

EL MONTE UNION HIGH SCHOOL DISTRICT
**CLEAN MOBILITY
IN SCHOOLS** PILOT
PROJECT



Final Project Report

March 2024



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Executive Summary

Nestled in the heart of California's San Gabriel Valley and situated 15 miles to the east of Downtown Los Angeles, El Monte Union High School District (EMUHSD) dedicates itself as an educational learning space to the well-being of its students, employees, and broader community and to clean mobility. EMUHSD serves approximately 8,000 students across six (6) high schools and operates one of California's largest adult education schools open since 1932. All of EMUHSD schools rank in the top 25% of disadvantaged communities and experience outsized pollution burdens—between the 85th-100th pollution burden percentiles¹.

The transportation of students from kindergarten through 12th grade produces emissions, criteria pollutants, and toxic air contaminants². Overall, transportation accounted for 39% of carbon emissions in California³. The California Air Resources Board (CARB) launched *The Clean Mobility in Schools Pilot Project* grant program and offered up to \$10 million in funding for school communities to adopt new mobility and zero-emission technologies to reduce transportation-related harms facing school districts and their local communities. In response to this opportunity, the District proposed the \$9.8 million project, *A Transformative Clean Mobility Pilot: Connecting Research, Education, and Community in a Disadvantaged School District*. The project aimed to revolutionize mobility at the school sites by adding new zero-emission transportation technologies, developing more holistic active transportation modules, enhancing workforce development opportunities, all while building student and community support around the advancement and adoption of zero-emission transportation options through outreach and education. Through the CARB grant, the District aimed to facilitate deeper community involvement in the green economy by exposing and educating students to career opportunities surrounding the evolving energy and transportation sectors.

In face of the rippling effects of a global pandemic and expected and unexpected project delays, the District accomplished the extraordinary. Through the project, the District was able to integrate eleven (11) electric school buses, eleven (11) electric maintenance vehicles, and six (6) light-duty passenger vehicles into its transportation fleet. These zero-emission vehicles were supported by the installation of fifteen (15) fast and high-power chargers and five (5) battery energy storage systems. Further, the project deployed a large-scale community-focused communications and marketing campaign. The campaign encompassed surveys, public outreach efforts, press releases, interviews, presentations, and even an animation, clean jobs video, and large-scale mural about the project that were created in partnership with two-time Pulitzer Prize finalist Lalo Alcaraz. The project was no small undertaking, but it accomplished an incredible task: *transforming the lives of thousands of students and community members*.

Background

About the District

Founded in 1901, El Monte Union High School District lies in the heart of the San Gabriel Valley and has close ties and working relationships with the community in which it serves. The District has six (6) high schools and one of the state's largest and most respected adult programs. A total of 8,000 students in grades 9-12 and another 11,000 in adult education are served by the District annually with 88.2% of students receiving free or reduced-price meals in one of the state's most disadvantaged communities.

¹ CalEPA | California Environmental Protection Agency. (n.d.). *California Climate Investments to Benefit Disadvantaged Communities*. CA.gov. <https://calepa.ca.gov/envjustice/ghginvest/>

² Electric School Bus Initiative. (2022, October 17). *Why We Need to Transition to Electric School Buses*. [electricschoolbusinitiative.org. https://electricschoolbusinitiative.org/why-we-need-transition-electric-school-buses](https://electricschoolbusinitiative.org/why-we-need-transition-electric-school-buses)

³ California Air Resources Board. (2023). *California Greenhouse Gas Emissions from 2000 to 2021: Trends of Emissions and Other Indicators*. https://ww2.arb.ca.gov/sites/default/files/2023-12/2000_2021_ghg_inventory_trends.pdf

According to California Senate Bill 535 (SB 535), disadvantaged communities are areas “(1) disproportionately affected by pollution and environmental hazards and (2) with socioeconomic vulnerability based on census tracts with high amounts of pollution and low populations.”⁴ In light of this designation, the CalEnviroScreen Tool categorizes these geographic areas as disadvantaged when census tracts receive the highest 25% of overall metric indicator scores. Every single El Monte Union High School District school site is in the top 25% of disadvantaged communities⁵.

As depicted in Table 1, each school and their surrounding neighborhoods are in high pollution burden areas. Factors such as particulate matter 2.5 (PM 2.5) and diesel particulate matter exposure threaten our community’s health and wellbeing on a daily basis⁶. The District’s community has a high share of people ages 25 years or older whose level of education is less than a high school diploma, stretching the District’s resources to provide services to adult students.

TABLE 1: HIGH POPULATION AND POLLUTION BURDEN PERCENTILES IN DISTRICT NEIGHBORHOODS AND SCHOOLS, CALENVIROSCREEN 4.0

<i>Neighbor- hood</i>	<i>School</i>	<i>Poverty</i>	<i>Education</i>	<i>Asthma</i>	<i>Heart Disease</i>	<i>PM 2.5</i>	<i>Diesel Particulate Matter Exposure</i>	<i>Traffic Impact</i>	<i>Pollution Burden</i>
El Monte		83 rd	95 th	55 th	41 st	78 th	80 th	88 th	99 th
	El Monte	83 rd	95 th	55 th	40 th	78 th	80 th	88 th	99 th
	Mountain View	84 th	92 nd	81 st	69 th	81 st	76 th	32 nd	95 th
	Arroyo	77 th	85 th	50 th	20 th	80 th	76 th	62 nd	85 th
	Ledesma	50 th	75 th	75 th	75 th	78 th	96 th	92 nd	100 th
North El Monte		63 rd	41 st	7 th	1 st	73 rd	37 th	27 th	90 th
South El Monte		78 th	93 rd	75 th	75 th	76 th	78 th	92 nd	100 th
	South El Monte	50 th	75 th	75 th	75 th	71 st	85 th	61 st	98 th
Rosemead		67 th	78 th	35 th	30 th	71 st	85 th	61 st	98 th
	Rosemead	67 th	78 th	35 th	30 th	71 st	85 th	61 st	98 th

Figure 1 depicts the summary of this data, as mapped by the CalEnviroScreen 4.0 tool for El Monte Union High School District schools. The impact of transportation on high pollution burden percentiles throughout the District cannot be overstated. Indeed, the transportation of children and youth to and from kindergarten through 12th grade (K-12) schools produces greenhouse gas (GHG) emissions, criteria pollutants, and toxic air contaminants⁷. CARB has identified approximately “200 pollutants as air toxics,” estimating that

⁴ *Final Designation of Disadvantaged Communities Pursuant to SB 535*. Oehha.ca.gov. (2022, May). <https://oehha.ca.gov/calenviroscreen/sb535>

⁵ California Office of Environmental Health Hazard Assessment. (2021). *CalEnviroScreen 4.0*. CA.gov. <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>

⁶ California Office of Environmental Health Hazard Assessment. (2024). *Diesel Particulate Matter*. CA.gov. <https://oehha.ca.gov/calenviroscreen/indicator/diesel-particulate-matter>

⁷ Electric School Bus Initiative. (2022, October 17). *Why We Need to Transition to Electric School Buses*. ElectricSchoolBusInitiative.org. <https://electricschoolbusinitiative.org/why-we-need-transition-electric-school-buses>

the “total cancer risk from all air toxics is 730 per million.”⁸ Diesel particulate matter is estimated to account for 520 per million of total cancer risk.⁹ For these reasons, District investments in climate change mitigation is a steadfast driver towards positive change for the El Monte Union High School District community.

The negative impacts of transportation on District students and community members, as reflected in high traffic impact percentiles above, are further compounded by insufficient mobility funds. This is additionally visible in the District’s historic bus deficit, restricting our ability to provide transportation for students in the community—thereby adding increased pressure on families, traffic congestion, and air quality challenges. As of 2019, the District was maximizing funds to lease buses from another school district over 70 miles away—all while remaining steadfast in efforts to secure a long-term plan to address this deficiency. The District also lacked charging infrastructure to support student, workplace, and fleet charging as well as a need to perform pedestrian, bike, and parent pickup mobility for the student population and for safety. The particular makeup of our student body and community, along with the District’s underfunded mobility operations, required a customized and groundbreaking solution.

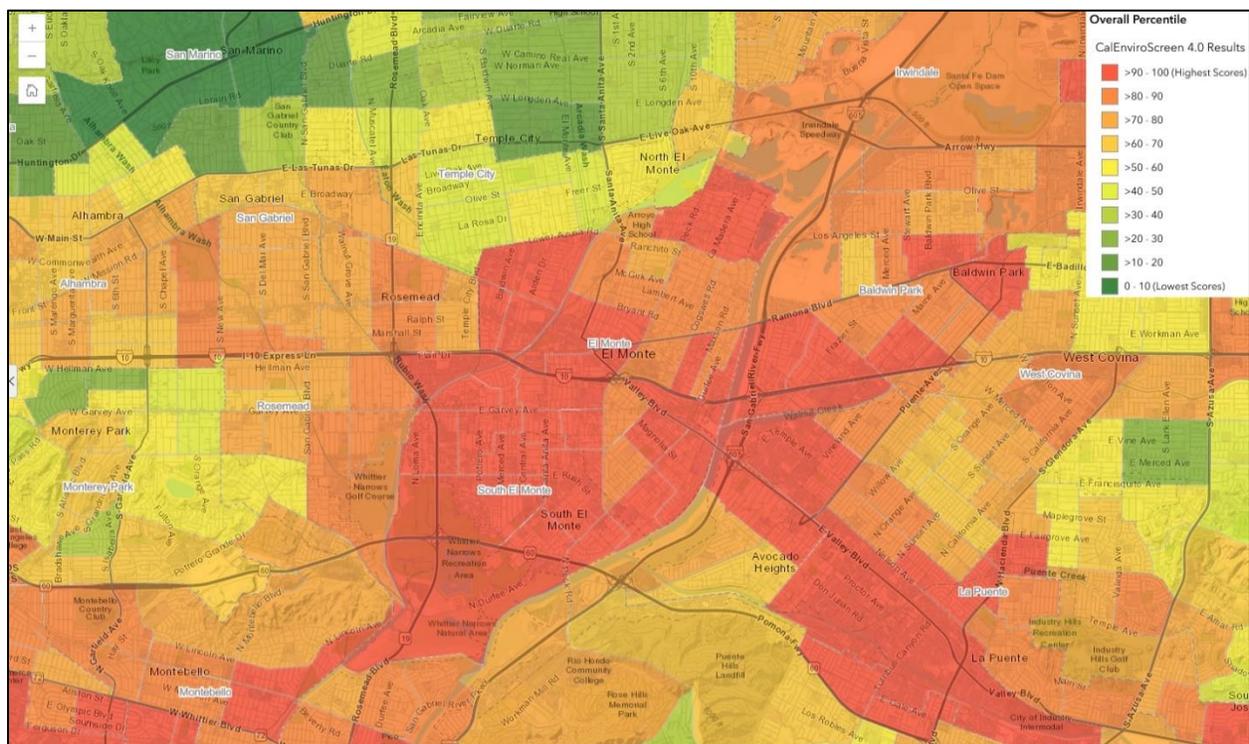


FIGURE 1: CALENVIROSCREEN 4.0 POLLUTION BURDEN OF DISTRICT

As a community institution serving a disadvantaged population, the District considers all the environmental, economic, and physical realities present in our community. Transportation options and climate change are major factors in the holistic wellbeing of those we serve. The District has strategically pursued incentives that would fund foundational infrastructure to support current and upcoming interventions to reduce emissions and increase mobility. The District is proud of its history of working to reduce emissions and improve energy efficiency onsite through fantastic program efforts like Proposition 39 Bond Program¹⁰,

⁸ State of California. (2024). *California Air Resources Board*. Health & Air Pollution | California Air Resources Board. <https://ww2.arb.ca.gov/resources/health-air-pollution>

⁹ Ibid.

¹⁰ California Association of Bond Oversight Committees. (n.d.) *Proposition 39*. bondoversight.org. <https://www.bondoversight.org/california-proposition-39/>

Charge Ready Program from Southern California Edison¹¹, and the \$11 million Clean Renewable Energy Bonds (CREBs) funded 2.76 MW solar installation. These programs allowed the District to build up a resume of experience in the clean energy sector and funding landscape and added to the District's previous recognition as a Green Ribbon School District and Energy Star leader.

Goals and Objectives

The District shares California's climate goals to address and mitigate climate change and safeguard the environment and residents' health. The District is uniquely posed to take on this challenge as we were desperately in need of mobility options and are disproportionately impacted by air pollutants. *The Clean Mobility in Schools Pilot Project* grant was created by CARB and offered up to \$10 million in funding for school communities to showcase their ability to create meaningful spaces that inspire future generations, realize impactful air quality improvements, and develop real solutions to the climate crisis. To develop a functional transportation system that facilitates GHG emissions reductions and support communities through public health, environmental, and economic improvements, the District proposed the project, *A Transformative Clean Mobility Pilot: Connecting Research, Education, and Community in a Disadvantaged School District*.

The *A Transformative Clean Mobility Pilot* envisioned transformative, synergistic emissions reduction strategies to expand community engagement, job creation, and education in our community. The project's goal was to increase the visibility and accessibility of zero-emission transportation options by deploying zero-emission technologies, along with supporting charging/fueling infrastructure, in one or more schools. The cornerstone of the project was to achieve these goals by facilitating community involvement in the green economy. From start to finish, community needs were central to project design and success. This holistic approach offered residents educational and economic advancement through workforce development opportunities, exposure to new and cutting-edge technologies, and targeted curriculum incorporation to support the next generation of innovative thinkers.

The project aimed to deploy new zero-emission school buses to the operating fleet—allowing the District to serve more students; plan for holistic active transportation infrastructure to improve safety congestion for pedestrians, bikers, and drivers; add new motor pool vehicles and maintenance vehicles that are battery electric 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. The project also incorporated a large communications and training initiative that allowed the District to spread news and updates about the project throughout the community. Further, a workforce training component of the project is significant as the District will be shaping the minds of our students as well as those who seek placement services in our community—building awareness of zero-emission transportation and creating workforce pathways.

Overall, the *Transformative Clean Mobility Pilot* set out to incorporate innovative and necessary mobility enhancements that would provide a showcase around the world of what can be possible to transform transportation at schools. While community awareness of zero-emission technologies somewhat existed before this project, through the support of project partners and by implementing the project objectives, the District would be able to transform the sentiments of our students, families, and community and not only be a leader for broader adoption but meet one of CARB's main goals of creating meaningful spaces that inspire future generations.

¹¹ Southern California Edison. (n.d.) *Charge Ready*. sce.com. <https://www.sce.com/evbusiness/chargeready>

Project Partners

A project of this magnitude required multiple project partners to effectively meet project goals and the specific needs of our community. To aid in this effort, the District engaged the following partner organization listed in Table 2 and outlined in Figure 2. Every project agency partner was key to the successful design planning and execution of the *A Transformative Clean Mobility Pilot*.

TABLE 2: LIST OF PROJECT PARTNERS AND RESPECTIVE PROJECT ROLES

Project Partner	Role
<p>California Air Resources Board (CARB)</p> 	<p>CARB was an essential part of the project, advising and supporting the District's efforts to achieve grant goals and reporting requirements. In fact, CARB generously hosted a student field trip at their Riverside Headquarters as part of the clean-energy curriculum instituted through the project.</p>
<p>El Monte Union High School District</p> 	<p>As the Grantee, El Monte Union High School District oversaw the grant, program, and construction tasks. The District further provided overall operational guidance on electric vehicle school buses and passenger vehicles, including installation and access to transportation maintenance teams. Finally, District representatives coordinated with various partners to engage student and teachers throughout the project, specifically, with respect to the zero-emission technology curriculum development.</p>
<p>Gladstein, Neandross & Associates (GNA)</p> 	<p>GNA (a TRC company) specializes in providing technical assistance and project development for advanced energy, transportation, and air quality projects. For this project, GNA used their technical expertise in research, development, and demonstration of advanced alternative fuel technologies. GNA functioned as collaborative support for the District, working to coordinate partner communication, ensure the District met reporting requirements, and store records for lifecycle of the grant.</p>
<p>Rio Hondo Community College (Rio Hondo College)</p> 	<p>Rio Hondo College is a comprehensive community college in the El Monte area and a natural partner for the District's educational efforts. Rio Hondo College oversaw curriculum advancement in El Monte Union High School District classrooms, finding and creating opportunities to expand the current curriculum.</p>
<p>Fehr & Peers (F&P)</p> 	<p>F&P is a Technical Partner providing transportation planning and engineering consulting through innovation and creativity with active transportation as a core competency. Developed active transportation plans with recommendations and conducted outreach and engagements as part of project.</p>
<p>San Gabriel Valley Conservation Corps.</p> 	<p>San Gabriel Valley Conservation Corps. provides environmental conservation education and job training, to develop an Individualized Service Plan (ISP) outlining the goals and implementation plan for the Clean Energy Fellow. This included conducting Career Development and Job Readiness programming such as workshops on communication, problem solving, and resume and interviewing skills.</p>

Project Partner	Role
<p data-bbox="245 327 566 390">Shell Recharge Solutions (Shell)</p> 	<p data-bbox="634 365 1417 516">Shell, previously Zeco Systems Inc. DBA Greenlots, seeks to accelerate the journey to net zero and support partners, businesses, and drivers in their switch to electric mobility. Shell was also responsible for charging the infrastructure equipment and network maintenance for the project.</p>
<p data-bbox="228 558 583 590">ENGIE Services U.S. (Engie)</p> 	<p data-bbox="634 579 1417 789">Engie, a national energy infrastructure and building services company, helps education, government, commercial and industrial customers become more efficient and sustainable. The El Monte Union High School District employed Engie to design, construct, install, and connect the battery energy storage system to the District’s solar energy generation panels and manage the battery storage system.</p>
<p data-bbox="272 842 537 873">AtoZ Bus Sales (A-Z)</p> 	<p data-bbox="634 814 1417 1024">A-Z guided the purchase and deployment of battery-electric vehicles. After assessing information from A-Z, the District secured electric carshare passenger vehicles from Chevrolet (Chevy), and school buses from Blue Bird and Micro Bird. A-Z was additionally responsible for maintenance requests and repairs throughout the project as well as supporting subsequent diagnostic analytics related to equipment failures along with other partners.</p>
<p data-bbox="256 1035 553 1098">University of California, Riverside (UCR)</p> 	<p data-bbox="634 1029 1417 1297">The University of California, Riverside (UCR) Bournes College of Engineering, Center for Environmental Research & Technology (CE-CERT) led the data collection and analysis for the District. UCR’s mission is to be a leader in environmental education, a collaborator with industry and government to improve the technical basis for regulations and policy, and a creative source of new technology. Researchers at UCR have impressive experience in collecting and analyzing data relating to vehicle operation, energy consumption, and emissions.</p>
<p data-bbox="224 1304 586 1335">VMA Communications (VMA)</p> 	<p data-bbox="634 1318 1417 1528">VMA Communications (VMA) has worked on outreach and stakeholder communications with dozens of K-12 school districts across Southern California, in addition to regional air quality agencies, transportation agencies, and health districts statewide. Along with other project partners, VMA supported outreach efforts for this project, including events, survey development, and marketing campaigns.</p>

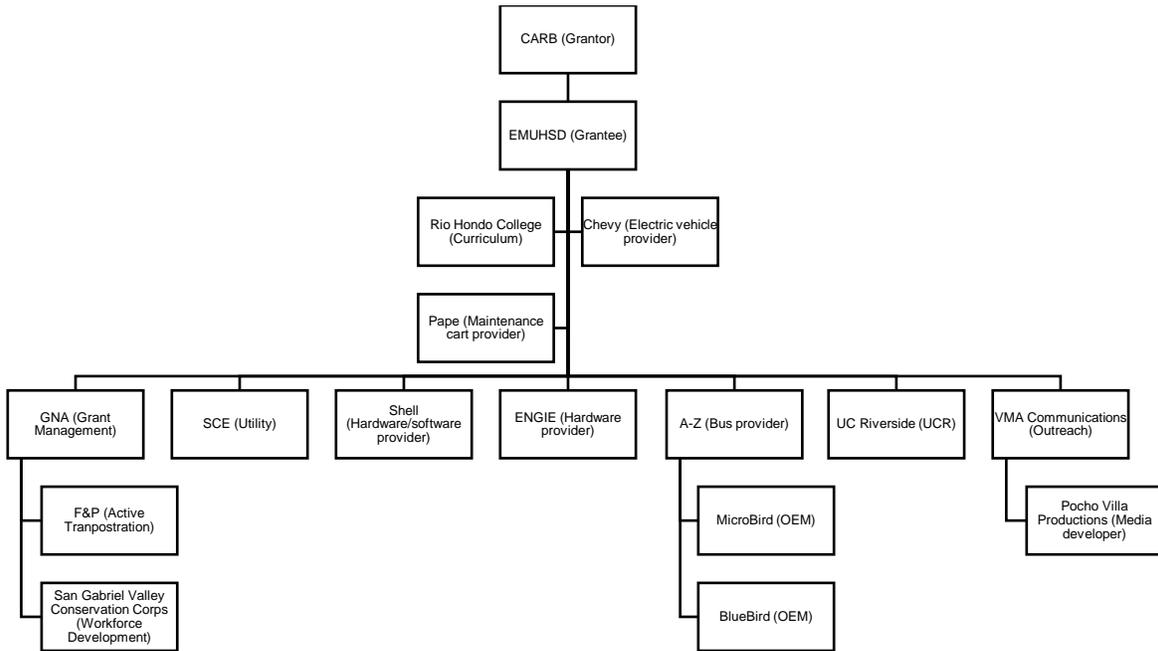


FIGURE 2: ORGANIZATIONAL CHART OF GRANTEE, AGENCY, AND PROJECT PARTNERS

Summary of Results

The scope of the project sought to transform the school District's transportation fleet and create an established transportation ecosystem by procuring and deploying electric school buses, light-duty passenger electric vehicles (EVs), and maintenance vehicles while ensuring the installation of necessary charging stations and battery energy storage solutions. Creating this longstanding system also required the creation and execution of an active transportation plan, which identified school-related mobility needs and solutions that would encourage active transportation. This initiative was further elevated by a large communications component, which allowed the District to spread the news of the project and its success within our community and more broadly—throughout the world. Details regarding the zero-emission technologies the District acquired, incorporated, and implemented into its transportation fleet and broader community mobility system can be found in the following sections alongside significant results of the project. These accomplishments are depicted according to the four main objectives of the project: Technology and Infrastructure, Workforce Training and Development, School Mobility and Active Transportation Plan, and Communications and Training Initiatives.

Technology and Infrastructure (Vehicles)

The District's transportation profile is multi-faceted and diverse. The District serves thousands of students and employees—all of which need feasible and accessible transportation into and out of the District's campuses. We have always aimed to provide enough transportation to support 1/3 of the school population, knowing that many students will still choose to walk, bike, or take their own car route. By not providing school-sponsored transportation, additional pressure is placed on families where the distance of biking and walking is not an option—putting financial and emotional stress on parents and students. Before the project, our school district was unable to sufficiently meet school transportation needs. Across the 20 school buses the District owned, we were only able to serve just over 1,000 students—a mere 15% of our population. This was a significant shortfall from the 33% standard. To ameliorate this shortage, the District leased external school buses from another school district, which put additional financial pressure on our already constrained school budget. Under this project, we were able to increase our school bus supply by 11x, allowing the district to serve an additional 900+ students and reach more than 25% of our school population. These changes expand beyond only the school buses serving our students. Before the project, gasoline maintenance vehicles and motor pool vehicles were used for school fleet at a deficit. For example, delays caused by refueling and having a shortage of vehicles caused staff to spend additional time walking short distances or even driving short distances to fulfill their duties. Under the project, those fleet vehicles were converted to 100% battery electric. Converting these vehicles to electric not only reduced fuel cost and emissions onsite but acquiring them and having their proficiency improved staff efficiency and effectiveness.

Electric School Buses

The District worked alongside project partner A-Z to purchase and deploy battery electric school buses. In total, eleven (11) electric school buses were procured for the school district. These included eight (8) Micro Bird G5 - Ford 200 Option by Blue Bird and Girardin and three (3) Blue Bird T3RE 3904 by Blue Bird. Throughout 2021, the school buses were delivered to the District and integrated into our bus fleet. By the end of 2021, the final school bus was delivered and into early 2022, all eleven (11) electric buses were California Highway Patrol certified.



FIGURE 3: MICRO BIRD G5 - FORD 200 SCHOOL BUS

The fully electric Micro Bird G5 can hold up to 19 passengers and one wheelchair. It has a battery capacity of 88 kilowatt-hours (kWh), rated power of 215 horsepower (hp), and range of 100 miles. It is ADA compliant and is equipped with wheelchair securement systems and helpful access features, including dual lift doors, recessed wheelchair tracks, and Slide N'Click or floor pocket anchorages, all of which offer safe and secure transport for students that use a wheelchair. Additionally, the fully electric Blue Bird T3RE can hold up to 81 passengers. It has a battery capacity of 155 kWh 315 hp of rated power, and range of up to 120 miles.



FIGURE 4: BLUE BIRD T3RE 3904 SCHOOL BUS

The eight (8) Micro Bird G5 school buses were designated for standard routes and the three (3) Blue Bird T3RE 3904 were exclusively used for field trips. All of the electric school buses are equipped with SAE 1772 CCS Type 1 charging port.

The District was overjoyed to receive and integrate the new electric school buses into our fleet. By incorporating these buses, CARB has significantly ameliorated school bus shortage challenges and allowed the District to better serve our community, and actively reduce emissions and the health hazards facing the individuals we serve. During the project, the District gained real-world experience in implementing the nascent technology. Amid their deployment, several EV school buses experienced multiple issues. This included telematics incapability, battery storage depletion, and charging functionality. The District worked collaboratively with our partners to conduct a full investigation and troubleshoot the technical issues. The school buses ended up undergoing repairs in addition to onsite maintenance and diagnostic analysis. The

electric fleet did not fully realize expected utilization due to these technical issues. The District has detailed these complications and processes for sustainable maintenance and operations in the “Challenges” section of this report.

Light-Duty Vehicles

The District originally set out to procure and deploy three (3) light-duty EVs to add to their transportation fleet. Specifically, Chevrolet Bolts with preference for 2022 models as they were the newest models available with the longest range at the time of the application. Throughout the course of the project, the District secured a better rate for the vehicles and could purchase a higher number of zero-emission vehicles without an increase in expected cost. They notified this change to CARB and were authorized to purchase three (3) additional passenger vehicles, totaling the procurement of six (6) 2022 Chevy Bolt vehicles. The Chevy Bolt has a battery capacity of 65 kWh, rated at 200 hp, and is equipped with SAE 1772 CCS Type 1 charging port. The purpose for the additional vehicles was to expand the use of zero-emission passenger cars for school events and other school purposes, in addition to supporting a car-sharing program among District staff. Due to available cost-savings on other project components, the District was able to utilize unused funding for more clean transportation initiatives and consequently more air quality improvements.

Maintenance Vehicles

Before this project, each school had approximately two (2) maintenance vehicles that were utilized for lawn and field maintenance, and one location lacked any cart. Without a cart onsite, the Plant Manager was required to walk, at times, long distances to service various site locations. To address these challenges, the District made sure to include the upgrade and procurement of additional maintenance vehicles into its project proposal. Through the project, the District purchased and deployed eleven (11) electric utility maintenance vehicles, specifically the GEM eM 1400 LSV by Polaris GEM, to replace the existing gasoline-powered vehicles.



FIGURE 5: GEM 1400 LSV MAINTENANCE VEHICLE

This model was chosen because they were similar to the existing carts used throughout district sites and have the ability to go off-road, i.e., driving over the school fields. Also, they have a flatbed with sides, which is helpful for their everyday utility roles. Of the five (5) schools, four school received two (2) vehicles and one school three (3).

Technology and Infrastructure (Supporting Infrastructure)

The District worked alongside project partners Shell, SCE, and Engie to conduct school bus charging station activities, which included the procurement, installation, and acquirement of relevant charging equipment and energy storage solutions. This project deployed energy storage systems at five (5) project sites as well as school bus charging infrastructure at the District's Bus Depot at South El Monte High School and at Mt. View High School.

Charging Stations

Prior to the *Clean Mobility in Schools Pilot Project*, the District provided 39 passenger vehicle EV charging stations at six district sites – five (5) high schools and the district office.¹² The District was excited at the opportunity to expand our charging portfolio and support the newly acquired school buses with 31 units of charge-ready infrastructure. For this project, Shell provided all school bus charging equipment and network service. The District was then responsible for the selection, purchase, and installation of the EV charging equipment. Sunbelt Electric was selected to install the charging equipment.

The Charge Ready Transport Program¹³ provides an additional rebate option to offset a portion of the costs associated with the purchase of the charging equipment. The Charging Equipment Rebate is only available to participants that will be acquiring and operating school buses or transit buses anywhere in SCE's service territory, and to participants who install charging equipment at a project site located in a designated disadvantaged community. The District intended to utilize this rebate to further reduce project cost and pass savings onto other project components. The rebate request was denied by SCE due to costs being covered by CARB grant.

In 2021, the 31 chargers were delivered to the District including 15 units exclusively for school bus charging. Between 2022-2023, grant-funded chargers were installed at their respective locations:

- Three (3) ABB Terra 54 HV (T54FVCJ) –50 kW High-voltage DC Fast Chargers (DCFC) and eight (8) BTCPower Single Pedestal 70A – Level 2 Chargers were installed at 1003 Durfee Avenue, South El Monte, CA 91733 (Bus Depot).
- Nine (9) BTCPower Single Pedestal 70A – Level 2 Chargers were installed at 2900 Parkway Drive, El Monte, CA 91732 (Mountain View High School). Four (4) of these chargers are for school bus

¹² El Monte Union High School District. (2017, December). *El Monte Union Installs 21 Electric Vehicle Charging Stations, 18 More Planned*. emuhd.org. <https://www.emuhd.org/site/default.aspx?PageType=3&DomainID=4&ModuleInstanceID=10&ViewID=6446EE88-D30C-497E-9316-3F8874B3E108&RenderLoc=0&FlexDataID=2989&PageID=1>

¹³ Southern California Edison. (n.d.). *Charge Ready Transport Program*. crt.sce.org. <https://crt.sce.com/overview>

charging, the remaining five (5) chargers are for supporting EV-usage and the District's newly acquired passenger EVs.



FIGURE 6: FAST CHARGERS AND HIGH-POWER CHARGING STATIONS AT EMUHS D BUS GARAGE



FIGURE 7: CHARGING STATIONS AT MT.VIEW HIGH SCHOOL

Given that California public K–12 schools are a state-owned and leased facility, they must submit plans to the California Division of the State Architect (DSA) to ensure they comply with code requirements and obtain DSA approval before construction begins.¹⁴ SCE ran into several hurdles and delays when going through the process of obtaining DSA permit approval. These were caused by new required questions regarding utility power to the sites that would change once the EV chargers were installed. Additionally, upon the delivery of the chargers, there were issues surrounding their compatibility with the electric school

¹⁴ State of California Division of the State Architect. (n.d). *Start Construction Project by Submitting Plans for Review*. [dgs.ca.gov. https://www.dgs.ca.gov/DSA/Services/Page-Content/Division-of-the-State-Architect-Services-List/Start-Construction-Project-by-Submitting-Plans-for-Review](https://www.dgs.ca.gov/DSA/Services/Page-Content/Division-of-the-State-Architect-Services-List/Start-Construction-Project-by-Submitting-Plans-for-Review)

buses. These complications and delays are detailed in the “Challenges” and “Lessons Learned” section of this report.

Battery Energy Storage Systems



FIGURE 8: ENGIE BATTERY ENERGY STORAGE SYSTEM

Necessary to the transformative goals of the grant, battery energy storage systems (BESS) to not only help charging infrastructure efficiently scale to meet immediate and future needs, but also reduce grid demand and support a stable, clean flow of energy to the District. Engie provided a turnkey solution that made for a streamlined installation and operations process and optimized the new electric school bus infrastructure.

The District has significant experience in deploying large-scale clean energy and emissions reductions projects. As mentioned, the District deployed an \$11 million CREBs-funded 2.76 MW solar installation at the Bus Depot at 1003 Durfee Avenue, South El Monte, CA 91733. However, the District had no existing BESS installed to mitigate peak electricity demand and best utilize the benefits of having solar energy available.



FIGURE 9: ENGIE’S BATTERY ENERGY STORAGE SOLUTION

Having BESS as part of this project provided more support to the existing solar panels on site at the Bus Depot so that the District would not experience high demand and peak charges when the use of electricity newly occurred outside of normal hours, like EV

charging in the evenings and when solar energy cannot be fully utilized. The overall installation of BESS curbed energy consumption and provided more power than previously possible for the electric school buses and our overall district grid operations.

The need for the District to install BESS has been high. Pre-project, SCE enrolled the District into EV demand response as part of the District's participation in the Charge Ready program to address grid impacts during peak electricity demand hours. At the time of application, peak demand charge time range changed from 4pm to 9pm in SCE territory. The District utilized SCE's free-of-charge rate analysis available through its assigned SCE account manager as well as monitoring utility bills use and demand charges with EnergyCAP, a utility bill accounting system paid for by the District. However, due to shifting demand peak hours to evening and the utility grid build out of more solar energy online during afternoon hours, there was a clear need to invest in battery energy storage.

Through this grant, the District installed four (4) BESS at each of the following sites: Arroyo High School, the District Bus Depot, Mountain View High School, Rosemead High School, and South El Monte High School. The District had ENGIE energy storage systems installed at the sites – a 250 kW/500 kWh system at both Arroyo High School and the School Depot and a 500 kW/1000 kWh system at all other locations. A BESS was installed at El Monte High School but was not funded by grant.

Workforce Training and Development

The workforce training part of this project is significant as the District, through curriculum and vendor-provided training, aimed to educate the minds of our students as well as those who seek placement services in our community—building awareness of zero-emission transportation and creating workforce pathways. Throughout the project, partners developed and conducted training sessions for bus drivers, maintenance crew, and District staff. The project was pleased to announce and cultivate its first Clean Energy Fellow and subsequent fellowship program.

Trainings

Through the course of the project, three (3) different trainings were hosted involving the newly acquired technology.

1. October 26, 2021 – A-Z hosted an electric school bus training. The session was led by A-Z Territory Sales Manager, Ammon Matavao, and provided an overview of how to conduct bus servicing and operations.
2. August 4, 2021 – District shared survey questions with staff that used maintenance vehicles for their positions. The surveys asked what their experience was with using an all-electric utility cart and how they expect the new utility carts to operate. Notable feedback included:

“Using it same way use the other carts, picking up packages, delivering, trash, emergencies, expectations are high.”

“This is the first time to have this type of utility cart. I suspect it will live up to its expectations as far as driving around. My only concern is the speed on the carts is really fast.”

“Better than the old ones.”

Following the survey and delivery of the vehicles in September 2021, a basic cart/utility vehicle driver hands on training was conducted alongside a general health and safety training using District safety, health, and other training requirements as a basis for the training session. A second training provided by A-Z Bus sales is anticipated but has yet to be scheduled by the writing of this report. It is anticipated to cover bus charging and long-term storage practices.

3. July 20, 2021 – An additional training was delivered by the District on the electric vehicle and cart operation and followed District-mandated health and safety criteria.

Clean Energy Fellow



FIGURE 10: CLEAN ENERGY FELLOW WENDY SANCHEZ AT PROJECT SITE

The District included a fellowship program to extend its educational mission to the community and showcase pathways for green-minded professional opportunities. The inaugural Clean Energy Fellow from San Gabriel Valley Conservation Corps was Wendy Sanchez. Sanchez is an alumna of El Monte High School and member of the District's broader community. The goal of her fellowship surrounded hands-on learning experiences in the field, specifically construction administration and project management in clean energy and mobility via a school district lens¹⁵. Wendy Sanchez completed her final presentation to the school district board on April 6, 2022.¹⁶

¹⁵ More information about the Clean Energy Fellowship and Wendy Sanchez's experience may be found here: [Clean Mobility Fellowship Video](#)

¹⁶ Presentation slides may be found here: [Introduction to Clean Mobility Fellowship](#); Recording here: [4-6-2022 EMUHSD Board of Trustees Meeting](#)



FIGURE 11: WENDY SANCHEZ (LEFT) CELEBRATES ALONGSIDE HER MENTOR AND DISTRICT FACILITY AND ENERGY MANAGER/CARB GRANT LEAD, LENA LUNA (RIGHT), AFTER RECEIVING AN AWARD OF RECOGNITION FOR BEING THE FIRST CLEAN ENERGY FELLOW DURING A BOARD MEETING

Sanchez was honored with a certificate of recognition for her contributions and commitment as the first Clean Energy Fellow for the District under the project. During the meeting, Sanchez highlighted her hands-on experience while being in the program. This included working with the District’s CARB Grant Lead and project partners to assist with the deployment of the District’s clean energy fleet by participating in a vehicle training session and the test-driving of the electric school buses and providing administrative support during project meetings. Sanchez also touched on the rewards of learning how the Project’s work will bring health and environmental benefits to her community and being able to contribute to towards those efforts. Sanchez’s efforts and inaugural position were recognized in *The Mid Valley New*¹⁷ and *California School News Report*¹⁸.

Curriculum Development

The District conducted zero-emission technology curriculum development activities, specifically the development of a Career Technical Education curriculum.

Between January and March 2021, the project team developed and submitted a Career and Technical Education (CTE) course outline and a draft Curriculum Development Plan to CARB for review. As part of the initial curriculum, the District leveraged Rio Hondo College’s dual enrollment program. This program offers District students a pathway to achieving a Bachelor of Science in Automotive Technology by leveraging the full Auto Shop program at El Monte High School. The goal was to have District graduates career-ready in the Auto Shop program and these students are a target population to address the workforce required for EV adoption to maintain the vehicles. The Auto Shop program was an ideal program to pilot an early zero-emission technology program as well as other programs that the District will inquire interest level with other CTE teachers. Through the project implementation, feedback from teachers and curriculum

¹⁷ The Mid Valley News. (2022, April 27). *El Monte Union High School District Honors First Clean Energy Fellow [page 2]*. Volume 59 Issue 17. <https://newspaper.midvalleynews.com/april-27-2022-volume-59-issue-17/>

¹⁸ VMA Communications. (2022, April 22). *El Monte Union High School District Honors First Clean Energy Fellow*. California School News Report. <https://mailchi.mp/5a2617e6873d/media-opportunitiesapril-22-2022?e=f47c5c69ce>

committee suggested to expand the curriculum to be applicable beyond the Auto Shop program and be inclusive of other components of clean energy. As such the project team broadened the scope of the curriculum to focus on entrepreneurship with clean technologies and energy generally.

The curriculum created in partnership with Rio Hondo College Business and Entrepreneurship professor incorporates units of study intended for use by high school teachers to expose students to concepts of green and renewable sources of energy including: solar technology, electric vehicle technology, and entrepreneurship. Within each of the three themes lessons and activities are designed to allow students to explore the advantages and challenges of these green energy fields and allows students to build a sample business plan incorporating a cost/benefit analysis within a real-world application. Specifically, the curriculum was broken into three sections (Solar technology, Electric Vehicles, Business modeling). In late 2022 and into early 2023, the District and Rio Hondo Professor Ivan Leon completed the curriculum. The final curriculum for both students and teacher can be found in the Attachments section.

Section 1 of the curriculum dives into solar technology and focuses on the following topics:

1. Solar Technology
2. Types of Solar Technology & Other Renewable Energy Sources
3. Advantages of Solar Technology
4. Disadvantages of Solar Technology
5. Solar Power and Our Environment

Section 2 introduces EVs and features the following topics:

1. The Early Rise and Fall of the Electric Car
2. Types of Battery Technology
3. A New Beginning for Electric Cars
4. The Future of Electric Cars
5. Variety of Electric Vehicles and the Differences
6. Health Benefits of Electric Vehicles
7. Positive Effects of Electric Cars
8. Negative Effects of Electric Cars

Section 3 takes on the spirit of entrepreneurship and introduces business-related skills, mindset approaches, and pathways for students to understand and create business models:

1. Developing a Business Plan
 - a. Sample Lean Canvas
 - b. Sample Lean Canvas Completed
2. Business Ideas and Opportunities
3. Lean Market Research
4. Target Market
5. Competition in Business
6. Competitive Advantage
7. Elevator Pitch
8. Marketing your Business
9. Key Metrics
10. Types of Expenses
11. Delivering Products and Services
12. The Economics of One Unit of Sale
13. Lean Canvas Workshop
14. Presentation Skill

The Curriculum was shared with the District's Career Technical Education (CTE) teachers as well as the district curriculum committee prior to sharing with classroom teachers for integration into instructional as a supplemental resource to their existing unit planning. Students were able to be exposed to real life implementation of green and renewable resource learning through their field trip to the CARB offices in the fall of 2023.



FIGURE 12: EL MONTE STUDENTS AT CARB RIVERSIDE HEADQUARTERS

On November 8, 2023, project partners VMA and GNA engaged with CARB Riverside Headquarters to conduct a student field trip to their testing facilities as part of the clean-energy curriculum. The field trip began with an overview of CARB, providing students with valuable insights into the organization's mission and the pivotal role it plays in safeguarding air quality and promoting clean energy solutions in California. Students from various schools that represented CTE programs and environmental clubs attended. The experience also gave students the opportunity to see themselves conducting work to help these efforts and be a part of the solution.

One of the highlights of the trip was the visit to CARB's light-duty vehicle testing lab, where students had the opportunity to witness cutting-edge emissions testing technology and gain insights into the meticulous processes that ensure vehicles meet California's strict air quality standards. In the clean energy chemistry lab, students were introduced to several sustainable energy solutions that researchers developed through precise testing of vehicle fuels and evaporative analysis. This segment of the trip highlighted the critical work CARB does to drive advancements in clean energy and reduce greenhouse gas emissions.

The field trip also featured a visit to a public art installation on the CARB campus, where students explored the intersection of art and environmental consciousness. According to CARB, the installation serves as a reminder of the importance of public engagement in promoting environmental awareness and art in inspiring positive change.

In summary, the Curriculum has provided a foundation to help energize students and teachers in the development of additional CTE learning opportunities in the District. The District has invested a number of resources to market career opportunities (see *Clean Energy Careers* animation digital short below). They are actively working to incorporate green technologies into existing CTE pathways: our partnership with Longo Toyota for battery technology implementation in our automotive program at El Monte High School is an example.

School Mobility & Active Transportation Plan

The District worked alongside project partner, Fehr & Peers, to create an active transportation plan for the District. The goal of this partnership was to identify school-related mobility needs and solutions that would encourage active transportation. In addition to school buses, a variety of students who walk and bike to school necessitated a more advanced active transportation planning that couldn't be completed previously.

The pedestrian and bike traffic combined with school bus and personal cars created a challenge for our community—jeopardizing safety of students and our community, increasing emissions from idling, and contributing to congestion. Conducting an assessment allowed the District to examine holistically the deployment of immediate solutions as well as more sophisticated and advanced planning in the near and long-term. The plan aimed to include all relevant modes of transportation like bike, pedestrian, pick-up/drop off, and other multimodal solutions (such as carsharing).

F&P sought to create one School Mobility & Active Transportation Plan for each of the five comprehensive high schools plus Ledesma Continuing High School at the conclusion of the project. Each Plan was tailored to the specific conditions and needs of each school but structured consistently and drawn from industry best practices to inform future actions that can be taken in years to come.



FIGURE 13: ARROYO HIGH SCHOOL COLLISION HEAT MAP (2015-2019 DATA)

Throughout the development of the plan, the District and F&P developed and conducted workshops for community engagement while performing data collection, literature reviews, and other relevant research. The process of creating the plan for each school was an inclusive process. In the beginning stages of the process, F&P met with individual school principals and project team members to ensure all-hands were on-deck to create a well-rounded plan. This led to the circulation of a project fact sheet, a circulation diagram that showed major access points to the school and focus areas for improvements/upgrades, and a collision map showing “hot spots” within one mile of the school to relevant parties within the school community (Example shown in Figure 13). These items further led to tailored outreach strategies for each specific school, and F&P joined different parents and PTSA meetings to ensure a comprehensive process. Further, F&P developed a Transportation Survey that was translated into English, Spanish, Mandarin, and Vietnamese. The survey invited students, parents, and staff to describe their school travel experiences and offer input to the process of developing project ideas. The online survey link was distributed to the individual school principals for circulation to the wider school-community. The survey was active for three (3) months and received 944 responses.

Figure 1: Top themes for making school trips easier, safer, more comfortable or more pleasant

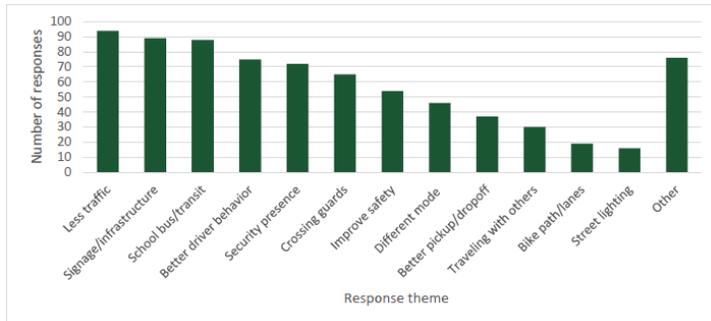


FIGURE 14: SURVEY RESPONSE THEMES

F&P analyzed the data from the survey and other relevant project components to draft and complete the final Active Transportation Plan for all project sites¹⁹. The final Active Transportation Plan can be found in the Attachments. These assessments and final findings were showcased through reports and presentations to the school District, CARB, and community members. An example of outcomes and recommendations from conducting the transportation plans can be found in Figure 14 and 15. For the former, *Other* indicates novel ideas presented by respondents such as starting school days later in the day, street re-designs, volunteering, etc. The latter showcases project development recommendations within a one-mile walkshed of the school. Recommendations were prioritized for intersections and corridors that were bicycle and pedestrian hotspots, and/or where survey participants noted they felt unsafe.

¹⁹ El Monte Union High School District. (n.d.). *School Mobility & Active Transportation Plans*. emuhsdmobility.com. <https://emuhsdmobility.com/school-mobility-active-transportation-plans/>

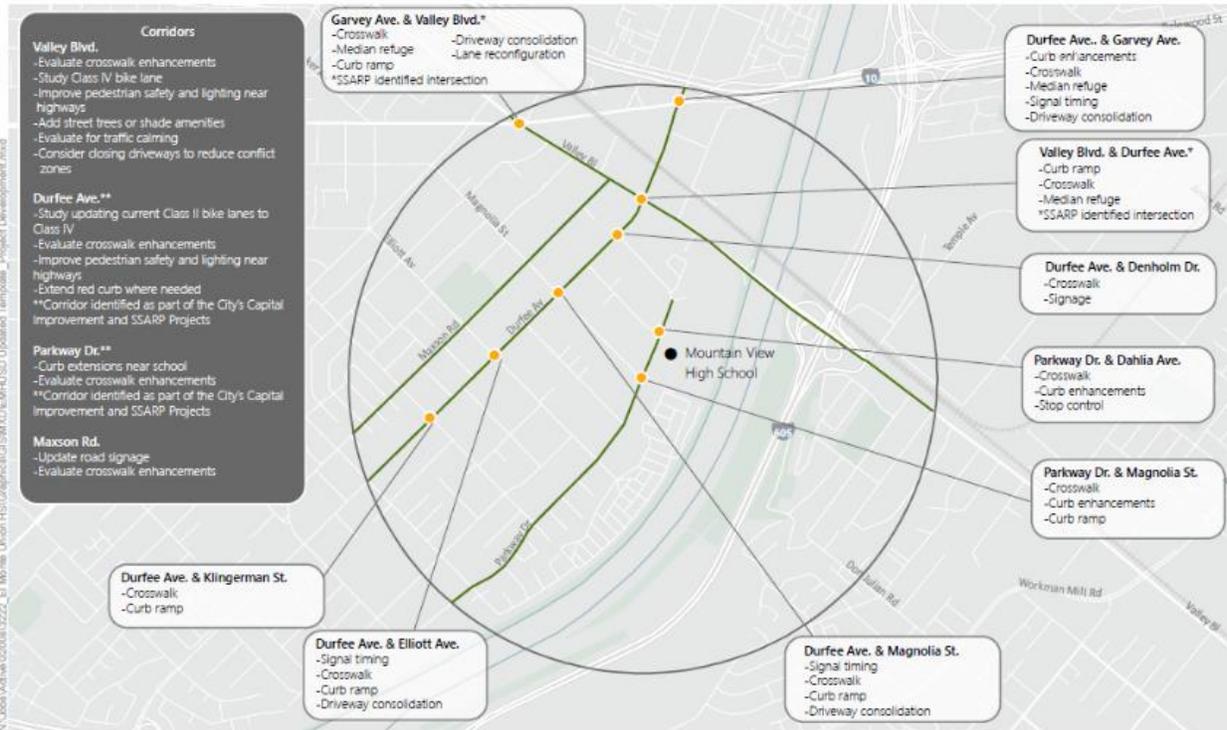


FIGURE 15: PROJECT DEVELOPMENT RECOMMENDATIONS EXCERPT FROM MOUNTAIN VIEW HIGH SCHOOL ACTIVE TRANSPORTATION PLAN

The project team presented the Active Transportation Plan to the City of South El Monte. As a result, the City of South El Monte made a formal request for budget authorization for Active Transportation projects. F&P also presented to the District Board on March 2, 2022.²⁰ This outreach increased the exposure of the plans and helped find opportunities for plan implementation.

Communications and Training Initiatives

The District worked alongside project partner, VMA, and community partners, San Gabriel Valley Conservation Corps and El Monte South El Monte Chamber of Commerce, to conduct outreach activities for applicable project elements. The scope of this task included outreach to the District's community through participation surveys and at least two (2) public events. VMA alongside community partners promoted the project via a multi-channel marketing plan to convey the benefits of clean vehicle transportation and urge the adoption of green tech in the low-income communities that are served by the school district.

Since the beginning of the project, developing outreach plans were an inclusive process that built on the strengths of different project team members and continuously incorporated feedback and suggestions from CARB. Overall, VMA balanced the framing of the program as a highlight of the District's green-energy mobility initiatives while emphasizing ways to motivate community members to adopt greener transit options. VMA further leveraged its connections with local and regional media to promote the program and feature the thought leadership involved.

²⁰ A link to a recording may be found here: [3-2-2022 EMUHSD Board of Trustees Meeting](#)

The following sections detail key outreach strategies and activities that were conducted. They highlight not only the project's objectives and successes, but showcase the District as a leader in the community and broader state of California to educate and inspire new modes of mobility.

Events

The District, VMA, and community partners organized and hosted many events including, two (2) ribbon cutting ceremonies, several school bus delivery and car-sharing program announcements, among other public events that highlighted the program's progress.

Green Ribbon-Cutting Ceremony



FIGURE 16: CROWD AT GREEN RIBBON CUTTING CEREMONY AT SOUTH EL MONTE HIGH SCHOOL ON AUGUST 18, 2021.

On August 18, 2021, VMA hosted a "Green" ribbon-cutting ceremony at South El Monte High School to commemorate the delivery of four (4) electric school buses and eleven (11) utility carts and share overall project goals. This event was one of three (3) project outreach events. It included guests from CARB, the State of California, local government officials, project partners, and clean air advocates. The event program included the following speakers: Dr. Edward Zuniga, Superintendent of El Monte Union High School District, The Honorable David Diaz, Clerk of the District's Board of Trustees, The Honorable Dean Florez, CARB Board Member and former member of the California Senate (ret.), Lena Luna, the District's Facility & Energy Manager and Grant Lead, and Mallory Spillard, 11th-grade Student Representative.

"This is a great day for El Monte Union, for residents of California and everyone who is working hard to reverse the deleterious effects of air pollution and provide blue skies for our children and grandchildren," said Dr. Edward Zuniga to kick-off the event. "The District is proud to be here as an inaugural member of the Clean Mobility in Schools Pilot Project" he continued. After the ribbon-cutting ceremony, guests received an opportunity to "take a look under the hood" of one of the new zero-emission school buses. Green-tech stations were available to provide guests with information on the Clean Mobility in Schools Pilot Project, as well as how they can help to protect the environment.

"El Monte Union High School District is a tremendous example of the work the California Climate Investments program is delivering to all California residents as we work collectively to reduce harmful exposure to air pollution by children and others in our working-class communities," said Senator Dean Florez (ret.), who is a voting member of CARB. He continued, "California is proud to be leading the effort to improve air quality and address climate change by driving transformative green technology and helping schools to educate the next generation about using clean mobility options."²¹

²¹ More detailed information, such as picture, testimonials, and videos may be found at this link: [Green Ribbon Cutting Ceremony](#)



FIGURE 18: STUDENTS LISTEN TO A REPRESENTATIVE FROM LONGO TOYOTA-LEXUS SHARE DETAILS ON NEW MODELS OF ELECTRIC AND HYDROGEN-POWERED VEHICLES

During the event, attendees were treated to information booths on environmental sustainability and tours of the District's new electric school buses and ride-share vehicles. Longo Toyota-Lexus wowed the crowd with a display of electric and hydrogen-powered cars (Figure 18).

"In celebration of today's Earth Day event, we are here to represent our school's Ecology Club, which is known for promoting environmental friendliness throughout our campus and community," said Rosemead High School senior Kent Chen. "We recycle everything, from water bottles to paper, to ensure our school is kept clean and host park and beach clean-ups for our community to support. We believe this event will help everyone understand the importance of taking care of our planet." Members of El Monte Union's green clubs were also invited to share information on the initiatives and activities they have created to better achieve green sustainability (Rosemead High School's Ecology Club Booth is seen in Figure 19).



FIGURE 19: ROSEMEAD HIGH SCHOOL'S ECOLOGY CLUB'S BOOTH AT THE CLEAN MOBILITY INFO FAIR

"What a fantastic opportunity for the El Monte Union community to continue in their mission of protecting our planet and to learn more about the Clean Mobility in Schools Pilot Project," said CARB Board Member Hector De La Torre during the event. "This project is a great example of how we can use clean transportation to reduce air pollution and improve the health of our communities. At CARB, every day is

Earth Day and by introducing electric vehicles and clean air initiatives into our schools, we can reduce emissions and provide a healthier environment for students."²²

California Clean Air Day Event

On September 28, 2023, Los Angeles County Office of Education and the California Clean Air Day Coalition hosted a press event at the District's Bus Depot focused on the Clean Mobility in Schools Pilot Project.²³ This event was a bonus event that surpassed the original outreach scope of the project. It came to fruition given the positive community reputation of the project and how integral these advancements have become for the broader county and state. Schools and local leaders gathered to introduce some of LA's first electric school buses, a student-driven campaign for cleaner air in advance of California Clean Air Day and publicly share the creation of a 90-second animation video, *Taking a Healthy Ride on the Green Side*²⁴.



FIGURE 20: EL MONTE UNION'S CLEAN AIR DAY CELEBRATION ON SEPTEMBER 28, 2023, AT THE DISTRICT'S BUS DEPOT

The following individuals were present and/or shared remarks at the event:

- Dr. Debra Duardo, Los Angeles County Superintendent of Schools
- Dr. Joe Lyu, CEO of Coalition for Clean Air
- Ricardo Padilla, Board President of El Monte Union High School District
- Dr. Edward Zuniga, Superintendent of El Monte Union High School District
- Lena Luna, Grant Lead, Clean Mobility in Schools Pilot Project and District Facility & Energy Manager
- Kirk McGinnis, Director of Curriculum and Instruction, El Monte Union High School District—developing Career Technical Education Modules about Clean Energy/Clean Transportation
- Lalo Alcaraz, the artist who created the *Taking a Healthy Ride on the Green Side* animations
- William Vargas, Transportation Coordinator, who manages the District's electric bus fleet and charging stations

²² Final event agenda, photos, attendee lists, and press release may be found at this link: [Clean Mobility Info Fair](#)

²³ Videos, photos, and detailed information from the event can be found at this link: [Clean Air Day Celebration](#)

²⁴ El Monte Union High School District. (2023, September 8). *Taking a Healthy Ride on the Green Side – Full Version* [Video]. YouTube. https://youtu.be/uQwzGKP6Hk0?si=JqTW7_oAp9tr-fNa

- Teacher Richard Heilemann and students from the South El Monte High School Sustainability Club

Mural and Car Wrap Ribbon-Cutting Ceremony



FIGURE 21: DISTRICT MEMBERS AND SPECIAL GUESTS CELEBRATE THE COMPLETION OF THE DISTRICT’S CLEAN MOBILITY IN SCHOOLS PILOT PROJECT DURING A RIBBON-CUTTING CEREMONY ON FEBRUARY 23

On February 23, 2024, VMA hosted the final and culminating outreach event of the project. The event marked numerous project milestones, including the completion of an 80-foot project mural atop the District’s Bus Depot, the unveiling of specially designed car wraps on the District’s acquired Chevy Bolts, and the premiere of the new Clean Energy Careers animation, all of which were created by Lalo Alcaraz and his team at Pocho Villa Productions, and the mural was installed by Levi Ponce.

The event hosted District students, administrators, project partners, parents, and representatives of local elected officials. The following individuals shared remarks at the event:

- Dr. Edward Zuniga, Superintendent of El Monte Union High School District
- Ricardo Padilla, Board President of El Monte Union High School District
- Lena Luna, Grant Lead, Clean Mobility in Schools Pilot Project and District Facility & Energy Manager
- Lalo Alcaraz, renowned artist and nationally syndicated cartoonist



FIGURE 22: LALO ALCARAZ SPEAKS DURING THE DISTRICT’S MURAL AND CAR WRAP RIBBON-CUTTING CEREMONY ON FEBRUARY 23

“At the beginning of this project, we met with students to get a better understanding of what is important to them and how we can educate the community about clean mobility and wow did they really blow our minds with the type of answers they were providing,” Alcaraz said during the ceremony. “From that meeting on, we took what we learned from them to create two animations, which feature the voices of El Monte Union students and administrators, as well as this beautiful mural, and the car wrap designs.”

“This project to electrify El Monte Union’s vehicle fleet and promote clean energy has been a true team effort,” EMUHSD Facility and Energy Manager Lena Luna said. “I am extremely proud of our transportation department, our bus drivers, and our students who have fully embraced this transition. Sustainability has been something our District has always advocated for, and we thank the California Air Resources Board for backing us every step of the way.”

Representatives from project partners A-Z, CARB, Engie, GNA, F&P, and SGVCC were also present at the event, and partners A-Z, Engie, and Shell sponsored the event’s refreshments.

Multimedia Products

Working closely with project partner, VMA, the District was able to amplify the project’s message and outcomes through several visual products. These included an animation and clean jobs video produced in partnership with two-time Pulitzer Prize finalist Lalo Alcaraz, and a video featuring students and staff highlighting new assets acquired from the project. Additionally, to mark the long-standing legacy of the project, an exclusive art piece was designed by Alcaraz specific to the project’s mission. The design was installed as a large-scale mural at South El Monte High School, which can be viewed from passersby on the nearest freeway, and as car wraps for the District’s ride-sharing vehicles.

Animation



FIGURE 23: TAKING A HEALTHY RIDE ON THE GREEN SIDE ANIMATION IMAGE

*Taking a Healthy Ride on the Green Side*²⁵ is an animation created to emphasize the significance of the objectives of the *Clean Mobility in Schools Pilot Project*. The animation was produced in partnership with two-time Pulitzer Prize finalist Lalo Alcaraz and his team at Pocho Villa Productions. The 90-second short focuses on green mobility options and benefits and encourages students to choose green transportation methods for commuting to school, including walking, using public transportation, scootering, biking, or carpooling. It features El Monte Union Superintendent Dr. Edward Zuniga, alongside District Facilities & Energy Manager Lena Luna, and student characters, including those inspired by real El Monte Union students who engaged in a focus group with Alcaraz at the project's outset.

Alcaraz, who is also the creator of the nationally syndicated comic strip "La Cucaracha", said he wanted to make sure the animation felt relevant to its audience and called on another group of students from El Monte's Mountain View High School to voice the characters, recording them in the school's own podcast studio at the invitation of VISTA Academy Coordinator and teacher John Mann (Figure 24).

²⁵ El Monte Union High School District. (2023, September 8). *Taking a Healthy Ride on the Green Side – Full Version* [Video]. YouTube. https://youtu.be/uQwzGKP6Hk0?si=JqTW7_oAp9tr-fNa



FIGURE 24: STUDENTS FROM MOUNTAIN VIEW HIGH SCHOOL IN VOICE THE CHARACTERS IN ANIMATION

The 90-second animation is accompanied by 30-second PSAs in English²⁶ and Spanish²⁷ that focus on green mobility options and benefits. As of January 2024, the animation and PSAs have been viewed over 30,000 times.

These resources were shared via a press release, on the District's Clean Mobility webpage, and on the District's social media channels. The PSAs were offered for broadcast statewide, thus amplifying the clean mobility message to communities across the state of California. They will remain available on the website going forward.

²⁶ El Monte Union High School District. (2023, September 8). *Taking a Healthy Ride on the Green Side – PSA* [Video]. YouTube. <https://www.youtube.com/watch?v=ZotHcn59A8Q>

²⁷ El Monte Union High School District. (2023, September 8). *Taking a Healthy Ride on the Green Side – Spanish PSA* [Video]. YouTube. <https://www.youtube.com/watch?v=aFMActBqbhQ>



FIGURE 25: MOUNTAIN VIEW HIGH SCHOOL'S VISTA ACADEMY SENIORS AND STUDENT PODCAST TEAM DEADALENE OLMEDO (LEFT), ASHLEY ERAZO (LEFT CENTER), MARTIN ELIOS OBIDA (RIGHT CENTER) AND ALEXIS MATA (RIGHT)

On September 19, 2023, Mountain View High School's VISTA Academy seniors and students hosted Lalo Alcaraz, on their student podcast, "The Art of Talking"²⁸(Figure 25). The special event was hosted in the school's cafeterium in front of 300 students and teachers. The event showcased the Clean Mobility in Schools Pilot Project and featured the new animation. It also explored Alcaraz's creative journey, how he's used comedy and humor as a vehicle for activism, and the impact of his work on Latin(x) representation in media. The event received media attention from local news networks ABC7 Los Angeles²⁹ and NBC 4 Los Angeles³⁰.

Clean Mobility Video

The project's *Clean Mobility Video*³¹ was released on October 6, 2021, and highlights scenes from the "Green" ribbon-cutting ceremony at South El Monte High School held on August 18, 2021, to commemorate the delivery of the project's electric school buses and utility carts.

The three-and-a-half-minute video includes clips of remarks and special interviews of the following key project members, partners, and supporters:

- District Superintendent Dr. Edward Zuniga
- The Honorable Dean Florez, CARB Board Member and former member of the California Senate (ret.)
- Jessica Johnson, Manager, Heavy-Duty Incentive and Training Section at CARB
- Lupita Huerta, Fehr & Peers Representative
- Lena Luna, the District's Facility & Energy Manager and Grant Lead
- Gideon Kracov, CARB Member and California Governor's appointee to the South Coast Air Quality Management District Governing Board
- The Honorable David Diaz, Clerk of the District's Board of Trustees

²⁸ VISTA Communications Academy. (2023, September 22). *Art of Talking Podcast with Lalo Alcaraz* [Video]. YouTube. <https://www.youtube.com/watch?v=57otmTXV8ZM>

²⁹ VISTA Communications Academy. (2023, September 20). *Lalo Podcast on ABC 7 News* [Video]. YouTube. <https://www.youtube.com/watch?v=DRiwSp3-YdU>

³⁰ VISTA Communications Academy. (2023, September 20). *Lalo Podcast on NBC 4 News* [Video]. YouTube. <https://www.youtube.com/watch?v=0zmarWewofY>

³¹ El Monte Union High School District. (2022, October 6). *El Monte Union High School District Clean Mobility Video* [Video]. YouTube. https://www.youtube.com/watch?v=LH_IJLjxnHg

- Scott Fisher, Vice President, Fleets, OEMs, Shell
- Brandom Bluhm, Director, New School Bus Sales, A-Z Bus Sales
- Wendy Sanchez, Project Clean Energy Fellow
- Ammon Matavao, Territory Sales Manager, A-Z Bus Sales
- Mallory Spillard, 11th-grade Student Representative
- Margaret Clark, City Council for Rosemead, California.



FIGURE 26: EL MONTE UNION HIGH SCHOOL DISTRICT CLEAN MOBILITY VIDEO

The emphasis of the video is to showcase the undertaking and trailblazing aspects of the Clean Mobility Project, the support the District has received from its students, staff, partners, and broader community, and the long-lasting changes the project has created that will be felt for years to come.

Clean Jobs Video

In partnership with Pocho Villa Productions, VMA and the District created the two-minute video *Clean Energy Careers*³² to focus on clean jobs and the different “green” career pathways that are possible for students to pursue. Written by Lalo Alcaraz, the video discusses careers in automotive tech, green architecture, green engineering, green agriculture, green business, and different California policies that align with these career fields. A shorter thirty second PSA was created to drive home the message³³ of the longer video in a more digestible and quick-worded format. The video features the voices of media personality, Alysha Del Valle, several students, Heather Choi, Grants Program Manager for Clean

³² El Monte Union High School District. (2024, February 29). *Clean Energy Careers – Full Version* [Video]. YouTube. https://www.youtube.com/watch?v=Dd-dkL_rj0

³³ El Monte Union High School District. (2024, February 29). *Clean Energy Careers – PSA* [Video]. YouTube. <https://www.youtube.com/watch?v=7LavEovyXw&t=2s>

Transportation Incentives at CARB, and Kirk McGinnis, District Director of Curriculum and Instruction.



FIGURE 27: CLEAN ENERGY CAREERS IMAGE

Clean Mobility Mural



FIGURE 28: CLEAN MOBILITY MURAL AT SOUTH EL MONTE HIGH SCHOOL

To drive home the message of the project, the District worked alongside partners VMA to install an 80-foot mural at South El Monte High School (Figure 28). Following the success of the *Clean Energy Careers* animation, video, and overall partnership with Lalo Alcaraz, the District worked with Alcaraz's team, Pocho Villa Productions, to design the mural. The mural shares the simple and effective phrase that was drawn from the project, "The Future is Emission Free!" It further includes a caricature that represents students, adult students, staff, families, and community members taking zero-emission modes of transportation, including a zero-emission school bus. It also includes the project microsite's landing page—([EMUHSDmobility.com](https://www.emuhsdmobility.com)). The mural is visible to the hundreds of thousands of drivers along California State Route 60 and is another method for showcasing the District's commitment to spreading awareness and education around the implementation of zero-emission transportation to its community and broader county and state. The mural was finalized on January 28, 2024³⁴, and an official unveiling ceremony was held on February 23, 2024.

³⁴ El Monte Union High School District. (n.d.). *EMU Mural Project Timelapse* [Video]. <https://www.dropbox.com/scl/fi/jift6c5rkwdhajw22bi11/EMU-Mural-Project-Timelapse.mov?rlkey=clbgtwrm7zyljxpyqpdhz07e6&e=1&dl=0>

Car Wraps



FIGURE 29: STUDENTS POSE IN FRONT OF CAR-SHARE VEHICLE

As part of the project scope, the vehicles acquired through the project for the District's rideshare program were required to have custom vinyl decal/wraps. The select products were to be environmentally friendly film, ink, or have other relevant features. Carrying forward the design developed by Lalo Alcaraz and Pocho Villa Productions, VMA and the District utilized the project's design as the car wraps for the newly acquired project vehicles. The car wraps use the same phrase, "The Future is Emission Free!" and were displayed on both sides of the vehicle. The car wrap also features depictions of students and the broader District community utilizing zero-emission modes of transportation, including bicycles, e-scooters, and an electric school bus. Students can be seen with car-wrapped vehicle in Figure 29.

Surveys

"When discussing these projects with the community, be mindful of community members by discussing ways in which these projects can help them in the long run. Also, connect these projects to the success of the community and relate it to their individual lives."

The District deployed pre- and post-project surveys to quantify the efficacy of the project's outreach campaign and gauge the level of knowledge and interaction with the project. VMA distributed the survey digitally by using Survey Monkey via press releases and to the school and surrounding communities and collected the survey responses. Student and district community received announcements of survey and lottery prize via email.

Pre-Survey

The initial survey was released to the District community on April 20, 2021, via a press release.³⁵ The pre-survey included 15 questions in total and was available in English, Spanish, Vietnamese, and Mandarin.

³⁵ El Monte Union High School District. (2021, April 20). *Take a Quick Survey on School Mobility, Enter to Win Raffle Prizes!* emuhsdmobility.com. <https://emuhsdmobility.com/2021/04/20/take-a-quick-survey-on-school-mobility-enter-to-win-raffle-prizes/>

Themes of the survey included questions surrounding respondent's background, familiarity with the goals of the project, followed by interest-centered questions that asked respondents for what they'd like to see from the project and what they anticipate for the deployment of the project's objectives. The full survey can be found in the Attachments.

In total, the survey received 93 responses. Results showed that survey undertakers were predominately best described as students, followed by district employees, school bus drivers, and then teachers. 72% of respondents said they were not familiar of the District's efforts to promote clean transportation. Similarly, the majority of respondents were not familiar with topics of EV school buses, car-sharing vehicles, energy storage systems, EV charging infrastructure, and zero-emission transportation & renewable energy workforce pathways prior to the District's participation in the project.

As the survey shifted to a forward vision of the students, mainly students, said they would like to see educational programs, followed by community events and then community workshops. Further, regarding aspects of clean transportation, the majority wanted to know more about electric vehicles, followed by career pathways and electric charging infrastructure, respectively.

Certain feedback was specific to District employees, teachers, or bus drivers, who responded that they believed the operations of the all-electric school buses, car-sharing vehicles, charging stations or other equipment would be efficient and easy to use. For a successful roll-out and training, the majority said they'd prefer hands-on-training, followed by a focus on presenting the information in small bites over time, and the least desired a focus on core fundamentals.

Regarding educational programs included in the Career and Technical Education (CTE) curriculum portion of the project, most respondents selected renewable energy, followed by electric vehicles, air quality and health impacts, and then mobility & active transportation.

Open feedback provided through the survey gave insight into the true sentiments surrounding the District's participation in the project and benefits to the District communities. Notable open-ended responses include (responses in Spanish, Vietnamese, and Mandarin were translated to English):

"I'm happy that the district is participating in cleaning fuel system and also electric energy resources and putting into effect. I also have an electric car so thank you for the encouragement."

"Personally as a student I would like to hear more on how we can participate in the clean mobility in schools pilot project. This sounds like a great opportunity to help the community and district."

"Please create CTE pathways opportunities evenly at all schools."

"That we try to speed up this movement and this is to say to implement safe, clean buses and above all a pilot project."

"When discussing these projects with the community, be mindful of community members by discussing ways in which these projects can help them in the long run. Also, connect these projects to the success of the community and relate it to their individual lives."

The complete results of the pre-survey may be found in the Attachments.

Post-Survey

The post-survey was released to the District community in the fall of 2023, via a press release and email announcement.³⁶ The post-survey was deployed to see how community sentiments regarding clean mobility had changed since the pre-survey and to gauge the project's broader influence on District community members. The post-survey included 12 questions in total and was available in English, Spanish, Vietnamese, and Mandarin. Themes of the survey included questions surrounding respondent's background, feedback on the project's efforts and events/resources to promote clean mobility, familiarity with and interests in continuing to learn about topics introduced in the pre-survey, i.e. EV school buses, career pathways, etc., followed by district employee, teacher, or bus driver-centered questions surrounding their experiences with the District's asset deployment and trainings, and future educational programs. The full survey can be found in the Attachments section.

In total, the post-survey received 147 responses. Results showed that survey undertakers were predominately best described as parent/caregiver, teacher, students, followed by district employees, and then bus drivers, with the majority of respondents from Arroyo High School. 67% of respondents rated the District Clean Mobility Project's efforts to promote clean mobility within its school communities as excellent. In comparison to the pre-survey, the majority of respondents were now familiar with topics of EV school buses, car-sharing vehicles, energy storage systems, EV charging infrastructure, and zero-emission transportation & renewable energy workforce pathways prior to the District's participation in the project.

Out of all the events and multimedia resources produced by the District on behalf of the project, when asked which were the most valuable, the top five survey respondents identified were the project's social media posts, the Clean Mobility Fair, the Clean Mobility in Schools website, the Clean Air Day Event, and local media coverage. Further, regarding aspects of clean transportation, what the majority wanted to know more about changed from electric vehicles, followed by career pathways and electric charging infrastructure, respectively, to community health benefits and ways to support clean transportation, followed by electric vehicles, electric charging infrastructure, and then career pathways. A new mention of other clean transportation respondents would like to learn more about included cycling infrastructure in the District and the community.

Similarly to the pre-survey, certain feedback was specific to District employees, teachers, or bus drivers. The survey asked about their experience with the District's all-electric school buses, car-sharing vehicles, charging stations or other equipment, and what their biggest challenges were. The majority specified other, followed by efficient to use and then confusing. Details shared in the other category mainly specified challenges with charging infrastructure as the biggest hurdle for EV drivers and bus drivers. The majority of respondents noted issues with charger reliability and accessibility, mentioning that chargers either did not work or there weren't enough to meet the charging needs of EV drivers and school bus drivers. Separately, trainings were provided for staff on electric vehicle equipment. The majority said they did not undergo training, and that the workforce training programs they attended were ineffective followed by effective and mostly effective.

Regarding follow-on educational programs included in the CTE curriculum, teachers and students were asked what they'd like to see included. Similar to the pre-survey, most respondents selected renewable energy as their number one choice. However, this was followed by air quality and health impacts and graphic arts/journalism. These were followed by what was once ranked number 2 in the pre-survey, electric vehicles, and then mobility & active transportation.

³⁶ El Monte Union High School District. (n.d.). REMINDER: Enter to Win, Take the Clean Mobility Community Survey. emuhdsdmobility.com. <https://mailchi.mp/vmapr/enter-to-win-take-the-clean-mobility-community-survey-reminder?e=4ae3dd9611>

Like the pre-survey, the post-survey asked for open feedback to provide insights on community sentiments surrounding the District's project outcomes and benefits to the District communities. Notable open-ended responses include (responses in Spanish, Vietnamese, and Mandarin were translated to English):

"In the land of private transportation, it is nice to see sustainable mass transportation being utilized in our District communities."

"Giving students and employees incentives for carpooling, coming to school on a scooter or skateboard or driving an electric car would motivate more people to participate in Clean Mobility Project."

"As a student, I've attended your Clean Mobility Info Fair and was impressed with all of the efforts the district is making to change to a more sustainable form of energy. However, one of my concerns is that I've yet to see, as a student, the actual use of any of the electric buses showcased. I often use district transportation in sporting events and field trips, but we always board the same buses as before. My suggestion is to make their use more widespread, and I hope to understand where these buses are being utilized and if it's simply because they're used at different locations instead of Rosemead."

"Provide statistics and information about carbon footprint and the amount of difference we are making to our planet."

"Keep striving for more programs to get the word out about how to become greener and about efforts going towards it."

"I wish I would have been able to attend some of the district events focused on clean mobility in schools, but they're often held during the school day on other campuses, so I haven't been able to attend. It would be helpful if community events were occasional held at other times not during the school day so that teachers could participate as well."

"Thank you for thinking about the community and our planet."

The complete results of the pre-survey may be found in the Attachments.

Project Media Outreach

The District, VMA, and community partners organized and shared elements of the program via various marketing and outreach strategies, including press releases, targeted e-mail campaigns, website updates, and social media content distribution. The following sections detail media highlights that were shared on behalf of the project and external media attention the project received.

Press Releases/E-Newsletters

Community members have been able to learn about the project through the following press releases and e-newsletters shared on behalf of the District:

- April 14, 2021 – [EMUHSD Kicks-Off \\$9.8 Million Grant for Clean Mobility Project](#)
- April 28, 2021 – [El Monte Union Recognized as Gold Tier San Gabriel Valley Energy Champion](#)
- July 23, 2021 – [El Monte Union Receives 4 of 11 Electric Buses as Part of Clean Mobility Project](#)
- December 29, 2021 – [El Monte Union Receives 9 Electric Buses as Part of Clean Mobility Project](#)
- April 22, 2022 – [El Monte Union High School District Honors First Clean Energy Fellow](#)
- September 13, 2023 – [El Monte Union Students Celebrate Enhanced, Innovative Learning Environments](#)
- September 25, 2023 – [UPDATE: El Monte Union Student Podcast Hosts Live Event with Award-winning Cartoonist Lalo Alcaraz](#)

- October 2, 2023 – [Coalition for Clean Air Showcases El Monte Union Clean Mobility in Schools Project for Clean Air Day](#)
- October 16, 2023 – [WATCH NOW: Witness the Inspiring Celebration of El Monte Union’s Clean Air Day](#)
- November 14, 2023 – [El Monte Union Students Learn Environmental Stewardship at California Air Resources Board Riverside Headquarters](#)

Presentations

Project partners presented on the project in the following instances:

- April 7, 2021 – Attended California Association of School Business Officials (CASBO) conference in partnership with Engie
- June 23, 2021 – [“Mobility Presentation - El Monte Board Meeting”](#) (Presentation slides may be found in the Attachments section.)

Dedicated Webpage (Microsite)



FIGURE 30: EL MONTE UNION HIGH SCHOOL CLEAN MOBILITY IN SCHOOLS PILOT PROJECT DEDICATED WEBSITE

To further support outreach efforts and engage students, faculty, and local community members, the District created a dedicated page for the project on the District’s website. The webpage was officially launched on November 2, 2020. Since launching in 2020, the site has received 90,218 unique visitors and 276,024 total visitors. Additionally, the project has amassed 12,040 subscribers for regular email updates.

External Media

Through the expert network and thorough outreach conducted by project partners, VMA, which were amplified by project partners, the project received the following external media recognition:

- June 3, 2021 – *CleanTechnica*, [“How A Southern California School District Is Leading The E-Bus Revolution”](#)
- June 17, 2021 – *California School News Radio: Season 3*, [“On the Road to Sustainability: Clean Mobility in El Monte Union”](#) (Podcast Appearance)
- July 7, 2021 – The Mid Valley News, [“District Receives 11 New Electric Maintenance Carts”](#) [page 2]

- February 25, 2022 – [CA School News Report](#)
- April 1, 2022 – School Transportation News, [“How A Southern California School District is Leading the E-Bus Revolution”](#)
- April 6, 2022 – The Mid Valley News, [“EMUHSD Releases Plans for Clean Mobility Project”](#) [page 2]
- September 16, 2022 – Channel 7 News on-site interview at the District’s bus depot, [“As CA moves to ban new gas-powered cars, is our infrastructure ready to charge all of those new EVs?”](#) Author Phillip Palmer interviewed Lena Luna and District contractor, Brett Beard, on Electrical Vehicle Infrastructure Training Program.
- The District’s electrical contractor (Beard Electric) was featured on Penske’s stories that move us: [Penske Truck Rental - Customer Stories](#). VMA and the Beard Electric team filmed at the new Bus Depot Site.

Grantee Collaboration and Coordination

El Monte was one of three (3) school districts awarded funds for the inaugural Clean Mobility in Schools Pilot Project. The other California school districts were San Diego Unified School District (awarded \$9.75 million) and Stockton Unified School District (awarded \$4.8 million). Through the course of the project, CARB hosted a meeting for all grantees to discuss and share best practices on the 1st Monday of every 3rd month (Quarterly). The first meeting held on December 7, 2020, allowed the opportunity for grantees to share the status of their projects, the current and past challenges they’ve encountered, like COVID-19 impacts and troubles with reimbursement and advanced pay methods, and the chance to share best practices and recommendations for CARB that can be carried into future iterations of the project. These themes carried into future meetings and became a helpful outlet for the District throughout the course of the project. The meetings afforded the opportunity to discuss project challenges, new and creative ideas for implementation, and create connections with other school districts with similar missions to ours—create a better and cleaner transportation system for the students and community we serve.

Scope of Work and Task Findings

Detailed Task Work Completed

Along with project partners, the District successfully achieved a whole host of varied but equally important, contract tasks. The table below provides details such as task number, description, and deliverables outlined in by CARB. The “Completed Milestones” column includes the deliverable title and submission date associated with each task.

Task #1: Project Administration

Milestones Completed:

Deliverables submitted to CARB

- Task 1.2.2 – Bus charging stations construction plan/ SCE Charge Ready Handbook (1/14/21)
- Task 1.2.4 – Draft vehicle acquisition plan (1/14/21)
- Task 1.2.5 – Active transportation feasibility assessment plan (11/17/2020)
- Task 1.2.6 – Data Collection and Analysis Plan (11/17/2020)
- Task 1.2.6 – Revised Data Collection and Analysis Plan (1/12/2021)
- Task 1.2.7 – Outreach plan (11/17/2020)
- Task 1.2.7 – Revised Outreach Plan (5/7/2021)
- Task 1.2.8 – Draft Curriculum development plan (3/15/21)
- Task 1.2.8 – Revised Curriculum Development Plan (5/7/2021)
- Task 1.2 – Compiled final project plans (5/7/21)
- Proposal to change scope to include an additional site, Mt. View High School (2/16/21)

Executed Contracts

- Task 1 – Gladstein, Neandross and Associates (GNA) Agreement to Provide Specialized Zero Emission Transportation Program Management and Advisory Services (EMUHSD Board approved 8/5/20)
<http://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=BRLRJ76E2E28>
- Task 1.2.6, 1.6, and 8 – University of California Riverside (UCR) Agreement for Data Collection and Analysis including Data Collection Plan and Final Report tasks (EMUHSD Board approved 11/4/2020)
<http://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=BUMRPD6E2908>
- Task 1.7 – SGVCC (12/9/20)
- Task 2 – Greenlots Sourcewell Cooperative Purchasing Agreement for electric vehicle charging stations equipment and networking software (EMUHSD Board approved on 11/4/20)
<http://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=BUQQKP69B720>
- Task 2 – Bus Charging Stations SCE Charge Ready (1/21/21)
- Task 3 – Battery Energy Storage - Public comment, contracting and board approval with Engie for energy via non-competitive contracting for energy services (CA Govt Code Section 4217.10) (4/19/21)
- Task 5 – Polaris Industries Approval to Issue and Release a Purchase Order for Utility Maintenance Vehicles Through Sourcewell (Formerly NJPA) Contract Number 051717-PSI (EMUHSD Board approved 8/5/20)
<https://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=BRLRFL6DCB1A>
- Task 6 – A-Z Bus Sales Inc., approval to Issue and Release Purchase Order for Purchase of 10 Zero Emission School Buses Utilizing Waterford Unified School District Piggyback Contract, Bid No. 01/17 (EMUHSD Board approved 8/5/20)
<https://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=BRLRGM6DF418>
- Task 7 – Fehr & Peers (9/28/20)
- Task 9 – VMA Communications, Inc. Agreement to Provide Education and Outreach Services (EMUHSD Board approved 8/5/20)
<https://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=BRLRH6E0D59>

- Task 10 – Curriculum Development Agreement board approval
<http://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=C8ZN785E837A>
- All vendors are subject to District policies specifically Business & Non-Instructional Operations policies (<https://go.boarddocs.com/ca/caemuhsd/Board.nsf/goto?open&id=8X6NNY60CF06>). Grant specific requirements and responsibilities are outline in finalized project plans.

Task 1.7 – Workforce Training - Clean Energy Fellow and Case Manager / Clean Mobility Projects

- The project team has completed the kickoff for Task 1.7 for the Clean Energy Fellow on March 5, 2021. Corresponding slide deck previously shared with CARB liason. Formal start date for the Clean Energy Fellow was April 1, 2021.
- Final presentation and fellowship closeout (4/26/2022)

Reporting

- Draft Final Report submitted (3/15/24)
- CCI Jobs Report submitted (12/14/2023)
- Q4-2023 Report submitted (3/14/2024)
- Q3-2023 Report submitted (11/17/2023)
- Q2-2023 Report submitted (11/17/2023)
- Q1-2023 Report submitted (6/16/2023)
- CCI Jobs Report (12/15/2022)
- Q4-2022 Report submitted (3/31/2022)
- Q3-2022 Report (12/13/2022)
- Q2-2022 Quarterly Report (9/20/2022)
- Q1-2022 Quarterly Report (4/30/2022)
- Q4-2021 Quarterly Report (1/30/2022)
- Q3-2021 Quarterly Report (10/30/2021)
- CCI Jobs Report for 2H-2021 (12/17/2021)
- CARB Project Profile (8/9/2021)
- Q2-2021 Quarterly Report submitted (8/6/2021)
- Q1-2021 Quarterly Report submitted (Q2-2022)
- Q4-2020 Quarterly Report submitted (02/01/2021)
- Q3-2020 Quarterly Report submitted (10/05/2020)
- CCI Jobs Report for 1H-2021 was submitted (6/17/2021)
- CCI Jobs Report for 2020 was submitted (12/15/2020)

Task #2: School Bus Charging Infrastructure

Milestones Completed:

- EMUHSD released a request for bid for an electrical contractor. Request for quotes was posted on December 20, 2022.
- The project team completed the installation of Level 2 and DC-Fast charging stations at the Bus Garage Site and completed commissioning (Q4-2022).
- The project team completed make-ready infrastructure installation at the Bus Depot Site and completed procurement of an electrical contractor to complete final charger installation (Q2-2022).
- Pre-construction meeting (10/26/21) and construction start at Bus Depot Site (11/1/21).
- High-voltage ABB Terra 54 chargers were delivered to the Bus Depot Site, eight (8) months earlier than expected (10/22/21).
- All BTCPower 70A chargers were delivered to the Bus Depot Site and await make-ready infrastructure for installation (8/17/21).
- Three DC Fast charger ABB Terra 54 units were delivered (7/19/21). Though the project team discovered that the voltage requirements of the chargers were incompatible and that the current ABB Terra 54's had to be replaced with a high-voltage version resulting in a 41-week delay (7/23/21).
- Design Plans for Bus Depot approved and notice-to-proceed provided to SCE (6/16/21).

- Preliminary designs for MVHS received and marked-up and are under revisions (6/16/21).
- EMUHSD uploaded all necessary documents to the SCE Charge Ready Transport program portal to proceed with make-ready infrastructure construction. As of March 23, 2021, all pre-construction documentation has been submitted.
- Preliminary design and base mapping process started on March 24, 2021. The SCE contractor has kicked off construction of make-ready infrastructure on March 27, 2021.
- EMUHSD executed the grant agreement for the SCE Charge Ready Program (1/21/21) for make-ready infrastructure at two sites, Mountain View High School and EMUHSD Bus Depot Site. Pursuant to the agreement, SCE will install make-ready infrastructure at no cost to EMUHSD.
- EMUHSD also requested quotes for the installation fees of the associated charging stations for the two sites. SCE will reimburse up to 50% of the EV unit costs via an incentive payment to EMUHSD.
- EMUHSD has submitted the SCE Charge Ready Handbook and agreement as the Task 1.2.2 – Bus charging stations construction plan (1/14/21).
- Southern California Edison (SCE) conducted an in-person site visit (10/16/2020) and developed final site and construction plans for ready-make infrastructure with conceptual designs (11/16/2020).
-

Task #3: Battery Energy Storage Infrastructure

Milestones completed:

- Permission to operate was provided (4/25/24)
- Full battery energy storage system construction and installation were completed at all remaining sites (Arroyo, Mt. View, and Rosemead high schools) (Q4-2022).
- Division of State Architects approved plans for El Monte High School. Site preparation was completed for Rosemead, Arroyo and Mt. View high schools (Q3-2022).
- Full battery energy storage system constructed and installed at South El Monte High School and Bus Depot Site (Q3-2022).
- Division of State Architects approval for Rosemead, Arroyo, Mt. View and South El Monte schools (Q2-2022).
- Construction for Bus Depot Site started (12/13/21).
- Battery housing materials delivered and stored off site (10/26/21).
- EMUHSD officially issued the Notice to Proceed for the Battery Energy Storage project component and held the kickoff meeting (7/21/21).
- Contracting with Engie was executed (4/14/21) and Engie commenced preliminary design and permitting. Public comment, contracting and board approval with Engie for energy via non-competitive contracting for energy services (CA Govt Code Section 4217.10) completed (4/19/21).
- Engie provided supplementary documents (W-9, vendor registration) (5/28/21). Engie also reserved BESS system with manufacturer.
- EMUHSD completed negotiations and finalized the proposed contract with Engie for battery energy storage components of the project. EMUHSD posted the Notice of Public Hearing for the proposed contract, which was open for public comment until Wednesday April 14, 2021 (3/31/21).
- School bus route optimization plan and recommendations completed (11/20/20).
- Installation cost estimates completed (11/20/20).
- Preliminary installation schedule submitted to EMUHSD (11/20/20).

Task #4: Car Sharing Vehicle Purchase and Implementation

Milestones Completed:

- El Monte Union High School District delivered six (6) car share vehicles for wrap installation (1/22/2024) and completed (4/23/24)
- Post-survey was distributed December 6, 2023, results are included in this report and subsequent attachments.
- Pre-survey results submitted to CARB (9/14/21).

- Received vehicles (1/17/2023)
- EMUHSD submitted a Purchase Order for the delivery of six (6) car-sharing vehicles. EMUHSD and the project team worked with CARB to provide necessary documentation for the addition of three additional units (11/22/21).

Task #5: Maintenance Vehicle Purchase and Implementation

Milestones Completed:

- Post-survey was distributed December 6, 2023, results are included in this report and subsequent attachments.
- Pre-survey results submitted to CARB (9/14/21).
- All eleven (11) maintenance vehicles were delivered (6/23/21).
- EMUHSD issued the purchase order for maintenance carts (3/1/21).

Task #6: School Buses Purchase and Implementation

Milestones completed:

- Post-survey was distributed December 6, 2023, results are included in this report and subsequent attachments.
- The project team completed CHP certification for all 11 electric school buses (May-2022).
- Final delivery of last Microbird EV school buses (11/15/21).
- Electric School bus training given by Ammon Matavao from A-Z Bus Sales (10/26/21).
- One MicroBird bus began operating routes to transport students due to extreme shortage of buses (9/16/21).
- Three additional Microbird buses delivered (8/18/21).
- One Microbird bus delivered (7/26/21).
- Two Bluebird buses delivered (7/23/21).
- One Bluebird bus delivered (7/21/21).
- Pre-survey results submitted to CARB (9/14/21).
- EMUHSD issued purchase order for school buses (3/1/21).

Task #7: Active Transportation Feasibility Assessment

Milestones completed:

- The project team presented the Active Transportation Plan to the City of South El Monte. As a result, the City of South El Monte will make a formal request for budget authorization for Active Transportation projects (3/22/22). Fehr & Peers also presented to the District Board on March 2, 2022.
- Fehr & Peers completed the final Active Transportation Plan for all project sites (11/15/21).
- Fehr & Peers completed the draft Active Transportation Plan for all project sites (8/16/21).
- Granada Transition Center was added to project scope to include:
 - Executive Summary
 - Collision and circulation diagrams
- The Transportation Survey was developed and translated into English, Spanish, Mandarin, and Vietnamese. The live survey link was distributed to the following individual school principals for circulation to wider school-community (2/8/21). The survey closed (5/6/21). The Fehr & Peers team analyzed the results. A language breakdown of received responses may be seen below.

Language Breakdown

	English	Spanish	Mandarin	Vietnamese
Student	400	10	3	6
Parent	374	115	13	8
Staff	14	1	0	0
Total	788	126	16	14

% of Total Survey (%)	83	13	2	1
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- As Fehr & Peers is tailoring outreach strategies to specific schools, Fehr & Peers joined ELAC parents meeting (1/27/21) and PTSA meeting (2/10/21) for El Monte High School, and ELAC/PTSA meeting (2/10/21) with Rosemead High School.
- Progress updates on Active Transportation Plans and Deliverables provided to all schools (1/14/21). In these updates, F&P sent the following documents to each school:
 - A project fact sheet to circulate to relevant parties within the school community.
 - A circulation diagram that shows major access points to the school and focus areas for improvements/upgrades.**
 - A collision map which shows collision “hot spots” within one mile of the school, which will guide upcoming conversations.
- The project team finalized sub-contracting between GNA and Fehr & Peers and held a kickoff on 10/12/2020. Additionally, a draft active transportation feasibility assessment plan was completed and submitted on 11/17/20.
- Initial kickoffs with individual school principals and project team members were completed for all schools.
 - Arroyo High School (11/9/20)
 - El Monte High School (11/10/20)
 - Rosemead High School (11/12/20)
 - Mountain View High School (11/12/20)
 - Ledesma High School (11/9/20)
 - South El Monte High School (11/12/20)

Task #8: Data Collection and Analysis

Milestones completed:

- Final Data Collection Report sent to CARB (4/4/2024) and included attachments.
- Geotab data-loggers installed on all car-sharing vehicles (Q3-2022).
- Microbird telematics portal account setup completed (12/9/21).
- Chargepoint telematics devices delivered to UCR (12/21/21).
- EMUHSD also began utilizing two Micro Bird school buses, therefore resulting in manual data collection until telematics installation (9/13/21).
- UCR has selected the three vendors for telematics and data collection to consider, this includes Engie, Geotab, and Zonar. Scoping calls have been held with all three. An additional vendor, Chargepoint, has been added for consideration and UCR is coordinating an informational call.
- The project team has received feedback on data collection plan components from CARB and has submitted a revised data collection plan (1/13/21).
- Contract execution was completed for UCR in November 2020 (11/4/20). Data collection kickoff, which included project partners A-Z, Engie, Shell and UCR was held on 10/2/2020. The project team has completed a data collection plan (submitted on 11/17/20) and UCR completed collection of data samples from project partners (A-Z, Engie, Shell).

Task #9: Outreach Activities to Various Audiences

Milestones completed:

- EMUHSD partnered with Award-winning Cartoonist to Promote Clean Transportation (Press Release in Attachments), which resulted in a 90-second EMUHSD Clean Mobility in Schools animation video. This partnership led to Lalo Alcaraz guesting on El Monte’s Art Talking Podcast, culminating in a live event (2/23/24)
- Post-survey was distributed December 6, 2023, results are included in this report and subsequent attachments.
- Pre-survey was distributed pm April 20, 2021, results submitted to CARB on September 14, 2021.
- Project partner, VMA Communications, completed pre-survey outreach activities to end-users,

students, and district staff. The Clean Mobility community survey closed on December 22nd with a total of 96 participants (69 English, 23 Spanish, 3 Vietnamese, 1 Chinese).

- VMA held a "Green-ribbon" cutting ceremony at South El Monte High School to commemorate the delivery of 4 EV school buses, 11 utility carts, and overall project goals. This included guests from CARB, the State of California, local government officials, and project partners. (8/18/21).
- With the approval of the first advanced pay request, EMUHSD issued purchase orders to VMA for outreach activities (3/1/2021).
- The project team held a kickoff call (9/12/20) related to reviewing the draft outreach plan developed by VMA. El Monte, in partnership with GNA, continued developing the outreach plan to include both VMA and El Monte components of the project.

Task #10: Curriculum Development

Milestones completed:

- Final Curriculum is included in Attachments of final report.
- Project partner VMA and GNA, have engaged with CARB Riverside Headquarters to conduct a student field trip to their testing facilities as part of the clean-energy curriculum. Student visit completed on November 8, 2023.
- EMUHSD and Rio Hondo Professor Ivan Leon completed the draft curriculum (10/14/2021).
- EMUHSD and Rio Hondo Professor held a kickoff call for curriculum development (Q3-2022).
- On December 8, 2021, the EMUHSD board approved the contract with the Rio Hondo professor for curriculum writing services.
- 15 students enrolled in the pilot course (9/9/21).
- The team received feedback on the draft curriculum development plan. EMUHSD submitted a Revised Curriculum Development Plan (5/7/2021).
- Rio Hondo Entrepreneur class was added to EMUHSD master schedule and EMUHSD staff recruited students for fall enrollment. The project team was in process of coordinating with Rio Hondo College Dean and instructor on remuneration, contracting, and fees (4/2/21).
- Draft Curriculum Development Plan submitted to CARB for review (3/15/21).
- The curriculum development plan includes course outlines at EMUHSD and Riverside County Office of Education, in coordination with the Los Angeles Trade Technical College.
- Project partners joined meetings with the District CTE Teacher (5/11/23) and Curriculum Committee Meeting (5/9/23), presenting the draft curriculum and soliciting feedback from participants.

Infrastructure and Operational Data Analysis

The District worked alongside project partner, UCR, to conduct data collection and analysis activities. UCR collected many data items directly related to fleet vehicles, while also coordinating with other project partners to obtain other data items identified in the Data Collection Plan. The District, in partnership with UCR, selected Chargepoint (formerly ViriCiti) for telematics data collection for the electric school buses, and Geotab for the electric passenger vehicles. GeoTab was initially preferred for both electric school buses and car-share vehicles as UCR has extensive experience working with this vendor. Ultimately, Chargepoint was selected to provide telematics for school buses as they provided additional data points that was not available with Geotab.

Vehicle Data Collection and Processing

ChargePoint data loggers were installed on each of the 11 electric school buses. The data logger was connected to the vehicle's controller area network (CAN) so that it could log several data points from the vehicle. The data logger was also equipped with a GPS receiver so that it could record vehicle location data simultaneously. For the three (3) Blue Bird electric school buses, the data logger was housed in the electrical panel, and the data were collected from March 2022 to September 2023. For the eight (8) Micro Bird electric school buses, the data logger was tugged behind the driver's seat, and the data were collected from January 2023 to December 2023.

An *Activity Event* table was used to collect and organize how many times the electric school bus was active during the project period. Data collected was compiled as four (4) types of activity events listed below. These were identified and stored in an *Activity Event* table chronologically. Moving, Idling, and Stopped are mutually exclusive. However, Charging is a subset of Stopped.

- Moving – key on and vehicle speed ≥ 3 kilometers per hour (kph)
- Idling – key on and vehicle speed < 3 kph
- Stopped – key off
- Charging – key off and ending battery level $>$ starting battery level

The start and end locations of each trip were indexed as either homebase or non-homebase. Note UCR distinguishes *Trip* from *Tour*. A tour consists of a series of consecutive trips that starts with an outbound trip (starting from homebase and ending outside), optionally one or more trips with start and end locations outside of homebase, and finally an inbound trip (starting from outside of homebase and ending inside).

For each of the *Activity Event*, *Trip*, and *Tour* datasets, descriptive statistics of travel distance, travel time, and energy consumption were calculated. These descriptive statistics were also differentiated between inside, around, and outside disadvantaged communities (DACs). In addition, other metrics such as idle fraction and energy efficiency (kWh per mile) were derived. Full data can be found in the attached Data Collection Report.

For the electric passenger vehicles, data were collected using a commercial telematics service from Geotab. The raw data collected from each vehicle include timestamp, vehicle location (latitude and longitude), vehicle speed, key on/off status, odometer, energy out (total energy flowing out of the battery while driving), energy in (total energy flowing into the battery while driving), and battery state of charge (SOC). All data items have a 3-minute interval except for energy out and energy in, which have a 1-day interval. By subtracting energy in from energy out, the net energy consumption during each interval can be calculated.

Since the data fields were logged at different frequencies, they were first synchronized and some of them were interpolated to fill the data gaps. Specifically, the timestamp of vehicle location was used as the basis for vehicle activity. Then, vehicle speed and odometer readings were interpolated based on time.

Subsequently, energy out and energy in were interpolated based on odometer, after which net energy consumption was calculated. Finally, SOC was interpolated based on net energy consumption.

Data Analysis and Findings

Electric School Bus Data and Analysis

Table 3 provides summary statistics of the data collected from the electric school buses. They are split into two groups. The first eight rows (Bus # 23 to 30) are Micro Bird G5 buses, which are of smaller size. The other three rows (Bus # 31 to 33) are the larger Blue Bird T3RE buses. Data were collected from the Blue Bird buses for about 18 months. Over that period, the three Blue Bird buses were utilized 36, 68, and 47 days, respectively. For the Micro Bird buses, their data collection period varied between 4 and 13 months as there were issues associated with making the data logger able to communicate with the vehicles' controller area network (CAN) that took several months to resolve. Over that period, the Micro Bird buses were utilized between 3 and 41 days, with one of them, Bus #23, never driven for at least one (1) mile during the data collection period. Cumulatively, the collected data represents 8,760 miles of driving and 993 hours of operation.

TABLE 3: SUMMARY STATISTICS OF DATA COLLECTED FROM ELECTRIC SCHOOL BUSES

Bus #	Make & Model	Days Total	Days Driven	Total Miles	Operating Hours	Driven Hours	Idle Fraction	Total Energy (kWh)	kWh per Mile	Weighted Avg kWh per Mile
23	Micro Bird G5	230	0	0	6	0	95%	2	-	0.88
24	Micro Bird G5	230	5	122	20	8	62%	130	1.1	0.88
25	Micro Bird G5	387	6	55	15	4	76%	57	1.0	0.88
26	Micro Bird G5	217	41	2,141	206	111	46%	1,834	0.9	0.88
27	Micro Bird G5	230	16	764	83	36	56%	679	0.9	0.88
28	Micro Bird G5	230	3	94	28	3	90%	115	1.2	0.88
29	Micro Bird G5	118	3	30	9	2	79%	42	1.4	0.88
30	Micro Bird G5	218	20	1,027	103	48	53%	853	0.8	0.88
31	Blue Bird T3RE	565	36	1,002	126	57	55%	1,538	1.5	1.49
32	Blue Bird T3RE	543	68	2,562	277	147	47%	3,678	1.4	1.49
33	Blue Bird T3RE	543	47	963	121	55	54%	1,540	1.6	1.49

Days Total: Total number of days between first and last data dates

Day Driven: Total number of days with at least 1 miles of distance traveled

Total Miles: Total number of miles traveled

Operating Hours: Total number of hours when the vehicle was on

Driven Hours: Total number of hours when the vehicle speed ≥ 3 kilometers per hour

Idle Fraction: Fraction of operating hours when the vehicle was idled

Total Energy: Total energy consumption (kWh)

kWh per Mile: Vehicle energy efficiency

Average kWh per Mile: Average vehicle energy efficiency for the same type of buses

The Micro Bird G5 and Blue Bird T3RE buses have an average vehicle energy efficiency of 0.88 kWh and 1.49 kWh per mile, respectively. This represents a weighted average which accounts for low usage Bus #23. To calculate actual battery capacity (Actual capacity = Nominal battery capacity*Manufacturer stated capacity), UCR assumed a usable battery capacity to be 80% of the nominal battery capacity with stated capacity of 88kWh, or $0.8*88\text{kWh} = 70$ kWh for the Micro Bird G5 buses. Thus, the average real-world range of the Micro Bird G5 buses in this project is 80 miles, which is lower than the manufacturer's claim of

over 100 miles³⁷. Similarly, assuming a usable battery capacity to be 80% of the nominal battery capacity with stated capacity of 155kWh, or $0.8 \times 155\text{kWh} = 124 \text{ kWh}$ for the Blue Bird T3RE buses. Thus the average real-world range of the Blue Bird T3RE buses in this project is 83 miles, which is lower than the manufacturer's claim of up to 120 miles³⁸.

The amount of time the buses are idling (or on but not moving) ranges from 46% to 95%, with an average of 53%. This is represented as idle fraction in the table above. This is expected as school buses make a number of stops to pick up and drop off students, during which they are usually idled with engine on. It should be noted that idling emissions from conventional school buses have long been a subject of air quality and public health concerns for many school communities. Since electric school buses have no tailpipe emissions, they abate some of these concerns.

The numbers of trips are reflective of the number of days driven shown in Table 4. The most utilized buses are Bus # 26, 27, 30, 31, 32, and 33. Except for the outlier of Bus #28, the number of tours per day for the other buses is between 0.9 and 1.6, which means that the school buses usually made one tour per day but occasionally made more than one tour on certain days.

TABLE 4: TRIP AND TOUR CHARACTERISTICS OF THE ELECTRIC SCHOOL BUSES

Bus #	Total Tours	Total Trips	Avg. Trips per Tour	Tours per Day	Avg. Miles per Tour	Avg. Miles per Trip	Longest Tour (Miles)	Longest Trip (Miles)
23	0	0	0	0	0	0	0	0
24	6	9	2	1.2	20	14	40	26
25	6	8	1	1.0	9	7	28	14
26	65	107	2	1.6	33	20	62	53
27	23	36	2	1.4	33	21	66	58
28	1	3	3	0.3	94	31	89	44
29	3	3	1	1.0	10	10	24	24
30	31	55	2	1.6	33	19	85	43
31	34	84	2	0.9	29	12	73	46
32	84	183	2	1.2	31	14	69	57
33	48	140	3	1.0	20	7	56	48

On average, the trip distance of these school buses is less than 35 miles, which is well below the average real-world range of the school buses. So, the buses can go on the route and return to the depot to get charged without any concerns. However, the longest tour for some buses, such as Bus # 30 and 31, is close to or even slightly exceeds the average real-world range of the buses. If the buses are not charged on-route during this kind of long tour, they will run the risk of running out of battery before being able to return to the depot.

Passenger Electric Vehicle Data

Table 5 provides summary statistics of the data collected from the electric passenger vehicles. The data collection period for these vehicles varied between 9 and 17 months, during which they were used between 8 and 52 days. Cumulatively, the data collected from the 6 project electric passenger vehicles represent 2,371 miles of driving and 130 hours of operation. These vehicles have much lower idle fraction as compared to the buses, ranging from 3% to 11%.

³⁷ MicroBird by Girardin. (n.d.). *Micro Bird G5 Electric*. microbird.com. <https://www.microbird.com/g5-electric>

³⁸ Blue Bird. (n.d.). *All-American RE Electric Supercharged*. <https://www.blue-bird.com/buses/allamerican/all-american-re-electric-bus>

TABLE 5: SUMMARY STATISTICS OF DATA COLLECTED FROM PASSENGER ELECTRIC VEHICLES

<i>Vehi cle #</i>	<i>Make & Model</i>	<i>Days Total</i>	<i>Days Driven</i>	<i>Total Miles</i>	<i>Opera -ting Hours</i>	<i>Driven Hours</i>	<i>Idle Frac- tion</i>	<i>Total Energy (kWh)</i>	<i>kWh per Mile</i>	<i>Average kWh per Mile</i>
6372	Chevy Bolt	264	14	226	10	10	3%	56	0.2	0.3
6397	Chevy Bolt	498	52	541	29	27	5%	139	0.3	0.3
6402	Chevy Bolt	285	45	808	44	39	11%	205	0.3	0.3
6416	Chevy Bolt	447	41	523	25	24	4%	129	0.2	0.3
6421	Chevy Bolt	400	8	64	4	4	5%	18	0.3	0.3
6425	Chevy Bolt	264	34	209	18	16	9%	61	0.3	0.3

Emissions, Energy, & Cost Impacts

Table 6 shows the emissions, energy, and cost savings from the deployment of electric school buses and electric passenger vehicles in this project compared to diesel school buses and gasoline passenger vehicles, respectively. The savings are calculated using the CARB’s Calculator Tool for Clean Mobility in Schools Pilot Project.³⁹ These savings are based on the actual number of miles that the electric vehicles have cumulatively traveled over the data collection period in this project. The savings will grow as these electric vehicles continue to be used in the next several years.

TABLE 6: EMISSIONS, ENERGY, AND COST SAVINGS FROM THE PROJECT’S ELECTRIC VEHICLES

	<i>Electric School Buses</i>	<i>Electric Passenger Vehicles</i>
Model Year	2021	2022
Number of Vehicles	11	6
Total Vehicle Miles Traveled	8,760	2,371
Net GHG Emission Reductions (MTCO_{2e})	13.0	0.8
Diesel PM Reductions (lbs)	0.04	0
NOx Reductions (lbs)	11.20	0.07
PM_{2.5} Reductions (lbs)	0.19	0.01
ROG Reductions (lbs)	0.19	0.02
Net Energy Use Reductions (Gasoline Gallon Equivalent)	1,116	72
Net Energy Cost Savings (\$)	5,701	399

³⁹ California Air Resources Board. (n.d.). *CCI Quantification, Benefits, and Reporting Materials*. [arb.ca.gov. https://ww2.arb.ca.gov/resources/documents/cqi-quantification-benefits-and-reporting-materials](https://ww2.arb.ca.gov/resources/documents/cqi-quantification-benefits-and-reporting-materials)

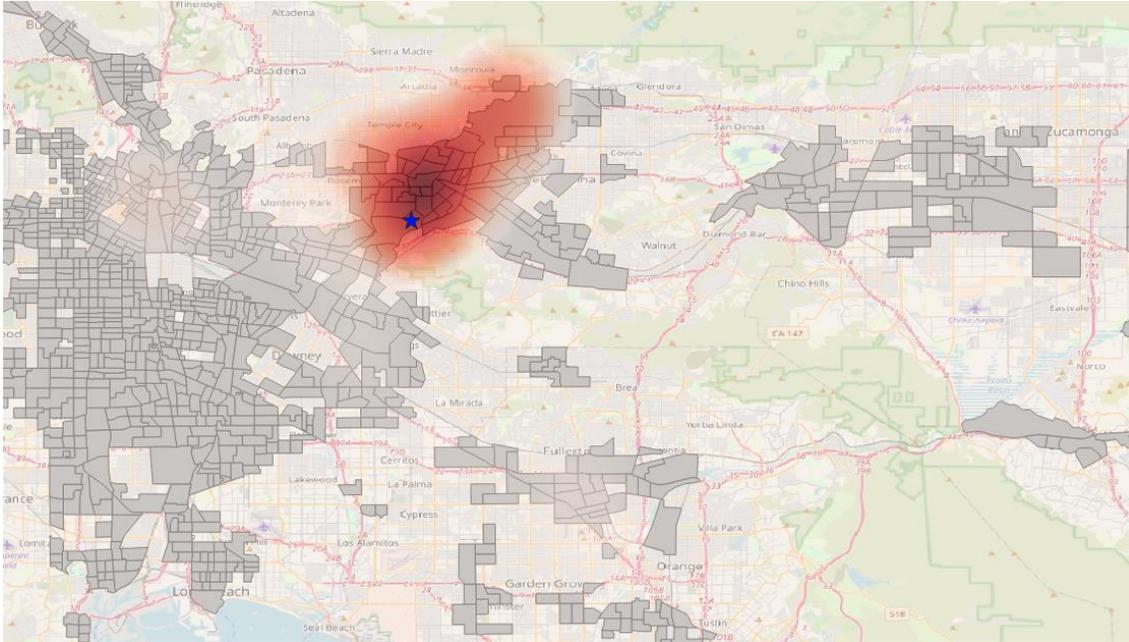


FIGURE 31: OPERATIONAL FOOTPRINT OF BUS #32 DISPLAYED AS RED SHADES. DARKER RED INDICATES HIGHER DENSITY OF VMT. BLUE STARS REPRESENT THE BUS DEPOT. GREY POLYGONS REPRESENT DACS

The level of emission benefits to DACs will vary depending on the extent to which the electric vehicles travel in or around DACs. Taking Bus #32, which is the most frequently used electric school bus in this project, as an example, during the data collection period, 90% of the total vehicle miles traveled (VMT) and 93% of the total vehicle hours of operation (VHO) for this bus were in or around DACs, thus significantly avoiding diesel emissions that would have otherwise been released into these communities. Figure 31 displays the operation footprint of this school bus. The operation footprint maps of all the electric school buses are given in UCR’s final report, which can be found in the Attachments.

Figure 32 shows the fraction of vehicle miles traveled and vehicle hours of operation in or around DACs for each electric school bus in this project. Excluding Bus #23, which did not make any trips during the data collection period, the buses traveled 66% to 95% of their distance and spent 60% to 99% of their operating time in or around DACs.

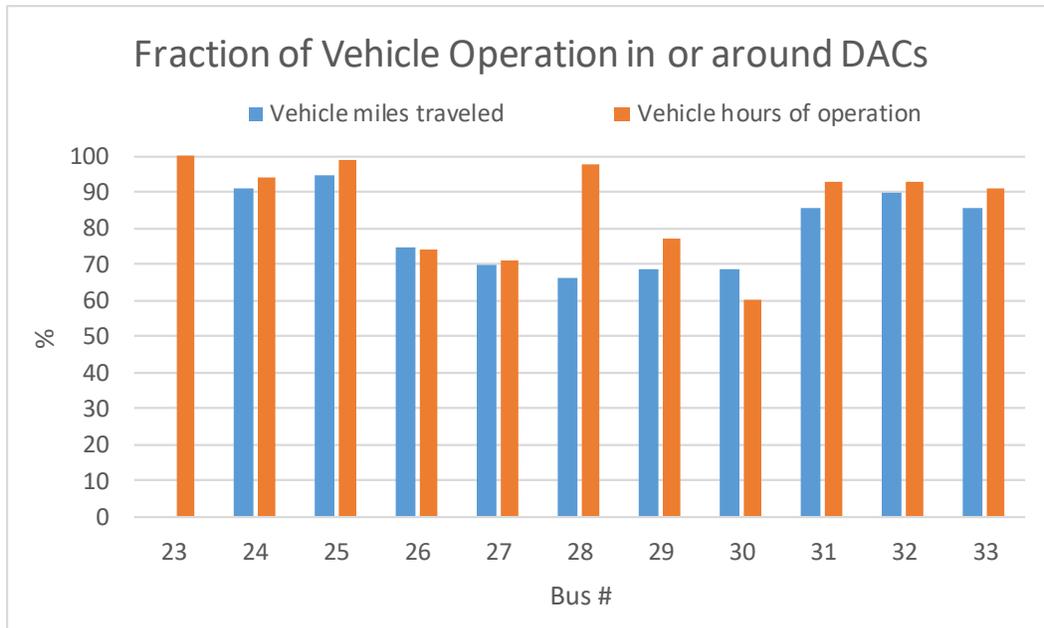


FIGURE 32: FRACTION OF VEHICLE MILES TRAVELED AND VEHICLE HOURS OF OPERATION IN OR AROUND DACS FOR EACH ELECTRIC SCHOOL BUS IN THIS PROJECT

Charging Equipment

Table 7 provides summary statistics of the data collected from the charging equipment. They are split into two groups. The first three rows are DC fast chargers while the other rows are Level 2 chargers. Data were collected from the DC fast chargers for about 13 months. Over that period, the three (3) chargers were utilized 98, 93, and 21 days, respectively. For the Level 2 chargers, their data collection period varied between 3 and 21 months, depending on the equipment location. Over that period, the utilization of these chargers also varied greatly where the chargers at Rosemead High School were utilized more often than those at the other locations. Cumulatively, the 31 chargers provided a total of 70.7 MWh of electricity to electric vehicles through 6,090 charging sessions.

TABLE 7: SUMMARY STATISTICS OF DATA COLLECTED FROM CHARGING EQUIPMENT

<i>Equip-ment ID</i>	<i>Charge Level</i>	<i>Equipment Location</i>	<i>Days Total</i>	<i>Days Used</i>	<i>No. of Sessions</i>	<i>Total kWh</i>	<i>Max Rate (kWh/hour)</i>
33405	DCFC	EMUHSD Bus Depot	381	98	145	6,995	50
33406	DCFC	EMUHSD Bus Depot	381	93	139	6,519	49
33407	DCFC	EMUHSD Bus Depot	381	21	29	1,167	49
52060B	Level 2	EMUHSD Bus Depot	405	0	0	0	0
52061B	Level 2	EMUHSD Bus Depot	404	44	38	1,789	13
52062B	Level 2	EMUHSD Bus Depot	404	49	56	2,272	8
52065B	Level 2	EMUHSD Bus Depot	404	19	19	672	8
52068B	Level 2	EMUHSD Bus Depot	404	19	12	478	7
52069B	Level 2	EMUHSD Bus Depot	405	15	22	1,153	11
52070B	Level 2	EMUHSD Bus Depot	405	16	17	745	8
52071B	Level 2	EMUHSD Bus Depot	404	18	16	1,136	6
52135B	Level 2	Arroyo High School	594	70	84	1,326	6
52178B	Level 2	Arroyo High School	615	198	234	2,653	21
52995A	Level 2	Arroyo High School	594	155	173	3,648	6
52996A	Level 2	Arroyo High School	615	294	1,069	2,979	6
52997A	Level 2	Arroyo High School	594	160	174	2,149	6
53003A	Level 2	Arroyo High School	615	331	1,349	3,876	6

Equip-ment ID	Charge Level	Equipment Location	Days Total	Days Used	No. of Sessions	Total kWh	Max Rate (kWh/hour)
52179B	Level 2	Mountain View High School	501	124	171	2,959	6
52180B	Level 2	Mountain View High School	432	113	122	879	6
52181B	Level 2	Mountain View High School	501	56	66	425	9
52182B	Level 2	Mountain View High School	432	155	161	1,847	6
52481B	Level 2	Mountain View High School	432	81	120	1,063	6
52063B	Level 2	Mountain View High School - Bus Charging	96	0	0	0	0
52064B	Level 2	Mountain View High School - Bus Charging	96	0	0	0	0
52066B	Level 2	Mountain View High School - Bus Charging	96	0	0	0	0
52067B	Level 2	Mountain View High School - Bus Charging	96	0	0	0	0
52132B	Level 2	Rosesmead High School	625	361	477	6,404	6
52133B	Level 2	Rosesmead High School	625	284	396	5,956	6
52134B	Level 2	Rosesmead High School	625	288	372	5,455	6
52183B	Level 2	Rosesmead High School	625	233	347	3,992	6
52184B	Level 2	Rosesmead High School	625	210	282	2,831	6

Figure 33 shows the level of charging activity for each charger at the District’s Bus Depot. The first row of the graphic lists the charging equipment ID number, and the second row shows the total amount of electricity each charger provided to electric vehicles over the data collection period. Then, the following rows show the fraction of electricity dispensed by each charger by time of day. In other words, they represent the charging load profile by time of day for each charger. The higher amount of charging is represented by “heat” where red shows periods of high charger use. Finally, the right most column shows the aggregate charging load profile by time of day for all chargers at the Bus Depot. This aggregate charging load profile is important information for managing the charging costs at the Bus Depot. Similar graphics that show the level of charging activity for each charger at Arroyo High School, Mountain View High School, and Rosemead High School are provided in Figure 34, Figure 35, and Figure 36, respectively. Note Arroyo and Rosemead chargers are not grant covered but provide valuable data nonetheless.

Equipment ID	33405	33406	33407	52060B	52061B	52062B	52065B	52068B	52069B	52070B	52071B		Total
Total kWh	6,995	6,519	1,167	0	1,789	2,272	672	478	1,153	745	1,136		22,925
Hour													
0	0.4	0.0	1.0	0.0	5.6	5.3	3.8	4.1	3.9	3.0	4.1		1.8
1	0.0	0.0	2.5	0.0	5.6	5.3	3.8	4.1	3.9	3.0	4.1		1.8
2	0.0	0.0	2.5	0.0	5.6	5.3	3.8	4.1	3.9	3.0	4.1		1.8
3	0.0	0.0	0.8	0.0	5.6	5.3	3.8	4.1	3.9	3.0	4.1		1.7
4	0.0	0.0	2.8	0.0	5.6	5.2	3.8	4.1	3.9	3.0	4.1		1.8
5	0.0	0.0	2.8	0.0	5.4	5.1	3.7	4.0	3.9	2.9	4.0		1.8
6	1.9	1.0	4.3	0.0	3.7	2.2	3.2	2.7	3.2	3.1	3.6		2.2
7	2.2	0.7	0.9	0.0	3.3	1.9	2.4	1.6	3.4	3.0	3.3		1.9
8	2.2	1.0	0.9	0.0	3.0	1.9	2.0	1.7	3.5	3.7	3.3		2.0
9	3.6	0.8	5.5	0.0	2.5	3.7	2.5	3.3	3.8	4.0	3.9		2.8
10	4.6	6.7	7.4	0.0	2.4	4.2	3.6	3.6	3.9	4.1	3.2		5.0
11	3.1	10.7	13.2	0.0	2.6	4.7	4.1	3.8	4.7	5.0	3.8		6.1
12	4.2	5.5	8.6	0.0	2.8	3.7	4.0	5.4	5.2	6.4	4.1		4.8
13	4.0	2.1	7.7	0.0	1.9	1.9	4.0	5.6	5.5	6.8	4.2		3.5
14	3.5	4.0	3.7	0.0	2.0	1.7	4.4	5.0	4.5	6.0	4.8		3.6
15	5.6	4.1	2.0	0.0	2.2	1.9	4.7	5.3	4.5	6.0	5.0		4.3
16	5.6	3.9	2.5	0.0	3.4	3.7	5.5	5.5	4.6	5.1	5.0		4.5
17	3.7	2.3	2.4	0.0	4.2	5.3	6.0	5.5	4.8	4.7	5.0		3.7
18	2.1	19.8	7.1	0.0	4.5	5.3	6.0	5.5	4.7	4.7	5.0		8.5
19	12.4	24.5	9.2	0.0	5.3	5.3	6.0	4.3	4.3	4.7	4.7		13.0
20	18.6	10.9	7.6	0.0	5.7	5.3	6.0	4.1	3.9	4.7	4.1		11.0
21	15.4	1.3	3.6	0.0	5.7	5.3	4.9	4.1	3.9	3.7	4.1		7.0
22	5.6	0.4	0.7	0.0	5.6	5.3	4.1	4.1	3.9	3.2	4.1		3.5
23	1.0	0.1	0.0	0.0	5.6	5.3	3.8	4.1	3.9	3.0	4.1		2.0

FIGURE 33: CHARGING ACTIVITY BY TIME OF DAY AT BUS DEPOT

Equipment ID	52135B	52178B	52995A	52996A	52997A	53003A		Total
Total kWh	1,326	2,653	3,648	2,979	2,149	3,876		16,631
Hour								
0	0.0	0.0	0.0	0.1	0.0	0.0		0.0
1	0.0	0.0	0.0	0.0	0.0	0.0		0.0
2	0.0	0.0	0.0	0.0	0.0	0.0		0.0
3	0.0	0.0	0.0	0.0	0.0	0.0		0.0
4	0.0	0.0	0.0	0.0	0.0	0.0		0.0
5	0.0	0.0	0.0	0.0	0.0	0.0		0.0
6	0.0	0.0	0.0	0.1	0.0	1.4		0.3
7	0.1	1.5	1.3	3.8	2.1	32.8		9.1
8	8.5	9.7	9.9	10.5	8.6	32.9		15.1
9	12.6	12.5	13.5	9.0	11.6	7.1		10.7
10	12.5	12.2	13.8	4.5	12.7	3.3		9.2
11	12.9	11.9	13.4	2.8	13.7	2.2		8.6
12	12.1	11.2	13.4	2.0	12.3	1.9		8.1
13	12.2	10.8	13.1	2.2	10.6	2.2		7.9
14	12.3	10.7	11.9	2.9	10.1	1.6		7.5
15	8.1	7.7	6.1	4.6	8.6	0.9		5.4
16	3.3	2.5	1.1	10.9	2.9	1.9		3.7
17	1.8	1.4	0.7	16.8	1.8	6.1		5.2
18	1.0	2.0	0.7	15.8	2.0	3.5		4.5
19	1.2	2.7	0.5	8.3	1.7	1.8		2.8
20	1.0	1.7	0.5	3.2	0.9	0.3		1.2
21	0.2	0.8	0.2	1.6	0.3	0.0		0.5
22	0.0	0.2	0.0	0.5	0.0	0.0		0.1
23	0.0	0.0	0.0	0.2	0.0	0.0		0.0

FIGURE 34: CHARGING ACTIVITY BY TIME OF DAY AT ARROYO HIGH SCHOOL

Equipment ID	52179B	52180B	52181B	52182b	52481B		Site
Total kWh	2,959	879	425	1,847	1,063		7,173
Hour							
0	0.0	0.0	0.0	0.0	0.0		0.0
1	0.0	0.0	0.0	0.0	0.0		0.0
2	0.0	0.0	0.0	0.0	0.0		0.0
3	0.0	0.0	0.0	0.0	0.0		0.0
4	0.0	0.0	0.0	0.0	0.0		0.0
5	0.0	0.0	0.0	0.0	0.0		0.0
6	0.0	0.1	0.0	0.2	0.0		0.1
7	2.5	5.4	5.0	4.6	1.4		3.4
8	14.6	12.5	16.0	11.1	13.2		13.3
9	15.2	13.0	14.7	11.2	14.6		13.8
10	15.1	13.5	12.7	10.9	14.9		13.6
11	14.4	12.9	11.4	11.1	13.5		13.0
12	12.3	11.6	9.1	11.1	11.6		11.6
13	9.7	10.8	9.4	10.8	11.1		10.3
14	8.4	9.3	8.0	9.9	8.5		8.9
15	5.2	5.9	5.5	8.2	5.6		6.1
16	0.8	1.9	1.9	4.8	3.4		2.4
17	0.5	1.1	3.2	2.6	1.2		1.4
18	0.5	0.7	2.0	1.5	0.5		0.9
19	0.5	0.6	0.7	0.9	0.3		0.6
20	0.3	0.4	0.1	0.5	0.1		0.3
21	0.0	0.2	0.0	0.3	0.0		0.1
22	0.0	0.1	0.0	0.2	0.0		0.1
23	0.0	0.0	0.0	0.1	0.0		0.0

FIGURE 35: CHARGING ACTIVITY BY TIME OF DAY AT MOUNTAIN VIEW HIGH SCHOOL

Equipment ID	52132B	52133B	52134B	52183B	52184B		Site
Total kWh	6,404	5,956	5,455	3,992	2,831		24,639
Hour							
0	3.0	1.2	1.7	2.4	0.9		1.9
1	2.9	0.9	1.6	2.3	0.8		1.8
2	2.7	0.9	1.6	2.3	0.7		1.7
3	2.6	0.9	1.6	2.2	0.7		1.7
4	2.6	0.9	1.4	2.1	0.7		1.6
5	2.0	0.8	1.2	1.8	0.5		1.3
6	1.5	0.7	0.8	1.3	0.4		1.0
7	3.0	2.5	3.0	1.4	1.3		2.4
8	4.6	5.0	5.5	3.4	6.1		4.9
9	6.0	6.2	6.2	5.0	6.5		6.0
10	6.2	7.2	6.2	4.9	6.5		6.2
11	5.7	7.1	6.3	4.8	5.9		6.0
12	5.3	6.4	5.7	4.7	5.0		5.5
13	5.4	6.0	5.9	5.4	5.1		5.6
14	5.4	6.0	5.0	5.2	4.8		5.3
15	4.6	5.2	4.7	4.6	5.4		4.8
16	3.0	4.5	3.8	4.4	6.3		4.2
17	3.7	6.5	5.2	5.8	7.6		5.5
18	4.5	7.1	7.0	7.3	9.5		6.7
19	6.5	6.2	7.5	7.8	8.7		7.1
20	6.8	6.6	7.0	7.9	6.6		7.0
21	4.9	5.7	5.2	5.9	5.1		5.3
22	4.0	3.4	3.4	4.3	3.4		3.7
23	3.4	2.0	2.5	2.9	1.5		2.5

FIGURE 36: CHARGING ACTIVITY BY TIME OF DAY AT ROSEMEAD HIGH SCHOOL

Budget

Advanced Pay Request/Disbursement Request Overview

The District was one of the first grantees to use the Advance Pay and Disbursement Request process. This process allows CARB to dispense grant funds in advance of the purchase or payment for eligible goods or services by the Grantee. The Advance Pay and Disbursement process gives CARB the ability to track grant funds closely and be reimbursed for unused funds. As the Grantee, El Monte Union High School District required a payment process that provided funds prior to purchase aligned with the District's payment process. The District's accounting system doesn't allow payment of vendor invoices unless there's sufficient funds in designated accounts. Because of this, the Advance Pay and Disbursement Request process was a conceptually advantageous process for all parties.

The list below details the number, submission date, and the associated tasks that utilized advanced pay.

Advance Pay Funds:

1. Funds to cover GNA, UCR, F&P, and VMA consulting services (1/12/2021).
2. Battery energy storage purchase, installation, testing, warranty, and training (5/10/2021).
3. School bus charging stations purchase (4/26/2021).
4. School bus charging stations, car share vehicles, outreach contract execution, curriculum development (12/13/2022)
5. Maintenance carts purchase & school bus charging station installation and permits (2/10/2023)
6. Amendments for project partners, GNA, UCR, & VMA (3/14/2024)

Budget v. Actuals

This project used various types of funding to achieve goals and contract deliverables. Table 8 provides a summary of grant and in-kind funds compared to actual spend required by tasks.

TABLE 8: SUMMARY OF TASKS AND PROJECT SPEND

<i>Task #</i>	<i>Task Description</i>	<i>Task Funds from Grant</i>	<i>Task In-kind Contributions</i>	<i>Actual Spend</i>
1	Project Administration: development and implementation of project plans; record-keeping procedures; reporting procedures; financial tracking and disbursements.	\$427,120		\$351,906.19
2	Charging Stations – Infrastructure Projects: conduct charging station activities for ten (10) stations.	\$319,940	\$21,060	\$312,228.15
3	Battery Energy Storage – Infrastructure Projects: conduct battery energy storage activities in five (5) areas.	\$3,804,500		\$3,860,359.19*
4	Car sharing / Motor pool Vehicles: conduct purchase and deployment activities for three (3) light-duty vehicles for teacher/staff school purposes.	\$254,500		\$268,248.24
5	Maintenance Vehicle Replacement: conduct purchase and deployment activities for eleven (11) maintenance utility vehicles.	\$255,750		\$157,134.12
6	School Bus: conduct purchase and deployment activities for ten (10) battery electric school buses.	\$4,075,600		\$3,731,497.52

Task #	Task Description	Task Funds from Grant	Task In-kind Contributions	Actual Spend
7	Active Transportation Feasibility Assessments at six (6) schools: conduct active transportation activities.	\$147,500		\$147,599.18
8	Data Collection and Analysis: conduct data collection and analysis activities for applicable project tasks.	\$283,256	\$15,040	\$230,109.00
9	Outreach Activities to Various Audiences: conduct outreach activities for applicable project elements.	\$128,750		\$360,691.46
10	Curriculum Development: development of a Zero Emission Technology Curriculum.	\$150,744		\$6,000.00
Totals		\$9,847,660	\$36,100	\$9,480,564.05

*Total project cost for BESS is \$6,071,253.65, but includes non-grant tasks. Spend reflects grant-scope items.

Leveraging and Cost-Savings

The District pursued multiple opportunities from other sources to leverage program funding and working closely with our vendors to capture maximum value for dollars spent.

SCE Charge Ready Transport Program

The District is proud to have leveraged the SCE Charge Ready Transport Program, which provided and installed make-ready infrastructure at both South El Monte and Mountain View high school sites. The program aims to advance transportation electrification and support nearly 9,000 EVs by 2024. As mentioned in previous report sections, the Charge Ready Transport Program provided the infrastructure to support the installation of electric vehicle charging equipment at no cost to the District up to the stub-outs. The Charge Ready Transport Program also provided an additional rebate option. The Charging Equipment Rebate is offered to offset a portion of the costs associated with the purchase of the charging equipment. Typically the rebate would've offset charger costs, but due to grant share covering costs SCE did not approve rebate.

Vehicle Procurement

The District was able to leverage cost savings from project vehicles to order additional project vehicles. Originally, there was only funding for ten (10) electric school buses. Due to unexpected lower cost for selected models, we were able to fund eleven (11) school buses. Similarly, the District was able to leverage relationship with Pape to negotiate more project vehicles than originally anticipated. With cost savings from these tasks, the District was able to fund the purchase of three (3) additional car-sharing cars as well.

CHALLENGES

COVID-19

Quarantine – Stay at Home Executive Orders

Throughout the course of the project, the project team encountered several challenges that required innovative ways to complete the project. Notably, the onset of the COVID-19 pandemic and state executive stay-at-home orders overshadowed the initial stages of the project in mid-to-late 2020. Basic project administration tasks, like kick-off meetings and coordination amongst the project team were delayed by up to three (3) to five (5) months as the project team pivoted to a virtual and remote work and school environment. The project team encountered limited access to school sites. Another challenge was the intensified vaccination and testing protocols for on-site work. All set to the backdrop of a shutdown of government agencies, which led to numerous delays in agency approval and the acquisition of permits. This resulted in the due dates for many tasks being pushed back by at least five (5) months and up to even one (1) year.

Global Supply Shortage

In parallel, the pandemic delayed the project's timeline and outcomes, as well as its rippling effects led to supply shortages that were out of the project team's control. These shortages led to delays of up to 18 months with the procurement of school buses, light-duty vehicles, and charging station infrastructure. One key mitigation strategy was to utilize current master agreements and contracts to bypass traditional lengthy procurement process with the District. Between July and September 2020, the team ran into challenges regarding the intended contracted company for energy storage, Engie. The issue was resolved by using non-competitive contracting for energy services and did not impact the timeline of deliverables.

School buses and Charging Infrastructure

Charger Incompatibility

Between January and June 2021, a nationwide microchip shortage caused longer lead times for school bus charging stations. Once delivered (July 2021), the District experienced compatibility issues between the chargers and school buses. A-Z informed Shell that the Blue Bird buses required higher voltage charging than provided by the ABB Terra 54. Shell informed and advised the District to replace the chargers. This issue caused a 41-week delay as the necessary high voltage chargers were on back order and required additional construction and permitting efforts.

Equipment Failures

At the end of 2021 and into 2022, the project team faced further issues with vehicle reliability and maintenance. One GEM vehicle had damaged pedals that needed servicing (the District convinced the vendor to cover the cost of the repair) and the electric school buses experienced transmission and charging issues due to a software interoperability issue.

Beginning in March 2023, several MicroBird and BlueBird buses experienced battery, software, and transmission issues resulting in shutdowns while in use and failing to start or hold charge. The District worked with A-Z (dealer), Shell (EV charging provider), and the EV bus manufacturer, MicroBird, to diagnose, resolve, and prevent similar problems in the future. This effort culminated in a troubleshooting meeting facilitated by GNA in late October 2023. During the meeting, A-Z gave status updates on school buses in repair and, along with Shell and MicroBird, discussed their initial impression of the causes for these malfunctions. First, the transmissions on eight (8) MicroBirds needed replacement. Second, the software on all school buses was outdated and causing systems to remain on even when the vehicle was off, in turn, draining the battery on an otherwise out of use, charged school bus. Finally, one (1) school bus required a new battery pack, and another was undergoing repair for a loose cable connection between the battery and the cluster module.

In early December 2023, GNA and A-Z had a follow-up meeting on the status of repairs and diagnostic analysis as well as District staff trainings. According to A-Z, a contributing cause of the school bus failures was improper charging and inspection protocol as well as unregulated temperatures and out of date software. A-Z explained that the bus auxiliary system relied on the high volt battery as a power source when the vehicle was on. However, when the vehicle is off, the auxiliary system is powered by the charged 12-volt battery. The software continuously prompted the auxiliary system to remain on when the vehicle was off, resulting in the battery appearing to be empty after being charged and off overnight. To resolve this, Ecotuned installed new software in November 2023. A-Z also discussed best practices for charging, downtime, driver inspections, and optimal temperatures, which further impact battery capacity and lifecycle. Currently, A-Z is finalizing their diagnostic report, developing a best practices document, and scheduling training for District staff. For future issues, A-Z is creating shared document for the District and GNA to access school bus data and maintenance statuses.

Impacts of these issues with the school buses and charging infrastructure can be seen through telematic data from UCR. Between March 2022 – October 2023, the electric school buses traveled a cumulative 8,120 miles, operated for 395 hours, completed 245 trips, and at capacity, serviced 4,655 student and adult trips (1,444 Micro Bird G5 trips and 3,211 Blue Bird T3RE 3904 trips). This number would have been higher had not, amid their deployment, several EV school buses experienced multiple issues as outlined. Comparatively, the baseline school buses (gas and diesel powered) in the District's fleet during the same period traveled a cumulative 51,553 miles, operated for 4,232 hours, completed 6,939 trips, and at capacity, serviced 329,744 student and adult trips.

Permitting

As mentioned, SCE's Charge Ready Program assisted EMUHSD with installing EV charging infrastructure by providing all make-ready infrastructure up to charger stub-outs. This includes ensuring that enough power is available and that the site can easily activate once the EV chargers are installed. Due to the project sites being on campus, the final permits to operate were to be issued by DSA. While SCE and the District have worked with DSA before, this project had a longer lead time because DSA required a new transformer calculation as part of the permitting process. This calculation required specific information regarding SCE installed equipment. For EV charging permitting, usually questions regarding power to the chargers are for after the switchgear is installed, but this calculation needed transformer information prior to the switchgear installation, which is not a standard SCE normally follows. EV charging projects require new transformers and new equipment, and these details are new for DSA as well given that the technology is being developed alongside permitting and processing advances. The biggest factors for delays were aligning responses to new close-out documents and approval and answering the SCE owned and installed transformer questions. Despite these delays, the project was energized and passed final inspection.

SCE recognizes that these are ongoing challenges, and they have consistently shared feedback throughout the process with DSA and project partners, specifically CARB. SCE is working with DSA on better preparation for responding to DSA's questions around the transformers, project site requirements, and broader EV installations at large. Going forward, the new calculation creates a precedent and changes the standards across the state for installing EV chargers, which in turn, fundamentally changes what happens for future EVs in schools. The main lesson learned from this process that SCE shared is a learning curve when implementing projects in school districts and navigating authority-having-jurisdictions (AHJ). For example, past projects were not in close proximity to school sites or student-frequented areas. Understanding these nuances will be critical for future implementation of EV projects. There is also need for more consistency to the permitting process across all California districts. Currently there are efforts with the state and DSA to address this. As such, SCE recommends consistency in communications to utilities on what is required, publishing of new requirements, and appropriate dedicated lines of communication at relevant AHJ's.

Cash Flow and Procurement

Typical grant cash flow is reimbursement based. This conflicts with typical operation of school funding, where invoices are only paid out when there is money in accounts. Furthermore, the District follows the state Department of Education protocols to ensure fair and transparent operations⁴⁰. This ensures the District is in good financial standing, but requires additional scrutiny when paying vendors. With this in mind, the District utilized the Advance Pay option provided by CARB. Between October and December 2020, the project team faced issues with completing advance pay and disbursement requests to CARB. Since CARB was developing processes for the advance pay request and there were ongoing discussions regarding needed materials, this resulted in a delay of funds that pushed back the purchase of project vehicles and the launch of outreach activities. This did not impact overall project delivery timeline but nonetheless exhibits the challenges that may be faced by other school districts. Considering this, the District advocates for a more direct funding stream that can be accessed more easily for project funds.

Data Collection

Data Logger Incompatibility

Between April and June 2021, two (2) Microbirds began operating due to a critical school bus shortage. Since data collection devices were not yet installed, data was manually recorded by plant managers and bus drivers until the full telematics capabilities were established. Given the manual recording of data, between January and June 2022, the project team moved forward with the installation of data collection devices on the Microbird buses. Bluebird and the baseline vehicles completed device installation; UCR collected and provided data to the District and CARB as needed. Furthermore, the District continued to utilize the Microbird telematics portal for supplementary data collection. For the remainder of 2022, the project team continued with the installation of Geotab data collection devices on the Microbird buses in tandem with ChargePoint device troubleshooting. UCR continued to collect and report data from Bluebird and baseline vehicles. Once the issue with the ChargePoint devices was resolved, the project team continued to move forward with ChargePoint data loggers and reserved Geotab devices as a backup solution for the school buses.

Overall, with a wide variety of data items to be collected, UCR utilized various data sources including vehicle specification sheets, vehicle telematics, District inventory software, accounting records, and traditional paper logs. While these data sources were available and provided an extensive amount of relevant data, several hurdles were present restricting UCR's ability to collect certain data items and perform certain analyses. For example, a comprehensive financial analysis of vehicle costs requires a detailed cost information of existing vehicles relative to the costs of the new vehicles. Also, the new vehicles are not always a 1:1 replacement with service routes not necessarily consistent.

As the project neared completion, the project team continued to install the firmware update to ensure data collection devices were functional. UCR continued to collect and report data from both Bluebird and the baseline vehicles.

Non-Standardization, Lacking Open Communication Protocols due to Proprietary Systems

The UCR team successfully collected data from the electric vehicles and charging equipment deployed in this project. However, given delays with logger incompatibility and battery and charging equipment issues on top of challenges to receive relevant data, UCR was unable to complete a comprehensive analysis of the project's impact. As previously reported the project team had interoperability issues between Chargepoint data loggers and Microbird buses. The project team had to work directly with the manufacturer and their data software provider (Ecotuned) to install the firmware update on the Microbird buses.

⁴⁰ <https://www.cde.ca.gov/fg/ac/co/csamletter2019.asp>

UCR planned to complete a comprehensive financial analysis of vehicle costs, but it required detailed cost information of existing vehicles relative to the costs of the new vehicles. Also, the new vehicles were not always a 1:1 replacement with service routes not necessarily consistent. Similarly, refueling and charging infrastructure had similar challenges in terms of comparing the capital and operational costs of the existing refueling infrastructure with those of the new charging infrastructure. For the District, much of the existing fleet is made up of Compressed Natural Gas (CNG) vehicles with on-site refueling. The installation, operational, maintenance, and fuel costs associated with the CNG refueling infrastructure are not delineated in the District's financial records and not discernable for individual vehicles. Historical data on CNG refueling patterns and events are also not available for comparison with electric vehicle charging activities. In addition, the installation of solar panels at some project sites also impacts the cost of electricity at those sites throughout the day.

However, the telematics data were not a reliable source for identifying charging events. This limitation is due to the lack of universal protocols for data communication between electric vehicles and chargers. Further complicating the data collection from electric vehicles is the lack of universal protocols for accessing on-board bus data. The electric passenger vehicles possess the standard on-board diagnostics (OBD-II) data port for light-duty vehicles, but they do not have to comply with specific data protocols required for internal combustion engine vehicles. Similarly, the electric school buses possess the standard J1939 data port for medium- and heavy-duty vehicles, but the two (2) electric school bus models in this project use different data protocols with varying data parameters. This means that the three (3) types of electric vehicles in this project all possess different data protocols, data fields, and data formats so each of them requires customized hardware and software tools to collect, store, and retrieve vehicle-based telematics data. Despite the numerous challenges faced, the UCR team was able to collect and compile a wealth of data regarding the performance and utilization of the electric school buses, electric passenger vehicles, and associated charging equipment that were deployed in this project.

Best Practices, Lessons Learned, Recommendations, Conclusion

Best Practices and Lessons Learned

Project Management

The problems encountered throughout the project led to numerous lessons learned for the project team that can be adopted for future grantees and iterations of this type of project.

In the project's beginning stages, the project team adjusted to the altered project timeline due to ongoing COVID-19 restrictions and delays from contracting resulting from School District policies for board approvals. Key lessons learned from this time of the project include:

- Significant upfront coordination is required to get the project off to the right start and ensure all the separate project partners are moving on their respective project assignments.
- Engage with other grantees or deployers of technology to understand larger market conditions and challenges as well as best practices .
- Regarding advance pay, the project team focused largely on splitting up the initial advance pay packet to develop a disbursement request packet separately from the advance pay. Moreover, the project lead and CARB must maintain constant communication on requested materials and documentation.

Carshare Electric Vehicles

The carshare electric vehicle manufacturer, Chevy, announced a price adjustment for their Chevy Bolt EUV product (<https://gmauthority.com/blog/2022/06/2023-chevy-bolt-euv-to-get-6300-price-drop/>). The District contacted their Chevy dealer regarding the announcements. Initial response from General Motors (GM) Fleet Office and the EV team from the Chevrolet Corporate Office indicated that this price adjustment is for retail products and not applicable for the District's fleet pricing. Unsatisfied with this response the District continued to have conversations with GM and Chevrolet to obtain the price adjustment. Despite back-and-forth communication, the District was not able to take advantage of the price adjustment and completed payment for trucks. The District's experience revealed key lesson learned for future purchasers:

- Purchasing parties must be aware of and understand pricing levels or tiers before purchasing. Prices fluctuate in the market; purchasers should be aware and plan for these shifts.

School Bus and Charging Equipment

As the project continued and ran into high voltage charger incompatibility and equipment failure issues, the District developed key lessons learned and future best practices to avoid a similar situation in the future:

- **District/End Users:** Equipment failures revealed best practices for end user charging protocol to ensure battery longevity and operational ability. To avoid battery depletion, the school bus should be placed in "Storage Mode" and charged using Level 2 chargers during prolonged periods (up to 3 hours) of downtime. Due to the RFID position on some of these chargers, they will turn off and need to be restarted. Thus, good practice would be to have a knowledgeable employee unplug and plug back in the charger during prolonged downtimes such as on Sundays, always ensuring the school bus is in "Storage Mode." It is essential that temperatures be monitored or controlled to preserve the battery capacity and lifecycle. Best practices to support dealership data collection include: 1) Communicating with the dealership when units are put into long-term storage mode; 2) implementing a daily route schedule that includes estimated mileage; 3) Assigning each school bus a specific charger. Finally, monthly inspections performed by drivers must include a wire connection evaluation.
- **Dealership:** Dealerships should strive to provide copies of full equipment specifications for all equipment ordered to the charging provider and to the purchasing entity. It is critical that specifications include electrical equipment and not just seating configurations and sizes. Dealerships should also ensure that they flag the high voltage charging requirements on the larger school buses more explicitly and ask for a spec sheet of charging hardware ordered to ensure equipment ordered meets the specifications of the school buses.
- **EV Charging Providers:** Companies like Shell and other EV charging providers should work with the dealership or vehicle manufacturer to secure product specification sheets for all products deployed at the site. They should then confirm the vehicle product sheets match what vehicles the purchasing entity is receiving and then decide the charging equipment that best meets these needs. These specifications should be reconfirmed 2-3 times in the build cycle to ensure that the vehicle manufacturer has not made product enhancements that will trigger incompatibility and vice versa for the charging equipment.
- **Purchasing Entities/Third Parties:** Hold three checks throughout the process to ensure proper exchange of information:
 - **Introductory Call:** review equipment orders and equipment specifications
 - **Mid-Call, pre charging hardware selection:** dealership and charging provider call to confirm charging hardware compatibility with vehicles.
- **Delivery Call:** confirm charging hardware is working effectively with school buses.

Related to the SCE Charge Ready program, site grant deeds were required to continue with the design and implementation phase of the program. Initially, these documents were not on file with the District. As such a request was made with the LA County Clerk Recorder and via Court order. Due to the age of these documents, they posed a challenge to locate, but ultimately the project team was able to find the necessary documents. A key lesson learned is to locate related documents prior to or during the application phase of the SCE Charge Ready Program, to avoid project delays.

While the project did experience a bus driver staffing shortage, which led to a lack of asset utilization, the nature of the problem was largely out of the project team's hands. There is little remediation for a bus driver shortage. Strategies such as increased pay and benefits are common resolutions but are not under the purview of the project team. As such it is critical to anticipate labor shortage delays in project implementation. The project team continued identifying mitigation measures for when full deployment is expected.

Data Collection

Regarding the maintenance and repair of the purchased electric vehicles (maintenance and school buses) and data collection issues, specifically compatibility, the project team's key lesson learned include:

- Purchasers must do their due diligence prior to and during the procurement process to ensure the technology is compatible with the intended vehicle, understanding that the technology is evolving, and incompatibility is an inherent risk.
- It is key that equipment is purchased with a quality warranty that will cover maintenance and repairs.
- It is critical that technology manufacturers, specifically through bus-dealers, provide support for service and reliability to ensure uptime.
- It is critical to ensure telematics devices and software are compatible with vehicle technologies. As a best practice, when selecting a vendor, future grantees should request compatible and validated vehicles from the telematics provider. Additionally, the project team experienced significant delay from the vendor. Upon notification of returning devices, they became more responsive, which may be a best practice for future interactions.
- Future grantees should consider data requirements for both new and existing fleet vehicles in order to execute project efficiently.

Recommendations & Conclusion

The *Clean Mobility in Schools Pilot Project* was no small undertaking. Seeking to reduce the pressures families face when finding ways to get their children to school, and more broadly fundamentally changing an entire school district's travel system took partnership, communication, creativity, and flexibility. The project was only able to accomplish what it set forth due to how well the District worked alongside its project partners to manage the project in an effective and timely manner and its unique and resourceful pathways for collaborating with vendors. Also, the District worked around challenges presented by funding flows to still deliver results from the project's scope.

Initial stages of the project were eclipsed by the onset of the COVID-19 pandemic. Ripples from the pandemic meant delays and sourcing challenges for the project team. However, as the scope changed for the project, creative ways were used to still work with vendors and procure crucial items. The District utilized innovative and tried and true contracting practices like Sourcewell vendors, piggyback contracting, and public procurement, to meet project requirements. Using these methods allowed flexibility for the District to move quickly within the project timeline for implementation and installation, which may not have been possible had they conducted a standard bidding process. The District's expert knitting of the different project team members further ensured the project was well-managed and that items were able to be procured efficiently.

When advanced pay was introduced as the new method for providing project funds, it ended up becoming a pain-point for project efficiency. The challenges consisted of ensuring proper documentation is filled out properly. Considering the challenge, we worked closely with CARB to streamline the process and share areas for improvement. Going forward, the District suggests CARB provide an informational/training session such that grantees are better prepared to develop and CARB to approve advanced pay requests quicker. Additionally, CARB can work with award recipients to allow them to choose the payment method that works best for them. For example, direct funding is the preferred method for funding distribution as this is a less cumbersome funding process for the District, if feasible.

Overall, the project accomplished an incredible task: *transforming the lives of thousands of students and community members.*

Here is a list of our compiled best practices and recommendations for future iterations of this project:

- **Build a Team:** A project of this magnitude requires a number of partners, and it is critical Grantees have sufficient internal capacity to support coordination, including grant management and reporting. Alternatively, a third-party vendor can provide grant management services. Grantee's should look to leverage existing contracts and/or purchase orders to streamline procurement. It is also critical that Grantees maintain constant communication with vendors to ensure product compatibility and compliance with school-district policies and AHJ's as it relates to permitting.
- **Budget and Plan:** Ensure that projected budget has sufficient contingency in the event of project delay. Grantees should also review school-district policies, so they do not conflict with incurring costs and/or CARB's advance pay protocol. Grantees should review advance pay and reimbursement documentation requirements as well to ensure smooth cash-flow. Grantees should also look to leverage other eligible funding sources to reduce project budget. Moreover, the project lead and CARB must maintain constant communication on requested materials and documentation.
- **Communication with Data:** Telematics devices both on vehicle and third-party options will evolve as the technology matures. New vehicles will have newer capabilities as well as new data connector types and ports. It is critical to ensure telematics device and software for data collection are compatible with vehicle technologies. As a best practice, when selecting a vendor, future grantees should request compatible and validated vehicles from the telematics provider. Grantees should also have a good understanding of data points being collected by devices to ensure proper data analysis is possible. Many vendors also have third party service providers that can impact customer support and may delay product repairs. Understanding key sub-partners is also helpful to expedite any issues with data collection.
- **Proper Upkeep:** School districts should be adequately prepared to deploy project vehicles in regular operational schedules and ensure vehicles are compatible with expected usage. The District experienced additional vehicle issues when vehicles were not being utilized enough, a problem due to BEV technology. Furthermore, vehicle upkeep is critical to ensure driver confidence in equipment. There may be some initial hesitancy due to novel technologies. Ensuring equipment is in proper working order will help provide a sense of security and trust in the equipment as well as prolong their life cycle.

Appendix

Photos

Photos may be found at the link below. Link access is limited to CARB liaison. Additional staff may receive access upon request.

[VMA Photos](#)

Raw Data

Raw data may be found at the link below. Link access is limited to CARB liaison. Additional staff may receive access upon request.

[UCR Data](#)

Attachments

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EL MONTE UNION HIGH SCHOOL DISTRICT
**CLEAN MOBILITY
IN SCHOOLS** PILOT PROJECT



Final Project Report

March 2024

Partnering with us for a better tomorrow:



This work is funded through the Clean Mobility in Schools Pilot Project grant awarded to the El Monte Union High School District. The Clean Mobility in Schools 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.

