Prepared for Fresno County Rural Transit Agency (FCRTA)

Electric Vehicle Charging Master Plan and Energy Management System Plan

April 30, 2026

FCRTA
Fresno County
Rural Transit Agency
*Accessible EV **Mobility** & **Infrastructure** For All*

WALKER
CONSULTANTS

ENERGEIA

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Executive Summary

Project Purpose and Background

The Fresno County Rural Transit Agency (FCRTA) is advancing a transition toward a fully electrified transit fleet to comply with California's Innovative Clean Transit (ICT) regulation and to support broader goals related to air quality, greenhouse gas reduction, and operational efficiency. As FCRTA replaces aging vehicles and expands electric bus deployment, a coordinated charging infrastructure strategy is necessary to ensure that future fleet operations remain reliable and cost-effective. This Electric Vehicle (EV) Charging and Energy Management System (EMS) Plan provides a framework for planning, sizing, and deploying the charging infrastructure needed to support that transition.

FCRTA operates transit services across a large rural geography that includes multiple incorporated cities and numerous unincorporated communities throughout Fresno County. Routes can exceed 200 miles per day, and the fleet is distributed across multiple operational sites to minimize deadhead travel and maintain service coverage. These operational characteristics require a distributed charging network rather than a single centralized depot. Infrastructure planning must therefore account for site-specific conditions, charging needs associated with individual routes, and the electrical capacity available at each location.

This Plan evaluates current and future fleet charging requirements, assesses electrical infrastructure and grid capacity constraints, and identifies planning-level infrastructure costs across FCRTA's service area. The analysis also examines managed charging strategies and the role of an Energy Management System in optimizing charging schedules, reducing energy costs, and coordinating distributed energy system assets. Together, these elements provide FCRTA with a practical roadmap for implementing fleet electrification while maintaining reliable transit service for the communities it serves.

Project Scope

The analysis for this Plan is organized around three service phases. Phase 1 represents electrification of FCRTA's existing transit services and routes. Phase 2 evaluates the potential addition of expanded microtransit service zones, while Phase 3 incorporates potential service expansion along key corridors and additional operational growth. Together, these scenarios provide a framework for understanding how charging needs may evolve as service levels increase and new vehicles are deployed.

To determine the infrastructure required to support these service scenarios, the project team conducted route-level charging demand modeling using vehicle miles traveled, battery capacities, vehicle efficiency assumptions, and operational dwell times. The analysis evaluated both overnight depot charging and mid-day layover charging strategies, including scenarios where vehicles may require additional charging during service hours to maintain schedule reliability. Charger types, quantities, and power levels were then sized for each operational location based on the modeled demand.

In addition to fleet charging modeling, the analysis included site visits and high-level electrical service assessments at FCRTA operational locations throughout Fresno County. These site reviews evaluated existing electrical infrastructure, physical constraints, and opportunities for charger installation. The project team also coordinated with Pacific Gas and Electric (PG&E) to review distribution feeder capacity and identify locations where additional electrical infrastructure may be required. Planning-level capital cost estimates were developed for each site, and the analysis also examined the role of managed charging and an Energy Management System in optimizing charging operations and reducing long-term electricity costs.

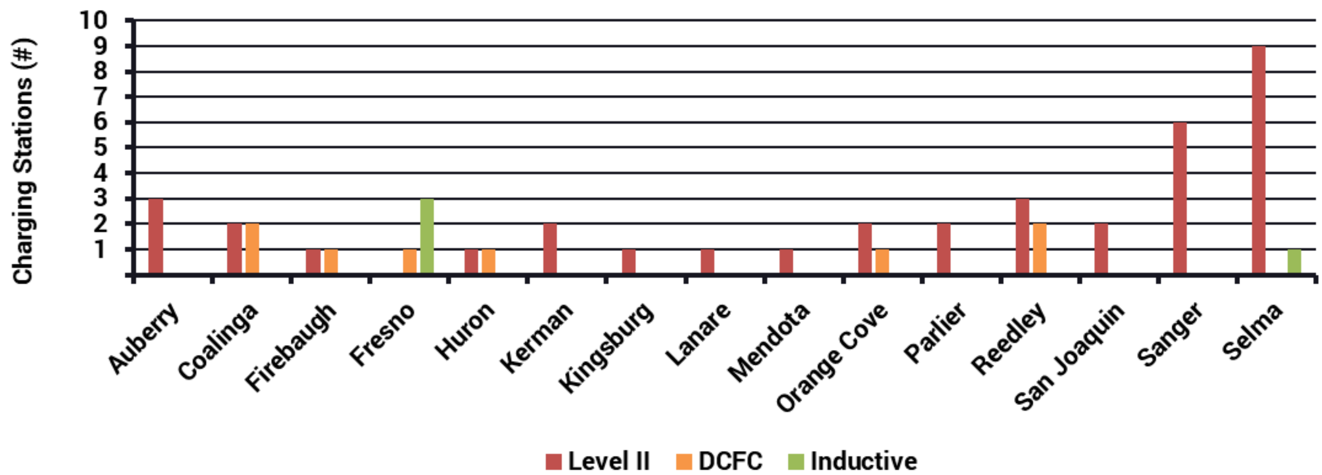
Countywide Fleet Charging Requirements

The analysis indicates that FCRTA will require a distributed network of charging infrastructure across multiple operational locations to support full fleet electrification under the evaluated service scenarios. In total, the charging strategy includes a mix of Level 2 chargers, DC fast chargers, and inductive charging infrastructure sized to meet the operational needs of each site. The infrastructure distribution across the County reflects the agency’s rural service model and the need to minimize vehicle deadhead time between routes and charging locations.

Most charging demand can be met through overnight depot charging using Level 2 infrastructure. However, certain fixed routes with higher daily mileage or limited dwell time require higher-power charging solutions. In these cases, DC fast chargers or inductive charging systems may provide the additional power needed to maintain vehicle readiness and schedule reliability during mid-day layovers. The Selma Maintenance Facility, which is FCRTA’s primary owned facility, already hosts a significant portion of the agency’s existing charging infrastructure and renewable energy assets. Other sites will require new charging installations to support future fleet electrification.

Overall, the analysis identified the total number of chargers, charger types, and installed charging capacity required across the system to support the phased service scenarios. These requirements reflect both current operational needs and anticipated future service expansion. The resulting charging network is designed to balance operational reliability, electrical capacity constraints, and capital investment considerations while maintaining flexibility as fleet deployment evolves.

Figure 1 Countywide Charging Infrastructure Requirements by Site and Charger Type



Grid Capacity and Electrical Service Considerations

Electrifying FCRTA's fleet will require electrical infrastructure upgrades at many operational locations. Site visits and electrical assessments conducted as part of this study indicate that most existing facilities were not originally designed to support the electrical loads associated with fleet EV charging. In many cases, existing panels, circuits, and service configurations are undersized or fragmented, limiting the ability to support high-power charging equipment using existing electrical infrastructure.

As a result, establishing new electrical services is likely to be the most practical and cost-effective approach for many locations. Installing new services allows charging infrastructure to be designed around future fleet needs rather than attempting to retrofit legacy electrical systems that were not built to accommodate large electrical loads. This approach can simplify infrastructure design, reduce installation complexity, and allow charging capacity to scale as additional electric vehicles are deployed.

To better understand grid integration considerations, the project team coordinated with Pacific Gas and Electric (PG&E) to evaluate distribution feeder capacity at each operational site. The analysis reviewed current and forecast distribution feeder headroom to determine whether the electrical grid can support the additional charging demand associated with fleet electrification. Results indicate that most sites have sufficient distribution capacity to support the modeled charging infrastructure, although several locations may require additional electrical capacity or utility coordination to accommodate long-term charging demand.

Table 1 PG&E Distribution Feeder Capacity by Site in 2030

Site	Distribution Feeder(s)	2030 Capacity Status	Constraint
Auberry	Auberry 1102	Available	No
Coalinga	Coalinga No 2 1106	Available	No
Firebaugh	Firebaugh 1101/1102	Available	No

Site	Distribution Feeder(s)	2030 Capacity Status	Constraint
Fresno	California Ave 1104	Available	No
Huron	Huron 1112	Available	No
Kerman	Kerman 1102	Expansion Needed	Yes
Kingsburg	Kingsburg 1102	Available	No
Lanare	Camden 1104	Available	No
Mendota	Mendota 1103	Expansion Needed	Yes
Orange Cove	Reedley 1112	Available	No
Parlier	Parlier 1104	Available	No
Reedley	Wahtoke 1109	Available	No
San Joaquin	San Joaquin 1108	Available	No
Sanger	Mc Call 1107	Available	No
Selma	Mc Call 1107	Available	No

Early coordination with PG&E will be an important step in the implementation process. Programs such as PG&E's Fleet Ready initiative and other standard interconnection processes can help facilitate electrical service upgrades and ensure that infrastructure deployment aligns with available grid capacity and utility planning timelines.

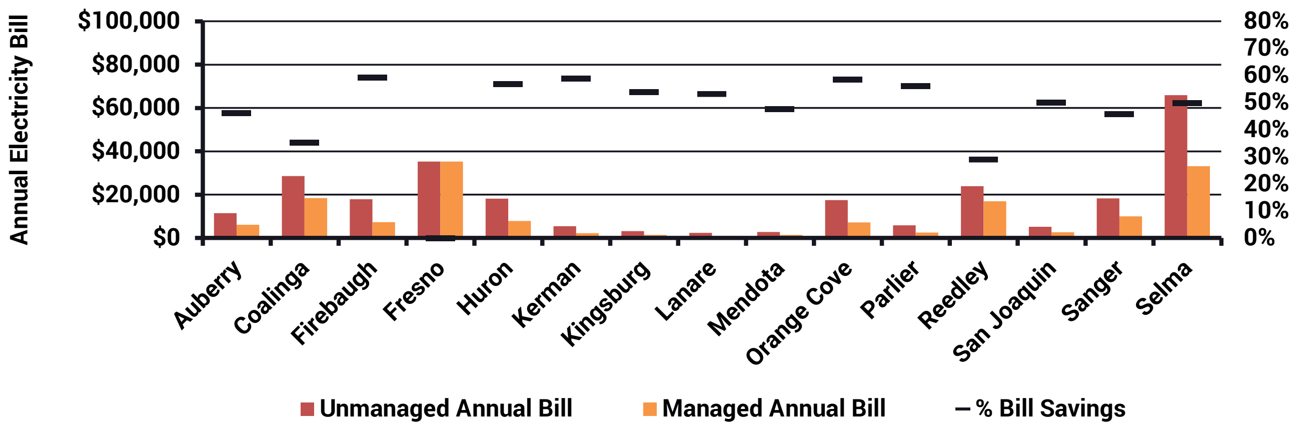
Managed Charging and Energy Cost Impacts

As electric vehicles are added to the fleet, charging bills will represent a significant portion of FCRTA's ongoing operating costs. The timing and coordination of vehicle charging can strongly influence electricity demand and utility costs. To evaluate these impacts, the project team modeled two charging scenarios: unmanaged charging, where vehicles begin charging immediately upon returning to a depot, and managed charging, where charging schedules are optimized to avoid high-cost electricity periods and distribute charging loads more evenly across available time windows.

Under unmanaged charging conditions, charging demand tends to concentrate during the early evening hours when vehicles return from service. This period often coincides with peak electricity pricing, resulting in higher energy costs and increased peak demand impacting the electrical system. In contrast, managed charging shifts charging activity to off-peak periods and staggers charging across available dwell times. This strategy reduces simultaneous charging loads and avoids charging during the most expensive utility rate periods.

The analysis demonstrates that managed charging can significantly reduce overall electricity costs and peak charging demand across FCRTA's system. By optimizing charging schedules and coordinating charging activity across multiple sites, FCRTA can reduce exposure to peak utility pricing while maintaining vehicle readiness for daily operations. Implementing an Energy Management System will be essential to achieving these benefits, as it allows charging schedules to be dynamically coordinated based on vehicle status, route schedules, electricity pricing, and available electrical capacity.

Figure 2 Unmanaged vs. Managed Charging Bills by Site in 2030



Infrastructure Capital Costs

Planning-level capital cost estimates were developed for each charging site to understand the magnitude of investment required to support fleet electrification. These estimates include major infrastructure components such as charging equipment, conduit and trenching, switchgear and electrical services, and site infrastructure improvements. Costs vary by location depending on the number of chargers required, total charging power capacity, distance to electrical infrastructure, and site-specific conditions.

In general, larger sites that support multiple vehicles or higher-power charging systems require greater investment in electrical infrastructure and site improvements. Sites that require new electrical service connections or substantial electrical upgrades may also incur higher costs compared to locations where sufficient electrical capacity already exists. Conversely, smaller sites with limited charging needs can often be served with modest infrastructure investments. These planning-level estimates provide an order-of-magnitude understanding of infrastructure costs to support long-term electrification.

The estimates presented in this Plan are intended to guide long-term planning and funding strategies rather than represent detailed engineering-level budgets. As projects move toward implementation, site-specific design, utility coordination, and permitting requirements will refine these cost estimates. Aligning infrastructure investments with fleet procurement schedules and available funding sources will allow FCRTA to phase infrastructure deployment efficiently while minimizing the risk of stranded assets.

Table 2 Planning-Level Charging Infrastructure Capital Cost Estimates by Site

Site	Charging Equipment	Conduit & Trenching	Switchgear & Electrical Services	Site Infrastructure	Total Cost Range
Reedley	$180–$220,000	$200–$240,000	$275–$300,000	$120–$160,000	**$775–$920,000**
Fresno	$2.6–$3.0M	$200–$300,000	$575–$750,000	$1.3–$1.6M	**$4.7–$5.6M**
Coalinga	$150–$190,000	$170–$230,000	$100–$150,000	$240–$300,000	**$660–$870,000**

San Joaquin	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Parlier	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Orange Cove	$150–$190,000	$170–$230,000	$100–$150,000	$240–$300,000	**$660–$870,000**
Huron	$150–$190,000	$170–$230,000	$100–$150,000	$240–$300,000	**$660–$870,000**
Sanger	$55–$80,000	$65–$95,000	$40–$65,000	$90–$125,000	**$250–$365,000**
Firebaugh	$145–$185,000	$160–$220,000	$95–$145,000	$225–$290,000	**$625–$840,000**
Auberry	$30–$45,000	$30–$50,000	$35–$60,000	$45–$70,000	**$140–$225,000**
Kerman	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Mendota	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Kingsburg	$20–$35,000	$30–$55,000	$35–$65,000	$30–$55,000	**$135–$210,000**
Lanare	$20–$35,000	$30–$55,000	$35–$65,000	$30–$55,000	**$135–$210,000**

Energy Management System Specification

As FCRTA expands its electric vehicle fleet and charging infrastructure across multiple operational sites, managing charging activity will become increasingly complex. Charging demand must be coordinated with vehicle schedules, available electrical capacity, electricity pricing, and future on-site energy resources such as solar photovoltaic systems and battery storage. An Energy Management System (EMS) provides the centralized platform needed to manage these elements and to ensure that charging operations remain reliable and cost-effective as the system grows.

An EMS enables FCRTA to monitor and control charging infrastructure across multiple depots and layover locations, optimize charging schedules to avoid peak utility pricing periods, and coordinate charging with operational needs. The system may be able to dynamically allocate charging power based on vehicle readiness, route schedules, and available electrical capacity, helping prevent overloads while ensuring vehicles are ready for service when needed. These capabilities support the managed charging strategies evaluated in this Plan and allow FCRTA to capture the energy cost savings associated with optimized charging operations.

In addition to charging optimization, an EMS can integrate with other energy assets and operational systems. As FCRTA expands solar generation, battery storage, and microgrid infrastructure at certain facilities, the EMS can coordinate energy production and storage with fleet charging demand. The system also provides operational visibility into charging activity, energy consumption, and vehicle status across the network. Implementing an EMS alongside charging infrastructure deployment will help FCRTA maintain efficient operations, manage energy costs, and support long-term expansion of its electrified fleet. The project team developed an EMS specification and Request for Proposals (RFP) to guide FCRTA’s procurement.

Table 3 Key EMS Features, Metrics, and KPIs

Category
Key Features
Fleet Operations
Vehicle Location Tracking
Fleet Status and Operational Trends
Automated Recharging Scheduling
Maintenance and Fault Detection
Fleet Logistics and Route Management
Charging Operations
Charging Port Status and Usage Trends
User and Role Access Management
Dynamic Pricing and Tariff Management
Real-Time Charging Station Visibility
Charging Session Reservation System
Load-Sharing and VPP Capabilities
Demand Charge Mitigation & Peak Shaving
Maintenance, incl Fault Management
Resource Operations
Market and Grid Services System
Energy Management System
Microgrid System
Industry Standards
UL Certification for Fleet Energy Systems
3rd Party Integrations
Grid (OCPP)
Demand Response (OpenADR)
BMS (ModBus)
Metering (RS-485)
REST API
Customer Service
24/7 Human System Support
Key Metrics & KPIs
Fleet Operations
Avg. Charging Duration per Session
Station Utilization Frequency
Station Operational Status
Vehicle Battery State of Charge
Fleet Emissions Saved
Charging Operations
Charging Port Status
Charger Utilization Rate
Number of Charging Sessions
Station Uptime
Charger Geographic Location
Real Time Charging Power
Site Electricity Consumption
Electricity Bills and Savings
Available Charging Incentives
Lifetime Cost Savings
Resource Operations
Site Battery Storage State of Charge
Battery Storage Charge / Discharge Profiles
Facility Peak Demand
Site Solar Generation

Implementation Strategy

Transitioning to a fully electrified fleet will require a phased implementation approach that aligns charging infrastructure deployment with vehicle procurement schedules, utility coordination timelines, and available funding sources. Because FCRTA's operations are distributed across multiple sites, infrastructure investments should be prioritized at locations where electric vehicles are currently deployed or where new vehicles are expected to be introduced in the near term. Early coordination with Pacific Gas and Electric (PG&E) will also be important to initiate electrical service upgrades or new service connections where needed.

In the near term, FCRTA can focus on advancing detailed design and utility coordination at priority sites identified in this Plan. Locations with existing electric vehicles or planned fleet additions should be addressed first to ensure that charging infrastructure is available as vehicles enter service. At the same time, implementing an Energy Management System will help FCRTA manage charging operations as infrastructure is deployed incrementally across the system.

Over the longer term, infrastructure investments should continue to be aligned with fleet replacement cycles and service expansion plans. Phased deployment reduces the risk of installing infrastructure before it is needed and allows FCRTA to incorporate lessons learned from early projects. The agency can also leverage federal, state, and utility funding programs to support infrastructure deployment and reduce capital costs. By sequencing projects strategically and coordinating closely with utility partners, FCRTA can build a resilient and scalable charging network that supports reliable transit service throughout Fresno County.

Table 4 Charging Site Deployment Prioritization

Prioritization	Site	Context and Justification
1	Reedley	• High charging demand tied to Sanger to Reedley College Transit layover charging and ridership • Potential support for deployment of current BYD K7MER buses • One of the largest non-Selma charging sites • May require early utility coordination to support future capacity
2	Fresno	• Supports key fixed-route and demand-response services such as mid-day layover charging • Largest charging demand site in nameplate power output terms, including high power inductive chargers • Estimated grid capacity may allow near-term deployment • Current funding opportunities may reduce upfront capital costs
3	Coalinga	• High-mileage fixed route service requires larger, higher power output charging infrastructure • Coalinga distribution system has been historically highly constrained • Site will also support key demand-response services
4	San Joaquin	• Candidate location for future mobility or resiliency hub deployment • Supports planned microtransit and demand-response expansion, microtransit hub for nearby unincorporated communities • Opportunity to pair charging with resilience-focused infrastructure • Strategic location to support emergency response, community services, and critical infrastructure
5	Parlier	• Candidate location for future mobility or resiliency hub deployment • Supports planned microtransit and demand-response expansion • Moderate incremental charging infrastructure requirements under Phase 2 and Phase 3 scenarios
6	Orange Cove	• Orange Cove services and future VMT drive higher charging demand, including DCFC infrastructure • Grid constraints are not forecast to limit deployment
7	Huron	• Forecast charging infrastructures includes high-power output DCFC supply equipment, and higher capital costs

		• Sufficient grid capacity to support charger integration
8	Sanger	• Early charging infrastructure deployment will reduce deadhead miles and costs associated with charging vehicles at Selma • Site will require additional vehicle switchouts to provide service, which may involve more complex infrastructure
9	Firebaugh	• Forecast charging infrastructures includes high-power output DCFC supply equipment, and higher capital costs • Sufficient grid capacity to support near-term charger integration
10	Auberry	• Site will require additional vehicle switchouts to provide service, which may involve more complex infrastructure • Grid constraints are not forecast to limit deployment
11	Kerman	• Identified as capacity constrained in grid analysis • Planned fleet growth under future microtransit service phases
12	Mendota	• Grid capacity constrained by 2030 • Early upgrades reduce future implementation delays
13	Kingsburg	• Relatively limited charging demand from future electrification • Sufficient grid capacity to support charger integration
13	Lanare	• Lanare microtransit service not yet deployed • Smaller future service area does not drive high charging demand

Introduction

To improve air quality and mitigate climate change, the State of California is currently implementing programs and strategies to achieve an economy-wide greenhouse gas (GHG) reduction of 40% and 80% below 1990 levels by 2030 and 2050, respectively. In 2019, the Innovative Clean Transit (ICT) regulation, implemented by CARB, states that starting in 2029, public agencies must purchase zero-emission new buses only, with a goal of complete transition to zero-emission buses by 2040.

In addition to complying with the State's ICT mandate, FCRTA has prioritized transitioning to a zero-emission fleet to do its part in addressing the poor air quality of Fresno County and the significant environmental, economic, and mobility-related disadvantages facing many rural communities. FCRTA has been a leader in its electrification efforts by purchasing 36 electric vehicles (EVs) to date, installing solar-powered publicly available EV charging stations throughout the County, planning for EV microtransit service, conducting an electrical grid analysis to analyze the electrical grid infrastructure and capacity, conducting a microgrid/community resiliency hub feasibility study to integrate battery energy storage, preparing a plan to transition FCRTA's vehicles to zero-emission, and a zero-emission transit feasibility analysis along the Golden State/CA Highway 99 corridor. Fleet electrification has been identified as a priority in FCRTA's Short-Range Transit Plan 2024-2028 and Fresno County Regional Long-Range Transit Plan 2019-2050.

FCRTA operates 26 transit subsystems with 127 vehicles in 13 rural incorporated cities and 39 unincorporated rural communities across Fresno County. Its fleet is aging and becoming increasingly expensive to maintain, as 83 of its vehicles have already exceeded their useful life benchmark (ULB). As funding becomes available, FCRTA is replacing these aging vehicles with battery-electric vehicles, which have lower operational and maintenance costs.

Battery range is a primary concern for FCRTA in ensuring its routes are completed safely. Some FCRTA vehicles travel over 200 miles in a single day. To provide the necessary service coverage and to reduce wasted vehicle deadhead time, FCRTA's fleet is spread across 13 bus depots. Strategically locating EV chargers throughout the County will be vital to meet FCRTA's operational needs. Therefore, FCRTA needs to conduct a comprehensive evaluation of EV charging needs countywide to accommodate current transit service and future service expansion, which includes expanded EV microtransit service. This document includes FCRTA's EV Charging Plan, which assesses FCRTA's current charging infrastructure, analyzes the fleet's future charging needs, electrical grid constraints, planning-level implementation costs, and the operational charging strategy for FCRTA's current and planned transit services.

As FCRTA strategically expands its EV charging infrastructure in Fresno County, it needs a comprehensive energy management system (EMS). With a growing EV charging network, increasing solar photovoltaic (PV) generation, and battery energy storage capacity through microgrids at its current maintenance yards and at new locations, it will become increasingly important for FCRTA to have a consolidated energy management system.

Charging needs and energy costs can fluctuate on an hourly and daily basis. To develop an optimal and efficient charging schedule based on the charging master plan, the energy management system will enable FCRTA to monitor energy use, charging needs, solar PV generation, and battery storage on a daily basis, thereby reducing energy consumption, maximizing energy savings, and supporting efficient transit operations and service management. The EMS will also enable stakeholders to monitor transit operations, route timings, vehicle statuses, and more on a single, consolidated digital platform.

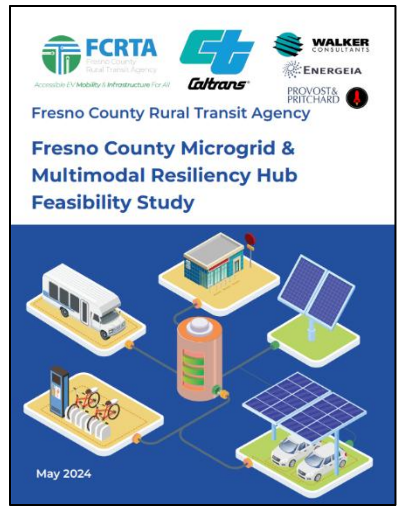
Together, these efforts position FCRTA to proactively manage the operational, electrical, and financial impacts of fleet electrification while maintaining reliable service for the communities it serves. The EV Charging and EMS Plan provides a roadmap for implementing the infrastructure, energy management tools, and operational strategies needed to support this transition. By aligning near-term decisions with long-term mobility, resilience, and sustainability goals, FCRTA can ensure a smooth and cost-effective shift to a fully zero-emission transit system.

Existing Conditions

Foundational Transit Planning Efforts

This EV Charging Plan builds directly on FCRTA's prior electrification, grid analysis, microgrid resiliency, and other Studies by translating high-level feasibility findings into site-specific infrastructure and operational recommendations. While earlier efforts established the technical viability and strategic value of fleet electrification and distributed energy resources, this plan focuses on the requirements needed to implement charging at scale. Together, these Studies provide a coordinated roadmap that links long-term goals with actionable infrastructure planning. For each Study, click the cover page to read the full report.

FCRTA Microgrid Resiliency Hub Feasibility Study



Background

The Study, funded by a Caltrans Sustainable Planning Grant, evaluated multi-modal community resiliency hubs (up to five initial sites) to expand transportation services, including on-site EV chargers, solar panels, co-located battery storage, emergency power, and other amenities to enhance community resiliency and reduce transit fleet tailpipe emissions.

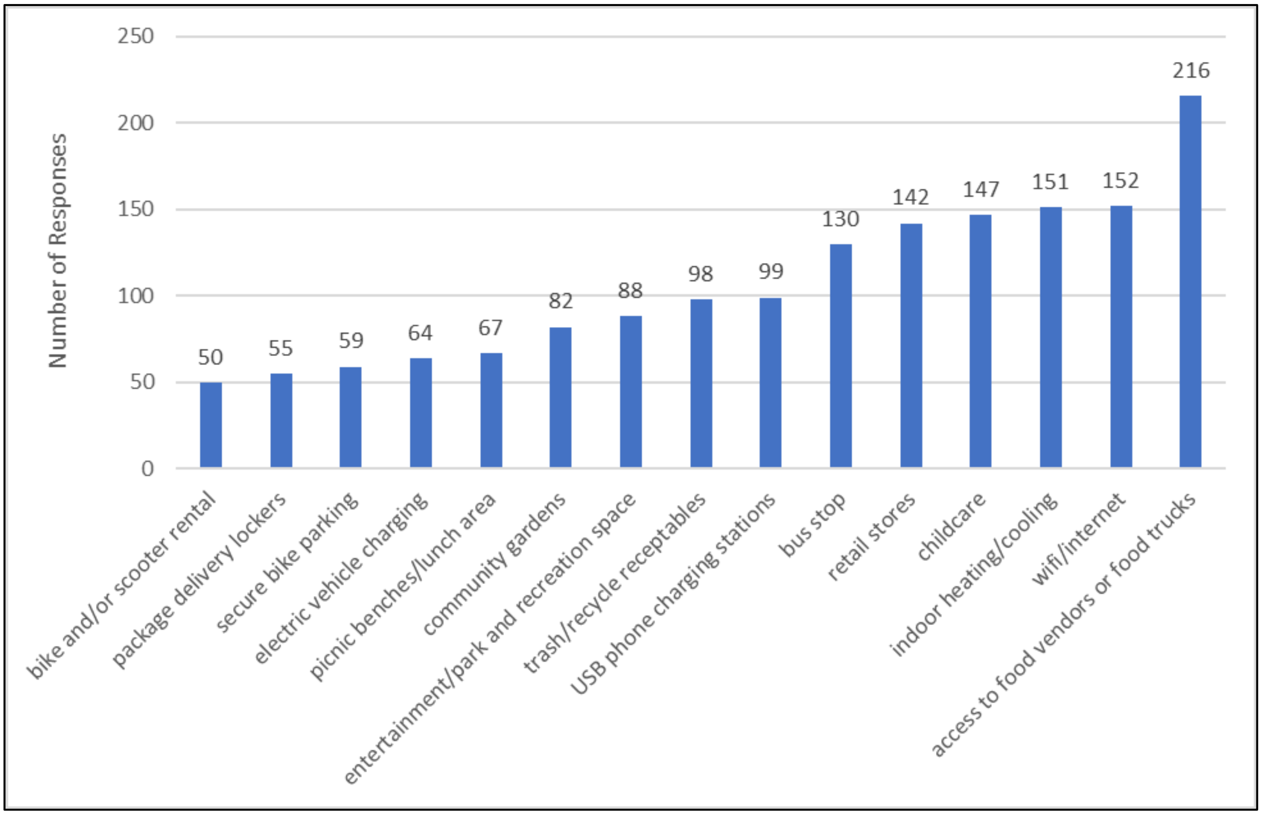
Community and Stakeholder Outreach

The outreach for the Study included online and paper surveys distributed throughout Fresno County, along with in-person pop-up events held in six rural communities. The project team also met regularly with an Advisory Committee comprised of local and regional stakeholders who reviewed interim findings and provided guidance on potential hub locations and community priorities.

The community outreach process yielded over 1,000 responses, highlighting several key themes. Participants expressed strong interest in hubs that offer practical amenities such as Wi-Fi, transit access, phone charging, heating and cooling areas, community gardens, childcare, and medical services. Respondents also identified parks, shopping centers, health care facilities, post offices, libraries, schools, and downtown areas as preferred hub locations.

Many community members reported feeling unprepared for emergencies, particularly natural disasters, and noted that they or their neighbors would likely require assistance in the event of a disaster. EV ownership among respondents was very low, and most participants were not considering purchasing an electric vehicle. Figure 3 below shows resiliency hub amenity priorities from the community outreach.

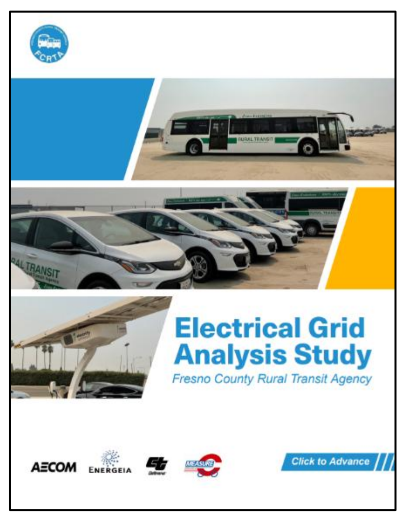
Figure 3 Survey Respondents Hub Amenity Priorities



Relevance to the EV Charging Study

The five sites recommended for microgrids include San Joaquin, Parlier, Fowler, Biola, and Lanare. San Joaquin and Parlier were the top two priority sites recommended for initial deployment. As part of the Study, FCRTA prepared its Zero Emission Bus Rollout Plan, as required by the ICT Regulations, which began to analyze electric vehicle charging needs for FCRTA's operations. This Study provides an important foundation for this EV Charging Plan, as it identifies potential sites for EV charging infrastructure and preliminary concepts for site development.

FCRTA Electrical Grid Analysis Study



Background

The Electrical Grid Analysis Study estimated the impacts of anticipated increased electrification of the transport and building sectors on the electric grid system and the unique challenges faced by FCRTA.

Community and Stakeholder Outreach

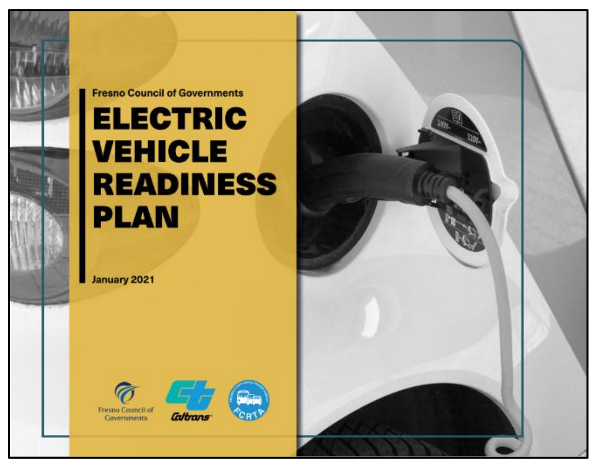
The Study incorporated public engagement and stakeholder involvement to ensure that grid-electrification planning reflects community needs and regional infrastructure realities. Outreach included educational workshops to help rural residents and stakeholders understand the impact of electrification and grid capacity on their communities. It also featured a virtual "information room" designed to share study materials, gather input, and foster direct engagement around the grid analysis process.

The FCRTA Electrical Grid Analysis Study's outreach highlighted concerns about whether the existing electrical grid could support widespread fleet electrification, particularly in rural areas of the county. Stakeholders emphasized the importance of planning infrastructure that improves community resilience and delivers benefits to disadvantaged areas. They also emphasized the importance of early utility coordination, clear funding pathways, and phased implementation to ensure that electrification efforts are both feasible and equitable.

Relevance to EV Charging Study

The Study found that while the rural Fresno County grid system generally holds sufficient capacity for future electrification, some grid constraints are forecasted in specific communities. The Study also highlighted gaps in grid capacity at select FCRTA depots, such as Fowler, Kerman, Parlier, Reedley, and Selma, necessitating this EV Charging Study to provide a comprehensive and integrated analysis of EV charging needs and spatial grid capacity.

FCOG EV Readiness Plan



Background

The Plan was developed to identify locations for electric vehicle charging infrastructure and ultimately reduce barriers to local EV adoption. The Fresno Council of Governments (FCOG) led the EV Readiness Plan in partnership with FCRTA and in close collaboration with the community and stakeholders. The analysis included an assessment of barriers to electrification, an evaluation of expected EV adoption, expected emissions reductions, types of chargers recommended for specific sites, and cost estimates. The EV Readiness Plan also includes identifying potential publicly accessible EV charging locations.

Community and Stakeholder Outreach

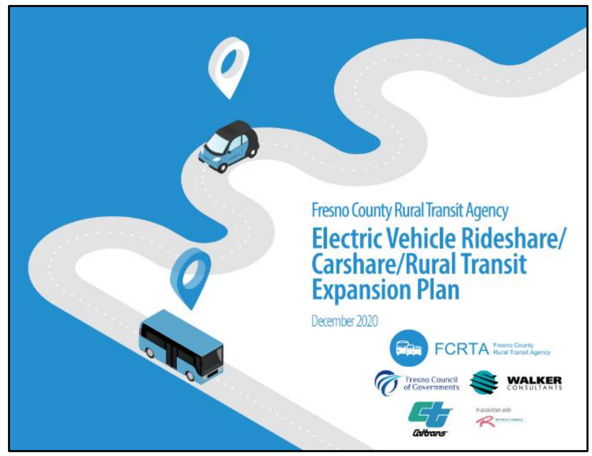
The project included a variety of community and stakeholder outreach efforts, including engagement with EV infrastructure providers, transit agencies, current EV users, utility companies, and the public, to identify needs, data gaps, and priority sites for charging infrastructure rollout across the region.

The public engagement component of the Plan was used to validate relevance of charger locations in disadvantaged or rural communities, assess existing infrastructure, and ensure the plan addressed equity concerns and the regional EV charging accessibility gap.

Relevance to EV Charging Study

The Plan provides a foundational approach to analyzing spatial public charging needs, potential sites, emissions benefits, and grid integration considerations, as well as key barriers and issues.

FCRTA EV Rideshare/Carshare/Rural Transit Expansion Plan



Background

The Plan outlines a business model for expanding EV microtransit and carshare services across rural Fresno County. It included community outreach, financial modeling, and identified funding streams, intended to improve cost-efficiency and accessibility.

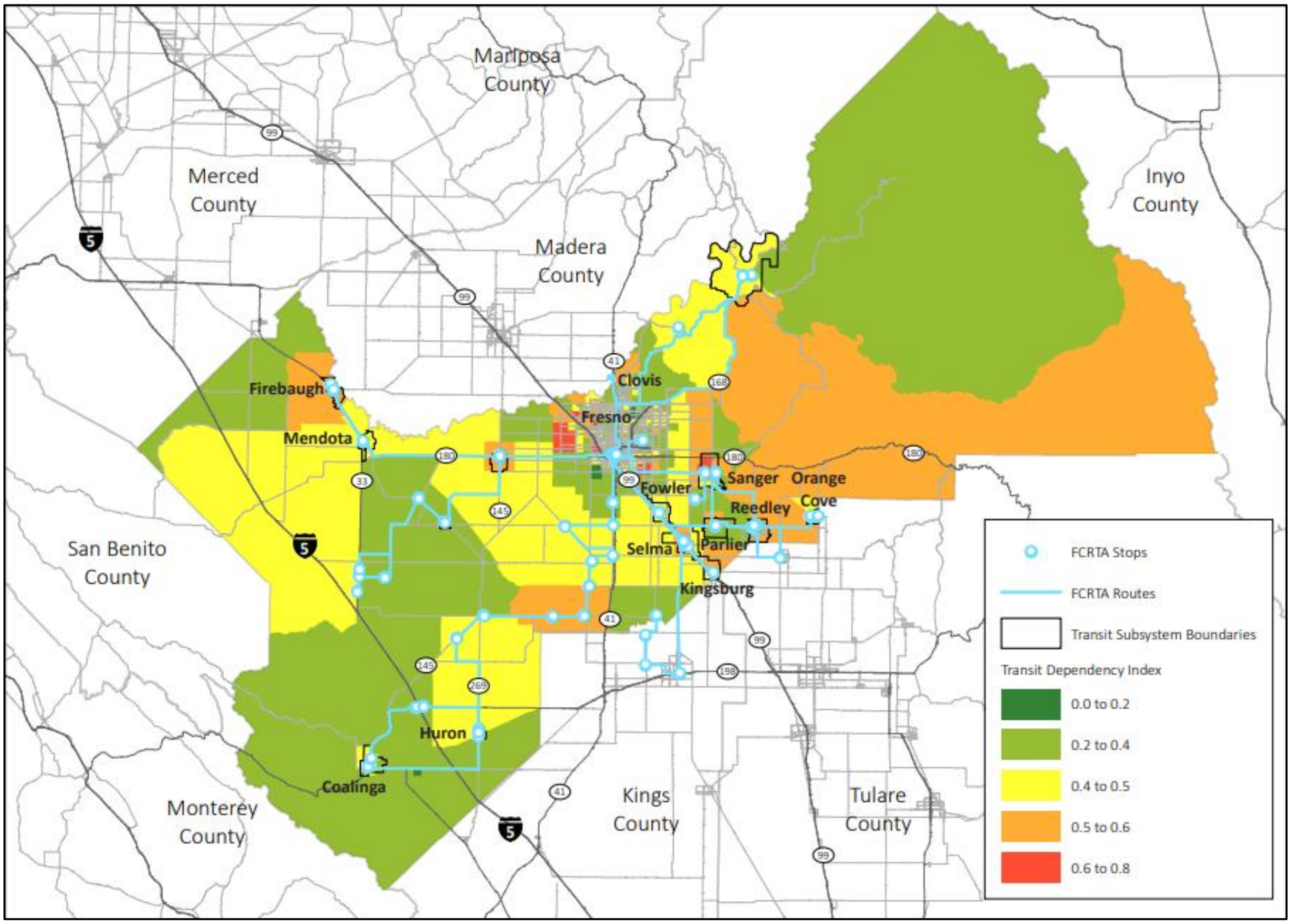
The expansion is tied to broader efforts, including electrical grid analysis, EV charging network planning, and the development of transit microgrids and resiliency hubs. This Plan supports future scalability by ensuring charging reliability and resilience in disadvantaged rural areas.

Community and Stakeholder Engagement

The Plan's engagement strategy included targeted outreach to social services organizations across Fresno County to assess mobility needs, particularly in rural and underserved communities. Survey instruments and stakeholder interviews were deployed to capture barriers and opportunities related to shared electric-vehicle mobility, car-sharing and ridesharing for transit-dependent populations.

Results showed strong interest among community stakeholders in EV-based shared mobility solutions that can fill transit gaps, especially for trips to jobs, medical appointments and training in areas lacking fixed-route service. Feedback emphasized the need for affordable fare structures, driver recruitment within the community, and the integration of EV technologies to support both environmental goals and improved community mobility. The figure below shows transit dependency factors across Fresno County.

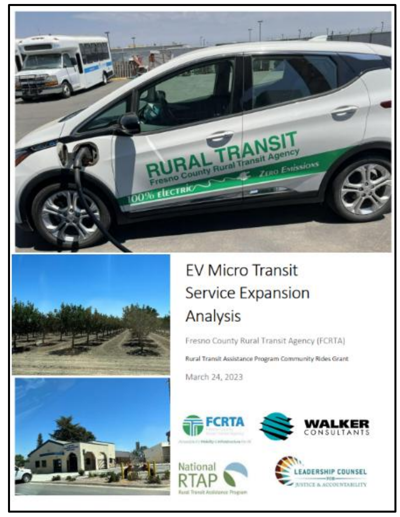
Figure 4 Transit Dependency Index by Area in Fresno County



Relevance to the EV Charging Study

The Plan set the foundation for FCRTA's rural microtransit service. FCRTA implemented service on a demonstration basis in Biola, CA, and installed infrastructure at the microtransit hub, including an EV charger, fencing, and security. The service and process for infrastructure installation provided learnings regarding partnerships with unincorporated communities. This includes setting upfront expectations on implementation workstreams, as these communities often have limited staff capacity and resources. The recommendations regarding microtransit zones are incorporated into the transit services assumptions for this EV Charging Study.

FCRTA EV Microtransit Service Expansion Analysis



Background

The Study focuses on EV microtransit services in five unincorporated Fresno County communities, including Laton, Lanare, Riverdale, Cantua Creek, and El Porvenir, based on origin-destination data and community input, aiming to connect residents to jobs, healthcare, social services, and essential errands.

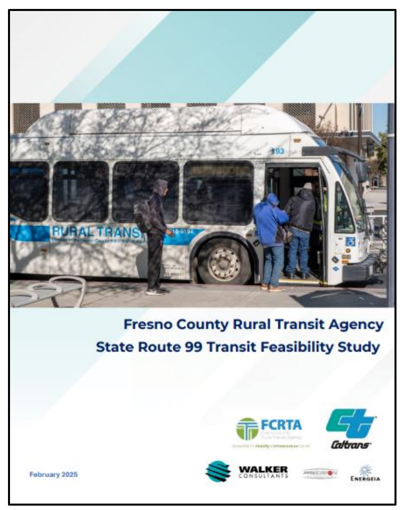
Community and Stakeholder Engagement

Through surveys and stakeholder outreach, the Study emphasizes hiring drivers from within the communities to build trust, boost ridership, and provide local employment, while addressing service gaps where traditional fixed-route transit is limited or non-existent.

Relevance to the EV Charging Study

The recommendations regarding microtransit zones are incorporated into the transit services assumptions for this EV Charging Study. FCRTA may soon begin the first stage of service, with its microgrid/mobility hub in San Joaquin, which would serve as an anchor for service in the surrounding unincorporated areas.

FCRTA State Route 99 Transit Feasibility Study



Background

This Transit Feasibility Study evaluated how to bring frequent transit to one of the State's and Fresno County's most traveled corridors, State Route 99 (SR 99). It is a major route in one of the world's most productive agricultural regions and is critical to the state's economic vitality. Senate Concurrent Resolution 17 (SCR 17) directs Caltrans to identify transportation-related needs along the corridor that will alleviate congestion and improve the movement of goods, thereby enhancing economic development in the San Joaquin Valley.

The Study evaluated the physical and financial feasibility of implementing light rail, bus rapid transit (BRT), or monorail, including exclusive bus lanes or shoulder-running BRT, along Golden State Boulevard (SR 99), connecting rural communities such as Calwa, Malaga, Fowler, Selma, and Kingsburg to Fresno, with potential further extensions

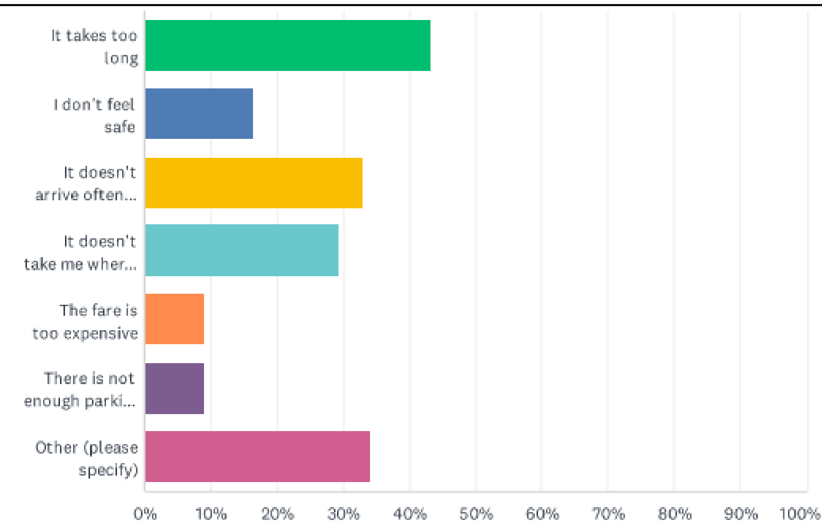
The analysis assessed each mobility option across cost effectiveness, service value, ridership potential, and technical feasibility, covering zero-emission vehicle integration, infrastructure, and operational impacts.

Community and Stakeholder Outreach

The Study included a comprehensive community and stakeholder outreach effort designed to gather input from residents, riders, and regional partners. From June 5 to August 31, 2023, the team conducted online and paper surveys to capture a wide range of perspectives on mobility needs and service preferences. Additional engagement took place through six community pop-up events and intercept surveys at bus stops, allowing staff to reach people directly where they travel and ensuring that feedback reflected real-world transit experiences.

An Advisory Committee played a central role in shaping the project's direction and recommendations. This group comprised governmental and non-governmental stakeholders from across Fresno County and met throughout the planning process to review data, evaluate early service concepts, and provide guidance on emerging ideas. Their insights helped ensure that the final recommendations were grounded in local priorities, operational realities, and the broader mobility goals of the region.

Figure 5 Transit Ridership Barriers Survey



ANSWER CHOICES	RESPONSES	
It takes too long	43.04%	34
I don't feel safe	16.46%	13
It doesn't arrive often enough	32.91%	26
It doesn't take me where I need to go	29.11%	23
The fare is too expensive	8.86%	7
There is not enough parking near the stations	8.86%	7
Other (please specify)	34.18%	27
Total Respondents: 79		

The figure above shows the results of a transit ridership barriers survey conducted during the outreach process. Overall, community members reported a need for increased, reliable, and frequent transit service. The SR 99 study addresses this feedback by recommending increased bus service on the SR 99 corridor and microtransit service that connects surrounding communities to the fixed route service. This charging plan incorporates the transit service recommendations from the SR 99 study into the service planning assumptions.

Relevance to the EV Charging Study

Near-term actions include increasing the frequency of existing fixed-route services and introducing microtransit in corridor cities and towns. In the long term, transition to BRT was advised once ridership thresholds are met, potentially aligning BRT deployment with a managed lane on SR 99. The recommendations in this Study informed the phased transit service assumptions for the EV Charging Plan analysis.

FCRTA's Current Transit Vehicle Fleet

FCRTA has a total fleet of 130 vehicles. Table 5 summarizes the current FCRTA fleet inventory by vehicle model, age, fuel, and body type, which was used to model the transition of internal combustion engine (ICE) vehicles to electric vehicles in FCRTA's Fleet Transition Plan.

Table 5 Current FCRTA Fleet Inventory by Vehicle Model

Vehicle Model	Engine Model Year	Number of Vehicles	Fuel Type	Vehicle Type
Bluebird	2007	4	CNG	Bus
GMC Glaval Titan	2008	12	CNG	Cutaway
GMC Glaval Titan	2009	15	CNG	Cutaway
Chevrolet Uplander	2009	4	Gasoline	Cargo Van
Chevrolet Arboc	2013	38	Gasoline	Cutaway
Ford 4 Wheel Van	2014	2	Gasoline	Passenger Van
Ford F-450	2014	2	CNG	Service Truck
Zenith Ram 3500	2016	6	Electric	Passenger Van
El Dorado	2016	8	CNG	Bus
Ford Villager	2017	1	Gasoline	Bus
Proterra	2018	5	Electric	Bus
Big Rex Trailer	2018	1	N/A	Trailer
Chevrolet Bolt	2019	14	Electric	Car
BYD K95 35-ft	2019	2	Electric	Bus
Chevrolet Bolt	2020	4	Electric	Car
BYD K7M-ER 30-ft	2021	2	Electric	Bus
Chrysler Voyager	2022	5	Gasoline	Passenger Van
2024 BYD K7M-ER	2025	3	Electric	Bus
Total		130		

Note: Current as of 6/4/2025

FCRTA's Current EV Charging Infrastructure

FCRTA has already installed various EV charging infrastructure across its service territory to support current fleet vehicles and public vehicle charging, including Envision Arc solar L2 chargers, WAVE Inductive L3 chargers (DCFC), and other models. Table 6 summarizes FCRTA's current and planned EV charging infrastructure, organized by City. Most chargers are installed away from bus yards at alternative locations, highlighting the need to develop a charging infrastructure plan centralized at bus yards and sized to each of FCRTA's unique vehicles, routes, and services.

It is important to note that while some existing charging infrastructure will support FCRTA's future electric fleet needs, such as infrastructure at the Selma Maintenance Facility, other infrastructure may not viably serve the future transit EV fleet, such as the Envision Arc solar chargers, for example. The Arc chargers are not interconnected with the centralized electricity distribution system and operate without sufficient battery storage to provide the necessary charging power reliability to maintain reliable transit operations on a day-to-day basis.

Table 6 Current FCRTA EV Charging Infrastructure by Incorporated City

City	Bus Yard Chargers	Additional Chargers
Coalinga	2 plug-in L2 chargers	1 Envision Arc solar charger at Downtown Parking Lot 1 BYD Charger and 1 Solar Tree 779 East Polk Street
Firebaugh	-	1 Envision Arc solar charger at Firebaugh City Hall
Fowler	1 JuiceBox 40 Level III charger	1 Envision Arc solar charger at Fowler Branch Library
Huron	1 Envision Arc solar charger	-
Kerman	-	2 Envision Arc solar chargers at Kerman Community Center
Kingsburg	-	1 Envision Arc solar charger at Kingsburg Branch Library
Mendota	2 Juicebox 75 L2 chargers	1 Envision Arc solar charger at Mendota City Hall
Orange Cove	-	2 Envision Arc solar chargers at Orange Cove City Hall 1 BYD charger and 1 Solar Tree at 1705 Anchor Ave
Parlier	-	2 Envision Arc solar chargers at Parlier City Hall

		3 JuiceBox 40 Level III chargers (unknown address)
Reedley	-	2 Envision Arc solar chargers at Reedley Public Works 2 Envision Arc solar chargers at Reedley Airport 10 Zerova AX L2 chargers behind City Hall
San Joaquin	-	1 Envision Arc solar chargers at San Joaquin City Hall
Sanger	-	1 Envision Arc solar charger at Sanger City Hall 1 JuiceBox L2 charger at unknown address
Selma (existing)	1 Juicebox 75 L3 charger 2 Proterra chargers	1 BYD charger 1 Proterra charger 2 JuiceBox 40 Level III chargers 1 JuiceBox 40 L2 charger at 1870 Dockery Avenue
Selma (under construction)	29 Zerova AX L2 chargers 1 WAVE inductive charger 2 BYD chargers	

In addition to existing charging hardware, electrical panels, metering arrangements, and grid interconnections may need to be upgraded to accommodate additional fleet charging. The following section summarizes the project team's prospective charging site facility assessment process to determine existing electrical infrastructure condition and its suitability to serve FCRTA's future fleet charging needs.

Facility Site Assessments

The project team conducted site assessments across FCRTA's incorporated cities and key operating locations to evaluate the suitability of existing electrical infrastructure to support future zero-emission fleet charging. The primary objective of these assessments was to document existing service conditions, identify potential electrical capacity constraints, and understand how each site's configuration may influence the scale and cost of future charging installations. These assessments helped confirm whether existing equipment, often designed to support building loads or small auxiliary systems, could viably support the continuous, high-power EV charging demand of FCRTA's vehicles. The table below lists the potential fleet charging sites that were visited and assessed, which were identified based on existing depot locations and collaboration with FCRTA. Selma was not assessed due to its recent Maintenance Facility development.

Table 7 Prospective Fleet Charging Sites

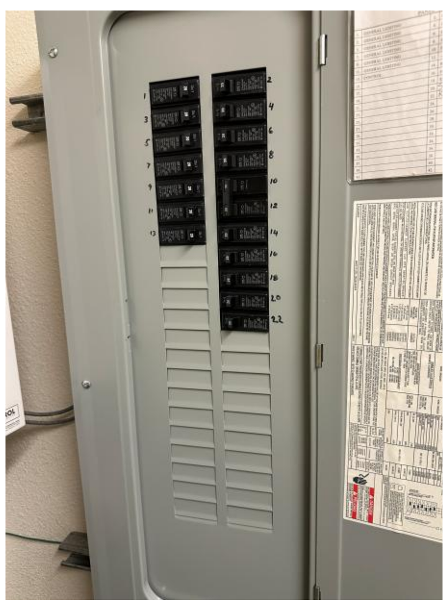
Facility Name	Address	City
Auberry	29143 Auberry Road	Prather
Coalinga	27500 Phelps Ave	Coalinga
Firebaugh #1	1890 7th St	Firebaugh
Firebaugh #2	1734 Saipan Ave	Firebaugh
Fresno	821 China Alley	Fresno
Huron	36311 Lassen Ave	Huron
Kerman	15201 W California	Kerman
Kingsburg	1200 Kern St	Kingsburg
Lanare	20620 S Grantland Ave	Riverdale
Mendota	1006 2nd St.	Mendota
Orange Cove	860 2nd St	Orange Cove
Parlier	8770 Mendocino	Parlier
Reedley	1600 S. Apple	Reedley
San Joaquin	21956 W Railroad Ave	San Joaquin
Sanger	1199 Commerce Ave	Sanger
Selma	1821 Pacific Ave	Selma

During each visit, the team inventoried switchgear, panelboards, metering arrangements, and utility transformer configurations, documenting site conditions through field notes and photographs. In several cases, facilities featured multiple interconnected distribution circuits, legacy meters, and service structures that were not designed for the electrical loads associated with EV fleet charging. While these observations provided a clear picture of existing conditions, most sites were unable to provide historical utility billing data with accurate site peak demand, limiting the ability to precisely quantify existing spare electrical capacity. As a result, the assessments focused on identifying the practical limits of current infrastructure and the likelihood that upgrades, or entirely new services, will be required to support large-scale fleet electrification.

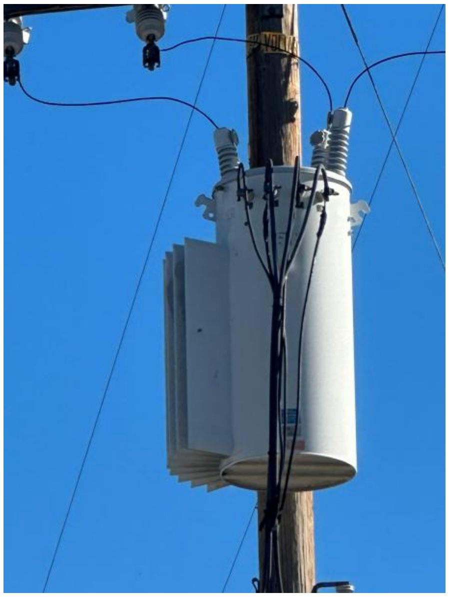
Based on these evaluations, the optimal pathway for accommodating FCRTA's long-term electrification goals and associated EV charging needs will likely involve new electrical services from PG&E. Programs such as PG&E's Fleet Ready or its Rule 29 interconnection process may help offset infrastructure upgrade costs and guide the development processes respectively, as most sites will require dedicated EV charging services separate from existing building loads. Based on historical data comparing typical costs of upgrading an existing service and establishing a new electrical service, establishing a new service with PG&E will be less expensive at the majority of FCRTA sites.

The following pages provide sample photographs from a subset of site visits, illustrating typical electrical configurations and infrastructure. Site visit photographs including meter and/or utility service identifiers have been excluded or redacted for security purposes.

Auberry Site Visit Selected Photographs

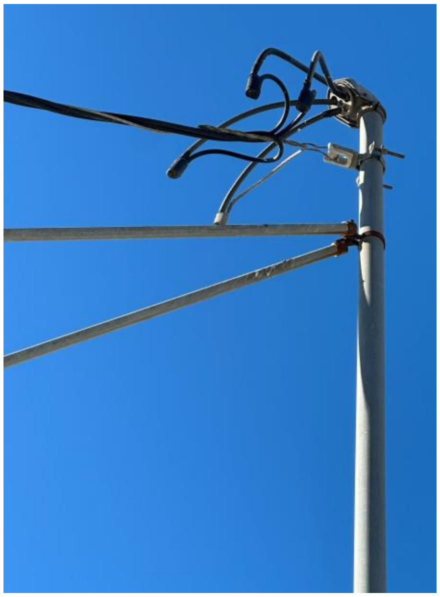


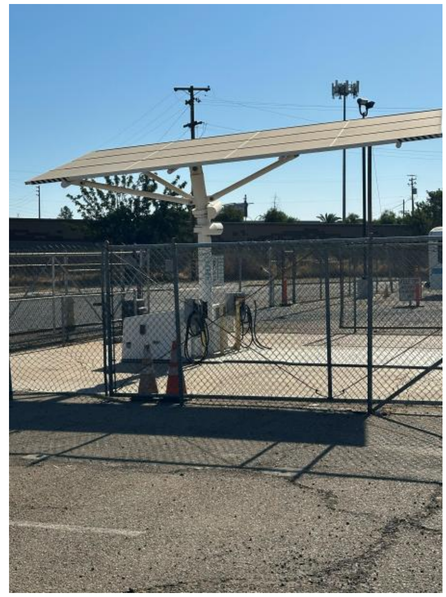
Firebaugh Site Visit Selected Photographs



Huron Site Visit Selected Photographs

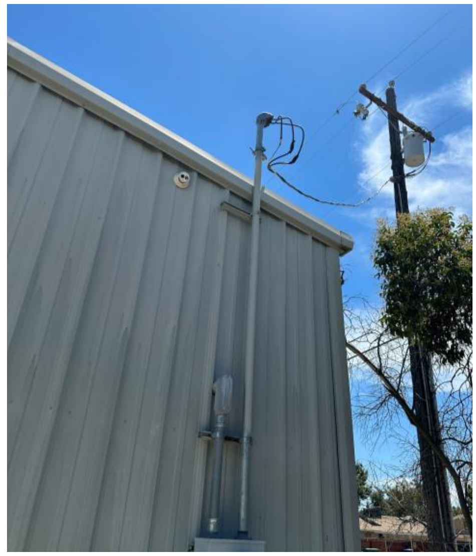
Kingsburg Site Visit Selected Photographs





Orange Cove Site Visit Selected Photographs

Reedley Site Visit Selected Photographs



San Joaquin Site Visit Selected Photographs

Selma Maintenance Facility

The Selma Maintenance Facility, shown below, serves as FCRTA's most advanced operational site, integrating vehicle maintenance, administrative functions, solar generation, and EV charging to support the agency's transition to a zero-emission fleet. The site is FCRTA's only owned parcel of land, featuring a 10,000-square-foot maintenance shop with four fully equipped bus bays, designed to service both natural gas and battery-electric buses. Adjacent to the shop is an office building that houses centralized dispatch, supervisor workspaces, and a conference room used for safety meetings and technician training on electric and solar technologies. The facility also features a bus wash system utilizing recycled water, a reverse-osmosis final rinse, and air-drying capabilities, as well as a dedicated canopy-covered wash pad for detailing cars and vans. A recently added hazardous materials storage building with concrete containment supports ensures safe and compliant operations.

Figure 6 FCRTA's Selma Maintenance Facility

As FCRTA accelerates toward its electrification goals, the Selma yard will be an essential site for charging and energy system management. The site features over thirty electric vehicle chargers, including Level 2 plug-in units and a Level 3 inductive WAVE charger that supports high-duty-cycle (continuous travel, frequent stop-and-go) transit operations. Three solar bus ports, an on-site solar field, and co-located battery storage provide renewable generation and load-shifting benefits that help reduce operational costs and improve resilience during grid outages. These assets are integrated through an energy management system that enables the agency to monitor charging demand, solar generation, and battery performance in real time.

Together, these improvements position the Selma Maintenance Facility as a model for rural zero-emission transit operations. By combining purpose-built maintenance infrastructure with expanding EV charging capacity and on-site renewable energy, the facility provides FCRTA with the operational flexibility needed to maintain service reliability, accommodate future fleet growth, and continue to lead the region in clean transportation innovation.

Stakeholder Outreach

Project Advisory Committee

FCRTA convened an Advisory Committee to support the development of the Fresno County EV Charging Master Plan and Energy Management System Plan. The Committee included representatives from Caltrans, the Fresno Council of Governments, Clovis Transit, Fresno Economic Opportunities Commission, California High-Speed Rail Authority, and public works and city leadership from rural communities, including San Joaquin, Selma, Fowler, Reedley, and Sanger.

Across the July 28, 2025, April 2, 2026, and April 14, 2026 Advisory Committee meetings, Committee members reviewed the need for a coordinated countywide charging strategy, discussed updates to key infrastructure such as the Selma Maintenance Facility, and evaluated current and future EV adoption and charging conditions across Fresno County. The Committee also reviewed study goals, including fleet transition planning, regional coordination opportunities, and the role of an energy management system in orchestrating fleet charging and energy assets across the County.

Participants emphasized consistent challenges and priorities across Fresno County, including, but not limited to:

1. Limited electrical capacity,
2. Long PG&E interconnection timelines,
3. Rising utility energy costs, and
4. Difficulty identifying viable charger sites within electrically and spatially constrained facilities.

Through subsequent meetings, the Committee further refined charging infrastructure needs, including the distribution of Level 2, DC fast charging, and inductive charging across the system, as well as the importance of prioritizing high-demand sites and aligning deployment with fleet electrification timelines. The Committee also discussed planning-level cost estimates, key cost drivers, and the importance of coordinating with utility providers and external infrastructure investments, including planned charging infrastructure associated with California High-Speed Rail.

Additionally, community leaders and agency partners shared ongoing efforts to advance transportation electrification and decarbonization, including deployment of solar-powered charging systems, upgrades to maintenance yard electrical infrastructure, expansion of Level 2 and DC fast charging, and exploration of microgrid and battery storage solutions. Committee members expressed strong interest in distributed solar generation, microgrids, and resilience hubs to manage costs, improve reliability, and support broader community energy needs.

Input from the Advisory Committee directly informed the development of the EV Charging Plan, including refinement of site planning assumptions, identification of coordination opportunities with regional partners, and evaluation of an energy management system to support reliable, cost-effective fleet electrification. The April 14, 2026 joint meeting with the Transit Roadmap Advisory Committee further reinforced the role of the EV Charging Plan as a technical foundation for broader service planning, incorporating feedback on service reliability, accessibility, and future operational needs.

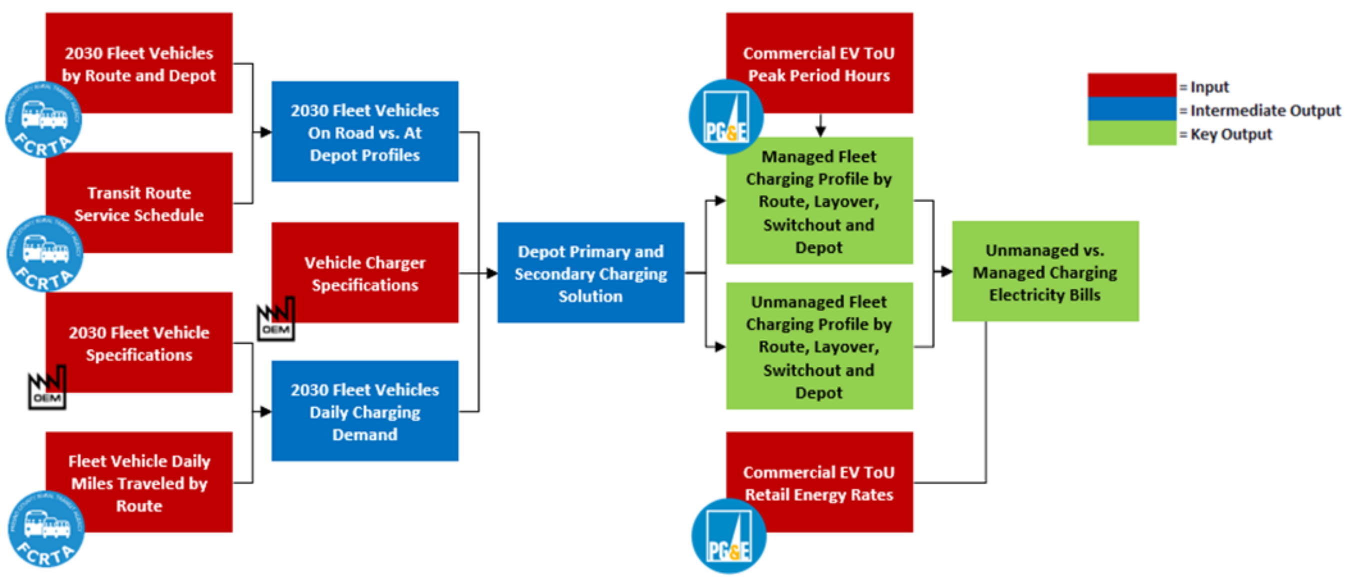
A comprehensive summary of Advisory Committee meetings and associated discussion topics is included in Appendix A.

Fleet EV Charging Modeling and Analysis

The EV Charging Master Plan provides an integrated roadmap for how FCRTA can successfully scale its electrification efforts across its depots, layover sites, and community resiliency hubs. Through detailed modeling of charging requirements, grid impacts, and energy management capabilities, the team identified strategies that enable FCRTA to minimize costs, mitigate infrastructure constraints, and enhance overall system reliability.

An overview of the modeling approach to right-size charging solutions per depot is shown in the figure below. It includes future fleet vehicle needs, charger models, and route information to identify and address charging requirements beyond the overnight depot. The approach involves developing estimates of grid and connection capacity requirements, as well as associated energy bill impacts, with and without managed charging. The following sections will cover the key methodologies, inputs and assumptions, and results.

Figure 7 Transit Charging Needs Analysis Methodology



Transit Service Assumptions

The following sections describe the three assumed phases of FCRTA transit services. It is assumed that Phase 1, full electrification of the current transit fleet, will be achieved by 2030[1]. Any additional transit services will be implemented with fully electric vehicles thereafter.

FCRTA is conducting a Transit Roadmap to plan for future transit services, which may result in potential changes to the Phase 2 and Phase 3 service scenarios. Specific Phase 2 and 3 implementation timing is not included in the analysis due to uncertainty related to funding, vehicle supply chain considerations, and charging infrastructure grid integration timelines. Fleet charging infrastructure needs to be analyzed to accommodate all three Phases of future transit service.

Phase 1 – Current FCRTA Transit Service

Phase 1 represents a future scenario in which FCRTA's current service structure is fully electrified, using the same routes, microtransit zones, and demand-response operations already in place. This phase models the EV charging needs required to support today's service levels once the fleet transitions entirely to zero-emission vehicles. It establishes the baseline daily energy demand, identifies the capacity needed at existing charging locations, and highlights where additional infrastructure or load management strategies will be necessary.

Phase 2 – Current FCRTA Transit Service + Expanded Microtransit

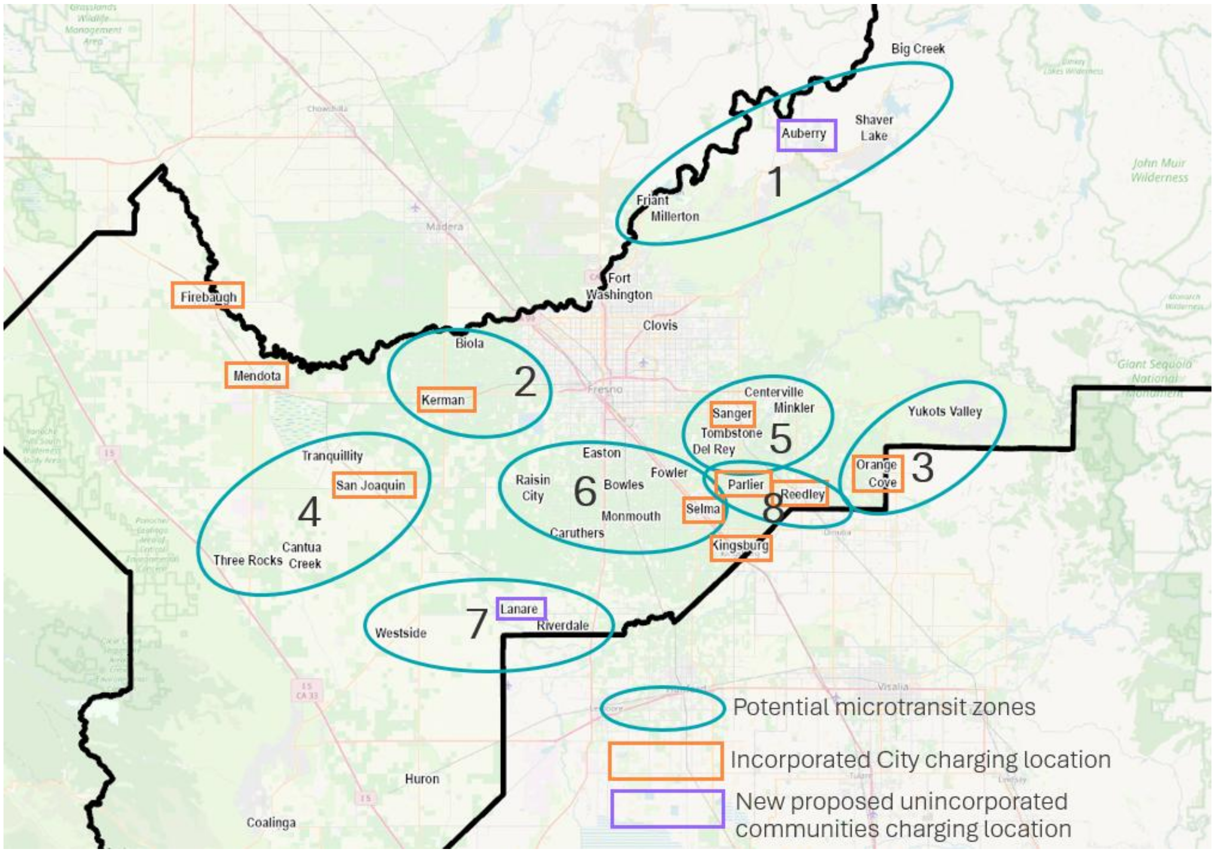
Phase 2 adds new potential microtransit service zones in unincorporated communities that currently lack flexible transit options. Each new zone is assumed to require one dedicated vehicle and one charger, reflected in the seven proposed microtransit areas shown in the deployment assumptions. This expansion broadens FCRTA's service footprint and increases total energy needs, requiring additional distributed charging sites outside incorporated cities to support community-based service.

Phase 3 – Current Service + Expanded Microtransit + SR99 Strategy

Phase 3 incorporates the remaining potential recommendations from the SR 99 Transit Feasibility Study, including increasing Southeast Transit service from three to six daily trips and adding a new microtransit zone serving Parlier and Reedley. Since other SR 99 recommendations are already captured in earlier phases, this phase focuses on the incremental vehicles and charging capacity needed to support the added frequency and the new microtransit zone. These enhancements increase charging peak demand and require strategically placed chargers along the SR 99 corridor to maintain reliable operation. The figure below depicts a fully deployed microtransit service expansion.

[1] This electrification goal is based on FCRTA's current Fleet Transition Plan. Actual timelines for full fleet electrification may vary based on funding opportunities, charging infrastructure implementation barriers, and electrical grid capacity.

Figure 8 Potential New Microtransit Service and Implemented SR99 Strategy[2]



Fleet Charging Analysis Inputs and Assumptions

Future FCRTA Electric Vehicle and Charging Energy Needs

To estimate transit route energy needs in kilowatt-hours (kWh), the team assigned each route an FCRTA-agreed electric vehicle model and combined the vehicle's efficiency (kWh/mile) with the assigned daily vehicle miles traveled (VMT) to calculate the daily charging need. Instances where daily energy needs exceeded vehicle battery capacity and how these gaps were addressed are covered in later sections of the analysis.

This analysis used the route and vehicle metadata from 2024 and 2025 collected by FCRTA, which included daily logs of vehicle IDs, route names, odometer start and end readings, and recorded daily VMT. The VMT data were cleaned and standardized before being analyzed by route service to determine the average, minimum, and maximum daily vehicle miles traveled by route. For future microtransit services, the project team assumed an average daily distance of 92 vehicle miles, based on Biola's historical microtransit service data.

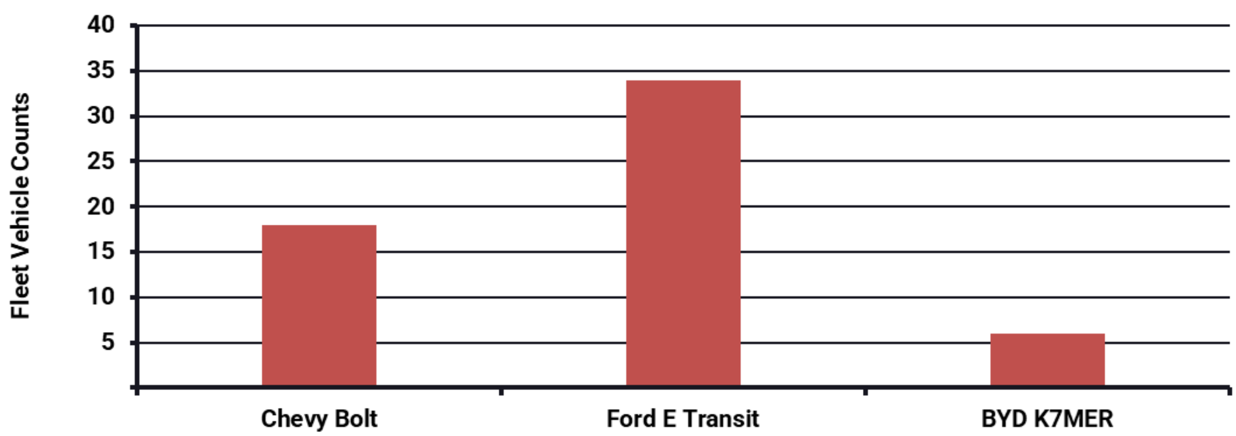
[2] Service expansion recommendations represent potential new on-demand and microtransit routes. Implementation of service expansion will depend on funding availability, site partnerships, charging infrastructure deployment, electrical grid capacity, and other factors.

The following inputs were used to calculate the daily energy consumption by depot:

1. Daily VMT by Route (miles)
2. Effective Vehicle Range (miles)
3. Vehicle Efficiency (kWh/mile)
4. Number of Vehicles in Service
5. Battery Size (kWh)

Figure 9 below shows the 2030 electric fleet vehicle needs for FCRTA in vehicle count terms. The operating fleet is forecasted to comprise 34 Ford E Transits, 17 Chevy Bolts, and 6 BYD K7MERs to support its current routes, including backup vehicles, but excluding any required mid-day vehicle switchouts.

Figure 9 2030 Electric Fleet Vehicle Phase 1 Transit Service Summary



Key vehicle operating assumptions, including vehicle efficiency, range, and maximum charging power, are shown in the table below.

Table 8 Key Vehicle Model Assumptions

Electric Vehicle Type	Battery Size (kWh)	Efficiency (kWh/mi)	Charge Capacity (kW)	Battery Range (mi)
Chevy Bolt	65	0.25	11	259
Ford E Transit	89	0.56	115	159
BYD K7MER	313	1.60	80	196

The following assumptions of vehicle types and the number of in-service vehicles assigned to each route are shown below in Table 9, including total vehicles with switchouts, which will be discussed in more depth in later sections of the analysis. Phase 3 of potential service expansion is inclusive of Phase 2 expansion.

Table 9 Transit Service Route Vehicle Assignments by Phase

Route	Vehicles (#)	Vehicles + Switchout Vehicles (Count)	Vehicle Type
Fixed Routes			
Coalinga Transit	1	1	BYD K7MER
Huron Inter-city	1	1	BYD K7MER
Kingsburg to Reedley College Transit	1	1	Ford E Transit
Orange Cove Transit	1	1	BYD K7MER
Sanger to Reedley College Transit	1	1	Ford E Transit
Southeast Transit	1	1	BYD K7MER
Westside Transit	1	1	BYD K7MER
On Demand Routes			
Auberry Transit	1	2	Ford E Transit
Auberry - Intra	1	2	Ford E Transit
Coalinga Transit	2	2	Ford E Transit
Del Rey Transit	1	1	Ford E Transit
Firebaugh Transit	1	1	Ford E Transit
Fowler Transit	1	1	Ford E Transit
Huron Intra-city	1	1	Ford E Transit
Kerman Transit	1	1	Ford E Transit
Kingsburg Transit	1	1	Ford E Transit
Mendota Transit	1	1	Ford E Transit
Orange Cove Transit	1	1	Ford E Transit
Parlier Transit	1	1	Ford E Transit
Reedley Transit	2	3	Ford E Transit
Sanger Transit	2	3	Ford E Transit
San Joaquin Transit	1	1	Ford E Transit
Selma Transit	3	4	Ford E Transit
Microtransit - Phase 2			
Microtransit Zone 1	1	1	Chevy Bolt
Microtransit Zone 2	1	1	Chevy Bolt
Microtransit Zone 3	1	1	Chevy Bolt
Microtransit Zone 4	1	1	Chevy Bolt
Microtransit Zone 5	1	1	Chevy Bolt
Microtransit Zone 6	1	1	Chevy Bolt
Microtransit Zone 7	1	1	Chevy Bolt
Microtransit - Phase 3 (Includes all Microtransit Zones from Phase 2)			
Microtransit Zone 8	1	1	Chevy Bolt

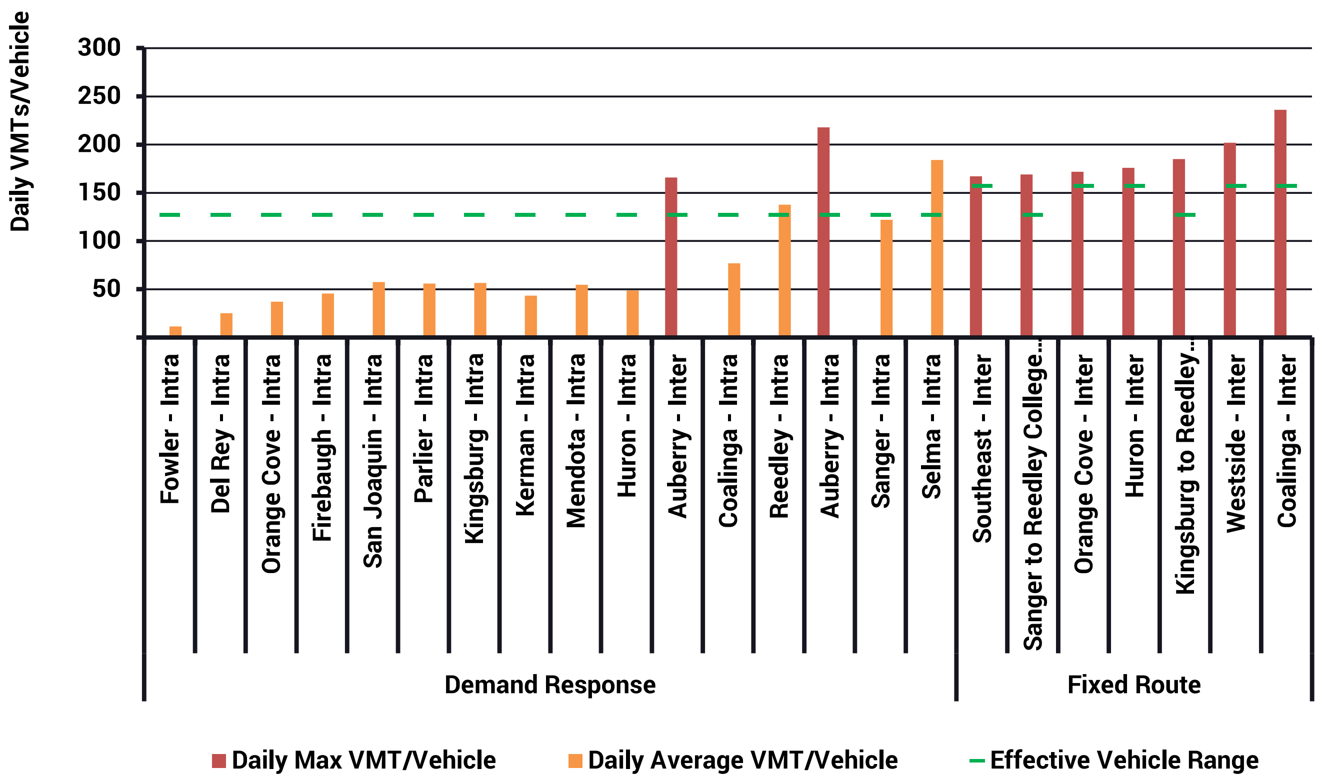
Additional key assumptions required to calculate route VMTs are shown in the table below.

Table 10 Key VMT Calculation Assumptions

Assumption	Value
Assumed simultaneous DCFC power (based on vendor specification)	75 kW
Battery state of charge range contingency	20%
Microtransit VMT assumption (miles/day)	92
Demand response (DR) route daily VMTs assumed to be average, excl. Auberry DR which is assumed to be the max daily VMT	-

Figure 10 below shows the curated VMT data used for the charging needs analysis. No route's VMT exceeded 250 miles, and most demand response routes require daily VMTs less than the vehicle range. However, all the fixed routes require daily VMT exceeding the effective vehicle range.

Figure 10 Daily VMT by Transit Routes



Where there are routes with daily VMT that exceed vehicle effective range (80% of battery capacity), secondary solutions are required to cover daily charging needs. Additional charging solutions to cover daily charging needs are described in the following section.

Depot Charging Solutions and Layovers

To calculate the number and types of chargers required at depots and layover sites, the team analyzed the vehicle type assigned to each route, the daily charging needs per vehicle, the number of vehicles, and the charging power per potential charger type.

Where route charging needs exceed effective range, three types of charging solutions were considered to ensure vehicles had enough energy to support daily operations:

1. **Primary: Overnight** – Overnight charging occurring at the route's home base depot
2. **Secondary: Layovers** – Mid-day charging for fixed routes only, used to top-up vehicle batteries
3. **Secondary: Switchout** – Mid-day vehicle switchout for demand response routes only

Together, layover and switchout charging solutions are considered secondary charging solutions throughout the analysis. To forecast primary charger composition, it was assumed that there would be one port per vehicle per route. Actual charging station counts depended on the assumed ports per charger configuration.

To forecast layover charger composition, the layover charging need was calculated as the difference between the daily charging need and the vehicle range. Hourly charging power was then calculated as total layover charging need divided by layover hours, less a contingency margin. If existing[3] site charger power (if one was already installed) was insufficient to support layover hourly charging needs, the smallest capable charger was selected to be installed at the layover site.

To forecast switchout charger composition, it was assumed that vehicles switch out midway through the day at the domicile depot if the daily charging need exceeded the vehicle range per the demand response route. To support switchout charging in these instances, it was assumed that one additional vehicle is added to the route. In turn, it was assumed that one additional Level 2 charger was added to the home base depot to support switchout charging. Thus, when switchout charging was required for a given demand response route, one additional Level II charger was added to the home base depot.

Total forecast depot chargers and nameplate charger power were then determined by summing the chargers and charger power across routes and charging solutions.

The following inputs were used for the analysis:

1. Vehicle Types
2. Number of Vehicles (#)
3. Daily VMT (miles)
4. Effective Vehicle Range (miles)
5. Vehicle Efficiency (kWh/mile)
6. Charger Power by Type (kW)
7. Type of Secondary Charging (Layover vs. Switchout)
8. Layover Start and End Time
9. Secondary Charge Location

[3] It is assumed that vehicle layovers at maintenance facilities or depots can use an existing charger.

Table 11 shows charger model specifications and vehicle mappings based on data provided by FCRTA. Charging infrastructure requirements are shown in both station and port count terms, due to the variability in number of ports per representative charger model.

Table 11 Charger Specifications and Compatible Vehicle Mapping

Type	Charger Model	Layover Charging	Fleet Vehicle Mapping	Max Power/Port	Ports/Charger
Level 2	AX-48	No	Chevy Bolt	11	1
Level 2	AX-48	No	Ford E Transit	11	1
DCFC	PKM150	Yes	Ford E Transit	75	2
Inductive	WAVE Wireless Inductive	Yes	BYD K7MER	250	1

Initial route-specific charging infrastructure needs were then calculated based on route energy requirements, charger model power per port and station, and route operational timings to minimize charger needs for non-coincident transit operations. The table below summarizes initial charging infrastructure needs by route and route type.

Table 12 Overnight Charging Requirements by Route

Services	Depot Charging (Overnight)			
Route	Overnight Depot	Charger Type	Charging Ports Needed	Charging Stations Needed
Fixed Routes				
Coalinga Transit	Coalinga	DCFC	1	1
Huron Inter-city	Huron	DCFC	1	1
Kingsburg to Reedley College Transit	Selma	Level 2	1	1
Orange Cove Transit	Orange Cove	DCFC	1	1
Sanger to Reedley College Transit	Sanger	Level 2	1	1
Southeast Transit	Selma	Inductive	1	1
Westside Transit	Firebaugh	DCFC	1	1
On Demand Routes				
Auberry Transit	Selma	Level 2	1	1
Auberry - Intra	Selma	Level 2	1	1
Coalinga Transit	Coalinga	Level 2	2	2
Del Rey Transit	Sanger	Level 2	1	1
Firebaugh Transit	Firebaugh	Level 2	1	1
Fowler Transit	Selma	Level 2	1	1
Huron Intra-city	Huron	Level 2	1	1
Kerman Transit	Kerman	Level 2	1	1
Kingsburg Transit	Kingsburg	Level 2	1	1

Services	Depot Charging (Overnight)			
Route	Overnight Depot	Charger Type	Charging Ports Needed	Charging Stations Needed
Mendota Transit	Mendota	Level 2	1	1
Orange Cove Transit	Orange Cove	Level 2	1	1
Parlier Transit	Parlier	Level 2	1	1
Reedley Transit	Reedley	Level 2	2	2
Sanger Transit	Sanger	Level 2	2	2
San Joaquin Transit	San Joaquin	Level 2	1	1
Selma Transit	Selma	Level 2	3	3
Microtransit - Phase 2				
Microtransit Zone 1	Auberry	Level 2	1	1
Microtransit Zone 2	Kerman	Level 2	1	1
Microtransit Zone 3	Orange Cove	Level 2	1	1
Microtransit Zone 4	San Joaquin	Level 2	1	1
Microtransit Zone 5	Sanger	Level 2	1	1
Microtransit Zone 6	Selma	Level 2	1	1
Microtransit Zone 7	Lanare	Level 2	1	1
Microtransit - Phase 3 (Includes all Microtransit Zones from Phase 2)				
Microtransit Zone 8	Parlier/Reedley	Level 2	1	1

Additional key assumptions regarding vehicles, charging equipment, and secondary solution specifications are summarized in the table below, which were used to identify the optimal secondary charging solutions where necessary.

Table 13 Key Depot Charger Calculation Assumptions

Assumption	Value
# of switchout vehicles per depot	1
Fresno will have inductive chargers as needed for layover charging	3
BYD K7MER max charge power for DCFC charging	80 kW
Chevy Bolt max charge power	11 kW for Level 2
Ford E Transit max charge power (DCFC)	115 kW
Auberry switchout overnight charge location	Auberry
Other demand response (DR) routes switch out overnight charge location	Original Depot
Switch-out charging will occur overnight at the secondary location	-
Switchout charging needs are equal to (n / n+1) * daily VMT * vehicle efficiency, where n = # active vehicles and n+1 because we are assuming only 1 additional vehicle needed for switchout charging	-
Switch-out time for demand response routes is assumed to be halfway through their route timing	-

This analysis identified the types and numbers of chargers required for secondary charging in cases where the initially sized chargers were insufficient or, in the Fresno layover location case, unavailable. Table 14 below shows this intermediate result.

Table 14 Secondary Charging Solution by Route

Services	Secondary Charging		Charger at Location		New Charger Required	
Route	Location	Type	Charger Type	Power (kW)	Charger Type	Power (kW)
Fixed Routes						
Coalinga Transit	Fresno	Layover	-	-	Inductive	250
Huron Inter-city	Coalinga	Layover	DCFC	75	DCFC	75
Kingsburg to Reedley College Transit	Reedley	Layover	Level 2	11	DCFC	75
Orange Cove Transit	Fresno	Layover	-	-	Inductive	250
Sanger to Reedley College Transit	Reedley	Layover	Level 2	11	DCFC	75
Southeast Transit	Fresno	Layover	-	-	DCFC	75
Westside Transit	Fresno	Layover	-	-	Inductive	250
On Demand Routes						
Auberry Transit	Auberry	Switchout	Level 2	11	-	-
Auberry - Intra	Auberry	Switchout	Level 2	11	-	-
Coalinga Transit	-	-	-	-	-	-
Del Rey Transit	-	-	-	-	-	-
Firebaugh Transit	-	-	-	-	-	-
Fowler Transit	-	-	-	-	-	-
Huron Intra-city	-	-	-	-	-	-
Kerman Transit	-	-	-	-	-	-
Kingsburg Transit	-	-	-	-	-	-
Mendota Transit	-	-	-	-	-	-
Orange Cove Transit	-	-	-	-	-	-
Parlier Transit	-	-	-	-	-	-
Reedley Transit	Reedley	Switchout	Level 2	11	-	-
Sanger Transit	Sanger	Switchout	Level 2	11	-	-
San Joaquin Transit		-	-	-	-	-
Selma Transit	Selma	Switchout	Level 2	11	-	-
Microtransit - Phase 2						
Microtransit Zone 1	-	-	-	-	-	-
Microtransit Zone 2	-	-	-	-	-	-
Microtransit Zone 3	-	-	-	-	-	-
Microtransit Zone 4	-	-	-	-	-	-
Microtransit Zone 5	-	-	-	-	-	-
Microtransit Zone 6	-	-	-	-	-	-
Microtransit Zone 7	-	-	-	-	-	-
Microtransit - Phase 3 (Includes all Microtransit Zones from Phase 2)						
Microtransit Zone 8	-	-	-	-	-	-

Fleet Charging Analysis Results

EV Charger Needs by Site

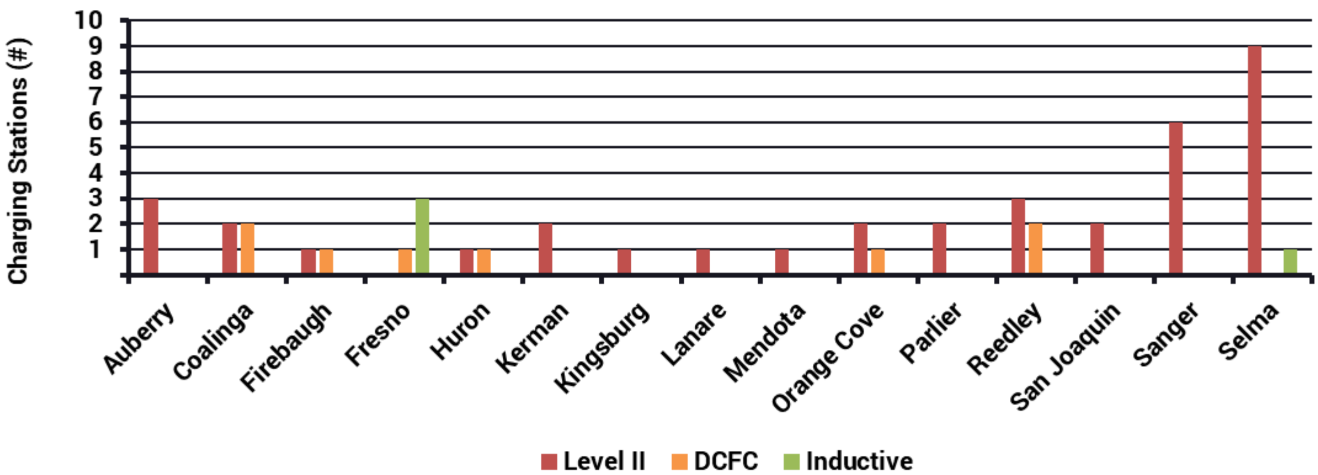
Table 15 below shows the total number of chargers required at each location and the total nameplate capacity required by charger type. As shown in the table, the analysis found that 51 EV chargers with a combined nameplate charging power capacity of 2,029 kW are needed to support FCRTA's fully electrified fleet. Selected route fleet charging needs, such as Fowler Transit, are included in the Selma charging requirement total due to their proximity to the Maintenance Facility.

Table 15 Total Chargers and Power Required by Site

	Charging Stations (#)				Total Charging Power (kW)			
Site	Level 2	DCFC	Inductive	Total	Level 2	DCFC	Inductive	Total
Total	**36**	**8**	**4**	**48**	**396**	**600**	**1,000**	**1,996**
Auberry	3	0	0	3	33	0	0	33
Coalinga	2	2	0	4	22	150	0	172
Firebaugh	1	1	0	2	11	75	0	86
Fresno	0	1	3	4	0	75	750	825
Huron	1	1	0	2	11	75	0	86
Kerman	2	0	0	2	22	0	0	22
Kingsburg	1	0	0	1	11	0	0	11
Lanare	1	0	0	1	11	0	0	11
Mendota	1	0	0	1	11	0	0	11
Orange Cove	2	1	0	3	22	75	0	97
Parlier	2	0	0	2	22	0	0	22
Reedley	3	2	0	5	33	150	0	183
San Joaquin	2	0	0	2	22	0	0	22
Sanger	6	0	0	6	66	0	0	66
Selma	9	0	1	10	99	0	250	349

The graphic below summarizes the resultant fleet charging infrastructure needs by location and charger type, assuming full implementation of Phases 1, 2, and 3 of the future transit service plans. For the Fresno downtown site at which multiple fixed routes will use layover charging, FCRTA is currently exploring various combinations of DCFC and inductive charging to serve fixed route vehicles. While the above charging infrastructure solutions would viably serve the fleet, FCRTA is investigating various options in alignment with Transit and Intercity Rail Capital Program (TIRCP) grant funding guidelines and project benefit requirements.

Figure 11 Total Charger Stations Required by Type and Site



Existing Fleet Charging Infrastructure and Gap Analysis

FCRTA has made significant investments in charging infrastructure, especially at its Selma Maintenance Facility. The above analysis quantifies charging infrastructure requirements without considering the existing infrastructure that could be used to serve the future transit fleet, thereby reducing overall costs and shortening utility interconnection timelines associated with new charger deployment. The Selma maintenance facility includes over 30 level 2 chargers and 1 WAVE inductive charger that can serve FCRTA's transit fleet charging requirements. No other charging infrastructure is assumed to satisfy fleet charging requirements due to:

1. Infrastructure age and anticipated asset useful life
2. Lack of centralized grid distribution interconnection
3. Unfeasible fleet charging locations and required transit deadhead (time) to reach the start/end of route

With the Selma existing infrastructure accounted for, the following table shows the new required infrastructure to serve FCRTA's transit fleet in charging port and power requirement terms. This dataset was used to prioritize site deployment and develop capital cost estimates for new fleet charging infrastructure across Fresno County. It is important to note that some dual-port charger models, such as the PKM150 DCFC model used in this analysis, may result in two ports at a site that requires only one port at a minimum. Should FCRTA choose to procure additional backup electric fleet vehicles, these additional ports may be able to serve those backup EVs or charge other vehicles during route layovers as the transit service evolves.

Additionally, the team conducted route-specific cost-benefit analyses to compare the deadhead time costs of charging vehicles at the Selma Maintenance Facility versus at new dedicated charging sites, such as Sanger. In every case, the more cost-effective solution was to develop new, dedicated depot charging infrastructure, rather than sending vehicles to Selma and incurring additional deadhead costs.

Table 16 New Chargers Required by Type and Site

Site	Charging Ports (#)				Total Charging Power (kW)			
	Level 2	DCFC	Inductive	Total	Level 2	DCFC	Inductive	Total
Auberry	3	0	0	3	33	0	0	33
Coalinga	2	2	0	4	22	150	0	172
Firebaugh	1	1	0	2	11	75	0	86
Fresno	0	1	3	4	0	75	750	825
Huron	1	1	0	2	11	75	0	86
Kerman	2	0	0	2	22	0	0	22
Kingsburg	1	0	0	1	11	0	0	11
Lanare	1	0	0	1	11	0	0	11
Mendota	1	0	0	1	11	0	0	11
Orange Cove	2	1	0	3	22	75	0	97
Parlier	2	0	0	2	22	0	0	22
Reedley	3	2	0	5	33	150	0	183
San Joaquin	2	0	0	2	22	0	0	22
Sanger	6	0	0	6	66	0	0	66
Selma	0	0	0	0	0	0	0	0

Estimated Vehicle Charging Bills and Demand Profiles by Site

Based on the charging infrastructure needs analysis, the team estimated the annual impact of EV fleet charging on depot energy bills by developing hourly demand profiles by route and overlaying hourly PG&E energy pricing.

There were two different hourly charging scenarios evaluated for this analysis:

- **Unmanaged Charging** – Vehicles charge immediately when returning at their end-of-day
- **Managed Charging** – Vehicles shift charging out of peak energy pricing period and spread demand across non-peak dwell periods

For unmanaged charging, vehicles were expected to charge once they returned to home base, such that vehicles charge at the depot charger's peak, technically capable of discharging power until all vehicle batteries are fully charged. The analysis also included a typical EV charger power profile to account for the typical reduced nameplate charger output as each vehicle battery increases in state of charge.

For managed charging, vehicles avoid charging during PG&E's peak price period and evenly distribute charging power across their dwell hours, such that the vehicle charges evenly at every hour it is at the depot outside of PG&E's peak periods. In practice, load shifting and shaving reduce peak charging load, which helps alleviate grid constraints, enhances grid reliability, and reduces depot energy bills. This modeled behavior is one potential set of objectives for an Energy Management System.

To estimate energy bills for each route, hourly profiles by charging scenario are combined with hourly PG&E energy prices. Route bills are aggregated by depot to calculate annual energy bills by charging scenario and depot.

Bill savings associated with managed charging are then calculated at each depot by taking the difference in annual energy bills for the unmanaged vs. managed scenarios.

In addition to the inputs listed in previous sections, the model uses key data inputs, including:

- Route and Layover Timing
- Battery Size (kWh)
- PG&E's BEV Rates ($/kWh)
- PG&E's Peak Periods
- Charger Specifications

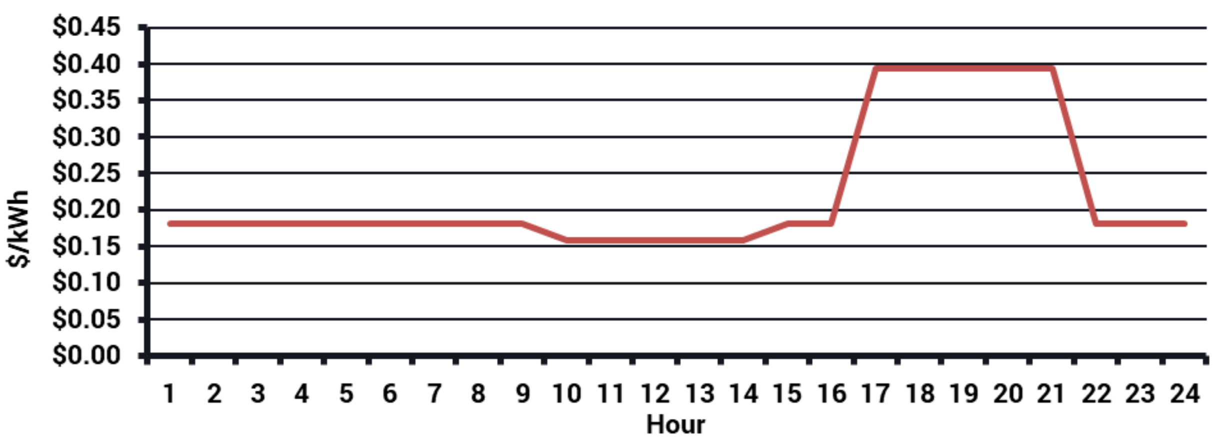
Table 17 below presents key assumptions including vehicle efficiency, range, and maximum charging power capacity. FCRTA owns multiple models of BYD vehicles, including the K7MER and the K9. The K7MER was selected due to its battery range and conservative charging power capacity.

Table 17 Vehicle Operating Specifications

Electric Vehicle Type	Battery Size (kWh)	Efficiency (kWh/mi)	Charge Capacity (kW)	Battery Range (mi)
Chevy Bolt	65	0.25	11	259
Ford E Transit	89	0.56	115	159
BYD K7MER	313	1.6	80	196

Figure 12 below shows PG&E's 2025 BEV-2 Rate selected as the input rate for the analysis. BEV-2 is the Business High Use EV Rate recommended by PG&E for sites with fleet EV charging installations.

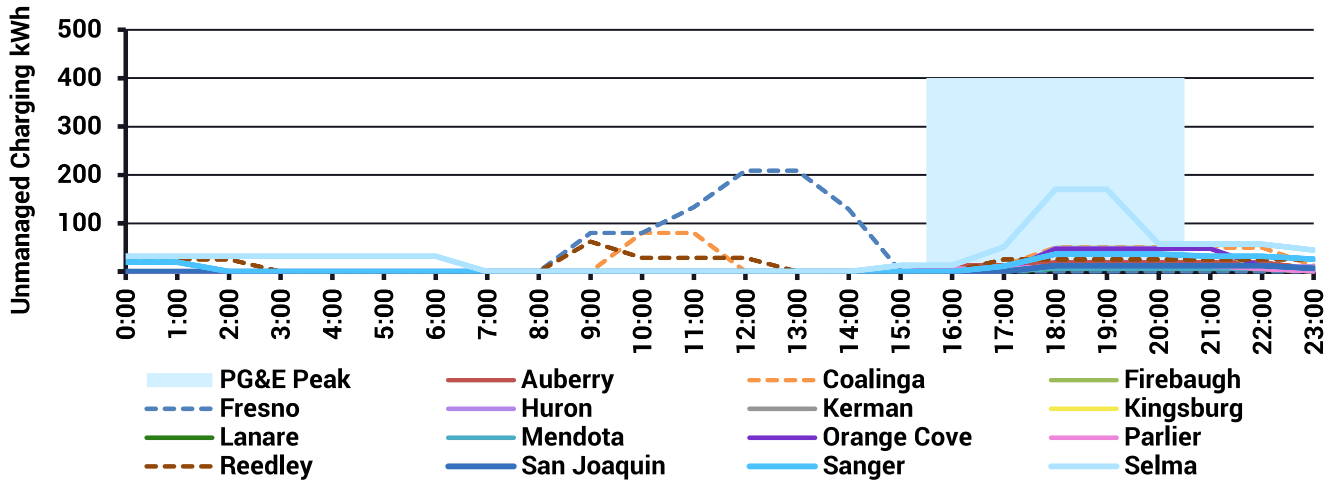
Figure 12 PG&E BEV-2 Electricity Rate by Hour



Source: PG&E

The figure below shows the estimated unmanaged charging demand by location throughout the operational day. Most vehicle charging occurs from 5:00 pm to 1:00 am, overlapping significantly with the utility peak period. There is also a mid-day peak, due to layover charging. Aside from Selma, which requires approximately 80 kWs of grid peak capacity, most non-layover sites require around 50 kWs of grid peak capacity. Depot connection capacity required varies widely, depending on the location.

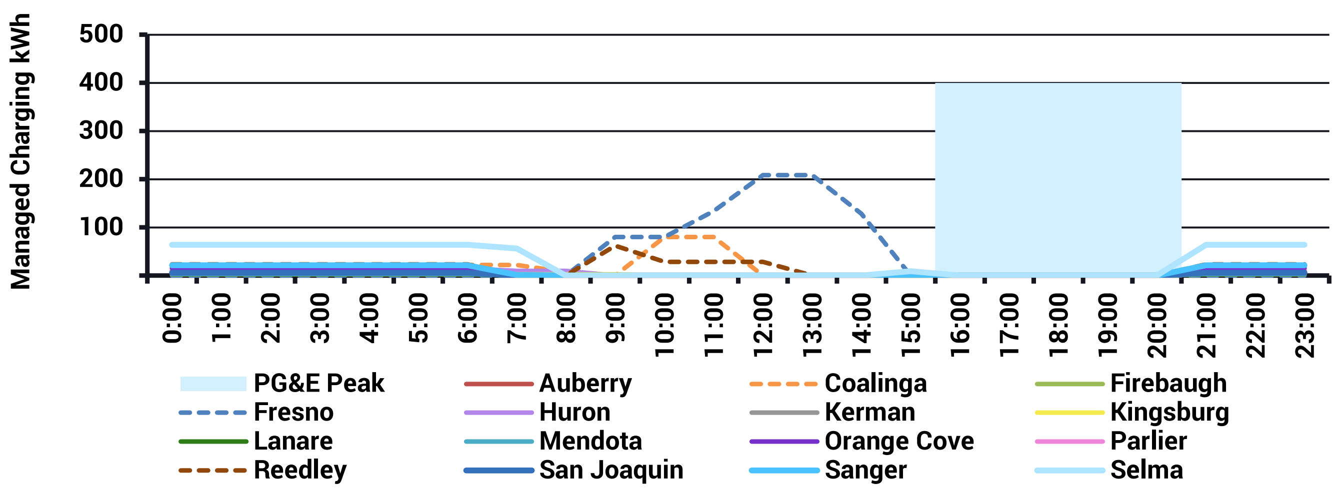
Figure 13 Hourly Unmanaged Vehicle Charging Demand by Location



Note: The dashed lines reflect depots or locations that support layover charging.

Figure 14 below shows the results for managed charging demand by location. Since managed charging avoids peak period charging, no charging occurs from 4:00 pm to 8:00 pm, reducing grid peak capacity needs to zero. Managed charging enables the depots to charge for longer and hence requires less energy per hour on average. Required interconnection capacity decreases marginally as a result.

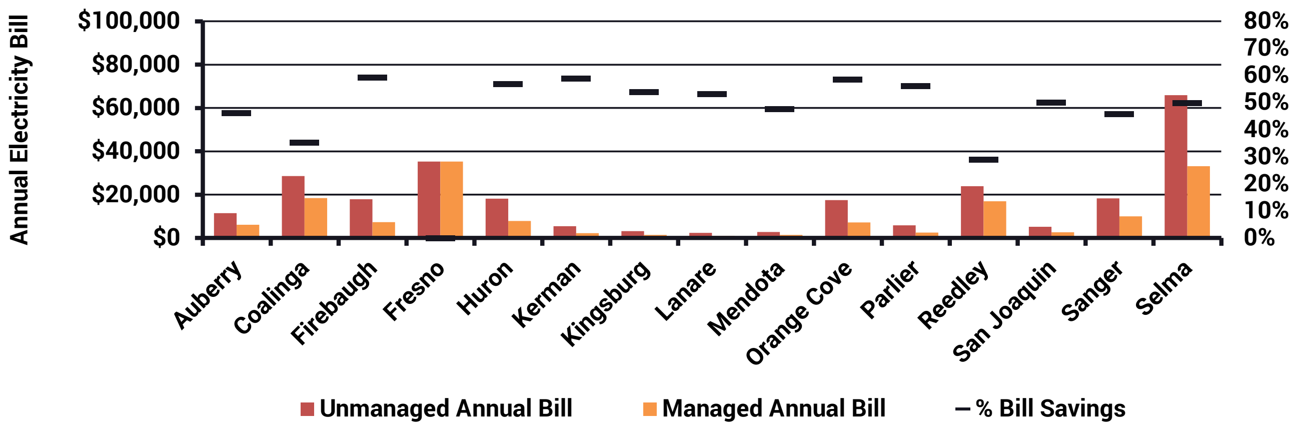
Figure 14 Hourly Managed Vehicle Charging Demand by Location



Note: The dashed lines reflect depots or location that support layover charging.

As shown above, managed charging reduces the unmanaged charge peak demand from up to 80 kW per location to 0 kWh total consumed during the peak time, distributing the charging demand evenly. This reduction to peak period consumption has major implications for bills, as shown in the figure below, for every location except Fresno. The Fresno site will not include overnight charging and only allows time-constrained layover charging, so it does not benefit from managed charging. On average, sites save approximately 40% on energy bills by deploying managed charging strategies.

Figure 15 Annual Charging Bills in 2030 by Site



Fleet Vehicle Charging Site Public Access Considerations

As part of the charging demand analysis, the project team reviewed current and anticipated public charging needs across Fresno County. Transit fleet operations require controlled access policies to maintain vehicle availability, safety, and service reliability. Public use of fleet-dedicated chargers could introduce scheduling conflicts, increased infrastructure wear, liability considerations, and operational security concerns that may compromise uninterrupted transit service.

It is important to note that FCRTA owns limited land assets, as the Selma Maintenance Facility is the only owned site hosting charging infrastructure. Many other locations are not structured to support public access. Regional public charging needs are being addressed through complementary efforts, including the FCOG Mobility Hubs Feasibility study, prior EV charging planning initiatives, and future microgrid feasibility work. These efforts may create opportunities for partnerships with public agencies and private entities to expand public charging access countywide while maintaining transit fleet-dedicated infrastructure.

While FCRTA's chargers may remain dedicated to fleet operations in the near term, the managed vehicle charging demand profiles developed in this plan may inform potential shared-use strategies in the future, should site control, operational safeguards, and partnership structures make public access feasible.

Electricity Grid Integration Assessment

Grid Integration Assessment Methodology

The project team assessed distribution feeder headroom capacity for the initial (2025) and target electrification year (2030) using the PG&E Grid Needs Assessment (GNA) forecast peak demand, and the GNA provided forecast feeder nameplate capacity. This data provided a comparison of expected grid capacity under PG&E's load growth assumptions.

The team then collaborated with PG&E to conduct a grid headroom capacity analysis that included expected depot charging impacts from the depot charging solutions specified in the previous sections. The team provided PG&E with forecasted EV charger configurations per depot, including the maximum charging power per charger and the charger count per type. PG&E evaluated the current distribution feeders and substations to determine their capacity to support the maximum charging demand per depot. PG&E also assessed whether feeder load switching could be undertaken to accommodate the additional load where constraints were identified.

Grid Integration Assessment Inputs and Assumptions

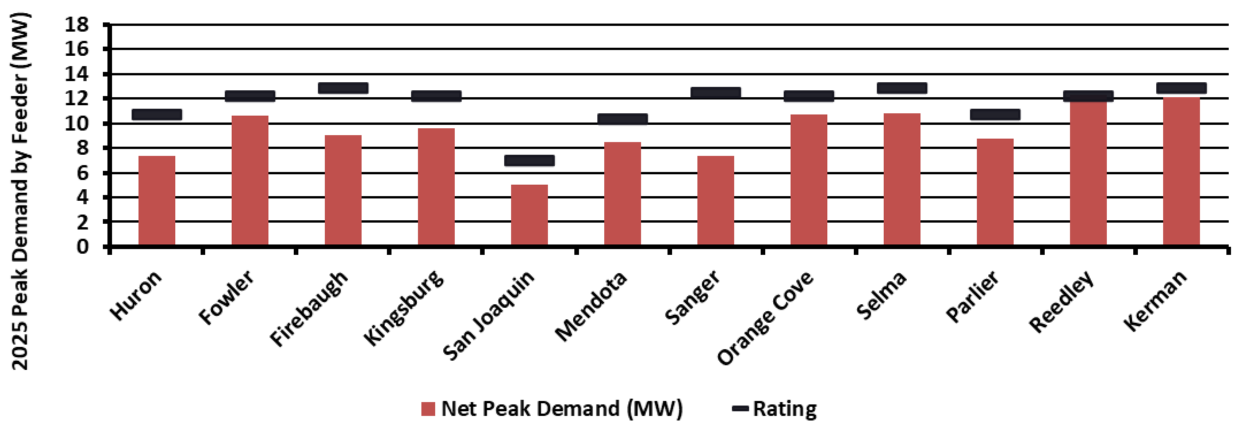
For the existing grid capacity assessment, the team used PG&E's 2025 GNA data to capture peak demand and nameplate rating per distribution feeder. Headroom was calculated as the gap between nameplate rating and feeder peak demand. The team analyzed and visualized asset headroom for 2025 and 2030.

For PG&E's grid capacity analysis including fleet charging impacts, depot charging demand was assumed to be the sum of all the chargers' max power, representing a scenario where all installed chargers were maximally discharging at the same time as the distribution asset peak demand. It is important to note that the analysis does not assume any managed charging benefits, such as off-peak energy shifting or other charging orchestration strategies.

Distribution System Capacity Analysis Results

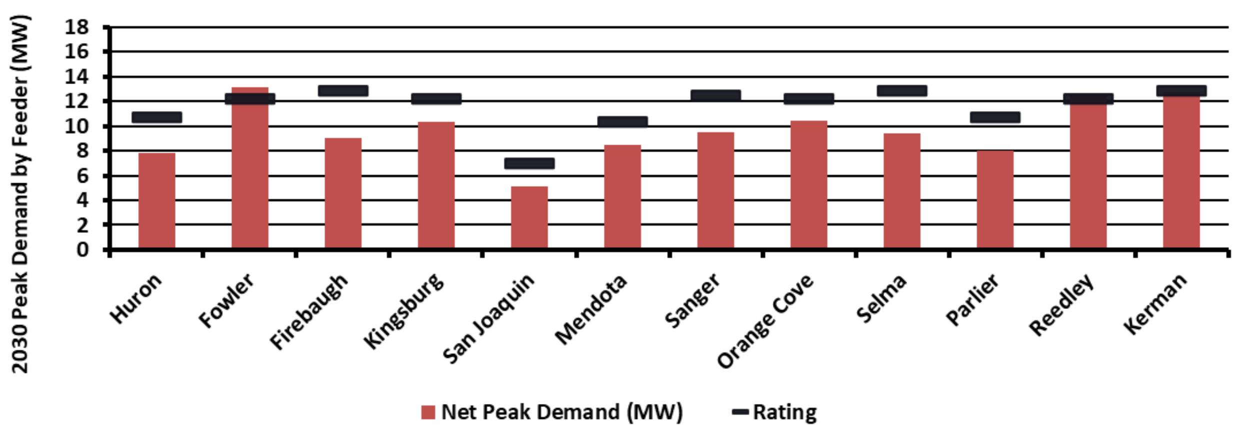
The figures below show the 2025 and forecasted 2030 capacity for depots and the net peak demand before including the fleet charging additional loads, respectively.

Figure 16 2025 Net Peak Demand by Depot



The 2030 analysis shows that Reedley, Fowler, and Kerman may need additional capacity to accommodate for net peak demand in 2030.

Figure 17 2030 Net Peak Demand by Depot



The maps below show the distribution spare capacity in 2025 and 2030 respectively, mapped in Fresno County by feeder before PG&E's grid capacity analysis to include the additional load.

Figure 18 Current Distribution Spare Capacity without Fleet Electrification

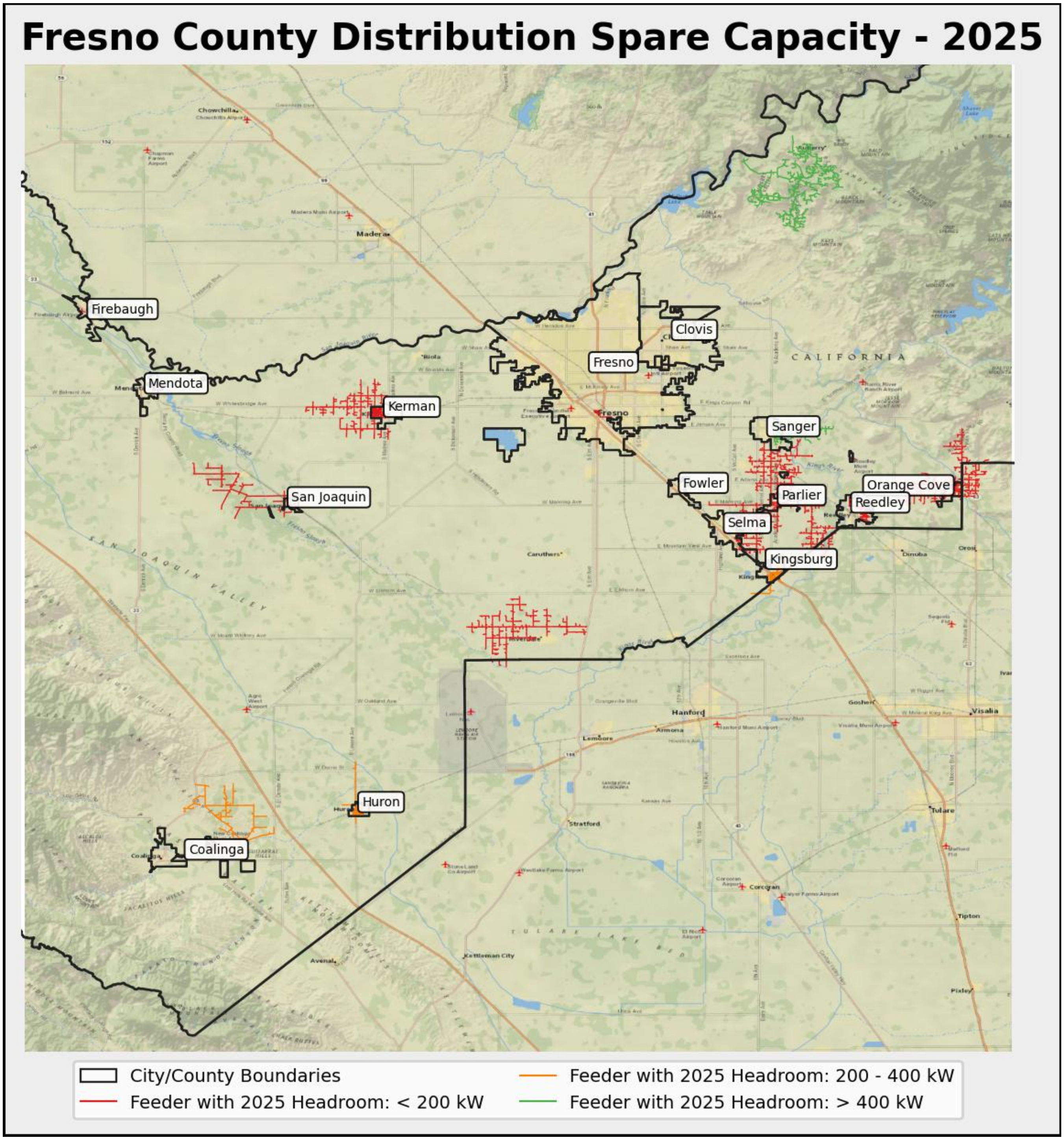
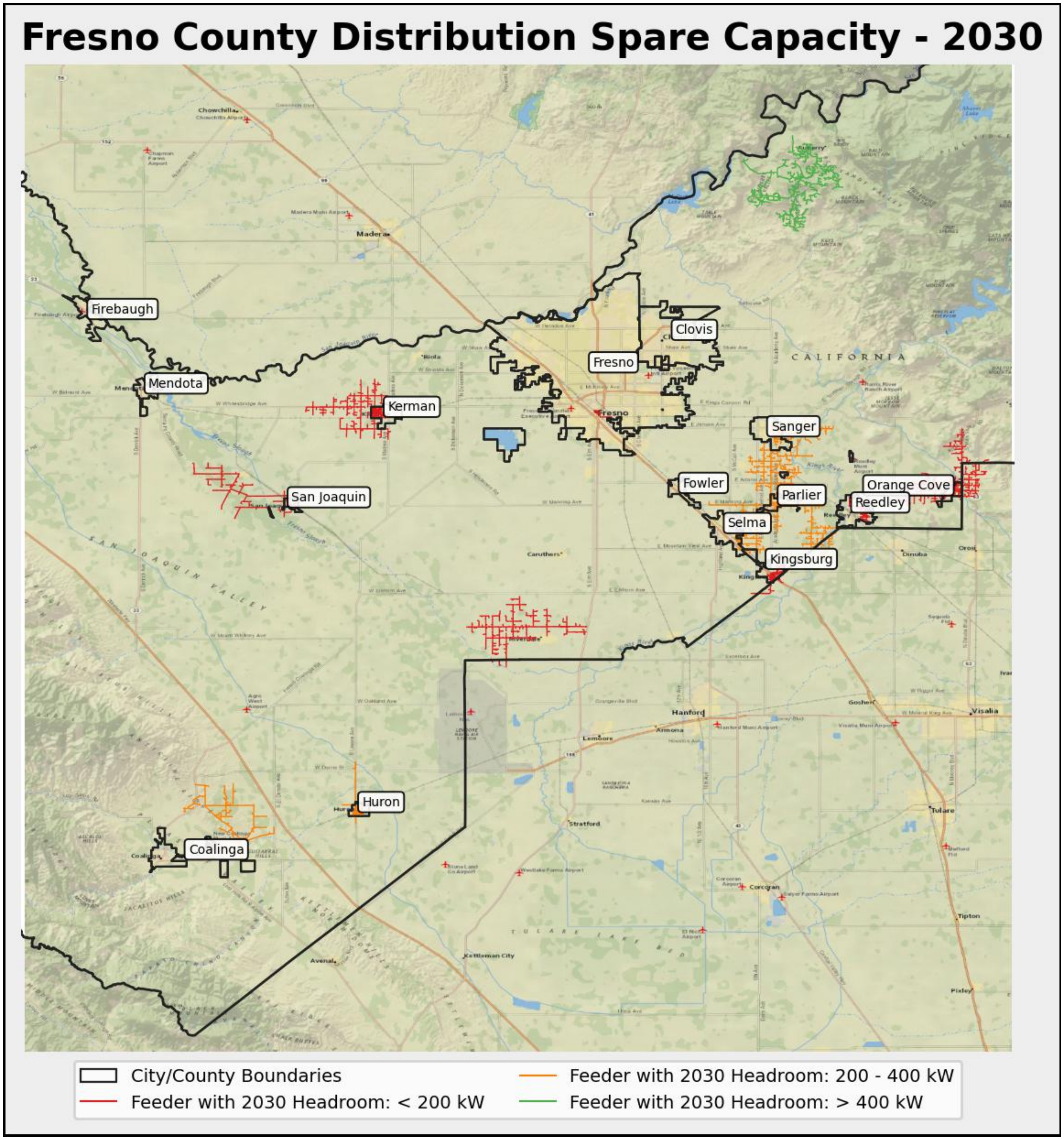


Figure 19 Projected 2030 Distribution Spare Capacity without Fleet Electrification



PG&E used estimated charging peak demand to analyze non-coincident asset capacity of load-serving distribution feeders and substation banks at each respective fleet charging site. The analysis determined that all but two sites have enough grid capacity at all hours of the year to accommodate the additional EV charging load from FCRTA's fleet.

Table 18 below shows the sites that are capacity-constrained after accounting for the additional loads from fleet electrification in 2030, after assuming feasible grid reconfigurations.

All sites with an "Available" capacity status either already have capacity available to accommodate fleet charging or have a PG&E planned expansion that will allow for additional capacity. The sites with "Expansion Needed" capacity status will require additional capacity to accommodate fleet charging and currently do not have any planned expansion by 2030.

The sites that require capacity expansion are in Kerman and Mendota. While this analysis suggests potential constraints on FCRTA's depot electrification, adding managed charging or a behind-the-meter solar-battery energy system could help relieve the constraints. Additional interconnection analyses and engagement with PG&E are recommended at these potential charging sites when FCRTA is ready to invest in capital infrastructure. These results from PG&E's internal asset headroom assessment were treated as a "source of truth" for distribution system capacity.

Table 18 PG&E System Integration Analysis Results

Site	Distribution Feeder(s)	2030 Capacity Status	Constraint
Auberry	Auberry 1102	Available	No
Coalinga	Coalinga No 2 1106	Available	No
Firebaugh	Firebaugh 1101/1102	Available	No
Fresno	California Ave 1104	Available	No
Huron	Huron 1112	Available	No
Kerman	Kerman 1102	Expansion Needed	Yes
Kingsburg	Kingsburg 1102	Available	No
Lanare	Camden 1104	Available	No
Mendota	Mendota 1103	Expansion Needed	Yes
Orange Cove	Reedley 1112	Available	No
Parlier	Parlier 1104	Available	No
Reedley	Wahtoke 1109	Available	No
San Joaquin	San Joaquin 1108	Available	No
Sanger	Mc Call 1107	Available	No
Selma	Mc Call 1107	Available	No

While the grid integration analysis assumes a conservative scenario in which all chargers operate at maximum power concurrently with peak distribution demand, FCRTA has opportunities to reduce actual peak loads through managed charging. Managed charging allows charging power to be staggered, delayed, or modulated based on vehicle schedules, utility conditions, and available electrical capacity while still ensuring vehicles are fully charged for service. This approach is commercially available via an EMS and has been deployed by transit agencies operating electric fleets.

Implementation Plan, Costs, and Funding Opportunities

Charging Site Implementation Prioritization

Prioritizing the deployment of charging sites is critical to ensuring that infrastructure investments align with fleet needs, operational timelines, and available electrical capacity. Fleet electrification will occur incrementally, and charging infrastructure requires coordination with utilities, permitting, and construction, so not all sites can be developed simultaneously. A clear prioritization framework will help FCRTA focus near-term resources on locations where charging is most urgently needed while sequencing future investments in a way that supports reliable service. For this plan, charging sites were prioritized based on the following factors:

1. Sites that will serve electric vehicles currently in service,
2. Sites that will serve electric vehicles for near-term future deployment,
3. Sites that may integrate with planned developments, such as mobility or resilience hubs, and
4. Relative size of each site's charging infrastructure needs.

Sites with existing electric vehicles were prioritized to support current operations, followed by sites with planned fleet expansions that will require new charging capacity in the near term, or sites that may integrate with development, such as mobility hubs. Among these, sites with the largest infrastructure requirements are prioritized to account for more significant capital costs, longer utility coordination timelines, and more complex construction needs. The following table shows the site prioritization plan, including notes on site context and justification. Selma is not included in the prioritization as the Maintenance Facility does not require incremental charging infrastructure to serve the fleet.

The prioritization below reflects current conditions with respect to the following:

- Fleet EV stock and near-term procurement
- Grid capacity and infrastructure
- Funding opportunities
- Potential integration with parallel developments

However, conditions will change from 2025 until 2030 and beyond. FCRTA should take an opportunistic approach to site infrastructure development, using the recommended factors above as a guide to dynamically prioritize fleet charging site deployment.

Table 19 Fleet Charging Site Prioritization

Prioritization	Site	Context and Justification
1	Reedley	• High charging demand tied to Sanger to Reedley College Transit layover charging and ridership • Potential support for deployment of current BYD K7MER buses • One of the largest non-Selma charging sites • May require early utility coordination to support future capacity
2	Fresno	• Supports key fixed-route and demand-response services such as mid-day layover charging • Largest charging demand site in nameplate power output terms, including high power inductive chargers • Estimated grid capacity may allow near-term deployment • Current funding opportunities may reduce upfront capital costs
3	Coalinga	• High-mileage fixed route service requires larger, higher power output charging infrastructure • Coalinga distribution system has been historically highly constrained • Site will also support key demand-response services
4	San Joaquin	• Candidate location for future mobility or resiliency hub deployment • Supports planned microtransit and demand-response expansion, microtransit hub for nearby unincorporated communities • Opportunity to pair charging with resilience-focused infrastructure • Strategic location to support emergency response, community services, and critical infrastructure
5	Parlier	• Candidate location for future mobility or resiliency hub deployment • Supports planned microtransit and demand-response expansion • Moderate incremental charging infrastructure requirements under Phase 2 and Phase 3 scenarios
6	Orange Cove	• Orange Cove services and future VMT drive higher charging demand, including DCFC infrastructure • Grid constraints are not forecast to limit deployment
7	Huron	• Forecast charging infrastructures includes high-power output DCFC supply equipment, and higher capital costs • Sufficient grid capacity to support charger integration
8	Sanger	• Early charging infrastructure deployment will reduce deadhead miles and costs associated with charging vehicles at Selma • Site will require additional vehicle switchouts to provide service, which may involve more complex infrastructure
9	Firebaugh	• Forecast charging infrastructures includes high-power output DCFC supply equipment, and higher capital costs • Sufficient grid capacity to support near-term charger integration
10	Auberry	• Site will require additional vehicle switchouts to provide service, which may involve more complex infrastructure • Grid constraints are not forecast to limit deployment
11	Kerman	• Identified as capacity constrained in grid analysis • Planned fleet growth under future microtransit service phases

12	Mendota	• Grid capacity constrained by 2030 • Early upgrades reduce future implementation delays
13	Kingsburg	• Relatively limited charging demand from future electrification • Sufficient grid capacity to support charger integration
13	Lanare	• Lanare microtransit service not yet deployed • Smaller future service area does not drive high charging demand

Planning-Level Infrastructure Capital Cost Estimates

The transition to a fully zero-emission fleet will require coordinated investment in charging infrastructure, electrical upgrades, and additional infrastructure across FCRTA's operating sites. To support long-term planning and funding opportunities, the project team developed planning-level capital cost estimates for each prospective site, informed by vendor equipment quotes, site assessments, expected site configurations, and typical utility service upgrade requirements and costs. These estimates reflect the infrastructure necessary to meet projected charging demand under future fleet scenarios, incorporating the full range of components required to support reliable operations. Cost estimates are organized by site and by the following major cost categories, and are planning-level estimates based on industry data and FCRTA's costs for existing infrastructure:

1. **Charging Equipment:** This includes charging dispensers, pedestals or mounts, integrated cable management systems, networking hardware, installation and commissioning costs, and a 10-year software license.
2. **Conduit & Trenching:** This includes civil engineering and underground installation of conduit, pavement or concrete restoration, and installment of conduit access points.
3. **Switchgear & Electrical Services[4]:** This includes above-ground electrical equipment and installation such as service panels, switchboards, transformers, protective devices, metering equipment and other infrastructure required to serve the chargers.
4. **Site Infrastructure:** This includes non-electrical physical improvements and modifications such as concrete pads and foundations, curb modifications, bollards, striping and signage, lighting, fencing, drainage improvements, site grading, and pavement work.

While the cost estimates in the table below are not intended to represent final design or procurement-level pricing, they provide a consistent basis for evaluating funding needs, prioritizing investments, and aligning infrastructure development with the charging deployment plan outlined in this report. FCRTA is exploring additional microgrid infrastructure in addition to solely EV chargers, to provide energy resilience and reduce energy costs. The cost estimates in this plan do not include additional microgrid infrastructure costs.

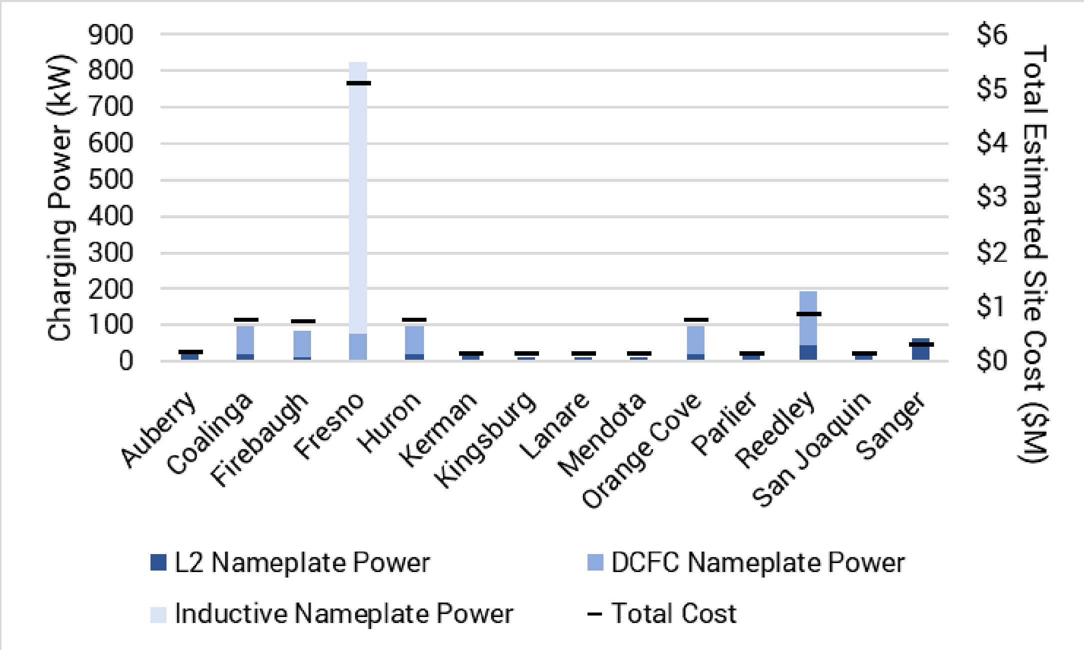
[4] All sites are assumed to require establishment of a new electrical service; actual electrical costs will be finalized in conjunction with PG&E service design and may vary based on transformer availability, service routing, and upstream capacity.

Table 20 Charging Infrastructure Capital Cost Estimates by Site

Site	Charging Equipment	Conduit & Trenching	Switchgear & Electrical Services	Site Infrastructure	Total Cost Range
Reedley	$180–$220,000	$200–$240,000	$275–$300,000	$120–$160,000	**$775–$920,000**
Fresno	$2.6–$3.0M	$200–$300,000	$575–$750,000	$1.3–$1.6M	**$4.7–$5.6M**
Coalinga	$150–$190,000	$170–$230,000	$100–$150,000	$240–$300,000	**$660–$870,000**
San Joaquin	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Parlier	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Orange Cove	$150–$190,000	$170–$230,000	$100–$150,000	$240–$300,000	**$660–$870,000**
Huron	$150–$190,000	$170–$230,000	$100–$150,000	$240–$300,000	**$660–$870,000**
Sanger	$55–$80,000	$65–$95,000	$40–$65,000	$90–$125,000	**$250–$365,000**
Firebaugh	$145–$185,000	$160–$220,000	$95–$145,000	$225–$290,000	**$625–$840,000**
Auberry	$30–$45,000	$30–$50,000	$35–$60,000	$45–$70,000	**$140–$225,000**
Kerman	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Mendota	$25–$40,000	$30–$55,000	$35–$65,000	$30–$55,000	**$140–$215,000**
Kingsburg	$20–$35,000	$30–$55,000	$35–$65,000	$30–$55,000	**$135–$210,000**
Lanare	$20–$35,000	$30–$55,000	$35–$65,000	$30–$55,000	**$135–$210,000**

While each site's unique infrastructure and constraints drive costs, a key driver of infrastructure deployment cost is charging power. Figure 20 below shows the cost impacts of introducing inductive charging at the Fresno charging site, and the relative cost of deploying DCFC infrastructure throughout the County. While relatively costly, this type of infrastructure may be essential to delivering high-power charging to vehicles so they can continuously operate high mileage routes, especially during short, mid-day layovers. The following section describes potential infrastructure funding opportunities that may offset the capital costs associated with this new charging infrastructure.

Figure 20 Infrastructure Cost Driver: Charging Infrastructure Nameplate Power



Electric Vehicle and Infrastructure Funding Sources

A strategic combination of federal, state, and utility funding sources will support vehicle procurement, charging station deployment, and the electrical upgrades needed across multiple rural operating sites. Several major programs and funding opportunities remain well-suited to assist agencies serving large geographic areas with long travel distances and dispersed services and routes. These funding pathways may reduce upfront capital costs and help agencies implement resilient charging solutions that align with CARB’s zero-emission transportation goals and programs.

One of the most notable opportunities potentially available to FCRTA is PG&E’s Fleet Ready program, which may cover the make-ready electrical infrastructure required for medium and heavy-duty EV charging. This includes the design, construction, and installation of customer-side infrastructure, which can offset a substantial portion of the cost of bringing new charging capacity online. Complementary statewide programs such as CARB’s HVIP voucher incentives and the California Energy Commission’s EnergIIZE Commercial Vehicles program also provide potential financial support for zero-emission vehicle purchases and charging equipment.

Measure C is Fresno County’s voter-approved half-cent transportation sales tax, administered by the Fresno County Transportation Authority, that has funded roads, transit, and new technology since 1986—and, with the 2007–2027 extension, it continues to generate the local dollars agencies use to match state and federal grants.

Measure C revenue is a crucial component of FCRTA's budget, as it has financed zero-emission vehicles, infrastructure, and day-to-day transit operations. Measure C is critical for FCRTA to remain competitive in state and federal grant programs that typically require a local match. The Measure C extension (beyond 2027) will be voted on in the November 2026 elections.

Appendix B highlights the key programs most relevant to FCRTA's electrification strategy, including a matrix of available funding sources, eligibility considerations, and project categories. Additional programs providing incentives and rebates for behind-the-meter solar PV and battery energy storage systems are available at the utility, state, and federal levels. These programs are not included within the scope of this planning process.

Energy Management System Plan

FCRTA continues to take decisive steps toward achieving its long-term vision of a fully electrified, reliable, and resilient transit system. This report builds on the foundational findings of previous work and extends the analytical framework to include energy management optimization, intelligent control, and long-term operational planning for FCRTA's charging infrastructure.

An Energy Management System is software that monitors, reports, controls, and manages energy system operations to minimize bills and potentially provide power backup. It enables jurisdictional and location specific services and information and can be leveraged to support additional locations and associated energy systems, such as other buildings with solar PV and battery energy storage.

The Energy Management System will serve as a central operational tool supporting fleet charging, energy cost management, and system resilience. Dispatch and maintenance staff can use the system to monitor vehicle charging status, charger availability, and real-time energy use, while management staff can use aggregated data to track performance, costs, and long-term trends. Over time, the EMS will support decision-making related to charging infrastructure expansion, fleet deployment, and integration of additional solar and battery resources. Establishing clear internal ownership and operational protocols for the EMS will be critical to ensure that the system supports both daily operations and long-term planning objectives. This report reviews best practices in transit energy management and identifies the most appropriate EMS solution specification for FCRTA's unique operating context in Fresno County.

Purpose, Goals, and Value Drivers

The EMS forms part of the foundation of FCRTA's electrification and resilience strategy. The EMS is envisioned as a centralized digital platform that integrates fleet, solar, battery, and charger data into one cohesive management environment.

The key energy-related challenges of rural transit electrification include, but are not limited to:

1. Frequent outages
2. The need to monitor dynamic energy needs, energy storage, and maintenance requirements while ensuring reliable transit service to community
3. Limited resources to manage a growing energy system, resources, and assets

To meet these challenges, the following EMS system deployment objectives were developed:

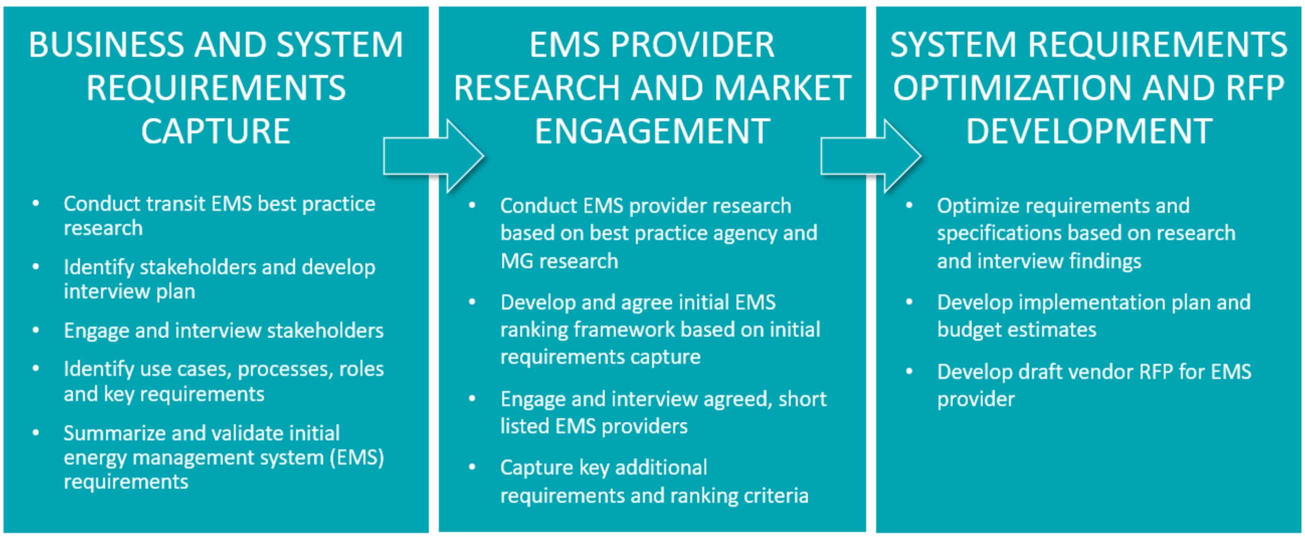
1. Safeguard the affordability, reliability, and resiliency of FCRTA's transit system
2. Identify best practice, fit-for-purpose EMS functionality and service levels
3. Provide an integrated solution to seamlessly manage FCRTA's sites, energy resources, assets, and use cases
4. Identify opportunities to leverage investment for the betterment of the community

Achieving these objectives will unlock the following opportunities for FCRTA:

1. Minimizing FCRTA operating costs due to energy, operations and maintenance
2. Minimizing FCRTA personnel impacts, incl. management and operations
3. Monetizing excess energy and capacity with PG&E, CAISO, and others
4. Maximizing community leverage via low-cost charging, resiliency hubs, etc.

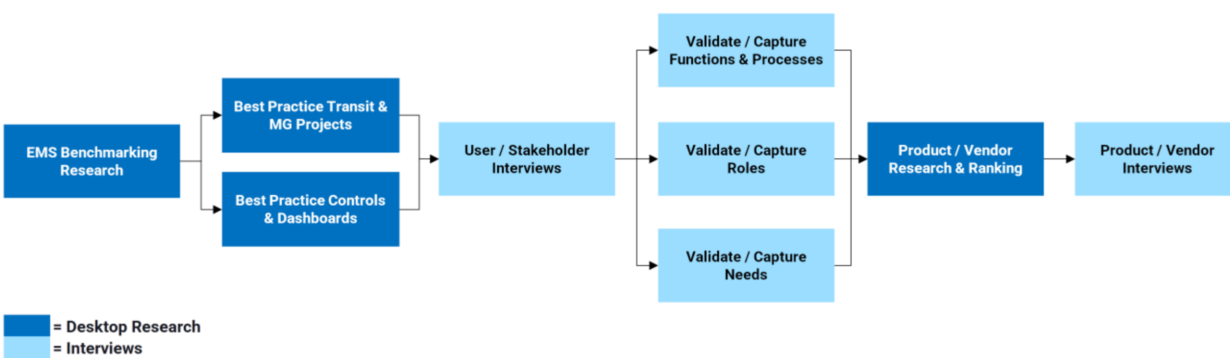
To identify business and system requirements and find the optimal system and provider fit for FCRTA, the team developed the following EMS development plan, shown below in Figure 21.

Figure 21 EMS Requirements Development Plan



The team's systematic approach to determining the best practice, fit-for-purpose EMS specification is shown in Figure 22.

Figure 22 EMS Research Plan Overview



Stakeholder Engagement

Summary of Key Stakeholders and EMS Users

To identify the EMS software requirements and feedback of users and stakeholders, the stakeholders listed in the table below were engaged for interviews. These stakeholders represented local transit providers, city planners, transit service providers, environmental groups, and unincorporated communities in Fresno. In addition, throughout the project, the team engaged the Advisory Committee to understand EMS use cases, business requirements, data visualization preferences, and other key inputs to the technical specification.

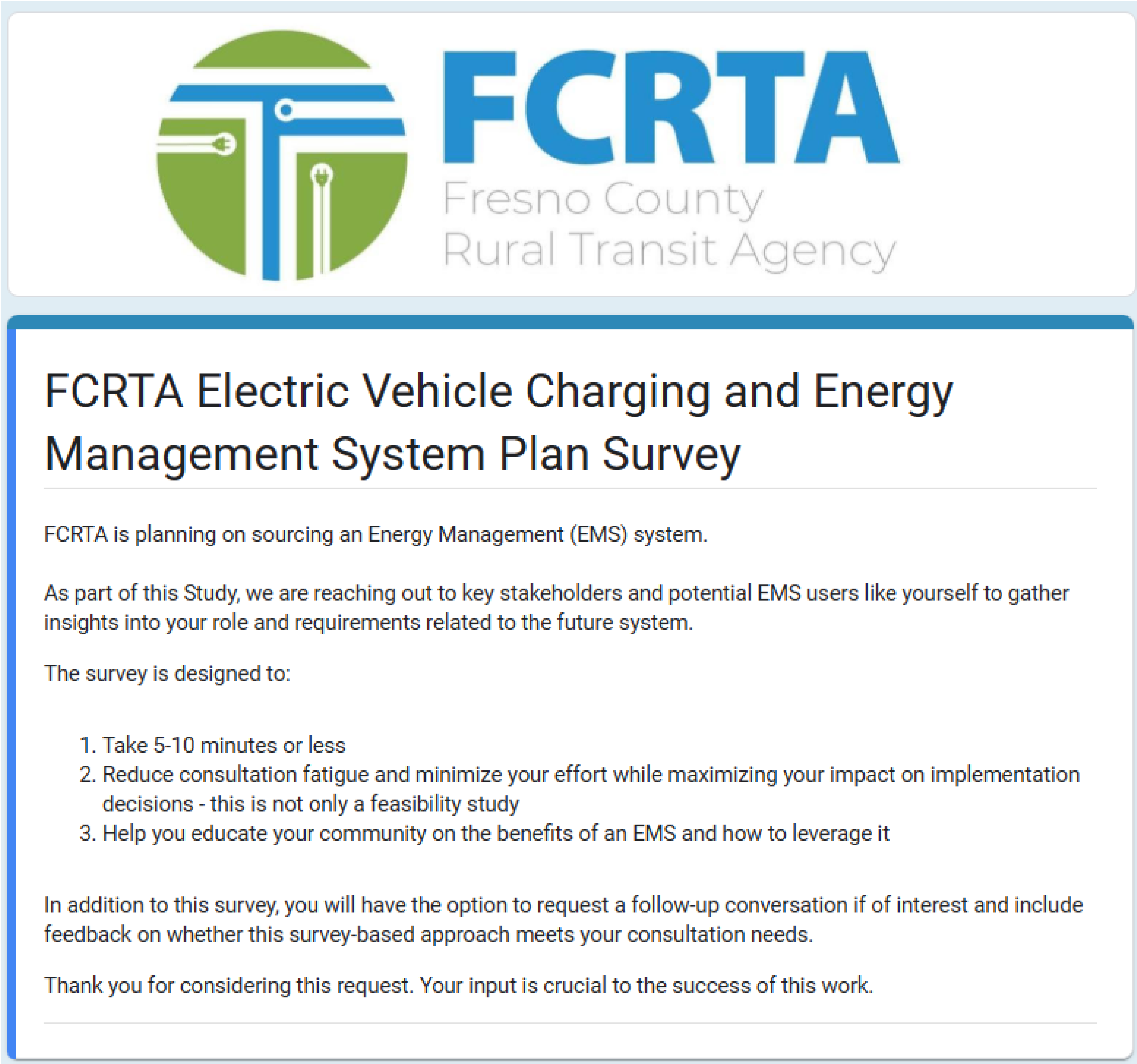
Table 21 EMS Specification Stakeholders

Category	Organization
Local Transit Providers	Clovis / FAX
City Planners / Administrators	Parlier, Huron, Orange Cove, SJ
Transit Service / Maintenance Providers	City of Selma Maintenance Dept.
Environmental Stakeholders	SJ Air District, CARB, CEC
Unincorporated Communities	CRLA, Leadership Counsel

Summary of Outreach Activities

The EMS stakeholder outreach strategy included an online survey to maximize stakeholder input and accessibility. Figure 23 below shows the online survey that was shared with the Advisory Committee and Table 22 shows the questions included in the survey. The team reviewed and considered survey responses when establishing the key requirements for an EMS tailored to FCRTA's needs, especially stakeholder use cases, goals, and needs.

Figure 23 Online Stakeholder EMS Survey Landing Page



FCRTA
Fresno County
Rural Transit Agency

FCRTA Electric Vehicle Charging and Energy Management System Plan Survey

FCRTA is planning on sourcing an Energy Management (EMS) system.

As part of this Study, we are reaching out to key stakeholders and potential EMS users like yourself to gather insights into your role and requirements related to the future system.

The survey is designed to:

1. Take 5-10 minutes or less
2. Reduce consultation fatigue and minimize your effort while maximizing your impact on implementation decisions - this is not only a feasibility study
3. Help you educate your community on the benefits of an EMS and how to leverage it

In addition to this survey, you will have the option to request a follow-up conversation if of interest and include feedback on whether this survey-based approach meets your consultation needs.

Thank you for considering this request. Your input is crucial to the success of this work.

Table 22 Stakeholder EMS Survey Questions

What do EMS users / stakeholders need from the EMS?
What is the interviewee's relevant role and background?
What is your role in the transit system in Fresno County?
How do you currently engage with FCRTA's transport service or infrastructure like vehicles, chargers, solar PV, or battery storage systems?
What information is essential for your role in the transit system and engaging with FCRTA, specifically? (e.g. operational, asset, costs, emissions, etc.)
What is the level of stakeholder's experience with an EMS or dashboard and understanding of their potential uses and benefits?
Do you know what an Energy Management System (EMS) is?

What do EMS users / stakeholders need from the EMS?
Have you used any EMS software in the past?
If so, what product did you use, what energy resources did the EMS manage, and in what industry?
What did you like and dislike about it?
Have you used any other data or operations dashboards before? What did you like and dislike?
What did you like and dislike about it?
What are stakeholder's key 'use cases', and associated goals and priorities?
What are your top 3 uses for FCRTA's planned EMS/Dashboard?
Understanding the Status of Transport or Energy System Operations
Asset Management of Vehicles, Depots, Chargers, or Energy Resources (e.g. batteries or solar PV systems)
Educating My Stakeholders and/or Myself (Emissions, Renewables, Community Charging, etc.)
Managing Major Event (e.g. Outages, Earthquakes, etc.)
Financial Management and Cost Control (e.g. Energy Costs)
Other?
What are your top 3 goals, priorities, or key requirements from implementation of FCRTA's EMS/Dashboards?
Ability to Tailor Dashboards?
Ability to Access Data Directly, e.g. via CSV, XML, or an API, to Add to your Own Visualization and Analysis Tools?
Availability of Different Access Platforms, e.g. Web, App, etc.?
Timeliness, Granularity and/or Frequency of Data?
Data Security and/or Privacy Arrangements?
Training and Support of Stakeholder's to Maximize their Benefits from the EMS/Dashboards?
Other?
How might the interact with FCRTA's EMS/dashboards and what will you need from it?
How do you expect to engage with the new EMS/dashboards on a day-to-day basis?
Do you have a preferred way/format of data shared with you by the EMS/dashboards?
How do you intend to utilize the data provided by the EMS/dashboard software?
Are there other aspects of the EMS/dashboards you'd like to leverage in your day-to-day?
What do you see as key opportunities and/or expectations regarding the EMS reducing your workload?
What training and support needs do stakeholders have?
How much time could you dedicate to training with the EMS, provided by the vendor?
What is your preferred training format? In-Person, Virtual Live, Virtual Asynchronous?
What else should we be considering?
Do you have any other ideas, questions, or concerns regarding the EMS plan?

EMS Market Engagement Summary

To identify best practice EMS functions and features and shortlist top vendors for engagement and validation, the team developed an EMS benchmarking methodology. This methodology:

1. Identified transit agencies that can provide the most relevant EMS benchmarks
2. Identified key functional categories, based on research
3. Reviewed a range of features reported by vendors
4. Developed a short list of key features by category
5. Scored each vendor based on weighted features

In the first phase of the research plan, the Walker team conducted transit EMS benchmarking research. The team identified leading states with 100% Zero Emission Vehicle mandates and transit agencies striving to exceed their state targets to find potential best practice examples. The research showed that the most aggressive ZEV targets come from urban agencies with large fleets in these leading states.

We then developed case studies for these or other leading electrifying transit agencies who have deployed:

- EV chargers
- Solar PV
- Backup battery storage
- EMS to orchestrate resources

The initial research results are summarized in Table 23 below. Antelope Valley Transit Authority was the most impressive in its target. The project team developed case studies for three additional transit agencies: Montgomery County Transit, Santa Clara VTA, and Vineyard Transit Authority. More information on the case studies can be found in Appendix D.

Table 23 Leading Transit Agencies with Aggressive ZEV Transition Targets

State	Transit Agency	Current Status (Target Year)	Urban/Rural	Number of Vehicles	Number of Depots
CA	Antelope Valley Transit Authority	Fully Operational (2022)	Both	102	13
CA	Fresno County Rural Transit Agency	Design and Development (2030)	Rural	80	13
CA	San Mateo SamTrans	Pilot (2034)	Urban	315	3
WA	King County Metro	Implementation Stage (2035)	Urban	1,404	6
CA	San Francisco Metro Transit Agency	Procurement and Testing (2035)	Urban	847	20
CA	Los Angeles Metro	Implementation Stage (2035)	Urban	1,888	101
OR	Portland TriMet	Implementation Stage (2040)	Urban	696	3
IL	Chicago Transit Authority	Implementation Stage (2040)	Urban	1,868	2
MD	MDOT Maryland Transit Authority	Procurement and Testing (2045)	Both	400	5

Best Practices in Data Visualizations and Dashboards

The team researched best practices in data dashboards to identify optimal metrics and visualizations and for FCRTA's EMS. Sources investigated include Harvard University, University of California, Berkeley, Duke

University, and Tableau. The objective of this exercise was to understand dashboard and data visualization best practices ahead of stakeholder engagement processes. The results of this research exercise are shown in the table below.

Table 24 Data Visualization and Dashboards Best Practices

Category	Best Practices (Source)
1. Design Simplicity	Use clear, simple, and familiar designs (Harvard)
	Avoid animations (Harvard)
	Use a solid border for visual distinction (Harvard)
	Utilize simple visual indicators (e.g., avoid 3D effects) (Harvard, Duke)
2. Text and Labeling	Ensure clear text labels for important data points (Harvard)
	Use sans-serif fonts, avoid all caps, and ensure legibility with large font size (UC Berkeley)
	Pass the squint test: data should remain readable even when squinting (Duke)
	Use clear language and avoid acronyms (UC Berkeley)
3. Color and Contrast	**Maintain appropriate color contrast:**
	4.5:1 for text against the background (Harvard)
	3:1 contrast ratio for charts (Harvard)
	Limit color usage:
	Use no more than 6 colors for categorical data (UC Berkeley, Duke)
	For sequential data, use white to highly saturated color scales (UC Berkeley)
	Add other visual indicators beyond just color to represent data (Harvard)
4. Chart and Data Visualization	**Axis and Scaling:**
	Vertical axes should start at 0 (UC Berkeley, Duke)
	Keep consistent scale divisions and intervals (UC Berkeley, Duke)
	Chart Forms:
	Maintain consistent chart styles across a series (Duke)
	Use the full axis and aim for a 45° slope for line charts (Duke)
	Simplify visualizations: avoid clutter and reduce less important detail (Duke)
	Visualize additional calculations for complex relationships (Duke)
5. Dashboard Layout and Flow	Logical layout with sensible flow: Information should be easy to follow (Tableau)
	Surface key information: Most important views, like KPIs, should be prominent (Tableau)
	Utilize white space and grouping: Use lines, shading, and colors to create logical groupings of data (Tableau)
	Keep the dashboard goal-focused: Design around the purpose and make relevant data the centerpiece (Tableau)
6. Interactivity and User Experience	Make elements clickable and interactive, but avoid excessive interactivity (Tableau)
	Limit unnecessary objects: Keep the design clean and avoid clutter (Tableau)

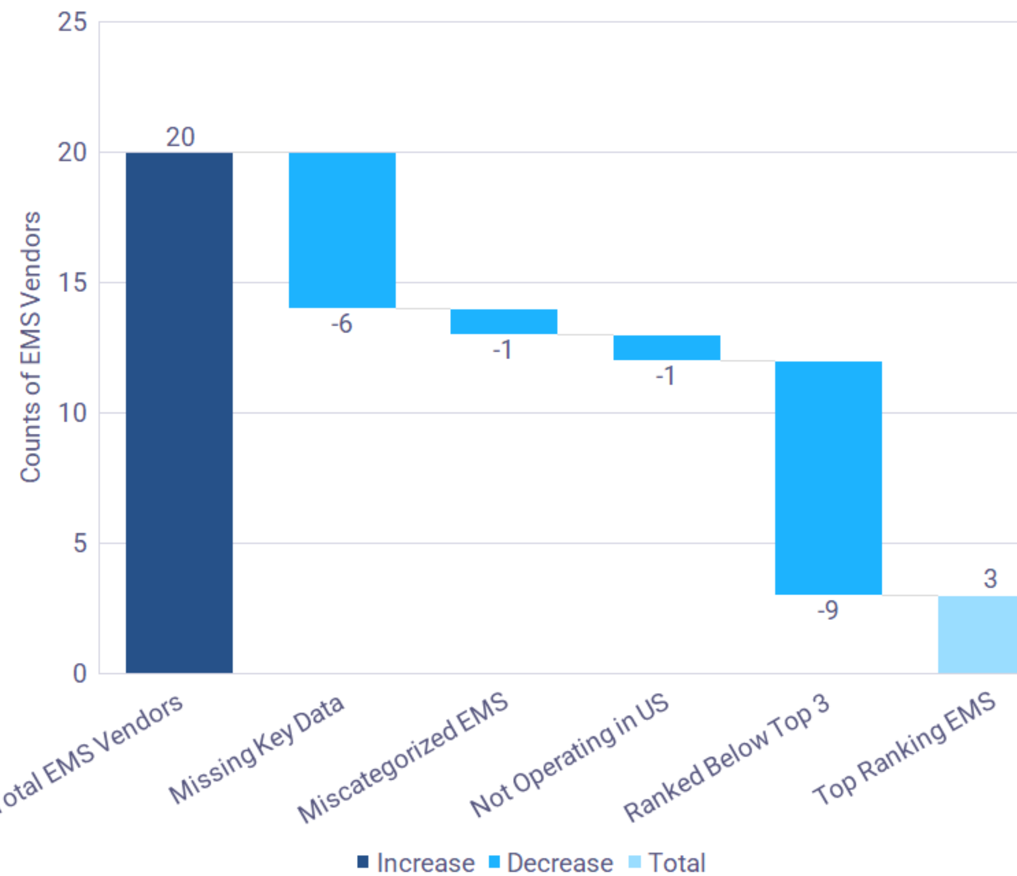
EMS Vendor Benchmarking

Based on the results of the best practice functions and features research, the team researched industry leading EMS vendors in the market, which identified 20 EMS vendors and products for initial stage research and review, 12 EMS vendors for the ranking stage based on the following filters:

- Missing key data and information
- Miscategorized as EMS
- No longer operating in the US

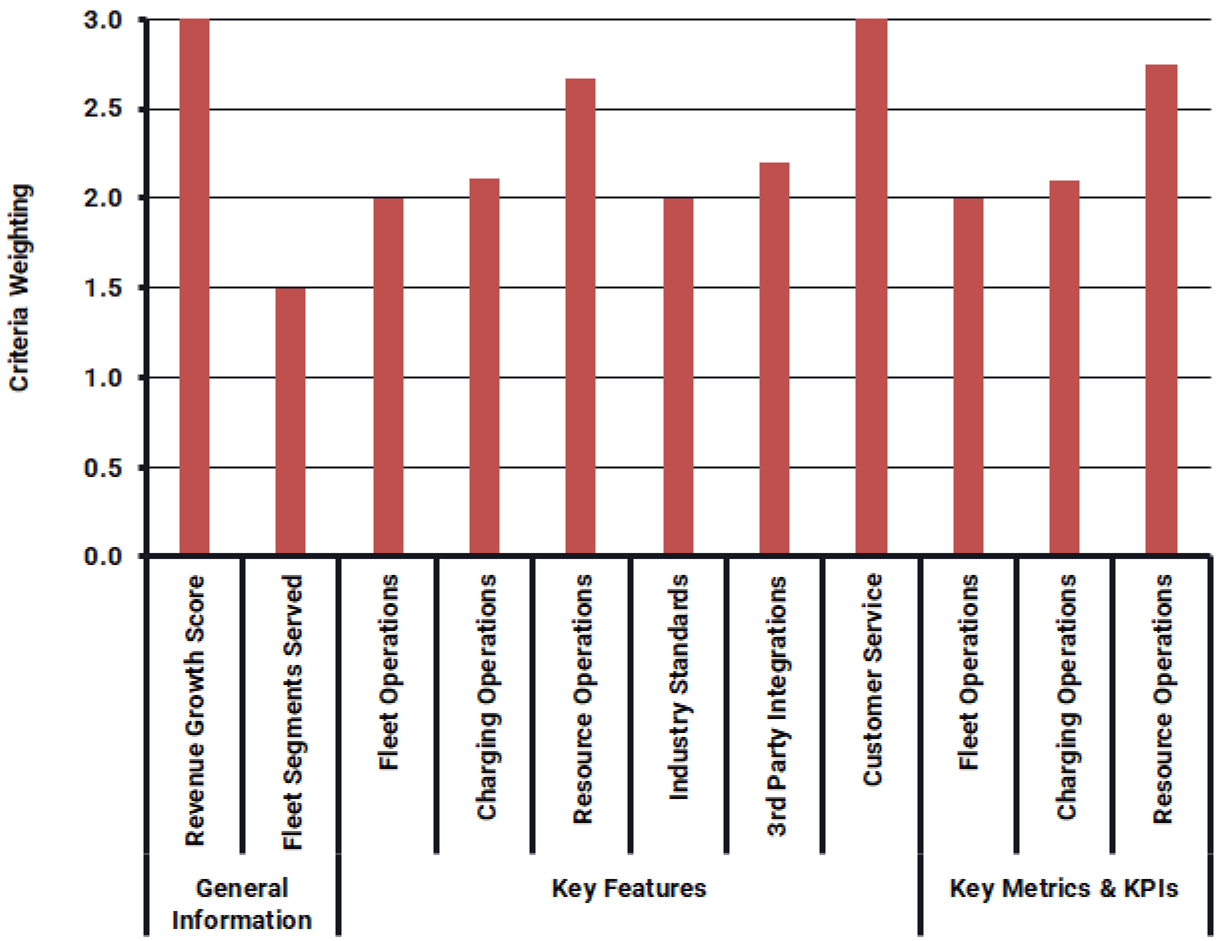
This EMS vendor classification and processing is shown in the graphic below.

Figure 24 EMS Research Processing Outcomes



The team developed draft criteria weights (1-3) by key features to assist in the EMS vendor ranking. The average weight by category is shown in Figure 25. Charging and resource operations, customer service, third party integrations, and indicative financial stability are weighted highest in ranking EMS vendors as shown in Figure 26 below.

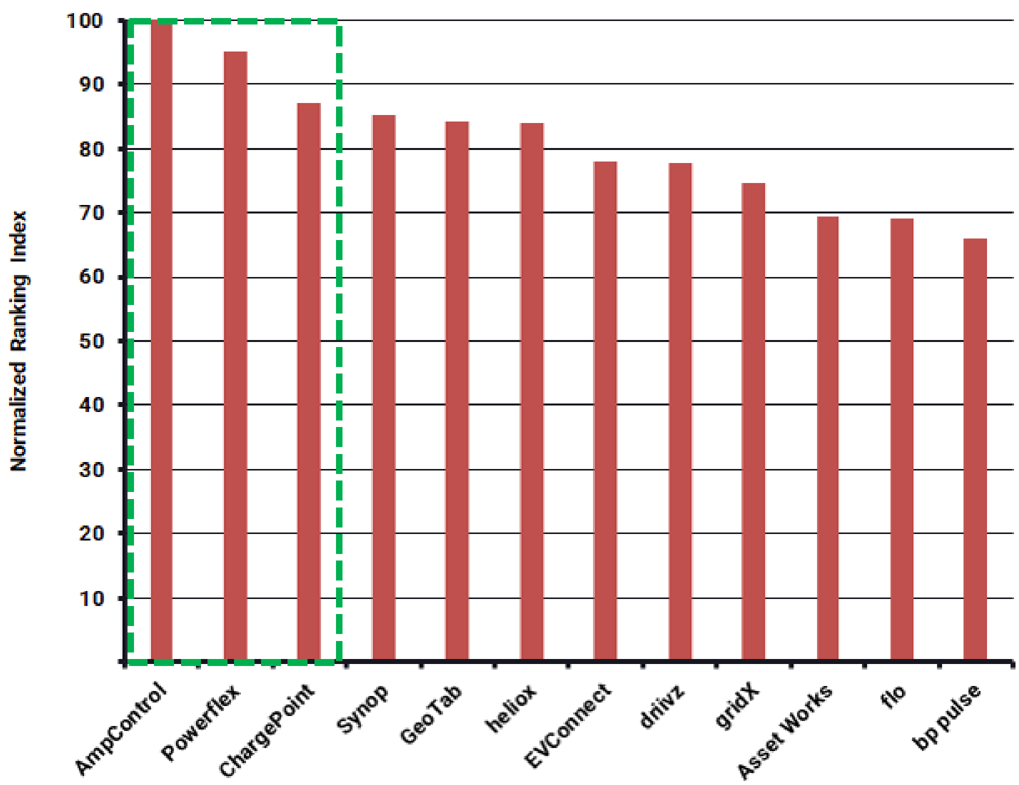
Figure 25 Average Criteria Weight by Category



The figure below shows the ranking and final short listing of the EMS vendors. As shown in the green box, AmpControl, Powerflex, and ChargePoint scored highest based on draft ranking criteria and weighting of desktop research. In addition to these vendors, Intertie was also shortlisted, as Intertie has installed multiple EV chargers and battery energy storage systems in FCRTA's service territory and maintaining streamlined product integration and compatibility was one of FCRTA's key priorities.

The team reached out to these vendors for interviews to understand vendor capabilities, pricing structures, and key pain points when responding to an EMS Request for Proposal (RFP). The team also request software demos to best understand each software's key functionality.

Figure 26 EMS Vendor Interview Ranking



EMS Vendor Interview Summary

Of the four shortlisted vendors, only two remained engaged throughout the data collection process. After multiple follow-up attempts, the team engaged the next top-ranking vendor, Synop, and successfully conducted an interview. The table below summarizes vendor engagement results, with the final interviewees highlighted in the green box.

Table 25 EMS Vendor Engagement Outcomes

Category	Synop	Intertie	AmpControl	ChargePoint	PowerFlex
Date of First Reach Out	7/31/2025	7/16/2025	7/16/2025	7/16/2025	7/16/2025
Date of Contact Established	8/4/2025	7/16/2025	7/16/2025	7/21/2025	N/A
Point of Contact	Jared Carson	Zander Mrlik	Won Moon Joo	Brittany Bennett	None
Method of Communication Utilized	Email Only	Email Only	Email Only	LinkedIn, Email, Call, Website Email	LinkedIn, Email, Call, Website Email
Number of Reach Out/Follow Up Attempts	1	1	1	5	>10
Initial Phone Call	N/A	N/A	N/A	7/29/2025	N/A
Interview Conducted	✓	✓	✓	✗	✗
Interview Date	8/5/2025	7/21/2025	7/24/2025	N/A	N/A
Demo Date	8/19/2025	8/28/2025	8/21/2025	N/A	N/A

The key interview takeaways are shown Table 26 below. These interviews informed the team that the typical pricing model for an EMS is a subscription fee that is based on the number of asset connections. This per-connector per-month fee can fluctuate based on the level of service the client needs, for example opting for 24/7 customer service or integrating vehicle telematics. All responses from the interviews were utilized in developing the requirements for the FCRTA-tailored EMS solution.

Table 26 EMS Vendor Interview Key Takeaways

Are there any questions that we should have asked?	Key Takeaway
Company Information	
How many years has the company been in operation for?	4-6 years
Where is the company based?	CA and NY
Do you have any presence in California?	All do
Has the company worked for any rural transit agencies?	Intertie and Synop do, Ampcontrol do not
Who are your key and typical customers?	Commercial and Private Fleet Operators
Do you offer an Energy Management System (EMS)? If, so what is your understanding of the definition of one.	EMS offered by all interviewees. EMS defined as a system providing energy services such as managing energy demand and usage, cost optimization, and integration with systems like CSMS, DERMs/VPPs, and DRMS.
What related software solutions and services does your company offer?	CSMS, Integration and Testing, OCPP-Compliance, Telematics, Load and Access Management
Technical and Functional Specification	
What do you see as the major benefits of an EMS for a rural transit agency?	Real-time monitoring and decision making, cost savings, interoperability, resiliency, flexibility
How much energy, emissions, and/or money can an EMS save a rural transit agency?	Depends on use case but 20-45% cost savings

Are there any questions that we should have asked?	Key Takeaway
What do you see as the key risks and issues that a rural transit agency will need to address as part of a successful EMS implementation	Software and hardware integration / interoperability / compatibility, Installation Errors, Limited Site Data, Cybersecurity, Data Sovereignty, Vendor Flexibility, Extended Development Timelines
What do you consider to be the key functions of an EMS in a rural transit application (to get the benefits)?	Resiliency, Cost Savings, High Uptime, Flexible Configuration, Greater Insight into System Performance
What inputs are needed during setup and what happens if they are not available?	Site Specific Data, Power availability, PV input, BASK and protocol signals, utility tariffs, system configurations, route information
How flexible should the data integration/ETL process be? e.g. sourcing specific data from EVSE and vehicle vendor systems, etc. are APIs used?	Support API integration and multiple APIs
What are the key internal and 3rd party system integrations, and what is the best way to manage them?	OCPP, Telematics, CSMS, Weather Integration, and Payment Management. Best way to manage is through validation and robust commissioning
How flexible should status and time series reporting be? By user, by location, by function, etc.	Role-based access control provided. Flexible to an extent.
What other technical considerations should we be aware of, e.g. integration issues, latency issues, cyber security issues?	Cybersecurity, Latency Needs, and Cellular Signal Strength
What EMS workflows should the software include, why?	Load management; onboarding and ongoing support; third party vendor communications about detected issues
What key EMS limitations should we be aware of and watching for, why?	OCPP, Interoperability, Customization, Hardware Compatibility, Telematic Data Incorporation, New Functionality Developments
What kind of training and support should we request?	24/7 Monitoring; Issue Escalation; Training and Direct Support
Project Specifications	
How should the project be phased?	Site assessment, input validation, tendering, installation, phased go-live, system integration, ongoing support
How long should the project implementation take, from scoping, planning, setup and cutover to operations?	1 - 9 months
What level and type of support should the client specify to ensure a successful project?	Strong project management, customization, data migration, performance tracking, testing, training, and dedicated client service team
What governance arrangements are recommended to ensure a successful project?	Phased governance model - project leadership and point of contact identification, progress trackers, weekly check-ins, and escalation pathways
What kind quality checks and controls (QA/QC) should be specified to ensure a quality implementation, e.g. a Test Plan?	Ranges from checklists to demo site set up with various charger and vehicle simulations to identify gaps
What kinds of measures are typically included in contracts to manage the risk of schedule, budget and scope variations?	SoW structure which can include SLAs outlining response times and operations framework
Commercial Specifications	
What commercial terms are typically included to manage the risk of non-performance, e.g. a % of the budget, credit reporting, etc.	Development milestones and timeline
How should the financial capacity / viability of a company be determined?	Strong financials, strategic partnerships, customer base, referrals, company focus, product maturity, support structure, and a service-oriented business model

Are there any questions that we should have asked?	Key Takeaway
What arrangements do you recommend for sharing data during the project lifetime?	APIs and Integration, Data Access Control, Data Residency, Transparency and Reporting, Confidentiality
What data and security standards should we specify as part of the project	SOC 2 Type II, GDPR, CSA STAR Registry, PCI DSS, Data Protection Standards, API based integrations, GCP-hosted with regional flexibility, read-only data access by site and user role
What key supplier terms and conditions should we expect and be prepared to accept?	Responses range from upfront and monthly fees to ongoing services agreement to provision of actual sample agreements
Budget Drivers	
What drives cost in an EMS implementation over time?	Device count, customization, testing, site complexity, software subscription, integration complexity, and timeline
What is a typical cost structure for a project like this?	$/port/month + Integration Costs + Ongoing Support (Tiered) OR Tiered $/port cost value (depending on support level)
Can we get a pricing schedule for budgeting purposes?	Yes
Key Highlights	
Are there any questions that we should have asked?	Business Model, Integration Expectations, Ecosystem Considerations, and Payment Access
Can we schedule a demo?	Yes

Note: VPP = Virtual Power Plant; CSMS = Charging Station Management System; OaaS = Operations-as-a-Service; V2G = Vehicle-To-Grid; MWh = Megawatt Hours; ODI = Oracle Data Integrator; DR = Demand Response; DERMS = Distributed Energy Resource Management System; OCPP = Open Charge Point Protocol; BASK = Binary Amplitude Shift Keying, SoW = Scope of Work; SLA = Service Level Agreement; GDPR = General Data Protection Regulation; PCI DSS = Payment Card Industry Data Security Standard

Table 27 below shows an example of a pricing structure and cost drivers for an EMS platform.

Table 27 EMS Pricing Structure Example

Category	Value
Cost per Port	$30-$50
Hardware Cost (per site)	$250 / device
One-Time Integration Fees	$10,000-$20,000
Telematics	No Additional Charge
24/7 Support (Tier 2)	$30-$40 / connector

Summary of Key EMS Requirements

Table 28 summarizes the key features and functions identified through benchmarking research, stakeholder input, and EMS vendor interviews. EMS features and functions are categorized into fleet, charging, resource operations, industry certifications and standards, third party integrations, and customer service offerings. The team notes that these requirements represent Charging Management

Systems as well as Energy Management Systems, as the latter is often embedded in the former. Core EMS functions are grouped under the Resource Options table.

Table 28 Best Practice EMS Key Features, Metrics, and KPIs

Category
Key Features
Fleet Operations
Vehicle Location Tracking
Fleet Status and Operational Trends
Automated Recharging Scheduling
Maintenance and Fault Detection
Fleet Logistics and Route Management
Charging Operations
Charging Port Status and Usage Trends
User and Role Access Management
Dynamic Pricing and Tariff Management
Real-Time Charging Station Visibility
Charging Session Reservation System
Load-Sharing and VPP Capabilities
Demand Charge Mitigation & Peak Shaving
Maintenance, incl Fault Management
Resource Operations
Market and Grid Services System
Energy Management System
Microgrid System
Industry Standards
UL Certification for Fleet Energy Systems
3rd Party Integrations
Grid (OCPP)
Demand Response (OpenADR)
BMS (ModBus)
Metering (RS-485)
REST API
Customer Service
24/7 Human System Support
Key Metrics & KPIs
Fleet Operations
Avg. Charging Duration per Session
Station Utilization Frequency
Station Operational Status
Vehicle Battery State of Charge
Fleet Emissions Saved
Charging Operations
Charging Port Status
Charger Utilization Rate
Number of Charging Sessions
Station Uptime
Charger Geographic Location
Real Time Charging Power
Site Electricity Consumption
Electricity Bills and Savings
Available Charging Incentives
Lifetime Cost Savings
Resource Operations
Site Battery Storage State of Charge
Battery Storage Charge / Discharge Profiles
Facility Peak Demand
Site Solar Generation

Based on the best practice research, interview, and analysis shown above, the team developed the following EMS RFP/RFQ structure to encompass key technical specifications and operational requirements of the prospective system. This outline was used to develop the EMS RFP document, which FCRTA will use to procure and engage with an EMS vendor.

1. Overview
2. Background
    a. FCRTA
        i. Today
        ii. Planned (2030 and beyond)
    b. Purpose of EMS

        i. Manage the Energy System to Minimize Bills and to Provide Resiliency (use cases)
        ii. Manage the Loads to Minimize Bills and to Provide Resiliency (use cases)
        iii. Provide Stakeholder Energy and CO2 Reporting
        iv. Scope Limitations

3. **Project Overview**
    a. High Level Scope
        i. Setup EMS including Configuration
        ii. Load in Depots and Devices Initially and Over Time
    b. High Level Timeline
        i. Setup EMS with Initial Depots and Devices
        ii. Participation in Agreed Value-Added Programs
        iii. Engage and Train Stakeholders
        iv. Ongoing Technical Support
4. **EMS Requirements**
    a. Roles and Responsibilities
    b. Energy Management
    c. Value Added Program Participation
    d. Reporting and Visualization
    e. Legal Requirements
    f. Technical Requirements
5. **Implementation Requirements (Tasks)**
6. **Operational Requirements**
    a. Training
    b. Technical Support
    c. Value Added Program Participation
7. **Organizational Requirements**
    a. Experience
    b. Financial Capacity
    c. References
8. **Response**
    a. Executive Summery
    b. EMS Solution
    c. Implementation Solution
    d. Team
    e. Budget
    f. Terms and Conditions (Variations)
    g. Qualifications

Appendix A: Advisory Committee Meeting Summaries

Fresno County EV Charging Plan and Energy Management System Plan

Advisory Committee Meeting
July 28, 2025

Meeting Minutes

Welcome

FCRTA welcomed members of the Advisory Committee

FCRTA Overview and Study Goals

FCRTA discussed their fleet electrification process and the importance of the study, as they need to park vehicles throughout the county, covering long distances. Goals of this study include:

- Overall EV Strategy incorporating existing and future plans and projects for FCRTA and regionally
- Equipment and infrastructure to facilitate fleet EV transition, considering FCRTA's unique needs
- Resiliency plan for solar, microgrids, and battery-powered energy storage
- Potential for agencies, cities, unincorporated areas, coordination, and public charging
- Energy Management System as a central monitoring point, improves reliability, creates cost savings, and conserves energy

FCRTA provided an update on the Selma Maintenance Facility, which is expected to be operational in the Fall.

Existing Conditions

Walker reviewed existing conditions for FCRTA's system, EV adoption, and charging infrastructure. Overall, Fresno County has lower EV adoption rates and fewer EV chargers than the state as a whole. FCRTA's microgrid feasibility study and future microgrid buildouts (pending grant funding) will support EV adoption.

Charging Needs and Opportunities

Cities and transit agencies discussed their current and future charging needs/fleets. The discussion generally focused on the challenges of converting fleets, such as the cost, PG&E hurdles, grid capacity, limited size of yards for vehicles and equipment, and increasing utility rates. One solution is to add solar capacity where possible.

San Joaquin

- Minimal EV infrastructure, would like to upgrade yards
- Working with FCRTA to do a microgrid, eager to begin
- Utility vehicles – most are electric, received through grants
- Chargers located at different areas of the maintenance yard (plug into 110 socket), water shop
- Use during the day, charge at night
- 10-12 vehicles need to transition – service trucks
- Have CNG units that FCRTA installed

- Looking to get rid of the CNG sweeper, replacing it with zero emissions
- Solar arc – the public uses one side, one for the City vehicle

Selma

- 1 solar arc (front charger is open to the public, back is for city vehicles)
- Parks are a microhub for the community's vehicles, and we want to expand
- Received Air District grant for EV golf carts at park locations
- PG&E policy: if you purchase a vehicle, they will bring infrastructure
- Backhoe – replace with first EV – going through grant application process
- Looking at park maintenance and street maintenance vehicles
- Council is interested in a solar field for the City
- PG&E rates increasing
- Solar fields are imperative to fill the gap

Fowler

- Apply for $20,000 EV grant
- 2 street legal golf carts for administrative use, upgrading lawn mowers
- Purchased Ford Lightning
- Upgraded the electric to 240 to accommodate electric vehicle chargers
- Council supportive of EV movement
- Installing pole mount EV charger
- Looking at portable generator – power during an outage of usage
- Fire station has solar panels
- Phasing out gas-powered vehicles
- Looking at a hybrid for a patrol vehicle

Reedley

- 2018- infrastructure for 16 charging units, eight active, did not have electrical capacity
- 8 chargers at City Hall/Police Department
- Public works yard 2 miles from Downtown – possibility of FCRTA moving school district to public works
- Moving City Hall to the Bank of America building
- Intend to convert police vehicles to EV
- Air District grant – purchased small electric vehicles for the wastewater treatment plant
- Electric planes at Reedley Airport
- Central Valley Transportation Center – EV charging stations for buses, EV charging stations, primarily used by the school district
- Electric ride-on motors
- Solar at City Hall, fire station, community center
- $100,000 earmarked for additional Level II chargers
- Year-long process through PG&E
- PG&E flex power program to get energized
- Range of the Ford E Transits is about 120 miles

Clovis Transit

- 2 EV cutaway buses
- 5 EV Chevy Bolts
- 2 Level III chargers – sharing among seven vehicles, can't add additional chargers, capacity is limited

- Challenges: Can only charge one vehicle at a time
- Exploring land options for converting fleet to hydrogen or electric

Fresno EOC

- At the end of the month, building a 3-acre solar farm and battery backup
- 56 charging stations
- PG&E will double the size of the transformer
- Waiting for additional funding
- Received Carl Moyer grant
- Have space to park bigger buses
- Food kitchen on site with eight freezers, consumes significant energy

Energy Management Systems Overview

- Energeia discussed the EMS background, how it benefits the community, and how an EMS would apply in Fresno County. See the meeting presentation for more details.
- Attendees were encouraged to take the EMS survey at this link https://forms.gle/457QErpPH7nxUZdG6

Wrap up and Next Steps

The team will continue to develop the analysis and share it with the committee.

<u>Attendees</u>

Janelle Del Campo – FCRTA
Moses Stites – FCRTA
Nicholas Isla - Caltrans
Lorena Mendibles – Caltrans
David Huff- Caltrans
Simran Jhutti – Fresno Council of Governments
Stan Bulla – City of San Joaquin
Russ Robertson – City of Reedley
Eric Rocha – City of Fowler
Michael Honn – City of Selma
Bethany Berube – Clovis Transit
Thomas Dunlin – Fresno EOC
Chrissy Mancini Nichols – Walker
Tania Schleck – Walker
Keith Hall- Walker
Ezra Beeman – Energeia
Juwi Beg – Energeia

Fresno County EV Charging Plan and Energy Management System Plan
Advisory Committee Meeting
April 2, 2026

Meeting Minutes

Reminder: goals and scope of this study include:

- Define overall EV infrastructure strategy incorporating existing and future operations and projects for FCRTA and regionally. Equipment and infrastructure to facilitate fleet EV transition, considering FCRTA's unique needs. Explore potential for agencies, cities, unincorporated areas
- Develop Energy Management System technical specification as a central monitoring point, improves reliability, creates cost savings, and conserves energy

Reviewed EV charging infrastructure needs across the County:

- Higher power requirements at a few key hubs (Reedley, Selma, Sanger, Fresno)
- Level 2 charging prioritized for vehicles that can charge overnight. DCFC and inductive recommended for fixed route layovers

Reviewed energy management system purpose and technical specification direction:

- EMS can be used to improve economics, efficiency and operations of fleet charging
- Technical specification includes key metrics, KPIs, features, used to develop draft procurement specification document

Wrap up and Next Steps

FCRTA discussed the need to identify funding for EV charging infrastructure and associated uncertainty. FCRTA is exploring charging sites with partner agencies as well, such as school districts in microgrid phase 2.
April 14th meeting will be final Advisory Committee meeting to review draft results, which will then be finalized and brought to Board for Plan approval.

Attendees

Janelle Del Campo – FCRTA
Emily Flores – FCRTA
Jennifer Rodriguez – FCRTA
Nicholas Isla – Caltrans
Lorena Mendibles – Caltrans
Daniel Esquivel-Mendez – Caltrans
Stan Bulla – City of San Joaquin
Bethany Berube – Clovis Transit
Tiffany Griggs – City of Sanger
Ben Weber – Walker
Nick Auerbach – Walker
Chrissy Mancini Nichols – Walker
Tania Schleck – Walker
Ezra Beeman – Energeia

Fresno County EV Charging Plan and Energy Management System Plan
Advisory Committee Meeting – Joint with Transit Roadmap Committee
April 14, 2026

Meeting Minutes

Welcome
FCRTA welcomed members of the Advisory Committee and initiated the meeting.

FCRTA Overview and Study Context
FCRTA provided an overview of the EV Charging Plan and Transit Roadmap Study, both funded through a Caltrans Sustainable Planning Grant.

- The EV Charging Plan is a technical study to support deployment of the agency's electric fleet
- The Transit Roadmap Study evaluates service, funding, and long-term system improvements, including Measure C considerations
- Both studies are critical to guiding future investment and operational decisions
- Stakeholder input will inform both efforts

Project Overview
Introduced the project team and outlined the purpose of the joint meeting:

- The EV Charging Plan serves as a foundational step for the Transit Roadmap
- Transition to zero-emission buses presents challenges related to grid capacity, charging availability, and long rural routes
- The Transit Roadmap builds on this foundation to evaluate service improvements

Reviewed FCRTA's service area:

- Service spans 13 incorporated cities and 39 unincorporated communities
- Includes fixed route, demand response, and rural dial-a-ride services
- Many communities served are disadvantaged and transit-dependent

EV Charging Plan Overview
Key elements of the plan include:

- Mapping current and future operations under full fleet electrification
- Quantifying charging infrastructure needs by route and location
- Developing planning-level capital cost estimates and identifying cost drivers
- Evaluating EMS to optimize charging, reduce peak demand, and lower energy costs

Charging Infrastructure Needs
- Charging needs were developed based on route-level demand and vehicle deployment
- Infrastructure requirements were identified for each community and associated depot
- Three charger types were evaluated:
  - Level 2 chargers for overnight depot charging
  - DC fast chargers for higher-power needs
  - Inductive chargers for high-demand fixed routes

Cost Estimates and Prioritization

- Cost categories include charging equipment, trenching, electrical service, and site infrastructure
- Total cost ranges were developed for each site
- Sites were prioritized based on:
    - Fleet charging demand and fixed-route deployment
    - Existing electric vehicles not currently in operation
    - Grid capacity and feasibility
    - Alignment with funding opportunities and parallel projects

Questions and Clarification

- Ben Lichty raised question regarding whether cost estimates include solar or other energy infrastructure
    - Walker clarified that cost estimates include charging infrastructure and grid interconnection only
    - Solar, battery storage, and microgrid components will be addressed in a future study
- Ben Lichty raised question regarding battery storage without solar
    - Walker noted that no final decision has been made
    - Solar paired with battery storage is typically more effective, but further evaluation is planned

High-Speed Rail Charging Coordination

- California High-Speed Rail Authority noted plans to install EV bus charging infrastructure in downtown Fresno/Chinatown
- Construction is expected to begin soon, with infrastructure available in advance of rail operations
- The facility is intended to support regional bus charging
- The EV Charging Plan represents baseline charging needs
- Future infrastructure, including HSR facilities, can help fill identified gaps
- Additional coordination is needed regarding charger types, power levels, and availability windows
- FCRTA expressed interest in utilizing the HSR charging site

Transit Roadmap Overview

- The roadmap builds on the charging plan to evaluate service improvements
- Focus areas include increasing ridership, improving accessibility, and enhancing system usability
- The study considers service design, funding availability, and long-term operational sustainability

Transit Roadmap Next Steps

- Continue outreach and stakeholder engagement through the summer and fall
- Keep the public survey open through mid-May and encourage distribution
- Conduct additional advisory committee meetings, with the next anticipated in late summer
- Continue analysis and development of service recommendations

Closing and Additional Feedback

FCRTA and Walker opened the floor for additional comments and feedback.

- Advisory Committee members were encouraged to provide feedback during the meeting or follow-up afterward. Additional input on service needs, community priorities, and planning considerations was welcomed

<u>Attendees</u>

Janelle Del Campo – FCRTA
Emily Flores – FCRTA
Jennifer Rodriguez – FCRTA
Nicholas Isla - Caltrans
Lorena Mendibles – Caltrans
David Huff- Caltrans
Simran Jhutti – Fresno Council of Governments
Stan Bulla – City of San Joaquin
Elizabeth Cabrera – City of San Joaquin
Frank Peter – Fresno Area Express
Ben Lichty – CA High-Speed Rail Authority
Thomas Dulin – Fresno EOC
Robert Beyer – MV Transportation
Manuel Campos – City of Kerman
Shannon Roberston – Reedley College
Jerry Buckley – Reedley College
Robert Pimentel – West Hills Community College
Anthony Taeza – MV Transportation
Bethany Berube – Clovis Transit
Rachel Hellett – Fresno Council of Governments
Nathan Olson – City of Sanger
Joshua Goggins – City of Sanger
John Jansons – City of Kerman
Brittany Carpenter – Fresno Metro Black Chamber of Commerce
Eric Rocha - City of Fowler
Nick Auerbach – Walker
Chrissy Mancini Nichols – Walker
Tania Schleck – Walker
Ben Weber – Walker
Kristine Cai – LSA
Ezra Beeman – Energeia

Appendix B: Vehicle and Infrastructure Funding Sources

Funding Source	Type of Funding	Funding Entity	Overview	Eligible ZEV Activities	
				Vehicles	Infrastructure
Low or No Emission Program (5339(c))	Competitive Grant	Federal Transit Administration (FTA)	-Provides funding for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities. -Caltrans is the designated recipient for small urban and rural areas. Eligible subrecipients include public agencies and private nonprofit organizations engaged in public transportation. -Notices of Funding Opportunity released annually; $1.1 billion available nationwide in FY 2025 and $1.1 billion available nationwide in FY 2026. -20% local match is required. -Zero-Emission Fleet Transition Plan required (can use ICT ZEB Rollout Plan with an Addendum or cover letter). -5% must be used for workforce development activities related to the zero-emission transition.	X	X
Grants for Bus and Bus Facilities Competitive Program (5339(b))	Competitive Grant	Federal Transit Administration (FTA)	-Provides funding to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities, including technological changes or innovations to modify low or no emission vehicles or facilities. -Caltrans is the designated recipient for small urban and rural areas. Eligible subrecipients include public agencies and private nonprofit organizations engaged in public transportation. -Notices of Funding Opportunities are released annually; $402 million available nationwide in FY 2025 and $412 million available nationwide in FY 2026. -20% local match is required. -Zero-Emission Fleet Transition Plan required (can use ICT ZEB Rollout Plan with an Addendum or cover letter). -5% must be used for workforce development activities related to zero-emission transition.	X	X
Grants for Bus and Bus Facilities Formula Program (5339(a))	Formula	Federal Transit Administration (FTA)	-Provides funding to states and transit agencies through a statutory formula to replace, rehabilitate and purchase buses and related equipment and to construct bus-related facilities. -Caltrans is the designated recipient for small urban and rural areas. Eligible subrecipients include public agencies and private nonprofit organizations engaged in public transportation. -Formula funding is distributed annually.	X	X
Charging and Fueling Infrastructure Discretionary Grant Program	Competitive Grant	United States Department of Transportation (USDOT)	-$2.5 billion over 5 years to strategically deploy electric vehicle (EV) charging infrastructure and other alternative fueling infrastructure projects in urban and rural communities in publicly accessible locations, particularly in underserved and disadvantaged communities. -Local match of at least 20% required. -Transit agencies are eligible for funding, but charging/fueling infrastructure must be open to the public.		X
Grants for Rural Areas (5311)	Formula	Federal Transit Administration (FTA)	-Provides funding for public transportation projects serving areas outside of an urban boundary with a population of 50,000 or less. -Funds may be used for capital, operating, planning or technical assistance projects. -FTA apportions funding to each state on an annual basis. -CA is eligible for sliding scale match of 88.53%/11.47% .	X	X
Urbanized Area Formula Grants (5307)	Formula	Federal Transit Administration (FTA)	-Provides funding in Urbanized Areas (UZAs) with a population of 50,000 or more for transit capital and operating assistance and transportation-related planning. -Caltrans is the designated recipient for all small UZAs. However, all UZA's work directly with the FTA to deliver projects.	X	X

Funding Source	Type of Funding	Funding Entity	Overview	Eligible ZEV Activities	
				Vehicles	Infrastructure
Enhanced Mobility of Seniors & Individuals with Disabilities (5310)	Formula	Federal Transit Administration (FTA)	-Provides capital, mobility management, and operating expenses to improve the mobility of seniors and individuals with disabilities. -Eligible applicants include non-profits and qualifying public agencies. -Caltrans administers FTA 5310 funding in rural and small urban areas and releases a Call for Projects. -20% local match is required.	X	X
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Formula	Federal Highway Administration (FHWA)	-Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards for ozone, carbon monoxide, or particulate matter (nonattainment areas) and for former nonattainment areas that are now in compliance (maintenance areas). - Local agencies nominate projects and coordinate with Metropolitan Planning Organizations (MPOs) or non-MPO Regional Transportation Planning Agencies (RTPAs) to select projects.	X	X
Carbon Reduction Program (CRP)	Formula	Federal Highway Administration (FHWA)	-Provides funds for projects designed to reduce transportation emissions, defined as carbon dioxide (CO_2) emissions from on-road highway sources. -Majority of funds are apportioned to different areas of the state based on population, or 'Local CRP.' Projects are selected for Local CRP by Metropolitan Planning Organizations (MPOs) and non-MPO Regional Transportation Planning Agencies (RTPAs). -California receives about $110 million per year of Carbon Reduction Program (CRP) funds over five years through the Infrastructure Investment and Jobs Act (IIJA).	X	X
Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP)	Voucher Program	California Air Resources Board (CARB)	-Voucher program to reduce the purchase cost of zero-emission vehicles. -Transit agencies decide on a vehicle based on an established list, contact the vendor directly, and then the vendor applies for the voucher. -Voucher rebates vary by vehicle type and model. Transit buses are eligible for up to $80,000 in funding. -Applications processed on a first-come, first-served basis.	X	
Carl Moyer Memorial Air Quality Standards Attainment Program	Competitive Grant	California Air Resources Board (CARB)	-Provides funding to help procure low-emission vehicles and equipment. -The local air districts administer the grants and select projects to fund.	X	X
California Volkswagen Environmental Mitigation Trust Funding	Voucher Program	California Air Resources Board (CARB)	-Incentives that replace older, high-polluting transit, school, and shuttle buses with new battery-electric or fuel-cell buses. -Applications for vehicles statewide are processed by the San Joaquin Valley Air Pollution Control District. -Incentive amount up to $400,000 per vehicle. -Applications processed on a first-come, first-served basis.	X	X

Funding Source	Type of Funding	Funding Entity	Overview	Eligible ZEV Activities	
				Vehicles	Infrastructure
Low Carbon Fuel Standard Credits	Credit Program	California Air Resources Board (CARB)	-Credits ZEV infrastructure investments based on relative emissions from typical petroleum fuels. -Requires EV chargers to be DCFC for eligibility.		X
SB1 State of Good Repair (SGR)	Formula	California Department of Transportation (Caltrans)	-Funds capital projects that help transit agencies maintain a state of good repair. -Agencies receive yearly SB1 SGR funding through their MPO, based on population and farebox revenues. -Agencies can decide to devote their portion of SB 1 funds to ZEV transition.	X	X
Low Carbon Transit Operations Program (LCTOP)	Formula	California Department of Transportation (Caltrans)	-Provides operating and capital assistance for transit agencies to reduce GHG emissions and improve mobility, with a priority on serving disadvantaged communities. -Funds from State Cap and Trade dollars. -Agencies eligible for STA funds receive LCTOP funds.	X	X
Transit and Intercity Rail Capital Program (TIRCP)	Competitive Grant	California State Transportation Agency (CalSTA)	-Funds capital improvements that reduce emissions of greenhouse gases, vehicle miles traveled, and congestion through modernization of California's intercity, commuter, and rail, bus, and ferry transit systems. -Public transit operators are eligible applicants. -Funds from State Cap and Trade dollars. -ZEV vehicles and infrastructure must be coupled with expanded transit service.	X	X
SB 125 Transit Program	Formula	California State Transportation Agency (CalSTA)	-SB 125 guides the distribution of $4 billion in General Fund dollars through the Transit and Intercity Rail Capital Program on a population-based formula to regional transportation planning agencies, which will have the flexibility to use the money to fund transit operations or capital improvements. -The bill also establishes the $1.1 billion Zero-Emission Transit Capital Program to be allocated to regional transportation planning agencies on a population-based formula and another formula based on revenues to fund zero-emission transit equipment and operations. -Funding is distributed through the Regional Transportation Planning Agencies.	X	X
State Transit Funds (STA)	Formula	California Department of Transportation (Caltrans)	- Derived from the statewide sales tax on diesel fuel. -The State Controller's Office apportions these funds based on a formula that allocates 50% of the funds according to population, and the remaining 50% according to transit operators' revenues from the prior fiscal year. -STA can be used for either operating or capital expenses.	X	X
Local Transit Funds (LTF)	Formula	California Department of Transportation (Caltrans)	-Derived from statewide sales tax. -These funds are apportioned based on population figures. -They are required to prioritize funding in this order: to fund LTF administration, support the public transportation system, including capital needs, and after these priorities are met, the remaining funds are allocated for street and road purposes.	X	X

Funding Source	Type of Funding	Funding Entity	Overview	Eligible ZEV Activities	
				Vehicles	Infrastructure
Sustainable Communities Program	Competitive Grant	California Department of Transportation (Caltrans)	-Competitive grant through Caltrans that can fund studies relevant to ZEV transition, such as an electrical grid analysis study, EV Charging Study, or Alternative Fuels study. -A local match is required.	Planning Only	Planning Only
Clean Transportation Program	Competitive Grant	California Energy Commission	-Funds projects that support innovation and accelerate the deployment of zero emissions transportation and technologies. -Annual funding up to $100 million statewide. -Multiple funding areas within the Clean Transportation Program.	X	X
Affordable Housing and Sustainable Communities Program (AHSC)	Competitive Grant	California Strategic Growth Council	-Funds affordable housing loans and other capital grants for housing-related infrastructure, sustainable transportation infrastructure, transportation-related amenities, and related programs. -Historically, most successful awards have included a partnership between developers of affordable and mixed-income housing, local governments, regional transportation agencies, and public transit providers. -At least 50% of funds are invested in and benefit disadvantaged communities (with project location determined by the site of the affordable housing development). Project scoring and selection takes into account community engagement during the development process and how the project addresses community-identified needs.	X	X
Clean Mobility Options (CMO) Voucher Pilot Program	Voucher Program	California Climate Investments	-CMO awards up to $1.5 million vouchers to develop and launch zero-emission mobility projects including the purchase of zero-emission vehicles, infrastructure, planning, outreach, and operations projects in low-income and disadvantaged communities. -Eligible applicants include governmental entities, non-profit organizations, and California Native American Tribal Governments. -Requires the completion of a Transportation Needs Assessment prior to applying for implementation funding.	X	X
EnergIIZE Commercial Vehicles	Competitive Grant	California Energy Commission (CEC)	-Provides reimbursement style grants to infrastructure projects in California that deploy ZEV charging/refueling in support of Medium-Duty and Heavy -Duty (MDHD) commercial fleets (class 2b-8). -Program has a catalog of technology that applicants can choose from.		X
SCE Charge Ready	Programs Vary	Southern California Edison (SCE)	-Several programs and rebates are available, including infrastructure installation, infrastructure upgrades, and meter distribution. -Assists owners with deploying the infrastructure and equipment necessary to support EV charging stations at their locations. This program helps by providing financial incentives, infrastructure, and technical support to facilitate the installation and maintenance of EV charging stations.		X
EV Fleet Program	Incentive	Pacific Gas and Electric (PG&E)	-Offers incentives to facilitate the installation of electric vehicle infrastructure. -PG&E constructs, owns and maintains all electrical infrastructure up to the customer's meter. -Fleet operators design, build, own, operate, and maintain the electrical infrastructure from the customer meter to the EV charger. In select instances, PG&E may also cover this portion of the work.		X

Funding Source	Type of Funding	Funding Entity	Overview	Eligible ZEV Activities	
				Vehicles	Infrastructure
Power Your Drive For Fleets	Incentive	San Diego Gas & Electric (SDG&E)	-The program connects fleets with resources, a fleet-friendly charging rate, and financial incentives to easily and cost-effectively design and install the charging infrastructure needed to power their medium- and heavy-duty electric fleets. -Program has 2 options for the infrastructure incentives. -Program requirements: Demonstrate commitment to procure a minimum of two electric vehicles; demonstrate long-term electrification growth plan and schedule of load increase; provide data related to charger usage for a minimum of five years; own or lease the property where chargers are in-stalled, and operate and maintain vehicles and chargers for a minimum of 10 years.		X
GovEV Program	Application for Funding	Peninsula Clean Energy	-GovEV Program provides comprehensive planning (at no cost to your agency) and funding to guide fleet transition to EVs and EV charging infrastructure. -Funds from the GovEV Program can be used for the incremental cost of EV replacements, EV charging equipment and installation, and energy management services.	X	X
Electric Bus Program	Rebate Application	Central Coast Community Energy	-Provides 3CE customers with incentives for the purchase or lease of all-electric buses for schools, public transit agencies, and agricultural worker transport businesses. -The location where the bus will be charged must be actively enrolled in 3CE service at the time the bus is ready to be delivered.	X	
Internal Revenue Code Section 45W	Tax Credit	Internal Revenue Service (IRS)	-Credit for Qualified Commercial Clean Vehicles. -For purchasers of commercial clean vehicles. Qualifying vehicles may include passenger vehicles, buses, ambulances, and certain other vehicles, as well as certain mobile machinery. Credit Amount: Up to $40,000 (max $7,500 for vehicles <14,000 lbs.)	X	
Air Pollution Control District Funding	Various	California Air Districts	-Local air districts administer air quality improvement grant programs. -For example, the San Joaquin Valley Air Pollution Control District's Charge Up! Electric Vehicle Charger Incentive Program provides funding for public agencies, businesses, and property owners of multi-unit dwellings (i.e., apartment complexes, condominiums, etc.) in the San Joaquin Valley to install electric vehicle (EV) chargers.		X
Joint Office of Energy and Transportation	Various	Various	The Joint Office provides information and resources about current funding opportunity announcements (FOAs), requests for information, and links to related opportunities from other DOE offices and federal organizations.	X	X

Appendix C: EMS Research Plan

Research Phase > Key Question	Research Method		
	Desktop	Modeling	Interviews
Which transit agencies can provide the best, most relevant EMS benchmarks?			
Which states have the most aggressive transit ZEV mandates?	✓		
Who are the leaders in rural transport/transit electrification? What agencies plan to electrify before state-mandated ZEV targets?	✓		
What are the key characteristics of their transit networks?	✓		
What electricity solutions have they implemented to support vehicle charging?	✓		
What charging resiliency/back-up solutions do they have and how do they manage them?	✓		
What other distributed energy resources do they have and how do they manage them?	✓		
What is best practice in EMS dashboards, controls, and user interfaces?	✓		
Environmental impacts/emission dashboards and metrics?	✓		
Energy savings and charging profiles?	✓		
Transit route and vehicle operations monitoring?	✓		
Transit charging resiliency and backup storage?	✓		
Energy cost savings and revenue from excess dispatchable resource?	✓		
Community charging and impact?	✓		
What do EMS users / stakeholders need from the EMS?			
What is the interviewee's relevant role and background?			
What is your role in the transit system in Fresno County?			✓
How do you currently engage with FCRTA's fleet or infrastructure like vehicles, chargers, solar PV, or battery storage systems?			✓
What information is essential for your role in the transit system and engaging with FCRTA, specifically? (e.g. operational, asset, costs, emissions, etc.)			✓
What is the level of stakeholder's experience with an EMS or dashboard and understanding of their potential uses and benefits?			
Do you know what an EMS is? Have you used any EMS software in the past?			✓
If so, what product did you use, what energy resources did the EMS manage, and in what industry?			✓
What did you like and dislike about it?			✓
Have you used any other data or operations dashboards before? What did you like and dislike?			✓

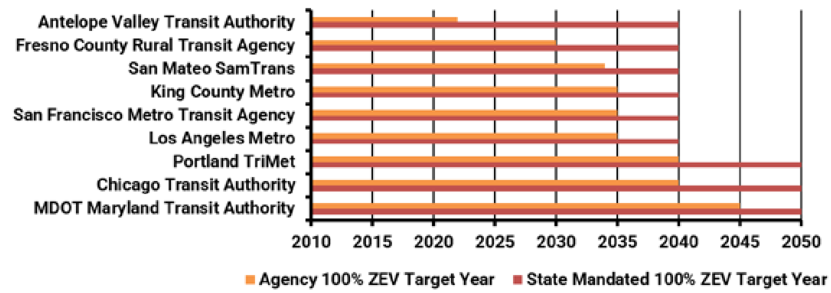
Research Phase > Key Question	Research Method		
	Desktop	Modeling	Interviews
What are stakeholder's key 'use cases', and associated goals and priorities?			
What are your top 3 uses for FCRTA's planned EMS/Dashboard?			✓
Operations (Transport, Energy)			✓
Asset Management (Vehicles, Depots, Chargers, Energy Resources, etc.)			✓
Education (Emissions, Renewables, Community Charging, etc.)			✓
Major Event Management (e.g. Outages, Earthquakes, etc.)			✓
Financial Management (Cost of Service, Energy Costs)			✓
Other?			✓
What are your top 3 goals, priorities, or key requirements from implementation of FCRTA's EMS/Dashboards?			✓
Ability to Tailor Dashboards?			✓
Ability to Access Data Directly, e.g. via CSV, XML, or an API, to Add to your Own Visualization and Analysis Tools?			✓
Availability of Different Access Platforms, e.g. Web, App, etc.?			✓
Timeliness, Granularity and/or Frequency of Data?			✓
Data Security and/or Privacy Arrangements?			✓
Training and Support of Stakeholder's to Maximize their Benefits from the EMS/Dashboards?			✓
Other?			✓
How might the interact with FCRTA's EMS/dashboards and what will you need from it?			
How do you expect to engage with the new EMS/dashboards on a day-to-day basis?			✓
Do you have a preferred way/format of data shared with you by the EMS/dashboards?			✓
How do you intend to utilize the data provided by the EMS/dashboard software?			✓
Are there other aspects of the EMS/dashboards you'd like to leverage in your day-to-day?			✓
What do you see as key opportunities and/or expectations regarding the EMS reducing your workload?			✓
What training and support needs do stakeholders have?			
How much time could you dedicate to training with the EMS, provided by the vendor?			✓
What is your preferred training format? In-Person, Virtual Live, Virtual Asynchronous?			✓
What else should we be considering?			
Do you have any other ideas, questions, or concerns regarding the EMS plan?			✓
Who are the leading EMS/MG providers and what are the best features and services they offer?			

Research Phase > Key Question	Research Method		
	Desktop	Modeling	Interviews
Who are the leaders and why?	✓	✓	
How big and financially stable are they, including operating years, revenues, etc.			✓
Where are they based, do they have a state or local presence?	✓		✓
Who are their key customers? Are they in rural transit/transport?	✓		✓
What are their key products and solutions? What is included in their solutions?	✓		✓
What is their design, development and implementation process, timeline and risk management arrangements			✓
How much money, energy or emissions on average has an organization saved by using their EMS software?	✓	✓	✓
What is their fee/pricing structure?	✓		✓
What are their key contractual terms and conditions?	✓		✓
How do they share data with their customers? What is their data privacy policy?	✓		✓
What kind of customer training and support do they offer?	✓		✓
What are the best product and service features and why?	✓	✓	
What are the key features and functionality that they offer? e.g. operations, asset management, bidding, etc.	✓		✓
What key data does the system report on? e.g. operations, major event, emissions, revenues, costs, etc.	✓		✓
Does it include key workflows and how easy it is to navigate the software?	✓		✓
What information will it require, how much integration will it require?	✓		✓
Are there any key limitations to using the software?	✓		✓
How does the EMS software integrate with existing infrastructure like solar PV and microgrids?	✓		✓

Appendix D: Transit EMS Case Studies

TRANSIT EMS BENCHMARKING

- Energeia identified leading states with 100% ZEV mandates and transit agencies aiming to exceed their respective state mandates to identify potential transit EMS best practice examples
  - Most aggressive ZEV targets are from urban agencies with large fleets in leading states
- We then developed case studies for these or other leading electrifying transit agencies who have deployed:
  - EV chargers,
  - solar PV,
  - backup battery storage,
  - and an EMS to orchestrate them



Leading States in ZEV Transit

State	100% ZEV Fleet Target Year
California	2040
Maine	2040
Washington	2040
Michigan	2040
New York	2040

Leading Transit Agencies with Aggressive ZEV Targets

State	Transit Agency	Current Status (Target Year)	Urban/Rural	Number of Vehicles	Number of Depots
CA	Antelope Valley Transit Authority	Fully Operational (2022)	Both	102	13
CA	Fresno County Rural Transit Agency	Design and Development (2030)	Rural	80	13
CA	San Mateo SamTrans	Pilot (2034)	Urban	315	3
WA	King County Metro	Implementation Stage (2035)	Urban	1,404	6
CA	San Francisco Metro Transit Agency	Procurement and Testing (2035)	Urban	847	20
CA	Los Angeles Metro	Implementation Stage (2035)	Urban	1,888	101
OR	Portland TriMet	Implementation Stage (2040)	Urban	696	3
IL	Chicago Transit Authority	Implementation Stage (2040)	Urban	1,868	2
MD	MDOT Maryland Transit Authority	Procurement and Testing (2045)	Both	400	5

CASE STUDY: ANTELOPE VALLEY TRANSIT

FCRTA
Fresno County Rural Transit Agency
Accessible EV Mobility & Infrastructure For All

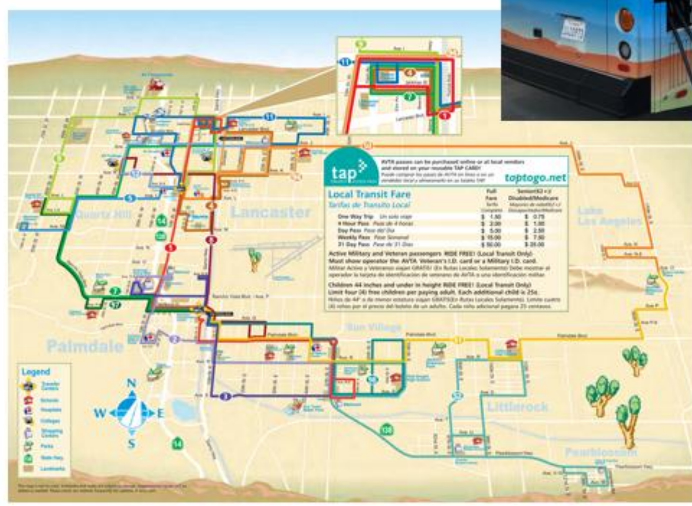
Antelope Valley Transit Authority

Key Facts:

- **State**: CA
- **Service Area Type**: Urban/Rural
- **Population Served**: 450,000
- **Routes/Vehicles/Depots**: 22/102/13
- **100% ZEV Target**: 2022 [Achieved]
- **Project Stage**: Fully Operational

EMS and BTM Resources:

- **Battery Storage**: 6 MWh
- **Solar PV**: 18 MW
- **EMS**: ChargePilot



CASE STUDY: MONTGOMERY COUNTY TRANSIT

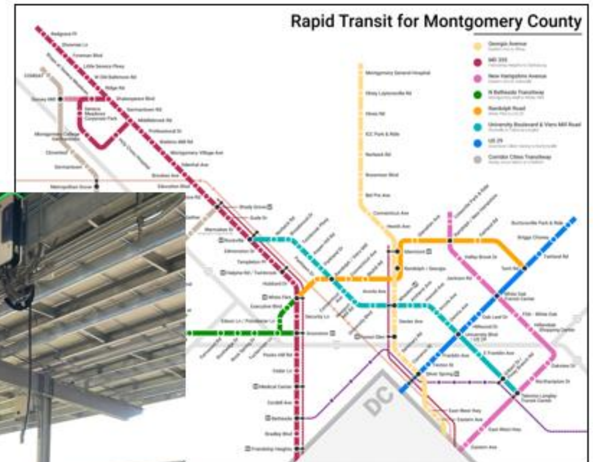
MCDOT

Key Facts:

- **State**: MD
- **Service Area Type**: Urban
- **Population Served**: 1,060,000
- **Routes/Vehicles/Depots**: 102/343/15
- **100% ZEV Target**: 2035
- **Project Stage**: Implementation/Transition

EMS and BTM Resources:

- **Battery Storage**: 4.3 MWh
- **Solar PV**: 2 MW
- **EMS**: AlphaStruxure



FCRTA Fresno County Rural Transit Agency
Accessible EV Mobility & Infrastructure For All

WALKER CONSULTANTS ENERGEIA

CASE STUDY: SANTA CLARA VTA

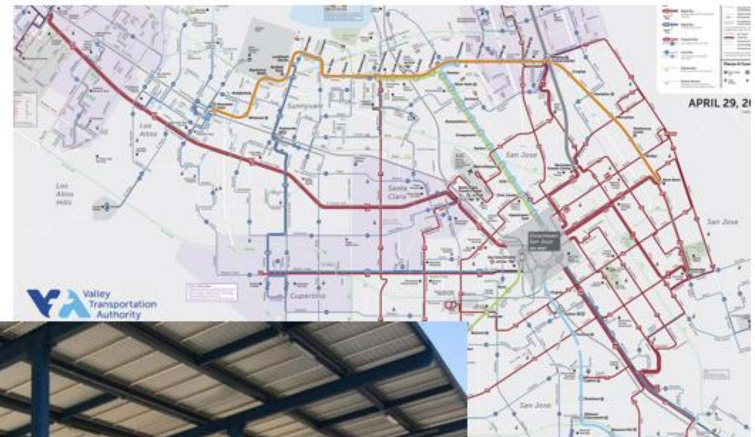
Valley Transportation Authority

Key Facts:

- **State**: CA
- **Service Area Type**: Urban
- **Population Served**: 1,871,000
- **Routes/Vehicles/Depots**: 70/450/3
- **100% ZEV Target**: 2036
- **Project Stage**: Microgrid Pilot

EMS and BTM Resources:

- **Battery Storage**: 4 MWh
- **Solar PV**: 1.5 MW
- **EMS**: Schneider Electric



CASE STUDY: VINEYARD TRANSIT AUTHORITY

FCRTA Fresno County Rural Transit Agency
Accessible EV Mobility & Infrastructure For All

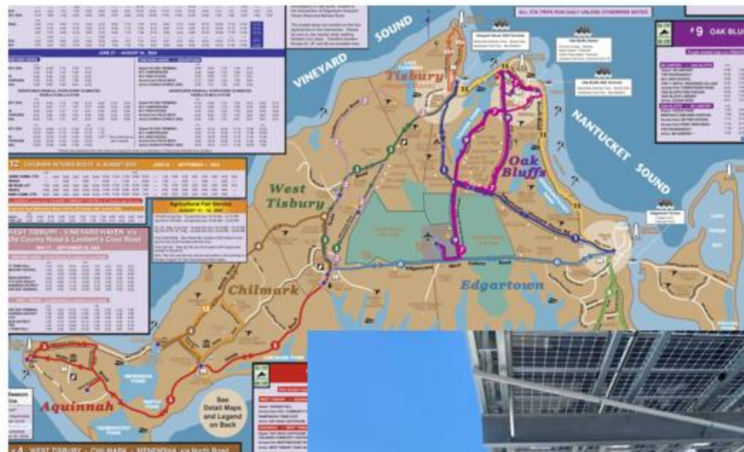
VTA Martha's Vineyard Transit Authority

Key Facts:

- **State**: MA
- **Service Area Type**: Urban/Rural
- **Population Served**: 20,350
- **Routes/Vehicles/Depots**: 12/16/1
- **100% ZEV Target**: 2040
- **Project Stage**: Implementation/Transition

EMS and BTM Resources:

- **Battery Storage**: 1.5 MWh
- **Solar PV**: 700 kW
- **EMS**: PXiSE



Appendix E: EMS Request for Proposals

Energy Management System Request for Proposals (RFP): System Requirements and Technical Specification

Contract Description

The Fresno County Rural Transit Agency (FCRTA) is seeking proposals from qualified vendors to implement and operate an Energy Management System (EMS) for FCRTA.

The scope of services includes configuring the EMS solution and providing support services to operate and maintain the system.

Evaluation Criteria and Weights

Experience and Qualifications- 30%

1. EMS solution implementation and support experience and history with similar transit contracts.
2. Understanding RFP requirements and the scope of services described in the RFP.

Organization and Management- 40%

1. Demonstrated EMS management and support capabilities and performance.
2. Qualifications and experience of the proposed staff and other key personnel.
3. Commitment and approach to maximizing the safety, quality, and efficiency of FCRTA's public transit operations.
4. Demonstrated understanding and commitment to equitable labor management practices, Equal Employment Opportunity, and non-discrimination in the selection of subcontractors and in the provision of public transit services.

Financials- 30%

(Cost Proposal opened only after review of technical proposals is completed)

1. Financial stability of Proposer.
2. Reasonableness of price proposal.

California Labor Code Preference- 10%

10% of the total score of the above 3 categories shall be added as a bonus to proposals meeting California Labor Code Sections 1070-1074 (Appendix A, Section F).

Definitions

- Mandatory specifications are described by the use of 'shall', 'must' or 'required'.
- Highly valued specifications are described by the use of 'should' or 'ideally'.
- Optimization is defined as delivering lowest net cost to FCRTA, within technical constraints.

Assumptions

- Single line diagrams and installed equipment details for each site will be provided as part of the RFP response.
- All systems to be integrated with, including transit operations, charging, 3rd party services, etc. shall be identified as part of the RFP response.
- The EMS solution and service provider is not required to provide any microgrid hardware, however, the provider may elect to do so as part of their microgrid interface solution.

EMS Solution Requirements

The purpose of the EMS is to deliver target levels of resiliency at least net cost by:

1. Managing the microgrid status at each site given grid electricity and access availability.
2. Managing the optimization of energy resources at each charging location, including flexible load, to achieve target resiliency at least net cost.
3. Interfacing with related systems and software, which may include transit operations, fleet charging and the electric utility.
4. Reporting on the status, history, and forecast of each site and the system.

FCRTA is currently planning for approximately 20 operational sites across Fresno County. Each site may host one or more electric vehicles, from a single sedan vehicle at a micro-transit location to multiple full-size electric buses at its Selma depot. FCRTA plans to operate more than 30 electric vehicles by 2035 across these sites.

Each site may include EV charging infrastructure, which may be managed by a 3rd-party charging software solution or integrated into the EMS solution, to manage the timing and duration of charge sessions. If applicable, information from the charging point system will be made available to the EMS to enable it to optimize operation of each behind-the-meter (BTM) energy system to achieve its goals.

The following sections define in further detail the key specifications that FCRTA is seeking in its EMS implementation and operation partner(s).

Operate to targeted levels of resilience

The EMS will operate BTM energy resources, including solar photovoltaic (PV) generation, battery energy storage, and flexible loads where possible, to achieve a specified level of resilience at least net cost. Net cost is defined as the cost of electricity at the site, net of any revenues generated by the assets for participating in 3rd party load management programs.

- Resilience shall be able to be configured in terms of hours able to operate during an outage, assuming no loss of a key system component.
- It shall be possible to configure each site's resiliency.
- It should be possible to configure site resilience by period, e.g. weekends vs. weekdays.

Manage microgrid configuration and resources

The EMS shall be able to operate the site's point-of-connection (PoC) to utility standards for a microgrid and operate the solar PV inverter and battery storage controller equipment, and flexible loads via standard physical and application-level interfaces, with or without a grid connection.

Proposals shall detail how they will interface with the specified Original Equipment Manufacturers (OEMs) by solar inverter, battery storage system, PoC, microgrid controller, building automation system and charge point system, if applicable.

Minimize site costs

The solution shall be able to minimize each site's net annual electricity costs, limited by available resources, vehicle and driver operational requirements, target resilience, surplus service prices and available rates.

The system should be able to identify and recommend the least cost PG&E rate given each site conditions and the overall system, where virtual net energy metering (VNEM) or other similar metering and rates are adopted.

Support current and future tariffs

The EMS should support all eligible PG&E tariffs across all sites, as well as for government agencies like FCRTA, and for organizations with multiple sites, microgrid systems and sites with charging infrastructure, including, but not limited to those summarized in the table below.

Rate/Program	Key Feature
RES-BCT	Credit transfer across non-contiguous sites.

Rate/Program	Key Feature
BEV-2	Replaces demand charges with predictable subscription blocks.
CMET	Allows islanding of multi-meter/cross-street assets.

Maximize value of surplus resources

The EMS solution should be able to interface with 3rd party systems as required to support the eligibility and delivery of the following 3rd party services using surplus energy resources:

- Resource Adequacy
- CEC Demand-Side Grid Support Program (DSGS)
- CAISO Emergency Load Reduction Program (ELRP)
- All eligible PG&E load management programs

If the solution is unable to automatically monetize surplus resources into these and other markets, it should enable 3rd party service providers via a standardized API.

Site Management Requirements

The EMS shall be able to configure each site to its specific conditions in terms of loads, energy resources, resilience target, rate, 3rd party services and associated price feeds. Each site's owner shall be able to monitor the energy system status, history and forecast conditions via a configurable dashboard which is detailed under Reporting.

Allows configuration of site-specific configurations

The EMS shall support the following configurations:

- **Connection** – Voltage and rating to feed into rate optimization
- **Resources** – Solar PV and battery storage capacities
- **Resiliency** – Target level
- **Rates** – Applicable rate

The EMS may support the following configurations:

- **Point of Connection** – Relevant equipment
- **Vehicles** – Number and type of vehicles needing to be charged and their route
- **Routes** – Route start, end, and distances
- **Chargers** – Number and type of chargers and ports

- **Building Management System** – Relevant identifying information
- **Services** – Markets that surplus resources can be applied to and associated pricing feeds

If the EMS does not directly forecast and optimize flexible loads and 3rd party services, it will need to integrate with systems that do, taking in load forecasts and flexibility constraints and communicating the planned schedule to the respective system.

Allows role-based access and configuration of site-level reporting

The specific roles and access levels are summarized in User Management.

Reporting Requirements

The EMS shall be able to report on the status, history and forecast[5] of:

1. Grid service
2. Point of Connection
3. Metered quantities
4. Energy resource state by device
5. Chargers by device
6. Electricity charges
7. 3rd party service delivery
8. 3rd party service revenues by type

Information shall be available at the system and site level, depending on user permissions.

The history shall be configurable by time interval and start and end date.

Reporting shall be accessible via:

- User configurable, online dashboards using a mobile device, tablet or computer
- API
- CSV or similar file

User Management Requirements

The EMS shall support the following key functional roles, each with read-only, read-write and administrative (manage users) sub-roles:

- **Transit Operator** – Able to manage all information
- **3rd party EMS Manager** – Able to manage all information
- **Site Owner** – Able to configure and view information about the site

[5] Forecasts may be limited to a subset of the reporting elements.

The EMS shall implement role-based security levels.

System Integration Requirements

The EMS shall integrate with or include the following key systems:

- Transit operations
- Charging operations
- Utility operations

The EMS should integrate with the following key software systems:

- Wholesale system / market operations

The EMS solution provider shall detail how they will integrate with specified systems, as well as the API the solution uses for integrating with 3rd party applications.

Technical Standard Requirements

- Microgrid hardware should comply with all relevant Federal, state and local standards.
- Microgrid operation should comply with all relevant PG&E standards.
- The EMS solution and service provider shall be ISO 27001 certified or similar.
- The EMS solution provider shall detail all technical, safety, security and industry standards their solution is certified to.

Miscellaneous Requirements

The provider shall detail the following specifications for its EMS solution:

1. Cloud solution availability / uptime
2. Site solution availability / uptime
3. User responsiveness / maximum lag times
4. Disaster restore points and restoration times

Implementation Requirements

The EMS solution provider shall:

1. Provide a detailed, week-by-week implementation plan
2. Provide a quote for a turnkey implementation and setup services
3. List all inputs needed to implement and setup, and timing of each
4. Provide an implementation risk management plan

The implementation team shall be described, with the project manager providing at least three references from similar implementations.

Support Requirements

FCRTA is a lean organization and prefers to contract with service providers to operate technical systems where possible and economic. The provider is therefore requested to quote the following support arrangements, as well as to recommend alternative support arrangements.

1. **Training** – This service would provide training to FCRTA and site owners regarding how to use the solution, including how to configure reporting.
2. **Operations** – This service would maintain system and site configuration, including to changes sites, and manage non-technical issues as they arise.
3. **Technical Support** – This is expected to be included in the annual license fee.

For each support service, the provider shall specify the hours of human support in Pacific Time, the use of any offshore contact centers or chat-bots, the response times by severity and impact of the technical issue, and any other service levels of note.

Organizational Requirements

Experience

The EMS solution and service provider shall detail its experience with similar projects. Ideally, these would be for a transit agency in California implementing a number of rural transit sites with microgrid capabilities and onsite solar PV and battery storage resources and monetizing surplus energy resources in 3rd party load management programs.

References

The EMS solution and service provider shall provide 3 references from similar project. Ideally, this would be a regional transit agency in California implementing a number of rural transit sites with microgrid capabilities and onsite solar PV and battery storage resources and monetizing surplus energy resources in 3rd party load management programs.

Risk Management Requirements

Given the operation of transit oriented microgrids is an emerging market, and many of the solution and service providers are start-ups, it is important that FCRTA be able to ensure that its EMS solution and service provider will remain solvent over the contract term.

The EMS solution and service provider shall comment on how it has structured its solvency and performance risks in comparable applications, including:

- **Guarantees** – Has or can bank, parent company or investor guarantees be provided to cover the cost of replacing the EMS in case of insolvency?
- **Software Escrow** – Has or can the software source code by provided in escrow to enable FCRTA to obtain 3rd party support in case of insolvency?

The provider should propose alternative insolvency and performance risk mitigations.

Budget Requirements

The provider shall detail its proposed budget for solution implementation, annual support by support type and annual license fees by cost driver, e.g. number of sites.

Any exclusions or assumptions regarding the proposed budget should be clearly stated.