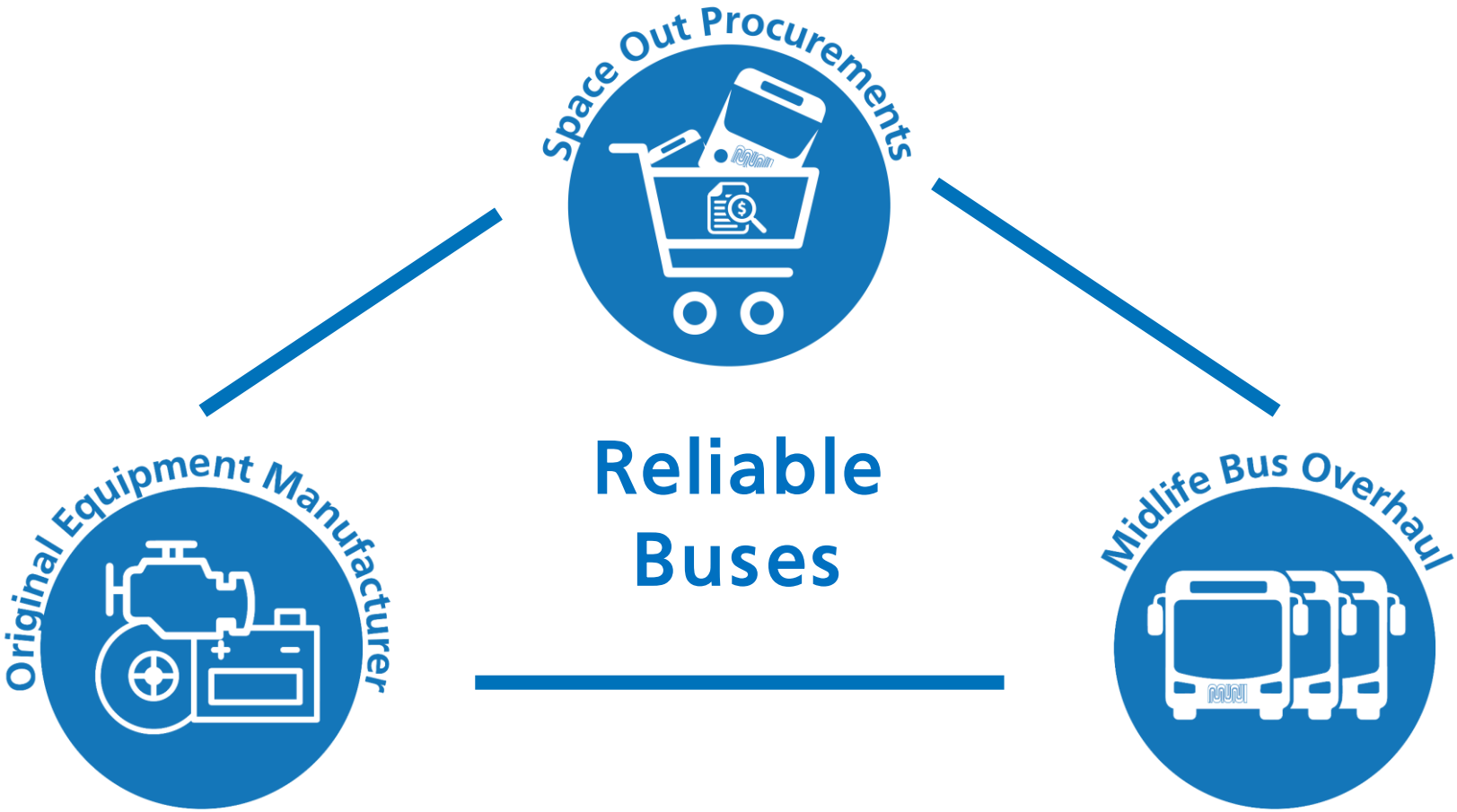
SFMTA Fleet Program Overview

EMSC Meeting

Jan 22, 2020

Fleet Program Overview



Hybrid - Series

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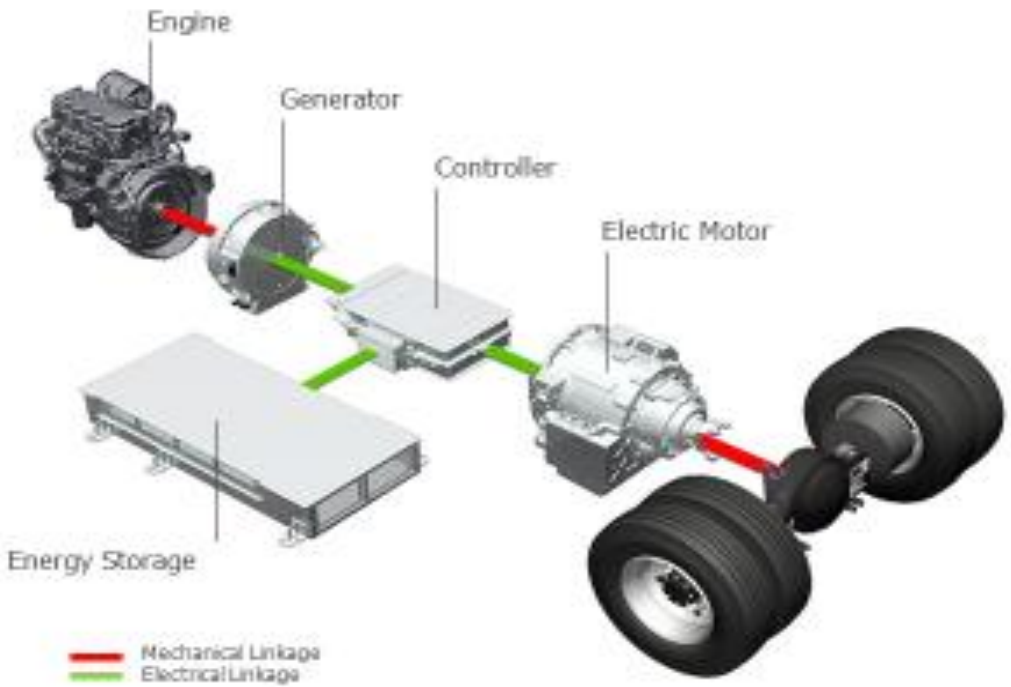
Series hybrid: full electric **propulsion**

No **mechanical link** between the diesel engine and the axle

All power comes from the **electric motor**

Power flows in **SERIES** from engine to generator to traction motor

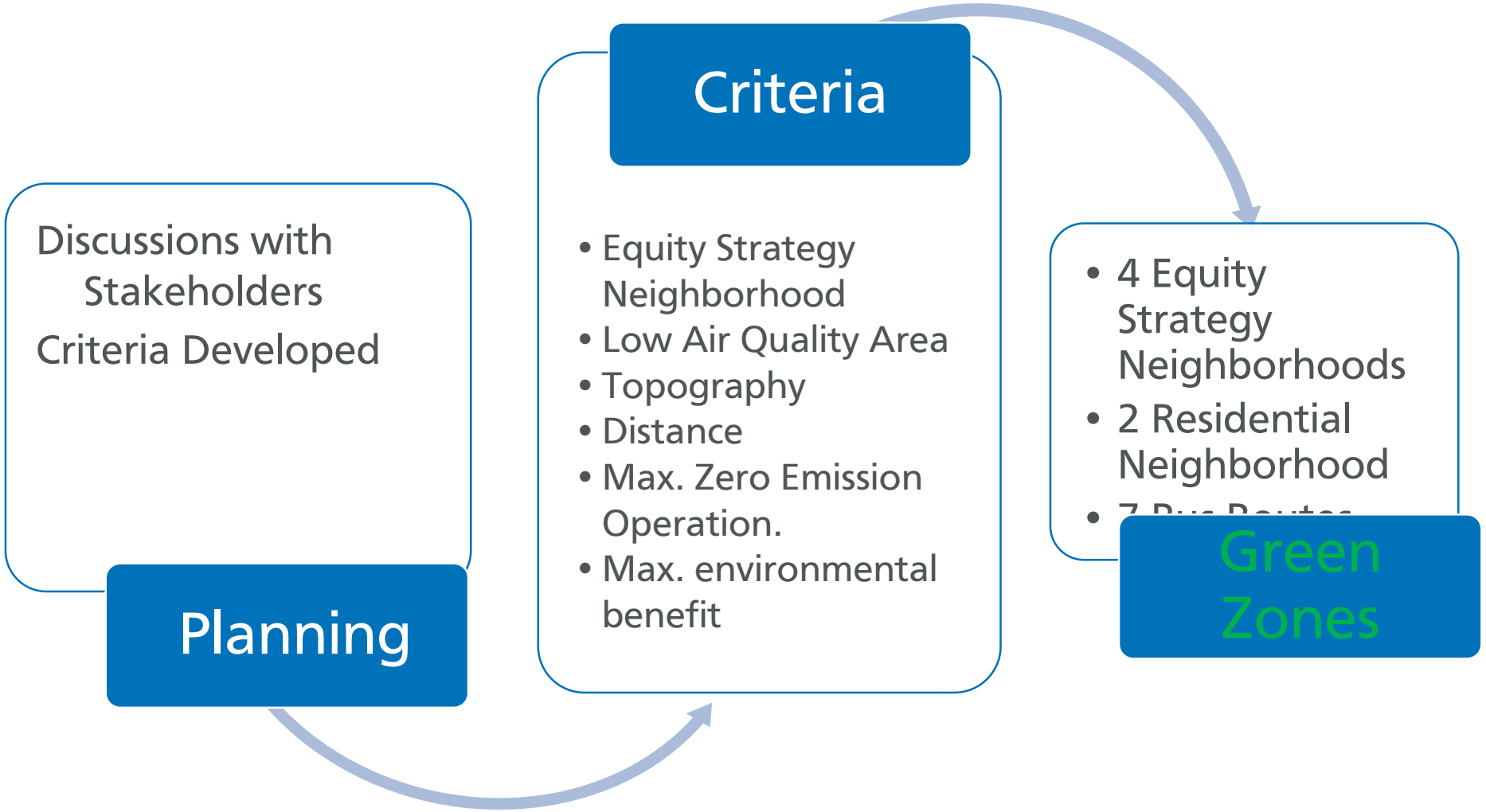
Adaptable in the future to **ALL ELECTRIC**



Hybrid – Green Zone

- Replace 68 aged buses with Green Zone hybrid-electric buses
- Taking advantage of higher energy capacity battery to run up to 1/3 of the route with engine off
- Noise reduction
- Comfortable ride experience
- Milestone accomplishment for SFMTA – path of the SFMTA Zero Emission Policy
- SFMTA is the pioneer for the Green Zone Operation.

Where are the Green Zones?



Where are the Green Zones?

Equity Strategy Neighborhoods

Western Addition, Downtown / Civic Center, Bay View, Mission

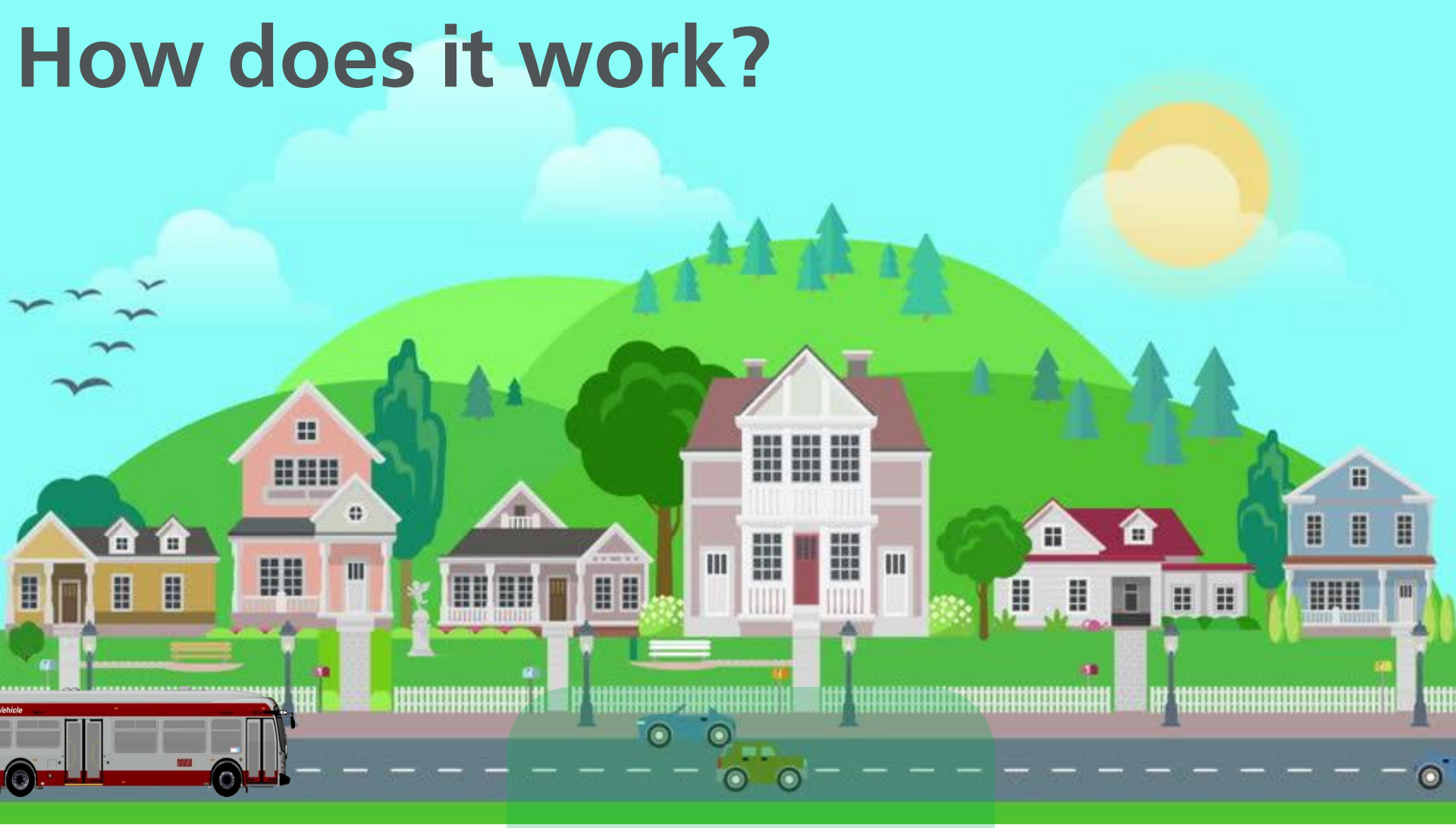
Residential Neighborhoods

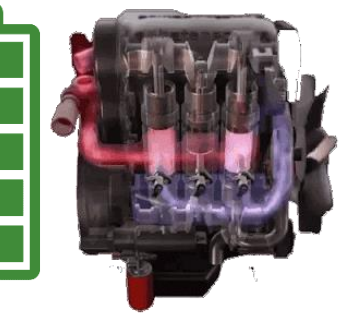
Park Merced, Marina

Bus Routes

- 2 – Clement
- 12 – Folsom/Pacific
- 19 – Polk
- 28 – 19th Ave
- 28R – 19th Ave Rapid
- 43 – Masonic
- 47 – Van Ness

How does it work?



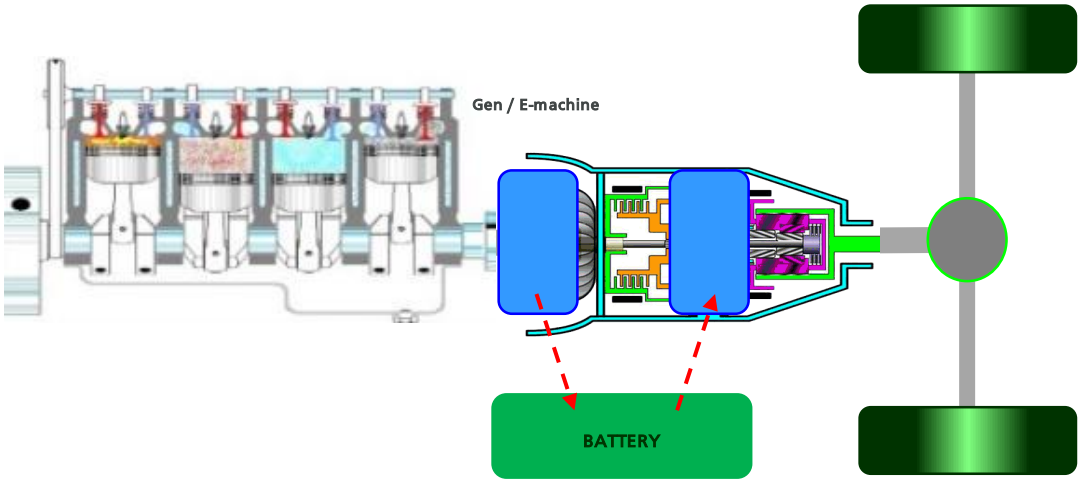


Green Zone

Hybrid - Parallel

Compound Split Parallel Hybrid System:

- Integral motor & generator & gearing
- Power provided by both engine & battery-powered
- Engine capable of operating independent of output speed



Improved reliability means better service

Over the past 30 years, our expectations of the fleet's reliability have dramatically increased

1980s	2000s	Today
2,000-3,000 miles	**4,000-6,000** miles	**10,000-12,000** miles

Mean Distance Between Failures (MDBF) is the industry-standard measurement of vehicle reliability. It tracks how long a vehicle travels before a mechanical failure that results in lost service.

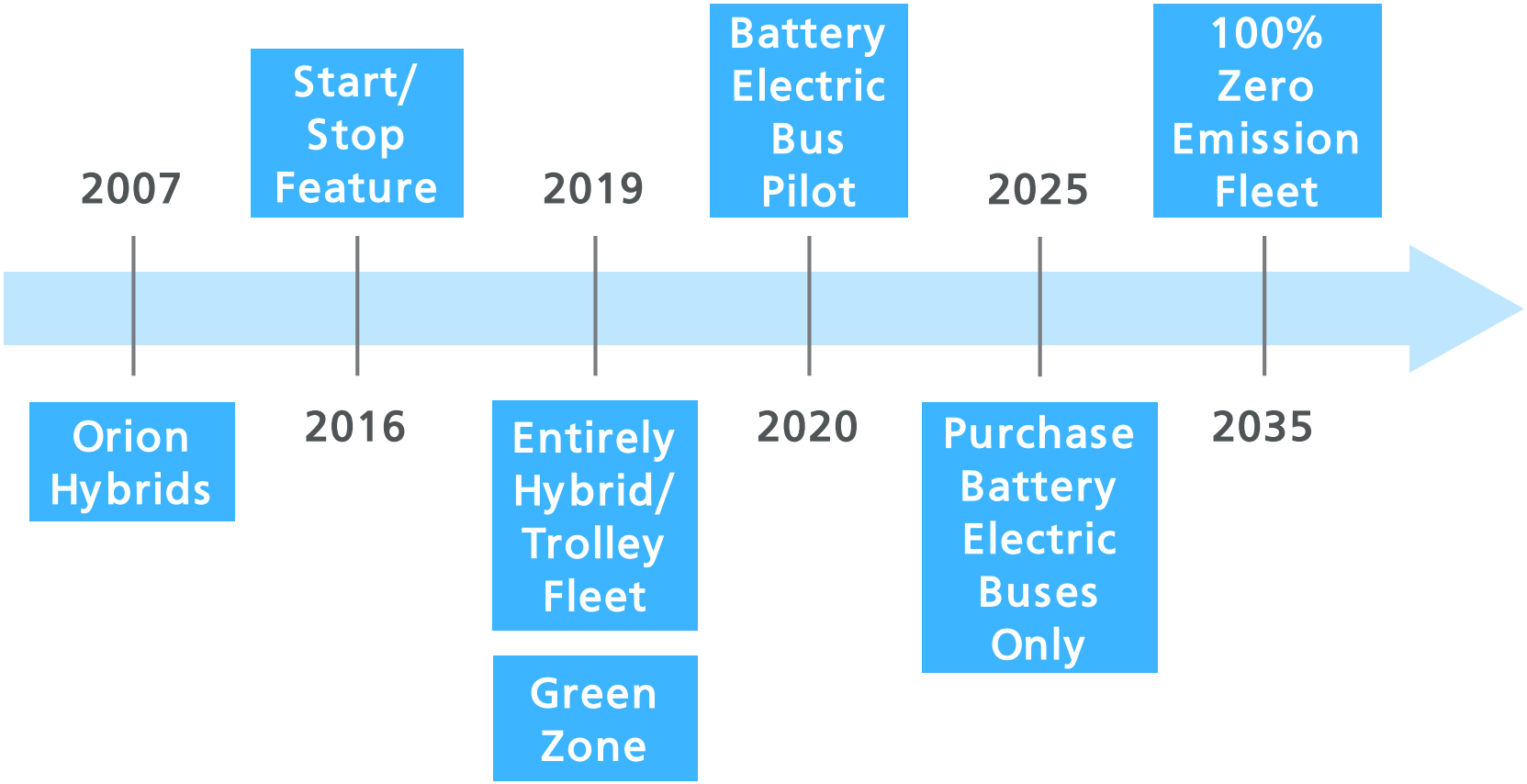
Performance Matrix - MDBF

- Difficult to compare between Neoplan, Orion with the New Flyer. Different time of manufacturing and different technology
- Neoplan – 4,500 MDBF
- Orion – 6,500 MDBF
- The New Flyer Hybrids are at approx. 10k -12k MDBF
- The New Flyer Trolleys are at approx. 8k-10k MDBF

Zero Emission Vehicles Resolution

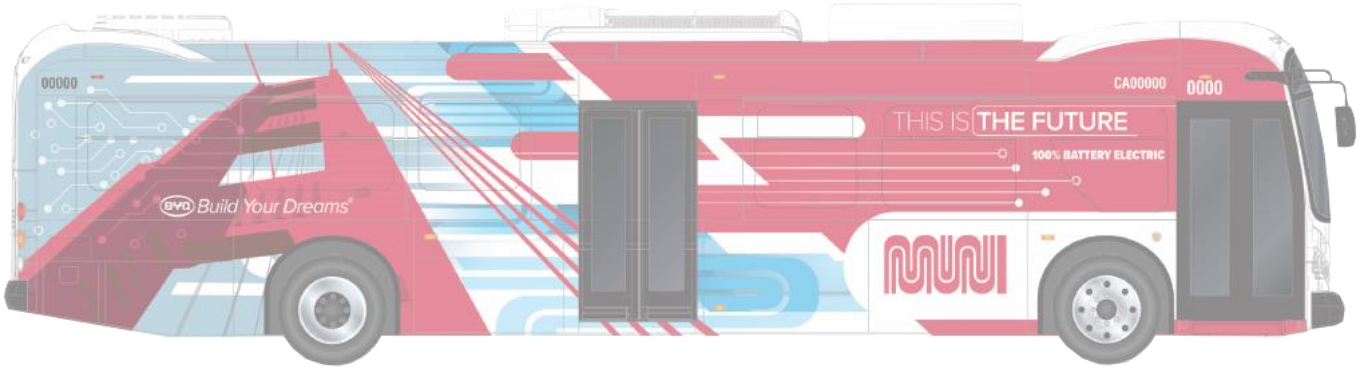
- SFMTA currently operates greenest fleet in North America
- SFMTA is national leader in pursuing sustainable, reduced, and zero emissions transit vehicles
- California Air Resources Board (CARB) has set ambitious requirements for electric-bus adoption in California
- SFMTA Board of Directors Zero Emissions Vehicle Resolution (2018) guides all aspects of our battery-electric vehicle program:
  - 2020: Pilot electric buses
  - 2025: 100% electric procurements
  - 2035: all electric fleet

Zero Emission Timeline



Battery-Electric Bus Pilot Overview

- Procure nine 40-ft battery-electric buses – three each from three different manufacturers to determine the current state of battery electric technology
- Use vehicles in regular revenue service on SFMTA's most demanding routes
- Install charging infrastructure at the Woods Maintenance yard
- Prepare a report analyzing the electric buses and comparing them to our existing hybrid electric and electric trolley buses.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100% BATTERY ELECTRIC
BYD Build Your Dreams
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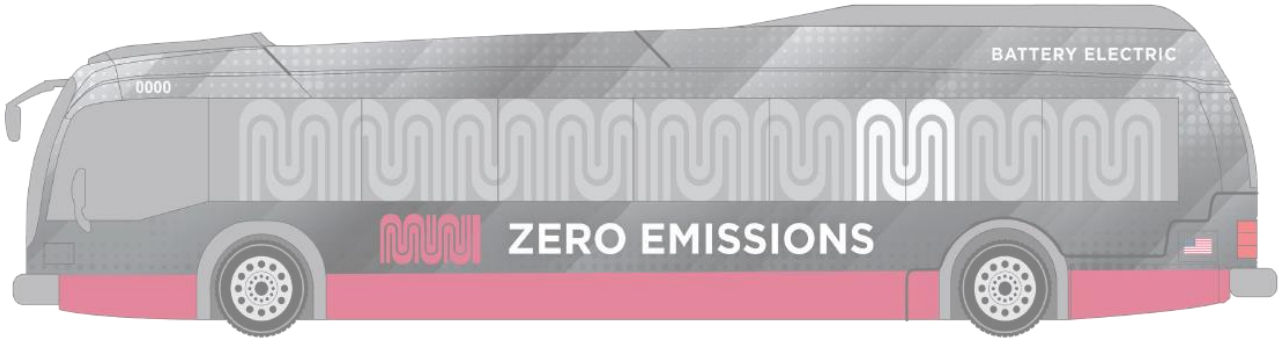
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BATTERY-ELECTRIC & ZERO-EMISSION

Goals for Battery Bus Pilot

- Compare battery buses to one another, as well as to our existing electric hybrid buses and trolley buses
- Evaluate performance, reliability, maintainability, and operability of the buses in SF unique operating environment
- Understand the best current technology on the market; battery technology used in electric vehicles is rapidly evolving
- Evaluate manufacturer's ability to deliver on safety and reliability for the "full bus," not just the battery components
- Evaluate new features that respond to customer and employee feedback such as new seats, CAD/AVL systems, a Passenger Information System, doors, wheelchair ramps, and security systems