

Clean Mobility in Schools (CMIS) Final Report

Stockton Unified School District Getting Stockton to Zero Emissions: Clean Air for Our Community

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Acknowledgment

This report was submitted in fulfillment of Grant G18-CMIS-03 by Stockton Unified School District under the sponsorship of the California Air Resources Board through Clean Mobility in Schools (CMIS). Clean Mobility in Schools is part of California Climate Investments, a statewide initiative that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment, particularly in disadvantaged communities.

The work for this grant was completed as of June 30, 2025.

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I. Executive Summary

The Clean Mobility in Schools (CMIS) Final Report outlines the accomplishments, challenges, and future recommendations of the Stockton Unified School District's (SUSD) efforts under the "Getting Stockton to Zero Emissions: Clean Air for Our Community" initiative. Funded through the California Air Resources Board (CARB) Grant G18-CMIS-03, this project aimed to reduce greenhouse gas emissions, improve air quality, and enhance transportation equity within disadvantaged communities.

Key Achievements:

- *Fleet Electrification: Deployment of 9 electric school buses and supporting infrastructure, reducing diesel dependency.*
- *Currently, SUSD transports about 3,000 K-8 students, with 100% of the general education routes being zero-emission.*
- *The SUSD Transportation Department is working to transition the 9th-12th-grade general education students back from city buses to district-operated transportation. By the 2025-26 school year, 600 students will be added, with an expected increase to 1,200 students by the 2026-27 school year.*
- *Infrastructure Development: Installation of charging stations, solar energy systems, and utility upgrades to support sustainable energy use.*
- *Energy Strategy & Planning: A Near-Term Energy Strategy and Long-Range Zero-Emissions Plan were developed to ensure SUSD's continued transition toward a 100% electric fleet.*
- *Community Engagement: Extensive outreach efforts, including educational programs and events, fostered awareness and community involvement in clean mobility initiatives.*
- *Data Collection & Reporting: Systematic tracking of vehicle performance, energy usage, and emissions reductions to assess project impact. Over 310,000 kWh of energy was used to power the vehicles, which would have otherwise been sourced from fossil fuels.*
- *Overall, with the contribution from CARB, there has been a substantial reduction in fuel costs achieved by switching to electric school buses. During a three-month period (August, September, October) comparing 2023 from 2024, SUSD has saved \$40,470 in diesel costs.*

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Challenges & Lessons Learned:

- *Project Delays & Workforce Changes: High turnover within SUSD and external partners led to timeline extensions and additional planning adjustments.*
- *Technical & Operational Hurdles: Issues such as charging inefficiencies, equipment malfunctions, and data integration challenges required adaptive solutions.*
- *Funding & Sustainability: Securing long-term financial support remains critical for maintaining and expanding clean mobility programs, specifically to support the required charging infrastructure for the expanding battery electric school bus fleet.*

Future Outlook & Sustainability:

SUSD aims to expand its zero-emission initiatives, optimize energy storage and management, and continue pursuing funding opportunities to support sustainable infrastructure. SUSD is located within the San Joaquin Valley which includes 20 of the 30 most disadvantaged communities in California. Assembly Bill 617 (AB 617) requires the SUSD to develop and implement carbon reduction strategies which is fundamental to this CMIS project. Community partnerships and educational programs remain a cornerstone of our long-term success. A key example of this commitment is the annual SUSD Earth Day event, which offers extensive hands-on learning opportunities for students and the broader community. At these events, SUSD provides solar and wind engineering kits, as well as air-quality-themed building kits, allowing students to explore concepts in clean energy and environmental science through engaging, interactive experiences. These kits offer real-world applications of engineering principles and promote awareness of sustainable practices from a young age. Notably, SUSD designed educational programs developed around these kits by SUSD to encourage creativity, critical thinking, and environmental responsibility, making science and sustainability both accessible and exciting for students. The CMIS project has further strengthened SUSD's leadership in environmental stewardship by laying a strong foundation for the SUSD's transition to a cleaner, healthier transportation system. The project has already achieved measurable reductions in emissions and is delivering long-term environmental and economic benefits for the community.

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II. Project Overview

The “Getting Stockton Schools to Zero Emissions: Clean Air for our Community” included the following components to enable SUSD to realize impactful air quality improvements and develop real solutions to the climate crisis: deployment of *nine* electric school buses, *eight* John Deere Gators for maintenance crew, zero-emission grounds equipment acquisition and installation of chargers, and a solar installation that will generate enough energy each year to support SUSD’s future goals of 100 percent of electric school bus charging needs. The project included comprehensive data collection and reporting as well as long-range planning for SUSD’s zero-emission future. Finally, the project team undertook outreach and education activities developed for SUSD students, teachers, staff, the Stockton community, and other school districts.

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Table 1 Project Overview

Project Element	Description	Cost Allocation
<i>Task 1 Project Administration and Grant Management</i>	<i>Development and implementation of project plans; record-keeping procedures; reporting procedures, financial tracking, and disbursements</i>	<i>\$404,033.00</i>
<i>Task 2 Develop a Near-Term Energy Strategy</i>	<i>Conduct the development and implementation of a battery energy storage system to support SUSD's growing electricity consumption.</i>	<i>\$326,186.00</i>
<i>Task 3 Vehicle and Grounds Equipment Acquisition</i>	<i>Conduct purchase and deployment activities for battery electric school buses, maintenance, and landscaping vehicles and equipment.</i>	<i>\$3,167,521.00</i>
<i>Task 4 Utility Upgrades and Charging Stations</i>	<i>Conduct energy generation and charging station activities for school bus charging stations. Maintenance department charging needs, and solar installation.</i>	<i>\$2,348,032.00</i>
<i>Task 5 Long Range Zero Emission Planning</i>	<i>Development of a zero-carbon master plan.</i>	<i>\$249,736.00</i>
<i>Task 6 Community Outreach and Engagement</i>	<i>Conduct outreach activities for applicable project elements.</i>	<i>\$611,789.00</i>
<i>Task 7 Data Collection and Data Reporting</i>	<i>Conduct data collection and analysis activities for applicable project tasks.</i>	<i>\$202,480.00</i>
TOTAL		\$7,309,777.00

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III. Project Team



Stockton Unified School District: Grantee: *The Stockton Unified School District (SUSD) serves over 40,000 students in 55 schools throughout the city of Stockton, California. SUSD has an annual budget of \$585 million. Of the students enrolled with SUSD, 82% are considered to be Socioeconomically Disadvantaged (California Department of Education). SUSD was the primary recipient of the CMIS grant and was associated with each of the project Tasks.*



Center for Transportation and the Environment (CTE): Sub-Grantee to SUSD: *CTE is a 501(c)(3) nonprofit organization founded in 1993. CTE brings people together to develop and commercialize clean, efficient, and sustainable transportation technologies. CTE collaborates with federal, state, and local governments, fleets, and vehicle technology manufacturers to advance clean, sustainable, innovative transportation and energy technologies. Since 1993, CTE has managed a portfolio of more than \$530 million in team research, development, and demonstration projects funded by a variety of federal and state organizations, including the U.S. Departments of Transportation, Energy, Defense, and Interior, as well as the California Air Resources Board and California Energy Commission. CTE is experienced in developing, implementing, and administering advanced transportation technology projects, with a focus on zero-emission buses. CTE brings broad technical program management, data collection and reporting, and zero-emission outreach to the team. CTE was primarily responsible for Task 1, Task 6, and Task 7, and provided administrative support to SUSD on the other Tasks. CTE also utilized ChargePoint (formerly ViriCiti) to install data loggers on the vehicles, which were used to track the key performance indicators.*

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NV5 (Formerly Sage Energy Consulting): Sub-Grantee to CTE: NV5 is an energy planning and project management firm with a decade of experience in school energy projects in California. NV5 has assisted over 80 California School Districts as owners' representatives to plan, procure, implement, and manage solar, storage, efficiency, electric vehicle, and microgrid projects. With deep expertise in project finance and contracting, NV5 negotiated dozens of third-party finance contracts as well as sought multiple sources of grant/incentive funding and managed the implementation of those projects. NV5 was responsible for the carbon accounting, emissions reporting, and long-range zero emissions reporting identified in Task 2 and Task 5.



The Mobility House (TMH): Sub-Grantee to CTE: TMH is an over 10-year-old technology company with 130+ employees based across offices in Silicon Valley, Austin, Munich, Zurich, and Warsaw, serving customers in over 10 countries. These include leading automotive manufacturers, fleet operators, utilities, and electric vehicle drivers. TMH's goal is to help create a zero-emission energy and mobility future. In order to do this, the company has built a technology platform, ChargePilot, that enables reliable and efficient charging of electric vehicle fleets and vehicle-grid integration using intelligent charging, energy management, and storage solutions. ChargePilot has been rolled out across Europe and North America with leading electric bus operators, delivery service fleets, and on corporate campuses. TMH has multiple international landmark energy projects in operation, such as the sophisticated EV battery-based storage solutions in the Johan Crujff Arena in Amsterdam and powering the island of Porto Santo in Portugal using its vehicle-grid integration technology. TMH is further accelerating the rollout of its solutions through its extensive partner network, including OEMs like the Nissan-Renault-Mitsubishi Alliance (shareholders), Daimler (shareholder), Volvo Cars, VW, Honda, and others. Energy companies include Mitsui, Amprion, Tennet, Terna, and others. The Mobility House was primarily responsible for the charge management strategy, school bus charging management system integration, and charger control validation and operation identified in Tasks 2 and Task 4.

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Schneider Electric: Sub-grantee to SUSD: Schneider Electric is a global company that develops and implements connected technology and solutions to manage energy and processes in ways that are safe, reliable, efficient, and sustainable. The leader in digital transformation of energy management and automation, Schneider Electric manages large-scale installations of energy storage solutions supporting a wide range of clients from residential to industrial. For the last five years, Schneider Electric and SUSD have been in a partnership optimizing Prop 39 funding, providing facility upgrades, and lowering annual utility costs. Schneider Electric was primarily responsible for the charging station construction and installation identified in Task 4.

IV. Community Background and Identified Transportation Needs

46 of SUSD's 55 schools are located within disadvantaged community boundaries. Since more than 80% of SUSD school sites, and 100% of those near the transportation yard, fall within those boundaries, it is likely that the school buses will spend the majority of their time in disadvantaged communities. 82% of the students enrolled with SUSD are considered to be Socioeconomically Disadvantaged (California Department of Education). Approximately 3.5% of SUSD students travel to and from school by school bus. While school buses are the safest mode of transportation for getting children to and from school, according to the U.S. Department of Transportation, the exposure to diesel emissions poses other significant risks.

V. Project Element Details

Grant Management (Task 1 - Project Administration)

Grant management includes coordinating regularly with CARB and all project partners, developing agreements with partners and paying partners for work completed, developing project plans, fulfilling project readiness requirements, maintaining project records, reporting on project status and data collected, and documenting and tracking expenditures.

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Table 2: Grant management associated subtasks and budget details.

Sub-task #	Sub-task Description	CARB Funds Spent
1.1	Kickoff Meeting	\$16,977.00
1.2	Project Management Work Plans	\$11,076.00
1.3	Policies and Procedures	N/A
1.4 – 1.6	Records Keeping and Reporting	\$340,094.51
1.6.4	Final Reporting	\$13,395.73
	Task Total	\$381,543.24

1a. Partnership Structure

California Air Resources Board (CARB) is the Clean Mobility in Schools grant funding agency. CARB was responsible for grant compliance and providing general guidance throughout the duration of the grant. CARB also assisted SUSD in executing two amendments throughout the funding period and was responsible for reviewing and approving disbursement requests.

Stockton Unified School District (SUSD) is the primary recipient of the CMIS grant award. SUSD, with assistance from CTE, was responsible for reporting all deliverables required by the grant term for its duration. SUSD also named CTE, Schneider Electric, The Mobility House, and NV5 as project partners in the grant application.

The Center for Transportation and the Environment (CTE) partnered with SUSD to originally apply for the CMIS funding opportunity. CTE was responsible for grant compliance and general project administration for the duration of the grant. Project administration activities included partner coordination, quarterly reporting, creating disbursement requests on behalf of SUSD, organizing meetings with relevant project partners, and ensuring grant compliance. Under Amendment 1, CARB granted CTE additional project management funding due to the expanded scope and timeline of the project.

1b. Deliverables

SUSD's key personnel oversaw and administered all aspects of the project, ensuring effective coordination with CARB staff and adherence to project guidelines. This included planning and

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participating in meetings, developing project plans, maintaining records, tracking financial disbursements, and ensuring proper reporting procedures.

At the outset, SUSD conducted a project kick-off meeting with CARB staff to establish expectations, discuss tasks, set milestones, and finalize reporting formats. Regular coordination meetings continued for the duration of the grant to review progress, address challenges, and ensure alignment with CARB's objectives. Throughout the project, SUSD was responsible for responding to requests from CARB and the public in a timely manner. To guide project execution, SUSD developed comprehensive project plans covering training, procurement, and infrastructure.

SUSD and CTE oversaw the execution of two grant Amendments throughout the duration of the project. Amendment 1 was executed in February 2021, which added additional funding and scope to the project. The additional scope included four additional electric school buses, supporting infrastructure, and additional project management support. Amendment 2 extended the term of the agreement to end on June 30, 2025, so that SUSD would have sufficient time to submit all required deliverables.

Financial accountability was a key component, which required SUSD and CTE to establish a robust system for tracking expenditures and disbursements. Data collection was systematically conducted at project launch, mid-project, and conclusion, with quarterly reports tracking progress toward reducing greenhouse gas emissions and benefiting disadvantaged communities. This final report was created to summarize expenditures, project milestones, participant outcomes, and lessons learned.

1c. Challenges, Lessons Learned, and Best Practices

High turnover can significantly disrupt project progress, and continuous training and proper onboarding are essential for maintaining momentum. SUSD experienced significant reorganization throughout 2021 and 2022 in part due to the COVID-19 pandemic. This organizational restructuring was a significant contributing factor to the grant Amendments, which extended the project. Organizations can never predict staff turnover or societal shifts; however, it is crucial for large projects to include a significant buffer to account for the unexpected. As with most school districts, SUSD is consistently in search of funding sources. Securing funding and planning for future growth is critical, particularly for infrastructure-heavy projects that require significant capital. The project team also determined that early and ongoing coordination with external partners, such as electrical providers, is essential to avoid delays and ensure smooth project execution. A thorough and detailed project plan, considering long-term scalability, is vital for the success of complex projects such as EV infrastructure implementation.

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Task 2 – Near-Term Energy Strategy

This project was built on existing, shovel-ready plans that SUSD and Schneider had developed for electric school bus charging upgrades. Task 2 provided the near-term energy planning needed to support and coordinate plans that SUSD had already been implementing and identified near-term opportunities to significantly enhance zero-emission energy production. This task ensured that planning and energy procurement were in place so the equipment delivered under this task could be charged effectively, balancing low cost and low emissions.

NV5 evaluated current energy use and local production, as well as developed a baseline carbon and emissions accounting. This gave SUSD a near-term overview of all available options and helped them understand how the increased electric use would impact costs. To create a new baseline for planned energy use, CTE modeled operation and charging scenarios for the new vehicles and equipment, determining expected operational use and the required charging time for the school buses and purchased grounds equipment.

At the time, Schneider had design drawings and pricing for the site upgrade in a shovel-ready state. In this phase, Schneider Electric finalized the design for the school bus charging upgrade, accounting for any increase in charging capacity if needed. The Mobility House developed an optimized charging strategy to minimize costs while ensuring school buses were fully charged for the next day's service. NV5 prepared a feasibility study for a stationary Battery Energy Storage System (BESS) for demand and load management.

Table 3: Near-Term Energy Strategy associated subtasks and budget details.

Sub-task #	Sub-task Description	CARB Funds Spent
2.1	Near-Term Energy Strategy	\$35,000.00
2.2	Prepare Self-Generation Incentive Program Application	\$5,000.00
2.3	Solar PPA RECs and Financial Performance Analysis	\$52,000.00
2.4	Baseline Carbon Accounting	\$29,000.00
2.5	Finalize the design of the initial charging expansion	\$174,282.00
2.6	Near-Term Energy Strategy Planning Report	\$30,904.00
	Task Total	\$326,186.00

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2a. Partners and Roles

NV5 conducted the District-wide energy consumption review, Self-Generation Incentive Program application, Solar Power Purchase Agreement, Renewable Energy Certificates, and financial performance analysis, establishing baseline fleet information and carbon report, and the Near-term Energy Strategy Report.

The Mobility House (TMH) and Schneider Electric developed the charge management strategy.

CTE and SUSD oversaw the three partners to ensure the deliverables met the expectations identified in the CARB agreement.

2b. Deliverables

SUSD embarked on a comprehensive review of its energy consumption, aiming to develop a high-level report outlining strategies for decarbonization. As part of this effort, preparations began for the California Public Utilities Commission's Self-Generation Incentive Program (SGIP) application. The initial submission focused on securing Equity SGIP funding for a Battery Energy Storage System (BESS) at the transportation facility.

Simultaneously, SUSD initiated the procurement process for a third-party-owned BESS system at the transportation yard. A Request for Proposal was crafted, leading to the solicitation of bids, an evaluation of proposals, and the selection of the most suitable vendor.

To establish a strong foundation for sustainable planning, a baseline carbon accounting process was undertaken by NV5. A detailed inventory cataloged all district-owned vehicles and equipment slated for replacement, capturing key operational data. Additionally, transportation mode choices in the Stockton area were analyzed to provide representative baseline information. Further assessment explored the emissions reduction potential of on-site solar photovoltaic (PV) projects, BESS, and vehicle-to-grid systems.

A critical component of the initiative was the development of a charging management strategy conducted by The Mobility House and Schneider Electric. This plan ensured that SUSD's energy projects would optimize power usage and charging infrastructure while capitalizing on Pacific Gas & Electric's (PG&E) beneficial electric vehicle tariffs. The goal was to maximize financial benefits from both energy generation and storage components.

To support this strategy, the district procured and installed Load and Energy Management (LEM) technology. Additionally, a structured vehicle and equipment charging plan was developed, modeling operational scenarios to determine usage patterns and charging requirements for school buses and grounds equipment.

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Ultimately, the insights gained from these efforts culminated in the Near-term Energy Strategy Report. This document produced key findings from SUSD's energy initiatives, outlining the optimal use of assets such as school buses and solar arrays to advance sustainability goals. The Near-term Energy Strategy Report is included as an Attachment.

2c. Outcomes

The Near-term Energy Strategy Report by NV5 was prepared for the SUSD and CTE as part of the CMIS grant. The study evaluated Distributed Energy Resources (DER) strategies, including solar photovoltaic (PV) and Battery Energy Storage Systems (BESS), to support the electricity demand of 11 electric school buses (ESBs).

The Mobility House (TMH) developed six charging profiles for the ESBs, and four operational scenarios were analyzed. Scenario II, which focused on super-off-peak charging (9:00 a.m. – 2:00 p.m.), was found to be the most cost-effective and best aligned with solar PV generation. SUSD already has a solar PV system under a Power Purchase Agreement (PPA), and while this system could fully offset the ESB charging demand if reallocated, it cannot support both the ESB load and warehouse electricity needs simultaneously. The system is owned by a third party and SUSD is buying power from Pacific Gas & Electric (PG&E).

Three DER strategies were evaluated: (A) leaving the existing PV system as is, (B) reallocating some PV to the EV service, and (C) reallocating PV with the addition of battery storage. Strategy A provided the highest financial savings, estimated at \$11,000 in 2021, as it maximized the value of solar energy under PG&E's retail tariff. Strategy C, which included battery storage, was found to be financially unviable due to high costs and minimal additional savings.

The study also assessed financial and carbon savings, finding that solar PV could reduce carbon emissions by approximately 114 metric tons (MTCO₂), representing a 59% reduction in site emissions. However, battery storage did not offer additional carbon savings due to energy losses during charge and discharge cycles. The Low Carbon Fuel Standard (LCFS) program could provide significant financial incentives, estimated at \$65,000 in the first year and up to \$573,000 over ten years. To fully leverage these credits, SUSD must clarify ownership of Renewable Energy Certificates (RECs) under the existing PPA contract.

A PPA buyout, estimated at \$854,900, could provide greater flexibility in using solar power for ESB charging. Additionally, installing an extra 130 kilowatt peak (kWp) of solar PV, at an estimated cost of \$585,000, could fully offset the ESB load and further reduce emissions by

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about 60 MTCO₂. To maintain flexibility, SUSD was advised to install spare conduit for potential future PV reallocation.

NV5 recommended maintaining the current solar PV system (Strategy A) as the best near-term approach, ensuring maximum financial savings while achieving significant emissions reductions. Future efforts should focus on securing additional funding, optimizing LCFS credits, and exploring long-term solutions such as a PPA buyout or solar system expansion.

The NV5 Near-term Energy Strategy Report is included as an Attachment.

2d. Challenges, Lessons Learned, and Best Practices

NV5 completed a long-term energy roadmap for SUSD, which benchmarked SUSD's emissions. The roadmap identified carbon emission reduction options and recommendations for reducing emissions. The significant challenge with the roadmap is that the future procurement of zero-emission vehicles and supporting infrastructure likely will not completely align with the initial plan. However, the benchmark will allow SUSD to continue to revisit the roadmap and adjust accordingly.

2e. Future Planning and Sustainability

The purpose of the baseline accounting report was to provide SUSD with a starting point for its carbon emissions. SUSD will continue to revisit the results of the study as it continues towards a 100% electric school bus fleet.

Task 3 – Vehicle and Grounds Equipment Acquisition

SUSD's vehicle and equipment purchase and implementation plan involved acquiring and deploying school buses, landscape, and maintenance vehicles and equipment per the Solicitation requirements. This included purchasing nine battery-electric school buses, issuing purchase orders, executing contracts, installing data collection devices, obtaining maintenance service plans, validating equipment, conducting driving range tests, and providing training for drivers and staff. Additionally, SUSD procured eight utility vehicles, two landscape trimmers, three ride-on mowers, two walk-behind mowers, two leaf blowers, and necessary batteries. Training sessions were also conducted for maintenance staff, district personnel, and first responders to ensure proper operation and safety.

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Table 4 SUSD Vehicle and Equipment – Purchase and Implementation associated subtasks and budget detail.

Sub-task #	Sub-task Description	CARB Funds Spent
3.1	Conduct purchase and implementation activities for school buses	\$3,060,262.39
3.2	Conduct purchase and implementation activities for grounds maintenance equipment	\$210,249.01
3.3	Maintenance, driver, and first responder training	N/A
	Task Total	\$3,270,511.40

3a. Partners and Roles

SUSD was the primary recipient of the funding associated with Task 3, which was used to purchase and deploy battery-electric school buses and maintenance equipment.

SUSD purchased the Blue Bird and Micro Bird school buses from A-Z Bus Sales.

Additionally, SUSD purchased lawn and grounds maintenance equipment from John Deere and Husqvarna.

CTE and SUSD oversaw the vehicle and equipment procurement and deployment to ensure the deliverables met the expectations identified in the CARB agreement.

3b. Deliverables

SUSD's vehicle and equipment purchase and implementation plan involved acquiring and deploying school buses, landscape equipment, and maintenance vehicles. Key tasks included issuing purchase orders, executing contracts, installing data collection devices if necessary, acquiring an operations and maintenance service plan, conducting validation and driving range testing, and providing training for drivers, maintenance staff, and relevant personnel. Additionally, the plan covered the purchase and deployment of landscape and maintenance equipment, including utility vehicles, various lawn care tools, and batteries. Similar steps were followed for these acquisitions, including issuing purchase orders, assembling vehicles, installing data collection devices, and securing maintenance service plans. Lastly, maintenance and first responder trainings were conducted to ensure proper handling and operation of the new equipment, covering essential training materials, presentations, and safety measures.

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3c. Data Collection

The data collection and analysis of the deployed electric school buses was a key component of Task 3 because it allows SUSD to track its progress towards a zero-carbon future. SUSD and CTE utilized both manual and automated methods to collect various data metrics from the vehicles. Metrics included miles driven, vehicle utilization, and energy consumed. The team was able to track miles driven simply via the odometers on the dashboard, while the other metrics were tracked using the bus telematics platform ViriCiti. CTE also developed a key performance indicator (KPI) dashboard for SUSD, which allowed the project team to log in through an online portal to review the performance of the electric school buses. CTE also presented quarterly KPI reports to SUSD and CARB. Additional details regarding the data collection and reporting efforts are described in the Task 7 section.

3d. Outcomes

SUSD purchased four Blue Bird electric school buses (ESBs) equipped with direct current (DC) fast charging and Vehicle-to-Grid (V2G) capability. Additionally, SUSD acquired two more ESBs with funding from the CEC, supplemented by CARB grants. While driver and maintenance training sessions were conducted, several concerns arose, including issues with overheating, dashboard controls, and charging logistics. Since SUSD transitioned its fleet over an extended period of time, maintenance staff were required to spend extra time ensuring the vehicles were charged in time for pullout. The logistical challenges were resolved after the entire staff was trained and more ESBs entered the fleet. In the area of landscaping and maintenance, SUSD received eight John Deere Gators along with battery-powered landscaping tools. To support this transition, a charging infrastructure was installed in the third quarter of 2020. SUSD also adjusted its procurement plans for MicroBird electric school buses. Initially planning to purchase four, rising costs led to the acquisition of only three. These school buses were delivered in March 2024, and data loggers were installed to monitor their performance.

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Image 1 Blue Bird Electric School Buses



Image 2 MicroBird Electric School Buses



3e. Challenges, Lessons Learned, and Best Practices

The most significant challenge associated with the vehicle and grounds equipment acquisition task was related to workforce development for the vehicle operations, maintenance, and grounds-keeping staff. The project did include some workforce development scope and funding, but more would have been beneficial. Although A-Z Bus was helpful in assisting SUSD in diagnosing and addressing major school bus issues, SUSD hopes to conduct all repairs in-

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house in the future. SUSD did come to the conclusion that once operators began driving the electric school buses, they preferred them to diesel buses due to their quiet and smooth-driving nature.

SUSD also experienced issues with the landscaping equipment providers Belcorp and Hilmar. The grounds-keeping staff overwhelmingly preferred the electric equipment, which also reduced air and noise pollution for schoolchildren and staff. However, SUSD did experience delays and a lack of communication whenever repairs were needed on the equipment itself.

3f. Future Planning and Sustainability

Stockton Unified School District (SUSD) continues to lead in sustainability efforts with 80% of its Grounds Department fleet now operating zero-emission landscaping equipment, 30 electric school buses are active on all general education routes for the district, and another 35 electric school buses slated to be in service by November 2025. In partnership with A-Z Bus Sales, John Deere, Husqvarna, and CTE, the district has implemented a comprehensive zero-emissions strategy deploying electric buses, utility vehicles, and landscaping equipment. This initiative was supported by a major infrastructure project, which included utility upgrades, solar canopy installations, and the integration of EV charging stations with future-ready Vehicle-to-Grid (V2G) capabilities. Work included bus yard preparation, conduit installation, charger testing, and the implementation of a smart charging management system to optimize queuing, scheduling, and maintenance. Real-time data is collected and monitored through ViriCiti and a custom KPI dashboard. To ensure the safe and effective use of new technologies, the district provided extensive training for drivers, maintenance teams, and first responders. Looking ahead, SUSD plans to continue replacing its remaining fleet vehicles with zero-emission alternatives and expand on-site battery storage capacity. These efforts aim to power EV charging infrastructure with renewable energy and move toward creating resilient microgrids, enhancing energy independence for both school sites and the surrounding community.

Task 4 – Charging Infrastructure

The infrastructure project focused on utility upgrades and the installation of charging stations, including a solar canopy. Key objectives included analyzing transportation system queuing, scheduling, and maintenance needs while incorporating Vehicle-to-Grid integration where applicable. The project involved several tasks, such as utility upgrades, grounds maintenance for charging, and school bus site preparation with conduit installation. Additionally, it included integrating a school bus charging management system, installing and testing chargers, validating charger control operations, and assessing data collection and analysis.

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Table 5: Charging Infrastructure and Utility Upgrades associated subtasks and budget details.

Sub-task #	Sub-task Description	CARB Funds Spent
4.1	Utility upgrades	\$10,000.00
4.2	Grounds maintenance charging upgrades	\$5,782.13
4.3	School bus site prep/conduit installation	\$15,000.00
4.4	School bus charging management system integration	N/A
4.5	School bus charger installation, testing, and commissioning	\$2,517,254.76
4.6	School bus charger control validation and operation	\$19,148.00
4.7	Design and mobilization	N/A
	Task Total	\$2,567,184.89

4a. Partners and Roles

SUSD was the primary recipient of the funding associated with Task 4, which was used to purchase the charging infrastructure.

Schneider Electric conducted the utility upgrades in coordination with Pacific Gas & Electric Company (PG&E). Schneider Electric was also tasked with preparing the school bus site prior to the charging infrastructure installation. After the completion of the installation, Schneider Electric completed the required commissioning and inspections. Finally, Schneider Electric completed the installation of DC Fast Chargers.

The Mobility House (TMH) integrated the charge management system and the charger control validation and operation.

CTE and SUSD oversaw the utility upgrades and charger installation to ensure the deliverables met the expectations identified in the CARB agreement.

4b. Deliverables

The primary objective of Task 4: Charging Stations and Utility Upgrades was to install the charging infrastructure that would support the battery-electric school buses. The first step prior to installation was the utility upgrades performed by Schneider Electric. Schneider Electric submitted design drawings and permitting approvals as the key deliverables for this subtask. The charging infrastructure installation included site planning and permitting, conduit installation, hardware installation, and concluded with the testing and commissioning of the equipment. Task 4.5 was amended in 2021 to add additional scope to the task, including the

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installation of DC fast chargers. All of the purchase orders and photos of the equipment were used as deliverables evidence for this task.

4c. Data Collection

The data collection efforts for the charging infrastructure primarily involved tracking the amount of energy delivered to the vehicles. The chargers were separately metered, which allowed SUSD to track the amount of energy that was dispensed. Additional information regarding the data collection efforts is discussed in Task 7.

4d. Outcomes

The development of the school bus charging infrastructure progressed in multiple phases, beginning with Phase 1, which was successfully completed in January 2021. During this phase, Schneider Electric oversaw the installation of twenty Level II alternating current (AC) chargers and necessary utility upgrades. With this work finalized, the initial school bus charging infrastructure became fully operational.

Building upon this foundation, Phase 2 introduced significant enhancements with the addition of DC fast chargers. As part of Amendment 1, four high-speed DC chargers were procured to improve charging efficiency. Although the ESBs can be fully charged overnight utilizing the AC chargers, the addition of the DC fast chargers improved flexibility by allowing SUSD to charge the vehicles on short notice, if a vehicle needed to be charged after the morning route, or if any of the AC chargers malfunction. By the second quarter of 2024, construction and installation were completed, marking another milestone in the project. SUSD was able to purchase and install six Level 2 chargers in June 2025 due to the leftover funding available from the unused funds from Task 6.3.

Image 3 Charging Infrastructure



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4e. Challenges, Lessons Learned, and Best Practices

SUSD reported low voltage supply and premature session termination events. To address these concerns, extensive repairs were carried out on Charger 4, Charger 8, Charger 11, and Charger 12. These repairs included replacing cables and circuit boards to restore proper operation. While these fixes improved performance, further diagnostics are ongoing in coordination with TMH to fully resolve any remaining issues and ensure the reliability of the charging infrastructure.

4f. Future Planning and Sustainability

SUSD continues to lead in sustainable innovation with a long-term commitment to zero-emission transportation and infrastructure. Through strategic planning and investment, the District has laid a robust foundation for a cleaner future—upgrading utility infrastructure, installing solar canopies, and deploying DC fast chargers to support the transition to an all-electric fleet. Early-stage infrastructure work included conduit installation, utility coordination, and charger commissioning. A smart charging energy management system, implemented by The Mobility House, ensures efficient energy distribution and grid responsiveness, while Schneider Electric and PG&E facilitated essential utility upgrades and site preparation. Advanced data systems were deployed to monitor charger performance and energy throughput, and targeted maintenance addressed challenges such as voltage fluctuations and premature charge terminations.

Looking ahead, SUSD is shaping the future of student transportation through its Long-Range Zero-Emission Planning initiative. Central to this effort is the development of a comprehensive Zero-Carbon Master Plan, led by NV5, which incorporates carbon benchmarking, scalable infrastructure designs, and a districtwide roadmap for Vehicle-to-Grid (V2G) integration. In parallel, CTE supported the development of a Fleet and Equipment Zero-Emission Use Plan, aligning operations with the District's electrification goals.

With support from key funding partners, SUSD has secured grants listed below:

Awarded:

- California Energy Commission (CEC) 2 electric school buses (\$748,018)
- San Joaquin Air Pollution Control District (5 electric school buses)
- Environmental Protection Agency (EPA) Round 1 - 20 electric school buses and chargers
- AB 617 San Joaquin Air Pollution Control District - 10 electric school buses (delivery estimated November 2025)
- EPA Round 2 - 20 electric school buses and chargers (\$6.9 million), with school bus delivery estimated November 2025

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In Progress:

- Zero-Emission School Bus and Infrastructure (ZESBI) - 6 electric school buses, chargers, and infrastructure
- EnergIZE (Energy Infrastructure Incentives for Zero-Emission) Commercial Vehicles Project - chargers at 4 comprehensive high schools, the district office, 2 elementary schools, and additional infrastructure at the transportation yard for the incoming electric school buses.

These strategic investments ensure that SUSD's infrastructure is not only meeting today's needs but is future-ready, scalable, smart, and resilient. As the District continues to lead by example, it is building a cleaner, healthier future for students, staff, and the broader Stockton community.

Task 5 – Long Range Zero-Emission Planning

Task 5 involved the planning and evaluation of long-term zero-emission strategies. Performance assessments were developed to identify zero-emission and net-zero energy pathways for SUSD. Key topics include greenhouse gas emission sources, inventory analysis, identifying data gaps, and exploring options for a strategic zero-carbon roadmap.

Table 6: Long Range Zero-Emission Planning associated subtasks and budget details.

Sub-task #	Sub-task Description	CARB Funds Spent
5.1	Develop a long-term energy strategy	\$155,000.00
5.2	Implementation option emissions evaluation	\$21,000.00
5.3	Conceptual design for future expansion	\$25,000.00
5.4	Vehicle – Grid Integration Roadmap	\$12,000.00
5.5	Fleet and Equipment Zero-Emission Use Plan	\$12,635.00
5.6	Deliver Long-Range Zero-Emission Plan	\$24,101.00
	Task Total	\$249,736.00

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5a. Partners and Roles

NV5 is a technical engineering and energy consulting firm that was primarily responsible for the Tasks identified in Task 5. Deliverables included the development of the long-range energy plan for SUSD. NV5 created district-wide carbon benchmarking metrics and a strategy memo to reduce carbon emissions. These efforts allowed NV5 to finalize SUSD's long-term energy master plan. Lastly, NV5 reported on quarterly emissions for SUSD and submitted a final emissions report.

Schneider Electric delivered a conceptual design for the future expansion of the SUSD's charging infrastructure.

CTE developed a fleet and equipment zero-emission vehicle (ZEV) use plan and the long-range zero-emission plan. CTE and SUSD oversaw the entire long-range zero-emission planning task to ensure the deliverables met the expectations identified in the CARB agreement.

5b. Deliverables

A thorough evaluation, review, and coordination with project partners was conducted to develop a comprehensive long-term energy strategy. This process began with the collection of relevant goals, modernization plans, and preferences, alongside collated data to establish a foundation for strategic planning. A district-wide energy and carbon benchmarking initiative then took place to assess current performance and identify areas for improvement.

Building on this assessment, a draft strategy and framework were developed to achieve a zero-carbon future. This effort was summarized and presented in a Zero-Carbon Masterplan Report, which was refined into a final long-term energy master plan, outlining actionable steps toward sustainability.

As part of the strategy, an emissions evaluation of various implementation options was conducted. This included periodic updates to emissions inventories, using data from baseline measurements established in Task 2. These evaluations were reviewed quarterly to ensure accurate tracking of actual and projected benefits.

Future expansion was also considered through the development of conceptual designs that support SUSD's evolving energy needs. Additionally, a Vehicle-Grid Integration Roadmap was created by conducting a literature review, research, and data analysis. This roadmap provides a clear strategy for integrating the school bus fleet with the energy grid, considering both current operations and future advancements.

To further support the transition to sustainable energy, NV5 developed a Fleet and Equipment Zero-Emission Use Plan. This plan outlines future energy requirements and optimal fleet sizing

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to accommodate a fully zero-emission fleet. Finally, a long-range zero-emission planning report was drafted, finalized, and submitted, consolidating all research, assessments, and projections into a comprehensive roadmap for achieving a fully sustainable and zero-emission future.

5c. Outcomes

NV5 undertook a comprehensive District-Wide Carbon Benchmarking initiative to evaluate current emissions, energy consumption, and potential opportunities for reduction. Meanwhile, Schneider Electric developed a conceptual site plan aimed at facilitating full fleet electrification, outlining the necessary infrastructure to support future expansion. The Final Emissions Report, part of Task 5.2, was completed in October of 2024 and is included as an Attachment to this report.

The Vehicle-Grid Integration Roadmap and Fleet and Equipment Zero-Emission Use Plan are also included as Attachments to this report.

5d. Challenges, Lessons Learned, and Best Practices

SUSD and CTE found it easy to work with NV5 with all the deliverables associated with Task 5 and hope to partner with them on future initiatives.

The most significant challenge regarding the carbon benchmarking and zero-carbon master plan regards the fact that these plans are always evolving and require updating over the course of SUSD's zero-carbon future. Similar to any transition plan, procurement plans and timelines change for a number of reasons, which require master plans to be updated accordingly. Fortunately, SUSD is ahead of schedule on its zero-carbon future and will be one of California's first school districts with a 100% zero-emission fleet. In conclusion, SUSD believes there is value in making updates to its master plans on a regular basis so that it can accurately track its progress towards a zero-carbon future.

5e. Future Planning and Sustainability

As part of SUSD's commitment to long-term sustainability and zero-emission goals, a comprehensive planning and evaluation effort was undertaken to develop and assess future-focused strategies. This initiative involved identifying zero-emission and net-zero energy pathways through detailed performance assessments, greenhouse gas (GHG) emissions inventory analysis, data gap identification, and the exploration of strategic options for a district-wide zero-carbon roadmap. Led by NV5, the effort included carbon benchmarking across all district facilities, quarterly emissions reporting, and the development of a long-term Energy Master Plan. SUSD's Energy Education Department contributed by designing a

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conceptual framework for expanding electric vehicle infrastructure, CTE developed a Fleet and Equipment Zero-Emission Use Plan, and collaborated in shaping the district's long-range sustainability strategy. Key deliverables included the Zero-Carbon Master Plan Report, implementation-phase emissions evaluations, a Vehicle to Grid Integration (VGI) Roadmap, and a comprehensive final planning report. These foundational documents, supported by funding from CARB, provide a clear and actionable framework for achieving SUSD's sustainability objectives in alignment with state climate mandates.

Additionally, SUSD is actively promoting transportation alternatives and reducing operational emissions through participation in programs such as the Employer Trip Reduction Implementation Plans (eTRIP) initiative and PG&E's EV Fleet Program. These programs support the district's transition to cleaner transportation technologies while delivering measurable reductions in both emissions and operating costs.

Task 6 - Outreach and Engagement

Task 6 involved the development of a comprehensive community outreach plan, followed by the execution of the plan, which included curriculum development, community-based programming, and environmentally-focused extracurricular activities for SUSD's students.

Table 7: Outreach and Engagement associated subtasks and budget details.

Sub-task #	Sub-task Description	CARB Funds Spent
6.1	Develop a community outreach plan	\$150,389.00
6.2	Host community meetings and events	\$331.65
6.3	Community outreach and curriculum development to incorporate a zero-emission pilot	\$126,950.25
6.4	Implement Student Extracurricular Activities	N/A
6.5	Community Outreach Videos	\$22,711.44
6.6	Reporting Results of Community Outreach Efforts	N/A
	Task Total	\$300,382.34

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6a. Partners and Roles

CTE led the development of SUSD's community outreach plan with guidance from SUSD based on its goals, making significant strides in environmental education and community outreach through its Energy Education Department. With the support of the CARB grant, SUSD has launched a dynamic program that connects students, staff, and the broader community with real-world environmental knowledge and career opportunities.

A standout achievement has been the district's strong partnerships with higher education institutions. SUSD has collaborated with UC Berkeley to bring air quality education into classrooms, where students not only learn the science behind air pollution but also engage in mentorship opportunities that introduce them to careers in the environmental field.

UC Merced has also played a key role by delivering air quality workshops to SUSD staff and drivers. These sessions focus on the health effects of diesel exposure and highlight the environmental and economic benefits of transitioning to electric vehicles, promoting both safety and sustainability within the district's transportation network.

The outreach program goes beyond the classroom. Working alongside local community organizations, SUSD offers workshops on upper respiratory health and environmental awareness. These sessions have empowered students, teachers, drivers, and community members alike to take active roles in environmental stewardship.

SUSD has also begun installing Purple Air monitors at school sites, giving students the opportunity to study real-time air quality data as part of their science and technology curriculum. This hands-on experience with data analysis not only enhances learning but also builds awareness of local environmental conditions.

The program is jointly overseen by SUSD, the CTE team, and the Energy Education Department, ensuring all efforts align with CARB grant goals and deliverables.

This initiative is more than just a program—it's a movement toward a healthier, more informed community and a cleaner, greener future for Stockton.

6b. Deliverables

SUSD is taking bold steps toward a cleaner, healthier future through its Community Outreach Plan, developed in partnership with CARB. As part of a larger sustainability initiative, the plan focuses on educating the community about clean mobility, reducing emissions, and supporting the adoption of zero-emission vehicles, while ensuring that all voices in our diverse community are included.

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This outreach effort was designed to be strategic and far-reaching. The team identified key audiences, including students, teachers, maintenance staff, and school bus drivers, and tailored training programs to meet their specific needs. From workshops and printed materials to social media campaigns and interactive ride-and-drive events, SUSD used a variety of methods to inform and engage the public about the benefits of clean technology.

To make this information even more accessible, the district created a repository of educational resources, including student led videos, fact sheets, and infographics, available in both English and Spanish on school and district websites. These tools help families and staff stay informed about the transition to clean energy and how it impacts their everyday lives.

SUSD's outreach was also closely aligned with CARB Low Carbon Transportation Investment Projects, ensuring that the district's work complemented broader statewide goals. Five major outreach events were held in coordination with clean vehicle rollouts, including two large community-wide Earth Day celebrations in April 2024 and April 2025 that will continue after the grant sunsets. These events brought together families, educators, and local partners to celebrate progress and explore hands-on demonstrations of green technology.

To ensure the program continues to improve and reflect the community's needs, SUSD also distributed surveys at outreach events. Finally, data gathered from these surveys and outreach activities were assessed and reported, providing valuable feedback to refine strategies and ensure long-term success in reducing emissions and promoting sustainable transportation options.

Through this forward-thinking approach, SUSD is not only promoting healthier air and more sustainable transportation, but it's also empowering a generation of students and community members to lead the way toward environmental stewardship.

Table 8: Log of outreach and engagement activities

Description of Activity	Date	Location	Number of Participants
Clean Air Day showcased SUSD's battery electric school buses to students and parents	October 6, 2021	Harrison Elementary	~40 students and their families
Earth Day 2024	April 13, 2024	Edison High School	~300 students and community members

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Description of Activity	Date	Location	Number of Participants
<i>Classroom Visits with UC Berkeley were a partnership between UC Berkeley graduate students and SUSD to learn about air quality and resources to improve it</i>	November 15, 2024	Fillmore and Merlo Schools	~80 students
<i>Classroom Visits with UC Berkeley were a partnership between UC Berkeley graduate students and SUSD to learn about air quality and resources to improve it</i>	February 28, 2025	Weber Technology	~80 students
Earth Day 2025	April 12, 2025	Stockton High School	~250 students and community members

6c. Outcomes

The Community Outreach and Engagement task was a critical component of this CMIS project, and one that distinguished it from so many other SUSD initiatives funded federally or by the State of California. The investment in SUSD’s community demonstrated the need to address environmental equity specifically within the AB 617 districts. This commitment to the Stockton community fosters long-term change and institutional readiness for sustainable practices. It also provides school districts across the State of California with a model to implement similar programs.

All of the community outreach and engagement tasks centered around educating the students and public, building relationships, and developing long-lasting curriculum for all age groups at SUSD schools. SUSD purchased solar cars and wind kits for classrooms to incorporate clean transportation and energy topics into the existing science curriculum. SUSD and UC Berkeley also conducted two separate classroom visits for students at targeted schools within the AB 617 districts. SUSD also coordinated with Air Guardian and UC Berkeley to develop a curriculum on air quality and pollution to present to students.

Starting in 2024, SUSD hosts a community-wide Earth Day event in partnership with many local environmental organizations. Every vendor participant had different resources and activities to share. For example, UC Merced provided attendees with Purple Air monitors identical to the ones being installed at schools across SUSD. While distributing these air monitors, they shared information about the work they do on the Purple Air Monitor project and displayed the data

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and monitoring that is happening in real time. The Anthropocene Institute had an interactive exhibit that allowed families to build a Lego air quality sensor. While families constructed these air sensors, the Anthropocene Institute educated them about air sensor technology. UC Berkeley conducted an air sensor demonstration and provided a workshop on how to create your own DIY air filter. Catholic Charities of the Diocese of Stockton partnered with the Electric Vehicle Auto Association to help showcase their electric vehicles at the event.

SUSD intentionally hosted these events within the AB 617 districts of the Stockton community in order to serve the most disadvantaged communities within the city. Additional details involving SUSD's community outreach activities is included with the Community Outreach Plan attachment.

6d. Challenges, Lessons Learned, and Best Practices

The majority of the challenges associated with Task 6 involved communication and information-sharing. SUSD learned that it is crucial to begin planning and distributing logistical details well in advance to all stakeholders. SUSD also discovered that it is necessary to have ongoing conversations with specific schools where events will take place. CTE and SUSD combated the communication challenge by hosting weekly or biweekly virtual meetings for all of its outreach events throughout the CMIS project in order to track progress. SUSD also determined that planning a large-scale community event is expensive, and unforeseen costs are inevitable, so it is important to create a budget that includes ample costs for incidentals.

6e. Future Planning and Sustainability

SUSD is committed to a long-term sustainability strategy that includes expanding its zero-emission fleet, developing workforce capacity, and engaging the community through ongoing outreach. Currently advancing toward a goal of deploying 100 electric school buses and installing districtwide infrastructure to support all electric vehicles, including transportation, utility, and landscaping equipment, SUSD is laying the groundwork for a fully electrified future. With CARB funding allocated toward data collection, hardware installation, recurring reporting, and program management, the district has built a foundation for evidence-based decision making and performance tracking. Partners, including CTE, ChargePoint, The Mobility House, NV5, and Schneider Electric, collaborated to ensure accurate data on fleet utilization, charging efficiency, and environmental impact highlighted by over 170,000 miles traveled, 310,000 kWh consumed, and 348 tons of CO₂ avoided. These efforts are reinforced through robust workforce development, where all staff - from drivers and maintenance to administrators - are being trained in electric vehicle operations, data systems, and sustainability practices. In parallel, SUSD has launched an annual Earth Day celebration and additional community events to engage students, families, and stakeholders in clean transportation awareness and environmental education. Additionally, energy education to the

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community and instilling it in the curriculum for SUSD students have played a vital part in teaching our students how to be good stewards and the next generation of leaders, innovators, and contribution to society. As SUSD continues to scale its zero-emission initiatives, it remains dedicated to education, equity, and environmental leadership across the Stockton community.

Community engagement remains a priority, highlighted by SUSD's second annual Earth Day event, where families learned about electric school buses and air quality. Despite challenges in workforce development and vendor responsiveness, the transition has been widely embraced, improving campus air quality and reinforcing SUSD's commitment to a cleaner, more sustainable future. Stockton Unified will continue engaging with our students and community members to educate and inspire action around environmental sustainability.

Task 7 – Data Collection and Data Reporting

Task 7 involved the data collection and analysis of all relevant tasks. The reporting and analysis allowed SUSD to make strategic operational decisions as it continues to expand its zero-emission vehicles and infrastructure, and community outreach.

Table 9: Data collection and reporting subtasks and budget details.

Sub-task #	Sub-task Description	CARB Funds Spent
7.1	Data collection kickoff meeting	\$9,927.00
7.2	Data collection hardware installation	\$32,043.40
7.3	Data collection, management, and reporting	\$21,745.00
7.4	Complete data reporting (recurring)	\$98,849.72
	Task Total	\$162,565.12

7a. Partners and Roles

CTE led the development of SUSD's data collection and analysis with assistance from the SUSD team.

CTE also subcontracted with ChargePoint (formerly ViriCiti) to provide the hardware for SUSD's school bus telematics platform.

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The Mobility House (TMH) assisted CTE with any relevant data from the charging infrastructure.

CTE and SUSD jointly oversaw the data collection and reporting task to ensure the deliverables met the expectations identified in the CARB agreement.

7b. Deliverables

The project team initiated the data collection and analysis phase by organizing a kick-off meeting to establish a structured plan for managing and delivering reports. This meeting ensured that SUSD would receive timely and actionable information to address any operational challenges effectively.

Following the meeting, purchase orders were issued, and contracts were executed for necessary products, services, and the installation of data collection devices and programs such as ViriCiti. The team then proceeded to collect data, conduct a literature review, and perform relevant research to support the project's objectives.

Finally, CTE analyzed the collected data to produce regular and final reports to ensure compliance with grant requirements and provide insights to enhance project outcomes.

7c. Data Collection

SUSD implemented a fleet of zero-emission vehicles, charging infrastructure, and electric landscaping equipment. The initiative included electric school buses, utility vehicles, mowers, and battery-powered tools, supported by Level 2 and DC fast chargers.

To ensure efficient data collection and project oversight, several partners were involved. ViriCiti provided telematics hardware and software for school buses, while The Mobility House managed data collection from chargers. CTE oversaw the project, handling data analysis and community outreach. SUSD supplied operational and maintenance data, NV5 focused on lawn and garden equipment data, and Schneider Electric provided infrastructure specifications.

Data collection covered vehicle performance, charging efficiency, and equipment usage, with structured reporting provided by CTE. Regular analyses compared the performance of the zero-emission fleet against conventional vehicles, with findings compiled into periodic reports for CARB.

This initiative reflected SUSD's commitment to sustainability, leveraging advanced technologies to reduce emissions and enhance clean transportation in schools.

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7d. Outcomes

To effectively measure the success of an electric school bus deployment, it is important to measure the available data points. CTE and SUSD tracked the vehicle and infrastructure utilization, fleet mileage, energy consumed, and carbon emissions reduced. The deployed fleet of battery-electric school buses has accumulated approximately 170,000 miles since the first vehicles were delivered in 2021. The average Blue Bird fleet fuel economy was 1.61 kWh/mile, and approximately 310,000 kWh of energy was used to charge the vehicles during the deployment. This energy used to power the vehicles would have otherwise come from fossil fuel sources. So, the emissions impact translates to 348 tons of greenhouse gas emissions saved, which is equivalent to 5,220 trees grown for 10 years across the Stockton community.

7e. Challenges, Lessons Learned, and Best Practices

The project team experienced many significant challenges with regard to data collection and reporting. One challenge involved a general lack of communication, both verbally among project partners as well as the various types of software utilized. It was a challenge to gather precise odometer readings from the vehicles themselves, which the team alleviated by providing a step-by-step form that the SUSD maintenance team was able to generate regularly. The lack of equipment communication between ViriCiti data loggers and the charger-level data provided by The Mobility House made it difficult for SUSD to identify whether certain issues were related to the electric school buses or the chargers. CTE developed a dashboard that gathers data from every source available so that SUSD could visually see all data metrics in one location.

7f. Future Planning and Sustainability

Data is at the heart of SUSD's sustainability strategy. With support from partners like The Mobility House, Schneider Electric, PG&E, NV5, and CTE, the District has deployed smart charging systems, solar canopies, and a robust EV fleet supported by a comprehensive Zero-Carbon Master Plan and Fleet Use Plan. Tools like ViriCiti and custom KPI dashboards track and report on fleet performance, charging efficiency, and carbon reductions. This data not only supports transparency with funders such as CARB and EPA, but also guides continuous improvement and strategic planning.

Looking ahead, SUSD is focusing on centralized data collation to track fleet performance, charger usage, energy throughout, emissions reductions, maintenance needs, and V2G readiness. A unified analytics dashboard and structured reporting schedule—ranging from monthly performance updates to annual sustainability reports—will ensure transparency, continuous improvement, and alignment with state climate goals. Key data outcomes—

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including emissions avoided, miles traveled, and energy consumed—serve to validate progress and justify continued investment. They also inform the Zero-Carbon Master Plan and V2G Integration Roadmap, ensuring SUSD remains aligned with statewide climate mandates and sustainability benchmarks.

Currently advancing toward a goal of deploying 100 electric school buses and installing districtwide infrastructure to support all electric vehicles, including transportation, utility, and landscaping equipment, SUSD is laying the groundwork for a fully electrified future.

With CARB funding allocated toward data collection, hardware installation, recurring reporting, and program management, the district has built a foundation for evidence-based decision making and performance tracking. Partners, including CTE, ChargePoint, The Mobility House, NV5, and Schneider Electric, collaborated to ensure accurate data on fleet utilization, charging efficiency, and environmental impact highlighted by over 170,000 miles traveled, 310,000 kWh consumed, and 348 tons of CO₂ avoided. Despite early challenges in data integration and communication, the development of a centralized dashboard and improved coordination among partners have helped streamline operations and reporting.

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VI. Project Spending

Table 9 Project disbursement schedule

Disbursement Request #	Date of Disbursement Submittal	Total CARB Funds Requested
1	September 4, 2020	\$17,043.08
2	October 26, 2020	\$727,313.94
3	February 16, 2021	\$635,466.67
4	May 6, 2021	\$1,590,176.51
5	May 6, 2021	\$211,798.38
6	August 10, 2021	\$180,459.58
7	November 23, 2021	\$580,115.92
8	March 9, 2022	\$121,571.29
9	April 26, 2022	\$49,659.33
10	August 3, 2022	\$137,155.07
11	August 21, 2023	\$110,301.86
12	December 5, 2023	\$159,817.13
13	January 10, 2024	\$71,366.65
14	May 6, 2024	\$118,778.63
15	May 6, 2024	\$96,908.57
16	September 9, 2024	\$227,467.16
17	September 9, 2024	\$1,358,220.94
18	February 3, 2025	\$115,438.93
19	May 5, 2024	\$334,049.75
20	June 17, 2025	\$218,175.57
21 Final	July 31, 2025	\$196,824.23
Total		\$7,258,108.99

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VII. Attachments

- *Near-term Energy Strategy Report*
- *Carbon Benchmarking Final Emission Report*
- *Vehicle-Grid Integration Report*
- *Fleet and Equipment Zero-Emission Use Plan*
- *Key Performance Indicators Reports*
- *Community Outreach Plan*