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Subject: Fresno Council of Governments Electric Vehicle Readiness Plan: Baseline Conditions Assessment Section

OVERVIEW & PURPOSE:

Determining specific strategies which will support economic and equitable adoption of electric vehicles in Fresno County requires a detailed understanding of current plug-in electric vehicle (PEV) conditions, including electric vehicle adoption rates for county residents and transportation agencies, existing infrastructure, and their key drivers and barriers.

As such, the project team has conducted a thorough baseline conditions assessment as a critical component of developing a comprehensive and effective Fresno Council of Governments Electric Vehicle Readiness Plan (Plan). The results of this assessment will serve as a foundation and guide to prioritizing and selecting specific PEV enablement strategies, including e-Mobility[1] options and public charging infrastructure locations for inclusion in the Plan.

This memorandum presents key findings from the project team's review of the existing and baseline conditions as deemed relevant to advancing efficient and equitable adoption of passenger PEVs within Fresno County. This analysis includes current levels of PEV adoption, availability of charging infrastructure for public use, and tail pipe emissions. Results for the existing regional transit fleet are also presented in this document.

EXISTING PEV CONDITIONS

An assessment of existing conditions within Fresno County was conducted by considering many parameters including the following:

- Adoption of electric vehicles by residents and transportation agencies
- Mean household income
- Home ownership rates
- Local public transportation fleets
- Existing publicly available charging infrastructure
- Transit fleet depots and fleets

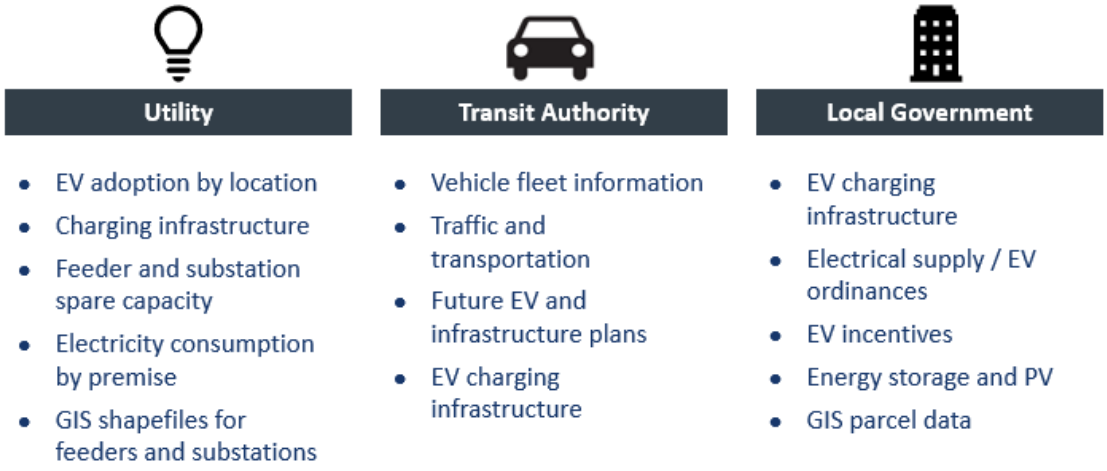
INFORMATION GATHERING AND VALIDATION

Information used to analyze FCOG's existing conditions was gathered from participating organizations using a request-for-information process, and desktop research. The results of the analysis were then presented to the stakeholder working group.

To collect information for the analysis, the project team utilized publicly-available datasets. Additionally, a Request for Information (RFI) was issued to relevant stakeholders, including transit agencies, local governments and the primary utility, requesting additional necessary data that included:

[1] eMobility refers to a range of electricity powered transportation options, not just private vehicles.

Figure 1 – Type of Data by Organization



Source: Energeia

Data gaps were estimated based on publicly available data, substitute data, or alternative estimation methods. An example of the table sent is included in the appendix.

The results of the existing conditions analysis, presented in the following sections, were presented to the stakeholder working group for feedback and will be further validated during the public consultation process.[2]

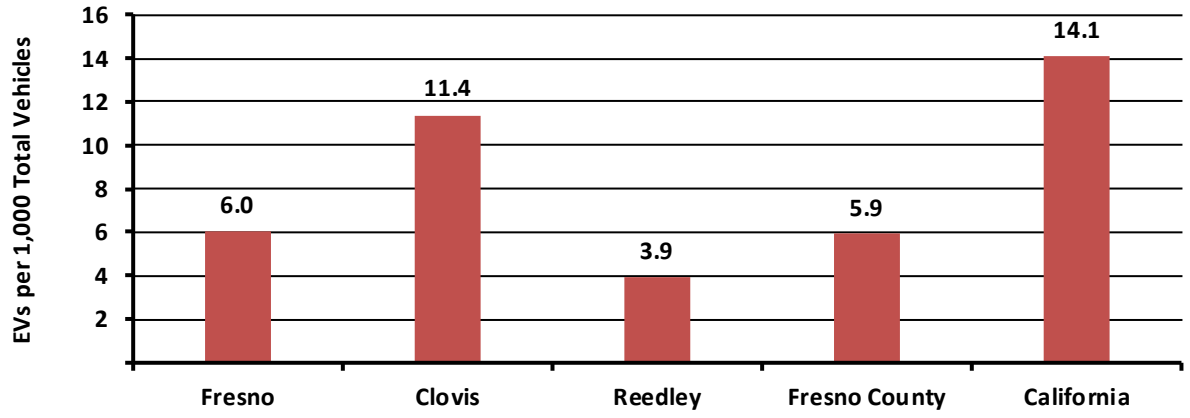
EXISTING ELECTRIC VEHICLES

In order to conduct data-driven projections and forecasts on expected PEV adoption by Fresno County residents under current and potential future conditions, data gathering was conducted utilizing data obtained through the RFI process and from the Department of Motor Vehicles (DMV), which provided data on PEVs registered in the County.

Public adoption of PEVs is defined as the number of the number of passenger and light truck PEVs purchased divided by the total number of passenger vehicles in the county. Data for public adoption of PEVs within Fresno County is presented in Figure 1 and is in terms of number of PEVs per 1,000 vehicles.

[2] The Stakeholder Working Group membership and meetings will be summarized elsewhere in the Plan.

Figure 1 – PEV Adoption per 1,000 Vehicles



Source: CA DMV (2018), Energeia analysis

The above findings show that the County currently has a lower adoption of PEVs than the California state average. Fresno and Reedley have significantly lower PEV penetration than the rest of the state, with Clovis being closer to California's average adoption.

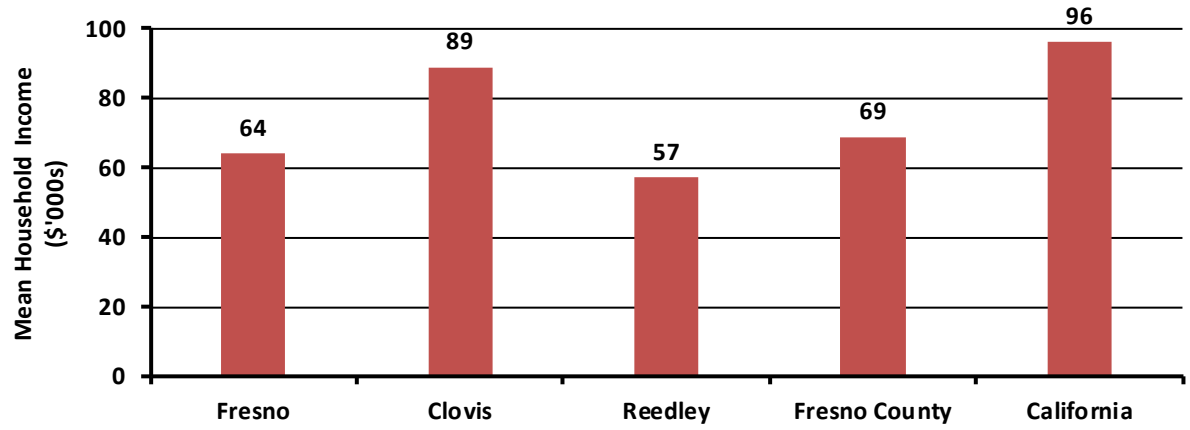
Differences in observed adoption within Fresno County, and in particular the major cities, compared to the California state average, are likely attributed to differences in key early adopter drivers, including income, home ownership and number of cars owned.

MEAN INCOME

Early adopters of PEVs have shown to be above average in income, own their own home, and own multiple vehicles to overcome the limited range of early vehicles.[3]

Average income within Fresno County mirrors PEV adoption rates in Fresno county and cities to date and can be seen in Figure 2. This is evidenced by the comparison of Figures 1 and 2.

Figure 2 – Mean Household Income (in thousands of dollars)



[3] Scott Hardman et al. (2016), *Comparing high-end and low-end early adopters of battery electric vehicles*, https://www.sciencedirect.com/science/article/pii/S0965856416302208

Source: Census Data (2017), Energeia analysis

The census sourced figures above show the mean household income within Fresno County is significantly lower than the state-wide mean. Lower income may be a key barrier to early adoption of PEVs for a number of reasons. Some of these households may not have a vehicle at all, much less interest or capability to purchase a new electric vehicle. Higher income households tend to adopt electric vehicles as a secondary vehicle and own a conventional internal combustion engine vehicle to support longer trips.

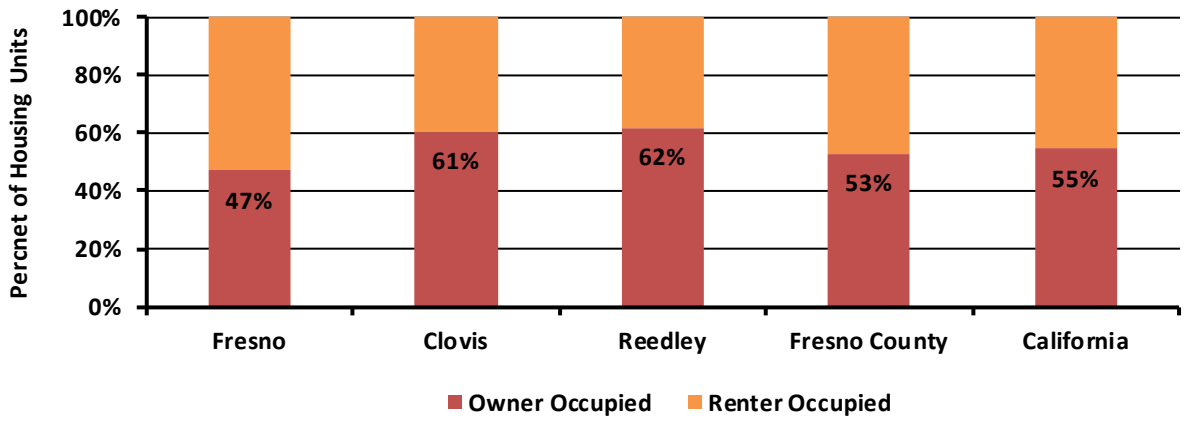
Although EVs are expected to hit cost parity with ICEs within the next few years, cost premiums compared to an equivalent ICE model are a reality for most EV models. For low income households, depending on their cost burden, they may not be able to purchase a second vehicle. These households comprise a subset of disadvantaged communities within Fresno County in which alternative modes of electrified transportation, such as ride sharing services and public transportation, may need to be explored to help overcome the aforementioned barriers. These populations will need additional financial resources and support to help achieve state PEV adoption targets. Strategies for addressing the resource gap will be included as part of the funding resources conducted as part of this work.

HOME OWNERSHIP

Another potential barrier to PEV adoption is renting a home. Renters can face increased difficulty in installing a home charger, generally a pre-requisite for purchasing a PEV in the absence of a robust public charging network. Additionally, renters often lack financial capacity compared to homeowners, and have an increased likelihood of moving in the near-term, undermining any economic incentive to buy a PEV. Both of these characteristics make this demographic less likely to purchase a PEV.

The localized data shows that Fresno City and County both have above average levels of renters compared to statewide levels (Figure 3). The low level of home ownership within the County supports the current observed lower levels of PEV adoption.

Figure 3 – Home Ownership Rates

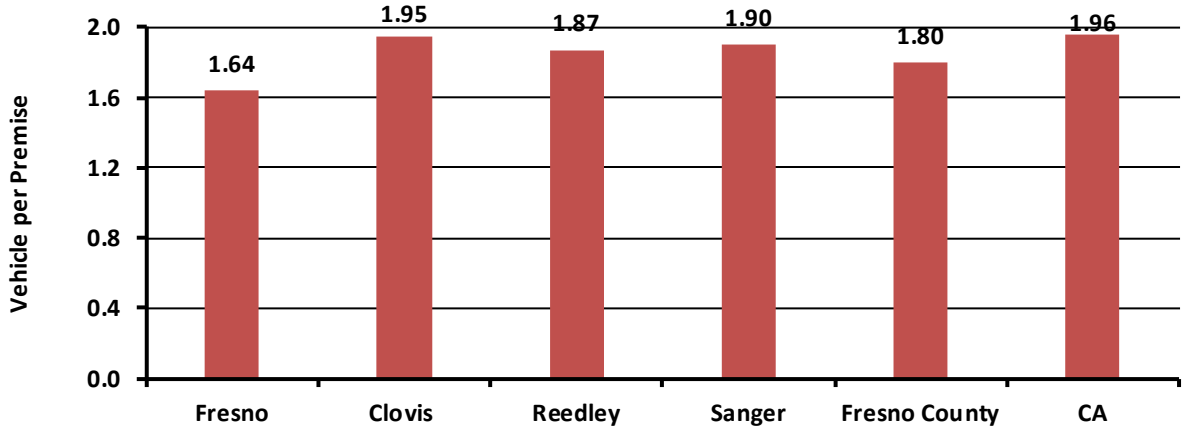


Source: Census Data (2017), Energeia analysis

Number of Vehicles per Household

Early adopters of EV vehicles tend to have multiple vehicles due to the current relatively low driving ranges and the general lack of public charging infrastructure, which constrains long distance traveling. As the range of mass-available vehicles is expected to significantly increase in the next five to ten years, this characteristic may become less relevant. For this analysis, the reporting of the number of vehicles per household was analyzed based on census reported data. This information is presented in Figure 4. Although Fresno County is slightly below the statewide average, it is not a significant enough difference to pose a major obstacle.

Figure 4 – Number of Vehicles per Household

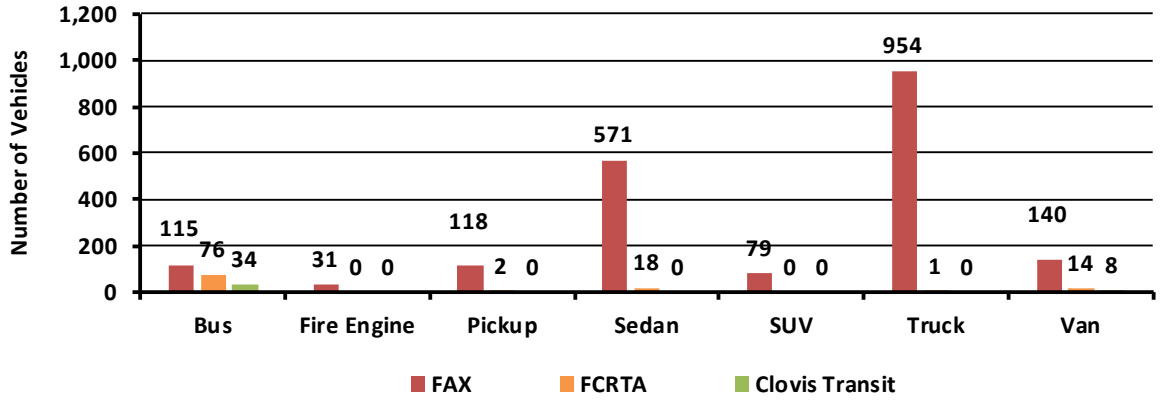


Source: Census Data (2017), Energeia analysis

Regional Transit Fleets

As part of this effort, the project team reviewed both County and City transit fleets to identify electrification opportunities. The agencies reporting fleet data included Fresno Area Express (FAX), Clovis Transit, and Fresno County Rural Transit Authority (FCRTA), which together address the public transportation needs of residents throughout the county. The distribution of existing vehicles by type and agency is presented in Figure 5.

Figure 5 – Transit Vehicles by Type and Agency



Source: FCOG RFI (2019), Energeia analysis

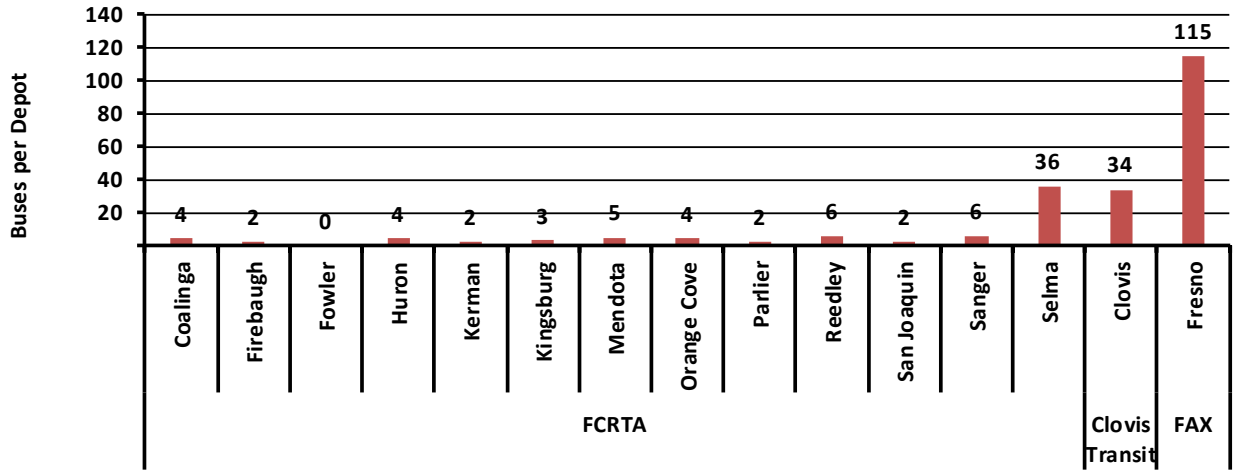
Currently, Fresno County has 225 buses across its transit agencies (FAX, FCRTA, and Clovis Transit). The subsequent transit fleet analysis focused on bus fleets as they:

- Are most likely to electrify in the short term (five to ten years) due to California state mandates to fully transition to electric buses by 2040[4]
- Have the largest impact on infrastructure needs, due to the daily cycles required and high charging demand
- Have electrification options (i.e. electric buses) on the market capable of replicating functionality of their ICE counterparts.

Transit Depots

A key visualization of the transit bus fleets is at the depot level, where electric vehicle charging infrastructure will need to be deployed in the short term. The bus counts per depot are presented in Figure 6. Both FAX and Clovis Transit utilize one depot for the entirety of their fleets, while FCRTA is spread among 13 depots. It should be noted that FCRTA's planned Selma facility is expected to house a large portion of their fleet and will include multiple PEV chargers on site. To effectively insure that the correct charging solutions are being installed at individual facilities, it is highly recommended for each facility to perform a detailed analysis on their individual bus duty cycles and scheduling prior to charger selection and installation.

Figure 6 – Transit Fleet Buses by Depot



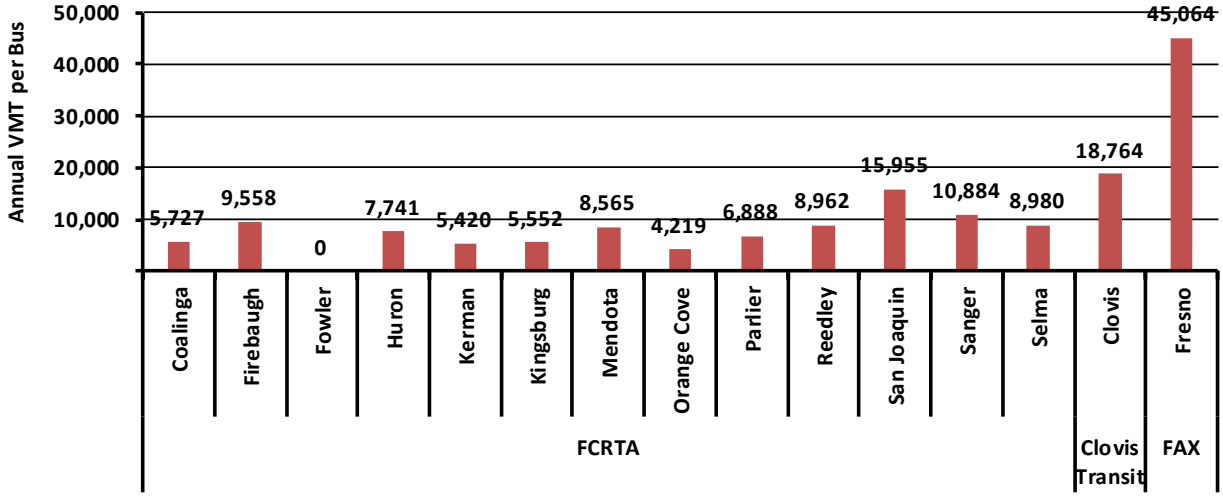
Source: FCOG RFI (2019), Energeia analysis

Annual Vehicle Miles Traveled

An assessment of annual vehicle miles traveled (VMT) was conducted to estimate the distances being traveled, daily refueling and battery requirements. The reported annual VMT of buses by depot is presented in Figure 7.

[4] CARB (2018), *California transitioning to all-electric public bus fleet by 2040* - https://ww2.arb.ca.gov/news/california-transitioning-all-electric-public-bus-fleet-2040

Figure 7 – Annual VMT of Transit Fleet Buses by Depot



Source: FCOG RFI (2019), Energeia analysis

The analysis indicates that FAX buses travel at least twice as much annually as their counterparts, which is consistent with a relatively high-density service area, enabling higher utilization per bus. Charging infrastructure plans will need to consider the mileage as a key driver of the storage and charging needs and subsequent grid impacts faced by each depot.

EXISTING CHARGING INFRASTRUCTURE FOR PUBLIC USE AND FOR PUBLIC TRANSIT

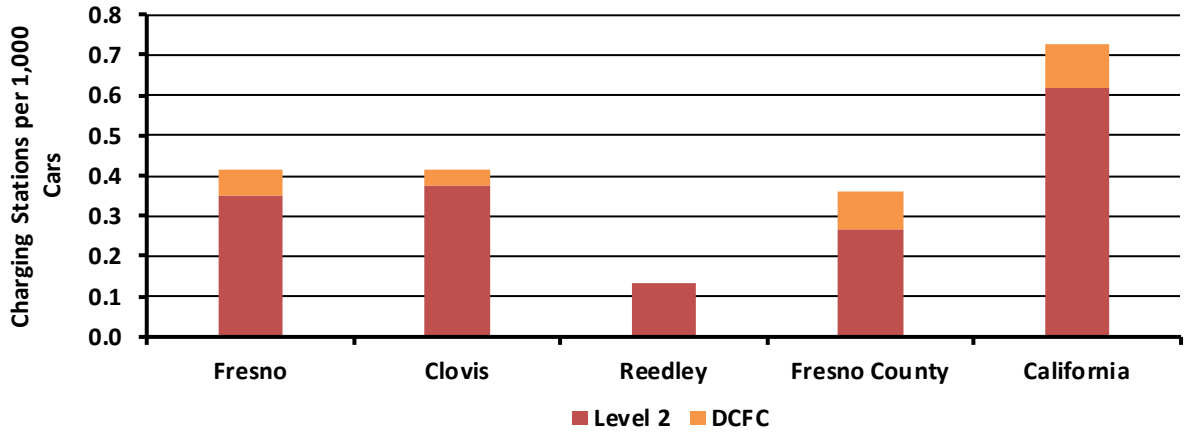
In order to assess the most effective and equitable opportunities for charging infrastructure siting, an analysis was conducted on existing charging infrastructure within Fresno County. This analysis was based on data obtained through public domain research of electric vehicle charging station counts and via the RFI process described in the previous section.

CHARGING STATIONS FOR PUBLIC USE

Insufficient levels of charging infrastructure for public use is another key barrier to PEV adoption. The lack of a robust public electric vehicle charging network can contribute to the "range anxiety" that many drivers feel regarding electric vehicle adoption where they worry that they will be stranded without an electric vehicle charger.

The number of reported public charging stations which are open for use by any PEV driver in Fresno County by major city and at the county level compared to statewide levels is reported in Figure 8. The comparison shows that the current number of public charging stations is less than the state level on a per 1,000 car normalized basis. However, the ratio of county deployments of L2s to DCFCs has been consistent with statewide ratios.

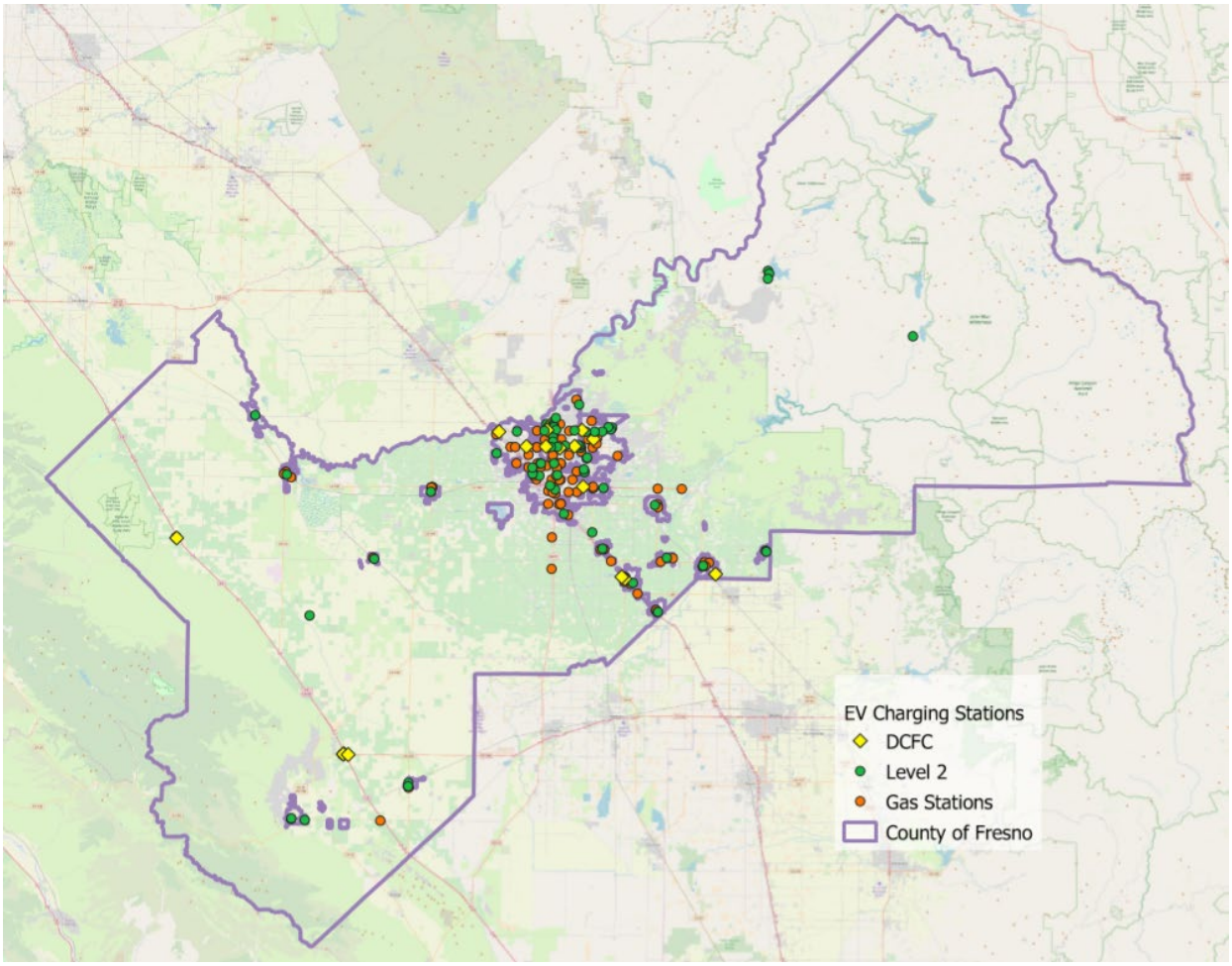
Figure 8 – Charging Stations by City, County, and Type



Source: US DOE (2019), CA DMV (2018), Energeia analysis

Figure 9 shows the location of all reported public charging stations in Fresno County by type. The figure also shows the location of gas stations to provide context as to the current routine of existing drivers in terms of where they fill up gas for their internal combustion engine vehicles. Siting electric vehicle chargers near these locations would allow for PEV adoption without significantly altering driver impacts – however, there may also be an opportunity to improve conditions, which will be examined as part of the optimal infrastructure siting analysis.

Figure 9 – Locations of Public Charging Stations

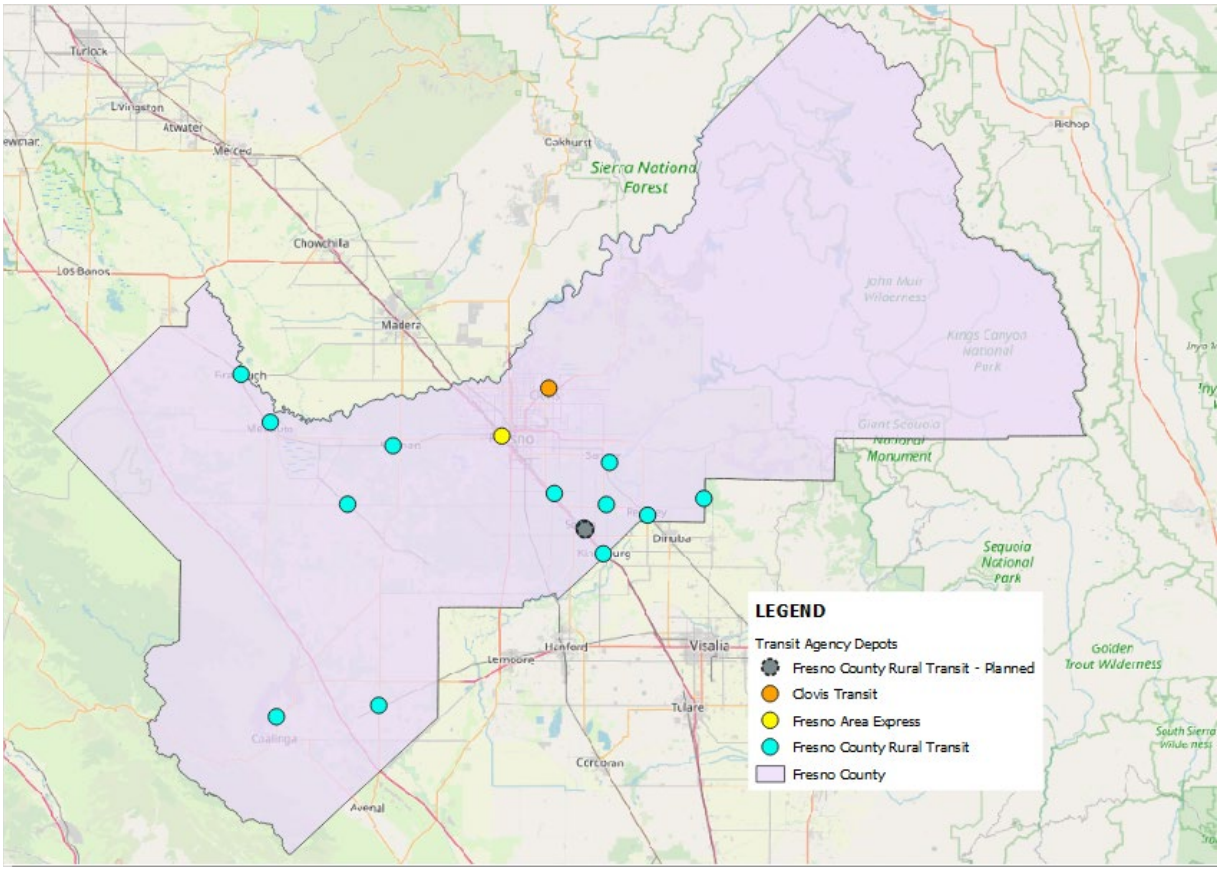


Source: Energeia Research

Charging Stations for Public Transit Fleets

A map of public transit fleet depots is presented in Figure 10, based on information provided in response to the RFI. Currently, FCRTA is the only agency with chargers deployed to power their electric buses at their Selma maintenance facility and public works yards.

Figure 10 – Locations of Transit Fleet Depots



Source: FCOG RFI (2019-2020)

EXISTING AIR QUALITY CONDITIONS

Existing air quality conditions within Fresno County were assessed as part of the baseline conditions assessment in order to identify high priority areas based on air quality burden and to inform quantification of the benefits of PEV charging station implementation. The analysis is based on data that was obtained via public domain research of emission trends and their correlations with vehicle uptake. Heatmap data was collected from the California Office of Environmental Health Hazard Assessment's (OEHHA) CalEnviroScreen 3.0 tool.

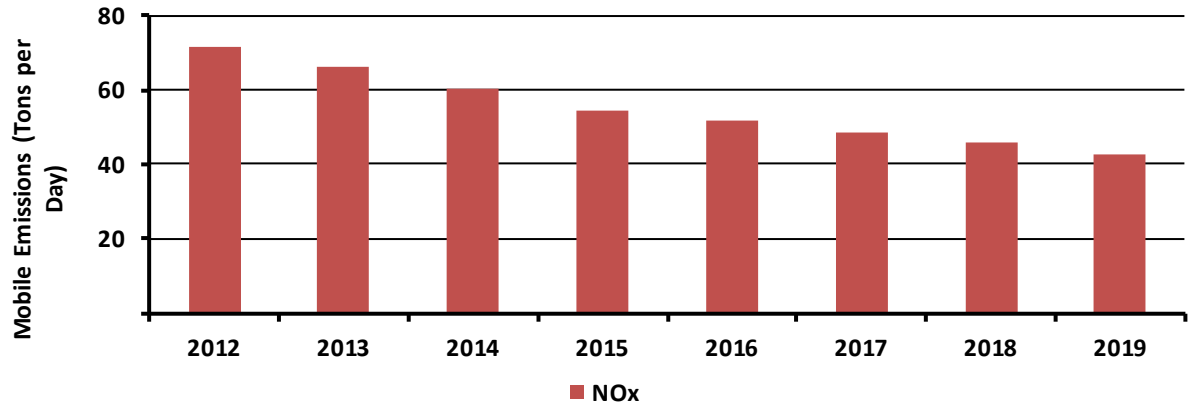
EMISSION TRENDS OVER TIME

Trends in the reported tailpipe emissions of nitric oxides (NO_x), sulfuric oxides (SO_x), and particulate matter 2.5 or less micrometers in diameter ($PM_{2.5}$) and particulate matter 10 or less micrometers in diameter (PM_{10}) from 2012-2019[5] are reported[6] in Figures 11-13.

The data shows that NO_x, $PM_{2.5}$, and PM_{10} emissions have continued to decline throughout the reported period. Emission levels of SO_x have decreased significantly in the years 2012-2014 and then have held at a fairly stable level since.

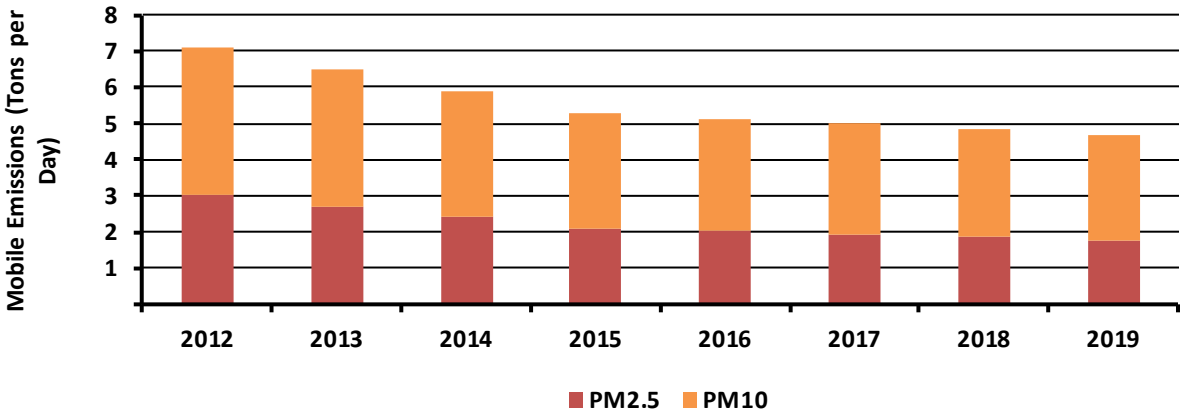
[5] An 8-10 year historical period was selected based on the 10-year forecast period of the Plan.
[6] SOx, NOx, P10 and P2.5 are the most commonly analyzed tailpipe and environmental emissions.

Figure 11 – Trends in NOx Emissions



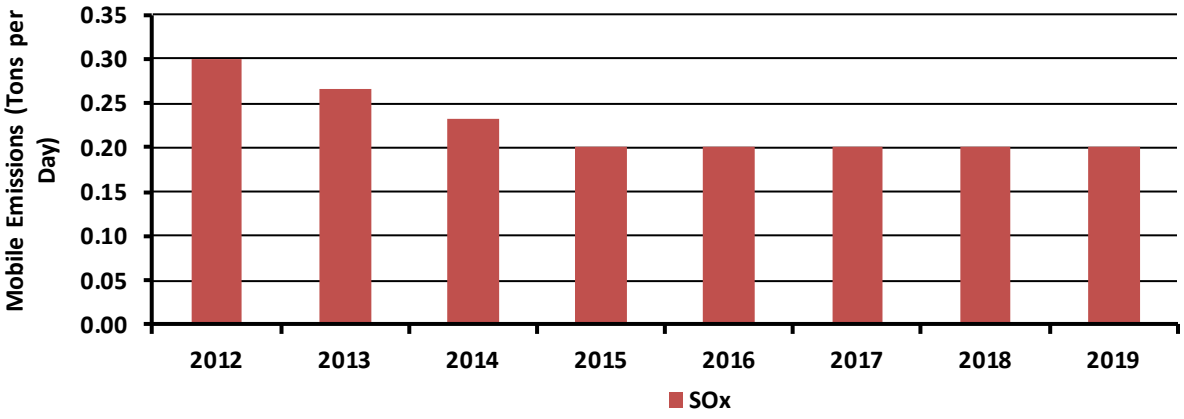
Source: CARB (2016), Energeia Analysis

Figure 12 – Trends in $PM_{2.5}$ and PM_{10} Emissions



Source: CARB (2016), Energeia Analysis

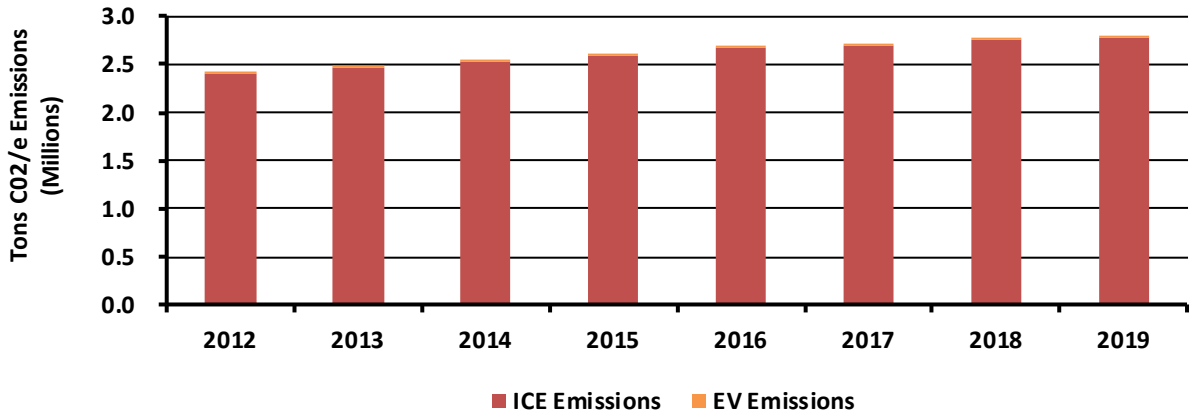
Figure 13 – Trends in SO_x Emissions



Source: CARB (2016), Energeia Analysis

In addition to air quality conditions, existing transportation-related greenhouse gas emissions were also reviewed as of CO_2 emissions is a priority statewide. Figure 14 shows CO_2 emissions[7] trends from 2012-2019 from passenger vehicle driving.[8] These are calculated based on per vehicle emissions estimates and the historical vehicle registration count for the County.[9]

Figure 14 – Trends in CO_2 Emissions



Source: US DOE (2019), CA DMV (2018), Energeia Analysis

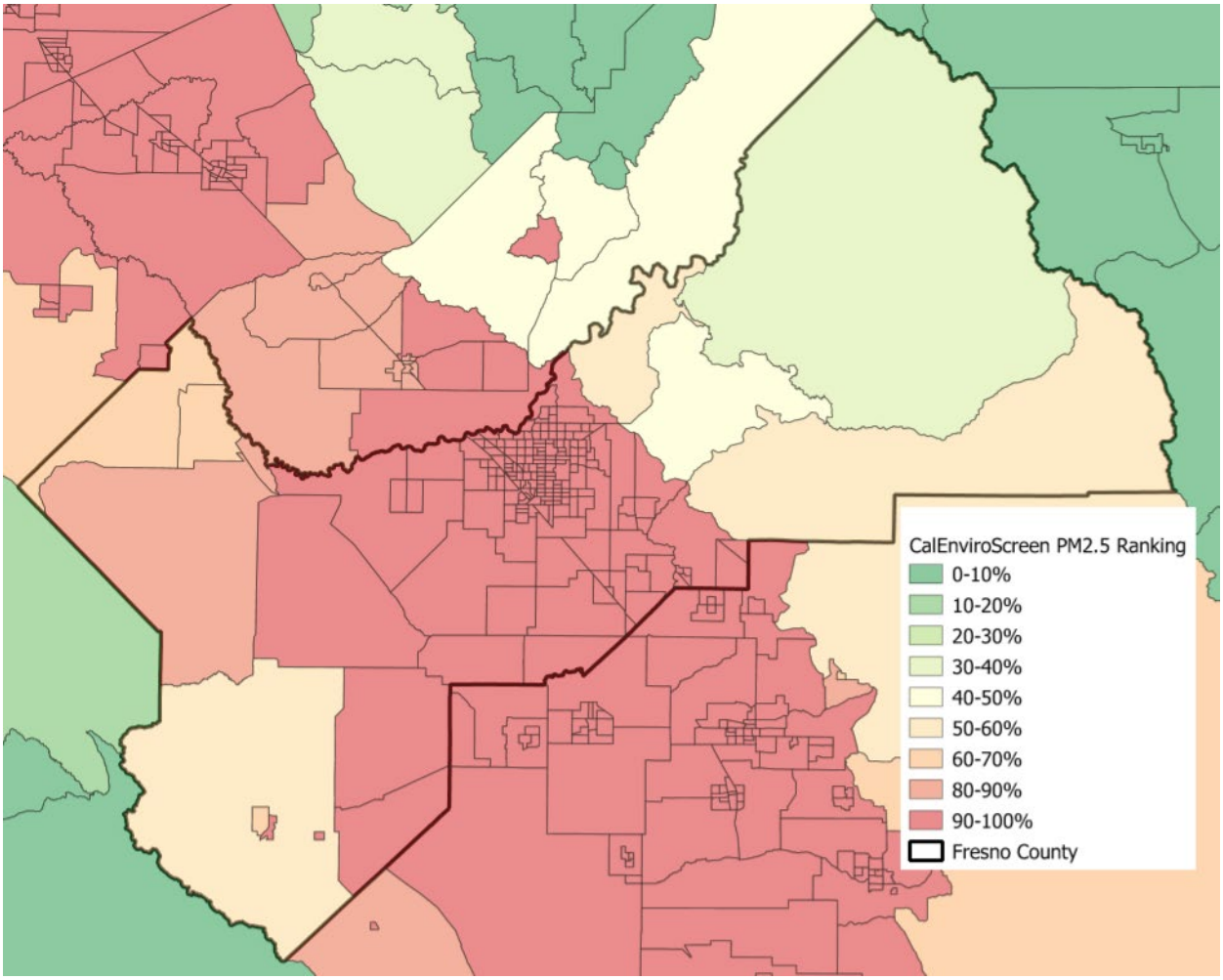
Localized Emissions Maps

Many areas within Fresno County are particularly impacted by high levels of pollutants generated by internal combustion engine vehicles, with multiple census tracts scoring in the highest percentile groups for both $PM_{2.5}$ concentration and diesel emissions in the state. These emissions are significant contributors to decreased air quality and can cause negative health impacts, including systemic respiratory complications and illnesses.

Figures 15-16 present localized emissions maps of $PM_{2.5}$ concentration and emissions levels within Fresno County, based on CalEnviroScreen 3.0 data. The maps are presented in the form of heatmaps, to provide a picture of zones particularly impacted with these high levels of pollutants. It is worth noting that higher emissions levels typically correlate with higher population concentrations. These

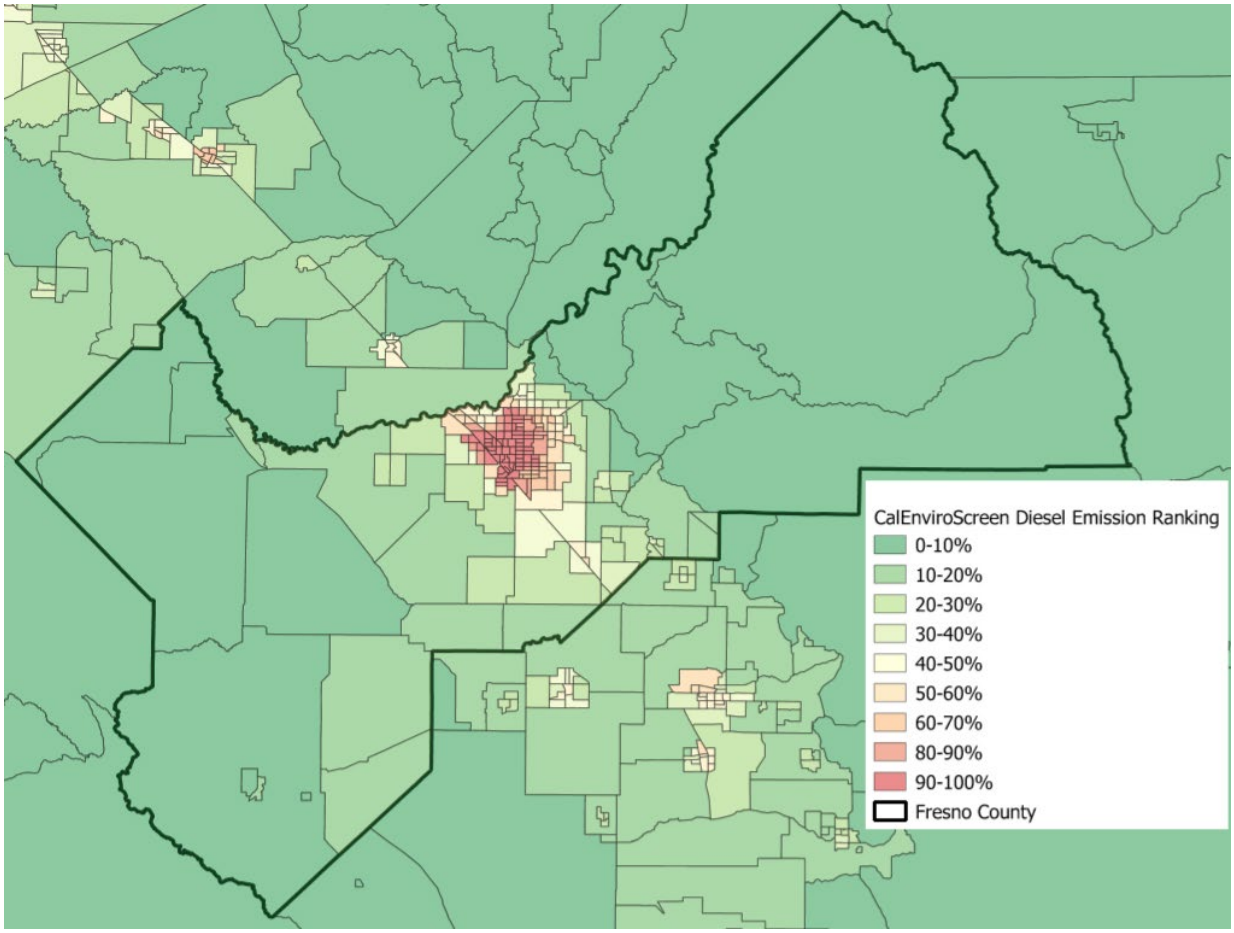
[7] CO2 intensity is based on a constant U.S. Department of energy assumption for EV and ICE vehicles.
[8] Emissions are directly correlated to the on-road vehicle count, which has been steadily increasing in Fresno County.
[9] EV emissions are calculated “well-to-wheel”, essentially the emissions generated from producing the electricity used by the vehicle.

Figure 15 – Heatmap of PM2.5 Concentration



Source: CalEnviroScreen 3.0, Energeia Analysis

Figure 16 – Heatmap of Diesel Emissions



Source: CalEnviroScreen 3.0, Energeia Analysis

PRELIMINARY FINDINGS

This memorandum presents the results of the analysis done as part of the baseline conditions assessment to inform the electric vehicle charging siting locations for public use within Fresno County as part of the Electric Vehicle Readiness Plan being prepared for the Fresno Council of Governments.

As a result of this analysis, the following preliminary findings are presented:

- Fresno County is currently below the state average in terms of electric vehicle adoption
- Many residents within Fresno County face relatively greater obstacles to PEV adoption including lower mean household incomes and lower levels of home ownership
- The number of publicly available electric vehicle charging stations with Fresno County is lower than the state average, representing another barrier to reaching statewide targets
- A robust public charging station network is critical to supporting and encouraging electric vehicle adoption to mitigate specific barriers faced by residents
- A detailed analysis of bus duty cycles and scheduling is needed to ensure optimal fleet and chargers purchases
- Identified emission “hot spots” would especially benefit from increased electric vehicle adoption and the associated reduction in emissions

APPENDIX:

RFI Summary: Requested Information	
Vehicles	Government transit fleet vehicles (by type, fuel, age, organization, dept., location, annual miles)
	Current EV purchase plans by organization
	Transportation miles per year by vehicle type (by household or area)
	Number of vehicles (by household or area)
	Avg. vehicle miles traveled (by household or area)
	Number of EVs (by household or area)
	Future plans to purchase an EV (by parcel or area)
Charging Infrastructure	Government chargers (by type, location, vendor, installation date, organization and dept)
	Current charging infrastructure plans by organization (including non-governmental)
Buildings	Relevant residential and commercial building ordinances covering parking, electrical supply for new construction
	Government owned buildings
	Current solar PV, storage, or charging plans by building (for FCOG local government)
	Tax assessor data by household
	Rent rates vs. ownership by household or area
	Single family vs. multi-family households by household or area
Electrical Infrastructure	Medium voltage feeders and substations
	Annual electricity consumption by household
Graphical Information System (GIS)	Shapefiles for all roads, households, permitting requirements, and other common land uses
	Shapefiles for all low voltage (LV) and medium (MV) feeders and substations in Fresno County
	GIS layers for available social indicators within the boundary (i.e. crime, mobility access, income, etc.)
Other Infrastructure	Traffic by road by time of day
	Storage adoption by household
EV Programs	Current EV incentive programs by Fresno County organization and department
	Current plans for Future EV incentive programs by Fresno County organization and department

Subject: Fresno Council of Governments Electric Vehicle Readiness Plan: EV Charging Infrastructure Performance Metrics Section

OVERVIEW & PURPOSE:

As the state of California and its local communities continue to invest in public charging infrastructure in an effort to make progress on the state's greenhouse gas emissions targets, developing key performance indicators (KPIs) is critical to ensuring implemented programs deliver expected results. These metrics should account for the interests of electric vehicle (EV)drivers, non-EV drivers, other users of public space, and the broader electric vehicle market potential[10]. As one of the frontrunners in stimulating electric mobility in the United States, California and its local partners, such as Fresno Council of Governments, and their work in developing these metrics can set replicable standards for measuring the success of public electric vehicle charging infrastructure investments nationwide.

The California Energy Commission (CEC) estimates that the state will need at least 344,000 electric vehicle chargers to meet the goal of 1.5 million zero emissions vehicles on the road by 2025[11]. Planning, management, and design of plug-in hybrid electric vehicle (PEV) charging infrastructure are critical components of successful transportation electrification and these stages should be accounted for in developing key performance indicators to enhance effective rollout and operation. The development of KPIs can also provide insight useful to share with stakeholders and implement interventions.

This memorandum summarizes the key stakeholders, result indicators as well as performance indicators which will be vital in performance measurement of the charging infrastructure during the roll-out process for inclusion in the Electric Vehicle Readiness Plan (EVRP), which aims to advance PEV adoption, being prepared for the Fresno Council of Governments (FCOG).

EFFECTIVE KPI AND KRI CHARACTERISTICS

Metrics are important in measuring a number of parameters and are particularly effective for demonstrating initiative success. A Key Performance Indicator (KPI) refers to a metric that reflects performance while a Key Result Indicator (KRI) refers to a metric that reflects results. Thus, KPIs are a measure of how well something is being done within a specific amount of time and are monitored constantly. On the other hand, KRIs are trailing indicators. They are outcome-based measurements and are measured after the occurrence.
KPI Characteristics:

- Have a significant impact on a strategic objective
- Are non-financial in nature
- Have short measurement cycles

KRI Characteristics:

- Typically financially oriented
- Are often centered around perception, such as satisfaction of community members using electric vehicle chargers

[10] Helmus, J.R.; van den Hoed, R. Key Performance Indicators of Charging Infrastructure. In Proceedings of the 29th Electronic Vehicle Symposium, Montréal, QC, Canada, 19–22 June 2016; pp. 1–9

[11] http://opr.ca.gov/planning/transportation/zev.html

- Occur over longer measurement cycles
- Success typically associated with growth or long-term improvements or reductions to meet established goals (e.g. greenhouse gas reductions)

Developing KPIs and KRIs are important because they keep objectives at the forefront of decision making.

FCOG EVRP: KPI AND KRI OBJECTIVES

As part of the development of performance metrics, four primary goals of a robust public electric vehicle charging infrastructure network were identified:

-
- Reducing GHG emissions
- Encouraging equitable electric mobility options
- Optimizing utilization of charging infrastructure
- Developing supportive business use cases

Based on the primary performance indicators and result indicators are presented for each of the objectives in Tables 1-4.

1. Sustainability Goals

Objective	Result Indicators	Performance Indicators
Reducing GHG emissions	• Improving air quality by reducing particulate matter, ozone levels and carbon monoxides • CO_2 emission reductions	• • kWh charged per total vehicle miles travelled (VMT) • Ratio of kWh charged to gallons of gasoline sold • EV Vehicle penetration (Total EV/Total car registration)

Table 1: Sustainability KRIs and KPIs

A primary objective for FCOG in developing public charging infrastructure is to facilitate zero emission miles to contribute to improved air quality (reducing emissions of CO, NOx, PM) and climate impacts (reducing CO2). Contributing to the sustainability goals is directly related to the result indicator “amount of electricity charged (in kWh)”, given that the indicator kWh provides a proxy for the amount of EV miles enabled by the charging infrastructure and thus for the amount of NOx, CO and PM prevented compared to internal combustion engines. Translation factors from kWh to number of miles driven as well as average emission factors of internal combustion engines are readily available to make relatively accurate estimations for air quality and climate change effects of the charging infrastructure. Measuring the increase in EV penetration is

also a good performance indicator as it can reduce carbon pollution and improve air quality.

2. Facilitating Electric Mobility

Objective	Result Indicators	Performance Indicators
Encouraging electric mobility options	• Accessibility of charging infrastructure • Charger utilization by urban/rural communities or communities of color • Growth in number of users of charging infrastructure (with considerations for vulnerable communities)	• Electrical capacity utilization • Number of unique charging station users • Percentage of types of different chargers (Level 2, DCFC) • Charge time ratio (charge time/connection time) • Spatial considerations (equitable distribution, maximized geographic coverage, etc.)

Table 2: Electric Mobility KRIs and KPIs

A second category of objectives relate to the objective of FCOG to play a facilitating role for increased adoption of electric mobility. This largely relates to facilitating EV users in providing charging facilities but also candidate EV users, considering purchasing an EV. Related result indicators include providing accessibility of charging infrastructure.

Accessibility to charging infrastructure is key to facilitating current (and future) EV users. One way to operationalize accessibility is geographic coverage of charging stations within the county. Another metric could be analysis of length of charging sessions, which can ultimately provide correlation of how extended charging can reduce the accessibility and availability of electric vehicle charging units for other users. In that vein, sessions that extend well past charging time can therefore cause an unnecessary decrease of accessibility for EV users. Monitoring this percentage per areas of scope is a necessity to take targeted measures. Given that accessibility is largely inhibited by extended sessions at a charger, interventions focused on removing fully charged EVs to make way for non-charged EVs can be powerful to achieve better utilization of the charging infrastructure.

3. Optimizing Capacity Utilization

Objective	Result Indicators	Performance Indicators
Optimizing utilization of charging infrastructure	• Utilization of charging infrastructure	• Percentage of low utilized stations

Table 3: Capacity Utilization KRIs and KPIs

A third category of objectives for policy makers relates to public concerns about using scarce parking space for charging facilities. This largely translates to the earlier mentioned electrical capacity utilization of charging infrastructure. Whereas optimizing accessibility problems concerning over-utilization, scarce parking resources require the charging infrastructure not being under-utilized.

For policy makers finding the sweet spot between over- and under-utilization, or in KPI terms, is marked by achieving sufficient level of utilization while retaining a sufficient level of accessibility for EV users. The topic of utilization is particularly relevant on a neighborhood level or for a cluster of charging stations, given that policy makers decide upon further rollout of charging stations by observing trends in utilization of neighboring charging stations.

4. Optimizing Facilitating Business Case for Charging Infrastructure

Objective	Result Indicators	Performance Indicators
Developing supportive business use cases	• Costs decreased • Benefits increased • Over-capacity reduced	• Costs/benefits-ratio • Life cycle of charging infrastructure • ∑kWh charged/∑potential kWh charged • Changes in peak kW

Table 4: Business Use Case KRIs and KPIs

Another concern for policy makers relates to improving the business case for public charging infrastructure, or somewhat broader, the facilitation of charging infrastructure development by commercial entities. Understanding and improving the business case is then high on the agenda of policy makers as well as the kind of actions local governments and agencies may play in improving it. The business case in its most rudimentary form is basically made up of two factors: costs and benefits.

Costs of Charging Infrastructure

The main costs for charging infrastructure relate to hardware costs, site preparation costs, installation, maintenance, electricity and grid connection costs. Particularly hardware and connection costs have a relatively high share in the total cost of ownership. Most of these costs (e.g. hardware, maintenance, installation, electricity) lie outside the span of control of FCOG. Nevertheless, other cost factors provide opportunities for interventions and require monitoring to establish possible effects. Typical KPIs then include (i) cost-benefit ratios (to be calculated on a lifecycle basis), (ii) percentage of charging stations with positive business case, (iii) life cycle of current charging stations.

Benefits of Charging Infrastructure

Benefits of charging infrastructure largely relates to broader societal benefits such as improved health of the residents and environmental benefits like reduced greenhouse gases and carbon dioxide emissions. Increase in charging infrastructure will drive more EV penetration which will improve air quality. Hybrid and plug-in electric vehicles can have significant emissions benefits over conventional vehicles. EVs can also reduce the emissions that contribute to climate change and smog, improving public health and reducing ecological damage.

PERFORMANCE METRICS

Developing public charging infrastructure has effect on multiple stakeholders for a government agency. FCOG programs with the goal to stimulate the development of charging infrastructure have to manage these different stakeholders and play a role in how policy makers related to this program evaluate the performance of the charging infrastructure. This goes beyond assessing whether sufficient charging points are provided, or whether a particular amount of charging sessions have been achieved for a certain month. Policy makers also have to manage how residents evaluate the development of charging infrastructure at the expense of parking spaces, as well as how EV users evaluate the availability of charging infrastructure in their neighborhood. As such stakeholders' interests and their importance for policy makers provides an important starting point for assessing the major stakes they have to manage when it comes to the rollout of new charging infrastructure. Table 5 provides an overview of the four most prominent stakeholders which influence how policy makers evaluate the performance of charging infrastructure.

Performance Metrics	Stakeholder	Data Source	Frequency of Measurement	Community Relevance
Air quality improvement due to charging infrastructure	FCOG	Charger data logs and publicly-available data such as data from CARB	Monthly	Reduced air pollution exposure
Climate change improvements due to charging infrastructure	FCOG	Charger data logs and publicly-available data such as data from CARB	Annually	GHG Reduction
Achieved cost effectiveness of charging infrastructure	FCOG	Charging Infrastructure Cost	Quarterly	Makes EV more affordable Attracts more EV users
Accessibility of charging infrastructure	EV Users	Customer Feedback	Quarterly	Developing comprehensive

				regional charging network Easy availability of chargers
Growth in number of users of charging infrastructure	EV Users	Number of EVs in the county	Monthly	Encourages green living
Increased level of utilization of charging infrastructure	Residents (non EV users)	Charge time of the charging station per day	Weekly	Makes charging infrastructure investment more relevant
Charging infrastructure – cost reduced	Commercial parties in EV chain	Shelf life of the charging station	Annually	Accelerating adoption by individuals
Charging infrastructure – benefits increased	Commercial parties in EV supply chain and EV users	Electricity price and tariffs	Annually	Accelerating adoption by individuals
Business case charging infrastructure improved	Commercial parties in EV supply chain and EV users	Percentage of charging stations with a positive business case over time	Annually	Opportunity to add more charging infrastructure

Table 5: Key stakeholders, objectives and metrics of charging infrastructure

CONCLUSION

Comprehensive metrics can be used to monitor strategies and progress on critical areas, report findings, adjust programs as needed, enable goal setting and tracking, and inform future decision making. This memorandum provides an overview of 1) characteristics of effective KPIs and KRIs; 2) objectives of a robust public electric vehicle charging network; and 3) proposed performance metrics and the responsible parties and data sources associated with them. Table 1-4 provides an overview of the identified KRIs and KPIs. The list was developed to measure a variety of areas which would contribute to the long-term success of the implementation of a charging network. Ease of measurement and availability of data were also considered when developing the metrics. It should be noted that metrics can vary from city level to neighborhood and even discrete charging units – based on the information needed. The metrics presented in this memorandum are intended to serve as a primary starting point for tracking initiative progress and metrics can be added or adjusted as circumstances arise.

A majority of KPIs can be extracted from transaction data from the charging infrastructure while a few of the KPIs may require simulations as input. Data derived from the use of charging infrastructure by EV users is essential for policy makers for effective rollout and optimization of the use of charging infrastructure. Therefore, FCOG should set stringent requirements on the type of data they collect from the providers of charging infrastructure and arrange support in

analyzing the data for optimization purposes. The above tables provide suggestions which type of indicators should be monitored to do this effectively.

Recommendations for further work include further testing the approach with different counties in different stages of charging infrastructure development, as required performance indicators may change within different stages. Also, target KRI and KPI values should be quantified where possible (including minimum and maximum values), so as to provide more practical steering opportunities and to have even clearer evaluations as to how well various charging initiatives are performing relative to goals set. . Based on the existing approach, other KRIs and KPIs can be developed for future stakeholders in the value chain of charging infrastructure, such as distribution system operators (DSO), and utilities; also, to establish possible conflicts in interest in particular KRIs and how they may be aligned.

Acronyms

CEC	California Energy Commission
DSO	Distribution System Operator
EV	Electric Vehicle
EVRP	Electric Vehicle Readiness Plan
FCOG	Fresno Council of Governments
GHG	Green House Gas
KPIs	Key Performance Indicators
KRIs	Key Result Indicators
kWh	Kilowatt-hour
PEV	Plug-in Electric Vehicle
VMT	Vehicle Miles Travelled

Subject: Fresno Council of Governments Electric Vehicle Readiness Plan: Funding Sources Section

OVERVIEW & PURPOSE:

Transportation is the sole largest source of greenhouse gas emissions in the state of California, at 40.1% of all emissions in 2017[12]. To address this issue, the state is pushing for an increase in electric vehicle adoption by calling for 1.5 million zero emissions vehicles on the road by 2025 through legislative efforts. The California Energy Commission estimates that the state will need at least 344,000 electric vehicle chargers to meet that goal, resulting in a public and private investment gap of approximately $2.6 billion[13].

Planning, management, and design of plug-in hybrid electric vehicle (PEV) charging infrastructure are critical components of successful transportation electrification. Although many communities are committed to furthering their electrification goals, identifying and obtaining appropriate funding sources can be a significant barrier to robust implementation. As a result, a thorough understanding of available funding opportunities and/or incentives for PEV charging infrastructure and electric vehicles is vital to achieving these commitments.

This memorandum outlines available funding sources and relevant incentives applicable for inclusion in the Electric Vehicle Readiness Plan (EVRP), which aims to advance PEV adoption, being prepared for the Fresno Council of Governments (FCOG). It solely highlights efforts relevant to PEV charging infrastructure within the FCOG geography.

FUNDING SOURCES:

The following are funding sources and relevant incentives to serve as baseline resources for the EVRP. There are a number of different funding sources available that have varying target recipients, such as single-family residents or small businesses. This memorandum organizes the available funding resources into three (3) categories based upon the role that FCOG would serve to maximize impact and potential benefit within the broader community. The categories are divided as follows: (1) Encourage private adoption of PEVs and PEV-related infrastructure (2) Leverage public investment in PEVs and PEV-related infrastructure and (3) Develop partnerships with local governments to expand PEVs and PEV-related infrastructure adoption. The sections focus on funding available to the private sector, public, and through state and federal initiatives, respectively. As such, identical funds may be repeated in different action sections due to overlapping stakeholders each fund pertains to. Each funding source has the providing agency, brief description, action to be taken by the applicant, funding amount, stakeholders impacted, and target locations for PEV charging infrastructure. It is important to note that the descriptions are not intended to be comprehensive and the programs may have additional requirements and restrictions that should be accounted for by applicants. It is suggested that applicants considering a funding source follow up directly with the sponsoring entity as they proceed with applications.

1. FCOG Action – Encourage electric vehicle adoption and/or increased charging infrastructure development by educating private stakeholders (developers, business owners, residents, etc.)

[12] https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2016/ghg_inventory_trends_00-16.pdf

[13] https://www.treasurer.ca.gov/cpcfa/calcap/workshop/20180130/evcs-presentation.pdf

on the various applicable funding sources available as these funding sources are primarily targeted for private infrastructure and do not explicitly support public-use charging infrastructure. Funding sources include:

CALIFORNIA AIR RESOURCES BOARD

Clean Vehicle Assistance Program: Funding for the public to offset initial costs for eligible EVs as well as lower Level 2 charger costs. The applicant needs to be from California, below a certain income level, and complete a specified training. The applicants must have secured the funding before purchasing the vehicle.

Table 1: Income bracket to be eligible for the Clean Vehicle Assistance Program.

Number of People	Maximum Annual Income
1	$48,560
2	$65,840
3	$83,120
4	$100,400
5	$117,680
6	$134,960
7	$152,240
8	$169,520

Applicant Action: Begin the application through this website.
Amount: Incentives vary based on income level and vehicle type. A $1,000 prepaid card for EVGO stations can be provided in lieu of Level 2 charger installation.

Table 2: Incentives offered for various vehicles and chargers through the Clean Vehicle Assistance Program.

Vehicle Type	Vehicle Incentive	Charger Incentive
Battery Electric Vehicle (BEV)	Up to $5,000	Up to $2,000 for Level 2
Plug-in Hybrid (PEV)	Up to $5,000	Up to $2,000 for Level 2
Hybrid Electric Vehicle (HEV)	Up to $2,500	N/A

Eligible Entities: Low income residents
Target Infrastructure Locations: Single family homes
Resource: https://cleanvehiclegrants.org/

Clean Vehicle Rebate Project: Rebate program for select electric vehicles purchased between 9/2/2019 and 12/2/2019. Income eligibility is required and low-income applicants (less than or equal to 300 percent of the federal poverty level) can receive an additional $2,500 in funding.

Table 3: Income bracket to be eligible for the Clean Vehicle Rebate Project. Residents less than or equal to 300 percent of the federal poverty line receive an additional $2,500 in rebates.

Filer	Maximum Annual Income
Single	$150,000
Head-of-Household	$204,000
Joint	$300,000

Applicant Action: Applications end 3/2/2020 if the applicant has purchased a zero-emission vehicle between 9/2/2019 and 12/2/2019. Check the resource link below for updates on future offerings.

Amount: Up to $4,500. Additional $2,500 for residents less than or equal to 300 percent of the federal poverty line.
Eligible Entities: Residents
Target Infrastructure Locations: Single family homes
Resource: https://cleanvehiclerebate.org/eng/eligible-vehicles

Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP): Vouchers provided directly through vehicle dealers for zero emission trucks and buses and applied at time of purchase. Vouchers are available on a first-come, first-serve basis and current funding availability can be found on the program website. The vouchers can be applied towards any vehicle model which is HVIP-approved. The list of approved zero emission vehicles includes school buses, coach buses, transit buses, as well as vans and medium to heavy duty trucks. The catalog of approved vehicles can be found on the program website. As any vehicle purchaser or fleet operator is eligible for this program, it should be noted that this specific program can also apply to other FCOG action categories presented in this memo, such as leveraging partnerships.
Applicant Action: Dealers must apply for certification through the program in order to offer vouchers. Any dealer or vendor affiliated with a manufacture which produces HVIP-approved vehicles may become an HVIP-approved dealer. Purchasers must purchase the vehicle through an approved dealer. Dealers will process the HVIP voucher.
Amount: Incentives vary from $20,000 to $190,000 per vehicle. Amount varies based on vehicle type and size with increased funding available for disadvantaged communities.
Eligible Entities: Any vehicle purchaser or fleet operator.
Target Infrastructure Locations: Vehicles purchased through the program must be domiciled in California for at least three years. Increased incentive amounts are available for vehicles domiciled in disadvantaged communities.
Resource: https://www.californiahvip.org

CALIFORNIA POLLUTION CONTROL FINANCING AUTHORITY (CPCFA)

Electric Vehicle Supply Equipment (EVSE) Loan and Rebate Program: Provides loans for the design, development, purchase, and installation of EVSE at small business locations and multi-family dwellings in California. A partnering financial program was also developed to encourage funding institutions to offer these loans. The Program may provide up to 100% coverage to lenders on certain loan defaults with the borrower receiving a rebate based on their loan amount.
Applicant Action: Participants fill out an application (borrowers and lenders) and submit via email.
Amount: Up to $500,000 loan, borrower eligible for a rebate at 10-15% of the loan amount. Rebate can be used for Level 2 charging, DC fast chargers, and medium/heavy duty chargers.
Eligible Entities: Small businesses (1,000 employees or less), financial institutions, landlords.
Target Infrastructure Locations: Workplace, business parking lot, multi-family
Resource: https://www.treasurer.ca.gov/cpcfa/calcap/evcs/index.asp

PACIFIC GAS AND ELECTRIC COMPANY (PG&E)

Clean Fuel Rebate: Rebate for owning or leasing an eligible electric vehicle within the service territory. It is up to the applicant to determine when to apply for the rebate; however, limited funds are available and are on a first-come first-serve basis.
Applicant Action: Apply through an online portal.
Amount: $800
Eligible Entities: Residents (PG&E customers)
Target Infrastructure Locations: Workplace, single family homes

Resource: https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/electric/clean-fuel-rebate-for-electric-vehicles.page

EV Fleet: Utility will construct, own, and maintain electrical equipment from the transformer to the meter. In addition, incentives are available for medium and heavy-duty vehicles and chargers within the service territory. At least 2 vehicles must be acquired before 2024. The owner is required to provide charging data for at least 5 years and operate the chargers for at least 10 years.
Applicant Action: Find out more information through this site.
Amount: Up to 25 vehicles and $42,000 for chargers.

Table 4: Incentives offered for various vehicles and chargers through PG&E's EV Fleet Program.

Vehicle Type	Per Vehicle Incentive Cap
Transit buses and Class 8 Vehicles	$9,000 per vehicle
Transportation refrigeration units, truck stop electrification, and forklifts	$3,000 per vehicle
School buses, local delivery trucks, and other vehicles	$4,000 per vehicle
Power Output	**Rebate for Eligible Customers**
Up to 50kW	50% of the charger cost, up to $15,000
50.1 to up to 150kW	50% of the charger cost, up to $25,000
150.1kW and above	50% of the charger cost, up to $42,000

Eligible Entities: Medium and heavy-duty fleet operators, business owners with medium and heavy-duty fleets (farms, construction firms, trucking companies, etc.).
Target Infrastructure Locations: Vehicle storage areas, manufacturing lots, schools
Resource: https://www.pge.com/en_US/large-business/solar-and-vehicles/clean-vehicles/ev-fleet-program/ev-fleet-program.page

SOUTHERN CALIFONRIA EDISON (SCE)

Clean Fuel Reward Program: Rebate for owning or leasing an eligible electric vehicle within the service territory. It is up to the applicant to determine when to apply for the rebate; however, limited funds last.
Applicant Action: Apply through this site.
Amount: $1,000 for vehicles obtained after 1/1/2019; $450 if obtained before then.
Eligible Entities: Residents (SCE customers)
Target Infrastructure Locations: Workplace, single family homes
Resource: https://www.sce.com/residential/electric-vehicles/ev-rebates-incentives/cfrp

THE SAN JOAQIN VALLEY AIR POLLUTION CONTROL DISTRICT

Alternate Fuel Mechanic Training: Funding to provide education for mechanics on alternative fueled vehicles. Open to institutions that are currently using an alternative fuels program, servicing an alternative fuels system, or making the transition to alternative fuels technology in their fleet or infrastructure operations.
Applicant Action: Apply through the online site.
Amount: Up to $15,000 per fiscal year for eligible education or training.
Eligible Entities: Repair shops, fleet maintenance businesses
Target Infrastructure Locations: Gas stations, auto-repair shops
Resource: http://valleyair.org/grants/mechanictraining.htm

Electric School Bus Incentive Program: Incentive to replace existing diesel school buses (at least 2 years old) with electric buses. Buses must service a public school and not yet have purchased the replacement bus.

Applicant Action: Apply through the online site.
Amount: Up to $400,000
Eligible Entities: Private fleet operator servicing public schools
Target Infrastructure Locations: School bus storage/maintenance lot
Resource: http://valleyair.org/grants/electric-school-bus.htm

Charge Up! EV Charger: Voucher to install new electric vehicle chargers (level 2 and up). To receive the voucher, the applicant must file for the voucher before equipment is purchased. Single family residences are not applicable for this program. Additional funds can be provided through the Fresno County Incentive Project; however, no funding is available at this time.
Applicant Action: Apply through the online site.
Amount: Funding cap is $50,000 per applicant/site.

Table 5: Incentives offered for various chargers through the Chare Up! EV Charger Program.

Charger Type	Maximum Amount per Unit	Minimum Cost Share
Level 2 Single Port	$5,000	None
Level 2 Dual Port	$6,000	None
Level 3/DC Fast Charger	$25,000	30% of total cost

Eligible Entities: Business owners, developers of multi-unit dwellings
Target Infrastructure Locations: Residential and business Curbside, business or multi-family parking lot, gas stations
Resource: http://valleyair.org/grants/chargeup.htm

Drive Clean! Rebate: Rebate for purchasing a new, eligible electric vehicle. Rebates are offered within 18 months from when the vehicle was purchased.
Applicant Action: Apply through the online site.
Amount: Up to $3,000, varies based on vehicle type

Table 6: Rebates offered for various eligible vehicles through the Drive Clean! Rebate Program.

Vehicle Type	Rebate
Battery-electric vehicles	$3,000
Hydrogen fuel cell vehicles	$3,000
Plug-in hybrid electric vehicles	$2,000
Zero-emission motorcycles	$1,000
Natural gas vehicles rated as Super Ultra-low Emission Vehicle	$1,500
Natural gas vehicles rated as an Advanced Partial Zero-emission Vehicle	$2,000

Eligible Entities: Residents, business owners
Target Infrastructure Locations: Workplace, single family homes
Resource: http://valleyair.org/drivecleaninthesanjoaquin/rebate/

CALIFORNIA ENERGY COMMISSION

Electric Vehicle Supply Equipment (EVSE) Incentive Program: Rebate for installing DC fast chargers or level 2 chargers. Disadvantaged communities can receive additional funding and are required to receive 25% of total funds. Chargers must be publicly available 24/7/265; thus, they cannot be located behind a fence or in a gated parking lot. Eligible sites include retail core, grocery store, restaurant, gas station, hospital, hotel, parking lot, casino, transit hub, or curbside. Design, engineering, and utility service request costs are eligible if incurred after October 10, 2019 but are incurred at the applicant's risk prior to funds reserved.

Applicant Action: All funding has been applied for and is being review. Check the real-time funding dashboard if funds open.
Amount: Varies based on community, technology, and number of connectors

Table 7: Incentives offered for various chargers, based on the community designation, provided through the EVSE Program.

Charger Type	Disadvantaged Community (DAC)	Outside DAC
Level 2	$80,000 or 80% of project cost, whichever is less	$70,000 or 75% of project cost, whichever is less
DC Fast Charger	$4,000 per connector Additional $1,000 per connector in Multi-unit dwelling	$3,500 per connector Additional $1,000 per connector in Multi-unit dwelling

Eligible Entities: Property owners, developers.
Target Infrastructure Locations: Disadvantage community business parking lot (hotel, multi-family, transit hub, hospital, etc.), gas station, residential and business curbside
Resource: https://calevip.org/

2. FCOG Action – Leverage public stakeholders (public department heads, schools, parks and recreation, etc.) to apply for the identified funding sources and obtain the investment needed to electrify their fleets and install public chargers. Sources include:

Pacific Gas and Electric Company (PG&E)

EV Fleet: Utility will construct, own, and maintain electrical equipment from the transformer to the meter. In addition, incentives are available for medium and heavy-duty vehicles and chargers within the service territory. At least 2 vehicles must be acquired before 2024. The owner is required to provide charging data for at least 5 years and operate the chargers for at least 10 years.
Applicant Action: Find out more information through the site.
Amount: Up to $9,000 per vehicle and up to $42,000 for chargers

Table 8: Incentives offered for various vehicles and chargers through PG&E's EV Fleet Program.

Vehicle Type	Per Vehicle Incentive Cap
Transit buses and Class 8 Vehicles	$9,000 per vehicle
Airport ground support equipment, and forklifts	$3,000 per vehicle
School buses, local delivery trucks, and other vehicles	$4,000 per vehicle
Power Output	**Rebate for Eligible Customers**
Up to 50kW	50% of the charger cost, up to $15,000
50.1 to up to 150kW	50% of the charger cost, up to $25,000
150.1kW and above	50% of the charger cost, up to $42,000

Eligible Entities: Public entities (local Department of Transportation, Department of Public Works, Parks and Recreation, Public Schools, airports)
Target Infrastructure Locations: School parking lot, public agency vehicle storage space
Resource: https://www.pge.com/en_US/large-business/solar-and-vehicles/clean-vehicles/ev-fleet-program/ev-fleet-program.page

THE SAN JOAQIN VALLEY AIR POLLUTION CONTROL DISTRICT

Alternate Fuel Mechanic Training: Funding to provide education for mechanics on alternative fueled vehicles. Open to institutions that are currently using an alternative fuels program, servicing an alternative fuels system, or making the transition to alternative fuels technology in their fleet or infrastructure operations.
Applicant Action: Apply through the online site.
Amount: Up to $15,000 per fiscal year for eligible education or training.

Eligible Entities: Public entities (local Department of Transportation, Department of Public Works, Parks and Recreation).
Target Infrastructure Locations: Public agency vehicle maintenance space
Resource: http://valleyair.org/grants/mechanictraining.htm

Public Benefit Grant Program: Funding to purchase new, eligible alternative fueled light duty vehicles. Funds are solely provided to public agencies, public educational institutions, and any other public agency as defined by Government Code section 6252. Applicants must be able to demonstrate that charging infrastructure will be available by time of vehicle purchase. Funding must be approved before the vehicle is purchased.
Applicant Action: Apply through the online site.
Amount: Up to $100,000 per agency ($20,000 per vehicle)
Eligible Entities: Public entities (Local Department of Transportation, Department of Public Works, Parks and Recreation, etc.)
Target Infrastructure Locations: Public agency vehicle storage spaces, public facility parking lots, curbsides
Resource: http://valleyair.org/grants/publicbenefit.htm

Electric School Bus Incentive Program: Incentive to replace existing diesel school buses with electric buses. Buses must service a public school and not yet have purchased the replacement bus.
Applicant Action: Apply through the online site.
Amount: Up to $400,000
Eligible Entities: Public Schools
Target Infrastructure Locations: School parking lots
Resource: http://valleyair.org/grants/electric-school-bus.htm

Charge Up! EV Charger: Voucher to install electric vehicle chargers (level 2 and up). To receive the voucher, the applicant must file for the voucher before equipment is purchased. Additional funds can be provided through the Fresno County Incentive Project; however, no funding is available at this time.
Applicant Action: Apply through the online site.
Amount: Up to $50,000 per applicant/site

Table 9: Incentives offered for various chargers through the Chare Up! EV Charger Program.

Charger Type	Maximum Amount per Unit	Minimum Cost Share
Level 2 Single Port	$5,000	None
Level 2 Dual Port	$6,000	None
Level 3/DC Fast Charger	$25,000	30% of total cost

Eligible Entities: Public entities
Target Infrastructure Locations: Public facility parking lot, curbside
Resource: http://valleyair.org/grants/chargeup.htm

CALIFORNIA ENERGY COMMISSION

Electric Vehicle Supply Equipment (EVSE) Incentive Program: Rebates for installing DC fast chargers or Level 2 chargers. Disadvantaged communities may qualify for additional funding and are required to receive 25% of total allocated funds. Chargers must be publicly available at all times (24/7/265); thus, they cannot be located behind a fence or in a gated parking lot. Eligible sites include parking lots, libraries, transit hubs, or curbsides. Design, engineering, and utility service request costs are eligible if incurred

after October 10, 2019 but are incurred at the applicant's risk prior to funds being reserved.
Applicant Action: **At the time of the writing of this memo,** all funding has been applied for and is currently being reviewed. The real-time funding dashboard will indicate if and when renewed funds become available.
Amount: Varies based on community, technology, and number of connectors.

Table 10: Incentives offered for various chargers, based on the community designation, provided through the EVSE Program.

Charger Type	Disadvantaged Community (DAC)	Outside DAC
Level 2	$80,000 or 80% of project cost, whichever is less	$70,000 or 75% of project cost, whichever is less
DC Fast Charger	$4,000 per connector Additional $1,000 per connector in Multi-unit dwelling	$3,500 per connector Additional $1,000 per connector in Multi-unit dwelling

Eligible Entities: Public entities
Target Infrastructure Locations: Disadvantage community business parking lot (library, transit hub, airport, etc.), residential and business curbside
Resource: https://calevip.org/

3. FCOG Action – Partner with local and state governments to develop pathways for innovative charging infrastructure or transportation electrification projects that would benefit FCOG constituents to access state or federal funding. Funding sources available for these projects include:

U.S. DEPARTMENT OF ENERGY / ENERGY EFFICIENCY AND RENEWABLE ENERGY

State Energy Program (SEP): SEP provides "formula" grants to states to assist in designing, developing, and implementing renewable energy and energy efficiency programs. Each state's energy office receives SEP funding and manages all SEP-funded projects.
Action: The California Energy Commission (CEC) uses these funds for their solicitations. Currently, there are no applicable grants.
Amount: Total funds are $56M for 2020, State must match 20% of funding.
Eligible Entities: Depending on application scope, many government agencies may apply.
Target Infrastructure Locations: Various depending on grant. Funding has been provided for school bus replacement to electric or CNG and hydrogen infrastructure for light duty vehicles. These projects schools and gas stations.
Resources: https://www.energy.gov/eere/wipo/state-energy-program-guidance

U.S. DOT FEDERAL HIGHWAY ADMINISTRATION (FHWA)

Congestion Mitigation and Air Quality Improvement (CMAQ) Program: The CMAQ program has provided more than $30 billion in funding to over 30,000 transportation related environmental projects for State DOTs, metropolitan planning organizations, and other sponsors throughout the US. Electric vehicle charging infrastructure is eligible for funding.
Action: FCOG sponsors CMAQ requests and has received bids for the 2020 application with plans to submit proposals to FTIP by June 2020. The FCOG document does plan for ~15% of funds to go to cleaner fuel technology.
Amount: Total funding in 2020 is $2.5B.
Eligible Entities: Governments, Department of Transportation
Target Infrastructure Locations: Public locations, gas stations, highway corridors

Resources: https://www.fresnocog.org/project/congestion-mitigation-air-quality-cmaq-program/

National Highway Performance Program (NHPP): The NHPP provides support for the condition and performance of the National Highway System (NHS) and for the construction of new facilities along the NHS - including EV charging stations.
Action: FCOG collaborates with Caltrans on implementing NHPP funds.
Amount: NHHP program funding for FY 20 is $24.2B.
Eligible Entities: Governments, Department of Transportation
Target Infrastructure Locations: Highway corridors
Resources: https://www.fhwa.dot.gov/specialfunding/nhpp/160309.cfm#Funding

U.S. DOT FEDERAL TRANSIT ADMINISTRATION

Low or No Emission Vehicle Program: This program provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities.
Action: Grant applications end 3/17/2020 but are expected to reopen under the next funding cycle.
Amount: Funding for FY 20 is $130M, 15% of cost to be shared by local or state government.
Eligible Entities: Governments, Department of Transportation
Target Infrastructure Locations: Transit hubs, transportation maintenance area
Resources: https://www.transit.dot.gov/funding/applying/notices-funding/low-or-no-emission-program-low-no-program-fy2020-notice-funding

Buses and Bus Facilities Program: The purpose of the Grants for Buses and Bus Facilities Program is to assist in the financing of buses and bus facilities capital projects, including replacing, rehabilitating, purchasing or leasing buses or related equipment, and rehabilitating, purchasing, constructing or leasing bus-related facilities.
Action: Grant applications end 3/30/2020. Check for availability in the next funding cycle.
Amount: Up to $45M per project, 20% of cost covered by local or state government.
Eligible Entities: Governments, Public School Districts
Target Infrastructure Locations: School parking lots, School bus storage/maintenance lot
Resources: https://www.transit.dot.gov/bus-program

CONCLUDING THOUGHTS:

This memorandum summarizes funding opportunities and incentives for PEV and associated charging infrastructure on a regional, state, and federal level. FGOC's role to utilize these funds are:

- Encourage electric vehicle adoption and/or increased charging infrastructure development by educating private stakeholders (developers, business owners, residents, etc.) on the various applicable funding sources available.
- Leverage public stakeholders (public department heads, schools, parks and recreation, etc.) to apply for the available funding sources and obtain the investment needed to electrify their fleets and install public chargers.
- Partner with local and state governments to develop pathways for innovative charging infrastructure or transportation electrification projects that would benefit FCOG constituents in accessing state or federal funding.

As a result of this research, four (4) key considerations were identified.

(1) Many of the funding opportunities are granted on a first come/first serve basis, so advance planning for PEV charging infrastructure is crucial.
(2) Funds target development of PEV infrastructure in various building types. Therefore, it is important to engage the necessary stakeholders to strategically site PEV charging infrastructure to maximize the availability of the chargers and connect them with the appropriate funding source. It is also worth noting that many funding sources are specifically targeting lower-income residents and disadvantaged communities. The EVRP will consider these building types when recommending potential sites for chargers to be installed.
(3) State grants require a portion of funds to come from the local jurisdiction. In these cases, FCOG can potentially be a liaison between the public and private sector to secure needed financing.
(4) Specific charging locations, such as residential curbside chargers, lack designated state and federal funding mechanisms. This offers an opportunity for FCOG to work with grant providers to develop solicitations that address gaps in existing funding in locations that would complement county needs.

Acronyms

BEV	Battery Electric Vehicle
CEC	California Energy Commission
CMAQ	Congestion Mitigation and Air Quality Improvement
CPCFA	California Pollution Control Financing Authority
EERE	Energy Efficiency and Renewable Energy
EV	electric vehicle
EVRP	Electric Vehicle Readiness Plan
EVSE	Electric Vehicle Supply Equipment
FCOG	Fresno Council of Governments
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HEV	Hybrid Electric Vehicle
kW	Kilowatt
NHPP	National Highway Performance Program
NHS	National Highway System
PEV	Plug-in Electric Vehicle
PG&E	Pacific Gas and Electric Company
SCE	Southern California Edison
SEP	State Energy Program
SJVAPCD	San Joaquin Valley Air Pollution Control District