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
Who We Are (Cont.)

• 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
ZEV Task Force

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

• 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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- Felicia Williams
  Board Member
  Foothill Transit

- Michael Hursh
  GM/CEO
  AC Transit
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.
ELECTRIC BUS PROGRAM MILESTONES

- **2010**: First three 35-ft buses and fast charge station
- **2014**: 12 more 35-ft fast charge buses deployed
- **2016**: Two 40-ft fast charge buses deployed
- **2017**: 14 extended range 40-ft buses and charging facilities
- **2018**: Three extended range 35-ft buses
- **2020**: Two Electric Double-deckers
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
COLLABORATE, 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’)

Battery Electric Bus Division
Administrative
Hydrogen Fuel Cell
- 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 FECBs
- Districtwide, when all projects are completed FCEB fueling capacity will be 325
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

- **Cost per Mile**
  - H2 – $2.14
  - BEB—$1.60
  - Diesel - $1.72

- **With Credits**
  - H2 – $1.42
  - BEB—$0.57
  - Diesel - $1.70

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**Figure 1: SxS Vehicle Matrix**

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<tr>
<th>FLEET</th>
<th>DIESEL (BASELINE)</th>
<th>DIESEL HYBRID</th>
<th>FUEL CELL ELECTRIC (FCEV)</th>
<th>BATTERY ELECTRIC (BEB)</th>
<th>LEGACY FUEL CELL</th>
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<td>Series Grouping</td>
<td>1600</td>
<td>1550</td>
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<td>Year</td>
<td>2018</td>
<td>2016</td>
<td>2019</td>
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<td>2010</td>
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<tr>
<td>Length</td>
<td>40'</td>
<td>40'</td>
<td>40'</td>
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**Data Summary (January - June 2021)**

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<th></th>
<th>Fleet Mileage</th>
<th>Cost/Mile</th>
<th>Cost/Mile (w/ credits)</th>
<th>Emissions (CO₂ Metric Tons)</th>
<th>Fleet Availability</th>
<th>Reliability (MBCRC)</th>
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<td></td>
<td>116,627</td>
<td>$1.72</td>
<td>$1.70</td>
<td>295</td>
<td>90%</td>
<td>7,775</td>
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<td></td>
<td>79,250</td>
<td>$2.08</td>
<td>$2.05</td>
<td>151</td>
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<tr>
<td></td>
<td>79,666</td>
<td>$2.14</td>
<td>$2.14</td>
<td>0</td>
<td>64%</td>
<td>4,193</td>
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<td></td>
<td>62,107</td>
<td>$1.60</td>
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<td>61%</td>
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<td>39,347</td>
<td>$4.75</td>
<td>$4.75</td>
<td>0</td>
<td>50%</td>
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World's first comparison of BEB & FCEB

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

Stanford University’s Precourt Institute of Energy
WORKFORCE DEVELOPMENT

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

Mechanic Development

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<th>FCEB-BEB Coursework</th>
<th>Hours</th>
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<td>Orientation and PPE/High Voltage</td>
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<td>Energy Storage System</td>
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<td>Power Train Technology</td>
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<td>Fuel Cell</td>
<td>30</td>
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<tr>
<td>5-Week Technical Training Program</td>
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Our Recommendations

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.