



**Massachusetts Bay  
Transportation Authority**

# MBTA Decarbonization Strategy

Presenter: Kat Eshel, Senior Director of Climate Policy and Planning

MBTA Board of Directors Meeting

March 26, 2026

# Summary and Purpose

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- Highlight the MBTA's unique role in achieving state climate goals as the largest provider of mass transportation
- Provide an overview of the various modal approaches, with a detailed update on bus modernization
- Provide update on progress toward electrification targets
- Outline next steps for decarbonization planning at the MBTA



# The MBTA is a climate solution for Massachusetts.

The MBTA has a dual role to play:

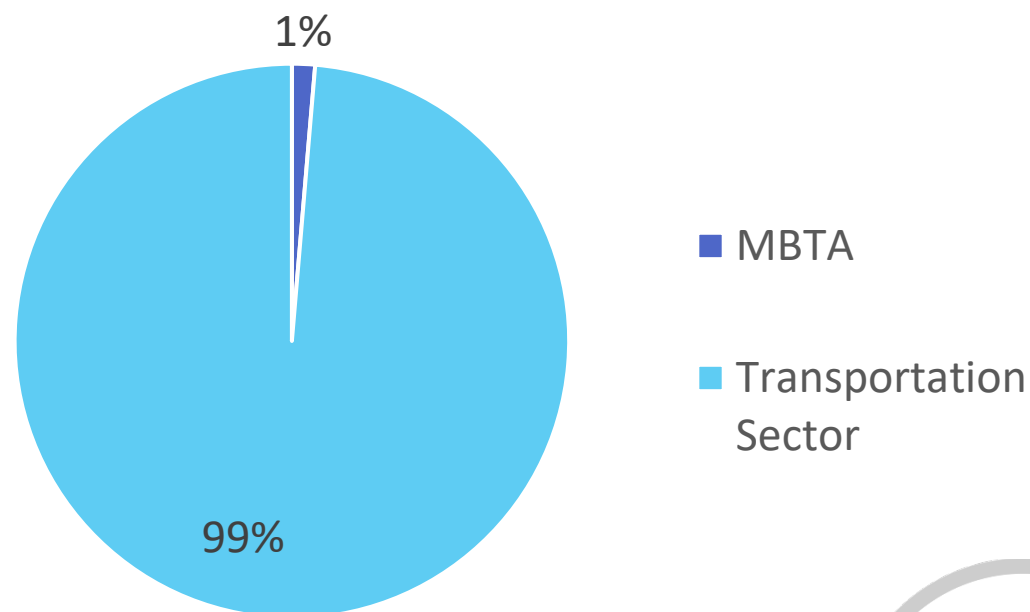
## 1. Provide low-carbon mass transportation services for the greater Boston region

- Frequent, reliable and accessible service that supports mode shift is the MBTA's most important contribution to state climate goals.
- Increased service could increase direct emissions while reducing regional emissions.

## 2. Improve the sustainability of the MBTA as an organization

- We cut our gross emissions by >25% and our net emissions by >40% since 2008, beating statewide targets.

*Transportation is the largest source of carbon emissions in Massachusetts. The MBTA accounts for 1-2% of those emissions, whereas transit serves ~10% of commuter trips in the Boston metro area.*



*2022 Transportation Subsector Emissions*



# What are the MBTA's decarbonization levers?

## Rolling stock

~72% of gross emissions

- Vehicle efficiency
- Electrification
- Fuel switching

## Power

24% of gross emissions (rapid transit + facilities)\*

- Source
- Distributed generation and energy storage

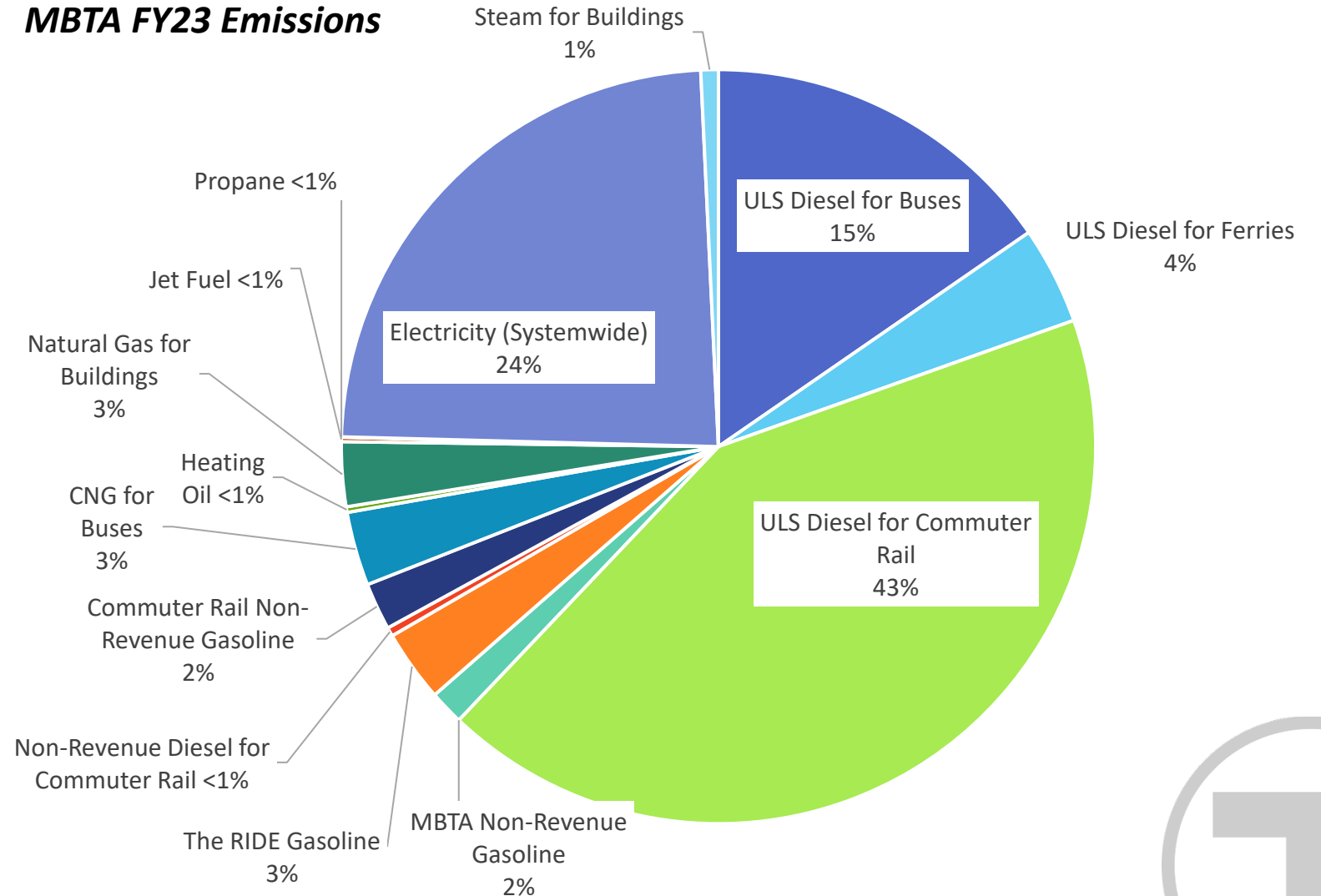
\* will include rolling stock in future years due to modernization initiatives

## Facilities

4% of gross emissions (steam and gas only)

- Standards for new facilities
- Retrofits of existing facilities

**MBTA FY23 Emissions**



# Our approach to decarbonization varies by mode and source.



## Regional Rail

*43% of emissions*

- Run trains every 30 minutes or less in inner core and key corridors with high ridership
- Switch to Tier IV diesel locomotives
- Decarbonize rolling stock (contingent on funding and grid)



## Bus

*18% of emissions*

- Implement Bus Network Redesign
- Replace obsolete bus maintenance facilities
- Transition fleet as diesel, CNG and hybrid vehicles reach end of life



## Power

*24% of emissions  
(subway, facilities)*

- Largest electricity consumer in MA
- \$5 billion SGR index,  $\frac{3}{4}$  of assets beyond EUL
- REC purchase since 2021 to offset our load



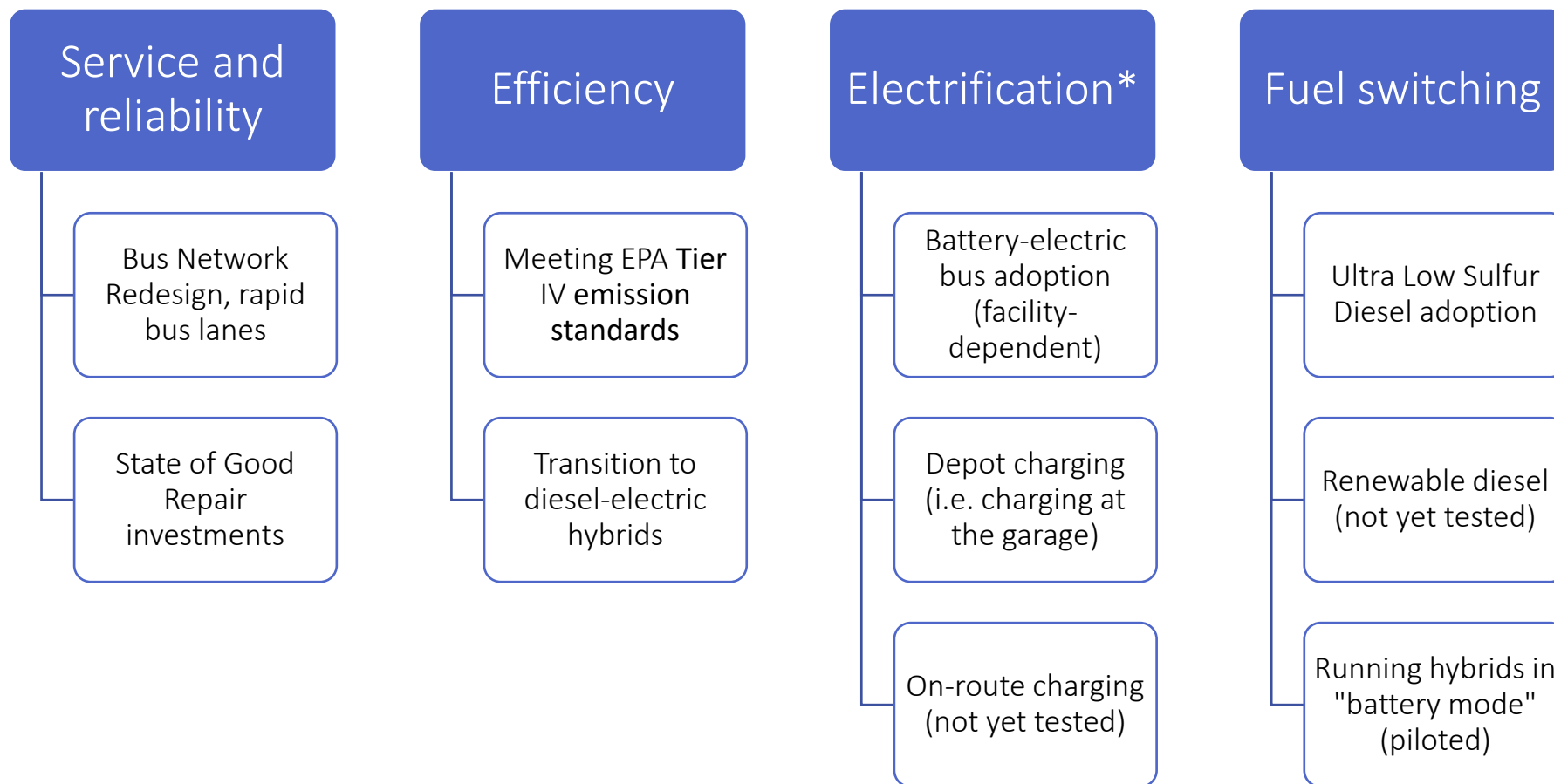
## Ferry, Non-Revenue, Facilities, The RIDE

*3-4% each*

- Feasibility studies completed or underway for rolling stock.
- Facility retrofits and updates to Design Standards and Guidelines



# Bus modernization through a decarbonization lens



\* Switching to battery-electric buses is dependent on facility modernization. We can only buy and deploy BEBs buses if we have facilities that are equipped to store, charge and maintain them.



# The Legislature set an electrification goal for the MBTA.

## An Act Driving Clean Energy and Offshore Wind (2022)

- Purchase only zero-emission passenger buses after 2030 and transition a 100% zero-emission passenger bus fleet by 2040; provide updates and recommend legislative or regulatory action

### Bus in the State's Climate Plans

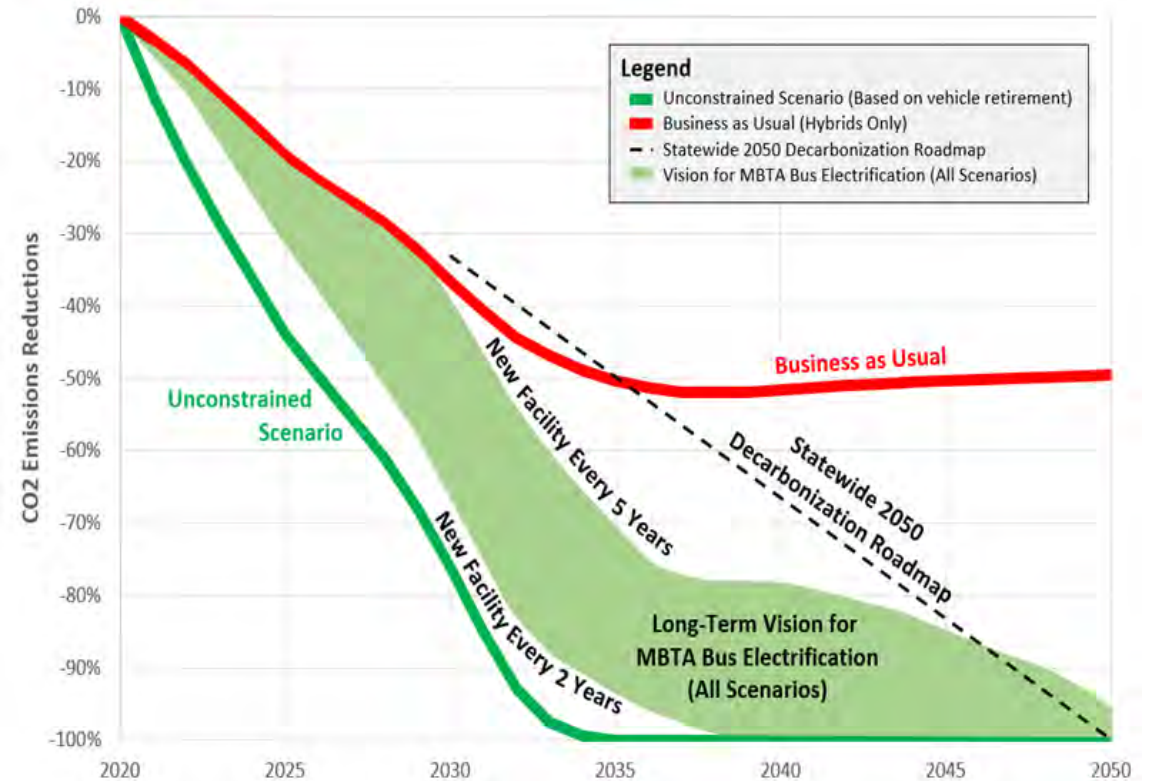
- The Clean Energy and Climate Plan (CECP) sets economy-wide and transportation sector targets.
- From a 1990 baseline:
  - 18% by 2025
  - 34% by 2030
  - 86% by 2050
- The CECP outlines strategies to reach the targets, including Bus Network Redesign and Modernization.
- EEA is developing the 2035 CECP to reflect changing conditions and new opportunities to progress toward net-zero emissions by 2050.

# Five years ago, we presented an integrated fleet and facility strategy.

Our bus modernization strategy was designed to support the Better Bus Project:

- Modernize obsolete bus facilities to support our workforce and accommodate new vehicle technologies;
- Allow for an increase in fleet size to position Bus Network Redesign the needs of growing ridership;
- Transition to a more uniform bus fleet.

After the 2022 climate bill set an ambitious goal, we adapted our strategy and released the Bus Electrification Plan.



*Bus electrification and emissions scenario (2022). The MBTA's bus electrification plan took a phase approach predicated on sufficient resources to deliver a new bus facility every 2 years.*



# Industry Backdrop: Bus technology has evolved over time

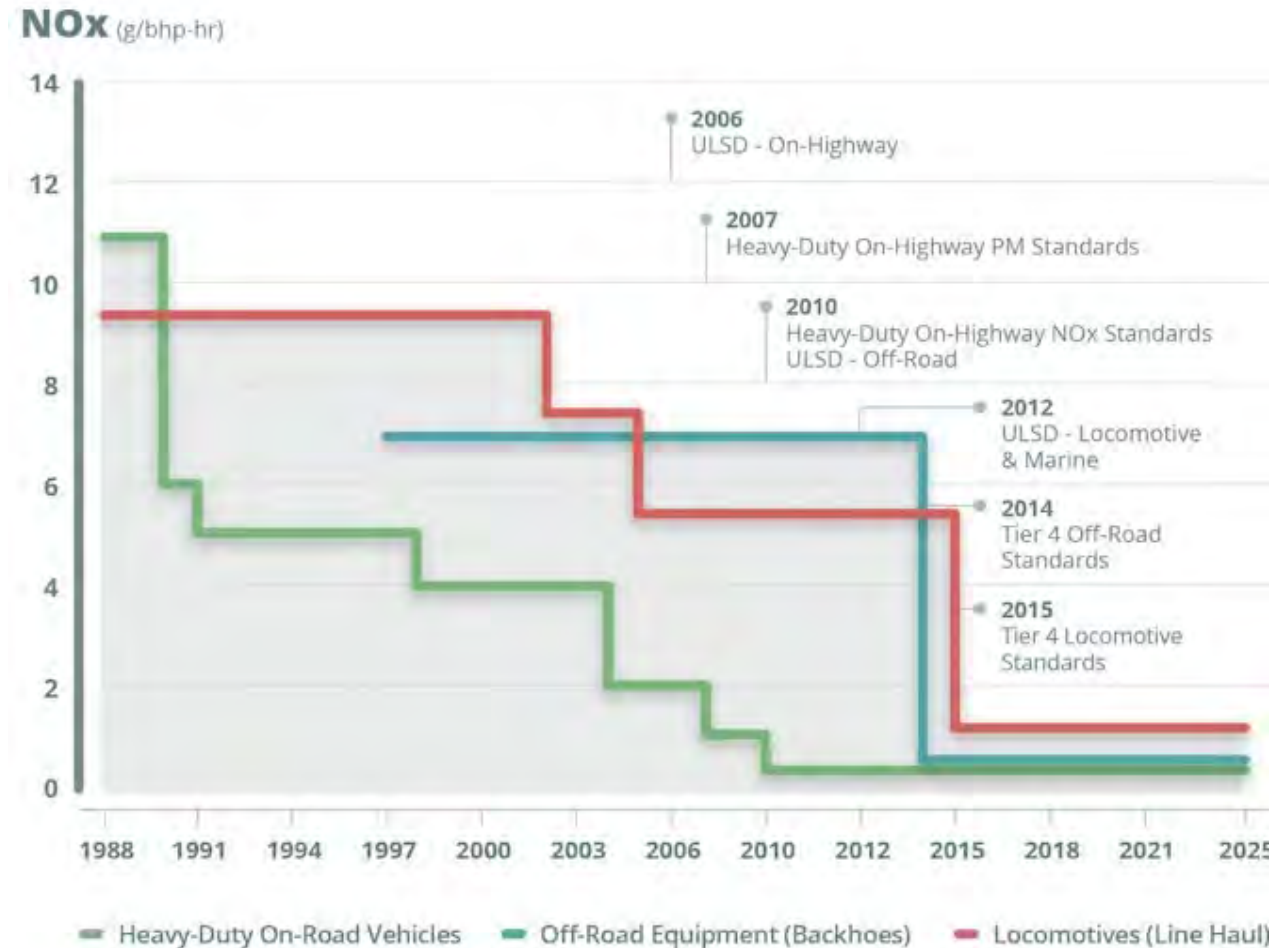
Hybrid buses offer significant improvements compared to conventional diesel buses

New hybrid buses meet regulatory EPA Tier IV emission standards.

BEBs are an emerging technology with zero tailpipe pollution, but they do not eliminate particulate pollution from tires and brakes.

Modern vehicle frames need overhead maintenance that can't fit into historic garages.

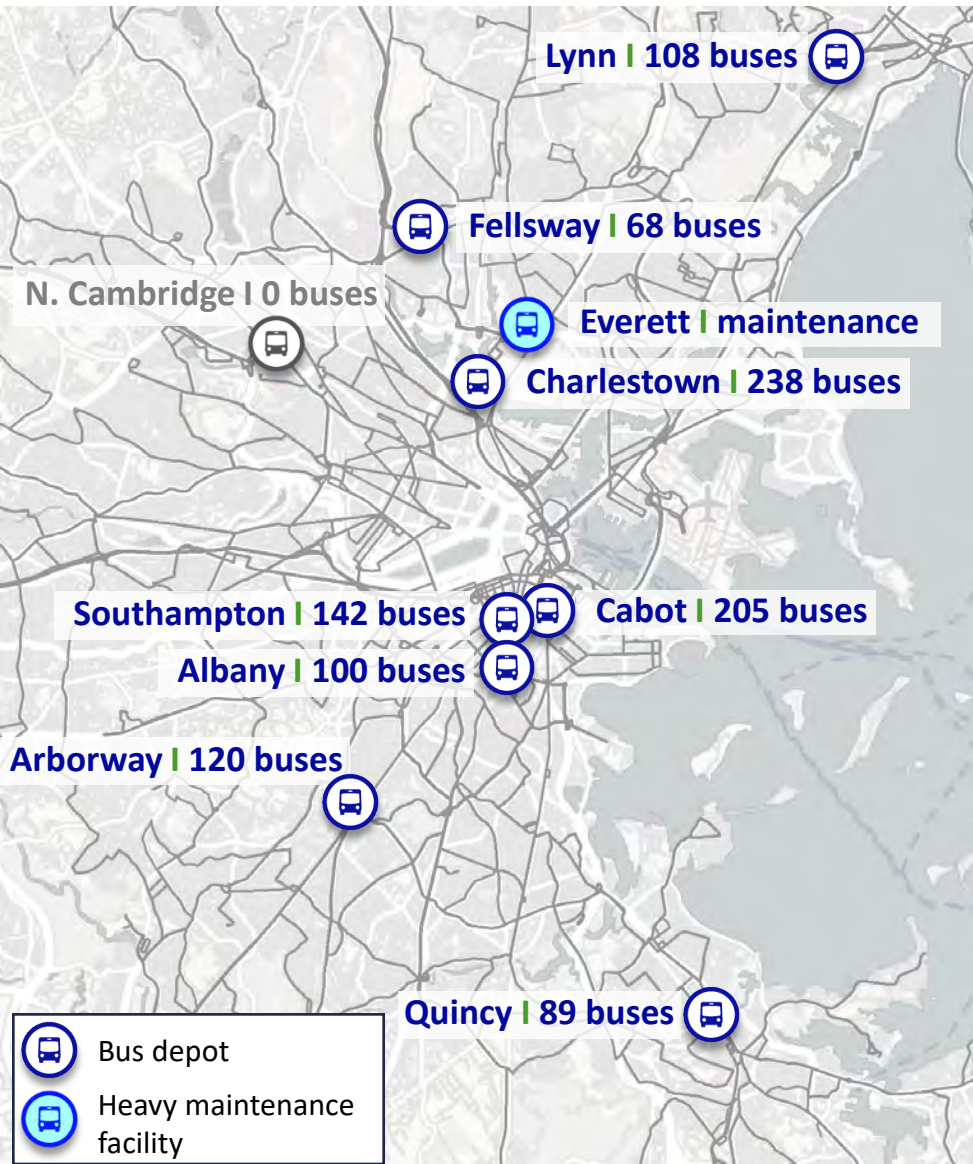
Improvements in NOx emissions standards for heavy-duty vehicles



Source: U.S. EPA Office of Transportation and Air Quality (OTAQ) Chart source: Engine Technology Forum



# Bus Facility State of Good Repair



Nine depots and one central heavy maintenance facility service approximately 1,050 buses.

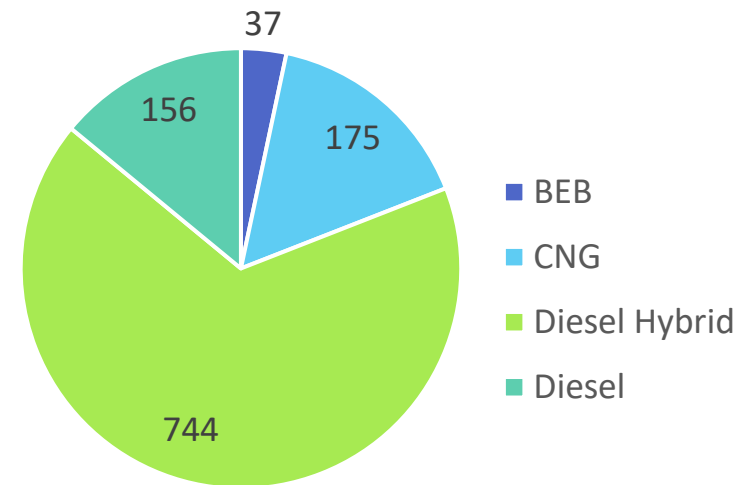
- 1904 – Quincy Opens (Streetcar)
- 1923 – Everett Opens (Orange Line)
- 1925 – Fellsway Opens, Quincy to Bus
- 1936 – Lynn Opens
- 1941 – Albany Opens
- 1975 – Cabot + Charlestown Open
- 1979 – North Cambridge Opens (ETBs)
- 2002 – Southampton Opens (60-ft only)
- 2004 – Arborway (temporary facility)



# How much progress have we made toward the mandate?

- Battery-electric buses (BEBs) will start to operate out in the summer service rating of the North Cambridge facility
- Quincy bus facility on track for Summer 2027 completion
- Chargers installed at Cabot (6 plugs) and Charlestown (8 plugs) to run test service for new BEBs as they're received ahead of BEB-ready garages opening

Bus Engines (as of January 2026)



- 95 additional Battery Electric Buses (BEBs) on order to be delivered by 2027
- 150 diesel and diesel hybrid buses to be retired by 2027



# Legislative request for updates

- Ch. 161A, Section 5:
  - "Each rolling 5-year plan shall report on the progress in meeting the requirements under said section 6A of said chapter 448 [2022 climate law adopting the zero-emission bus mandate] including, but not limited to, the number of zero-emission passenger buses operated, the number of non-zero emission passenger buses operated, barriers to increased numbers of zero-emission passenger buses, if any, and recommended legislative or regulatory action needed to address barriers or otherwise promote compliance."



# Progress update: Arborway and what's next

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- The FY27-31 CIP proposes to fully fund Arborway's remaining design and construction.
  - \$371.5 million from Commonwealth Transportation Fund.
  - The facility will 100% BEB-ready with a mix of BEBs and hybrid buses on day 1.
  - We will be phasing in BEBs as the market can support on as we monitor what the industry can deliver and its impact on service.
- BEB facilities designed to store, charge and maintain BEBs are required to support and facilitate purchase and operation of BEBs.
- We will continue to monitor market conditions, the rolling stock industry and peer transit agencies as we all face new challenges, to ensure the best path forward for decarbonization and bus electrification.



# We've made significant progress

## The Boston Globe MBTA plans to expand bus service beyond pre-pandemic levels this spring

By Nick Stoico Globe Staff. Updated March 24, 2026. 2:47 p.m.



The MBTA #1 bus rolls past MIT on its way into Boston on May 1, 2024. PAT GREENHOUSE/GLOBE STAFF

### We're improving service beyond pre-pandemic levels

- 20% YOY ridership growth on Bus Network Redesign Phase 1 routes
- Bus lanes and automated camera enforcement (upcoming)

**We're investing in facilities:** North Cambridge, Quincy, now Arborway.

### We're investing in our fleet and reliability

- CNG overhauls and hybrid bus procurements to ensure reliable service while new facilities are underway
- BEB procurements to progress the electrification target

### Discretionary funding has been critical

- We have been successful in securing federal funding for BEB and hybrid bus procurements
- State funding is enabling Arborway's construction



# But bus electrification faces headwinds

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- Bus manufacturers cannot meet the growing demand
  - Two manufacturers in the US (New Flyer, Gillig)
  - Recent efforts by APTA, and from the federal government, to encourage more manufacturers and reduce customization by the industry
  - The market is rife with price fluctuations and escalation costs
- The incremental cost is 15-20% for BEB facilities. Federal and state funding has been critical.
- Deploying new technology has operational impacts which we are monitoring, including:
  - Fire, life safety and power needs of new battery-electric technology
  - Cold weather performance
  - Managing reliability and service impacts
- We are in contact with our peer agencies, many of which are revisiting their electrification targets and investing in diesel and hybrid bus fleets to provide reliable service.



# What's next?

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- It is critical that the MBTA ensure that bus service remains reliable, safe and frequent so that transit remains viable for those that need it, and to make bus travel the preferred mode of choice in the region.
- The MBTA's ultimate goal is provide high-quality service to support mode shift and getting people out of cars.
- We will be advancing authorized BEB procurements, developing designs for Arborway and procuring hybrid buses,
- MBTA will be developing a MBTA Decarbonization Plan, including:
  - Analyzing regional emissions reduction from current transit ridership
  - Clarifying levers and constraints, including technology, market and funding impacts across all modes
  - Identifying pathways to reduce the MBTA's emissions while growing ridership
  - Integrating findings into the 2035 CECP



# Delivering decarbonization is a balancing act.

- Excellent service is the MBTA's highest decarbonization priority to support the Commonwealth's climate goals.
- We've made major strides. There are further opportunities to reduce our direct emissions, as well as costs.
- This a dynamic field of practice with emerging and rapidly evolving technology. We'll continue to monitor which investments can meet our service and climate goals.