

California Transit
Association



Innovative Clean Transit Comprehensive Review

Prepared for: California Air Resources Board
September 22, 2022

Today's Presenters



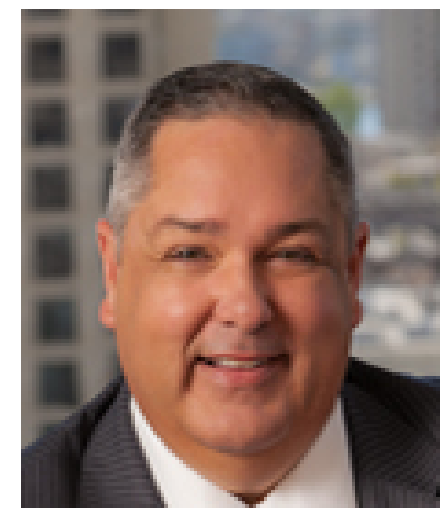
Michael Pimentel
Executive Director
California Transit Association



Doran Barnes
Chair, ZEV Task Force
California Transit Association
(CEO, Foothill Transit)



Felicia Williams
Board Member
Foothill Transit



Michael Hursh
GM/CEO
AC Transit

Who We Are



- Nonprofit trade organization
- Represent more than 220 transit-affiliated organizations
 - 85 transit and rail agencies in CA
 - 123 business members nationwide
 - All leading OEMs
- Advocate for statewide and federal policies and funding solutions that support and advance public transit





- Represented California's transit industry in development of the ICT regulation (2015-2018)
- Led negotiations with CARB Board, Executive Staff on final provisions of regulation
- Now leading advocates for transition to zero-emission transit buses at state- and federal-level



- Created by the Association's Executive Committee in 2018 to:
 - *Provide technical guidance* to Association staff *on multi-year educational program* focused on implementation of ZEV regulations;
 - *Weigh in, as experts, on policy matters* related to: ZEV funding and financing; the IOU programs; electricity rate design; and, workforce development and training; and,
 - *Track regulatory compliance issues.*
- Originally, focused on Innovative Clean Transit regulation; in 2022, expanded to include focus on Commercial Harborcraft regulation and proposed In-Use Locomotive regulation

First Name	Last Name	Title	Organization
Bruce	Abanathie	Principal Transportation Planner	Santa Clara Valley Transportation Authority
Mona	Babauta	Deputy General Manager-Bus Division (Golden Gate Transit)	Golden Gate Bridge, Highway & Transportation District
Doran	Barnes	CEO	Foothill Transit
Gary	Chang	Sr. Program Manager	San Francisco Municipal Transportation Agency
Alex	Clifford	CEO	San Joaquin Regional Transit District
John	Drayton	Consultant, National ZEV Practice Lead	Burns Engineering
Jerry	Estrada	General Manager	Santa Barbara MTD
William	Fay Jr.	Vice President, Sales	GILLIG LLC
Lauren	Gularte	Manager of Government and Regulatory Affairs	San Francisco Bay Area Water Emergency Transportation Authority
Mark	Fisher	Director, National Sales	New Flyer of America
Kevin	Kane	Executive Director/CEO	Victor Valley Transit Authority
Diana	Kotler	Executive Director	Anaheim Transportation Network
Liria	Larano	Deputy Chief, Fleet & Facilities Infrastructure	San Mateo County Transit District
Salvador	Llamas	Chief Operating Officer	Alameda-Contra Costa Transit District
Jesus	Ocampo	Transit Vehicle Maintenance Superintendent	City of Santa Monica Big Blue Bus
Chris	Orlando	Chief Planning and Communications Officer	North County Transit District
Lisa	Patton	Executive Director/Vice President, Budget & Finance	Long Beach Transit
Sasha	Pejcic	Managing Partner - North America	Everergi LLC
Devon	Ryan	Government and Community Affairs Officer	Caltrain
Margo	Ross	Chief Operations Officer	Santa Cruz Metropolitan Transit District
Lionel	Sanchez	Deputy Managing Director	Capitol Corridor
Tim	Sasseen	Market Development Manager, US	Ballard Power Systems
Steve	Schupak	Sr. Mgr. Proj. Cont.	Los Angeles County Metropolitan Transportation Authority
Denton	Shuey	Regional Sales Manager	Nova Bus
Lauren	Skiver	CEO/General Manager	SunLine Transit Agency
John	Soria	Transit Administration Manager	Montebello Bus Lines
Michelle	Stewart	Senior Manager, Special Projects	Metrolink
Crystle	Stidham	Operations Manager	City of Fresno
Jarrett	Stoltzfus	Director of Government Relations and Public Policy	Proterra
Cliff	Thorne	Director of Maintenance	Orange County Transportation Authority
Richard	Tree	Executive Director	Tulare County Regional Transit Agency
Norman	Tuitavuki	Chief Operating Officer	Monterey-Salinas Transit District
Judy	Vaccaro-Fry	Chief Financial Officer	Antelope Valley Transit Authority
Michael	Wygant	Chief Operating Officer	San Diego Metropolitan Transportation System

Priorities Aimed at Addressing Barriers to Transition



Capital Costs

- BEBs, FCEBs
- Make-Ready Infrastructure, EVSEs, Hydrogen Refueling
- Demand Management Technologies
- Resiliency

Operating Costs

- Cost of Electricity, Hydrogen
- Access to LCFS

Workforce Training

- Availability of Training Curriculum
- Publication of Lessons Learned, Best Practices

Our Actions to Support ICT Regulation



- Helped secure a 500% increase in federal funding for ZEBs in IIJA
 - Successfully lobbied Congress to provide scoring preference for agencies that have committed to full fleet transition
- Helped secure a multiyear set-aside in ZEB funding in state budget
- Secured a sales and use tax exemption for ZEBs
- Secured CEQA exemptions for ZEB charging/refueling infrastructure
 - Association-sponsored legislation would expand exemptions to include operations/maintenance facilities for ZEBs

Our Actions to Support ICT Regulation



- Supported, and advised on, development of DGS master agreement for ZEBs
- Secured seat on CEC Clean Transportation Advisory Committee
- Helped create new infrastructure programs, commercial electric vehicle tariffs at IOUs
- Revamped Spring and Fall Conferences to focus on ZEB issues



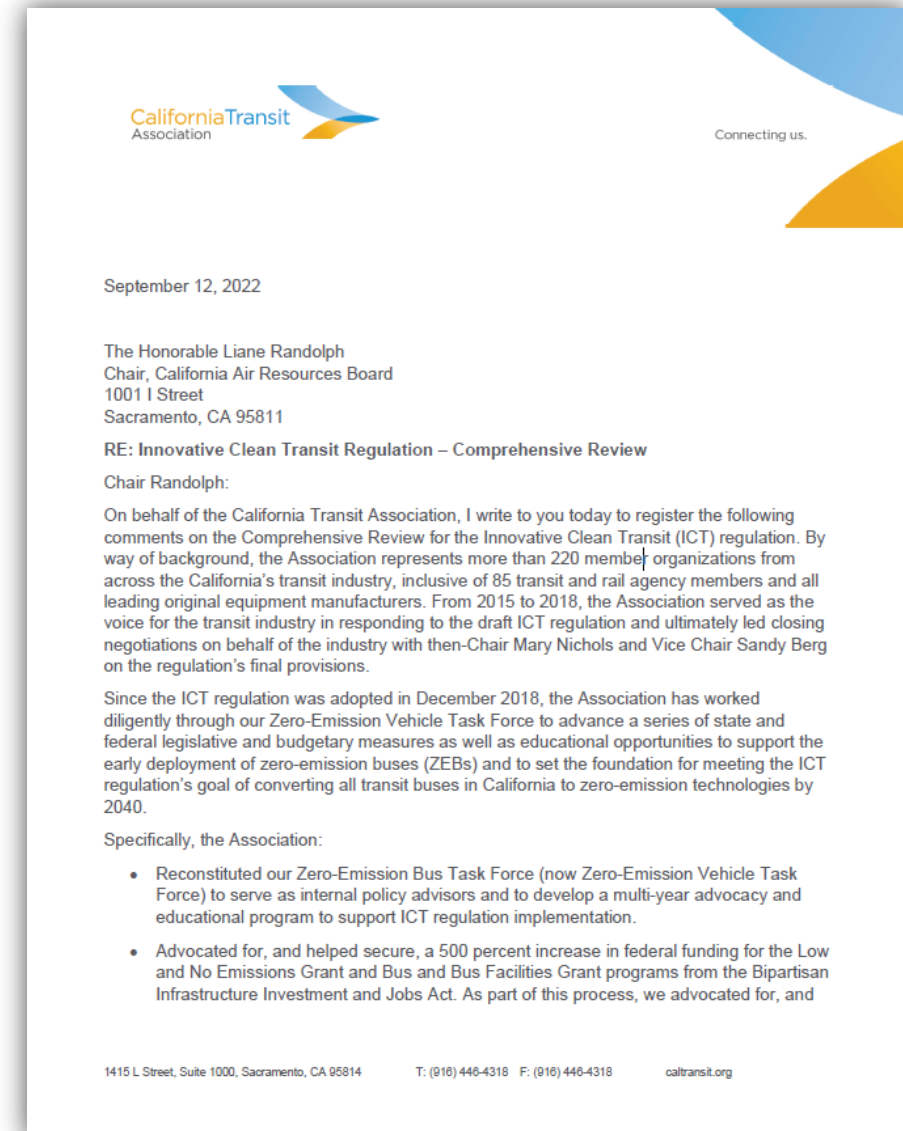
- COVID-19 pandemic negatively impacted the transit industry
 - Reduced revenue, increased expenses
 - Halted some procurements
 - Created supply chain issues, delays in infrastructure buildout
- ZEBs remain more expensive than conventional buses
 - Cost drivers include vehicles, infrastructure, fuel, workforce
- ZEBs not yet one-for-one replacement for conventional buses
 - Range limitations and availability issues persist

Our Assessment: Challenges Ahead



- Costs of procuring and operating ZEBs
- Cost impacts and delays associated with COVID-19 pandemic
- Range limitations and availability of ZEBs
- Sufficient grid resilience to support ZEB transition
- Access to dedicated funding

We remain committed to partnership with CARB, addressing challenges



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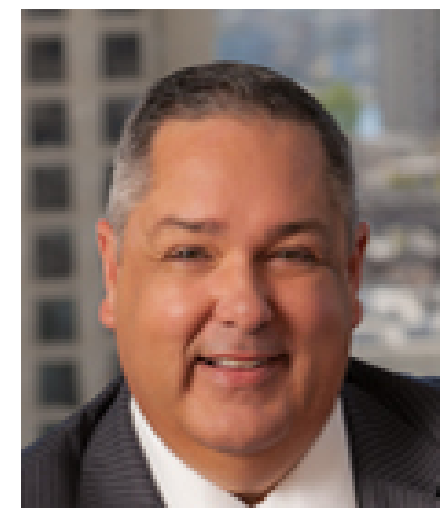
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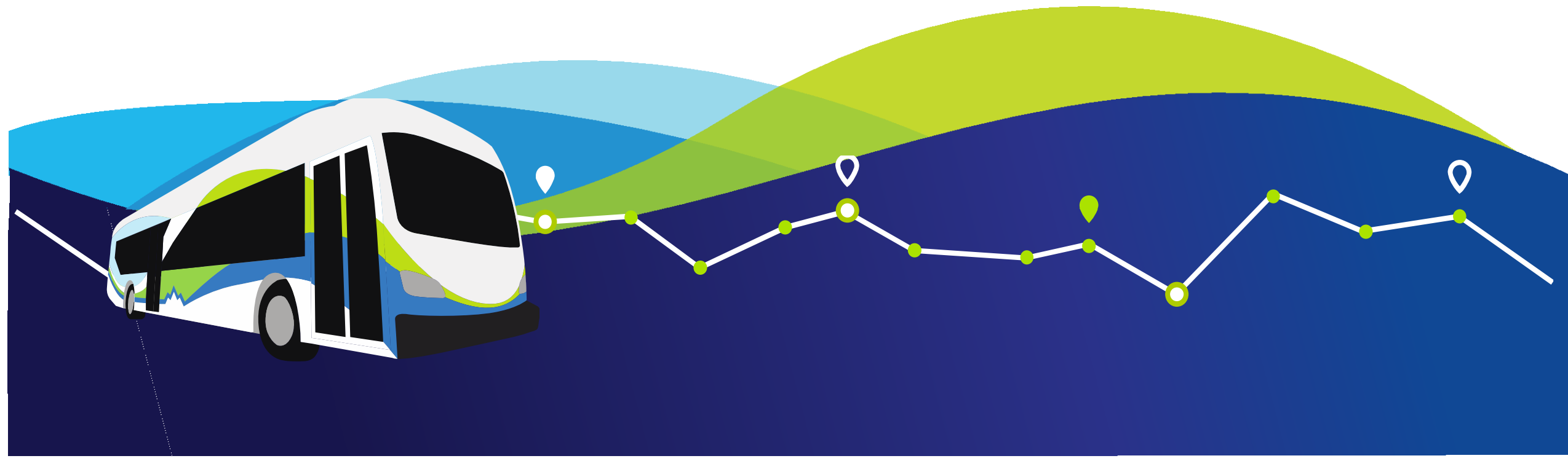


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Foothill Transit's Zero-Emissions Journey



The Foothill Transit **MISSION**

To be the premier public transit provider committed to:
safety, courtesy, quality, responsiveness, efficiency, innovation.



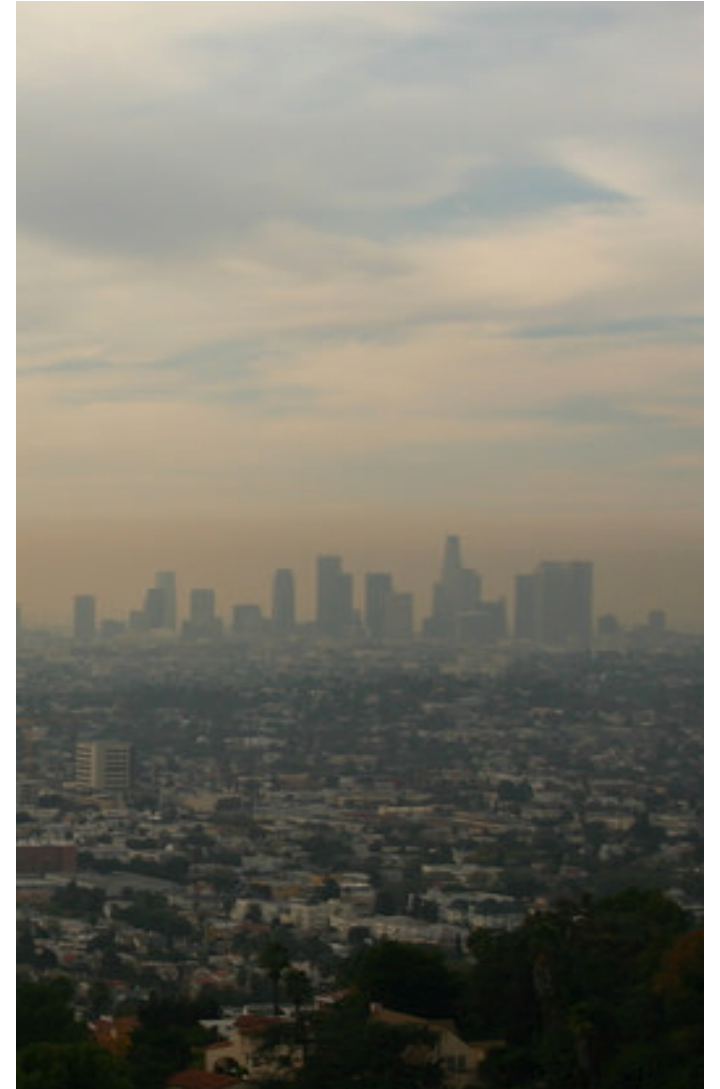
ABOUT FOOTHILL TRANSIT

- Pomona and San Gabriel Valleys
(Eastern Los Angeles County)
- 327 sq. mile service area, 1.5m
service pop.
- 30 local and 6 express routes
- 337 CNG buses, 33 electric buses
- Innovation is part of our core
mission



LOS ANGELES BASIN AIR QUALITY

- Poor air quality
- Large population base
- On-shore breeze pushes air inland





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.



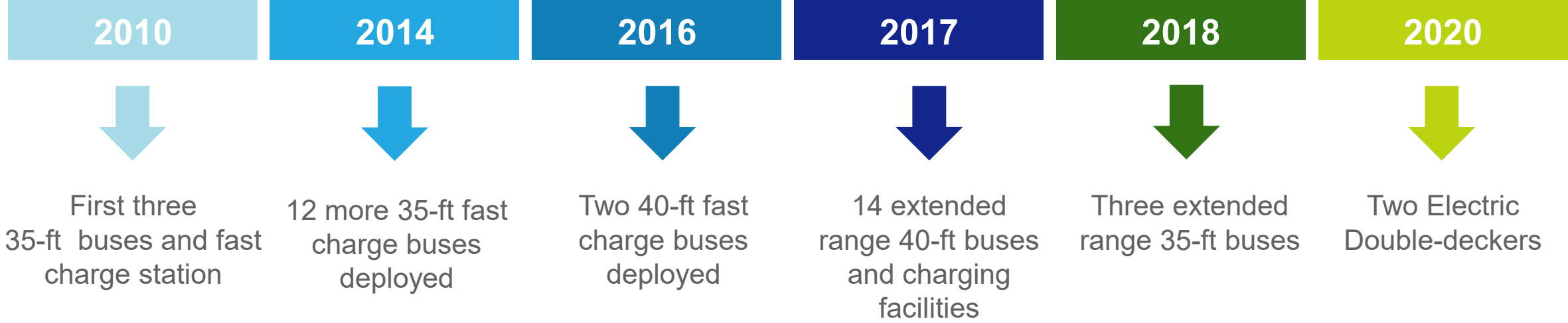
ecoliner
Zero Emissions Electric Vehicle



Foothill Transit

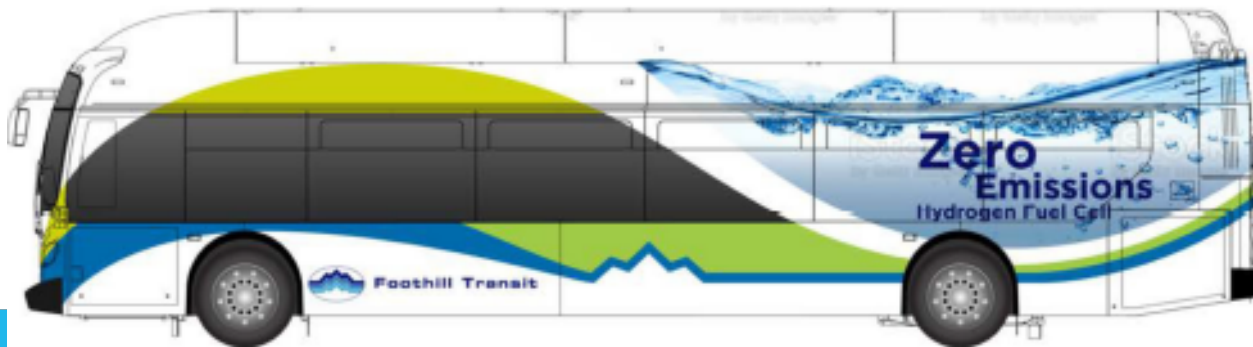


ELECTRIC BUS PROGRAM MILESTONES



THERE ARE TWO ROADS TO ZERO

- 33 hydrogen fuel cell buses being delivered
- Fueling infrastructure under construction



ONGOING CHALLENGES

- Economically moving to scale
- Fleet reliability
- Resiliency
- Workforce development
- Funding!!!



FUNDING IS CRITICAL

- \$429,000 differential between fuel cell and CNG buses
- Hydrogen is more than double the cost of CNG
- Electric charging infrastructure is very costly and impacts operations
- Zero Emissions can't come at the cost of service cuts!



STATE AND FEDERAL FUNDING IS UNSURE

- 33 buses to be ordered within then next six months
- *Zero* federal bus and bus facilities funding
- *Zero* Lo/No funding
- *Zero* TIRCP funding



COLABORATE, SHARE AND SUPPORT

- California Transit Association's Zero Emissions Vehicle Taskforce
- Zero Emission Bus Resource Alliance
- Hydrogen Fuel Cell Bus Coalition
- **California Air Resources Board**



Thank you!



Felicia Williams

Foothill Transit Board Member
City of Pasadena Council Member
fwilliams@cityofpasadena.net



AC Transit ZEB Programs



ZERO EMISSION



- ❑ **Leader in advancing ZE technology since 2000**
- ❑ **Implemented one of the nation's most comprehensive ZEB programs**
- ❑ **Started with H2 electric bus technology and expanded to include battery electric buses.**

A HISTORY OF LEADERSHIP



Over 5M ZE miles, eliminating 12,831+ metric tons of CO2

FLEET & FACILITIES



Facilities - 7

- Richmond D3
- Emeryville D2
- East Oakland D4
- Hayward D6
- Central Maintenance Facility
- Training & Education Center
- General Office

Fleet - 637 buses (545)

- ZEBs 43 (36 FCEB & 7 BEB)
On order: 21 BEB
Future: 34 FCEB (25 40' & 9 60')

ZEB HYDROGEN



- ❑ Emeryville (D2) & Oakland (D4) are home to Hydrogen fueling stations
- ❑ Fueling capacity has been expanded to 78 FCEBs districtwide
- ❑ New funding expands FCEB fueling to 130 at D4
- ❑ Seeking funding for new station in Hayward & 25 FCEBs
- ❑ Districtwide, when all projects are completed FCEB fueling capacity will be 325



ZEB BATTERY



- Battery electric charging stations at D2 & D4
- Currently support electric charging for 6 BEBs
- Future plans, installing BEB charging for up to 50 BEBs at D4 and 26 BEBs at D2
- Will increase our charging capacity up to 82 BEBs



Cost per Mile



Figure 1: 5x5 Vehicle Matrix

FLEET	DIESEL (BASELINE)	DIESEL HYBRID	FUEL CELL ELECTRIC (FCEB)	BATTERY ELECTRIC (BEB)	LEGACY FUEL CELL
Series Grouping	1600	1550	7000	8000	FC
Technology Type	Diesel	Hybrid	Fuel Cell	Battery	Fuel Cell
Bus Qty	5	5	5	5	5
Manufacturer	Gillig	Gillig	New Flyer	New Flyer	Van Hool
Year	2018	2016	2019	2019	2010
Length	40'	40'	40'	40'	40'
Data Summary (January - June 2021)					
Fleet Mileage	116,627	79,250	79,666	62,107	39,347
Cost/Mile	\$1.72	\$2.08	\$2.14	\$1.60	\$4.75
Cost/Mile (w/ credits)	\$1.70	\$2.05	\$1.42	\$0.57	\$4.75
Emissions (CO ₂ Metric Tons)	295	151	0	0	0
Fleet Availability	90%	62%	64%	61%	50%
Reliability (MBCRC)	7,775	7,205	4,193	5,646	1,457

- Cost per Mile**
H2 – \$2.14
BEB-\$1.60
Diesel - \$1.72
- With Credits**
H2 – \$1.42
BEB-\$0.57
Diesel - \$1.70

ZEB STUDY

ZERO EMISSION TRANSIT BUS TECHNOLOGY ANALYSIS



World's first comparison of
BEB & FCEB



*Stanford University's Precourt
Institute of Energy*

5 different bus types:
diesel, diesel hybrid, BEB,
FCEB, legacy FCEB



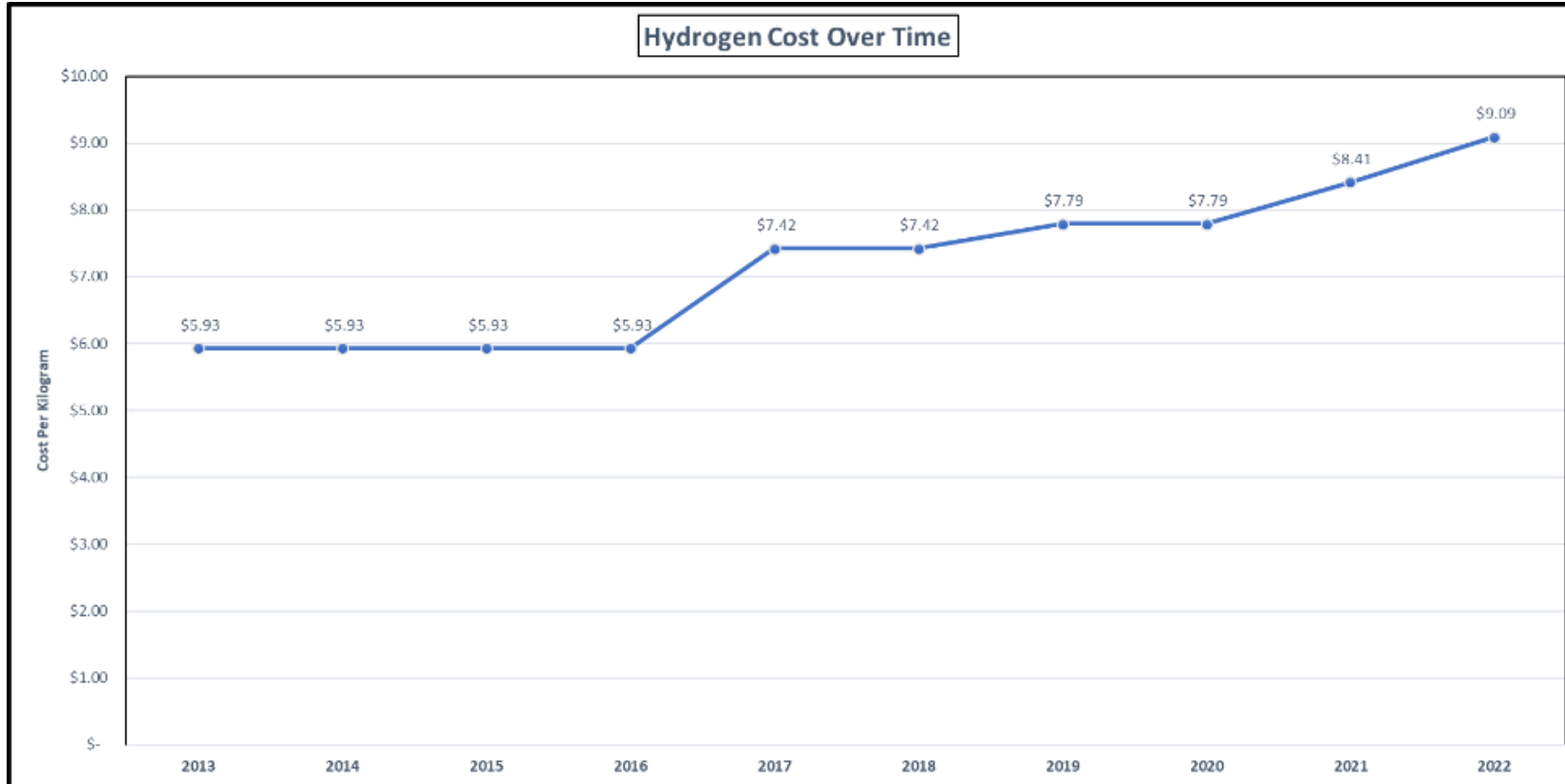
Same routes from the
same division using the
same Bus Operator pool



Same key performance
indicators



Hydrogen Cost Over Time



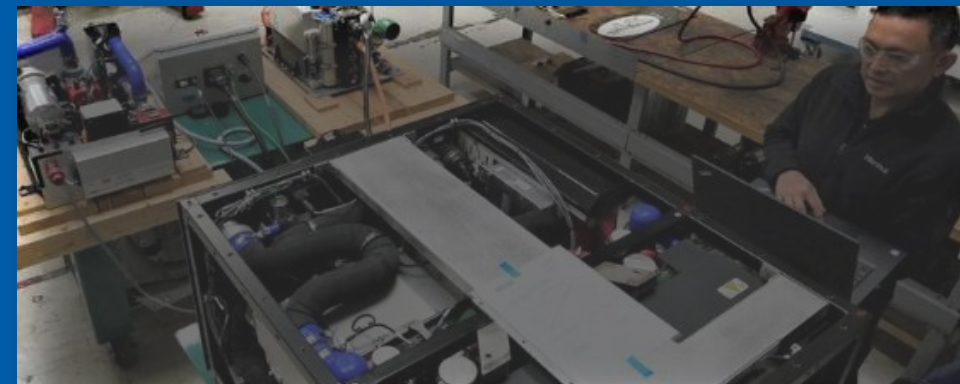
WORKFORCE DEVELOPMENT



- ❑ Safety & Familiarization
- ❑ Advanced Diagnostics
- ❑ Approx. 318 hours of ZEB specific training

Mechanic Development

FCEB-BEB Coursework	Hours
Orientation and PPE/High Voltage	8
Energy Storage System	40
Power Train Technology	40
Fuel Cell	30
5-Week Technical Training Program	200



QUESTIONS?



THANK YOU!



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- 1. Update CARB policies to ensure transit agencies have continued access to HVIP funds.*
- 2. Develop an executive-level ICT implementation working group at CARB (with CEC, CPUC, GO-Biz) to troubleshoot challenges.*
- 3. Update LCFS so transit agencies can track electricity usage from the meter.*
4. Continue coordinating with CEC on ZEB infrastructure funding programs.
5. Continue supporting increased funding for ZEBs and infrastructure in state budget.
6. Continue coordinating with CPUC on Commercial EV tariffs.

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