ANNUAL

PERFORMANCE METRICS REPORT

CALENDAR YEAR 2020

Metropolitan Transportation Authority

June 2022

Executive Summary

Performance measurement and benchmarking is a critical tool that the Metropolitan Transportation Authority (MTA) uses to assess whether it is effectively achieving its mission; measure its performance when compared to peers; and determine whether industry best-practices can be applied to its own operations and cost-structure. The MTA and its operating agencies regularly monitor and review a myriad of key performance indicators (KPIs). This information is used every day to shape policy and decision-making. Many of these metrics are publicly reported on social media, the MTA's website and during public meetings. Others are submitted to government oversight agencies such as the Federal Transit Administration (FTA) for inclusion in its National Transit Database (NTD).

In June 2019 the New York State Legislature passed legislation that amended Public Authorities Law (PAL), Section 1276 to require the MTA to provide an annual performance metrics report that compares NYCT and MTA railroads' performance with other national and international peer agencies. The specific metrics that the MTA includes in its annual report are:

- **Total operating cost per passenger;**
- **Total operating cost per car per mile;**
- **Maintenance cost per car per mile**;
- **Passenger journeys per total staff and contractor hours**; **and**
- **Staff hours lost to accidents**

Final peer benchmarking data typically is not available to the MTA until 11 months after the prior calendar year ends. Consequently, this annual report, the second one issued by the MTA, contains metrics data for the calendar year 2020. Major findings of this report include:

Impacts of the Pandemic: The emergence of the COVID-19 pandemic worldwide had a dramatic impact on the operations and cost structures of transit operators during 2020. That having been said, the timing and magnitude of the pandemic's impacts was varied by region, as was each operator's response. ***For that reason, benchmarking utilizing 2020 data, while still useful, is particularly challenging, and 2020 should be noted as a unique year across the board.***

NYCT Operating Costs: ***NYCT operating costs dropped in 2020, largely due to the existence of a hiring freeze. Cost per trip was the lowest among the national peer group but second costliest when compared to the international peer group.*** Cost per vehicle mile was slightly above average among the national peers and the fourth most costly when compared to the international peer group.

NYCT Maintenance Costs: ***NYCT maintenance costs were above average when compared to the national and international peer groups.*** The primary driver was NYCT's cost for asset/facility maintenance. Fleet maintenance costs were only slightly above the average.

NYCT Safety: ***When compared to the international peer group, NYCT experienced the third highest number of staff hours lost due to accidents. A significant factor is the impact of the Workers Compensation Program on employee availability. Workers compensation unavailability more than doubled between 2010 and 2019, and then grew again in 2020 due to the pandemic.***

Railroad Operating and Maintenance Costs: ***Whether measured by cost per trip or cost per vehicle mile, the railroads were among the highest when compared to the national and international peer group.***

Railroad Safety: ***When measured through number of employee staff hours lost per 1,000 work hours, the railroads' safety metrics were the least favorable when compared to the peer groups.***

NYCT and Railroad Operational Performance: An important part of benchmarking is determining whether levels of investment correlate with operational performance. For the first time, this report contains benchmarking data for a limited number of key operational performance metrics. ***NYCT on-time performance improved during 2020 but was the third lowest among the international peer group. Mean distance between failure was among the bottom half of the international peer group. At the railroads, on-time performance was first and third best among the national peer group and second and third best among the international peer group. Mean distance between failure was among the top half of the peer group.***

While some drivers of cost are driven by broader national and regional factors and therefore are beyond the control of local transit operators, others are within their ability to manage. ***MTA Chair and Chief Executive Officer Janno Lieber has emphasized the importance of benchmarking to drive efficiency and operational improvement and has tasked executive leadership to use the metrics data contained in this report as well as the broader array of data reported and evaluated every day to spur a comprehensive review of MTA practices. The MTA Office of Strategic Initiatives is working with the MTA Office of Management Budget and operating agency leadership to identify opportunities for improvement. Some of the key areas of focus are employee availability, the workers compensation program, train service schedule optimization, enterprise asset management and fleet maintenance/investment.***

PAL Section 1276 also requires that the MTA publish monthly operational performance metrics on behalf of NYCT and the railroads. The final section of this report provides links to these reports.

New York City Transit -- Subways

Benchmarking Efforts

As far as peer benchmarking is concerned, the New York City Transit Subways Division (NYCT) is a member of the Community of Metros (COMET), an international benchmarking group managed by the Transport Strategy Centre at Imperial College London. COMET, of which NYCT is a member, is made up of large and medium size metros. COMET provides NYCT with 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:

- Buenos Aires Metrovias
- Mexico City Metro
- Montreal Metro
- Newcastle Tyne and Wear Metro
- Metro de Santiago
- Metro Sao Paulo
- Ottawa OC Transpo
- Metro Rio
- Toronto Subway
- Vancouver SkyTrain
- Metro de Barcelona
- Berlin U-Bahn
- Brussels Metro
- Istanbul Metro
- Lisbon Metro
- London DLR
- London Underground
- Metro de Madrid
- Moscow Metro
- Oslo T-Bane
- Paris Metro and Paris RER
- Bangalore Namma Metro
- Bangkok MRT
- Beijing Subway
- Delhi Metro
- Dubai Metro
- Guangzhou Metro
- Hong Kong MTR
- Kuala Lumpur RapidKL Rail
- Nanjing Metro
- Seoul Metro
- Shanghai Metro
- Shenzhen Metro
- Singapore MRT
- Sydney Metro
- Sydney Trains
- Tokyo Metro
- Taipei Metro

The charts developed for this report have been anonymized in line with the confidentiality agreement. The charts are indexed to an average value and each metro is represented by a letter. To maintain the anonymization, the lettering is unique to each chart. The most current year which comparable data is available is 2020.

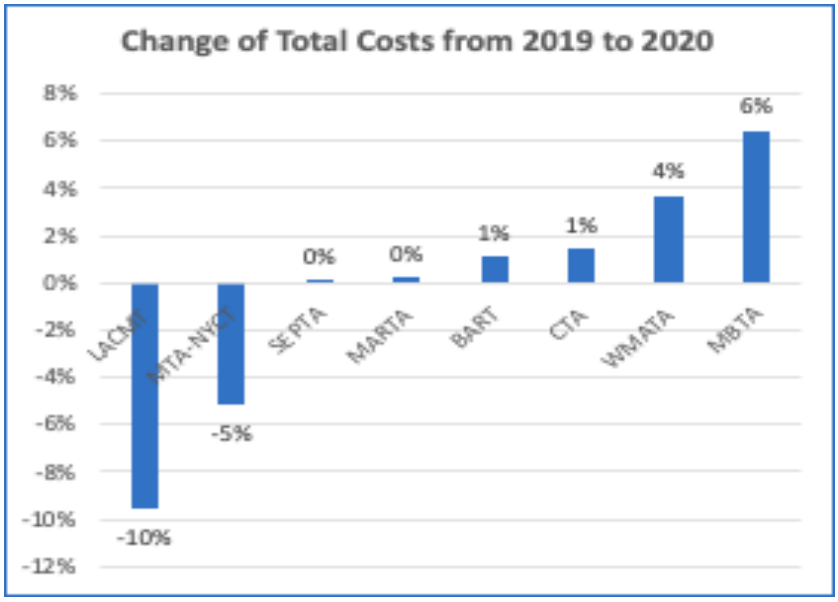
Operating Costs and Performance

2020 was a highly unusual year due to the global pandemic. While January and February were typical months in terms of costs and customer use, New York City essentially shut down in March plummeting ridership to just 10% of normal. The agency stopped running customer service in the overnight hours in order to clean trains and stations, and it hired outside firms to conduct deep cleaning of frequent touch points in the stations.

The pandemic was world-wide, but different cities had varying responses. Metros in India were forced to shut completely for more than six weeks. Taipei went for months with virtually zero cases and thus nearly normal ridership. Some Chinese metros expanded track and added stations and thus increased their ridership. While regulations in the United State also varied between cities, there is more similarity in the regulatory environment and labor market. These factors and others make 2020 data comparisons and benchmarking interesting, especially when evaluating pandemic response, but less meaningful in assessing efficiency in a normalized environment.

NYCT reduced its operational costs (maintenance, operations, administration) in 2020 as compared to 2019. While service reductions had a modest impact, the decrease was largely due to the implementation of a general hiring freeze during the pandemic. As displayed in the table below, across the country, one other agency also reduced its total costs, two agencies held relatively steady, two experienced cost increases less than inflation and two experienced increases rate greater than the rate inflation. These varying results reflect the different approaches each agency took to the pandemic.

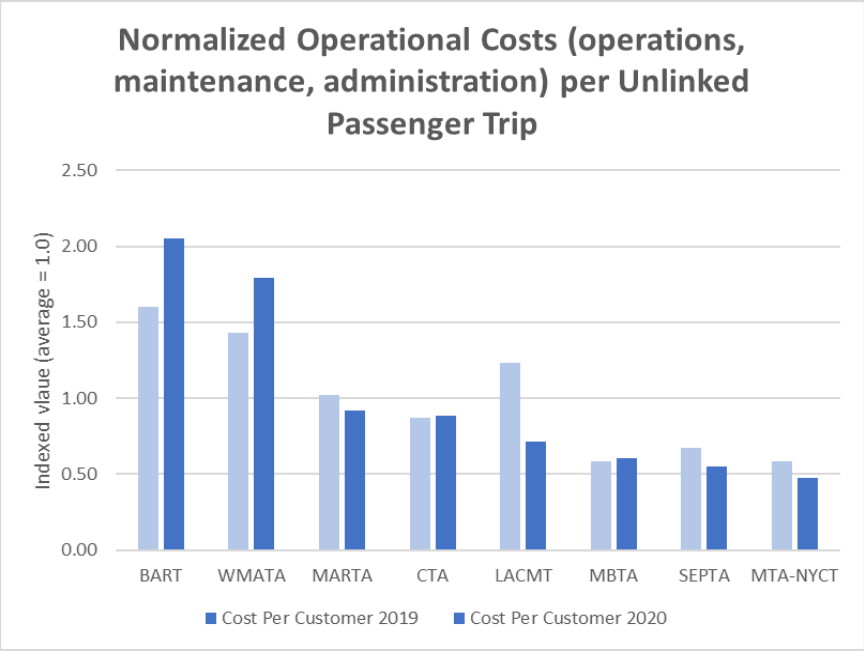
Operational Costs (National Peers)



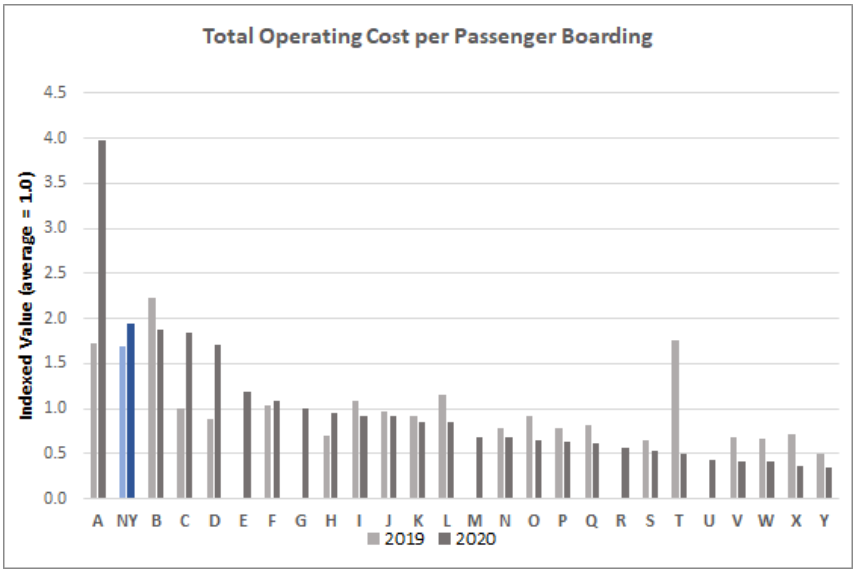
In addition, it is important to note that in 2017-2018, the New York State Legislature recognized the need for increased investment in the subway system to improve operational performance and the customer experience. The initial $830 million program was followed-up with an ongoing $300 million in dedicated annual funding from surcharges on for-hire vehicle rides. While this investment is reflected as an increase in maintenance costs, it is key to maintaining and improving the subway system. One of the goals of the Program is to improve service reliability and reduce the need for overtime related to late trains and extended tours for operating crews.

One important metric used to compare the efficiency of Metros is operating cost per passenger trip. The NTD collects data based on unlinked passenger trips. Compared to its national peers, NYCT excelled. **In both 2019 and 2020 NYCT had the lowest cost per unlinked trip of any domestic agency.** All agencies experienced greatly reduced ridership in 2020, and hence cost per passenger increased in 2020. Yet, NYCT's increase was the lowest of any agency. Compared to its international peers, however, NYCT is the second most costly. NYCT is one of a group of five agencies that have similar costs - all 75%-100% above the international average.

Operational Costs per Passenger Trips (National Peers)

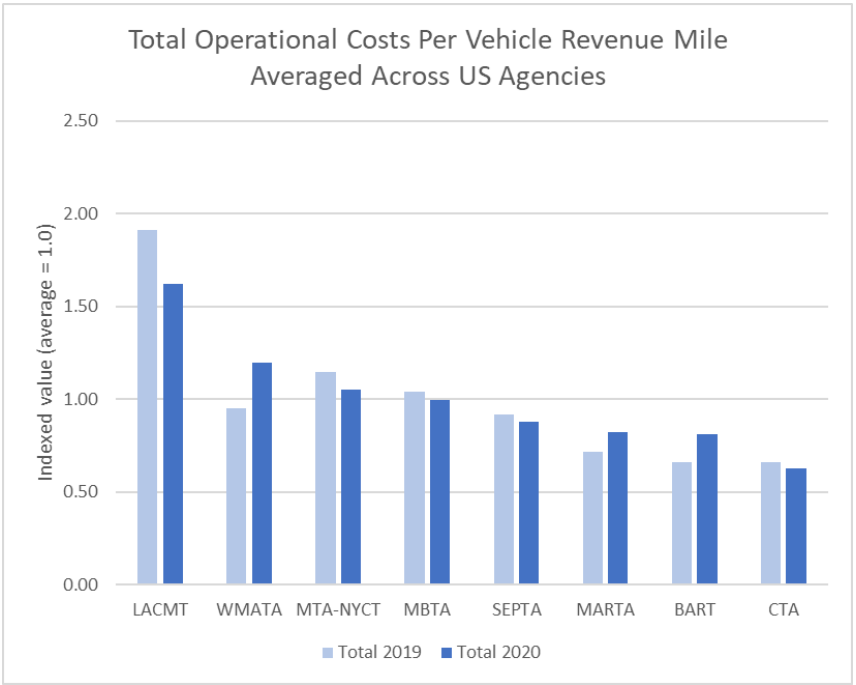


Operational Costs per Passenger Trips (International Peers)

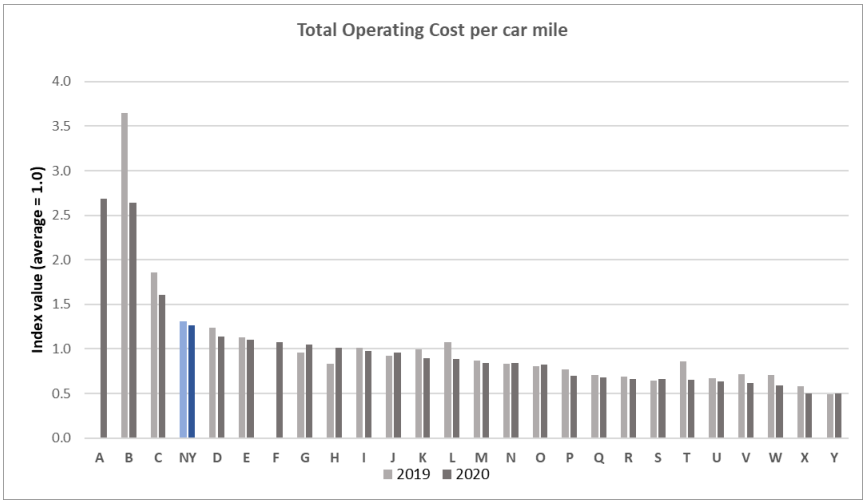


The next two graphs show total operational costs per vehicle revenue miles (includes operating costs and maintenance costs and does not include capital costs). Compared to other agencies across the country, NYCT's costs are just slightly above the average in both 2019 and 2020. NYCT is the fourth most expensive using this metric when compared to international counterparts. Also note in 2020, costs per VRM dropped as compared to 2019 – this was primarily attributable to the impacts of the hiring freeze.

Operational Costs per Vehicle Mile (National Peers)

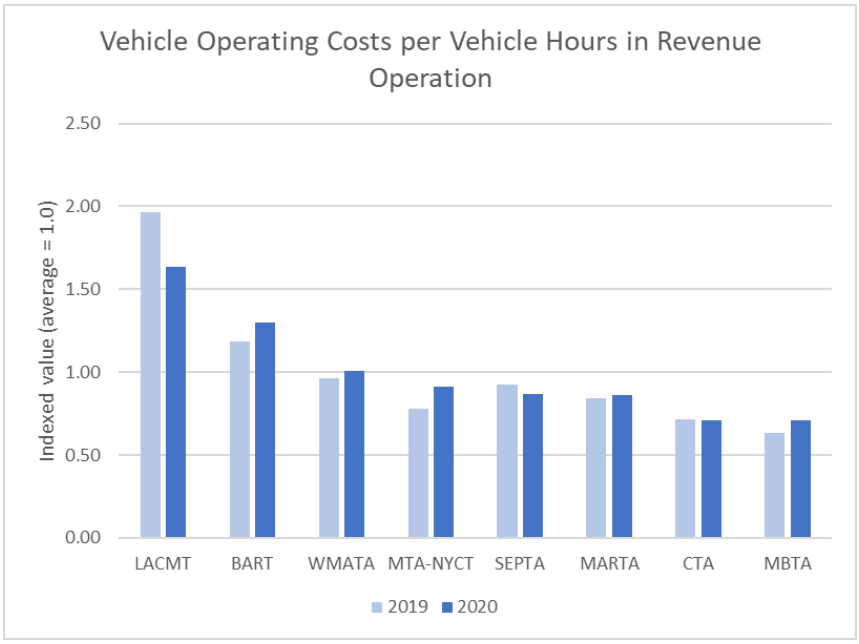


Operational Costs per Vehicle Mile (International Peers)

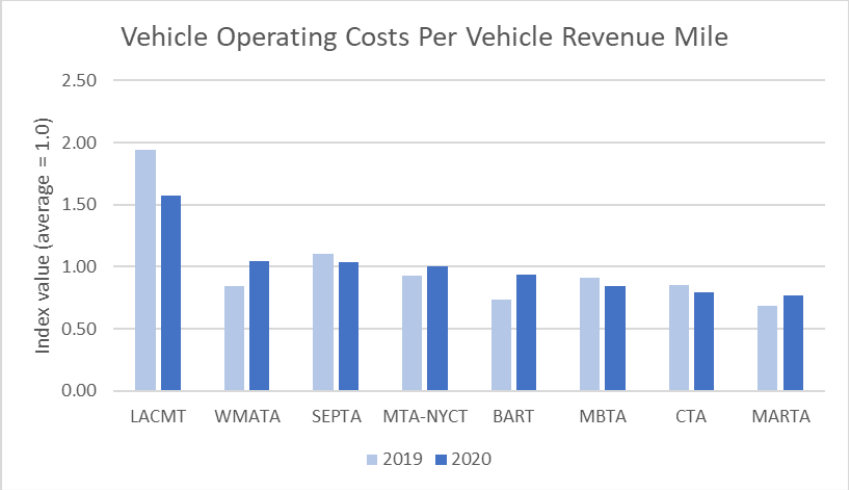


This report also depicts the operational costs excluding maintenance costs. Below are two measures of operating costs. The first shows operating costs per vehicle hours of operations. The second shows costs per vehicle miles travelled. NYCT shows both because nearly all operating costs are labor. Thus, hours of revenue service is a somewhat better measure than vehicle miles travelled. NYCT is slightly less costly than the national average in both measures.

Operating Costs (Excluding Maintenance) per Vehicle Hours (National Peers)



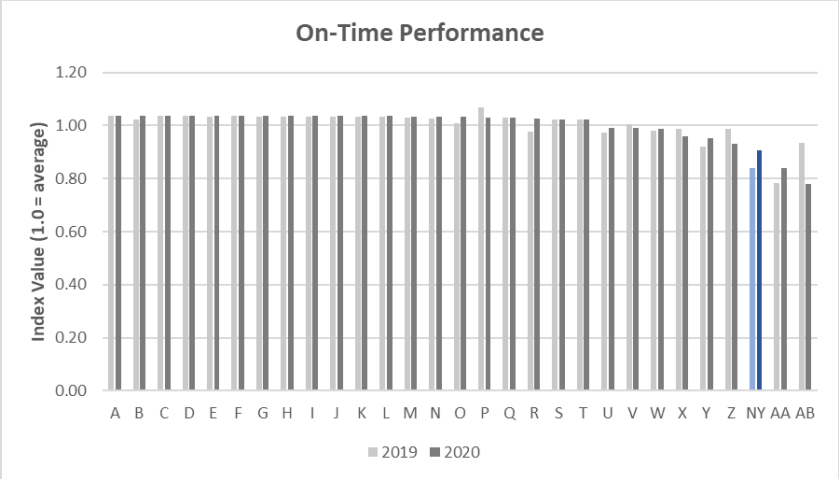
Operating Costs (Excluding Maintenance) per Vehicle Mile (National Peers)



NYCT is engaged in many efforts to contain operating costs. One of these is developing train schedules that are as efficient as possible, while also ensuring reliable operations. In 2021 and 2022, NYCT is capitalizing on the results of the SPEED initiative to lift speed limits, calibrate timed signals, and adopt optimal operation techniques to reduce scheduled running times on selected lines. In addition to speeding up trips for passengers, the reduced running times allow for more efficient use of crews and reduced operating costs.

An important part of benchmarking is determining whether levels of investment correlate with operational performance. NYCT monitors and evaluates a myriad of operational metrics. For the purpose of this section of the report, NYCT displays on-time performance. While NYCT OTP has improved over the last two years, it still is the third lowest among the international peer group. There are multiple drivers of OTP, many of which that do not pertain solely to the level of investment. Still, NYCT continues to engage peers to learn from their experiences and consider updated practices when relevant. National peer data was unavailable in time to include in this report.

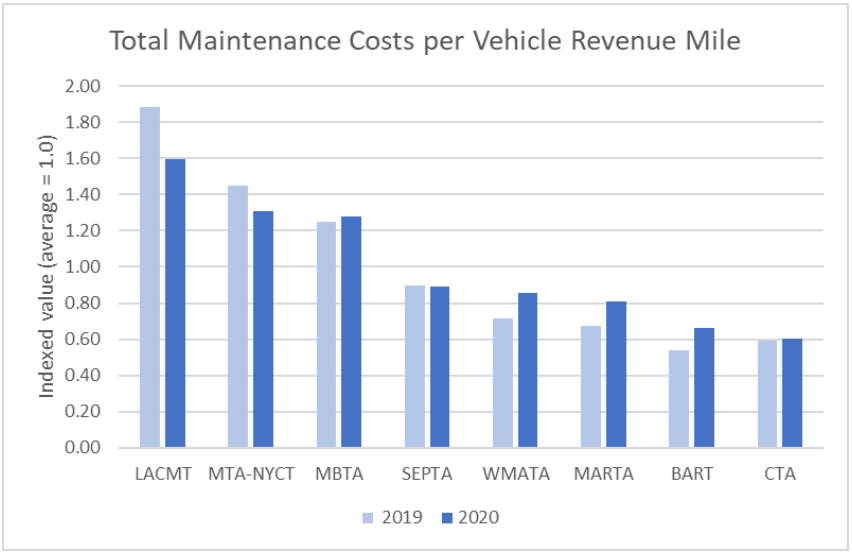
On-Time Performance (International Peers)



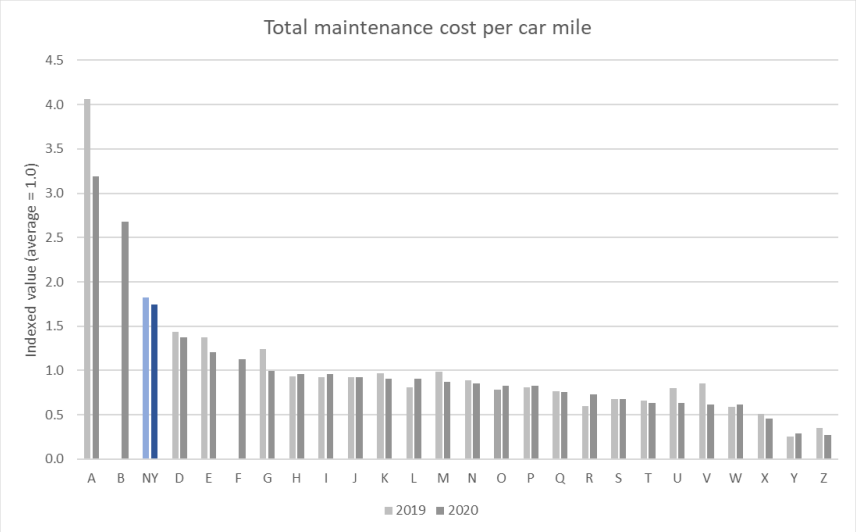
Maintenance Costs and Performance

As can be seen in the graphs below, total NYCT's maintenance cost per revenue mile was above the national and international average in both 2019 and 2020. To get a better sense of the drivers of maintenance costs, this report includes two additional graphs that differentiate between train car maintenance and facility maintenance (tracks, signals, tunnels, structures). These graphs demonstrate that NYCT has just above average costs among national peers when it comes to train car maintenance, but significantly higher costs when it comes to facility maintenance.

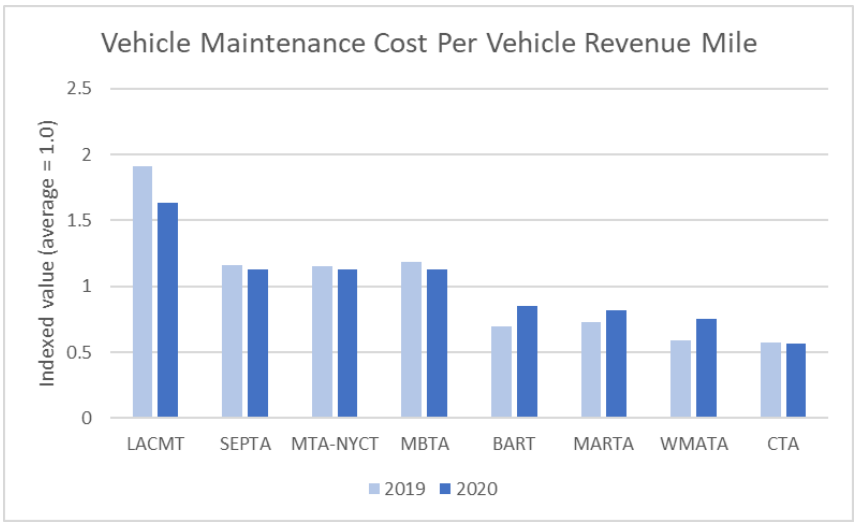
Maintenance Costs per Vehicle Mile (National Peers)



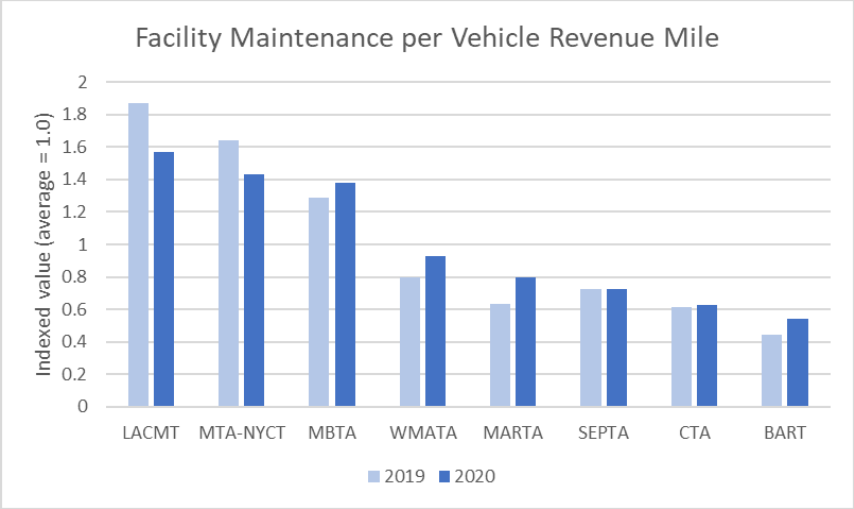
Maintenance Cost per Vehicle Mile (International Peers)



Fleet Maintenance Costs per Vehicle Mile (National Peers)



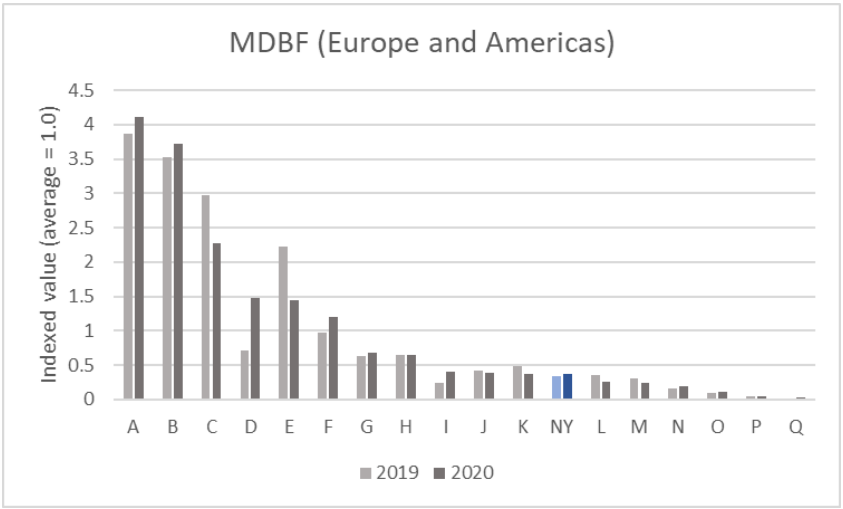
Facility Maintenance Costs per Vehicle Mile (National Peers)



While car types and ages vary across all agencies and many including NYCT have multiple manufacturers of train cars, the fact that car maintenance takes place in yards and shops, where there is no possible conflict with customer service, appears to make NYCT's costs closer to average.

One way to evaluate the impacts of train car maintenance investment is through the metric of mean distance between failures (MDBF). The graph below shows seventeen European, North and South American metros. NYCT's performance in MDBF is among the lowest in the peer group. This data serves as an impetus of NYCT to assess its maintenance practices versus peers and apply lessons learned.

Mean Distance Between Failure (International Peers)



For facility maintenance, NYCT has the second highest costs per vehicle revenue mile. The combination of the age of the system, the complexity of track and signal system and the number of stations itself

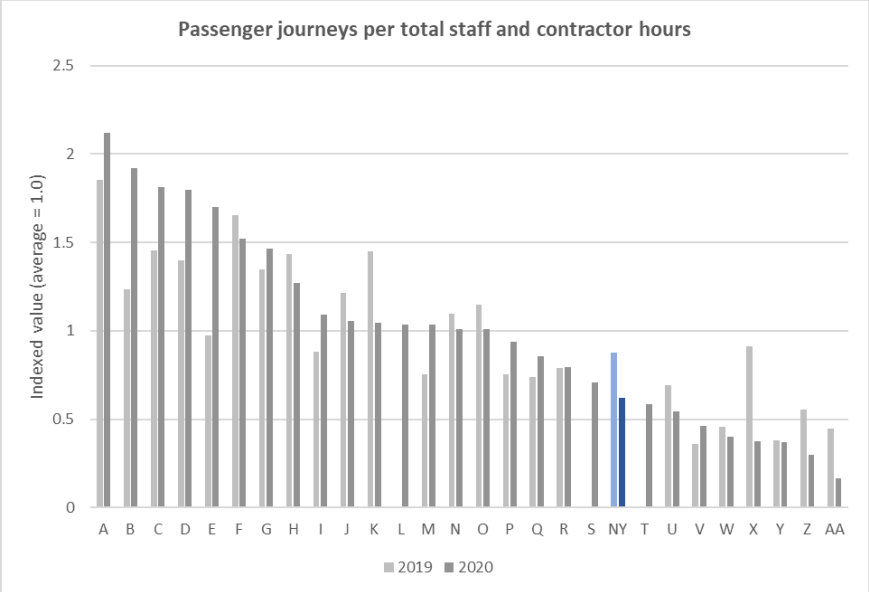
contributes to higher expense levels than many counterparts. Compounding these factors is the system's 24-hour service commitment, providing short and inefficient windows of opportunity to perform in system maintenance in the overnight hours. In comparison, all other national peer agencies close overnight, allowing for efficient maintenance to occur.

The MTA is in the midst of a long-term effort to adopt Enterprise Asset Management practices systemwide. NYCT is in the final phases of the rollout of its new system that will provide real-time data using hand-held devices for inspection and maintenance data. This in turn will be made available in dashboard format to inform managers of areas in need of additional focus, areas where results demonstrate positive results. The use of mapping tools will enable managers to better plan work and improve efficiency. NYCT expects that all major assets will be integrated by the end of 2023.

Labor Costs

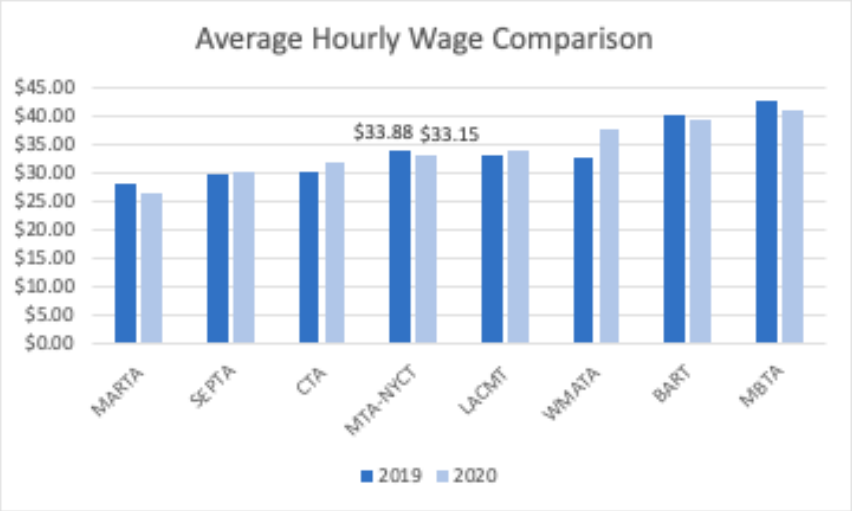
A critical driver of cost across all expenditure categories is the price of labor, including wages and fringe benefits. NYCT provides slightly under the average number of passenger journeys per total staff and contractor hours among international peers. Due to the sharp decline in passenger journeys in 2020 as a result of the pandemic, the number decreased greatly in 2020.

Passenger Journeys per Staff and Contractor Hours (International Peers)



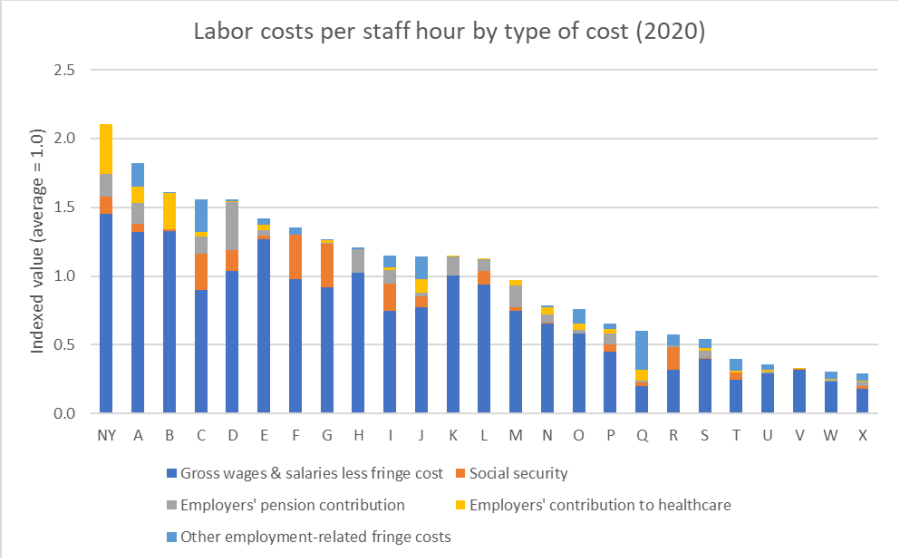
The graphs below generally show that NYCT labor costs are more expensive than the international peers but on par with the national peers.

Average Hourly Wages (National Peers)



Part of what makes both NYCT and other U.S. peer labor costs greater than international peers is health insurance, which are covered by the government in most other global countries. The following graph shows that health insurance is the highest labor expense aside from wages and salaries for NYCT.

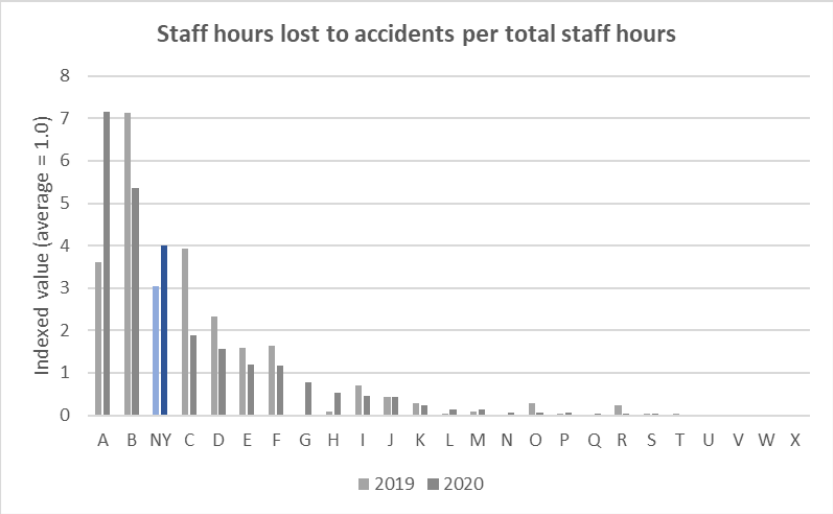
Labor Costs by Type (International Peers)



Employee Safety

When compared to international peers, NYCT had the third highest proportion of staff hours lost per total staff hours in 2020. There is a large range in this data 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.

Staff Hours Lost to Accidents (International Peers)



One of the key drivers of staff hours lost at NYCT is the workers compensation program. The average number of unavailable days due to workers compensation/injured on duty causes more than tripled between 2010 and 2020, from 2.65 days to 9.63 days. The MTA estimates that each one-day change in NYCT hourly employee average availability costs $17 million annually. To address the number and duration of employee unavailability, in June of 2019 the Workers' Compensation Division implemented a new, comprehensive litigation model to address meritless and excessive schedule loss of use ("SLU") claims (which may or may not relate to lost time from work) being filed with an increasing frequency. The WCD provided training and continuing oversight of outside counsel regarding the litigation of these claims. For the 12-month period prior to the implementation of the litigation model, the average amount of monthly SLU payments was $2.4 million. With the implementation of the litigation model, the average amount of monthly SLU payments from July 2019 through December 2019 was reduced to just under $1 million - a substantial reduction from the benchmark. WCD continues to focus on this initiative to drive improvement.

Efforts to curtail lost time are numerous. One of the more recent ones is the production of a joint labor/management safety task force. That group recently approved of the use, in certain instances, of a train as a safety barrier, instead of individuals flagging. This reduces the number of workers placed in traffic to provide a safe work area, thereby helping to improve the efficiency and reduce the cost of maintenance work on the track.

MTA Railroads

Performance measurement and the focus on key metrics is an important component of the management strategy of the MTA's railroads. Much of the work involves the daily review of performance, but equally important is understanding how MNR and LIRR compare to national and international peers. For this reason, the MTA railroads routinely share data with other operators, whether it's on an "informal" staff basis or through membership in groups such as the American Public Transportation Association (APTA), the Commuter Rail Coalition (CRC) or the International Suburban Rail Benchmarking Group (ISBeRG). The MTA's two railroads are founding members of ISBeRG, which is managed by the Transport Strategy Centre at Imperial College. ISBeRG's principal aim is to identify and share best practices in a confidential environment. Through ISBeRG, members share comparative KPI data and conduct in-depth benchmarking studies on issues of shared interest. ISBeRG also offers an online forum for immediate inquiries to members about specific issues and strategies.

While it is true that benchmarking provides useful insights, it is also important to acknowledge that significant differences exist among the railroads that pose challenges for drawing apples-to-apples conclusions, particularly when it comes to comparisons with international peers. Differing local economies, prevailing wages and collective bargaining agreement provisions can 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. Together these factors have also have a significant impact on relative cost structures.

The MTA railroads use benchmarking information developed through ISBeRG, such as KPI data and in-depth study findings, to identify best practices and inform decision-making. Benchmarking provides comparative information across all aspects of operations and support, including safety, service quality, and cost-effectiveness, which enables the railroads to assess how current and future programs and plans align with those findings. The data reveals that there are several key opportunities to reduce costs including modernizing the fleet, applying effective fleet maintenance, proactively addressing right of way maintenance, and improving employee availability. These are among the key principles of the LIRR Forward Program and MNR's Way Ahead Plan, each of which focus on conducting enhanced preventative maintenance to improve service reliability and reduce costs in the long term. The benefits of these investments have been evident on both railroads in recent years with improved on-time performance (OTP) and increased mean distance between failures (MDBF) for rolling stock.

For comparison of MNR and LIRR operations and costs to domestic commuter rail systems, the Federal Transit Administration (FTA) collects operating and financial data for its annual National Transit Database (NTD). In this report, MNR and LIRR data is compared to the following peer systems in NTD:

- New Jersey (NJ Transit)
- Chicago (Metra)
- Philadelphia (SEPTA)
- Boston (MBTA)
- Los Angeles (Metrolink)

For comparison to international commuter rail systems, MNR and LIRR data is provided to ISBeRG, an international benchmarking group for suburban rail operators. ISBeRG uses different definitions for the required benchmarking data than that of COMET and NOVA. Also, even though NTD and ISBeRG metrics have overall similarities in definition, there are sometimes differences in the underlying data. These differences may result in metrics that, on view, are not comparable between the two peer groups.

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

- JR East (Tokyo)
- Sydney Trains (Sydney)
- Metro Trains (Melbourne)
- Ferrocarrils de la Generalitat de Catalunya (Barcelona)
- Queensland Rail (Brisbane)

The ISBeRG charts developed for this report have been anonymized and indexed to the average, in line with the confidentiality agreement. To maintain anonymization, the lettering is unique to each chart. The most current year which comparable data is available is 2020. It is important to note that conducting metrics benchmarking versus international peers is difficult because each commuter railroad operates in a unique environment with widely varying mandates and service standards, and within dramatically different economies that affect labor and non-labor unit costs.

Operating Costs and Performance

2020 was a highly unusual year due to the global pandemic. The pandemic was world-wide, but different cities had varying responses. This makes 2020 data comparisons and benchmarking interesting, especially when evaluating pandemic response, but less meaningful in assessing efficiency in a normalized environment.

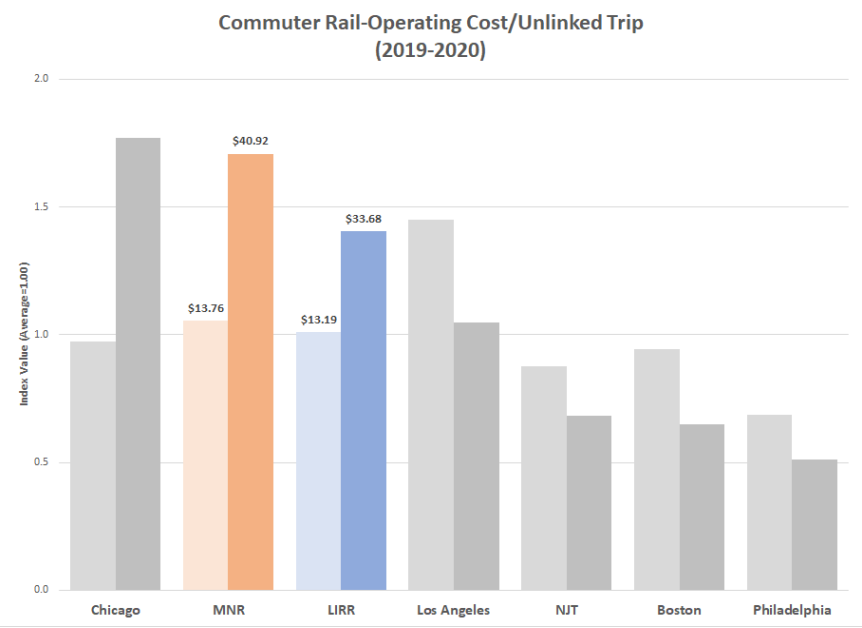
At the beginning of 2020, MNR and LIRR performance was on an upward trajectory, with many key service indicators reaching seven to eight-year highs. As of January 2020, both railroads were reporting record ridership, slightly above January of the prior year, with LIRR at 7.2 million rides for the month and Metro-North at 7.0 million rides. On January 30, 2020, the World Health Organization (WHO) declared the Covid-19 outbreak a global health emergency, and in March New York State declared a state of emergency in New York as the pandemic spread. Over the subsequent months, the MTA railroads' operations, ridership, and finances were severely impacted by the crisis. One month after the emergency declaration MNR's ridership was down 95 percent and LIRR's was down 97 percent. Despite loss of ridership and plummeting revenues the MTA continued to provide critical transportation services at near-normal levels, supporting lifesaving public services, moving essential workers to wherever they were needed, and helping to keep the regional economy up and running. The unprecedented drop in ridership and traffic across all agencies brought a dramatic decline in MTA revenues for 2020. In 2020, MNR operated at approximately 63% of pre-pandemic weekday service during the latter half of the year and LIRR provided approximately 90% of pre-pandemic weekday service. These service reductions impact many of the operational metrics for 2020 for both MNR and LIRR. It is also important to note that neither LIRR or MNR reduced operations or

maintenance staff due to the pandemic. The year-to-year operating costs remained relatively constant for both railroads.

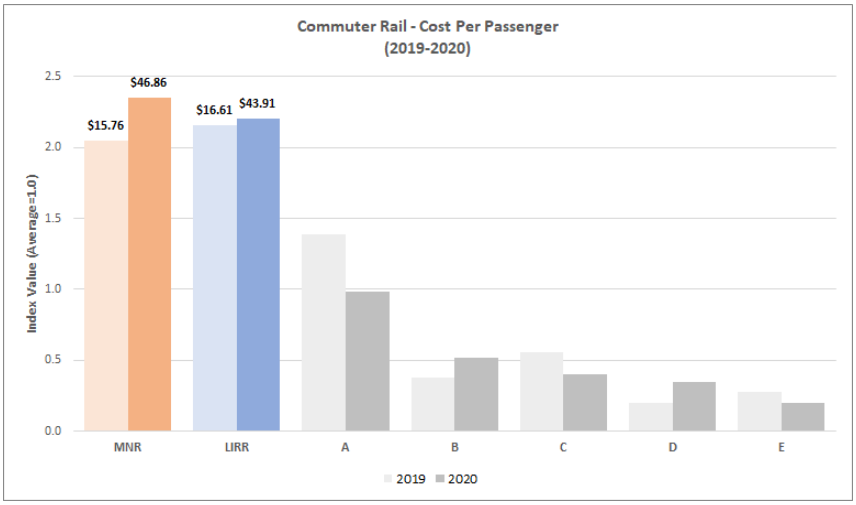
As shown in the following graph, among the seven national peer operators, the LIRR and MNR rank second and third highest when measured by average operating cost per trip. They are the highest when measured by cost per vehicle mile. As defined in the NTD, total operating costs include all train service, maintenance and administrative expenses. Some of the most significant operational factors that drive costs at MNR and LIRR include:

- Hours of Operation: LIRR provides 24 hours of service 7 days per week, and MNR provides 20-22 hours of service 7 days a week
- Ungated System: Neither LIRR nor MNR operate gated systems, therefore they require onboard fare validation/collection
- Branch Service: Both LIRR and MNR run service to and from a central business district (New York City) and do not have ability to offer through-running service
- Electrification: Both LIRR and MNR operate over both electrified and non-electrified territory, thereby requiring both electric and diesel fleets

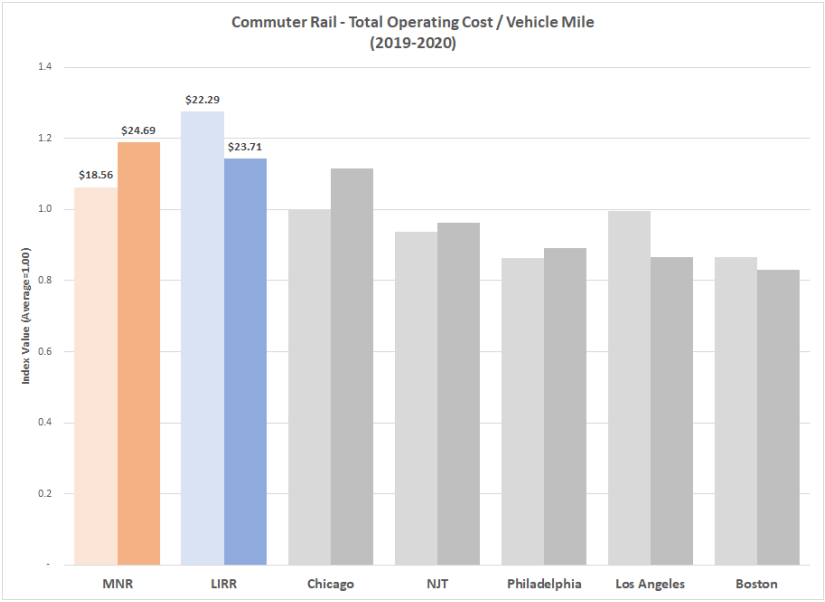
Operating Cost per Unlinked Trip (National Peers)



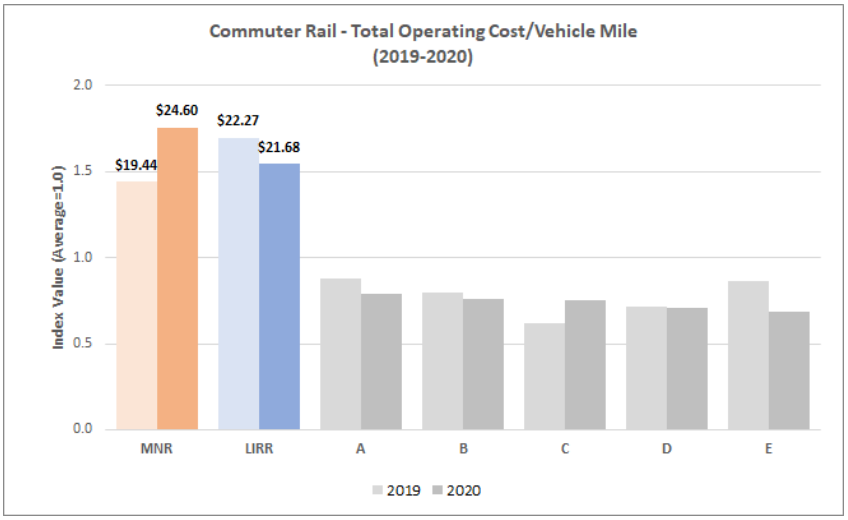
Operating Cost per Passenger (International Peers)



Operating Cost per Vehicle Mile (National Peers)



Operating Cost per Vehicle Mile (International Peers)



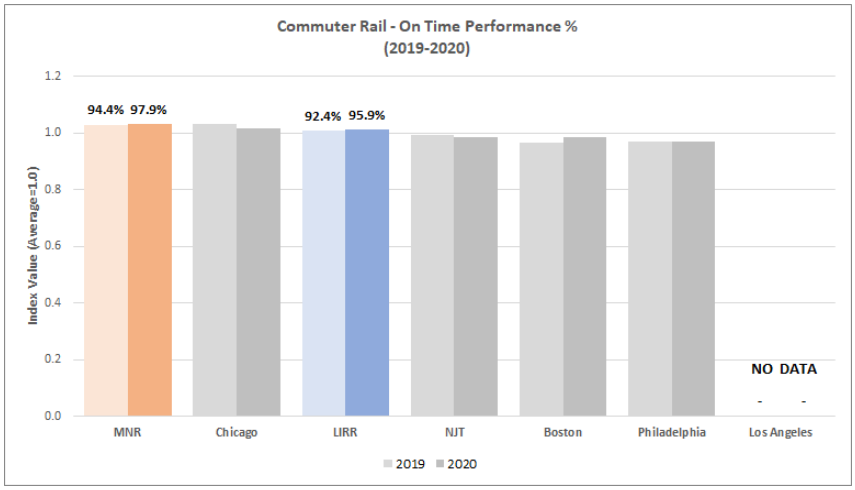
The graphs above demonstrate that the two MTA railroads have the highest total operating cost per trip and per vehicle mile of the selected NTD and ISBeRG peers. There are many reasons for this variance, some of which are operational in nature and some of which are financial in nature.

From the operational perspective, MNR and LIRR operate in an ungated environment, which currently entails additional onboard train crew staffing to validate and collect tickets. This contrasts to most of the ISBeRG peer agencies, which have gated or proof-of-payment systems that do not require this level of staffing. The two railroads fall more in line with peer agencies when factoring this out of benchmarked agency operating costs.

Another consideration is that many international rail systems feature through-running from one branch to another through their Central Business District (CBD), offering an efficient operating environment. In contrast, MNR and LIRR run terminal service operations into New York's CBD, which requires making additional non-revenue train moves and drives up costs.

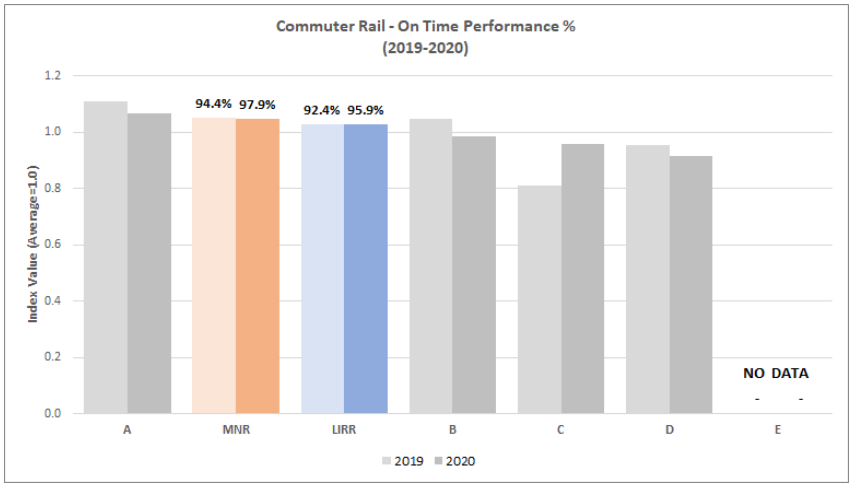
An important part of benchmarking is determining whether levels of investment correlate with operational performance. The MTA railroads monitor and evaluate a myriad of operational metrics. For the purpose of this report, they display on-time performance. In both peer groups, MNR and LIRR are among the top three in on time performance. The 2020 values for MNR and LIRR show improvement partly as a result of operating fewer trains due to the loss of ridership in the early months of the COVID-19 pandemic.

On Time Performance % of Scheduled Trains (National Peers)



Source: This information is not available via the NTD process. These On Time Performance measures are from agency published information. Los Angeles (Metrolink) does not provide on time performance information.

On Time Performance % of Scheduled Trains (International Peers)



Peer E does not provide this data to ISBeRG

LIRR's operational metrics saw improvements across the board, attributable both to infrastructure improvements and to the year's reduced ridership and service levels. "On-Time Performance" (OTP) for 2020 was 95.9 percent, a 3.5 percent increase from the previous year. MNR recorded similar gains in its operational metrics from both infrastructure improvements and reduced service levels. MNR's On-Time Performance (OTP) for 2020 was above goal at 97.9 percent. The Hudson Line performed at 98.2 percent OTP, the Harlem Line at 97.8 percent, and the New Haven Line at 97.8 percent.

The LIRR's Capital Program is making crucial investments in rolling stock to maintain and improve safety, reliability, and customer convenience. Major Rolling Stock projects that are already underway and will impact the LIRR's operating environment over the next several years include:

- Purchase of 202 M9 electric cars to eventually replace the aging M3 fleet and expand service. As of December 2021, 114 cars have been Conditionally Accepted with all 202 cars scheduled to be accepted by the 4th quarter of 2022;
- Purchase of 54 M9 option cars to continue the expansion of LIRR fleet. Negotiations with the M9 car builder are ongoing; and
- Purchase of up to 10 work locomotives to replace an aging fleet that is very expensive to maintain and has low reliability. Procurement is ongoing and is trending to a 3rd quarter 2022 award.

In addition to the Rolling Stock projects that have commenced or are scheduled to be underway by 1st quarter 2022, the LIRR's Capital Program also includes funding for the following fleet projects:

- Purchase of 160 M9A electric cars for ESA service.
- Purchase of 30 coaches and up 10 Dual Mode Locomotives to address service needs and ridership growth and LIRR's non-electric fleet service

Separately, the LIRR has begun a study to determine the feasibility of being the first in the nation to use battery-operated trains in the non-electrified territory. This may result in significant environmental and customer service improvements across the LIRR.

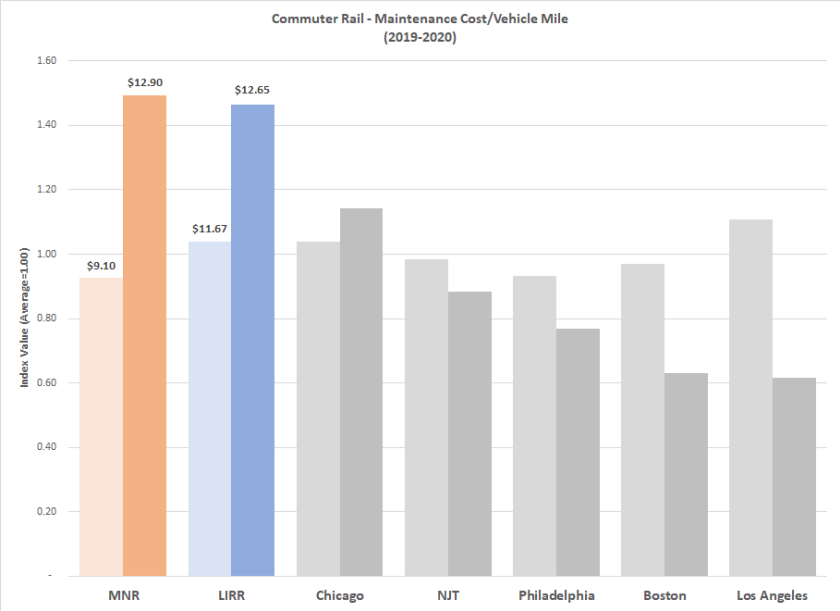
MNR has the following rolling stock acquisitions in process, both of which are included in the 2020-2024 Capital Program:

- Purchase of additional 66 M8s for use on the New Haven Line. Delivery of all 66 new M8s are currently estimated by June 2022.
- In December 2020, MTA Board approved a contract with Siemens Mobility Incorporated to purchase 27 new locomotives to replace 27 existing Genesis P32s owned MTA/MNR. Also, the Connecticut Department of Transportation is participating in this contract to obtain 5 new locomotives to replace their Genesis P32s that are used in the Metro-North system.

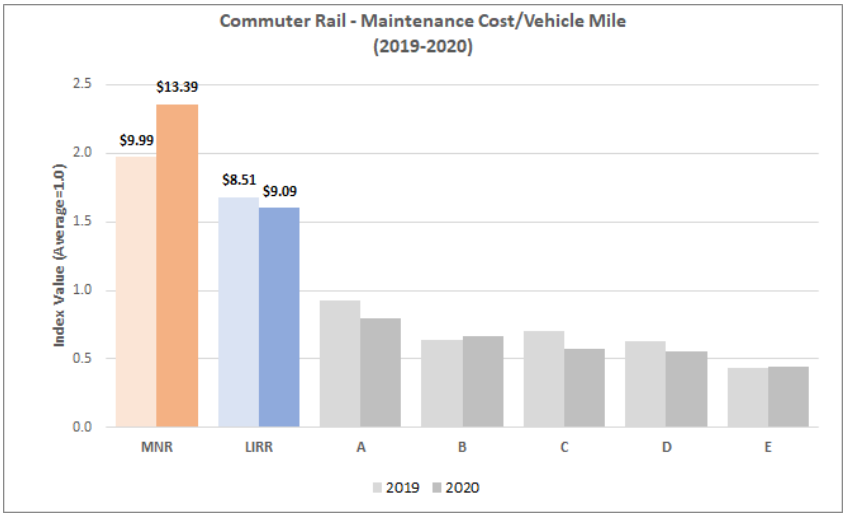
Maintenance Costs and Performance

The following graphs demonstrate that LIRR and MNR have the highest maintenance costs per vehicle mile among the peer groups. Maintenance costs fall into two primary categories: those pertaining to the fleet and those pertaining to right of way infrastructure. FRA Regulations require more frequent inspections of train equipment and infrastructure, which drives up maintenance and total operating costs.

Maintenance Cost per Vehicle Mile (National Peers)



Maintenance Cost per Vehicle Mile (International Peers)



A primary driver of fleet maintenance costs at both MTA railroads is that they operate multiple fleet types, each with their own set of components, facilities and maintenance requirements.

For example, the LIRR operates an M3 electric fleet that is over 30 years old, an M7 fleet that is approaching 20 years old, a C3 diesel coach fleet that is just under 25 years old, and a fleet of diesel locomotives that is also approaching 25 years old. It was not until 2020 that the first new M9 cars started arriving on the property and being placed into service.

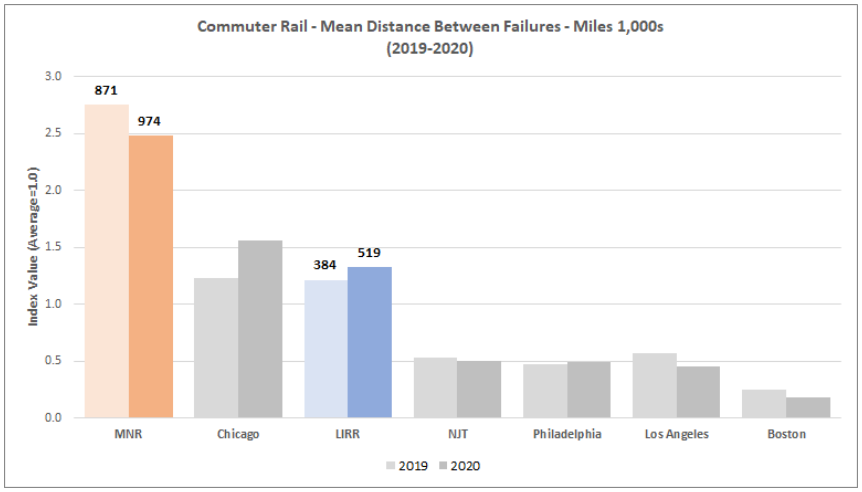
MNR also uses M3s and M7s on its Hudson and Harlem lines that are comparable in age to LIRR. MNR received a fleet of M8s for the New Haven Line that arrived in the early 2010s. The M8s have dual power

modes utilizing third rail as well as overhead catenary. Finally, MNR utilizes dual-mode diesel locomotives for non-electrified territory at the outer reaches of the service area. Each fleet type is scheduled for maintenance events at various shop and yard locations. Daily inspections and brake tests are performed, in addition to 92-day, 180-day, 1-year interval maintenance events.

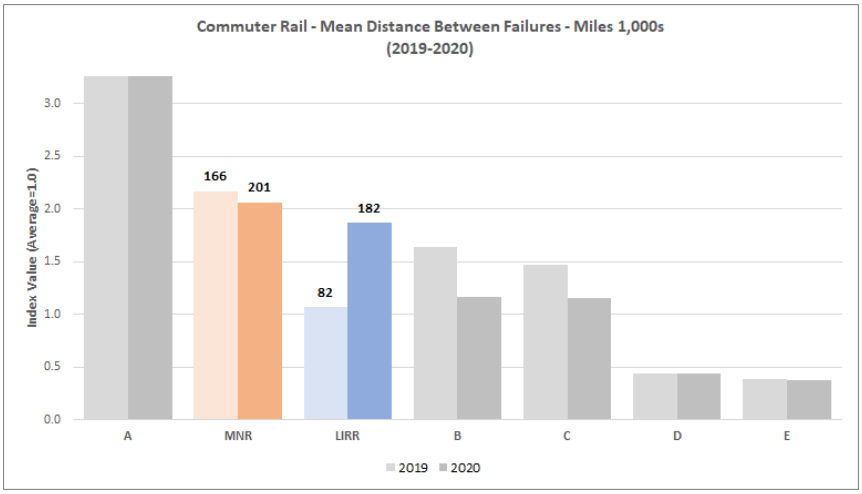
Right of way maintenance costs at MNR and LIRR are largely driven by the railroads' strong commitment to maintaining their infrastructure assets in a state of good repair. This requires the dedication of substantial in-house staff resources including trackworkers and signal workers.

As noted earlier in this report, an important part of benchmarking is determining whether levels of investment correlate with operational performance. The MTA railroads monitor and evaluate a myriad of maintenance-related metrics. For this report, they focus on mean distance between failure. Both NTD and ISBeRG use different data measures to define a reportable rolling stock mechanical failure, impacting the absolute value used in the peer comparisons. The benchmarking values also differ to the actual reported MDBF values published by LIRR and MNR in their own reports. The charts below show that the MTA railroad first and third best among the national peer group and second and third best among the international peer group.

Mean Distance Between Failures, Miles Thousands (National Peers)



Mean Distance Between Failures, Miles Thousands (International Peers)



Peer A's indexed result is many multiples higher than the rest of peer group average

In 2020, LIRR's "Mean Distance Between Failures" (MDBF) jumped by 29.8 percent to an agency-published 241,175 miles from 185,829 miles the previous. The MDBF improvement was due largely to the retirement of low-performing M3 railcars and addition of new M9 cars, as well as the reduced service levels. The railroad continues to optimize fleet performance through its Reliability Centered Maintenance (RCM) program, Enterprise Asset Management (EAM) implementation, acquisition of the new M9 fleet, and other operational initiatives.

MNR's MDBF also improved in 2020, largely due to the warranty correction of new PTC equipment, which had generated equipment failures the prior year. MNR-published MDBF was 278,951 miles in 2020, which is a new record high. Completion of PTC equipment installations also improved car availability in 2020, resulting in a 99.9 percent "consist compliance rate," which is the percentage of cars required for daily service and customer seating.

The fundamental approach that the MTA railroads take toward fleet maintenance is Reliability-Centered Maintenance (RCM) - a process used to determine the maintenance requirements of rolling stock in its operating environment. The key principle of RCM is to evaluate the performance and life cycle of asset components and to perform scheduled maintenance at a frequency that corresponds to this information rather than per the schedule by original manufacturers.

The adoption of the RCM principles and procedures by LIRR has enabled it to optimize the maintenance plans for increased reliability and resource efficiencies. RCM procedures have contributed to the fleets' improved performance as measured by Mean Distance Between Failure (MDBF), Mean Distance between Component failure (MDBCF) and On Time Performance (OTP). The RCM program has resulted in the LIRR being able to extend fleet maintenance repairs including those related to the Heating/Ventilation/Air-Condition System (HVAC), air brakes, batteries and couplers.

In 2019, LIRR modified an M3 train with laser technology to mitigate the negative effects of the leaf season on train performance in the fall. By utilizing the laser technology and two high-pressure washer trains with increased pressure from 4,000 to 20,000 psi the Railroad could effectively cover more territory daily. These innovative approaches have made a big difference by reducing the low adhesion related train delays as compared to the same period in the previous year.

MNR's Maintenance of Equipment Department produces and executes an annualized Maintenance Plan, which in turn supports the 20-Year Rolling Stock Plan. RCM at Metro-North Railroad is applied to assure the design level of reliability, safety and regulatory compliance. Evaluation and adjustment of the Maintenance Plan to improve rolling stock availability and performance is achieved through continuous assessment. Reliability Centered Maintenance has contributed to the MNR fleets' improved MDBF and Consist Compliance.

Right of way maintenance is also a major target of investments. The LIRR is taking several important steps to perform infrastructure maintenance more cost effectively with an eye toward improving service reliability. For example, the LIRR increased the frequency of rail safety tests performed by a Sperry Rail Car, a train car fitted with ultrasonic and induction test equipment designed to detect internal rail defects that are not readily visible from two times per year to three times per year. These investments have produced positive results, as the number of train delays caused by infrastructure defects and failures dropped dramatically.

Over the last couple of years, there has been an unprecedented increase in major construction projects (mainline third track between Floral Park and Hicksville, double track between Farmingdale and Ronkonkoma, East Side Access, etc.) along the right of way resulting in full branch extended weekend shutdowns. The LIRR has taken advantage of these continuous shutdowns to perform maintenance work as well. The full weekend shutdowns allow the maintenance employees to be significantly more productive.

As part of LIRR Forward, the right of way maintenance group has proactively rebuilt priority switches, rails and track circuits to reduce unplanned maintenance. The LIRR has also been proactive in working with PSEGLI to replace over 200 PSEGLI utility poles.

MNR's updated strategy launched in Summer 2021, called Way Ahead – Moving Forward, includes a commitment to accelerating maintenance and major rehabilitation projects to support safe and reliable train service. Plans include expansion of the SMARTRACK program (described below), partnering with MTA C&D on the first phase of the Park Avenue Viaduct Rehabilitation project, to minimize customer impacts; improving infrastructure planning and project delivery by integrating schedules for maintenance and rehabilitation projects; and advancing the cyclical replacement of rail through a new, dedicated rail gang.

MNR has continued to expand its SMARTRACK Program, in which crews undertake critical infrastructure work by strategically shutting down continuous segments of track, giving multiple work groups uninterrupted access to maintain and improve the system. As one example, MNR expedited the replacement of four track switches at a critical interlocking directly south of the Scarsdale Station (CP119) in less time than originally planned, resulting in less impact on train service and an increased improvement in the reliability of Harlem Line train service.

In addition, MNR took advantage of reduced service levels during the pandemic to provide extended work access to multiple work sites across MNR territory to improve the infrastructure. This critical work continues to increase rail service reliability by reducing infrastructure-related train delays. Examples include track rehabilitation work in Grand Central Terminal; cable installation and signal house work for the Waterbury Branch Cab Signal Project, which took advantage of bussing on the branch line because of the pandemic; acceleration of the Tree Trimming Program, which mitigates against extreme weather

events by trimming or removing trees along the MNR right-of-way that can fall on MNR tracks; installation of fiber for Positive Train Control; and multiple bridge construction projects in Mount Vernon.

Through the work of MNR's Production Tie Gang, Safety (FRA) and Maintenance exceptions were reduced considerably between the Fall 2019 and Spring 2020. Track Geometry Inspection Services (TGIS) scans results indicate MNR reduced Maintenance Exceptions by 9% and reduced Safety (FRA) Exceptions by 12% during this same period. Switch Failure Incidents decreased by 10% from the prior year's monthly average. Also, MNR recorded 1,771 miles of Ultrasonic Rail Testing in 2020, a 20% increase over the planned amount of testing. 185 rail defects were corrected as a result of this advanced testing.

MNR also deployed its own Brandt Road Rail Powered Continuous Work Platform (CWP). The CWP is made up of nine connected rail cars with an articulated digging arm and other attachments that can travel the length of the consist to load or unload materials (e.g., stone, riprap, dirt, debris) from the side of the train. The CWP is used to remove large debris, stabilize the track bed and shoreline, and expedite the restoration of passenger service after a storm. It can carry 425 tons, allowing it to distribute or remove large amounts of material quickly and efficiently. Shoreline restoration often requires the replacement and movement of ballast and large riprap, which can be very time consuming without the right equipment. Obtaining its own CWP ensures MNR has this important resource available on demand. As one example, in the aftermath of Hurricane Ida, the MNR CWP worked 24/7 for several weeks and can be credited with helping to restore passenger service more quickly.

Labor Costs

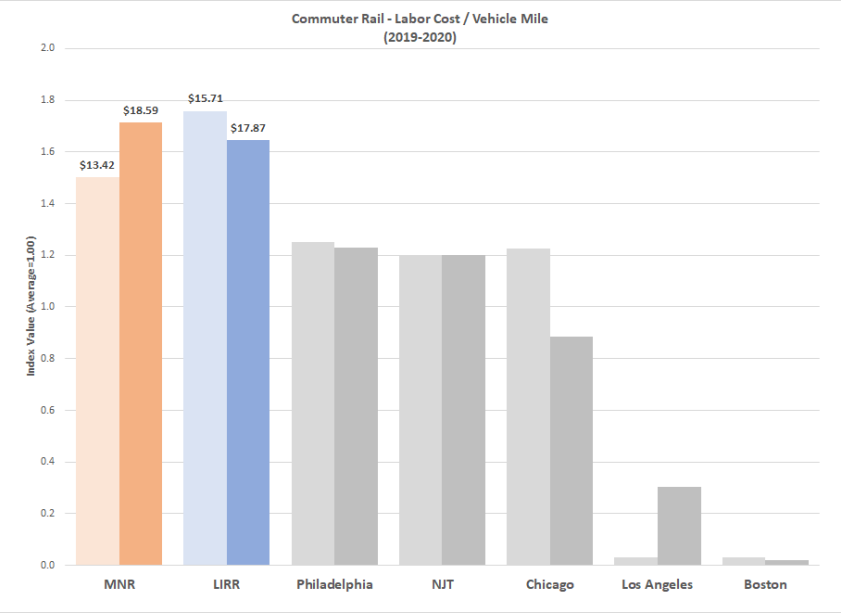
Labor-related costs including fringe benefits represent between 50 and 60% of total costs at the LIRR and MNR. As discussed earlier in this report, benchmarking labor costs among peers is challenging because costs of living differ by region, and each railroad has its own unique set of collective bargaining agreements, benefits packages and wage patterns.

As with NYCT, MNR and LIRR have high labor costs associated with New York's high cost of living and wages and health care costs. There are several factors that drive labor costs at the MTA commuter railroads including:

- Force Account vs Third Party: In many instances, the MTA railroads perform work in house rather than using third party contractors and consultants
- Unfunded Pension Liability: Labor costs at the LIRR include expenses related to covering the unfunded liability of a closed pension plan
- East Side Access: in recent years, the LIRR has begun to ramp-up staffing in advance of East Side Access opening day, which is not scheduled to launch until 2022.
- On Board Fare Validation and Collection: Since LIRR and MNR are ungated systems, they must deploy sufficient train crew staff for fare collection

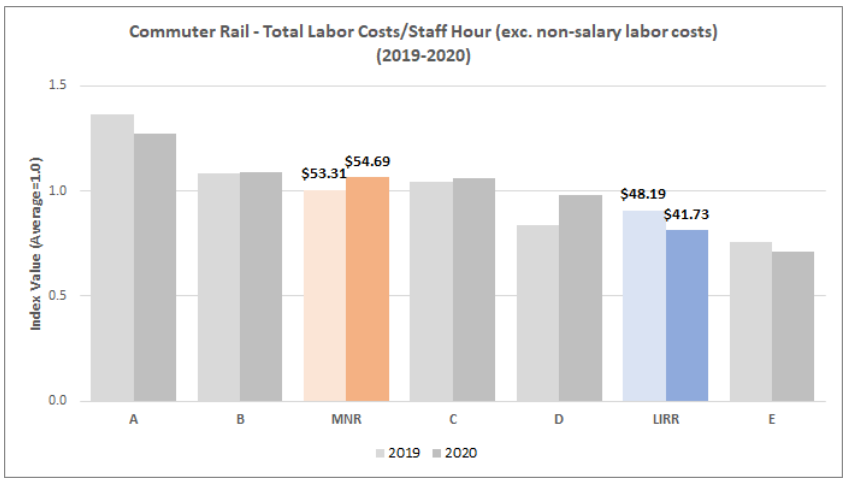
Nevertheless, the following graph shows that LIRR and MNR have the highest labor costs per vehicle mile among the national peers. There are several factors that drive labor costs at the MTA commuter railroads including the fact that MNR and LIRR operate in an ungated environment, which requires additional onboard train crew staffing to validate and collect tickets.

Labor Cost per Vehicle Mile (National Peers)



Boston and Los Angeles contract for commuter rail service; Labor costs are limited to Administration

Labor Cost per Staff Hour (International Peers)



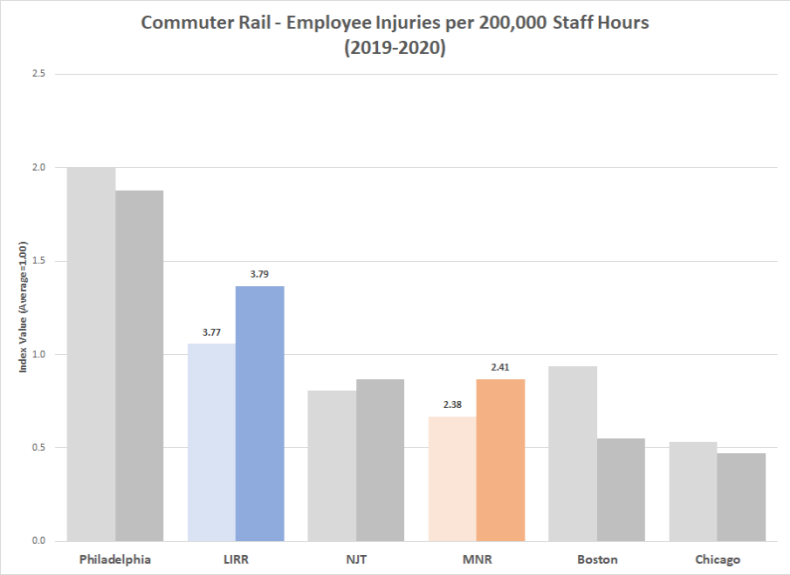
It is important to note that the above graphs are similar but have differing underlying data points. The national peer graph shows Labor Cost per Vehicle Mile. The international peer data shows costs Labor Costs per Staff Hour.

MNR has continued an aggressive infrastructure renewal program by expanding Maintenance of Way spending as well as increasing employee training and skillsets since 2014. This has also been supported by the areas of safety and training.

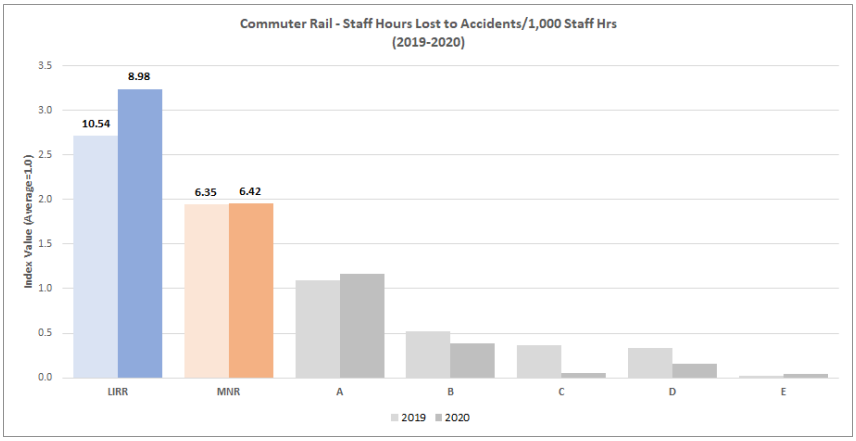
Employee Safety

Both MNR and LIRR, since the onset of the COVID-19 pandemic, have taken extensive efforts to protect their passengers and employees, including distribution of sanitizer, masks and other personal protective equipment (PPE) to employees; a major customer information campaign using posters, announcements, digital messaging, and social media; distribution of free masks to customers at major LIRR and MNR stations; and enforcement of onboard mask compliance by MTAPD. Cars, stations, and facilities were disinfected either once or twice per day.

Reportable Employee Injuries per 200,000 Staff Hours (National Peers)



Staff Hours Lost to Accidents per 1,000 Staff Hours (International Peers)



It is important to note that the above graphs are similar but have differing underlying data points. The national peer data on reportable injuries is sourced from the FRA Safety Data and Reporting website. This

information is not available via the NTD process. The international peer data is a metric included in ISBeRG reports.

Beyond pandemic-related actions, MNR's Office of System Safety has launched a series of successful programs and initiatives aimed at improving employee and customer safety. An increasingly data-driven and holistic approach to safety solutions carried out in collaboration with MNR operations, combined with new messaging and communication strategies, has led to a steady overall decline in both employee and customer injuries. As part of the overall safety program, the importance of safety is reinforced by executive leadership and carried through all levels of the organization.

MNR has also placed a strong emphasis on employee training with initiatives such as the New Employee Safety Orientation required for all new hires, specialized Supervising for Safety training emphasizing leadership behaviors that promote safety in the workplace; and quarterly Safety Focus Weeks, where targeted safety topics are covered with all employees, including reviews and lessons from actual safety incidents. MNR also engages employees and recognizes their contributions with initiatives such as the annual Safety Excellence Awards, where employees nominate coworkers who have made an exemplary effort to improve the railroad's safety, reliability and efficiency. Additionally, MNR's Safety Culture Survey is periodically used to gather employee opinions to help evaluate the impact of programs, establish priorities, and monitor performance.

LIRR's corporate safety program works toward an accident-free workplace through the implementation of a comprehensive, sustainable, and measurable safety initiative. This initiative is a collaborative effort between the Corporate Safety Department, LIRR operating, support, and administrative departments, and labor partners. Designed to engage every level of the organization in promoting the value of safety, communication of safety begins at the highest executive levels and is reinforced through the entire workforce.

LIRR conducts quarterly "Safety FOCUS Days" across the agency, each attended by approximately 4,000 employees. Additionally, LIRR's participation in C3RS, a collaborative effort between management, labor, and the FRA, provides a mechanism for employees to confidentially report incidents that could have resulted in operating and safety incidents.

In 2019, LIRR was awarded the APTA Rail Safety and Security Excellence gold award for safety. The agency partnered with the MTA Police Department to create the Right-of-Way Task Force, which allowed the MTA to respond quickly to trespasser complaints, illegal dumping of debris, track encroachments and potential security breaches. Along with the task force, LIRR improved safety by installing high security fencing.

MNR's Right of Way Task Force, managed by MNR's Security Department, is a collaborative partnership with the MTA Police Department, as well as MNR's Maintenance of Way and Transportation Departments, along with the MNR Office of System Safety. The program entails assessing locations along the right of way for safety and security concerns and then recommending, prioritizing, and implementing security solutions. Examples include installing fencing and/or gates, securing structures, posting signage, removing foliage, and geotagging access points.

Suicide prevention initiatives at MNR include delivery of QPR Suicide Prevention Gatekeeper training to employees; this training teaches frontline employees to recognize the warning signs of someone in a mental health crisis or who is contemplating suicide, as well as how to approach the individual, bring them to safety, and get them the help they need. MNR also partners with the National Suicide Prevention Lifeline and the Crisis Text Line to help connect individuals in need to those resources.

In 2020, LIRR and MNR were recognized as APTA Rail Safety Award Winners with LIRR receiving the Gold Award and MNR receiving a Certificate of Merit for Commuter/Intercity Rail in recognition of their grade crossing safety initiatives. By partnering with Waze and initiating a grade crossing road marking program, where they began installing reflectorized delineators and painted road striping with reflective road markers at all crossings. The delineators guide motorists over the crossings, visually reinforcing not to turn on to the tracks at the same time the Waze driving app presented hazard notifications to drivers for at-grade railroad crossings. The system-wide implementation of these two initiatives resulted in significant reduction of vehicle right of way incursion events and an eighty-six percent reduction in the number of trains delayed by reports of vehicles on the tracks.

LIRR and MNR continue to prioritize the safety of customers and communities through the "Together Railroads and Communities Keeping Safe" (TRACKS) program. TRACKS is a free community outreach program that covers grade crossing safety, rider safety, trespassing and suicide prevention. TRACKS is designed for students, drivers, customers, pedestrians and residents who work and live in or around the communities MNR and LIRR serves. The success of the TRACKS program earned MNR APTA's Gold Award for Safety In 2018.

While benchmarking safety performance to international peers is challenging due to widely varied reporting and criteria, the railroads do analyze the data and use it to drive decision making. The most significant cause of employee lost time due to accidents at the MTA railroads are slips, trips and falls. At the LIRR, the Corporate Safety Department launched a "Walking Is Working" campaign to raise awareness about hazards that can exist on the property. The campaign highlighted concrete strategies and tips for reducing risk. Leveraging membership with the National Safety Council, posters, toolbox/tailgate talks and five-minute safety talks are distributed each week for use by employees in their safety meetings and job briefings. At MNR, communication strategies to address identified trends or patterns include targeted messages sent directly to employees on an ongoing basis, to focus their attention on immediate issues ranging from work process or facility infrastructure changes to expected weather hazards. In addition, current issues are emphasized in the New Employee Safety Orientation Program and Safety Focus Week events described above, as well as in operations training programs, in collaboration with the MNR Operations Training and Operating Rules Departments.

Public Metrics Reporting

The MTA was also directed to prepare and publish meaningful and informative performance metrics for all customer trips provided by New York City Transit Authority (subways), Long Island Rail Road (LIRR) and Metro-North Railroad (MNR) on a monthly basis. The monthly reports cover:

- **Additional platform time** (for the subways, the average added time that customers spend waiting on the platform for a train, compared with their scheduled wait time)

- **Additional train time** (for the subways, the average additional time customers spend onboard the train [due to various service issues], compared with their scheduled on-train time)

- **Customer journey time performance** (for the subways, the percentage of customer trips with an estimated total travel time within five minutes of the scheduled total travel time)

- **Elevator availability** (for the subways, LIRR and MNR, the percentage of time that elevators are operational systemwide)

- **Escalator availability** (for the subways, LIRR and MNR, the percentage of time that escalators are operational systemwide)

- **Additional journey time** (for the subways, the comparison of measured or estimated actual journey time compared to schedule)

- **Journey time** (for the subways, time on platform and the time on train. Journey time is calculated as either actual journey times that customers experience, or as scheduled journey times. Journey time and its components may be based on a manual or an automatically generated sample)

- **Major incidents** (for the subway, incidents that delay fifty or more trains where a train is considered delayed if it is more than five minutes late or skips planned stops; for MNR and LIRR, incidents that delay ten or more trains greater than five minutes and fifty-nine seconds)

- **Lost time accidents** (for the subways, a job-related incident that results in the inability of an employee to perform full job duties for at least one working day beyond the day of the incident. Rates are based on lost time accidents per one hundred employees)

- **Employees' lost time days** (for MNR and LIRR, the total number of calendar days employees' treating medical professionals have determined that they cannot work due to an occupation injury or illness)

- **Employee lost time rate** (for MNR and LIRR, the number of occupational injuries or illnesses per two hundred thousand employee hours worked)

- **Terminal on-time performance** (for the subways, the percentage of trains arriving at their destination terminals as scheduled with a train counted as on-time if it arrives at its destination early, on time, or no more than five minutes late, and has not skipped any planned stops; for MNR and LIRR, the percentage of trains arriving at their final destination terminals as scheduled with a train counted as

on-time if it arrives at its destination early, on-time or no more than five minutes and fifty-nine seconds late, provided that the percentage of trains not arriving at their final destinations shall include unscheduled cancellations)

- **Additional data** (for the subways, the percentage of trains arriving at their scheduled terminals between four and five minutes after their scheduled arrival time; for MNR and LIRR, the percentage of trains arriving at their scheduled terminals between four and five minutes and fifty-nine seconds after their scheduled arrival time as well as the percentage of cancelled trains)

Implementation

The MTA agencies have all previously introduced performance metrics dashboard pages accessible on the MTA website (https://new.mta.info/transparency/metrics). Some of the monthly performance metrics required in the legislation were already being reported.

Beginning in October, 2019, monthly data for the required additional categories were added to the MNR and LIRR performance metrics pages under the category of "New York Public Authorities Law Metrics": The web addresses are:
LIRR: http://lirrdashboard.mta.info/Home/LegislationMetrics
MNR: http://mnrdashboard.mta.info/Home/MNRNYLaw

New York City Transit (NYCT) is in the process of revising its dashboard pages, and as an interim step is publishing the required performance metrics in a downloadable Microsoft Excel file:
https://subway-dash-files.s3.amazonaws.com/CombinedMetricsNYCT.xlsx