

Appendix A:

Clean Transportation Incentive Project Summaries

Light-Duty Vehicle Ownership Projects

Grantee	Project Title
Center for Sustainable Energy	Clean Vehicle Rebate Project
Beneficial State Foundation	Clean Vehicle Assistance Program
Community Housing Development Corporation	Community Housing Development Corporation Financing Assistance Pilot Project - Driving Clean Assistance Program
South Coast Air Quality Management District	Clean Cars 4 All - South Coast AQMD's Replace Your Ride
San Joaquin Valley Air Pollution Control District	Clean Cars 4 All - Drive Clean in the San Joaquin, Tune In and Tune Up
Bay Area Air Quality Management District	Clean Cars 4 All - Bay Area AQMD's Clean Cars for All Program
Sacramento Metropolitan Air Quality Management District	Clean Cars 4 All - Sac Metro Air District Clean Cars 4 All Program

Clean Vehicle Rebate Project (CVRP)

The Clean Vehicle Rebate Project (CVRP) promotes clean vehicle adoption in California by offering rebates of up to \$4,500 to income-qualified consumers for the purchase or lease of new, eligible fuel cell electric vehicles (FCEV), battery electric vehicles (BEV), plug-in hybrid electric vehicles (PHEV), and zero-emission motorcycles (ZEM). CVRP also offers an increased rebate to support transportation equity. Consumers with household incomes less than or equal to 300% of the federal poverty level are eligible for the following rebates: \$7,000 for a FCEV, \$4,500 for a BEV and \$3,500 for a PHEV.



Center for
Sustainable
Energy™

The Center for Sustainable Energy (CSE) administers CVRP throughout the state for the California Air Resources Board as part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: March 2010 – Present
Grantee: Center for Sustainable Energy
Partners: California New Car Dealers Association, Central California Asthma Collaborative, Comité Civico del Valle, Groundwork, Community Resource Project, Reach Out, Liberty Hill and 18 other local CBO partners and over 30 other community partners

Grant Amount through FY 19/20:

CCI: \$945,101,981
AQIP & CEC: \$146,362,532
Project Total: \$1,091,464,513



CVRP Program Updates

- New rebate amounts: \$4,500 for a FCEV, \$2,000 for a BEV, \$1,000 for a PHEV, and \$750 for a ZEM.
- Decreased rebate limits per individual to one rebate per lifetime (previously two rebates).
- Shorter application window limit, applications must be submitted within three months of vehicle purchase or lease date.
- New MSRP cap of \$60,000 for all BEVs and PHEVs. No MSRP cap for FCEVs.
- Eligible PHEVs must have a minimum all-electric range of 35 mi. in compliance with the Urban Dynamometer Driving Schedule (UDDS) test standards.

Lessons Learned

- Sharing of new and creative ways to reach communities virtually during the current health and economic crisis.
- CVRP utilizes in-language material and leverages relationships with trusted CBOs to deliver messaging that resonates with diverse communities.
- Awareness of EVs and incentives still remains low and outreach efforts need to evolve to reach and engage with consumers at their level of understanding and when they are most receptive to receiving information.
- Dealerships are unsure of what stage of sales cycle is most appropriate to discuss increased rebates. Dealers are receptive to further training to better understand stackable incentive opportunities with other equity programs.

Status Updates

- As of February 2020, over \$78 million in rebate funds issued to low-moderate income consumers.
- In-person outreach ceased March 2020 due to current health and economic crisis, outreach converted to virtual, email, and phone calls.
- Education and outreach efforts traditionally focused on "Clean Vehicle-Ready" car shoppers has shifted toward low-moderate income audience.
- Dealer team has completed 1,878 in person visits to dealerships within a DAC census track or DAC benefiting zip code and continues to review the increased rebate during all in person dealership visits.



Clean Vehicle Assistance Program cleanvehiclegrants.org

The Clean Vehicle Assistance Program (CVA Program) is a statewide pilot program that provides grants and fair financing options to help income-qualified Californians purchase or lease a new or used clean vehicle. The program aims to make clean vehicles accessible and affordable to all who qualify and reside in California. After a successful first phase funded by a \$5 million grant, the CVA Program relaunched in February 2020 with expanded capacity and funding. Clean vehicle grants are tiered based on income level and vehicle type. The highest grants amounts are available to the lowest income tier. The maximum vehicle grant amounts are \$5,000 for a plug-in hybrid or battery electric vehicle and \$2,500 for a hybrid electric vehicle.



clean vehicle
assistance program

The CVA Program is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment—particularly in disadvantaged communities.

Dates: June 2018 - Ongoing
Grantee: Beneficial State Foundation
Partners: Beneficial State Bank, Center for Sustainable Energy, Grid Alternatives, Rising Sun Energy Center
Grant Amount:
CARB Contribution: \$29,000,000
Matching Funds: \$1,403,500
Project Total: \$30,403,500



Vehicles/Equipment Funded

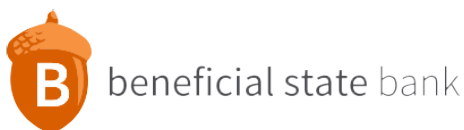
- The CVA Program has funded over 775 clean vehicle grants and over 150 charging grants since the launch of the pilot program.
- Clean vehicles include hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEV).
- Participants who purchase a PHEV or BEV are eligible for up to \$2,000 in additional funding for the purchase and installation of a level-2-speed home charger or a pre-paid charge card for public charging and a portable charger.

Lessons Learned

- The early success of our program has shown that our low-income California residents are interested in clean vehicle ownership.
- Dealerships are a key partner to work with in order to provide a positive experience for grant recipients.
- While we work together to reach the goal of 5 million clean vehicles in CA by 2030, we must prioritize the strength and well-being of low-income communities and communities of color.

Status Updates

- 775 clean vehicles have been funded.
- Program re-opened February 2020.



Community Housing Development Corporation Financing Assistance Pilot Project

Driving Clean Assistance Program

The Community Housing Development Corporation (CHDC), a community-based organization in Richmond, received a \$2.9 million grant to introduce the purchase and adoption of advanced technology vehicles in low-income and disadvantaged communities in 12 Bay Area Counties. The pilot project provides qualified applicants up to \$5,000 in hybrid or plug-in vehicle price buy-down, and up to an additional \$2,000 to purchase a level 2 in-home charger. The pilot enables low-income individuals and families, who would otherwise not qualify for a loan due to credit challenges, to obtain a loan at competitive rates significantly lower than the traditional deep subprime rates. The transformative initiative includes credit, budget counseling and financial education training. Project benefits include increasing access to jobs, health care, education, and enhancing every day activities, while also addressing climate change goals.



The Community Housing Development Corporation Financing Assistance Pilot Project is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: November 2015 – March 2026
Grantee: Community Housing Development Corporation
Partners: Travis Credit Union, Grid Alternatives, and Beneficial State Bank

Grant Amount:
CARB Contribution: \$2,932,457
Matching Funds: \$181,000
Project Total: \$3,113,457



"Not only was it a good opportunity to increase my financial literacy but I was also able to purchase a "green" vehicle that I would've not been able to afford otherwise."



"I never thought that I would ever be able to afford a hybrid vehicle. Because of this program I now have a reliable vehicle to get to work and I save gas and help the environment."

Vehicles/Equipment Funded

- Funded 172 advanced technology vehicles Feb. 2016 – Aug. 2020 with a goal to fund 88 more by December 2020, funded vehicle technologies include:
 - Hybrid Electric Vehicle (HEV)
 - Plug-in Hybrid Electric Vehicle (PHEV)
 - Battery Electric Vehicle (BEV)
- Participants who purchase a PHEV or BEV may request financial assistance up to \$2,000 in additional funding for the purchase and installation of home charging equipment.

Lessons Learned

- Trust is a key foundational element to working successfully with low-income and disadvantaged communities.
- Early community engagement and ongoing, continuous community outreach is needed to build and maintain trust.
- Partnerships with community stakeholders, such as churches and community resource centers, are essential to project sustainability.

Status Updates

- Phase three implementation occurs in the December 2020 through 2022 timeframe.
- Gaining traction in the adoption and purchase of advanced technology vehicles in low-income and disadvantaged communities.



Clean Cars 4 All South Coast AQMD's Replace Your Ride

The South Coast Air Quality Management District administers the Replace Your Ride Program, which is part of California's Clean Cars 4 All and Enhanced Fleet Modernization (EFMP) Programs. The goal of Replace Your Ride is to improve air quality and increase access to advanced technology vehicles for lower income applicants. Eligible applicants may receive funding assistance of up to \$9,500 to replace high-polluting vehicles with newer, cleaner options. The replacement options include advanced technology such as a hybrid, plug-in hybrid, battery electric or fuel cell, or choose an alternative mobility option such as transit passes or an electric bike in lieu of a replacement vehicle.



Clean Cars 4 All is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: June 2015 – Ongoing
Grantee: South Coast Air Quality Management District
Partners: Pacoima Beautiful, Liberty Hill Foundation, Opus Inspection, Foundation for California Community Colleges, Clean Fuel Connections, Inc., SA Recycling, LKQ Pick Your Part, 53 auto dealerships



Grants Awarded:

Clean Cars 4 All: \$ 61,000,000
EFMP: \$ 9,300,000

Vehicles/Equipment Funded

- Approved 6,575 vouchers, of which 88% of participants fall within the low-income category.
- Incentivize purchase of 3,495 plug-in hybrid electric vehicles, 677 battery electric vehicles, and 10 fuel cell vehicles.
- The retired vehicles have an average model year of 2000 and an average of 178,082 miles on the odometer.
- Replacement vehicles have an average MPG of 52 and average MPGe of 106.
- \$33,857 in incentives given to participants for Level 2 vehicle chargers after purchasing battery electric vehicles.
- \$43,000 in incentives given to participants who chose the Alternative Mobility option.
- 93% of program participants are from disadvantaged communities.

Lessons Learned

- Targeted community outreach and consumer assistance workshops have greatly aided in building a good reputation for the program and a trusting relationship with applicants.
- Multi-lingual assistance is necessary to ensure the program is accessible to district's low-income families and disadvantaged communities.

Status Updates

- Working closely with community-based organizations to help make the program as accessible as possible.
- Participation has increased each program year, with over 2,000 clean car vouchers processed the past 12 months.
- User-friendly program website utilizing paperless application and approval allows for a streamlined and efficient process for both participants and administrators.



Clean Cars 4 All

Drive Clean in the San Joaquin, Tune In and Tune Up

The San Joaquin Valley Air Pollution Control District (District) has number of programs that aim to reduce emissions from light-duty vehicles. Drive Clean in the San Joaquin Program offers Repair, Replace and Rebate. Since 2015, the Vehicle Replacement Program provides financial assistance for low- to moderate-income residents by replacing their old, high-polluting vehicle with a newer, more fuel-efficient model that is eight years old or newer. Funding helps lower income residents get into cleaner, more reliable vehicles while improving air quality in the Valley. This is part of California's Clean Cars 4 All and Enhanced Fleet Modernization Programs (EFMP). It has funded the replacement of nearly 2,900 high-polluting vehicles through the second quarter of 2020.



The Clean Cars 4 All program is part of the California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: May 2015 – Current
Grantee: San Joaquin Valley Air Pollution Control District (SJVAPCD)
Partners: California Air Resource Board (CARB) and Valley Clean Air Now (Valley CAN)

Grants Awarded:
Clean Cars 4 All: \$28,000,000
EFMP: \$7,900,000



Vehicles/Equipment Funded

- 2,835 high-polluting vehicles off the road
- \$27.5 million spent for clean air vehicles
- Battery Electric: 285
- Plug-In Hybrid: 1,244
- Hybrid: 1,123
- Conventional: 183

Lessons Learned

- Requiring participating dealerships to fix all safety recalls before completing a vehicle purchase helps the program provide participants with a high standard of consumer protection.
- High demand for advanced technology vehicles means participating dealerships must actively manage inventory.
- Building a broad dealership network ensures competitive pricing and vehicle choice for participants.
- High level of administrative support is necessary to help participants successfully complete the program.

Status Updates

- Leveraged existing Repair Program events to screen residents for eligibility and educate them about the Replacement Program.
- Conducted strategic, grass-roots Replacement Program workshops within rural, low-income communities to maximize participation.
- Program provides full benefit of the incentives to participants at the time of purchase, which helps reduce the upfront out-of-pocket cost for low-income residents.
- Program provides materials and one-on-one support to help applicants learn about the benefits of advanced technology vehicles.



San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT



Clean Cars 4 All

Bay Area AQMD's Clean Cars for All Program

The Bay Area Air Quality Management District's Clean Cars for All Program provides up to \$9,500 in incentives for income qualified households (up to 400% of the Federal Poverty Level) to retire older, high-polluting vehicles and replace them with a newer, cleaner vehicle or with mobility options (e.g. public transit, electric bicycles, etc.). Eligible vehicles for purchase or lease include hybrid electric, plug-in hybrid, battery electric, or fuel cell electric vehicles. This program will reduce criteria pollutants and greenhouse gas emissions throughout the Bay Area and support the goal of equitable access to electric vehicles and clean transportation.



**CLEAN CARS
FOR ALL**

Clean Cars 4 All is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: April 2019 – Ongoing
Grantee: Bay Area Air Quality Management District
Partners: GRID Alternatives, Community Housing Development Corporation, Beneficial State Foundation, Beneficial State Bank, Travis Credit Union

Grants Awarded (as of August 2020):

Clean Cars 4 All: \$14,000,000
Local Funding: \$5,000,000



Vehicles/Equipment Funded (as of August 2020)

- \$9,500,000 awarded
- \$7,500,000 spent to fund: 199 Hybrid electric vehicles (HEV), 463 Plug-in hybrid electric vehicles (PHEV), 212 Battery electric vehicles (BEV), 5 Fuel cell electric vehicles (FCEV), 6 Public transit cards, and 71 Level 2 home chargers

Lessons Learned

- One-on-one support, virtual inspections, online sales, and no touch delivery have been vital to the program's continued success and helped application and award numbers continue to rise.
- Education and coordination with complementary and local incentives are vital to selection of cleaner vehicle types.
- Outreach events and ride & drives are not as successful or cost effective as online advertisements, news coverage, and other outreach methods. Referrals from friends and family remain the most successful outreach method and account for over 53% of the referrals for Clean Cars for All.

Status Updates

- Application processing and participation unaffected in 2020.
- Over 78% of participants choose to purchase PHEVs, BEVs, FCEVs (over HEVs).
- Demand has increased significantly. The Air District will be using local Transportation Fund for Clean Air funding to help supplement the Clean Cars for All Program.



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT



ENERGY FOR ALL
A program of GRID Alternatives



beneficial state foundation



Clean Cars 4 All

Sac Metro Air District Clean Cars 4 All Program

The CC4A Program benefits areas in and near Disadvantaged Communities (DAC) census tracts and low-income Sacramento County residents by scrapping older, higher polluting vehicles and replacing them with newer, cleaner hybrid, plug-in hybrid, and zero-emission vehicles. Starting in 2021, this Program will provide participants the option to receive funding toward alternative transportation (e.g., public transit, car sharing, e-bikes) voucher in lieu of a replacement vehicle.



Clean Cars 4 All is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in underserved communities.

Dates: April 2020 – Soft Launch
August 2020 – Full Launch

Grantee: Sacramento Metropolitan Air Quality Management District

Partners: GRID Alternatives, Pick N Pull, SMUD, FLUXX

Grant Funding Received through FY 19/20:

GGRF:	\$4,000,000
VW Settlement	\$5,000,000
Project Total:	\$9,000,000



Vehicles/Equipment Funded

- Up to \$9,500 awarded to eligible low-income consumers for Hybrid electric vehicles (HEV), Conventional & Plug-in hybrid electric vehicles (PHEV), Battery electric vehicles (BEV), and Fuel cell electric vehicles (FCEV).
- Alternative transportation options such as transit passes and e-bikes.

Lessons Learned

- Technology gap had widened for some participants, while some report positive responses to our 100% online and remote application process.
- Keeping implementation protocol closely aligned with other District's process lessens adoption barriers for contractors, participants and dealerships.
- Establish all partner contracts before publicizing program launch dates.

Status Updates

- Over 1,000 community members expressed interested in program after initial announcement.
- This program officially launched August 2020 and is now taking applications on a first-come first-serve basis.
- 10 Authorized Auto Dealers participating with 6 additional in process of getting authorized.
- Program has developed a contactless approach for implementation.
- Cross District collaboration has been one of our project's strengths.



Light-Duty Clean Mobility Pilot Projects

Grantee	Project Title
City of Los Angeles	EV Carsharing Pilot Program (BlueLA Carsharing) Project
Sacramento Metropolitan Air Quality Management District	Our Community CarShare Sacramento Pilot Project
San Joaquin Valley Air Pollution Control District	Valley Air ZEV Mobility Pilot Project
San Joaquin Valley Air Pollution Control District	Ecosystem of Shared Mobility in the San Joaquin Valley
Metropolitan Transportation Commission	Car Sharing and Mobility Hubs at Affordable Housing Pilot Project
Community Bridges	Lift Line Paratransit Dial-a-Ride Electric Vehicle Transition Program
CALSTART	Clean Mobility Options Voucher Pilot Program
California Vanpool Authority (CalVans)	Agriculture Worker Vanpools Pilot Project – XL Hybrid Vehicles
El Monte Union High School District, San Diego Unified School District, and Stockton Unified School District	Clean Mobility in Schools Pilot Project
TBD	Sustainable Transportation Equity Project (STEP)

EV Carsharing Pilot Program (BlueLA Carsharing) Project

In June 2015, the City of Los Angeles received an award of \$1.6 million in CARB grant funds for the Car Sharing and Mobility Options in Disadvantaged Communities (DAC) Pilot Project (BlueLA Carsharing). The City's Department of Transportation (LADOT) used the grant funds to deploy 100 electric carsharing vehicles and implement a carshare pilot program with 22 carsharing stations (110 EV charge points) in DACs, including Westlake, Pico-Union, several areas north of the University of Southern California, and portions of Downtown, Hollywood, and Koreatown. In May 2019, CARB awarded the City of LA a \$3 million grant to more than double the scale and impact of the carsharing fleet in the BlueLA Phase 2 Expansion Project. The expansions adds service in South Los Angeles, East Los Angeles, and East Hollywood.



BlueLA Carsharing is part of California Climate Investments, a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment – particularly in disadvantaged communities.

Dates: October 2015 – Ongoing
Grantee: City of Los Angeles
Partners: LADOT, LADWP, BlueLA Carsharing LLC, Mobility Development Partners, Shared-Use Mobility Center, Salvadoran-American Leadership and Education Fund (SALEF)

Grant Amount:
CARB Contribution: \$4,669,343
Matching Funds: \$5,066,667
In-Kind Funds: \$2,689,715
3rd-Party Capital Investment: \$18,780,000
Project Total: \$37,820,000



Vehicles/Equipment Funded

- 39 carsharing sites with a total of 195 charge points and 106 electric carshare vehicles are currently in operation, with 1 more station (5 additional charge points) completed construction and expected to come into full service by the end of 2020.
- 5 EV charge points installed at each carsharing site, with an average of 3 electric carsharing vehicles.
- Blink Charging acquired BlueLA on September 18, 2020, and all services will continue to operate during the transition without interruption.

Lessons Learned

- Public-private partnerships allow up front flexibility and resources, but may not be sustainable as a service. A long-term home for these programs may require moving to community-controlled model.
- Buy-in from key decision-makers and community leaders can increase the efficiency of complex tasks like siting and constructing EV infrastructure. Dedicated and committed resources are essential to success.
- Setting aside an ample budget for outreach to the community and businesses within the project area is critical.
- At the initial onset of Covid-19, the operator halted service, but returned after developing new cleaning protocols and procuring protective equipment for operation staff. Surveyed users continued using BlueLA for essential trips.

Project Highlights

- This project has reduced about 1909.83 metric tons of GHG emissions - equivalent to 214,902 gallons of gasoline.
- Low-income qualified Community Members make up more than half of all membership types.
- Almost 900,000 miles driven with over 48,000 trips, and 6,200+ members recruited since program launch.



Our Community CarShare Sacramento Pilot Project

www.ourcarshare.org

The Sacramento Metropolitan Air Quality Management District is in Phase 3 of a \$4.4 million project to increase access to zero- and near-zero emission transportation for low-income residents living in affordable housing communities within Sacramento's disadvantaged and low-income neighborhoods. The project provides subsidized transportation to participating residents through clean technology car sharing and pre-paid vouchers for ride hail services, paratransit, Amtrak, and public transportation. Project benefits include increased clean mobility access for residents, improved air quality through greenhouse gas and toxic emission reductions, and contributing to regional and statewide goals for transportation electrification.



Our Community CarShare Sacramento Pilot Project is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates:	May 2017 – Ongoing
Grantee:	Sacramento Metropolitan Air Quality Management District
Partners:	Zipcar, GIG, Breathe California, Mutual Housing California, Sacramento Housing and Redevelopment Agency, City of Sacramento, Sacramento Municipal Utility District
Grant Amount:	
CARB Contribution:	\$4,363,847
Matching Funds:	\$1,466,760
Project Total:	\$5,830,607



Vehicles/Equipment Funded

- Service available at 7 community housing sites, with 4 new sites launching by the end of 2020
- Each site has at least 2 electric vehicles and 2 chargers, includes: Kia Souls, Chevy Bolts, a Chrysler Pacifica Plug-in hybrid, and Toyota Mirai fuel cell vehicles
- Zipcar manages the vehicle reservation system and maintains the car share vehicle pool
- Residents reserve vehicles for free for local trips up to 3 hours at a time
- Non-driving residents are eligible for a \$100/month VISA allowance, coded for transportation services only.

Lessons Learned

- Enlist resident volunteers to aid in communication/translation and tailor outreach to each community served
- On-site project staff support is crucial to residents' participation in the project and for quick response to issues
- Use an easy, accessible, and convenient reservation system with alternatives to smart phones and computers
- Build in strategies for the project to be financially sustainable after grant funds are exhausted
- Residents voiced a strong desire for expanded reservation hours and more vehicles available for reservation

Project Highlights

- Over 565 approved members and 32,445 vehicle reservations (as of July 2020)
- Over 480,000 electric miles driven (average trip length is 15 miles)
- Consistently positive feedback from community residents (77% gave a 5-star rating)
- Vehicle utilization rate is 30% to 35% (above the average public utilization rate for Zipcars)
- Project shows early success and good potential for replication in other disadvantaged communities statewide.

Valley Air ZEV Mobility Pilot Project

The San Joaquin Valley Air Pollution Control District (APCD), has received a \$749,800 grant from the California Air Resources Board for the transformative implementation of advanced clean car sharing and mobility options in census tracts that are within the top 19% of disadvantaged communities. The funding for the ZEV mobility project will develop Electric Vehicle Supply Equipment (EVSE) infrastructure in the San Joaquin Valley, offering participants residing in targeted disadvantaged communities a combined electric vehicle (EV) vanpooling and car-sharing service. The project enables participants to obtain affordable access to EVs without the burden of ownership.



The ZEV Mobility Pilot Project is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: May 21, 2018 – July 2021
Grantee: San Joaquin Valley APCD
Partners: Green Commuter, CALSTART

Grant Amount:
CARB Contribution: \$749,800.00
Matching Funds: \$1,160,300.00
Project Total: \$1,910,100.00



Vehicles/Equipment Funded

- Funds available for 12 electric vehicles (6 Tesla Model X's and 6 Chevrolet Bolts) and at least 31 charging stations (5 DCFC/Level III chargers and Level II chargers for the remaining).
- The project has 25 Level II charging stations (Cantua Creek, Castle Airport, and Delhi), 5 DCFC/Level III charging stations (Castle Airport and Delhi), 6 Chevrolet Bolts, and 3 Tesla Model X's in operation.

Lessons Learned

- Key challenges in securing a host site include obtaining a county building permit in the allotted timeframe and selecting a location that can provide public access with a viable power system.
- Poor internet connection in remote communities like Cantua Creek affects easy access to the reservation system.
- COVID-19 has posed many challenges, including the need to provide safe social distancing measures in vehicles, disinfecting vehicles between rentals, reduced demand for rideshare in Cantua Creek and Delhi, and no demand for vanpooling to college campuses including California State University, Bakersfield.

Project Highlights

- Volunteer drivers help provide residents unable to drive access to medical facilities, stores, community events, etc.
- Green Commuter provides staff support to help enlist and follow up with participants, and assist with translation.
- Green Commuter holds regular community events and door-to-door outreach efforts to promote services.
- Cantua Creek participants appreciate the rideshare services and hope to see long term sustainability.



Ecosystem of Shared Mobility in the San Joaquin Valley

The San Joaquin Valley Air Pollution Control District (APCD) was awarded \$2,250,000 from FY 2016-17 Greenhouse Gas Reduction Funds. There are three project components. The first is the car sharing service Míocar (formerly known as Valley GO) in affordable housing communities located within Tulare and Kern counties. The second is VAMOS (formerly known as Valley Flex), a Mobility as a Service (MaaS) application which improves the efficiency of existing transit services within local transit agencies by providing in app trip planning within Stanislaus and San Joaquin counties. An integrated payment system within this app is in development. The third component is providing ride hailing services through VOGO (Volunteers On The Go) which offers free rides to residents from volunteer drivers when transit is not an option.



The Ecosystem of Shared Mobility Project is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: May 21, 2018 – 2021
Grantee: San Joaquin Valley APCD
Partners: Sigala Inc, UC Davis, Mobility Development, Self Help Enterprises, San Joaquin Valley Community Shared Mobility, MOVE, TCAG, KernCOG, City of Dinuba Transit, SJV Rural Development Center, Kern County, Tulare County Area Transit, SJCOG, StanCog, City of Escalon, City of Manteca, San Joaquin RTD, Shared Use Mobility Center

Grant Amount:
CARB Contribution: \$2,250,000
Matching Funds: \$1,093,826
Project Total: \$3,343,826



Vehicles/Equipment Funded

- In February 2020, this service became fully operational with 27 Battery Electric Vehicles (BEVs) including 3 plug-in hybrid minivans, and 17 Level 2 EV chargers installed at 8 locations.
- The 27 vehicles in operation consists of 7 BMWs i3s, 17 Chevrolet Bolts, and 3 Hybrid Pacificas.

Lessons Learned

- Outreach and education to local community members is key to the participation in newly developed programs.
- There is a need for car sharing programs in disadvantaged communities and areas with little to no transit access.

Project Highlights

- There are currently 160 active Míocar members using the service to travel to medical appointments, errands, and social activities. Members have travelled a total of 56,000 miles so far.
- VOGO drivers have driven residents 9,000 miles to essential medical visits and for grocery shopping.
- The VAMOS app has undergone substantial development and has completed standardization of data collection procedures for surveys and usage data. UC Davis and VAMOS vendors was put into educating and customizing the program to the needs of transit agencies. These agencies are also assisting with VAMOS outreach.



Car Sharing and Mobility Hubs at Affordable Housing Pilot Project

The Metropolitan Transportation Commission (MTC), the Bay Area's transportation planning, financing and coordinating agency, in partnership with TransForm, a nonprofit addressing climate change and social inequity through transportation and housing solutions, received a \$2.25 million grant from the California Air Resources Board to design and implement three mobility hubs at affordable housing developments in Richmond, Oakland, and San Jose. The mobility hubs will include an electric vehicle car sharing program and a mix of additional mobility options based on residents' needs, such as transit passes and bike sharing. The project team is focused on implementation and recently kick-started bike sharing in San Jose.



METROPOLITAN
TRANSPORTATION
COMMISSION

The Car Sharing and Mobility Hubs at Affordable Housing Pilot Project is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: July 1, 2018 – March 31, 2022

Grantee: Metropolitan Transportation Commission

Partners: TransForm, Shared-Use Mobility Center, East Bay Asian Local Development Corporation, First Community Housing, City of Richmond, Richmond Community Foundation

Grant Amount:

CARB Contribution: \$2,250,000

Matching Funds: \$932,500

Project Total: \$3,182,500



Vehicles/Equipment Funded (Exact Mix Depends on Location):

- Across three locations, the project will fund: battery electric vehicles, electric vehicle charging stations, and driving credits to subsidize trips.
- The project will also include some or all of the following, depending on residents' needs and interests: transit passes, bike sharing (electric and traditional), bike infrastructure (secure storage, fix-it stations), mobility credits (Lyft, GIG), and travel information displays.

Lessons Learned

- Conducting a community transportation needs assessment before a project is designed is critical to understand the unique mobility needs of the community.
- Permitting for EVSE installation within the public right-of-way is lengthy and should be considered in timelines.
- Ample staff time, especially from site partners, is necessary for outreach and establishing community trust.
- Creative and flexible methods of community engagement are required during shelter-in-place orders, and to keep residents informed.

Project Highlights

- The project team completed a comprehensive needs assessment consisting of surveys, focus groups, and interviews to ensure that the program addresses the unique needs of residents, and continues to adapt in light of community challenges with COVID-19.
- Prioritizes ongoing connection with residents through advisory groups at each location to provide input and serve as ambassadors of the program.



Lift Line Paratransit Dial-a-Ride Electric Vehicle Transition Program

The Lift Line Paratransit Dial-A-Ride Program, operated by Community Bridges, replaced two existing gas-powered shuttles with two 16-seat electric vehicle (EV) shuttles equipped with wheelchair lifts thanks to funding from California Climate Investments. The EV shuttles are the first all-electric paratransit vehicles to be deployed in Santa Cruz County, and are charged by two Level II charging stations installed at the Lift Line fleet facility in Watsonville, CA. The chargers are accessible to the public.



The Lift Line Paratransit Dial-a-Ride Electric Vehicle Transition Project is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates:	April 2018 – Ongoing
Grantee:	Community Bridges
Partners:	Santa Cruz County Regional Transportation Commission (Measure D)
Grants Awarded:	
CARB Contribution:	\$268,219
Matching Funds:	\$92,373
Project Total:	\$360,592



Vehicles/Equipment Funded

- 2 ZEUS (Zero Emissions Utility Shuttles) assembled by Phoenix Motorcars
 - Ford E450 with rear wheel drive and a top speed of 60 mph
 - Up to 110 miles driving range (UDDS); Up to 85 miles average road range
 - Dual-Mode regenerative braking system
- 2 Level II Electric Vehicle (EV) Charging Stations

Lessons Learned

- Electric charging infrastructure requires government support and coordination. PG&E was unable to supply the timely infrastructure needed to deploy Level III charging stations at many locations, so the transition was difficult and costly.
- While EV technology is improving, current EVs are maxed out on daily range, limiting routes and service integration.

Project Highlights

- The shuttles provide seniors and people with disabilities, door-to-door rides to medical appointments, Meals on Wheels dining sites, and Elderday Adult Day Health Care.
- During the COVID-19 pandemic, Lift Line:
 - Partnered with Meals on Wheels and the Great Plates Delivered Program to deliver hot food to participants.
 - Expanded essential services rides to all seniors and disabled Watsonville residents to restaurants (for takeout), grocery stores, and banks.
 - Temporarily eliminated the application requirement for riders during the shelter in place order.



Clean Mobility Options Voucher Pilot Program

The Clean Mobility Options Voucher Pilot Program (Clean Mobility Options) is a new statewide voucher-based funding program that supports zero-emission “shared” and “on-demand” services such as car-sharing, ride-sharing, bike-sharing, and innovative transit services for low-income and disadvantaged communities. Clean Mobility Options provides up to \$1,000,000 in voucher funds per project to cover the costs for vehicles, infrastructure, planning, outreach & community engagement, and operations. Funding is also available for communities to assess their community transportation needs and develop mobility solutions with vouchers of up to \$50,000. Eligible applicants are public agencies, nonprofit organizations, and tribal authorities. Vouchers for Clean Mobility Options are awarded on a first-come, first served basis.



Clean Mobility Options is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: April 2019 - Ongoing
Grantee: CALSTART
Partners: Shared-Use Mobility Center, GRID Alternatives, Local Government Commission

Grant Amount:
CARB Contribution: \$37,000,000
Matching Funds: \$820,000
Project Total: \$37,820,000



Vehicles/Equipment Funded

- Funds zero-emission electric vehicles, bicycles, electric bicycles, scooters, electric scooters, passenger vans, and other innovative mobility options in underserved communities to improve access to clean transportation
- Funds transportation needs assessments to ensure projects are responsive to community-identified needs
- Funds technical assistance to build capacity in communities

Lessons Learned

- Unmet needs for clean mobility services across the state are significant, and demand for funding in low-income and disadvantaged communities is high
- Targeted 1:1 engagement and technical assistance helps build a more diverse pool of applicants
- Tailored outreach and engagement with tribal communities improves access to clean transportation funds and allows for greater understanding of tribal needs, including unique structural and cultural barriers to obtain funding

Project Highlights

- In 2020, \$20 million allocated for mobility projects (opens October 2020) and \$1.15 million for needs assessments
- 24 Community Transportation Needs Assessment vouchers awarded in 2020, of a total 44 applications received
- Set-aside funding for tribal entities: \$2,000,000 for mobility projects and \$150,000 for needs assessments in 2020
- Conducted 5 public work group meetings to incorporate stakeholder feedback on program design and eligibility criteria, 9 public outreach events across the state in Fall 2019, and 10+ informational webinars
- Encourages collaborative investments by professional mobility providers and other partners
- Facilitates cooperation between public transit agencies and community-based organizations



Agricultural Worker Vanpools Pilot Project XL Hybrid Vehicles

The California Vanpool Authority (CalVans) helps keep our roadways safe and agribusiness productive by providing agricultural workers living in low-income and disadvantaged communities statewide with safe, affordable and reliable vans for use in driving themselves and others to job sites. The project uses clean technology hybrid conversion vans, which have fewer harmful tailpipe emissions compared to a gasoline counterpart. Additional emissions reductions are realized through the use of shared mobility. Riders pay a modest fee to ride in a CalVans vanpool; cost varies, but most riders pay a little over \$2.00 per ride. This fee covers CalVans' cost of maintaining and insuring the vans, and the cost of replacement when vans wear out. Drivers receive no pay; they volunteer to operate a vanpool and manage ridership.



The Ag Worker Vanpool Pilot Project is part of California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy and improving public health and the environment – particularly in disadvantaged communities.

Dates: Dec. 2018 – Dec. 2019
Grantee: California Vanpool Authority

Grant Amount:
CARB Contribution: \$4,700,000
Matching Funds: \$1,175,000
Project Total: \$5,875,000



Vehicles/Equipment Funded

- 154 General Motors, 15-passenger vans upfitted with XL Hybrid Conversion System technology.
- Approximately 70 percent of the project fleet served workers in the San Joaquin Valley, with remaining deployments in the Coachella Valley, Salinas Valley, Santa Maria and South Coast.

Lessons Learned

- Off-road applications are not a good fit for this technology. The hybrid conversion system loosens when vans are driven on bumpy, unpaved surfaces, causing the vehicle to grind and putting the conversion system at risk of falling off. On-road applications are a more appropriate use for this technology.
- Ridership surveys, vehicle telematics, and other participant feedback is critical to assess project effectiveness, quantify emission benefits, and adaptively manage the project. The cloud-based "Silent Passenger" system provides real-time information on vanpool vehicles, providing the ability to schedule maintenance, track engine trouble codes, monitor speeds and track vehicle miles traveled.
- Vehicle manufacturers should integrate clean technology equipment into their dealership and sales structure for simplicity and to better serve customers on warranty issues and service support.

Project Highlights

- The hybrid vans funded under this project comprise 22% of CalVans agricultural worker vanpool fleet.
- Project vans served 282,000 workers from project launch until December 31, 2019.
- The total miles traveled for project vanpools was 2,884,883 miles.
- Emission benefits include, 27,918 metric tons of CO₂ equivalent greenhouse gas emission reductions, 11.3 tons of nitrogen oxides, 1.3 tons of particulate matter 2.5, and 2.8 tons of reactive organic gasses, and the benefits achieved by reducing the use of single occupancy vehicles by workers to reach job sites.
- CalVans is the only recognized agricultural worker transportation program in the nation, and the only public transit agency in the United States certified by the U.S. Department of Labor to provide agricultural worker transportation under the H-2A guest worker program.

Clean Mobility in Schools Pilot Project

The Clean Mobility in Schools Pilot Project grant program is new to the suite of Low Carbon Transportation Equity Incentives. This opportunity facilitates bold transformations for school transportation systems. It touches on the usual dirty diesel vehicle replacements, like school buses, as well as new modes of clean travel through an expansion of education and infrastructure projects for students, parents, and the surrounding communities. Changing reliance on traditional vehicles and transportation options is just the beginning – these projects possess the potential to reach even further with the support of a range of partnerships, based in their community.



Clean Mobility in Schools is part of California Climate Investments, a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment – particularly in disadvantaged communities.

Dates: May 2020 – Spring 2023
Grantees: El Monte Union High School District, San Diego Unified School District, Stockton Unified School District

Grants Awarded:
CARB Contribution: \$24.6 million
Matching Funds: \$212,700
Project Total: \$24.8 million



Vehicles/Equipment Funded

- Zero-emission school buses and charging infrastructure
- Zero-emission car sharing programs, active transportation options (i.e. bike share programs, and feasibility studies)
- Zero-emission landscaping and custodial equipment, as well as innovative food delivery vehicles

Also, as part of the projects, grantees can:

- Install energy storage projects that support zero-emission vehicles and equipment
- Plan for zero-net energy futures

Lessons Learned

- Outreach and communication products are best developed according to community demographics for language, culture, and availability of resources.
- Clean mobility projects typically require infrastructure that can be challenging to implement, but can be done effectively with a mix of public- and private- sector partners.

Project Highlights

- Pilot curriculum development and local community colleges / trade school partnerships connect zero-emission technologies with student career paths.
- Development of replicable blueprints can assist other school districts in implementing similar project types.
- Examination of the costs and benefits of providing charging infrastructure for district staff, as well as vehicle to grid capabilities, can support total system resiliency.



Sustainable Transportation Equity Project (STEP)

STEP is a new pilot that takes a community-based approach to overcoming barriers to clean transportation. STEP's overarching purpose is to increase transportation equity in disadvantaged and low-income communities throughout California via two grant types: Planning and Capacity Building Grants and Implementation Grants. STEP aims to address community residents' transportation needs, increase residents' access to key destinations (e.g., schools, grocery stores, workplaces, community centers, medical facilities), and reduce greenhouse gas emissions. STEP requires that projects center the knowledge and expertise of residents through all phases of project design, implementation, and evaluation and has the flexibility to fund many different types of projects to ensure that STEP funds can help meet the needs of each community within that community's context.



STEP is part of California Climate Investments, a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment – particularly in disadvantaged communities.

Dates: May 2021 – Mar. 2025
Grantees: To be determined (Oct. 2020)

Grant Funding Available:
Planning and Capacity Building Grant: \$1,750,000
Implementation Grant: \$17,750,000



Eligible Projects

Planning and Capacity Building Grant:

- Projects that help identify community residents' transportation needs and prepare to implement clean transportation and supporting projects (e.g., community transportation needs assessments)

Implementation Grant:

- Clean transportation and supporting projects. Funded projects will work together to increase community residents' access to and use of their transportation system without a personal vehicle.
- For example, one grant may fund a variety of clean transportation and supporting projects, including but not limited to zero-emission buses, a new vanpool service, bike and pedestrian paths, transit passes, parking management strategies, and an outreach and education campaign to encourage active transportation.

Lessons We Hope to Learn

- Best practices for effective community decision-making and the impact of community decision-making on the success of clean transportation projects
- What clean transportation projects are most needed according to community residents
- The benefits and challenges of a flexible, partnership-focused, and place-based grant program
- The impact of technical assistance providers on application development and grant implementation

Status Updates

- Received a total of 34 proposals, including 20 Planning and Capacity Building and 14 Implementation Grant proposals, requesting almost \$109 million in funding.
- An interagency review panel evaluated the proposals and identified awardees in October 2020.

Heavy-Duty Advanced Technology, Demonstration, and Pilot Projects

Grantee	Project Title
South Coast Air Quality Management District	California Collaborative Advanced Technology Drayage Truck Demonstration Project
Port of Long Angeles	Port of Los Angeles Green Omni Terminal
San Bernardino County Council of Governments	Multi-Class Heavy-Duty Zero-Emission Truck Development Project for Intermodal and Warehouse Facilities
San Joaquin Valley Air Pollution Control District	The Green On-Road Linen Delivery Project
San Joaquin Valley Air Pollution Control District	The San Joaquin Valley Transit Electrification Project
San Joaquin Valley Air Pollution Control District	USPS Zero-Emission Delivery Truck Pilot Commercial Demonstration
Sacramento Metropolitan Air Quality Management District	Sacramento Regional Zero-Emission School Bus Deployment Project
Sunline Transit Authority	Sunline Fuel Cell Buses and Hydrogen Onsite Generation Refueling Station Pilot Commercial Deployment Project
Bay Area Air Quality Management District	Goodwill Industries Electric Delivery Vehicle Project
City of Porterville	City of Porterville Transit Electrification
Center for Transportation and the Environment	Fuel Cell Electric Bus Commercialization Consortium Project
Gas Technology Institute	Fast Track Fuel Cell Truck Project or "Fast Track"
CALSTART	Opposed Piston Engine Class 8 Heavy Duty On-Road Demonstration
Port of Long Beach	C-PORT: The Commercialization of POLB Off-Road Technology Demonstration
Center for Transportation and the Environment	Demonstration of Zero-Emission Technologies for Freight Operations at Ports
Project Clean Air	SJV Electric Tractor Development and Demonstration
Bay Area Air Quality Management District	Zero-Emission Ferry Demonstration Project

Grantee	Project Title
Center for Transportation and the Environment	Fuel Cell Hybrid Electric Delivery Van Deployment
Center for Transportation and the Environment	Next Generation Fuel Cell Delivery Van Deployment
Center for Transportation and the Environment	Zero-Emission Beverage Handling and Distribution at Scale
Gas Technology Institute	Zero-Emission for California Ports
Port of Los Angeles	Zero-Emission Freight "Shore to Store" Project
Port of Long Beach	Sustainable Terminals Accelerating Regional Transformation
Project Clean Air	Net-Zero Farming and Freight Facility Demonstration Project
South Coast Air Quality Management District	Volvo Low Impact Green Heavy Transportation Solutions
San Joaquin Valley Air Pollution Control District	Flexible Solutions for Freight Facilities - San Joaquin Valley Zero and Near-Zero Emission Enabling Freight Project
San Joaquin Valley Air Pollution Control District	Frito Lay Transformative Zero and Near Zero Emission Freight Facility Project
North Coast Unified AQMD	The Rural School Bus Pilot Project
San Joaquin Valley Air Pollution Control District	San Joaquin Valley Zero-Emission Cargo Handling Demonstration Project

California Collaborative Advanced Technology Drayage Truck Demonstration Project

This project will provide development and commercialization of zero- and near zero-emission trucks by building upon the success of recent truck demonstration projects.



Phase 1 deployment included trucks with previously developed technologies, such as Kenworth's CNG range extended plug-in hybrid electric trucks developed under the ZECT 2 program and Volvo's diesel plug-in hybrid electric truck developed under a DOE grant. In Phase 2, OEMs supported larger deployments with various innovations. Forty-four pre-commercial Class 8 zero- and near zero-emission drayage trucks and infrastructure will be deployed into fleets.

Dates: 8/31/2016 – 4/15/2021
Grantee: South Coast AQMD
Partners: Bay Area AQMD, San Diego APCD, San Joaquin Valley APCD, San Diego G&E, BYD, Kenworth, Peterbilt/Transpower, Volvo, University of California Riverside, West Virginia University, LA Metro, multiple demonstration fleets and technology partners
Grant Amount:
CARB Contribution: \$23,658,500
Matching Funds: \$16,463,972
Project Total: \$40,122,472



Vehicles/Equipment Funded

- 25 BYD battery electric trucks with 100 – 124 mile electric range
- 14 Peterbilt/Transpower battery electric trucks with 100-150 mile electric range
- 2 Kenworth CNG range extended plug-in hybrid electric trucks with a 50 EV & 200 mile HEV range
- 1 Kenworth HFC range extended plug-in hybrid electric truck with a 30 mile EV & 120 mile HEV range
- 3 Volvo diesel plug-in hybrid electric trucks with 30 mile electric/400 mile range

Lessons Learned

- BYD: Need for standardization in OBD interface and charging ports, compatibility issues with Phase 1 truck and vehicle telematics software
- Kenworth: Common Hybrid Vehicle Chassis Design: 2 vehicles in operation, 1 inoperable; supplier faults & 1 in test.
- Peterbilt: Value in having OEM as prime/final vehicle manufacturer. Charging rates/infrastructure costs & complexities. Varied duty cycles from drayage to regional haul with 14 operators to learn diversity of range & efficiency.
- Volvo: All-electric range of the PHEV was significantly increased using machine-learning. Connected infrastructure technology (Eco-Drive) can help further reduce energy consumption and in-use emissions on urban freight corridors if it is integrated with driveline and aftertreatment controls.

Status Updates

- BYD: All 25 vehicles deployed, in data collection phase
- Peterbilt: Phase 2 vehicles with faster charging with CCS 1 connector; Powertrain & energy storage redesign
- Kenworth: Continue to improve vehicle efficiency of hybrid drive train all electric and hybrid electric mode
- Volvo: Continue to improve Eco-Drive concept and validate aftertreatment technologies in preparation for fleet testing this year



Build Your Dreams®



Port of Los Angeles- Green Omni Terminal

The City of Los Angeles Harbor Department (Port of Los Angeles) and Pasha Stevedoring and Terminal are implementing the Green Omni Terminal project that incorporates zero-emission vehicles and cargo handling equipment to move goods from ships through the terminal to clean truck transportation to their final destinations, while making terminal operations more resilient and sustainable through the incorporation of onsite solar power and battery storage into a microgrid. The electrified cargo handling equipment includes five yard tractors, three 21-ton forklifts, and two on-road trucks.



An at-berth vessel emissions control system (ShoreKat) is integrated into the project to address the largest source of greenhouse gas and priority pollutant emissions at the terminal. A one-megawatt rooftop solar photovoltaic array added to the terminal will supplement current power usage and help meet 100% of the electricity demands for terminal operations.

Dates: 06/01/2016 – Winter 2021

Grantee: City of Los Angeles, Harbor Department

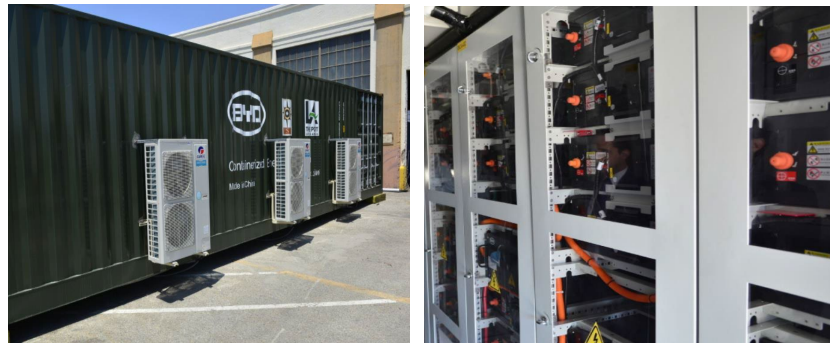
Partners: Pasha Stevedoring & Terminals, Burns and McDonnell, BYD Motors, TransPower Inc., PermaCity, Clean Air Engineering Maritime

Grant Amount:

CARB Contribution: \$14,510,400

Matching Funds: \$12,092,000

Project Total: \$26,602,400



Vehicles/Equipment Funded

- Five Battery Electric Yard Tractors (2 TransPower, 2 BYD, 1 TBD)
- Three Battery Electric 21-ton Forklift Repowers (TransPower)
- Two Battery Electric On-road Drayage Trucks (TransPower)
- One At-berth Vessel Emission Control System –ShoreKat (Clean Air Engineering Maritime)
- 2.6 megawatt battery storage systems

Lessons Learned

- All equipment operating in the County and City of Los Angeles requires certification to UL Standards. Significant time should be built into project schedule to accommodate.
- Anticipate extra time for permitting for the first-of-its-kind project. This is the first solar-powered microgrid in Los Angeles.
- Consider ample time for commissioning and training before demonstrating new equipment.

Status Updates

- Four yard tractors, both on-road trucks, and three forklifts are at the terminal.
- Battery storage system is being permitted by City of Los Angeles, Department of Building and Safety & Fire Dept.
- Structural building repairs necessary to support solar are complete. Solar array to be installed late 2020.
- The ShoreKat treatment system demonstration period is complete. The ShoreKat is still used to treat emissions.
- Project has been extended to fully demonstrate solar, 2.6 MW battery storage, and an additional yard tractor.

Multi-Source Facility Freight Electric Truck Demonstration Project

This project demonstrated a total of 27 yard trucks and service trucks at three best in class freight facilities. Ten trucks were deployed at each of two BNSF Railway intermodal facilities: San Bernardino and Los Angeles. An additional four trucks were deployed at a new Daylight Transport facility in Fontana. All three of these locations are in the top 10% of disadvantaged communities according to CalEnviroScreen2.0. The technology demonstrators are leaders in the industry and both BNSF and Daylight have indicated that this demonstration has provided valuable insights and as a result they are evaluating other battery electric options and the possibility of broader adoption of electric on-road and off-road vehicles at their facilities.



All trucks were built by BYD Motors, LLC at BYD's facilities in Lancaster, California and were delivered to BNSF and Daylight with manufacturer's warranties. The California Air Resources Board supported this project by monitoring and analyzing the performance of the all vehicles via data loggers and real-time telematics. Project outcomes and data will ultimately be utilized to help inform the marketplace and assist in paving the way for widespread commercialization of the tested vehicles.

Dates:	May 12, 2016 – March 31, 2020
Grantee:	San Bernardino Council of Governments
Partners:	BNSF, BYD Motors, CALSTART, Daylight Transport
Grant Amount:	
CARB Contribution:	\$9,100,800
Matching Funds:	\$10,216,172
Project Total:	\$19,316,972



Vehicles/Equipment Funded

- BNSF Los Angeles – One BYD 5F model service truck, Ten BYD 8Y yard trucks, ten 200 kW AC chargers, and 11 data loggers.
- BNSF San Bernardino – Two BYD 5F model service trucks, Ten BYD 8Y yard trucks, ten 200 kW AC chargers, and 12 data loggers.
- Daylight Transport Fontana – Four BYD 8Y yard trucks, Three 100kW AC chargers, three data loggers.

Lessons Learned

- Plan for EV charger infrastructure delays and seek help from the cities – this was the most time consuming task for this project.
- Driver input is key and is essential to the design process. There is a lot to be learned from the end users about ergonomic preferences, visibility requirements, etc. This project learned the importance of an independent operation of a fifth wheel for example.
- Plan for an abundance of administration time for the project, there are many possible issues that can arise on such an active and evolving project.

Status Updates

- The demonstration period was successfully completed on January 31, 2020.
- BNSF's service providers (ITS and Parsec) and Daylight Transport have nearly completed taking ownership of some of the project yard trucks and service trucks from BYD.



The Green On-Road Linen Delivery Project

The San Joaquin Valley Air Pollution Control District (SJVAPCD) project is tasked with successfully deploying 21 zero-emission all-electric walk-in vans to be used in linen deliveries, a specific delivery segment with ideal routes for electrification. Industry partners & demonstrators include Motiv Power Systems, AmeriPride Services, and CALSTART. AmeriPride Services is a one-stop solution for uniforms, linens, and facility service since 1889. AmeriPride selected its Stockton, Merced, Fresno, and Bakersfield locations to demonstrate the technology in disadvantaged communities where they currently operate and to evaluate for use in their other locations throughout North America. The zero-emission vehicles in this project use Motiv's EPIC F-59 chassis, a complete body-ready, all-electric equivalent to internal combustion vehicles.



The SJVAPCD is a public health agency whose mission is to improve the health and quality of life for all Valley residents. SJVAPCD has drawn on its extensive experience gained in implementing these and numerous other incentive programs, to effectively oversee the administration of this project under the Zero-Emission Truck and Bus Pilot Commercial Deployment solicitation. The SJVAPCD has become a model for efficient and effective implementation of grant programs throughout the State.

Dates: Spring 2017 – Spring 2020
Grantee: San Joaquin Valley Air Pollution Control District
Partners: Motiv Power Systems, AmeriPride Services, and CALSTART
Grant Amount:
CARB Contribution: \$7,125,515
Matching Funds: \$5,818,168
Project Total: \$12,943,683



Vehicles/Equipment Funded

This project focused on taking an electrified commercial walk-in van application, previously only deployed in small commercial projects, and scaling it to AmeriPride's local fleet operations. This provides an opportunity to validate the core technology at a fleet and operational portfolio level, generating the data required to support future full all-electric fleet deployments. All project trucks are built on a Motiv-powered, all-electric Ford F-59 chassis.

- Project vehicles are distributed as follows:
- 4 Motiv zero-emission walk-in-vans deployed at AmeriPride Stockton, CA
- 5 Motiv zero-emission walk-in-vans deployed at AmeriPride Merced, CA
- 10 Motiv zero-emission walk-in-vans deployed at AmeriPride Fresno, CA
- 2 Motiv zero-emission walk-in-vans deployed at AmeriPride Bakersfield, CA

Lessons Learned

- Maximum fleet performance is achieved through successful driver training.
- Successful EVSE infrastructure implementation is a fully corroborative activity between site managers, utilities, and technology providers.

Status Updates

- Stockton fleet in service Q2 2018; CARB accepted Beta Test Report August 2018.
- Merced fleet in service Q3 2018.
- Fresno fleet in service Q2 2019.
- Bakersfield fleet in service Q2 2019.
- All vehicles in service as of Q2 2019.
- Average fleet up time is 98% with cumulative fleet mileage of 231,400 as of Q1 2020.



San Joaquin Valley Transit Electrification Project

The *San Joaquin Valley Transit Electrification Project* is accelerating the deployment of commercially available heavy-duty, zero-emission, public transit buses to provide public benefits to disadvantaged communities throughout the San Joaquin Valley. This project will serve as a regional-scale deployment to show that California-made battery electric transit buses better serve communities' transit needs, substantially reduce greenhouse gas emissions (GHG), and eliminate criteria emissions—which provides needed public health co-benefits for disadvantaged communities in one of the state's most challenging regions for attainment of ever tightening air quality standards.



In addition, the scale of the project will drive down per-vehicle zero-emission bus costs and offer tremendous opportunities for shared infrastructure, mechanics, spare parts, and workforce training. The project will result in a regional-scale heavy-duty zero-emission success story that will provide scalable lessons learned to better inform and educate transit fleet operators to help drive additional deployments of zero-emission heavy-duty technologies throughout California.

Dates: 11/14/2016 – Spring 2020

Grantee: San Joaquin Valley Air Pollution Control District

Partners: Proterra, City of Visalia Transit District, Fresno County Rural Transit Agency, San Joaquin Regional Transit District and City of Modesto Transit Services

Grant Amount:

CARB Contribution: \$13,414,215

Matching Funds: \$8,764,606

Project Total: \$22,178,821



Vehicles/Equipment Funded

- The City of Visalia Transit Division has deployed 3 Proterra extended-range buses and 4 depot-chargers.
- Fresno County Rural Transit Agency (FCRTA) has deployed 5 Proterra extended-range buses and 8 depot-chargers.
- San Joaquin RTD has deployed 2 Proterra fast-charge buses and 2 overhead fast chargers.
- The City of Modesto Transit Services has deployed 5 Proterra extended range buses and 8 depot chargers.

Lessons Learned

- Contracting needs more time allocated in the schedule. It can often be lengthy and sometimes lead to project delays.
- Better and more frequent communication between all project partners can help improve efficiency and effectiveness of the project.
- Infrastructure planning and construction should be started in the beginning. This piece always takes longer than expected.

Status Updates

- All electric buses have been deployed and have been providing data collection to third party data collector.
- All charging infrastructure has been delivered and nearly in-place.
- Data collection with Ricardo has concluded and data from all partners is being analyzed.



USPS Advanced-Drive Transport and Delivery Vehicle Demonstration Project

The San Joaquin Valley Air Pollution Control District (District) and project team oversaw the building and deployment of 15 zero-emission electric United States Postal Service (USPS) step-vans and charging infrastructure across two USPS hubs in Stockton and Fresno in California's Central Valley. The step-vans form the basis of the USPS Advance Vehicle Cluster from which USPS will continue to explore the electrification of its massive fleet of vehicles. 7 step-vans were built and provided by Motiv Power Systems and 8 from Cummins Electrified Power. During the project the USPS operated step-vans on routes of 50 to 75 miles with frequent stops.



The project included driver training, data capture and data analysis. It also creates a roadmap for further commercialization in parcel delivery service by demonstrating the practicality and economic viability of zero-emission units. A 'Voice of the Customer' event was held to discuss these opportunities with interested fleets. Funding was provided to evaluate opportunities for solar generation and storage to further enhance the benefits of zero-emission trucks.

Dates: 07/01/2017 – Spring 2020

Grantee: San Joaquin Valley Air Pollution Control District

Partners: United States Postal Service, CALSTART, Motiv Power Systems, Cummins Electrified Power, Black & Veatch

Grant Amount:

CARB Contribution: \$4,555,670

Matching Funds: \$2,222,903

Project Total: \$6,778,573



Vehicles/Equipment Funded

15 zero-emission all electric USPS delivery step-vans:

- 8 Cummins Electrified Power (6 Fresno, 2 Stockton)
- 7 Motiv Power Systems (4 Fresno, 3 Stockton)

15 associated EVSE at two locations:

- Fresno Vehicle Maintenance Facility- 10 chargers: 4 3-Phase 208V/240V @ 100A Level 2; 6 Single Phase 240V @ 80A Level 2
- Stockton USPS West Lane Post Office- 5 chargers: 3 3-Phase 208V/240V @ 100A Level 2; 2 Single Phase 240V @ 80A Level 2

Lessons Learned

- Electric vehicle on-road performance is on par with or better than gasoline vehicle performance
- Optimal locations for chargers is crucial to prevent logistical and operational issues
- USPS is evaluating resizing EV parking spaces as a potential solution to reduce charging infrastructure damages
- Electrical infrastructure costs and designs are not yet optimal but increasingly becoming more cost-effective

Status Updates

- All 15 vehicles have been delivered and placed into service
- As of February 2020 the vehicles have been driven a total of 48,540 miles since their first deployment
- Vehicles meeting operational needs with few exceptions (i.e. AC can affect range in hot summer months)
- USPS intends to use the electric vehicles at least until the end of the warranty period and potentially longer



Sacramento Regional Zero-Emission School Bus Deployment Project

The Sacramento Regional Zero-Emission School Bus Deployment Project's large-scale deployment of zero-emission school buses will prove that commercially available zero-emission school buses have the best total cost of ownership, substantially improve maintenance and performance, and optimally serve the needs of school districts to sustainably transport California's children to and from school.

SACRAMENTO METROPOLITAN



Twin Rivers, Elk Grove, and Sacramento City School Unified School Districts have committed to operate the zero-emission school buses and charging infrastructure on the identified routes for this project for many years beyond the end of the grant agreement. The end-users consider this project to be the strong spark that is needed now to transition fleets to be fully zero-emission.

Dates: 02/13/2017 – Spring 2020
Grantee: Sacramento Metropolitan Air Quality Management District
Partners: First Priority Bus Sales, Lion, Motiv Power Systems, SMUD, TransTech, and ChargePoint.
Grant Amount:
CARB Contribution: \$7,535,643
Matching Funds: \$6,949,826
Project Total: \$14,485,469



Vehicles/Equipment Funded

- Deploy zero-emission, battery-electric school buses from eLion and TransTech and charging ports to serve as a large-scale demonstration in the State's Capital.
- 28 Zero-Emission School Buses show that battery electric school buses best serve school transportation needs, substantially reduce GHG emissions, and eliminate toxic emission exposures to children in disadvantaged communities.
- Twin Rivers Unified School District: 16 Type C eLion and 8 Type A TransTech school buses.
- Sacramento City Unified School District: 3 Type A TransTech school buses and 1 Type C eLion.
- Elk Grove Unified School District: 8 Type C eLion school buses.
- Install and commission 29 charging ports for all project school buses.

Lessons Learned

- Time delays due to unintended consequences in planning on the scope of work for the project, incorrect assumptions regarding infrastructure completion steps.
- Delays in construction of infrastructure, due to requirements, regulations, inspections. Project setbacks.
- Develop improved communication and collaboration with our facilities department, for more understanding and acceptance of new technology. Breakthrough resistance to change.
- Stricter management of invoicing and payment process needed between participant and their vendor.

Status Updates

- 27 Electric Buses deployed, transporting students daily. One more bus to be delivered.
- Expanded the existing electric school bus population, & developed relationships with key stakeholders to grow the fleet. Added new permanent technology businesses and jobs to our region.
- Provided proving ground for air district to implement new electric school bus projects with new school district partners.

SunLine Fuel Cell Buses & Hydrogen Onsite Generation Refueling Station Pilot Commercial Deployment Project

The SunLine Fuel Cell Buses & Hydrogen Onsite Regeneration Fueling Station Pilot Commercial Deployment Project has deployed five new 40-foot fuel cell electric transit buses (FCEBs) in daily service in the Coachella Valley. The project also includes an upgrade to SunLine's existing hydrogen refueling station with a new electrolyzer hydrogen production plant, supporting compression and storage equipment, and two 350-bar fueling dispensers. The station will have a total fueling capacity of 900 kg/day. Data will be collected and analyzed for both the station and buses for the period of operation.



SunLine Transit Agency provides service in the Coachella Valley and is a leader in zero-emission bus technology. SunLine shares knowledge with other transit agencies through the West Coast Center of Excellence in Zero Emission Technology. The five New Flyer XHE40 Xcelsior® FCEBs will expand SunLine's fleet of zero emission buses to a total of sixteen FCEBs plus four BEBs.

Dates: 02/09/2017 – Winter 2020
Grantee: SunLine Transit Agency
Partners: New Flyer Industries
Nel Hydrogen Inc.
Zen Clean Energy Solutions

Grant Amount:
CARB Contribution: \$12,586,791
Matching Funds: \$5,714,619
Project Total: \$18,301,410



Vehicles/Equipment Funded

Five New Flyer Xcelsior® XHE40 Buses

- Hydrogen-powered 40' fuel cell electric buses
- Powered by Ballard FCveloCity-HD 85 kilowatt modules
- Based on standard Xcelsior® CHARGE electric propulsion system

Nel Hydrogen Production and Fueling Station

- 900 kg/day capacity
- M400 series modular PEM electrolyzer
- H2Station® modules deliver 350 bar hydrogen
- Supplied as complete turnkey solution

Lessons Learned

- Site civil costs much higher than budgeted, including utility upgrade costs to bring new power line to site
- Commissioning plan and site acceptance criteria for station need to be clearly defined, and collaborative effort required; redundant hydrogen supply is critical during early operation
- Fuel cell bus technology is mature, leveraging reliability improvements from previous generations

Status Updates

- All 5 buses delivered by January 2019, in regular service
- Hydrogen production and fueling station completed December 2019, in daily operation
- Data collection and analysis is underway and will continue until December 2020



Goodwill Industries Electric Delivery Vehicle Project

The Bay Area Air Quality Management District partnered with Goodwill Industries of San Francisco, San Mateo, and Marin (SFGoodwill) to showcase the commercial viability of heavy-duty electric trucks. The first of its kind demonstration in the U.S., the Project deploys 10 battery-electric delivery trucks and one battery-electric debris hauler, along with supporting electric charging infrastructure. Vehicles were manufactured by BYD Motors at its facility in Lancaster, California. Deployment strategies, accounting for vehicle operation times, charging schedules, and electrical costs, were developed by the Center for Transportation and the Environment.



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT

The objective of the Project is to advance commercialization of zero-emission technology in the delivery truck sector by demonstrating costs and benefits and providing a roadmap and best practices for other fleets considering electric vehicles. Accelerating zero-emission delivery truck deployments is critical in achieving the state's goal of reducing greenhouse gas emissions from on-road trucks with the co-benefit of reducing criteria pollutant emissions.

Dates: 02/15/2017 – Fall 2020
Grantee: Bay Area Air Quality Management District
Partners: SFGoodwill, BYD Motors, Center for Transportation and the Environment

Grant Amount:
CARB Contribution: \$2,738,557
Matching Funds: \$1,697,362
Project Total: \$4,435,919



Vehicles/Equipment Funded

- Ten BYD T7 electric delivery trucks
- One BYD T9M roll-on/roll-off debris hauler
- Ten 40 kW AC electric vehicle chargers
- One 80 kW AC electric vehicle charger

Lessons Learned

- Strong project management and communication are critical in ensuring a successful project.
- Deploying new technologies requires financial reserves and flexibility to account for unplanned expenses and timeline delays.
- Pre-testing all components of 1-2 vehicles in anticipated business operations may identify and resolve unforeseen issues before full fleet build-out (i.e., implement a pilot within a pilot).

Status Updates

- All chargers have been installed with time-clock functionality to limit the amount of simultaneous charging.
- All vehicles were delivered to SFGoodwill in 2018 to begin testing.
- All vehicles are expected to continue testing in normal business operations through September 2020.



Porterville Transit Electrification

The City of Porterville's project is to commercially implement and administer at high concentration, ten zero-emission transit buses, at a single bus hub (Porterville Transit) and daily service on all nine routes of the Porterville Transit System for a period of 28 months. This project will demonstrate the practicality and economic viability of wide-spread adoption of zero-emission heavy-duty transit buses.



Project also includes the purchase and installation of one 200kW opportunity charging station at the Porterville Transit Center, 10 200kW overnight charging stations at the bus maintenance yard, 45kW PV system at the Porterville Transit Center and bus maintenance facility.

Dates: 12/05/2016 – Summer 2020
Grantee: City of Porterville
Partners: GreenPower Motor Company
San Joaquin Valley Air Pollution
Control District
Southern California Edison

Grant Amount:
CARB Contribution: \$9,516,422
Matching Funds: \$7,437,280
Project Total: \$16,953,702



Vehicles/Equipment Funded

- 10 GreenPower Motor Company EV350 Transit Buses
 - 430kW battery capacity
- 12 BTCPower Charging Stations
 - Modular Level 3 DCFC
 - 200kW
- ViriCiti Telematics
- In-plant Inspections during manufacturing phase

Lessons Learned

- Design and construction of charging station infrastructure much more complex than originally estimated.
- Operator behavior and environmental conditions have a large affect on the transit bus range.

Status Updates

- All 10 buses have been delivered
- Charging Station Facility has been completed
- Revenue service started March 1, 2020



San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

Fuel Cell Electric Bus Commercialization Consortium (FCEBCC) Project

In order to realize near- and long-term commercialization goals and to establish fuel cell electric buses as an industry standard, the unit cost of the buses will have to decrease significantly and more transit agencies will have to deploy these vehicles in revenue service. The FCEBCC is addressing these challenges by building 20 fuel cell electric buses through an industry collaboration between New Flyer and Ballard Power Systems for deployment at AC Transit and OCTA. Messer, LLC, Trillium and Air Products are providing the reliable hydrogen fuel supply and fueling technology capable of meeting the demands of the transit industry.



25th Anniversary
1993-2018

CTE is relying on its experience with research, development, demonstration, and deployment projects that has helped bridge the gap to commercialization for zero-emission buses, to lead the team which also includes Transworld Associates and Fiedler Group. Bay Area Air Quality Management District and South Coast AQMD are providing match share funding for the buses.

Dates: 02/01/2017 – Summer 2020
Grantee: Center for Transportation and the Environment
Partners: AC Transit, OCTA, New Flyer, Ballard Power Systems, Messer, Trillium, Air Products, TWA, Fiedler Group, BAAQMD, and SCAQMD
Grant Amount:
CARB Contribution: \$22,347,502
Matching Funds: \$23,152,357
Project Total: \$45,499,859



Vehicles/Equipment Funded

Funding from CARB, BAAQMD, SCAQMD, AC Transit, and OCTA supports the build and deployment of both buses, fueling infrastructure, facility upgrades at OCTA to safely work on hydrogen-fueled buses, and Project Management.

- 10 New Flyer fuel cell electric buses for AC Transit.
- 10 New Flyer fuel cell electric buses for OCTA.

Infrastructure to support the project includes installation of a new station and upgrades to an existing station.

- Messer, LLC is upgrading AC Transit's Emeryville and Oakland hydrogen fueling stations to serve 30 buses or more per day.
- Trillium and Air Products have designed and installed a new hydrogen station at OCTA's Santa Ana base to fuel as many as 50 buses per day.
- Fiedler Group is leading efforts to upgrade OCTA's Santa Ana base to support service and maintenance of fuel cell buses and hydrogen fueling.

Lessons Learned

- Schedule sufficient time to work through vehicle specifications and execute procurement contracts
- Acceptance testing by transit agencies for a new technology bus takes months, not weeks
- Closely coordinate the design, specifications, and timing of vehicles, fueling stations, and facility upgrades for gas detection and ventilation systems. All three project components need to be operational in order to deploy buses in passenger service

Status Updates

- OCTA Station operational and filling buses as of January 2020.
- AC Transit Station operational and filling buses as of January 2020.
- All 20 buses accepted and deployed in service February 2020



Fast-Track Fuel Cell Truck

GTI and its technology partner, TransPower are deploying a total of five plug-in hybrid fuel cell-electric Class 8 trucks in Southern California, operated by two major truck fleet operators in a phased rollout.

The three trucks deployed in the first phase are being operated at the Port of Los Angeles, by Total Transportation Services Inc (TTSI). Two additional trucks, using new Peterbilt gliders and a new fuel cell configuration, will be deployed in a second phase and will be operated throughout the Los Angeles region by Daylight Transport, LLC.



The plug-in hybrid fuel cell-electric trucks will be supported by charging and mobile hydrogen fueling infrastructure at the Port of Los Angeles and in Fontana. The vehicles will be fueled onsite from “drop-and-swap” mobile tube-trailers. Frontier Energy will coordinate training, data collection and reporting, and Center for Sustainable Energy will coordinate local community outreach.

Dates: 04/16/2018 – Fall 2020
Grantee: GTI
Partners: TransPower, TTSI, Daylight, Frontier Energy, Center for Sustainable Energy, Hydrogenics, Loop Energy, Peterbilt Motors, OneH2

Grant Amount:
CARB Contribution: \$ 5,081,478
Matching Funds: \$ 1,694,216
Project Total: \$ 6,775,694



Vehicles/Equipment Funded

Phase 1 (update 3 existing EV Navistar chassis)

- New battery and electric accessory system
- Hydrogenics fuel cells and on-board hydrogen storage sized for uninterrupted one-shift operation
- One Electrical Vehicle Supply Equipment (EVSE) station at the Port of Los Angeles

Phase 2 (2 new trucks)

- Peterbilt 579 gliders with EV powertrain and battery system
- Loop Energy fuel cells and on-board hydrogen storage sized for uninterrupted one-shift operation
- Two EVSE stations in Fontana, CA

Lessons Learned

- The ZEV market is evolving faster than anticipated, so are partners' goals
- Local authorities having jurisdiction could benefit from unified code and streamlined permitting process
- Fueling infrastructure and hydrogen supply are volatile, need more investment to improve resilience

Status Updates

- Phase 1 vehicles are in operation
- Phase 2 vehicles are in final stages of assembly
- Education and outreach is in progress

Opposed Piston Engine Class 8 Heavy-Duty On-Road Demonstration

The Opposed Piston Engine Class 8 Demonstration Project will deploy and validate with major truck, engine and fleet partners a world-leading engine design that will meet California's ultralow NOx requirement (0.02 g / bhp-hr) while simultaneously providing a 15-20% increase in fuel efficiency compared to 2017 EPA requirements. This will be the first demonstration in the United States of a high-efficiency and low NOx engine / powertrain vehicle in Classes 7-8. The CALSTART-managed project combines two proven solutions – the Opposed Piston (OP) engine, largely developed by Achates Power, Inc., and the ultralow NOx aftertreatment system developed by Southwest Research Institute.



An ultralow NOx diesel engine, combined with decarbonized fuel, can be a powerful air quality and climate solution for the most demanding duty cycles needing long range, route variability, and heaviest loads. Successful completion will support commercialization and widespread adoption of this technology in Class 7-8 trucks, thereby supporting CARB's goals of reducing emissions needed to meet air quality standards and reducing CO2 emissions from larger trucks for which there is a shortage of other available options.

Dates: 01/26/2018 – Spring 2022

Grantee: CALSTART

Partners: Achates Power, South Coast AQMD, San Joaquin Valley APCD, Sac Metro AQMD, Peterbilt, Aramco Services Company, Southwest Research Institute, Delphi, Eaton, Faurecia, Corning, BASF, Federal Mogul, Tyson Foods, Walmart

Grant Amount:

CARB Contribution: \$6,994,601

Matching Funds: \$9,705,267

Project Total: \$16,699,868



Vehicles/Equipment Funded

The project will build four 10.6L diesel OP engines based on Achates Power's proven designs and technology.

- Three engines are running on dynamometers at Achates Power in San Diego and at Aramco Services in Wixom, Michigan to develop the hardware and software and to demonstrate efficiency, emissions and durability.
- One engine is installed in a Peterbilt 579 tractor.

The Peterbilt tractor will then be placed in revenue service with Walmart for a minimum of 3 months. An in-field demonstration will be conducted to measure and report on the performance of the technology, and to prepare for CARB certification for commercialization. This will include collection of engine in-use emissions data using a Portable Emissions Measurement System (PEMS).

Lessons Learned

- While the on-road demonstration is useful, most of the development and value proposition occurs on the dynamometer (especially since engines in this application class are certified on a dyno). Flexibility to shift the project mix between laboratory or field demonstration can optimize the overall program.
- Large technical improvements require large efforts. Financial support for follow-on projects of successful demonstrations should be considered in order to bridge the gap between initial demonstration and volume deployment.

Status Updates

- All engines are running, engine transient testing with aftertreatment is on-going, vehicle integration is complete and vehicle development is starting.
- Testing has confirmed the engine and aftertreatment system capability to meet the efficiency and tailpipe emissions goals and full system integration is ongoing.
- FEV estimated that a HD OP engine should cost 11% less than a 2017 4-stroke while enabling ultralow NOx and 2027 GHG.

achatesPOWER
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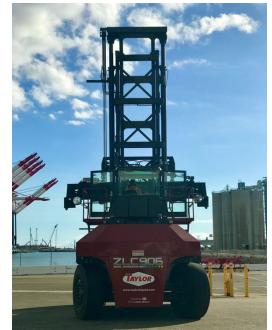
C-PORT: The Commercialization of Port of Long Beach Off-Road Technology Demonstration Project

The C-PORT Demonstration Project brings together a diverse group of industry-leading project partners to advance the goals of the San Pedro Bay Ports Clean Air Action Plan. The Port of Long Beach, in partnership with SSA Marine and Long Beach Container Terminal (LBCT), will demonstrate four pieces of zero-emissions cargo handling equipment (CHE) at Pier E and Pier J container terminals. The demonstration will include three never-before-tested battery-electric top handlers and a battery-electric yard truck.



This pilot project, funded by the 2016-2017 Off-Road Advanced Technology Demonstration Projects Program, will test the performance capability of pre-commercial zero-emission CHE in one of the most challenging duty cycles. The C-PORT Demonstration Project is anticipated to reduce annual emissions by 347 MT CO₂e, 0.69 tons NO_x, 0.159 tons ROG, and 0.0212 tons diesel PM₁₀.

Dates: 05/01/2018 – Spring 2021
Grantee: Port of Long Beach
Partners: Academy of Global Logistics, BYD, CARB, Grant Farm, Green Education, Inc., ILWU, Long Beach Container Terminal, Kalmar, South Coast AQMD, SSA Marine, Taylor Machine Works and Tetra Tech, TransPower
Grant Amount:
CARB Contribution: \$5,249,820
Matching Funds: \$2,532,266
Project Total: \$7,782,086



Vehicles/Equipment Funded

Three battery-electric top handlers developed by Taylor Machine Works and BYD:

- 931 kWh lithium iron phosphate (LiFePO₄) battery pack
- One 200 kW BYD charging station per top handler
- Deploying one at Pier E and two at Pier J

One battery-electric yard truck developed by Kalmar Global and TransPower:

- 154 kWh LiFePO₄ battery pack
- 70 kW charging station
- Deploying at Pier E

Lessons Learned

- All partners should be convened early to ensure efficient design and industry-specific requirements are incorporated; technology providers, OEMs, engineers, terminals, and the workforce.
- Deploying charging infrastructure at active terminals requires creative solutions and long lead times to secure UL certification, or equivalent, and sign off by the authority having jurisdiction.
- Data collection parameters shall be assessed during project exploration to determine if metering will be required.

Status Updates

- All zero-emission CHE units deployed as of February 2020.
- All charging stations have been UL certified, or equivalent, and commissioned.
- Baseline emissions testing will be completed by the end of 2020 and data collection will continue for the demonstration.



Demonstration of Zero-Emission Technologies for Freight Operations at Ports: Fuel Cell Hybrid Electric Top Loader

The project team, led by Center for Transportation and the Environment (CTE), is building and will demonstrate an electric top loader with fuel cell range extension and wireless charging capability. The objective of this project is to promote future commercialization that will significantly transform the industry while achieving greenhouse gas, criteria pollutant, and toxic emission reduction. The demonstration will generate performance data that will be analyzed to determine the project's effectiveness in meeting its objectives.



The electric top loader is being built and integrated by Hyster-Yale Group; two 45-kW fuel cell engines are being built by Nuvera Fuel Cells, LLC; 250-kW wireless charging equipment is being built by Wireless Advanced Vehicle Electrification (WAVE); and IGX Group will provide hydrogen fuel via mobile refueler. Fenix Marine Services will demonstrate the electric top loader in regular container handling service at the Port of Los Angeles for 8 months.

Dates: 05/03/2018 – Spring 2021
Grantee: CTE
Partners: Hyster-Yale Group, Nuvera Fuel Cells, WAVE, Fenix Marine Services, IGX Group

Grant Amount:
CARB Contribution: \$6,508,543
Matching Funds: \$2,366,159
Project Total: \$8,874,702



Vehicles/Equipment Funded

Under the Demonstration of Zero-Emission Technologies for Freight Operations at Ports grant, CARB will be funding the following equipment:

- One (1) fuel cell hybrid electric top loader developed and built by Hyster-Yale Group.
- Two (2) 45-kW fuel cell engines developed and built by Nuvera Fuel Cells, LLC.
- One (1) 250-kW wireless charging systems developed and built by WAVE.
- One (1) hydrogen mobile refueler furnished by IGX Group.

This equipment will be delivered to and operated at the Port of Los Angeles by Fenix Marine Services for a period of 8 months.

Lessons Learned

- The ability to accommodate for tire wear when charging wirelessly is an important design factor for large heavy-duty vehicles.
- Installing infrastructure in a port setting requires significant planning, effort, and coordination with local AHJs.
- Robust communication among all stakeholders is important for all phases of design, build, risk mitigation, issue resolution and deployment.

Status Updates

- Vehicle assembly is complete, and full system validation was completed by end of March 2020.
- Final fuel cell engine assembly and validation is complete and integrated after two successful prototype iterations.
- Wireless charging system build is complete and commissioned before vehicle deployment in Q2 2020.
- Site design and construction is complete, and installation of wireless charging system and H2 mobile refueler was completed in Q2 2020.

San Joaquin Valley Electric Tractor Development & Demonstration

Project Clean Air, Inc., as the lead applicant, has partnered with HummingbirdEV, Moonlight Companies, Fresno State Transportation Institute, Fresno State Ag Farm, Ranch Management, and Kings River Tractor to create the San Joaquin Valley Electric Tractor Development and Demonstration project. Through this project, four zero-emission, all electric battery 50 HP tractors and one zero-emission, all electric battery Class 6 truck will be delivered to the main demonstration site, Moonlight Companies in Reedley, CA. Moonlight will work with the secondary demonstration sites to test uses in various terrains and functions. The central San Joaquin Valley is a prime location for an eTractor deployment – fixed route project, wide range socioeconomics, and the availability of and access to recharging/fueling stations for zero-emissions vehicles.



PROJECT CLEAN AIR

Dates: June 5, 2018 – November 2020
Grantee: Project Clean Air, Inc.
Partners: Hummingbird EV, Moonlight Companies, Fresno State Transportation Institute, Fresno State AG Farm, Ranch Management, Kings River Tractor

Grant Amount:
CARB Contribution: \$1,500,000
Matching Funds: \$792,054
Project Total: \$2,292,054

The SJV Electric Tractor Development and Demonstration has been conceived and developed by all of the Project Partners, with a great amount of support from the agriculture industry, public health officials, educators and clean air advocates. While Project Clean Air is the lead applicant, each partner plays a crucial role in the success of the project. These Project Partners have a great amount of advanced technology experience to oversee and ensure the success of this demonstration.



Vehicles/Equipment Funded

The demonstrated technologies include the electrification of off-road agriculture equipment; specifically 50 HP tractor (4 total) and a Class 6 medium-duty truck. The eTruck is a vital component to the project; the truck will serve as the Vehicle-to-Vehicle Fuel Tender recharging the electric tractors in the orchards and farm fields where they will be operating.

- Four 50 HP Electric Farm Tractors of 25 kWh or greater
- One Class 6 Electric Truck with V2V Recharger system for in-field eTractor recharge
- Demonstration to occur in Reedley at Moonlight, Cantua Creek at Ranch Management & on CSU Fresno AG Farm

The Project Goals Include

- Design, customize, develop, and test the first all-electric agriculture tractors with supporting electric Class 6 truck in California
- Demonstrate the functionality and GHG Emissions Reductions of the electric fleet (including eTractors and eTruck)
- Create a market for electric agriculture and freight equipment

Status Updates

- Design and development of the eTractor began in June 2018
- Installed electric drive system and V2V for first eTractor & eTruck thru Jan. 2020 with lab testing thru March 2020
- Public unveiling at World Ag Expo 1st eTractor and Mobile Charging Class 6 eTruck Feb. 2020
- Field Testing/Validation/Data collection on the Farm began April 2020 with first two eTractors
- 3rd & 4th eTractor shipped in April, final assembly and energized began field testing in May/June 2020.



Zero-Emission Hydrogen Ferry Demonstration Project

The Bay Area Air Quality Management District, in partnership with Golden Gate Zero Emission Marine, was awarded a \$3 million grant by the California Air Resources Board to build the first hydrogen fuel cell passenger ferry in the United States. The vessel, named the *Water-Go-Round* will demonstrate a pathway to commercialization for zero-emission hydrogen fuel cell marine technologies. Applications of this technology go beyond passenger ferry service, including industrial freight transportation, government operations, marine research, and more. In Fall 2020, the *Water-Go-Round* is planned to perform demonstrations of passenger and freight service between Port of San Francisco, Oakland, Redwood City, and the City of Martinez, and sightseeing trips in the San Francisco Bay and to the Farallon Islands.



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MANAGEMENT
DISTRICT

The *Water-Go-Round* is a 70-foot aluminum catamaran, designed by Incat Crowther, and will have a top speed of 22-knots and a capacity to transport up to 84 passengers. The vessel is being built in Alameda, CA by Bay Ship & Yacht. The fuel cell electric propulsion system is being provided by BAE Systems and will be powered by three independent 120 kW fuel cells built by Hydrogenics, which was recently acquired by Cummins, Inc. The *Water-Go-Round* will have enough on-board hydrogen storage capacity for up to two days of normal operation. Golden Gate Zero Emission Marine is providing project coordination, technical management and expertise for the project and Sandia National Laboratories will analyze data collected from the project and conduct hydrogen safety training.

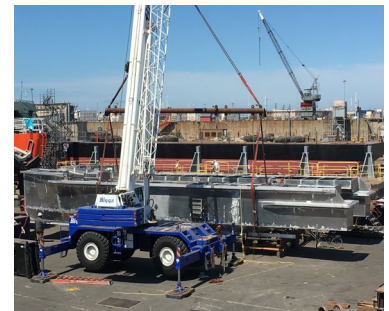
Dates: 05/25/2018 – 6/30/2021

Grantee: Bay Area Air Quality Management District

Partners: Golden Gate Zero Emission Marine, Switch E-Maritime, Bay Ship & Yacht, BAE Systems, Cummins, Red and White Fleet, Port of San Francisco, Sandia National Laboratories

Grant Amount:

CARB Contribution:	\$3,000,000
Matching Funds:	\$2,465,000
Project Total:	\$5,465,000



Key Project Phases

The *Water-Go-Round* is a first-of-its-kind vessel, the development of which relies on the innovative vision of Golden Gate Zero Emission Marine and careful coordination between project partners, who are leaders in their fields. Project milestones were carefully developed to monitor the project schedule and to identify potential problems as early as possible. Key milestones include:

- Design of vessel and powertrain, including hydrogen storage and fueling procedures
- Procurement of powertrain hardware and fuel cells
- Ferry build and sea trials
- Demonstration of vessel operations and fueling
- Data collection and analysis
- Commercialization feasibility assessment

Lessons Learned

- Building adequate room into the timeline and budget to allow for adjustments may help address unforeseen issues.
- Having partners with industry specific expertise as well as those with knowledge in advanced fuel technologies is critical in successfully building a product that meets industry needs.
- A project's success is contingent on each of the project partners' ability to follow-through on their initial commitment.

Status Updates

- The powertrain system and fuel cells were factory tested both individually and as a system.
- The vessel structure is expected to be completed in the next few months, with operations to begin in late 2020.
- The project has positively influenced commercialization efforts of zero emission marine technologies around the world.



GOLDEN GATE
ZERO
EMISSION MARINE



BAE SYSTEMS



Zero- and Near Zero-Emission Freight Facilities Project: Fuel Cell Hybrid Electric Delivery Van Deployment

The project team, led by Center for Transportation and the Environment (CTE), will build and demonstrate 15 additional fuel cell hybrid electric delivery vans based upon their first prototype built in partnership with the U.S. Department of Energy. The objective of this project is to promote future commercialization of fuel cell system retrofit kits that will significantly transform the parcel delivery market while achieving greenhouse gas, criteria pollutant, and toxic emission reductions. The demonstration will generate performance data that will be analyzed to determine the project's effectiveness in meeting its objectives.



The fuel cell hybrid electric delivery van powertrain will be provided by Unique Electric Solutions and fully integrated by W.W. Williams; University of Texas – Center for Electromechanics will provide consultation into the fuel cell and hydrogen system integration; Hydrogenics will supply each of the 30-kW fuel cell engines; and hydrogen fuel will be provided at the Shell fueling station local to the UPS customer center in Ontario, CA, where the vehicles will be demonstrated in regular UPS delivery service for one year.

Dates: 03/13/2019 – Winter 2022
Grantee: CTE
Partners: Unique Electric Solutions,
Hydrogenics USA,
University of Texas – Center for
Electromechanics,
United Parcel Services (UPS),
W.W. Williams

Grant Amount:

CARB Contribution: \$4,302,896
Matching Funds: \$4,969,429
Project Total: \$9,272,325



Vehicles/Equipment Funded

Under the Zero- and Near Zero-Emission Freight Facilities Project grant, CARB will be funding the following equipment:

- Fifteen fuel cell hybrid electric delivery vans integrated by Unique Electric Solutions and W.W. Williams.
- Fifteen 30-kW fuel cell engines developed and built by Hydrogenics USA.

This equipment will be delivered to and operated at the UPS Customer Service facility in Ontario, CA where they will be demonstrated for one year in regular parcel delivery service.

Lessons Learned

- 125 miles of zero-emission range can be achieved with a fuel cell delivery van, meeting over 97% of parcel delivery route needs.
- The use of proven off-the-shelf components is critical for system-level integration and build for demonstration projects.
- Robust communication among all stakeholders is important for all phases of design, build, risk mitigation, issue resolution and deployment.

Status Updates

- The prototype vehicle continues to operate out of the UPS facility in Gardena, CA, and has been in service for over one year.
- Unique Electric Solutions completed its manufacturing plan and engineering design updates for these 15 delivery vans.
- The 15 delivery vans will be built, tested and deployed in batches of 5 with the first vehicle build currently underway.



The University of Texas at Austin
Center for Electromechanics

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W.W. Williams
CONSIDER IT DONE.

Zero- and Near Zero-Emission Freight Facilities Project: Next Generation Fuel Cell Delivery Van Deployment

The project team, led by Center for Transportation and the Environment (CTE), will build and demonstrate four fuel cell hybrid-electric walk-in delivery vans featuring Linamar's new Gen 2.0 eAxe design. The objective of this project is to promote future commercialization of fuel cell vehicles that will significantly transform the parcel delivery market while achieving greenhouse gas, criteria pollutant, and toxic emission reduction. The demonstration will generate performance data that will be analyzed to determine the project's effectiveness in meeting its objectives.



Linamar Corporation is responsible for design, build, and validation of the eAxe; Roush Performance will integrate the fuel cell hybrid electric propulsion system into new Ford F-59 chassis; Ballard Power Systems will supply each of the 85-kW fuel cell engines; and hydrogen fuel will be provided at the Shell fueling station local to the UPS customer center in Ontario, CA, where the each vehicle will be demonstrated in regular UPS delivery service for one year.

Dates: 02/07/2019 – Fall 2021
Grantee: CTE
Partners: Linamar Corporation
Ballard Power Systems
United Parcel Service (UPS)
Roush Performance

Grant Amount:
CARB Contribution: \$5,831,866
Matching Funds: \$5,838,236
Project Total: \$11,670,102



Vehicles/Equipment Funded

Under the Zero- and Near Zero-Emission Freight Facilities Project grant, CARB will be funding the following equipment:

- Four fuel cell hybrid electric delivery vans integrated by Linamar Corporation.
- Four 85-kW fuel cell engines developed and built by Ballard Power Systems.

These zero emission delivery vans will be delivered to and operated at the UPS Customer Service facility in Ontario, CA, where they will be demonstrated for one year in regular parcel delivery service.

Lessons Learned

- The expected range of 150 miles will meet virtually all of the UPS operational needs.
- Robust communication among all stakeholders is important for all phases of design, build, risk mitigation, issue resolution and deployment.

Status Updates

- The project team has completed final vehicle and subsystem designs.
- The project team conducted a Functional Hazard Analysis that codifies all safety considerations and details mitigation strategies.
- Linamar has assembled the first eAxe and will complete validation before delivery to Roush for integration.
- All four F-59 chassis were delivered to the Roush facility and the first vehicle build has begun.



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Zero-Emission Beverage Handling and Distribution at Scale

The project will deploy 21 BYD Class 8 Day Cab (8TT) trucks and charging infrastructure in beverage handling and distribution services at four Anheuser-Busch (AB) distribution facilities in the Los Angeles region, and construct solar energy generation at one of the locations to offset energy demand from the chargers. Based on input received from operators, BYD has made improvements to the range, acceleration, suspension and ergonomics of the truck compared to previous generations to increase the range of applications that can be served by these battery electric trucks. This project will demonstrate how to reach zero-emission across the range of activities at AB distribution facilities with minimal modifications to fleet logistics.



With successful deployment of these Class 8 Day Cabs and rooftop solar the team will develop the confidence and experience needed to expand this electrification initiative across an entire distribution fleet, and demonstrate the financial, operational and environmental benefits of the technology. The project team consists of BYD Motors LLC, the truck manufacturer; Anheuser-Busch, the vehicle operator and maintenance provider; ENGIE Services U.S., Inc., the solar generation and charging developer; and CTE, the overall project manager and technical consultant.

Dates: 10/08/2018 – Spring 2021
Grantee: The Center for Transportation and the Environment
Partners: Anheuser-Busch, BYD Motors LLC, & ENGIE Services U.S., Inc.
Grant Amount:
CARB Contribution: \$5,530,303
Matching Funds: \$5,795,866
Project Total: \$11,326,169



Vehicles/Equipment Funded

Pomona Site

- Four BYD Class 8 Day Cab (8TT) trucks
- Four 40 kW BYD Chargers

Riverside Site

- Four BYD Class 8 Day Cab (8TT) trucks
- Four 40 kW BYD Chargers

Sylmar Site

- Five BYD Class 8 Day Cab (8TT) trucks
- Five 40 kW BYD Chargers

Carson Site

- Eight BYD Class 8 Day Cab (8TT) trucks
- Eight 40 kW BYD Chargers
- 958 kW Rooftop Solar Array

Lessons Learned

- AB conducted testing of BYD's second generation 8TT truck in April and May of 2019. Some modifications to the truck were requested, such as redesigning the assist handle at the back of the truck and changing the fifth wheel height. These were incorporated into the final truck design.

Status Updates

- All 21 trucks have been built and inspected by Anheuser-Busch
- As of February 2020, charger installation had been completed at one site, with commissioning scheduled for March 2020
- All trucks expected to be operational in June 2020



Zero Emissions for California Ports (ZECAP)

The objective of this project is to validate the commercial viability of zero-emissions hybrid fuel cell-electric yard trucks operating in a demanding, real-world cargo-handling application at the Port of Los Angeles. GTI and its technology partners, will deploy two hybrid fuel cell – electric yard trucks at the Port of Los Angeles, operated by TraPac for 12 months.

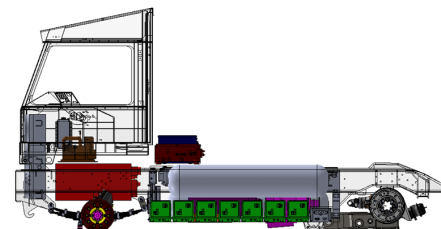
The project has been designed to minimize schedule and technology risks, while maximizing the amount of time the trucks will be in service and the amount of operating data they will generate. This is accomplished by leveraging existing fleet relationships, existing vehicle platforms, and an exceptional, results-focused team of partners.



Yard trucks are the single largest source of emissions in all classifications of cargo handling equipment, but are difficult to convert to zero-emissions due to the unique duty cycle and operating environment. The project is intended to demonstrate to port terminal operators that fuel cell powered, zero-emissions yard trucks are a safe, reliable, and operationally preferable solution to meet the port's clean air action plan.

Dates: 03/29/2019 – Spring 2021
Grantee: GTI
Partners: REV Group (Capacity), BAE Systems, Ballard Power Systems, ZEN Clean Energy Solutions, Hydrogen Technology Energy Corporation, Frontier Energy, TraPac

Grant Amount:
CARB Contribution: \$ 5,788,335
Matching Funds: \$ 6,017,078
Project Total: \$ 11,805,413



Vehicles/Equipment Funded

- Two Capacity Trailer Jockey Series TJ9000 gliders configured with:
 - BAE Systems HDS200 HydriDrive® powertrain. This mature proven system is capable of a peak propulsion power of 200kW (270 hp) and peak torque of 5200 Nm (3800 ft-lbs). During deceleration, the system will employ regenerative braking and capture energy in the battery pack for later use.
 - Ballard Power Systems FCveloCity®-HD85 proton exchange membrane fuel cell providing up to 85kW of zero emissions electrical power.
 - 10-20kg of onboard hydrogen storage at 350bar
- HTEC's stationarily-placed mobile tube-trailer hydrogen fueling system. The fueling station will store up to 400kg of hydrogen at 450bar and will provide 2kg/min fill without pre-cooling of the hydrogen. The station will be refilled via tanker delivery, or "drop-and-swap" tube-trailer.

Lessons Learned

- Existing relationships between partners are key
- Yard trucks have extremely limited constrained packaging space
- Begin efforts for demonstration fuel early; fueling solutions are key to deployment success

Status Updates

- Agreements have been executed in Fall 2019
- Vehicle/system packaging and performance simulations underway
- Hydrogen infrastructure planning and equipment design in progress



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Port of Los Angeles “Shore to Store” Project

The Port of Los Angeles and our partners are proud to implement this first phase in a long-term industry collaboration to scale a Zero-Emission framework for goods movement throughout California. This project consists of three major components, each combining with ongoing demonstrations at the Port to showcase a snapshot of the Zero-Emission supply chain of the future, and will provide a model by which freight facilities can structure their operations.



Ten hydrogen fuel cell electric Class 8 on-road trucks will be developed through a collaboration between Kenworth Truck Company and Toyota Motor North America. Second, Shell Oil North America will build and operate two large capacity hydrogen fueling stations in Wilmington and Ontario California, forming the basis of a network of hydrogen infrastructure in Southern California. Finally, the Port of Hueneme will demonstrate two electric yard tractors, the first pieces of zero-emission equipment at their facility.

Dates: 03/21/2019 – Spring 2021
Grantee: Port of Los Angeles
Partners: Toyota Motor North America, Kenworth Truck Company, Shell Oil Products, Port of Hueneme, South Coast Air Quality Management District, National Renewable Energies Laboratory

Grant Amount:
CARB Contribution: \$41,122,260
Matching Funds: \$41,426,612
Project Total: \$82,548,872



Vehicles/Equipment Funded

- Ten hydrogen fuel cell electric Class 8 on-road trucks, developed by Toyota and Kenworth
- One large capacity hydrogen fueling station in Wilmington, CA
- One large capacity hydrogen fueling station in Ontario, CA
- Two electric yard tractors at the Port of Hueneme

Lessons Learned

- Extensive pre-deployment testing can reveal vital issues before demonstration begins.
- Anticipate extra time for permitting for Hydrogen fueling projects. Hydrogen production/storage is still new to the area.

Status Updates

- First truck delivery in March 2020. Five trucks in service by April 2020.
- First hydrogen station began construction December 2019. Hydrogen Stations scheduled for completion by October 2020.
- Port of Hueneme Yard Tractor delivered August 2020.



Sustainable Terminals Accelerating Regional Transformation (START) Project Phase 1

The START Project is a pioneering demonstration of a multi-region, zero- and near zero-emission supply chain in advancement of the California Sustainable Freight Action Plan. Funded by the Zero- and Near Zero-Emission Freight Facilities Grant, the Project will demonstrate what sustainable supply chains of the future can look like: containers delivered by the world's cleanest vessels, loaded onto zero-emission yard tractors, handled by zero-emission top handlers and rubber-tired gantry (RTG) cranes, transferred to zero-emission trucks headed for an off-dock cargo-handling facility.



The START Project will demonstrate 102 pieces of zero-emissions terminal equipment and trucks at three California seaports, develop a better than Tier 4 emissions tugboat, deploy two American-flagged Jones Act container vessels with some of the cleanest available engines, and advance workforce development programs to support sustainable goods movement across California. The START Project is anticipated to reduce annual emissions by 12,821.7MT CO₂e, 25.796 tons NO_x, 1.052 tons ROG, and 0.2682 tons diesel PM₁₀.

Dates: 01/23/2019 - Summer 2021
Grantee: Port of Long Beach
Partners: SSA Terminals, Shippers Transport Express, Matson Navigation Lines, Centerline Logistics, Port of Oakland, Port of Stockton, South Coast AQMD, Southern California Edison, Tetra Tech, and Momentum.

Grant Amount:

CARB Contribution: \$50,000,000
Matching Funds: \$52,998,742
Project Total: \$102,998,742



Vehicles/Equipment Funded

Port of Long Beach

- 33 DINA and TransPower Battery-Electric Yard Tractors
- 1 Taylor and BYD Battery-Electric Top Handler
- 9 ZPMC and Cavotec Battery-Electric Rubber-Tired Gantry (RTG) Cranes
- 5 Peterbilt and TransPower 500-hp Battery-Electric Class 8 Drayage Trucks

Port of Oakland

- 5 DINA and TransPower Battery-Electric Yard Tractors
- 1 Taylor and BYD Battery-Electric Top Handler
- 10 Peterbilt-TransPower 400-hp Battery-Electric Class 8 Drayage Trucks

Port of Stockton

- 18 Wiggins and Thor 36,000-lb Battery-Electric Forklifts
- 16 World-Lift 8,000-lb Battery-Electric Forklifts
- 1 Zephir Battery-Electric Rail Car Mover with Range Extender

Harbor Craft and Ocean-Going Vessels

- 2 Tier 3 Low-NOx Jones Act Container Ships
- 1 Tier 4 Electric Drive Tugboat

Lessons Learned

- Interest in sustainable goods movement is growing rapidly among shippers, carriers, and operators.
- Charging infrastructure costs are often higher than anticipated, particularly in the constrained port environment.
- Electrifying a heavy-duty fleet requires innovative charging solutions designed in concert with the equipment.

Status Updates

- Four Wiggins 36,000-lb and two World-Lift 8,000-lb electric forklifts delivered to Port of Stockton and SSA Marine.
- Matson's M/V LURLINE is the nation's first CON-RO Vessel to enter operation with Tier 3 dual fuel marine engines.
- Design and construction of EVSE is rapidly advancing at the Ports of Stockton, Oakland, and Long Beach.



Net-Zero Farming and Freight Facility Demonstration Project

Through this project, five zero emission, all electric battery class 7 trucks with all-electric transport refrigeration units (eTRUs) will be delivered to the main demonstration site, Moonlight Companies in Reedley, California. The eTRUs will operate 100 percent of the time within a Disadvantaged Community based on CalEnviroScreen 3.0. Project Clean Air, Inc., as the lead applicant, has partnered with HummingbirdEV, Moonlight Companies, Volta Air, TechTruth Consulting to create the Net-Zero Farming and Freight Facility Demonstration Project.



**PROJECT
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The Net-Zero Farming and Freight Facility Demonstration Project has been conceived and developed by all of these partners with a great amount of support from the agriculture industry, public health officials, educators and clean air advocates. The project partners have a great amount of advanced technology experience to oversee and ensure the success of this demonstration. Each of the project partners are taking a leading role in providing replicable clean advanced technology medium- and heavy-duty trucks that can have immediate positive impacts through adoption by agricultural freight movement throughout California's Central Valley.

Dates: March 2019 – Fall 2021
Grantee: Project Clean Air, Inc.
Partners: HummingbirdEV, Moonlight Companies, Volta Air and TechTruth Consulting

Grant Amount:
CARB Contribution: \$3,283,735
Matching Funds: \$3,283,735
Project Total: \$6,567,470



Vehicles/Equipment Funded

The Demonstrated Technologies include the electrification of class 7 trucks and TRUs.

- Five Class 7 single trucks will be designed & developed as full battery electric for Ag Fruit Freight Transport
- Five TRU boxes will be purpose-built as battery electric eTRUs specifically for Fruit Transport between packing and cold storage warehouse facilities.
- Each Class 7 eTruck will receive an eTRU with Solar to serve as a complete zero-emission refrigerated transport unit truck to serve the "First 5 to 15 miles" of agriculture freight movement to market.

The Project Goals Include

- Customize, manufacture, and deploy five all-electric class 7, single vehicle 3-axle, trucks rated to 54,000 GVWR and eTRUs.
- Demonstrate the functionality and GHG Emissions Reductions of the electric fleet, specifically in Disadvantaged Communities
- Create a market for all-electric heavy-duty TRUs in the agriculture and freight industries by improving existing technology.

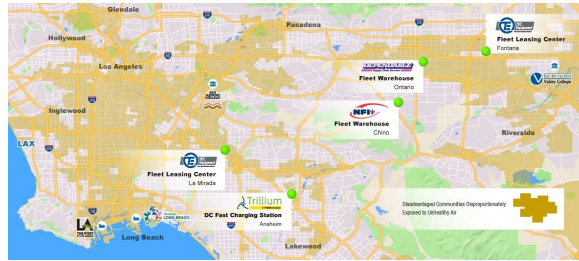
Status Updates

- Contract kick-off was in May 2019
- Design and Development of Electric Drive System, Engineering of Cab/Chassis, plus zero emission TRUs.
- First cab & chassis completed by Fall 2020
- Field Testing Winter 2021 through Summer 2021



Volvo LIGHTS Project

Low Impact Green Heavy Transport Solutions



This project creates a zero-emission goods movement system from the Ports of Long Beach and Los Angeles to four freight handling facilities in disadvantaged communities. This project deploys pre-commercial and commercial zero-emission technologies, including the introduction of Volvo's North American Class 8 battery electric truck. The project also includes data collection, maintenance training, sales and service support, and outreach to accelerate commercialization of heavy-duty, battery electric technologies.

Dates: 2/25/2019 – 6/30/2021
Grantee: South Coast AQMD
Partners: Volvo, DHE, NFI, TEC Equipment, CALSTART, Greenlots, Trillium, SCE, UCR CE-CERT, Rio Hondo and San Bernardino Valley College, Reach Out, POLA, POLB
Grant Amount:
 CARB Contribution: \$44,839,686
 Matching Funds: \$45,855,308
 Project Total: \$90,694,994



Vehicles/Equipment Funded

52 pre-commercial and commercial Class 8 vehicles and infrastructure deployed at freight handling facilities:

- 23 Heavy-duty battery electric trucks (HDBET)
- 29 Off-road battery electric tractors, forklifts
- 58 Non-proprietary Level 2 and 50 kW and 150 kW DC fast chargers
- 1.9 GWh annual solar energy

Featured innovative technologies:

- Multiple truck configurations to meet local and regional expected applications and range
- New lithium ion battery chemistry for increased energy density by >20%
- Self-learning control algorithms that optimize energy usage and range
- Targeted HDBET platform in three market segments showcasing highest potential: drayage, regional distribution, short haul
- During the project, Volvo Class 8 HDBET will be certified for commercial sale in California
- Solar and second life batteries to mitigate grid impacts and energy costs
- Networked chargers with intelligent vehicle telematics
- Leasing program for customer fleets in 2021

Lessons Learned

- Field certification may be an interim solution to install recognized components at a site
- Infrastructure deployment lead times are longer, thereby making it challenging to align with equipment delivery

Status Updates

- Five trucks delivered to TEC Fontana Dec. 2019. Three HD tractors built April 2020. Production of trucks by late 2020.
- February Technology Showcase featured first five trucks and partner project contributions for 200+ media, fleet, dealer, public official and NGO guests
- Two 50 kW chargers at TEC Fontana; 50 kW/150 kW chargers, yard tractors/forklifts April 2020; solar at DHE July 2020.



Flexible Solutions for Freight Facilities – San Joaquin Valley Zero- and Near Zero-Emission Enabling Freight Project

Flexible Solutions for Freight Facilities is a BNSF Railway led initiative to demonstrate zero- and near zero-emission technologies in and around its yards. GE Transportation, now a Wabtec company, will design, manufacture and commission a single Battery Electric Locomotive (BEL) running from Stockton to Barstow in commercial operations. The BEL will reduce operating costs while simultaneously reducing criteria pollutant and greenhouse gas emissions.



In addition, zero and near zero equipment will be demonstrated at the company's intermodal yards in Stockton and San Bernardino. The Stockton and San Bernardino facilities will each demonstrate a Mi-Jack brand hybrid-electric rubber-tire gantry (RTG) crane. The San Bernardino facility will also deploy a full-electric side loader and BYD's Class 8 drayage truck solution, which will be used for short-haul drayage operations in San Bernardino. The project also includes electrical upgrades and electric vehicle supply equipment (EVSE) to charge the series of zero and near zero pieces of equipment and vehicles.

Dates: 03/01/2019 – Spring 2021
Grantee: San Joaquin Valley Air Pollution Control District
Partners: BNSF Railway, GE Transportation, BYD, MiJack, Southern California Edison, Pacific Gas & Electric, SH&H Inc., ITS ConGlobal, Southwest Research Institute, Café Coop

Grant Amount:

CARB Contribution: \$22,616,647
Matching Funds: \$22,620,673
Project Total: \$45,237,320



Vehicles/Equipment Funded

Equipment: This project funded five pieces of equipment/vehicles deployed at BNSF's Stockton and San Bernardino railyards including:

- One GE Transportation Battery Electric Locomotive (Stockton)
- Two Mi-Jack hybrid-electric rubber-tire gantry crane (Stockton, San Bernardino)
- One Taylor Machine Works, Inc. full-electric side loader (San Bernardino)
- One BYD all-electric Class 8 drayage truck (San Bernardino)

Infrastructure: This project provided for the accompanying electrical upgrades & EVSE equipment at Stockton and San Bernardino used for charging the equipment including:

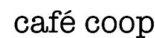
- One wayside charger to recharge the BEL batteries (Stockton)
- One RTG EVSE (Stockton)
- EVSE for the Class 8 drayage truck and electric side loader (San Bernardino)

Lessons Learned

- Early and constant communication with utilities and contractors is key for successful electric charging infrastructure
- Awardees, not the agency, are responsible for registering with the Department of Industrial Relations to allow contractors to report on prevailing wages
- Provide vendors with deliverables and grant agreement milestone descriptions to ensure reporting and invoicing is correct

Status Updates

- Power limited test of assembled locomotive with single battery module successfully completed December 2019
- Electric drayage truck in operation at San Bernardino yard
- Assembly of hybrid-electric RTG cranes complete and all-electric side loader in production
- Offsite electrical upgrades complete with onsite improvements in process



Frito-Lay Zero and Near-Zero Emission Project – Modesto, California

The San Joaquin Valley Air Pollution Control District has partnered with Frito-Lay, a division of PepsiCo, to implement an industry-leading showcase for environmentally sustainable manufacturing, warehousing and distribution which will transform the 500,000 square-foot Modesto, California manufacturing site to one of Frito-Lay's largest in the United States. Frito-Lay aims to replace all of its existing diesel-powered freight equipment with zero-emission (ZE) and near zero-emission (NZE) technologies.

The project will integrate an incredible array of commercially available and pre-commercial ZE and NZE technologies in a number of applications. In addition to the fleet assets, an on-site renewable energy generation (solar PV) and energy storage systems will be installed to better serve the energy needs of the manufacturing facility and warehouses.



Dates: 2019 - 2021
Grantee: San Joaquin Valley APCD
Partners: Frito-Lay; American Natural Gas; BYD Motors LLC; Café Coop; CALSTART; ChargePoint; Crown; Gladstein, Neandross & Associates; Meritor; Peterbilt; Project Clean Air; Tesla; University of California, Riverside CE-CERT; and Volvo.

Grant Amount:

CARB Contribution: \$15,382,243
Matching Funds: \$15,382,244
Project Total: \$30,764,487



Vehicles/Equipment Funded

Vehicles:

- Fifteen Tesla heavy-duty battery electric tractors
- Six Peterbilt 220 EV battery electric trucks
- Three BYD battery electric yard trucks
- Twelve Crown Lithium-Ion battery electric forklifts
- Thirty-eight Volvo VNL tractors with ISX12N low NOx engine

Equipment:

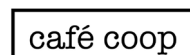
- Compressed natural gas fueling station providing renewable fuel
- 1 MW solar carport with energy storage
- Truck charging infrastructure and energy storage for battery electric vehicles

Lessons Learned

- Start the contracting process with all subcontractors as early as possible
- Ensure that project is priced and scoped with prevailing wage and California Public Works requirements
- Assemble a project team with a diverse set of perspectives and expertise to ensure success
- Engage utilities as early as possible

Status Updates

- All CNG tractors commissioned and CNG Station completed in March 2020
- All forklifts commissioned
- Design and construction for solar carport and truck charging infrastructure in progress
- Project completion anticipated in early 2021



Rural School Bus Pilot Project

The Rural School Bus Pilot Project provides grants for the purchase of commercially available cleaner school bus technologies such as zero-emission (fuel cell or battery electric) and low carbon fuel options (renewable fuels). Schools in rural communities with the oldest and worst polluting fleets who traditionally have had fewer opportunities for grant funding are given funding priority, although all school districts within California are eligible to participate. Applicants can apply each program year for either one replacement bus that uses renewable fuels or up to three zero-emission buses as expansion projects.



Old bus requirements:

- Chassis must be 20 years old or older to receive funding
- Gross Vehicle Weight Rating (GVWR) must be 14,000 pounds or greater
- Bus must have current CHP Certification
- Must be applicant owned

New school bus must be current model year and be either:

- Zero-Emission (battery electric or fuel cell); or
- Hybrid or Internal Combustion Engine (diesel, compressed natural gas, propane) using renewable fuel

Dates: 12/21/2016 – Summer 2025

Grant Administrator: North Coast Unified AQMD

Grant Amount:

Project Total (4 Fiscal Years): \$61,550,000



Vehicles/Equipment Funded

Zero-Emission school bus and electric charging infrastructure projects:

- Up to \$400,000 per bus, up to 3 buses per year
- Bus Types include A, B, C, and D
- Up to an additional \$5,000 for charging infrastructure per bus

Hybrid or Internal Combustion Engine school bus projects:

- Up to \$165,000 per bus, 1 bus per year
- Bus Types include A, B, C, and D
- Incremental renewable fuel costs can be included

Lessons Learned

- Purchase order processing time can be improved by utilizing a standardized required and optional equipment list.
- Dismantling activities can be improved by offering focused training on the destruction reporting requirements to dismantle and salvage yard operators.
- Global supply chain disruptions impact production schedules. Flexibility in delivery dates amongst project funding years improves expenditure targets.

Status Updates

Zero-Emission school bus and electric charging infrastructure projects:

- 33 buses have been delivered and are on the road.
- 45 buses are on order and are expected to be on the road by Spring 2021.
- 47 buses are expected to be ordered through 2020 with anticipated deliveries by Spring 2022.
- 9 charging stations have been partially funded, with an expected 12 more projects to be funded.

Hybrid or Internal Combustion Engine school bus projects:

- 13 buses have been delivered and are on the road.
- 31 buses are on order and are expected to be on the road by Spring 2021.
- 16 buses are expected to be ordered through 2020 with anticipated deliveries by Spring 2022.

San Joaquin Valley Zero-Emission Cargo Handling Demonstration Project

The San Joaquin Valley Zero-Emission Cargo Handling Demonstration Project (Project) will accelerate the commercial deployment of zero-emission off-road technologies by demonstrating two state-of-the-art battery-electric 30,000-pound capacity forklifts with additional cargo handling attachments at the Port of Stockton—significantly reducing GHG emissions and eliminating criteria pollutants and exposure to associated toxic diesel emissions to benefit adjacent and surrounding disadvantaged communities. DANNAR has developed an off-road battery-electric cargo handling mobile platform, on the cusp of commercialization, that offers multi-function capabilities that can efficiently replace multiple pieces of single-purpose, conventional diesel cargo handling equipment currently used by ports, freight support facilities, distribution centers, warehouses, and intermodal yards throughout California.



San Joaquin Valley AIR POLLUTION CONTROL DISTRICT

Dates: 06/04/2018 – August 2020
Grantee: San Joaquin Valley Air Pollution Control District
Partners: SJVAPCD, DD DANNAR LLC, ChargePoint, carbonBLU, Port of Stockton
Grant Amount:
CARB Contribution: \$772,555
Matching Funds: \$403,540
Project Total: \$1,176,095

The proposed Project will provide economic and environmental benefits and demonstrate the scalability, practicality, and economic viability of widespread transformation of zero-emission heavy-duty cargo handling equipment to help implement the Sustainable Freight Action Plan, AB 32, SB 32, AB 118, and SB 535.



Vehicles/Equipment Funded

- Two DANNAR 4.00 Mobile Power Stations (MPS)—zero-emission, battery-electric 30,000-pound forklifts combined with additional heavy-duty cargo handling and freight attachments: one with a dump truck bed and the second with an electric vertical scissor-lift. MPS features:
 - 126kWh and 168kWh respectively in each MPS of energy storage in high-capacity BMW lithium ion battery packs
 - Energy export panel with two 240VAC outlets and three 120VAC outlets
 - Four-wheel drive and four-wheel, multi-mode steering
 - Full-time 4X4 electric drive with regenerative braking
 - Towing Capacity: excess of 600,000 lbs.
 - Submersible up to four feet
- Two ChargePoint DC fast chargers to charge both MPSs and will provide opportunities to expand the fleet of zero-emission forklifts.

Lessons Learned

- Technology for zero-emission electrics vehicles has evolved to levels allowing for peak performance and productivity in work vehicles.
- Tier 1 suppliers of off-road equipment are universally shifting focus and product development to electric components.
- Operators of electric work vehicles are very receptive to the enhanced machine operation and increased performance of ZEV machines.

Status Updates

- DANNAR completed assembly for the Mobile Power Stations and delivered them to the Port of Stockton for data collection.
- DANNAR is working closely with the Port of Stockton to provide ongoing customization to the MPS in order to parallel the functional abilities of a baseline forklift.
- CarbonBLU is working with the Port and DANNAR to establish the emission testing once the MPSs are ready for deployment.



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Heavy-Duty Purchase Incentive and Financing Assistance Projects

Grantee	Project Title
CALSTART	Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)
CALSTART	Clean Off-Road Equipment Voucher Incentive Project (CORE)
California Pollution Control Financing Authority (CPCFA)	Truck Loan Assistance Program

HVIP: A Decade of Driving California to Clean Trucks and Buses

Launched in 2009, the Hybrid and Zero-Emission Truck Bus Voucher Incentive Project (HVIP) plays a crucial role in the deployment of zero-emission and other clean technologies. HVIP responds to a key market challenge by making clean vehicles more affordable for fleets through point-of-purchase price reductions. With an HVIP voucher, technology-leading vehicles can be as affordable as their traditional fossil-fueled counterparts, enabling fleets of all sizes to deploy advanced technologies that are cleaner and quieter.



HVIP is the earliest model in the United States to demonstrate the function, flexibility, and effectiveness of first-come first-served incentives that reduce the incremental cost of commercial vehicles. HVIP is fleet-focused, providing a streamlined and user-friendly option to encourage purchases and leases of advanced clean trucks and buses throughout California. Approved dealers are a key part of HVIP success and are trained to facilitate the application process.

Dates: 2009 – Present
Grantee: CALSTART
Partners: TetraTech

Funding Totals:

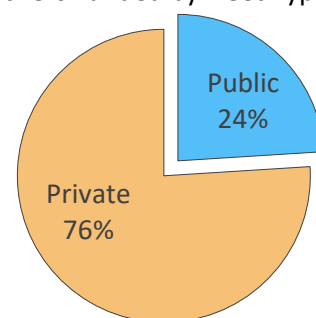
8,700 Vouchers Requested: \$510 million
5,600 Vouchers Redeemed: \$218 million

Note: Vouchers are redeemed after the vehicles are built and ready to hit the road

All data current through July 2020



Vouchers Funded by Fleet Type



Vehicles/Equipment Funded

- Catalog has 140+ vehicle models from 30 manufacturers; in 2010, HVIP started with 3 participating manufacturers
- Vocations include freight and drayage trucks, delivery vans, utility vehicles, transit, school, and shuttle buses, refuse trucks and more
- Over 1,400 individual purchasers / fleets have participated
- Nearly 60% of all vouchers are for vehicles domiciled in a disadvantaged community

Project Highlights

- HVIP-funded vehicles have traveled 188 million clean-vehicle miles since 2010
- The State's investment in HVIP has catalyzed an additional \$2.2 billion in of other public and private spending toward these vehicle purchases – over \$4 for every \$1 of HVIP investment, redirected from traditional technologies to clean technologies
- HVIP exemplifies CARB's "theory of change" for how first-success "beachhead" applications such as battery electric transit spread to other technology applications to achieve broader and faster commercialization

Status Updates

- About 80 percent of all HVIP demand occurred in the most recent two years, reflecting the rapid growth in technology availability and market demand
- In fall 2019, HVIP's allocated funding for fiscal year 2019-20 (\$142 million) was oversubscribed, and HVIP closed to new voucher requests until new funding is available



California Clean Off-Road Equipment Voucher Incentive Project (CORE) *Moving Freight Forward*

The Clean Off-Road Equipment Voucher Incentive Project (CORE) encourages California freight equipment users to purchase or lease currently commercialized zero-emission off-road freight equipment. This streamlined voucher incentive project helps offset the higher cost of zero-emission technology with a point-of-sale discount. CORE is a market acceleration project, analogous to the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), intended to grow the market for zero-emission off-road freight equipment with an easy-to-use, first-come-first-served process, a pre-approved eligible equipment catalogue, and increased funding to deploy equipment in the communities most impacted by freight pollution.

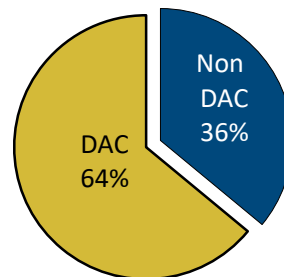


CORE voucher amounts are based on the incremental cost difference between traditional equipment and new zero-emission alternatives. Additional funding is available for charging infrastructure and equipment deployed in pollution overburdened (DAC) and low-income AB 1550 communities.

Dates: February 2020 – August 2020
Grantee: CALSTART
Partners: TetraTech

CORE Voucher Funding: \$41,073,707

Vouchers Funded in DAC Communities



Eligible Vehicles/Equipment

CORE funds zero-emission off-road freight equipment and infrastructure:

- On- and Off-Road Terminal Tractors
- Truck- and Trailer-Mounted Transportation Refrigeration Units
- Mobile Power Units (MPUs)
- Large Forklifts
- Railcar Movers
- Ground Power Units (GPUs)
- Container Handling Equipment
- Wide-Body Aircraft Tugs
- Airport Cargo Loaders
- Mobile Shore Power Cable Management Systems

CORE funded 316 pieces of equipment with this round of funding.

Lessons Learned

- CORE exhausted its funding in 6 months, showing a high demand for zero-emission equipment.
- With 13 different manufacturers and 48 models of eligible equipment, CORE is growing the zero-emission off-road industry.

Status Updates

- As of August 4, 2020, all funding had been awarded. The entire \$41 million dollars has been requested at this time. Voucher requests that are on the Contingency List may be funded if funding becomes available.
- There are currently 408 voucher requests on the Contingency List.
- No new voucher requests are currently being accepted.



Truck Loan Assistance Program

Launched in 2009, the Truck Loan Assistance Program utilizes Air Quality Improvement Program (AQIP) funds to help small-business fleet owners, affected by California Air Resources Board's (CARB's) In-Use Truck and Bus Regulation, to secure financing for upgrading their fleets with newer trucks. The program is implemented in partnership with the California Pollution Control Financing Authority (CPCFA) through its California Capital Access Program (CalCAP) and leverages public funding with private funding from participating lending institutions.



Lenders use their traditional underwriting standards to establish loan terms. The program currently includes an interest rate cap of 20 percent. To support lender participation, State funds are deposited as contributions into lender loan loss reserve accounts to cover potential losses from loan defaults. Since the program primarily reduces criteria and toxic air contaminant emissions, AQIP is the only source of CARB funding available for this program.

Program Inception Date: 2009
Administrator: CPCFA
Independent Contributor: CARB
Partners: 24 participating lenders statewide

CARB Contributions: \$125.4 million
Total Financed: \$1.8 billion
Number of Loans: 27,000
Number of Trucks: 27,750
Number of Trailers: 688
(As of 6/30/2020)



Vehicles/Equipment Financed

- On-road heavy-duty vehicles and equipment for compliance with the Statewide In-Use Truck and Bus Regulation.
- Used and new trucks equipped with 2010 and newer model year engines certified to 2010 and later model year emission standards.
- Trailers may be eligible for financing only in conjunction with an eligible tractor.
- Equipment warranty when funded with the purchase of an eligible truck.
- The engines can use diesel fuel, compressed natural gas (CNG), liquefied natural gas (LNG), or other fuels including zero-emission technology.

Borrower Eligibility

- Have a fleet of 10 or fewer heavy-duty vehicles at the time of application.
- Borrower must have 100 or fewer employees & \$10 million or less in annual revenue, averaged over three years.
- Total enrolled principal amount must not be in excess of \$2.5 million at any CalCAP participating financial institution over a three year period.
- Obtain a loan that is for a vehicle registered with the California Department of Motor Vehicles.

Status Updates

- Effective March 2, 2020, CARB contribution rates were increased to help continue or increase lender participation in the program. The rates were increased to ten percent for lenders with loan loss reserves of \$500,000 or more. Contribution rates for lenders with loan loss reserves under \$500,000 remained at 14 percent.

