



DTPW'S Metrorail Maintenance and Cleaning Performance Assessment

June 19, 2019

IMG
PARABEL



Executive Summary



- IMG Rebel was engaged by CITT to perform a review of maintenance and cleaning practices at Metrorail, conducted between February and May 2019
- Metrorail has struggled to meet service and vehicle availability targets over the last 12-18 months, though new vehicle deliveries have improved performance more recently
- However, given existing maintenance, labor, and cleaning practices, combined with recent challenges with the new vehicles, it is uncertain whether the short-term performance gains will translate to longer-term sustainability
- DTPW must revisit and improve a variety of maintenance practices and be granted the flexibility to hire qualified maintenance and motivated cleaning personnel
- This report makes a series of recommendations on how to improve Metrorail's maintenance and cleaning performance

The Scope of Work Consisted of One Overarching Question and Four Primary Components



Is Preventive Maintenance and Cleaning Adequately Being Carried Out?

1 Fleet availability & reliability

At any given time, is **enough rolling stock available** for scheduled operations?

How often are **in-service failures occurring**, leading to cancellations or delays?

2 Fleet maintenance

Are **maintenance procedures in line with industry standards**, and are they being followed?

3 Rolling stock comfort

Are the **vehicles clean** and free from broken/defective interiors and graffiti?

4 Cost of operations & maintenance

Is the **cost of O&M in line with industry standards**?

Primary Components of Preventive Maintenance and Cleaning Practices



1

Fleet availability & reliability

2

Fleet maintenance

3

Rolling stock comfort

4

Cost of operations & maintenance

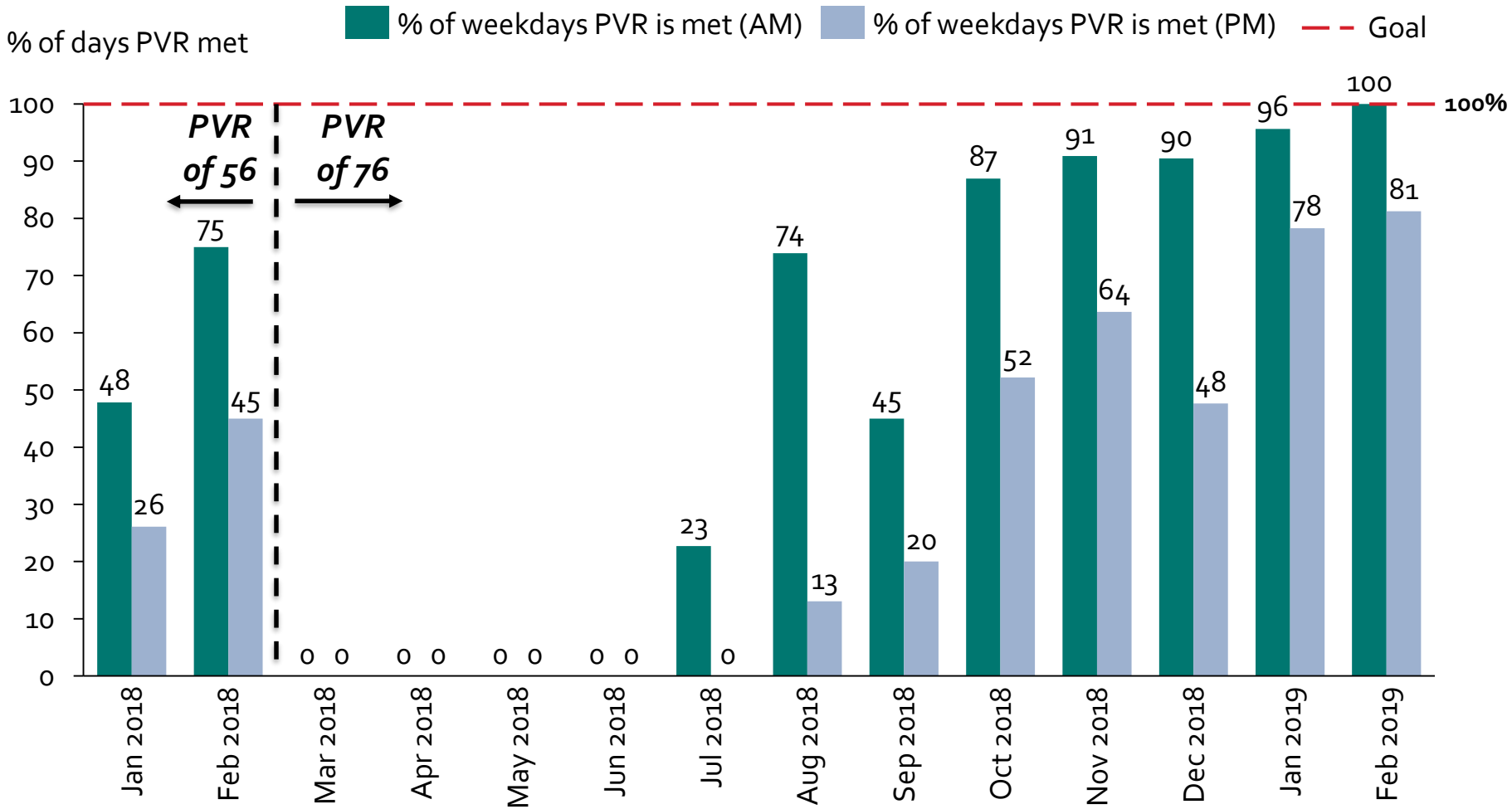
Summary and recommendations

1 Fleet Availability & Reliability Observations



- Lack of Spare Parts (Legacy Budd and New Hitachi Vehicles)
- Legacy Budd Vehicles not maintained to manufacturer's specifications (No Mid-Life Overhaul)
- Some **Data Reporting** is in aggregated form and can make conditions appear better than what passengers actually experience

1 Metrorail Struggled to Maintain Vehicle Availability to Meet Peak Vehicle Requirement



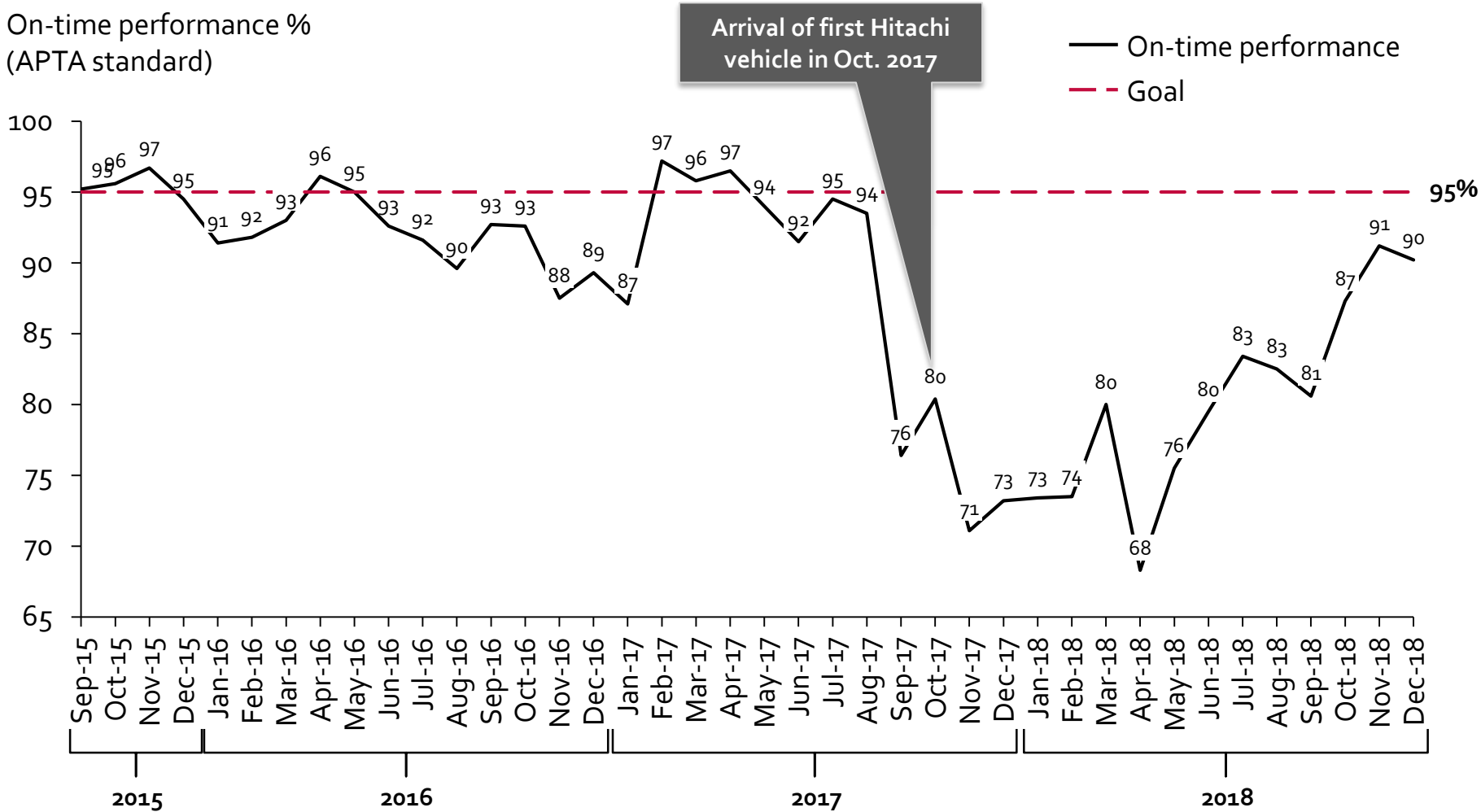
Source: Metrorail availability Excel spreadsheets

1

On-time Performance Lagged Behind Goal of 95% from Late 2017 through 2018



On-time performance %
(APTA standard)



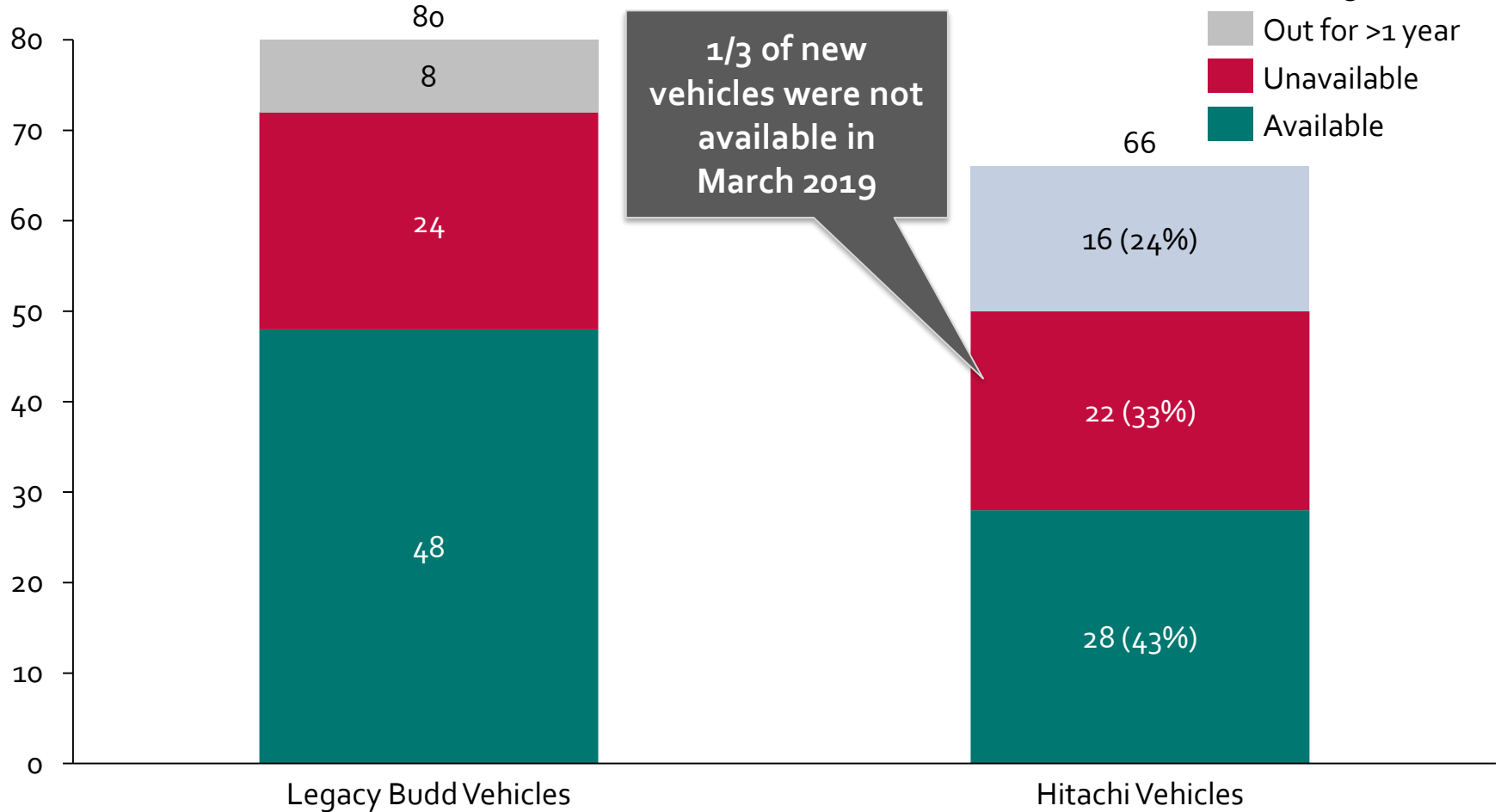
Source: MDT Monthly Operations Reports

1

New Vehicles Increased Ability to Meet PVR, but this May be Temporary



of vehicles



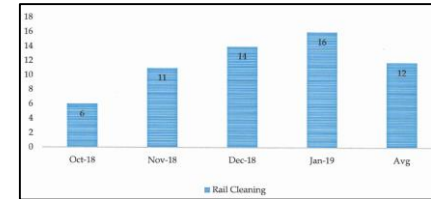
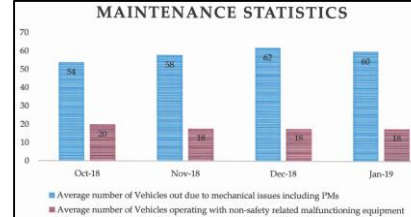
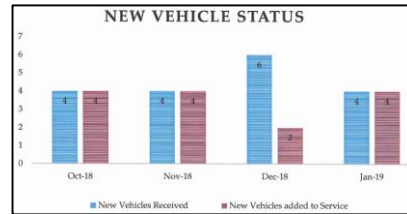
Source: Metrorail fleet status report on March 18th, 2019

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Current Performance Measures Do Not Align With Passenger Experience

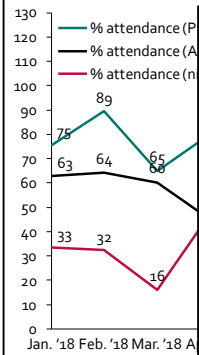


Current Reporting to CITT on Metrorail

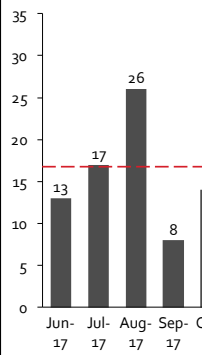


Illustrative Future Reporting on Metrorail

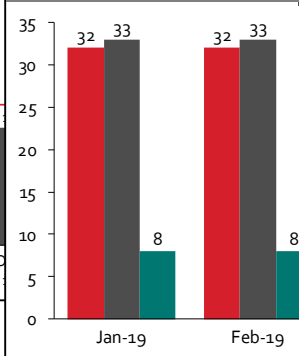
5. Cleaning performance



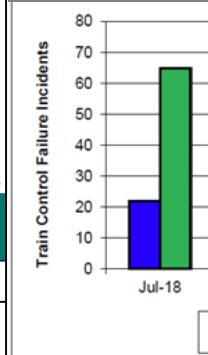
4. Parts stockouts



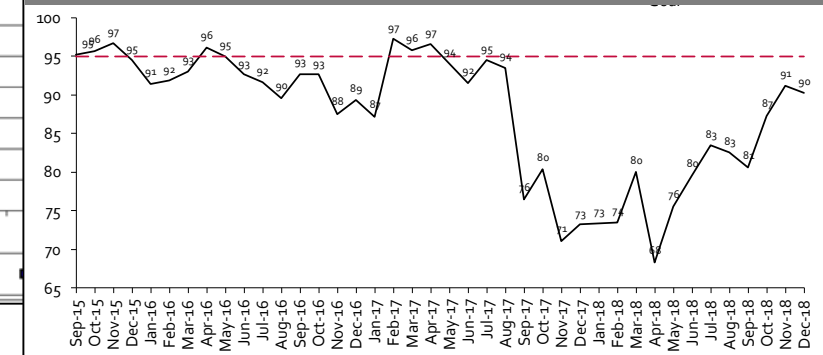
3. Vacancy rates



2. Train control failures



1. Service performance



1

Recommendations on Fleet Availability & Reliability



- **Ensure Hitachi delivers spare parts**, per the new vehicle contract and adhere to 5-year warranty requirements
- **Plan and budget for mid-life overhaul today for Hitachi vehicles** to ensure state of good repair
- **Breakdown all performance metrics and measures** to a granular level to properly reflect passenger experience

Primary Components of Preventive Maintenance and Cleaning Practices



1 Fleet availability & reliability

2 Fleet maintenance

3 Rolling stock comfort

4 Cost of operations & maintenance

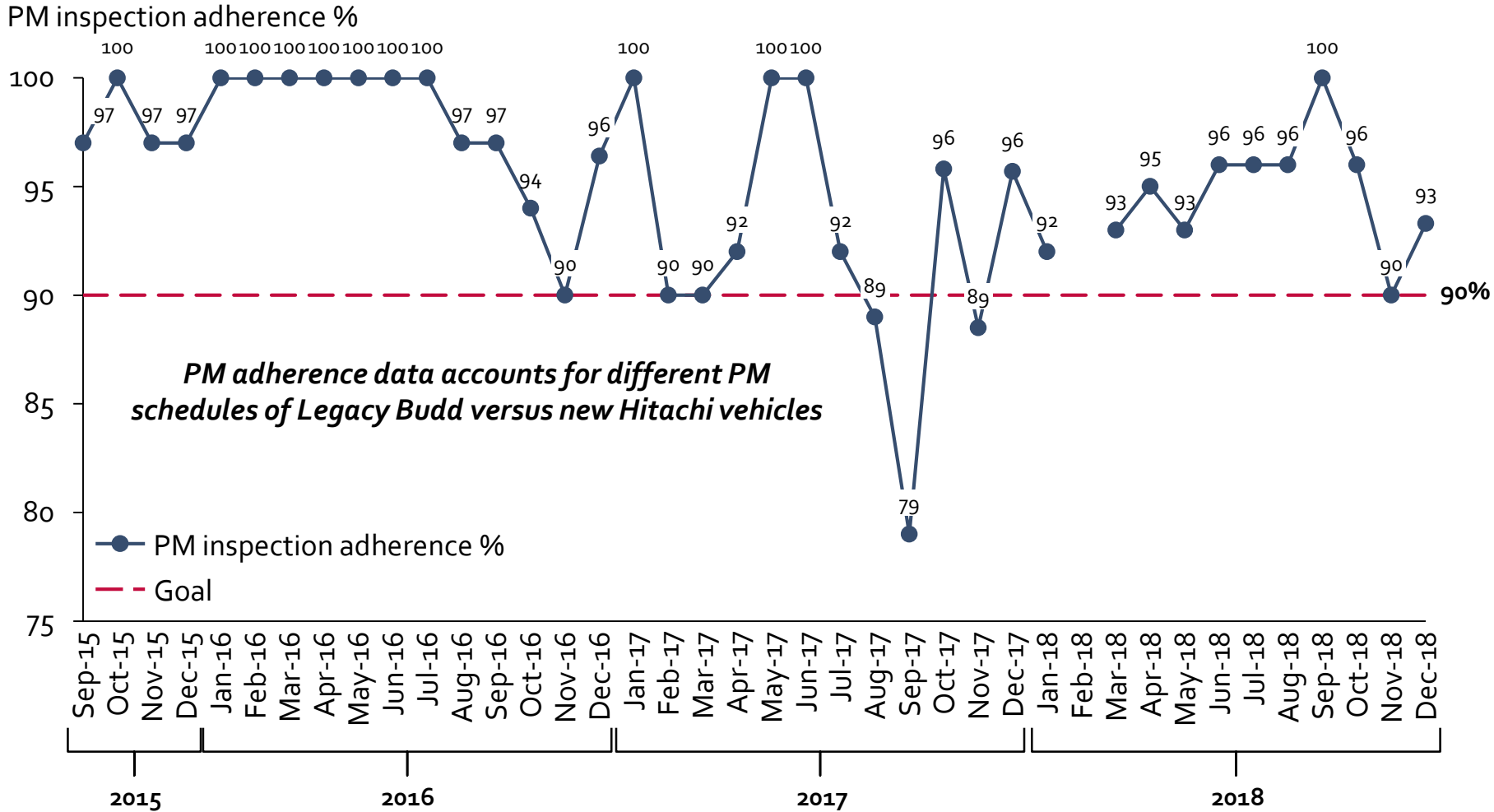
Summary and recommendations



2 Fleet Maintenance Observations

- **Records are maintained in paper format** preventing the ability of maintenance technicians and supervisors to view vehicle repair history, analyze trends and adapt maintenance practices accordingly
- **Manuals for new Hitachi vehicles are not up to date** and do not reflect and/or consolidate all vehicle configuration updates
- **2/3 of filled positions are unqualified** to perform work due to labor restrictions
- **Maintenance work is 50% corrective/reactive and 50% preventive/proactive**

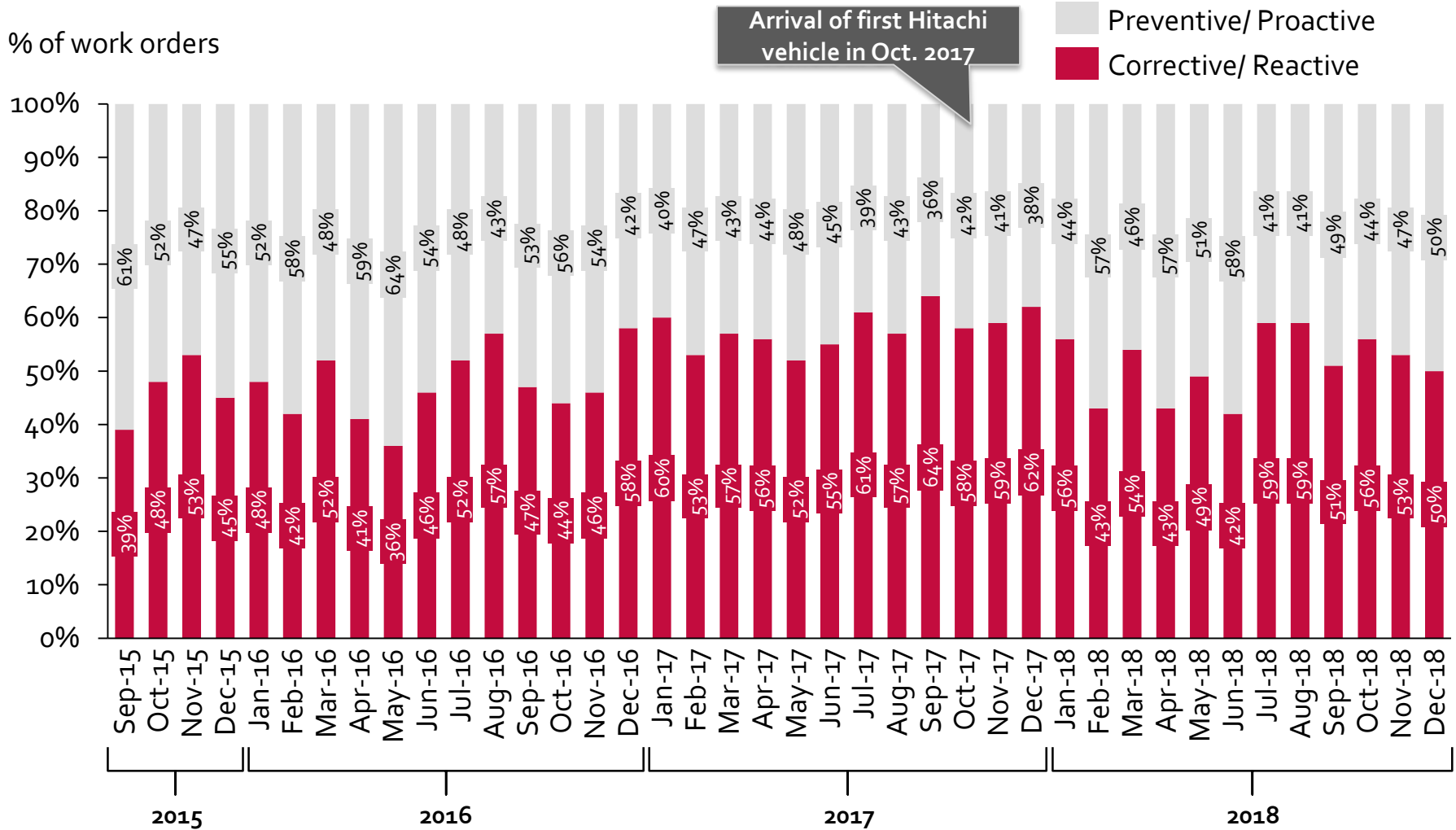
Preventive Maintenance Schedules and Inspection Checklists are Generally Adhered



Source: MDT Monthly Operations Reports

2

50% of maintenance work is corrective, meaning PM may not be preventing failures



Source: MDT Monthly Operations Reports



Labor Rules Represent One of the Biggest Challenges for Rail Maintenance



	Train Control	Traction Power	Vehicle Electronics	Total
<i>Filled positions qualified to perform independent work</i>	4 (12%)	3 (11%)	5 (13%)	12 (12%)
<i>Filled positions unqualified to perform independent work</i>	19 (56%)	15 (56%)	30 (79%)	64 (65%)
<i>Vacant positions</i>	11 (32%)	9 (33%)	3 (8%)	23 (23%)
Authorized positions	34	27	38	99

- **Most (65%) of current technicians are considered unqualified**, and supervisors must instead perform the role of technicians, diverting attention from supervisory responsibilities creating inefficiencies and resulting in cost increases
- **Agreement with TWU, in conjunction with Section 13(c)**, requires DTPW to offer maintenance positions to TWU members (effectively senior bus drivers) with no minimum qualifications requirement
- **Remaining qualified technicians from pre-1990** (when interpretation of labor rules allowed for outside hiring) **will soon be retiring**

Source: Conversations with DTPW staff



2 Recommendations on Fleet Maintenance

- **Move to electronic maintenance records with trend analysis**, ensuring it is not simply used for document management (as EAMS currently is for Metromover)
- **Finalize new Hitachi vehicle manuals** to ensure that PM checklists are specifically referencing sections of these manuals and are accounting for different vehicle configurations
- **Institute minimum qualifications requirement for all new technical employees** in rail maintenance, including vehicle electronics, traction power, and train control technicians
- **Maintenance work** should be more preventive/proactive rather than corrective/reactive (80/20)

Primary Components of Preventive Maintenance and Cleaning Practices



- 1 Fleet availability & reliability
 - 2 Fleet maintenance
 - 3 Rolling stock comfort
 - 4 Cost of operations & maintenance
- Summary and recommendations



3 Rolling Stock Comfort Observations

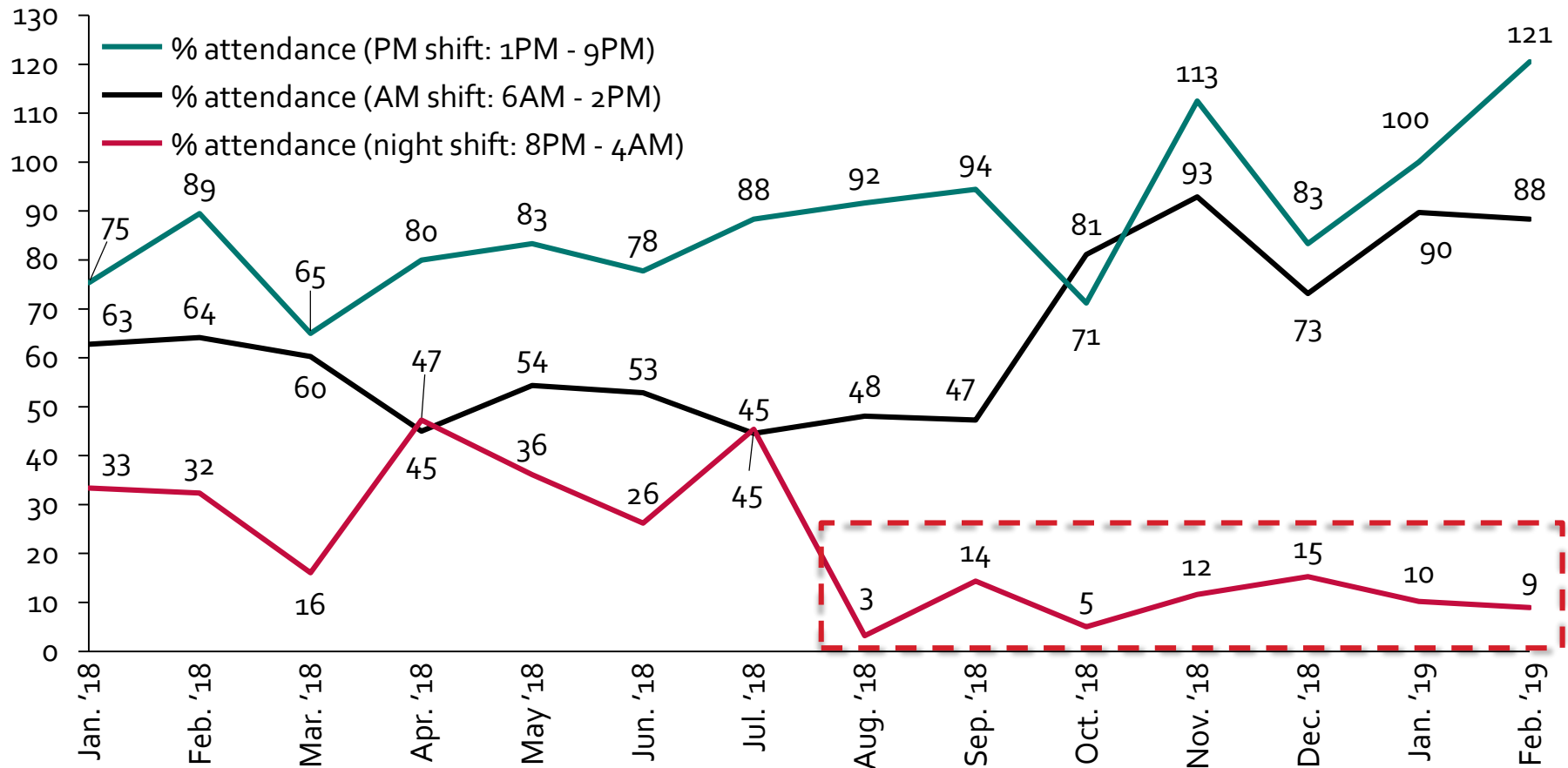
- **Vehicle cleanliness is below acceptable standards** and detracts from the riding experience, as found in both complaints data and through in-person observations
- **Low cleaner attendance for the night shift**, during which vehicles are cleaned for the next day's service, is **likely a major contributor to suboptimal cleaning performance**
- **Vehicles become dirtier as the day progress**, indicating more mainline cleaners are needed
- **Metrorail stations are generally clean** and mostly present a safe and comfortable environment for customers

3

Vehicle Cleaner Attendance for the 8pm to 4am Drives Suboptimal Cleaning Practices



Cleaners Attending / Cleaners Scheduled
(% attendance)



Source: Metrorail Availability Excel workbook

3 Recommendations on Rolling Stock Comfort



- **Hire additional cleaning staff**, especially for mainline cleaning during service
- **Consider whether to outsource vehicle cleaning at terminal stations to contractors** (as is currently done with station cleaning)
- **Promote Positive Attendance** and renegotiate bargaining agreement

Primary Components of Preventive Maintenance and Cleaning Practices



1 Fleet availability & reliability

2 Fleet maintenance

3 Rolling stock comfort

4 Cost of operations & maintenance

Summary and recommendations

4 Cost of Operations & Maintenance Observation

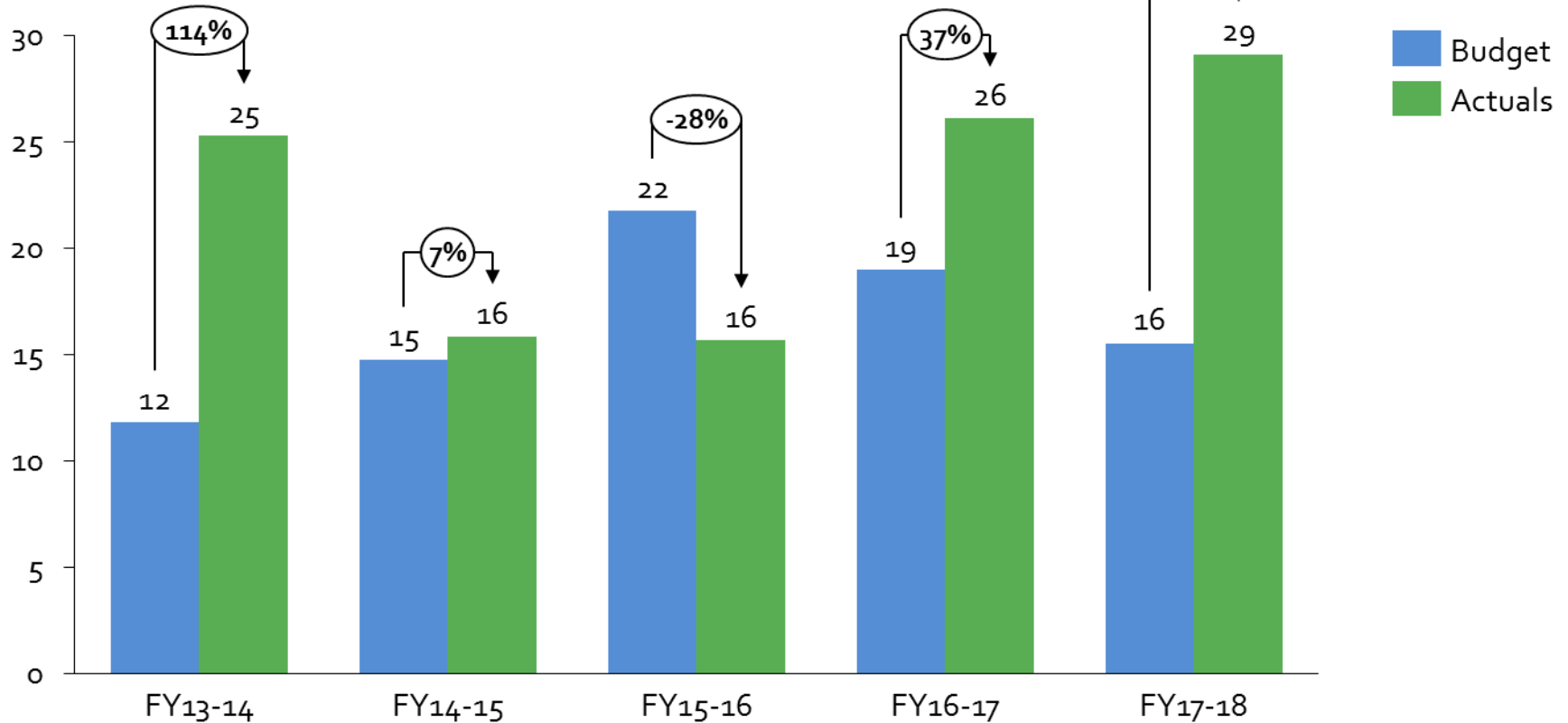


- Actuals expenditures exceeding Budget, year after year
- DTPW spending on O&M is comparable to peer systems, based on actual expenditures

4 Annual Rail Maintenance Budget is Not Realistic



Budget vs.
Actuals (\$M)



*FY18-19 full-year actuals estimated based upon year-to-date spending

Source: Division 82 Budget vs. Actuals Data

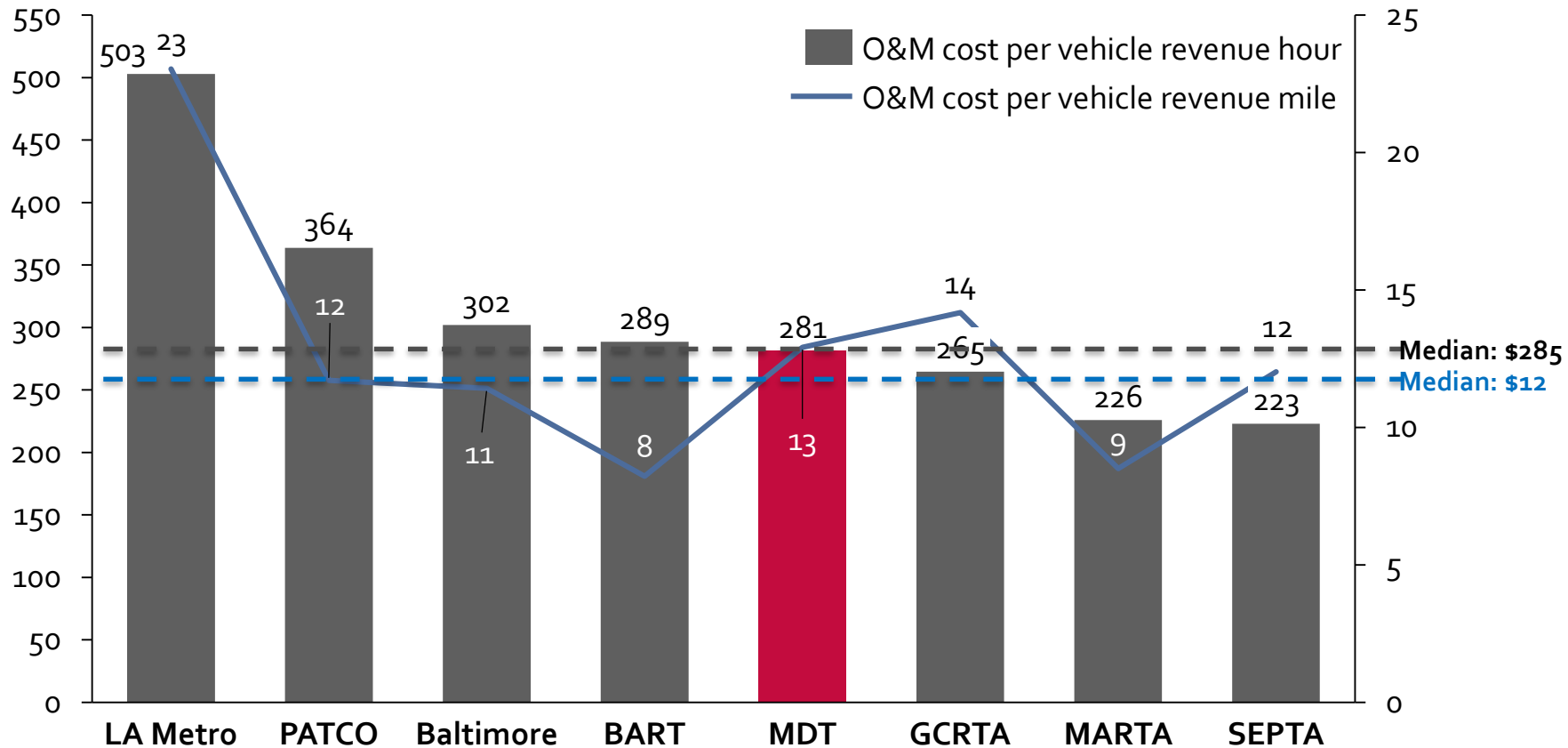
4

Metrorail Spending on O&M is Comparable to Peer Systems



Cost (\$) per vehicle revenue hour

Cost (\$) per vehicle revenue mile



Note: Statistics displayed are for heavy rail systems only
Source: 2017 NTD Data

4

Recommendations on Cost of Operations & Maintenance



- **Define and approve realistic annual budgets for rail maintenance**, accounting for past actuals and anticipated future needs

Primary Components of Preventive Maintenance and Cleaning Practices



- 1 Fleet availability & reliability
- 2 Fleet maintenance
- 3 Rolling stock comfort
- 4 Cost of operations & maintenance

Summary and recommendations

Recommendations in Order of Priority (1/2)



Address immediately (within 30 days)

- 2 **Minimum qualifications requirement** for all new technical employees in rail maintenance, including vehicle electronics, traction power, and train control technicians
- 1 **Additional spare parts availability** for train control system and new vehicles, in accordance with Hitachi contract terms
- 1 **Redefinition of key performance indicators (KPIs)** to more closely align reports from DTPW with safety outcomes and passenger experience

Address in the medium term (within 3-6 months)

- 2 **Finalization of Hitachi vehicle manuals** and linkage to PM inspection forms, including specific procedures for different vehicle configurations in use
- 3 **Vehicle cleaning practices** (i.e. whether to outsource) and **hiring of additional cleaning staff or contractors at terminal stations**
- 4 **Realistic annual budgeting** for rail maintenance, accounting for past actuals

Recommendations in Order of Priority (2/2)



Address in the long term (within 1 year)

- 1** **Digitization of all maintenance records** into quantifiable / analyzable modules within EAMS, fully moving away from paper-based inspection and maintenance forms
- 1** **Mid-life overhaul plan** for Hitachi vehicles

Conclusion



This was a **high-level overview** of DTPW's Preventive Maintenance and Cleaning Practices. We highly **recommend a more in depth review** of these practices to ensure system safety, reliability and efficiency as well as passenger comfort.

The Team's most important takeaway is that, while Metrorail is attempting to adequately maintain its system in the short-term, it is **not prepared to effectively maintain new vehicles and ensure safety of critical systems**, such as train control, in the short-, medium- and long-term.

Our **recommendations should provide DTPW with guidance on priorities** in order to achieve Metrorail's safety and performance objectives for the foreseeable future.

