

ZERO-EMISSION FLEET TRANSITION

March 2021



Agenda

- ZEV Overview
- MDOT MTA Transition Goals (GGRA)
- Tech Overview
- Phasing
- ZEB Pilot
- Workforce
- Next Steps

Zero-Emission Vehicles

- Propulsion system that removes carbon emissions from tailpipe
- Two available options in today's market: Battery electric and hydrogen fuel cell
- Both propulsion systems have pros & cons and they both require substantial infrastructure investment to support energy needs



ZEV in the Transit Industry



Rapid growth of ZEV

2,500 battery electric and 100 hydrogen fuel cell buses manufactured to date

Most are pilots; only a handful of 25+ deployments

Bloomberg predicts 70% of bus procurements will be battery electric by 2030



Challenges with ZEV deployments

SEPTA's fleet of 25 electric buses out of service for 6+ months

NY MTA facing electric grid, electric rate, and bus depot resiliency challenges

MBTA range dropped to 60 miles in cold temps



Biden transition

“Provide every American city with 100,000 or more residents with high-quality, zero-emissions public transportation options through flexible federal investments with strong labor protections”

MDOT MTA ZEV Goals

2030

50% Fleet
Conversion
(380 buses)

GGRA Plan
commitment

2045

95% Fleet
Conversion

RTP Target



ZEV Technology

Battery Electric Buses (BEB) technology will be able to meet the 2030 goal; however, range and reliability are key issues to monitor

Technology is evolving rapidly; flexibility to adapt is key

Preserve option for Hydrogen Fuel Cell (FCEB) in the future at Northwest

Mixed fleet with some diesel will support reliability in all weather conditions, power outages, and ability to support statewide emergency evacuations

- ▶ Hot and cold weather, heavy passenger loads, topography and battery decay over time greatly reduce the range BEBs can travel on a full charge

ZEV Charging Infrastructure



- Charging will occur at MTA bus facilities
 - Potential for limited use of on-route charging
- Significant electric grid upgrades and facility retrofit projects are needed
- Potential for private sector partnership and financing

ZEV Phasing Plan



Kirk 

Q1 2021 – Q4 2024 Pilot & Retrofit | BEBs arrive mid-2025 | Design-build | First facility, lessons learned critical

Northwest 

Q4 2021 – Q3 2026 retrofit | BEBs arrive late-2026 | In-ground chargers | Design-build, opportunity to combine Kirk effort

Eastern 

Q2 2022 – Q3 2029 reconstruction | BEBs begin arriving 2028 | Purpose-built ZEB depot | Fed funding required

Kirk ZEB Pilot

Overview

The 7-bus Kirk ZEB pilot includes 5 overhead chargers. Each BEB will operate in revenue service on multiple routes. The ZEB PM team will ensure a wide variety of bus operators, operations, and maintenance staff are exposed to the benefits and challenges of operating and servicing a BEB. Detailed lessons learned will be documented.

Pilot Duration

- 1.5-2 years (must hit all four seasons at a minimum)
- **Specifications**
- Four 40' battery electric buses (NF)
- Three 60' battery electric buses (NF)
- Five overhead 150 kw Siemens chargers
- New Flyer bus performance software
- OEM-agnostic charge management software



Workforce Considerations

- Extensive employee training and new job descriptions
 - Mechanics moving more toward IT technician than traditional mechanic
- Changes to agency procedures
 - Scheduling, bus assignments, field supervision, maintenance
- Coordination with Union and collective bargaining contract changes are critical



ZEV Transition Next Steps

2021 – Refine ZEV strategy and prepare to execute

- Begin Concept Design for facility retrofits and evaluate bus specifications
- Establish ZEV Transition Program
- Identify ZEV workforce considerations
- Evaluate grid needs and coordinate with BG&E
- Explore procurement options including life cycle cost analysis:
- Advance LoNo and VW pilot projects

2022 – Procure charging infrastructure and launch pilots

Conclusion



MTA is committed to meeting 50% bus fleet transition to ZEV by 2030



Significant funding is needed to accomplish this (Approx. \$380M over next 10 years)



MTA will be among the first large-scale ZEV fleets in North America



This is a major workforce transition and reliable 24/7 daily operations throughout transition and construction is essential

Q&A

