

**Linda Urata**

**Regional Planner, Kern COG**

**Coordinator, San Joaquin Valley Clean Cities Coalition**

*Good morning! Thank you, councilmember Smith. I am Linda Urata, a regional planner for Kern COG, the San Joaquin Valley Clean Cities Coordinator, and your hostess for today. Thank you for attending Kern COG's TRANSITions 2019 Transit Symposium. First, some housekeeping items. Exits, Vendors, Vehicles, Restrooms, Breaks.*

*Technology over the past decade has developed to where zero emission transit buses – battery electric and fuel cell – are becoming an option in Central California for transit fleets of all sizes.*

*Kern COG understands that the primary mission of transit agencies is to move people from one place to another safely and efficiently. Today, that may mean:*

- with the convenience of a phone app that will pick someone up where they want and take them where they want, without having to walk more than a hundred feet or so on either end of the trip;*
- serving people with special needs whether they be elderly, students, having some disability under ADA, or completing their trip by scooter or bicycle;*
- keeping the cost of the trip very affordable;*
- meeting fare-box requirements;*
- training drivers and customer service reps;*
- recruiting and retaining qualified maintenance technicians;*
- called into service during emergencies or special events;*
- connecting to inter-regional transit and last-mile options;*
- reducing emissions from vehicles;*

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- *supporting community events;*
- *managing a business office, which includes writing grants and writing reports;*
- *balancing a rise in minimum wage with a decrease in ridership;*
- *forming new partnerships; (much more that I am forgetting or unaware of) and*
- *Transitioning your fleet to a new fuel technology. Next thing you know, you will be operating buses that drive themselves and talk to the cars and traffic signals around them!*

*Now before you all run for the doors, because you are reminded of the pile of work facing you, allow me to give you a reason to stay!*

*Both environmental and cultural forces are at work, and transit agencies are faced with changing how they do business.*

*Each of us is aware of the poor air quality in the region and the need for increased efforts to meet air quality standards. AB617 calls for efforts to improve air quality at the local level. New voices and experienced champions are calling for a move toward zero-emission vehicles. The California Air Resources Board is answering that call, and important to you here today, having passed the Innovative Clean Transit (or ICT) regulation in December 2018. CARB also is interested in listening to the challenges, garnering resources, sharing information, offering grants, and providing assistance to transit agencies throughout this transition. You will not only hear from CARB today, but I invite you to ask questions and express concerns,*

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*and to keep the phone numbers and emails that you find for Shirin and Yachun on that last slide!*

*Transitioning to zero emission and low greenhouse gas emitting transportation will help the entire region meet our air quality goals for what transportation planners call “Conformity”. Therefore, even if your fleet does not fall under the new ICT regulation, we hope that you consider reducing emissions from your transit fleet.*

*As I recall, Kern COG was one of the first MPOs in the State to award Congestion Mitigation for Air Quality (CMAQ) funding for the purchase of natural gas transit buses and the installation of CNG infrastructure for transit.*

*Culturally, transit agencies acknowledge that individuals are increasingly moving toward new ways to get around without driving their own cars. The MPOs (aren’t you glad Bob Smith told you what that stands for? I am!) The MPOs partnered with Dr. Caroline Rodier, a researcher at the UC Davis Institute of Transportation, to study last-mile transit in rural parts of the San Joaquin Valley. You will hear an update about two pilot programs [Valley Go and Valley Flex] in the Central Valley funded by CARB and led by Dr. Rodier in partnership with several MPOs, transit agencies, low-income housing, Sigala Inc., and the San Joaquin Valley Air Pollution Control District. As a member of the team, I can say it has been an interesting year so far. I believe that the experience from this project will enlighten us all.*

*To gain some insight into the considerations of moving your transit fleet to either battery electric or hydrogen fuel cell or for smaller transit fleets not encompassed*

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*in the Innovative Clean Transit Rule to find out more about renewable natural gas, our zero emission bus transit panel will provide some basic considerations. These gentlemen bring many years of experience and passion to their work and to today's presentations.*

*We've lined up a great variety of presentations on finding money to help with a transit transition. Federal, State, and local agencies, public utilities, have funding opportunities such as grants and incentives for vehicles, infrastructure, training, and shared mobility. Others who could not travel here today sent information on aggregate purchasing and pricing information. So during the breaks or before you leave, be sure to visit the vendor room to pick up more information.*

*Additionally, you will hear from the San Joaquin Valley Electric Vehicle Partnership on their efforts to develop the market for zero emission transportation in the Central Valley, Eastern Kern County, and Mariposa County. By hosting events throughout the year, the SJV EVP provides opportunities to hear from program managers, experienced fleets, and new technologies.*

*Our hometown transit, Golden Empire Transit has a fleet of 90 compressed natural gas buses equipped with wheelchair lifts and bike racks. GET offers 16 routes, which operate 7 days a week and transport more than 6 million passengers each year with its fixed route buses. In addition, GET operates 21 compressed natural gas GET-A-Lift buses. For those of you who may not know, GET-A-Lift is a paratransit service for eligible riders who have a disability that prevents them from making some or all of their trips on fixed route buses.*

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*Several of these paratransit shuttles will be pressed into a new service called RYDE. Presently, individuals are choosing new private Transportation Network Services such as Uber and Lyft, and asking for the same type of service from public transit. Today, you will hear from GET about a new service using the GET-A-Lift buses, a micro-transit pilot in the southwest part of Bakersfield.*

*Unfortunately, missing from today's presentations is a lot of solid operations data. Each technology is different. Each application is different. In short – your mileage may vary. As more information emerges, the SJVEVP, CARB, Original Equipment Manufacturers, the US Department of Energy, and others will be working to share that information with the transit agencies. Also missing today are sessions on training needs. CARB held a zero emission bus technology showcase and symposium earlier this month. There was a lot of fabulous information with regards to training. We will share a link to the CARB website where the presentations will be posted and provide you with an overview during today's wrap-up.*

*We DO have Jack Hall with us today to tell us about GoMentum, an autonomous vehicle and connected vehicle testing ground in Concord, California.*

*By now you may have noticed the centerpieces, bus transformers, chocolate kisses, and butterflies. And if you don't think chocolate kisses bring about change, you are forgetting about the boost to your mood and energy levels! Yeah- you thought I was going to say waistline, didn't you?*

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*As a graduate of UCLA, I am sworn to quote John Wooden when speaking in public. One of my favorite Wooden quotes, is that “things work out best for those who make the best of the ways things work out”. I hope that today you learn a few ways to make a transit transition work for you, your agency, and the public you serve.*

*Thank you.*

*Now let’s get started.*



# Innovative Clean Transit Regulation

Kern Council of Governments' TRANSITions 2019 Transit Symposium

Bakersfield, California  
February 26, 2019

# OVERVIEW

- Innovative Clean Transit regulation
- Comprehensive review
- Funding opportunities
- Next steps



# ELEMENTS OF INNOVATIVE CLEAN TRANSIT REGULATION

- Applicability
- Zero Emission Bus (ZEB) Rollout Plan
- ZEB purchase requirements
  - Flexibility, exemptions, and credits
- Low-NOx engines and renewable fuels
- Annual reporting and record keeping



## APPLICABILITY AND PURCHASE DEFINITION

- Applies to all transit agencies that own, operate, or lease buses with gross vehicle weight rating (GVWR) >14,000 lbs.
  - Include standard, articulated, over-the-road, double-decker, and cutaway buses
- Does not apply to:
  - Caltrans, Caltrain, Amtrak, or school districts
  - Vehicles operate on rails, trolleybuses, or school buses
- Purchase means when a transit identifies and commits funds to execute a Notice to Proceed, or to sign a lease or a purchase agreement with a bus manufacture to begin with production of a bus



## REQUIREMENTS DIFFER BY FLEET SIZE

### A Large Transit Agency

- Serves other areas with populations >200,000
  - Has >100 buses\* during peak operation
- 
- Operates in South Coast or San Joaquin Valley
  - Has >65 buses\* during peak operation

### A Small Transit Agency

All other  
transit  
agencies

\* Includes all buses with a GVWR >14,000 lbs., but excludes demand response

# ZEB ROLLOUT PLAN

- An individual transit agency plan on how to transition to a zero emission bus fleet by 2040
- Approved by the transit agency's board of directors and submitted to CARB
  - July 1, 2020 for large transit agencies
  - July 1, 2023 for small transit agencies
- Helps inform funding plans and utility planning, and engage general public
- Non-binding and expected to change



## REQUIRED ROLLOUT PLAN COMPONENTS

- Plan for full transition to ZEBs by 2040 (considering minimum bus useful life)
- Planned bus purchase schedule
- Identify types of ZEB technologies planning to deploy
  - Both battery electric (on-route or depot) or fuel cell electric are eligible
- Infrastructure build out schedule, location and type
- Workforce training (planner, technician, driver, etc.)
- Describe how planned ZEBs would serve disadvantaged communities
- Identify potential funding sources



# ZEB PURCHASE SCHEDULE

- Allows buses to have their minimum useful life
- 2023 requirement discharged if 850 ZEBs purchased by 12/31/2020
- 2024 requirement discharged again if 1,250 ZEBs purchased by 12/31/2021
- Early ZEB purchases count towards future compliance
- Retain newly purchased ZEBs for at least 5 years, starting January 1, 2023

Year	ZEB Percentage of Total New Bus Purchases	
	Large Transit Agency	Small Transit Agency
2023	25%	-
2024	25%	-
2025	25%	-
2026	50%	25%
2027	50%	25%
2028	50%	25%
2029 & after	100%	100%

## LATE PHASE-IN FOR LESS COMMON BUS TYPES

- Purchase of zero-emission cutaway, over-the-road, double decker, and articulated buses
  - Starts on or after January 1, 2026
  - When bus type passes Altoona testing
- Voluntary early ZEB purchases of these types will still count towards compliance



## BONUS CREDITS TO RECOGNIZE EARLY ACTIONS

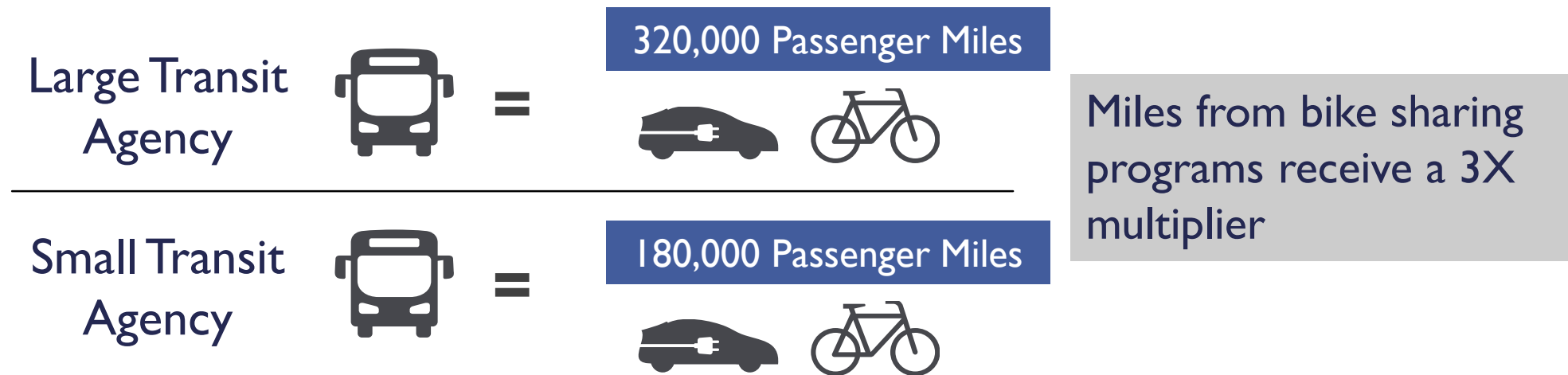
- Bonus credits do not count towards ZEB purchase discharge threshold
- Bonus credits count towards future obligations and extends funding eligibility
  - BEB and FCEB bonus credits expire on 12/31/2028
  - Electric trolleybus bonus credits expire by 12/31/2024
- Bonus credits may be used in a Joint Group situation but not transferrable

Technology	In Service	Bonus Credits
FCEB	Between January 1, 2018 and January 1, 2023	+1
FCEB	Prior to January 1, 2018	+2
BEB	Prior to January 1, 2018	+1
Electric Trolleybus	Between January 1, 2018 and December 31, 2019	+1/10

FCEB= Fuel Cell Electric Bus; BEB= Battery Electric Bus

## ZERO-EMISSION MOBILITY (OPTIONAL)

- Zero-emission car sharing, vanpool, micro-transit, active transportation
  - Vehicles with GVWR  $\leq$  14,000 lbs., scooters, or bicycles
- May be used in lieu of ZEB purchases
- Transit agency must track zero-emission passenger miles for each eligible vehicle



# ZEB PURCHASE COMPLIANCE SUMMARY

- Required number of ZEBs calculated based on percentage of new bus purchased each year
  - Round to nearest whole number
- Meet the required number of ZEBs with any combination of the following:
  1. Bonus credits
  2. Zero-emission mobility credits
  3. Existing ZEBs in the fleet
    - Include ZEBs from previous purchases exceeding the required number of ZEBs, leased ZEBs, and buses converted from conventional technologies to ZEBs
  4. New ZEB purchase
- Items (1), (2), and (3) can only be used once and must be used first before item (4) is being counted towards compliance calculation



# TRANSIT AGENCIES MAY COMPLY JOINTLY (OPTIONAL)

## ■ Eligibility to form a ZEB Joint Group

- All members must share the use of infrastructure, or
- Be within the same Metropolitan Planning Organization, Regional Transportation Planning Organization, Air District, or Air Basin

## ■ Compliance requirements

- Submit the request one year before the Joint Group takes effect
- Comply with individual ZEB purchase requirements collectively (including bonus credits)
- If the largest member is a large transit agency it must meet its minimum number of ZEBs required
- Exemptions apply only if ZEB purchase requirements cannot be met by whole group
- May submit one rollout plan as a ZEB Joint Group



## EXEMPTIONS TO SAFEGUARD AGAINST UNCERTAINTIES

- Ensure transit service not adversely affected
- Address circumstances beyond transit agency's control
- Tailor to individual transit agency's special situations
- Request must be submitted to CARB by November 30<sup>th</sup> of each year
- Approved exemptions from ZEB purchases valid until the next bus purchase
  - For the approved year, a transit agency can purchase conventional buses with internal combustion engines instead

# EXEMPTION FOR FINANCIAL HARDSHIP

- Cannot offset incremental capital costs of all available ZEBs and associated infrastructure
  - Must demonstrate transit agency not able to secure sufficient funding and not able to obtain financing for remaining incremental cost
- Cannot offset incremental managed net electricity cost
  - Show estimated electricity costs for applicable utility rates and charging strategy
  - Possible financial sources such as Low Carbon Fuel Standard (LCFS) credit value must be considered
  - Compare to same combustion engine bus type and use case in the fleet
- Transit agency has publicly declared a fiscal emergency
  - Provide copy of Board Resolution following a public hearing



## EXEMPTION FOR ZEB INFRASTRUCTURE DELAYS

- Infrastructure not ready within 2 years of initial ZEB purchase or in time to operate ZEBs
  - Purchase of new rights-of-way or construction of new facilities, change of general contractor
  - Delays in construction permits or utilities' power supply, natural disaster, and more
- Supporting documentation
  - Letter from Board of directors and the related 3<sup>rd</sup> party explaining reasons

## EXEMPTION IF NEEDED BUS TYPE IS NOT AVAILABLE

- For the bus type (with the applicable weight class identified) intended to purchase
  - Has not passed Altoona testing
  - Does not meet Americans with Disabilities Act (ADA) requirements
  - Would create conflicts with other laws/regulations
- Supporting documentation
  - Summary of all bus body-types with their Gross Vehicle Weight Rating (GVWR) and chassis information
  - Current fleet information showing any available ZEB that would meet the ZEB purchase requirements has already been purchased
  - Reasons why existing same type of ZEBs are not available for purchase



## EXEMPTION FOR ZEBs INSUFFICIENT DAILY MILEAGE

- None of the available depot charging BEBs can meet the daily mileage needs of any similar bus type in the fleet
  - Exemption applies even if on-route charging or FCEBs are available
- Supporting documentation
  - Explanation why an exemption is needed
  - Current monthly data report to show daily usage for existing buses
  - Request for proposal and the resulting bid showing BEB battery capacity
  - Empirical data on BEBs on daily assignment, if available
    - If not available, CARB calculates energy use per mile from Orange County Bus Cycle
- Exemption granted if supported by empirical data or if daily mileage >80% of bus range (using largest available battery pack)



## EXEMPTION FOR GRADEABILITY

- Available ZEBs cannot meet gradeability of equivalent internal combustion engine bus
- Gradeability requirements cannot be met by any other equivalent bus in the fleet
- Supporting documentation
  - Topography information for applicable route or block
  - Performance data of current conventional buses of same type
  - Any other relevant empirical data
  - RFP and the resulting bid showing required gradeability and minimum sustained speed



# LOW-NOX ENGINES & RENEWABLE FUELS REQUIREMENTS

- Low-NOx engine purchases begin January 1, 2020
  - Applies to all transit agencies
  - Excludes buses dispatched from NOx exempt areas
  - Does not require switching fuel types
- Low-NOx engine (or paired with hybrid propulsion)
  - Must be commercially available for 2 years
  - Must be certified to lowest level of NOx
- Renewable fuels when fuel contracts are renewed beginning January 1, 2020
  - Excludes small transit agencies



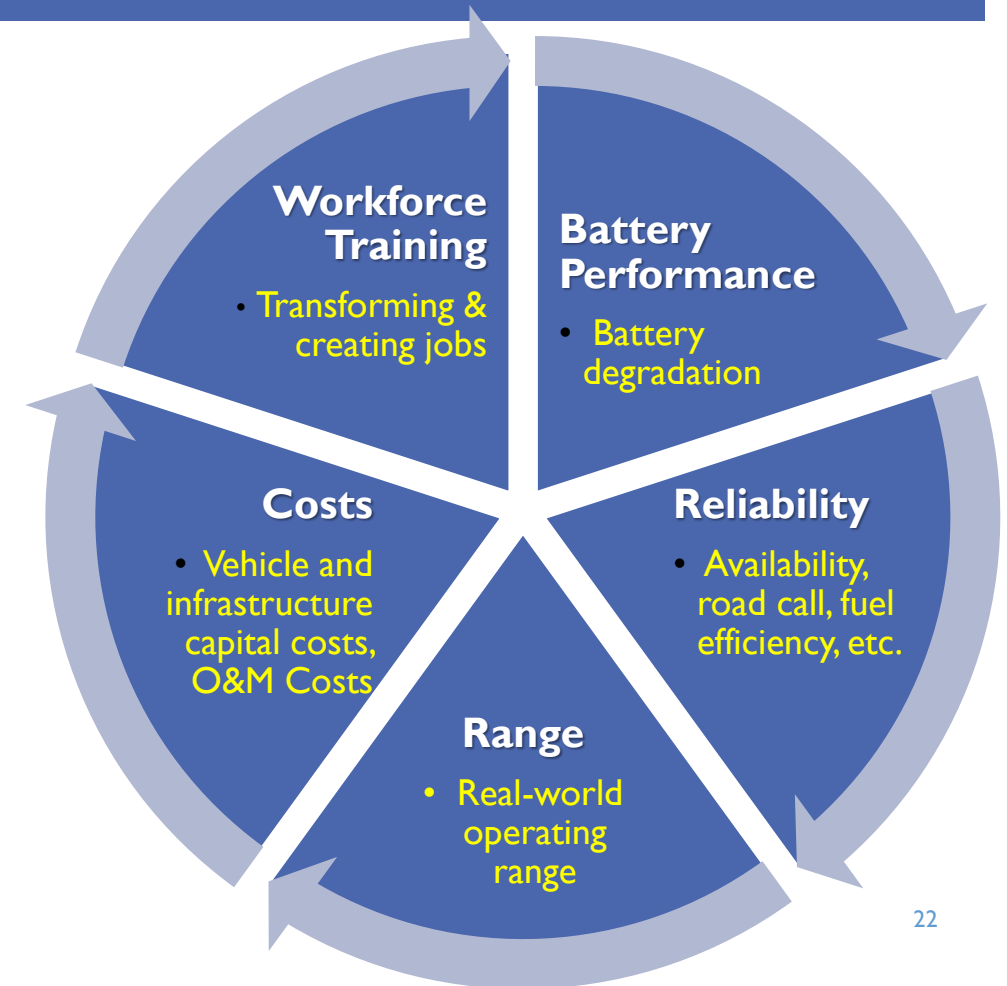
# REPORTING AND RECORD KEEPING REQUIREMENTS

- Initial reporting starts in 2021 for all transit agencies
- Every transit agency must report annually by March 31<sup>st</sup> each year
  - Information on agency, bus purchases, fuels purchases
  - Individual bus, engine and propulsion system information
  - Total annual zero-emission passenger mile if using the mobility option
- Every transit agency must retain records of information reported for 3 years after bus retirement or contract expiration
  - Records of Notices to Proceed and related bus purchase contracts, lease, and conversion
  - Records of Low-NOx engine purchases
  - All fuel purchase contracts (large transit agencies)
  - Record of zero-emission passenger miles if using the mobility option



# COMPREHENSIVE REVIEW

- Identify status of ZEB technology
- Evaluate over 20 different metrics
- Evaluate real-world data and experience
- Help formulate appropriate policies and funding strategies
- Continued coordination with transits, OEMs, utilities, and other state agencies
- One year before the first ZEB purchase requirement
- Complements annual updates to the Board



## SIGNIFICANT INCENTIVES AVAILABLE

### HVIP

Low NO<sub>x</sub> engines, ZEVs,  
advanced technology, &  
infrastructure

**FY 18-19**  
**\$125 M**

### VW

Zero-emission transit,  
school, & shuttle bus  
replacements

**\$130 M**

### Carl Moyer

Cleaner engines & ZEVs  
up to \$80,000/bus plus  
fueling infrastructure

**FY 18-19**  
**\$79 M**

### AB 617

Engine replacement &  
infrastructure in DAC

**FY 18-19**  
**\$245 M**

### LCTOP

Expanded bus or rail  
services, & multimodal  
facilities

**FY 17-18**  
**\$146 M\***

### TIRCP

Rail, bus, ferry transit  
improvements

**FY 17-18**  
**\$291 M\***

### Utility Programs

Charging infrastructure  
service upgrades and  
electricity rates (SB350)

**>\$575 M**

### LCFS

Credits for using low  
carbon transportation fuels

**~\$10,000/bus/yr**

\* Calculated from cap-and-trade auction proceeds listed at [arb.ca.gov/cc/capandtrade/auction/aug-2018/ca\\_proceeds\\_report.pdf](http://arb.ca.gov/cc/capandtrade/auction/aug-2018/ca_proceeds_report.pdf)

## CARB APPROVED FUNDING PLAN - VOUCHERS

- Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) and Low NOx Engine Incentives

- \$125 million for FY 18-19 (first come first served)

- New bus purchase: ZEBs only
- Low NOx engine: repower only

- Infrastructure voucher enhancement

- Up to \$30,000 per charger for BEB
- Up to \$100,000 per FCEB with purchase of 5 or more

- More Information available at:

[https://www.arb.ca.gov/msprog/aqip/fundplan/proposed\\_1819\\_funding\\_plan.pdf](https://www.arb.ca.gov/msprog/aqip/fundplan/proposed_1819_funding_plan.pdf)

Category	Base Amount*
Low NOx Engine Repower	\$50,000
Zero Emission Bus (20 ft – 24 ft)	\$80,000
Zero Emission Bus (25 ft – 29 ft)	\$90,000
Zero Emission Bus (30 ft – 39 ft)	\$120,000
Battery Electric Bus (40 ft – 59 ft)	\$150,000
Battery Electric Bus (60 ft)	\$175,000
Double Decker Bus (40 ft)	\$175,000
Fuel Cell Electric Bus (≥ 40 ft)**	\$300,000

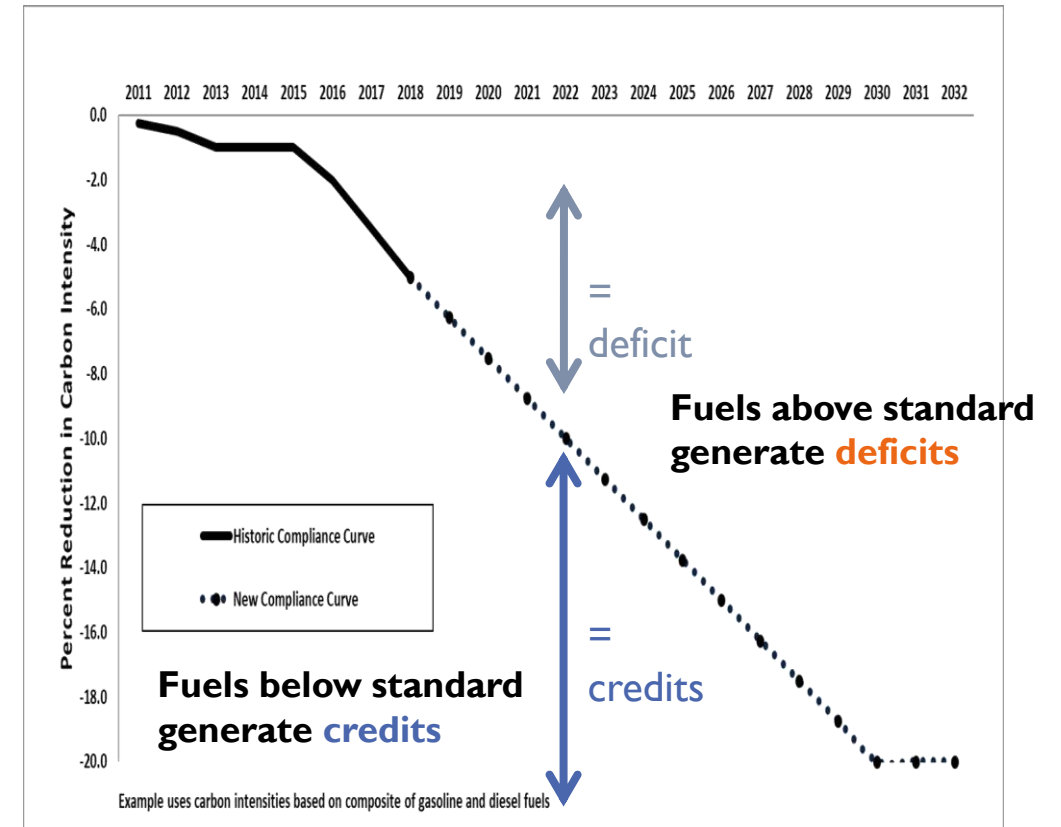
\*Up to \$15,000 more for use in a disadvantaged community

## VW MITIGATION TRUST FUNDING FOR TRANSIT

- \$130 million for transit, school, and shuttle buses
  - Released in two equal allocations for \$65 million each
  - Up to 50 percent of each allocation for transit buses
  - Both battery and fuel cell electric transit buses are eligible
  - Requires scrapping old vehicle
- Administered statewide on a first come, first served basis by the San Joaquin Valley Air Pollution Control District
  - Workgroup meetings anticipated in spring 2019
  - Application period anticipated late spring/early summer 2019
- More information available at: <https://ww2.arb.ca.gov/our-work/programs/volkswagen-environmental-mitigation-trust-california>

# LOW CARBON FUEL STANDARD (LCFS)

- Originally adopted in 2009, last amended in 2018
- Reduce carbon intensity (CI) of transportation fuel pool by at least 20% by 2030
- Transit agencies can opt-into LCFS to generate credits for using lower-carbon fuels
  - Credits do not expire, have monetary value and can be traded in the LCFS market
- Starting 2019, transit agencies that own hydrogen fueling infrastructure can also generate credits
- More information available at:  
<https://www.arb.ca.gov/msprog/bus/lcfs.pdf> and  
<https://www.arb.ca.gov/fuels/lcfs/lcfs.htm>



## APPROXIMATE CREDIT REVENUE FOR TRANSIT BUSES IN 2019

Bus Fuel Type	Example CI* (gCO <sub>2</sub> e/ MJ)	Fuel Efficiency		Credit Revenue Per Mile (LCFS credit value \$200)	Annual Credit Value (based on an annual mileage of 40,000)
BEB Using Grid Electricity	95	0.5	mile/kWh	\$0.54	\$21,649
BEB Using On-site Solar Electricity	0	0.5	mile/kWh	\$0.68	\$27,121
FCEB Using Hydrogen From Generic Lookup Table Pathway	120	6.5	mile/kg	\$0.22	\$8,702
FCEB Using Hydrogen From Electrolysis Through Zero-CI Electricity	10	6.5	mile/kg	\$0.62	\$24,949

\*CIs shown here are for illustration purpose and subject to changes.

## CONTINUED EFFORTS

- Technology Showcase and Symposium in Sacramento on February 6-7, 2019
  - A joint effort amongst CARB, the Antelope Valley Transit Authority (AVTA), and the California Transit Association (CTA)
  - Presented latest advances and funding opportunities
  - Recording and presentations available at <http://www.zebtechsymposium.com/presentations.php>
- Work with transit agencies on implementation
- Monitor status of ZEB technology
- Report to the Board annually
- Conduct a comprehensive review in early 2020s



# CONTACT INFORMATION

- Innovative Clean Transit <https://arb.ca.gov/msprog/ict/ict.htm>
- Yachun Chow, Manager  
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(916) 445-6017

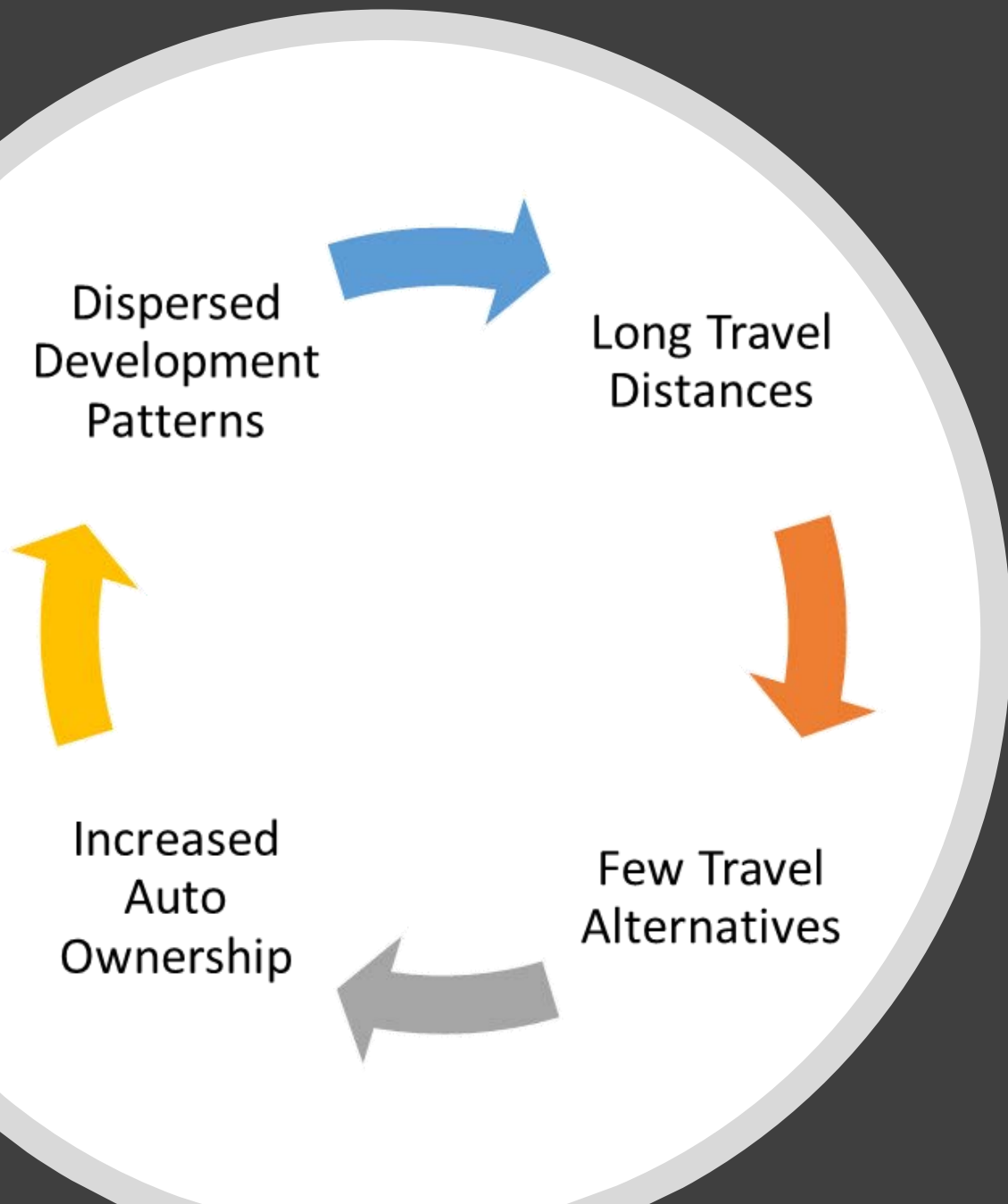




# Ecosystem of Shared Mobility Services in the San Joaquin Valley

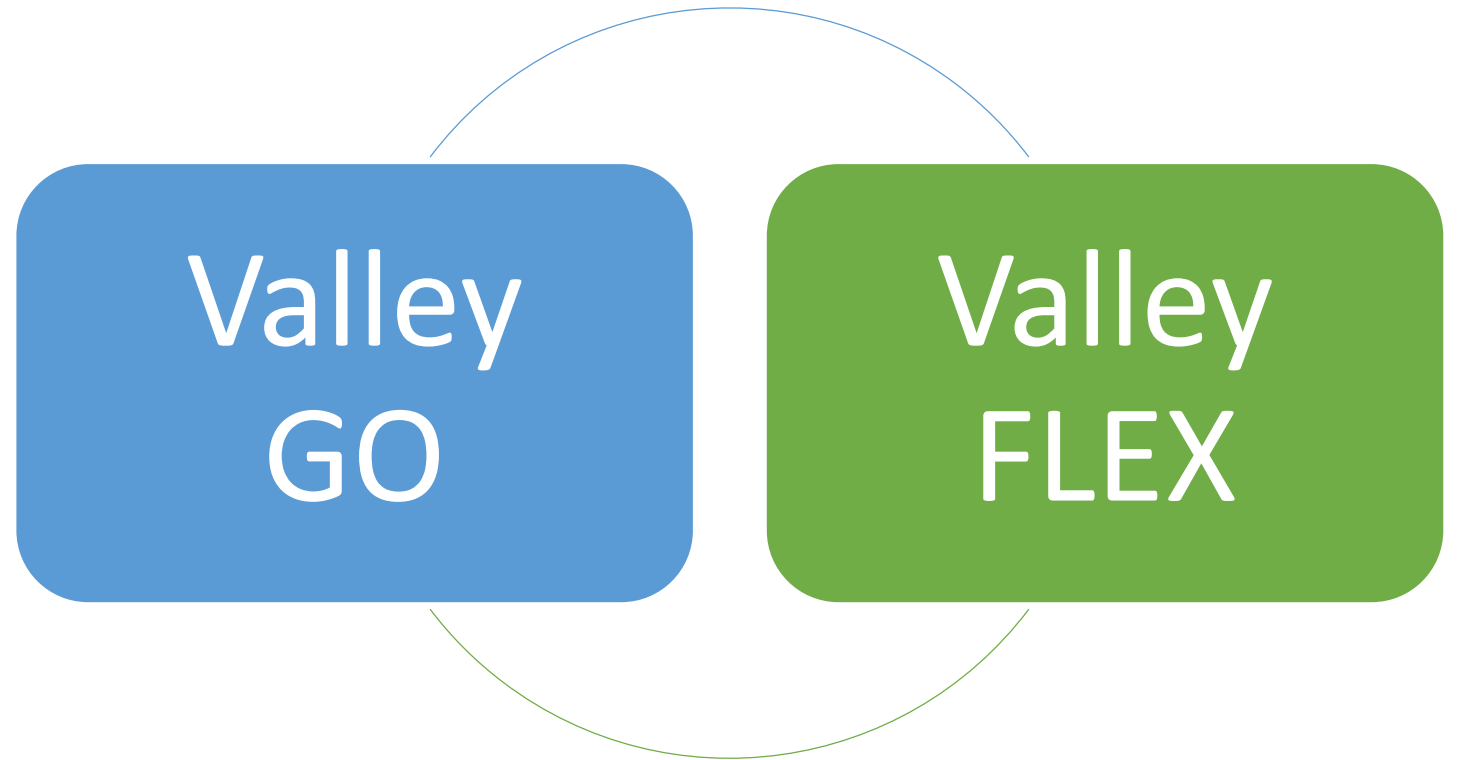
Caroline Rodier, Ph.D., University of California, Davis

Institute of Transportation Studies and National Center for Sustainable Transportation



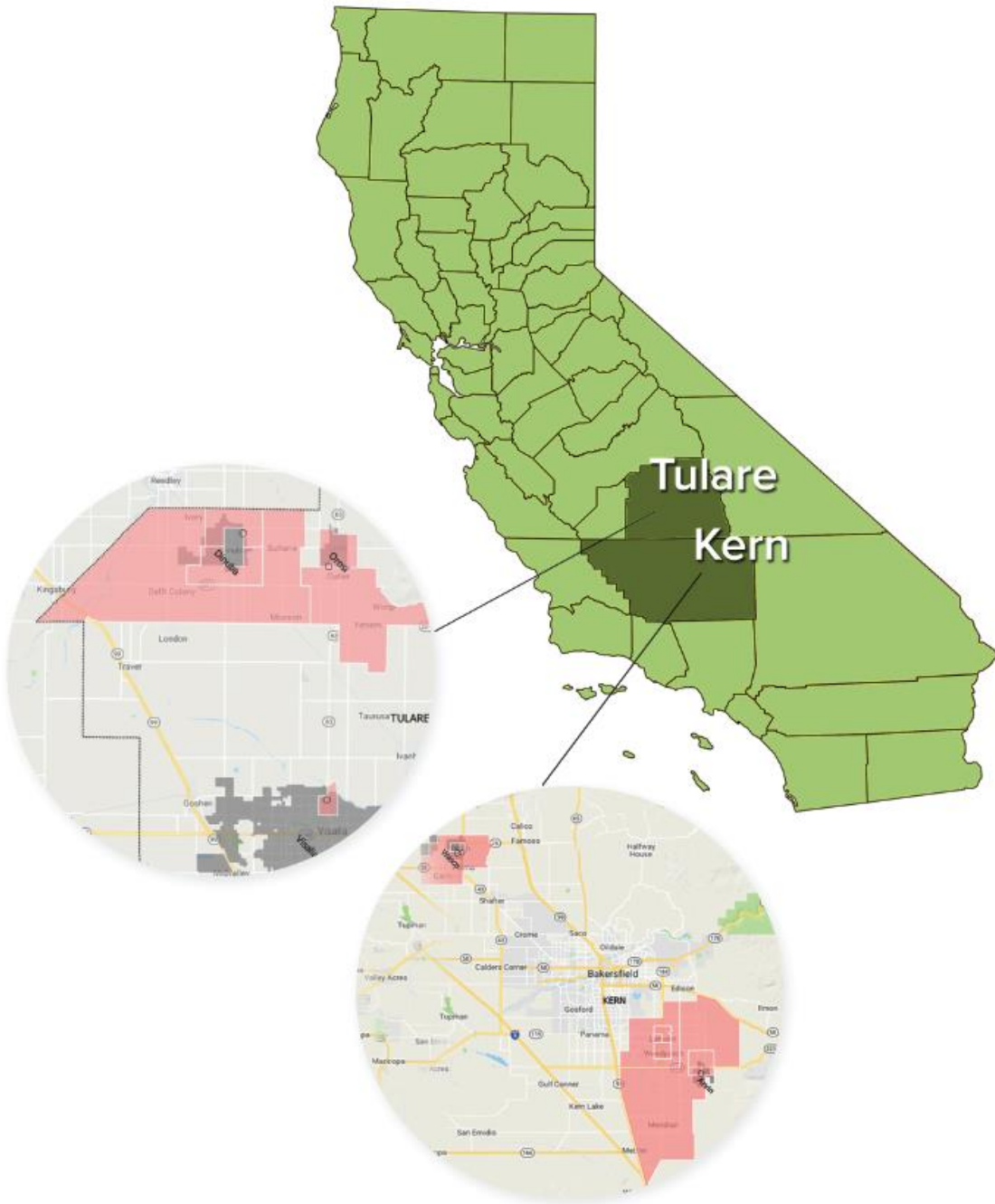
# Cycle of Rural Auto Dependence

# Two Pilots



# Valley GO

- What: EV carsharing and ride-hailing service
- Where: At six affordable housing complexes in Tulare and Kern counties



## How Valley GO Works



### 1. JOIN

Application Eligibility: age, driver's license, payment method



### 2. RESERVE

In advance or on-demand: Via smartphone app, website, or phone



### 3. UNLOCK CAR

Use key card or smart phone app



### 4. DRIVE CAR

To desired destinations



### 5. RETURN

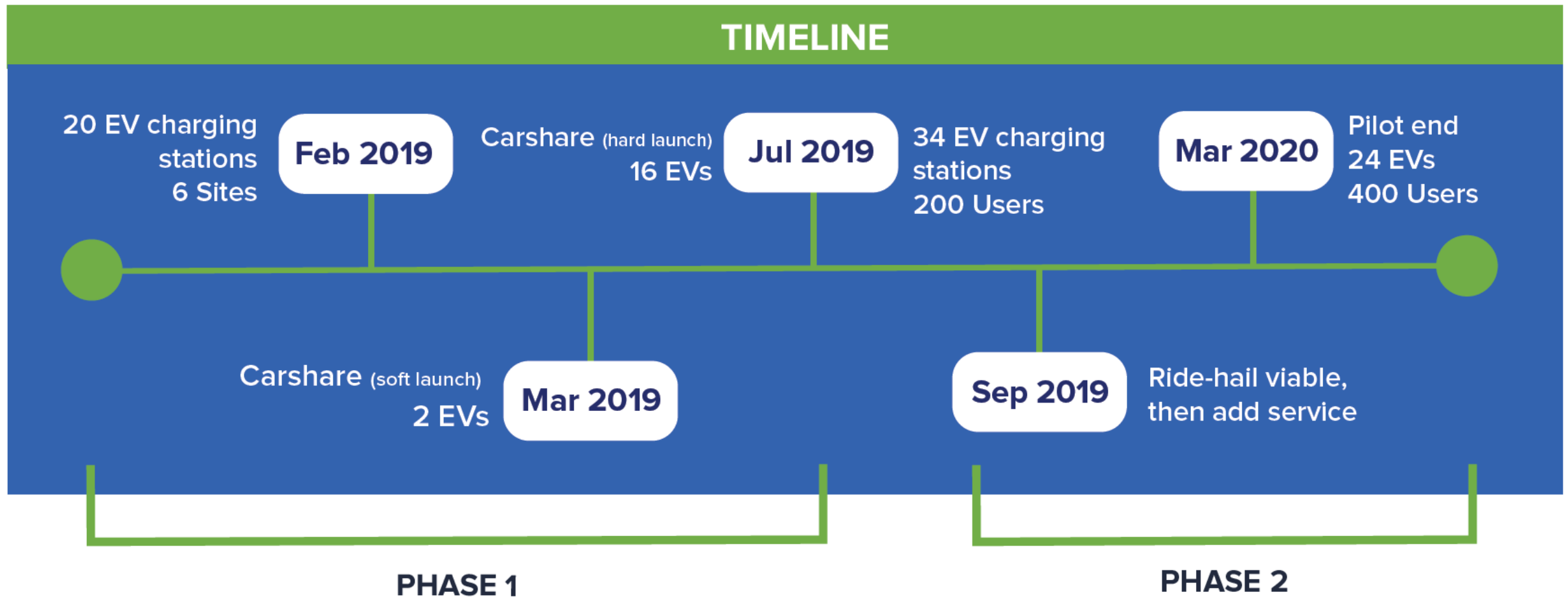
And park at original pick up location

# Initial Communities

## Affordable Housing Locations in Phase 1

Complex	Address	Units	Cars	County
Sierra Village	1375 N Crawford Ave, Dinuba	44	2	Tulare
Highland Gardens	2423 N Highland St, Visalia	36	2	Tulare
Sandcreek	41020 Road 124, Orosi	60	2	Tulare
Caliente Creek	909 Meyer Street, Arvin	46	2	Kern
Sunrise Villa	1600 Poplar Avenue, Wasco	44	3	Kern
Rosaleda Village	650 N Maple St, Wasco	226	2	Kern

# Valley GO Implementation Timeline



# Valley GO Partners

- ARB, Kern COG and TCAG (funders and program partners)
- SJVAPCD and Sigala, Inc. (grant administrators)
- UC Davis (implementation management and research evaluator)
- Self-Help Enterprises (EV site host, engagement and marketing)
- Kern County and City of Wasco housing authorities (EV site hosts)
- CalVans (fleet owner, maintenance and insurance)
- Mobility Development Group (carsharing operations)
- Rural Development Center at Fresno State (marketing)



## Volunteer Ridehailing

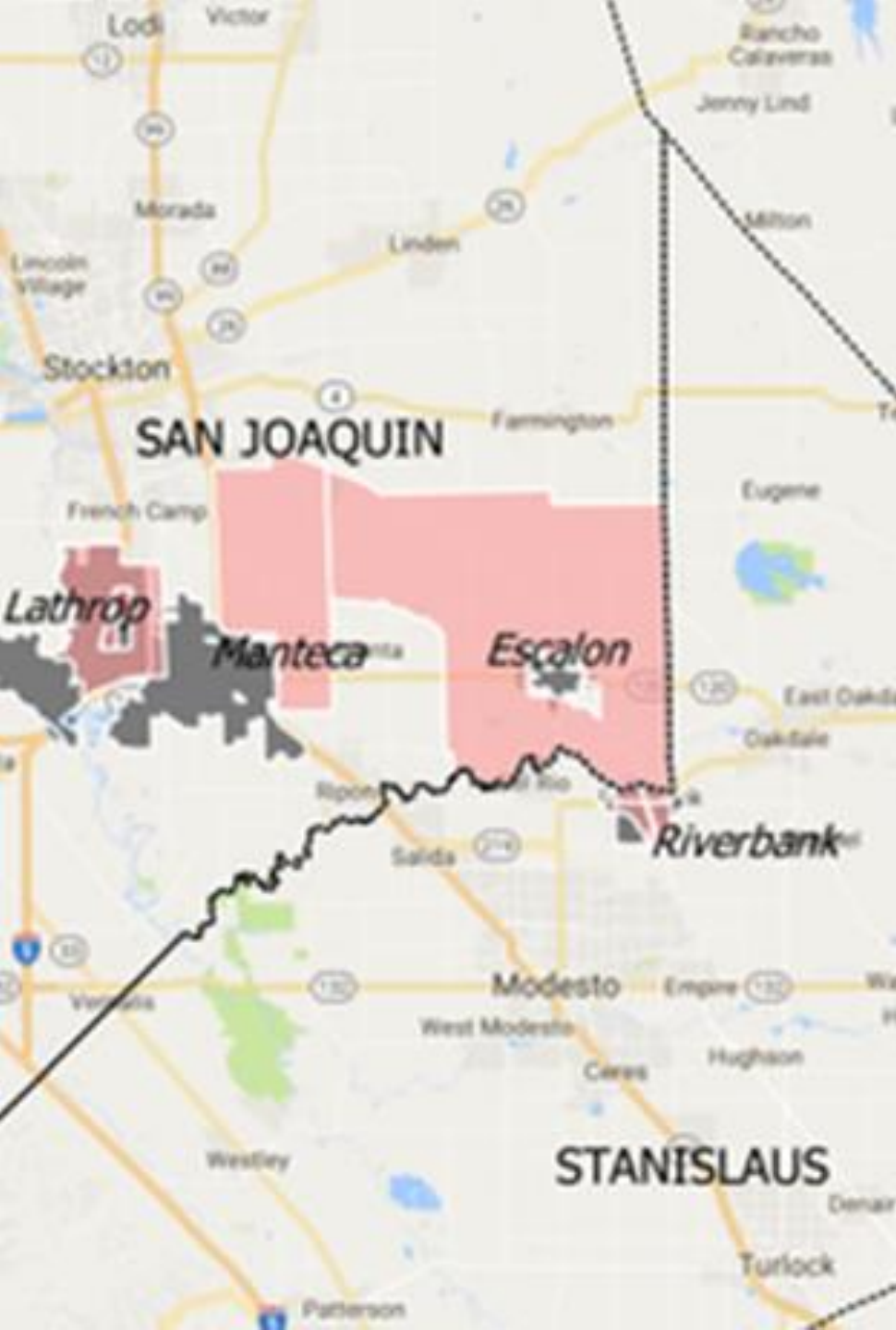
Like Uber and Lyft but volunteer drivers **reimbursed for round trip driving expenses**



## Smartphone Transit App

Like google transit directions but includes **demand responsive** access service

# Valley FLEX



# Volunteer Ridehailing: Partnership with MOVE Stanislaus

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Rural disadvantaged communities



Can't get there by transit



Automate administration and dispatch



Lower costs and maximize service

# Smart Phone Transit Options App (Stanislaus and San Joaquin Counties)

<

LOCATION

Origin

Destination

Downtown Stockton

Costco

3801 Pelandale Ave, Modesto, CA 95356

Memorial Medical Center

1700 Coffee Rd, Modesto

QWERTYUIOP

ASDFGHJKL

↑ZXCVBNM

123☺🎤spaceSearch

☰

TIMELINE

37 min

31.7 miles

CHOOSE YOUR TIMELINE

As soon as possible

Depart earliest at

Arrive latest by

Sat May 11

12

01

Sun May 12

1

02

AM

Today

2

03

PM

Tue May 14

3

04

Wed May 15

4

05

SET TIMELINE

<

TRANSIT OPTIONS

37 min

31.7 miles

Mary (Riverbank)

DAR

\$3.00

90 min

>

John (Lathrop)

VTC

Valley Flex

\$2.00

80 min

>

Irene (Rural Escalon)

VTC

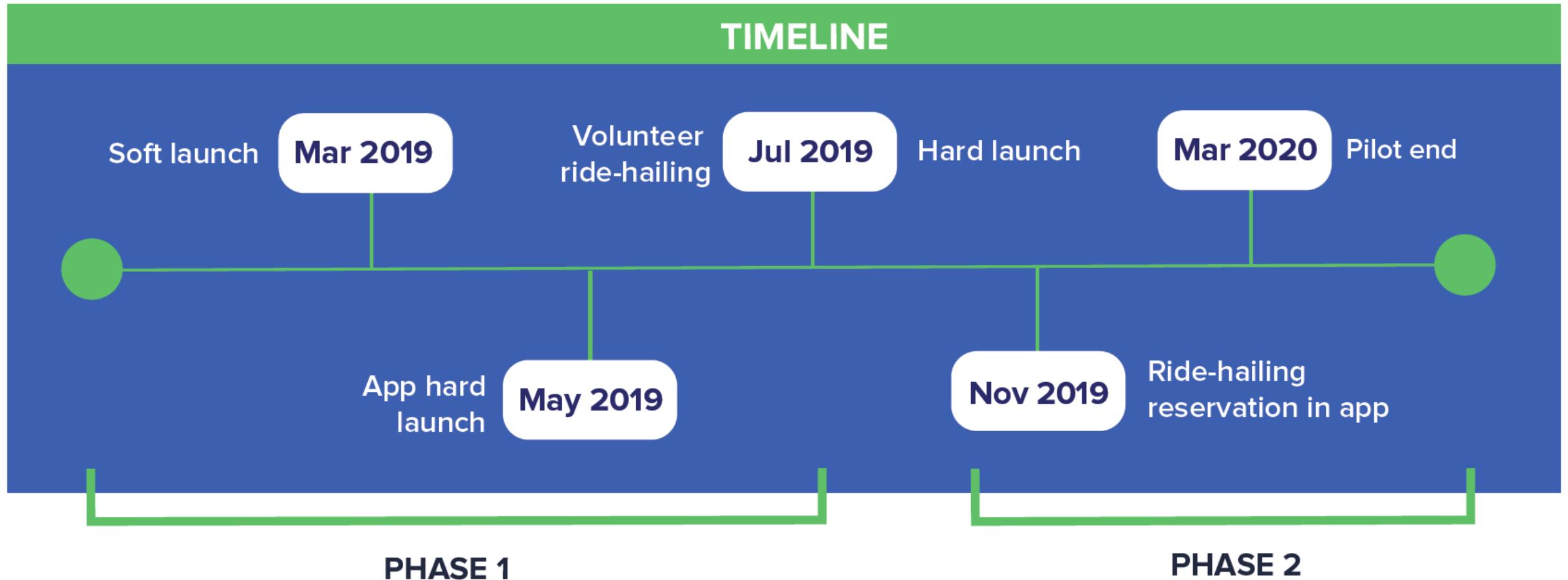
Valley Flex

\$0.00

40 min

>

# Valley FLEX Implementation Timeline



# Valley FLEX Partners

- ARB, SJCOG and StanCOG (funders and program partners)
- SJVAPCD and Sigala, Inc. (grant administrators)
- UC Davis (implementation management and research evaluator)
- MOVE Stanislaus (volunteer ride-hailing program development)
  - Technology: Mobility Development Group and VTC
- San Joaquin and Stanislaus transit agencies (app integration)
  - Technology: DemandTrans, Trillium, Kyyti and SUMC
- Fresno State, MOVE Stanislaus and SUMC (engagement and marketing)

- Thank you!
- Questions?
- Contact:
  - Caroline Rodier, Researcher, ITS-Davis, [cjrodier@ucdavis.edu](mailto:cjrodier@ucdavis.edu)
  - Jeffery Song, Post-Doctoral Researcher, ITS-Davis, [jwksong@ucdavis.edu](mailto:jwksong@ucdavis.edu)

@NCST\_Research - [https://twitter.com/NCST\\_Research](https://twitter.com/NCST_Research)

@ITS\_UCDavis - [https://twitter.com/ITS\\_UCDavis](https://twitter.com/ITS_UCDavis)



# Self-Help Enterprises





# Service Area



- ★ Sacramento
- San Francisco
- Los Angeles



# Location Significance





# Marketing and Outreach

- ▶ Mechanics Taking place
- ▶ Information
- ▶ Marketing plan relative to the community
- ▶ Methods & Deliverables
- ▶ Research Evaluation
  
- ▶ Humanity ....



# Success through Humanity

► *We will listen to what you, care about.*

► *And .. This will help you with that.*



# Mobility Development

Networks • Partnerships • Strategies

We launch, grow and operate carshare, bikeshare, ride-sharing and volunteer networks in mid-sized cities and rural communities



# Our technical experience:

- Planning for long-term program continuity
- facilitating participation of community-based organizations in program design
- EV Carshare and ride-hailing
- Development of tech-enabled Volunteer Transportation
- EVSE construction in association with carshare programs
- Flexible and Electric bikesharing
- Integration of wheelchair accessible vehicles (WAVs)
- Design of Mobility Hubs
- Fundraising/grantwriting for these programs



# Valley Go Sites

- Highland Gardens - Visalia
- Sierra Village - Dinuba
- Sand Creek - Orosi
- Caliente Creek - Arvin
- Sunrise Villa - Wasco
- Rosalita Village - Wasco

# Thank You

Richard Kosmacher, General Manager

[Richard@mobilitydevelopment.org](mailto:Richard@mobilitydevelopment.org)

[www.mobilitydevelopment.org](http://www.mobilitydevelopment.org)

# TRANSIT*ions* TRANSIT*ions* TRANSIT*ions*

Bill Williams – Director Commercial Sales



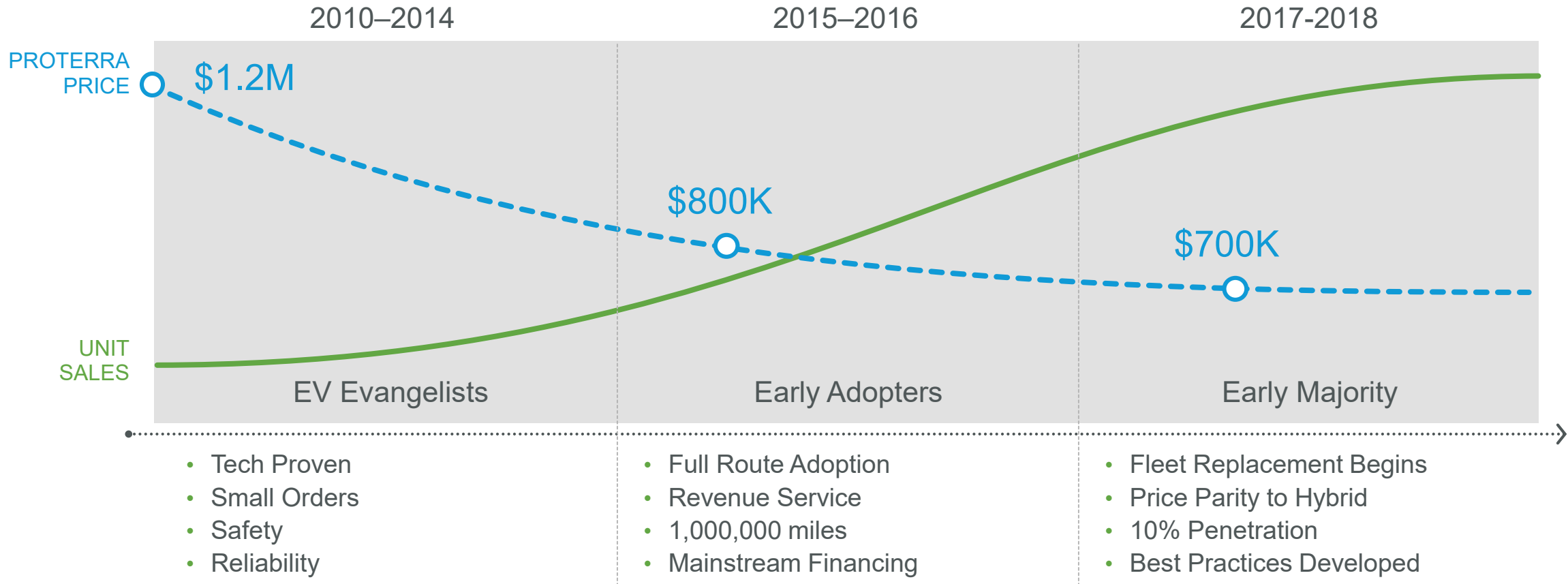


# California's Bus Fleet Will Be 100 Percent Electric by 2040

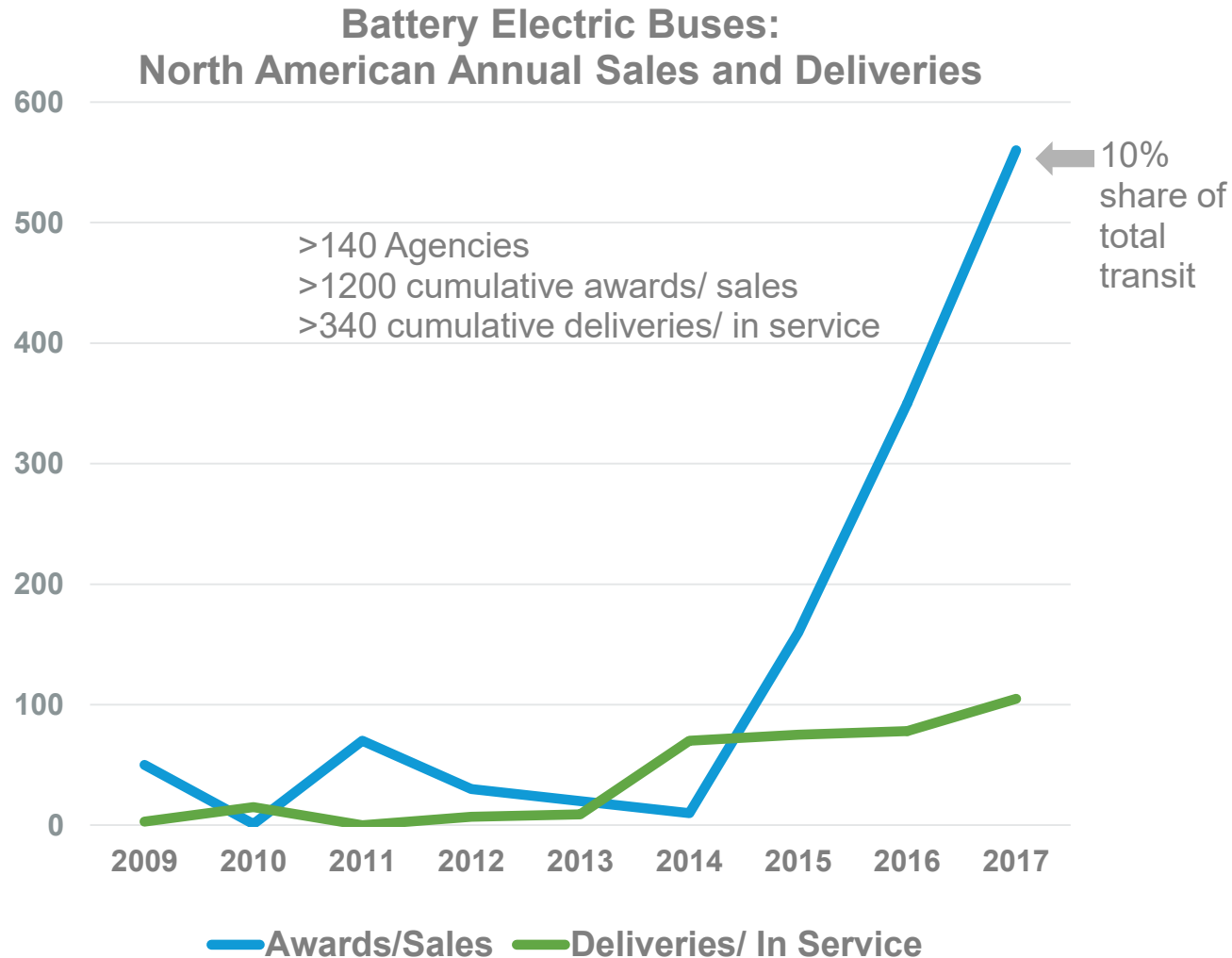
Any new public transit bus purchased in California by 2029 must be a 100 percent electric vehicle, according to a new unanimous vote by the California Air Resources Board, the state's clean air agency. It is the first statewide policy in the United States to require an entire vehicle class go electric, the Union of Concerned Scientists wrote.



# THE TRANSIT MARKET IS RAPIDLY SHIFTING TO EV



# THE TRANSIT MARKET IS RAPIDLY SHIFTING TO EV



Source: CTE Center for Transportation and the Environment

- Moving toward **widespread industry adoption**
- **Purchase barriers eliminated** due to:
  - Improved range
  - Charging standardization
  - Sharp decline in battery costs
  - Service-proven performance

- ❖ Transportation is now the largest source of emissions of all energy sectors in the nation, responsible for more than 28% of greenhouse gas emissions.
- ❖ Smog from buses and other vehicles drives up asthma rates across the country, with children under 18 and low income communities bearing the burden.
- ❖ In addition to providing invaluable public health and environmental benefits, ZEBs are cheaper to maintain and cost less than diesel and compressed natural gas alternatives over the vehicle's lifetime.
- ❖ At the beginning of 2018, only 300 battery electric buses were on US streets.
- ❖ The two leading manufacturers in the US market – BYD and Proterra – report total sales of almost 1,300 buses through 2018, an overall 30% increase in ZEB deliveries.
- ❖ Additionally, commitments from California and major transit hubs, including New York City and Seattle, to go 100% electric with their bus fleets have led to estimates that electric buses will make up one third of the national fleet by 2045.

# SMARTER CHARGING

## COMPATIBLE WITH INDUSTRY-STANDARD CHARGING SYSTEMS



### OVERHEAD CHARGING

Keep your Catalyst buses rolling with easy depot or on-the-road charging, made simple by industry-standard SAE J3105 overhead systems.

- Charge on the road for longer routes or enable 24/7 circulator operations
- Low maintenance costs and high availability
- Compatible with roof-mounted pantographs as well as inverted pantograph systems, offered by Schunk and other suppliers



#### ADOPTED BY MAJOR OEMS



### PLUG IN CHARGING

Regardless of your fleet size, powering up your Proterra buses at the depot is as easy as plugging in a standard J1772-CCS Type 1 charger.

- Universal chargers are offered by Proterra and other suppliers
- Catalyst vehicles can be configured with two charge ports for flexibility at the depot
- Electric buses, utility vehicles and cars can share the same standardized chargers



#### ADOPTED BY MAJOR OEMS





Proterra works closely with customer to recommend the [appropriate charging solution](#) for fleets and facilities planning for scale as the demand for charging increases.

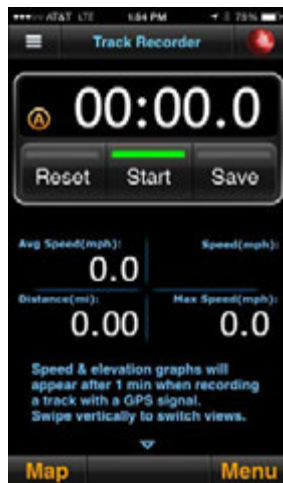
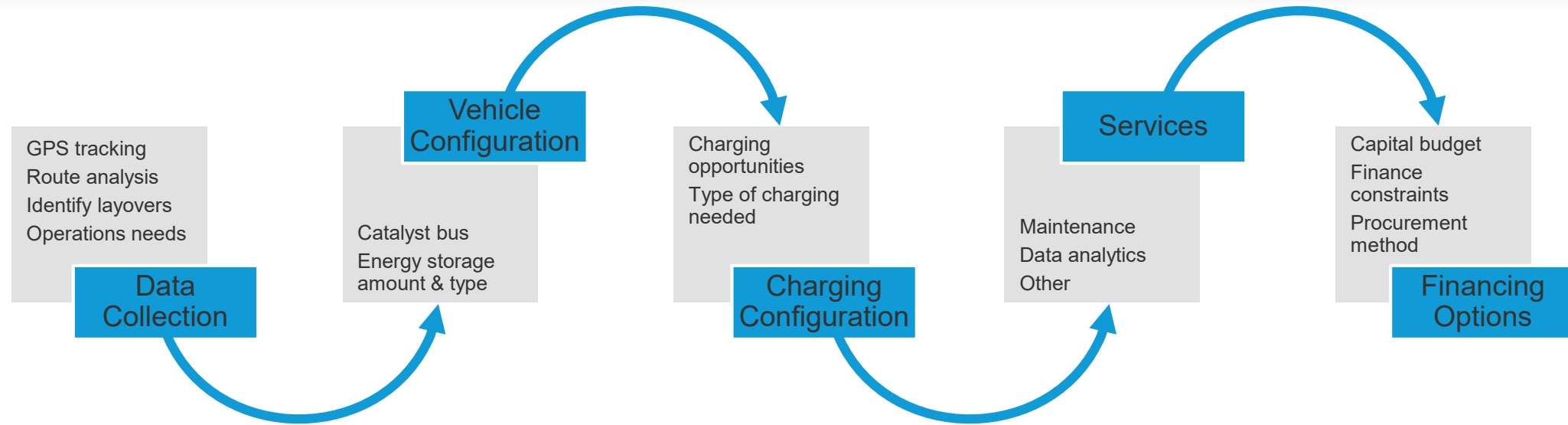
Proterra technologies enable:

- Efficient charge speed
- Dynamic power sharing
- Driver-friendly stations
- Cost-effective operations
- Universal compatibility
- Serviceability
- Low maintenance costs
- High availability

Our experts provide counsel on:

- Site layout
- Energy management
- Real-time energy monitoring
- Site configurations

# THE PROTERRA PROCESS OF ENGAGEMENT



**Proterra's** approach is to work with you to identify the most efficient, most cost-effective way to electrify your high-priority routes. From riding your routes to structuring a financing package, we take a consultative approach and support you throughout the entire process.

- ✓ **We will provide a GPS device to track each of your routes**
- ✓ **We will have the data evaluated**
- ✓ **We will have a route analysis to present**
- ✓ **We will also present a TCO, compared to existing or newer Propane, CNG, Fuel-Cell or Diesel fleet**
- ✓ **This will include infrastructure recommendations**

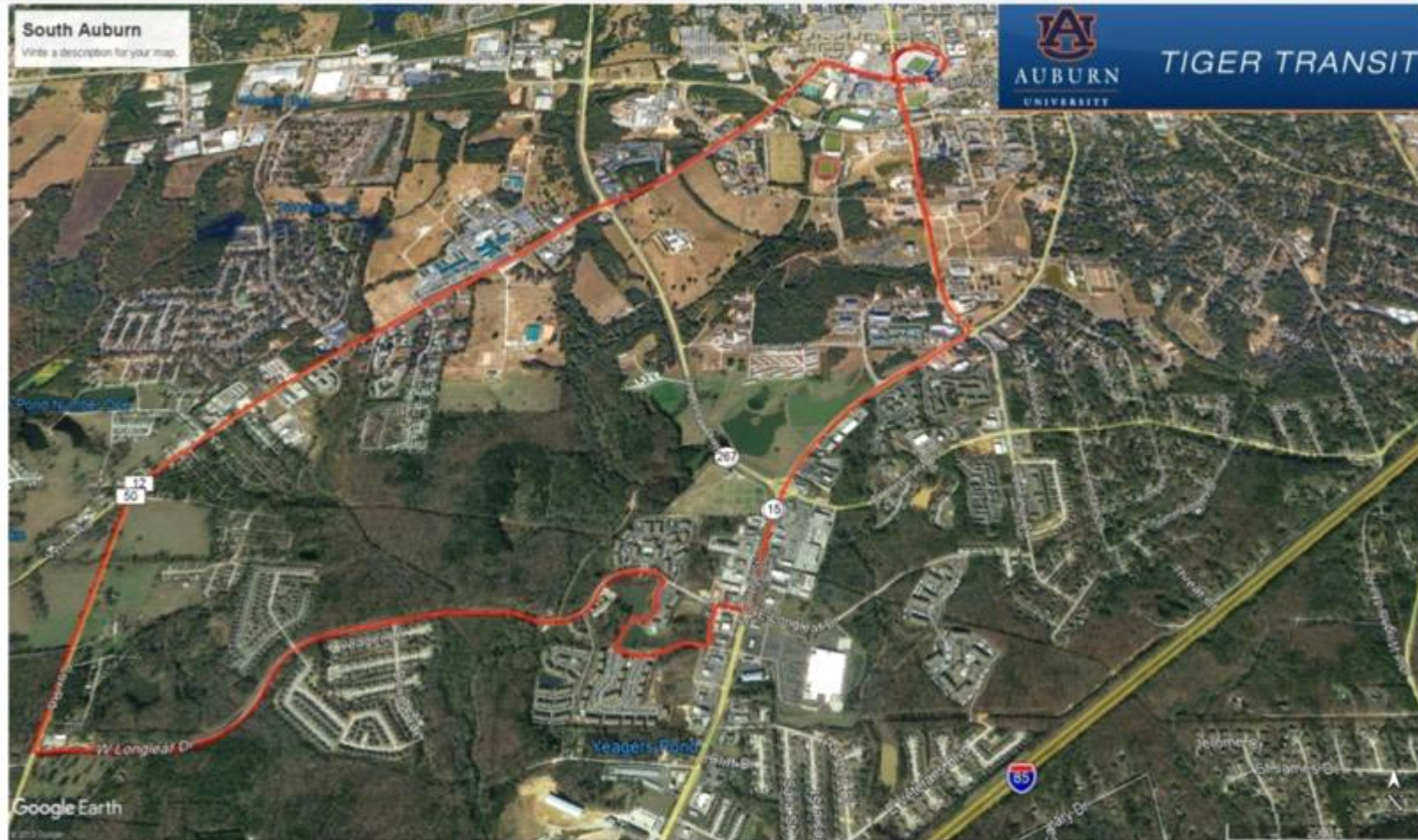
# ROUTE SIMULATION RESULTS – Proterra Catalyst® 35ft



## AIRPORT ROUTE SAMPLE

Route Information	E2
Route Name	Long Term Parking
Distance	2.2 miles
Duration	14 minutes
Average Speed	10 mph
Maximum Speed	40 mph
Maximum Grade	8.0%
Average Day Results	
Passenger Count	29
Ambient Temperature	70 °F
Efficiency	2.113 kWh/mi
MPGe	17.8
Total Energy Consumed	4.65 kWh
Estimated range with 1 full charge	166 miles
System Energy Recaptured by Regen	29%
1 Lap Final SOC	98%
Environmental and Operating Impact	
Hot Day	
Passenger Count	29
Ambient Temperature	93°F
Efficiency	2.561 kWh/mi
MPGe	14.7
Estimated range with 1 full charge	137 miles
Cold Day	
Passenger Count	29
Ambient Temperature	34°F
Efficiency	2.936 kWh/mi
MPGe	12.8
Estimated range with 1 full charge	120 miles

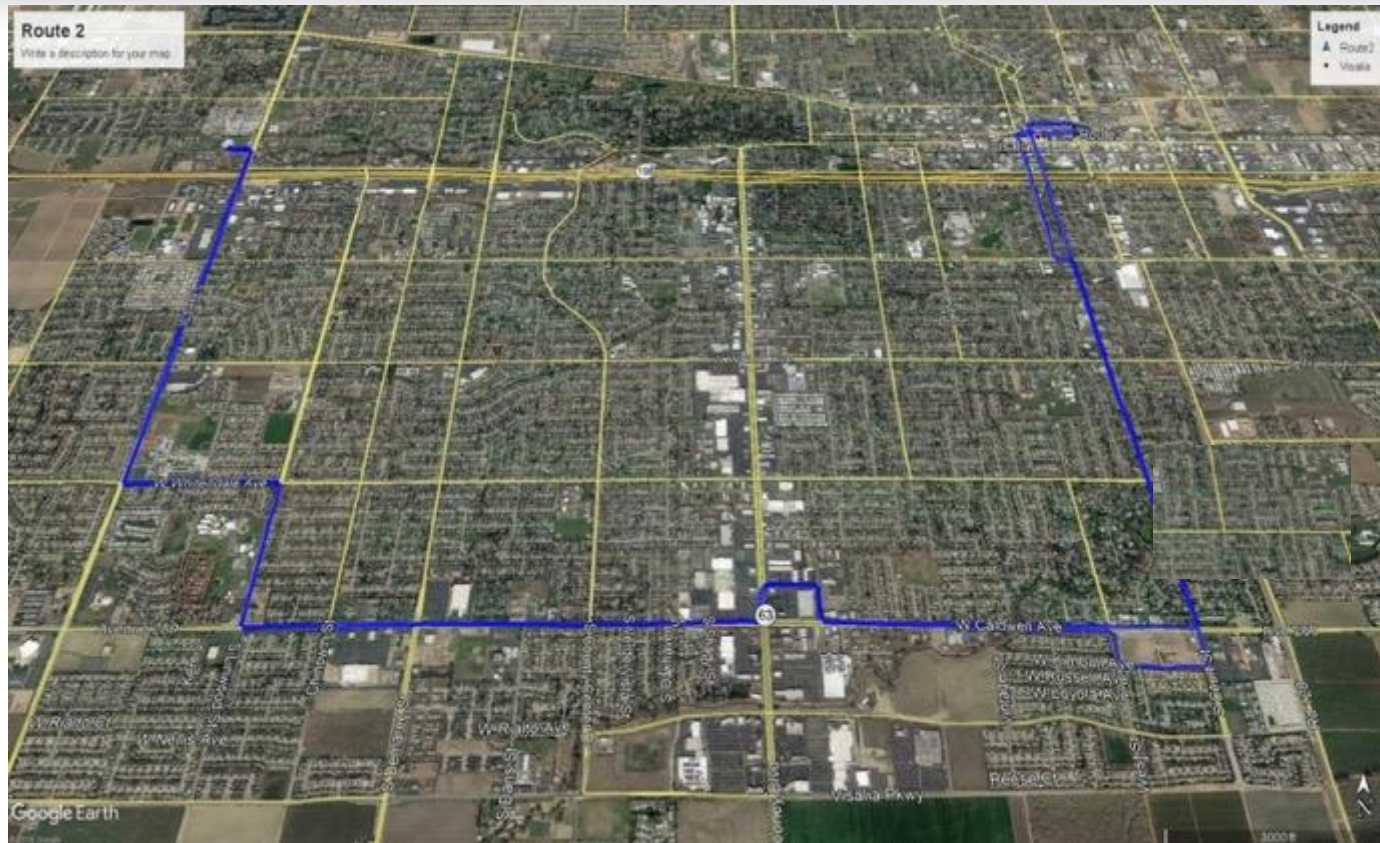
# ROUTE SIMULATION RESULTS – Proterra Catalyst® 40ft



## UNIVERSITY ROUTE SAMPLE

Route Information		E2
Route Name		South Auburn
Distance		8.2 miles
Duration		30 minutes
Average Speed		16 mph
Maximum Speed		41 mph
Maximum Grade		3%
Average Day Results		
Passenger Count		40
Ambient Temperature		62 °F
Efficiency		1.907 kWh/mi
MPGe		19.7
Total Energy Consumed		15.6 kWh
Estimated range with 1 full charge		184 miles
System Energy Recaptured by Regen		25%
1 Lap Final SOC		95%
Estimated 1 Lap Recharge Time (On-route charger)		TBD
Environmental and Operating Impact		
Hot Day		
Passenger Count		40
Ambient Temperature		91°F
Efficiency		2.183 kWh/mi
MPGe		17.2
Estimated range with 1 full charge		161 miles
Cold Day		
Passenger Count		40
Ambient Temperature		28°F
Efficiency		2.399 kWh/mi
MPGe		15.6
Estimated range with 1 full charge		146 miles

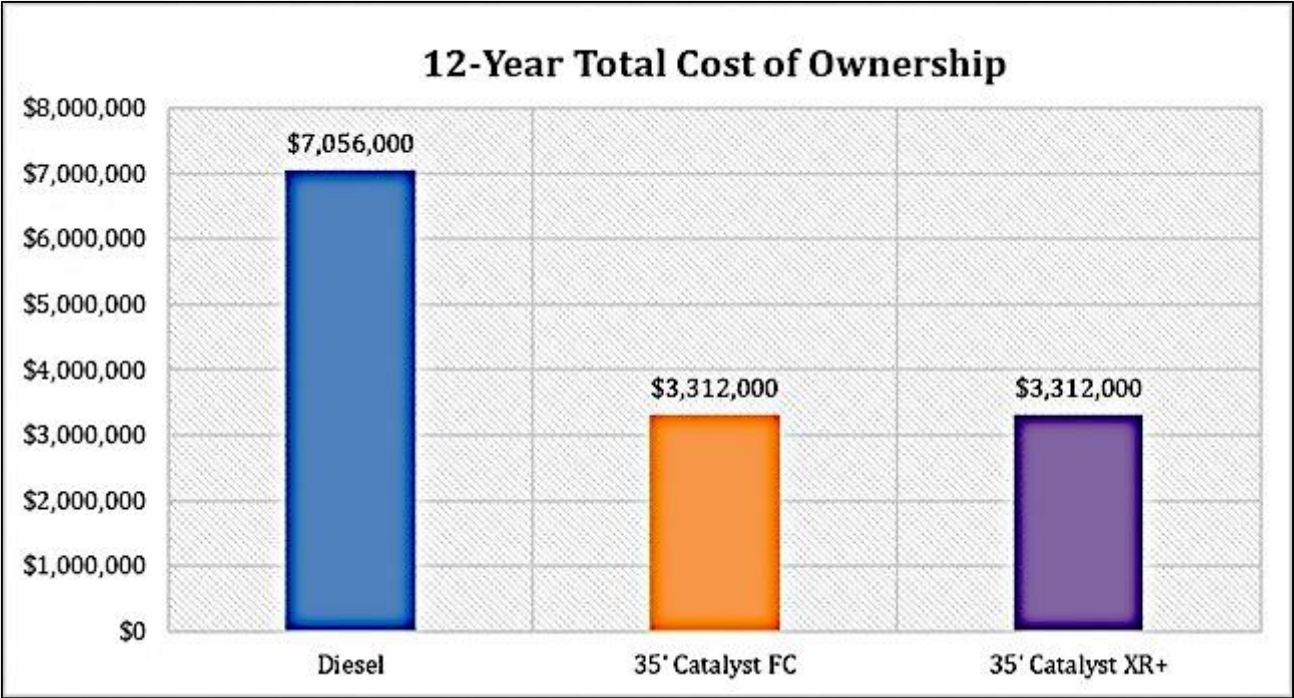
# ROUTE SIMULATION RESULTS – Proterra Catalyst®



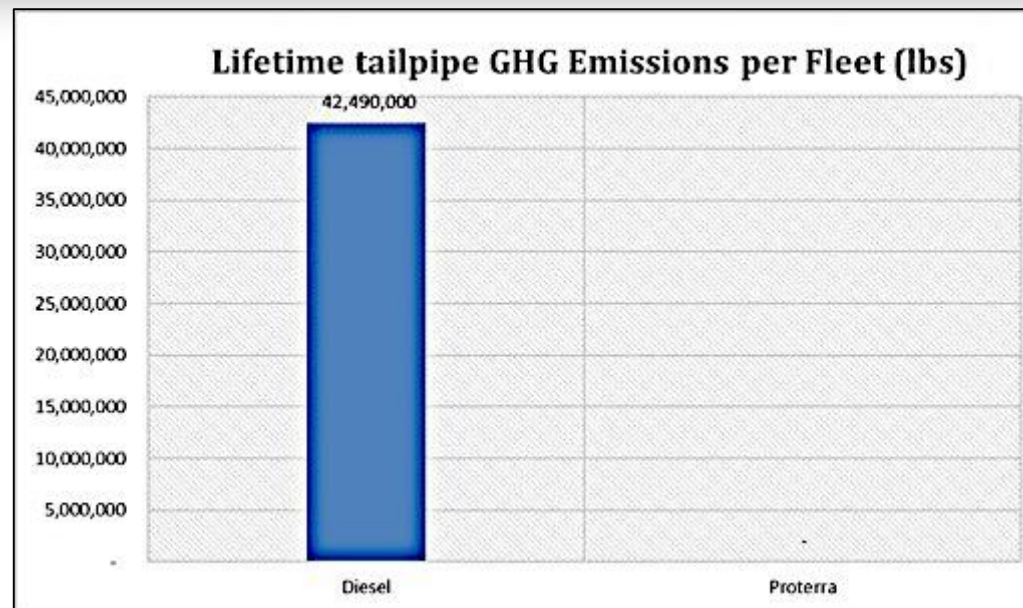
## TRANSIT CITY ROUTE SAMPLE

Route Information	E2 – DuoPower 35FT	E2MAX-DuoPower 40FT
Route Name	2	
Distance	17 miles	
Duration	75 minutes	
Average Speed	13.6 mph	
Maximum Speed	46 mph	
Maximum Grade	0.5%	
Average Day Results		
Passenger Count	29	40
Ambient Temperature	64°F	64°F
Efficiency	1.852 kWh/mi	1.991 kWh/mi
MPGe	20.3	18.9
Total Energy Consumed	31.5 kWh	33.8 kWh
Estimated range with 1 full charge	190 miles	265 miles
System Energy Recaptured by Regen	38%	38%
1 Lap Final SOC	90.5%	93%
Estimated 1 Lap Recharge Time (On-route charger)	TBD	TBD
Environmental and Operating Impact		
Hot Day		
Passenger Count	29	40
Ambient Temperature	99°F	99°F
Efficiency	2.349 kWh/mi	2.446 kWh/mi
MPGe	16.0	15.4
Estimated range with 1 full charge	150 miles	216 miles
Cold Day		
Passenger Count	29	40
Ambient Temperature	35°F	35°F
Efficiency	2.617 kWh/mi	2.992 kWh/mi
MPGe	14.3	12.6
Estimated range with 1 full charge	134 miles	176 miles

# EXAMPLE - TOTAL COST OF OWNERSHIP FLEET OF 12 - 35' BUS

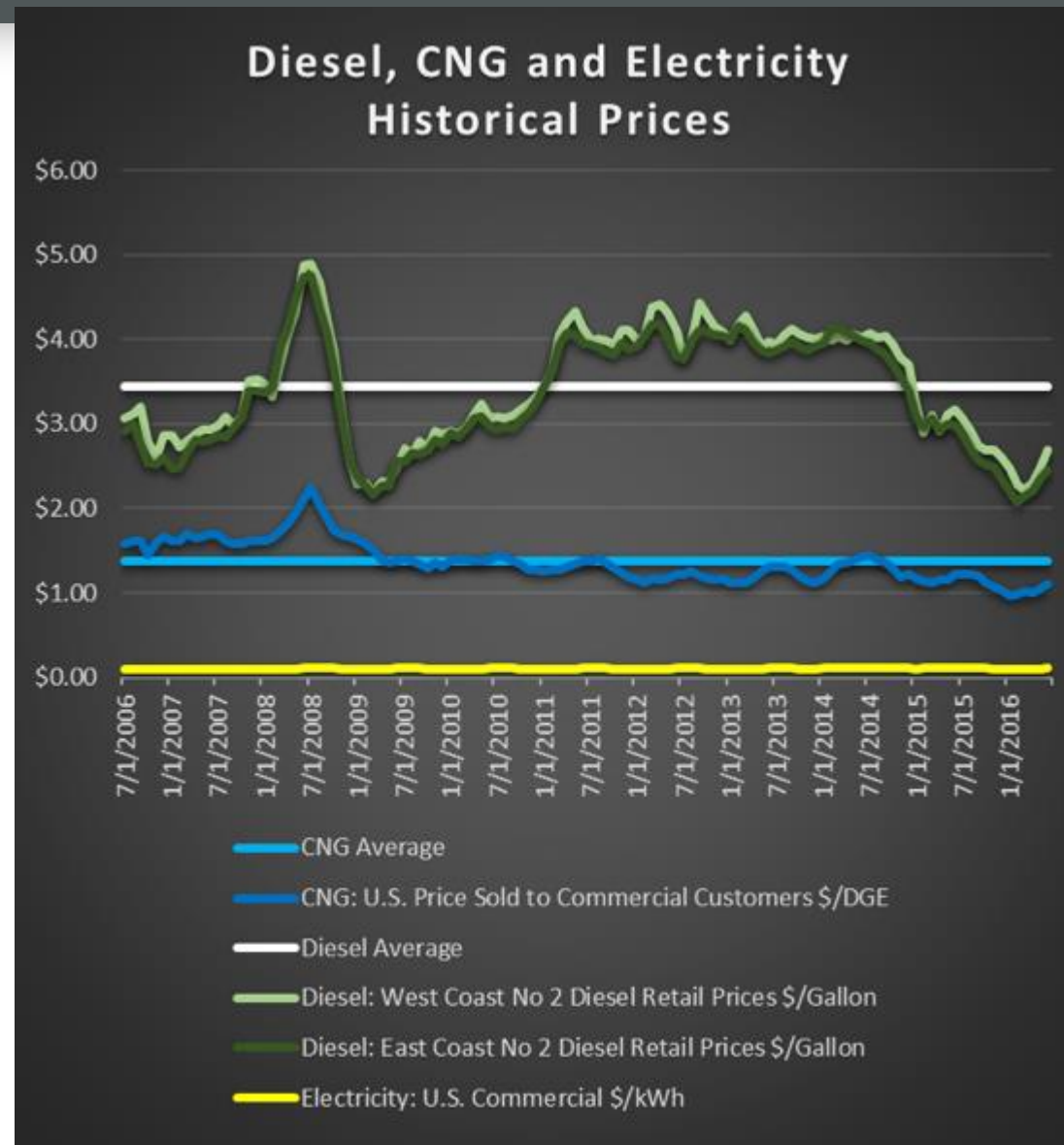


ELECTRIC vs. Diesel	vs. 35' ELECTRIC FC BUS	vs. 35' ELECTRIC E2 BUS



LIFETIME DIESEL EMISSIONS PREVENTED PER FLEET IS EQUAL TO PLANTING 661,000 TREES

# HISTORICAL FUEL PRICES



THANK YOU.



PROTERRA

**Bill Williams**  
DIRECTOR COMMERCIAL SALES



PROTERRA



# Fuel Cell Electric Buses – Transitioning to Zero Emissions

Kern COG's 2019 Transit Symposium  
February 26, 2019

**TRANSITIONS**  
**TRANSITIONS**  
**TRANSITIONS**



Kern Council  
of Governments

Jaimie Levin  
Sr. Management Consultant

Center for Transportation  
and the Environment



# About CTE



- **Mission:** To advance clean, sustainable, innovative transportation and energy technologies
- **501(3)(c) non-profit** engineering and planning firm
- **Portfolio - \$500 million**
  - Research, demonstration, deployment
  - **95 Active Projects** Totaling over **\$300 million**
- Focused on **Zero Emission** Technologies
- **National Presence**
  - Atlanta, Berkeley, Los Angeles, St. Paul

# CTE Members

TRANSITIONS  
TRANSITIONS  
TRANSITIONS

cte  
25<sup>th</sup> Anniversary  
1993-2018

## Leadership Circle Members

AIR  
PRODUCTS

BAE SYSTEMS

BALLARD

BYD

THE LINDE GROUP  
Linde

NEW FLYER OF AMERICA

NOVA BUS

PLUG  
POWER

PROTERRA

TOYOTA  
Let's Go Places



The University of Texas at Austin  
Center for Electromechanics

## Members

AC  
TRANSIT

CALACT  
CALIFORNIA ASSOCIATION FOR  
COORDINATED TRANSPORTATION

-chargepoint+

CLEAN CITIES  
GEORGIA

COMET  
CENTRAL MICHIGAN TRANSIT

ElDorado  
National

General Motors

GILLIG

GP  
GreenPower Bus  
The Future of Public Transportation

HYDROGENICS  
SHIFT POWER | ENERGIZE YOUR WORLD

LITHIUMWERKS

MST  
MONTEREY-SALINAS TRANSIT

OHIO STATE

SANTA CRUZ  
METRO

electriphi

Southern  
Company

STEALTH  
POWER

Test Devices Inc.

TRANSWORLD  
ASSOCIATES LLC

Trillium

UES  
UNIQUE ELECTRIC SOLUTIONS

CCW  
COMPLETE COACH WORKS

UTA

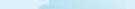
VANNER  
www.vanner.com

VVTA  
VALLEY VIEW TRANSIT AUTHORITY

VOLTABOX

WAVE  
Wireless Advanced Vehicle Electrification

NUVERA



# Class 8 Fuel Cell Trucks

- **Specifications**

- 85 kW Fuel Cell
- 100 kWh Battery
- 420 kW (560 HP) Motor
- 30 kg Hydrogen Storage
- Plug-in Capable



- **Performance**

- 80,000 lbs GVWR
- 150-Mile Range
- 65 mph Top Speed
- Power: Maintains 30 MPH on 6% Grade
- Torque: Enough to Start on 20% Grade
- Port of Los Angeles – June 2018



<https://www.todaystrucking.com/focus-kenworth-zero-emissions-cargo-transport/>

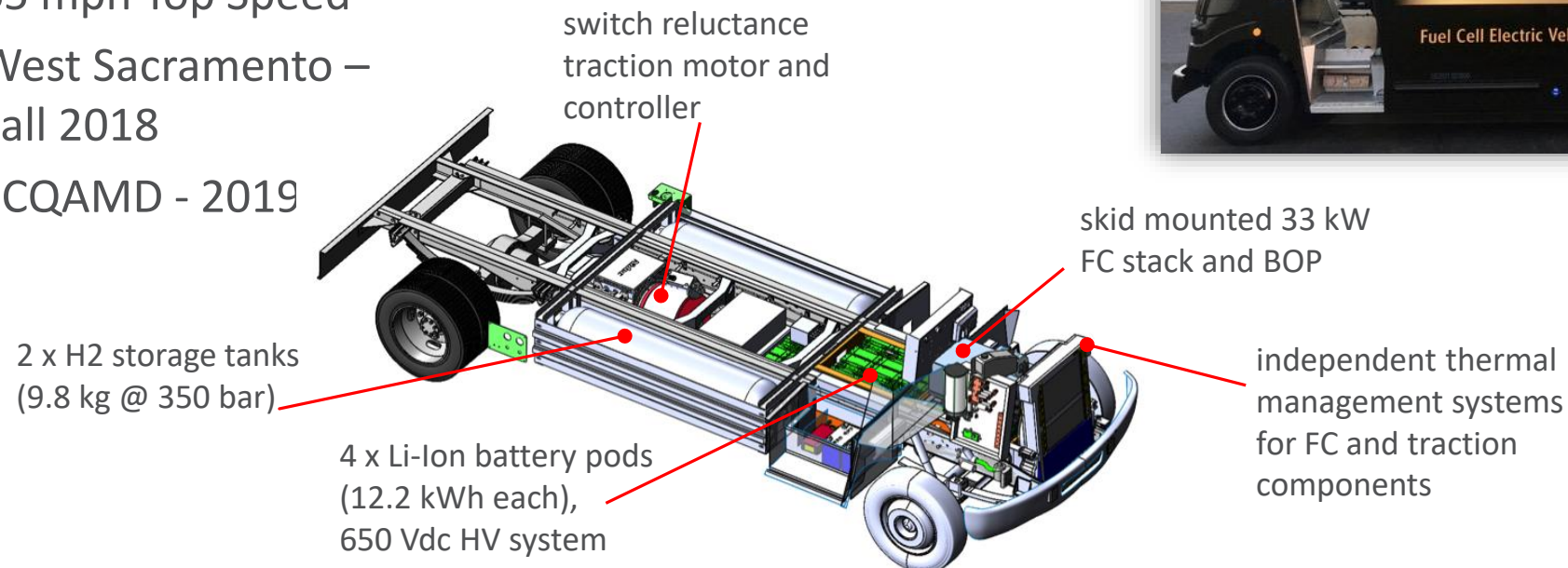
# UPS Class 6 Step-Van

- **Specifications**

- 33 kW Fuel Cell
- 49 kWh Battery
- 9.8 kg Hydrogen Storage

- **Performance**

- 125-Mile Range
- 65 mph Top Speed
- West Sacramento –  
Fall 2018
- SCQAMD - 2019



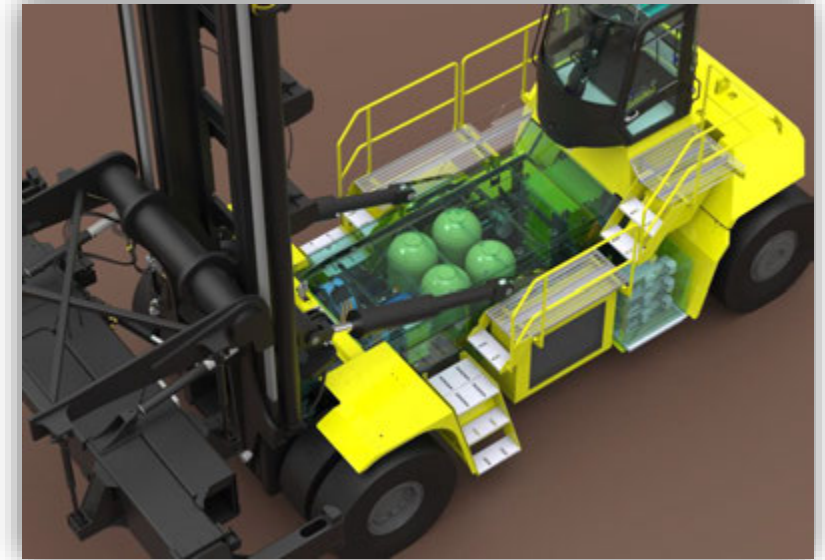
# Hyster–Yale Top Loader

## Electric Top Loader with Wireless Charging and Fuel Cell Range Extender

### Approximate Size and Weight of ETL

Descriptor	Weight/Measurement*
Weight without Load	181,000 lbs.
Front Axle Loading with Load	230,000 lbs.
Overall Length	35 feet
Overall Width Over Drive Tires	16 feet

\*Based on Hyster Yale Diesel H1150HD-CH, 6-high Top Loader

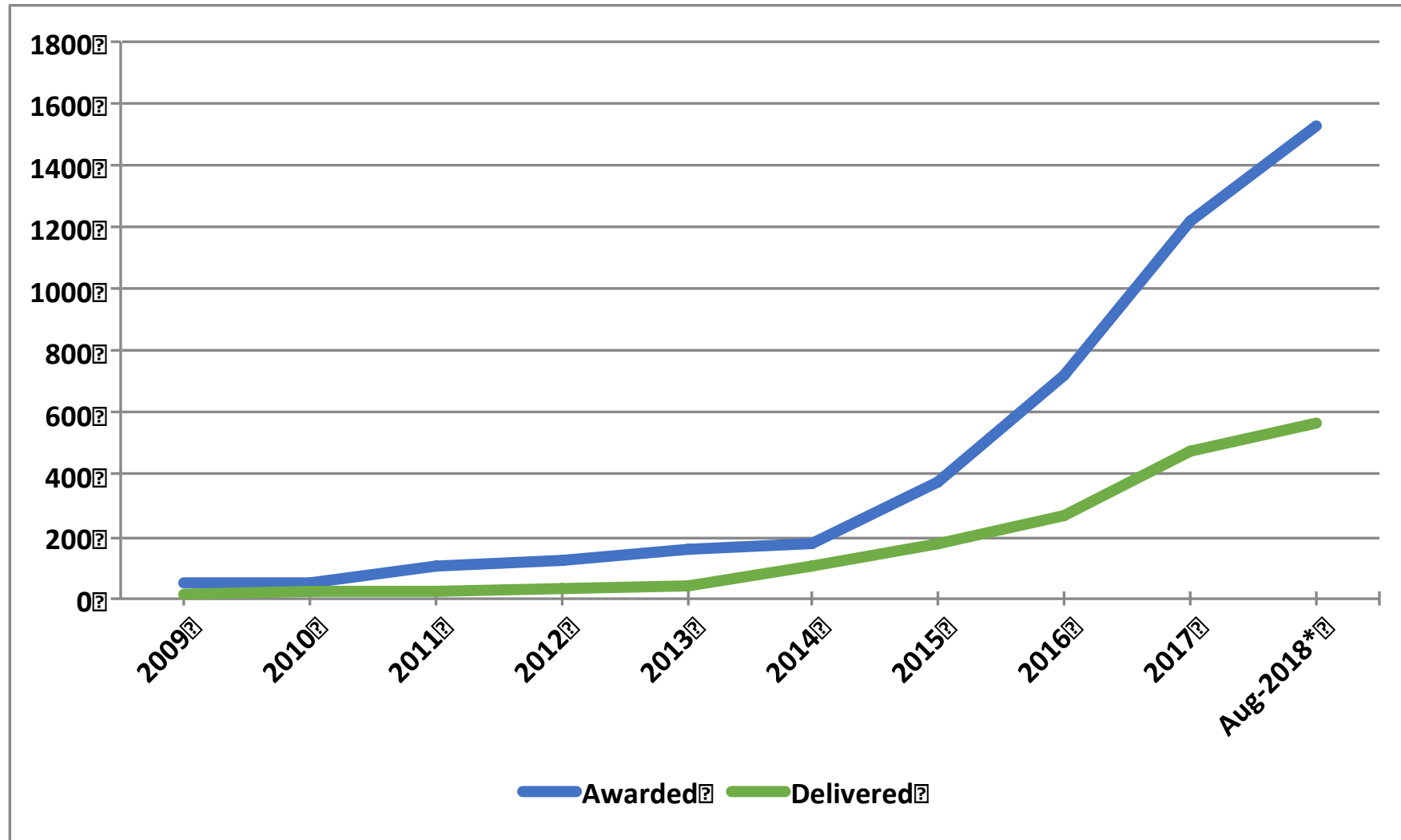


# Shell Hydrogen

- Largest Fuel Retailer in the World
- 4 Existing Light-duty Stations (southern CA)
- 2017 California Energy Commission Award for 7 New Stations (northern CA)
- 2018 California Energy Commission Award for Heavy-Duty Truck Fueling Station (1,000 kg/day) with 100% Renewable Hydrogen (Port of Long Beach)
- 2018 CARB ZANZEFF Freight Facilities – Two 1,000 kg/day truck fueling stations at Port of LA and Ontario Airport (350 and 700 Bar Fueling)

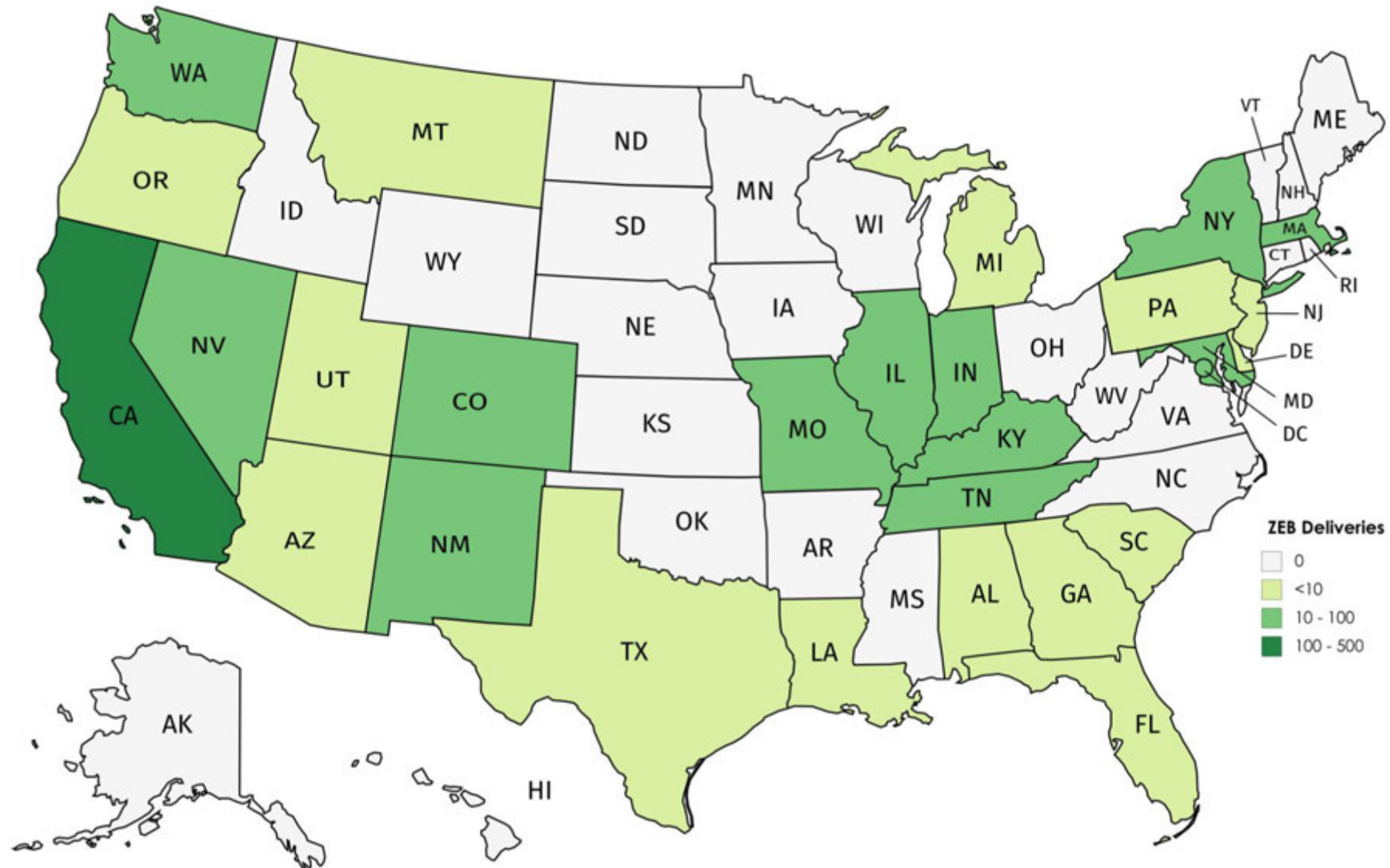


# U.S. ZEB Annual Awards/Deliveries





# ZEB Deliveries



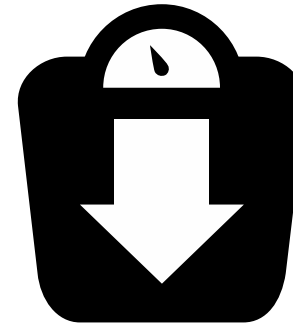
# ZEB OEMs



# FCEB Advantages

**250-300  
miles**

Proven  
range



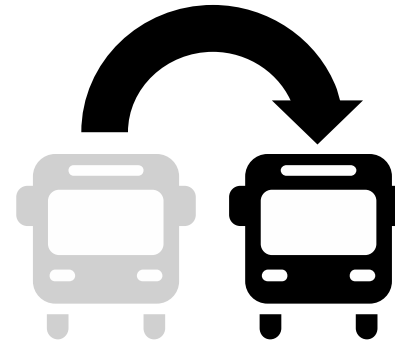
Significant  
reduction in  
vehicle weight

(carry more  
passengers)



Rapid refueling  
speeds

(6 to 10 minutes)



**1:1**  
replacement of  
conventional  
vehicles

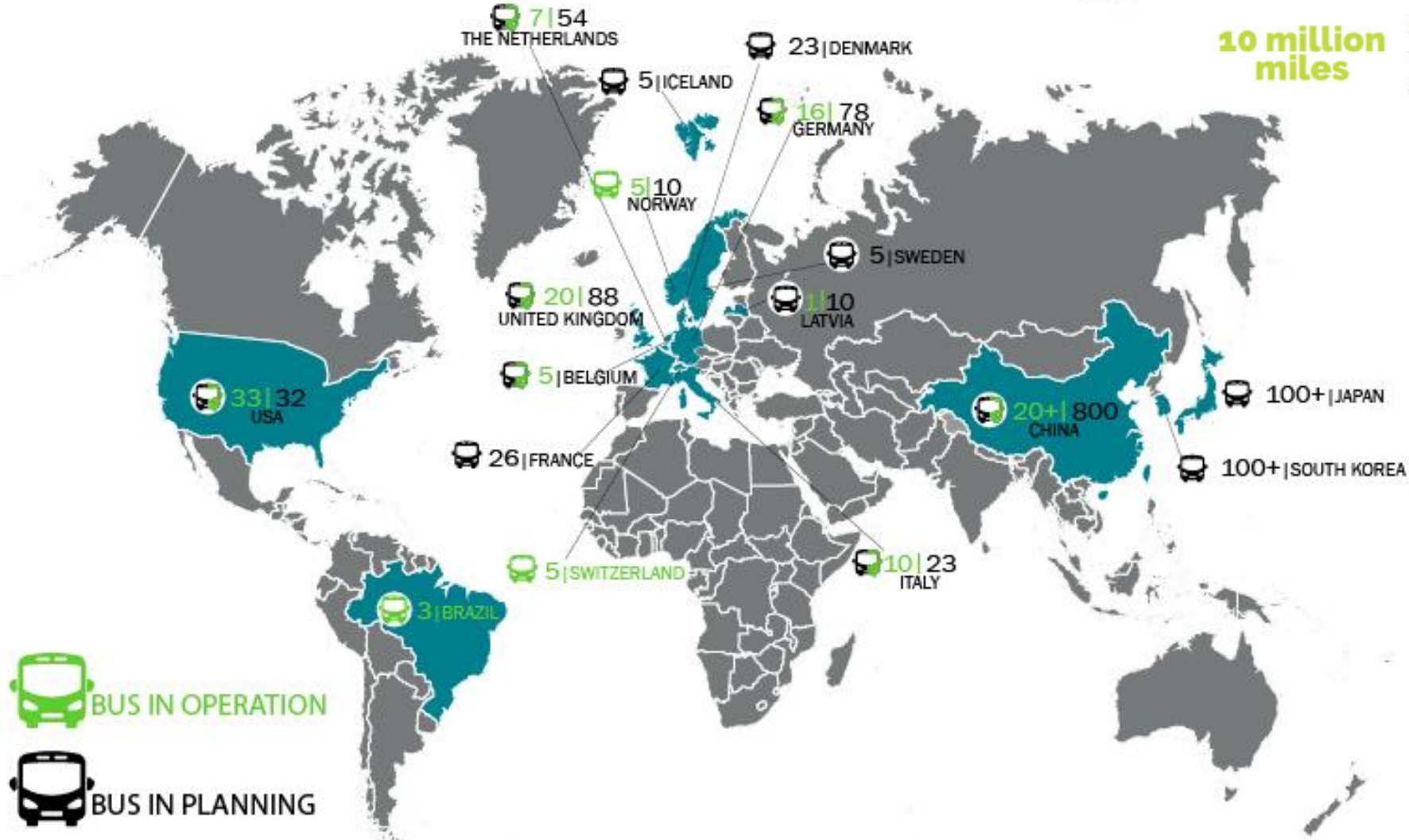
# Worldwide Acceptance

## FUEL CELL BUSES WORLDWIDE

 125 | 1100+

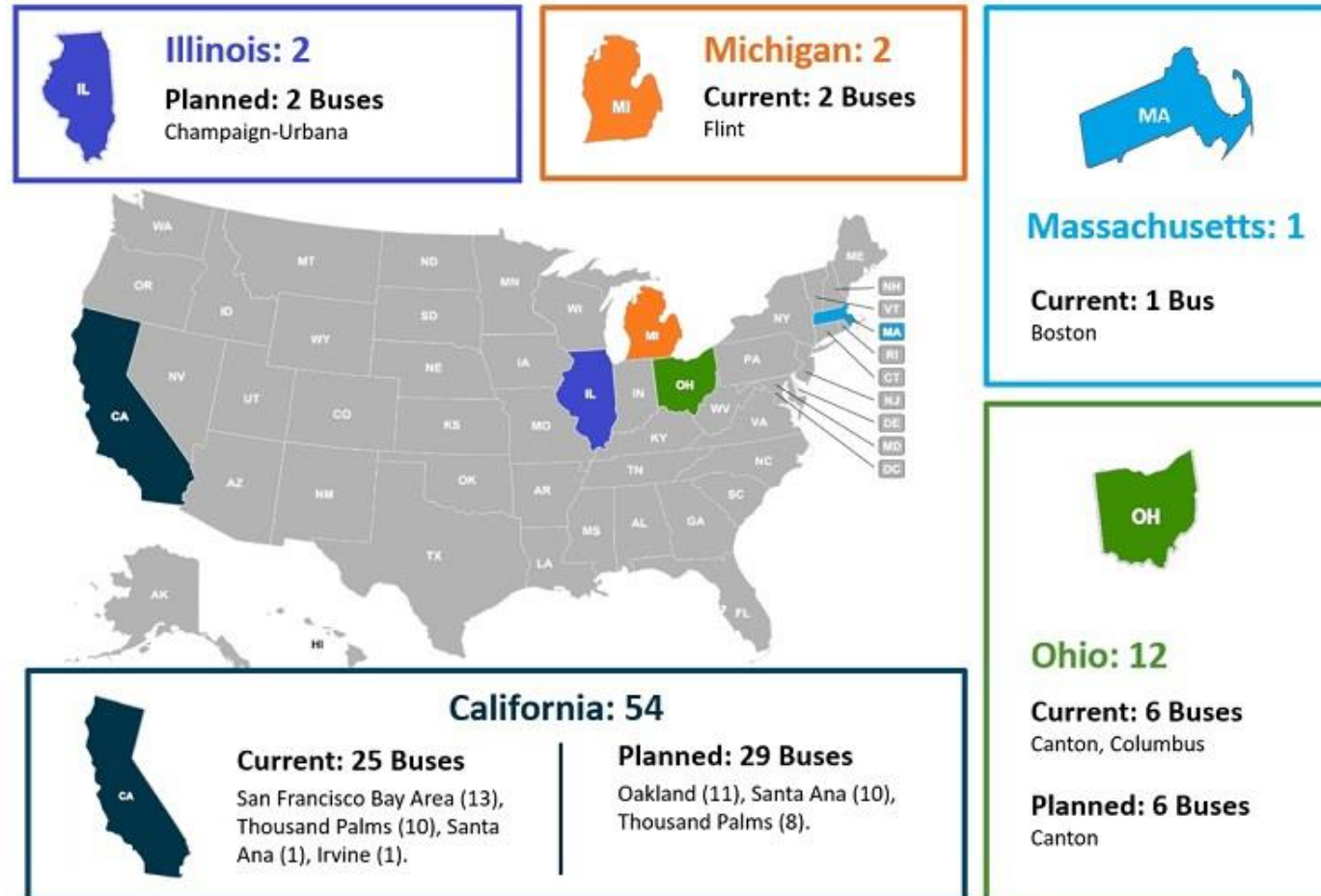
10 million  
miles

Over 10 million miles of proven service worldwide; 3 million miles at AC Transit and over 1 million at SunLine Transit.



# U.S. Fuel Cell Electric Buses

## Fuel Cell Transit Buses in the United States



Source: DOE and NREL

# CTE Fuel Cell Electric Bus Projects

- AC Transit Expanded Service (13 Buses)
- OCTA Demonstration (1 ElDorado Bus)



- CUMTD Articulated Buses (2 Buses)
- AC Transit ZEB Study/ZEB Corridor (BEB/FCEB)
- San Diego ZEB Study (BEB/FCEB)
- LA Metro ZEB Study
- Spokane Transit and Shasta Regional Transportation ZEB Studies



# 31,401 Hours/2.7 million miles

AC Transit Fuel Cell Bus Performance - 2/19/2019

Bus	FUEL CELL HOURS	JAN Miles @ 9 MPH	Vehicle Miles Life to Date
FC4	24,839	3,047	234,804
FC5	24,999	4,179	237,070
FC6	24,889	3,588	200,962
FC7	31,676	2,960	219,373
FC8	23,607	674	166,517
FC9	24,266	2,954	208,795
FC10	26,826	2,316	242,063
FC11	27,440	3,354	239,646
FC12*	*2999	3,006	228,004
FC13	16,628	4,197	162,853
FC14	27,922	3,161	235,853
FC15	23,022	2,702	194,872
FC16	27,579	2,608	218,957
<b>TOTALS</b>	<b>303,693</b>	<b>38,746</b>	<b>2,789,769</b>
<b>Average</b>	<b>23,547</b>	<b>2,980</b>	<b>214,598</b>

NOTE: FC7 and FC12 fuel cells were manufactured by UTC in 2003, 14 years ago with an expected EOL of 5,000 hours. The other 11 fuel cells were manufactured by UTC in 2008 and 2009.

\* LDV Station converted to Linde commercial station as of September 2018. AC Transit stopped recording fuel dispensed as of 5/2018.

\*Fuel Cell Changed on FC12 11/21/18 with 25,969 hrs logged.



2017 21,610 66,422 168

20 39

20 7,742

500k

s

2014 1,129 1,749 931

2015 1,63

2016 1,95

2017 1,66

2018 1,46

2019

TOTALS 7,84

Total to Date



# FCEBCC and Next Steps

- **Fuel Cell Electric Bus Commercialization Consortium (FCEBCC)**

- \$45 million
- 20 Buses
- Two Stations
- Facility Upgrades

- **Next Step**  
100-Bus Initiative



# 100-Bus Initiative



## NEED

Transit agencies will need **both** Battery-Electric and Fuel Cell Electric Buses (FCEBs) to meet the California Air Resources Board goal of 100% zero emission buses by 2040.

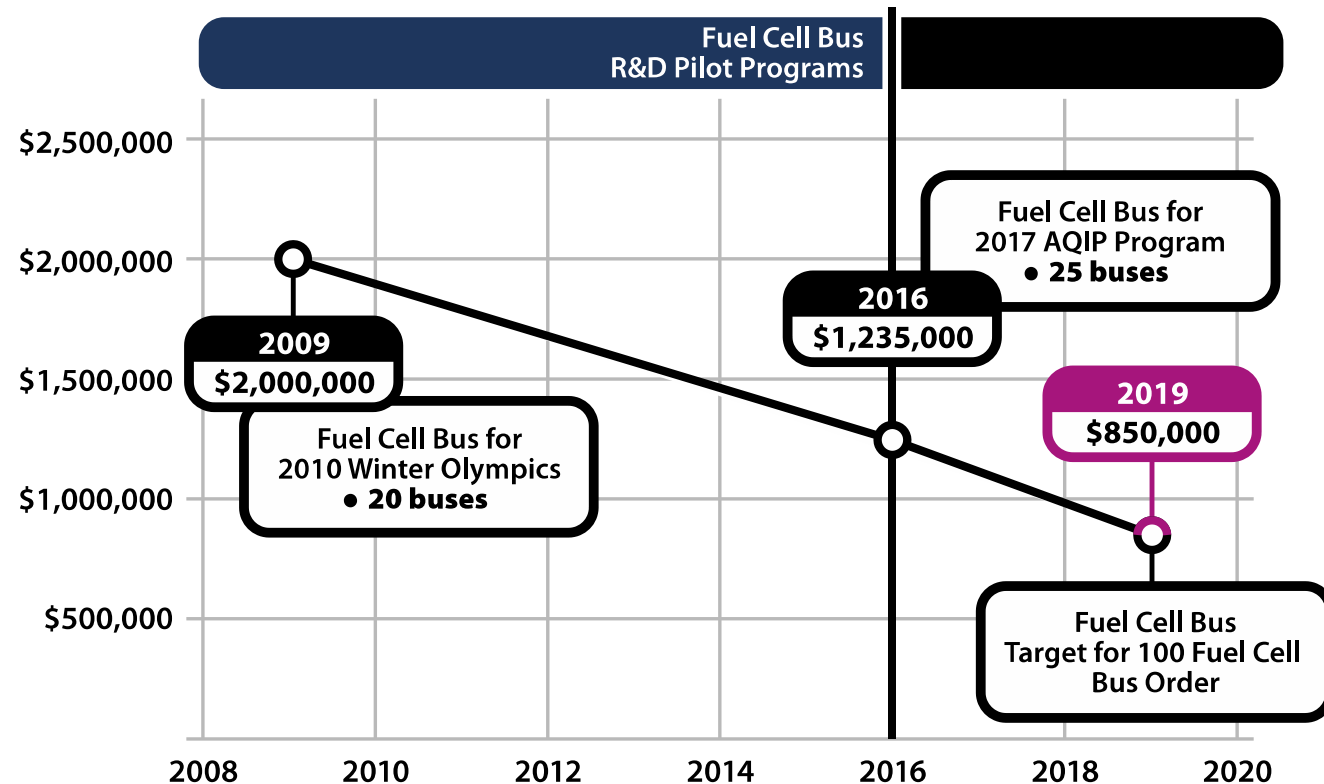
## OBJECTIVE

Drive down the capital cost of North American FCEBs to the point where they are **commercially viable** for transit properties seeking zero-emission solutions — **\$850,000/bus**.

## ACTION

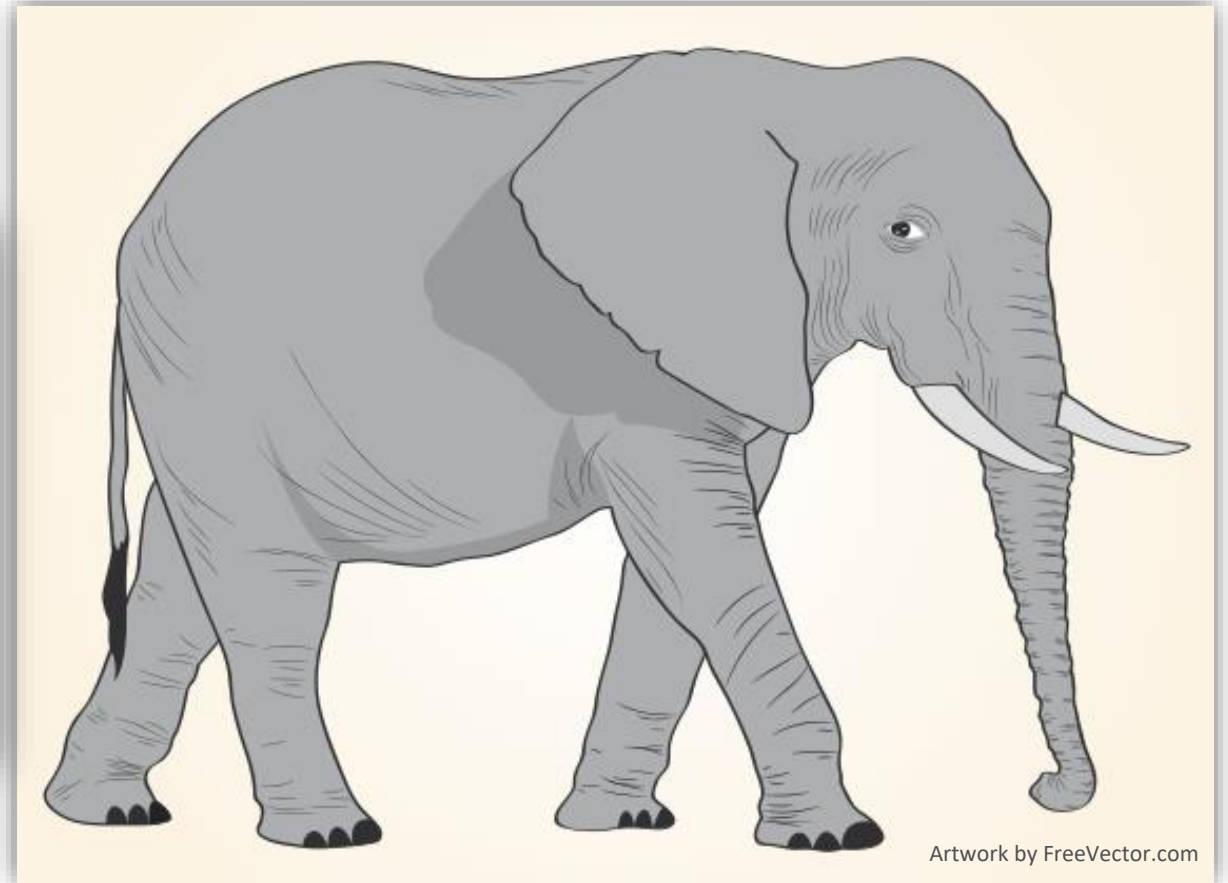
Four or more transit agencies in northern and southern California, **purchasing up to 25 FCEBs** each, and installing hydrogen fueling stations and facility upgrades where needed.

## Driving Price Down



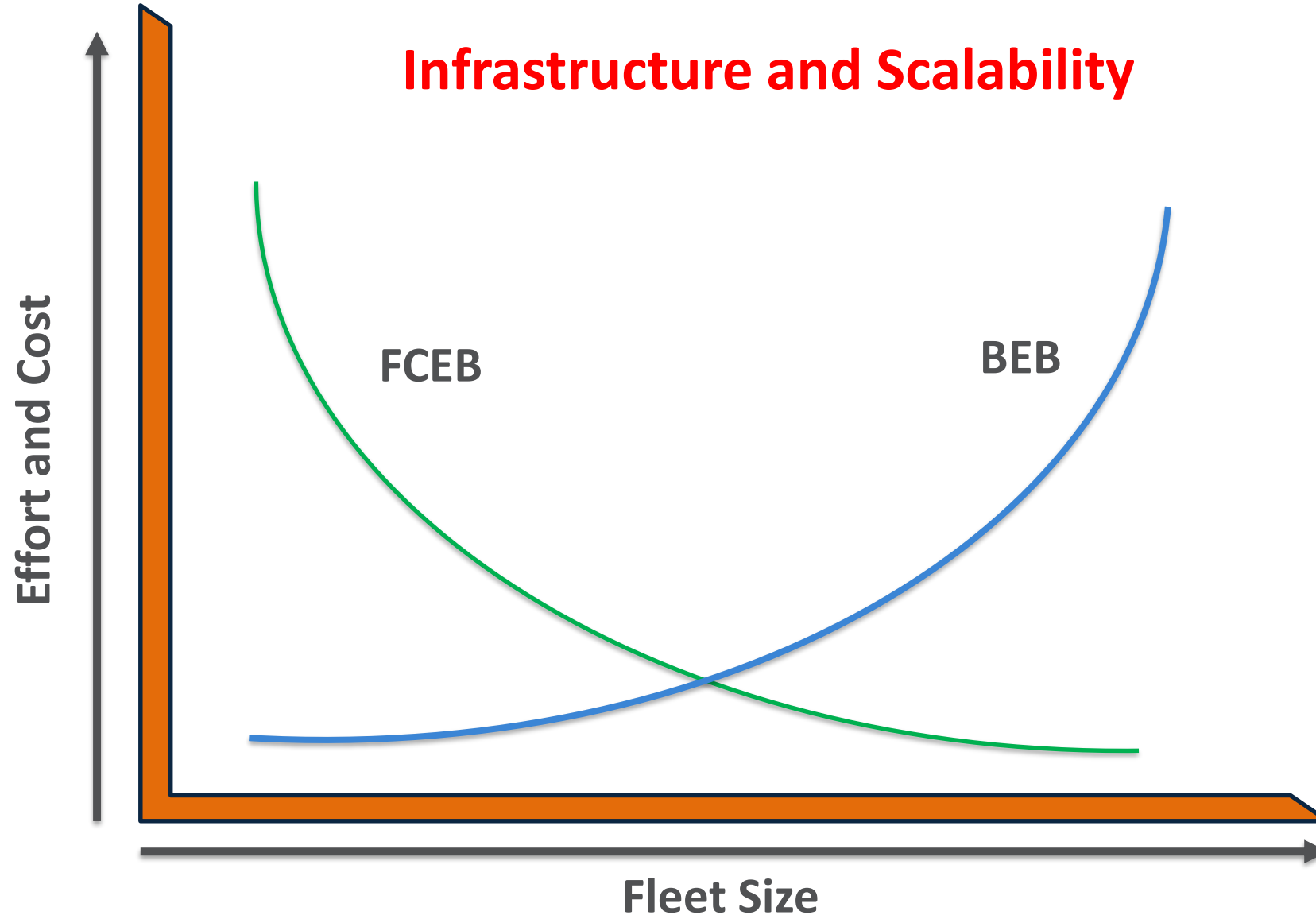
Source: New Flyer Industries

# The Elephant in The Room



**How to Scale Refueling Stations?**

# The Challenge for 100% ZEB Deployment



# H<sub>2</sub> Infrastructure Challenges

## PARSE

**P**

**Price** and delivery of H<sub>2</sub> 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 five- to seven-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.

# Fueling Station Evolution



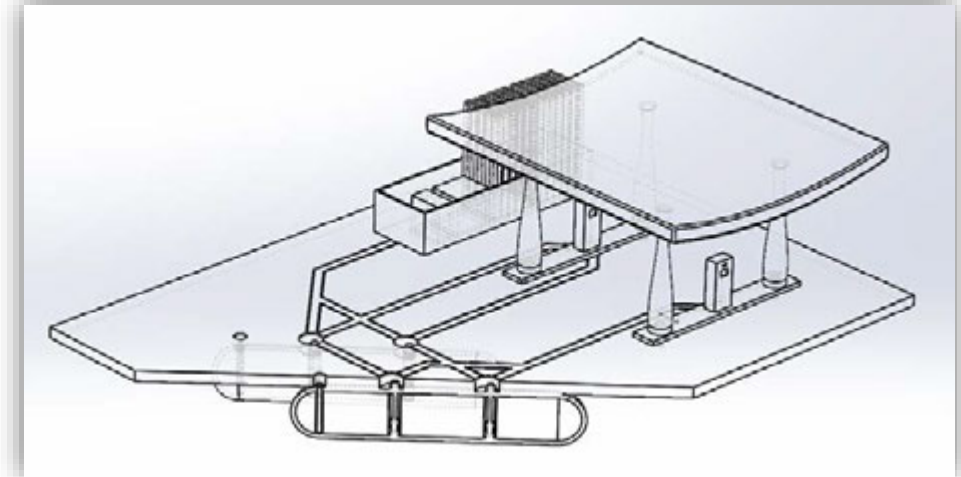
60' x 30' (50-Bus Capacity)



12- to 15-Bus Capacity; Expand to 30 Buses



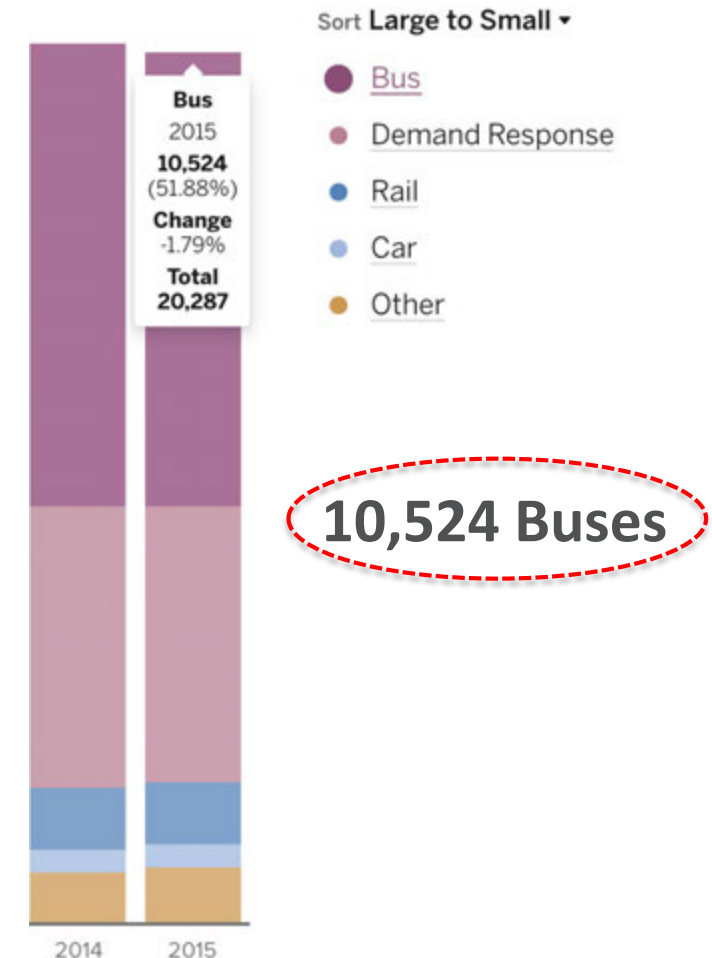
Parallel Fueling



Underground LH2 Tanks and Pumps

# CARB Innovative Clean Transit Regulation

- **Full transition** to zero-emission buses by **2040**
- **2023, 25%** of the total number of new bus purchases in each calendar year must be zero-emission buses
- **2026, 50%** of the total number of new bus purchases in each calendar year must be zero-emission buses
- **2029, 100%** new bus purchases must be zero-emission buses
- Purchased new buses **delivered within two years** from the initial date of a Notice to Proceed
- **Rollout Plans** by large transit agencies (100 or more buses) by **July 1, 2020**



# International ZEB Conference in San Francisco

## September 26 an 27, 2019



Jaimie Levin  
Director of West Coast Operations  
Center for Transportation & the Environment  
(510) 851-0625  
[Jaimie@cte.tv](mailto:Jaimie@cte.tv)

# Zero Emission Transit Experience

*February 26, 2019*



A  **Love's** Company

# The Love's Family of Companies



- Founded 1964, headquarters in Oklahoma City
- 470 travel stops in 41 states, 22k employees
- 24-hour access to fuel, restaurant offerings, convenience store products
- Network of hotels and storage locations



- Headquartered with Love's in Oklahoma City
- 765 trucks – fueled by CNG, biodiesel, renewable diesel
- Delivery of fuel and other products to Love's stores nationwide



- Headquartered in Houston, offices in Phoenix and OKC as well
- Commodity supply, trading, and logistics
- Supply Love's with gasoline, diesel, ethanol, DEF, biodiesel, renewable diesel
- Extensive experience in RFS and LCFS renewable fuel programs



- Headquartered in Houston
- Alternative fuels service provider: CNG, Hydrogen, and EV Charging
- Design/Build, Operations & Maintenance, Retail Fuel Supply, Renewable Natural Gas
- 20+ years experience in CNG
- On-site power generation, Solar Installation, Energy Storage Solutions



- Headquartered in Oklahoma City
- Quick lube, inspection, and preventative maintenance services to heavy-duty trucks
- 52 nationwide service stations and 25+ years experience

# Trillium – Who we are



CNG / RNG



EV Charging



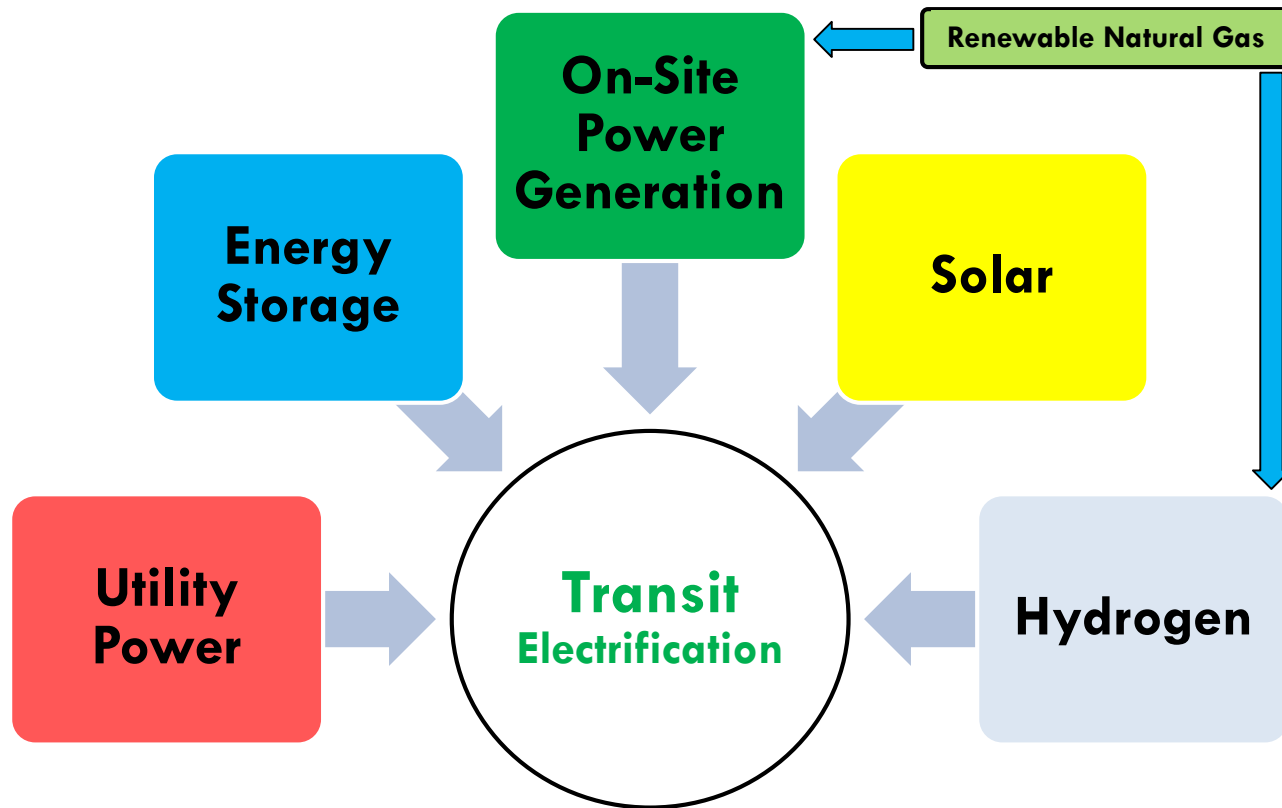
Hydrogen Fueling



- Trillium provides turn-key solutions for **EV Charging, CNG, and Hydrogen Fueling**
  - Design/Build Services
  - Operations & Maintenance
  - Retail Fueling
  - **Renewables:** Solar and Renewable Natural Gas
- Trillium owns or operates **220 stations** nationwide



# Trillium's Zero Emission Infrastructure Portfolio



*Fleet operations and fueling experience are critical for transition to zero emission.*

# How to make the transition?



Combined EV/CNG station – Placentia CA – planned Q3 2019



## Battery Electric Bus and Fuel Cell Electric Bus *Zero Emission Solutions*

*Managing “fuel” costs and sustaining transit operations are critical to electrification of California fleets.*

Solar Array at Love’s Las Vegas



Power Generation proposal for EV Transit Customer



# Key Considerations



- **How can I take control of my infrastructure and power costs?**
  - Plan for scalability
  - Balance future-proofing versus overbuilding
  - Protection against rate changes and phased-in demand charges
- **Do I have to recalibrate my fueling window?**
  - Optimize TOU and demand charges by changing rollout / charging times
  - Use on-site generation assets and utility alternatives to *maintain current operations* schedule, mitigate costs
- **Renewable options**
  - On-site solar, Renewable Natural Gas, Renewable PPAs
- **Additional revenue streams**
  - LCFS and RFS renewable credits
  - Demand response
  - Utility cost offsets
- **Private Capital**
  - Fixed forward Hydrogen / Electricity costs, financed infrastructure

# Delivering Energy is Costly

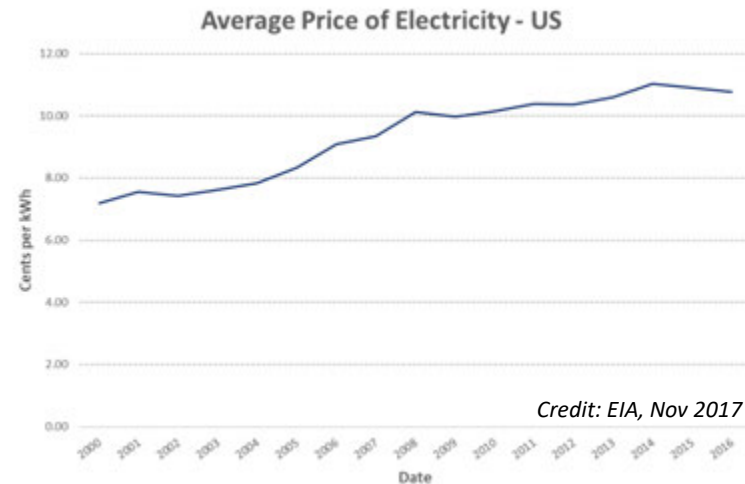


## Hydrogen

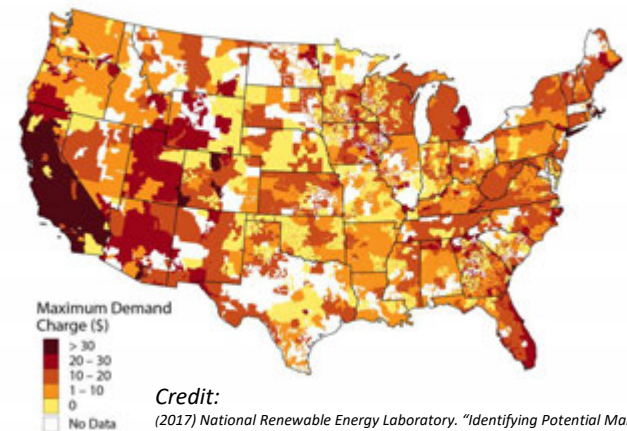
- Compressed or liquid delivered H<sub>2</sub> brings logistical risks and exorbitant costs
- On-site production via SMR or electrolysis
- Ammonia delivery systems

## Electricity

- Utility rates come with **uncertainty**... future operating cost risk
- Immediate Challenges - transformer upgrades, infrastructure needs, grid reliability
- Long Term Challenges - phased in demand charges, utility recovery of capital, rate structure overhaul



Maximum demand charges by utility territory



Credit:

(2017) National Renewable Energy Laboratory. "Identifying Potential Markets for Behind-the-Meter Battery Energy Storage: A Survey of U.S. Demand Charges." <https://www.nrel.gov/docs/fy17osti/68963.pdf>

***The Utility is not the only option for power.***

# On-site Power Generation



## The Challenge:

*Reliable, Reasonably Priced Power for BEB Fleets*

- **High power costs obstruct electrification** of transit fleets
- Uncertainty of future rates, cost recovery adjustments
- Reliability, grid stability concerns at scale
- Specialty rates and phased in demand charges only delay the problem
- Pace of adoption is slow as a result

## A Solution:

- **On-site, natural gas power generation** delivering clean power to EV Chargers
- Emissions compliant, **and creates an additional pathway for RNG**
  - Lower potential CI scores than grid, solar, or wind
- Scalable – add or upgrade generators with growth of BEB fleet
- Small footprint and versatile implementation
- Redundancy that eliminates blackout risk
- Cost savings versus utility, and certainty of those costs, facilitates fleet electrification. **Clear forward costs = capital and operational planning.**

# Renewable Natural Gas → Power Generation



# Renewable Natural Gas → Power Generation



# Solar → EV and Electrolysis

- Net metering programs allow generation during the day and “usage” at night
- Additional LCFS credit generation when paired with EV chargers
- Investment Tax Credit (ITC) allows 30% capital cost to be used against tax liability
- Providers can sell an array outright or finance via PPA
- Zero emission energy production

However...

- Demand charges remain
- TOU rates can affect value of net metering
- Significant rooftop / canopy space or excess real estate



Solar Array at Love's in Santa Nella, CA



Small scale Electrolyzer – H<sub>2</sub> production

# Energy Storage



- Incorporating energy storage with on-site generation (renewable natural gas, solar) can improve operating costs significantly
  - Displaces additional generation units, reduces maintenance/fuel costs
  - Further **mitigates demand charge** risks
- ITC applies to solar + storage, reducing capital cost
- Ability to leverage asset during non-fueling times for demand response programs
- **Peak Shaving**: provides flexibility of operations, fueling during peak periods without the cost
- However, **standalone energy storage still exposed** to utility rate risks
  - Phased-out incentive rates
  - Future TOU changes
  - Rate-based infrastructure programs

# Conclusions



## **Zero Emission solutions will not be one-size fits all**

- Transit operations, budgets, and needs will be unique
- Assessing options with utility (and beyond utility) key to managing costs and effectively transitioning, scaling fleet
- Numerous tools at your disposal, and many solutions will combine aspects of on-site generation, storage, solar, and utility

## **Utility partnerships are important**

- But should not dictate when or how you manage your rollout schedule
- Start with assumption that it is possible to maintain operations, by utilizing assets that complement utility connection

## **Identify the savings and revenue opportunities**

- Grant funding opportunities, but also...
- Demand response programs
- LCFS and prospective eRIN revenue from renewable natural gas
- Private Capital
- And ability to leverage existing CNG infrastructure for on-site power generation



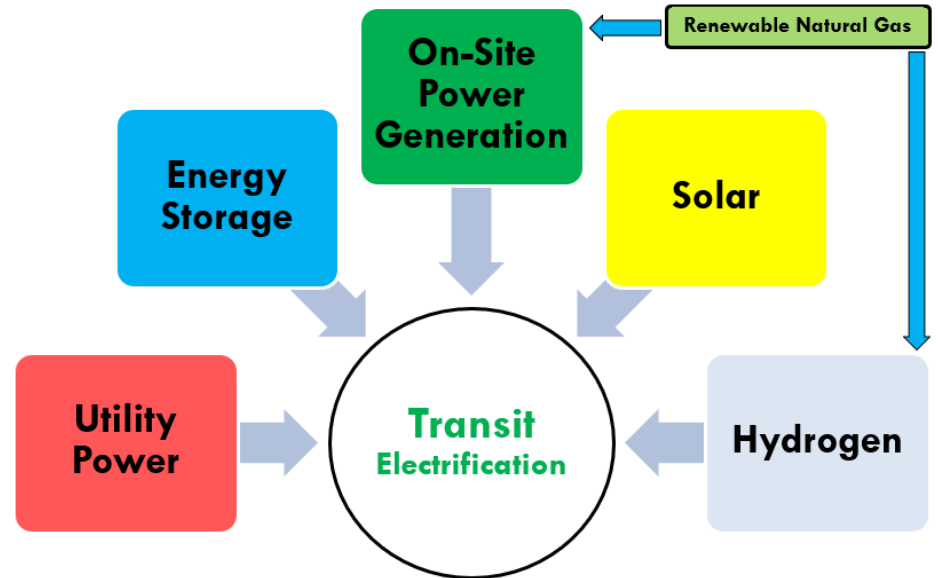
## Alex Agrons

General Manager – Strategic Initiatives

Office: (713) 332-4800

Email: [Alex.Agrons@Loves.com](mailto:Alex.Agrons@Loves.com)

Houston, TX



1-800-920-1166  
[loves.com/trillium](http://loves.com/trillium)

A  Loves Company

# Testing and Deployment of Automated Vehicles

**Jack Hall**

*Intelligent Transportation Systems CV/AV Program Manager*

Contra Costa Transportation Authority

February 26, 2019



CONTRA COSTA  
transportation  
authority

# Contra Costa County, California

## Location

Eastern suburb  
of the  
San  
Francisco  
Bay Area



## Population

1 Million+



## Thriving Commerce

Businesses headquartered in  
Contra Costa County include:



## Diverse

Demographically, economically  
and geographically



# Who We Are

- CCTA is a public agency formed by voters in 1988 to manage the county's transportation sales tax program and to lead transportation planning efforts.
- We are responsible for maintaining and improving the county's transportation system by delivering critical transportation infrastructure projects to safely and efficiently get people where they need to go.
- Managing entity of autonomous vehicle (AV) testing site: GoMentum Station.



# What We Do



## **PEDESTRIAN**

Make improvements to sidewalks, crosswalks, trails, and paths



## **LOCAL STREETS**

Smooth traffic flow on major roads and invest in improvements such as repairing potholes and road surfaces



## **BUSES**

Invest in a reliable, comfortable and convenient bus network



## **SAFE ROUTES TO SCHOOLS**

Focus on programs and projects aimed at bicycle and pedestrian safety for K-12 students



## **FERRIES**

Expand the Bay Area ferry system by looking to ferries as an alternate commute method between West County and San Francisco



## **BICYCLE**

Invest in safe routes and infrastructure improvements for bicyclists



## **BART**

Improve BART service and stations, extend routes and increase parking at stations



## **HIGHWAYS**

Complete Contra Costa's highway system, and improve air quality and noise protection along these corridors



## **CARPOOL/RIDESHARE**

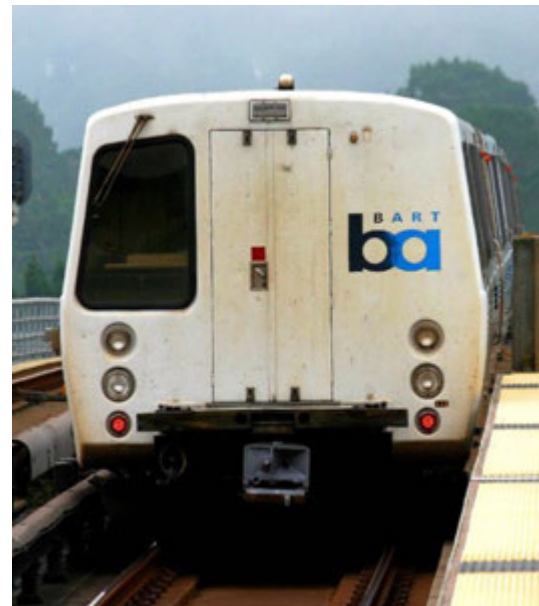
Implement programs to reduce traffic congestion by encouraging carpooling and ridesharing



## **PROGRAMS FOR SENIORS AND PEOPLE WITH DISABILITIES**

Enhance transit options to improve mobility for seniors and people with disabilities

# What We Heard



The background is a blue-tinted photograph of a tunnel interior. The tunnel has a ribbed ceiling and walls, with some lights visible. A large, semi-transparent circular graphic is overlaid on the left side of the image. The text "Testing a Solution" is centered in the middle of the image, underlined.

# Testing a Solution

---

# Searched the World for the Perfect SAV



# We've Celebrated Many "Firsts"



BILL  
1592



**DMV**  
AUTHORIZATION



# Needed a Forklift to Uncrate Vehicle



# Safe Testing in Controlled Environment

**November 2016**

Testing @ GoMentum Station

**March 2017**

Testing @ Bishop Ranch



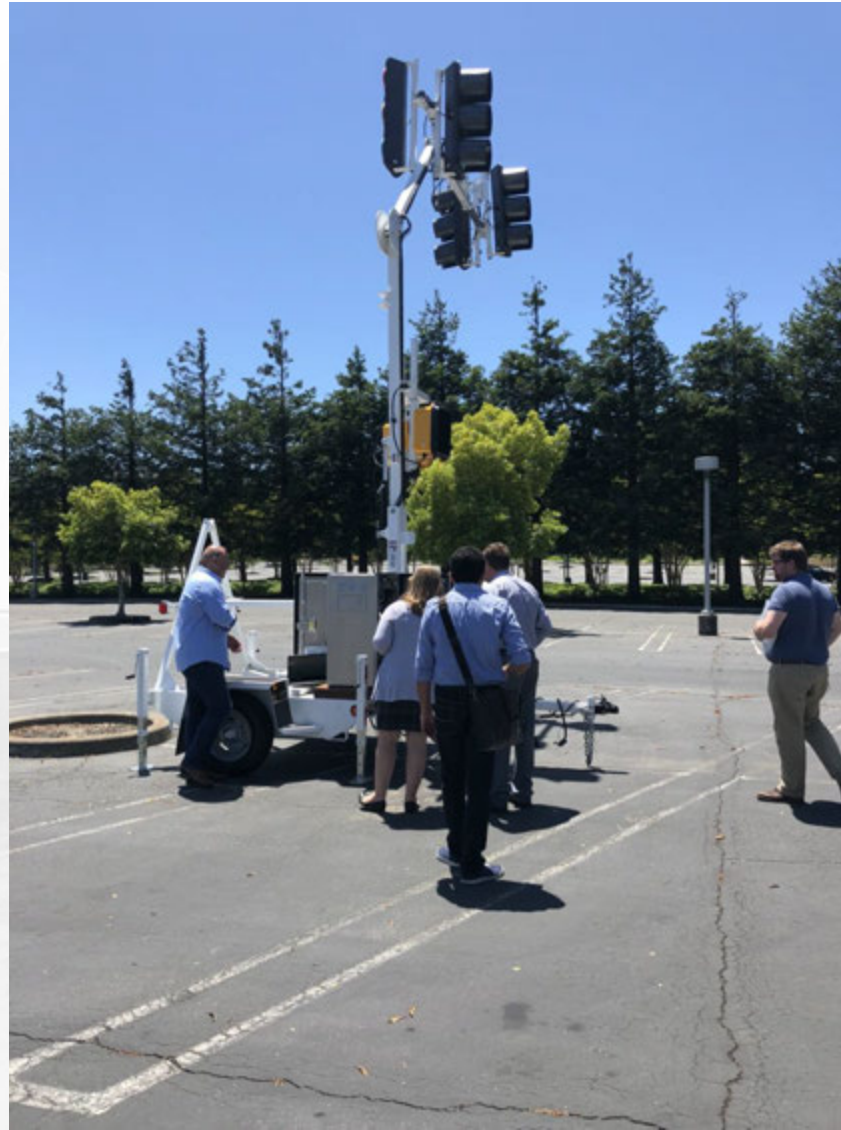
# Vehicle Storage



# Charging



# Parking Lot within Business Park



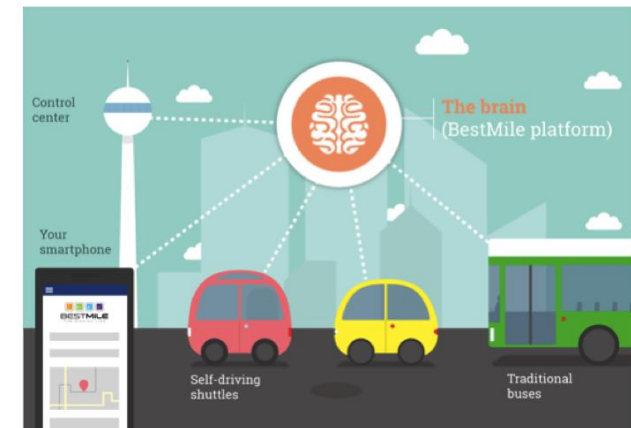
# Launch on Public Roads



**March 6, 2018**

First Test on Public Roads  
@ Bishop Ranch

# SAV Partners

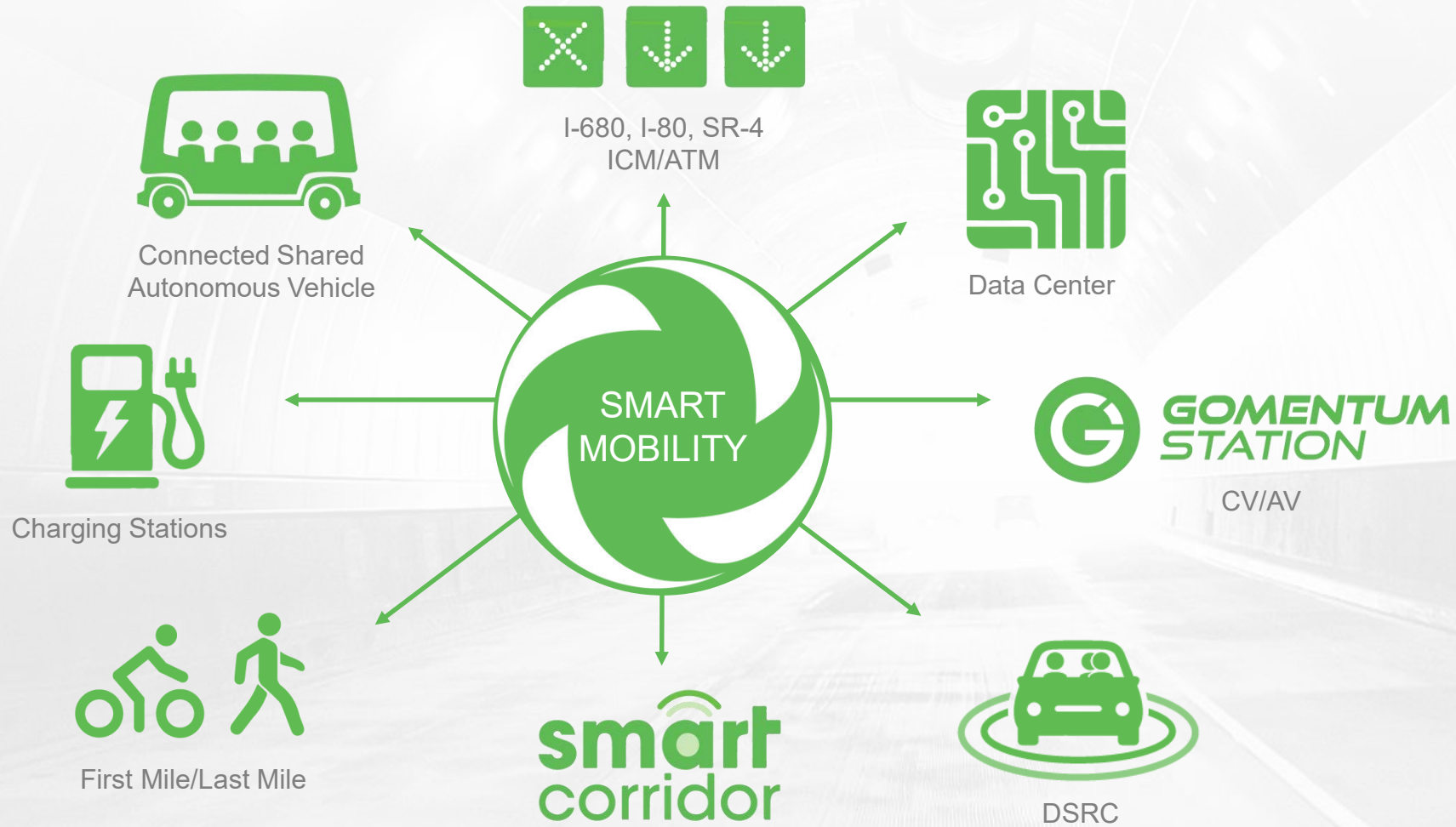


The background is a blue-tinted photograph of a tunnel. A road with lane markings leads into the distance, where a small car is visible. The tunnel walls are lined with reflective panels, and there are lights on the ceiling. Large, semi-transparent circular shapes are overlaid on the left side of the image.

# SAVs: Link to the Future of Transportation

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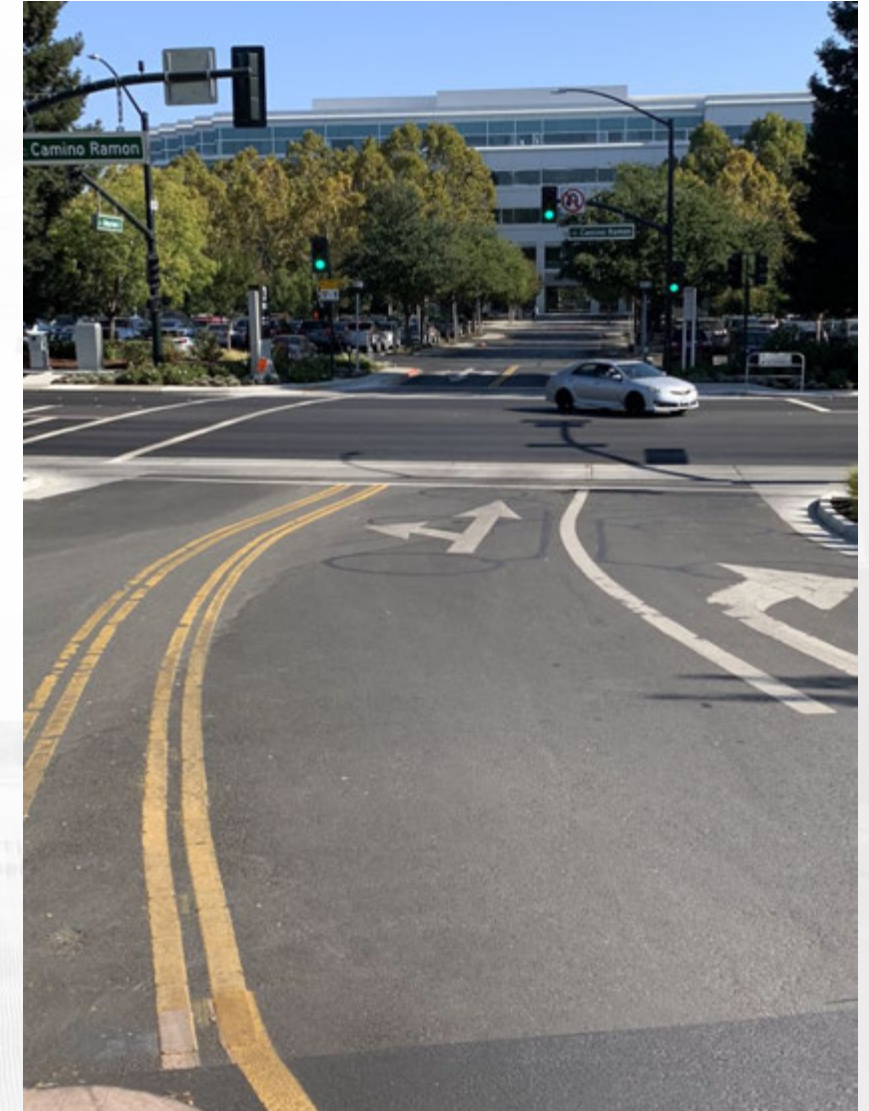
# Smart Mobility



# Shuttle Service within Bishop Ranch

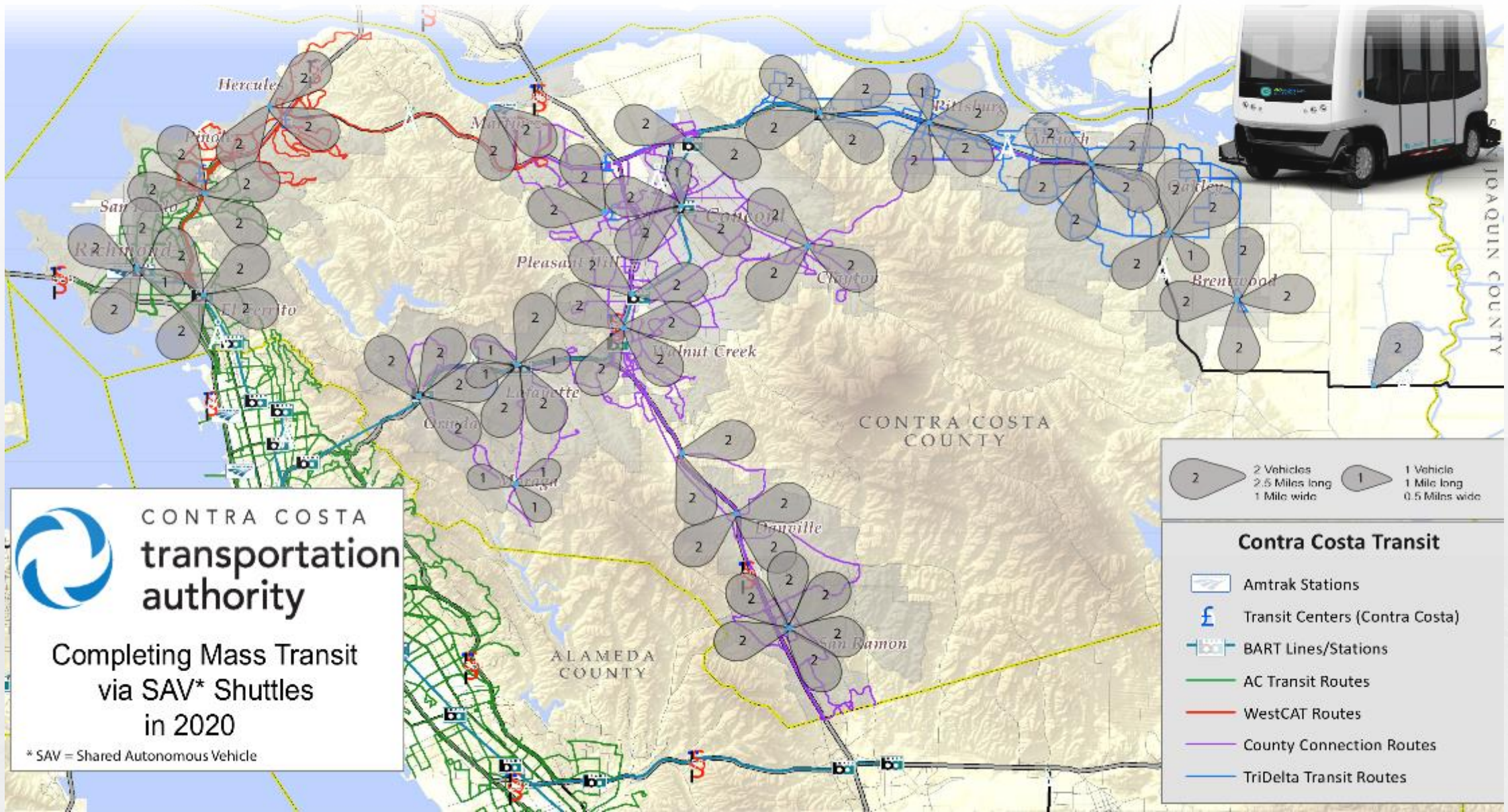


# Shuttle Service with Local Traffic



# Phase III – Implementation

EasyMile SAV



 **CONTRA COSTA**  
**transportation**  
**authority**

Completing Mass Transit  
via SAV\* Shuttles  
in 2020

\* SAV = Shared Autonomous Vehicle

# Redefining Mobility

ECONOMIC GROWTH  
& JOB CREATION

EFFICIENT MOBILITY

ENHANCED SAFETY

HEALTHIER  
ENVIRONMENTS

21<sup>ST</sup> CENTURY  
TRANSPORTATION

Point Edith Wildlife Area



Concord Navy  
Weapon Station

Over 5000 acres  
with 2100 acres  
available for  
testing

# PAVED ROADS

- Over 20 miles of paved roadways including a 7-mile long spine road for high speed testing
- Additional roadway improvements based on Master Plan

# TUNNELS

Two 1400-ft. long tunnels ideal for testing guidance, sensors & communications technologies

WORK RESTRICTION  
CONTACT NORTON WAREHOUSE  
FOR SCHEDULING  
AND COST OF THE WORKING PERIOD

# FREEWAY UNDERPASSES

Freeway underpasses and variable roadway geometrics

# PARKING LOTS

Several parking lots for testing by multiple users

# We Are a Global AVPG



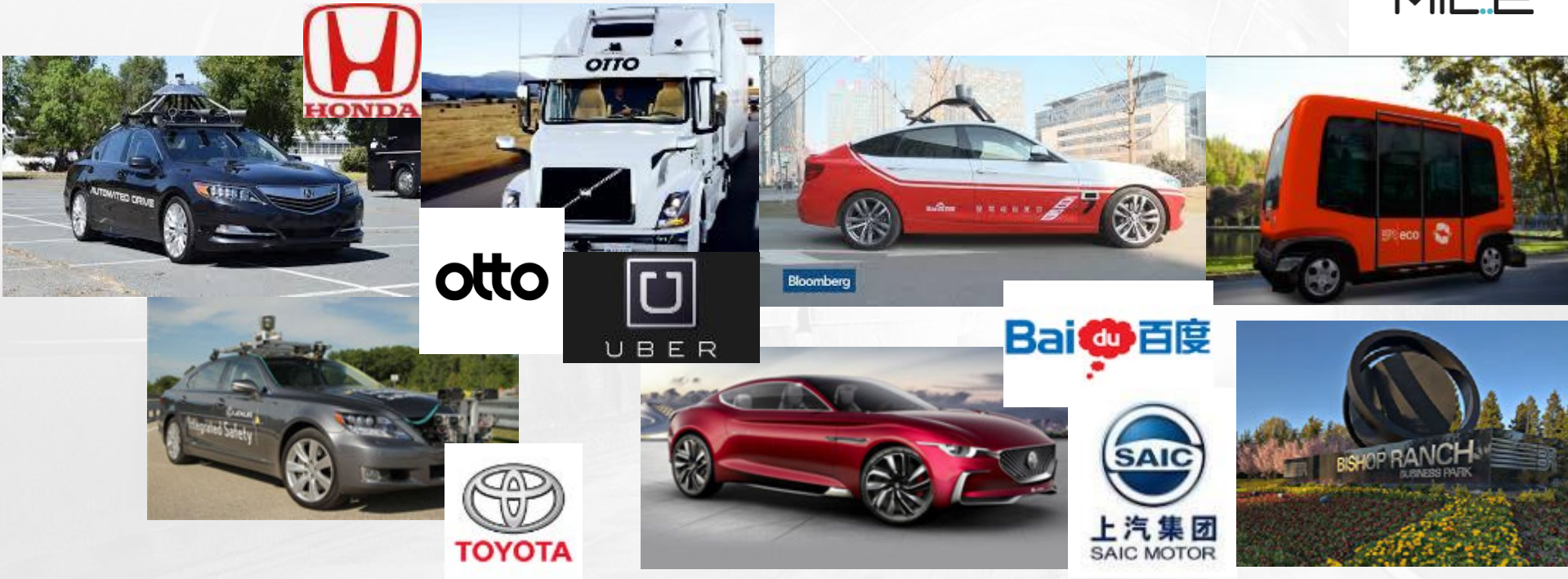
GoMentum Station is an International Entity



# GoMentum Station is Multimodal

## Key AM Partners

## Testing at GoMentum Station



# HONDA Research Institute





**Bai du 百度**

# Questions and Answers



CONTRA COSTA  
transportation  
authority



**GO**MOMENTUM  
STATION

- Transportation Development Act
- Local Transportation Fund (LTF) – may be used for public transit projects or streets and roads projects. LTF funding requires an annual unmet transit needs a public hearing and a farebox ratio of 10% for rural operators and 20% for urbanized operators.
- State Transit Assistance (STA) – may only be used for public transit operations and capital projects. STA does require qualification criteria on a sliding scale.
- Federal Transit Administration (FTA)
- Section 5307 – Urbanized Transit Operators –May be used for operations and capital projects.
- Section 5310 – Elderly and Disabled Transit Operators – May be used for operations and capital projects. There are approximately 11 eligible agencies that may be eligible for 5310 funding for a funding pot that is between \$1 million and \$1.2 million.
- Section 5311 – Rural Transit Operators. On an annual basis, nine Kern County transit operators share \$1.4 million resulting in about 30% of all operating costs. Operators may also use the FTA 5311 program of projects to compete for Congestion Mitigation Air Quality Improvement funds (CMAQ) for projects that improve air quality.
- Section 5339(c )- Low or No Emission Vehicle Program – May be used to purchasing or lease low-or-no-emission buses; acquiring low-or-no-emission buses with a leased power source; constructing or leasing facilities and related equipment (including intelligent technology software) for low-or-no-emission buses; and

for constructing new public transportation facilities to accommodate low-or-no emission buses; rehabilitating or improving existing public transportation facilities to accommodate low-or-no-emission buses.

- The grant application for this program is detailed and data-driven. Although time-consuming at the administrative level, the City of Arvin was able to secure over \$2 million dollars from this program and became the only California transit operator to qualify.

## Strategy and Planning

Using a combination of FTA Section 5311 and CMAQ funds

I recommend using CMAQ funds through the 5311 program of projects. The CMAQ call for projects is a highly competitive program within the region. You may have to consider this program as a funding source in FY 2019-120 or outer years. Although the CMAQ program is decided locally, Caltrans become the CMAQ administer once the project has been entered by the transit operator in the 5311 regional program of projects or POP.

Given that the actual funds may take two to three fiscal years to be received, I recommend infrastructure projects for the 5311 CMAQ project. Examples might include Solar panels, solar converters and batteries, electric vehicle chargers and the supporting cables and equipment. The operator may also consider hydrogen projects rather than going electric. Both types of fueling require high-cost and would be better suited for a onetime-capital investment.

Purchasing electric or hydrogen vehicles may be better suited for annual funds that can be reserved for you to two or three years such

as Caltrans' State of Good Repair, Low Carbon Transit Operators Program, or TDA.

Since I mentioned the **State of Good Repair** and Low Carbon Transit Operators Program funding, let's talk about these programs. Caltrans' State of Good Repair or SGR funds the Kern Region with about \$1.2 million each year and adds an additional \$6.7 million dollars' worth of STA funds to the Kern Region. Last year, Kern COG's TTAC members recommended that every other year, Kern COG removes half of the annual regional apportionment and divides the regional money by 5 resulting in about \$100,000 extra dollars to five individual Kern County operators. This distribution allows a smaller transit operator the ability to fund a project that would not otherwise be fundable by the normal population-based apportionment.

Low Carbon Transit Operator Program apportions approximately \$1.2 million per year. Between SGR and LCTOP, even rural transit operators should be able to begin purchasing low or no emission vehicles within a period of four to five years. Remember, replacing gasoline-fueled vehicles with electric or hydrogen-fueled vehicle often is not a one-to-one replacement. Electric or hydrogen-fueled vehicles may have half the range of a gasoline-fueled vehicle. So, obviously, that comparison should be a part of your transition financial plan.

Now above and beyond the State and Federal funding programs I have discussed with you, there are always new and emerging funding streams that may enhance your Transitions funding strategy. The new and emerging funding streams are being monitored by Kern COG staff and as they become available and uses may be

defined for public transit, we will contact your agency and include you as a regional partner.



San Joaquin Valley  
**Electric Vehicle  
Partnership**

**Bill Williams – Co-Founder, Chairman and Project Clean Air Board of Directors**

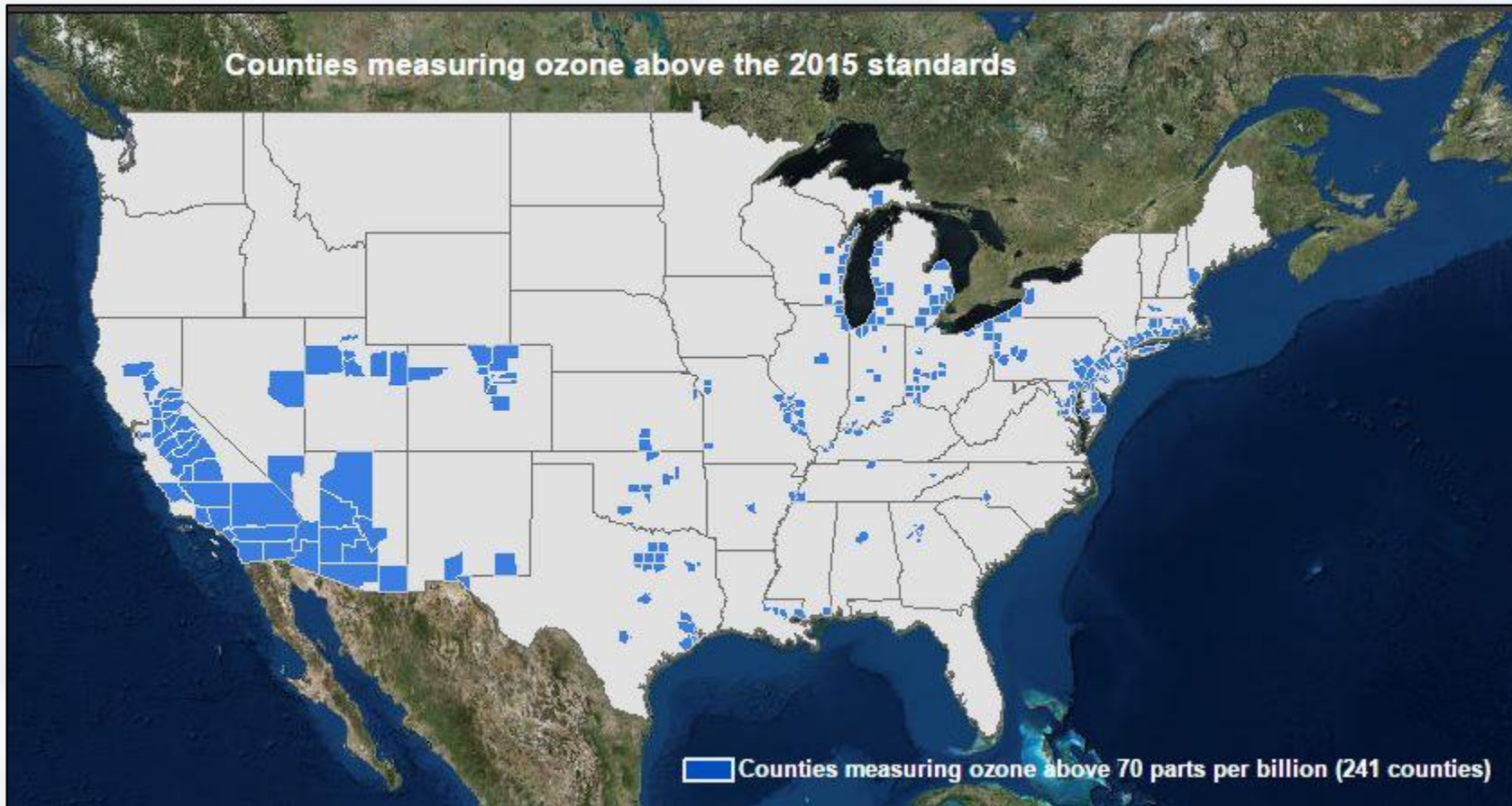


# STATE OF THE AIR 2018



# EPA National Ambient Air Quality Standard

## 2015 Standard of 70 ppb for Ozone



## EPA National Ambient Air Quality Standard



# Here's the full top ten list of the most polluted U.S. cities by ozone, according to



1. Los Angeles-Long Beach, CA
- 2. Bakersfield, CA\***
- 3. Visalia-Porterville-Hanford, CA**
- 4. Fresno-Madera, CA**
5. Sacramento-Roseville, CA
6. San Diego-Carlsbad, CA
- 7. Modesto-Merced, CA**
8. Phoenix-Mesa-Scottsdale, AZ
9. Redding-Red Bluff, CA
10. New York-Newark, NY-NJ-CT-PA

\*Bakersfield ranked worst for short-term particle pollution in a list that featured several other California cities, including San Francisco, Fresno, Long Beach and Los Angeles.

# Why Does It Matter?

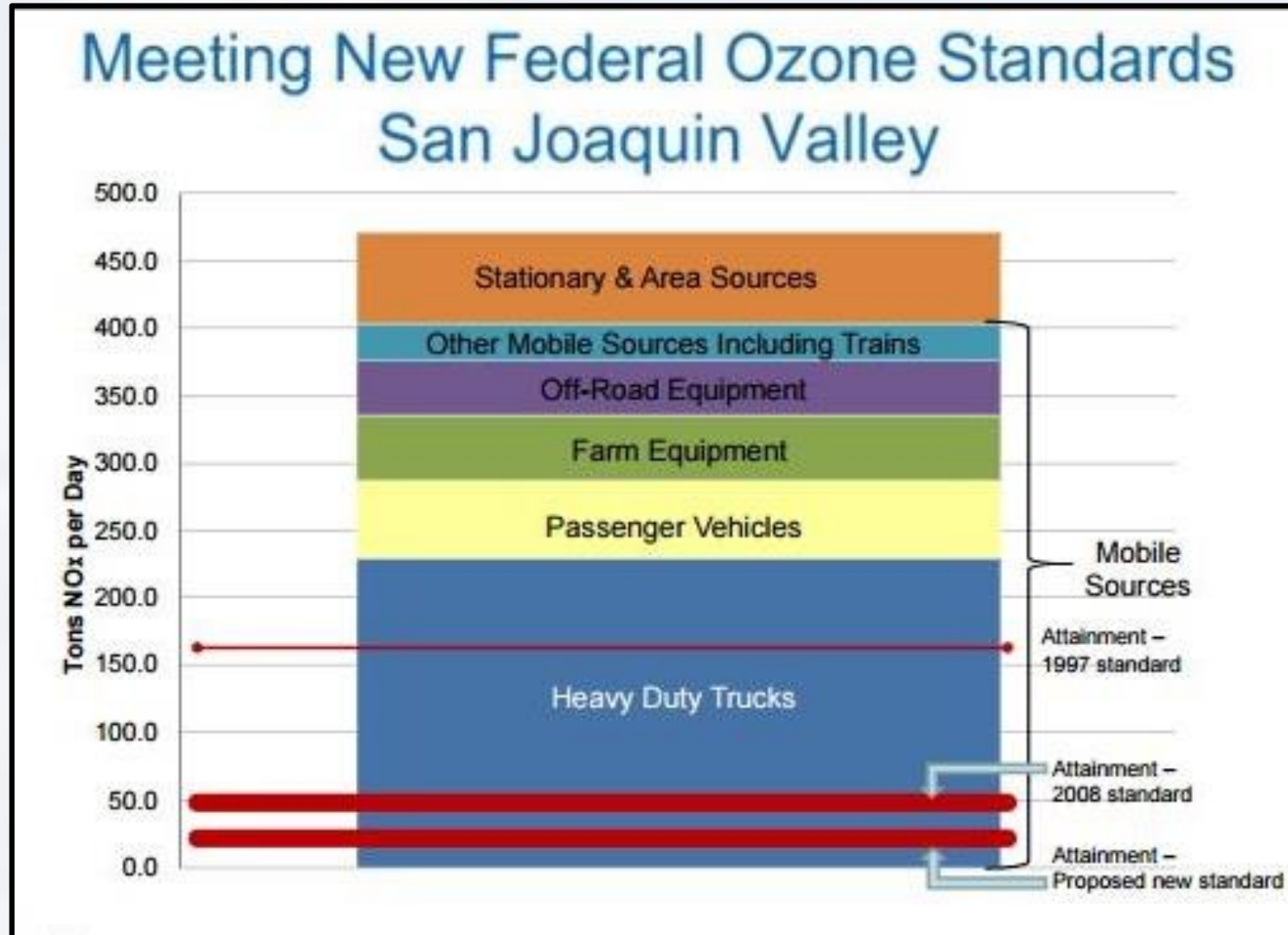
## San Joaquin Valley Faces Unique Challenges

### Climate and Geography Contribute to Pollution

- Hot, dry summers with stagnant winds
- Surrounding mountains and meteorology create ideal conditions for air pollution formation and retention
- Pollution follows the wind pattern and generally flows from north to south
- I-5 and Hwy 99 (major transportation arteries) run all the way through the Valley
- High rate of population growth
- Chronic poverty and unemployment rates



# Vehicles now account for the majority of the Valley's smog problem.



**Major** reductions in vehicle emissions will be essential. Alternative fuels are key for the Valley to meet air quality standards.

Source: San Joaquin Valley Air Pollution Control District

# EPA's Estimated Air Quality Health Benefits

Benefits of meeting the standards in California add to the nationwide benefits after 2025, with the value of the additional benefits estimated at \$1.2 to \$2.1 billion annually after 2025. This includes the value of avoiding harmful health effects, including:

- 120 to 220 premature deaths
- 160,000 asthma attacks among children
- 120,000 days when kids miss school
- 5,300 missed work days
- 380 asthma-related emergency room visits

***SJV Population approximately 4,000,000 people!***

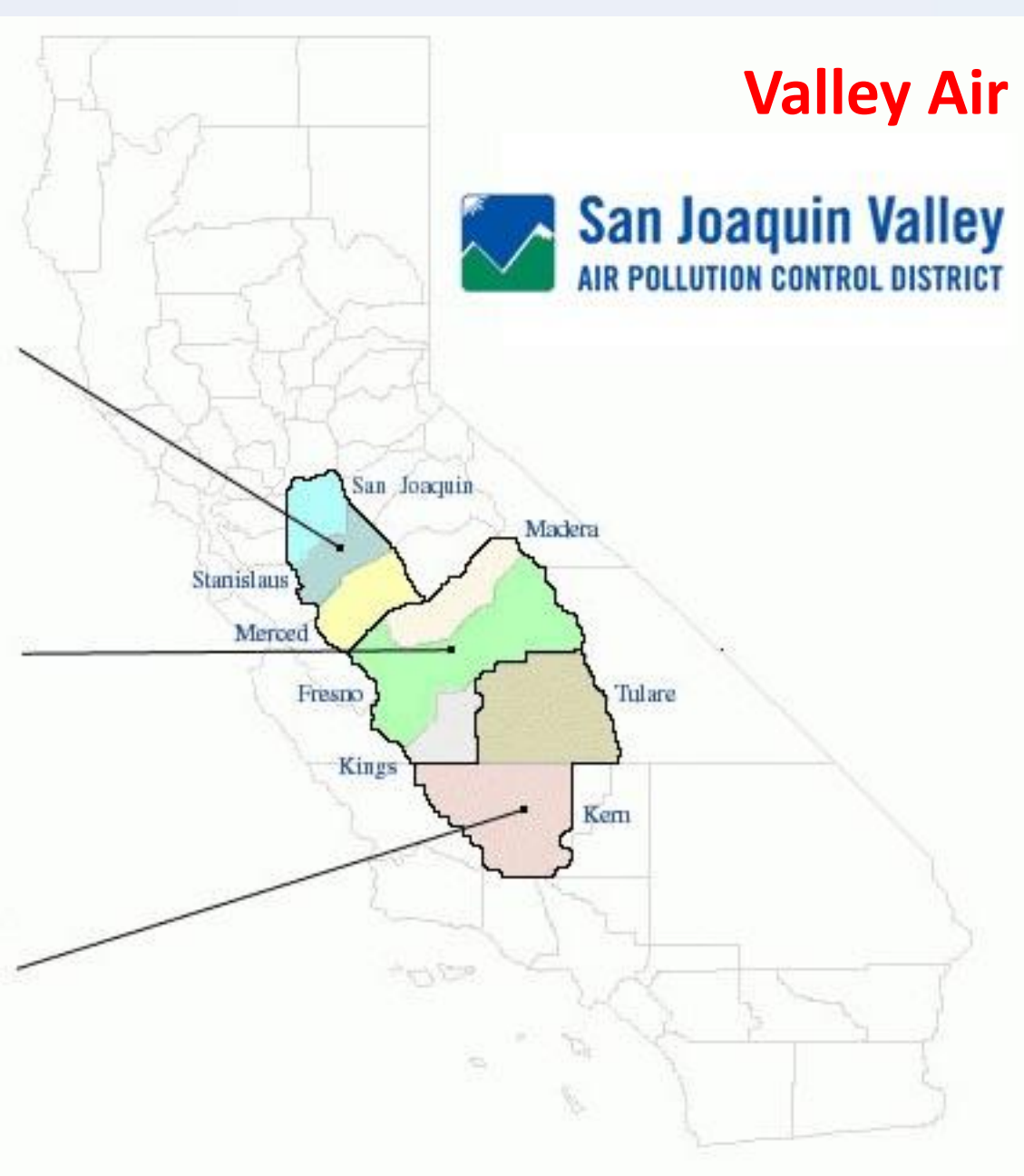
# Valley Air District *Charge Up!* Program



- **Electric Vehicle Infrastructure:**

- Charge Up! Program

- Incentives for EV chargers
    - Funds up to \$6,000 per Level 2 EV charger and up to \$25,000 for Level 3 DCFC
    - Awarded funding for over 400 EV chargers at \$2.6 million to date





**San Joaquin Valley**  
AIR POLLUTION CONTROL DISTRICT



### ***Incentives for Clean Air Vehicles:***

- Drive Clean in the San Joaquin
  - **Replace:** Funding up to \$9,500 to replace a 1999 or older high polluting car with a clean air vehicle
  - Replaced over 1,600 vehicles with a total of \$23 million to date
  - **Rebate:** Funding up to \$3,000 to purchase or lease of a new vehicle
  - The District issued over 8,000 rebates for a total of over \$21.5 million in incentives to date

Grants & Incentives Website:

<http://valleyair.org/grants/>

# Electric Vehicles in Kern County

- **Current:**
  - Vehicles: 1,365 rebates; 1,824 vehicles
  - Charging stations: Level 1: 30+
    - Level 2: 98
    - DC Fast Charging: 18
- **2025 Goal:** CEC EV Infrastructure Projection (EVI-Pro) Model
  - Vehicles: 14,872
  - Level 2 Workplace: 528
  - Level 2 Public: 614
  - DC Fast Charging: 222
  - Charging Spaces: 4,000





4 - Bakersfield Train Station



2 City of Selma, and 12 more locations  
of Solar Powered EV Charging Stations

# Workplace Charging Workshop

## Save the Date!



### Who Should Attend:

- eTRIP Employers
- Hospitals
- School Districts
- Public Agencies
- Large and Small Employers

If interested in attending, please contact:

Courtney Velasco at (661) 847-9756



Friday, February 24, 2017  
Bakersfield Memorial Hospital  
9:30am to 2:00pm

# EVENTS AND TRAINING

## All about Electric Vehicles

### Talent Pipeline RICO CEC Grant:

- 40 teachers trained from 22 schools in Kern, Tulare, and Fresno Counties
- Day-camps June-August 2016 reached 600 students at 3 summer day camps in Arvin, Bakersfield, and Sanger
- 27 Dealerships received Dealership Toolkits
- First Responder Training – Adopted for nationwide program

## RIDE AND DRIVE EVENTS

# Fresno

### Event Details:

- National Drive Electric Week
- September 12, 2015
- Fashion Fair Mall
- 10AM to 3PM
- 11 EVs available for test drives
- 150 total test drives
- 31 EVs present for EV tailgate party
- Live radio remote by Spanish station 92.1FM KONDO (partially sponsored by NRG)
- Fresno Bee ads sponsored by the Air District
- Notable Vendors: NRG, PACE, Center for Sustainable Energy, the Air District
- eLion's 100% electric bus and a mobile solar generator in attendance



**National Drive Electric Week**

**Take a Test-Drive at Fresno's Largest Gathering of Electric Vehicles!**

**Saturday, Sept. 12, 2015**  
10:00 a.m. – 3:00 p.m.  
Fresno Fashion Fair Mall  
N. 1st St. and E. Shaw Ave.  
(Forever 21 Parking Lot)

**FREE AND OPEN TO THE PUBLIC**

**NDEWFresno.org**

**FREE FOOD**

Bring your family and friends to experience the excitement of driving electric at this one-day opportunity to see why so many people are making the switch to electric vehicles.

Already own an EV? Join us and display it in the largest gathering of EVs in Fresno.

Test-drive a variety of EVs, including:

- BMW i3
- Chevrolet Spark EV
- Chevrolet Volt
- Ford C-Max Energi
- Ford Focus Electric
- Ford Fusion Energi
- Mercedes-Benz B-Class Electric Drive
- Mitsubishi i-MiEV
- Nissan LEAF
- Toyota Plug-In Prius (subject to change)

Find out about:

- What current drivers love about their EVs
- Special utility EV rates for your home
- Incentives from the Center for Sustainable Energy and the Valley Air District
- The region's clean technology efforts at the San Joaquin Valley Electric Vehicle Partnership booth
- Charging at the NRG eVgo station
- Reducing your driving costs while curbing pollution

Organized by:

- San Joaquin Valley Electric Vehicle Partnership
- Center for Sustainable Energy
- Valley Air District

Sponsored by:

- NRG
- San Joaquin Valley Electric Vehicle Partnership

Presented by:

- Electric

## RIDE AND DRIVE EVENTS

# Bakersfield

### Event Details:

- EV Week
- October 4, 2015
- Valley Plaza Mall
- 10AM to 5PM
- 9 EVs available for test drives
- 50-75 test drives
- Live radio remote by country station 107.9FM KUZZ
- Notable vendors: Blue Sky Partners, Kern Green, Kern Transit, Center for Sustainable Energy, CommuteKern



**EV WEEK 2015** **FREE Test Drives**  
**Bakersfield - Valley Plaza Mall**  
 Wible Road Entrance  
 October 4, 2015 - 11AM - 4PM

Come out to Electric Vehicle Week on Sunday, October 4 at the Valley Plaza Mall for a fun day of electric vehicle ride and drives, FREE tacos, electric bikes - and featuring KUZZ AM/FM "Live" broadcast and their FREE Money Machine - in the Target Parking lot near Wible Road, 11:00AM - 4:00 PM.

**The first 100 EV test-drivers will receive two FREE tacos!**

In partnership with Best Ride Ever! - a ride and drive campaign from the California Plug-In Electric Vehicle Collaborative - EV Week offers test-drives of the latest cars, information on the benefits of going electric - including special utility rates from PGE, a California rebate program and carpool lane access - all in a hassle-free, no sales environment.

**Join us and "go electric" at EV Week Bakersfield!**  
**Vehicles for test drives (subject to availability):**  
 BMW Ford Mercedes Chevy  
 Nissan KIA Fiat Mitsubishi

For more information [www.chargeacrosstown.org](http://www.chargeacrosstown.org).

**Silver Sponsors**

**Sponsors**

**Partners**

**Participants (invited)**

# ELECTRIC VEHICLES IN THE SJV

# IKEA's EV Yard Tractor

- IKEA's first zero-emission, all-electric truck was able to save 4,800 gallons of diesel fuel as well as reduce 1.3 tons of nitrogen oxides (NO<sub>x</sub>), 0.04 tons of particulates (PM) and 68 tons of carbon emissions (CO<sub>2</sub>) during a year-long demonstration project at the company's Tejon Distribution Center.
- The vehicle logged more than 13,000 miles in its first year and currently is operating at a rate of 15,000 miles per year, with the cost of energy for the electric tractor less than 3 cents per mile, compared to more than 75 cents per mile for a diesel tractor.
- IKEA's 1.8 megawatt rooftop solar system provided about 90 percent of the power needed to charge the vehicle. The electric version also saves more than \$6,000 per year in maintenance costs.
- IKEA now is getting a second yard tractor as well.



## By The Record

Posted Aug 8, 2018 at 6:44 PM

Updated Aug 8, 2018 at 6:44 PM



STOCKTON — San Joaquin Regional Transit District has been named the 2018 Outstanding Public Transportation System Achievement Award winner by the American Public Transportation Association





BUS MAPS & SCHEDULES ▾

OW HIRING: Bus Operators (No Prior Experience Required)

**ELECTRIC BUSES**

**CLEARLY BETTER**  
ZERO-EMISSION, ALL-ELECTRIC BUS





## YOSEMITE NATIONAL PARK

Yosemite National Park, CA

Yosemite is the first U.S. National Park to permanently add zero-emission buses to its shuttle fleet.

<https://www.nps.gov/yose/index.htm>



## CALIFORNIA CLEAN ENERGY TOUR ELECTRIC VEHICLES INTERNATIONAL



**UPS deployed 100 all-electric EVI delivery vans that are reducing greenhouse gas emissions and air pollution, and helping to protect the environment and public health.**

# California's Bus Fleet Will Be 100 Percent Electric by 2040

Any new public transit bus purchased in California by 2029 must be a 100 percent electric vehicle, according to a new unanimous vote by the California Air Resources Board, the state's clean air agency. It is the first statewide policy in the United States to require an entire vehicle class go electric, the Union of Concerned Scientists wrote.



## ADDITIONAL FUNDING OPPORTUNITIES

The Valley Air District encourages interested applicants to review the following funding opportunities that are currently available to help reduce the out-of-pocket costs to purchase and install EV chargers. Applicants may be able to stack funds between these programs and Charge Up for maximum savings.

### Fresno County Incentive Project

Eligible Charge Up! applicants who plan to install EV chargers in Fresno County may also qualify for incentives through the [Fresno County Incentive Project \(FCIP\)](#). FCIP offers rebates up to \$4,000 for a single port EV charger and up to \$7,000 for a dual port EV charger.

### PG&E

[PG&E's Electric Vehicle Charge Network](#) is a program to install 7,500 EV chargers at workplaces and multi-unit dwellings between 2018-2020. This turnkey program covers logistics (e.g., construction, permitting) and infrastructure costs all the way to the charger, as well as a portion of the charger cost. Either the site or PG&E can own the chargers, and preferred segments have higher incentive levels (multi-unit dwellings, disadvantaged communities).

### Charge Ready

To support California's zero-emission policies, the [Charge Ready Program](#) is deploying infrastructure to serve qualified electric vehicle (EV) charging stations throughout our service territory. You can visit SCE's [map](#) of charging station projects to track their progress. To explore other ways to install charging stations at your site, please visit our [EV for Business website](#) for more information.

# Other Possible Funding Sources

## Low Carbon Fuel Standard Credits

For electricity used as a transportation fuel, you may be eligible to generate LCFS credits if you:

- Operate public charging stations
- Host private access EV charging at a business or workplace
- Operate a fleet of electric vehicles (including electric forklifts)

## Kern County EIR Air Mitigation Fund

- Established by Kern County Zoning Ordinance with funds paid by oil and gas companies to drill wells in Kern County
- Kern County and the San Joaquin Valley Air Pollution Control District will manage the fund
- Application process to be developed
- Variety of pollution-reduction projects to be funded in the future, including electric vehicle infrastructure

## Contact Information:

Bill Williams

Project Clean Air

4949 Buckley Way, Suite 206

Bakersfield, CA 93309

Phone: (661) 847-9756

Email: [projectcleanairprograms@gmail.com](mailto:projectcleanairprograms@gmail.com)



PROJECT  
CLEAN  
AIR



San Joaquin Valley  
**Electric Vehicle  
Partnership**



***MICROTRANSIT***



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



# Purpose of Transit

Ensure a world where accessibility, mobility, & spontaneity are achievable for every rider & transit fulfills its promise to be:



**A BRIDGE**  
connecting individuals  
with opportunities



**A CHOICE**  
towards social &  
environmental  
responsibility



**A COMMITMENT**  
to inclusivity & providing  
access for all



**A CHANCE**  
to create new,  
meaningful connections  
& interactions



# Overview

- Starting Sunday April 7, 2019
- On-demand, curb-to-curb shuttle service
- 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





# What is Microtransit?

- Key Concepts

- Flexible, on-demand service
- Zone based
- Less expensive than a fixed route
- Replace under-performing routes
- Personalized ride-hail experience with a dedicated fleet

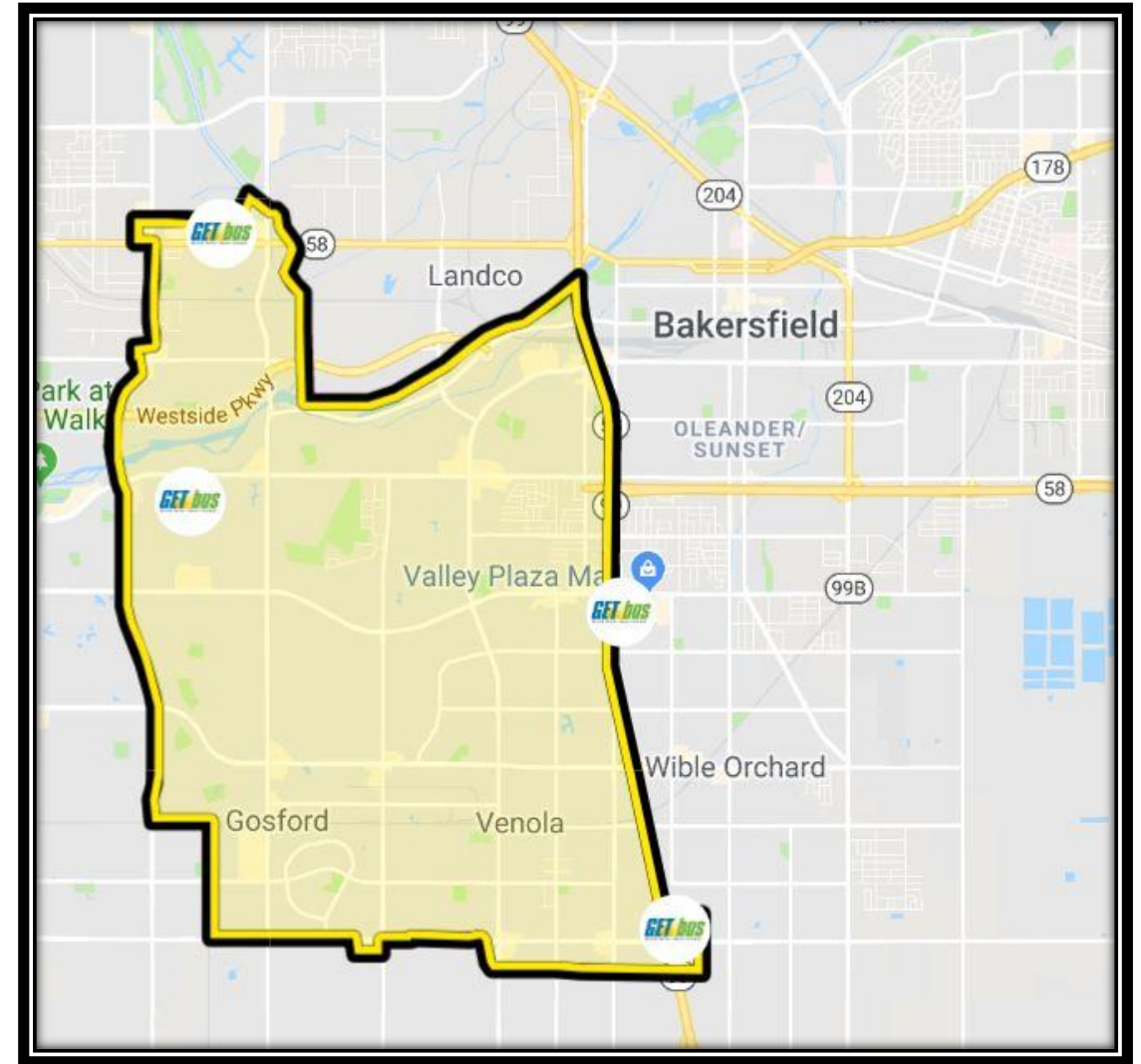
- Technology Tools

- Microtransit Platform
  - Service Boundaries
  - Dynamic routing
  - Analytics
- User-friendly Apps
  - Hailing
  - Navigation
  - Payment



# Ryde Zone

- Route 47
  - Walmart Panama/Truxtun
- Route 61
  - Stine Harris/ BC
  - South of Rosedale Hwy
- Transit Hubs
  - CSUB
  - SWTC
  - Walmart Panama
  - Walmart Rosedale





➤ How is Ryde different from other rideshare services?

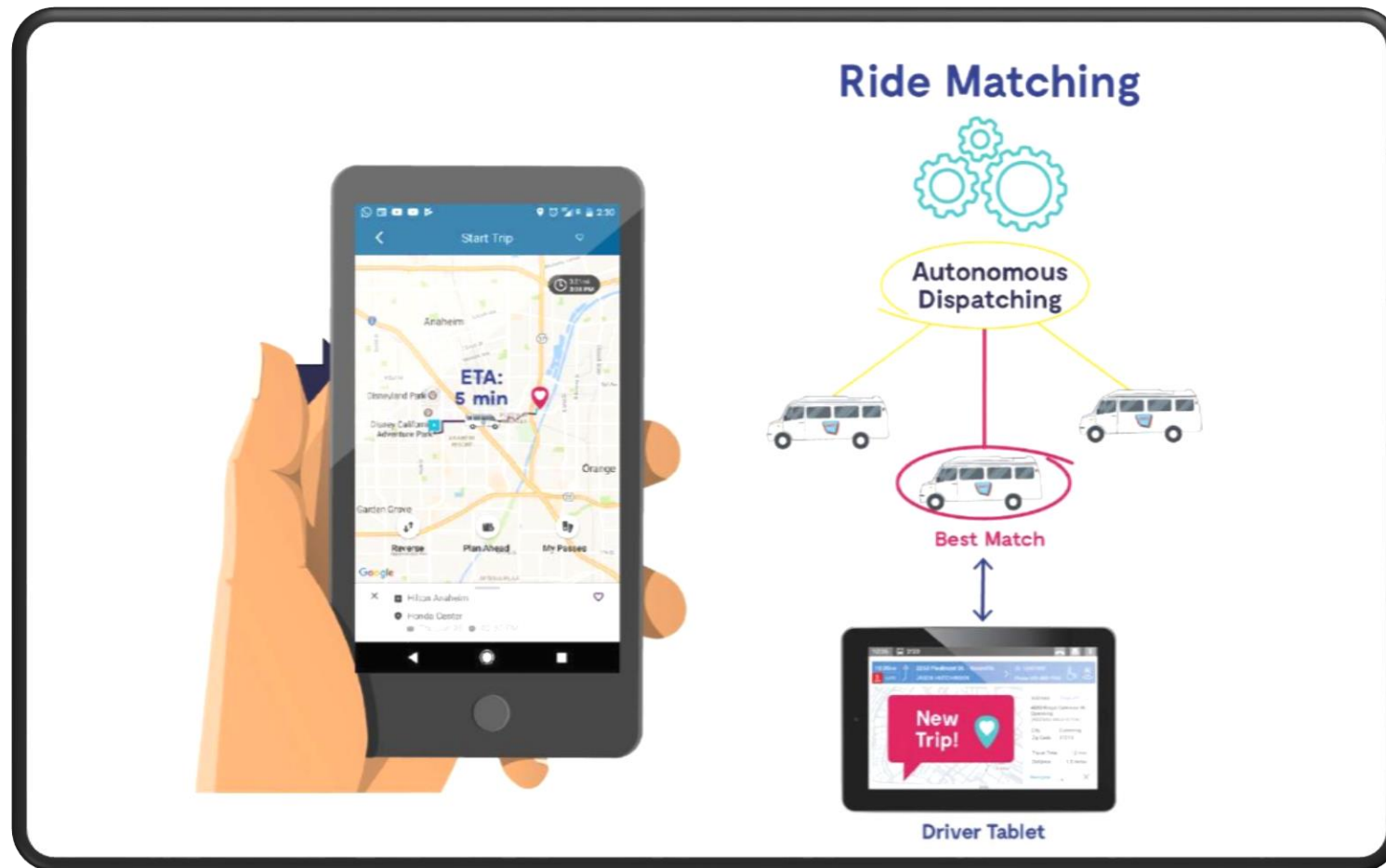
➤ How can I book a Ryde?

➤ How long will I have to wait for my Ryde?

➤ How do I connect outside of the zone?

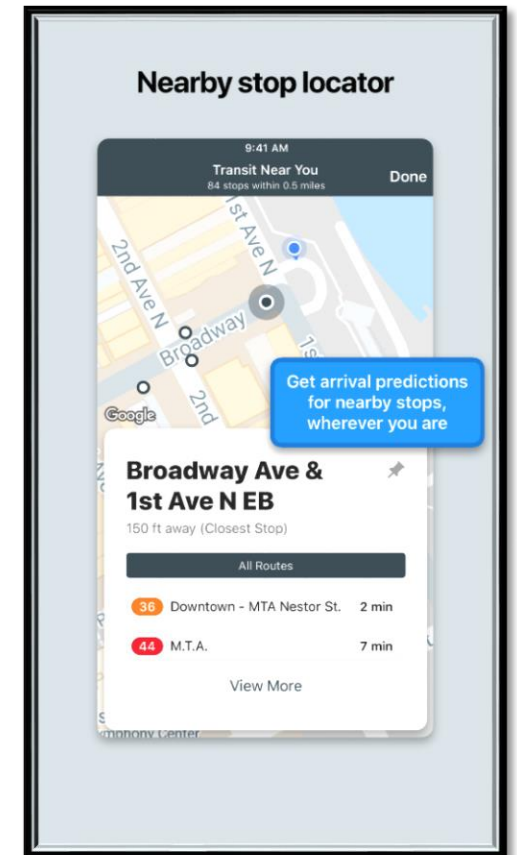
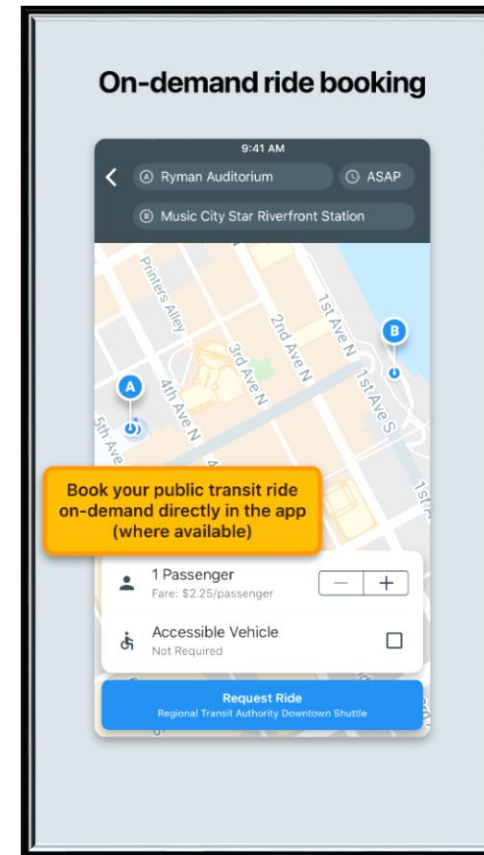
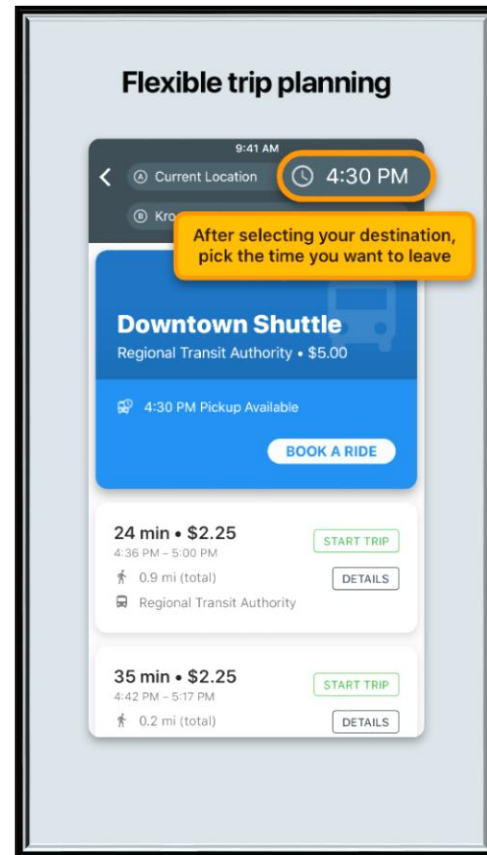
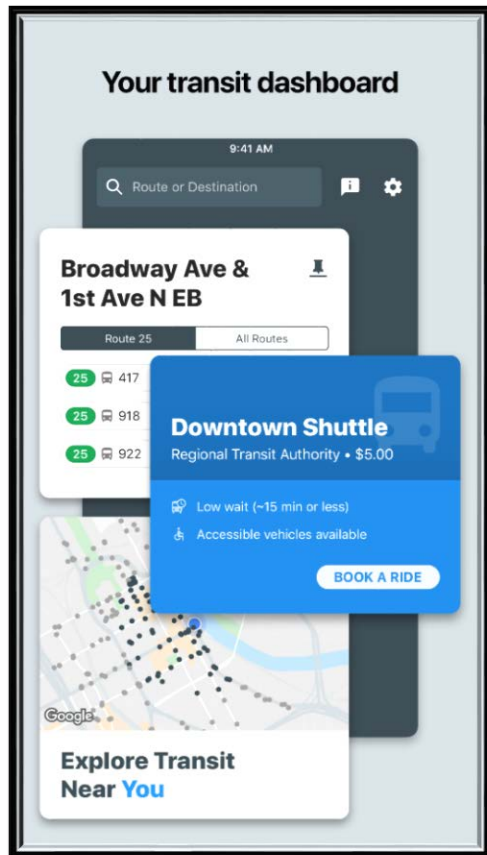


# Mobility on Demand





# User-Friendly App







# Conclusion



- Ridership has declined for the past decade
- Service Area grown
- Bakersfield lifestyle has changed
- Reconsider business model
  - Acting in the public interest: efficient, equitable and effective
- No Plans for Service Changes today
  - GET team review options in the study
  - Engage GET Employees and the Community



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



*[www.RYDEbakersfield.com](http://www.RYDEbakersfield.com)*



# Bus Voucher Incentives

Tarah Campi  
Program Manager, CALSTART  
626-744-5628  
[info@californiahvip.org](mailto:info@californiahvip.org)

TRANSITions Symposium  
February 2019



# What is HVIP?

Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project

- **First-come, first-served vouchers** – Immediate discount at sale
- **Dealers learn voucher system** – Fewer complications for fleets
- **Set aside funding for each voucher** – Price certainty at time of request
- New and retrofits; electric, hybrid, fuel cell, EPTO, Low-NOx natural gas
- 6,500 + vouchers, 1,000 fleets, 9 years



# Zero-Emission Transit Bus Voucher Amounts

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

# Zero-Emission Shuttle Bus Voucher Amounts

GVWR (lbs)	Base Vehicle Incentive	
	Outside Disadvantaged Community	In Disadvantaged Community
8,501 – 10,000	\$25,000	\$30,000
10,001 – 14,000	\$50,000	\$55,000
14,001 – 19,500	\$80,000	\$90,000
19,501 – 26,000	\$90,000	\$100,000
26,001-33,000	\$120,000	\$135,000
>33,000	\$150,000	\$165,000

# Zero-Emission School Bus Voucher Amounts

<b>GVWR (lbs)</b>	<b>Base Vehicle Incentive</b>	
	<b>Outside Disadvantaged Community</b>	<b>In Disadvantaged Community</b>
5,001 – 8,500	\$25,000	\$30,000
8,501 – 10,000	\$30,000	\$35,000
10,001 – 14,000	\$55,000	\$60,000
14,001 – 16,000	\$90,000	\$100,000
16,001 – 26,000	\$150,000	\$160,000
26,001 – 29,000	\$175,000	\$190,000
>29,000	\$220,000	\$235,000

# Low Nox School Bus

*Bluebird*

*8.9L Engine*

*Voucher Amount: \$45,000*

*A-Z Bus Sales*

Repowered transit buses with  
8.9L engines are also eligible:

**Cummins Westport**

**\$45,000 Voucher Amount**



# Examples of Eligible Vehicles



Lion Bus



BYD



Phoenix



Motiv



Orange EV



Gillig



Chanje



Motiv



Lightning Systems



GreenPower



Workhorse



BYD



Proterra



Complete Coach Works



New Flyer Industries



Zenith Motors



Motiv Power Systems



Blue Bird



Motiv

[www.californiahvip.org](http://www.californiahvip.org)

# Infrastructure Voucher Enhancements

- **Electric Vehicle Supply Equipment (EVSE):** Up to **\$30,000** per battery electric vehicle voucher
  - Covers hardware costs, load management software, energy storage
  - Does not cover labor or utility upgrade costs
- **H2 infrastructure:** Up to **\$100,000** for equipment cost for each fuel cell vehicle voucher; covers real costs of equipment
  - Must have at least 5 vehicle vouchers
  - Infrastructure cost can't be already covered by another grant
  - Approved on a case-by-case basis by CARB/CALSTART

# Transition to Zero

## Supporting Planning & Adoption of Zero-Emission Buses

### ***TRANSITions 2019***

February 26, 2019

Traeger Cotten, PE

(559) 331-9715



Energy for What's Ahead<sup>SM</sup>



# Transportation Electrification Advisory Services

## **SCE will assist Transit Agencies with the following:**

- Provide rate analysis, forecasting, GHG savings calculations
- Facilitate the application process, provide technical requirements, and address easement issues
- Work with Service Planning on siting and infrastructure issues
- Provide engineering resources to address technical concerns
- Support in meeting new ICT regulation ZEB Rollout Plans





## SCE's ZEB Rollout Plan Support includes:

- Estimated schedules for construction of facilities and infrastructure upgrades for bus charging
- Provide information on available funding from our infrastructure programs to support electric buses
- Estimate electricity costs and LCFS credits to assist you in comparing fueling costs
- Develop suggestions for a phased-in approach to ZEB procurement and infrastructure deployment to avoid interruptions to your operations

## Rates for EV Charging

### 2019 changes to EV Rates

- TOU-EV-7, TOU-EV-8, and TOU-EV-9 will be available March 1<sup>st</sup>, 2019
- No demand charges in 2019 through 2023; Demand charges phased in from 2024 through 2028

Calendar Year	2019-2023	2024	2025	2026	2027	2028	2029+
Rate Year	1-5	6	7	8	9	10	11
% of Final FRD	0%	16.67%	33.33%	50%	66.7%	83.33%	100%

- Will maintain lower demand charges than current EV rates ongoing
- The new on-peak time period is from 4 PM to 9 PM

# Charging Infrastructure Programs

**SCE's Charge Ready programs support the expansion of electric vehicle charging at homes, workplaces, schools and public places, as well as fleet and industrial vehicle charging for public agencies and private industry.**



## Charge Ready Transport

This program will help grow the transportation electrification market over a five-year period by installing electric infrastructure at customer sites to support charging plug-in buses, medium- and heavy-duty trucks, forklifts and other non-road cargo handling equipment.



## Charge Ready Transport

- CPUC approved total program budget of **\$356.4M**
- Total budget should achieve a minimum of **870 make-ready installations** by 2024 with **8,490 electric vehicles** procured or converted.
  - Minimum **15%** for **transit agencies**
- Charging station **rebates** are available for **transit buses** and sites located in Disadvantaged Communities.
- Program will **launch in Q2 2019**

# Charge Ready Transport Program Overview

**SCE will deploy make-ready infrastructure up to the interconnection point with charging equipment.**

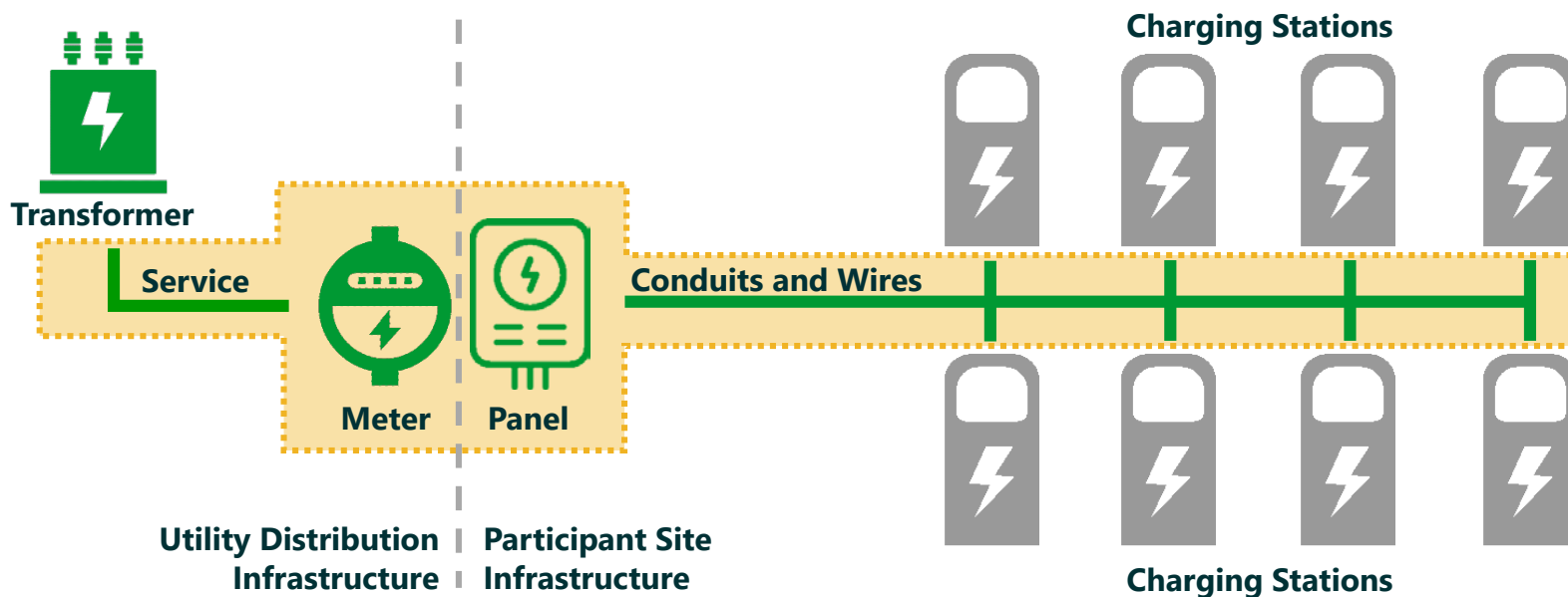
**Participants can select from a list of approved charging equipment.**

**Customer ownership option on customer side infrastructure is available.**

**Charging equipment rebate available to transit agencies, school bus operators, and sites located in disadvantaged communities.**

# Defining Make-Ready Infrastructure

- Standalone charging station model



Program covers costs associated with service drop, meter, panel, and circuit dedicated to EV charging. Make-ready ends at interconnection point with customer charging equipment providing AC service.

# SCE Bus Transit Workshop 3/1

**Friday, March 1, 2019  
8:30 to 11:30 a.m.  
2244 Walnut Grove Avenue,  
Rosemead, CA 91770**

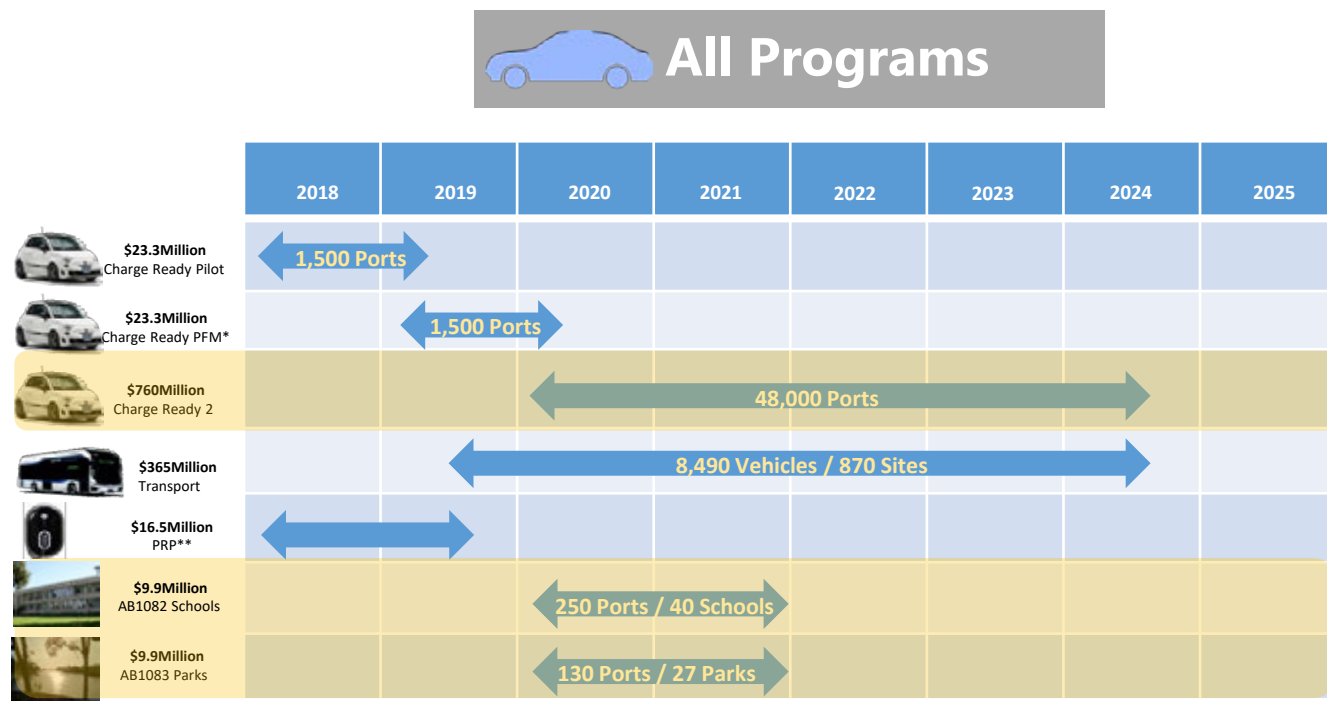
**RSVP Here:**

**<https://pluggedincustomers.sce.com/c/r/TransitiontoZero>**

**Questions? Contact [ChargeReadyBus@sce.com](mailto:ChargeReadyBus@sce.com).**

**This event is open to transit agencies and cities  
operating transit buses only.**

# Summary of Make-Ready Programs



\* PFM - Petition For Modification  
(Charge Ready Bridge Funding)

\*\* PRP - Priority Review Pilots:

- 1) Charge Ready Home Installation Rebate
- 2) Charge Ready | Transit Bus
- 3) Port of Long Beach Projects
  - 1) Gantry LB
  - 2) Container Movers LB
- 4) Charge Ready DC Fast Charge

Items in these swim lanes are filed but not approved and could be substantially altered or not offered

Before we depart today, I want to share a few things I heard when CARB hosted a ZEB Technology Showcase and Symposium in Sacramento earlier this month. Show of hands, did anyone attend in person? On their computers? Thank you.

Scaling up a zero emission fleet increases the cost per bus for Battery Electric Buses. While for Fuel Cell (Hydrogen) buses, the up-front costs are expensive but the cost per bus goes down over time.

An experienced fleet manager noted that buying the buses was the easy part. The transition required commitment from his board of directors AND everyone in the organization was impacted.

Route planning – one fleet reported having to now run through a hub to get an extra charge and finish the run.

Bus service hours

Grant Writing – how to tell your story changed

Training for purchasing departments – how to write a bid sheet!

Maintenance Changes – From scheduled maintenance (no more oil changes) to new Maintenance Bay equipment

Marketing Team Engaged – get everyone in-house and the public in support of the change

Customers, Customer service reps, Dispatchers

Rebranding the buses

## **Training – [We could do 4 hours on training]**

### Auxiliary Systems

Electric Drive and Fueling Systems for Operators (e.g. learning new equivalencies – if you have 4 kWh left, how many miles is that with the AC running, in stop and go versus an express route, flat versus hilly; docking to a charging station is different from pulling up to a CNG or Diesel station; accelerating and braking changes, missed opportunities to charge, cool or heat bus while still plugged in before leaving the yard)

Even the bus cleaners required some training

There is help now and more help coming.

OEMs will help with some of the training

There will certainly be more webinars, events, and expos in the Central Valley and throughout the State.

For instance, SunLine is expanding West Coast Center of Excellence in Zero Emission Technology through a Federal grant and will soon open a training center at their Palm Springs location that operates CNG, BEV and Fuel Cell buses. They are hosting a workshop next week.

ETP receives \$3 million / year from the California Energy Commission to offer all sorts of training

Clean Cities and other clean transportation nonprofits will keep its members alerted to opportunities.

EV Infrastructure Training Program (EVITP.org) Provides training for EV installers, typically electricians.

SCRTTC (formerly College of the Desert) offers training: safety, basic preventive maintenance, fuel cell diagnostics and management systems, mentor-training.

I think that is enough on training! You get the idea.

Telemetrics becomes more important – understanding how your bus is operating, how each driver is performing. AVTA has an EPIC grant from the CEC to learn if offering incentives to operators will help optimize their speed-profile performance.

You will have to think of the questions **you** need answered. You will have to communicate those questions to others. Will the experience in the San Joaquin Valley be different because our service and boardings, weather and terrain are different? Possibly. Where do you turn for solutions?

Every challenge has a solution and this process helps down the road.

We hope today provided a way for you to get started. Presentations will be posted next week. **And now for the final prizes!**

**If you have both candy and a transformer, your table has two prizes.**

**Susanne – Please choose a number between 1 and 31.**

**The person or people at the table, with a birthday closest to Susanne's number win a centerpiece. If you won a prize earlier, do not forget to see the vendor to collect your prize.**