

2020 TRANSIT SYMPOSIUM

TRANSIT*ions* TRANSIT*ions* TRANSIT*ions*



KERN COUNCIL
of GOVERNMENTS

2020 TRANSIT SYMPOSIUM

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GET bus

GOLDEN EMPIRE TRANSIT DISTRICT



RYDE



Program Update on Innovative Clean Transit Regulation and Zero-Emission Bus Deployment

TRANSIT*ions* 2020 Transit Symposium

February 27, 2020

OUTLINE

- Rollout Plan
- Joint Group
- ZEB Deployment Status and Technology Update
- Comprehensive Review
- Statewide Data Collection
- Useful Information and Resources



ZEB ROLLOUT PLAN—THE FIRST REQUIREMENT

- ICT regulation adopted December, 2018
- Requires all transit agencies to gradually transition to zero-emission
- First requirement is submission of a complete Rollout Plan
- Rollout Plans must be completed and approved by the transit agency's governing body and submitted to CARB
 - July 1, 2020 for large transit agencies
 - July 1, 2023 for small transit agencies



ROLLOUT PLAN—MAIN COMPONENTS

- A Rollout Plan must include **all** these 8 components (§2023.1(d)(1))
 - A goal of full transition to ZEB by 2040
 - Types of planned ZEB technology (BEB, FCEB, or both)
 - Estimated timeline to modify infrastructure
 - Estimated timeline of all future bus procurements
 - Estimated timeline of any bus conversion to ZEB
 - Plans on how to deploy ZEBs in disadvantaged communities
 - Estimated timeline and plans to train bus operators and maintenance staff
 - Potential funding sources



ROLLOUT PLAN—A LIVING DOCUMENT

- Rollout Plan Guidance Document is available online
 - Mandatory information identified as “required” and by citing the code
 - Supplemental information identified as “optional”
- Prepare the Rollout Plans based on best available information
- A Rollout Plan is a living document
 - Transit agencies may update their Rollout Plans in the future as see fit
 - CARB recommends resubmittal of any updated Rollout Plans
- CARB will post approved Rollout Plans online



ROLLOUT PLAN—LEVEL OF DETAILS

- Level of details need to show the planning effort required in the regulation
- Example 1: § 2023.1(d)(1)(F) on ZEBs in disadvantaged areas (DACs)
 - If no or all DAC area → simply identify the situation
 - If mixed → need to identify the deployment approach
 - There is no requirement to deploy ZEBs in DAC first
- Example 2: § 2023.1(d)(1)(C) on infrastructure schedule
 - May be identified along with ZEB deployment schedule
 - Estimated timeline is allowed
 - Planning deferred to future is considered incomplete



MAJOR COMPLIANCE MILESTONES IN THE NEAR FUTURE

- Rollout Plan for large transit agencies due: June 30, 2020
 - 3 large transit agencies in central valley: Golden Empire, FAX, SJ RTD
- First reporting deadline for all transit agencies: March 31, 2021
- Rollout Plan for small transit agencies due: June 30, 2023
- First ZEB purchase requirement for large transit agencies: 2023

JOINT GROUP—ELIGIBILITY

- Transit agencies may comply collectively
- All members to meet at least one of these criteria:
 - Being located in the same service area of a Metropolitan Planning Organization (MPO) or Regional Transportation Planning Organization
 - Being located within the same air basin
 - Being located within the same Air Quality Management District, Air Pollution Control District, or Air Resources District
 - Share the use of infrastructure (no need to share ownership)



JOINT GROUP—HOW TO COMPLY COLLECTIVELY

- May jointly submit one Rollout Plan
- Collectively purchase the same total number of ZEBs annually as if each transit agency were complying individually
- If the largest transit agency is large, it must purchase at least the required minimum number of ZEBs as if it would have operated alone
- When requesting for exemption, explain why the requirement cannot be met by other members
- If a Joint Group fails to comply, each participating transit agency will be evaluated for compliance individually

JOINT GROUP—PROCEDURE

- Submit a request to CARB including all of the following:
 - A list of all participating transit agencies
 - A statement of intent from a responsible official for each participating transit agency
 - A proposed start and end dates of the Joint Group
 - A description on which eligibility criteria are met
- Submit the request at least one year before the Joint Group takes effect
- Notify CARB of any change in the membership along with transit agencies' boards approving the changes

PRELIMINARY ZEB DEPLOYMENT STATUS IN CALIFORNIA (FEBRUARY 2020)

- Deployed by transit agencies
 - 298 ZEBs deployed
 - Additional 483 ZEBs ordered
- 260+ ZEBs deployed by universities, private companies, etc.
- 40+ zero-emission school buses deployed



SYNCHRONIZATION & MULTIPLE RESOURCES NEEDED

Infrastructure Installation



Bus Procurement



Fuel Cost Management



ZEB TECHNOLOGY UPDATE—BATTERY ELECTRIC BUS (BEB)

- Easy to deploy one or two buses for pilot purpose
- Major infrastructure scale up may require significant lead time
- Factors for consideration
 - Bus procurement → Range
 - Fuel cost management → Energy use management
 - Infrastructure installation → Power needs
- Infrastructure cost studies:
 - LA Metro <https://boardagendas.metro.net/board-report/2019-0458/>
 - Foothill Transit <http://foothilltransit.org/wp-content/uploads/2014/05/Burns-McDonnell-In-Depot-Charging-and-Planning-Study.pdf>

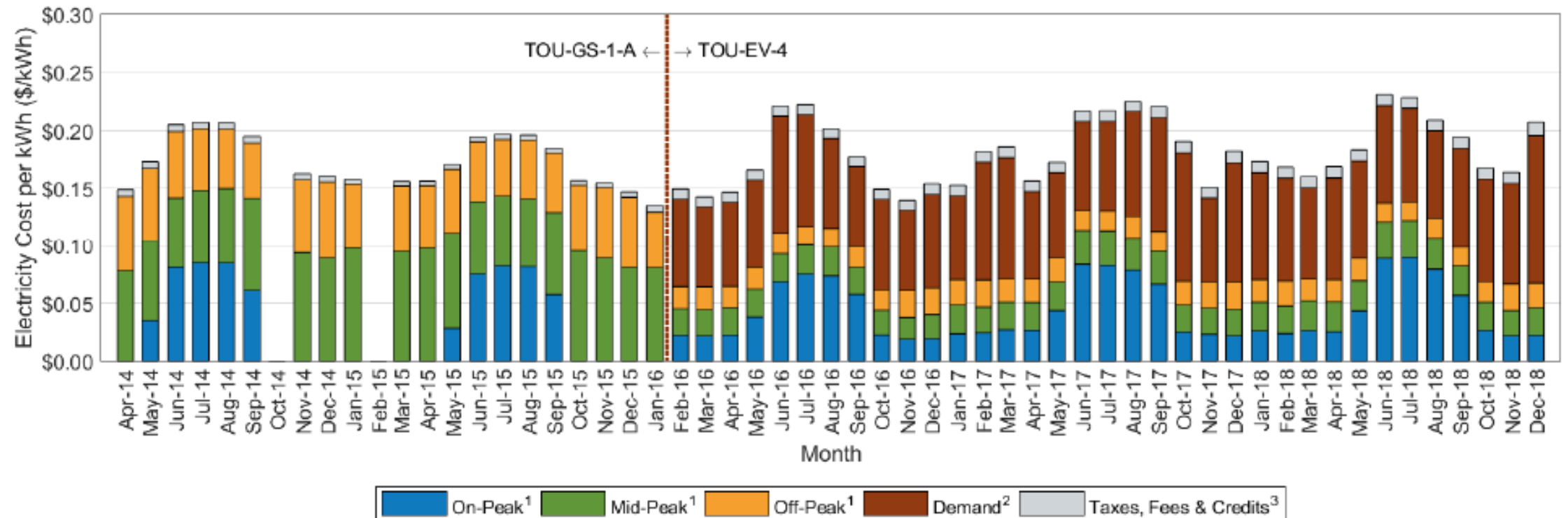
RANGE MANAGEMENT FOR BEB

- Factors affecting range
 - Terrain, use of HVAC, driving behavior, driving cycle, etc.
- Potential range mitigation
 - Route simulation or testing—know how range is affected by conditions of your routes
 - Increase fuel efficiency
 - Driver training
 - Reduce vehicle weight
 - Select suitable technologies
 - Battery size → vehicle weight (therefore, fuel efficiency) and range

ENERGY COST FOR BEB

- Electricity cost formula is complicated
- How electricity cost is incurred
 - Electricity consumption
 - Electricity rate
 - Time of use
 - Demand charge (per meter based)
- Not a linear relationship

EXAMPLE OF ELECTRICITY COST (FOOTHILL TRANSIT)



1. On-Peak, Mid-Peak, and Off-Peak charge categories include respective costs for delivery and generation
2. Rate structure changed from TOU-GS-1-A to TOU-EV-4 February 2016, introducing demand charges
3. 'Taxes, Fees & Credits' category includes all remaining utility bill items (positive & negative charges)

POWER NEEDS AT A TRANSIT DEPOT YARD FOR BEB CHARGING

- Power needs: how much power is needed to charge buses and support other on-site needs
- Design assumptions
 - Everything is turned on at the same time
 - Include both existing power usage (e.g. transit building electricity usage) and expected new power needs (e.g. charging 20 new BEBs)

EXAMPLES FOR POWER NEEDS TO CHARGE 200 BEBs

Fast Charging

- Example 1. Fast charging 200 BEBs at the 250 kW rate all at once
 - $250 \text{ kW} \times 200 = 50,000 \text{ kW} = 50 \text{ MW}$
 - Infrastructure building could be expensive and time consuming
- Example 2. Fast charging 50 BEBs at the 250 kW rate each time
 - $250 \text{ kW} \times 50 = 12,500 \text{ kW} = 12.5 \text{ MW}$
 - Infrastructure is less expensive
 - Fast charging makes 4 charging shifts possible

Slow Charging

- Example 3. Slow charging 200 BEBs at the 60 kW rate all at once
 - $60 \text{ kW} \times 200 = 12,000 \text{ kW} = 12 \text{ MW}$
 - Infrastructure cost is similar to example 2
 - Slow charging is possible for 1 charging shift
- Example 4. Slow charging 100 BEBs at the 60 kW rate each time
 - $60 \text{ kW} \times 100 = 6,000 \text{ kW} = 6 \text{ MW}$
 - Potentially least infrastructure cost
 - Slow charging 2 shifts may not work for morning peak hours

ZEB TECHNOLOGY UPDATE—FUEL CELL ELECTRIC BUS (FCEB)

- Equivalent range and fueling time to diesel and CNG technologies
- Infrastructure cost may be challenging for a one- or two-bus pilot
- Flexible range design
- Easier large deployment
- Long-term fuel price signal needed

FCEB DEPLOYMENT EXPERIENCE

- ZEBA program at AC Transit
 - Surpass DOE/DOT ultimate targets for fuel cell stack lifetime (25,000 hours)
 - In-house training program
- SunLine Transit
 - At least 9 generations of FCEB deployment
 - Showcase potential fuel cost parity with conventional counterparts
 - In-house training program available to all transit agencies
- 30 new FCEBs delivered to AC Transit, OCTA, and SunLine

INFRASTRUCTURE DEPLOYMENT FOR HYDROGEN PRODUCTION AND STORAGE

■ SunLine

- Largest electrolyzer station in the United States with 900 kg daily production
- Potential public station in the future

■ AC Transit

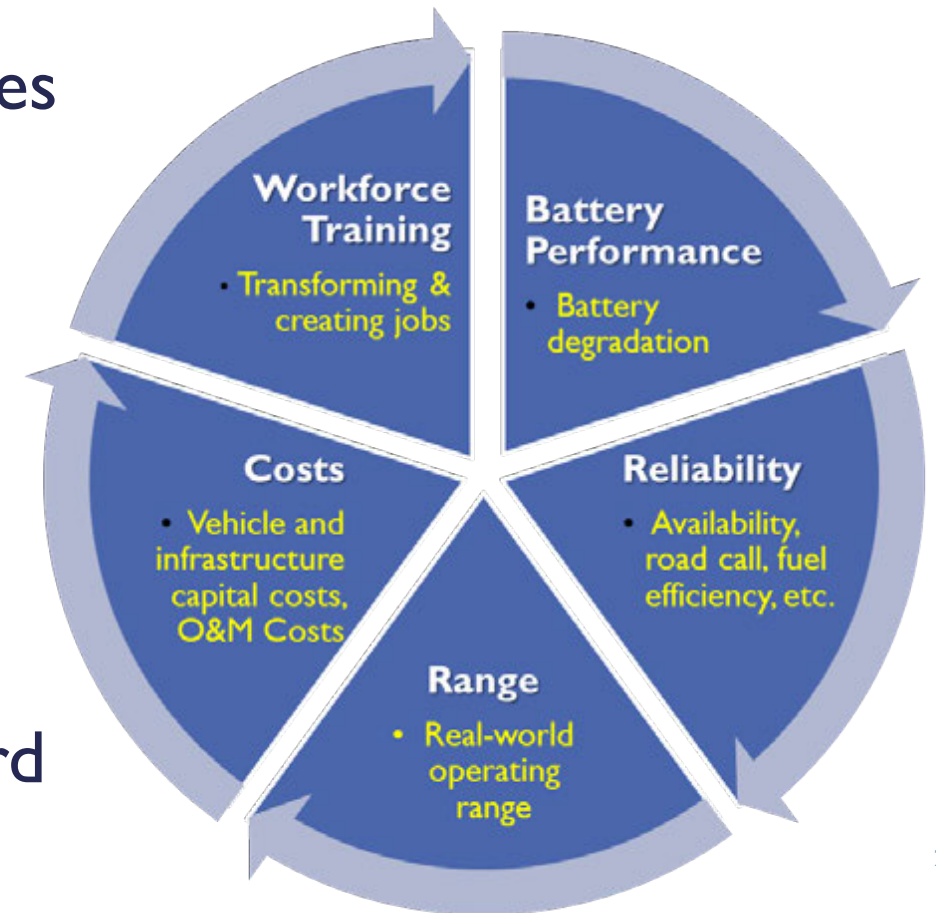
- Emeryville Station – demonstrating solar electrolysis
- Oakland Station – demonstrating biogas-fed stationary fuel cells

■ OCTA

- New station fueling capacity up to 50 buses (1,500 kg of H₂ within 8 hours)
- Largest in the United States
- \$4.77 million on infrastructure

COMPREHENSIVE REVIEW

- Inform HD ZE policy and funding strategies
- Ensure transit service not adversely impacted
- Address program readiness
- One year before the first ZEB purchase requirement
- Complements annual updates to the Board



STATEWIDE DATA COLLECTION

- Supports comprehensive review and long-term technology evaluation
- Participation is voluntary and results will be public
- Anticipated work from participating transit agencies
 - ZEB and infrastructure specs upon vehicle deployment
 - Monthly data collection on ZEB performance and O&M costs
 - Conducting quality control of data before each monthly submittal
- Draft statewide data collection is available online
 - The template is not a form or required format
 - The template will be provided in an Excel format for easy data management



USEFUL INFORMATION AND RESOURCES (I)

- CARB 2020 Symposium and Showcase
 - March 23, 2020 at Crocker Museum, Sacramento
 - Free registration at <http://california2030.org/carb-showcase/>
 - Space is limited, priority given to transit agencies
- California Transit Association webinar series
<https://caltransit.org/events/webinars/>
 - Battery Electric Bus webinar series
 - Fuel Cell Electric Bus webinar series



USEFUL INFORMATION AND RESOURCES (2)

- Innovative Clean Transit <https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit>
- Guidance package <https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit/ict-guidance-package>
 - CARB Implementation Guidance Document
 - CARB Rollout Plan Guidance Document
- Contacts
 - Yachun Chow, Manager yachun.chow@arb.ca.gov (916) 322-7450
 - Shirin Barfjani, Lead Staff shirin.barfjani@arb.ca.gov (916) 445-6017

MTS' Zero Emission Bus (ZEB) Pilot Project



Presented by Kyle Whatley, Zero Emissions Bus Project Specialist
February 27, 2020



MTS Overview

MTS provides transit for San Diego and surrounding cities, rural parts of the county, and to the international border – 3,240 total square miles

- Bus, Light Rail, Paratransit, Taxicab
- Bus: nearly 100 bus routes, 630 fixed route buses
- Light Rail: nearly 54 miles of Trolley right-of-way, over 130 cars
- 300,000 passengers daily, 86 million annually
- Bus remains a transit workhorse in San Diego



MTS' Path to Clean Fuels

MTS remains committed to the clean fuel path. In 2002, MTS began converting the bus fleet to renewable Compressed Natural Gas (CNG), and continues to implement clean fuel solutions:

- **2016:** Propane vehicles purchased
- **2018:** Zero emission bus pilot commenced
- **2022:** Articulated sixty-foot electric bus pilot scheduled to begin

In addition, and in compliance with the ICT regulation, MTS is developing plans to purchase:

- 25% zero emission buses by 2023
- 50% zero emission buses by 2026
- 100% zero emission buses by 2029



MTS ZEB Pilot & ZEB Study

Pilot Assessment

Pilot Program Design

Pilot Implementation

ZEB Roadmap



MTS ZEB Pilot Program

Key components being evaluated:

- **Costs**
 - Initial capital and construction - \$12.5 million to date
 - Operating costs including fuel and maintenance, including battery replacement
- **Operational Characteristics, Range and Fuel Efficiency**
 - Validation testing finalized
 - 4 buses in-service
- **Training for Employees and Emergency Response**
 - Over 400 drivers trained
 - Over 50 maintenance staff trained
 - Multiple Fire and PD jurisdictions



Battery Electric Bus (BEB) Procurement

- New Flyer
 - Six (6) 40 ft. extended range BEB
 - 466 kWh of on-board storage (expected range 160 miles)
 - Arrived October 2019
- Gillig
 - Two (2) 40 ft. extended range BEB
 - 444 kWh of on-board storage (expected range 154 miles)
 - Arriving September 2020



Charging Infrastructure

Phase I:

Installation of six (6) chargers at the Imperial Avenue Division to support pilot project

- Construction Completed: July 2019



Phase II:

Installation of two (2) chargers at Kearny Mesa Division, South Bay and East County (Six (6) chargers total)

- Design completed: November 2019
- Construction expected completion: July 2020



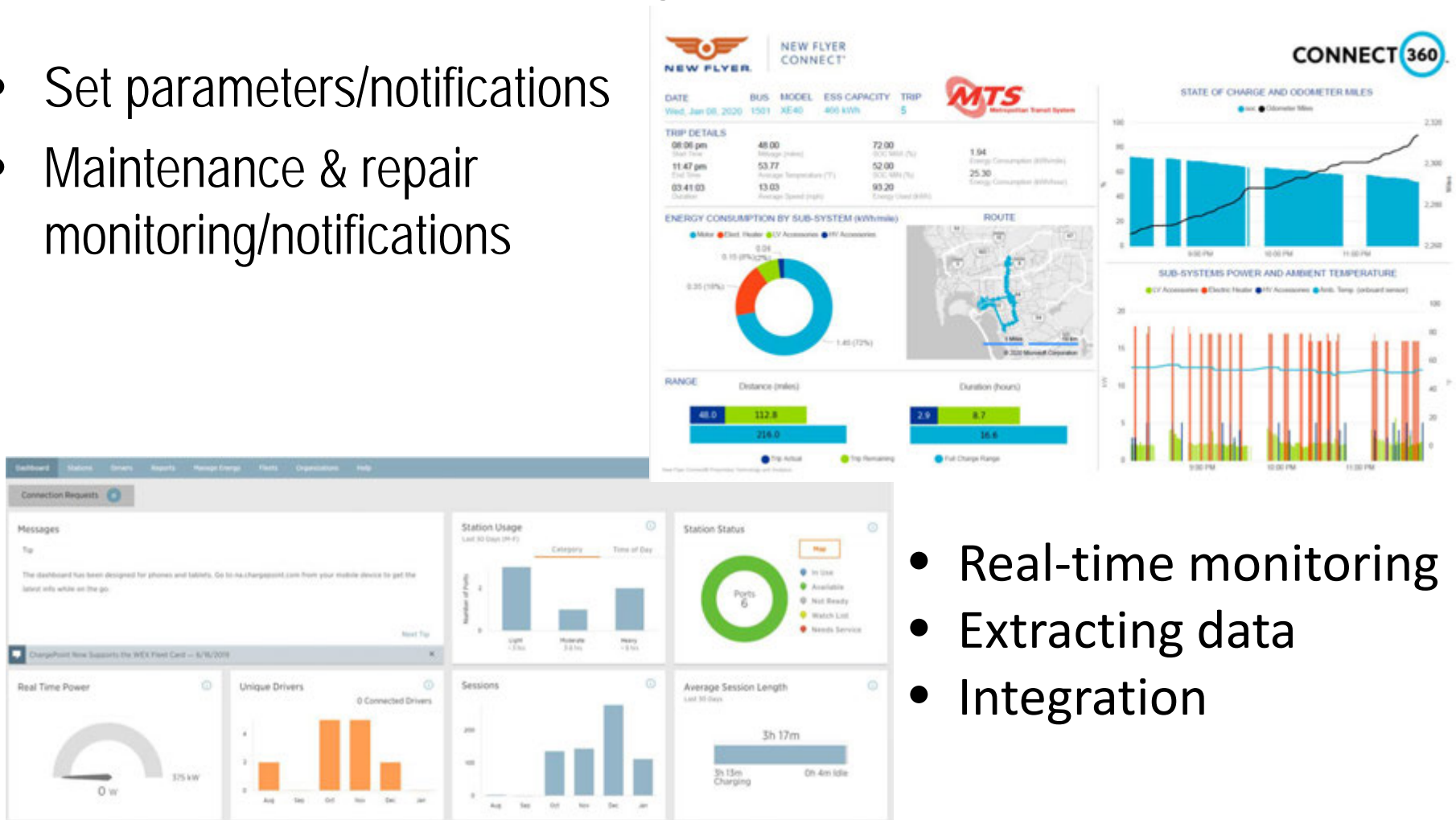
ChargePoint CPE250

- Combined Charging System 1 (CCS 1) connector
- 62.5 kWh max output
 - Paired dispensers allow for 125 kWh output



Telematics Systems - Software

- Set parameters/notifications
- Maintenance & repair monitoring/notifications



- Real-time monitoring
- Extracting data
- Integration



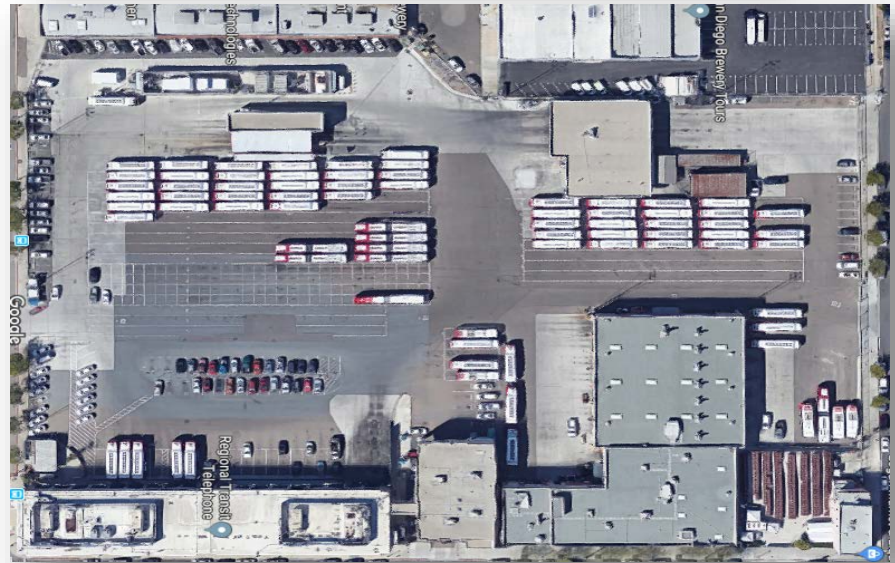
TIRCP Iris Rapid (South Bay)

- Twelve (12) sixty-foot battery electric bus purchase
 - CA State Bid for bus purchase
- Charger infrastructure
 - Design: Long-term design (Scalable)
- SDG&E feasibility site assessment for power need



Challenges

- Infrastructure
- Constrained footprint
- Training
- New site
- Inexpensive CNG
- Expensive electricity
- Grid capacity
- Range limitations
- Funding



Operational Analysis

BEB Block Coverage

| Bus Type | 2020 | 2030 | 2040 |
|--------------|------------|------------|------------|
| Cutaway | 23% | 39% | 45% |
| 40' | 42% | 74% | 94% |
| 45' | 82% | 100% | 100% |
| 60' | 48% | 65% | 76% |
| Total | 41% | 68% | 84% |

- Indicates that vehicles currently not commercially available; assumptions made based on vehicles that are currently in testing or development
- Only 45' BEBs achieve 100% block coverage
- Cutaway service (on demand) creates significant challenges for BEB operations
- Assume 5% battery capacity (BEB) or fuel tank (FCEB) improvement every two years

Potential Transition Costs

| | Baseline | S1: BEB Depot Only | S2: BEB Depot + On-Route | S3: Mixed BEB and FCEB | S4: FCEB Only |
|---------------------------|-------------------------|-------------------------|--------------------------|-------------------------|-------------------------|
| Fleet | \$ 832,469,000 | \$ 1,073,782,000 | \$ 1,095,205,000 | \$ 1,193,105,000 | \$ 1,474,318,000 |
| Infrastructure | \$ - | \$ 122,394,000 | \$ 133,578,000 | \$ 167,004,000 | \$ 72,524,000 |
| Fuel | \$ 252,569,000 | \$ 295,811,000 | \$ 312,555,000 | \$ 322,762,000 | \$ 451,898,000 |
| Maintenance | \$ 762,263,000 | \$ 773,981,000 | \$ 783,033,000 | \$ 805,384,000 | \$ 812,484,000 |
| Total | \$ 1,847,301,000 | \$ 2,265,968,000 | \$ 2,324,371,000 | \$ 2,488,255,000 | \$ 2,811,224,000 |
| Incremental over Baseline | | \$ 418,667,000 | \$ 477,070,000 | \$ 640,954,000 | \$ 963,923,000 |
| ZEB % in 2040 | 2% | 77% | 86% | 94% | 94% |

Next Steps

- ZEB Pilot Ongoing
 - Collect & analyze data
 - Roadmap transition plan
- Assessment of Fuel Cell Options
 - Site analysis performed at the Kearny Mesa Division (fueling station)
- Evaluating Additional Funding Options
- Working with SDG&E
- Developing CARB Rollout Plan



Updates

For additional information and to follow our progress,
visit MTS' ZEB Project Website:

<https://www.sdmts.com/inside-mts-current-projects/zero-emissions-bus-pilot-program>



ELECTRIC BUS

Program History, Lessons Learned and Future Plans

Doran Barnes | Executive Director



Foothill Transit

ABOUT FOOTHILL TRANSIT

- Pomona and San Gabriel Valleys of eastern Los Angeles County
- 327 sq. mi service area, 1.5 million residents
- 12 Million boarding's per year
- 36 local and express routes.
- 343 CNG buses, 33 electric buses.



THE Foothill Transit MISSION

To be the premier public transit
provider committed to:

SAFETY
COURTESY
QUALITY
RESPONSIVENESS
EFFICIENCY
INNOVATION



Foothill Transit



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



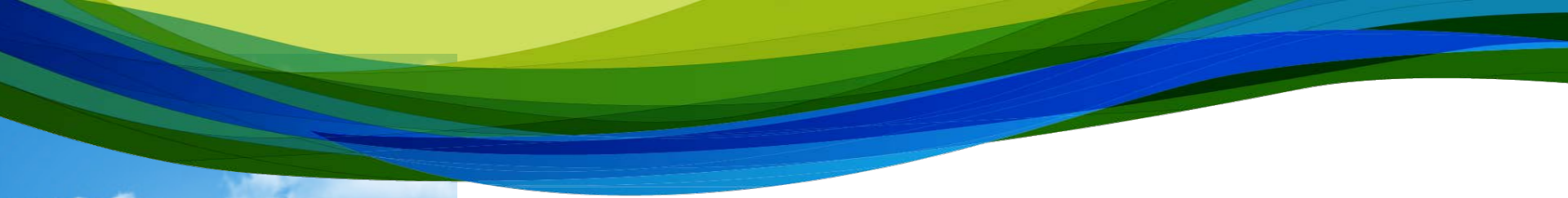
FOOTHILL TRANSIT ECOLINER 2010



CURRENT SERVICE

- 16 FAST CHARGE electric buses
- Line 291 – La Verne – Claremont – Pomona
- 7-min charge at Pomona Transit Center
- 8 buses at peak service
- In operation since 2010





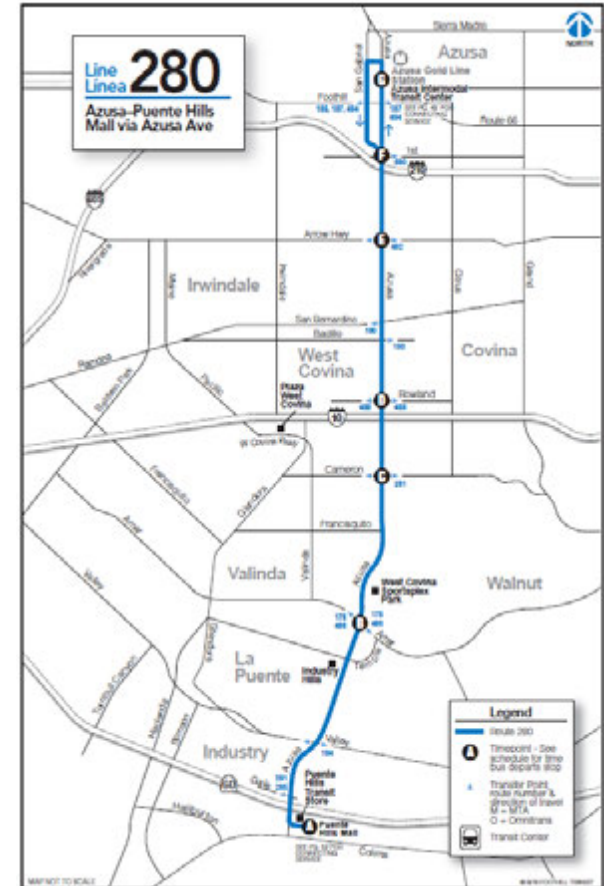
ABOUT OUR CHARGING STATIONS

- One high power fast-charge station with two overhead chargers, sufficient to serve all buses
- Over 150,000 charge cycles to-date, and 1.8 million electric bus miles
- Located at Pomona Transit Center, a central hub with off-street flexibility, safety and security



CURRENT SERVICE

- 14 EXTENDED RANGE electric buses
- Line 280: Azusa – Covina – West Covina
La Puente – Industry – Puente Hills Mall
- Overnight charging at Arcadia
Maintenance and Operations Facility
- On-route charging available at Azusa
Intermodal Transit Center (near Gold
Line Station)



INITIAL CHARGING INFRASTRUCTURE



NEXT GENERATION CHARGING INFRASTRUCTURE



CURRENT CHALLENGE: INSTALLIN DEPOT CHARGERS



MAINTENANCE FACILITY CHARGING



ARCADIA IN-DEPOT CHARGING STATIONS



Foothill Transit

SCE TIME OF USE EV8 RATES

| TOU Period | Weekdays Summer | Weekdays Winter | Weekends/Holidays Summer | Weekends/Holidays Winter |
|----------------|--------------------|--------------------|-----------------------------|-----------------------------|
| On-Peak | 4 p.m. – 9 p.m. | N/A | N/A | N/A |
| Mid-Peak | N/A | 4 p.m. – 9 p.m. | 4 p.m. – 9 p.m. | 4 p.m. – 9 p.m. |
| Off-Peak | All other hours | 9 p.m. – 8 a.m. | All other hours | 9 p.m. – 8 a.m. |
| Super Off-Peak | N/A | 8 a.m. – 4 p.m. | N/A | 8 a.m. – 4 p.m. |



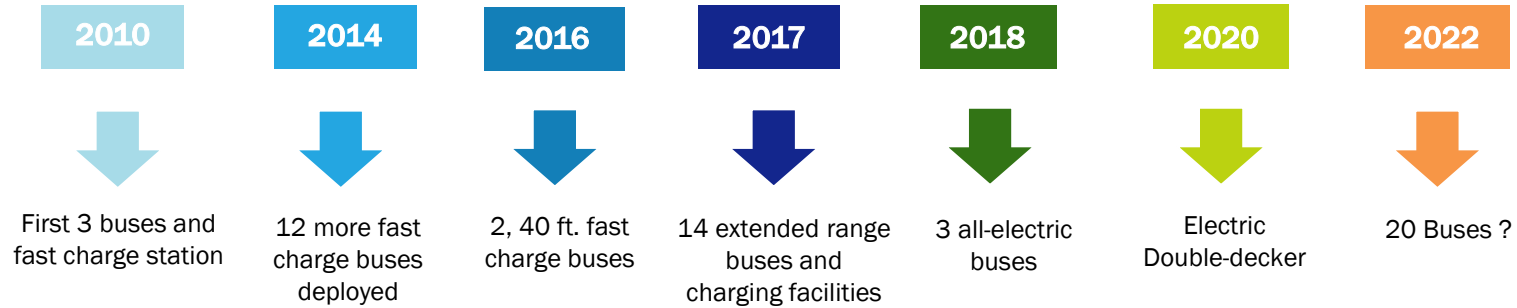
SCE TIME OF USE EV8 RATES

Summer season starts 12 a.m.
June 1 to 12 a.m. October 1

| Timeframe | Rates |
|---|----------|
| Summer Season On-Peak | \$0.483 |
| Mid-Peak | \$0.245 |
| Off-Peak | \$0.119 |
| | |
| Winter season starts 12 a.m. October 1 to 12 a.m. June 1 | |
| Winter Season Mid-Peak | \$0.284 |
| Off-Peak | \$0.133 |
| Super Off-Peak | \$0.0764 |



ELECTRIC BUS MILESTONES





NEXT: ELECTRIC DOUBLE DECK BUS



Foothill Transit

RECOMMENDATIONS

Start small

Expect the unexpected

Electric power infrastructure is the
key to success



Foothill Transit

THANK YOU

Doran J. Barnes | Executive Director
dbarnes@foothilltransit.org



Foothill Transit



Getting to Zero

Transitioning to a 100% Zero-Emission Bus Fleet

Kern Council of Governments
Transitions 2020

February 27, 2020

Jaimie Levin
Senior Managing Consultant

About CTE



- **Mission:** To advance clean, sustainable, innovative transportation and energy technologies
- **501(3)(c) non-profit** engineering and planning firm
- **Portfolio - >\$550 million**
 - Research, demonstration, transition planning, deployment
 - **99 Active Projects** Totaling over **\$300 million**
- Focused on **Zero-Emission** Technologies
- **National Presence**
Atlanta, Berkeley, Los Angeles, Minneapolis/St. Paul

61 CTE Members



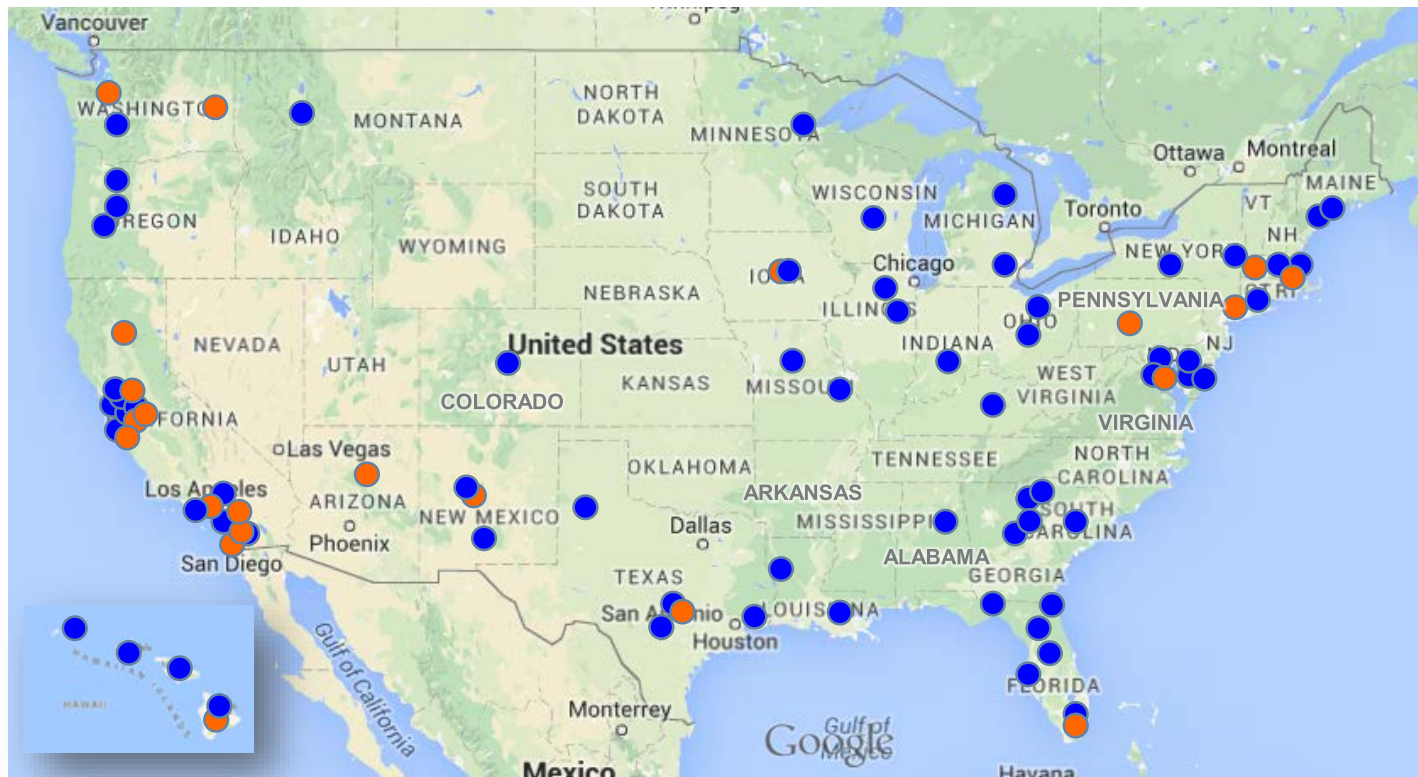
Leadership Circle Members



Members



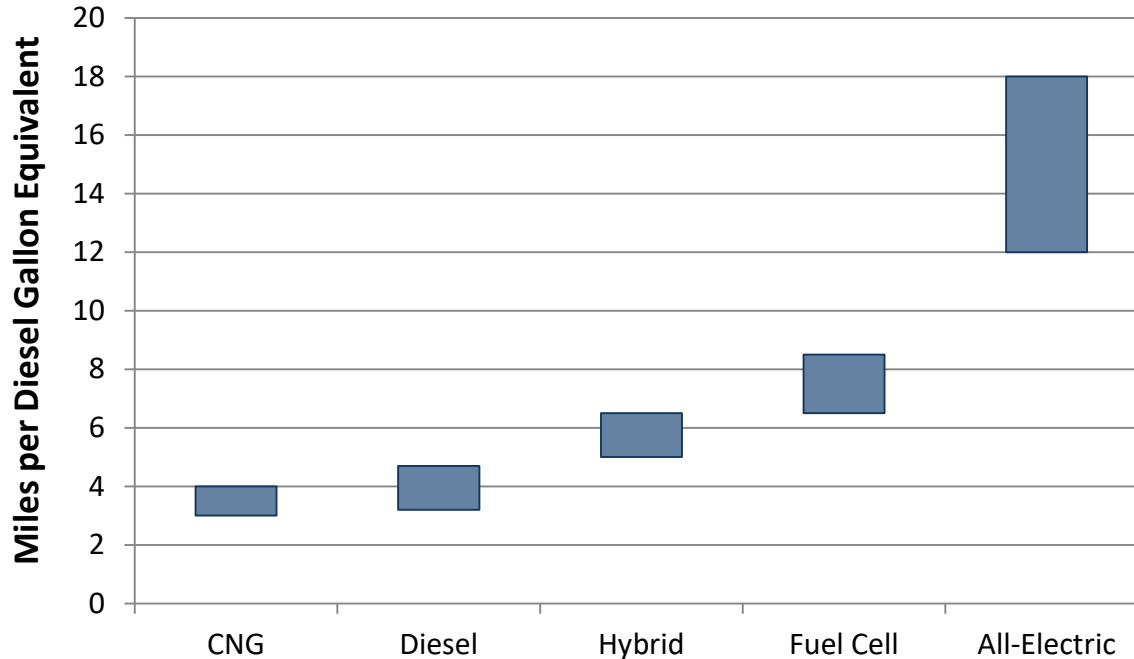
CTE Zero Emission Bus Projects



- ZEB Planning Projects
- ZEB Deployment Projects

Electric Drive Characteristics

Electric Bus efficiency (and range!) changes with local conditions and driving habits more than diesel and CNG buses.

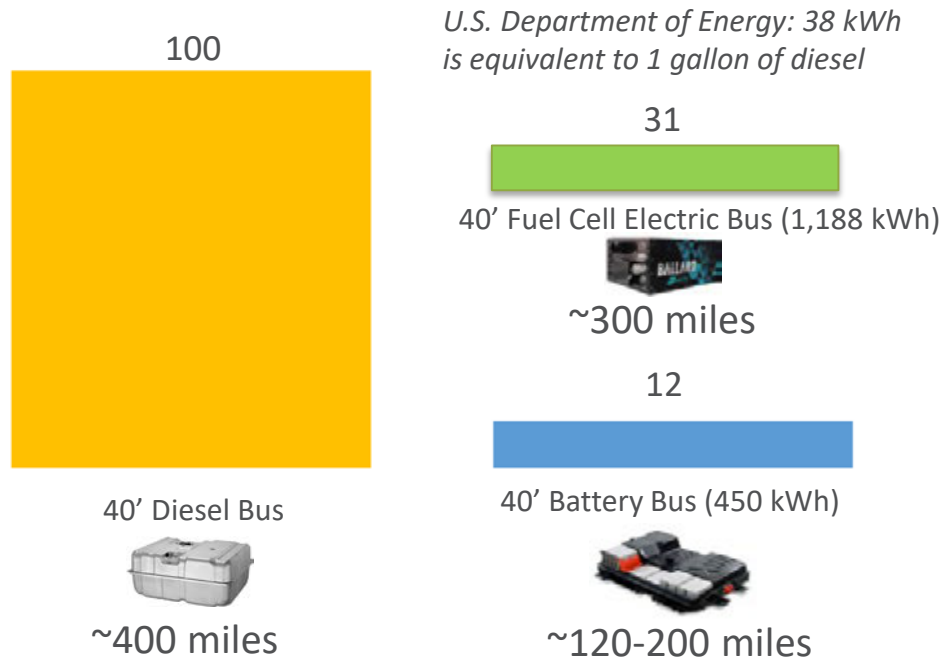


Far more efficient, but the range of efficiency makes it more difficult to plan!

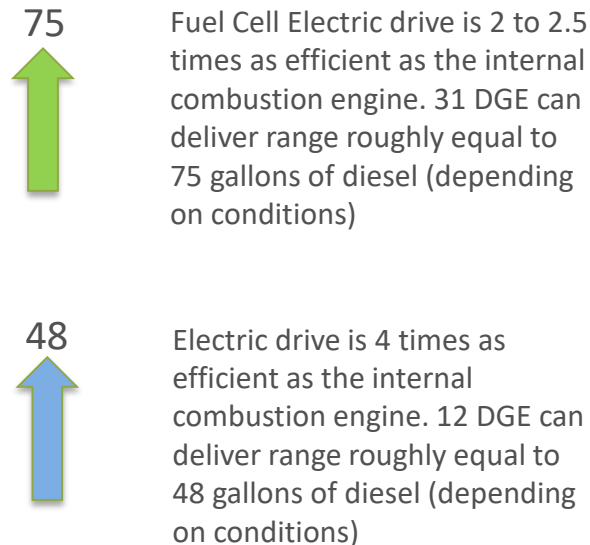
Electric Drive Characteristics

Different methods of storing energy require different deployment plans.

"Diesel Gallons" On Board



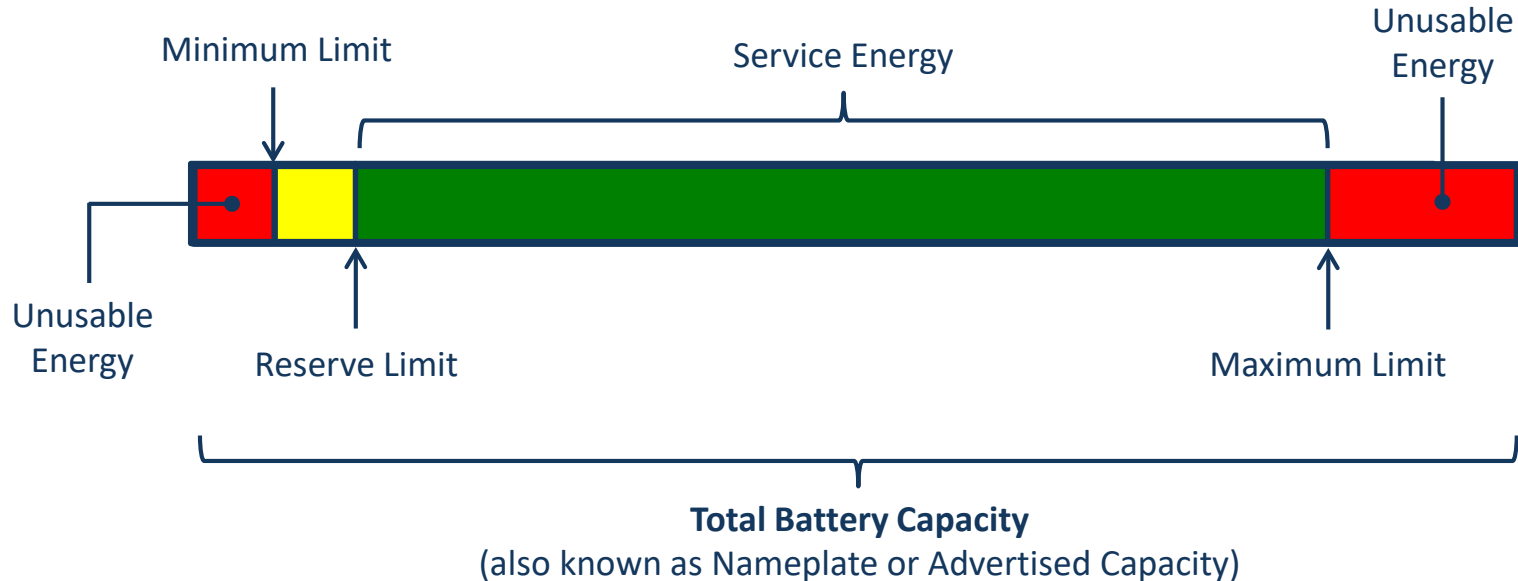
But, considering efficiency:



Electric Drive Characteristics

Understanding how much of the battery is usable for service is critical for planning your deployment.

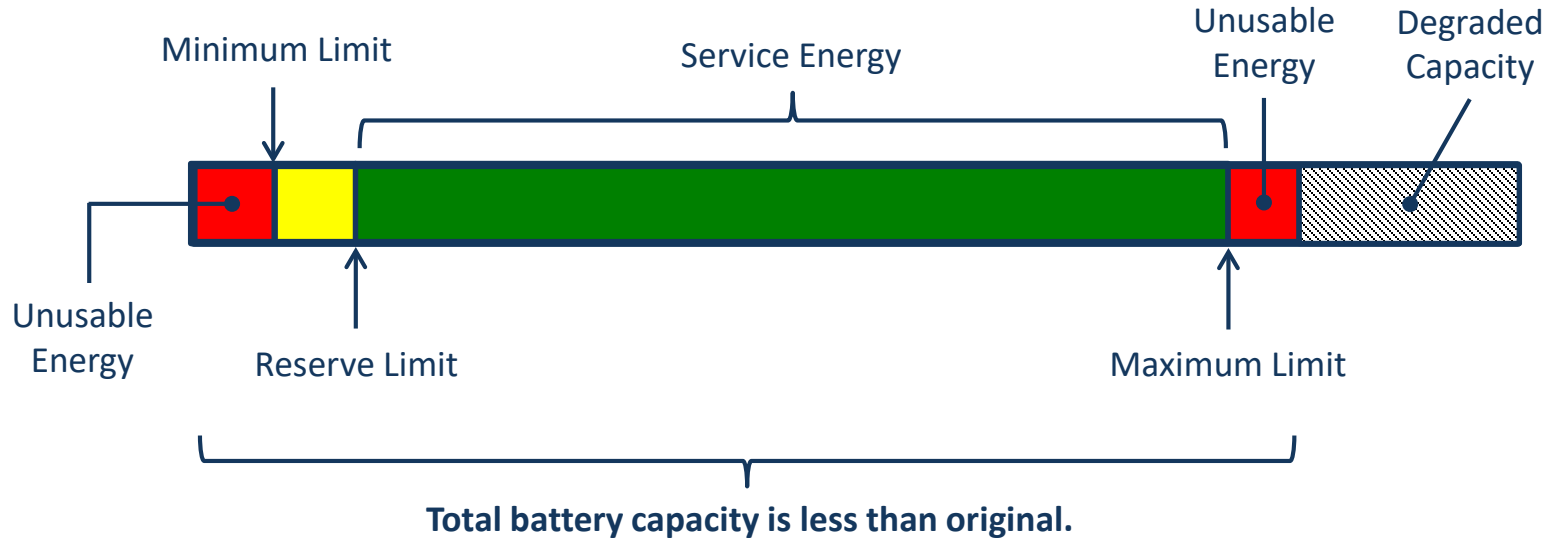
New Battery



Electric Drive Characteristics

Understanding how much of the battery is usable for service is critical for planning your deployment.

Battery at End of Life*:



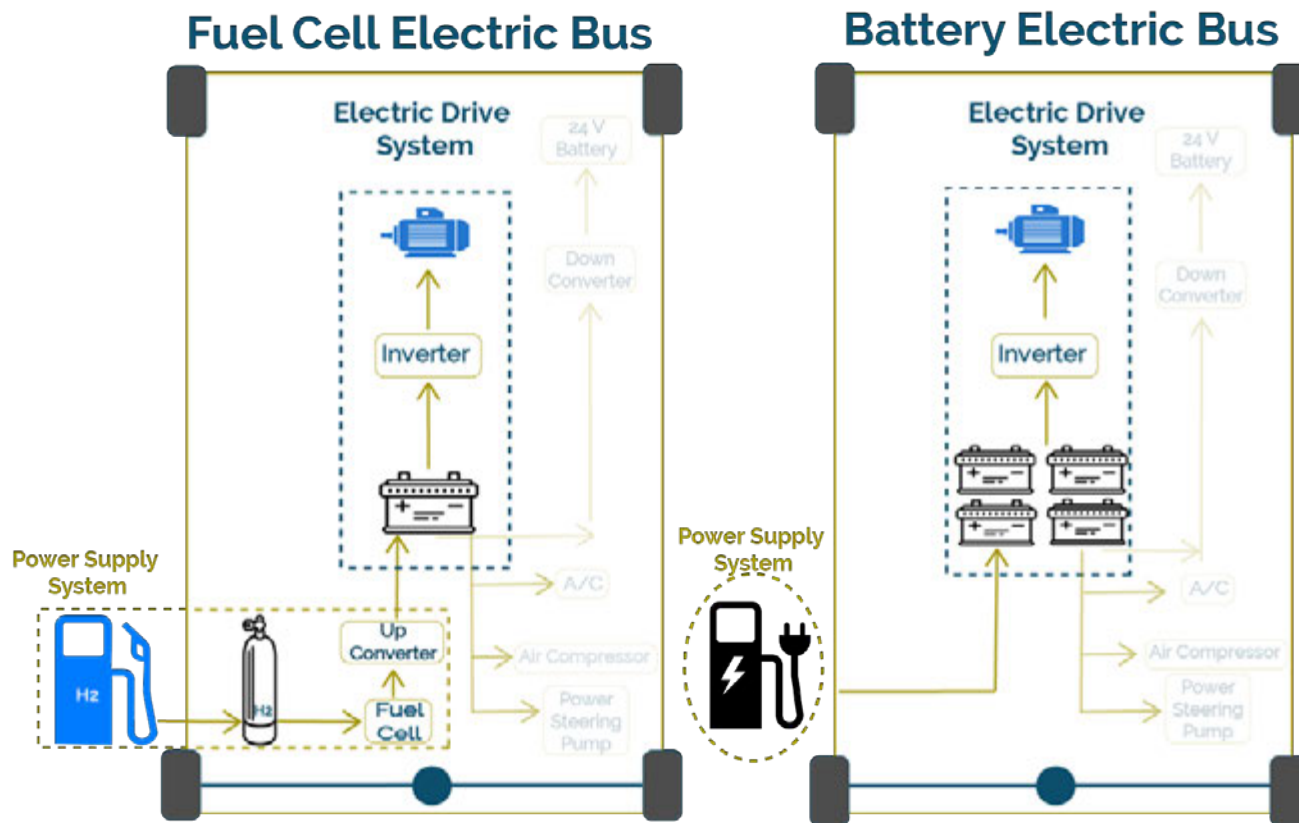
*as defined by battery warranty

Factors Affecting Range



- **Route characteristics:** speed, stops, grade
- **Ridership**
- **Weather - Climate**
- **Heating and cooling.** (Heat is no longer “free.”)
- **Battery degradation**
- **Operator Driving Behavior**

ZEB Technologies



ZEB Challenges & Constraints



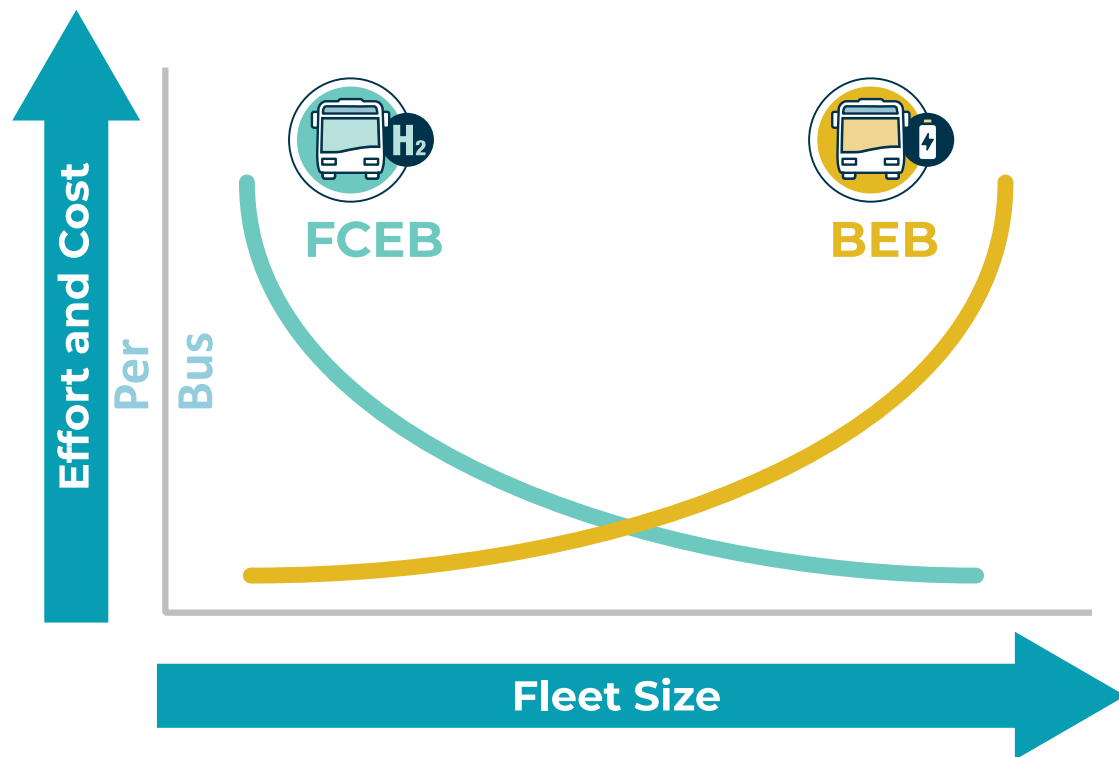
BEB

- Currently, Range-limited. Expected to improve over time
- Operational complexity increases at scale
- Infrastructure may impede on parking spaces
- Greater redundancy and resiliency challenges
- Variability of electricity costs

FCEB

- High cost of H2 to fuel buses
- Currently, higher incremental costs

ZEB Infrastructure Costs

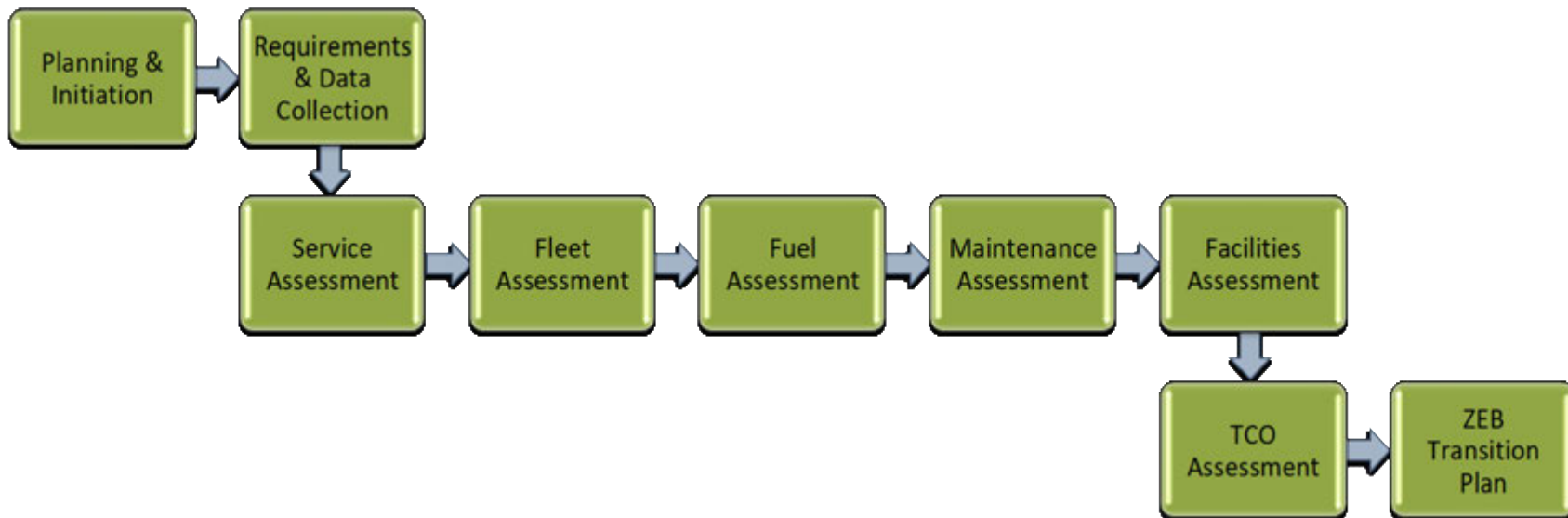


- FCEB: High initial cost for H₂ fueling stations can be leveraged over many buses in larger fleets
- BEB: More equipment and infrastructure is needed to support larger fleets

ZEB Transition Scenarios

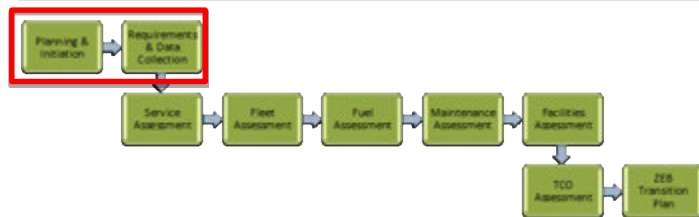
| Scenarios | Comments |
|---------------------------------------|---|
| Baseline | Assumes continuing with current fleet composition |
| Depot-Charged BEB | May not reach 100% due to range limitations |
| Depot-Charged BEB w/additional BEBs | Split blocks and add more buses to overcome BEB range constraints to meet service requirements. May increase operating costs, demand for real estate for parking, etc. |
| Depot-Charged BEB w/on-route charging | Add on-route charging to overcome BEB range constraints to meet service requirements. May impact service schedules since on-route charge sessions cannot be skipped or shortened. |
| Depot-Charged BEB w/FCEBs | Deploy a mixed fleet of BEBs and FCEBs where BEBs are focused on shorter blocks and FCEBs are on longer blocks not possible with BEBs |
| FCEBs only | Likely meets all service requirements and has similar operational profile to current fleet |

ZEB Transition Planning Approach



Goal: Consider challenges and constraints to evaluate the best scenario for the transit agency

ZEB Transition Planning Methodology



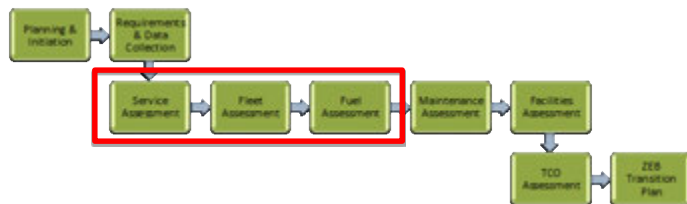
1. Planning & Initiation:

- Action: Project planning & kickoff
- Deliverable: finalize scope, approach, tasks, assignments, and timeline

2. Requirements & Data Collection:

- Actions: Collect route, block, fleet, operational, maintenance, and facilities information, collect route data, conduct bus modeling & route simulation analysis
- Deliverable: Complete package of data used to complete the assessments that complete the TCO assessment.

ZEB Transition Planning Methodology



3. Service Assessment:

- Implement results of route modeling to inform applicability of ZEB technologies.

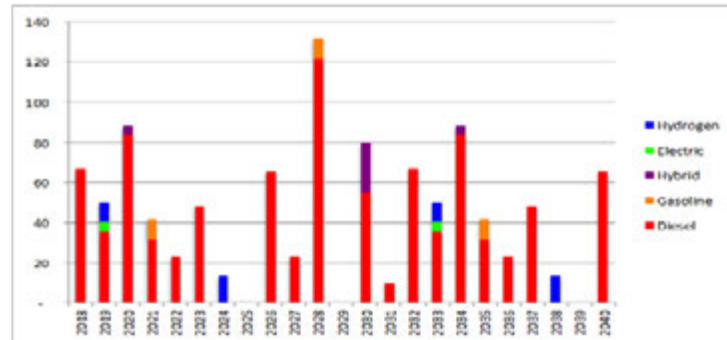
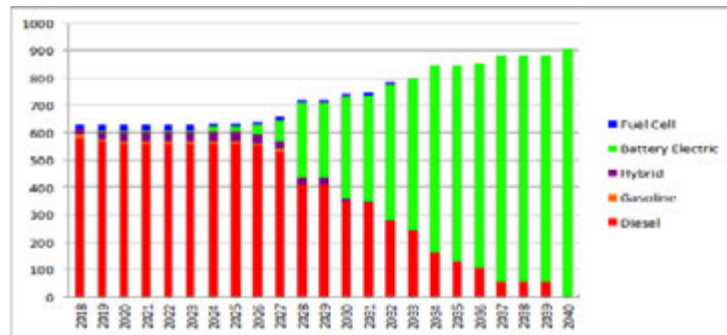
4. Fleet Assessment:

- Provide timeline & Costs for fleet transition and recommendations for suitable technologies.

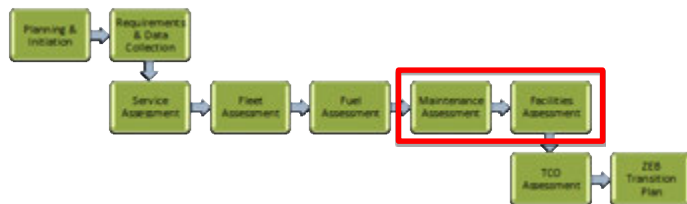
5. Fuel Assessment:

- Analyze fuel demands and project future fuel use/costs for a transitioning fleet.

Fleet Transition Examples (not DASH data)



ZEB Transition Planning Methodology



6. Maintenance Assessment:

- Analyze labor/material costs and mid-life overhaul costs over the transition period.

7. Facilities Assessment:

- Identify electric/H2 fueling infrastructure requirements, infrastructure needs, design/construction, siting and utility requirements, and operational impact.



PARSE

P

Price and delivery of H₂ on parity with conventional fuels.
Also equipment maintenance cost reduction.

A

Area of fueling footprint to refuel 50, 100, or 200 buses.

R

Renewables for hydrogen production; **Resiliency** - Natural Disasters;
Also **Redundancy** to ensure near 100% service reliability.

S

Speed of refueling in the normal 8- to 10-hour night window; Also
Scalability for future expansion.

E

Entry-Level Startup and Equity (CapEX) needed to build at an
affordable price, utilizing baseline components for future scale up.

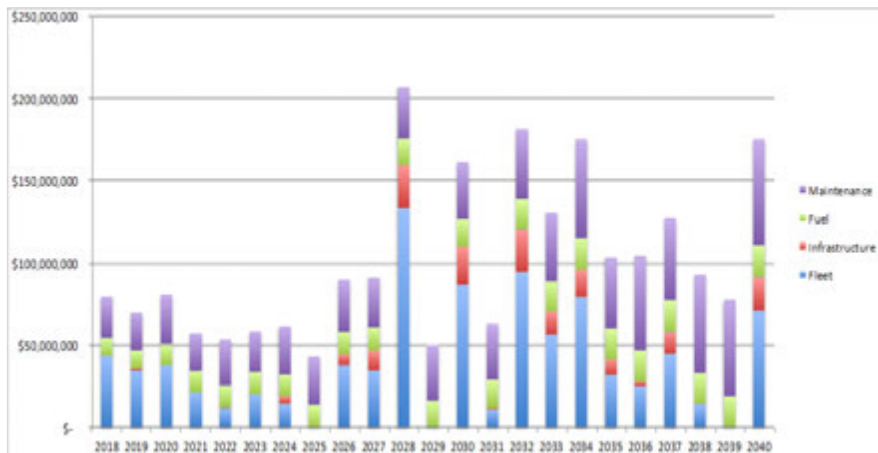
ZEB Transition Planning Methodology



8. TCO Assessment:

- Summarizes cost impact analyses for the ZEB transition.

Cost Examples (not DASH data)



9. ZEB Transition Plan:

- Develop a ZEB transition plan with capital project definitions and projected timelines.

2020 International ZEB Conference in Denver



2020 INTERNATIONAL
ZERO EMISSION BUS CONFERENCE
DENVER • SEPTEMBER 16TH - 18TH

For more information, please visit www.ZEBConference.com



Zero Emission Bus Programs

Salvador Llamas

COO, AC Transit
February 27, 2020



AC Transit



What We've Learned...

20+ Years of ZEB Experience



2003-2006

(1) 30' Thor
175 MILE RANGE



2006-2010

(3) 40' VanHools
300 MILE RANGE



2010 - present

(13) 40' VanHools
220 MILE RANGE

- ✓ Over 3.2M zero emission miles
- ✓ FTA/DOE Targets:
 - 10 - Ultimate target 25K hours
 - 1 - over 32K hours
 - Reliability performance at or above diesel

- ✓ Planning & Stakeholder Engagement
- ✓ ZEB Procurement
 - Bus specs based on performance
- ✓ Infrastructure design & construction
- ✓ Sustainable maintenance practices
 - Advanced diagnostics & repairs
 - Fuel cell rehab - stack replacement

GreenRoad 2020

Side by Side Comparison of Technologies



2019

Battery Electric Drive

(5) Xcelsior XE40

200 MILE RANGE

2019

Fuel Cell Electric Drive

(10) Xcelsior XHE40

300 MILE RANGE

- ✓ GreenRoad program will deploy BEB & FCEB in identical service
- ✓ True side-by-side comparison
 - Same agency
 - Same service environment
 - Same OEM
- ✓ Performance report
 - Capex
 - O&M



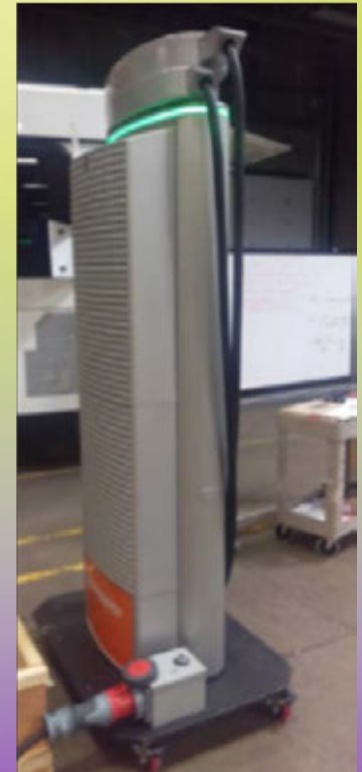
actransit.org

ZEB Fueling

Hydrogen Fueling Stations EMERYVILLE & OAKLAND



Battery Bus Chargers OAKLAND



GreenRoad University



ZEB Safety & Familiarization

- High Voltage Battery
- Electric Drive Motor
- Fuel Cell Power Plant
- High Pressure Gaseous Fuel

5-week Program

- Basic P.M.I.
- Basic Diagnostics & Repair
- Advanced Diagnostics & Repair

Training Provided

- 513 Mechanics / 20,558 Hours
- Every Bus Operator



ZEB Future

- **Transition to a 100% ZEB fleet**
 - ✓ ZEB Study
 - ✓ Clean Corridors Plan
 - ✓ Facilities Master Plan
 - ✓ 45 ZEB Deployment Plan

- **Challenges and Risk**
 - ✓ Funding gap
 - ✓ ZEB procurement and infrastructure construction
 - ✓ Utilities – PSPS, project delivery
 - ✓ Hydrogen fuel providers – redundancy
 - ✓ Rapidly evolving technology





Thank You!

For more
information,
please visit
actransit.org

Leading the way to a

ZERO EMISSION FUTURE.





TRANSITIONS: USING ELECTRIC BUSES FOR INTERCOMMUNITY SERVICE

BOB NEATH

KERN TRANSIT

FEBRUARY 27, 2020

BYD MODEL K9 BATTERY ELECTRIC BUS



EDWARDS COMMUTER EXPRESS


- Bus will be based in Mojave
- Connects Tehachapi and Rosamond
- One AM and one PM trip
 - Other trip is a regular Route 100 trip
- Transfer to/from AVTA Route 747
- Returns to Mojave mid-day
- Approximate 80 mile round trip


BEGINNING MARCH 16TH

Weekday Commuter Service

between Tehachapi Park & Ride

and Edwards Air Force Base






| A.M. Runs | | | | | | | | |
|--------------------------------------|---------------------------------|---------------------------------|--------------------------------------|--------------------------------------|-----------------------------|--------------------------------------|--------------------------------------|-----------------------------------|
| Depart Tehachapi Park and Ride | Arrive Rosamond Taco Bell | Depart Rosamond Taco Bell | Arrive Building 1202 Stop 2132 | Arrive Building 1600 Stop 2136 | Arrive NASA Stop 2139 | Arrive Building 3500 Stop 2140 | Arrive Building 2750 Stop 2142 | Arrive Commissary Stop 2143 |
| 5:05 6:00 | 5:47 6:47 | 5:53 6:53 | 6:24 7:24 | 6:30 7:30 | 6:37 7:37 | 6:42 7:42 | 6:47 7:47 | 6:52 7:52 |

| P.M. Runs | | | | | | | | |
|-----------------------------------|--------------------------------------|--------------------------------------|-----------------------------|--------------------------------------|--------------------------------------|---------------------------------|---------------------------------|--------------------------------------|
| Depart Commissary Stop 2143 | Depart Building 1202 Stop 2132 | Depart Building 1600 Stop 2136 | Depart NASA Stop 2139 | Depart Building 3500 Stop 2140 | Depart Building 2750 Stop 2142 | Arrive Rosamond Taco Bell | Depart Rosamond Taco Bell | Arrive Tehachapi Park and Ride |
| 4:05 5:05 | 4:12 5:12 | 4:18 5:18 | 4:25 5:25 | 4:30 5:30 | 4:35 5:35 | 5:01 6:01 | 5:07 6:07 | 5:59 6:50 |

Monday through Friday only. No weekend service.

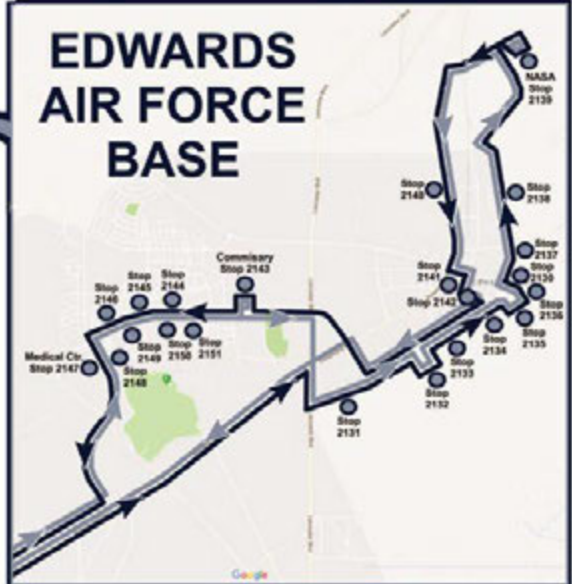



FARES & PASSES

| GENERAL REFUND | |
|--------------------------|---------|
| INTERCOMMUNITY ROUTE | \$3.50 |
| ALL ROUTES - 31 DAY PASS | \$65.00 |
| & all Dial-A-Ride | \$32.50 |

*The reduced fare is for youth (18 and under) with proper identification, and to seniors (65 and over) with a valid ID card. Reduced fare is not available for disabled passengers with a Kern Transit Reduced Fare Card.

For transfers to and from AVTA Route 747





www.kerntransit.org
 800.323.2396
info@kerntransit.org

METHODS FOR CHARGING A BATTERY ELECTRIC BUS

- Overnight charging
- Mid-day charging
- En route charging
- Regenerative braking



CHALLENGES KERN TRANSIT FACES INTRODUCING BATTERY ELECTRIC BUSES

- Long routes (up to 200 miles round trip)
- Multiple routes utilize freeways (less regenerative braking)
- Steep grades (up to 6%) on SR 58 and Interstate 5
- Buses scheduled for multiple round trips each day (or quick fill up)
- Large service area - 8,000 square miles (NYC is 300 square miles)

POSSIBLE SOLUTIONS

- Additional buses
 - Remove from service for daytime charging
 - Split trips
- Place multiple charging stations throughout the County
 - Partnering with local agencies
 - County-wide bus purchasing strategy
- Scheduling changes
 - Eliminate “reverse commute” trips (AVTA commuter trip strategy)
 - Longer layovers
- Await technological developments

TRANSITIONS REQUIRE...

- Acceptance of the challenge
- Developing creative ideas
- Working through problems
- Resilience

THANK YOU!





California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project

Hannah Hamilton
hhamilton@calstart.org



What is HVIP?



- Streamlined, first-come-first-served “voucher” incentives – no proposal process
- Electric, fuel cell, ePTO
- Low-NOx natural gas (11.9L engine only)
- Trucks and buses
- New vehicles and retrofits
- Operating now for 10 years
- 7,500 + vouchers
- 1,000 fleets

Why Voucher Incentives?

- Point of purchase discount
 - Fleets get immediate discount at sale
- Dealers learn voucher system
 - Fewer complications for fleets
- Set-aside funding for each voucher
 - Price certainty at time of request



Sample Voucher Amounts



Zero-Emission Transit Buses:

| Bus Length and Bus Type | Base Vehicle Incentive | |
|--|---------------------------------|----------------------------|
| | Outside Disadvantaged Community | In Disadvantaged Community |
| 20 ft – 24 ft | \$80,000 | \$90,000 |
| 25 ft – 29 ft | \$90,000 | \$100,000 |
| 30 ft – 39 ft | \$120,000 | \$135,000 |
| 40 ft – 59 ft | \$150,000 | \$165,000 |
| ≥ 40 ft. Double Decker Bus | \$175,000 | \$190,000 |
| ≥ 60 ft. Zero-Emission Battery-Electric Articulating Transit Bus | \$175,000 | \$190,000 |
| ≥ 40 ft. Hydrogen Fuel Cell Electric Bus | \$300,000 | \$315,000 |

HVIP Waitlist Status



- Waitlist for HVIP vouchers is ~\$140 million
- Funds to cover the first ~\$133 million are expected to be available from CARB as early as March (date TBA)
- Requests on the waitlist will not be reviewed or approved until funds are available
- **CARB closed the Waitlist to additional requests on Nov. 1, 2019** due to demand having exceeded the funds available for FY19-20

HVIP Waitlist Status



- No date has been provided yet for when the Waitlist will re-open
- Funds for **FY20-21** are expected to be appropriated by the Legislature in fall 2020
- The HVIP team suggests exploring **other funding sources** such as the Carl Moyer Memorial Air Quality Standards Attainment Program and Volkswagen Mitigation Trust
- Updates will be posted on www.CaliforniaHVIP.org when available

HVIP Policy Changes



A number of policy changes went into effect 10/25/19 which will pertain to new requests when the waitlist re-opens (and those made 10/25 - 11/1/19)

- Limit of **200 voucher requests per fleet** per calendar year
- Stacking, or combining HVIP funding with other public programs, is allowed in a limited number of cases:
 - **Stacking is permitted with local incentive programs** as long as both programs are not paying for the same incremental costs.
 - Stacking with other **state incentives** such as Carl Moyer or AB 617 is only available for **public transit buses**, after max funds from non-HVIP program
 - Stacking is not permitted with Proposition 1B, VW Environmental Mitigation Trust, or California Energy Commission funds.
 - HVIP-funded vehicles may access **infrastructure** funded by any other funding sources.

Partial Sales and Use Tax Exemption



- **Assembly Bill 784** provides a partial sales and use tax exemption on purchases and leases of eligible zero-emission transit buses in California
- As of **October 9, 2019** and through **December 31, 2023**
- Purchasers must be city/county government, transportation/transit district, or other **public agency** providing public transit services
- The bus must be **HVIP-eligible** (see catalogue at CaliforniaHVIP.org)
- The partial tax exemption applies **whether or not HVIP funding was used to purchase or lease the transit bus**
- Purchases **do not** have to be made via an HVIP-eligible dealer or manufacturer in order to qualify
- For more information and specific definitions, go to www.CDTFA.ca.gov

Other Programs and Resources



- Total Cost of Ownership Estimator
 - Visit CaliforniaHVIP.org/TCO
- Advanced Vehicle Technology and Infrastructure Funding Finder Tool
 - COMING SOON
- Clean Off-Road Equipment Voucher Incentive Project (CORE)
 - Visit CaliforniaCORE.org or email info@CaliforniaCORE.org
- Clean Mobility Options (CMO)
 - More info to come this afternoon!

Questions?

www.CaliforniaHVIP.org

HVIP's Toll-Free Hotline
Available Mondays to Fridays, 9 a.m. – 5 p.m.
1-888-HVIP or 1-888-457-4847

or

Email us at: info@californiahvip.org





SOUTHERN CALIFORNIA
EDISON®

Energy for What's Ahead®

Energy for What's Ahead

Our Transportation Electrification Pathway

Traeger Cotten

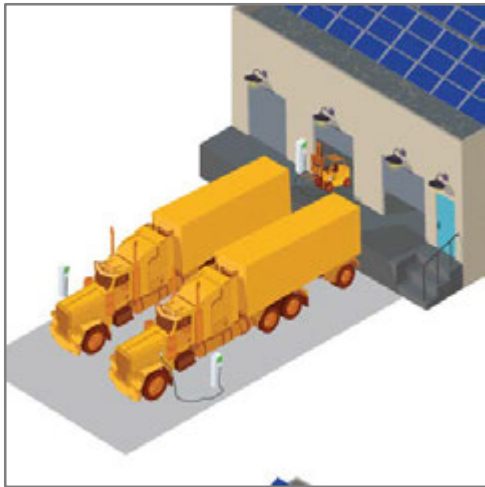
Field Engineer, Southern California Edison

February 27, 2020

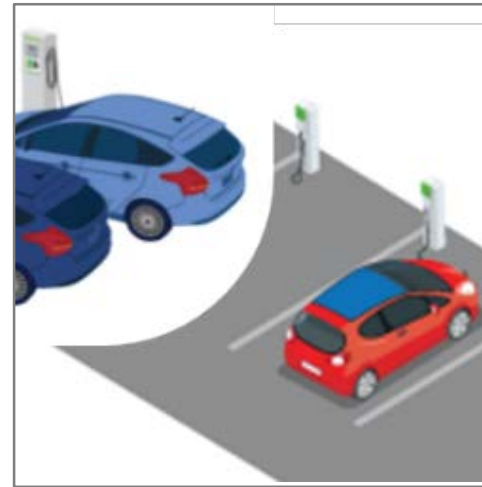


SCE is accelerating vehicle electrification across multiple sectors

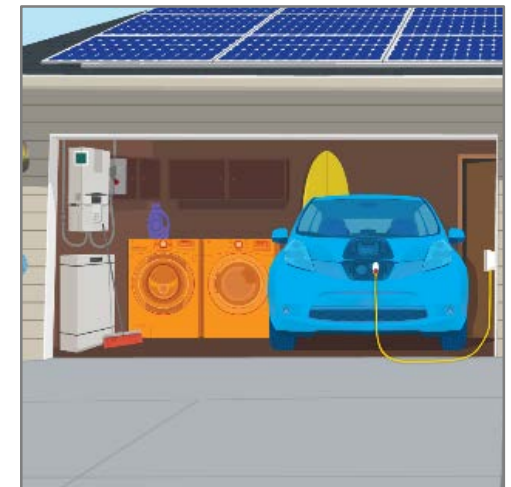
Medium- & Heavy-Duty Transit/School Buses



Workplace & Public



At Home Charging



Charge Ready Transport provides infrastructure for fleet electrification



- ☐ Approved total program budget of **\$356.4M**
- ☐ Achieve minimum **870 sites** with **8,490 electric vehicles** procured or converted
- ☐ **Covers cost of all infrastructure** needed up to charging station
- ☐ **Charging station rebates** available for **transit/school buses** and **sites in disadvantaged communities**



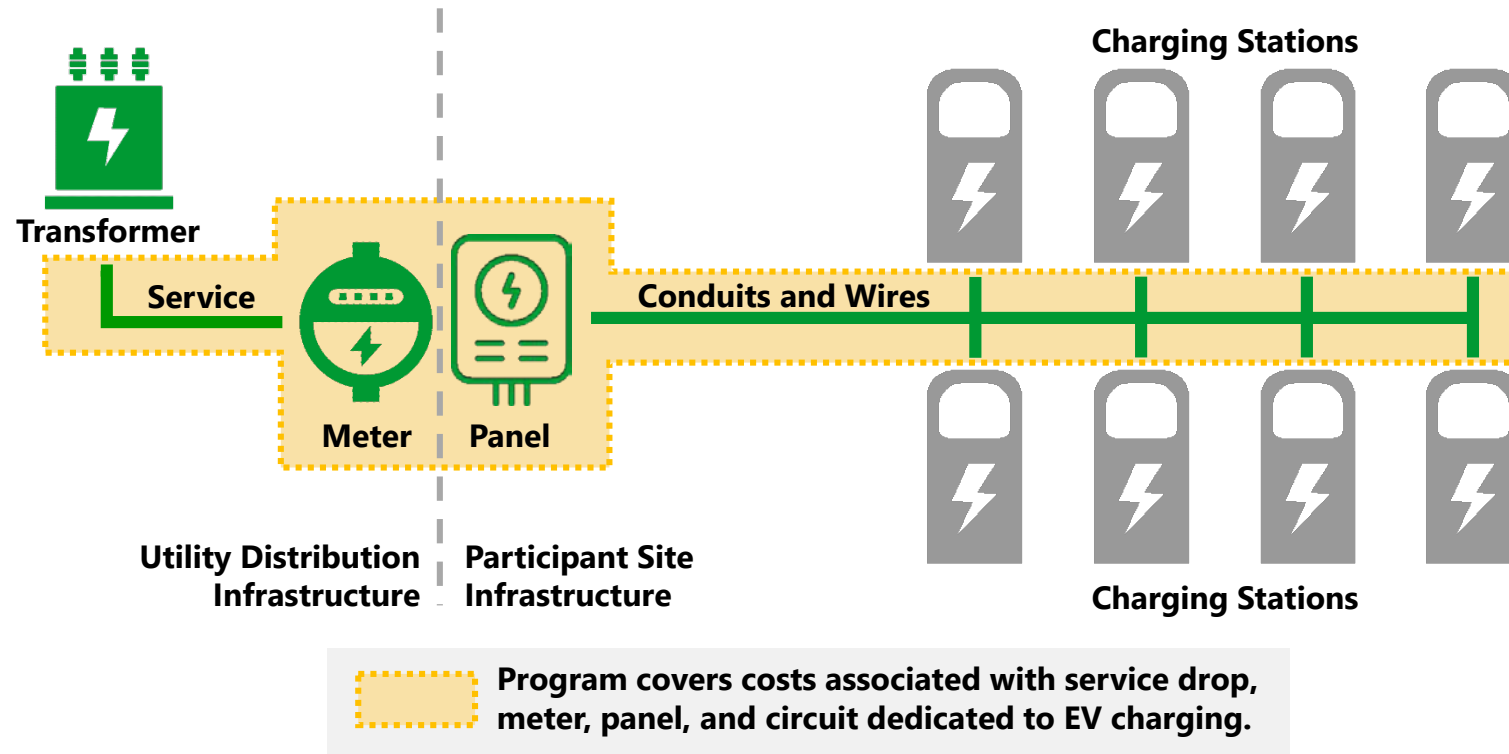
Charge Ready Transport: Infrastructure for EV Trucks and Buses

- Medium-Duty Vehicles
- Heavy-Duty Vehicles
- Forklifts
- School Buses
- Transit Buses
- Port Cargo Trucks
- Airport Ground Support Equipment
- Transportation Refrigeration Units (TRU)
- Truck Stop Electrification (TSE)



Our Charge Ready Programs Cover the Cost to Build EV Charging Infrastructure

- SCE will cover cost of make-ready infrastructure and may offer a rebate to offset cost of procuring and installing charging stations
- Participant is responsible for procuring charging stations



SCE will advise customers throughout the process



Transportation Electrification Advisory Services

- ☐ Fleet Analysis Services
- ☐ Site Feasibility Studies
- ☐ Fueling calculation and Rate Analyses

Transportation Electrification Project Management

- ☐ Single Point of Contact for multi-site projects
- ☐ Dedicated project management group for EV charging projects

SCE will continue to develop new programs to spur EV adoption



AB1082 Schools

- ☐ **No-cost or utility owned infrastructure** to serve level 1 or level 2 EV charging
- ☐ Available to **K-12 Schools**
- ☐ **One-time rebate** (with the no-cost option) to offset the costs of charging stations



AB1083 Parks

- ☐ **Utility owned** infrastructure (for existing or new construction) to serve level 2 or DCFC EV charging
- ☐ Available to **California State parks and beaches**

Join us on this ride.

Traeger Cotten

Field Engineer
(559) 331-9715

Michele Marquette

Account Manager
(559) 685-3232





EV Fleet Program





EV Fleet Program overview

PG&E will help you install EV make-ready infrastructure for medium- and heavy-duty fleets

\$236 million
budget over 5 years
FROM 2020–2024

700+ sites
SUPPORTING
6,500 new EVs

Support conversion of commercial and public fleets to electric

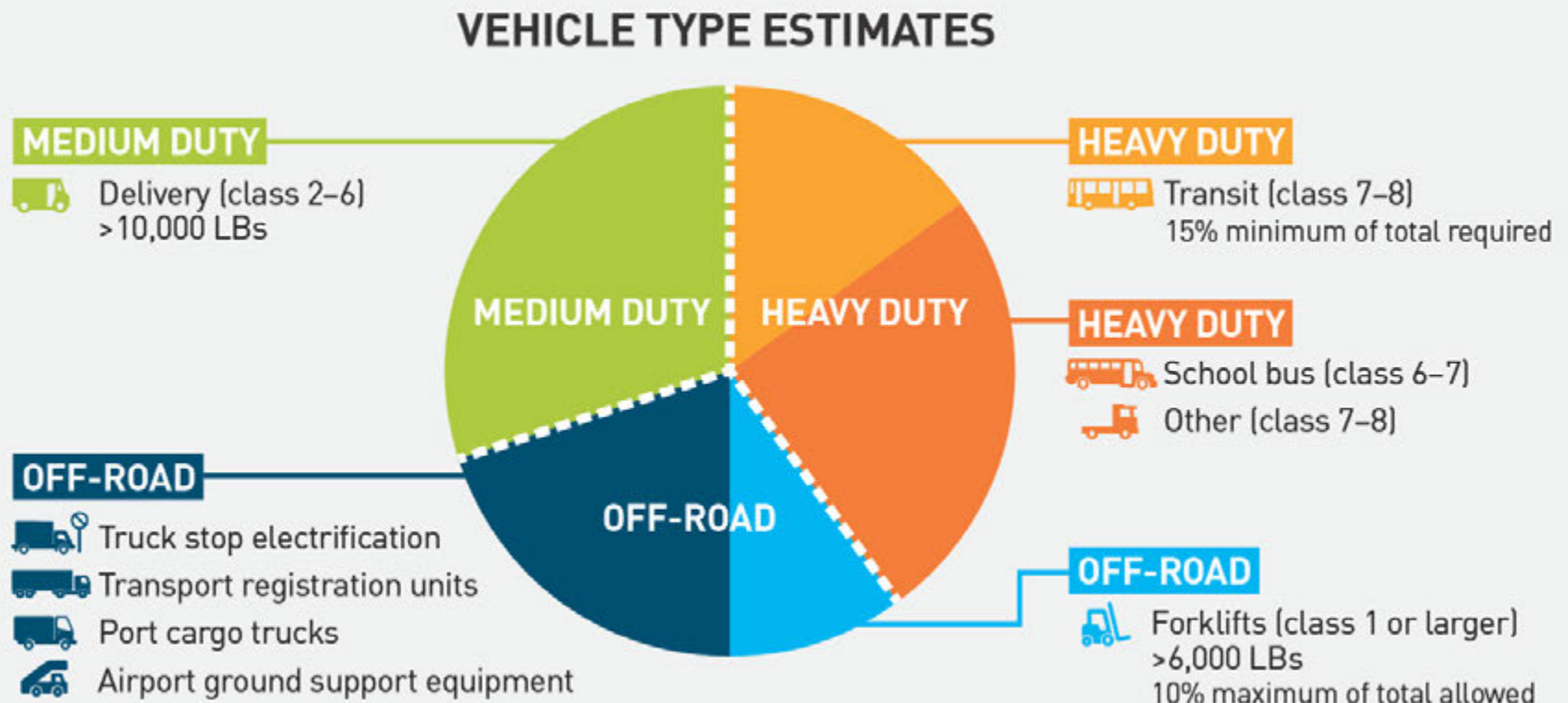
EXAMPLES:

Delivery vehicles, school buses, transit buses, and more...



EV Fleet vehicle sector mix

EV Fleet will target a diverse mix of medium- and heavy-duty vehicle types*

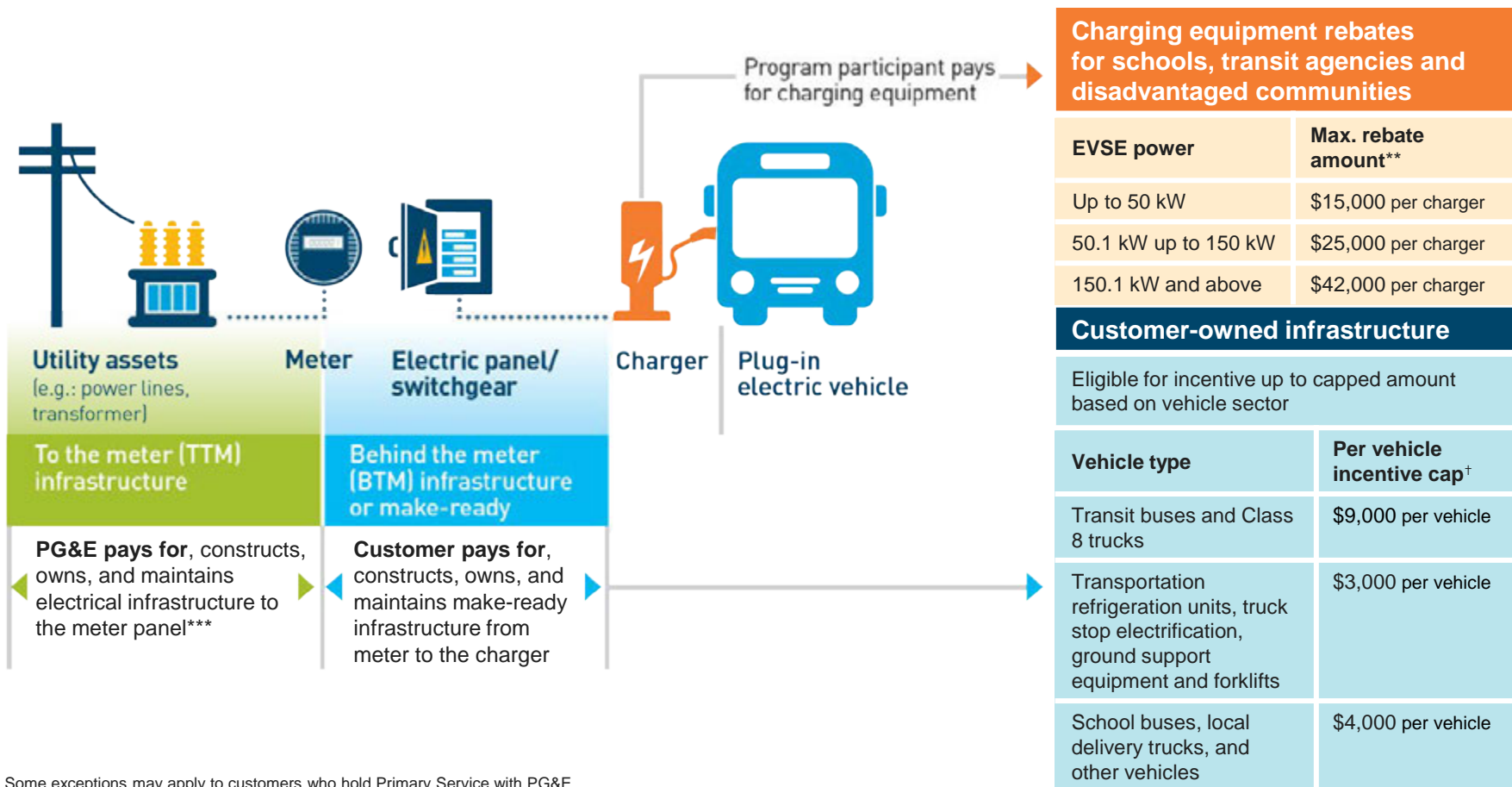


*Actual representation of vehicle types subject to vary based on program implementation, project costs, and market readiness



EV Fleet ownership—customer-owned

PG&E pays for infrastructure cost up to the customer meter



* Some exceptions may apply to customers who hold Primary Service with PG&E

** EVSE rebate amounts subject to change later in 2019 based upon EVSE RFQ. Rebate not to exceed 50% of charger equipment and installation costs. EVSE must meet minimum and standard requirements to be eligible for rebate

*** Customer-owned eligibility at PG&E discretion based on project scope and associated costs

† Limited to 25 vehicles per site; sites with more vehicles to be considered on an individual basis

How to prepare

What we need from **you**



Demonstrate commitment
to procurement of a minimum
of 2 electric fleet vehicles



Demonstrate long-term
electrification growth plan and
schedule of load increase



Provide data related to
charger usage for
a minimum of **5 years**



Own or lease the property
where chargers are installed, and
operate and maintain vehicles and
chargers for minimum of **10 years**

Ready to apply



1. Has a **Paid Vehicle Invoice, Approved Vehicle Grant**, or provides a **Letter from their Board/Owner, City Council**
2. Has a **vehicle and electrification plan**
3. **Knows location** for charger placement (Map)
4. Knows **charger company, model and size (KW)** (Datasheet)
5. **Secured funding** for out of pocket cost.
ie: Grants or Approved Budget
6. Has **leadership approval** for EV Fleet program participation

Commercial EV Rate Structure

Note: All rate values and proposals in this presentation are preliminary and should be considered directional. Rate proposals have not been approved by the CPUC.



Summary of Commercial EV Rate

PG&E has been approved to develop **new commercial EV rate plans** to support adoption of clean, electric vehicles

The EV rates **eliminate demand charges**, instead using a monthly subscription pricing model to enable:

- More affordable charging
- Simpler pricing structures
- Improved certainty and budgeting

PG&E designed two rates specifically for **fleets, fast charging, workplaces and multifamily dwellings** and will create a new rate class* for Commercial EV (CEV) charging:

CEV-Small

- Charging installations **up to 100 kW**, e.g. smaller workplaces and multifamily sites

CEV-Large

- Charging installations **over 100 kW**, e.g. fleets, fast charging, and larger sites
- Options for secondary and primary voltage service

* To enable new rates, EV charging must be separately metered from existing buildings and facilities



EV - Commercial rate structure (Large Secondary)

1) Customers choose subscription level, based on charging needs

Subscription Charge

\$95.56

/ 50 kW connected charging¹



Customers that want to **manage charging loads** can opt for a lower subscription level

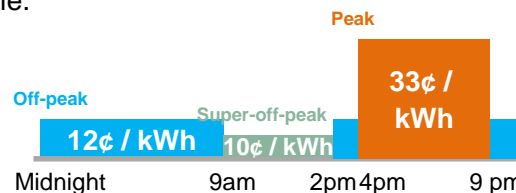
2) Subscription remains consistent month-to-month



If site charging power exceeds subscription, several customer communications are triggered.

3) Energy usage is billed based on time-of-day pricing (CEV-Large)

Energy Charge



Charging is cheapest mid-day, when PG&E has higher levels of renewable energy generation

Customers should avoid charging during peak hours from 4-9 p.m., when possible

1) Values above represent CEV-Large, secondary voltage rates. CEV-Small rate has a lower subscription charge (~\$12.41 per 10 kW connected charging)

-All rate values in this presentation are preliminary and should be considered directional. Rate values have not been approved by the CPUC.

EV Fleet electrification process

PRELIMINARY DESIGN (3-5 months)

FINAL DESIGN and EXECUTION (6-8 months)

- CUSTOMER TASK
- PG&E TASK



START

1 SUBMIT EV FLEET APPLICATION

Consult with your fleet OEM and/or electrical contractor to prepare and complete a PG&E EV Fleet program application pge.com/evfleetapp

1

6 SIGN CONTRACT

All parties review and approve the proposal. Contract is signed

6

5 PG&E ESTIMATE

PG&E calculates the time, effort and cost of your build-out (referred to as rough order of magnitude, or ROM)

5

CUSTOMER INFRASTRUCTURE DESIGN

Electrical contractor designs your charging system infrastructure behind-the-meter (BTM), which includes charging stations

2

3

4

PG&E INITIAL DESIGN

PG&E works with you and your electrical contractor on an optimal design

3 PG&E estimates how much electric capacity you'll need (referred to as a capacity check)

4 PG&E surveys your site and provides initial design of your to-the-meter (TTM) infrastructure build-out

7

7 CUSTOMER BEGINS BTM CONSTRUCTION PROCESS

Submit/obtain permit from local jurisdiction

8

8 PG&E FINAL DESIGN

PG&E finalizes TTM design

9

9 Construct electrical infrastructure behind the utility meter

10

10 Install EVSE/charging equipment

11

11 Complete municipal inspection(s)

12

PG&E TTM CONSTRUCTION

PG&E constructs utility infrastructure, installs meter and makes any necessary transformer upgrades

14

14 CUSTOMER COMMISSIONS EVSE EQUIPMENT

Ensure equipment is functioning as intended:

- Test EVSE for voltage
- Ensure connectivity to equipment manufacturer network

13

PG&E TURNS ON SERVICE

PG&E activates your service once inspections are complete

15

PG&E ISSUES QUALIFYING REBATES

COMPLETE



Thank you!

Dean Kunesh
D1KB@pge.com



Administered statewide by:

South Coast Air Quality Management District

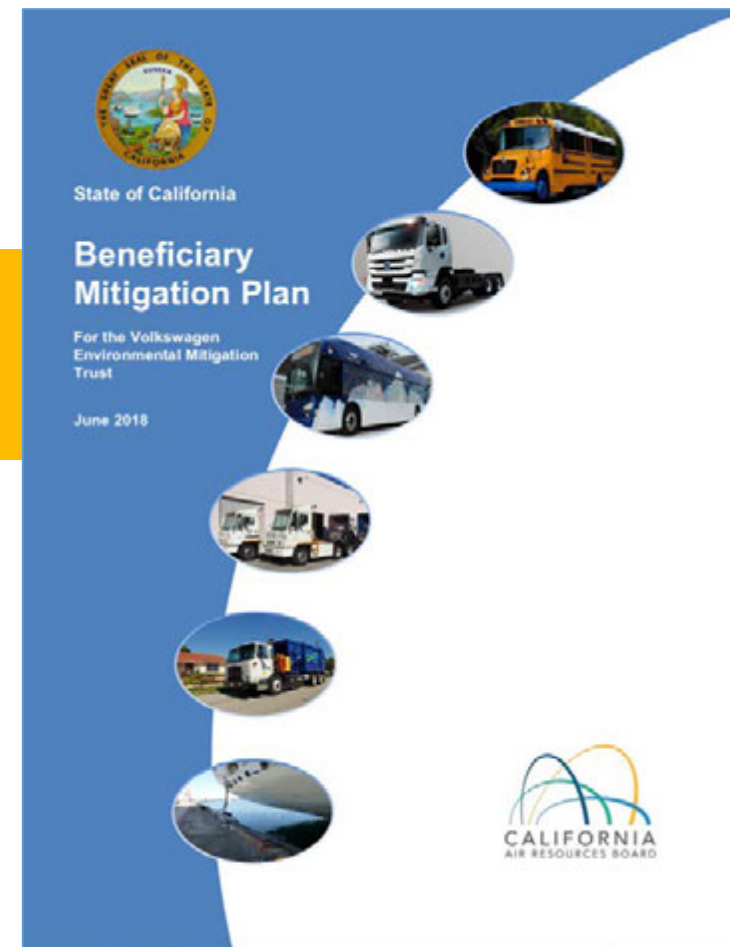
Bay Area Air Quality Management District

San Joaquin Valley Air Pollution Control District

Overview of the Volkswagen Environmental Mitigation Trust



| | | | |
|---|--|---|--|
| 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 | | UNITED STATES DISTRICT COURT NORTHERN DISTRICT OF CALIFORNIA | |
| | | IN RE: VOLKSWAGEN "CLEAN DIESEL" MARKETING, SALES PRACTICES, AND PRODUCTS LIABILITY LITIGATION | MDL No. 2672 CRB (JSC) |
| | | This Order Relates To: <i>United States of America v. Volkswagen AG et al.</i> , Case No. 16-cv-295 (N.D. Cal.) | ORDER GRANTING THE UNITED STATES' MOTION TO ENTER PROPOSED AMENDED CONSENT DECREE |
| | | In September 2015, Volkswagen publicly admitted it had secretly installed a defeat device—software designed to cheat emissions tests and deceive federal and state regulators—in certain Volkswagen- and Audi-branded turbocharged direct injection ("TDI") diesel engine vehicles. Litigation quickly followed, and hundreds of actions were soon centralized in the above-captioned multidistrict litigation ("MDL"). One of these lawsuits is an action brought by the United States Department of Justice ("United States") on behalf of the U.S. Environmental Protection Agency ("EPA") for violations of the Clean Air Act, 42 U.S.C. § 7401 et seq. | |
| | | After five months of intensive negotiations under the supervision of a Court-appointed Settlement Master, the United States; the People of the State of California, by and through the California Air Resources Board ("CARB") and Kamala D. Harris, Attorney General of the State of California (collectively, "California"); Volkswagen AG ("VW AG"); Audi AG; Volkswagen Group of America, Inc. ("VWGoA"); and Volkswagen Group of America Chattanooga Operations, LLC ("VW Chattanooga") (collectively, "Volkswagen") reached a Partial Consent Decree that resolves claims concerning the 2.0-liter TDI diesel engine vehicles. (See Dkt. No. 1605.) Now, just over one year after news of the defeat device became public, the United States moves for the entry of the proposed Amended Partial Consent Decree ("Consent Decree"). (Dkt. | |



Zero-Emission Transit, School, and Shuttle Buses

Eligible Projects and Funding Amounts

\$65M to Replace Class 4-8 Transit and Shuttle Buses

Transit Buses

Up to \$180,000

*For a new, commercially-available,
battery-electric bus*

Up to \$400,000

*For a new, commercially-available,
fuel-cell bus*

Shuttle Buses

Up to \$160,000

*To replace an eligible shuttle
bus with new, commercially-
available, zero-emission
technology*

- ✓ Total funding for this category is \$130 million, with the initial \$65 million increment available in 2020
- ✓ No more than 50% of available funds in each increment will be allocated to a single bus category
- ✓ Total cost per vehicle must not exceed 75% for non-government owned and 100% for government owned vehicles
- ✓ Stacking of VW funds with HVIP and other CARB funds not allowed

Zero-Emission Transit and Shuttle Buses

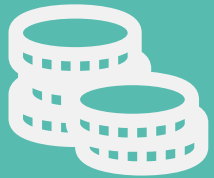
Key Points



Open to public and private organizations



First Come, First Served



**\$130M Total Funding
\$65M available in 2020**

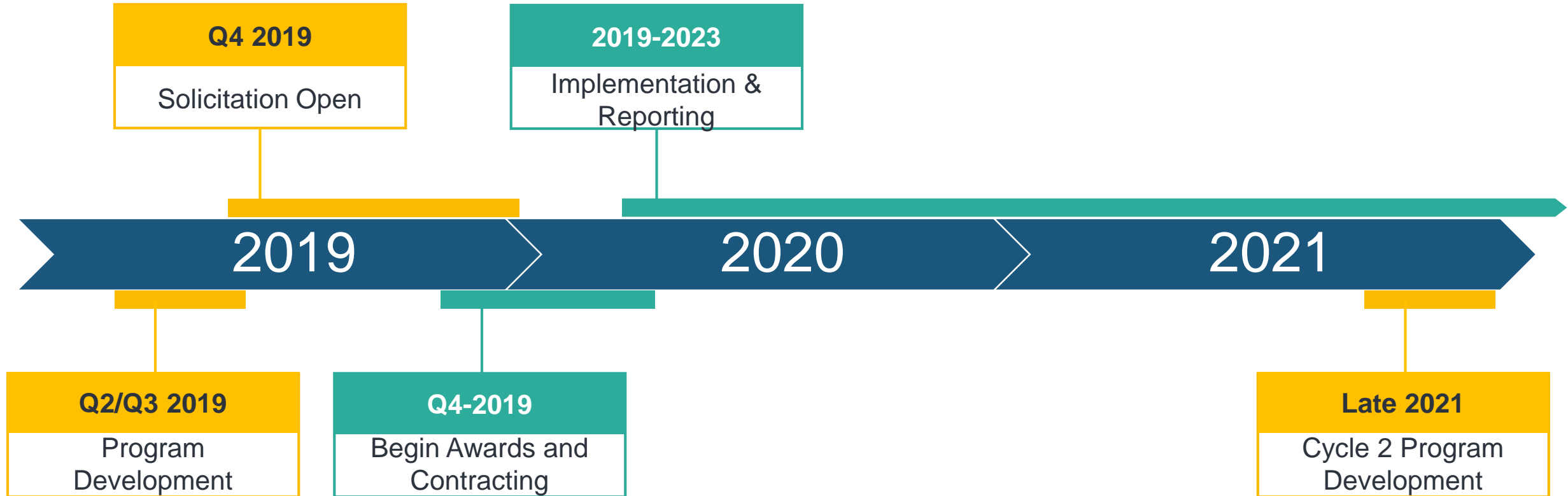


50% of funding to disadvantaged or low-income communities



Zero-Emission Transit and Shuttle Buses

Tentative Schedule



Zero-Emission Transit, School, and Shuttle Buses

Overview

- Applications must be submitted electronically through the online portal at <http://vwbusmoney.valleyair.org>
- Requirements for Old Bus (to be replaced)
 - Internal combustion engine (gasoline, diesel, CNG, or propane)
 - GVWR 14,001 or greater (Class 4 – 8)
 - Transit and shuttle buses must be 2009 or older
- Requirements for the New Bus (replacement bus)
 - Must be zero-emission (hydrogen fuel cell and battery electric-powered)
 - Listed on HVIP Eligible Vehicle List at www.californiahvip.org/
- Funding Limitation
 - The maximum funding expenditures per Entity, as determined by Tax Identification Number, is \$3,250,000
- Contract is required prior to beginning project, with three (3) year annual report
- Funds are disbursed upon verification of project completion (reimbursement)

Grantee Reporting and Operational Requirements



Inspections

Make old and new engine / vehicle available for inspection



Operations

Operate the “grant-funded” engine / vehicle in accordance with the contract



Payment

Submit request for grant funds AFTER receiving award and completing project



Reporting

Submit annual reports for the term of the contract (expected 3 years)



Scrapping

Scrap an older engine / vehicle and replace it with the “grant-funded” engine / vehicle

Heavy Duty Alternative Fuel Infrastructure

- Open to public and private entities through a competitive Request for Proposals (RFP) process (Next RFP TBD)
- Eligible categories include
 - Alternative Fueling Station such as L/CNG Natural Gases and Hydrogen
 - Battery Charging Station - level 2 and higher to support heavy-duty vehicles
- ***Maximum Percentage of Eligible Costs: Not to exceed \$1 million per project***

| Maximum Percentage of Eligible Cost | Project Types |
|-------------------------------------|--|
| Up to 40% | Baseline maximum for all projects |
| Up to 50% | Publicly Accessible Projects |
| Up to 90% | Public School Buses – Battery Charging and Alternative Fueling |
| Up to 90% | Any Project Located at a Sensitive Receptor (schools, hospitals, and other locations) |
| +10% | Additional Incentive for Projects Primarily Fueling Class 7/8 Heavy Duty Trucks serving a Port, Railyard, or Freight Facility (not to exceed 100% of eligible project costs) |

Public Benefit Grants Program

New Alternative Fuel Vehicle Purchase

- The San Joaquin Valley Air Pollution Control District (SJVAPCD) is currently accepting applications on a first-come, first-serve basis from valley public agencies and eligible community action agencies requesting funding for the purchase of new alternative-fuel vehicles.
- Eligible vehicle must be a new electric, plug-in hybrid, or alternative fuel vehicle with a Gross Vehicle Weight Rating (GVWR) less than or equal to 14,000 pounds.
- Law enforcement agencies may apply for pursuit-rated hybrid police vehicles.
- Funding:
 - \$20,000 maximum for each new vehicle
 - \$100,000 maximum funding amount per calendar year per agency
- For additional information please contact program staff at (559) 230-5800 or visit our website at <http://valleyair.org/grants/publicbenefit.htm>
- A list of eligible on-road vehicles is available on our website.

Contact Information

Questions regarding the Clean Vehicle Fueling Infrastructure Program:

Call or email SJVAPCD Incentives Department:

Attn: David Lopez or Jocelyne Mejia

559-230-5800

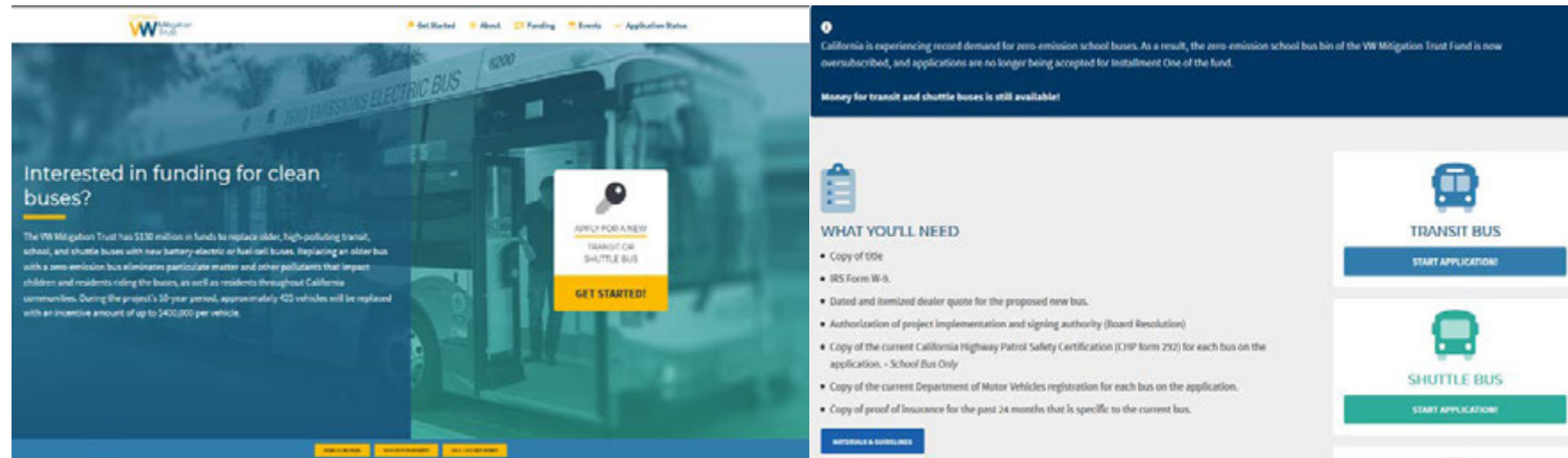
grants@valleyair.org

- ❖ Ask for the Clean Vehicle Fueling Infrastructure Program Staff
- ❖ Sign up for SJVAPCD E-mail notifications at <http://valleyair.org/lists/list.htm>

Questions and Contact

Contact us at...

- <http://vwbusmoney.valleyair.org>
- Email General Inquiries to vwbusmoney@valleyair.org
- Sign Up for Updates at http://lists.valleyair.org/mailman/listinfo/vw_mitigation_trust_busmoney
- Call us at 1-833-Bus-Money
- Questions?





Lightning
Systems

Kern Council of
Governments' Transit
Symposium
2/27/2020



30 MILLION URBAN TRUCKS AND BUSES

20%

of total greenhouse
emissions

3.7M

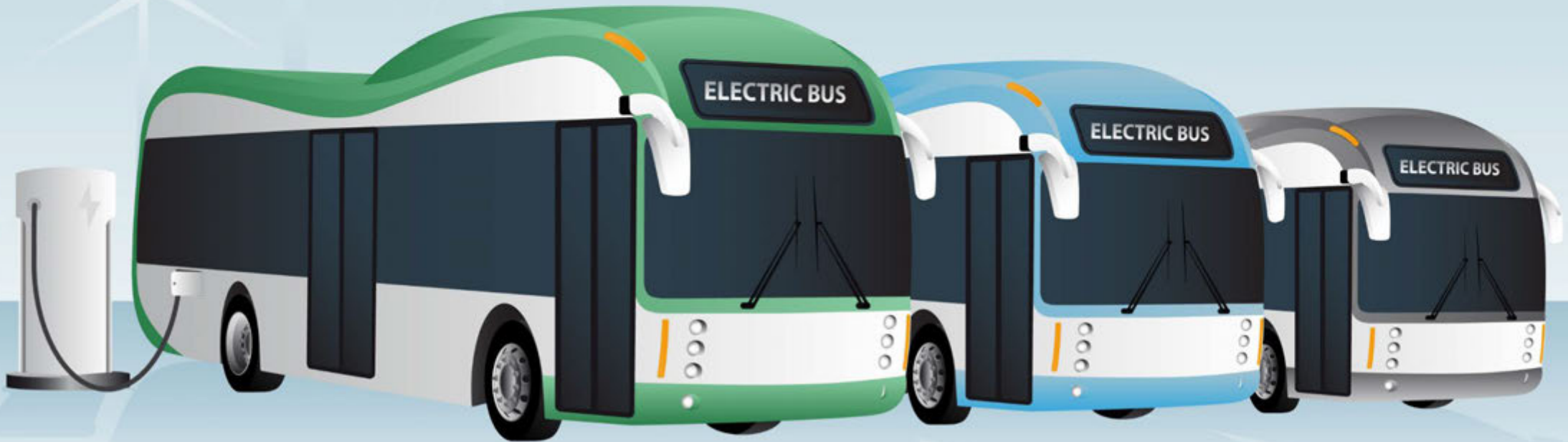
premature deaths due
to urban air pollution

A GLOBAL CRISIS
that can only be addressed by **ZERO EMISSIONS VEHICLES (ZEVs)**

Sources: EPA (greenhouse emissions), World Health Organization (premature deaths) Lighting Systems

DRIVING ELECTRIFICATION

- Electrification brings:
 - Dramatic noise reduction (for both outside the vehicle and passengers)
 - Air Quality and human health
 - Climate change
 - More control and optionality around energy and resiliency



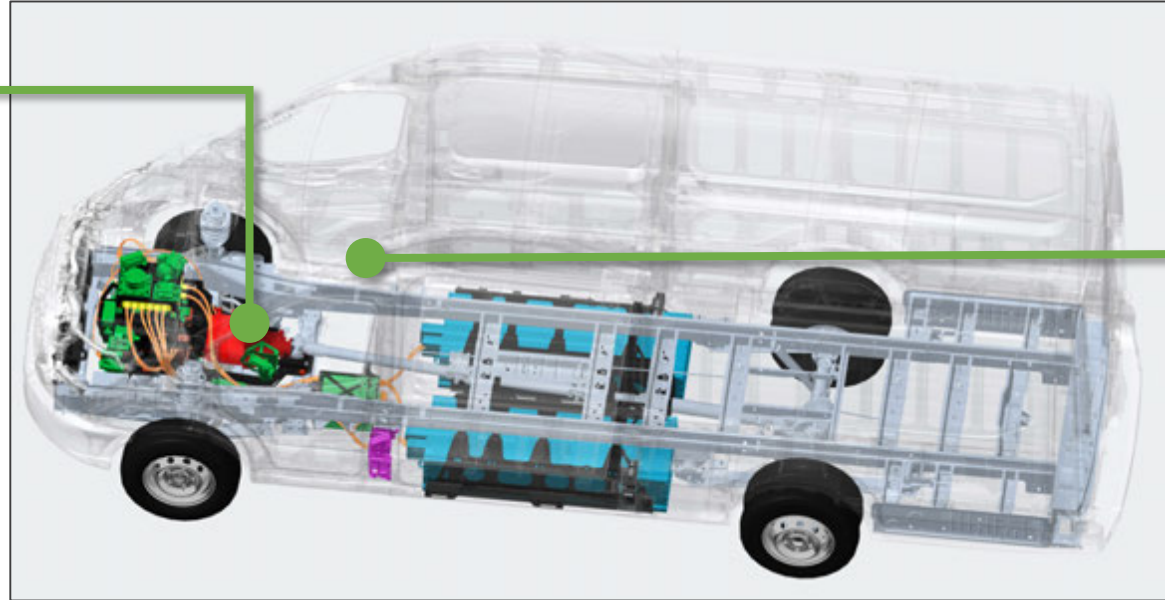
TRANSFORMING ESTABLISHED OEM TRUCKS AND BUSES INTO PREMIUM COMMERCIAL ELECTRIC VEHICLES



EV POWERTRAIN

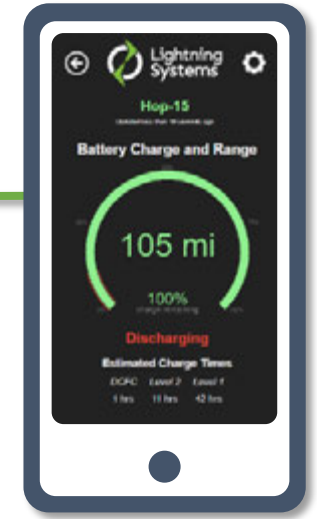
High quality, integrated system that's easy for upfitters to install

Focus on the Heart and Brain of Electrification



EV SOFTWARE

Advanced algorithms, controls, and integration



EV ANALYTICS

Actionable fleet intelligence

Engineered with custom and off-the-shelf components

Proprietary deep integration with OEM vehicle

Critical to fleet range and ROI

THE ESTABLISHED TECH PROVIDER FOR EV FLEETS

\$55M Invested
BY LEADING COMPANIES



+10 Years
OF INDUSTRY EXPERIENCE



50+ Fleet Customers
WORLDWIDE



UNPARALLELED ZEV CAPABILITIES

Engineering, Integration, and Commercialization of ZEV Technologies

ELECTRIC POWERTRAINS FOR CLASS 3-8 VEHICLES

| | Convert NEW Vehicles | | | Repower EXISTING Vehicles | | |
|--------|---|--|---|---|--|--|
| | Class 3 | Class 4 | Class 5 | Class 6 | Class 7 | Class 8 |
| TRUCKS | Ford Transit 350HD  | Ford E-450  | Ford F-59  Ford F-550  | GM 6500XD  | | |
| BUSES | Ford Transit 350HD  | Ford E-450  | Ford F-550  | | Transit Bus Repower  | Transit Bus Repower  |



CARB Certified

Enabled and supported by



and their dealer networks

WE'RE SETTING THE NEW STANDARD FOR FLEET VEHICLES

Impressive *PERFORMANCE* to Thrill Any Driver

Faster Full
Torque
at 0 RPM

+

Shorter Braking
Distance

+

Little Or No
Noise

+

Hill Hold and
Creep

+

Intuitive
Controls

Smart and Economic *PERFORMANCE* to Please the CFO

Top Efficiency in
Every Class
**Improved 400%
over ICE**

.....

Regen Braking
**Safety
and Savings**

.....

No Oil, No DEF
70% Less Service

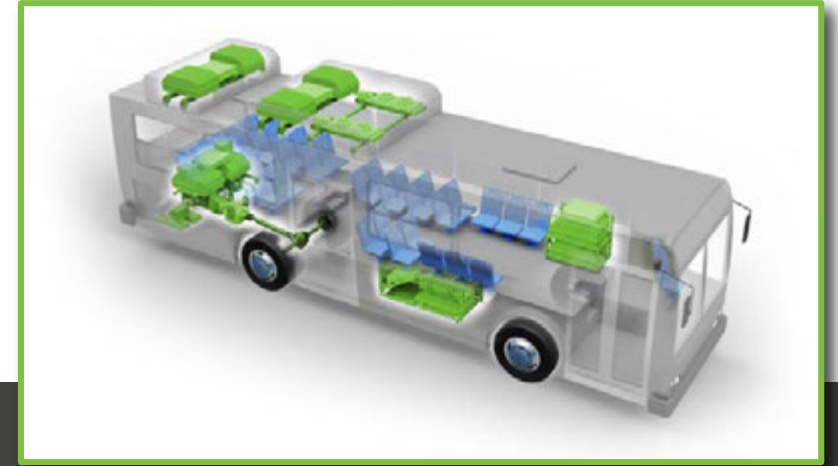
.....

Zero Emissions
**Always in
Compliance**

.....

DC Fast-Charge
**to Minimize
Infrastructure**

BROAD APPLICABILITY: NEW AND EXISTING COMMERCIAL VEHICLES



Convert **NEW** Vehicles

Shuttle buses
Delivery/work trucks
Short haul trucks

VEHICLES

Repower **EXISTING** Vehicles

Shuttle buses
Transit buses
Delivery/work trucks

Lower vehicle TCO than gas or diesel

ECONOMICS

Up to 75% less expensive than new ZEV

Near OEM chassis plant

UPFITTER LOCATION

Near customer deployment location

LIGHTNING ANALYTICS

Accurate and Actionable Reports delivered by Fleet Experts



INCREASE RANGE



**PREVENTATIVE
MAINTENANCE**



**IMPROVE DRIVER
BEHAVIOR**



**DEDICATED
FLEET EXPERTS**



**NO SECURITY
RISKS**

AI-ENABLED ANALYTICS HELP WITH FLEET AND DRIVER MANAGEMENT



- Increase range
- Optimize routes
- Reward/correct behavior

 **Lightning Systems**

Secure, customizable reports that **INTEGRATE** with existing fleet management programs

LIGHTNING ANALYTICS PROVIDE DEEP EV INSIGHTS

Daily Report (August 14th, 2018)



Route Chart (SoC indicated by color, Green is full SoC, Red is SoC Low Light On)

50% Greater Efficiency

LS Class 3 Competitors
1.8 mi/kWh 1.2 mi/kWh
(official CARB test data)

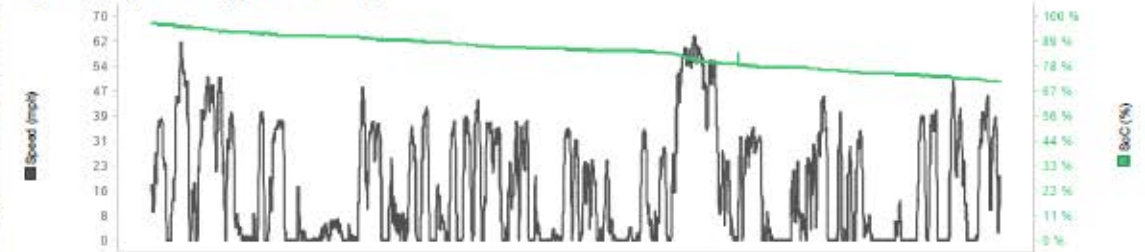
Machine Learning Optimization:

- HVAC energy use
- Acceleration & Route
- Regenerative Braking
- Driver training

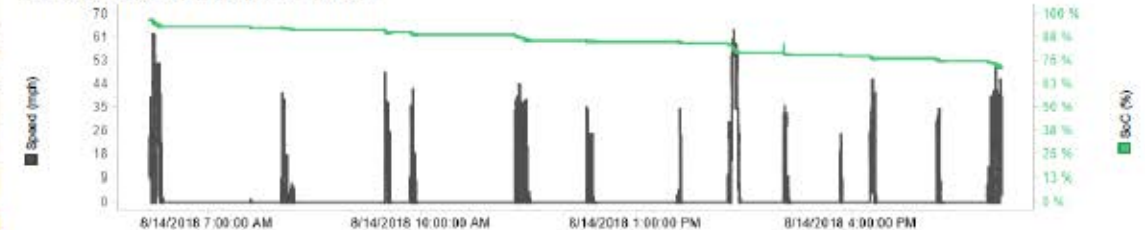
50 vehicle parameters at 1Hz
= 260M DataPoints/veh/day



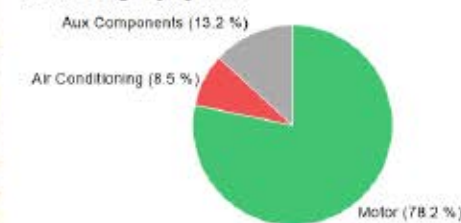
Speed (mph) and SoC (%) while Moving



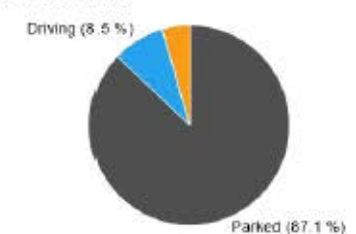
Speed (mph) and SoC (%) over Full Day



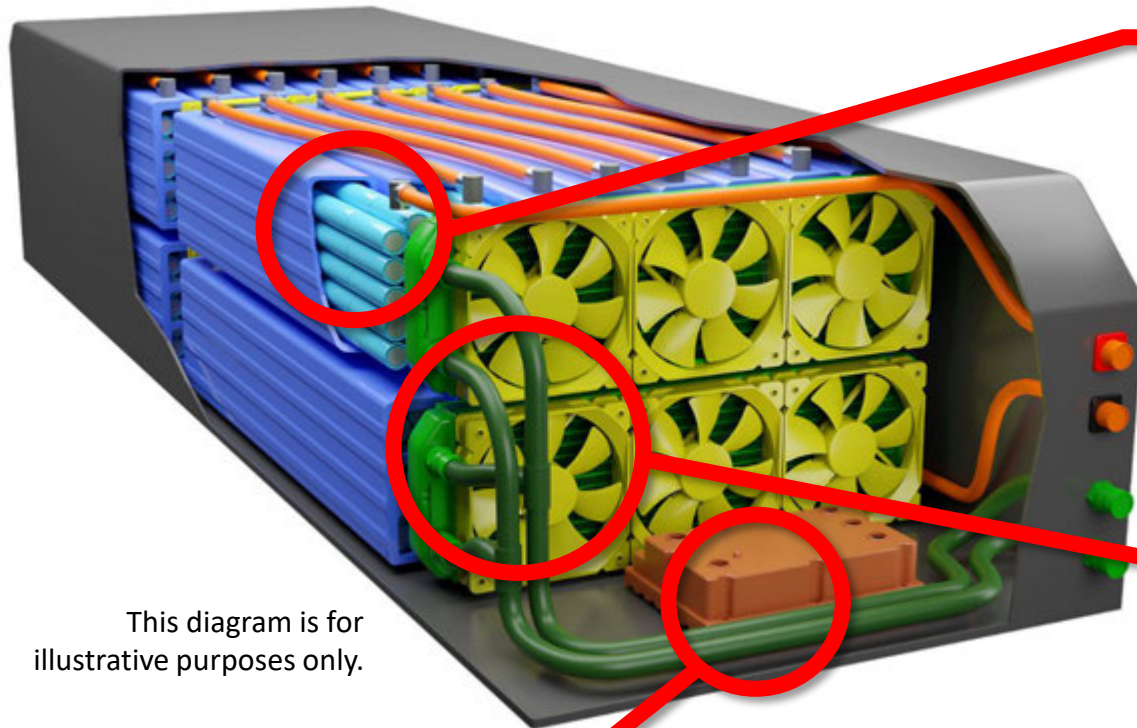
Power Usage by Systems



Route Time Distribution



LIGHTNING SELECTS ONLY THE BEST BATTERIES



This diagram is for illustrative purposes only.

Battery Management

- Lightning Systems' electric drivetrains incorporate **sophisticated software and hardware controls** at all levels.
- **Battery controls** manage state-of-charge including cell balancing.
- Supports **AC charging and DC Fast Charge**. (Most other vendors don't offer DC Fast Charge.)

Premium battery cells

- **High-quality** 18650-type Li-ion cells from a major electronics OEM.
- The same cells are used in EVs from most **major US and European car manufacturers**.
- Nickel-Manganese-Cobalt (NMC) technology provides **great range and reliability**.
- **Internal safety features** prevent over-current conditions.

Thermal Management

- Batteries have an optimal operational temperature range for **maximum range and performance**.
- It also extends the battery's operational life from **just one year to seven years or more**.
- Lightning's thermal management system is one of the **most sophisticated in the industry**. It automatically...
 - cools to ambient temperatures (radiator)
 - cools below ambient temperatures (chiller)
 - heats above ambient temperatures (heater)

SELF-CONTAINED POWERTRAIN KIT

A Swap-In Replacement for the ICE

- The kits shown here are Ford Transit EV upfits.
- One sled carries the electric motor, the integrated transmission, the inverter and accessories such as power steering pump and AC compressor.
- Mounts in the vehicle on the existing engine mount points and mates with the driveshaft.

BENEFITS TO THE BOTTOM LINE AND BEYOND



Save on fuel & fueling time



Dramatically more vehicle uptime with no emission testing, no oil changes, no DPF maintenance



Zero emissions means cleaner air in communities you serve



Fewer parts and a well-engineered powertrain mean lower maintenance costs



Significant savings on operating costs



Regenerative braking dramatically reduces brake wear

BUY AMERICA and BUY AMERICAN

Federal funding requirements for preferring US-manufactured goods.



This program relates to **federally-funded transit projects**. The requirement is that a minimum of 65% of the components of the product must be produced in the USA. Our analysis for our E-450 conversion shows 83.3% domestic-produced components (by cost).

<https://www.transit.dot.gov/buyamerica>

https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/Buy_America_Fact_Sheet.pdf



This program relates to federal funding of **Airport Improvement Programs**. It asserts a preference for 100% American-sourced products; however, there are provisions for waivers if certain requirements are met. We meet the two requirements for one of the waiver provisions:

- At least 60% US-produced components
- Final assembly in the US

https://www.faa.gov/airports/aip/buy_american/

BATTERY ELECTRIC FORD TRANSIT 350HD

- Battery-electric vehicle
- Smooth, quick and quiet
- Best efficiency of any Class 3 van
- Elegant cabin integration with batteries fully under the floor
- 3rd party dynamometer-certified 120-mile range
- CARB and HVIP certified
- Ford eQVM certified: Ford vehicle warranty and matching Lightning powertrain warranty for complete coverage
- Installation, maintenance and service performed by certified partners
- LightningAnalytics gives insight into usage and efficiency
- Available New or Repower

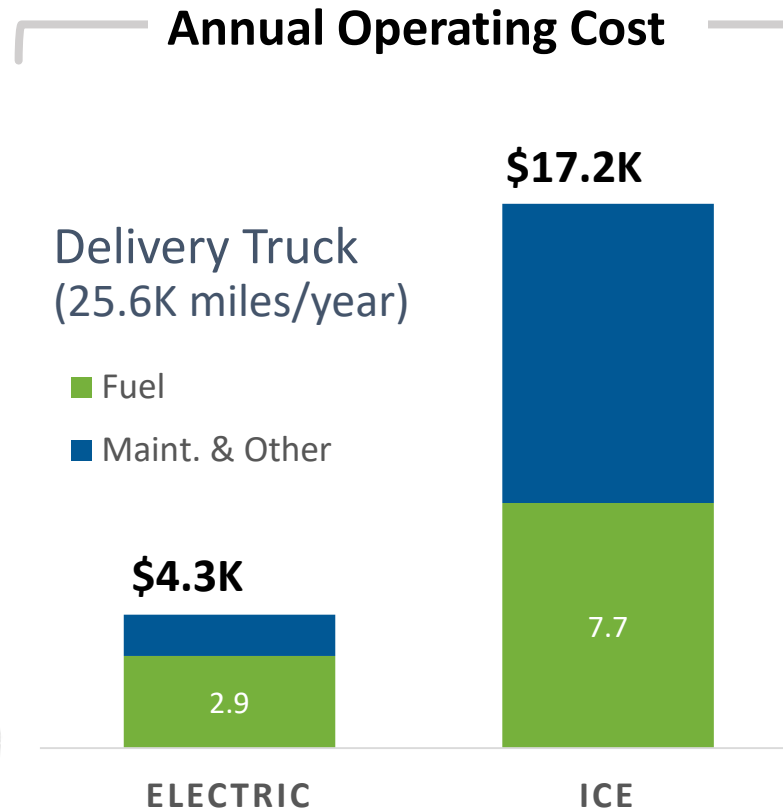


COMPELLING ECONOMICS

IMMEDIATE MONTHLY OPERATING SAVINGS AND ATTRACTIVE ROI VS. ICE



Transit 350HD



| ROI in California today | | |
|-------------------------|-----------|-----------|
| | Cargo | Passenger |
| HVIP voucher/grant | \$55,000 | \$80,000 |
| Powertrain Price | \$99,000 | \$99,000 |
| NET price | \$44,000 | \$19,000 |
| Savings/year vs. ICE | \$13,000 | \$15,000 |
| ROI | 3.4 years | 1.3 years |

- **+\$13-15K** / Year in Savings per vehicle
- ROI of **1.3 to 3.4** years with grant

* Maintenance includes: Labor cost of fueling, incremental insurance costs (for EV), oil change/inspection, and brake service

BATTERY ELECTRIC FORD E-450



35
MPGe



- Battery-electric vehicle
- Smooth, quick and quiet
- Elegant cabin integration with batteries fully under the floor
- Ford eQVM certified: Ford vehicle warranty and matching Lightning powertrain warranty for complete coverage
- Installation, maintenance and service performed by certified partners
- LightningAnalytics gives insight into usage and efficiency
- Available New or Repower



LIGHTNING EV COST SAVINGS

| Savings Analysis for Ford E-450 Shuttle | | |
|--|----------------|---------------|
| | Gasoline | Electric |
| Miles per year | 32,850 | 32,850 |
| Fuel economy (MPG and M/kWh) | 6 | 1 |
| Cost of fuel (\$/gallon and \$/kWh) | 3.95 | 0.15 |
| Total brake and oil/inspection costs (\$/Mile) | 0.148 | 0.022 |
| | | |
| Fuel and maintenance cost per month | \$2,207 | \$306 |
| EV incremental lease price per month | \$0 | \$518 |
| Total Cost per Month | \$2,207 | \$824 |

Lightning Electric Shuttles have a much lower TCO than Gasoline vans

CONSIDER REPOWERING : AN ALTERNATIVE TO BUYING NEW



REDUCE

vehicle & operating costs
immediately while
eliminating fuel use and harmful
vehicle emissions



REUSE & RECYCLE

your legacy assets made
green, extending vehicle life
and eliminating additional waste



Repowers are eligible for CA HVIP
vouchers and other grants through US

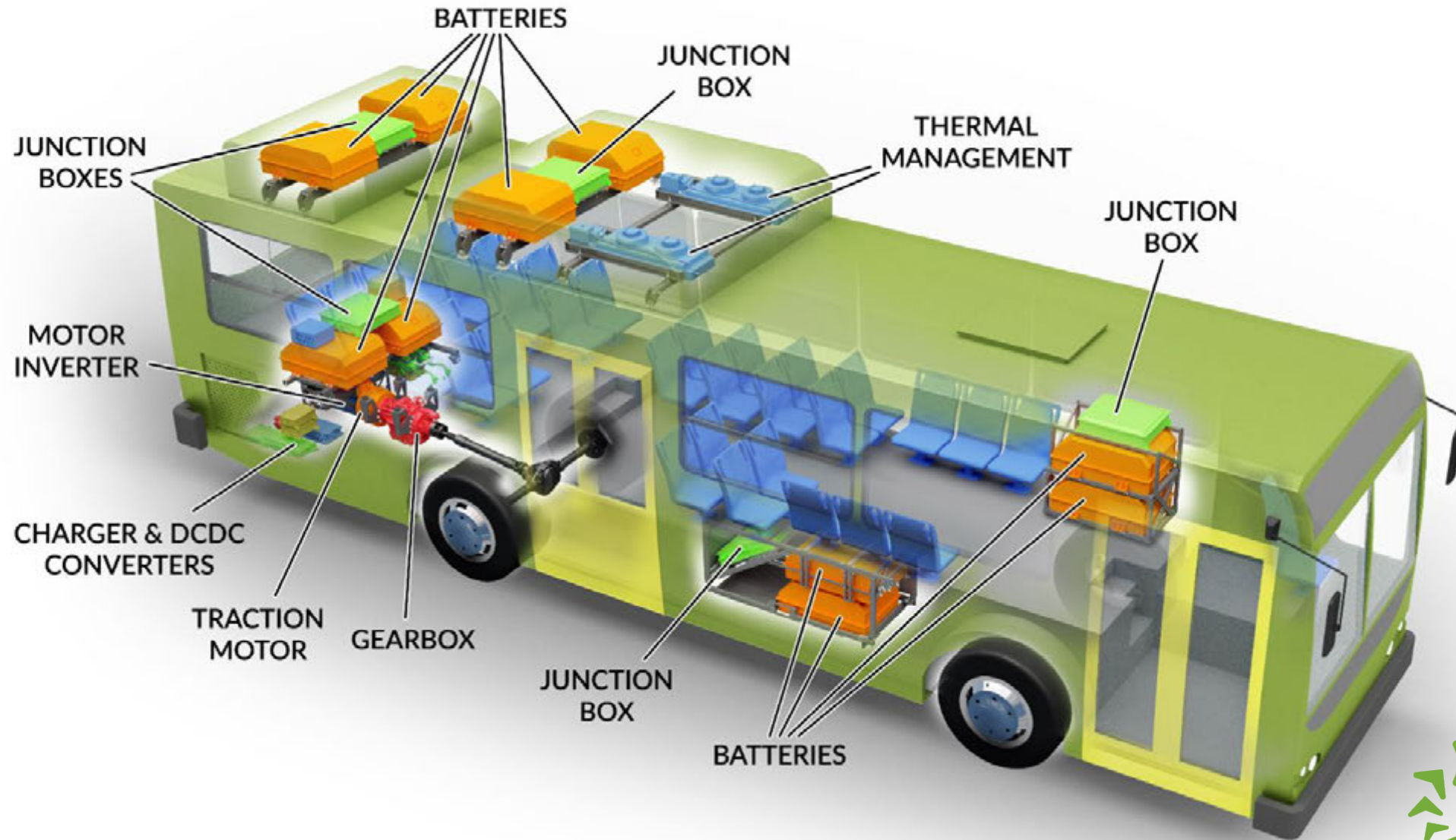


REPOWER: AN ALTERNATIVE TO BUYING NEW

- Repower existing fleet vehicles with Lightning's cutting-edge ZEV powertrain
- Keep the bus you & your mechanics are familiar with
- Refurbish vehicles to upgrade to current safety & cosmetic standards
- Creates new ZEV vehicles that meet looming mandates
- Less expensive than a new bus
- Quick lead time (new ZEV vehicles have 18-24 month waiting list)



CITY BUS REPOWER POWERTRAIN CONFIGURATION

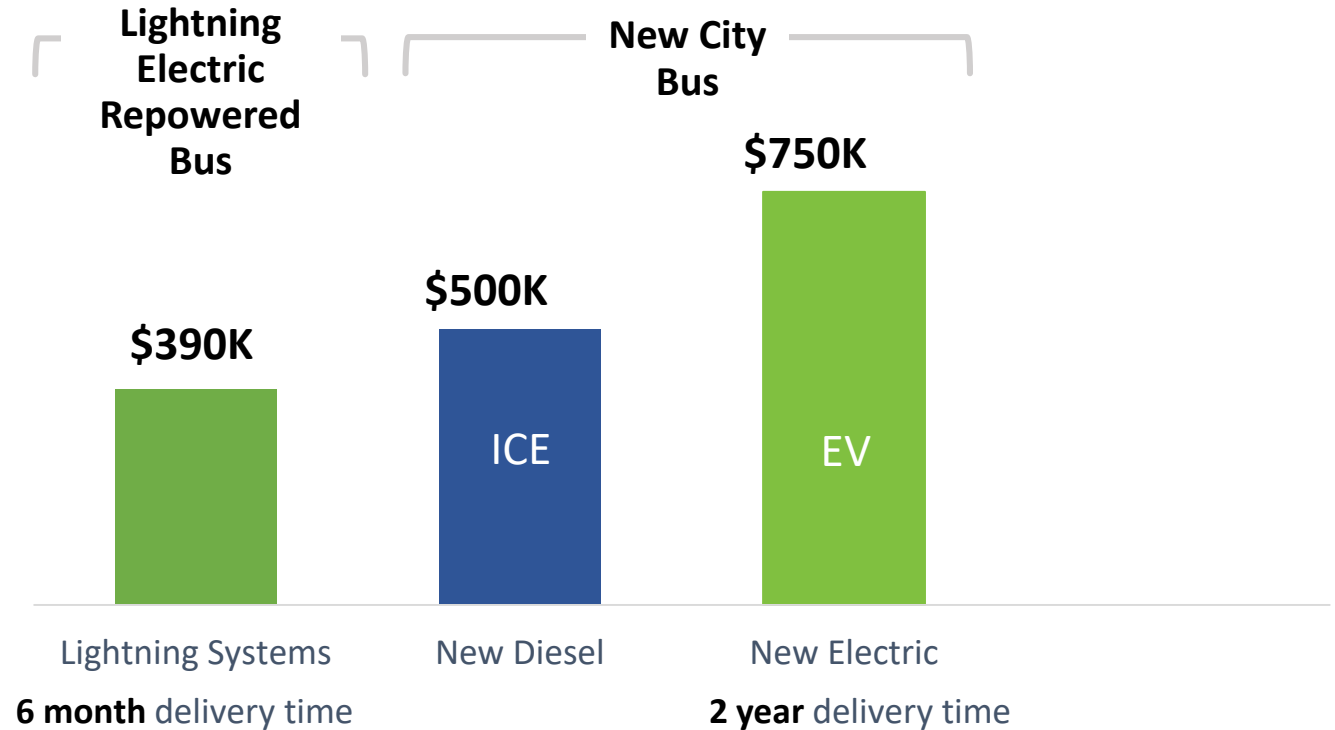


COMPELLING ECONOMICS: REPOWER EXISTING VEHICLES

\$1B CALIFORNIA CITY BUS REPOWER OPPORTUNITY



Proven success in
Repowering Transit
Buses in Boulder,
CO



- ICE buses serve 20 yrs, but need a new powertrain every 7 yrs
- California legislation mandates 100% EV by 2029 – in 10 years



- CA requires 1,500 E-buses/year for 10 years
- US E-bus manufacturers produce 400/year today
- Lightning provides a solution for half the price



LIGHTNING SYSTEMS ENERGY SOLUTIONS

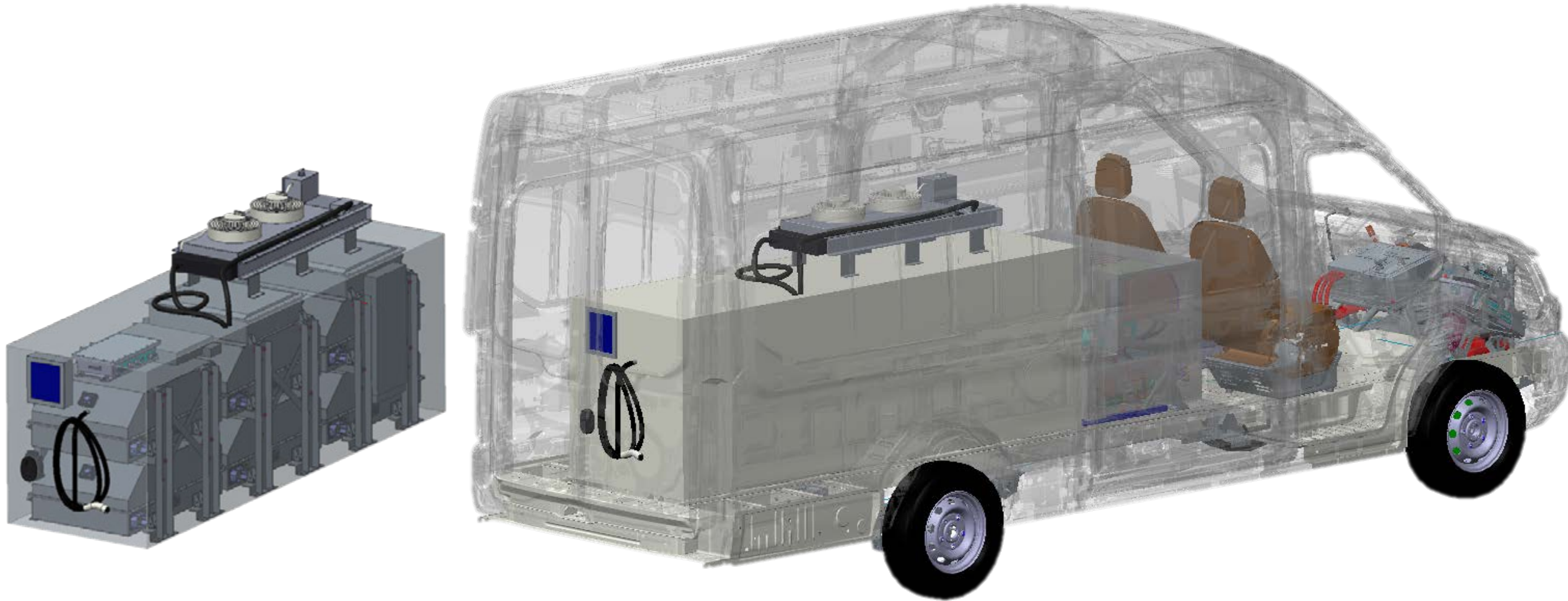
A COMPREHENSIVE SOLUTION TO CHARGING YOUR VEHICLES

- Charging the vehicles requires a comprehensive solution of both software and hardware to ensure economical and technical requirements are met
 - Lightning Systems offers a comprehensive range of charging stations (Level 2 AC, DC Fast Charge)
 - We have a partner that can help you implement EV charging from soup to nuts
 - We can provide a sophisticated charging management software solution
- Many agencies will benefit from distributed energy generation and looking beyond utilities



LIGHTNING SYSTEMS MOBILE VEHICLE BATTERY CHARGER FOR MOBILE FAST CHARGING AND LOT CHARGING

LEVEL 2 IN—DCFC OUT



WHAT CAN WE DO TOGETHER TO DRIVE BROADER ADOPTION?

- City ZEV Zones
 - City councils can mandate zero emission vehicles in their cities and create revenue streams for noncompliance that can be used for transit agencies
- More microtransit
 - City of Porterville –12 new vans replacing one bus
 - Financing -- The transition from low capital acquisition cost and high operational costs to high capital acquisition and low operational cost can be accelerated through long term financing such as vehicle leasing, battery leasing, and vehicle as a service financing models



LET'S TALK ABOUT YOUR FLEET NEEDS

Speak with our experts about funding for vehicles and chargers

Available NOW



Available NOW



Available NOW



Available NOW



- Call: 1-800-223-0740
- Email: Info@lightningsystems.com
- Visit: 815 14th Street SW, Suite A100, Loveland, CO 80537
- Offices also in San Francisco & San Diego



Lightning Systems

Fleets Powered by Lightning

Tim Reeser





Fresno City College





Fresno City College



While the other guys are charging over

\$45,000 +

for their program (ouch),

Fresno City College beats the other guys HANDS DOWN.

- **An Associate's Degree or Certificate of Achievement**
- **ASE Certification**
- **ASE Education Foundation Hands on Experience**
- **Contract Education/Fleet Training**

Fresno City College costs

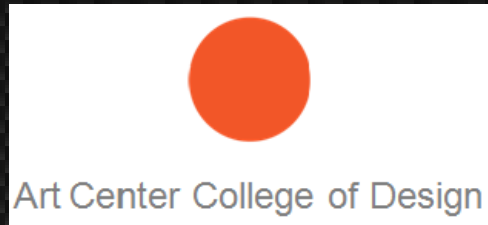
\$6000.

With books. And lab fees.

No, we're not kidding.

**An Associate's Degree of Applied
Science, ASE Certification, and a **REAL**
CAREER in a Dealership/Fleet.**

Your Associates of Science degree transfers to...



FRESNO STATE



**With Fresno City College's 2 plus 2 program,
furthering your education is EASY.**



**We have many outlets for financial aid,
including FAFSA, a government agency
dedicated to scholarships and grants for college
students. One application, MILLIONS in
financial aid!**

Internships?

A Job?

A Career?

**Meet our industry
partners...**

GENERAL MOTORS

ASEP

AUTOMOTIVE SERVICE EDUCATIONAL PROGRAM



CHEVROLET



BUICK

ACDelco[®]

GMC





LOCAL



Jeep



SUBARU





TOYOTA

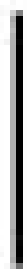


TECS

(Technical Education College Support)

ELITE

PROGRAM



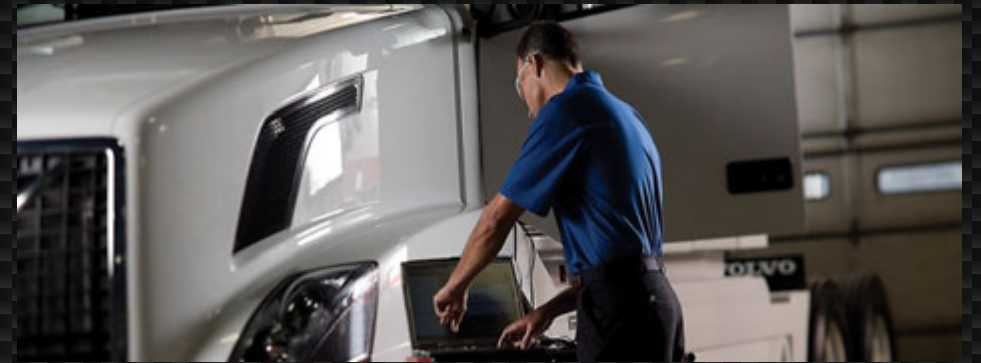
L I N C O L N

ACE

Automotive Career Exploration



AFFINITY TRUCK CENTER





| **Education Foundation**

(Formerly NATEF)



Fresno City College

Dual Enrollment with Local Area High Schools

- ASE Education Foundation – Tier 1 (Inspection, Maintenance, & Minor Repair - IMMR) for Local Area High Schools (Diesel)
- ASE Education Foundation – Tier 1 (Maintenance & Light Repair - MLR) for Local Area High Schools
- Create an Educational Pathway for Automotive/Diesel Technology High School students



Fresno City College

WE NEED YOUR PARTNERSHIP!

- Dual Enrollment with your Local Area High Schools and the FCC Automotive/Diesel Technology Program
- Create an Educational Pathway for Automotive/Diesel Technology High School students to the FCC Automotive/Diesel Technology Department
- Scholarships 501(c)3: Affinity Truck Center, Volvo/Mack, Central Valley: GM, FCA, Subaru, Toyota, Ford Dealers/Fleets



Fresno City College

SPONSOR! SPONSOR! SPONSOR!

- Tool and Equipment Incentives: MDI 2, Snap-On, Matco
- On the Job Training => GM CoL => MIT => GM Boot Camp => GM START => GM ASEP
- Pay Plan for completion of GM Training Paths
(Example: Fundamentals @ 45 Hours)
- GM ASEP Student = GM STS 80%-85%



Fresno City College

SPONSOR! SPONSOR! SPONSOR!

- Tool and Equipment Incentives: wiTECH, Laptops, Snap-On, Matco
- On the Job Training => DealerCONNECT, FCA Performance Institute
- Pay Plan for completion of FCA Levels
- Mopar CAP Student = Level 0, 1, *2, *3

(*Must be FCA Dealer Sponsored to acquire these Levels!)



Fresno City College

SPONSOR! SPONSOR! SPONSOR!

- Tool and Equipment Incentives: Scan Tools, Laptops, Snap-On, Matco
- On the Job Training => OEM LMS (Learning Management System – Subaru, Toyota, Ford)
- Pay Plan for completion of Levels
- FCC Automotive Technology Student



Fresno City College

SPONSOR! SPONSOR! SPONSOR!

- Tool and Equipment Incentives: Scan Tools, Laptops, Snap-On, Matco
- On the Job Training => OEM LMS (Learning Management System – Volvo/Mack)
- Pay Plan for completion of Levels
- FCC Diesel Technology Student



Fresno City College

CONTRACT EDUCATION

- Fleet Training
- SCRTTC (So. CA Regional Transit Training Consortium) Training
- ETP (Employment Training Panel) Training
- ATL (Advanced Transportation & Logistics)
- NAFTC (National Alternative Fuels Training Consortium) Training



Fresno City College

CONTRACT EDUCATION (Continued)

- AFV (Diesel, LPG, CNG) Training
- ATV (HEC, BEV, PHEV) Training
- National Institute for Automotive Service Excellence (ASE) Training/Preparation
- Drivability and Emission Control Systems
- Electrical Diagnosis –
Basic/Intermediate/Advanced

Motor Age Training

www.PassTheAse.com

800-240-1968





Snap-on



Fresno City College



Coming June 2022

Fresno City College – West Fresno Campus





Fresno City College – CTE / ATC



- Legend:**
- | | |
|--|---------------------------------|
| 1 - Monument Signage | 10 - Exercise Station |
| 2 - Advanced Transportation Center (ATC) | 11 - Bioswale |
| 3 - Academic Center | 12 - Secured Parking |
| 4 - Pedestrian Plaza | 13 - Dedicated Police Parking |
| 5 - Fountain | 14 - Phase I Parking |
| 6 - Gazebo | 15 - Phase II Parking Expansion |
| 7 - Food Truck Area | 16 - Phase III Parking |
| 8 - Pedestrian Path | 17 - Future Building |
| 9 - Bike Path | 18 - City of Fresno Bike Path |
| | 19 - Connection to Community |



West Fresno Campus

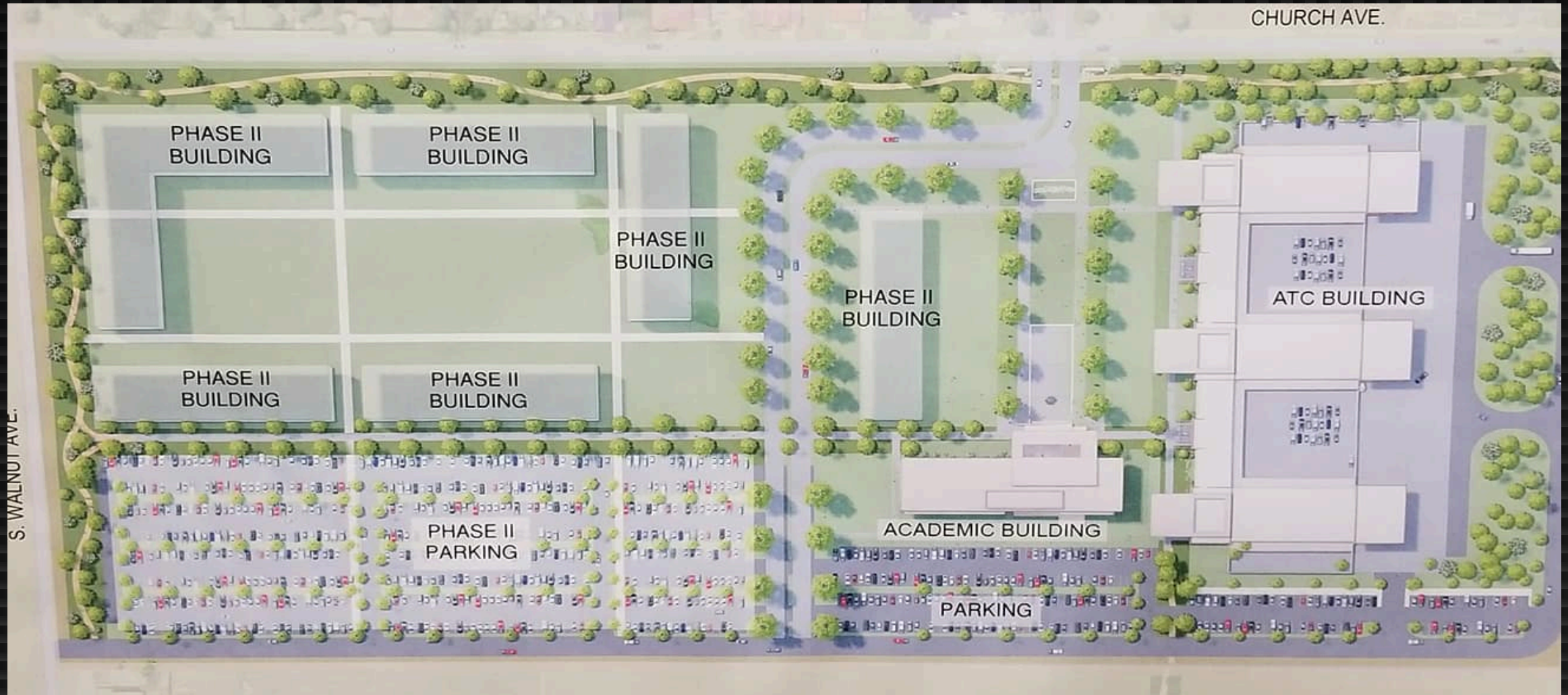





Fresno City College – CTE / ATC

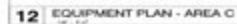
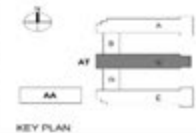


Fresno City College – West Fresno Campus Phase 1



STATE CENTER COMMUNITY COLLEGE DISTRICT
WEST FRESNO CAMPUS

TRUE NORTH 
AREA E
SCALE: 1/8" = 1'-0"

[illegible]

K&S MIS
SIMPLY THE WAY TO SUCCESS



WEST FRESNO CAMPUS

1000-0000-0000-0000

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ENT PLAN

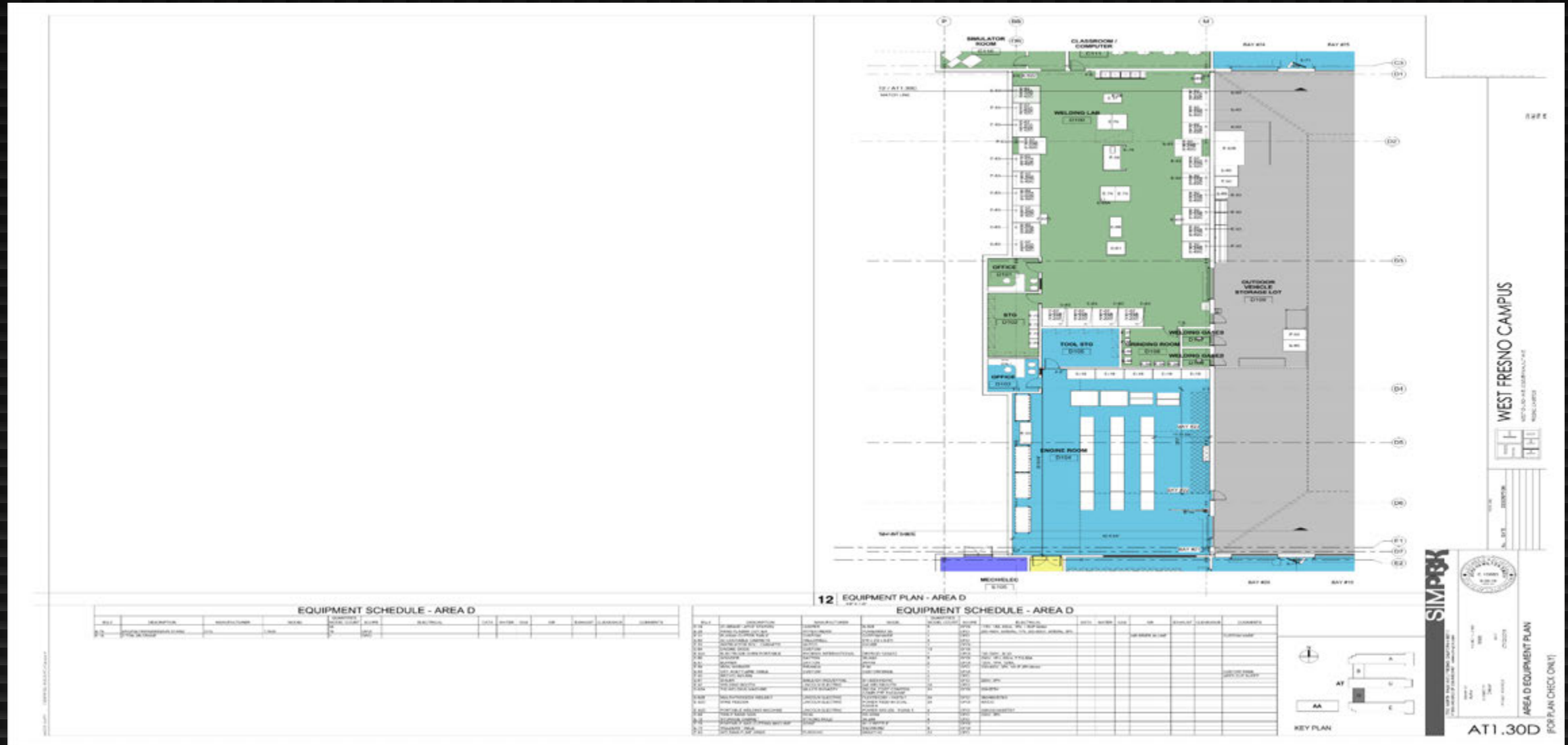
EQUIPMENT

NFEACB

00



Fresno City College – Powertrain/Engine Room



Questions?



Today's Transit for Tomorrow's World

Building The Future Workforce

Tommy Edwards
Chief Performance Officer
SunLine Transit Agency

SunLine Operations – 350 Employees



Routes

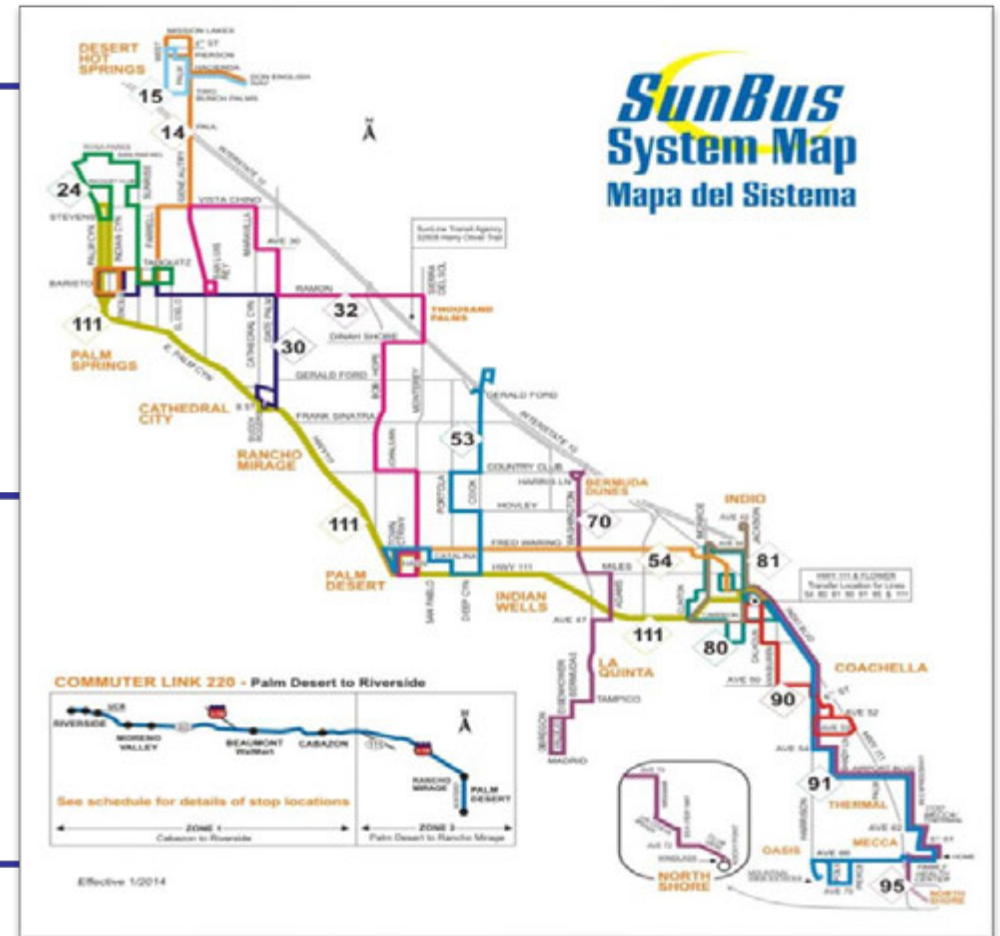
- 14 fixed routes
- 1 express route
- 1 Riverside Commuter Link
- ADA Paratransit

Fleet

- 61 CNG
- 16 Electric Hydrogen Fuel Cell (2 in production)
- 4 Electric Battery BYD
- 39 CNG Paratransit Vehicles

Revenue Miles vs. Passenger Trips

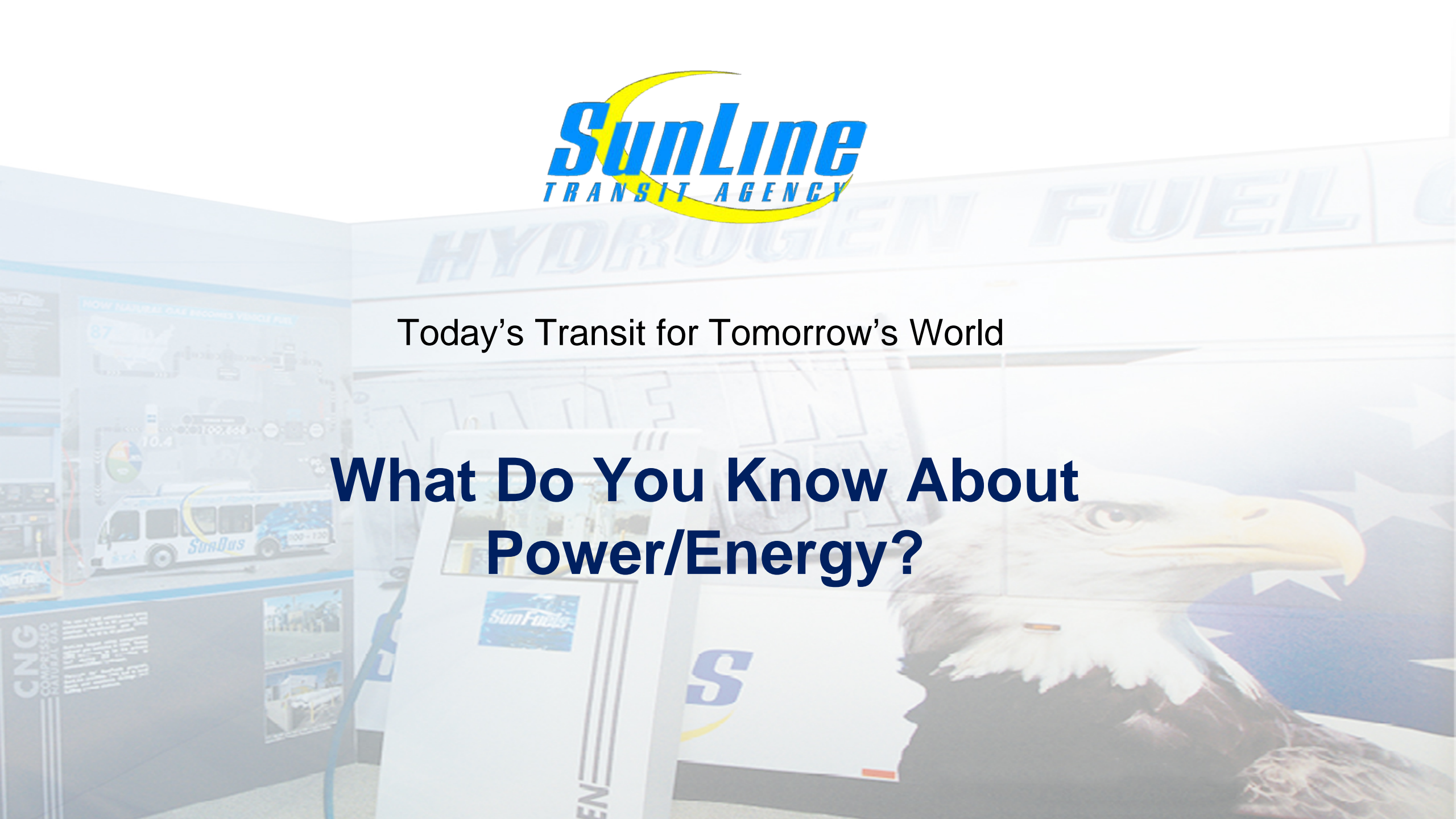
- 4.3 million revenue miles
- 4.5 million passenger trips





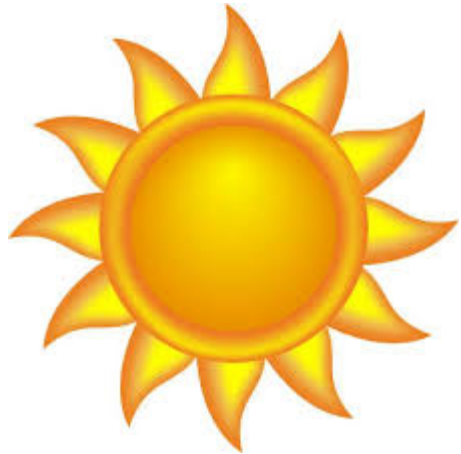
Today's Transit for Tomorrow's World

What Do You Know About Power/Energy?



Primary Energy Sources

All Energy on Earth is from the Sun!



Sun Energy

Dead plant/animal life, heat, pressure (>100s of millions of years) – Fossil Fuels

coal, oil, natural gas

Corn/Trees/Grass (months – years)

ethanol, biogas, biomass

Hydro (weeks – months)

evaporation, clouds, rain, lakes

Wind (days – weeks)

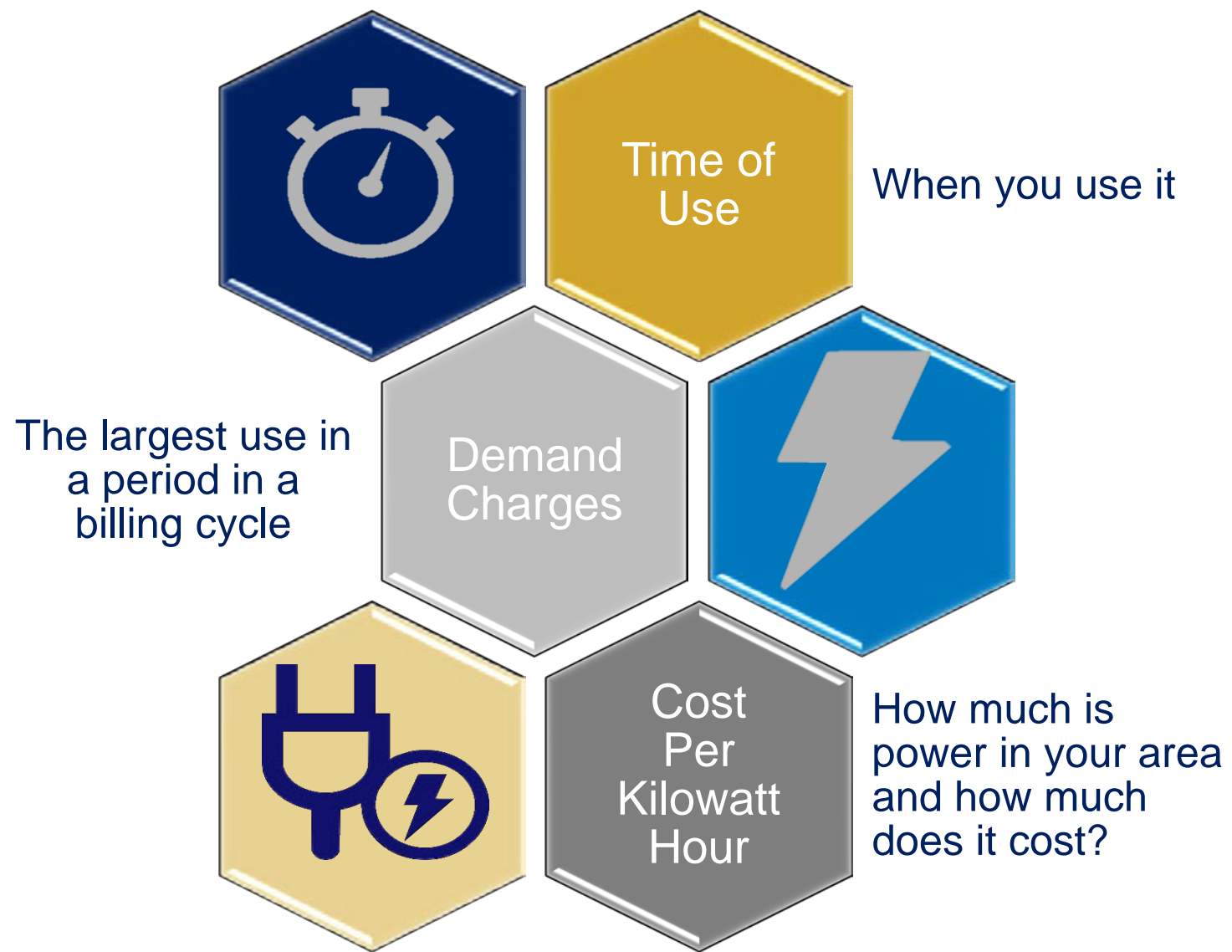
wind turbine

Solar (instant)

“Energy sustainability requires conversion of resources at the same rate at which they are naturally replenished on earth without externalities”



Electricity Puzzle



Energy Options for the Coachella Valley



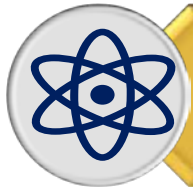
Hydrogen Basics



Most abundant element on earth



Hydrogen makes up over 90% of all atoms in the universe



Smallest atom and lightest of all chemical elements



Hydrogen comes from water (H₂O) and makes up 10% of the mass of the human body



Odorless/tasteless/colorless

Hydrogen Benefits

Used as rocket fuel/vehicle fuel

Can be stored as liquid or gas

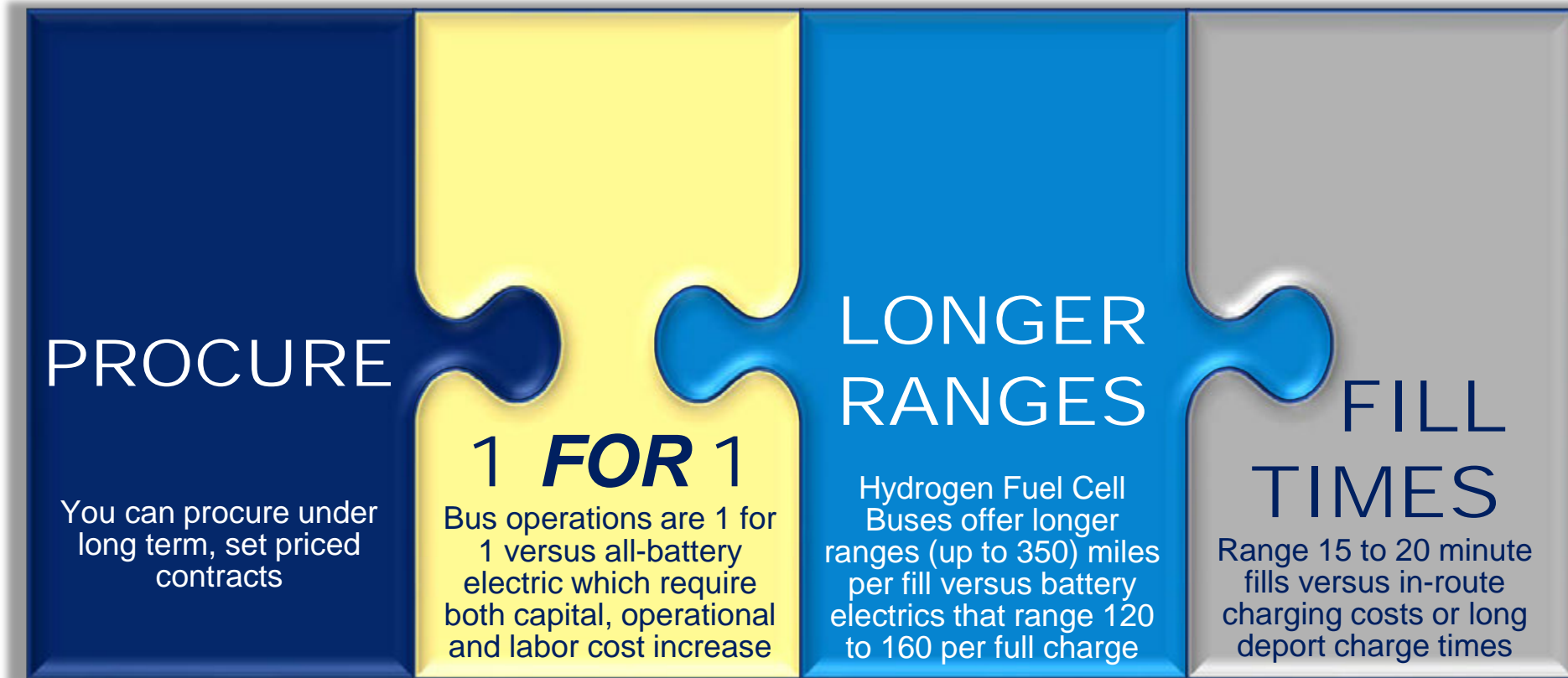
Can be converted from liquid to gas and back again
It can be converted into electricity

Does not produce harmful emissions

Renewable

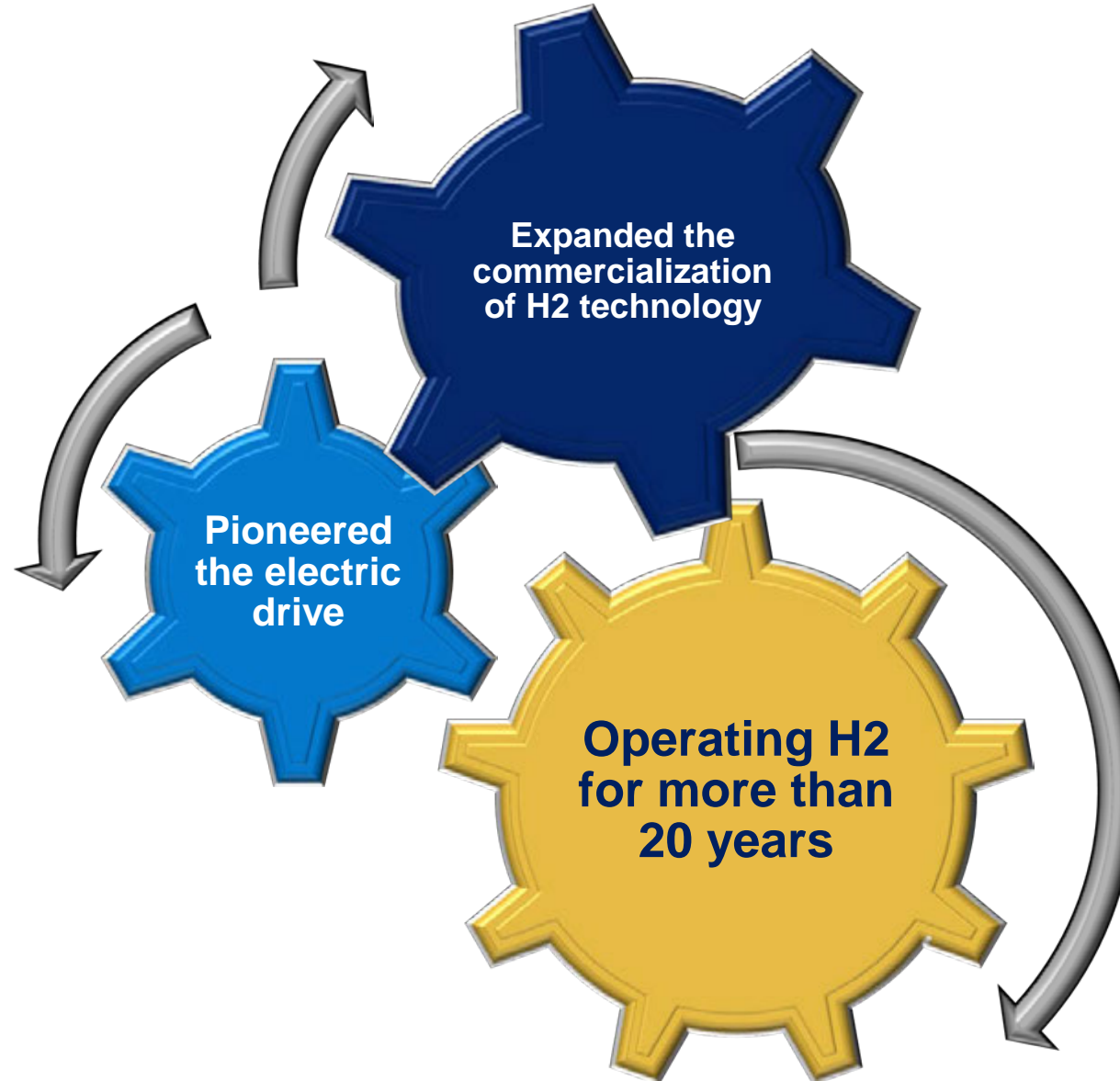
Fuel Efficient

Hydrogen Cost/Benefit



Normal fueling, cleaning, procedures through standard fuel lanes

SunLine's Technology Contribution



SunLine's Long History in Hydrogen

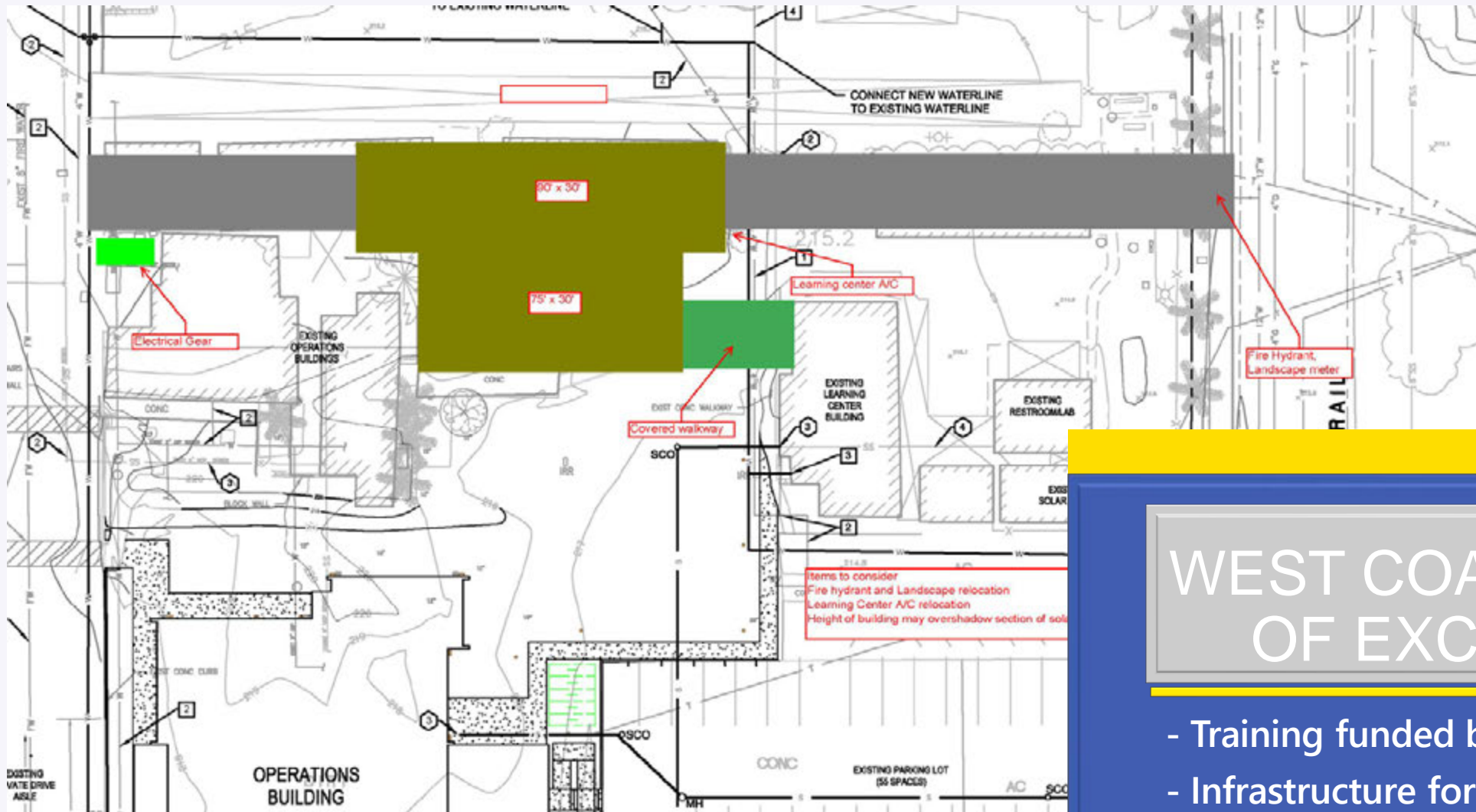


Leaders in Hydrogen Electric Fuel Cell Bus Technology for over two decades
SunLine will have 19 Electric Fuel Cell Buses in 2020

(Grant Submissions for up to 12 Additional Buses)

West Coast Center of Excellence





WEST COAST CENTER OF EXCELLENCE

- Training funded by FTA
- Infrastructure for Center partially funded by FTA

Completed Training Modules



Advanced Technology
Technician Training



Procurement Insights for
ZEB purchases



Planning and executing
ZEB's in service



Leadership, mission, value
creation for a successful
ZEB Program

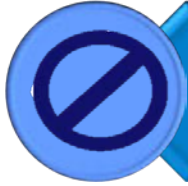
Key Takeaways



SunLine has made a deep commitment to reducing environmental impacts while delivering world-class transit services



Hydrogen Fuel Cell is tracking to be less costly to operate than all battery electric buses



SunLine does not use any solid fuel to deliver transit to the Coachella Valley



Zero emission technology works



California's Innovative Clean Transportation Rule is a game-changer for the clean fuels industry



Thank You



tedwards@sunline.org



Clean Mobility Options Voucher Pilot

Program Overview

Bakersfield, CA
February 27, 2020



What are the goals of this program?

Improve access to **clean mobility options** that are safe, reliable, convenient, and affordable to communities throughout California.



- Increase mobility options in disadvantaged communities
- Reduce greenhouse gases and pollutants



- More zero-emission vehicles
- Local solutions that inform projects throughout the state

Funding Details - \$20 million

Mobility Project Vouchers

- \$19 million in mobility project vouchers available statewide
- At least \$1 million of this set-aside for tribes
- Maximum Project Budget:
\$1 million per project

Needs Assessment Vouchers

- \$1 million in community transportation needs assessment vouchers available statewide
- Maximum Project Budget:
\$50,000 per project

Eligibility Overview

Mobility Projects and Needs Assessments

- **Applicant:** Government entity, qualified nonprofit, or tribe
- **Project area:** Disadvantaged community *residents* (see next slide)

Mobility Projects

- **Experience:** 1+ year operating mobility services
- **Project model:** Zero-emission car-sharing, bicycle or scooter-sharing, carpooling/vanpooling, innovative transit, or ride-on-demand (i.e. Lyft)
- **Community need:** Based on community transportation needs survey that includes direct engagement with community residents
- **Financial Sustainability:** Must commit to 4 years of operations

Who Can Apply?

Lead Applicants

- Public agencies
- Nonprofit Organizations
- California-based Native American Tribes

Sub-applicants

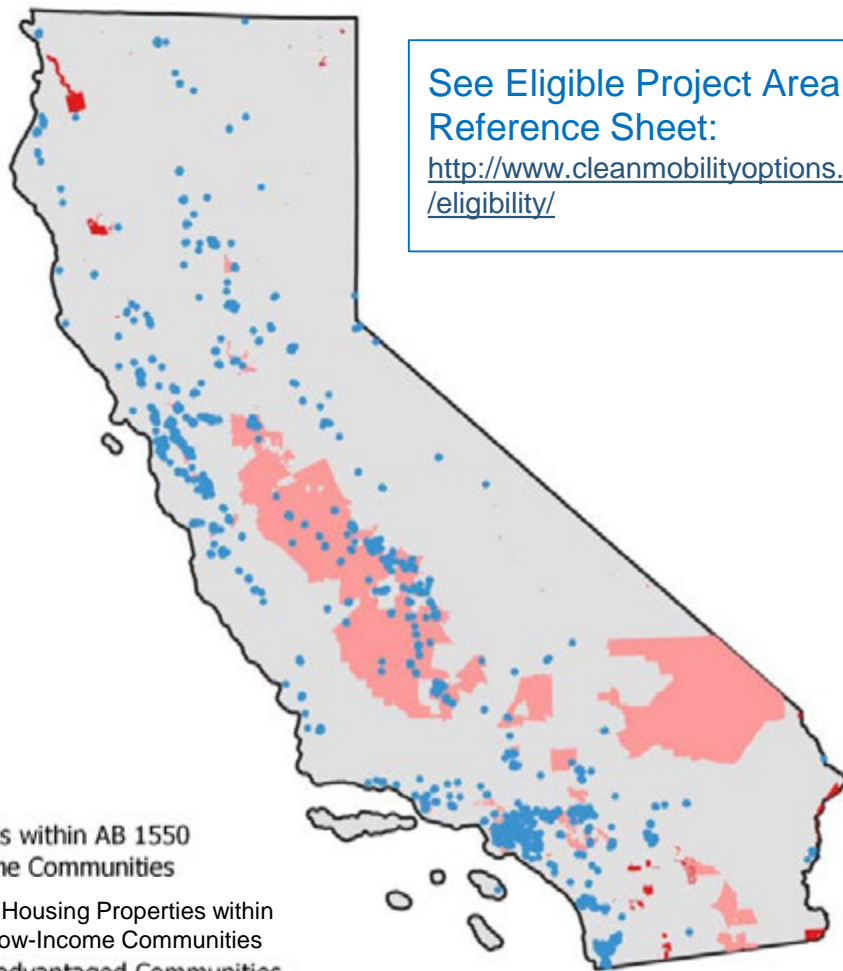
- Any entity with lead applicant eligibility
- Public, private or nonprofit organizations
- Can include providers of mobility services, charging infrastructure, related infrastructure, community outreach, and technical services

Eligible Project Areas

- **CalEnviroScreen 3.0**
Disadvantaged Communities (DACs)
- **Deed restricted affordable housing** within **AB 1550 Low-Income Communities** or DACs
- **Tribal Lands** within AB 1550 Low-Income Communities or DACs

Legend

- Tribal Lands within AB 1550 Low-Income Communities
- Affordable Housing Properties within AB 1550 Low-Income Communities
- SB 535 Disadvantaged Communities



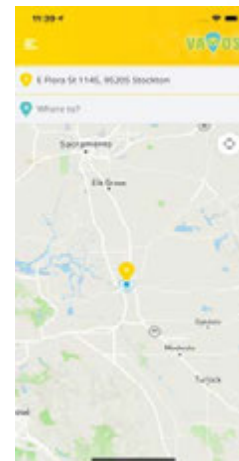
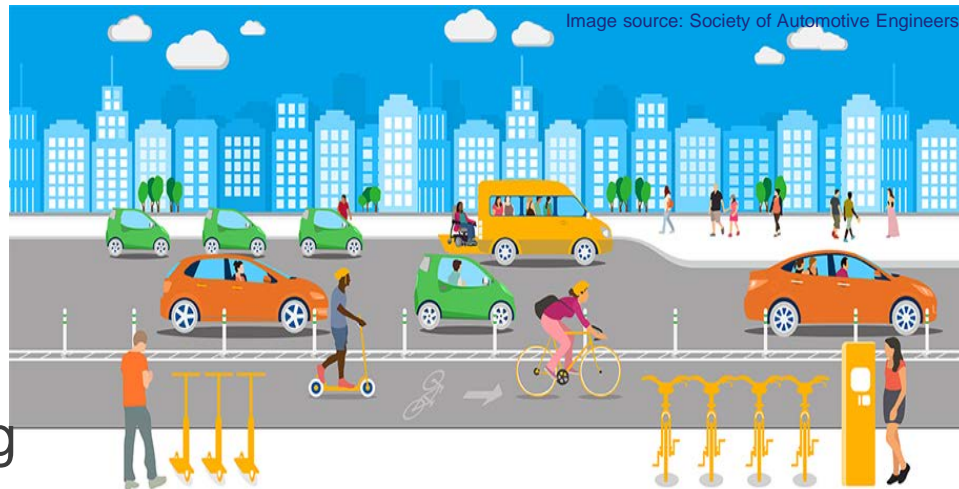
See Eligible Project Area
Reference Sheet:

<http://www.cleanmobilityoptions.org/eligibility/>

Types of Services

Eligible Project Models:

- Carsharing
- Carpooling/vanpooling
- Bikesharing/scooter-sharing
- Innovative transit service
- Ride-on-demand service
- Other transportation enhancements
 - Up to 10% of voucher budget
 - Transit subsidies, integration with multimodal payment cards, etc.



Transportation Enhancement Example:

VAMOS transit trip planning app, with information from multiple San Joaquin Valley transit agencies

vamosmobility.com

Resources and Technical Assistance

- **Website:** www.cleanmobilityoptions.org
- **Application technical assistance**
 - Complete TA request form on website <http://www.cleanmobilityoptions.org/assistance/> or
 - Email request to info@cleanmobilityoptions.org or
 - Call **(626) 744-5670**
- **Application Toolkit - available on website**
 - Sample Needs Assessment Survey
 - **Clean Mobility Provider Directory:** <http://www.cleanmobilityoptions.org/directory/>
 - Coming Soon: Project Design and Partnerships Guide
- **Mobility on Demand Learning Center**
 - Case studies and other materials on www.learn.sharedusemobilitycenter.org

Thank you!





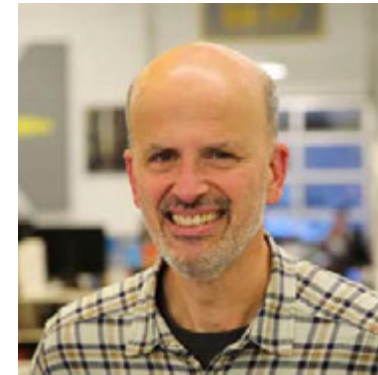
The San Joaquin Valley's Electric Carshare Service

The Míocar Team

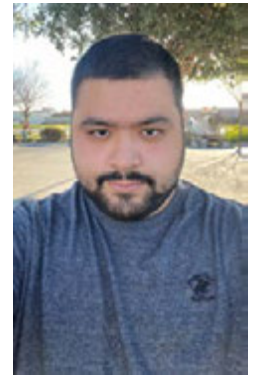
- Our office is in Visalia, CA
- We handle all of our customer service in - house
- Our bilingual team is on call 24/7



Gloria Huerta



Richard
Kosmacher



Javier Zepeda

https://miocar.org



https://miocar.org



Incognito



miocar

LOCATIONS & CARS

PRICING

FAQS

JOIN

TERMS

CONTACT



Download on the
App Store

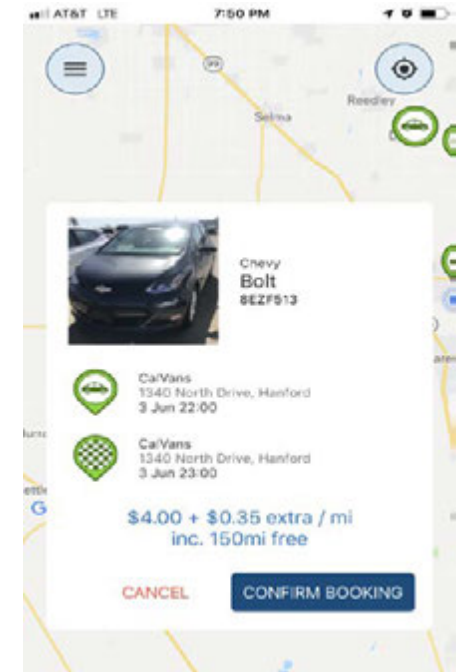
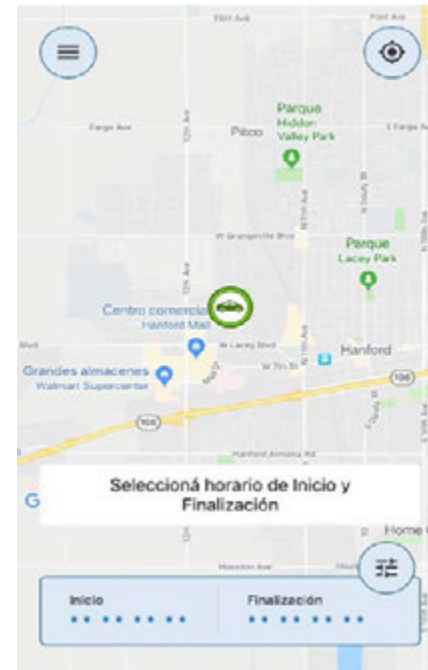
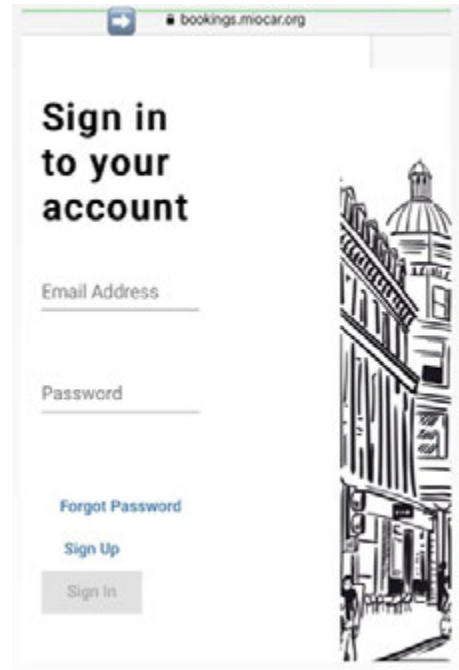
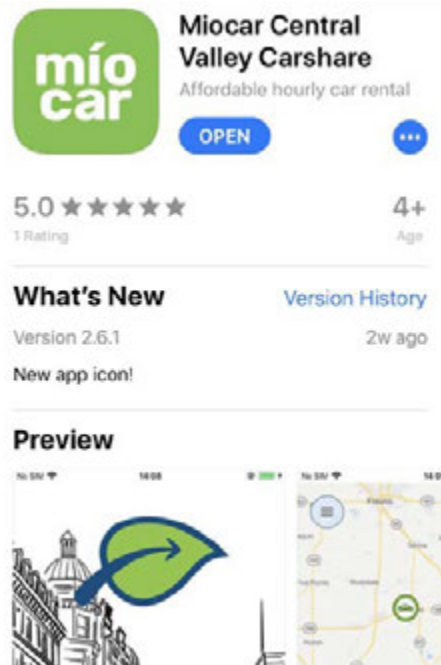


GET IT ON
Google Play

www.miocar.org

Míocar Is Affordable & Easy to Use

\$4/hour, \$35/day, \$.35/mile after 150 miles



Available Vehicles*

*vehicle mix may change to achieve better mile ranges and EV tech advances, prices decrease



Chevy Bolt

240 mile range



Chrysler Pacifica

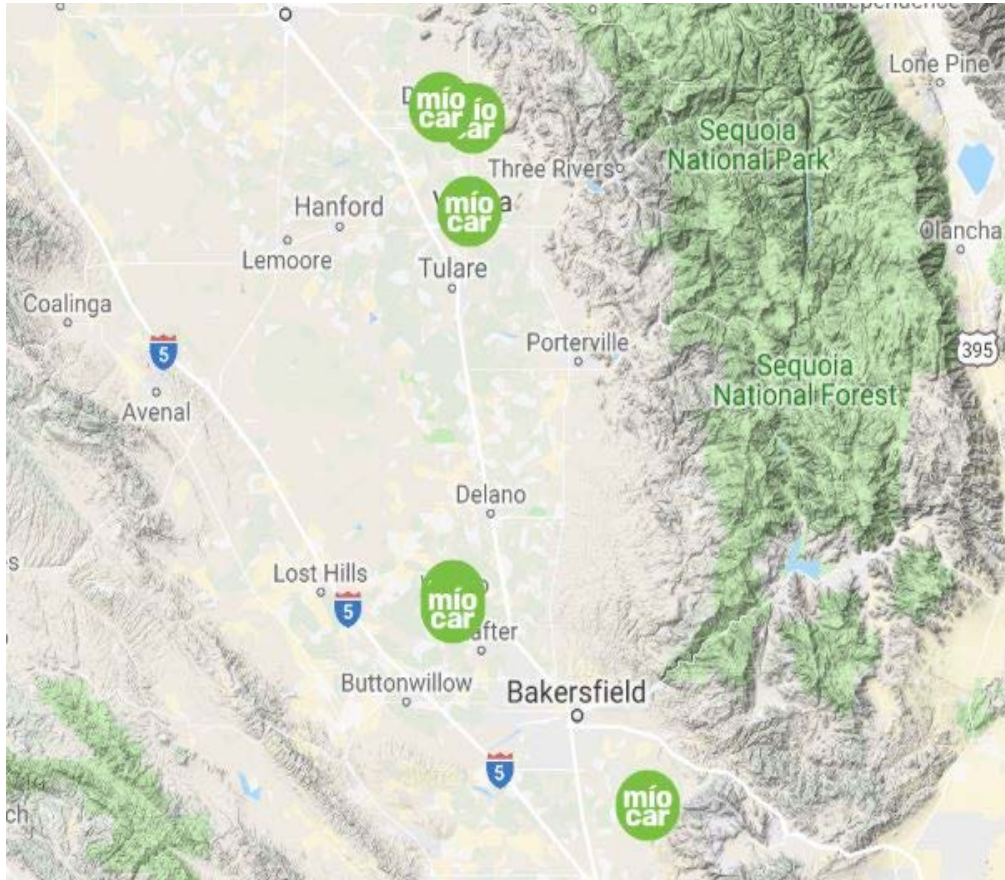
Plug-in hybrid minivan
516 mile range



BMW i3

180 mile range

Current System



Orosi, CA
Dinuba, CA
Visalia, CA
Wasco, CA
Arvin, CA
Lamont, CA

Launched July 2019:

- 27 vehicles
- 300 members
- 25,000 miles driven
- Over 600 reservations

Stations can be in neighborhoods or community centers



Local Support & Community Design



Building Míocar is Cost - Effective and Customizable

- Can deliver new EV station equipment or leverage existing infrastructure
- Range of use cases possible:
 - Individual car sharing members
 - Business and institutional members
 - Professional drivers on ride - hailing or volunteer driver platforms



About the ARB's Clean Mobility Options (CMO)

- **Eligible Areas:** Top 25% Disadvantaged Communities (CalEnviroScreen)
- **Eligible projects:** EV carsharing, on-demand transit, micro mobility (e.g., bike and scooter sharing), and other for **smaller communities**
- **Funding cap per applicant:** ~\$1M
- **Total Funds:** \$10 Million
- **Simple Application:** Basic demonstration of community support for project
- **Streamlined payments:** Direct payment to vendors
- **Administration:** Local agency or organization or through your MPO (not air district)

Investing in Míocar will result in a long -term program

Miocar is a non-profit collaborative between San Joaquin Valley Partners.

CMO Vouchers can be used to replicate this model:

- A \$450,000 investment in a 15-car system, for example, will sustain your program for the first four years, with operating revenues rolled into ongoing costs.
 - Program can be scaled up or down to fit target communities. Some cities are working together on voucher applications.
 - Our team will work with you to size the program to maximize viability
- Any surpluses will be returned into program growth
- Miocar maintains fleet, insurance, and program's hardware and software

Míocar Assets Stay In the Community

Míocar is a social enterprise originating in the San Joaquin Valley with a mission of delivering affordable transportation options for all.

Building Míocar into your community transportation plan will be a long -lasting investment, leveraging local investment and coordinated planning efforts.

The Míocar team leans on our experience folding non -profit shared mobility programs into the backbone of local and regional transit service.



Míocar: Initial Research Results

Caroline Rodier, Ph.D.

Institute of Transportation Studies, UC Davis

TRANSITions 2020

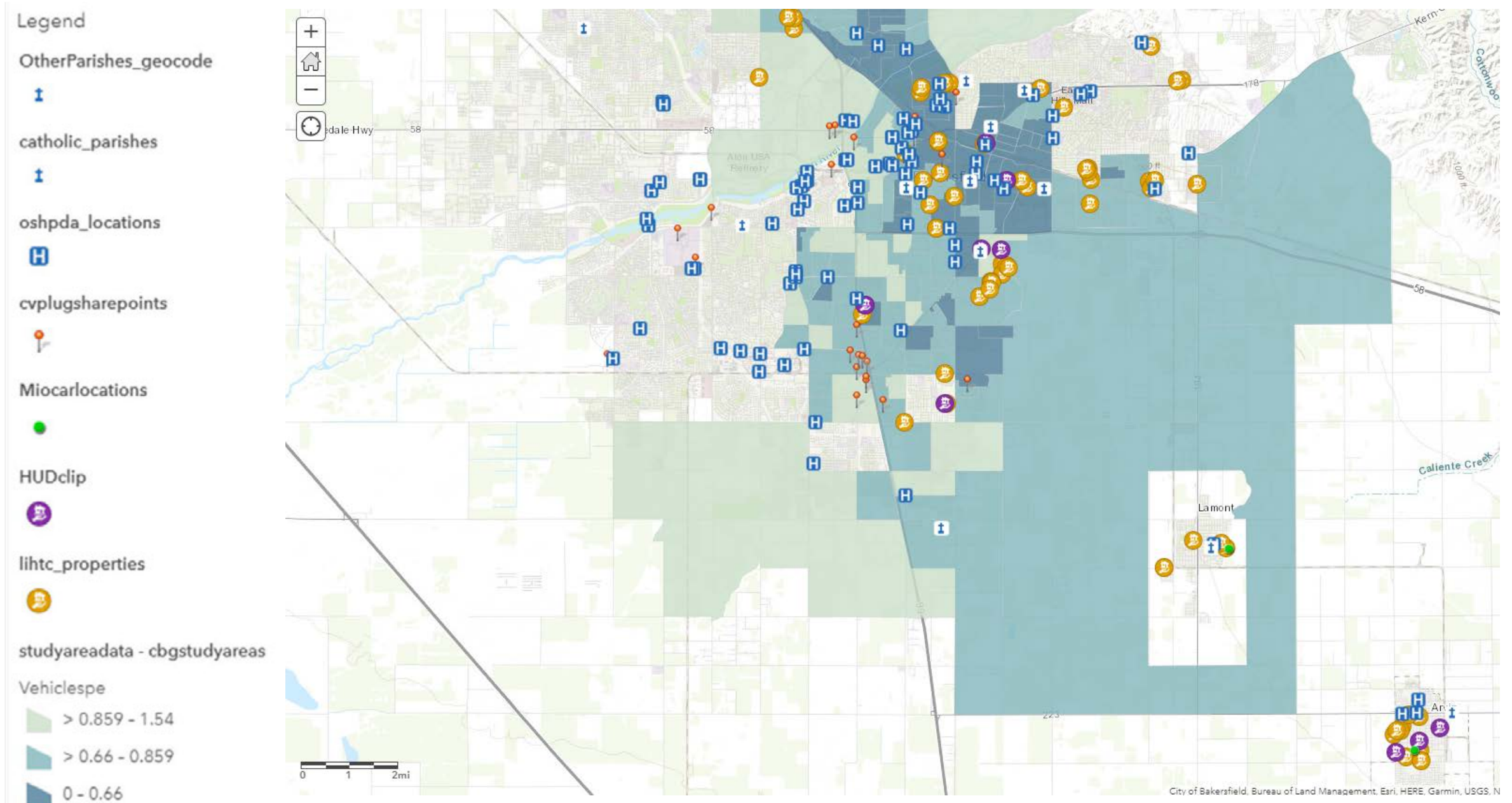
February 26, 2020



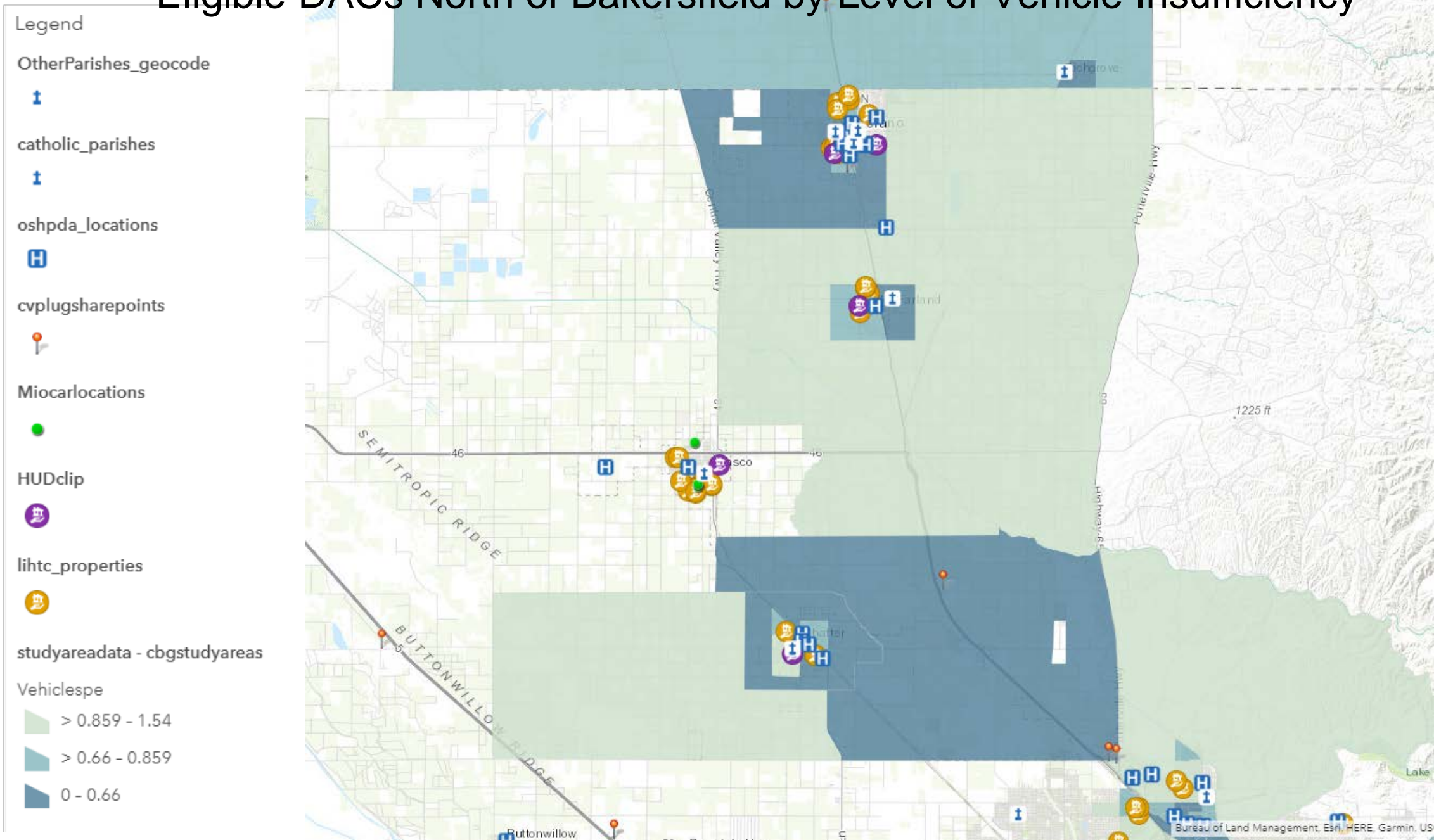
UC Davis Mapping Tool for Possible EV Carsharing CMO Locations in the San Joaquin Valley

For more information contact Juan C Garcia Sanchez (or JC)
at jcgarciasanchez@ucdavis.edu

Eligible DACs in and around Bakersfield by Level of Vehicle Insufficiency



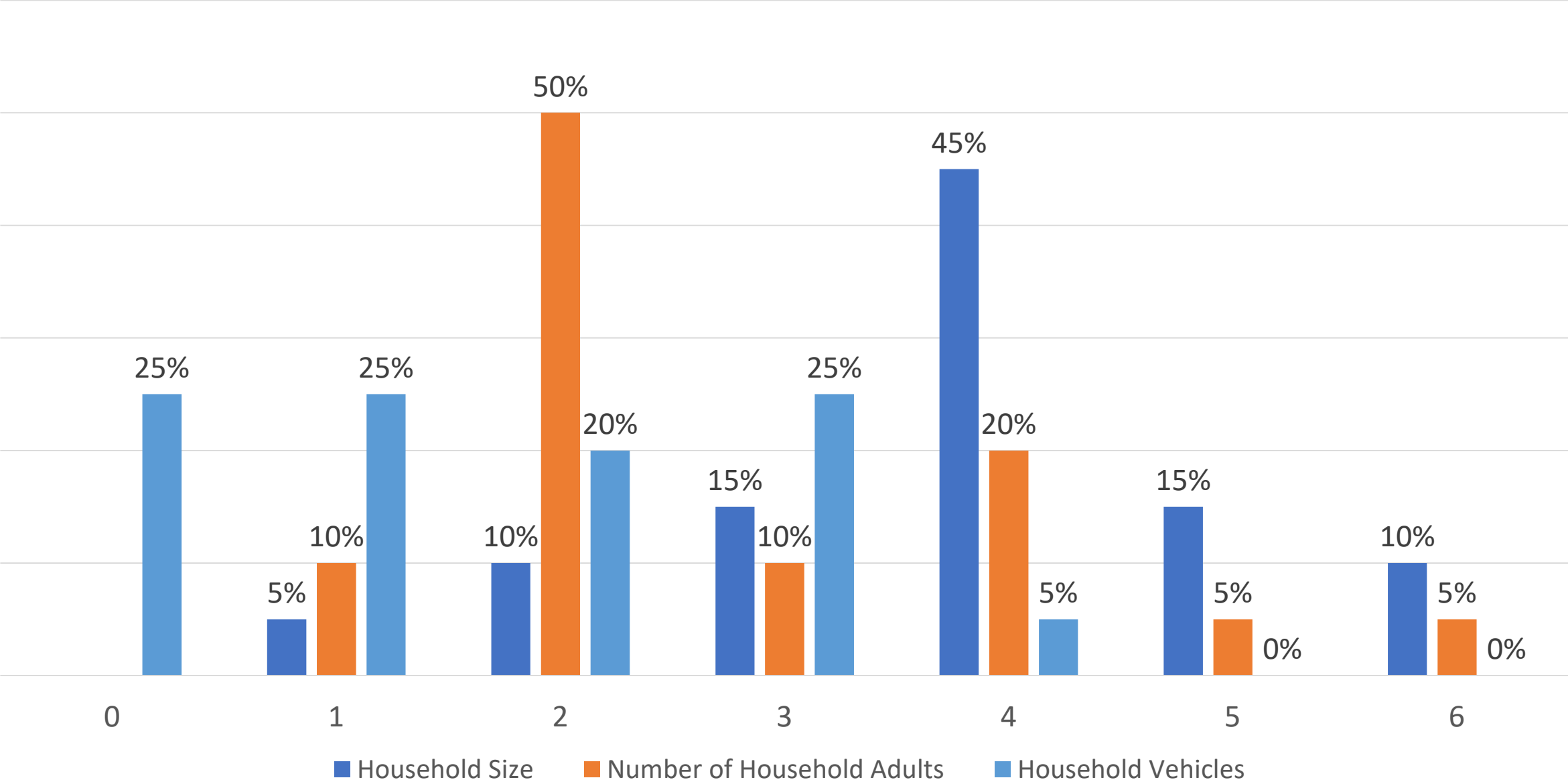
Eligible DACs North of Bakersfield by Level of Vehicle Insufficiency



Miocar Member Usage Data

| Since 9/19 Miocar Launch | Total | Average |
|--------------------------|--------|---------|
| Reservations | 458 | 5 |
| Vehicle Miles Traveled | 29,685 | 87 |
| Reservation Hours | 6,115 | 73 |

Active Miocar Users (Initial Survey with 20% response rate)



Rate of Poverty among Active Miocar Users from Initial Survey
(20% response rate)

| Federal Poverty Level | Percent |
|-----------------------|---------|
| Less than 100% | 35% |
| 100% | 35% |
| 200% | 29% |

Traveled to Reservation Destinations without Miocar? (after reservation survey)

| | |
|--------------------------------|-----|
| No | 60% |
| Unsure | 17% |
| Yes, using these modes: | 24% |
| <i>Driven my own car</i> | 70% |
| <i>Got a ride from someone</i> | 10% |
| <i>Rented a car</i> | 20% |

Primary Reservation Purpose: Miocar After Reservation Survey (30% members reporting)

| | |
|-------------------------|-----|
| Family/personal errands | 38% |
| Work-related | 29% |
| School | 10% |
| Social/recreational | 10% |
| Medical | 7% |
| Other | 5% |
| Shopping | 2% |

Share of travel that would NOT have been made by primary reservation purpose.

| | |
|-------------------------|-----|
| Family/personal errands | 75% |
| Work-related | 75% |
| Medical | 70% |
| School | 50% |
| Other | 50% |
| Social/Recreational | 25% |
| Shopping | 0% |

Mode to Miocar Hub: After Reservation Survey (30% members reporting)

| Mode to Miocar Hub | Percent |
|----------------------|---------|
| Walk, Bike, or Other | 44% |
| Private Vehicle | 29% |
| Public Transit Bus | 15% |
| Taxi, Uber, or Lyft | 12% |

Final After reservation questions...

| | |
|---|-----|
| Average Number of People in the Vehicle | 2.2 |
| Average Service Rating (1-5) | 4.1 |

A landscape photograph featuring a long, straight asphalt road that recedes into the distance. The road is flanked by vibrant yellow fields, likely rapeseed. In the background, there are rolling hills and mountains under a dramatic, cloudy sky. A large, multi-colored rainbow arches over the entire scene, its ends touching the horizon on both sides. The word 'míocar' is superimposed in large, bold, green lowercase letters across the center of the image.

míocar

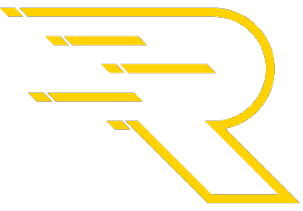
<https://www.youtube.com/watch?v=koQGCHmj74&feature=youtu.>



MICROTRANSIT



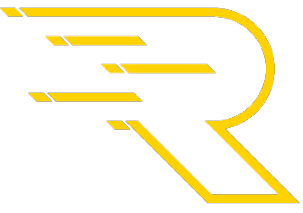
*We make life better by connecting
people to places one ride at a time.*



What is Microtransit?



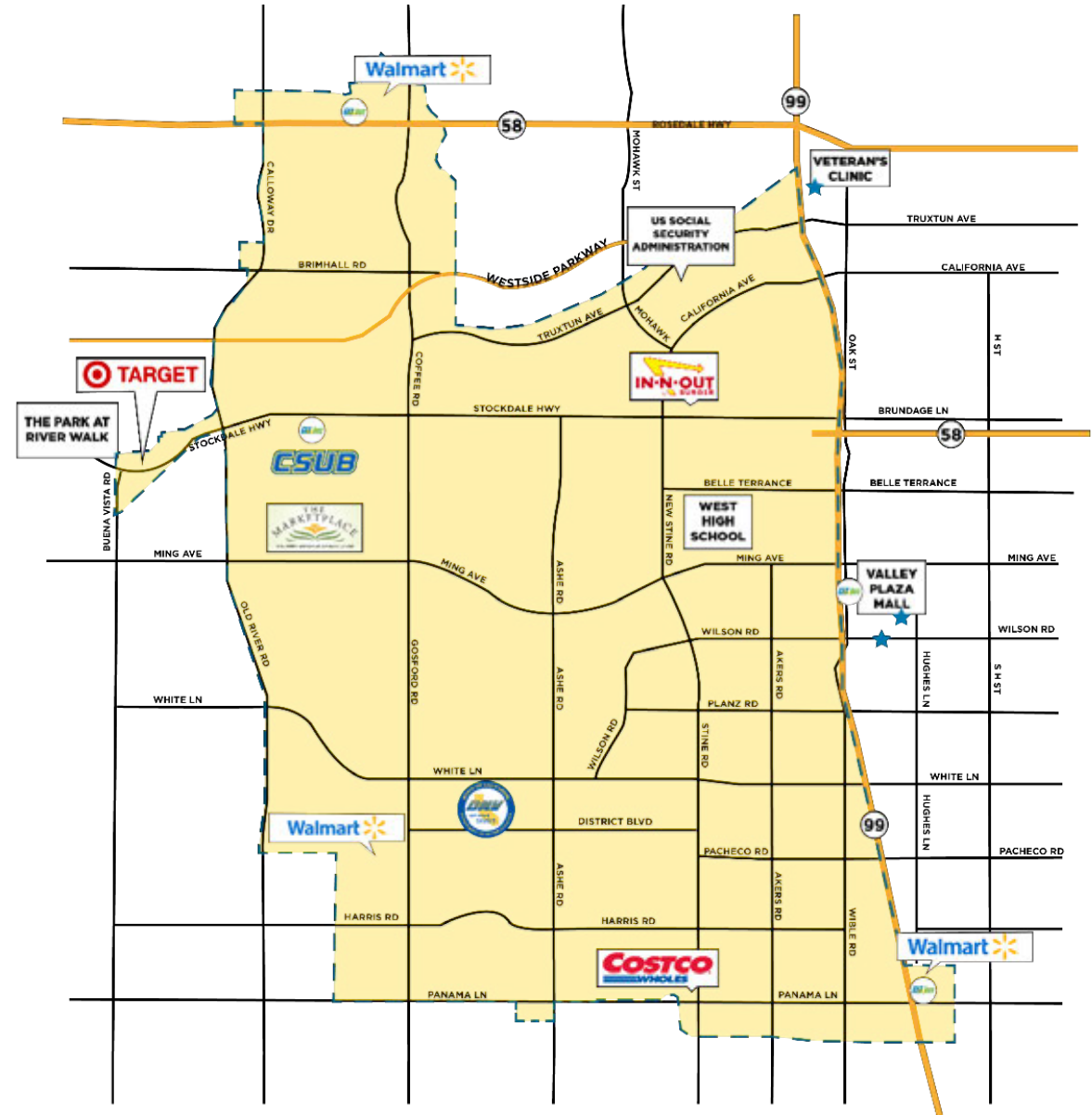
- **On-demand, curb-to-curb shuttle service**
- **Platform**
 - Dynamic routing
- **User-Friendly App**
 - Personalized ride-share experience
- **Adapt to Bakersfield lifestyle changes**
 - Identified a zone with under-performing routes
 - Pilot to serve low-density areas



RYDE Overview

- **Started April 2019**
 - Pilot ends after December 2020
- **Zone Profile**
 - 23 sq mi of the general SW area
 - Diverse Demographics (income, ethnicity)
 - Shopping, schools and universities, doctors offices, entertainment, etc.
- **Rides within the zone are \$3.50**
- **Hours of Operation**
 - Mon - Fri 6 am - 11 pm
 - Sat & Sun 7 am - 7 pm

****Closed Thanksgiving and Christmas Day****
- **Marketing and Outreach**
 - Traditional
 - Grassroots Outreach





RYDEbakersfield.com

- **Milestones**

- Total Rides Booked since April: 22,118
- Daily Boardings: January = 115; April = 35 (est. 70%)
- Passengers per revenue hour: 1.9

- **Booking RYDE**

- 54% - *TransLōc* App
- 39% - Phone
- 5 % - Walk-up
- 2% - Web

- **Most Popular Time**

- 1 PM – 4 PM

- **Popular Destinations**

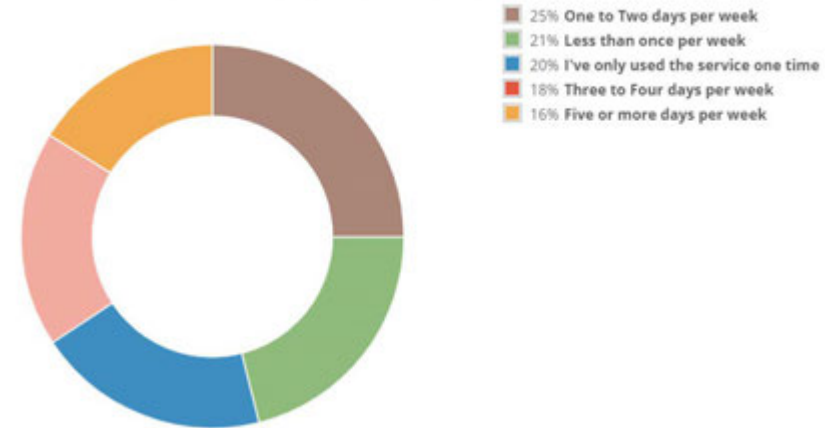
- GET Transit Centers (*CSUB, Southwest Transit Center, Northwest Promenade*)
- Shops at Riverwalk

- **Average Trip Length**

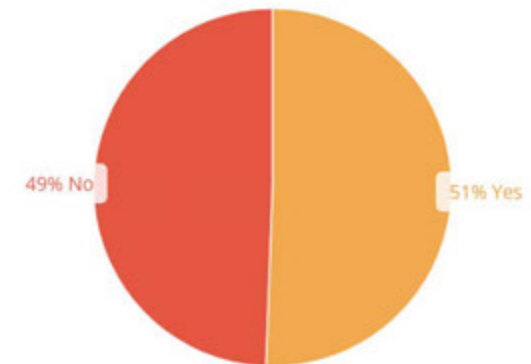
- 4 mi

- **Rider and Driver Feedback**

How often do you use the RYDE service?



Have you used RYDE to connect to/from the GET fixed-route bus?



 *Thank You!*



TransLōc App



RYDEbakersfield.com