FY18 Focus

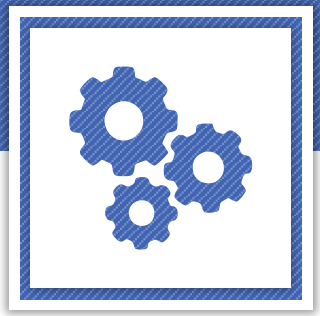
CONTROLLING COSTS AND IMPROVING SERVICE IN TRANSPORTATION AND MAINTENANCE

FEBRUARY 2017

Massachusetts Bay Transportation Authority

Contents

Core operations: A call to action



MBTA bus transportation and maintenance

MBTA Red / Orange line maintenance

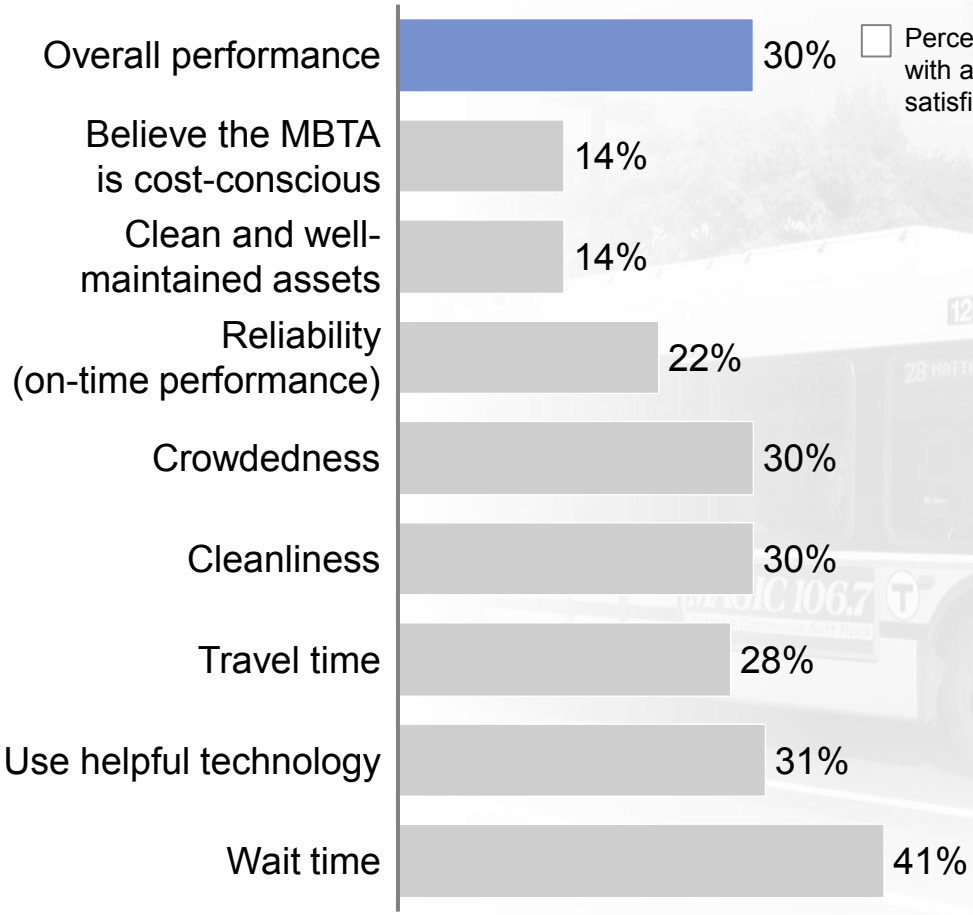
MBTA customer service agents

The MBTA's core goals

- To provide reliable service for customers
- To provide safe modes of transport for our communities
- To operate in a financially sustainable manner (the legislation creating the FMCB mandates a balanced budget throughout FY17-21)
- To deliver every passenger trip as cost effectively as possible

What percent of customers highly rate the MBTA's performance?

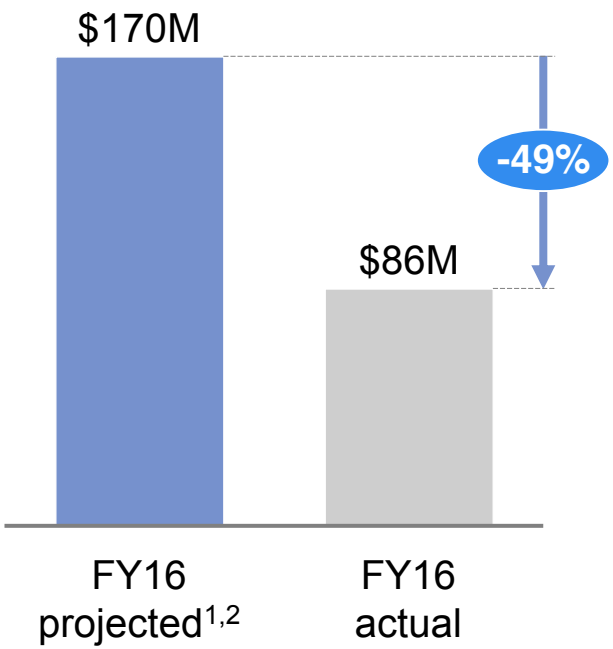
Customer satisfaction with current MBTA performance



Source: MBTA performance dashboard, customer satisfaction, October 2016. n=412

Efforts to date have resulted in a 49% reduction in forecast operating deficit, but there still is a $86M projected deficit remaining

MBTA operating deficit



Reduced by:

1. Operating cost controls
   - Headcount control, with elimination of non-essential positions
   - Revamping and enforcing overtime policies
   - Refinancing debt and consolidating accounts
   - Renegotiating terms of existing service contracts
2. Increasing own-source revenue[3]
   - Aggressive growth in digital advertising

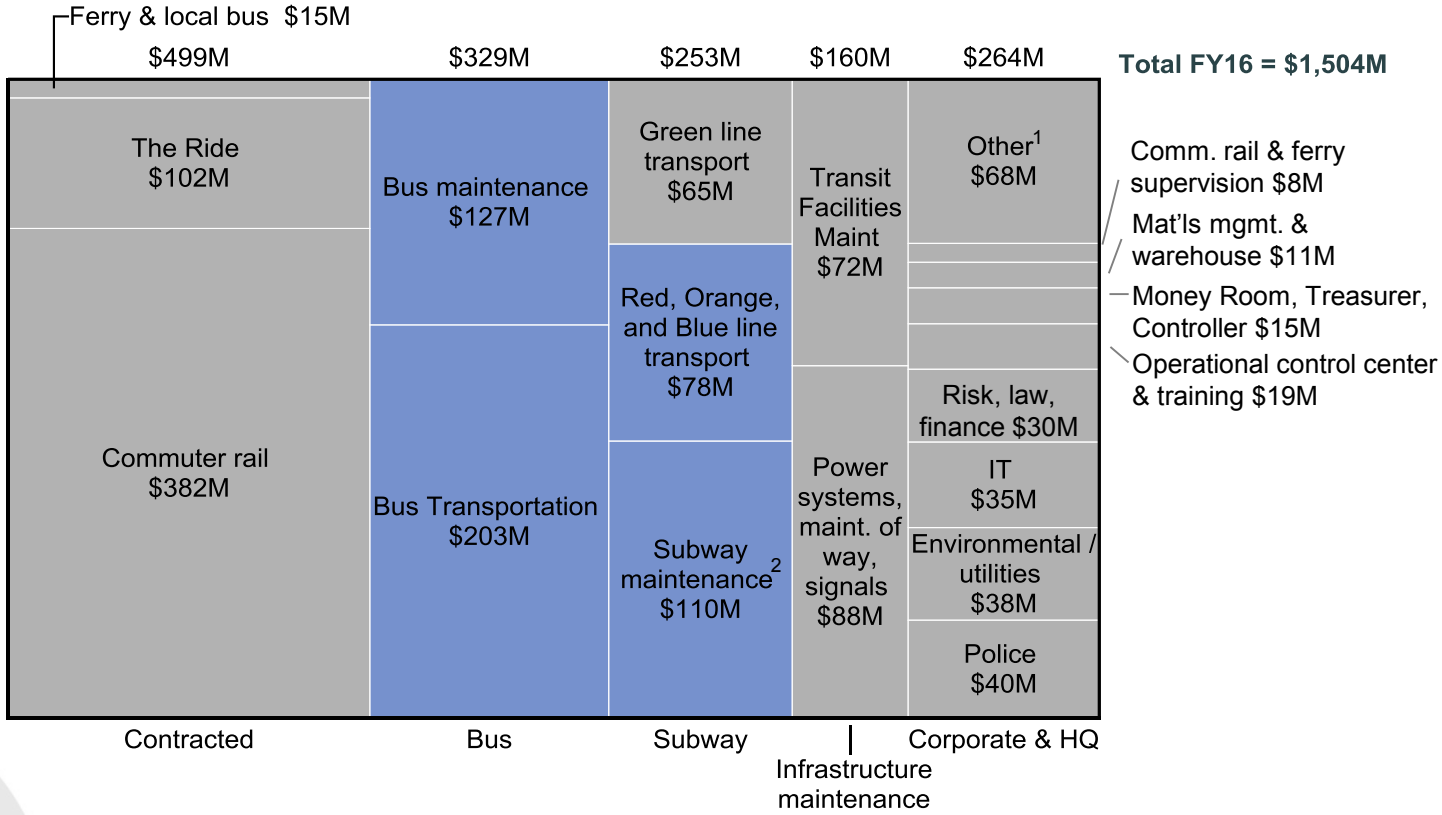
1 FY16 projected deficit as of July 2015 creation of the FMCB
2 Doesn't include additional state assistance of $156M for operations and $31M into pay-go-capital account
3 Current effort underway: submission of parking RFP

Source: MBTA data

Recent efforts have focused on controlling operating costs and reducing non-operating costs

MBTA FY16 operating expense, excluding debt service

Focus of document



	Contracted	Bus	Subway	Infrastructure maintenance	Corporate & HQ
Headcount[3]	**NA**	**2,525**	**2,053**	**746**	**1,023**

Recent efforts e.g.:

- The Ride taxi
- Uber/Lyft pilot
- Dispatch-center
- Overtime management
- Absenteeism management
- Warehouse, money room, call center
- Wireless telecom
- Third party administrator for absence management
- State-wide contracts

1 Includes operating costs for non-revenue vehicles
2 Includes subway's share of vehicle cleaning contract, Red/Orange line maintenance $46M
3 Excluding capital employees
Source: MBTA data

Three areas in core operations identified for further exploration and action in FY18

Area and rationale	Operating cost base FY16	Operating cost base FY21	Potential FY21 savings
 **Bus Transportation and Maintenance** ▪ Large ridership, with performance currently below the MBTA's standards ▪ Large and growing cost base and net subsidy per trip ▪ Multiple options exist to improve the situation, including a viable external market	$329M	$384M	Up to $140M
 **Red and Orange line car maintenance** ▪ Introduction of new fleet presents opportunity to innovate ▪ Firms in the market, including rail car manufacturers, could perform this work	$46M	$71M	Up to $14M
 **Customer service agents (CSAs)** ▪ Potential to improve customer service and satisfaction ▪ Potential to also reduce costs	$17M	$20M	Up to $11M

To achieve these savings, the MBTA could consider internal reforms, engagement in 3rd-party performance contracts, or some combination of the two

SOURCE: MBTA data

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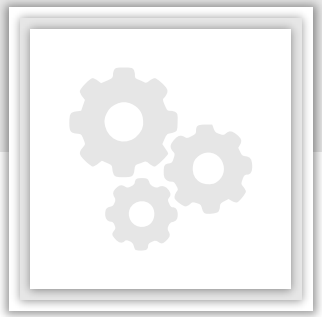
Core operations: A call to action



MBTA bus transportation and maintenance

MBTA Red / Orange line maintenance

MBTA customer service agents

Main messages in this discussion of bus service

Baseline

- MBTA-operated bus service plays a critical role in the region, providing 113M passenger trips annually. The MBTA's 2,525 bus personnel work hard daily to deliver service to our communities
- Service performance remains a major issue for the MBTA's riders; roughly 65% of buses arrive on time, and 30% are crowded at peak times
- Bus operations and maintenance costs, excluding fuel, have been rising at 5% per year[1] driven largely by headcount and wage increases
- Last year's net subsidy to operate bus service was $224M ($329M less $105M in revenue), which is projected to grow to $262M by FY21
- Certain transit authorities and agencies (e.g., Denver, Orange County, Los Angeles, Long-Island, Las Vegas) have used 3rd parties to provide bus operations and maintenance activities
- In situations where authorities have contracted substantial amounts of their bus service, the contracted portions have been up to 30-40% less expensive per hour of service than the internally-provisioned portions

Questions

- What alternative bus operating models could the MBTA consider?
- If the model changes, what are the potential effects on the system's performance and required financial subsidy?

1 FY13-FY16 cost grew at 4% annually, since fuel costs decreased at 9% annually
Source: MBTA data

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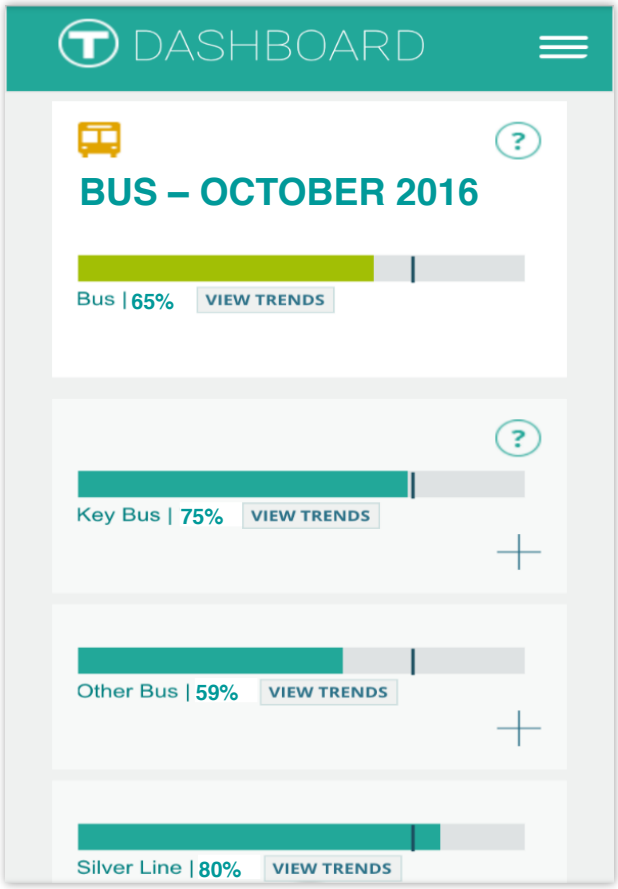
Current performance of the MBTA bus system

What have other agencies experienced when contracting for bus service?

What contracted operating models could the MBTA consider for bus?

How does the MBTA bus service perform?

Bus on-time performance is 65% on average, below the goal of 75%[1,2]



A number of bus routes fail service tests on a regular basis

Poor reliability[1]

87% of routes with reliability below target in Spring 2016

Crowding

30% of routes had peak loads over 140% seating capacity in Spring 2016

1 MBTA bus on-time performance is defined as "within 3 mins of scheduled departure time" (for core service, and 6 mins for non-core service)
2 Comparisons to other systems are difficult because systems have different definitions of on-time performance , and do not measure on-time performance at the same places
Note: OCTA contracting on-time performance standard of 85% (departure within 5 minutes of scheduled time), Las Vegas RTC contracting on-time performance standard of 95% (departure within 2 minutes of scheduled time), NICE contracting on-time performance standard of 70% (departure within 1 prior to and 5 minutes late vs. scheduled departure time)
Source: MBTA Office of Performance Management and Innovation

What are some of the concerns customers are currently raising about MBTA bus service?

Route:

111 — **Park Ave. - Haymarket**
"I normally take the 111 bus seven days a week…sometimes I have to wait for 2 or 3 to pass."

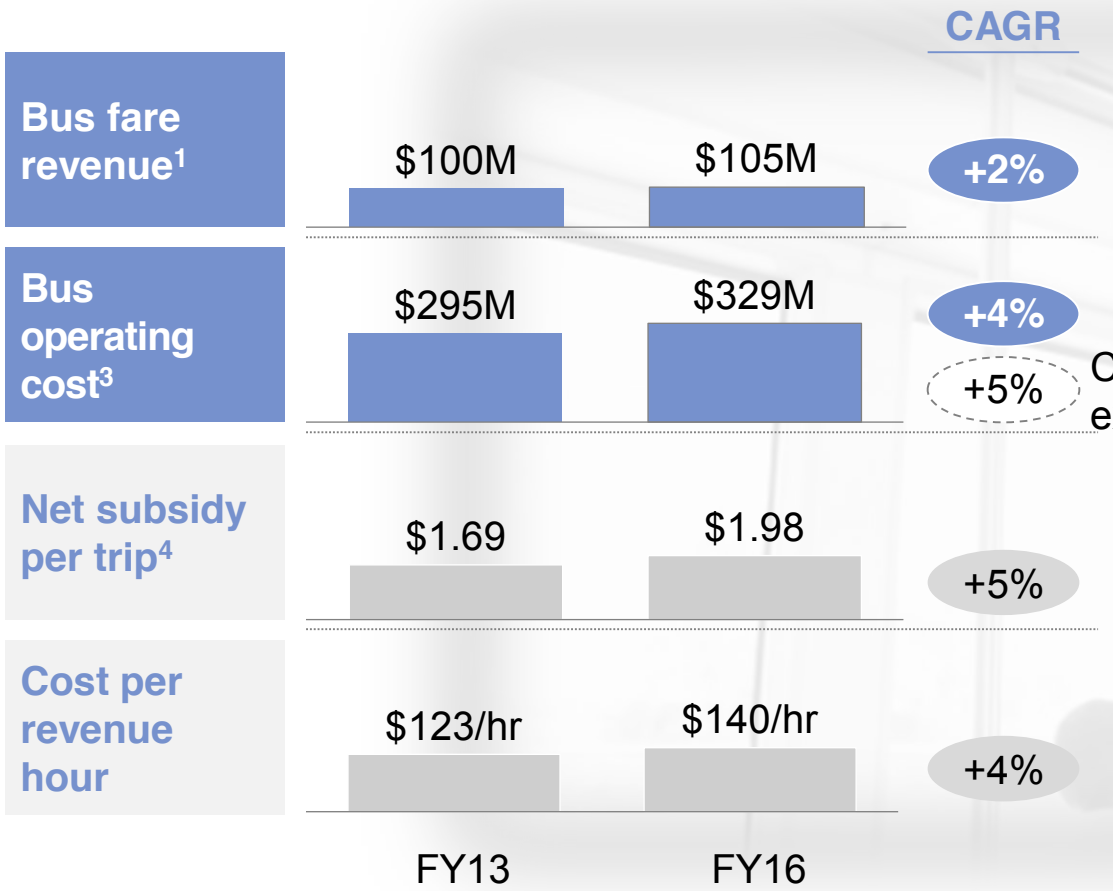
57 — **Watertown-Haymarket (via Comm. Ave.)**
"I am always left behind by the buses because they are too crowded."

7 — **City Point - South Station**
"I sometime have to wait 3 to 4 buses before I can get on [the bus]."

66 — **Harvard Square-Dudley Station**
"The 66 ruins my morning, every morning."

Source: MBTA customer workshop

Bus costs have grown at 5% per year, outpacing revenue and increasing the net subsidy per trip



Driven by fare increases – ridership has remained essentially flat

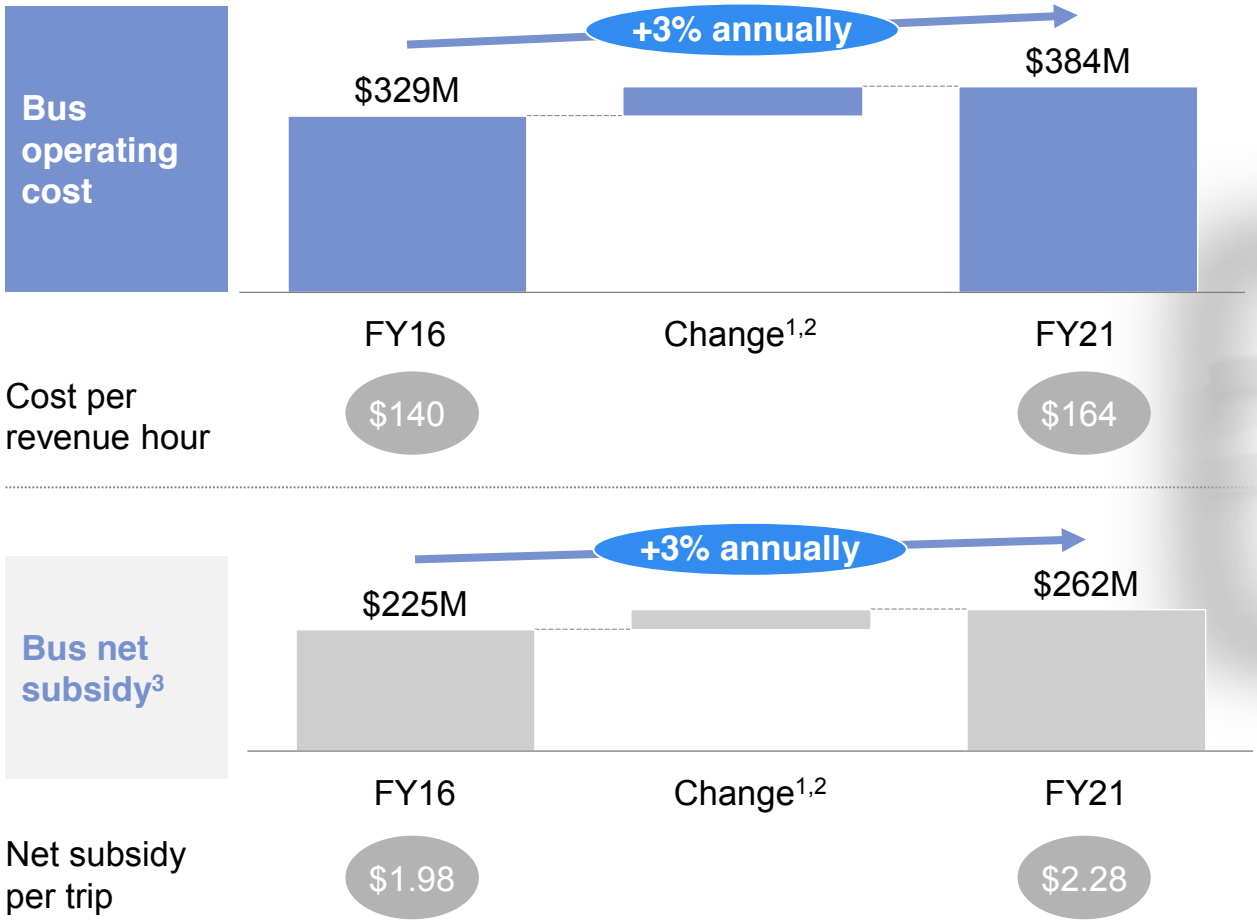
Doesn't include estimated allocation of ~$90M[2] for bus system share of MBTA retiree health cost

Major drivers:
- Wage rates
- Operator headcount

1 Includes single trips, weekly and monthly passes
2 Based on external review, estimated unaccrued retiree health cost of ~$35,000/employee across the MBTA
3 Maintenance cost includes cost of repairing damage to vehicles, but does not include general liability insurance, which is managed centrally for the overall MBTA (2016 bus claims of $5.4M or ~$2/revenue hour)
4 Bus cost minus bus fare revenue, divided by total number of trips of 113M in FY16, 115M in FY13

Source: MBTA data

How are MBTA bus costs and net subsidy expected to grow by FY21, the end of the original FMCB legislation period?



- At current course and speed, the net subsidy needed for the bus system is expected to grow to $262M by FY21
- To increase customer satisfaction and respond to stakeholder requests, the MBTA could consider increasing service levels in certain capacity-constrained corridors
- However, under the current operating model, every 10% of new service hours added would likely:
  - Increase operating costs by $35-40M
  - Require capital for new facilities and fleet

1 Costs assuming driver headcount remains flat; wages grow at 2.5%; fringe increases to ~52% to account for increasing pension/healthcare costs; Energy Information Administration forecasted growth rates for compressed natural gas and diesel accounting for fuel and efficiency and shift in fleet; and average growth FY13-FY16 in all other costs (with a $5M material spend decrease in 2018 from new fleet)
2 Net 0.1% growth in ridership including elasticity effect of fare increases of 7% every other year starting in 2018
3 Bus operating cost minus bus fare revenue
Source: MBTA internal data, EIA

What paths are currently under consideration to reduce bus transportation and maintenance costs?

Two paths to reducing costs currently under consideration

Current operating model

With changes to service planning, delivery, and employee salaries, as well as pension reform

Or…

Contracted service

Potential contracted service models for all or some bus service

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Current performance of the MBTA bus system

What have other agencies experienced when contracting for bus service?

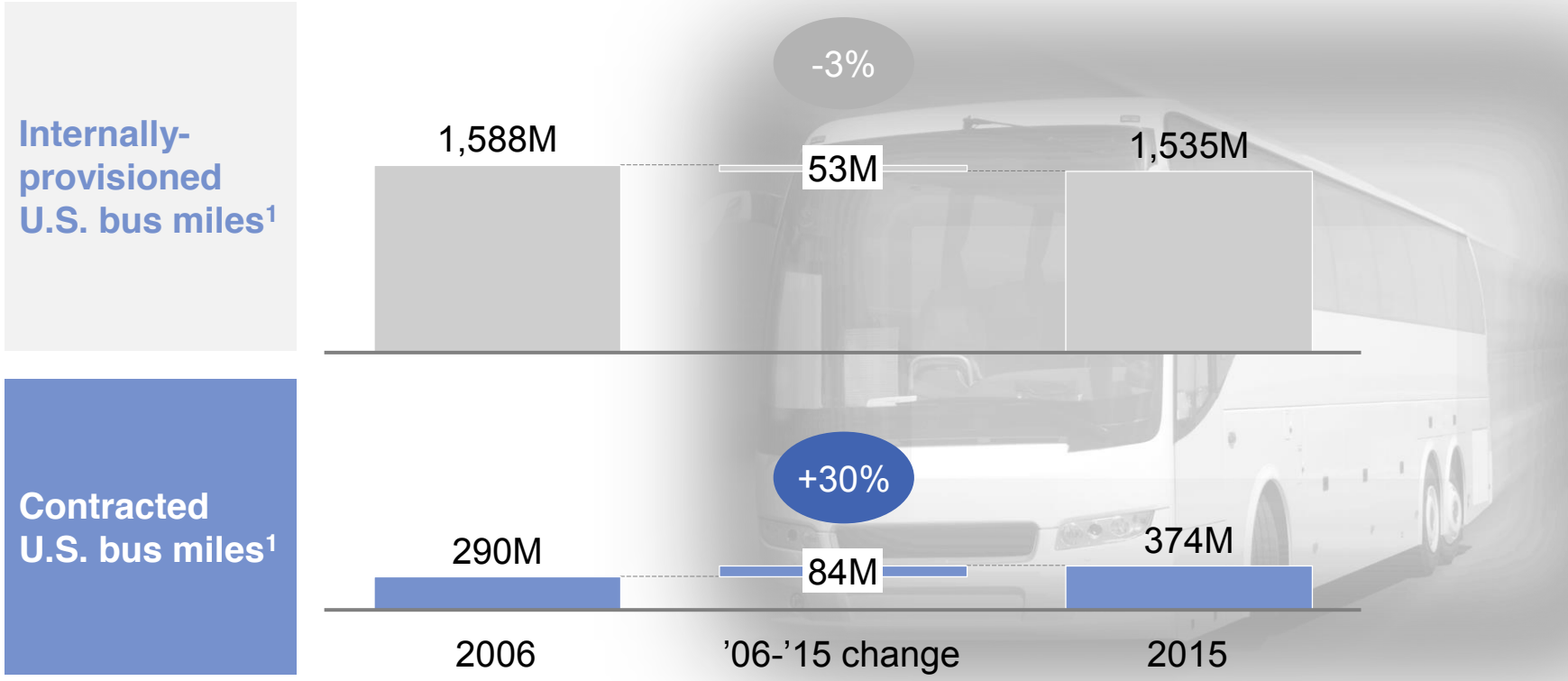
What contracted operating models could the MBTA consider for bus?

What alternative operating models have other transit authorities implemented?

	Description	Example authorities
Contract select bus routes	▪ Use contracts for certain routes, often outside core service areas	MBTA, massport, Miami-Dade County Transit, VTA (Santa Clara), SEPTA (Philadelphia)
Contract a substantial portion of bus operations	▪ Within the same network, use contracts alongside public operations, usually from different facilities	Denver RTD, MTS Metropolitan Transit System (San Diego), OCTA (Orange County)
Contract bus operations entirely	▪ Use one or more vendors to provide all bus transportation and maintenance ▪ Also occurs internationally MTR, Transport for London	RTC rtcsnv.com (Las Vegas), Connecticut Department of Transportation, Phoenix Valley Metro, All 13 Mass. RTAs, nice Nassau Inter-County Express (Long Island Bus), York Region Transit

Source: National Transit Database, transit authority operating profiles, industry publications, APTA

How has the mix of public vs. contracted bus service provision changed in the US?



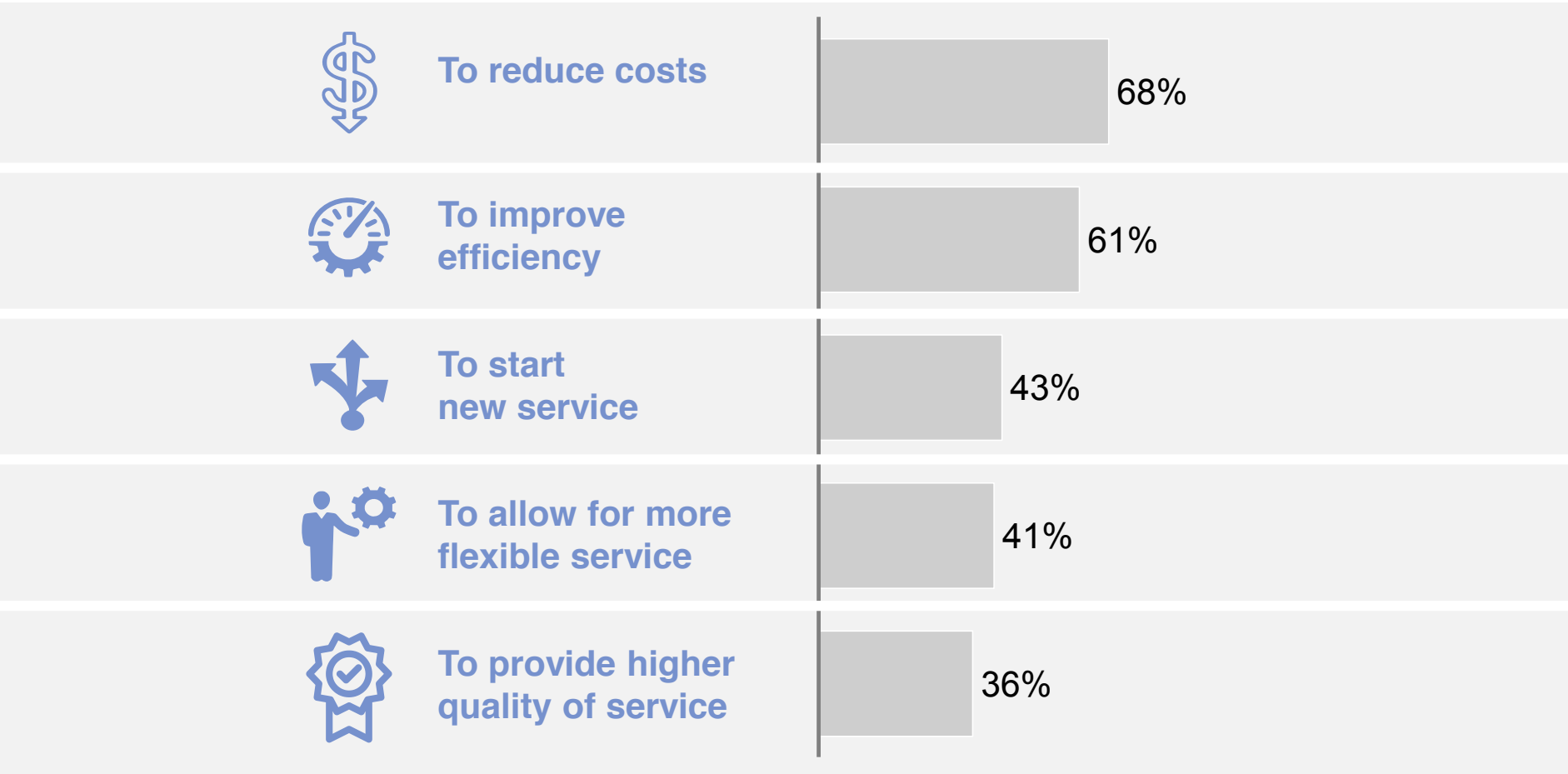
1 Annual revenue miles for all bus modes reported in National Transit Database (Motor Bus, Commuter Bus, Rapid Bus, Trolley Bus)

Source: National Transit Database

Why do transit authorities contract bus transportation and maintenance?

GAO[1]: Factors considered by transit authorities when deciding to contract bus service

% of surveyed authorities selecting option (n = 160)



1 Government Accountability Office GAO-13-782: *Transit Agencies' Use of Contracting to Provide Service.* Survey in April 2013

NICE (Long Island Bus) has improved performance and lowered cost by contracting its entire bus service

nice NASSAU INTER-COUNTY EXPRESS

305 buses

~28M passengers annually

~10M revenue miles

All contracted with private provider

2012 — 2016

MTA Long Island Bus

(Long Island bus operated by NY MTA)

transdev MOBILITY INSPIRED BY YOU

(All routes shifted to TransDev)

Performance

- TransDev **increased on-time performance**[1] to 70% from 2013 to 2014
- TransDev preserved all routes, added one new and two express routes, and **matched frequency to demand** when planning and scheduling service
- **Increased customer satisfaction** from 33% in 2011 to 63% in 2012
- **Reduced complaints** per 100k passenger trips to ~8 (down from ~12 in 2014)

Cost

- Provided service for **$132/revenue hour** in 2014, including G&A costs associated with TransDev administering entire transit authority
- Transitioned to contracted service **and retained a majority of the workforce.** All eligible employees were offered a position at the same wage rate, with a private-sector retirement plan

1 NICE defines on-time as departure within 1 minute prior to and 5 minutes late vs. scheduled departure time

Source National Transit Database, expert interviews

Las Vegas has contracted its entire fixed-route bus service to competing providers

RTC
rtcsnv.com

- **668** buses
- **~60M** passengers annually
- **~15M** revenue miles
- All contracted with private providers

1993 — VEOLIA TRANSPORTATION *(Operated all routes)*

2012 — Keolis / MV We Provide Freedom *(Routes split between contractors)*

2016

Performance

- **85-90% OTP**[1] on all routes
- Service **contracted to two providers** in order to **increase competition** and drive performance
- Survey of customers across routes reveals that 40% are highly satisfied, compared to industry average of 12%[2]

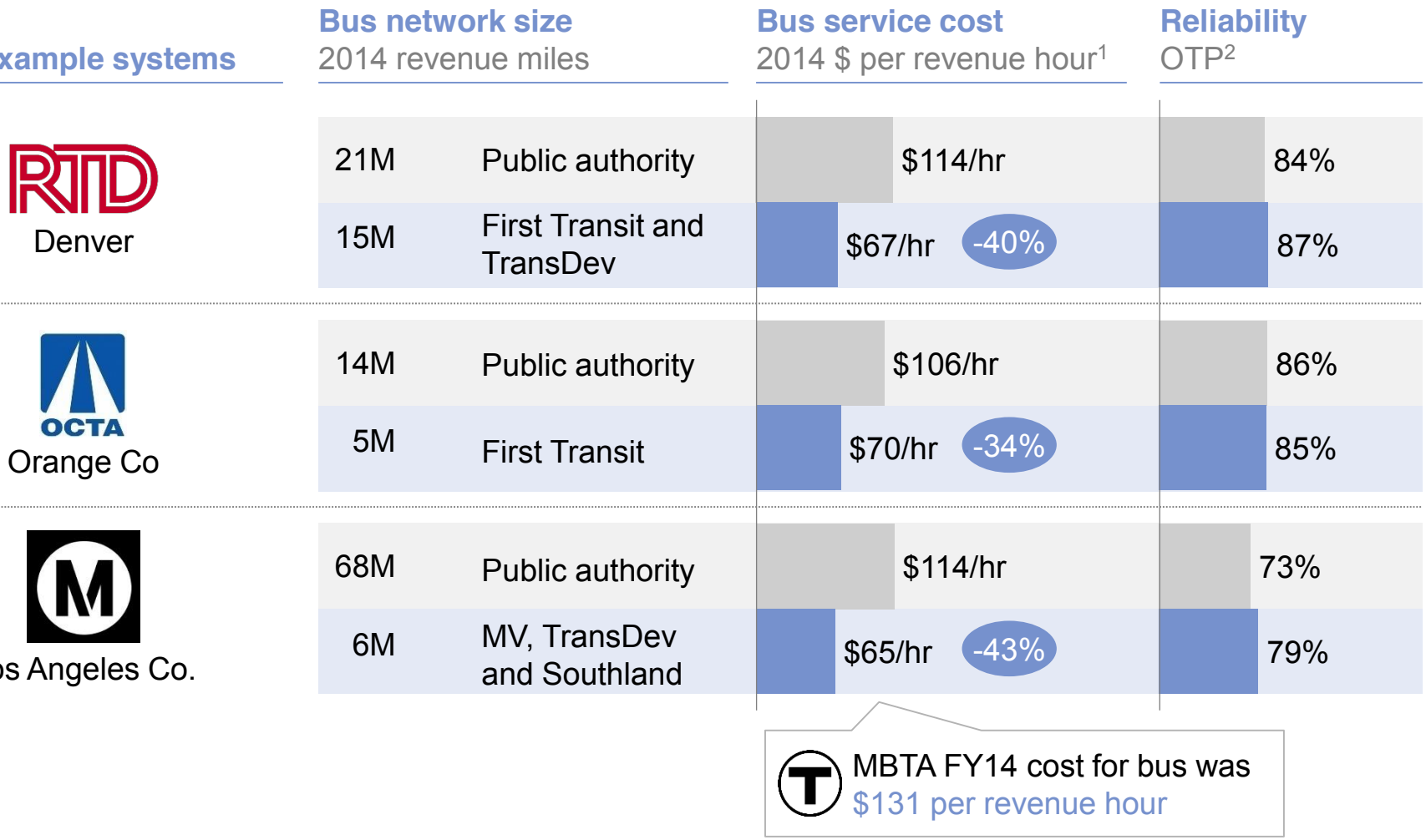
Cost

- Cost of **~$100/revenue hour** in 2014
  - Public authority determines routes and fares, and owns facilities and vehicles

1 RTC of Southern Nevada defines on-time as departure within 2 minutes of scheduled time
2 A "highly satisfied" customer is one who ranks the transit system as 8-10 (on a scale of 1-10, 10=highest rating)

Source National Transit Database, expert interviews, public contracts

How do authorities that have substantial in-house and contracted bus operations perform?



1 Total 2014 cost of bus vehicle operations, bus vehicle maintenance, and bus non-vehicle maintenance reported by NTD – excluding G&A
2 On-time performance, which is often measured differently across different transit authorities
Source: National Transit Database, transit authority operating profiles, industry publications, and procurement contracts

How much does contracted bus service cost in the Northeast?

Example systems		Bus network size miles[1]	Bus service cost $ per revenue hour
EZRide (Boston)	▪ Operated in Cambridge, MA and Boston by Paul Revere	0.2M	$81/hr[2]
MBTA-Winthrop-(Boston)	▪ Operated by Paul Revere	0.2M	$89/hr.[3]

1 Bus service miles for EZRide and Winthrop are as of 2015
2 Includes vehicle depreciation
3 Includes vehicle depreciation of ~$9/revenue hour

Source: MBTA data

What is the typical business model adopted when bus service is contracted?

Scope of service contracted

- All bus transportation and maintenance services, with some exceptions (e.g. OCTA's Anaheim base contracts transportation only)

Asset ownership

- Authorities provide vehicles due to lower cost of capital and practical need to retain ownership
- Contractors typically run and maintain authority owned facilities

Contract terms and oversight

- Performance monitoring processes to ensure performance complies with contractual terms
- Payment is often on a per-revenue hour basis, although fixed-cost and per-trip arrangements also exist
- Duration usually 3-5 years with optional extension(s)

Labor practices

- Most private vendors have unionized workforces and bring in their own management
- Benefit rates usually lower from less expensive health plans and retirement plans
- Private operators can generally operate with a leaner headcount due to increased productivity and lower absenteeism

Source: Government Accountability Office, assessment of existing contracts, expert interviews

What could a private-sector contractor do to improve performance and cost of the bus system?

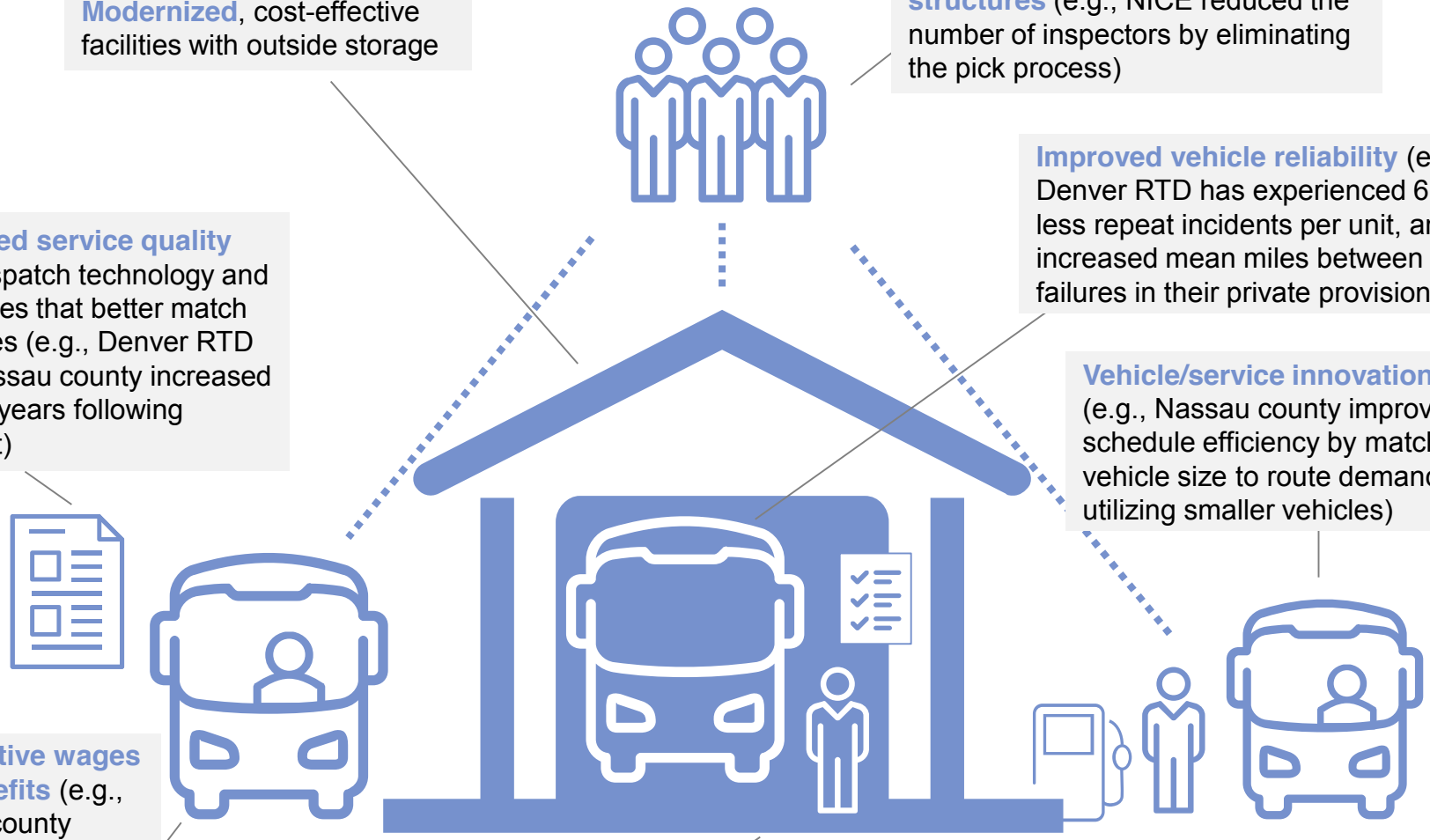
Modernized, cost-effective facilities with outside storage

Lean and efficient management structures (e.g., NICE reduced the number of inspectors by eliminating the pick process)

Improved service quality from dispatch technology and schedules that better match run times (e.g., Denver RTD and Nassau county increased OTP in years following contract)

Improved vehicle reliability (e.g., Denver RTD has experienced 67% less repeat incidents per unit, and increased mean miles between failures in their private provision)

Vehicle/service innovation (e.g., Nassau county improved schedule efficiency by matching vehicle size to route demand, utilizing smaller vehicles)



Competitive wages and benefits (e.g., Nassau county realized savings in labor costs via more flexible work- rules and private benefits)

Increased labor productivity and shorter vehicle downtime (e.g., Nassau county implemented look-ahead planning, closely tracked parts inventory, and improved standardization to reduce time-on-task)

Source: MBTA Data, expert interviews

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Current performance of the MBTA bus system

What have other agencies experienced when contracting for bus service?

What contracted operating models could the MBTA consider for bus?

What contracting principles could maximize likelihood of high service quality?

- Select a vendor on performance potential as well as low cost
- Structure contract with several addressable and specific key performance indicators, e.g.:
  - **Required OTP targets with a fine schedule**
  - **Miles between road-call standards for all vehicles**
  - **Target spare ratios**
- Realistically asses asset condition, and specify a quality / modernization standard for new facilities
- Hold structured and constructive labor negotiations with the goal of retaining and transitioning MBTA employees to private workforce

Can be met through:

- Enhanced scheduling technology
- Supply-chain management
- Standardized operating procedures and preventative maintenance scheduling
- Look-ahead maintenance planning

What is the range of performance contracting applications the MBTA could consider for the bus system?

Options A through D examined on following pages

All bus transportation and maintenance activities for…

A **Four "Focus40" bus garages[1]**

- Potential FY21 savings: **$30-45M**

All bus garages

- Potential FY21 savings: **$100-140M**

B **Bus diversions service only[2]**

- Potential FY21 savings: **$1-2M** (mostly against capital budget)
- Enables rapid expansion of capital program

D **Additional 25-50% service**

- Savings would be against a new cost projection

Maintenance-only options…

C **Heavy bus maintenance activities (Everett)**

- Potential FY21 savings: **$4-5M[3]**

All bus maintenance activities (9 bus garages)

- Opportunity could be up to **$30-40M** annually
- Recommend sending an RFI to test the market

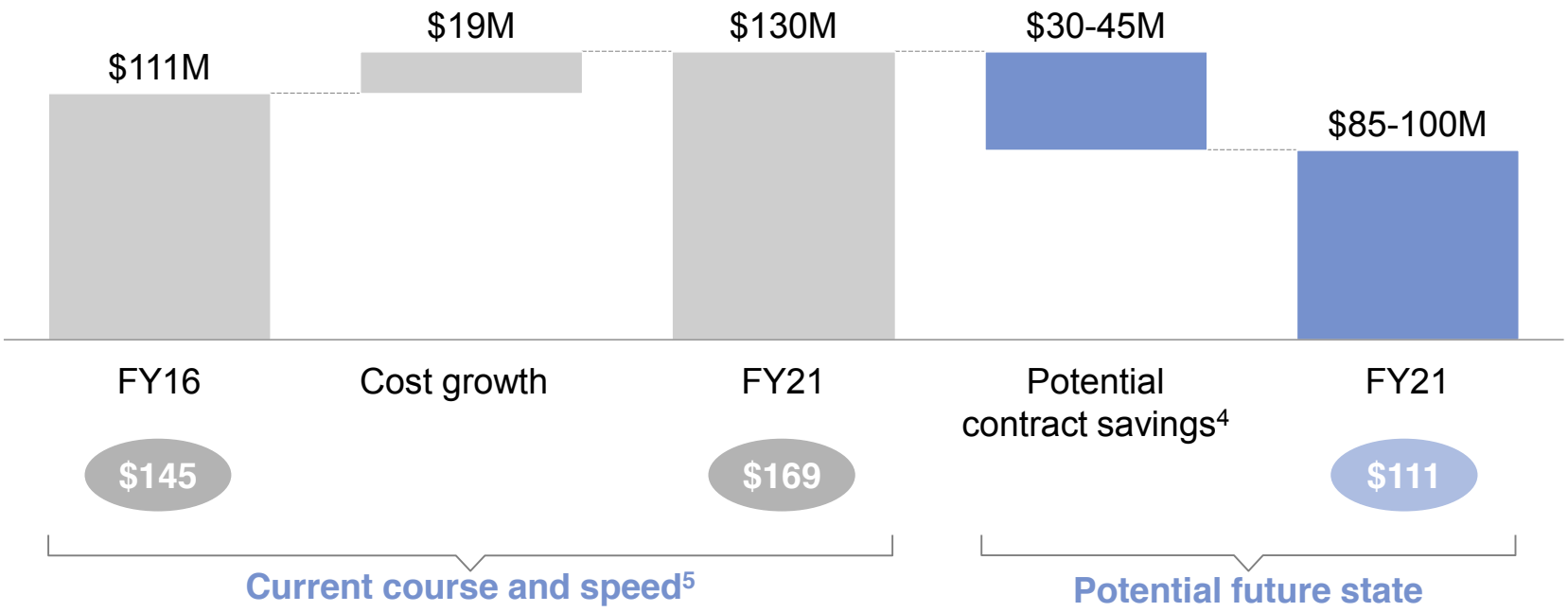
Note: Although this work considered 3rd-party contracting of these activities, some of the productivity and cost improvements could also be implemented internally

1 Arborway, Fellsway, Quincy, and Lynn; identified by MassDOT "Focus40 investment plan for the MBTA" as needing full rehabilitation or replacement
2 Buses to replace rail service during construction
3 Included within "All bus garages" savings of $100-130M; $2M included in "Four Focus 40 bus garages" savings of $30-45M

Source: MBTA data

A By how much could a phased-in performance contract reduce operating costs at the four "Focus40" garages?

Four "Focus40" garages[1]: Cost growth and potential savings from performance contracts[2]



- ~25-35% savings, excluding capital cost to rehabilitate or build new garages
- For comparison, current Paul Revere 2016 cost/hr to operate MBTA service in Winthrop is ~40% lower than MBTA overall cost/hr[6]

1 Fellsway, Lynn, Arborway, Quincy
2 Includes allocation of Everett, fuel, uniforms and other shared costs based on total hours
3 Assuming FY16 service levels (revenue hours) persist to FY21
4 Assuming contract cost growth of 2% annually (versus 3% annual MBTA cost growth)
5 Labor grows at 2.5% annually, fringe rate increases to ~52% due to increasing pension and healthcare contributions. Material & services growth at historical rate of 6.5%, with spend base reduced in 2018 for new fleet delivery. Fuel grows in line with EIA projections
6 Excluding the cost of vehicle depreciation
Source: MBTA Data, expert interviews

A Four garages were identified in the MassDOT Focus40 plan as needing major rehabilitation or replacements

Arborway

Quincy

Fellsway

Lynn

Allocation of **MBTA capital funds** could be required to rehabilitate or replace these facilities

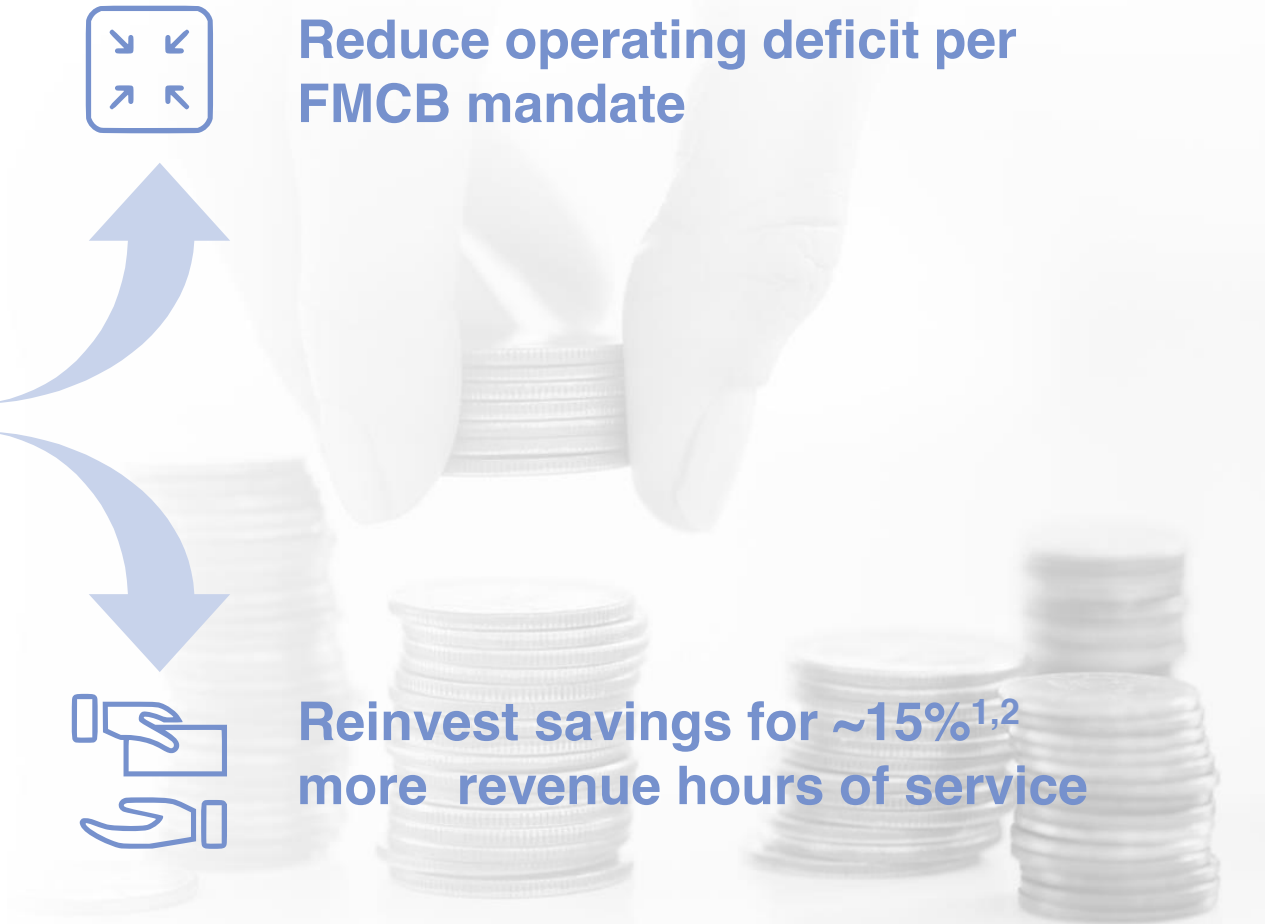
Source: MassDOT "Focus40 investment plan for the MBTA"; "CH2MHill MBTA Bus Maintenance Efficiency Study", Images from MBTA

A What are the potential uses of the cost savings from contracted service?

Potential **$30-45M** of operating cost savings from contracting

Reduce operating deficit per FMCB mandate

Reinvest savings for ~15%[1,2] more revenue hours of service



1 Assumes additional revenue hours are purchased from outside provider at $111/revenue hour in FY21
2 Requires additional capital investment in buses and facilities

Source: MBTA data, expert interviews

A What are the potential paths for the existing workforce at these 4 garages if transportation and maintenance are both contracted?

Employee category	Current Focus40 garages headcount[1,2]
Bus operators	577
Inspectors	54
Machinists	96
Fuelers	24
Other[3]	38
Total	**789**

Potential pathways for current employees …

Some or all employees moving to the contractor

Employees moving into positions at other bus garages as they become available

~672[2,4] employees are expected to attrite from the bus system over the next four years, including retirement, voluntary, and involuntary separations

Employees moving into positions elsewhere in the MBTA as they become available

Expected 4-year attrition for the operators, machinists, inspectors, and fuelers for the entire MBTA is ~1,000[5] (for all positions it is ~2,000)

1 Fellsway transportation headcount allocated from Charlestown district by total hours
2 Including both full-time and part-time employees
3 Includes garage administrative staff, supervisors, etc.
4 Assuming annual attrition of 97 bus operators, 8 inspectors, 30 machinists, 4 fuelers, and 29 "other" – in line with 10-year historic averages voluntary and involuntary attrition and movement to non-bus MBTA positions
5 Assuming placement into non-management positions outside the bus system

Source: MBTA data

B Could the MBTA rapidly expand capital delivery by increasing bus diversion support through a performance contract?

What are diversions?

- **Buses** to replace rail service during construction, such as:
  - Longfellow Bridge
  - Winter resiliency
  - Red Line floating slab

How are they managed today?

- Hours are worked by **MBTA bus operators on overtime**
- **FY16 total cost was $5-6M**, all paid through capital budget[1]

How do others manage diversions?

- **Other systems manage diversions via contracts**

Metro-North Railroad

Peter Pan Bus Lines

Paul Revere Transportation, LLC

What are the potential benefits

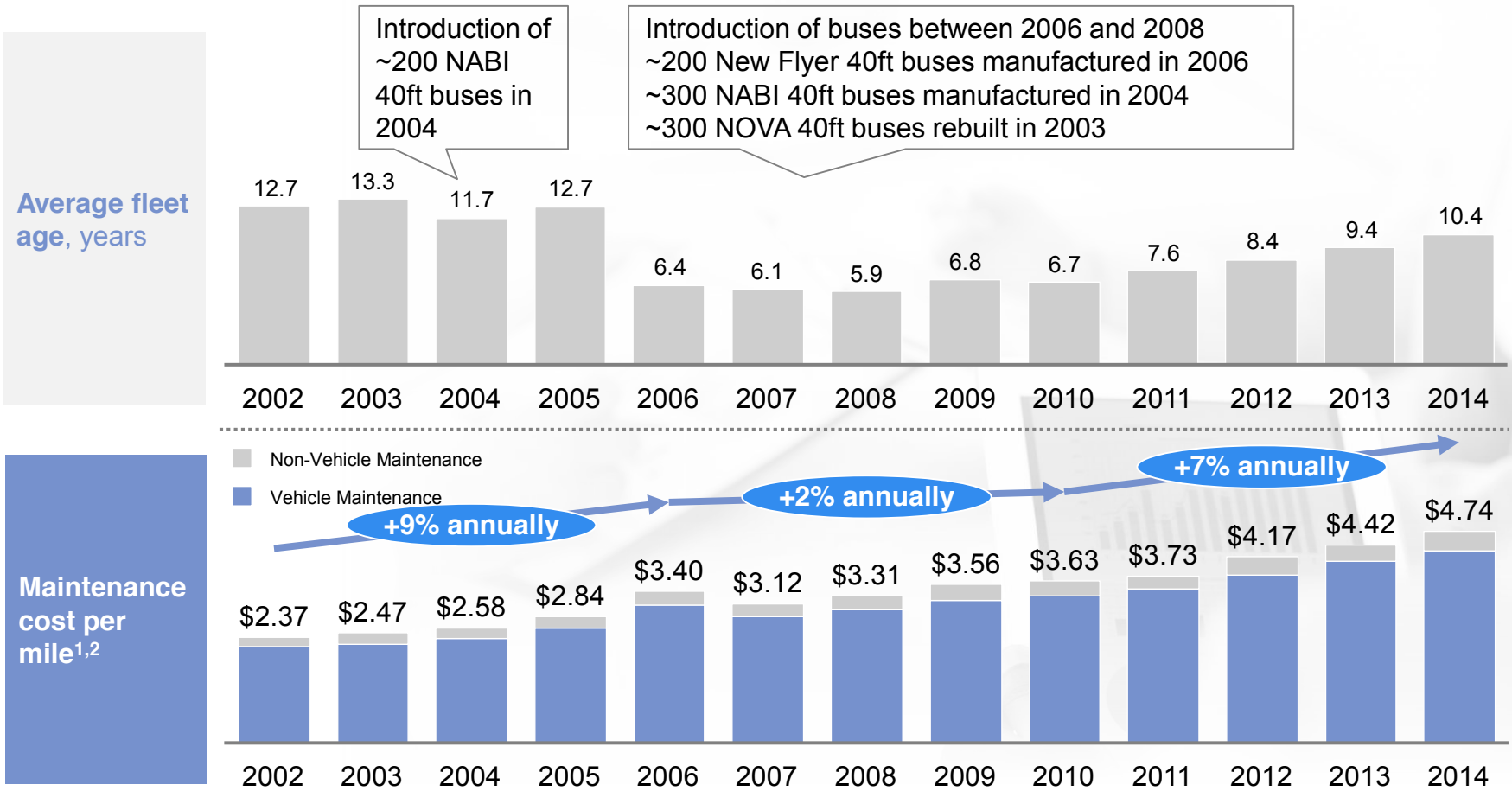
- Provide the **capacity and flexibility** to increase the frequency of capital projects (SGR repairs)
- **MBTA could save up to $1-2M** via flexible contracts for diversions
- A vendor could potentially provide service for ~$80/total vehicle hours[2]

1 Based on total cost of transportation labor ($3.2M, 57K hours) from OT labor cost + FICA and total cost of maintenance (~$2.4M) allocated based on total FY16 maintenance cost divided by total operator hours (2.9M)

2 Based on Winthrop bus route cost, assuming MBTA owns buses, excluding vehicle depreciation of ~$9/revenue hour, assumes total operators based on MBTA total operator : total vehicle hour ratio

Source: MBTA data, expert interviews

C What has been the impact on maintenance cost when new fleets are introduced?

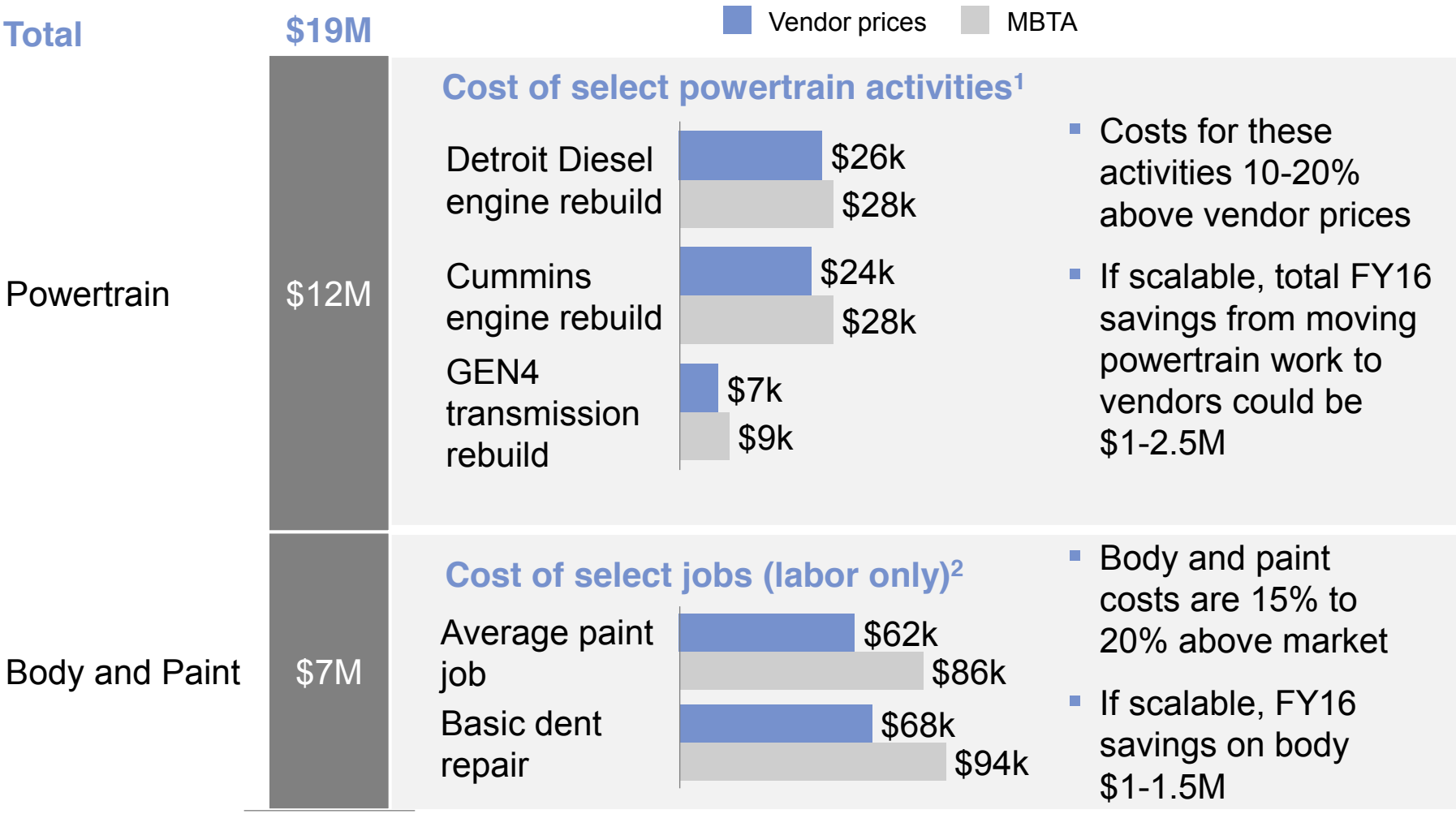


1 Division of growth periods allows for 2 years' lag in the potential impact of new buses on maintenance cost per mile
2 Fully loaded maintenance cost per mile including total labor and fringe bill

Source: National Transit Database

C Could performance contracts for heavy maintenance activities reduce costs?

Bus heavy maintenance cost at Everett



1 Estimates based on local vendor pricing
2 Vendor pricing based on competitive wage rates in the Boston area and profit margin for similar work

Source: MBTA data on Everett costs versus vendor pricing; MBTA payroll data and Bureau of Labor Statistics Boston Metro wages

D If the policy decision is made to expand MBTA bus service by 25-50%, what would be the likely required funding?

Facilities

2 to 4 new garages[1]

- ~20-40 bays and ~45,000-90,000 square feet of building space[2]

Vehicles

250-500 additional buses

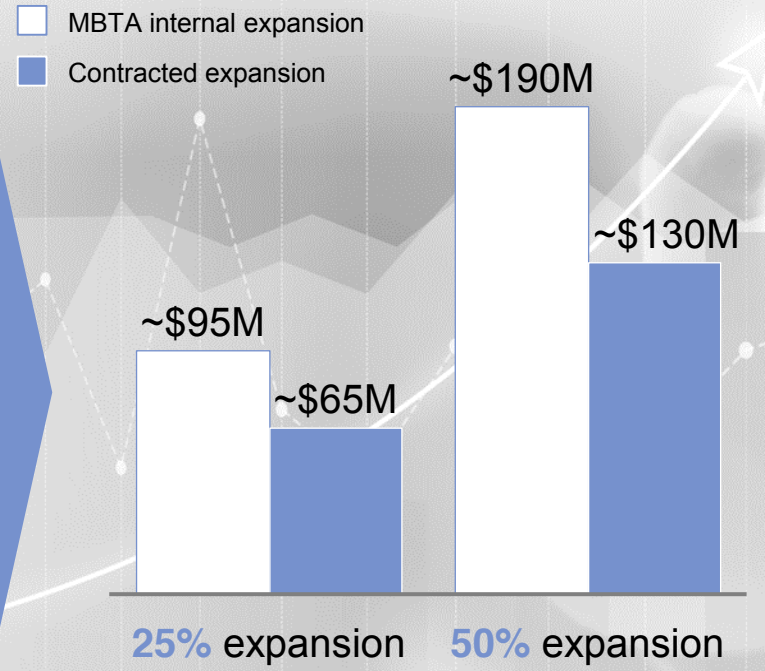
- ~225-450 standard and ~25-50 articulated buses, depending on service type

Staff

~600-1,200 additional bus staff[3]

- 500-950 transportation
- 100-220 maintenance

FY21 internal vs. contracted operating cost of expanded service[4]



$30-60M of operating cost savings from expanded service through performance contracting (excluding any capital costs for new vehicles or facilities)

1 Depending on garage size and service level added
2 Assuming current space/bus and maintenance bays/bus at Fellsway (outdoor storage garage) is required; WRTA new facility cost of ~$650/sqft
3 Assuming contracting labor efficiency
4 Assuming ~0.6M - 1.2M hours of service added at either internal MBTA cost of $164/revenue hour vs. contracted cost of $111/revenue hour
Source: Analysis of existing MBTA staffing levels and asset base

In conclusion…

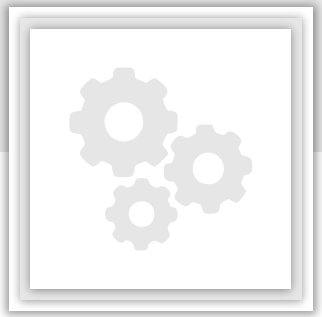
- The MBTA bus system is a critical service that is currently facing the challenge of aging capital assets, low on-time performance, and a growing cost base
- Other authorities' experience with contracting – and the MBTA's experience locally – indicate contracting could be a viable solution
- The MBTA can explore contracting for:
  - All transportation and maintenance activities currently performed from four garages needing major rehabilitation or replacement
  - All bus diversions service
  - Heavy maintenance activity currently performed at Everett
  - All new bus service added in the future

The MBTA could test the market to answer these questions:

- What innovations and technology could a contractor bring to improve operations and customer service?
- To what extent could costs and the required taxpayer subsidy be reduced through contracting?
- Could a contractor cost-effectively provide modern facilities to replace the MBTA's worst-condition ones?
- How much flexibility to expand service would contracting give the MBTA?

Contents

Core operations: A call to action



MBTA bus transportation and maintenance

MBTA Red / Orange line maintenance

MBTA customer service agents

Main messages in this discussion of rail car maintenance

Baseline

- In FY2016 the MBTA spent approximately $58M in operating costs on rail car maintenance, including $19M of heavy maintenance spend in Everett[1]
- Maintenance spend on the Red and Orange lines is driven by the age of the fleets, ~36 years old. Unit maintenance costs could be reduced by the delivery of new fleets (by CRRC in 2022), and management actions to adjust headcount accordingly
- The Blue line fleet is relatively new with higher spend due to a Reliability Centered Maintenance program (RCM) which is expected to reduce heavy maintenance/overhaul costs on this fleet in the future
- At current course and speed, rail car maintenance costs on the Red and Orange line are expected to grow at ~9% annually (5% excluding added service) and add more than $25M to the T's cost base
- A range of contracting models are used by other transit authorities in order to reduce maintenance costs
- Chicago, Atlanta, and Washington D.C. all use flexible contracts for rebuilds (e.g., quarter, mid-life, and / or three-quarter overhauls)

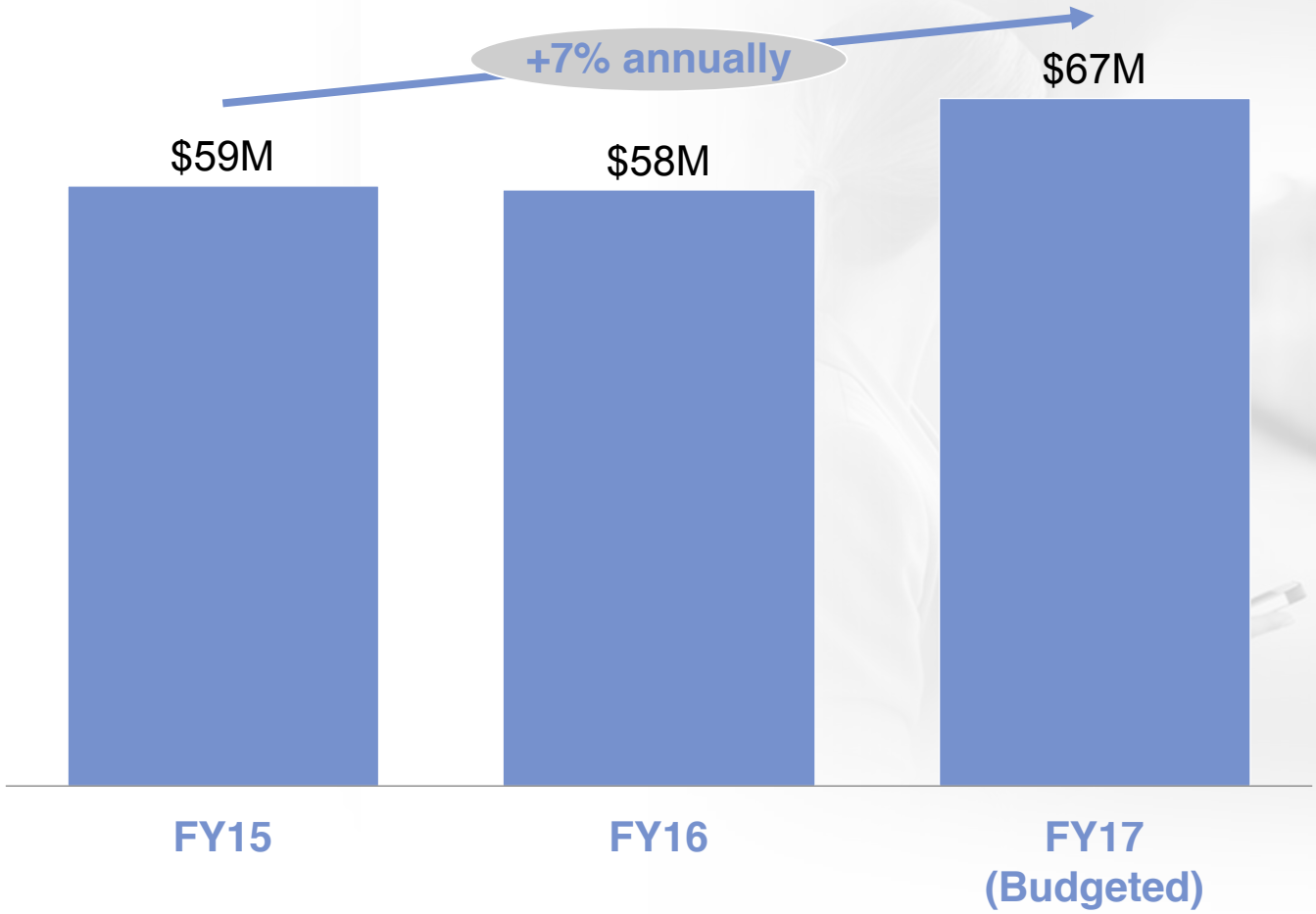
Questions

- How are similar public transit authorities approaching rail car maintenance?
- What are the various rail car maintenance contracting options?
- What is the potential impact of contracting rail car maintenance?

1 Excluding ~$10M of rail car operating maintenance spend associated with the Green line

Rail car maintenance costs are budgeted to rise 7% from 2015 to 2017

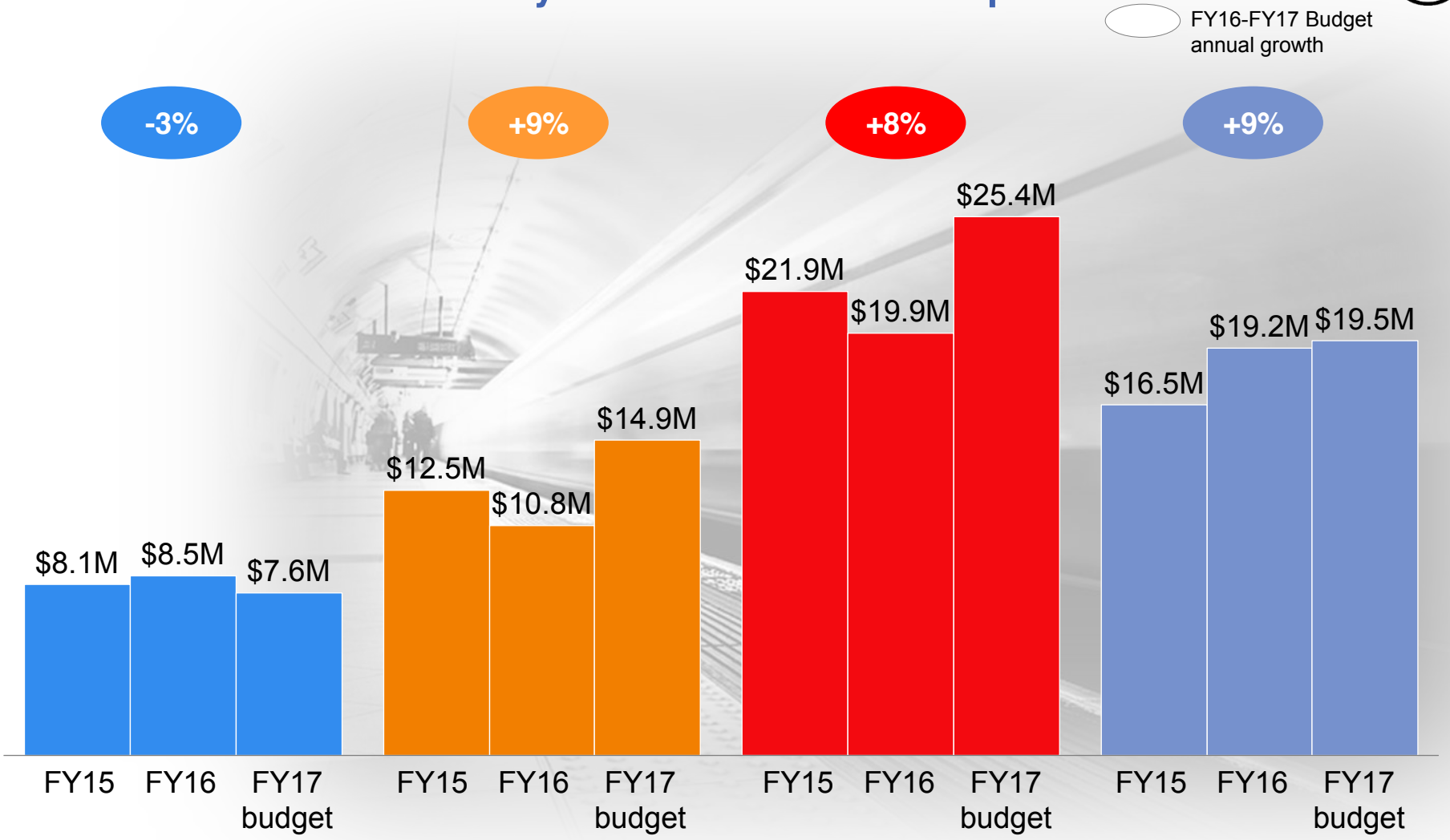
Blue, Orange, and Red line shop and heavy rail car maintenance, excluding Green line, operating costs[1]



1 Includes allocation for Everett but excludes Green Line (Cabot and Wellington railcar maintenance shops and Everett rail heavy maintenance share)

Source: MBTA data

How have rail car maintenance costs grown by subway line and at the Everett Heavy Rail maintenance shop?

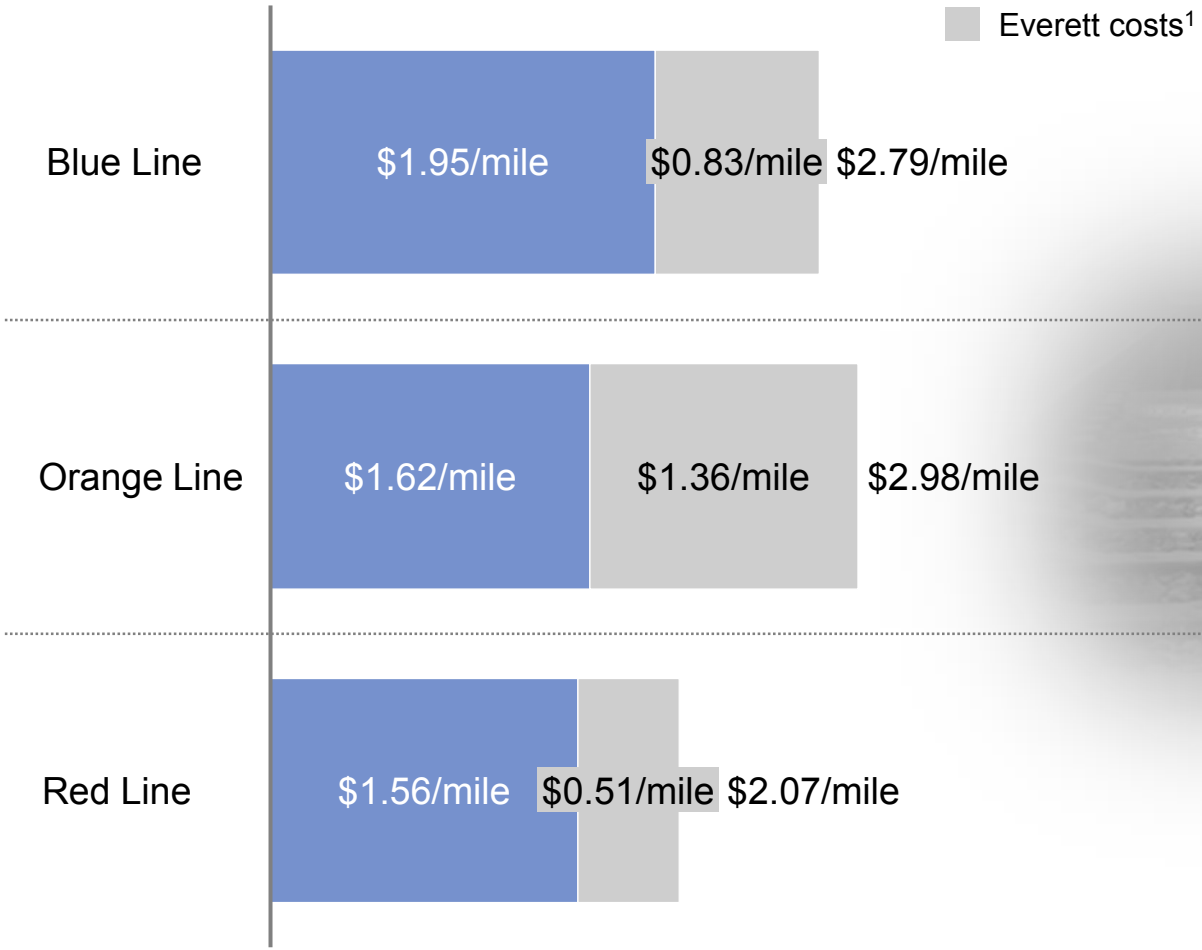


1 Operating expense only, excluding $7M of capital spend over a multi-year period, per the MBTA fleet plan, being spent in support of the RCM on the new Blue line fleet

Source: MBTA data

How do the operating maintenance costs per mile compare by line?

FY16 rail car maintenance per-mile operating costs

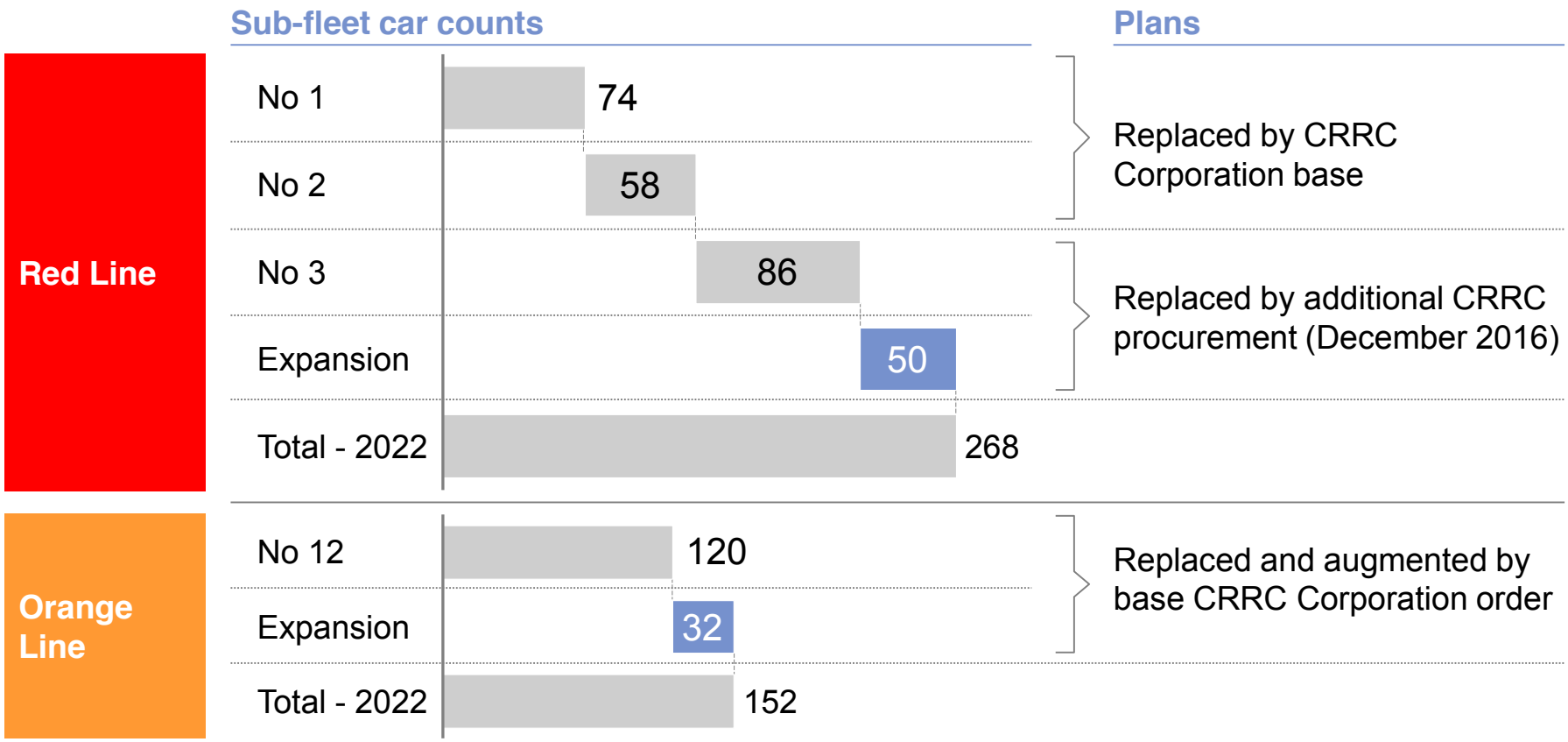


Notes

- Reliability Centered Maintenance (RCM) program raises shop-level expenses **but could avoid need for overhauls**
- Everett costs are lower due to RCM and newer fleet
- High level of Everett support due to age of fleet and continuing need for repairs
- Does not include capital costs for overhauls
- Does not include capital costs for overhauls

1 Excludes spend / headcount devoted to Green Line (based on hours of activities devoted to each line, with indirect allocated proportionally)
Source: MBTA data

Under current plans, the Red and Orange fleets are expected to be replaced by 2022 and the fleets are planned to grow by 82 cars



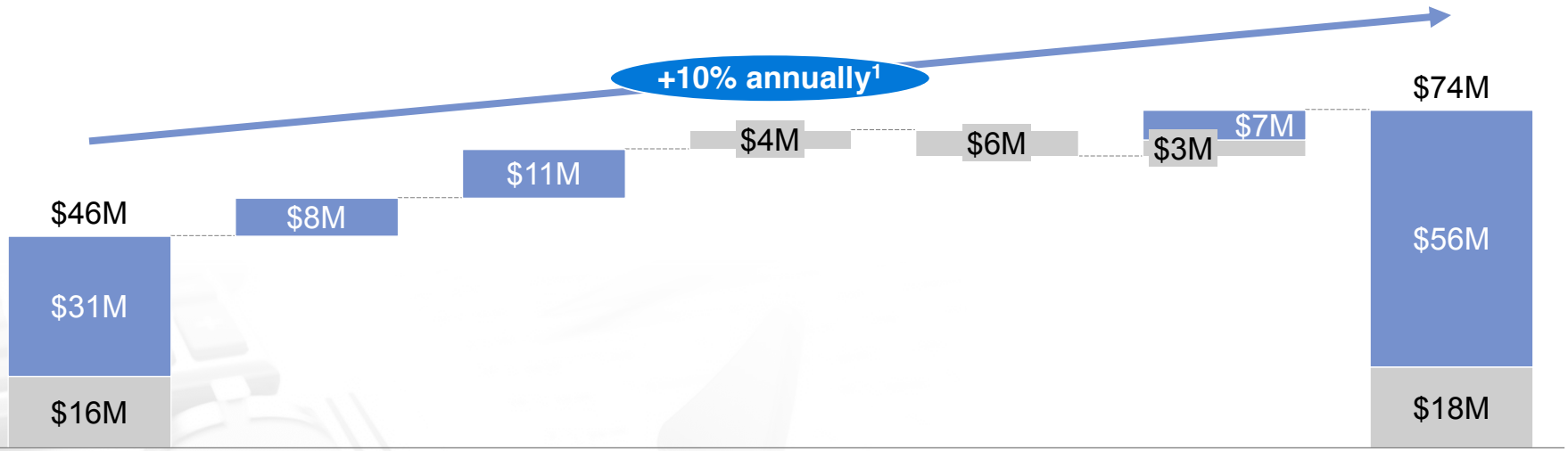
The introduction of a new and potentially uniform fleet for the T's two highest-capacity subway lines can create an opportunity to re-examine how the T delivers maintenance

Source: MBTA integrated fleet plan

How are MBTA Orange and Red line maintenance costs expected to grow by FY21, the end of the original FMCB legislation period?

Everett heavy maintenance
Rail shop fleet maintenance

Orange and Red line shop and heavy fleet maintenance: baseline costs and sources of growth



Shops

Everett

25% miles growth from new service[2]	Similar per-mile cost to Blue Line	25% miles growth from new service[2]	Orange: ~50% down due to fleet Red: ~40% up to match	Growth based on historic T increases

1 6% growth annually excluding additional miles driven
2 Assumes that percent growth in fleet translates to same percent growth in service miles
Source: MBTA Data, expert interviews, National Transit Database

What are the models for providing rail service?

	Maintenance and operations in-house	Some or all maintenance only contracted	Maintenance and operations contracted	Full design, build, operate, maintain contract
Commuter or light rail	Metro-North Railroad Long Island Rail Road Toronto Transit Commission	Transport Sydney Trains	Keolis Metra	RTD Hudson-Bergen Light Rail
Metros	MTA Underground Toronto Transit Commission	metro cta marta	Melbourne Metro MTR Stockholm 北京地铁 Beijing Subway	Ottawa Train sydneyMETRO northwest

Detail follows

Source: Transit authority websites, expert interviews

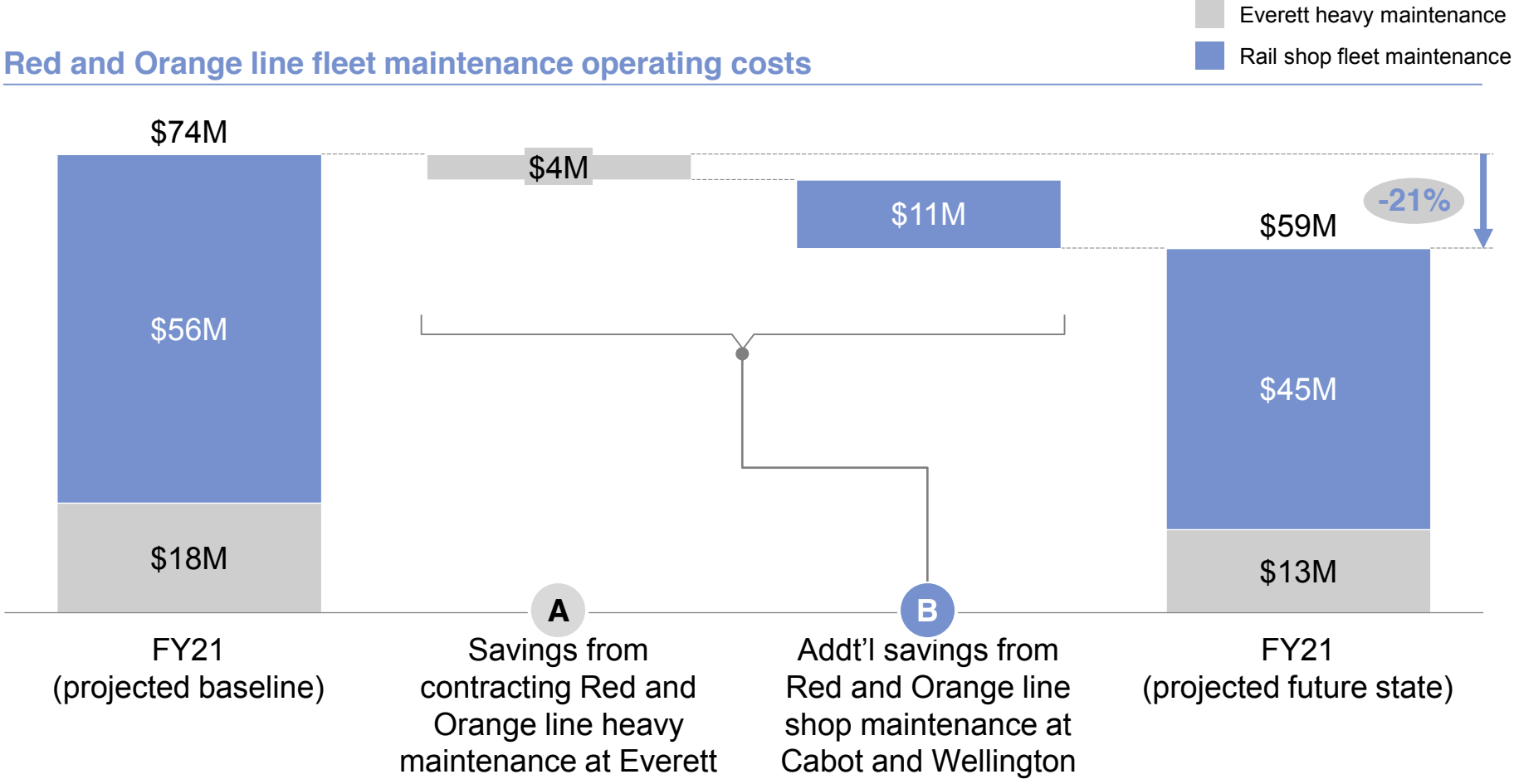
What examples are there of using flexible contracts for rail car maintenance (assuming operations remain in-house)?

	Description	Example authorities
Contract overhauls	Use flexible contracts for rebuilds (e.g., quarter, mid-life, and / or three-quarter overhauls)	Metro, MBTA, CTA, MARTA
A Contract overhauls and heavy maintenance	Overhauls and heavy maintenance of major components (e.g., traction motors, trucks, HVAC, etc.)	DART
B Contract overhauls, heavy maintenance and light maintenance	Overhauls, heavy maintenance, and running repairs (e.g., doors, brakes, lighting, etc.)	Transport Sydney Trains

Source: Transit authority websites, expert interviews

How could maintenance contracts for the Red and Orange line fleet maintenance affect the MBTA's FY21 cost base?

Red and Orange line fleet maintenance operating costs



The strategy would be to employ a flexible contract for the new Red and Orange cars, which could comprise 100% of their respective fleets by 2022[1]

1 Depends on activation of option to replace Red Line No 3, and assumes addition of 50 new Red Line cars (OEM TBD)

Source: MBTA Data, expert interviews, National Transit Database

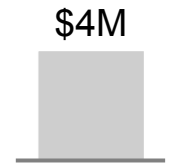
How could contracts for rail car maintenance be structured?

A Everett rail Orange and Red line activity

FY21 cost $18M[1]

Vendor provides heavy components for installation

Approach	Discrete component rebuilds are conducted by vendor, which utilize skilled assembly-line staff
Market	OEMs may be able to provide this service, but would require bidding and direct negotiations to test
Savings levers and amounts	Labor (wages, benefits, and efficiency): $3M Materials & services (spend and waste): $1M



B Cabot and Wellington shops

FY21 cost $56M[1]

Vendor performs day-to-day maintenance at shops

Approach	Technicians from vendors to maintain vehicles on a day-to-day basis within rail shops
Market	Existing liquid market does not appear to exist in U.S., as approach has not been utilized at other metros
Savings levers and amounts	Labor (wages, benefits, and efficiency): $10M Materials & services (spend and waste): $1M

1 Includes total cost of labor and materials

Source: MBTA Data, expert interviews, National Transit Database

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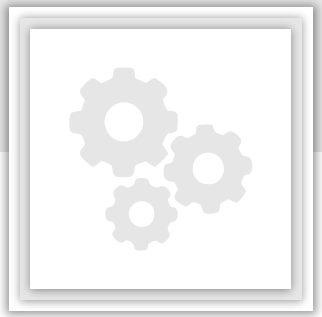


MBTA bus transportation and maintenance

MBTA Red / Orange line maintenance

MBTA customer service agents

Main messages in this discussion of customer service agents

Baseline

- The current Customer Service Agent (CSA) role provides support for basic customer needs within the subway system, and includes no specialized customer service or safety training
- The MBTA currently employs 202 customer service agents (CSAs) at an average wage of $27 per hour (excluding fringe); total cost of CSAs was ~$17M in FY2016
- Customer satisfaction with the subway system has been average at 4.7 out of 7.0, and remained relatively flat over the first half of 2016
- Two primary contracted customer service options exist
  - Basic coverage, contracted “eyes and ears”, with current transit authorities such as Denver RTD currently using this approach
  - Advanced coverage, customer service orientation with safety training specific to the role, larger rail networks such as Eurostar currently utilize this service

Questions

- Are there ways to improve the customer experience through the CSA roles?
- What are alternative models for customer support?
- What is the potential impact if an alternative approach is used?

What is the role of the CSAs and what are the associated costs?

Current MBTA CSAs

Profile

- Largely former token takers and rail operators
- Original purpose was to make transition to automated fare collection

$25-$35 / hour excluding fringe[1]

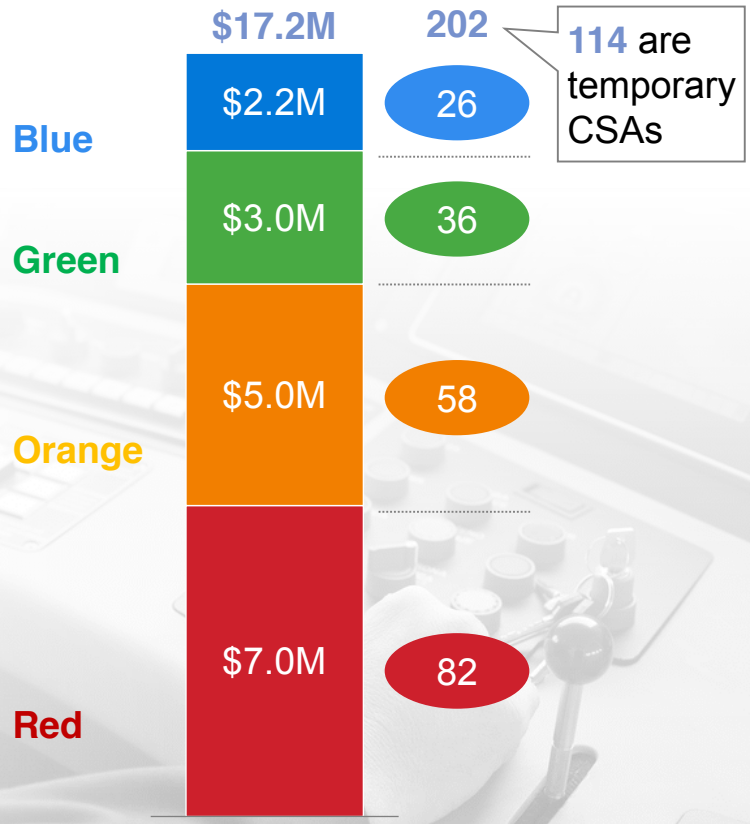
Fare issues and wayfinding

- Provide basic coverage for customers
- Key role in Charlie Card transition in 2006/7

Security / fare evasion

- Limited specialized training in safety / emergency response
- Staff have understanding of rail operations

FY16 CSA Labor Cost[1] / CSA total headcount[1]



Costs are expected to grow $2.6M to a total of $19.8M by FY21[2]

1 Average = $27, FY 2016 MBTA budget data, general MBTA information
2 Assumes annual 2.5% cost escalation from labor costs + an increase in the fringe rate to 52%

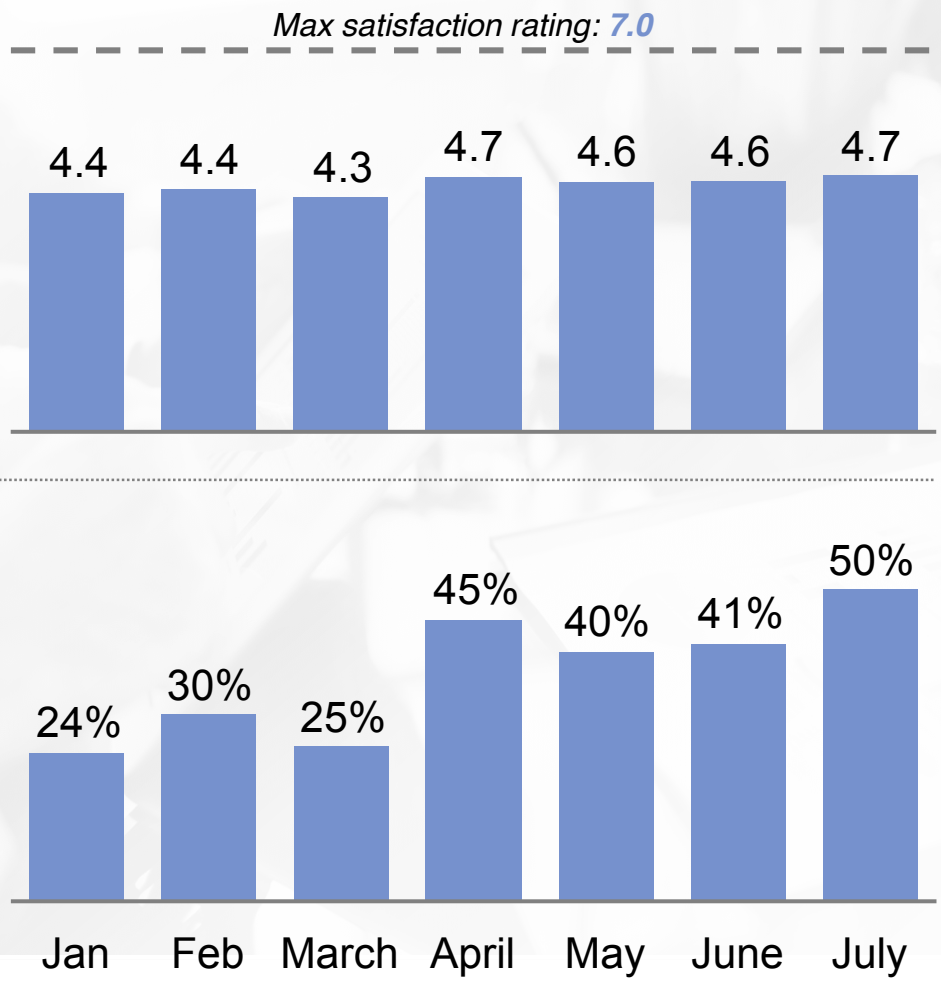
Source: Public research on wages from job postings

How is customer satisfaction on the subway system?

Measuring satisfaction

- The MBTA asks customers to grade the T from 1 to 7
- From January ‘16 to July ’16 the average performance was **4.5**
- The T also calculates a “Net Positive Score”: the percentage of riders giving a high score (5-7) minus the percentage giving a low score (1-3)
- From January to July the subway had a net positive score of **36%**

Subway customer satisfaction, Q1 & Q2 2016



Source: MBTA Office of Performance Management and Innovation

What are some other ways to approach the CSA role, and what are the benefits from each model?

	Approach	Providers	Example clients
Basic coverage	Limited to no customer service training or experience Serve as basic 'eyes and ears' to report safety issues to police	Allied Universal Security Services Securitas Airserv An ABM Company	RTC of Southern Nevada RTD VTA Sound Transit Dulles International Your Journey Begins With Us.
Advanced coverage	Customer service orientation, with focus on fare issues and customer wayfinding Training in safety and rail operations	Across The Nation Promo, Model & Staffing Ltd. First Arriva	Network Rail Eurostar

Regardless of the approach, coverage for CSA services could be included in the bid and contract for a new Automated Fare Collection system

Source: MBTA data

Case Study: Airlines and airports have increasingly moved to flexible contracts for front-desk positions to reduce costs

Contracted airport ground operations

In the past 5 years, many airlines have moved to contracting

The primary goal has been to reduce costs and allow for flexibility in staffing

- Ability to ramp up / down quickly based on travel patterns
- Staff are generally cross trained (e.g., check in customers, handle baggage, etc.)

Performance / customer satisfaction have generally been positive

- Some airlines have had lower performance during transition

Staff hold security-sensitive positions

Airline and airport customers

Dulles International – Your Journey Begins With Us.

United Airlines

Alaska Airlines

Delta

American Airlines

Providers of contracted services

AIRSERV – An ABM Company

envoy

Piedmont

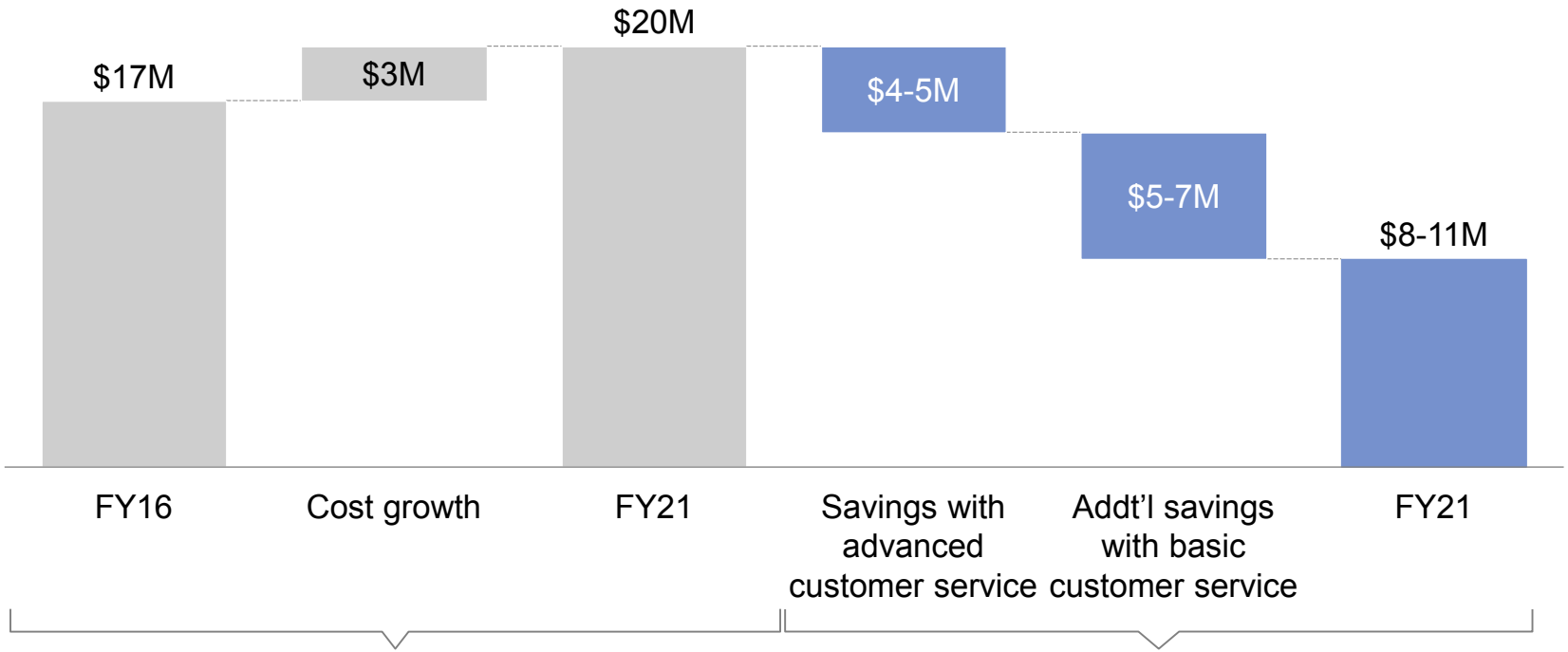
DGS

Menzies Aviation

Source: Expert interviews

What are the potential savings of contracting the customer service agent role?

Customer Service Agents: Cost growth and potential savings from performance contracts



Current course and speed[1]

Potential future state[2]

- Savings primarily driven by lower wages and fringe
  - Basic cust. service: $10-12/hour, 20-25%
  - Advanced cust. service: $20-22/hour, 30-40%

1 Assumes wage growth of 2.5% and fringe escalation from 48.7% to ~52% due to increasing pension and healthcare costs
2 Based on public research / job descriptions and estimates of benefits

Source: MBTA data, expert interviews

Appendix

What could a private-sector contractor do to improve performance and cost of the bus system?

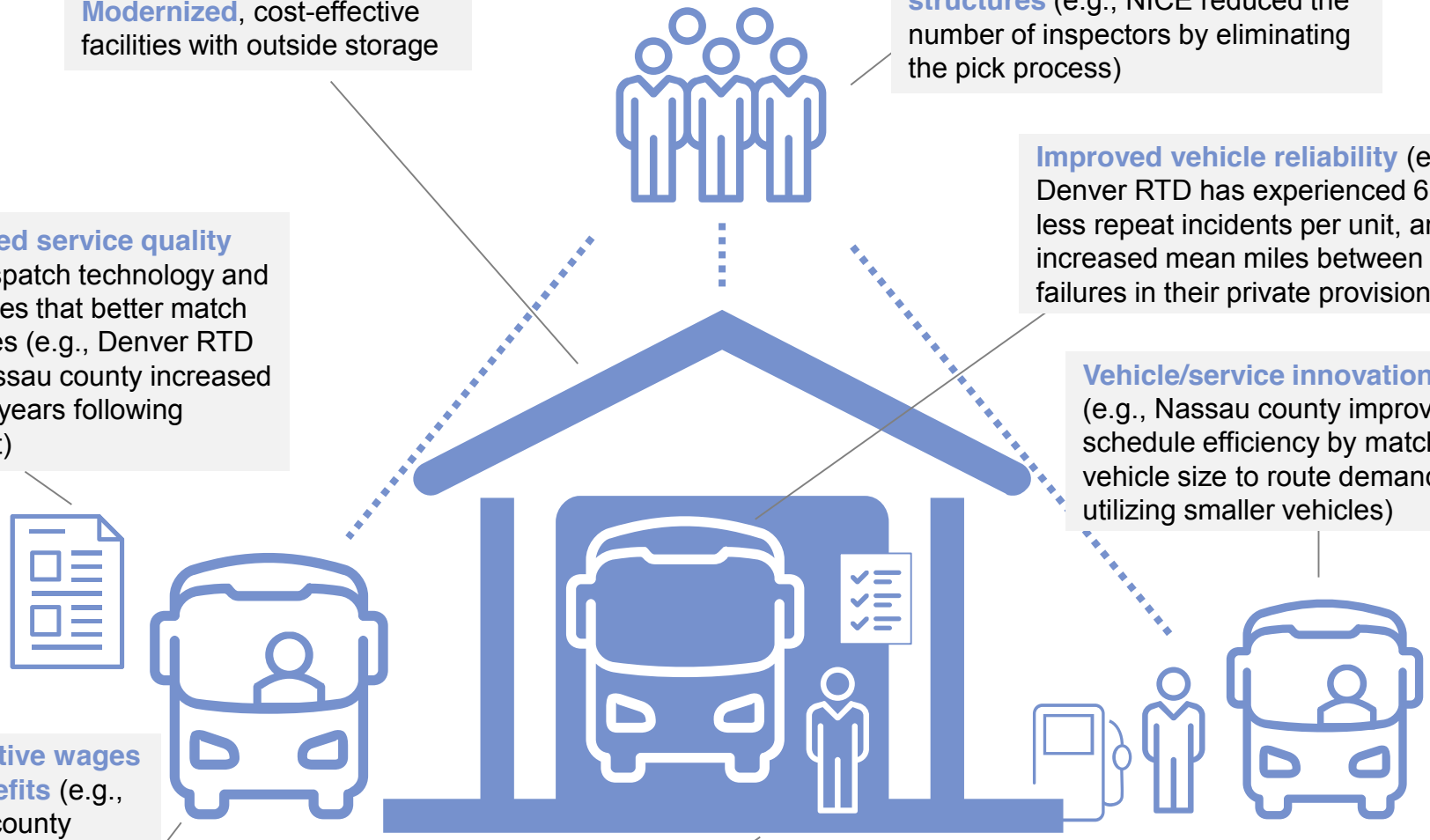
Modernized, cost-effective facilities with outside storage

Lean and efficient management structures (e.g., NICE reduced the number of inspectors by eliminating the pick process)

Improved service quality from dispatch technology and schedules that better match run times (e.g., Denver RTD and Nassau county increased OTP in years following contract)

Improved vehicle reliability (e.g., Denver RTD has experienced 67% less repeat incidents per unit, and increased mean miles between failures in their private provision)

Vehicle/service innovation (e.g., Nassau county improved schedule efficiency by matching vehicle size to route demand, utilizing smaller vehicles)



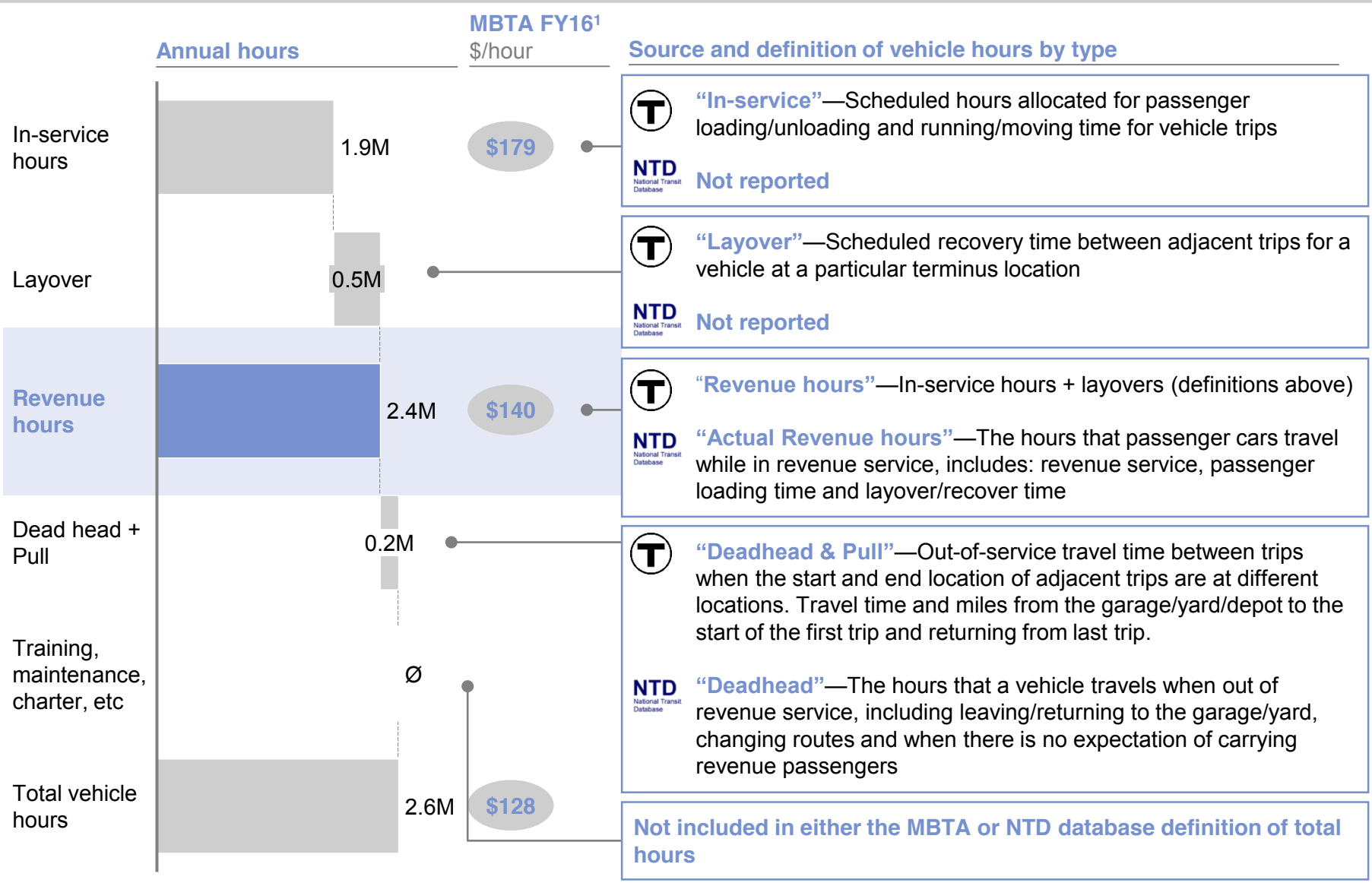
Competitive wages and benefits (e.g., Nassau county realized savings in labor costs via more flexible work- rules and private benefits)

Increased labor productivity and shorter vehicle downtime (e.g., Nassau county implemented look-ahead planning, closely tracked parts inventory, and improved standardization to reduce time-on-task)

Source: MBTA Data, expert interviews

Definition of hours and of cost per hour, per MBTA and per NTD

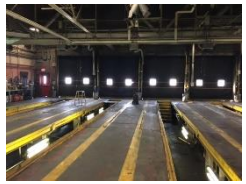
Used as standard metric throughout presentation



1 Adjusted as of November 2016 for actual FY16 fringe rate, and adjusted annual vehicle revenue hours

Source: National Transit Database, MBTA

A The MBTA Focus40 plan identified four bus facilities in need of near-term replacement

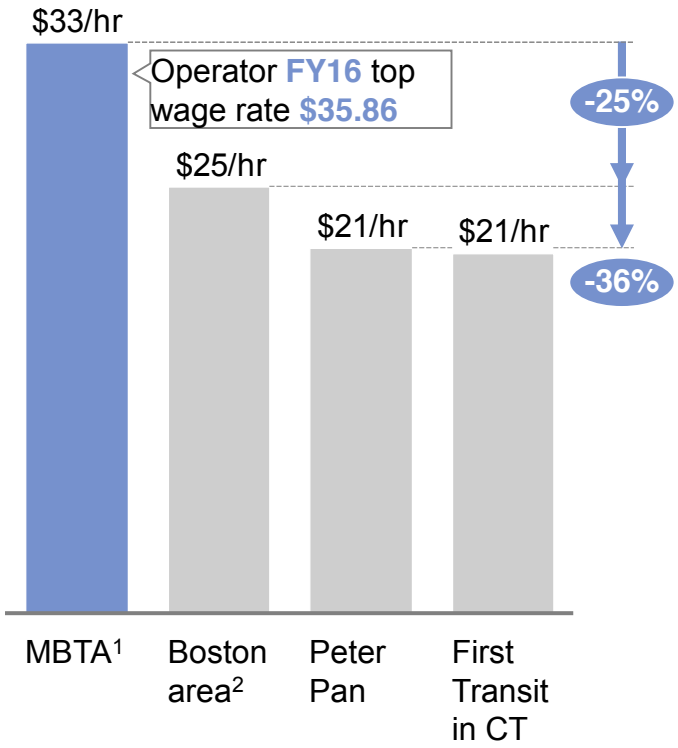
Facility	Assessment per MassDOT Focus40	FY16 cost[2]	Headcount	# of buses
Fellsway (Built 1925) 	"Very poor condition."	$13M	30 Maintenance, 89 Transportation, 119	76
Lynn (Built 1936) 	"Not suitable for maintenance of modern vehicles. Prior assessment recommended converting to storage and operations only and relocating maintenance"	$24M	34, 166, 200	89
Quincy (Built 1930) 	"Built in 1930. In poor condition and not suitable for modern maintenance needs and practices. Needs to be rebuilt or replaced"	$20M	37, 127, 164	86
Arborway Built 2003[1]) 	"Temporary facility built in 2003. Some facilities in trailers, and only six repair bays for 119 buses."	$35M	50, 256, 306	120
Total		$111M[3]	151, 638, 789	**371**

1 Built in 2003 as a temporary facility
2 Total transportation and maintenance cost associated with this facility, not including any allocation of Everett heavy repair facility or corporate overhead
3 Includes ~$19M of Everett and Admin allocation

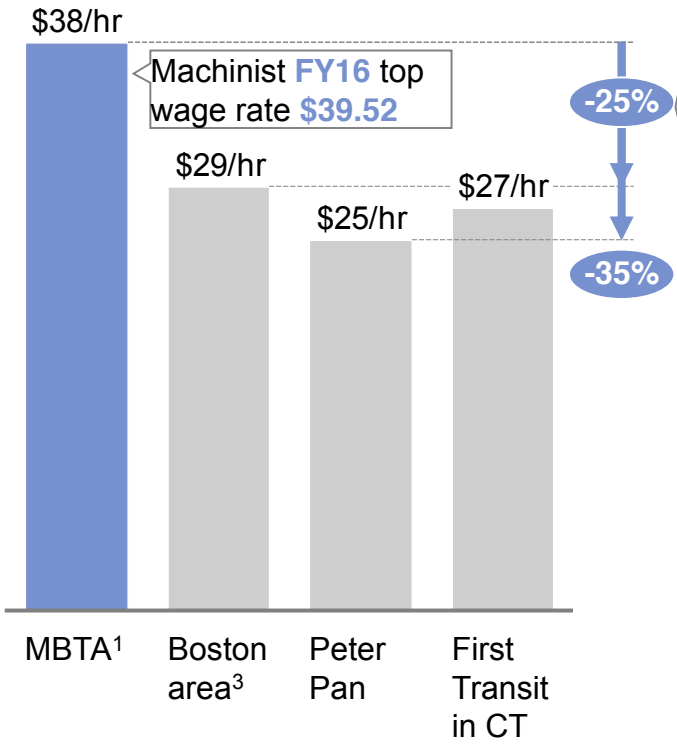
Source: MBTA Focus40 investment plan

A How do the MBTA's bus service wage rates compare to benchmarks?

Transportation wage rates
Bus drivers' average hourly wage



Maintenance wage rates
Bus machinists' average hourly wage



City of Boston fleet mechanics:
- Reach top pay ($36.30/hr) after 9 years of service
- Starting pay for an entry level position, $21-25/hr

MBTA bus garage mechanics:
- Reach top pay of ~$40/hr after 2 years of service
- Also receive defined benefit pension

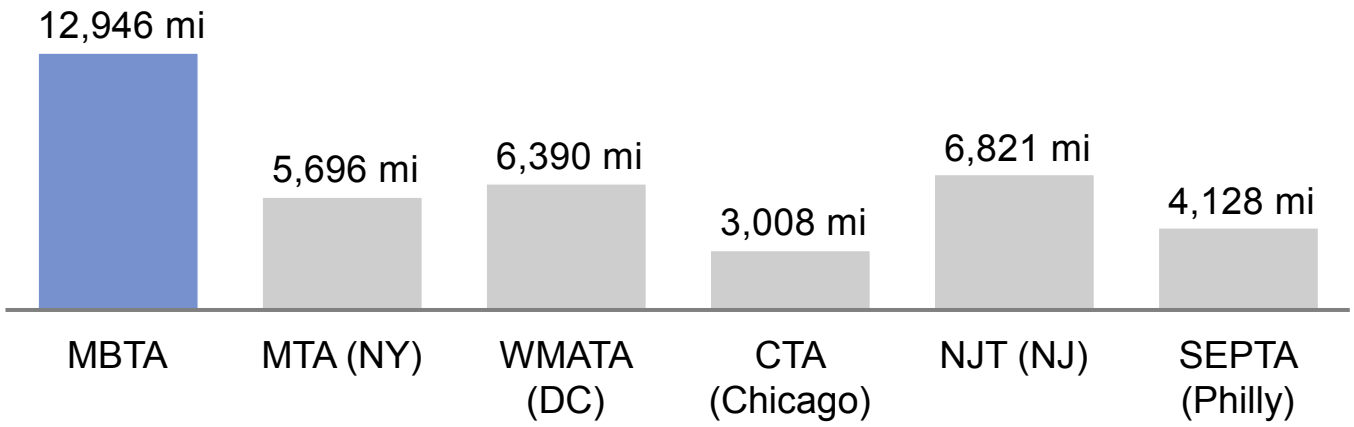
~$37-53 million and ~$13-18 million annual savings respectively if MBTA's bus drivers and machinists were paid at Boston area or Peter Pan average hourly wage

Note: Peer systems (Chicago, New York City, and Washington D.C.) top wage rates are ~10% lower on average than the MBTA top rates
1 Average hourly wage of MBTA's drivers and machinists in 2016 September payroll
2 Hourly mean wage of bus drivers transit and intercity in Boston-Cambridge-Newton region in May 2015
3 Hourly mean wage of bus and truck mechanics and diesel engine specialists in Boston-Cambridge-Newton region in May 2015

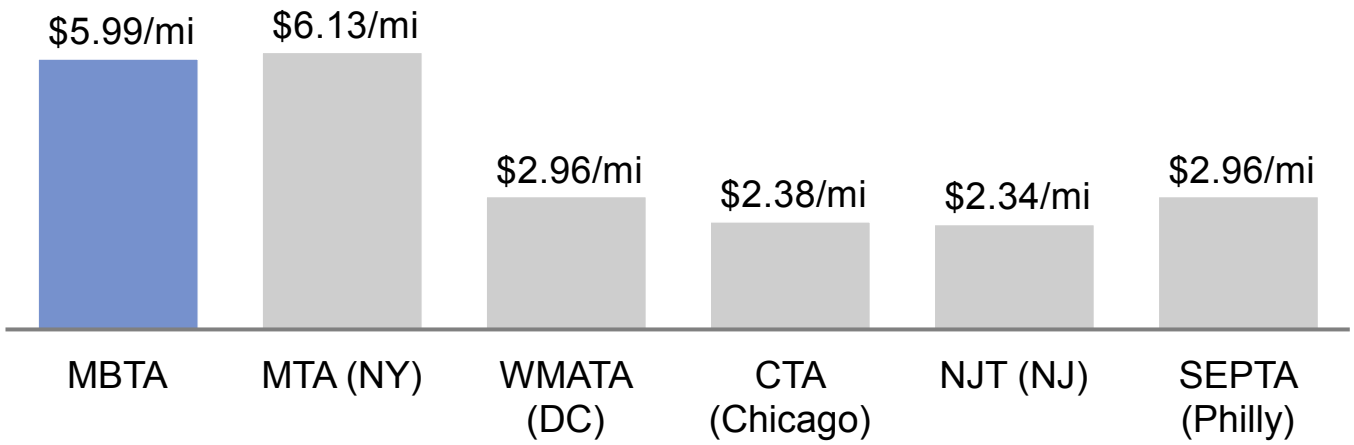
Source: Bureau of Labor Statistics (BLS), MBTA payroll in Sep 2016, interview with Peter Pan and CT Transit salaries in Connecticut from indeed.com

How does the MBTA maintenance cost per mile and bus reliability compare to peers?

Mean miles between failures

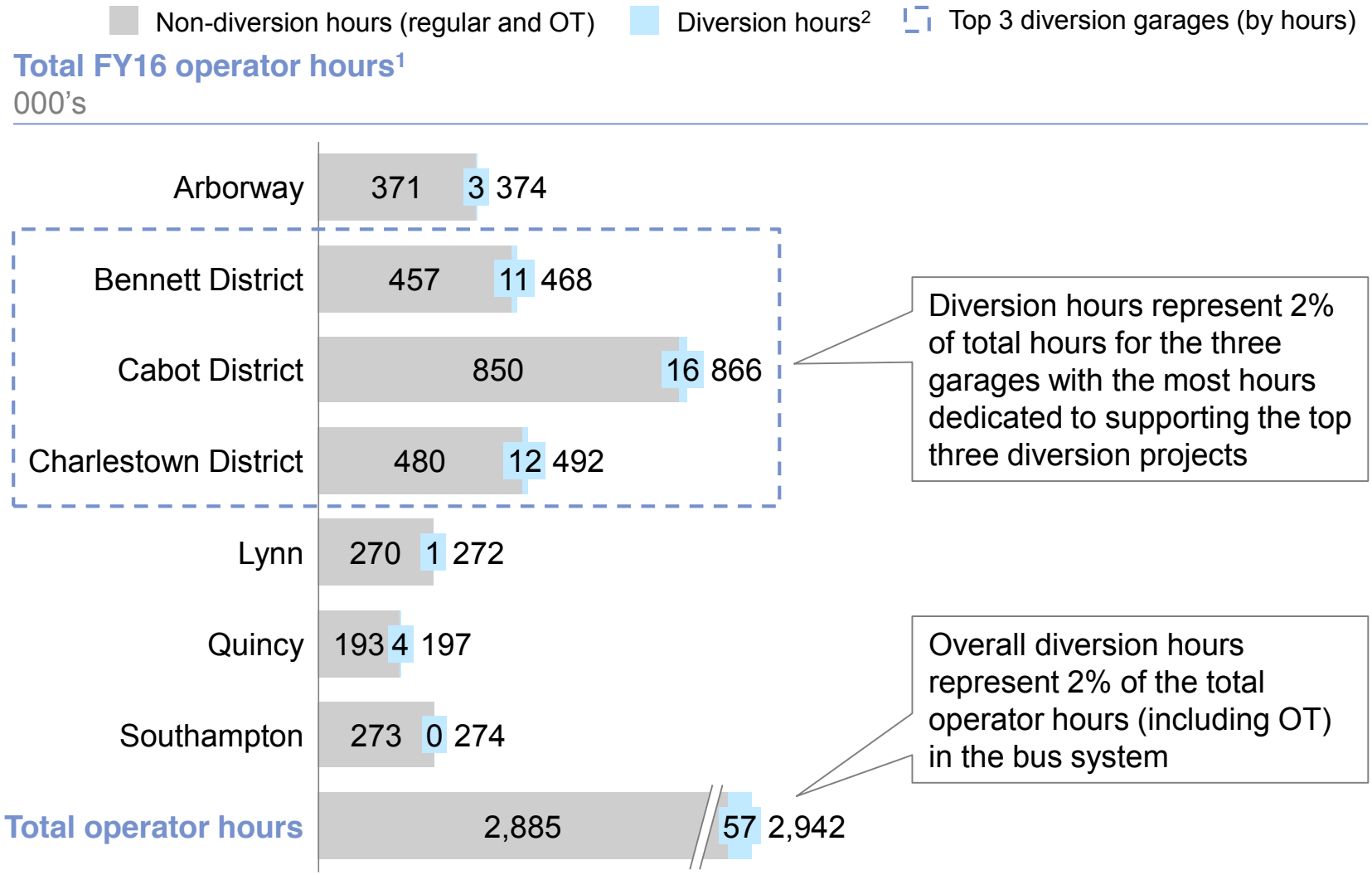


Maintenance cost / mile



Source: MBTA bus maintenance audit (CH2MHill, conducted Spring 2016)

B What share of total operator hours are represented by diversions?[1]



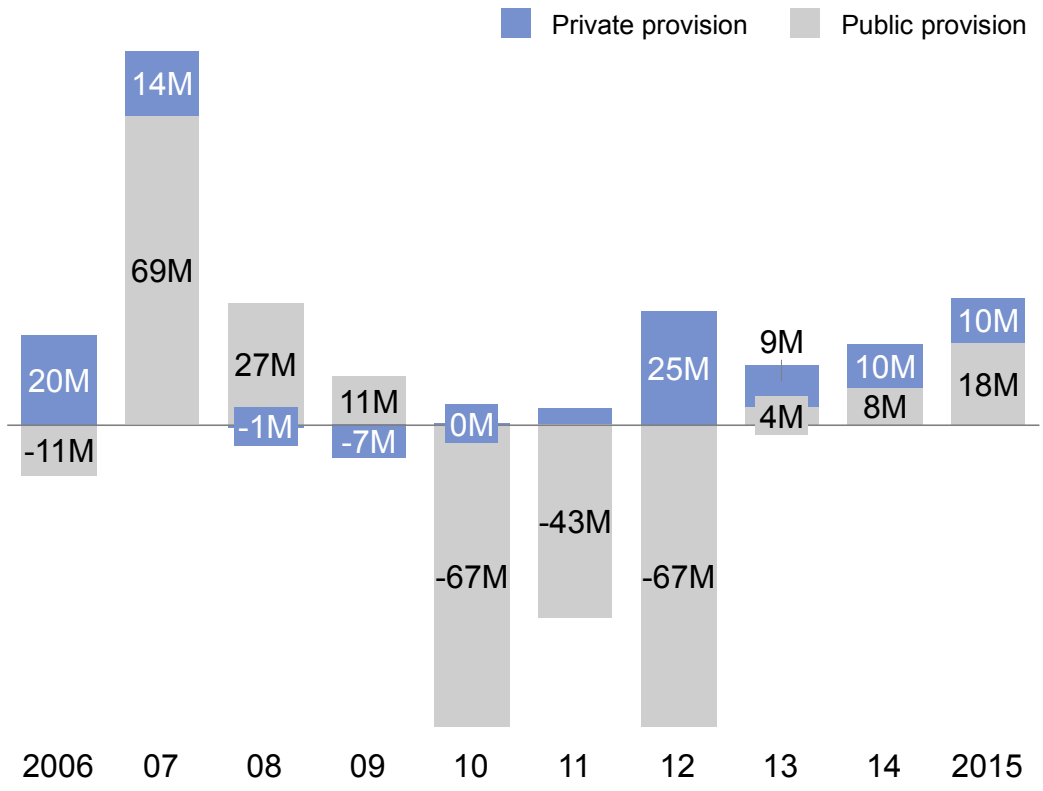
1 1 Total operator hours includes regular pay hours and OT hours (excluding non-work pay, e.g. vacation, sick time, etc.)
2 Top three diversion projects split by garage account for 85% of all planned diversion hours in FY16; remaining 15% included in total

Source: MBTA data

How is the mix of private vs. public bus service provision changing in the US?

Annual change in revenue miles of all US bus systems[1]

Revenue miles



Total change

Revenue miles

Notes

- In 2015, **~20% of total 1.9B revenue miles of all US bus systems were contracted**, up from 16% a decade before
- **Recent increase** in bus service miles is driven by **conversion from public to private** (e.g. Nassau, NY and Austin, TX) and by **new private provision** (e.g. Phoenix, AZ)
- In 2007, many public authorities increased service, though this service (and more) was subsequently cut during the financial crisis (e.g. NJ, NY, Chicago)

1 NTD reporting modes (Motor Bus, Commuter Bus, Rapid Bus, Trolley Bus)

Source: National Transit Database