Doran Barnes
Chief Executive Officer
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 is proud to introduce the world’s first heavy duty, fast charge, zero emissions electric bus.

Launching in Pomona, California
Roland Cordero
Director of Maintenance and Vehicle Technology

Electric Bus Charge
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
Joseph Raquel
Director of Planning

Bus Range
Fast Charge Buses

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

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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%

Electric Bus Range Test Results

Distance traveled (miles)

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<th>Test 1</th>
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Felicia Friesema
Director of Marketing and Communications

Marketing Strategy
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 FOOTHILL 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 change in sustainable transportation by adding two Alexander Dennis Ltd. (ADL) Enviro200 battery electric, double-deck buses to its fleet by early 2023. 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

Environmenatal Benefits
Compared to a 40-foot CNG bus that carries approximately 37 seated customers, the Enviro200 bus can carry 80 seated customers in the same road footprint, thereby more than doubling the trip capacity. This further Foothill Transit’s goal of a zero carbon emissions fleet by 2030.

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/Windawi facility depot chargers

Current Electric Fleet
- 13 Proterra 35’ fast charge coaches
- 13 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
Branding: Same but Different
Results

- Always ready to share
- Well over 3.4 M electrical miles
- Successful funding initiatives
- Popular appeal
- Project longevity
Michelle Lopes Caldwell
Director of Finance

Burns & McDonnel Study
Foothill Transit Fleet Replacement Plan

Study Fleet Replacement Plan and Cumulative Electric Buses by Depot

* Foothill fleet replacement plan as of March 2019
Gradual Electrification

- Electrification of both yards in parallel, not subsequentially
- “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

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<thead>
<tr>
<th>BEB Rebates &amp; Incentives</th>
<th>FCEB Rebates &amp; Incentives</th>
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<tr>
<td>LCFS credit revenue at $100 / Ton</td>
<td>LCFS credit revenue (N/A)</td>
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<tr>
<td>HVIP Rebate; $120,000 / BEB</td>
<td>HVIP Rebate; $315,000 / FCEB</td>
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<tr>
<td>SCE 50% charger rebate</td>
<td>Charger rebates (N/A)</td>
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Fuel Cell Bus and Battery Electric Bus Fleet Comparison

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

**Annual Levelized Costs**

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<th>Electric Bus</th>
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</table>

- **Bus Equipment Cost**
- **Bus Maintenance Cost**
- **Energy Cost**
- **Battery/Fuel Cell/Engine Replacement**
- **Charger O&M and Replacement Cost**
- **Charging/Hydrogen Infrastructure Cost**
Why Fuel Cell?

- Vehicle Range
- System Resiliency
- Infrastructure Cost
- Vehicle Fueling Process
Program Timeline

- **April 2021**: Bus and Infrastructure procurement
- **April 2022**: Infrastructure construction
- **July 2022**: Vehicle delivery
- **August 2022**: Revenue service deployment
Current Plans

Proof of Concept (Line 486 deployment)

Resiliency – Fleet Mix

Lifecycle Cost Comparison vs. BEB
Roland Cordero
Director of Maintenance and Vehicle Technology

Electric Double-Deck Bus
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

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