

Appendix G

LOW CARBON TRANSPORTATION INVESTMENT PROJECT SUMMARIES

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The following low carbon transportation investment projects are a key component in California's long-term transformation to clean and equitable transportation. Below are summaries of California Air Resources Board (CARB) funded projects that have spurred heavy-duty advanced clean technologies and charted paths to clean transportation equity. The summaries provide a brief description of each project. Included in the titles are links to web pages with more information on the project scope, location, information on partners and stakeholders, lessons learned and potential emission benefits.

Light-Duty Clean Mobility Investments

Statewide Clean Mobility Options Pilots

Clean Mobility Options Voucher Pilot Program (CMO)

A new statewide voucher-based funding program that supports zero-emission shared and on-demand services such as carsharing, ridesharing, bikesharing, and innovative transit services for low-income and disadvantaged communities. CMO 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. Vouchers are awarded on a first-come, first served basis. Eligible applicants are public agencies, nonprofit organizations, and tribal governments.

CARB Contribution \$37,196,000 Matching Funds: \$820,000

Project Total: \$38,016,000 Location: Statewide

In 2020, the program's first year, a total of \$21,150,000 in voucher funds is being allocated as follows:

- 2020 Community Transportation Needs Assessment Voucher Recipients
 - Total Awardees: 24
 - Total Funding \$1,150,000
- 2020 Mobility Project Voucher Recipients
 - Total Awardees: 20
 - Total Funding: \$20,000,000

Sustainable Transportation Equity Project (STEP)

A new pilot project 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 rely on 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.

CARB Contribution: \$19,500,000

Project Total: \$19,500,000 Location: Statewide

In 2020, the program's first year, a total of \$19,500,000 in grant funds was allocated as follows:

- 2020 Planning and Capacity Building Grant Awardees
 - Total Awardees: 8
 - Total Funding \$1,750,000
- 2020 Implementation Grant Awardees
 - Total Awardees: 3
 - Total Funding: \$17,750,000

Clean Mobility Options Pilot Projects by Region

Northern Region:

Our Community CarShare Sacramento Pilot Project – Legacy Project

The Sacramento Metropolitan Air Quality Management District is implementing this pilot which provides traditional carsharing and subsidizes transportation services for residents in participating affordable housing communities located in disadvantaged communities within the Sacramento Metropolitan Statistical Area. The current project serves eight affordable housing communities with two battery electric vehicles and two, level II chargers per site (16 total). Phase 1 launched in 2017 at four housing communities; Phase 2 launched in early 2019, expanding the project to three additional communities, and began offering subsidized transportation vouchers for non-driving residents for the use of ride hail services and regional transit. Phase 3 will launch throughout 2021 and serve three more housing communities and add a centralized mobility hub serving multiple communities.

CARB Contribution: \$5,863,847 Matching Funds: \$1,841,760

Project Total: \$7,330,607 Location: Sacramento

2020 CMO - Community Transportation Needs Assessment Voucher Recipients:

- *Community Resource Project*, \$49,970, Sacramento
- *Paskenta Band of Nomlaki Indians*, \$50,000, Paskenta Reservation in Tehama County
- *Sacramento Public Library*, \$49,800, South Sacramento (Southgate) in Sacramento County

2020 CMO – Mobility Project Voucher Recipients:

- *The McConnell Foundation*, \$1 million, “Redding Bikeshare,” Redding downtown area in Shasta County

Coastal Region:

Lift Line Paratransit Dial-a-Ride Electric Vehicle Transition Program – Legacy Project

Community Bridges-Lift Line replaced two existing gas-powered shuttles with two 16-seat electric vehicle (EV) shuttles equipped with wheelchair lifts. The project is expanding to replace another existing gas-powered shuttle with a zero-emission, ADA wheelchair equipped, 14-passenger medium shuttle bus. The project will also cover operation costs for a driver. The EV shuttles are the first all-electric paratransit vehicles to be deployed in Santa Cruz County, and are charged by two publicly accessible Level II charging stations installed at the Lift Line fleet facility in Watsonville, CA.

CARB Contribution: \$508,975 Matching Funds: \$92,470

Project Total: \$869,567 Location: Watsonville

2020 CMO - Community Transportation Needs Assessment Voucher Recipients:

- *Ecology Action*, \$50,000, Salinas in Monterey County
- *Social Good Fund/Regeneración Pajaro Valley*, \$50,000, Watsonville in Santa Cruz County
- *The Latino Equity Advocacy & Policy Institute (The LEAP Institute)*, \$50,000, Pajaro in Monterey County
- *Youth Transportation Organization*, \$50,000, Richmond in Contra Costa County

2020 CMO – Mobility Project Voucher Recipients:

- *City of Richmond*, \$1 million, “Richmond On-Demand,” Richmond in Contra Costa County
 - *Oakland Department of Transportation*, \$1 million, “Oakland E-Bike Library,” West Oakland, Downtown, Chinatown, San Antonio, Fruitvale and East Oakland in Alameda County
 - *Oakland Unified School District*, \$1 million, “On-Demand Oakland Unified Student Transportation,” Oakland in Alameda County
 - *Richmond Community Foundation*, \$1 million, “Richmond Community Carshare,” Richmond in Contra Costa County
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2020 STEP – Planning and Capacity Building Grant Recipients:

- *City of Oakland Department of Transportation*, \$184,753, East Oakland in Alameda County
- *Isla Vista Community Services District*, \$182,158, Isla Vista in Santa Barbara County
- *Solano Transportation Authority*, \$299,997, Vallejo in Solano County

Central Region:

Car Sharing and Mobility Hubs at Affordable Housing Pilot Project – Legacy Project

The Metropolitan Transportation Commission (MTC), in partnership with TransForm will design and implement three mobility hubs at affordable housing developments in Richmond, Oakland, and San Jose. The mobility hubs will include an electric vehicle carsharing program and a mix of additional mobility options based on residents’ needs, such as transit passes and bike sharing. The project team completed a comprehensive transportation needs assessment process in 2020 consisting of surveys, focus groups, and interviews to ensure that the program addresses the unique needs of residents, and continues to adapt considering community challenges with COVID-19.

CARB Contribution: \$3,015,000 Matching Funds: \$755,000

Project Total: \$3,770,000 Location: Richmond, Oakland and San Jose

Ecosystem of Shared Mobility in the San Joaquin Valley – Legacy Project

The San Joaquin Valley Air Pollution Control District is implementing a suite of mobility services in six disadvantaged, rural counties in the San Joaquin Valley. The services include MíoCar, an affordable all electric carsharing and ride sourcing service, with 27 battery electric and plug-in hybrid electric vehicles and 17 chargers at eight affordable housing complexes in Tulare and Kern counties. VAMOS, a Mobility-as-a-Service application, allows residents to efficiently plan trips across counties with different transit services. The app connects residents to MíoCar reservations, VOGO (a volunteer ride-hailing service), bike routes, bus routes, and payment options for transit fares.

CARB Contribution: \$3,119,000 Matching Funds: \$1,311,084

Project Total: \$4,430,084 Location: San Joaquin Valley

Valley Air ZEV Mobility Pilot Project – Legacy Project

The San Joaquin Valley Air Pollution Control District is implementing an advanced clean carsharing and mobility options project that operates in disadvantaged communities within Cantua Creek and Delhi. The funding supports the Electric Vehicle Supply Equipment infrastructure in the San Joaquin Valley, offering participants a combined electric vehicle vanpooling and carsharing service. The project has funded nine electric vehicles, including six Chevy Bolts and three Tesla Model X's, as well as 29-publicly accessible level two chargers and three DC fast chargers. Currently, the project has shut down and will be ending in the next couple of months due to COVID.

CARB Contribution: \$749,800 Matching Funds: \$1,160,300

Project Total: \$1,910,100 Location: San Joaquin Valley

2020 CMO - Community Transportation Needs Assessment Voucher Recipients:

- *City of Fresno Department of Transportation Fresno Area Express*, \$48,430, Fresno
- *Fresno Economic Opportunities Commission*, \$50,000, Del Rey, Firebaugh, Fowler, Kerman, Mendota, Parlier in Fresno County
- *Fresno County Rural Transit Agency*, \$36,885, Biola in Fresno County
- *Fresno Metro Ministry*, \$49,990, Fresno
- *Kern Council of Governments*, \$49,924, Tejon, Tubatulabal; Delano, McFarland, Wasco, Shafter, Taft, Arvin, Buttonwillow, Lamont, Lake Isabella, Bodfish in Kern County

- *Porterville Unified School District*, \$48,802, Porterville in Tulare County
- *The LEAP Institute*, \$50,000, Kettleman City in Kings County

2020 CMO – Mobility Project Voucher Recipients:

- *Fresno Metro Black Chamber Foundation*, \$599,500, “Expansion of E-Bike Services in Fresno,” Fresno
- *San Joaquin Council of Governments*, \$998,614, “Stockton Electric Vehicle Carshare Service,” Stockton and San Joaquin County
- *The LEAP Institute*, \$1 million, “Green Raitero and Green Cruiser Ride Sharing,” Huron in Fresno County

2020 STEP – Planning and Capacity Building Grant Recipients:

- *Circle of Life Development Foundation*, \$200,000, Bakersfield in Kern County

2020 STEP – Implementation Grant Recipients:

- *San Joaquin Council of Governments*, \$7,480,385, South Stockton in San Joaquin County

Southern Region:

L.A. City Carsharing Pilot Project – Legacy Project

The City of Los Angeles, Department of Transportation is implementing a carsharing pilot, known as BlueLA powered by Blink Mobility, that includes the construction and installation of 100 carshare stations with 500 charge ports and operation of an electric vehicle carshare program with 300 electric vehicles in disadvantaged communities within the City of Los Angeles. Through an upcoming expansion, the program will also include a fleet of a least 600 electric bicycles or scooters. BlueLA powered by Blink Mobility currently serves the communities of Westlake, Koreatown, Pico-Union, Downtown, Echo Park, Boyle Heights, and Chinatown, with Phase 2 development planned for additional vehicles in more LA communities scheduled for 2021.

CARB Contribution: \$4,669,343 Matching Funds: \$26,524,394

Project Total: \$31,193,737 Location: Los Angeles

2020 CMO - Community Transportation Needs Assessment Voucher Recipients:

- [ActiveSGV](#), a project of Community Partners, \$50,000, El Monte and South El Monte in Los Angeles County
- [Big Pine Paiute Tribe of the Owens Valley](#), \$50,000, Big Pine Indian Reservation in Inyo County
- [BikeVentura](#), \$49,804, Oxnard in Ventura County
- [CHERP-Locally Grown Power](#), \$50,000, Pomona in Los Angeles County
- [County of San Diego](#), \$49,515, Spring Valley in San Diego County
- [Native American Environmental Protection Coalition](#), \$50,000, Manzanita Reservation in San Diego County
- [Riverside Community College District](#), \$49,530, Riverside City College, Moreno Valley College, Norco College in Riverside County
- [The LEAP Institute](#), \$50,000, Mecca in Riverside County
- [Urban Collaborative Project](#), \$18,750, Chollas View and Ocean View in San Diego County
- [Western Riverside Council of Governments](#), \$48,600, Moreno Valley, Corona, San Jacinto in Riverside County

2020 CMO – Mobility Project Voucher Recipients:

- [Cahuilla Band of Indians](#), \$1 million, "Cahuilla Clean Mobility Project," Cahuilla Band of Indians Reservation, Anza in Riverside County
- [City of Chula Vista](#), \$997,833, "CV Community Shuttle," Senior community in northwest Chula Vista in San Diego County
- [City of National City](#), \$999,996, "FRANC Program," Downtown Transit Centers of National City in San Diego County
- [City of Rialto](#), \$1 million, "Rialto Bike Share Program," Rialto in San Bernardino County
- [City of Riverside](#), \$1 million, "Riverside Clean Air Carshare," Riverside
- [Community Economic Development Corporation and Institute for Maximum Human Potential](#), \$1 million, "SankofaCity: Zero Emissions Multimodal Transportation Ecosystem," Greater Leimert Park Village Crenshaw Corridor, Leimert Park and South Los Angeles
- [Housing Authority of the City of Los Angeles \(HACLA\)](#), \$1 million, "Charging Forward: HACLA's EV Lending Library for Economic Equity," Los Angeles
- [Imperial County Transportation Commission](#), \$998,875, "Calexico Mobility On-Demand," Calexico in Imperial County

- *Los Angeles Cleantech Incubator*, \$926,318, “Zero Emissions Shared Mobility for Rancho San Pedro,” Rancho San Pedro community in Los Angeles
 - *Omnitrans*, \$1 million, “OmniRide Bloomington,” Bloomington area of San Bernardino County
 - *The Energy Coalition*, \$999,972, South El Monte Electric Carshare Program, South El Monte Los Angeles County
 - *Twenty-Nine Palms Band of Mission Indians*, \$993,300, “On-Demand Electric Vehicle Service for the Twenty-Nine Palms Band of Mission Indians’ Reservation,” Coachella in the southern region of the reservation in San Bernardino County
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2020 STEP – Planning and Capacity Building Grant Recipients:

- *Anaheim Transportation Network*, \$200,000, Anaheim in Orange County
- *City Heights Community Development Corporation*, \$199,248, City Heights in San Diego County
- *City of South El Monte*, \$205,108, South El Monte in Los Angeles County
- *Omnitrans*, \$230,500, San Bernardino County

2020 STEP – Implementation Grant Recipients:

- *City of Commerce*, \$3,240,078, Commerce in Los Angeles County
- *Los Angeles Department of Transportation*, \$7,077,770, South Los Angeles in Los Angeles County

Clean Mobility in Schools Projects

Central Region:

Getting Stockton to Zero Emissions: Clean Air for Our Community

The CARB grant will allow the Stockton Unified School District (SUSD) to pursue its goal of becoming California’s first zero-emission school district under its plan “Getting Stockton Schools to Zero Emissions: Clean Air for our Community.” The award will enable the Center for Transportation and the Environment and SUSD to develop a master plan for the entire school district while deploying pilot vehicles on a small scale for testing. These small-scale deployments will inform future adjustments to the district’s master plan. The goal is to use the funding in phases to quickly implement the most significant changes first while creating a master plan to ultimately achieve a fully zero-emission school district in the most effective way possible. The project will provide significant positive community health impacts and

dramatically reduce the use of fossil fuels while providing opportunities to communicate these results to the community and the district's students.

CARB Contribution: \$4,938,491 Matching Funds: \$0

Project Total: \$4,938,491 Location: San Joaquin County

Southern Region:

Clean Mobility in Schools Pilot Grant

The Lincoln High School Clean Mobility in Schools Pilot Project (Pilot) takes place in the Lincoln High School cluster area. The Pilot creates transformative, synergistic emissions reduction strategies for the school's transportation options and positively impact the air quality in the area. The goal is to increase the visibility of and access to zero-emission transportation options by placing commercially available zero-emission technologies and supporting charging infrastructure in the school. The program will also benefit the Lincoln High School's feeder elementary and middle schools located within the area. The project includes: one battery electric food delivery truck and one food serving vehicle; a variety of zero-emission landscape and custodial equipment including maintenance vehicles and crew trucks, power washers, mowers, and more; two zero-emission carpool vehicles; 13 battery electric school buses with managed charging stations, vehicle-to-grid capability and two battery storage units; a robust public education effort to support behavior changes for students, parents and staff; two electric bicycle sharing projects for senior students and teachers; and a replicable template for other districts to use for implementing similar projects.

CARB Contribution: \$9,775,349 Matching Funds: \$176,600

Project Total: \$9,951,549 Location: San Diego County

A Transformative Clean Mobility Pilot: Connecting Research, Education, and Community in a Disadvantaged School District

The El Monte Unified High School District's project will transform mobility at the school sites by adding 11 new zero-emission buses to the fleet, allowing the District to serve more students; develop a pilot, entrepreneurial clean mobility Career Technical Education curriculum; plan for more holistic, active transportation to ensure safety as well as improve congestion from pedestrians, bike share, and car share; add new motor pool vehicles and maintenance vehicles that run on battery or electric power to improve efficiency and reduce reliance on gasoline use; and enable onsite energy storage that ties into the District's existing solar system so operational demand costs can be reduced long-term.

CARB Contribution: \$9,847,660 Matching Funds: \$36,100

Project Total: \$9,883,760

Location: Los Angeles County

Heavy-Duty Projects

Statewide:

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 that 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.

Project Total: \$61,550,000

Location: Statewide

Cross Regional:

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

The purpose of the FCEBCC project is to help accelerate the commercialization of zero-emission buses. To realize near- and long-term commercialization goals and to establish fuel cell electric buses as an industry standard, the unit cost of fuel cell electric buses will have to decrease significantly and more transit agencies will have to deploy these vehicles in revenue passenger service. Accelerating the commercialization of fuel cell electric buses will provide important air quality benefits to communities most impacted by pollutant emissions from conventionally fueled transit vehicles. The FCEBCC addressed these initial challenges by building 20 fuel cell electric buses through an industry collaboration between New Flyer and Ballard Power Systems for deployment at Alameda-Contra Costa Transit and Orange County Transit Authority. Messer, LLC, Trillium and Air Products provided reliable hydrogen fuel supply and fueling technology capable of meeting the demands of the transit industry.

CARB Contribution: \$22,267,218 Matching Funds: \$22,981,357

Project Total: \$45,248,575

Location: Alameda, Contra Costa and Orange Counties

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

Flexible Solutions for Freight Facilities, a BNSF-led project, demonstrated zero and near-zero emission technologies on locomotives and around rail yards. Wabtec designed, manufactured, and commissioned a single Battery Electric Locomotive (BEL) used within a diesel consist (multiple locomotives providing tractive effort) running between Stockton and Barstow in commercial operations. The BEL improved fuel efficiency averaged 12% improvement while reducing criteria pollutant and greenhouse gas emissions compared to a conventional diesel. The project also includes two hybrid-electric rubber-tired gantry cranes, a battery-electric side loader and a battery-electric drayage truck operating at the rail yards in Stockton and San Bernardino.

CARB Contribution: \$22,616,647 Matching Funds: \$22,620,673

Project Total: \$45,237,320 Location: Stockton and San Bernardino

California Collaborative Advanced Technology Drayage Truck Demonstration Project

Class 8 heavy-duty on road trucks used to transport cargo to or from California's ports and intermodal rail yards comprise this portfolio of commercially promising zero- and near-zero emission truck technologies. These trucks will demonstrate the practicality and economic viability of zero- and near-zero emission technology operating in revenue service in and around the Ports of Long Beach, Los Angeles, Oakland, Stockton and San Diego. Included as part of this project, installation of charging infrastructure will enable safe charging of the trucks for statewide demonstration. The project has four original equipment manufacturers participating: BYD Motors, Kenworth Truck Company, Peterbilt Motors and Volvo Technology of America, LLC.

CARB Contribution: \$23,658,500 Matching Funds: \$16,463,972

Project Total: \$40,122,472 Loc.: Port of Long Beach, LA, Stockton, Oakland, San Diego

Fast-Track Fuel Cell Truck Project

Gas Technology Institute and its technology partner, TransPower, will deploy a total of five plug-in hybrid fuel cell-electric Class 8 trucks in Southern California, operated by a major truck fleet operator in a phased rollout. Three phase 1 trucks built on 2013 model year Navistar ProStar chassis and two phase 2 trucks built on 2020 model year Peterbilt chassis will be operated at the Port of Los Angeles by Total Transportation Services Inc., and by TransPower in the San Diego region. The plug-in hybrid fuel cell-electric trucks will be supported by charging and mobile hydrogen fueling infrastructure (tube-trailer) at the Port of Los Angeles, in the San Diego region and at public hydrogen stations. Frontier Energy will

coordinate training, data collection and reporting, and Center for Sustainable Energy will coordinate local community outreach.

CARB Contribution: \$5,081,478 Matching Funds: \$1,139,950

Project Total: \$6,221,428 Location: Port of Los Angeles and the San Diego Region

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 oxides of nitrogen (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 engine, largely developed by Achatas Power, Inc., and the ultralow NOx after treatment system developed by Southwest Research Institute.

CARB Contribution: \$6,994,601 Matching Funds: \$9,705,267

Project Total: \$16,699,868 Location: Central Valley and Los Angeles Area

Sustainable Terminals Accelerating Regional Transformation (START) Project Phase 1

The Port of Long Beach and along with other partners are a pioneering demonstration of a multi-region, zero- and near-zero-emission supply chain that advances the California Sustainable Freight Action Plan and showcases emission reduction strategies replicable throughout freight facilities. START demonstrates sustainable supply chains of the future: containers delivered by the world's cleanest vessels, loaded onto zero-emission (ZE) yard tractors, handled by ZE top handlers and rubber-tired gantry cranes (RTGs) and transferred to ZE trucks and off-dock cargo-handling facilities. START deploys 102 zero- or near-zero-emission vessels and cargo handling equipment units including: the nation's largest deployment of electric RTGs, the largest fleet of ZE yard tractors at a single port terminal, and the first deployment of 36,000-lb electric forklifts.

CARB Contribution: \$50,000,000 Matching Funds: \$54,988,249

Project Total: \$104,988,249 Location: Port of Long Beach, Oakland and Stockton

Northern Region:

Next Generation Fuel Cell Delivery Van Deployment

The project team, led by the Center for Transportation and the Environment, will build and demonstrate four fuel cell hybrid-electric walk-in delivery vans featuring Linamar's new Gen 2.0 eAxle 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 reductions. The demonstration will generate performance data that will be analyzed to determine the project's effectiveness in meeting its objectives.

CARB Contribution: \$5,831,866 Matching Funds: \$5,838,236

Project Total: \$11,670,102 Location: West Sacramento

*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 illustrated 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. 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.

CARB Contribution: \$7,535,643 Matching Funds: \$6,949,826

Project Total: \$14,485,469 Location: Greater Sacramento Region

Coastal Region:

*Goodwill Industries Electric Delivery Vehicle Project**

The Bay Area Air Quality Management District partnered with Goodwill Industries of San Francisco, San Mateo, and Marin to showcase the viability of heavy-duty electric trucks – the first of its kind being demonstrated in the U.S. by deploying 10 battery-electric delivery trucks, one battery-electric debris hauler, and supporting electric charging infrastructure for the 11 vehicles. The vehicles were manufactured by Build Your Dreams (BYD) Motors at its facility in Lancaster, California. The Center for Transportation and the Environment developed the deployment strategy, considering expected vehicle operation times, charging schedules and times, and the expected electrical costs.

CARB Contribution: \$2,738,557 Matching Funds: \$1,697,362

Project Total: \$4,435,919 Location: San Francisco, San Mateo and Marin

Zero-Emission Hydrogen Ferry Demonstration Project

This project funds the development, construction, and demonstration of "Sea Change," an electric ferry powered by hydrogen fuel cells. The project serves to demonstrate the use of an electric ferry powered by hydrogen fuel cells for passenger and freight service. Its demonstration will take place on San Francisco Bay and will operate between Ports of San Francisco and Oakland. It will also demonstrate several operations, including sightseeing and education trips on San Francisco Bay.

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

Project Total: \$5,465,000 Location: Ports of San Francisco and Oakland

Central Region:

Frito-Lay Zero- and Near-Zero Emission Project

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. This will transform the 500,000-square-foot Modesto manufacturing site, one of Frito-Lay's largest in the United States. Frito-Lay aims to replace all its existing diesel-powered freight equipment at this facility with zero-emission and near-zero emission technologies.

CARB Contribution: \$15,382,243 Matching Funds: \$15,450,257

Project Total: \$30,832,500 Location: Modesto

*The Green On-Road Linen Delivery Project**

The San Joaquin Valley Air Pollution Control District project was 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 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.

CARB Contribution: \$7,125,515 Matching Funds: \$5,818,168

Project Total: \$12,943,683 Location: Stockton, Merced, Fresno and Bakersfield

Net-Zero Farming and Freight Facility Demonstration Project

Through this project, five zero-emission, all electric battery Class 8 trucks with all-electric transport refrigeration units will be delivered to the main demonstration site, Moonlight Companies in Reedley, California. The electric transport refrigeration units will operate 100 percent of the time within a disadvantaged community based on Cal Enviro Screen 3.0. Project Clean Air, Inc., as the lead applicant, has partnered with HummingbirdEV, Moonlight Companies and TechTruth Consulting to create the Net-Zero Farming and Freight Facility Demonstration Project.

CARB Contribution: \$3,283,735 Matching Funds: \$3,283,735

Project Total: \$6,567,470 Location: Reedley

Porterville Transit Electrification

The City of Porterville purchased and operates 10 GreenPower Motor Company EV350 40-foot zero-emission all-electric transit buses on all nine Porterville Transit fixed routes based from the Porterville Transit Center. To accommodate the 10 zero-emission buses, the City of Porterville installed two 200 kilowatt hour (kWh) opportunity chargers at the Transit Center and ten depot 200 kWh chargers at the bus yard. All the miles traveled are in disadvantaged communities.

CARB Contribution: \$9,516,422 Matching Funds: \$7,437,280

Project Total: \$16,953,702 Location: Porterville

San Joaquin Valley Electric Tractor Development & Demonstration

Project Clean Air, Inc. has partnered with HummingbirdEV, Moonlight Companies, Fresno State Transportation Institute, Fresno State Ag Farm, and Kings River Tractor to create the San Joaquin Valley Electric Tractor Development and Demonstration project. Through this project, four zero-emission, all battery-electric 50 HP tractors, one zero-emission and all battery-electric Class 6 trucks have been delivered to the main demonstration site, Moonlight Companies in Reedley, CA. Moonlight will work with 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-emission vehicles.

CARB Contribution: \$1,500,000 Matching Funds: \$792,054

Project Total: \$2,292,054 Location: Reedley

*The 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 serves as a regional-scale deployment to show that California-made battery electric transit buses better serve communities' transit needs, substantially reduce greenhouse gas emissions, 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.

CARB Contribution: \$13,414,215 Matching Funds: \$8,764,606

Project Total: \$22,178,821 Location: City of Visalia, City of Modesto, Fresno County

San Joaquin Valley Zero-Emission Cargo Handling Demonstration Project

The San Joaquin Valley Zero-Emission Cargo Handling Demonstration 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 greenhouse gas 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.

CARB Contribution: \$772,555 Matching Funds: \$403,540

Project Total: \$1,176,095 Location: Port of Stockton

*United States Postal Service Advanced-Drive Transport and Delivery Vehicle Demonstration**

The San Joaquin Valley Air Pollution Control 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. Seven step-

vans were built and provided by Motiv Power Systems and eight from Cummins Electrified Power. During the project the USPS operated step-vans on routes of 50 to 75 miles with frequent stops.

CARB Contribution: \$4,555,670 Matching Funds: \$2,222,903

Project Total: \$6,778,573 Location: Stockton and Fresno

Southern Region:

Capture and Control System for Oil Tankers Project

The South Coast Air Quality Management District is implementing this project is to design, develop, safely demonstrate the capture and control system that reduces oxides of nitrogen, particulate matter 2.5, reactive organic gases, toxic air contaminants, and diesel particulate matter (PM) from both the auxiliary engines and boiler of oil tankers. The project includes an innovative barge-based capture and control system design, including a self-propelled spud-barge platform, an exhaust capture system, purification units, carbon-capture, solar, battery storage, and fuel cell/hydrogen storage. The fuel used to power the barge and the capture and control system will be either renewable or zero-carbon fuel, which mitigates greenhouse gas emissions from this operation. This project will address the unique safety requirements for oil tanker vessels. The capture and control system will be deployed at the Port of Long Beach, a disadvantaged community. It is expected to provide emission reduction benefits to the disadvantaged communities surrounding the San Pedro Bay Ports in the South Coast Air Basin.

CARB Contribution: \$10,000,000 Matching Funds: \$3,349,000

Project Total: \$13,349,000 Location: Port of Long Beach

The Commercialization of POLB Off-Road Technology (C-PORT) Demonstration

The C-PORT Project is the first ever grant funded zero-emission human-operated cargo-handling equipment demonstration at the Port of Long Beach. The C-PORT project included the deployment of three battery-electric top handlers, one battery-electric yard tractor, and all associated charging infrastructure at two terminals in the Port complex. The Port of Long Beach, in partnership with SSA Marine and Long Beach Container Terminal, demonstrated four never-before-tested battery electric units at the Pier E and Pier J container terminals. This demonstration project tested the performance capability of pre-commercial zero-emission cargo-handling equipment in one of the most challenging duty cycles across two terminals. C-PORT also included important workforce development, community education and data collection and analysis aspects that ensured a variety of stakeholders were aware of, and engaged in, this important zero-emission transformation at the Port of Long Beach.

CARB Contribution: \$5,249,820 Matching Funds: \$2,532,266.74
Project Total: \$7,782,086.74 Location: Port of Long Beach

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

The project team, led by the Center for Transportation and the Environment, 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.

CARB Contribution: \$6,508,543 Matching Funds: \$2,366,159
Project Total: \$8,874,702 Location: Port of Los Angeles

Fuel Cell Hybrid Electric Delivery Van Deployment

The project team, led by the Center for Transportation and the Environment, is building and demonstrating 15 additional fuel cell hybrid electric delivery vans based upon their first prototype built in partnership with the U.S. Department of Energy. The fuel cell hybrid electric delivery van powertrain is being provided by Unique Electric Solutions and fully integrated by W.W. Williams; University of Texas – Center for Electromechanics is providing consultation into the fuel cell and hydrogen system integration; Cummins/Hydrogenics is supplying each of the 30 kilowatt fuel cell engines; and hydrogen fuel will be provided at the Shell fueling station local to the United Parcel Service's (UPS) customer center in Ontario, California where the vehicles will be demonstrated in regular UPS delivery service for one year.

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

Joint Electric Truck Scaling Initiative (JETS)

With the increased availability of commercial, CARB certified Class 8 battery electric trucks, there is greater interest in learning about the feasibility of large-scale truck deployments at a single fleet. JETS is one of the first pilot projects to be funded in California which will provide fleets with guidance and lessons learned to successfully carry off a large scale 100 battery electric trucks and infrastructure deployment and enable more fleets to transition to zero-emission technologies. Battery-electric trucks in this project will have a minimum daily

range of at least 200 to 250 miles on a single charge and most trucks will be in drayage service, with some in short regional haul service. Ancillary support services such as networking software for charger management, demand response, and fleet uptime and reliability, complete battery-electric trucks maintenance service plans, as well as solar and energy storage to offset demand charges, will enable fleets to utilize these trucks to meet revenue service needs.

CARB Contribution: \$16,019,316 Matching Funds: \$46,824,684

CEC Contribution: \$10,964,955

Project Total: \$73,808,956 Location: Ontario and South El Monte

*Multi-Class Heavy-Duty Zero-Emission Truck Development Project for Intermodal and Warehouse Facilities**

This project is demonstrating a total of 26 battery electric yard trucks and service trucks at three best in class freight facilities. Ten trucks are deployed at each of two BNSF Railway intermodal facilities: San Bernardino and Los Angeles. An additional three trucks are deployed at a new Daylight Transport facility in Fontana. All three of these locations are in the top 10% of disadvantaged communities according to Cal Enviro Screen 2.0. The technology demonstrators are leaders in the industry and a successful demonstration could lead to broader adoption at other BNSF and Daylight facilities in California. It could also accelerate electric truck adoption at the ports, other intermodal railyards, and freight support facilities in California and the rest of North America.

CARB Contribution: \$9,100,800 Matching Funds: \$10,216,172

Project Total: \$19,316,972 Location: San Bernardino, Los Angeles and Fontana

Multi-Source Green Omni Terminal Project

A cornerstone of the San Pedro Bay Ports' Clean Air Action Plan (CAAP) is the Technology Advancement Program established to facilitate the development and demonstration of clean technologies to support CAAP goals. To achieve the scale of technology development for a zero-emission transformation, the San Pedro Bay Ports have needed to move beyond the small-scale projects to larger operational scale and multi-source projects, benefitting from local, state and federal grants. The Port of Los Angeles Multi-Source Green Omni Terminal Project is one such project. This project has allowed the Port of Los Angeles and the Pasha terminal to demonstrate various prototype zero emission cargo handling equipment, heavy duty vehicles, and an emissions capture system in a live terminal setting--demonstrating the challenges with deploying prototype equipment.

CARB Contribution: \$14,510,400 Matching Funds: \$12,092,000

Project Total: \$26,602,400

Location: Port of Los Angeles

Port of Los Angeles "Shore to Store" Project

The Port of Los Angeles and its partners are implementing 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 have been developed through a collaboration between Kenworth Truck Company and Toyota Motor North America. Several trucks are in the process of being deployed to project partner fleets. Second, Shell Oil North America has built two large capacity hydrogen fueling stations, and will oversee operations 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.

CARB Contribution: \$41,122,260 Matching Funds: \$41,426,612

Project Total: \$82,548,872

Location: Port of Los Angeles

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

SunLine Transit Agency provides transit service throughout the Coachella Valley and is a leader in zero-emission bus technology. With this project, Sunline added five new fuel cell electric buses to their existing fleet of alternative fuel buses, which also includes battery electric buses. The project upgraded SunLine's existing hydrogen fueling station in Thousand Palms, California, with a new electrolyzer hydrogen production plant, supporting compression and storage equipment, and two new hydrogen fuel dispensers. With this station upgrade, SunLine is now able to refuel its current fleet of 17 fuel cell electric buses (FCEBs) with capacity to spare for several additional FCEBs. New Flyer provided the XHE40 Xcelsior® FCEBs, Nel supplied the electrolyzer and hydrogen station equipment and oversaw the installation, and Zen Clean Energy Solutions assisted with project management and data collection.

CARB Contribution: \$12,586,791 Matching Funds: \$6,166,424

Project Total: \$18,753,215

Location: Coachella Valley

Volvo Low Impact Green Heavy Transport Solutions (LIGHTS) Project

South Coast Air Quality Management District partnered with Volvo Group North America to conduct a freight facility project that will realize commercialization and market penetration of heavy-duty battery electric trucks in California and throughout North America. Volvo, a major heavy-duty original equipment manufacturer, will be partnering with some of the top fleet and industry leaders to reduce emissions at warehouses and freight facilities in disadvantaged communities using zero-emission on- and off-road equipment and through warehouse energy efficiency improvements. This project is scalable and replicable to reduce emissions throughout the goods movement system. The Volvo LIGHTS project seeks to achieve emission reductions and deploy pre-commercial and commercial zero-emission technologies, including Volvo's North American market introduction of Class 8 battery-electric trucks.

CARB Contribution: \$44,839,686 Matching Funds: \$45,855,308

Project Total: \$90,694,994 Location: Port of Long Beach and Los Angeles

Zero-Emission Beverage Handling and Distribution at Scale Project

The project is deploying 21 BYD Class 8 Day Cab trucks and charging infrastructure in beverage handling and distribution services at three Anheuser-Bush 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 demonstrates how to reach zero-emissions across the range of activities at Anheuser-Bush distribution facilities with minimal modifications to fleet logistics.

CARB Contribution: \$5,530,303 Matching Funds: \$5,795,866

Project Total: \$11,326,169 Location: Los Angeles Region

Zero Emissions for California Ports

Yard trucks are the single largest source of emissions in all classifications of cargo handling equipment but are difficult to convert to zero-emission due to the unique duty cycle and operating environment. The project is intended to demonstrate to port terminal operators that fuel cell powered, zero-emission yard trucks are a safe, reliable, and operationally preferable solution to meet the port's clean air action plan. This project will deploy two hybrid fuel cell-electric yard trucks at the Port of Los Angeles. These yard trucks will be fueled on-site with a stationarity-placed mobile fueler.

CARB Contribution: \$5,788,335 Matching Funds: \$6,017,078
Project Total: \$11,805,413 Location: Port of Los Angeles

*Projects have been completed