

Houston METRO Pathway to Environmental Sustainability

January 2022

DOT FUNDING & FINANCING PROGRAMS WITH EV ELIGIBILITIES

DOT Funding and Financing Programs with EV Eligibilities*

LEGEND

Construction and installation of EV charging infrastructure including parking facilities and utilities.	Workforce development and training related to EV infrastructure.	EV acquisitions and engine conversions - cars or trucks.	Planning for EV charging infrastructure and related projects.	Construction and installation of EV charging infrastructure to support operational, resiliency, national energy security, environmental, and community goals for freight transportation.	Installation of EV charging infrastructure as part of transit capital projects eligible under chapter 53 of title 49, United States Code.

	FY 2021 AMOUNT						
FORMULA PROGRAMS							
National Highway Performance Program (NHPP)	\$23.1 B						
Surface Transportation Block Grant Program (STBG)	\$10.2 B						
Congestion Mitigation & Air Quality Improvement Program (CMAQ)	\$2.4 B						
National Highway Freight Program (NHFP)	\$1.5 B						
State Planning and Research (SPR)	\$641.5 M						
Metropolitan Planning (PL)	\$357.9 M						
DISCRETIONARY PROGRAMS							
Rebuilding American Infrastructure with Sustainability and Equity (RAISE) (formerly known as BUILD)	\$1.0 B						
Infrastructure for Rebuilding America (INFRA) Grant Program	\$889.0 M						
Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD)	\$53.3 M						
OTHER ALLOCATED PROGRAMS							
Federal Lands and Tribal Transportation Program (FLTTP)	\$1.0 B						
Highway Infrastructure Program (HIP) (other than for bridges)	\$644.0 M						
Puerto Rico Highway Program (PRHP)	\$74.9 M						
Territorial Highway Program (THP)	\$37.3 M						
INNOVATIVE FINANCE PROGRAMS							
State Infrastructure Banks (SIBs)	Varies						
Transportation Infrastructure Financing and Innovation Act (TIFIA)	Varies						

Disclaimer: Many of these programs are oversubscribed, and EV charging infrastructure competes with many other types of eligible projects.

* All eligibility determinations are fact specific. Limitations may apply. Additional low and zero-emission fuel types also may be eligible under these programs.

Note: Total (in millions and billions, rounded to one decimal place)

The Biden Administration's Infrastructure Plan proposes funding opportunities to Accelerate Deployment of Electric Vehicles and Chargers

Houston METRO has at least two proposals prepared to respond to these opportunities and continuing to explore others.

Houston METRO will continue exploring private and public funding options

FEDERAL TRANSIT ADMINISTRATION INITIATIVE



- On June 15, 2021, FTA announced the *Sustainable Transit for a Healthy Planet Challenge* to encourage transit agencies to take bold actions and investments to support President Biden's goal of achieving a 50 percent reduction in greenhouse gas (GHG) emissions from 2005 levels by 2030
- Participating transit agencies would develop climate action or sustainability plans that detail strategies such as:
 - Converting fleets to electric buses
 - Making facilities more energy efficient; and
 - Applying other technologies
- Plan must be submitted in April 2022

CITY OF HOUSTON CLIMATE ACTION PLAN



- City of Houston launched its Climate Action Plan on Earth Day in April 2020
- Goal 1: Shift regional fleet to electric and low-emission vehicles
- Target 2030 for 100% conversion of COH's non-emergency vehicles

TRANSPORTATION



Goal 1: Shift regional fleet to electric and low-emission vehicles.



Goal 2: Reduce vehicle miles traveled (VMT) per capita.



Goal 3: Provide equitable and safe mobility choices.

ENERGY TRANSITION



Goal 1: Grow Houston's investment in renewable and resilient energy.



Goal 2: Make Houston the leader in carbon capture technology and energy innovation.



Goal 3: Restore, protect, and enhance Houston's natural ability to capture and store carbon.

BUILDING OPTIMIZATION



Goal 1: Reduce building energy use and maximize savings.



Goal 2: Expand investment in energy efficiency.



Goal 3: Invest in skilled local jobs to optimize building operations.

MATERIALS MANAGEMENT



Goal 1: Reduce waste and transform the circular economy.



Goal 2: Optimize waste operations and create power from waste.



Goal 3: Ensure safe and cost-effective long-term disposal capacity.

CLIMATE ACTION PLAN VISION STATEMENT

Pending METRO Board approval

1. METRO will shift to 100% zero-emission bus purchases on or before FY2030
2. METRO will manage its operations to avoid or minimize environmental impacts on the human health and safety of our employees
3. METRO will apply green principles to the design and management of its facilities. METRO will foster sustainable use of natural resources by promoting energy management, recycling, re-use, and re-purposing of materials, and waste reduction management opportunities
4. METRO will collaborate with other organizations to achieve shared environmental goals
5. METRO will develop an agency wide Climate Action Plan to achieve the objectives of this Sustainability Vision Statement

Climate Action Plan Sustainability Vision Statement #1

- The current fleet mix includes traditional fuel, CNG and hybrid buses
- Agency fleet replacement plan had previously called for purchase of 100 buses per year
- Due to the pandemic, no diesel fuel or CNG buses were purchased in FY2020 or FY2021

METRO

ZERO EMISSIONS GOAL & TARGET YEAR

METRO's existing business practice operates buses for their useful life of approximately 12-15 years (depending on vehicle type)

- As of FY2021, the average fleet vehicle is 6.8 years old.
- 2030 is the staff recommendation to target transition of fleet purchases to zero emissions vehicles. It aligns to the city's initial fleet transition goal of non-emergency vehicles by 2030, industry trends and federal efforts.
- Flexibility will be needed due to timing of infrastructure upgrades, resiliency and available capacity

Climate Action Plan

Step 1: METRO will transition to zero emissions bus purchases on or before FY2030 while maintaining diverse fleet to ensure resiliency and service levels

Step 2: METRO will purchase 20 battery electric buses for operation on two bus corridors in FY2022

Step 3: METRO will seek to pilot/demonstrate Hydrogen Fuel Cell bus(es)

Step 4: METRO will continue to pursue funding to support the purchase of zero emissions vehicles and infrastructure

- **METRO submitted application for 20 electric buses to the FTA Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grant Program with anticipation of notification by October 2021**

CLIMATE CHANGE NEXT STEPS

January 2022

- Requesting Board approval of METRO's Climate Action Plan

Other Electric Vehicles

UNIVERSITY DISTRICT AV PROJECT PHASE I – CLOSED LOOP DEPLOYMENT



Type of vehicle:
Electric automated shuttle

Passenger capacity per vehicle:
12 passengers: 6 seated / 6 standing
Passenger

Operated on campus at Texas Southern
University

7,000 successful trips

High customer satisfaction

Houston METRO awarded federal grant
to implement Phase II connecting to
Light Rail and University of Houston

PHOENIX MOTORCARS ZEUS 400

Shuttle of the Future - Phoenix Motorcars



(Draft schematic, design subject to change, E-450 Ford Chassis)

- Buy America Compliant
- Compliant with the Federal Motor Vehicle Safety Standards (FMVSS)
- Proven & Tested Vehicle

Automated Bus Consortium

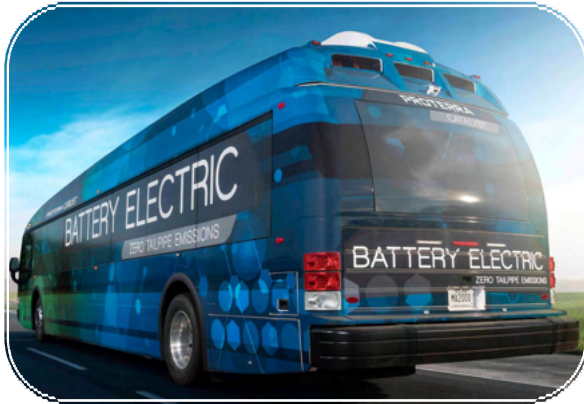


Zero Emission Vehicle Update

Public Safety, Customer Service & Operations Committee

July 2021

Zero Emission Technologies Currently in the Marketplace



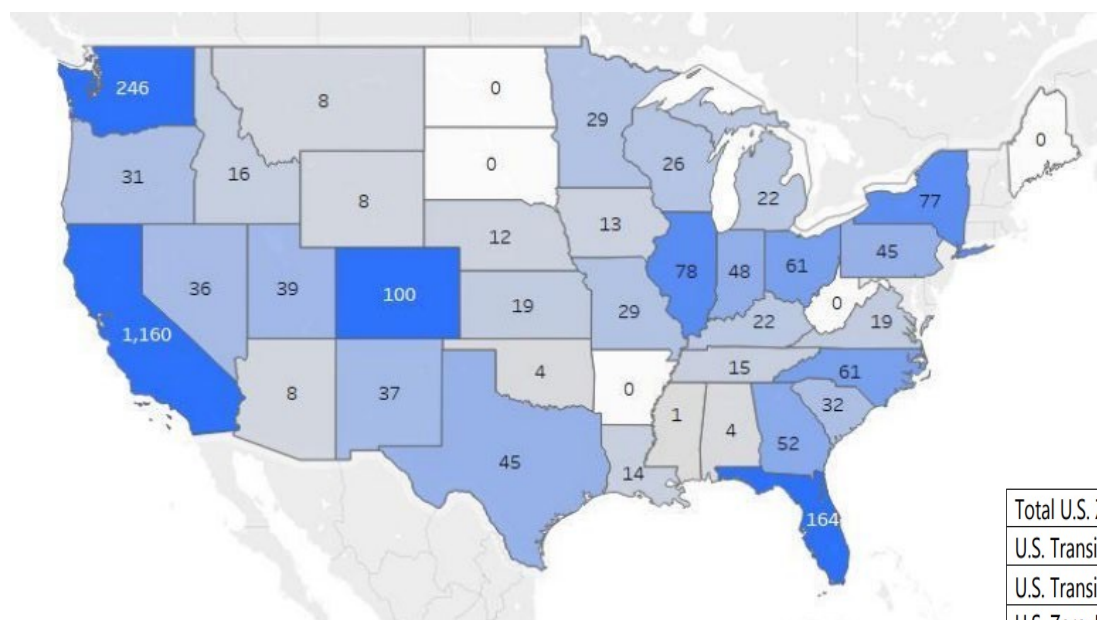
Battery
Electric



Hydrogen
Fuel Cell

Zero Emission Buses Outlook in the U.S.

December 2020 data / In service, ordered or planned

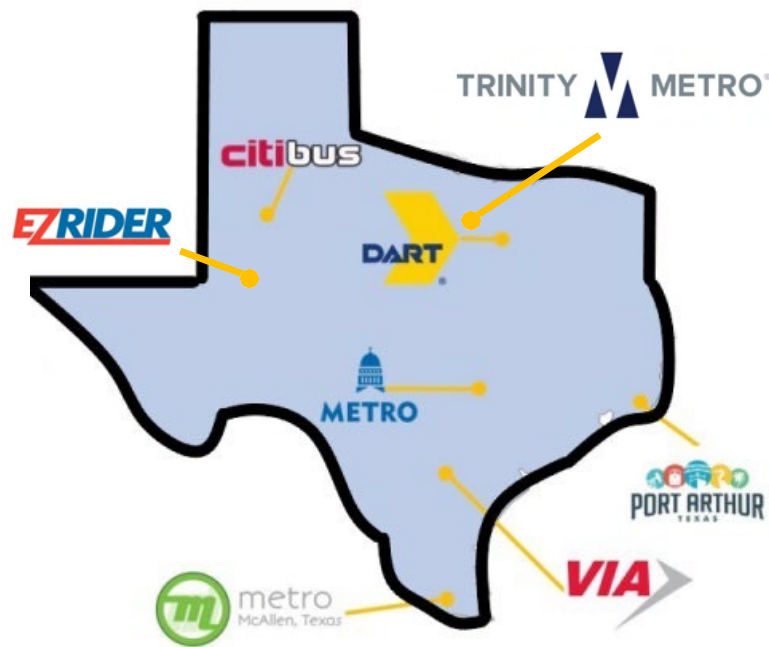


Total U.S. Zero-Emission Transit Buses (ZEBs)	2,790
U.S. Transit Battery Electric Buses (BEBs)	2,703
U.S. Transit Hydrogen Fuel Cell Buses (FCEBs)	87
U.S. Zero-Emissions Small Buses	617
Active U.S. Zero-Emissions Transit Buses	1015
Canadian Zero-Emissions Transit Buses	249

Source: Zeroing in on ZEBs: 2020 Edition

Zero Emission Buses Currently Operating in Texas

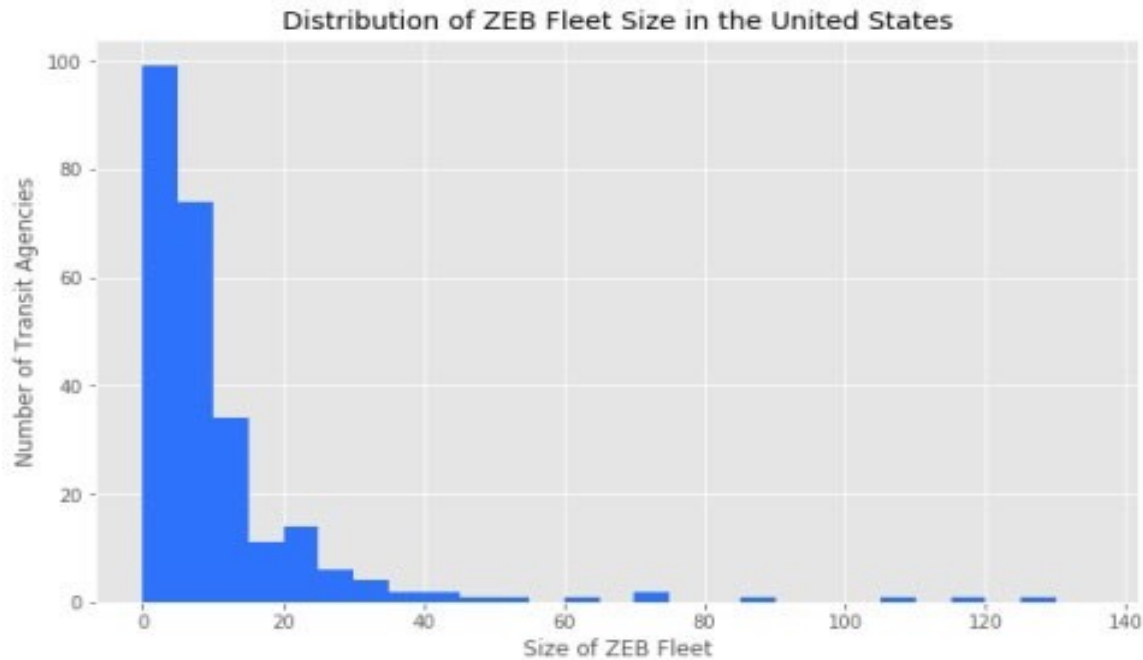
(July 2021 data)



Texas	46
Lubbock (Citibus)	2
Dallas (Dart)	7
Fort Worth (Trinity)	2
Austin (CAP Metro)	10
Odessa (EZ Rider)	10
McAllen (METRO)	2
San Antonio (VIA)	3
Port Arthur (PAT)	10

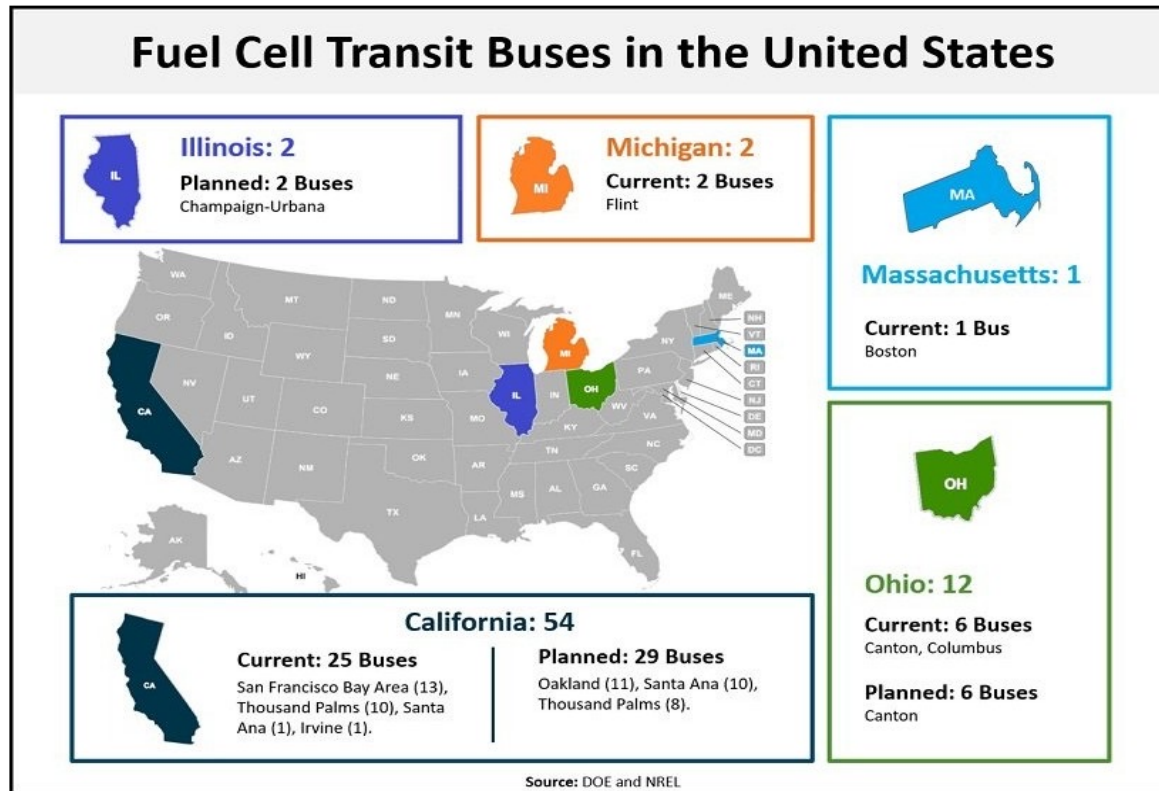
All purchases based on receiving Federal Transit Administration (FTA) Low/No Emissions Grants

Zero Emission Vehicle Distribution



Source: Zeroing in on ZEBs: 2020 Edition

Estimated 54 Fuel Cell Transit Buses are being tested in the U.S.



Source: DOE and NREL

METRO's Zero Emissions Fleet Options

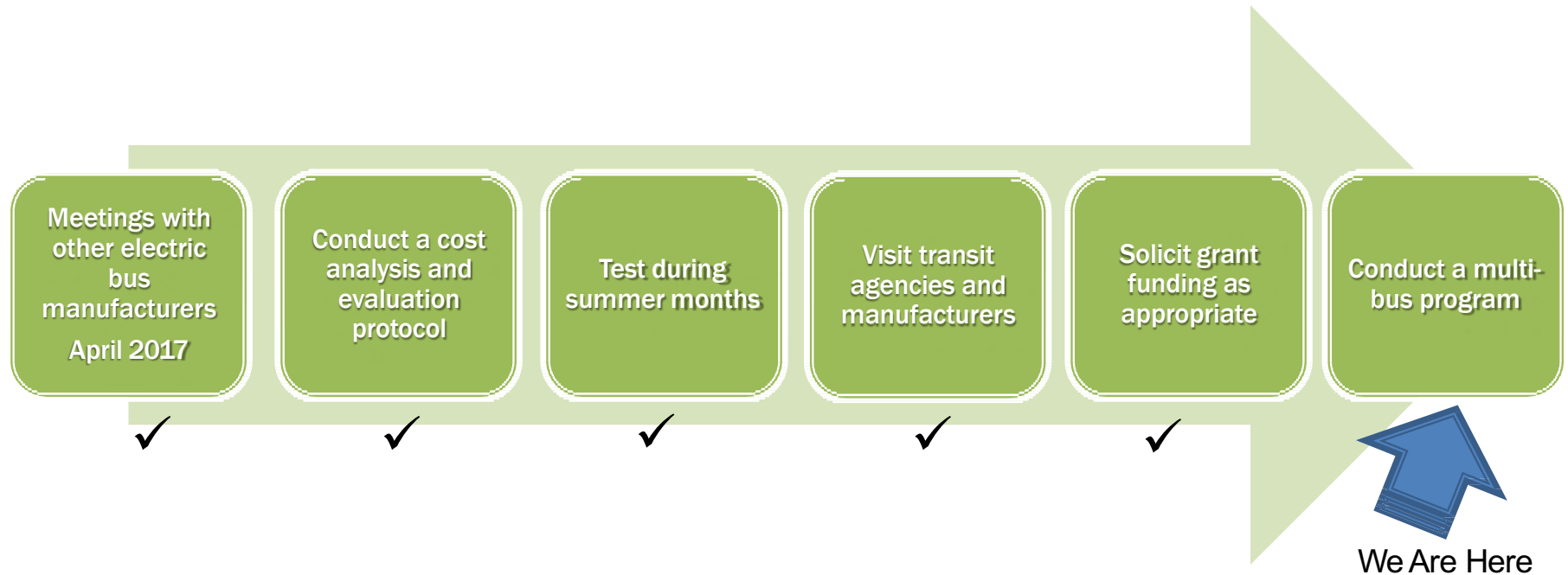
Hydrogen

- Negligible infrastructure cost
- Improved range over battery electric
- A/C performance concern
- Maintenance savings
- Vehicle cost premium of 80%
- Zero Tailpipe emissions
- Emerging technology

Battery Electric

- High infrastructure cost
- Range – A/C performance concerns
- Maintenance savings
- Vehicle cost premium of 70%
- Zero Tailpipe emissions

Zero Emission Bus Technology (Battery Electric) Where Are We?



Centerpoint & Evolve

- Staff has met with Centerpoint and Evolve
- Both have agreed to offer assistance as follows:
 - Evolve
 - Feasibility and cost benefit review of the Multi Bus Program
 - Feasibility and cost benefit review of larger scale use of battery electric bus implementation
 - Centerpoint
 - Review METRO's power needs for Multi Bus Program
 - Review METRO's power needs for larger scale
 - Assist METRO with efficiency projects (TEES, LED lighting, future use of solar power)
- Staff providing required background information

METRO & COH Partnership



METRO Operations has partnered with City of Houston Fleet Operations to explore:

- Opportunities for electric charging of municipal and transit vehicles
- Adding fleet electric and hydrogen fueled vehicles
- Opportunities for public electric charging at transit properties

ZERO EMISSION VEHICLE OPTIONS

Community Connect/METROLift/ Alternative Low Emission Fueled Buses

**Electric Transit Cutaway Shuttles:
Paratransit Service (METROLift)
10 Battery Electric Cutaway Shuttles
Depot Charging Infrastructure**



Hydrogen Fuel Cell Buses



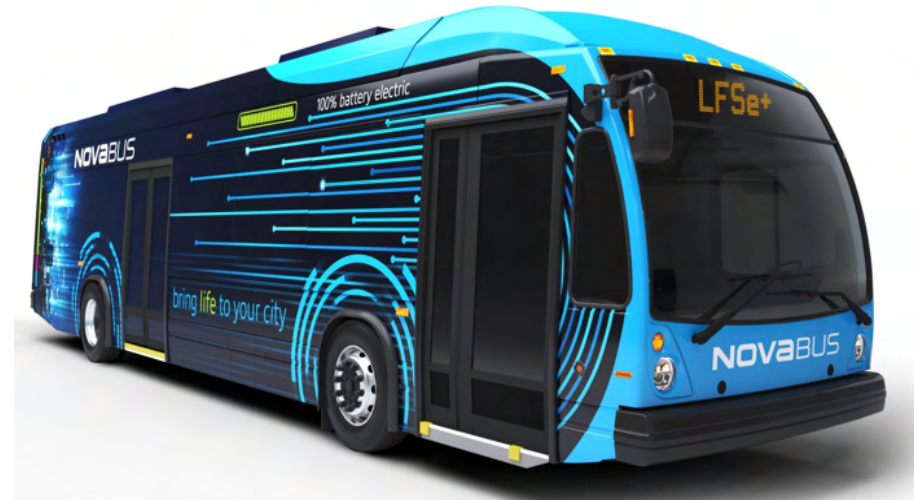
Proposed Next Steps

Battery Electric Buses

- **Electric**
 - **Purchase 20 electric buses**
 - Bus to be operated on Bellaire Signature/Quickline & 28 OST/Wayside
 - Polk & West Bus Operating Facility
 - Project would include buses and all required facility infrastructure
 - **Purchase 10 cutaway style**
 - Operate in METROLift or Community Connect services
 - Project would include buses and all required facility infrastructure
 - **Purchase 15 Chevy Bolt electric cars cutaway style**
 - Nonrevenue support vehicles
 - Will be stationed at 1900 Main street and charging stations will be setup within METRO staff parking lots.
 - Delivery delayed due to Battery system recall.

20 Nova LFSe+ 100 percent electric, long-range dual charging bus

- Nova Bus 100 percent electric, long-range dual charging bus, the LFSe+,
 - Lower weight and increased power density contribute to improved bus performance and durability
- Expect delivery of buses in the October 2022 timeframe. (Nova agreed to accelerate production)
- Facility enhancements are in design phase
- Construction of facility enhancements to occur this summer



10 Phoenix Motorcar Zeus 400 Shuttle Buses

- Phoenix Motorcar has developed a all electric drive system that allows the flexibility to electrify any body or application built on a Ford E-series platform.
- Expect delivery October 2022
- Use in Community Connect and METROLift service
- Electric charging equipment ordered, and installation does not require design nor city permitting



Proposed Next Steps

Hydrogen Fuel Cell Buses

- Developed specification for a 40-foot Transit bus
- Visited transit agencies and manufacturers
- Develop plan for Multi bus program
 - 5-10 buses
 - Operated out of METRO Fallbrook Bus Operating facility
 - Reviewing various fueling opportunities
- Expect to start solicitation process in the coming months. Typically takes 18-24 months to receive new buses.
- Continue to actively solicit grant opportunities

QUESTIONS

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