Washington Metropolitan Area Transit Authority

Board Action/Information Summary

○ Action ◉ Information	MEAD Number: 203430	Resolution: ○ Yes ◉ No

TITLE:

Zero-Emission Bus Transition

PRESENTATION SUMMARY:

Metro's zero-emission bus transition advances a transformational investment in zero-emission bus technology. The Zero-Emission Bus Transition Plan provides a baseline framework to advance Metro's zero-emission transition, which supports the region's efforts to meet its climate goals.

PURPOSE:

Provide an overview of Metro's Zero-Emission Bus transition.

DESCRIPTION:

For conflict-of-interest purposes, please note the following vendors associated with the Zero-Emission Bus Program: **WSP, Foursquare Integrated Transportation Planning, KLT Group, Capitol GCS, Equitable Cities, AECOM, Omni Strategies, Center for Transportation and the Environment, New Flyer, Nova, Rosendin, Clark, Gannett Fleming, STV, Wendel, Coffman, Hensel Phelps, Mona Electric, Stantec, S-E-A.**

Key Highlights:

- The Zero-Emission Bus Transition Plan provides a baseline framework and strategy to convert Metro's fleet and facilities to 100% zero-emission buses by 2042. The Transition Plan will be updated periodically as technologies and markets evolve, as service needs change, and as additional opportunities to accelerate the transition are identified.

- Construction of Metro's first zero-emission bus division is underway at Northern Bus Division.

- Construction of Bladensburg Division, which will also support zero-emission buses, is also underway.

- Planning and design work is underway for a new Western and retrofit Cinder Bed Road Bus Divisions to support zero-emission buses.

- Coordination with external stakeholders is on-going while staff advances bus procurements and other program activities.

- The initial estimate of the additional investment for the full transition is $2.3 billion. These are costs associated with ZEB fleet and facilities above and beyond the status quo of investing in and maintaining the existing fleet of conventional buses and associated infrastructure.

Background and History:

In 2019, Metro completed an internal analysis of the state of electric bus technology and market and identified opportunities to begin testing buses and equipment. That initial assessment allowed for the development of Metro's first phase of zero-emission bus deployment. In this first phase, Metro will gain experience with 12 battery-electric buses and review vehicle performance in operation. In 2020, Metro applied for and received a grant from the Federal Transit Administration to support this deployment and contracts have been awarded for the 12 buses. Design work is complete and construction of the infrastructure at Shepherd Parkway Bus Division to support the electric bus charging equipment is ongoing. In standing up this first phase of electric bus deployments, Metro has laid the groundwork for the internal and external coordination as well as the internal processes necessary to support the broader fleet transition.

In June 2021, the Board adopted zero-emission bus goals that include the purchase of only lower-emission and electric buses in the next procurement and a transition to 100% zero-emission bus purchases by 2030, leading to a 100% zero-emission bus fleet by 2045. This transition of the nearly 1,600-bus fleet will improve regional air quality, reduce greenhouse gas emissions, and provide customers with a cleaner, quieter bus ride. In December 2021, the Board adopted the Metrobus Fleet Management Plan to account for the transition to zero-emission buses. Metro's efforts align with those of transit agencies in the National Capital Region and throughout the country.

Discussion:

Metro is advancing multiple efforts all aligned with and advancing the zero-emission vehicle goals established by the Board. Construction is underway at Northern and Bladensburg Bus Divisions. An initial battery electric bus order has been placed and staff is advancing work on a new solicitation for additional hybrid and battery electric buses. In addition, efforts are moving forward to support partnership and regional coordination.

Undergirding all of these effrots, the Zero-Emission Bus Transition Plan provides a road map for the processes, investments, and activities to transition our fleet, facilities, and workforce to support the transition to a fully zero-emission Metrobus fleet. The Transition Plan supports reliable and safe

service, integrates equity, manages costs of conversion, and meets Board-adopted goals while also exploring options for accelerating the transition. The framework establishes the fleet, facilities, workforce, and business practices necessary to complete the transition by 2042 – three years ahead of the current goal. Metro is committed to updating this plan as technology evolves and opportunities arise to further accelerate the conversion.

The Transition Plan establishes a pathway for Metro to transition the fleet and facilities as quickly as possible, given current conditions and technology. The amount of time it takes to retrofit existing and build new electric bus-ready garages (without impacting bus service for customers and operations) is the biggest constraint to reducing the overall transition timeline. The Transition Plan provides the most time-efficient and cost-effective order in which we can convert bus garages to support the new fleet.

The incremental cost to Metro over the life of this program is projected to be approximately $2.3 billion. This cost includes the incremental cost of new vehicle types and associated maintenance equipment, charging equipment and infrastructure, and operating and maintaining the fleet and facilities (above and beyond the cost to operate and make investments to support the current bus fleet). Competing for Federal funding is an important part of this transition. Metro was successful in FY2020, receiving a $4.2 million FTA low or No Emission Program grant. Metro is preparing grant applications for the Federal Transit Administration's Fiscal Year 2023 Low or No Emission and Buses and Bus Facilities grant programs to support the transition.

To make the transformation change from internal combustion engines to zero-emission requires coordination across all of Metro. Efforts are underway to develop employee training – both for maintenance and operations; update procurements; and reskill frontline staff to be efficient and safe users of new technology. Looking outwards, Metro is working with utilities, infrastructure, workforce development, and funding entities to identify areas of synergy and overlap.

Key findings from the Transition Plan include:

- *Technology*. Metro will initially deploy battery-electric buses and will continue to evaluate hydrogen fuel cell electric buses.

- *Service Delivery*. Metrobus service is well-suited for the range that battery-electric buses provide. Modeling showed that battery-electric buses can support 92 percent of Metro's current service blocks under typical conditions and 78 percent under strenuous conditions.

- *Equity*. Zero-emission buses can bring benefits to riders and residents near bus garages by improving air quality, reducing noise, and improving quality of life in a community. The proposed facility phasing incorporates equity considerations.

- *Facilities Assessment*. Metro's bus divisions are suitable for the conversion to facilities that can support battery-electric buses. All facilities will require upgrades from the respective electric utility to support charging needs.

- *Business and Workforce Planning*. The transition creates the opportunity for staff throughout Metro, especially frontline workers, to gain new skills to support the new technology. The transition also requires updates to business practices and new training for staff.

- *Resilience*. As each bus division is converted to support zero-emission buses, especially battery-electric buses that rely on electric power, Metro will consider resilience measures during the design phase of each garage.

FUNDING IMPACT:

There is no funding impact to providing an information item.

TIMELINE:

Previous Actions	June 2021 – Sustainability Vision and Principles and Metrobus Fleet Plan December 2021 – Approval of Metrorail and Metrobus Fleet Plans and Metrorail Service Standards April 2022 – Sustainability and Zero-Emission Bus Update
Anticipated actions after presentation	Summer 2023 -- Update Zero Emission Goals Fall 2023 -- Update Metrobus Fleet Plan

Zero-Emission Bus Transition

Safety & Operations Committee
March 23, 2023

Purpose

- Provide an overview of Zero-Emission Bus (ZEB) transition

Metro's current electric bus in front of Northern Bus Garage

Current ZEB Goals (adopted 2021):

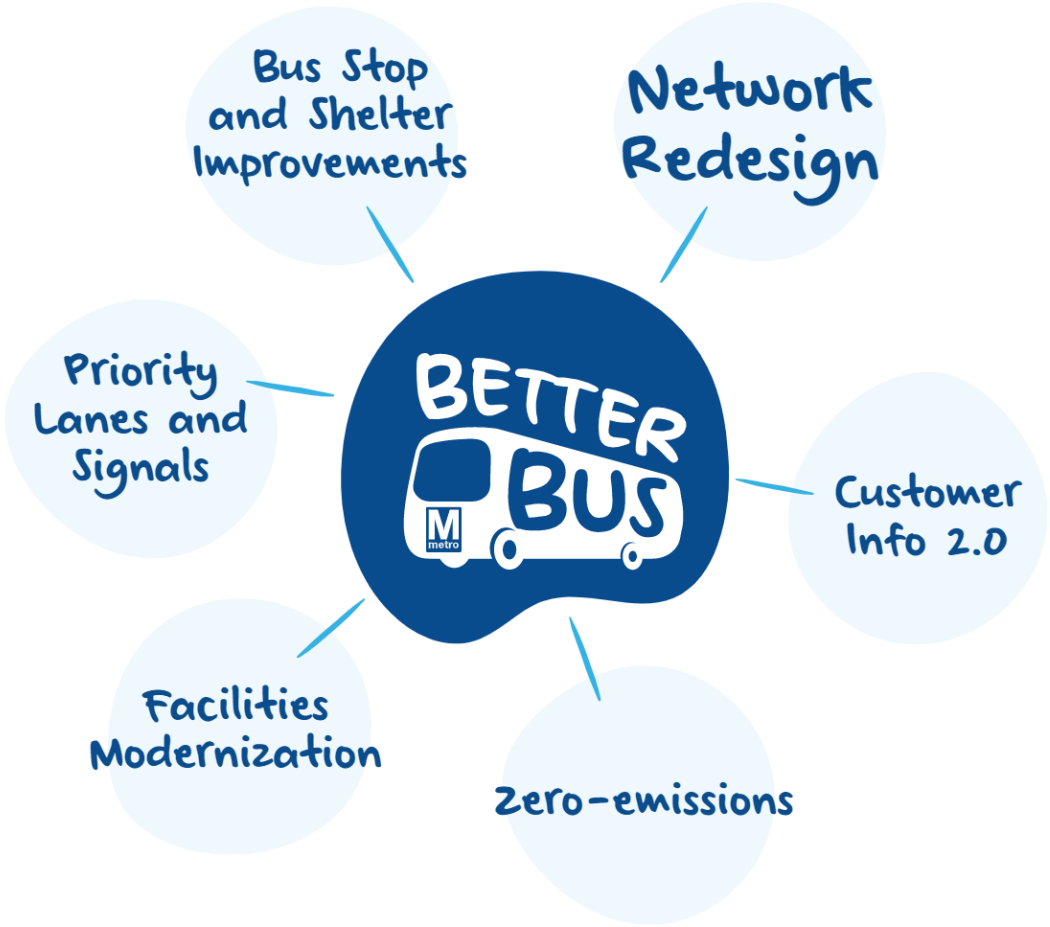
- 2030: 100% ZEB purchases
- 2045: 100% ZEB fleet

Accelerating

New Accelerated Timeline:

- 2027: 100% ZEB purchases
- 2042: 100% ZEB fleet

Metrobus Helps Meet the Region's Climate Goals



Frequent, reliable bus service increases customer trips

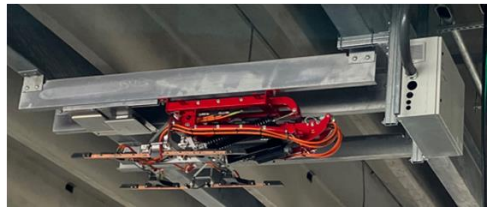
Zero-emission buses make transit more sustainable

Every trip on Metrobus reduces emissions, ZEBs reduce emissions even more

Advancing Zero-Emission Bus Program

- Facilities under construction: Northern and Bladensburg
- Facility planning underway: Western and Cinder Bed Road
- 12 buses ordered, additional procurements underway
- Regional coordination
  - Utilities
  - Transit partners

Northern Bus Garage groundbreaking



Pantograph charging

Electric bus on production line

Mobile charger

Electric demo bus at Bladensburg groundbreaking

Overhead charging

Pathway to Transition to Zero-Emission Buses

Plan to **accelerate ZEB transition**

- 100% ZEB purchases by 2027
- 100% ZEB fleet by 2042

Transition requires coordinated actions across **Metro organization, utilities, transit partners**

Battery-electric buses can **provide most of Metro's current service**

Investment for full transition **~$2.3 billion**

Transition Plan sets the baseline to transition to ZEB and will be updated as technologies, markets, and service needs evolve

Facility Phasing

- 9 bus divisions to convert across DMV
- Facilities are of varying ages and conditions and must continue to support existing fleet and service
- Under construction: Northern and Bladensburg
- Phasing considerations:

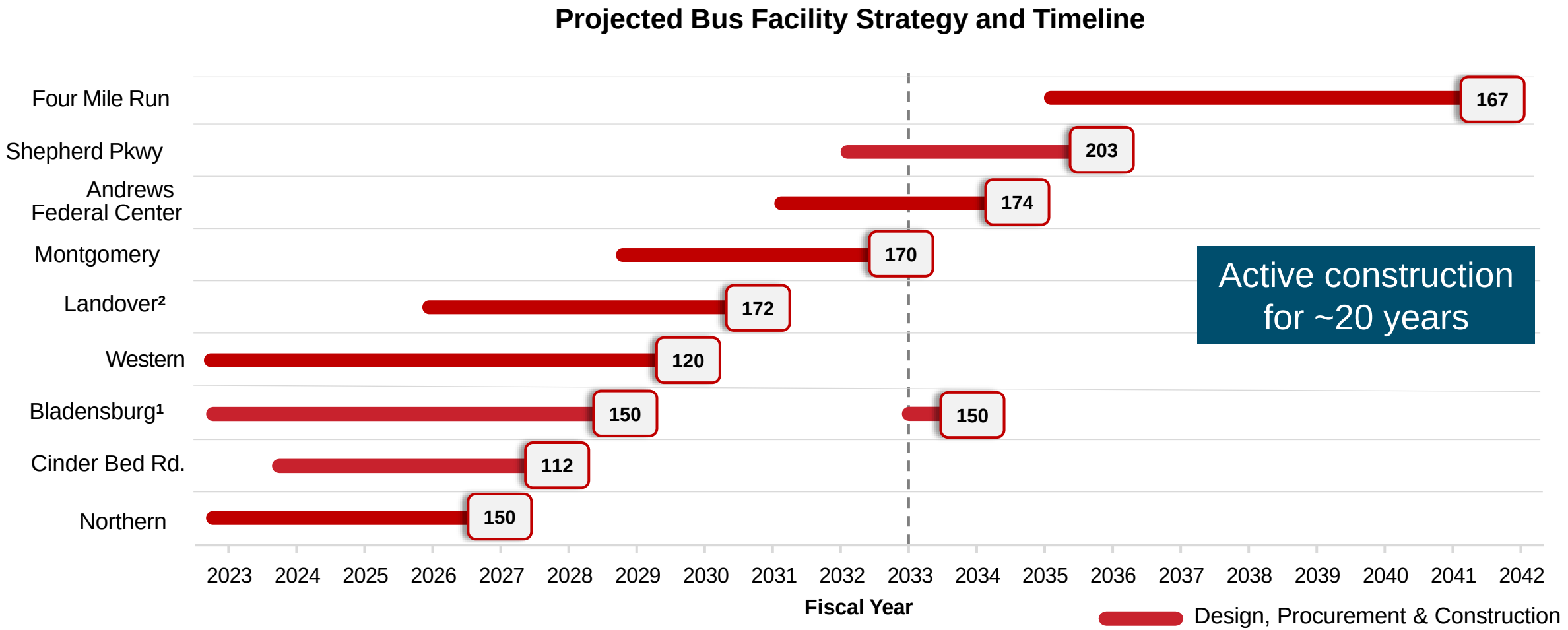
Equity: facility location and communities served	Facility condition
Continuity of bus service	Utility capacity

Electrification upgrades as part of facility reconstruction

Electrification upgrades to already modernized facility

Rendering Source: WSP

Focused Substantial Investment in Facility Conversions Will Enable All Divisions to Fully Support Zero-Emission Buses by 2042



1. *Bladensburg phase 1 ~150 BEBs; additional ~150 BEBs phased in*
2. *Landover phase 1 complete FY30; phase 2 complete FY31*

Internal and External Coordination Key to Transition Plan Success

Metro Workforce

Prepare Bus Maintenance

- Specialized training to maintain buses

Support Bus Transportation

- Coordinate training of operators, Bus Operations Control Center, and field supervisors

Refine Other Business Processes

- Support procurement, operations, and maintenance of new technology
- Reskill and engage frontline staff
- Include safety throughout

External Coordination

Utilities

- Inform offsite and on-site power-related upgrades, timelines, and costs

Regional ZEB Working Group

- Infrastructure
- Utilities
- Funding and policy coordination
- Workforce development

Transition Plan Supports Applications for Grant Funding

FTA awards grants through several competitive programs

FY2020

- FTA awarded $585M for Low or No Emission and Buses and Bus Facilities grant programs
- Metro was awarded $4.2 million FTA Low or No Emission Program grant

FY2021 and 2022

- FTA awarded $589M (FY2021) and $1.66B (FY2022)
- Metro submitted applications for Northern and Bladensburg ZEB projects, but not awarded grants
- Peer agency awards: MBTA ($116M), MTA/NYCT ($116M), LA Metro ($104M)

FY2023

- FTA expected to award $1.7B Metro is preparing grant applications for both grant programs
- Transition Plan must be submitted with ZEB project applications

Near-term Activities to Facilitate Transition

Infrastructure

Advance garage designs and construction plans, focusing first on garages that will convert earlier

Continue engaging Pepco, Dominion, and BGE to provide needed power

Integrate resilience into facility design

Test and implement **charge management systems**

Vehicles/Service

Deploy initial Battery-Electric Buses and gather best practices from peers to inform scale up

Conduct study to assess fuel cell electric bus and battery-electric bus market and technology trends

Workforce

Prepare workforce for transition

Develop comprehensive **internal stakeholder engagement and communication plan**

Programmatic

Aggressively pursue **funding and partnerships**

Create **equity-specific tracking metrics**

Continue to **collaborate with other regional transit agencies**

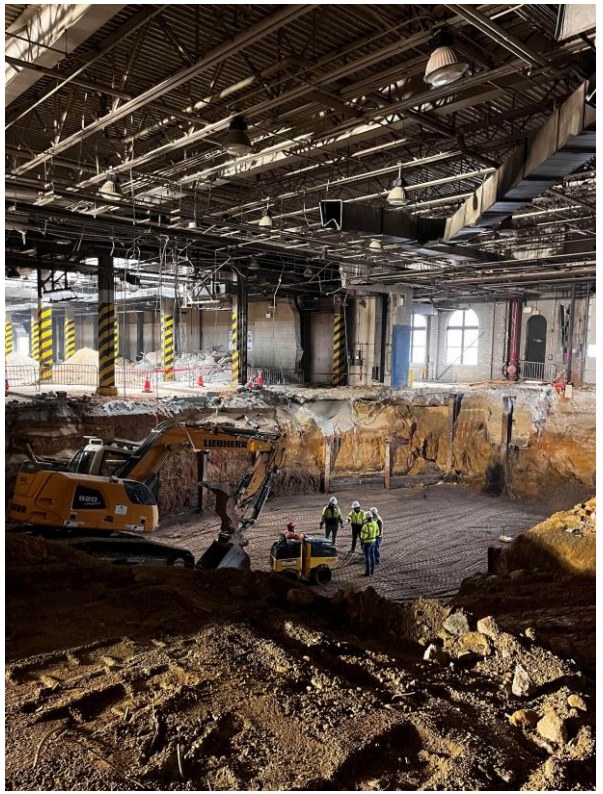
- Shared en-route charging

Board Considerations: Next Steps

Board considers accelerated ZEB goals for adoption

- 100% ZEB purchases by 2030 → 2027
- 100% ZEB fleet by 2045 → 2042

Board considers revised Metrobus Fleet Plan with accelerated transition



Construction work at Northern Bus Garage