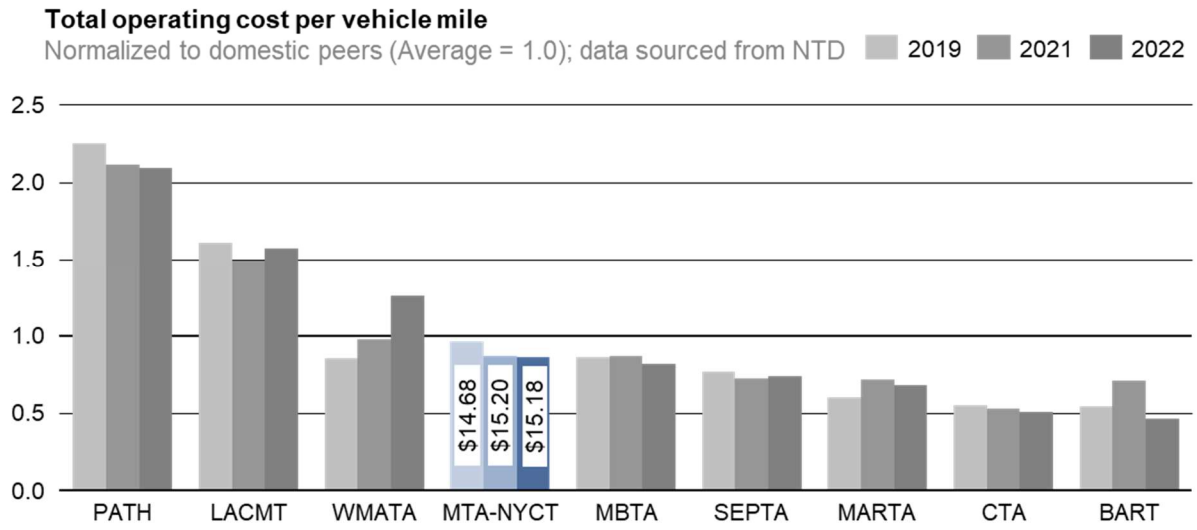
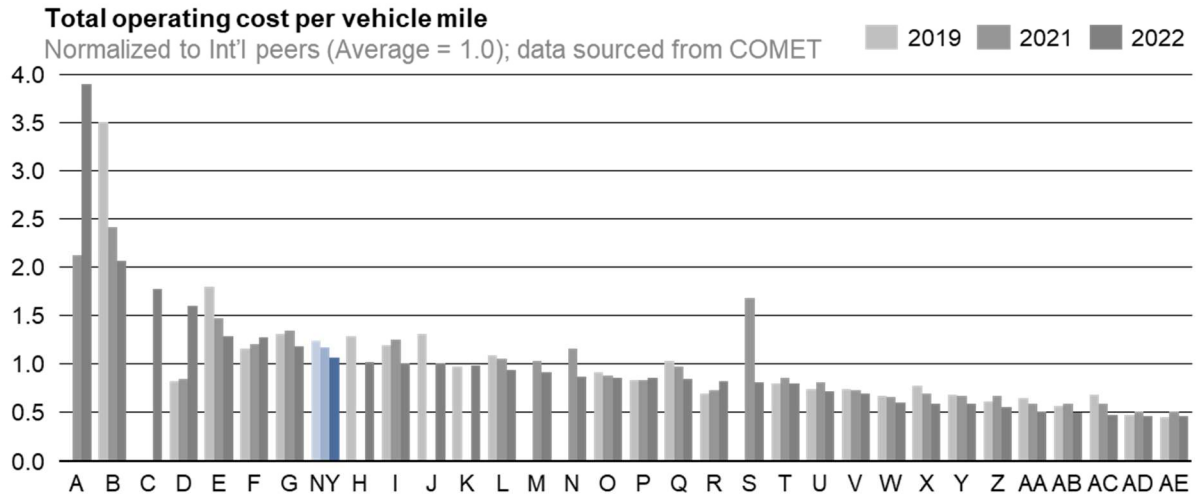



**Chart 6: Total operating cost per vehicle mile (international peers)**




In addition to reporting on overall costs, the NY legislation requests annual reports on maintenance expenses. Maintenance is 58% of overall operating costs and directly impacts our ability to provide reliable service to customers. Overall maintenance cost per mile increased ~6% for NYCT, though its indexed rate remained steady at ~25% higher than national peers. NYCT is the 4$^{th}$-most expensive system compared to international peers, though relative positioning has improved since 2019. Accordingly, maintenance costs remain a focus area for

NYCT management, and commentary on relative cost drivers and NYCT's efforts to improve them are shared in more detail below the summary charts.

**Chart 7: Total maintenance cost per vehicle mile (domestic peers)**

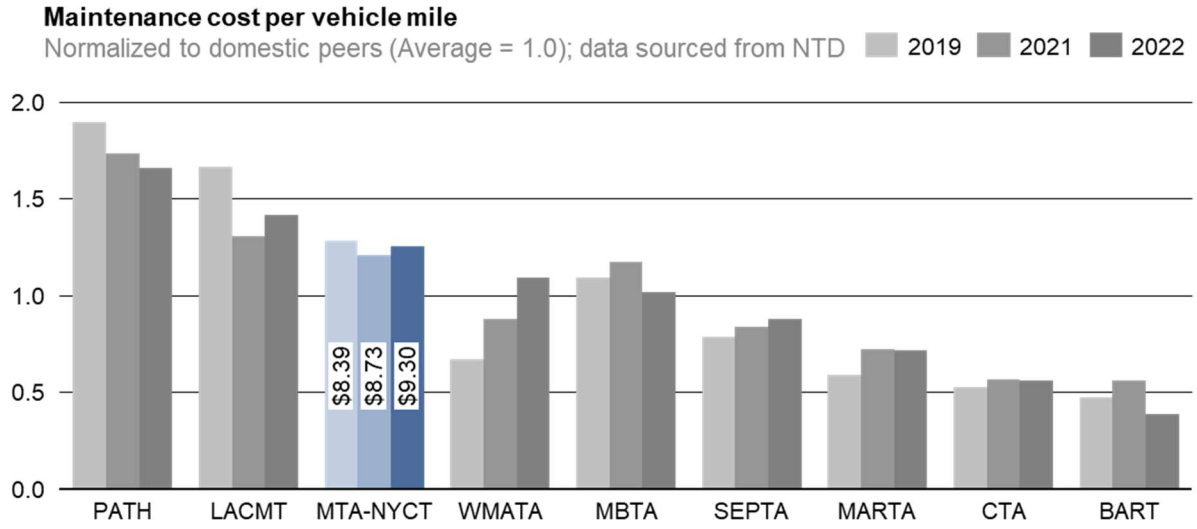
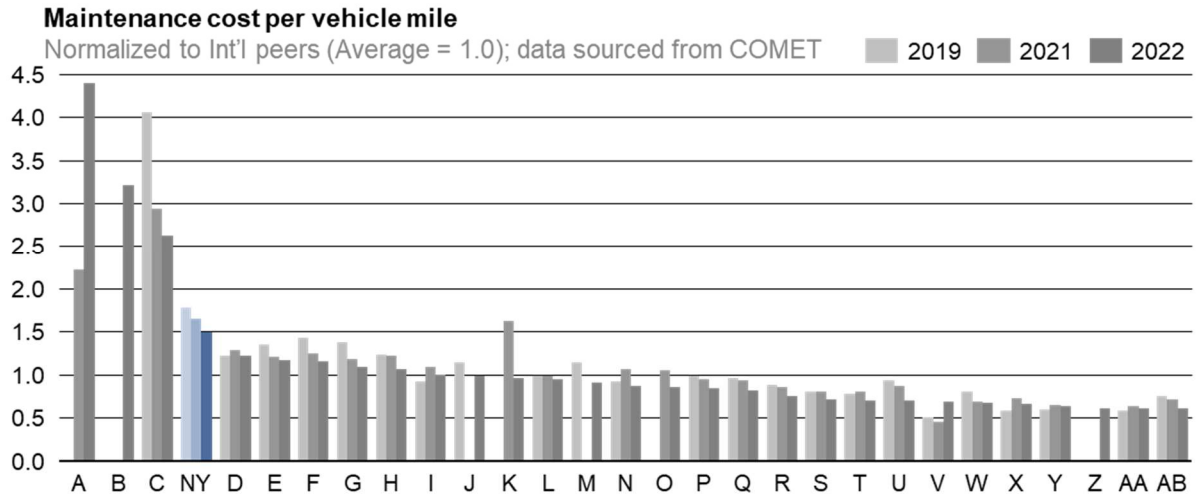



**Chart 8: Total maintenance cost per vehicle mile (international peers)**




Maintenance costs can be separated into two parts: (1) costs for 'facilities' – track, signals stations, and structures, and (2) rolling stock.[3] This segmentation suggests the MTA's higher costs in the domestic context are primarily due to facility maintenance (41% above average), not vehicle maintenance (1% above average). In the international context, the MTA performs similarly compared to peers in both; this is likely due to the persistence of discussed labor gaps in both.

[3] Note that in this benchmarking exercise this definition differs from typical MTA internal definitions, which typically use facility just to refer to building structure (maintenance depots, stations, and rolling stock shops).

NYCT faces multiple unique challenges in facility maintenance that explain the relative cost of the system. The age of the facilities, the complexity of track and signal systems, and the large number of stations all contribute to higher expense levels than many peers. Compounding these issues is the system's 24-hour service commitment. This provides short and inefficient windows of opportunity to perform in-system maintenance when done while trains are running. It also increases necessary staffing for maintenance with flaggers to keep workers safe on or near the tracks.

Nevertheless, in 2023 NYCT undertook a comprehensive review of its operations and identified a total of $300M in financial benefits through a variety of initiatives, many linked to utilizing data to inform more productive maintenance practices while not compromising reliability. Over time, this should help to arrest facility maintenance cost growth despite the many structural constraints of the subway.

**Chart 9: Facility maintenance cost per vehicle mile (domestic peers)**

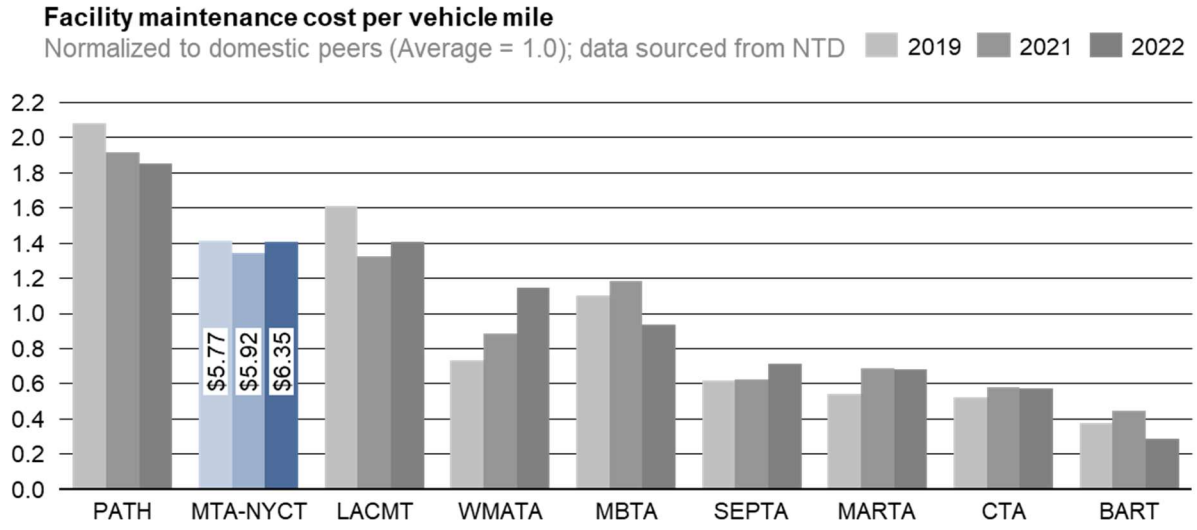
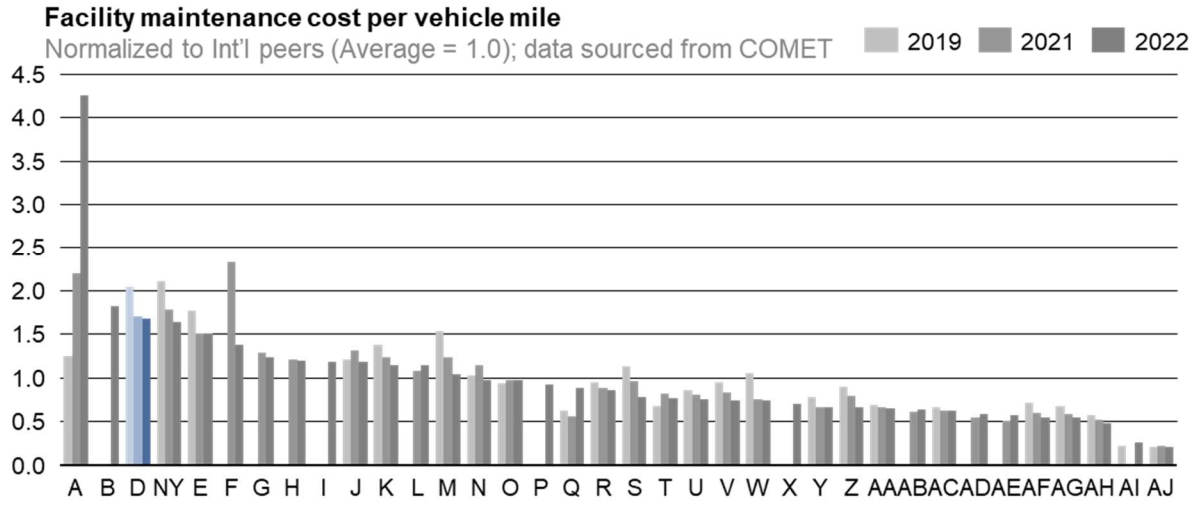



**Chart 10: Facility maintenance cost per vehicle mile (international peers)**



NYCT has average vehicle maintenance costs for domestic peers. Compared to international peers, NYCT spends the 4th most on vehicle maintenance per car mile, at roughly 50% more than average. In addition to the flow-through of higher labor costs, increased costs are caused by NYCT's aging fleet, with the 7th oldest average vehicles in the international comparison set. The average fleet age will decrease as we continue to accept new R211 subway cars into the fleet and retire older cars. Vehicle maintenance costs have also been a focus of recent savings efforts, with modified overhaul cycles expected to reduce spending slightly in 2023 and more so in 2024.

**Chart 11: Vehicle maintenance cost per vehicle mile (domestic peers)**

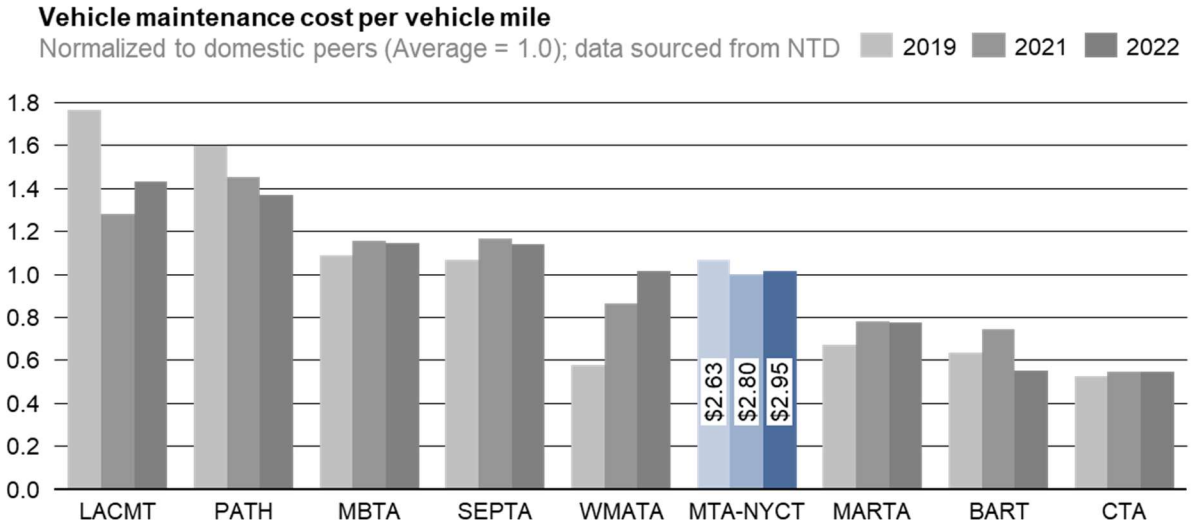
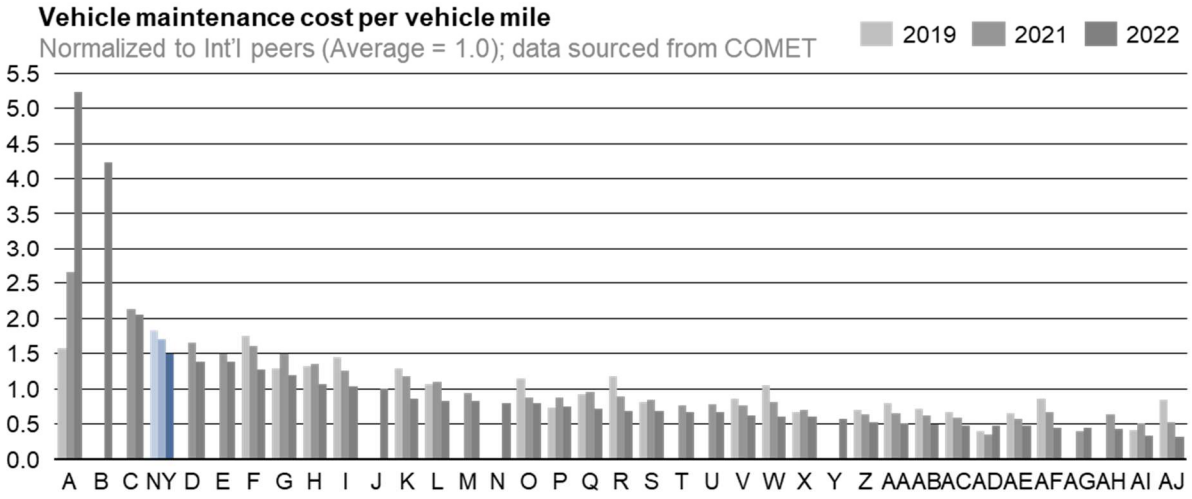



**Chart 12: Vehicle maintenance cost per vehicle mile (international peers)**




## Operations

Mean distance between failure measures fleet reliability, helping to measure the effectiveness of maintenance practices. Domestic and international approaches to benchmarks differ slightly. NTD compares all major mechanical failures that prevent a vehicle from completing or

beginning its route, while COMET compares all rolling stock failures causing greater than a 5-minute delay. Domestically, NYCT performs at average and has improved significantly since 2019 relative to peers. Internationally, NYCT's performance declined in 2022. Part of the reason for this is the need for NYCT current use of vehicles beyond their 'useful life' – in particular the R46s. As new replacement vehicles for the R46 are progressively integrated into the fleet, NYCT expects this metric to improve in 2024 and 2025.

**Chart 13: Mean distance between failure (domestic peers)**

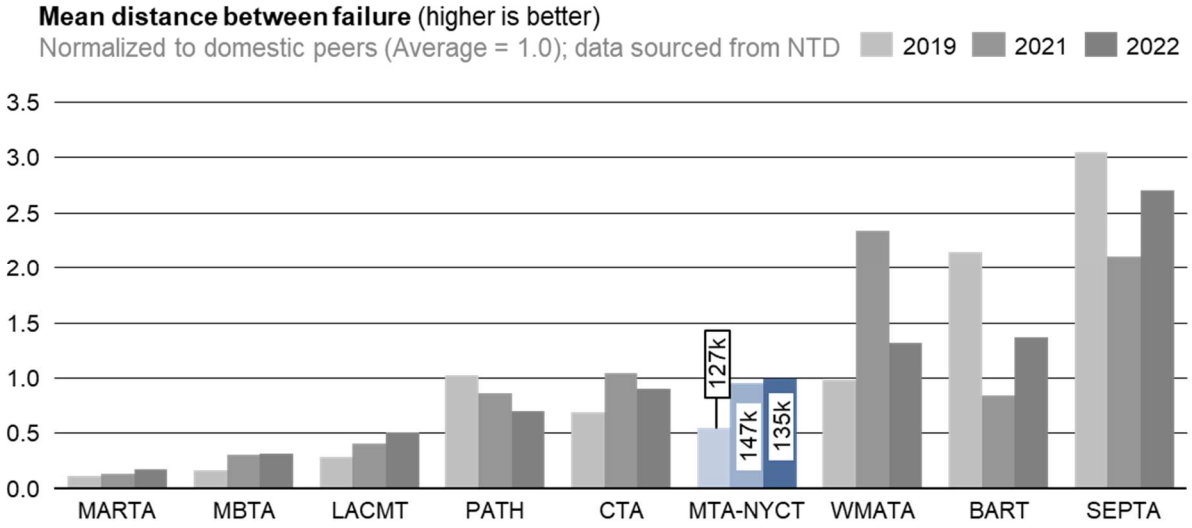
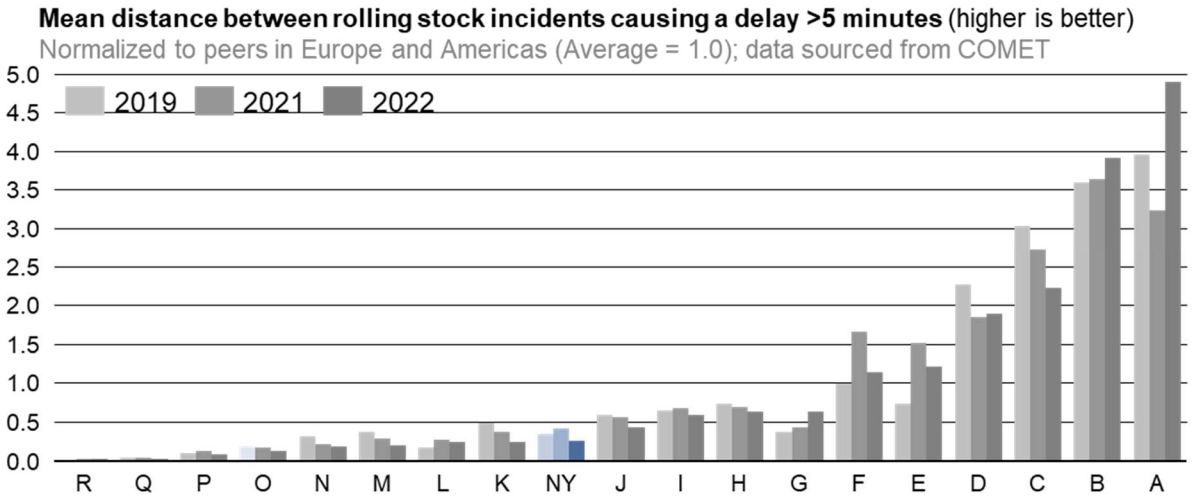


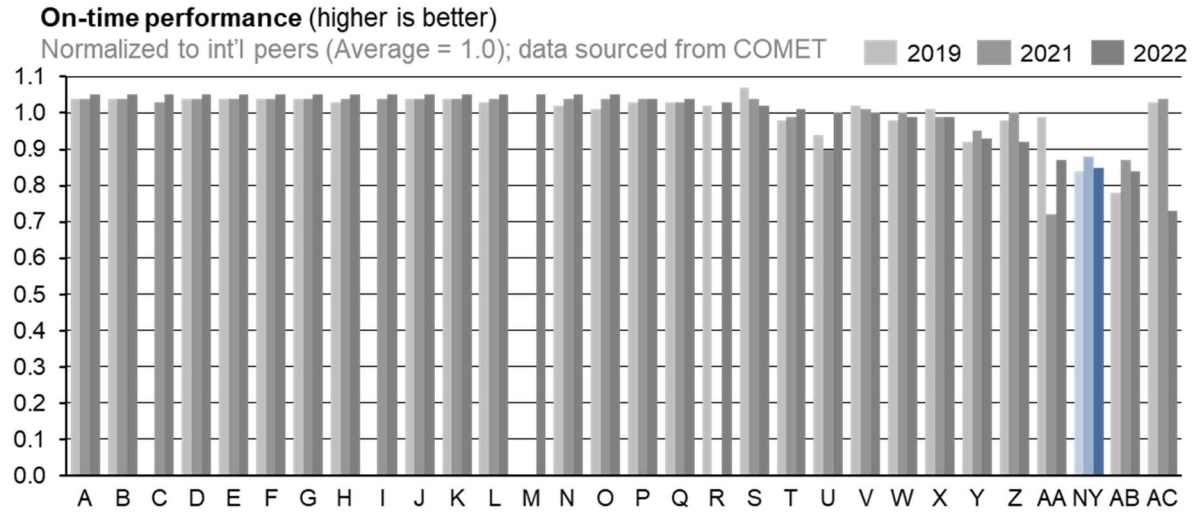

**Chart 14: Mean distance between rolling stock incidents causing a delay >5 minutes (Peers in Americas and Europe)**




On-time performance (OTP) is one of the simpler operational metrics to compare across systems; it indicates the proportion of scheduled trips that arrived at their destination terminals within 5 minutes of scheduled time. While NTD does not track data for domestic peers, COMET tracks for international set.

Absolute and relative OTP ticked down slightly in 2022, leaving NYCT 3rd lowest among peers. While NYCT has done a better job of recovering its riders post-COVID, these increased passengers naturally increase dwell times and impact OTP. New NYCT and subway leadership appointed in 2023 have enhanced the focus on service reliability and incident management. This should lead to improvements going forward even as system utilization increases.

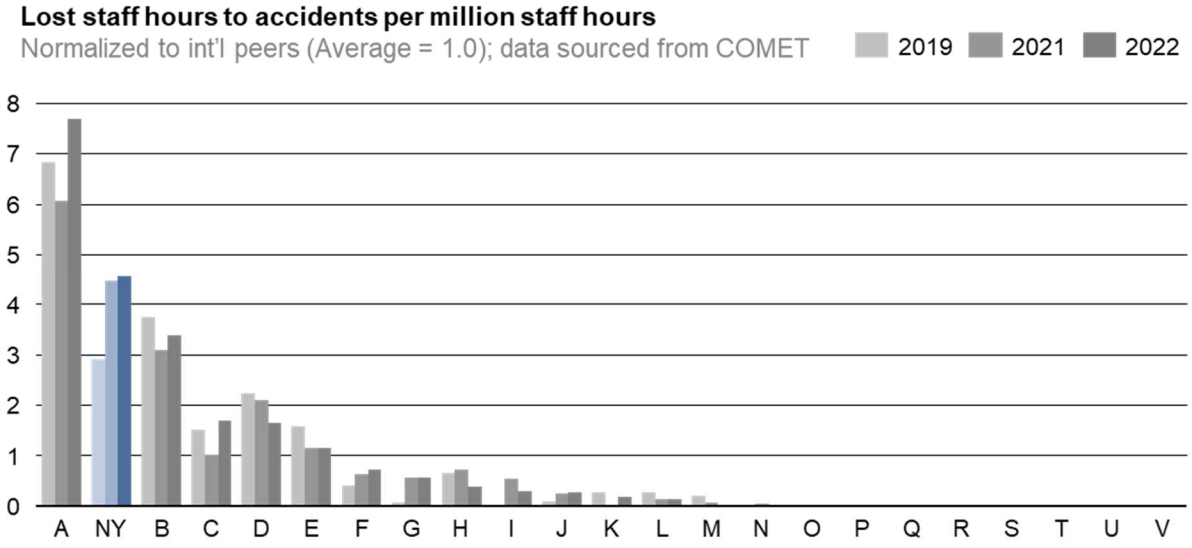
**Chart 15: On-time performance (international peers)**




## Safety

When compared to international peers, NYCT had the second-highest proportion of staff hours lost per million staff hours in 2022. There is a wide range in this data, as shown in Chart 16, which may be influenced by cultural factors, industrial relations, and work practices often governed by unique collective bargaining agreements, such as the extent to which staff who have had an accident can be reassigned to other tasks (i.e. "light duty") and still be productive.

**Chart 16: Lost staff hours to accidents per million staff hours (international peers)**



Improving employee availability is a top priority across the MTA, including NYCT. All drivers are considered, including sick usage, workers' compensation, and injury on duty. One key element is increased unavailable days due to workers compensation. Unavailable days more than doubled between 2010 and 2019, and then grew again after 2020. Reducing factors that drive workers compensation claims has been an intense focus area for NYCT since 2022, and improvements are expected in subsequent reports. More generally, MTA management is focused on increasing system-wide availability for all operating agencies.

# MTA Railroads

## Background

The MTA's two railroads are founding members of ISBeRG, which is managed by the Transport Strategy Centre at Imperial College. The MTA railroads use benchmarking information developed through ISBeRG, such as KPI data and in-depth study findings, to contextualize its own performance, identify best practices, and inform decision-making.

Significant differences exist among railroads across the world, particularly when comparing U.S. railroads to international peers. Differing local economies, prevailing wages and collective bargaining agreement provisions can also have dramatic impacts on respective labor costs. Government mandates, including safety regulations, vary widely, and each railroad exists in a unique operating environment, often with different service schedules, geographic layouts and protocols. This complicates the benchmarking effort – both in choosing peers, as well as interpreting the data comparisons.

To compare MNR and LIRR operations and costs to domestic commuter rail systems, this report leverages operating and financial data from the Federal Transit Administration's National Transit Database (FTA, NTD). In this report, MNR and LIRR data is compared to the following peer systems in NTD:

- New Jersey Transit (Northern New Jersey)
- Metra (Chicago metropolitan area)
- SEPTA (Philadelphia metropolitan area)
- MBTA (Boston metropolitan area)
- Metrolink (Southern California)

For some metrics, MBTA and Metrolink's submitted data is not representative or complete; this is likely due to their use of 3rd party service operators (Keolis for MBTA; Amtrak for Metrolink). Where potentially impactful, this is footnoted to avoid confusion. Additionally, MTA railroads operate on a larger scale than other domestic railroads. LIRR reported 81.6 million unlinked trips and MNR reported 54.5 million unlinked trips in 2022. Domestic peers averaged 19.7 unlinked million trips, and none matched MNR or LIRR's volumes.

As described above, the MTA benchmarks itself against international peers by leveraging data from ISBeRG. Although NTD and ISBeRG collect and disseminate similar metrics about railroad performance, methodological differences between the two data sources produce slightly different values for each railroad in the charts presented in the following sections.

In this report, LIRR and MNR data is compared to the following ISBeRG members:

- Ferrocarrils de la Generalitat de Catalunya (Barcelona, Spain)
- Queensland Rail (Brisbane, Australia)
- Metro Trains (Melbourne, Australia)
- Sydney Trains (Sydney, Australia)

This is a limited set compared to the broader ISBeRG database. Other members of ISBeRG are excluded because they are not directly comparable; some reasons for excluding members include:

- Some have different modes and are thus less comparable (e.g., rapid transit providers)
- Other US railroads are not included as focus is on comparisons to international peers
- Post-COVID performance changes have meaningfully hurt some railroads' performance; railroads that still have significant service degradation are not included

## Costs

MTA railroads should be placed in the appropriate global labor context before comparing relevant labor statistics. MNR wages are approximately 4% lower on a per hour basis than average domestic peer; LIRR wages are higher, roughly 17% above average per hour. This divergence in costs is reflective of different collective bargaining between the two railroads but is beyond day-to-day operational management.

When compared in an international setting, two gaps impact the railroads' performance. First, non-wage labor costs (e.g., healthcare, pension, social security, other fringe benefits) are significantly above the peer set.[4] These benefits are significantly above the peer average when normalized for working hours. This is primarily caused by healthcare expenses and other benefits that the MTA pays due to the US's regulatory frameworks. Similarly, the US has somewhat higher wages than both Spain and Australia on average. As a result, the MTA can compare metrics while normalizing for the operating conditions that MNR and LIRR face: MNR costs would be 28% lower and LIRR costs would be 22% lower if paying average international peer wages and benefits for the exact same hours worked. While the submitted, non-normalized metrics are shown on graphs, this offers an initial guide to assessing what share of gaps are attributable to MTA railroad productivity instead of extenuating labor factors.

[4] Note that LIRR and MNR have different cost submissions between the two data sources, reflective of distinct accounting rules and policies followed for the ISBeRG submission. In the future, the MTA plans to better align ISBeRG submissions. In instances of disparities, NTD data is likely more representative given shared accounting rules for submission.

**Chart 17: Average hourly wage, including paid absence (domestic peers)**

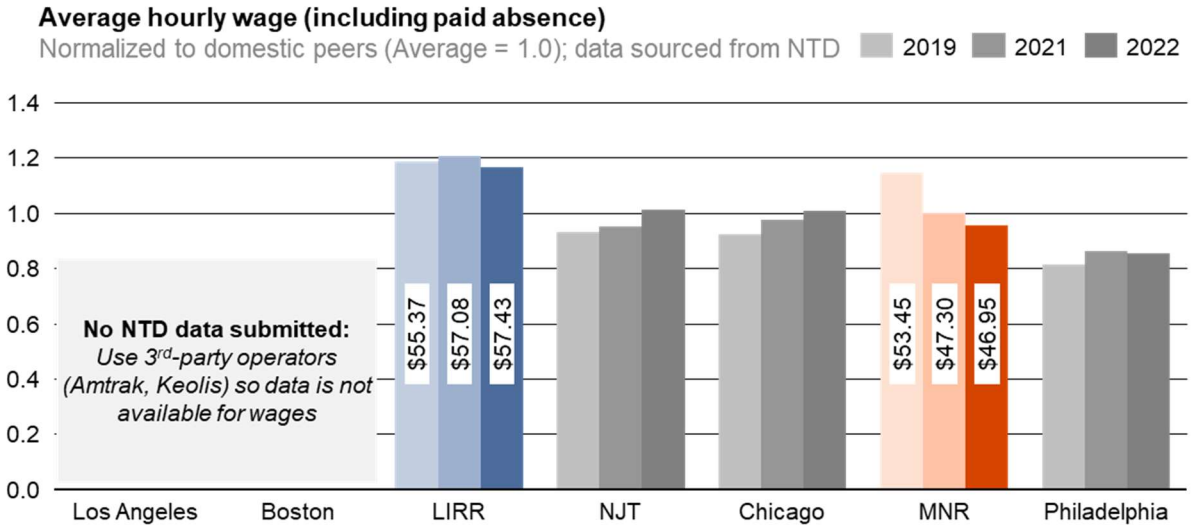



**Chart 18: Average labor cost per hour (international peers)[5]**


With that context in mind, the first metric MTA railroads use to measure efficiency is operating cost per passenger trip. MTA railroads are both cheaper than average domestic peer on this metric and continued to close gap to 2019 performance in 2022. Improved performance relative to peers is primarily caused by better ridership recovery post-COVID. LIRR hit 70% of 2019 unlinked trips, MNR hit 60% while domestic peers averaged 41% ridership recovery.[6] That said, even in 2019 MTA railroads were performing at the domestic average, indicating general cost control practices in line with domestic average.

[5] Note that LIRR and MNR have different cost submissions between the two data sources, reflective of distinct accounting rules and policies followed for the ISBeRG submission. In this case, it leads to overstating gap in labor costs per hour on same definitions. In future, expect results to be aligned more closely.
[6] This is measured on an unlinked trip basis, which count a trip with a transfer as two trips. Other MTA publications typically refer to different figures, which typically reflect "passenger journey" metrics.

Globally, MTA railroads both moved closer to average in 2022. ISBeRG uses passenger journey data, which counts transfers as one trip (compared to NTD, which counts transfers separately). Even after accounting for labor costs mentioned above, there remains an approximately 35-40% productivity gap for both railroads.

Some of this gap is caused by relevant operating differences: LIRR and MNR both provide long service hours: 24/7 service for LIRR and 20-22 hours per day over 7 days for MNR. These service windows increase maintenance costs, have relatively lower passenger loads, and cause additional operating costs. Both systems are ungated, requiring onboard fare validation and collection. Other international systems appear to have more stations within dense city limits, likely increasing off-peak passenger journeys outside general commuting options. Finally, both systems run over electrified and non-electrified territory, requiring maintenance of both electric and diesel fleets, and broadening work types performed across the right-of-way.

However, even accounting for these structural differences, there are likely productivity gaps between the railroads. In 2024, the MTA has set cost savings targets for both railroads that will help to drive savings over 2022 performance. Areas for improvement include improving car inspection productivity, optimizing materials management and reducing the frequency of overtime.  Scheduling and crewing approaches in light of reduced ridership levels are also being examined.

**Chart 19: Total operating cost per unlinked trip (domestic peers)**

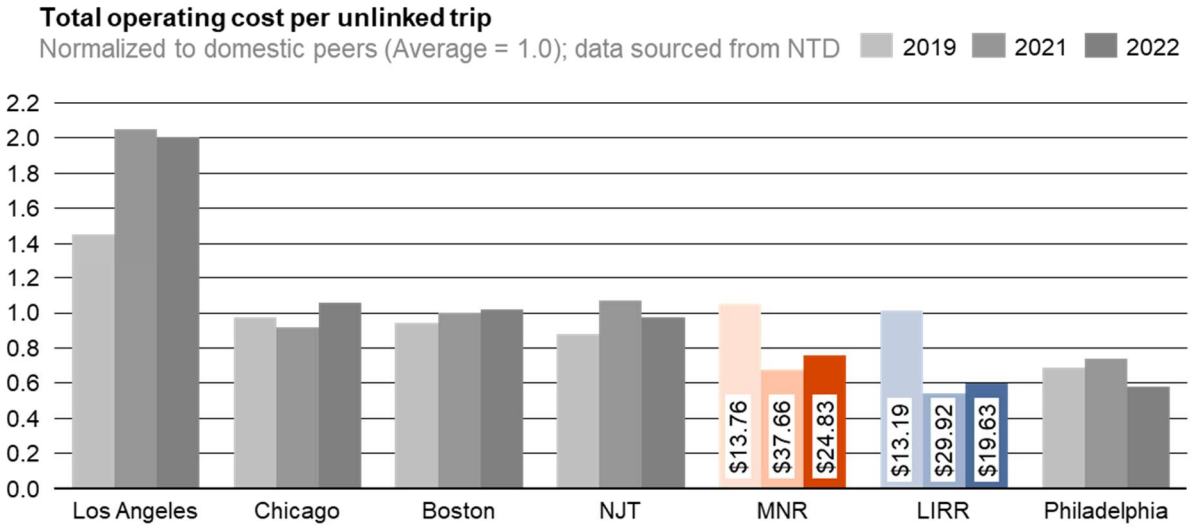
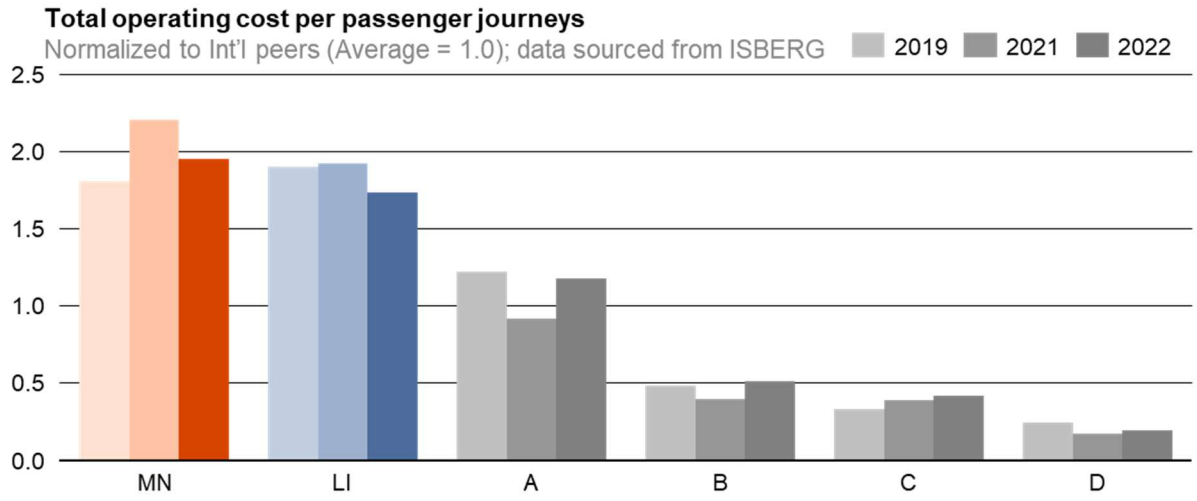



**Chart 20: Total operating cost per passenger journey (international peers)**




Costs can also be compared on the basis of vehicle miles. Here, MNR is approximately average compared to peers, with a large 2022 reduction due in part to an increase in vehicle miles traveled to meet increased passenger demand. LIRR is ~16pp behind domestic peers. Approximately half the gap is explained by LIRR's domestic wage premium it pays over the relevant peers. The other half is likely due to productivity opportunities discussed above.

When compared internationally per mile, both railroads are more expensive than global peers. After normalizing for labor and benefits above, gaps remain – approximately 5-10% for MNR and 15-20% for LIRR. The primary drivers include distinctive operating conditions as discussed above, as well as opportunities for higher productivity and asset utilization through reducing spare ratios.

**Chart 21: Total operating cost per vehicle mile (domestic peers)**

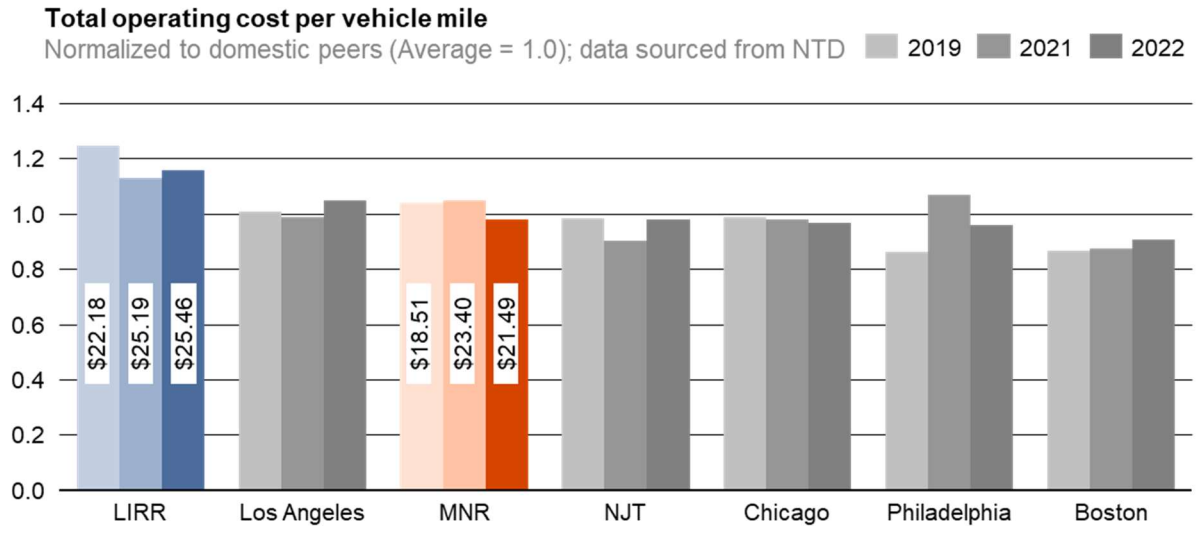
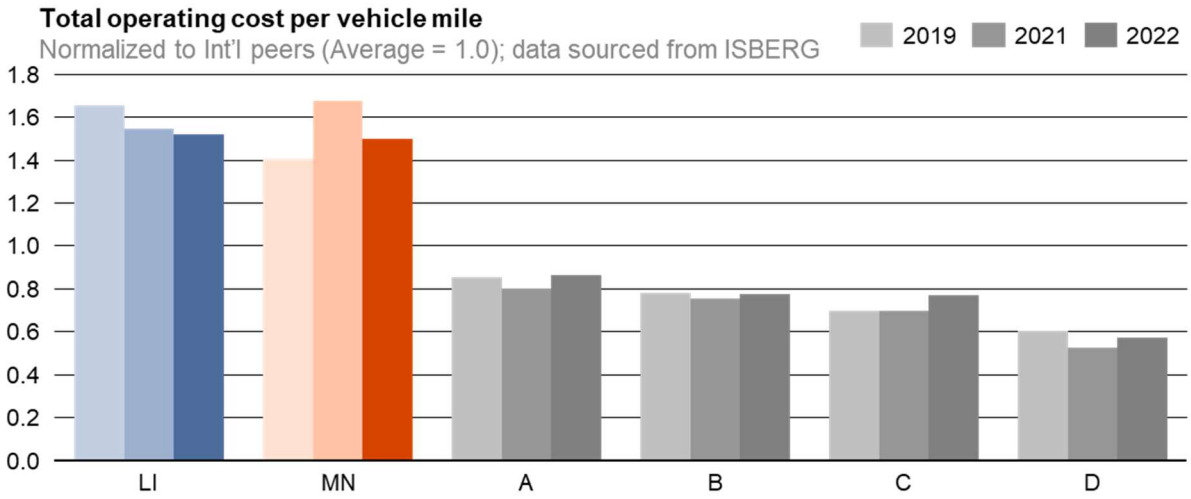



**Chart 22: Total operating cost per vehicle mile (international peers)**




Maintenance costs drive a large share of operating costs. In general, MTA railroads maintenance costs exceed domestic peers. Some of this is likely caused by two peers with lowest expense (Los Angeles, Boston) paying 3rd-party operators to operate their commuter rail services; this different approach may affect results through underlying performance and accounting differences.[7] However, even removing those two would leave MNR and LIRR above the domestic average.

Internationally, both railroads trail the peer average, in both cases by substantial amounts. Even after adjusting for the global labor differences, that leaves ~30-40% productivity gaps between systems. More detailed discussion of the causes of these gaps will follow in detailed subcategories of facility and vehicle maintenance for the railroads.

**Chart 23: Total maintenance cost per vehicle mile (domestic peers)**

[7] Note that operate has distinct meanings in each context. Amtrak operates Metrolink including both engineers and conductors; from public filings, unclear how much maintenance is performed by them. MBTA appears to pay Keolis for management, operations, and maintenance of commuter rail. See peer websites for more information.

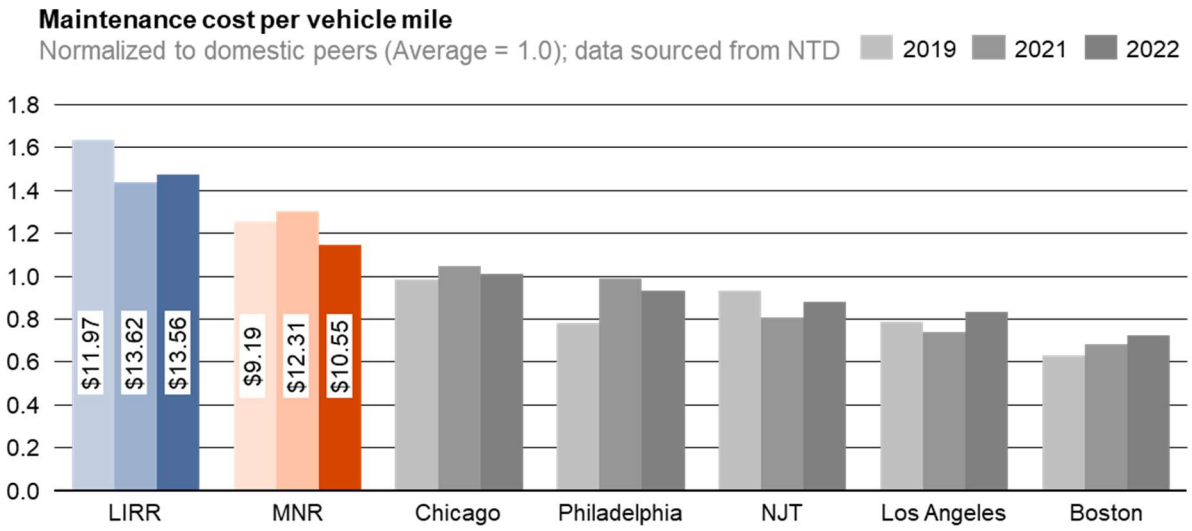
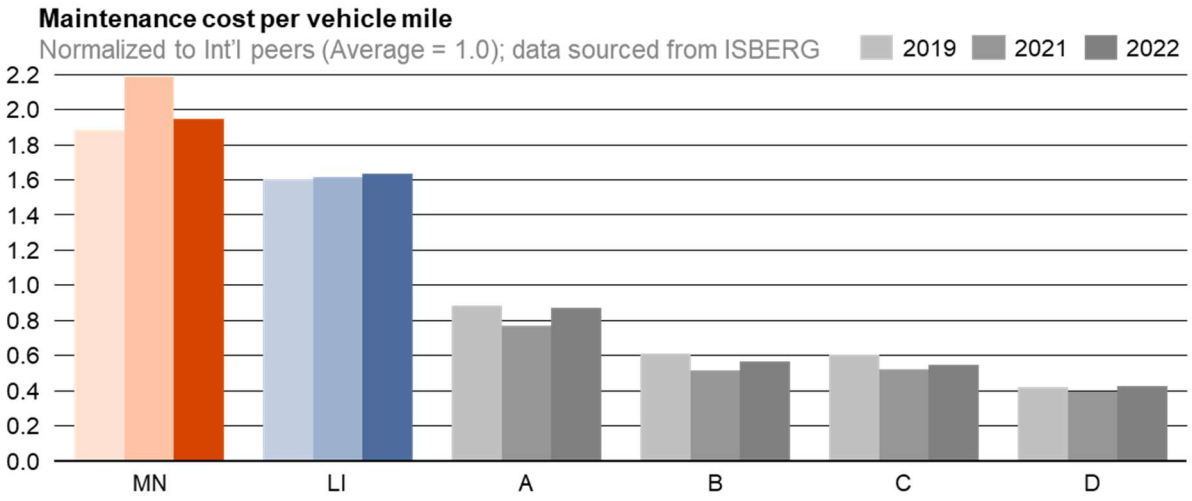



**Chart 24: Total maintenance cost per vehicle mile (international peers)**[8]

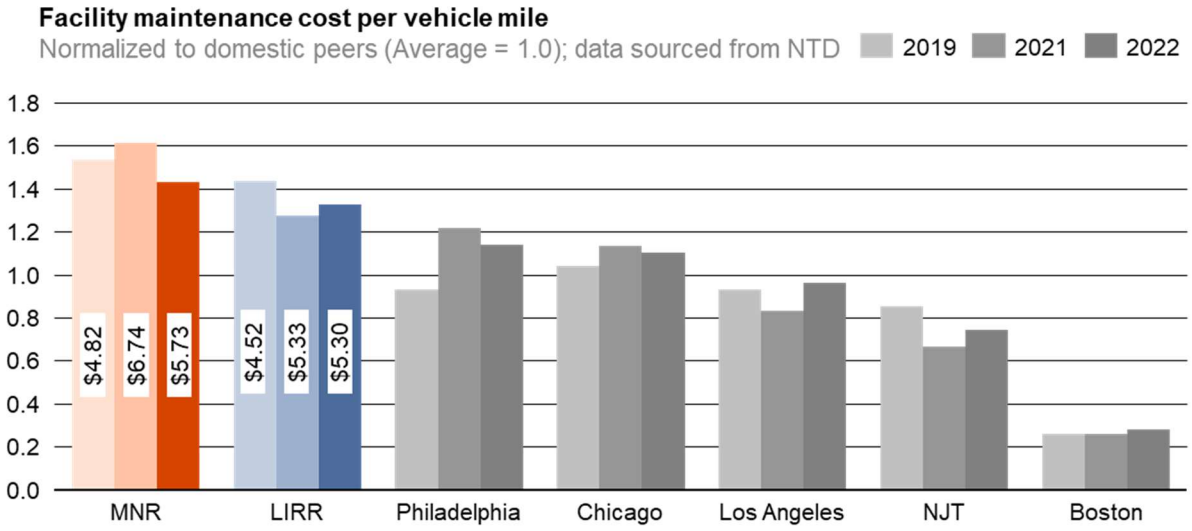



Facility maintenance primarily includes right-of-way maintenance along with station costs. The gap on facility maintenance costs is 43% for MNR and 33% for LIRR versus our domestic peers; in both cases, the gap has shrunk since 2019 (Chart 25). This difference is driven by a combination of track ages and some outstanding productivity opportunities. Additionally, gross vehicle miles obscure the costs of managing track miles in both electric and diesel territory, and further cloud our ability to take away the real differences here.

That being said, reducing facility maintenance costs while still providing reliable service is a high priority for the MTA. Both railroads are attempting to reduce costs here in part through more efficient management of overtime for maintenance of way staff, with benefits to be realized in 2024.

[8] Relative performance flips between LIRR and MNR in international metrics. This is primarily due to different accounting approaches for international submission, especially around allocation of pension costs to specific subgroups for LIRR. Actual performance is better reflected in NTD graph, not the ISBeRG graph.

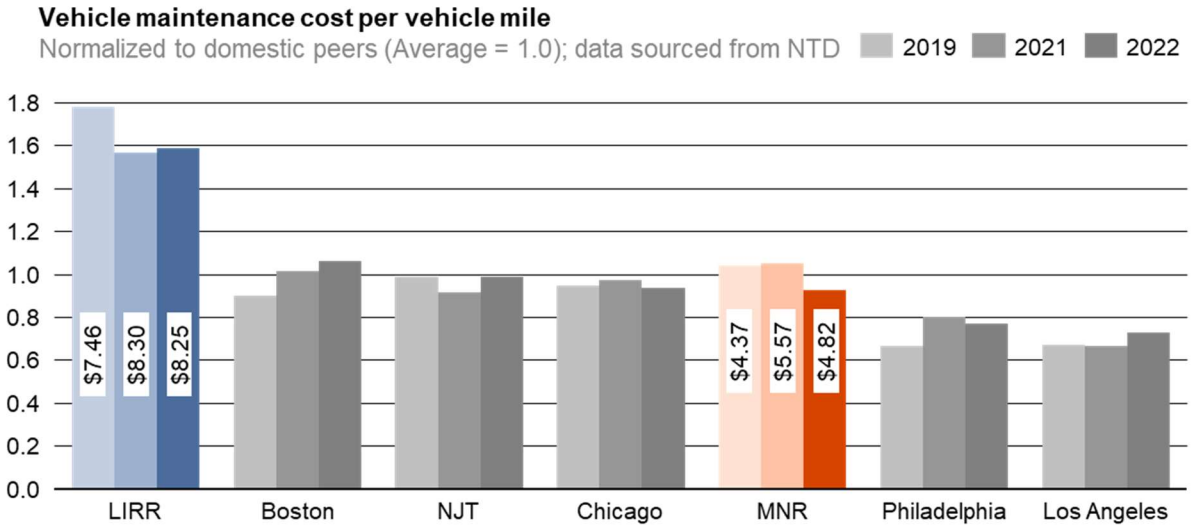
**Chart 25: Facility maintenance cost per vehicle mile (domestic peers)**




Vehicle maintenance costs have distinct patterns between railroads. MNR is cheaper than the average domestic peer. LIRR is almost 50% more expensive than the average domestic peer. Some of this is caused by fleet diversity. Both railroads have multiple vehicle models, each with their own components, facilities, and maintenance cycles. Additionally, the oldest vehicles in each fleet are quite old, leading to higher spending to maintain service.

Achieving productivity gains in vehicle maintenance is already a priority for both railroads. Both railroads are looking to shorten to optimize inspection frequencies and measuring the productivity of standard tasks. Closer attention to overtime choices (and filling vacancies to minimize the need) is a primary focus area going forward, especially for Long Island Rail Road.

**Chart 26: Vehicle maintenance cost per vehicle mile (domestic peers)**

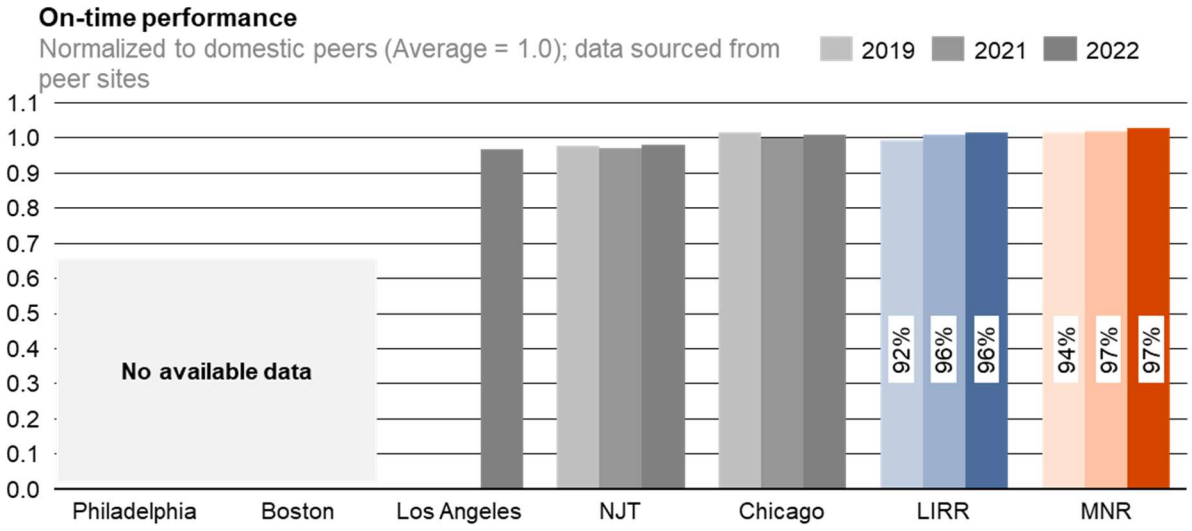


## Operations

The MTA railroads monitor multiple operational metrics as well. This report uses on-time performance and mean distance between failure as the most easily comparable metrics across railroads. On both, MTA railroads outperform many peers.

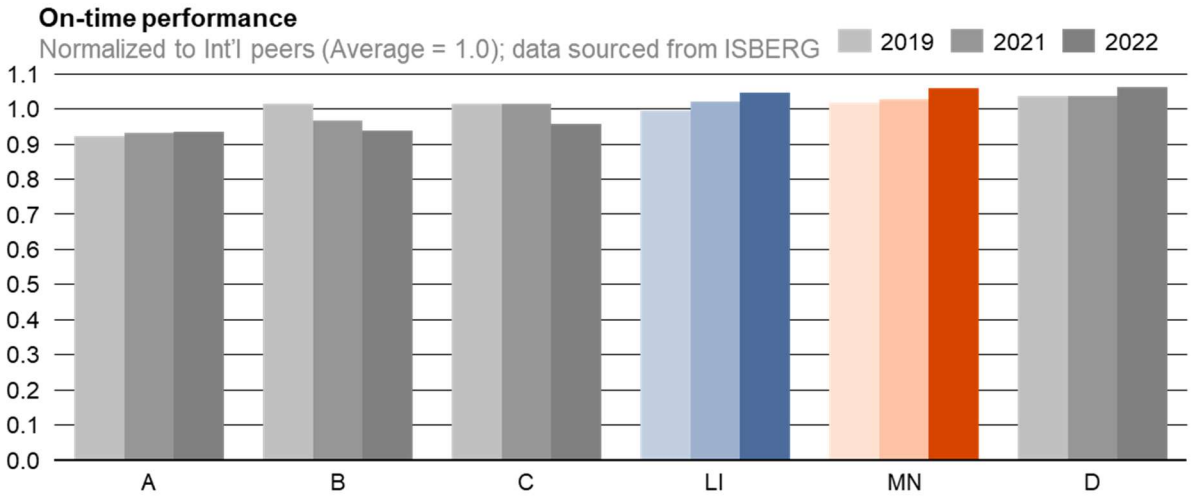
LIRR and MNR slightly outperform all national peers in on-time performance where data is available. Compared to international peers, MNR and LIRR are better than all but one peer and perform above average. This is especially impressive in context of increased service and ridership in 2022, which should have challenged 2021's on-time performance gains.

**Chart 27: On-time performance (domestic peers)**




Note as on-time performance is not available via the NTD process the data has been sourced from the public website of any agency that provides this information.

**Chart 28: On-time performance (international peers)**



Mean distance between failure measures the relative reliability of rolling stock. NTD and ISBeRG use different measurements: NTD compares “major mechanical failures”, while ISBeRG includes all rolling stock incidents causing a delay in >5 minutes. When comparing the two metrics, note that there are significantly fewer of the former each year (fewer than 100 per railroad per year, against more than 60 million revenue miles); this reflects both the quality of MTA maintenance and the severity of these incidents. Given the low prevailing rate of NTD failures as compared to mere rolling stock-related delays, it may not be useful to compare results between the two benchmarks themselves.

Both railroads lead the domestic benchmarks, with relative performance improving in 2022 compared to peers. On international benchmarks, the railroads also lead, though MNR experienced a relative decline in performance from last year compared to peers. The international benchmark includes more incident types; when considering both graphs, this suggests MNR had more minor incidents but remained relatively well performing on major incidents. Meanwhile, LIRR improved performance compared to all international peers.

**Chart 29: Mean distance between failure (domestic peers)**

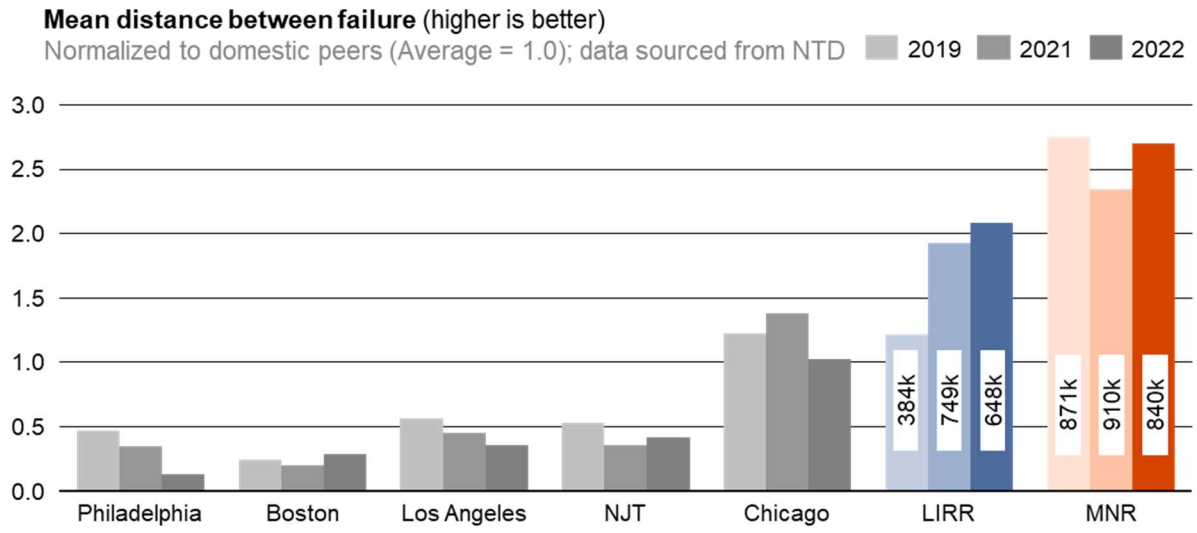
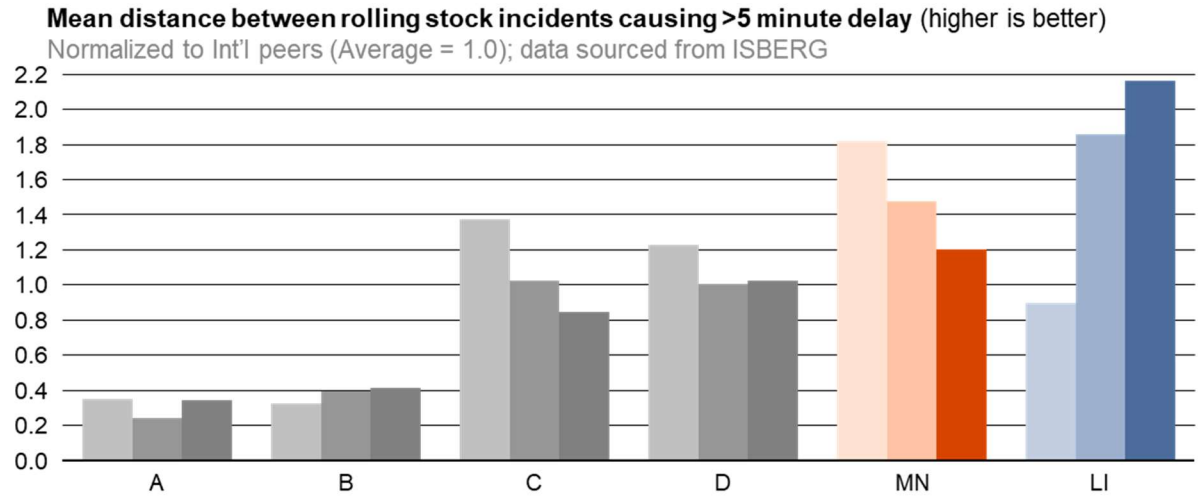



**Chart 30: Mean distance between rolling stock incidents causing >5 minute delay (international peers)**




## Safety

Safety of employees is a top priority for both railroads. Actual operating results are different between the two railroads. The first metric is a domestic one: reportable employee injuries per 200k staff hours (collected by the FRA, not NTD). This shows a slight uptick in injuries for both railroads in 2022. LIRR has the highest injury rate of any domestic peer, while MNR has a below average rate. Some drivers of recent changes include rises in hearing loss injures as measured by Standard Threshold Shift and an increase in employee injuries due to emotional trauma (such as those occurring after altercations with customers). Both rose significantly for LIRR between 2019 and 2022.

For the international comparison, railroads are compared on staff hours lost to accidents; this metric is harder to interpret because it includes injury rates, injury severity, and unique labor rules and practices (e.g., extent to which staff who have had an accident can be reassigned to other tasks and still be productive). In either case, both railroads trail their international peers. Long Island Rail Road is significantly higher than Metro-North Railroad in absolute terms. That difference is driven in no small part by unique collective bargaining rules for Long Island that increase absences for any given outage. LIRR expects reportable employee injuries and uncapped hours lost to decline in future years.

**Chart 31: Reportable employee injuries per 200k staff hours (domestic peers)**

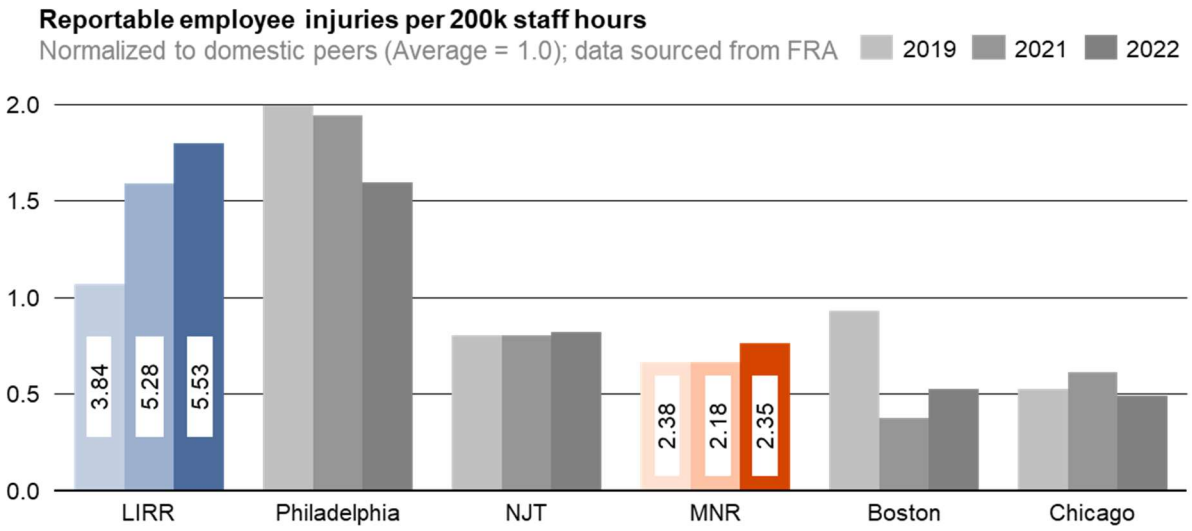
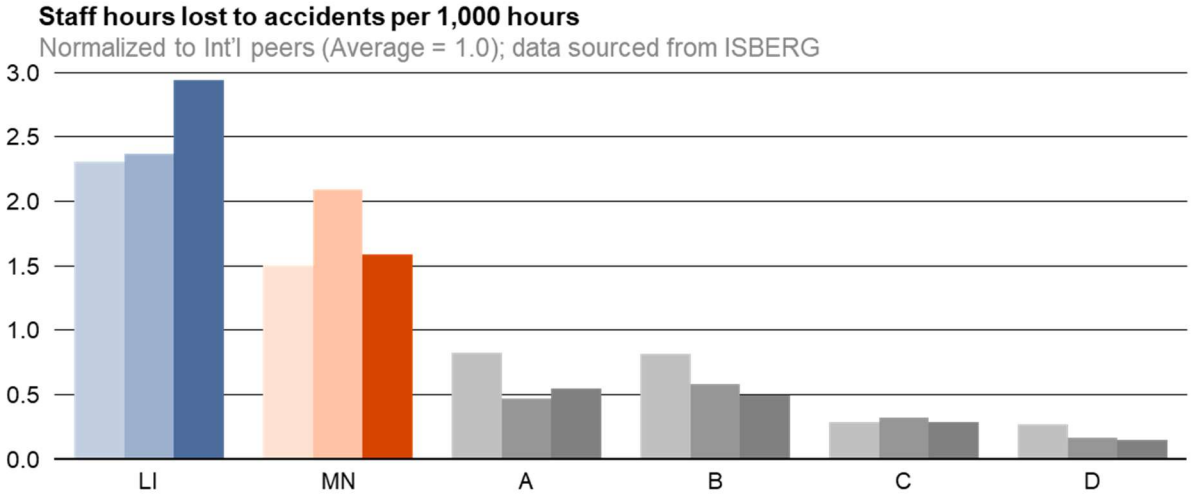



**Chart 32: Staff hours lost to accidents per 1,000 hours (international peers)**




Both railroads are focused on improving the safety of customers and communities. MTAPD has strategically increased their presence across the network to deter and respond expeditiously to harassment and assault on frontline employees, helping to counteract troubling trends. Labor and management keep an open channel of communication to address safety concerns and issues. Finally, ergonomic studies are helping to identify soft tissue risks and potential solutions across the agencies.