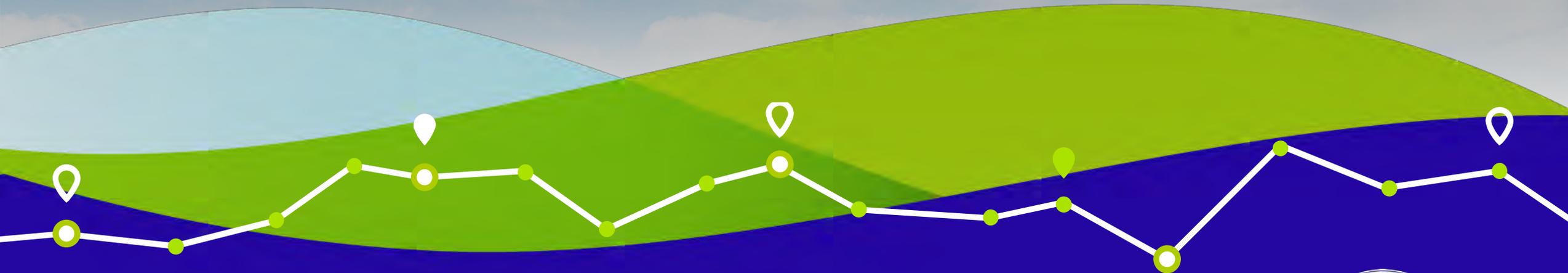


SCAG
clean cities
COALITION

Foothill Transit's Zero-Emissions Journey



Foothill Transit

SPEAKER

Doran Barnes

Chief Executive Officer



Foothill Transit



Foothill Transit

About Foothill Transit

- Pomona and San Gabriel Valleys (eastern Los Angeles County)
- 327 sq. mi service area, 1.5m service pop.
- 12.6 Million boardings per year, 43,000/day
- 36 local and express routes.
- 343 CNG buses, 32 electric buses.
- Innovation is part of our core mission.



The Foothill Transit **MISSION**

To be the premier public transit
provider committed to:

SAFETY
COURTESY
QUALITY
RESPONSIVENESS
EFFICIENCY
INNOVATION



Why Implement ZEB

- Poor air quality
- Large population base
- ARRA Funding for Technology Project
- CARB Regulation



Foothill Transit Ecoliner 2010



The graphic features a green background with a large leaf shape on the left containing a white circuit board pattern. At the top, there are four icons in green squares: a recycling symbol, a sun, a cluster of grapes, and a leaf. The text is centered and right-aligned. At the bottom, there are logos for 'ecoliner' and 'Foothill Transit'.

Foothill Transit is proud to introduce the world's first heavy duty, fast charge, zero emissions electric bus.

Launching in
Pomona, California
September 3, 2010.

ecoliner
Zero Emissions Electric Vehicle

Foothill Transit



SPEAKER

Roland Cordero

Director of Maintenance and
Vehicle Technology



Electric Bus Charge



Foothill Transit

In-Route Chargers

Pomona Transit Center

- One high power fast-charge station with two overhead chargers, sufficient to serve all buses
- Over 200,000 charge cycles to-date, and 2.4 million electric bus miles
- Located at Pomona Transit Center, a central hub with off-street flexibility, safety and security
- 15 in-route fast charge buses



In-Route Chargers

Azusa Intermodal Transit Center - AITC

- Two overhead fast charges
- Supports extended range buses
- 14 extended range buses
- Over 1.0 M bus miles



In-Depot Chargers



In-Depot Chargers



SPEAKER

Joseph Raquel

Director of Planning



Bus Range



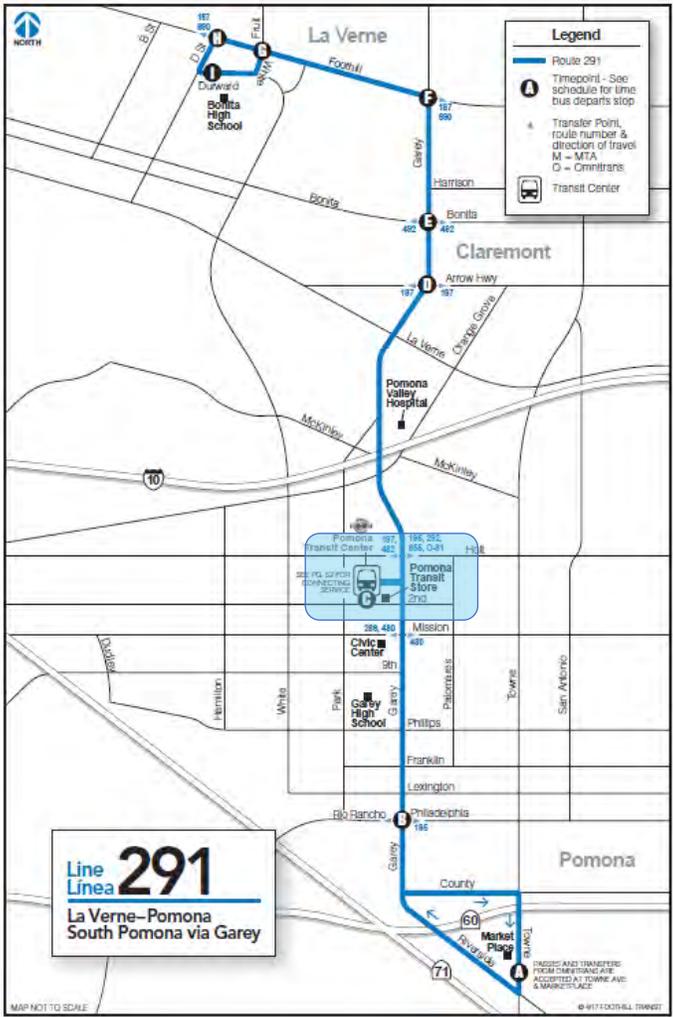
Foothill Transit

Fast Charge Buses

- Line 291 – La Verne – Claremont – Pomona
- 9 miles one way
- 8 peak vehicles
- Fast charge buses
- 5 minute in route charging

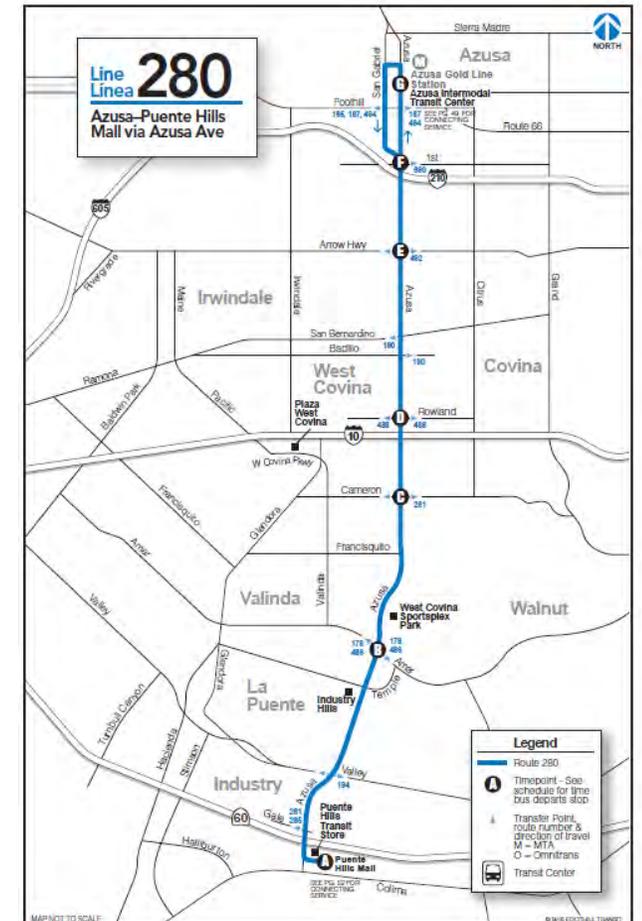
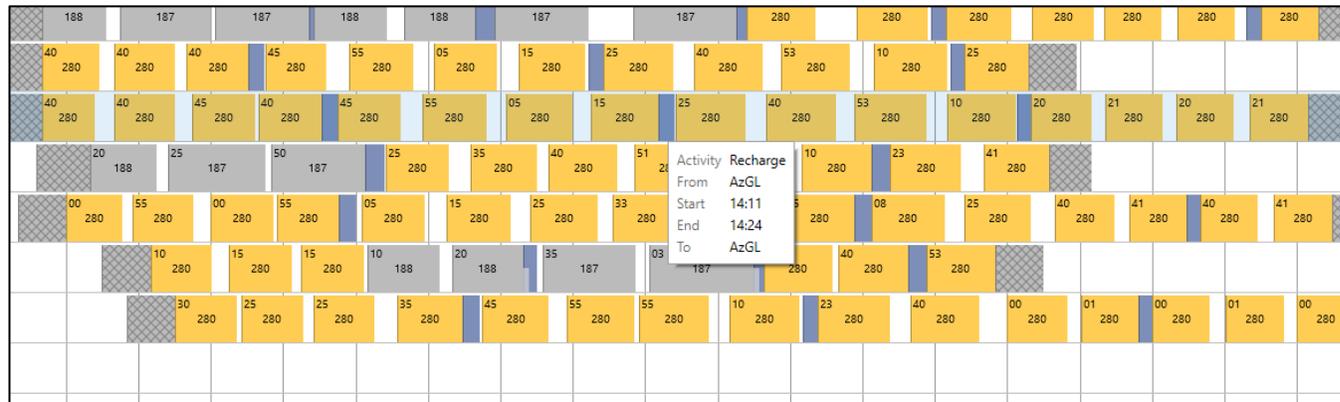
Direction : North

ToMa	GaRR	PTC	PTC	BoGa	DuDs
4:00	4:05	4:13	4:18	4:31	4:40
4:30	4:35	4:43	4:48	5:01	5:10
5:00	5:05	5:13	5:18	5:31	5:40
5:20	5:25	5:33	5:38	5:51	6:00
5:40	5:45	5:53	5:58	6:11	6:20
6:00	6:05	6:13	6:18	6:31	6:40



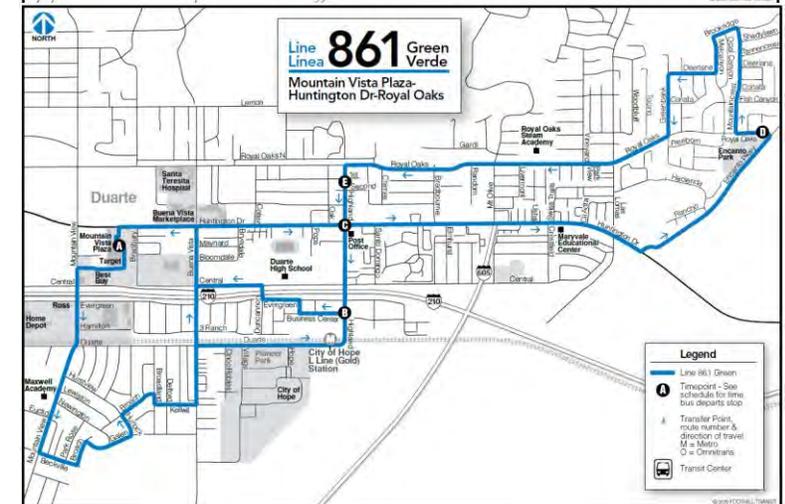
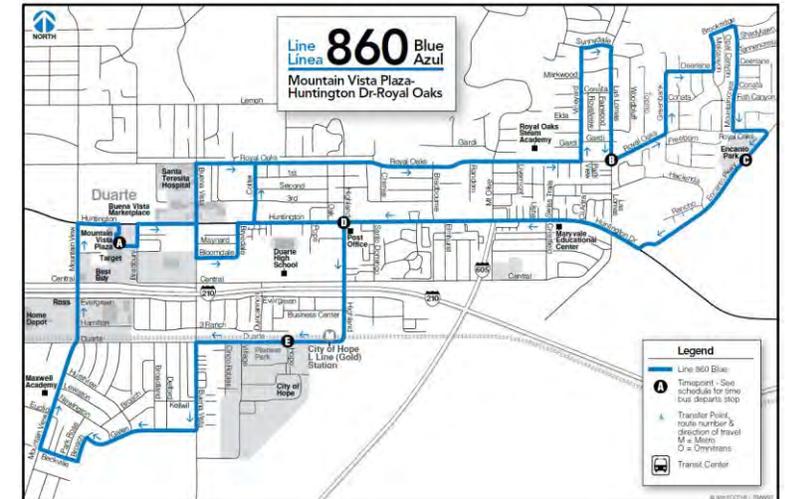
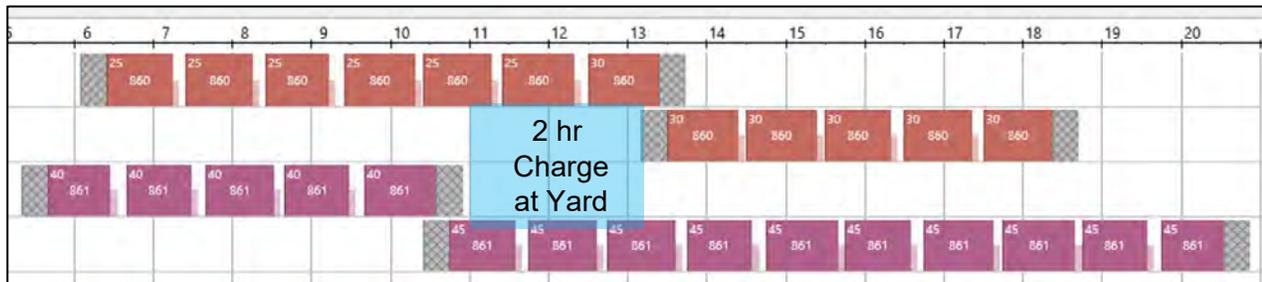
Extended Range Buses

- Line 280: Azusa– Puente Hills Mall via Azusa Avenue
- 11 miles one way
- 11 peak vehicles
- Extended range buses
- 12-minute opportunity charge every 3 or 4 trips



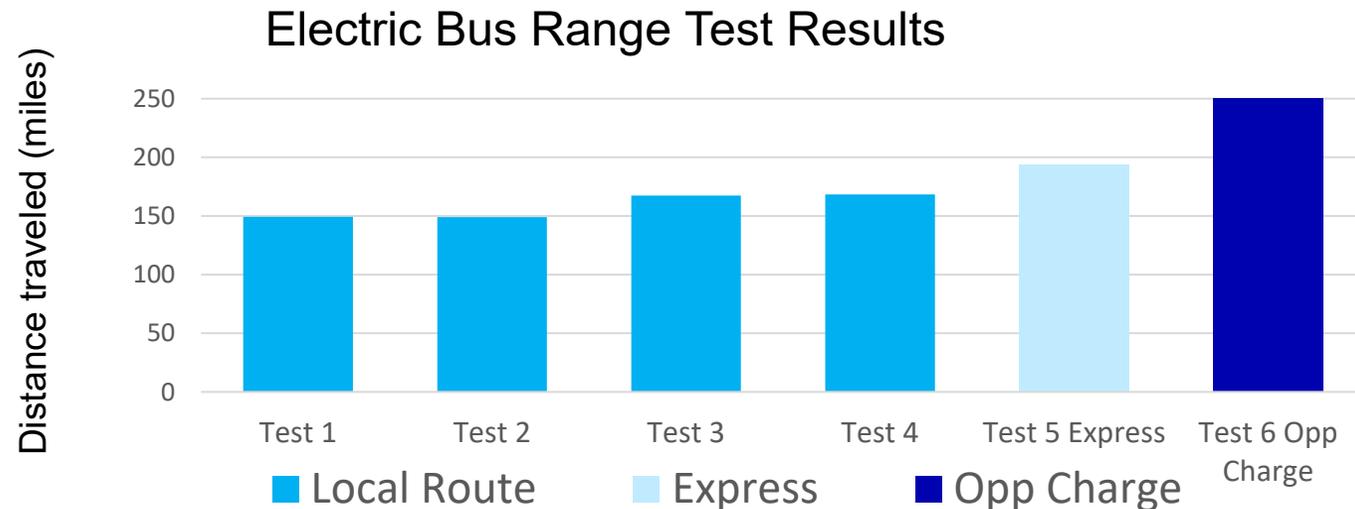
Extended Range Buses

- Lines 860 and 861: Duarte
- Line 860: 13 miles
- Line 861: 12 miles
- 3 extended range electric buses
- Overnight charge and 2-hour midday charge at yard



BEB Range Testing

- Four tests on local routes average 159-mile range
- Results varied from 149 to 168 miles.
- Express line test, 194 miles
- Opportunity charge, 250 miles
- Battery level 100%→10%



SPEAKER

Felicia Friesema

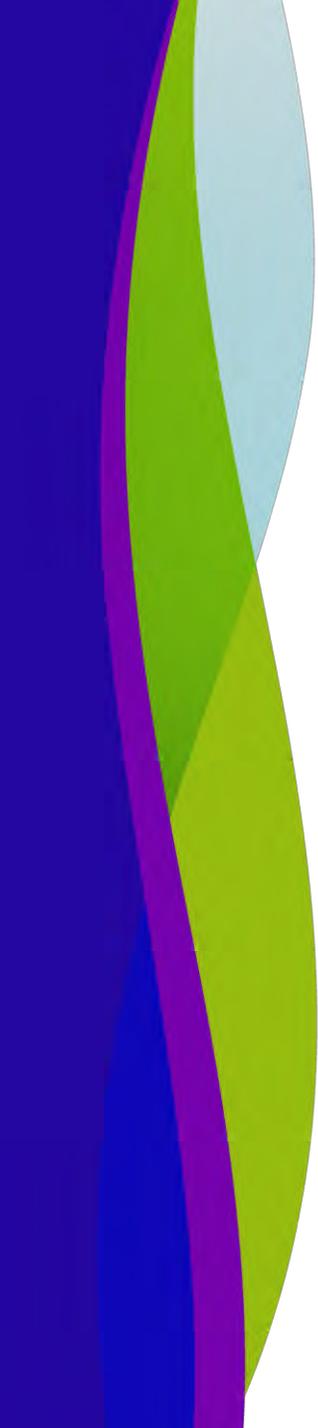
Director of Marketing and
Communications



Marketing Strategy



Foothill Transit



Goal of ZEB Communications

The mission of Foothill Transit is to be the premiere public transit provider committed to **safety**, courtesy, quality, responsiveness, efficiency, and **innovation**.

- Public safety, technologically amazing, and quiet
- Stakeholders want efficiency, better quality of life for communities, sustainability, and fundable

Tools of ZEB Communications



AMERICA'S FIRST ELECTRIC DOUBLE DECK BUS SERVICES FOOHILL TRANSIT ROUTES

Moving Towards 2030 All-Electric Goal
Foothill Transit is committed to operate a 100 percent electric bus fleet by 2030. The current electric bus program consists of:

- 14 40-foot Proterra Extended Range buses
- 3 35-foot Proterra Extended Range buses
- 14 35-foot Proterra short-range fast-charge buses
- 2 40-foot Proterra Catalyst short-range fast-charge buses

Foothill Transit is leading the charge in sustainable transportation by adding two Alexander Dennis Inc. (ADI) Enviro500 battery electric, double-deck buses to its fleet by early 2020. These will be the first two transit double-deck electric buses in the country. The buses will service Foothill Transit's Silver Streak route from Pomona to downtown Los Angeles.

Quick facts:

- Expected 80 seated passenger capacity
- Two fully ADA compliant wheelchair compartments
- Service begins early 2020

Environmental Benefits
Compared to a 40-foot CNG bus that carries approximately 37 seated customers, the Enviro500 bus can carry 80 seated customers in the same road footprint, thereby more than doubling the trip capacity. This furthers Foothill Transit's goal of a zero carbon emissions fleet by 2030.



Foothill Transit
Going Good Places



ZERO-EMISSIONS FLEET

Program History and Future Plans
Since 2010, Foothill Transit has operated one of the largest fleets of electric buses in the nation. We are running 33 electric buses in revenue service. To date, our electric bus fleet has driven over 3.4 million miles and provides zero-emission service to residents in the San Gabriel Valley.

Current Electric Infrastructure

- 2 Pomona Transit Center fast chargers
- 2 Azusa Transit Center fast chargers
- 1 Pomona facility fast charger
- 16 Arcadia/Irwindale facility depot chargers

Current Electric Fleet

- 13 Proterra 35' fast charge coaches
- 2 Proterra 40' fast charge coaches
- 14 Proterra 40' extended range coaches
- 3 Proterra 35' extended range coaches
- More than 3.4 million miles of electric service operated

Upcoming Fleet

- 2 Alexander Dennis double-deck coaches
- 20 hydrogen fuel cell coaches
- Hydrogen fueling infrastructure



Foothill Transit Going Good Places

Branding: Same but Different



Results

- Always ready to share
- Well over 3.4 M electrical miles
- Successful funding initiatives
- Popular appeal
- Project longevity



Raise the roof!

Preview our new all-electric
Double Deck buses

 Foothill Transit

SPEAKER

Michelle Lopes Caldwell

Director of Finance

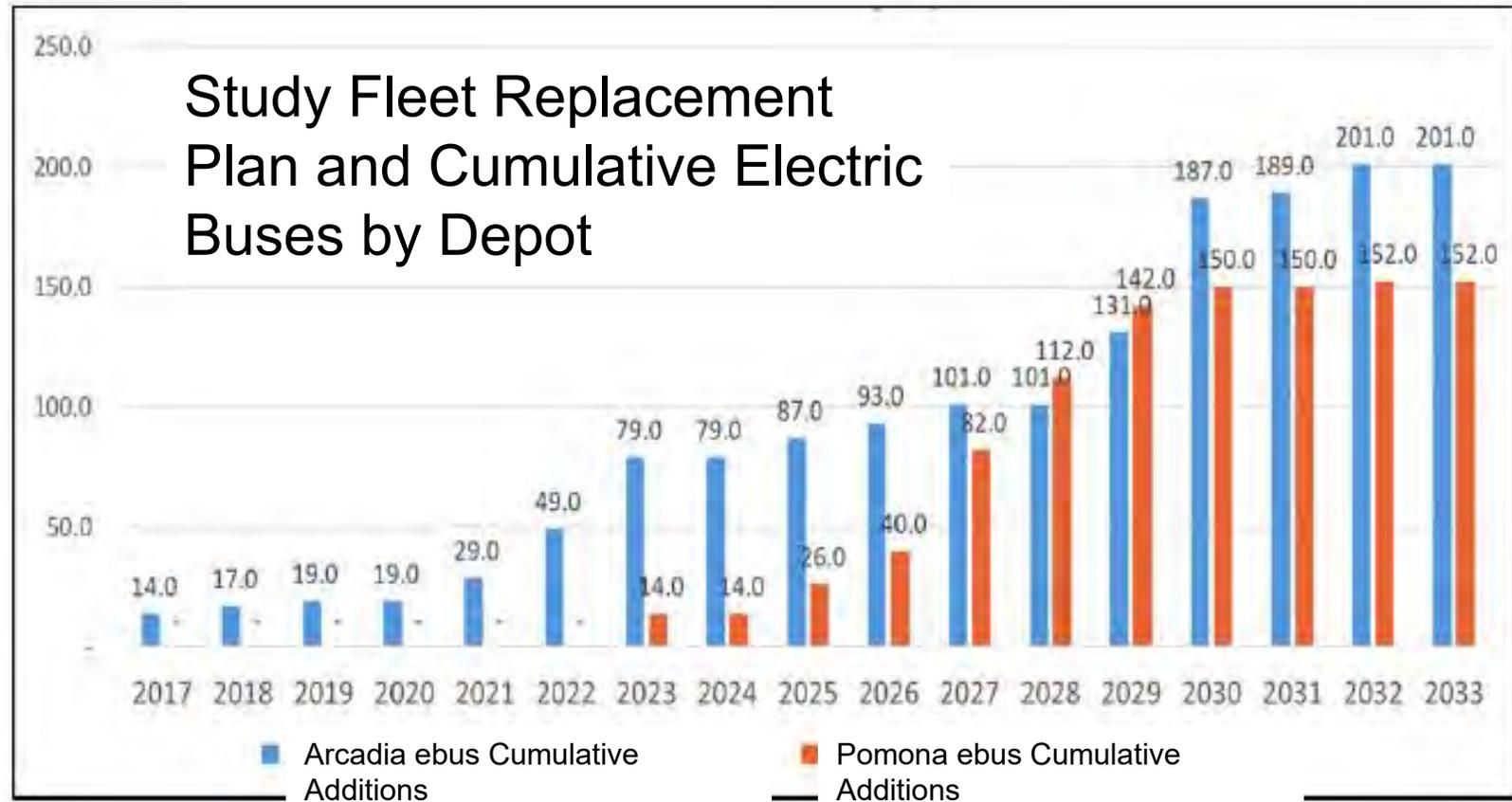


Burns & McDonnell Study



Foothill Transit

Foothill Transit Fleet Replacement Plan



* Foothill fleet replacement plan as of March 2019

Gradual Electrification

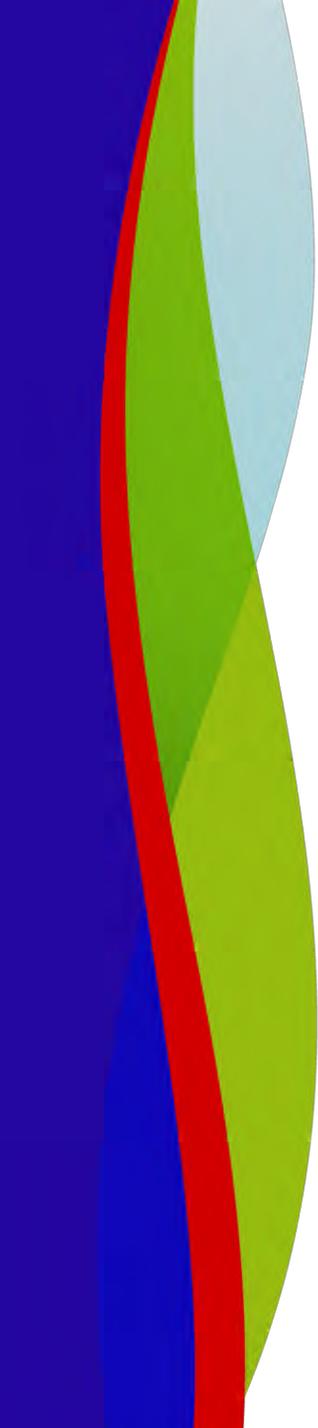
- Electrification of both yards in parallel, not subsequently
- “Interlining”
 - Separation of routes not recommended
 - Distinction in 3 phases



All blocks remain as they currently are (can remain as they are)

Intermediate transition phase (with only a small increase in vehicle requirement)

Fleet 100 % electric (further increases in the vehicle requirement for both depots)



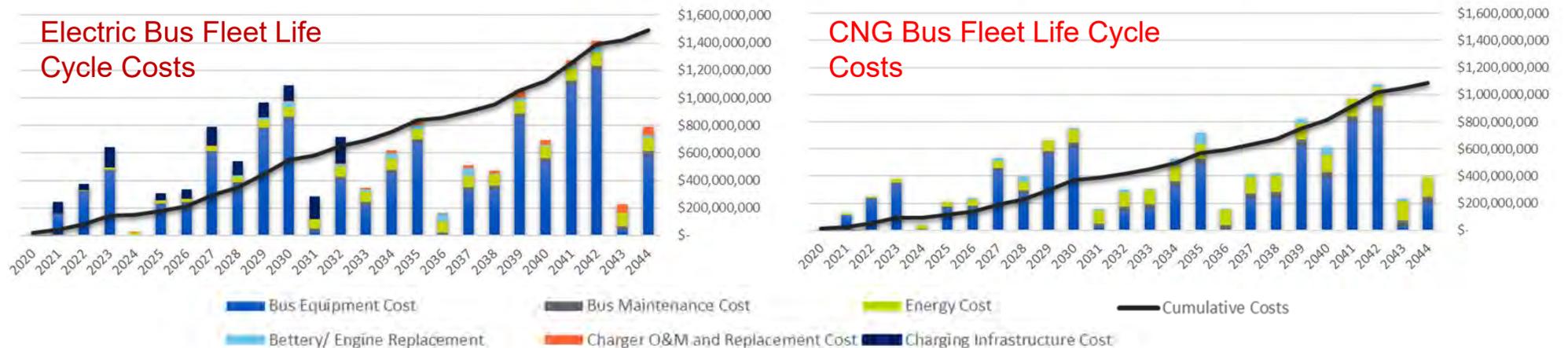
Existing and Future Depot Operational Assessment

- Each depot will transition to an electrified site over the next 10 years
- Yard operators will transition from CNG fueling to BEB charging
- Buses will be charged when returning to the depot.
 - Overnight charging will be the bottleneck in the future
 - Charged buses will move to parking area and another bus will be charged
- Other daily yard activities such as cleaning, fare drop off, and typical maintenance will be like today

Life Cycle Cost Analysis

25-year life cycle costs developed comparing CNG fleet (base case) and BEB fleet
All operating and capital costs were considered for both cases

- Electric Bus and CNG Bus purchase costs (Foothill recent procurement pricing)
- CNG fuel cost vs SCE TOU rate electricity costs (Study estimates)
- Electric bus O&M vs CNG bus O&M (NREL O&M reports)
- Charging Infrastructure capital costs (Study cost estimate)
- Charger O&M and replacement costs (Vendor proposals)



Battery Electric Bus and Fuel Cell Electric Bus Fleet Comparison

Considering Two Bus Technologies

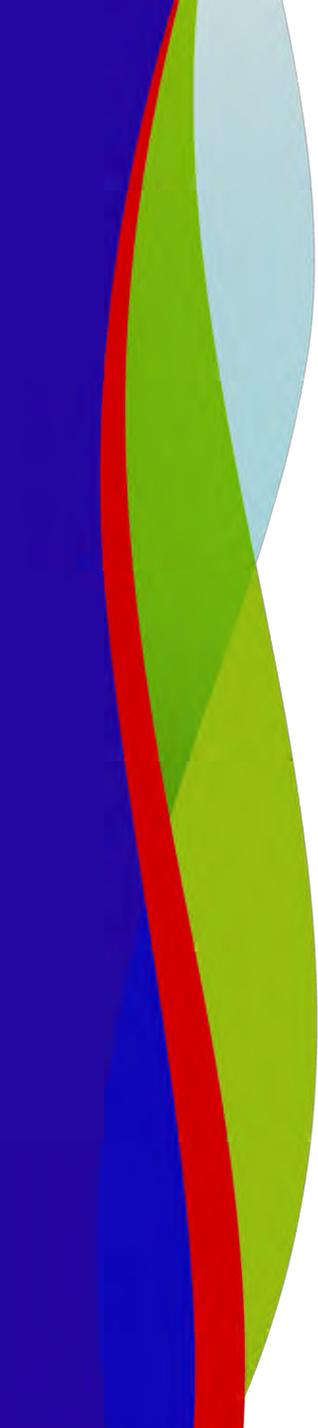


Battery Electric Bus
Fleet (Electricity
Powered)

VS



Fuel Cell Electric
Bus Fleet
(Hydrogen Fueled)



Battery Electric Bus and Fuel Cell Electric Bus Fleet Comparison

Credits and Incentives

BEB Rebates & Incentives

LCFS credit revenue at \$100 / Ton

HVIP Rebate; \$120,000 / BEB

SCE 50% charger rebate

FCEB Rebates & Incentives

LCFS credit revenue (N/A)

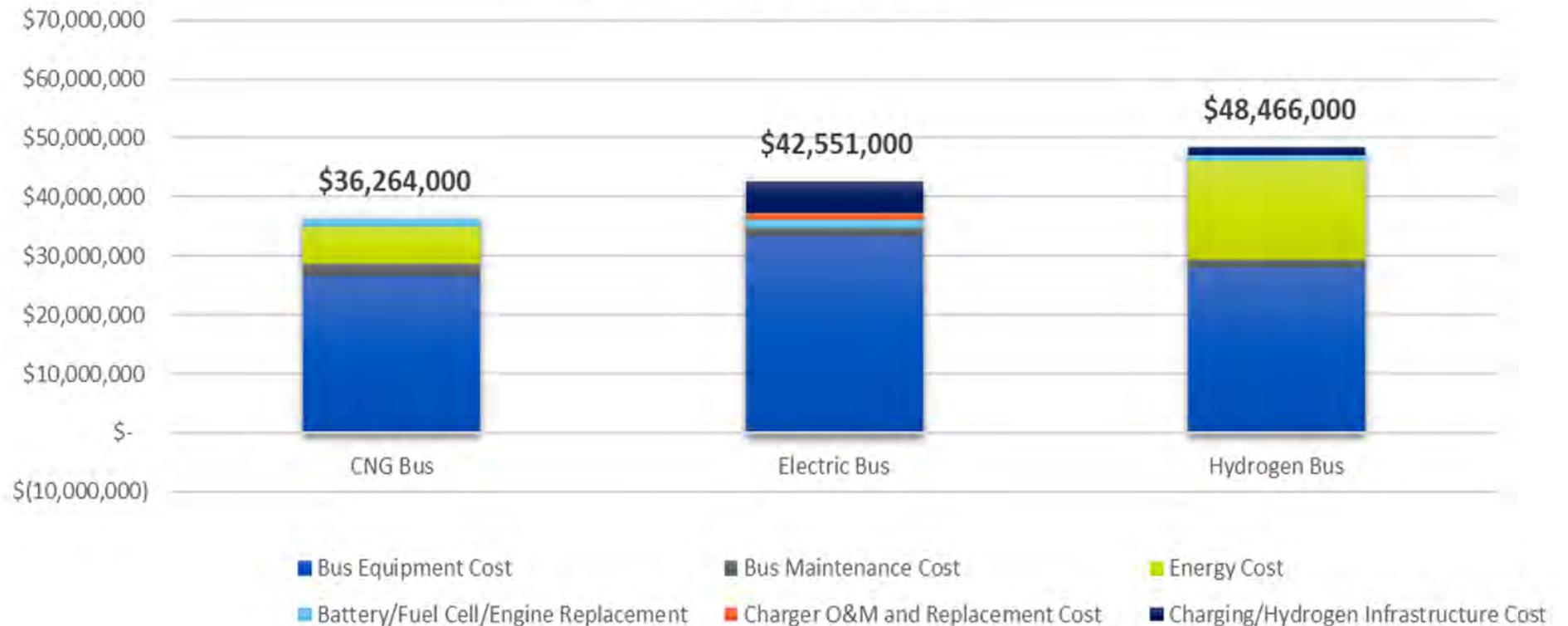
HVIP Rebate; \$315,000 / FCEB

Charger rebates (N/A)

Fuel Cell Bus and Battery Electric Bus Fleet Comparison

(LCFS @ \$100/TON + HVIP Rebate + SCE Rebates Case)

Annual Levelized Costs



SPEAKER

Kevin Parks McDonald

Deputy Chief Executive Officer

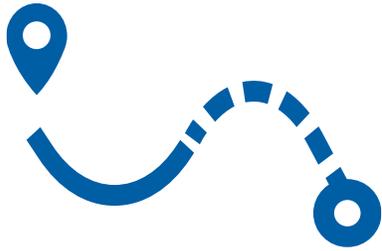


Timeline

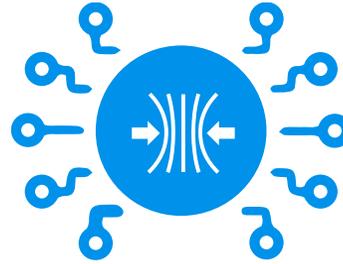


Foothill Transit

Why Fuel Cell?



Vehicle Range



System
Resiliency

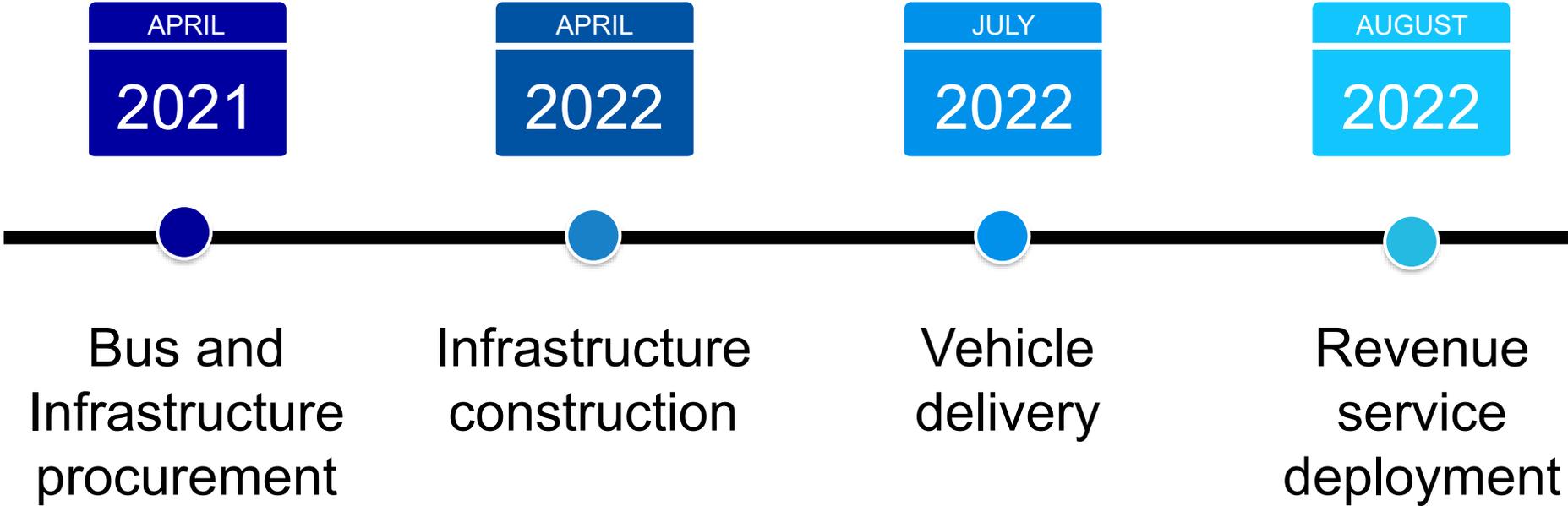


Infrastructure
Cost



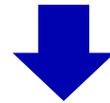
Vehicle
Fueling Process

Program Timeline



Current Plans

Proof of Concept (Line 486 deployment)



Resiliency – Fleet Mix



Lifecycle Cost Comparison vs. BEB

Double-Deck Electric Bus

- Four years in the making
- First two double – deck battery electric buses in transit service
- High-capacity, smoother ride, reduce emissions
- Local funds
- Extended range



Thank you for attending!

The recording and slides will be posted to SCAG's
Toolbox Tuesday site.

<https://scag.ca.gov/toolbox-tuesday>

Joseph Cryer

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