Fresno Council of Governments

ELECTRIC VEHICLE READINESS PLAN

January 2021

Fresno Council of Governments

Caltrans

FCRTA

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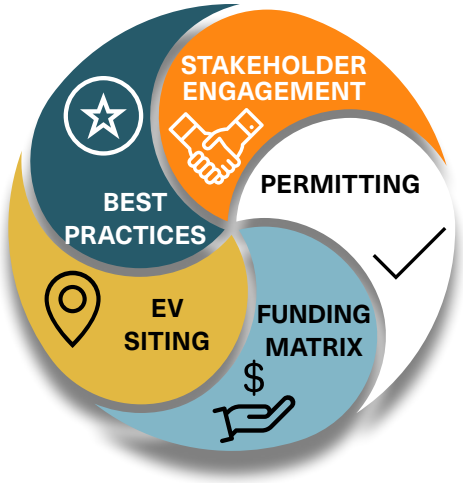
01 EXECUTIVE SUMMARY

The Fresno Council of Governments' (FCOG) Electric Vehicle Readiness Plan (EVRP) was developed to identify locations for electric vehicle charging infrastructure and ultimately contribute to increased local electric vehicle adoption. The EVRP development was led by FCOG in partnership with the Fresno County Rural Transit Agency (FCRTA) and funding from Caltrans. To inform siting recommendations, the document includes the results of technical analysis driven by electrification trends and forecast. The analysis included an assessment of barriers to electrification, an evaluation of expected electric vehicle adoption, expected emissions reductions, types of chargers recommended for specific sites, and magnitude of cost for implementation of a robust charging network within Fresno County. The EVRP was developed with active stakeholder participation and reflects FCOG's commitment to community engagement to ensure that recommendations appropriately capture local priorities.

There are many barriers that can hinder communities from developing local electric vehicle charging networks. As such, the EVRP includes information to supplement the technical analysis and provide a holistic lens of implementation considerations. This includes best practices, permitting considerations, and a funding matrix to determine eligibility and funding opportunities to support implementation.

The findings presented in this document are intended to support infrastructure investment decisions for transit agencies, local governments,



and other relevant partners. As such, its recommended use is as a baseline guiding document for decision making. The presented best practices and recommendations are intended to supplement, rather than replace, individual studies and assessments by communities and agencies as they determine the feasibility of specific initiatives and electric vehicle charging infrastructure locations.

The findings of this document indicate that many residents within Fresno County face greater barriers to plug-in electric vehicle (PEV) adoption, including lower mean household incomes and lower levels of home ownership. As such, Fresno County currently has a lower penetration rate of electric vehicles compared to the California average. The area also faces additional vulnerabilities, that include the majority of the county being designated in the top 10% of communities in California whose residents are disproportionately impacted by poor air quality and pollution, much of which is attributed to transportation emissions from internal combustion engines (ICE).

Increasing electrification within Fresno County is vital to meeting state emissions targets as well as contributing to improved public health. Public charging networks are a key factor to increasing electrification, particularly within vulnerable, disadvantaged, and low-income communities. Therefore, a robust public charging network is critical to drive EV adoption rates, reduce pollution, and meet state targets. Without such a network, this work finds that EV adoption rates could drop by 75% compared to the pro-rated California target. If target adoption rates are achieved, CO_2 emissions could be reduced by one million pounds, decrease NOx rising by over 2,500 tons, reduce P2.5 emissions by 80 tons, and reduce PM10 emissions by 200 tons by 2030.

To meet state targets, a phased approach for implementation of the charging network is recommended. This includes installing Level 2 chargers by 2025, with the addition of a DCFC network by 2030. The EVRP illustrates optimal locations for these installations in each part of the county. Locations within disadvantaged communities have been prioritized in order to encourage adoption within these areas as well as to provide equitable access to the benefits of transportation electrification.

The cost of implementing such a network can represent a significant capital expenditure, particularly for capital communities. As such, it is important to leverage local, state, and federal funds, which can support an average of 85% of capital expenditure (CAPEX) costs. Additionally, there are a range of charger ownership and revenue models, which can be hybridized and adapted to meet local needs.

Policies are also critical in enabling implementation of electrification initiatives.

RECOMMENDED ACTIONS FOR POLICYMAKERS INCLUDE:

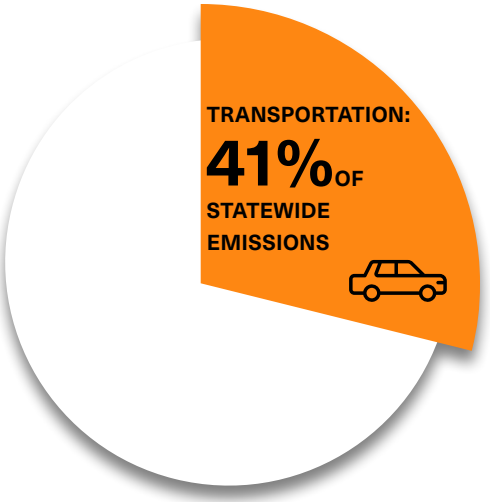
- **Adopting policies** across jurisdictions to align the prioritization of electrified transportation,
- **Enhancing monitoring and reporting** of progress on emission reduction and progress toward transportation electrification,
- **Streamlining permitting processes** of charging stations to reduce cost and time of developments,
- **Updating building codes** to newer versions of CalGreen to expedite charging infrastructure and reduce future improvement costs,
- **Enhancing collaboration between stakeholders** such as private developers, utilities, and other jurisdictions or government agencies to improve planning and identify barriers early in the process,
- **Expanding community outreach** to disadvantaged communities who often encounter the largest barriers to PEV adoption yet face the harshest consequences from pollution,
- **Improving education** of PEV technologies and available funding mechanisms to reduce barriers to entry and mitigate public concerns.

These strategies should be evaluated, in combination with technical forecast and appropriate funding sources, to encourage implementation within communities that equitably provides the benefits of electrification within Fresno County.

02

THE NEED FOR AN ELECTRIC VEHICLE READINESS PLAN

As a state, California continues to cement itself as a climate leader with policies, targets, and regulations intended to curb statewide emissions, reduce negative climate impacts, and holistically address community issues such as mobility and economic growth. Due to its size and complexity, the transportation sector remains a primary contributor to California emissions, accounting for 41% of statewide emissions. Therefore, widespread electrification, and its associated emissions reductions, is an integral component of meeting state emissions targets.[82] Recent policies and programs have increased PEV purchases in the state. However, adoption has been unequally distributed across socio-economic groups as low income, vulnerable, and disadvantaged populations face increased barriers to electrification. Without widespread electrification, communities will be unable to meet state targets and as such, promoting inclusive access to electrified mobility options remains a priority to achieving equitable and impactful emissions reductions.



In May 2019, the Fresno Council of Governments (FCOG) was the recipient of the Caltrans Sustainable Communities Planning Grant to develop a regional Electric Vehicle Readiness Plan (EVRP), originally called the Fresno County Regional Electric Vehicle Charging Infrastructure Network Plan. A primary focus of the EVRP is to contribute to meeting state emissions targets by reducing transportation-related greenhouse gas emissions. The document was developed with active stakeholder participation and includes recommendations of potential charger locations, electric vehicle charging infrastructure best practices, potential funding sources, and potential partnerships. Particular focus was given to disadvantaged areas to ensure equitable recommendations. The EVRP is intended to serve as a resource for FCOG, local jurisdictions, utilities, agencies, and investors to consider recommended infrastructure and associated strategies to drive PEV adoption within Fresno County. Strategies discussed include planning, ordinances, funding allocation, and prioritized siting.

The majority of rural and agricultural communities, including Fresno County, often have limited ability to invest in infrastructure advancements due to financial and budgetary constraints. Consequentially, these communities have exhibited slower adoption rates of electric vehicles, exacerbated by a lack of available public charging.

82 Clean Transportation: An Economic Assessment of More Inclusive Vehicle Electrification in California *https://www.next10.org/publications/ev-benefits*

These considerations make it important to conduct a data-driven analysis of siting processes that account for the unique characteristics of rural communities, as compared to large metropolitan areas.

The EVRP is a forward-looking plan for increasing electrification by identifying and addressing areas of opportunity within the Fresno County region's public and transit electric vehicle charging infrastructure network. In doing so, it aims to increase accessibility of electric vehicle charging infrastructure within Fresno County, and support communities in meeting their emissions targets.

03

FRESNO COUNCIL OF GOVERNMENTS

The FCOG is responsible for comprehensive regional planning, with a focus on transportation and related issues. Their efforts support community involvement in planning, programming, and legislation as well as providing technical services.

The Fresno Council of Governments (FCOG) is an association of local governments, informally created in 1967 and subsequently formalized in 1969. FCOG is led by a policy board that includes mayors from each of the incorporated cities and a representative from the County Board of Supervisors. The member agencies represented are:

04

STAKEHOLDER ENGAGEMENT

In order to develop a full understanding of local PEV charging infrastructure needs, FCOG led outreach to stakeholder groups, including local government, educational, non-profit, and industry representatives. Stakeholder engagement was a foundational part of the EVRP and conducted throughout the entirety of the development process. Successful stakeholder engagement can pose numerous benefits to planning processes, such as increasing long-term and broad-based support as well as increasing the likelihood of successful implementation. Most importantly, it increases the likelihood that project recommendations will be closely aligned with community needs and achieve positive outcomes.

Outreach was conducted to ensure that the resulting EVRP reflected views and needs of stakeholders, and provided opportunities for stakeholders to voice concerns, identify co-benefits, and leverage partnerships. All stakeholder engagement was conducted in parallel with feedback and input from a Stakeholder Working Group. Details on stakeholder engagement structure and Working Group participants can be found in Appendix C.

Four goals were determined during the early stages of stakeholder engagement and guided all subsequent engagement activities.

1. Ensure stakeholders are presented with information throughout the project planning process, and have opportunities to provide feedback
2. Identify stakeholders that represent a broad cross-section of the communities, interests, and backgrounds
3. Understand stakeholder and community barriers to PEV adoption and priorities regarding siting
4. Coordinate stakeholder feedback to optimize implementation and siting of appropriate PEV charging infrastructure

4.1 Stakeholder Engagement Findings

Three primary concerns were identified as the result of stakeholder engagement. These concerns are categorized as:

FUNDING SOURCES

Stakeholders cited a need for increased funding, that extends beyond capital costs for the charger itself. Examples include operations and maintenance costs as well. Even funding opportunities to support basic infrastructure needs can be critical in advancing electrification. This has been identified as an issue, particularly in rural communities, where roads may not have existing curb and cutters to support a curbside PEV charger installation. Limited existing infrastructure place such communities even further behind in terms of access to technology and/or mobility.

COMMUNITY MOBILITY NEEDS AND TRANSPORT THAT SUPPORTS ACCESS TO NEEDED GOODS AND SERVICES

Vulnerable communities often rely on public transit and community mobility options to access critical goods and services. Electrification initiatives that focus on providing electric community mobility options can be an effective way to address transportation needs of vulnerable communities while contributing to emissions reductions.

INNOVATIVE TRANSIT MODELS AS TRADITIONAL RIDE-SHARING AND PUBLIC TRANSIT MODELS OFTEN DON'T MEET THE NEEDS OF RURAL COMMUNITIES WHOSE RESIDENTS FREQUENTLY TRAVEL FAR DISTANCES.

As a vast and sprawling area, traditional ride-sharing and public transit models often don't meet transportation needs of Fresno County residents. The long distances can make ride-sharing platforms cost prohibitive for vulnerable populations. To date, most rural cities in Fresno County do not have transportation network companies as an option to fill in any gaps in service. Additionally, public transportation options are limited to fixed routes with less frequency which make it an impractical transportation solution for regular travel.

In response to the identified stakeholder priorities, long-term considerations were identified for future development that builds upon the work conducted in the EVRP. These actions are intended to supplement and advance the analysis and recommendations presented in this document and would require further work and development by local communities and agencies. These include:

- Connecting the EVRP to more localized, ongoing, and actionable efforts.
- Prioritizing sites that can serve as mobility hubs for integrated mobility access.
- Considering novel and non-traditional approaches, such as rural PEV Co-ops.
- Communicating long-term benefits and advantages to electrification as upfront costs can be a deterrent for many communities.

05 BASICS OF PLUG-IN ELECTRIC VEHICLES AND CHARGING INFRASTRUCTURE

Understanding electric vehicles and chargers is key in proper technology selection, site planning, and effective policy decisions. Oftentimes, a lack of sufficient knowledge can discourage community members from adopting electric vehicles due to a lack of familiarity. Providing public facing information can be an effective way to reduce this barrier. As a relatively new and rapidly evolving technology, both PEVs and charging stations are offered in many different options, each having their own traits such as cost, power levels, and design.

5.1 Vehicle Types

PEVs include battery electric vehicles (BEVs) and plug-in hybrid vehicles (PHEV). BEVs are entirely powered by electricity stored in the vehicle's battery; whereas, PHEVs are powered partially by an onboard battery and a backup ICE fueled by gasoline if needed. Table 1 provides an overview of the traits for each type.

Table 1. BEV Compared to PHEV Technical Specifications

	Plug-in Electric Vehicles (PEVs)	
Trait	**Battery Electric Vehicles (BEV)**	**Plug-in Hybrid Vehicles (PHEV)**
Vehicle Size	Commonly sedans. Beginning to develop SUVs and buses.	Sedans and SUVs. More models available than BEVs.
Battery Size[82]	42-128 kWh	15-27 kWh
Range[83]	150-250 miles	10 – 50 miles on electricity; additional 300 miles on gasoline[84]
Efficiency[85]	2-4 mi/kWh	45 mi/gal
Fuel Cost[86]	4-8 cents/mile at $0.16/kWh	7.8 cents/mile at $3.50/gal
Battery Pack Cost[87]	$154-$177/kWh	$200-$210/kWh

82 https://theicct.org/sites/default/files/publications/EV_cost_2020_2030_20190401.pdf
83 https://theicct.org/sites/default/files/publications/EV_cost_2020_2030_20190401.pdf
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86 https://avt.inl.gov/sites/default/files/pdf/fsev/costs.pdf
87 https://theicct.org/sites/default/files/publications/EV_cost_2020_2030_20190401.pdf

PHEVs are less expensive than BEVs and can typically travel up to 50 miles on a single charge; which typically meets the need of regular commutes, approximately 29 miles per day[88]. On the other hand, BEVs have recently made extraordinary improvements in range and cost due to improved battery technology. For California, the Department of Energy estimates a gallon of gasoline to cost $2.94 compared to an equivalent electric gallon at $1.86. Lowering cost and increasing vehicle range continue to make BEVs an ever-attractive option.

5.2 Charger Types

Electric vehicle chargers vary in terms of power output and by the connector type. Power output of a charge is directly linked to vehicle charging time; the higher the power, the quicker the battery is charged. There are three charger power levels.

Level 1 chargers uses standard three-pronged, 120-volt outlets typically found in a home. Such chargers are well suited for home and over-night charging locations due to charging speeds of 2-5 miles of range per hour[89]. Due to larger battery sizes available on the market, Level 1 chargers are becoming less common compared to other levels.

Level 2 chargers use 220-volt outlets, commonly used by refrigerators or air conditioners. The higher voltage allows these chargers to charge at a rate of 10-20 miles of range per hour[90]. Level 2 chargers are typically found at workplaces or curbside parking spots.

Level 3, or DC Fast Charging (DCFC), requires commercial power levels which allows for high charging speeds, at around 60-80 miles of range per hour. The increased power causes the most strain on the electrical grid. DCFC are best suited for gas stations or rest stops if proper infrastructure is in place due to the rapid charge time.

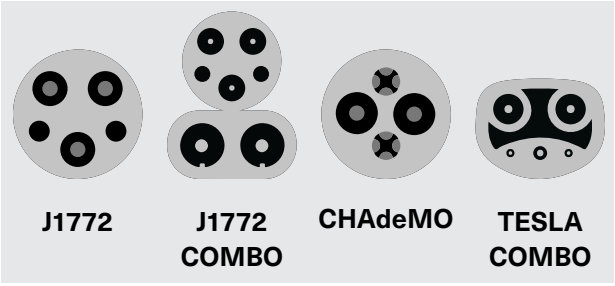
When selecting a charger, the associated costs, charging speeds, grid impacts, and vehicle compatibility need to be considered as shown in Figure 1.

Figure 1. Comparison of EV Charging Station Technology

CHARGER TYPE	RECHARGE TIME	COST TO CHARGE	IMPACT TO GRID
DCFC	TRAVEL (20 MIN)	$	HIGH 200-500 VDC, UP TO 350A
LEVEL 2	PUBLIC AND WORKPLACE (0.5-8 HOURS)	$	MED 208/ 240VAC, 80 A
LEVEL 1	RESIDENTIAL (8 HOURS)	$	LOW 120 VAC, 12-16 A

Each charger type is equipped with a connector that transfers power from the grid to the vehicle. In the United States, four connector types are used as shown in Figure 2. The connector type refers to the shape of the charging inlet on the vehicle, which needs to be compatible with the EVCS port.

Figure 2. Common PEV Connector Types



- **J1772 and J1772 Combo:** J1772 primary connector type used for Level 1 and Level 2 charging. A J1772 Combo is a J1772 connector with additional ports to also enable DC fast charging.
- **CHAdeMO:** Used on some US cars for DC fast charging only. Vehicles with CHAdeMO will have a second inlet, usually a J1772, for Level 1 or Level 2 charging.
- **Tesla:** Used only by Tesla for Level 1, Level 2, and DC fast charging.

88 https://www.bts.gov/statistical-products/surveys/national-household-travel-survey-daily-travel-quick-facts
89 https://afdc.energy.gov/files/u/publication/WPCC_L1ChargingAtTheWorkplace_0716.pdf
90 https://afdc.energy.gov/files/u/publication/WPCC_L1ChargingAtTheWorkplace_0716.pdf

5.2.1 Public Charging Infrastructure

There are many use cases for an extensive public charging infrastructure network. The two primary cases relevant to Fresno County are:

1

PROVIDE ALTERNATIVES TO AT-HOME CHARGERS

Many populations face barriers in installing chargers at their places of residence (e.g. rented units, multi-family units, installation costs, etc.). An expansive public charging network will enable the purchase of electric vehicles even without a charger installed at home.

2

REDUCE DRIVER RANGE ANXIETY

The most common reason consumers do not purchase PEVs is range anxiety, the concern that a vehicle's battery does not have sufficient range to reach its destination. The availability of public charging infrastructure can mitigate this concern.

06 BASELINE CONDITIONS

An assessment of current PEV conditions was conducted to determine strategies to encourage equitable PEV adoption. The assessment entailed evaluating existing adoption rates for county residents and transportation agencies, as well as existing charging infrastructure. Data on existing conditions was collected from publicly available datasets and through a Request for Information (RFI) that was issued to relevant stakeholders, as shown in Figure 3. Following the presentation of existing conditions, this section provides a detailed analysis of localized key drivers and barriers for electric vehicle adoption.

Figure 3. Information Gathered from the RFI Process by Stakeholder

UTILITY

- EV adoption by location
- Charging infrastructure
- Feeder and substation spare capacity
- Electricity consumption by premise
- GIS Shapefiles for feeders and substations

TRANSIT AUTHORITY

- Vehicle fleet information
- Traffic and transportation
- Future EV and infrastructure plans
- EV charging infrastructure

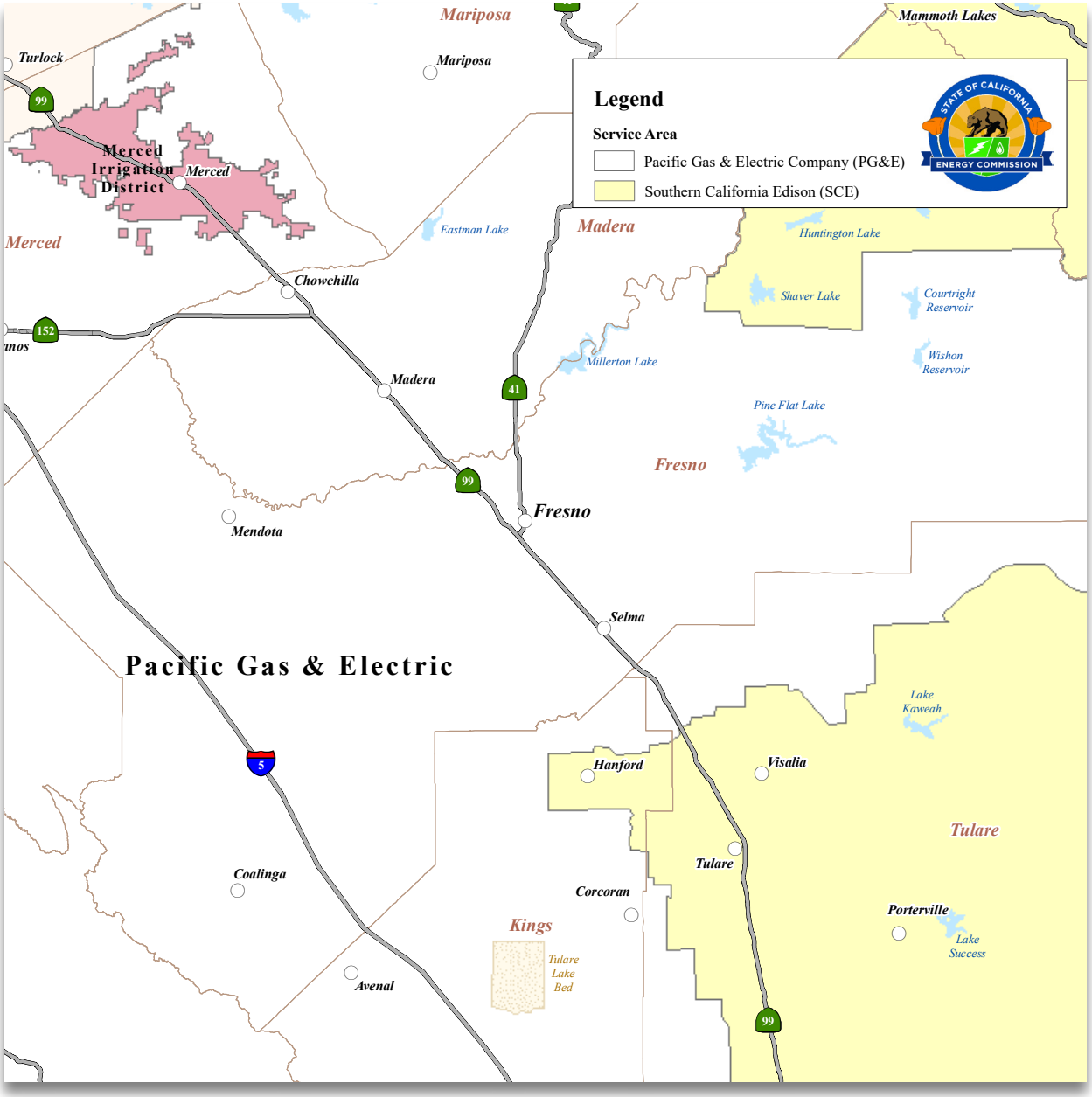
LOCAL GOVERNMENT

- EV charging infrastructure
- Electrical supply/EV ordinances
- EV incentives
- Energy storage and PV
- GIS parcel data

6.1 Electric Utilities Serving Fresno County

Electric utilities play a critical role in development of PEV charging infrastructure. As charging networks expand, the added electrical loads can significantly impact grid infrastructure. Working with the local utility is critical to ensure sites have adequate electrical capacity. Additionally, electric utilities view transportation electrification as a business growth opportunity; thus, they often encourage this transition by providing incentives or other benefits to support development. Two electric utilities, Pacific Gas & Electric and Southern California Edison, serve the county. A map of their respective coverage areas in Fresno is shown in Figure 4.

Figure 4. Electric Utility Map for Fresno County



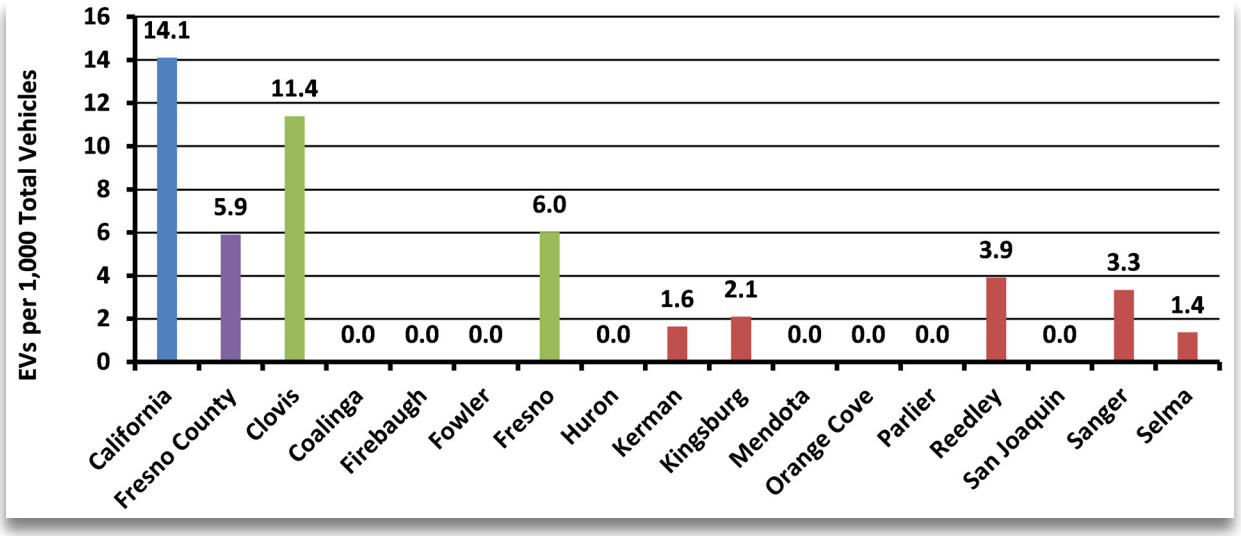
Source: California Energy Commission

6.2 Existing Vehicle Conditions: Personal Vehicles

In 2018, the density of registered PEVs (measured as PEVs per thousand vehicles) in Fresno County was lower than the California state average. Fresno and Reedley had significantly lower PEV penetration than the rest of the state, with Clovis being closer to California's average adoption. Numerous cities have yet to achieve any PEV penetration.

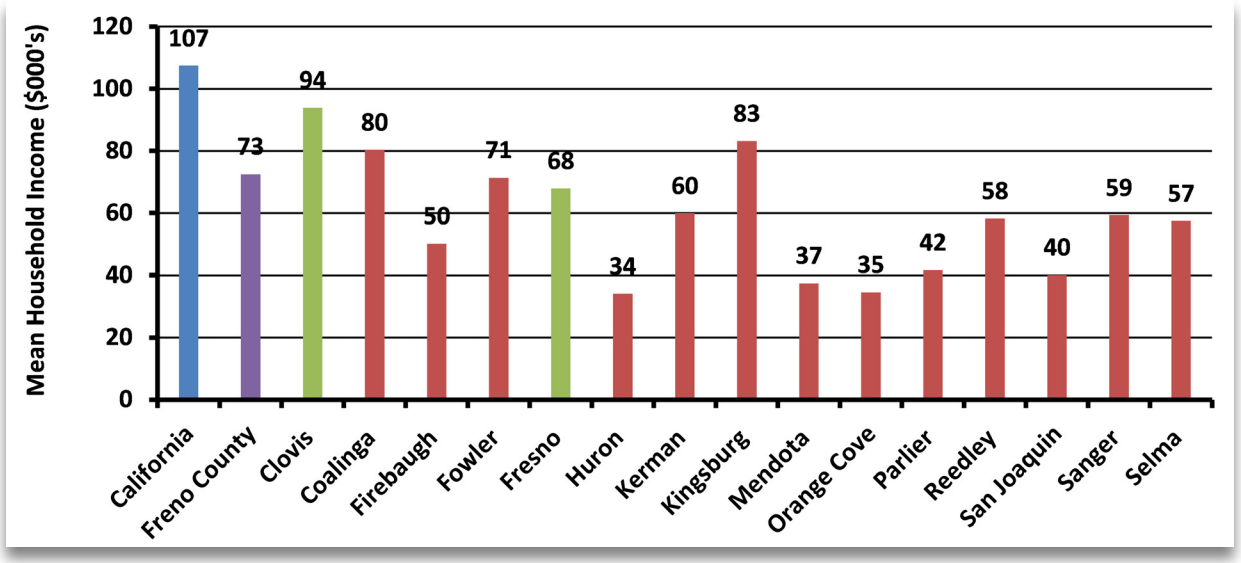
Income, home ownership, and number of cars owned are typically key attributes that directly correlate to adoption rates[82]. Higher income individuals are more likely to own PEVs due to the higher upfront costs. In 2016, a medium sized PEV is roughly $15,000 more expensive than an equivalent ICE vehicle[83]. While price premiums are falling quickly, it has been a major barrier for low income residents even with utility and state incentives. Illustrating this, the mean income of households, shown in Figure 6, correlate with PEV adoption rates.

Figure 5. PEV Adoption Rates for Fresno County



Source: CA DMV (2018), Energeia analysis

Figure 6. Mean Household Income for Fresno County



82 https://www.sciencedirect.com/science/article/pii/S0965856416302208

83 http://www.automotivebusiness.com.br/abinteligencia/pdf/EV-Price-Parity-Report.pdf

Another potential barrier to entry is residents unable to install home charging stations because they are renters; homeowners are three times more likely to own an PEV than renters[84] . There are two reasons for this. Renters often have lower income, leading them to prioritize other amenities over charging stations, and landlords are often hesitant about installing a home charger as this would be an added cost passed down to the tenant that is currently only attractive for a small portion of renters. Even if a current tenant desires a charging station installed, the next tenant may not. The localized data shows that most of the County has above average levels of renters compared to statewide levels, shown in Figure 7. The low level of home ownership within the County supports the current observed lower levels of PEV adoption. A notable exception is Reedley and Kingsburg, which have a similar ownership level as Clovis, but a lower PEV penetration. This could be attributed to home ownership costs in Reedley and Kingsburg being lower compared to Clovis.

Early adopters of PEVs traditionally own or lease multiple vehicles, where at least one ICE vehicle serves as a backup for longer trips. The lack of public charging and shorter driving ranges of PEVs are points of anxiety for many drivers which is often resolved by having a 'backup' vehicle. Higher battery capacities, thus longer driving ranges, and increased development of the public charging infrastructure expected in the next 5-10 years may mitigate such worries. Figure 8 illustrates the number of vehicles per household in cities across Fresno County. The majority of the County is at or below state levels, potentially meaning this barrier is not as significant as other factors.

Figure 7. Homeowner and Renter Rate in Fresno County

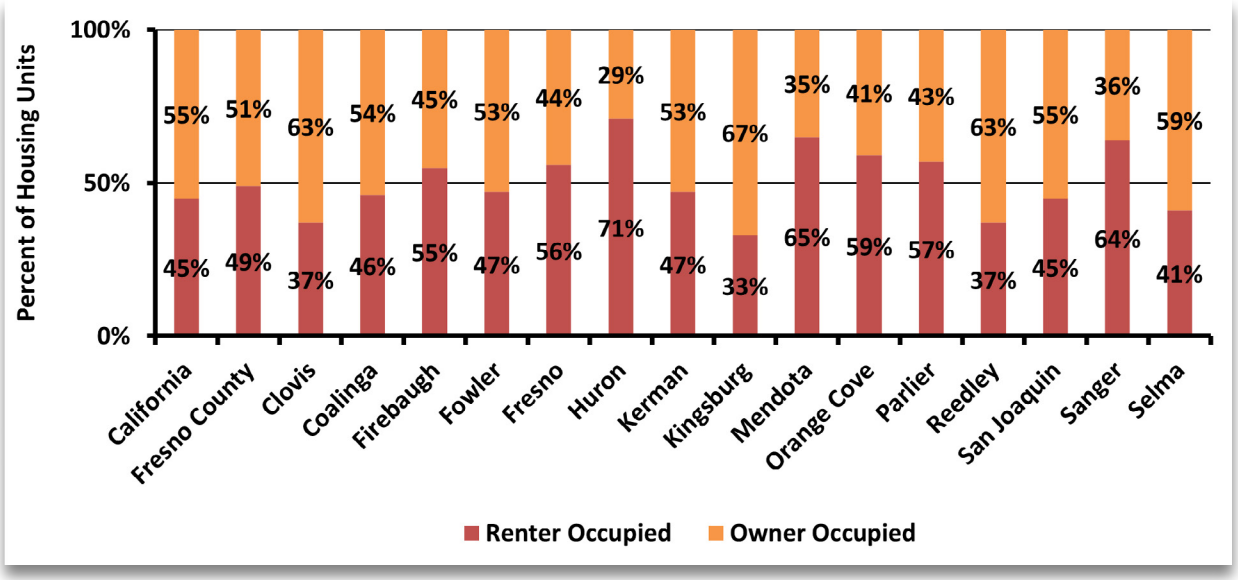
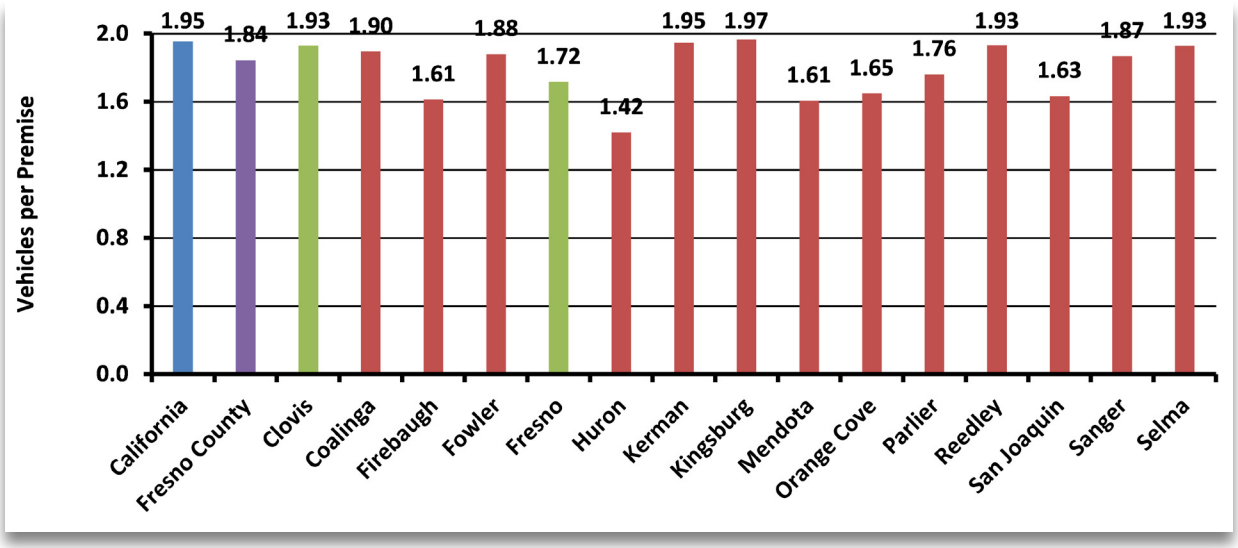


Figure 8. Average Number of Vehicles per Premise in Fresno County



84 https://www.ourenergypolicy.org/wp-content/uploads/2018/08/WP291.pdf

6.3 Existing Vehicle Conditions: Fleet Vehicles

Fresno Area Express (FAX), Clovis Transit, and Fresno County Rural Transit Association (FCRTA) are the three transit agencies that serve Fresno County. 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.

Although public transit buses are a major component of City and County transit fleets; there remain important opportunities to electrify other assets as well. Each transit agency's vehicles are presented by type of vehicle in Figure 10. The technical analysis presented focused on assessment of the existing bus fleet, as the 225 buses serving Fresno County are the most likely candidates to be electrified in the near term due to state mandates requiring transition over by 2040 and market ready technology. While pickups, trucks, and vans are a large portion of the total fleet, these are less likely due to the limited availability of cost-effective electric solutions that are readily available on the market.

Figure 9. Number of Buses per Depot in Fresno County

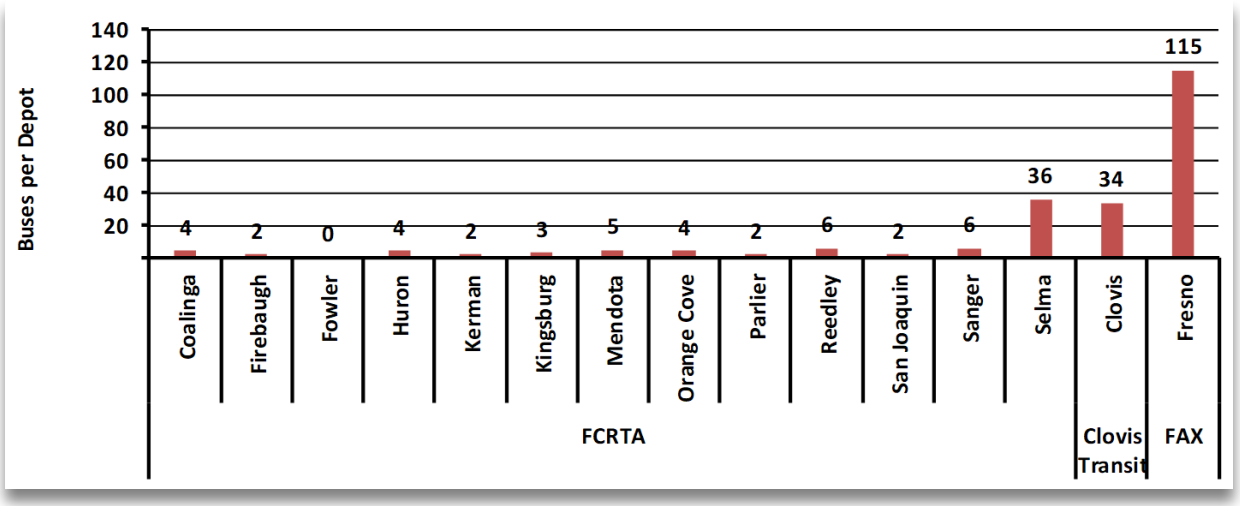
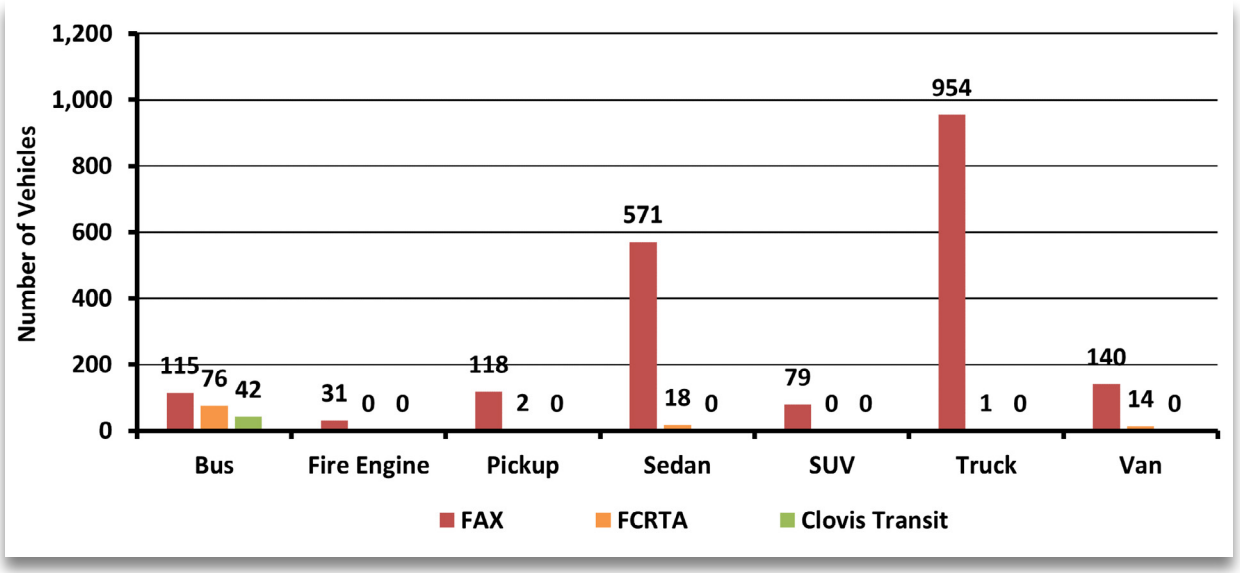


Figure 10. Number of Fleet Vehicles for Fresno Transit Agencies



A key analytic to determine the business case and feasibility to transition to an electric bus fleet is the annual vehicle miles traveled (VMT), reported in Figure 11. The figure reflects all data received from agencies through the RFI process. From this statistic, the miles traveled per route can be calculated which enlightens fleet operators on the necessary battery capacity and charging infrastructure needed to return batteries to full charge before redeployment. Charging infrastructure plans also need to consider the consequent grid impacts faced by each depot.

6.4 Existing Charging Stations

An analysis was conducted on existing public charging stations within Fresno County to identify gaps and trends that could be addressed with future infrastructure improvements. This analysis was based on data obtained through public domain research of electric vehicle charging station counts and via the Request for Information Process.

An insufficient public charging network is a barrier to PEV adoption due to the perception of "range anxiety", a belief by drivers that they will be unable to find a charging station when the car battery is low. This challenge is exacerbated for drivers who do not have home chargers and rely solely on public chargers. 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 12 with geographical maps of stations shown in Figures 13-14.

Figure 11. Annual Vehicle Miles Traveled per Bus in Fresno County

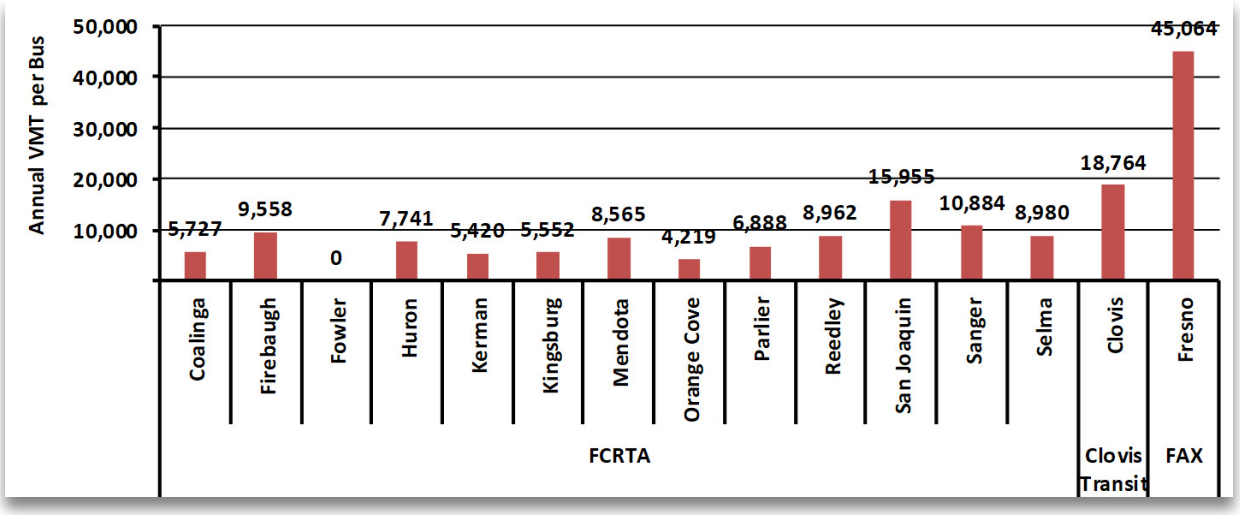


Figure 12. Charging Stations in Fresno County

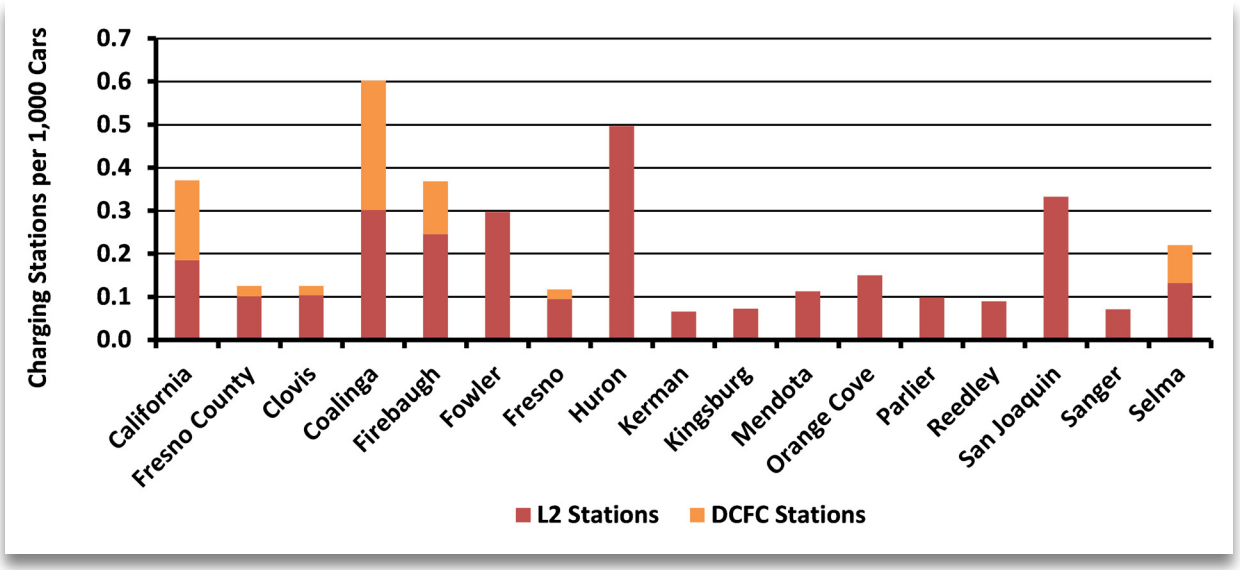


Figure 13. Locations of Existing Charging Stations in Fresno County

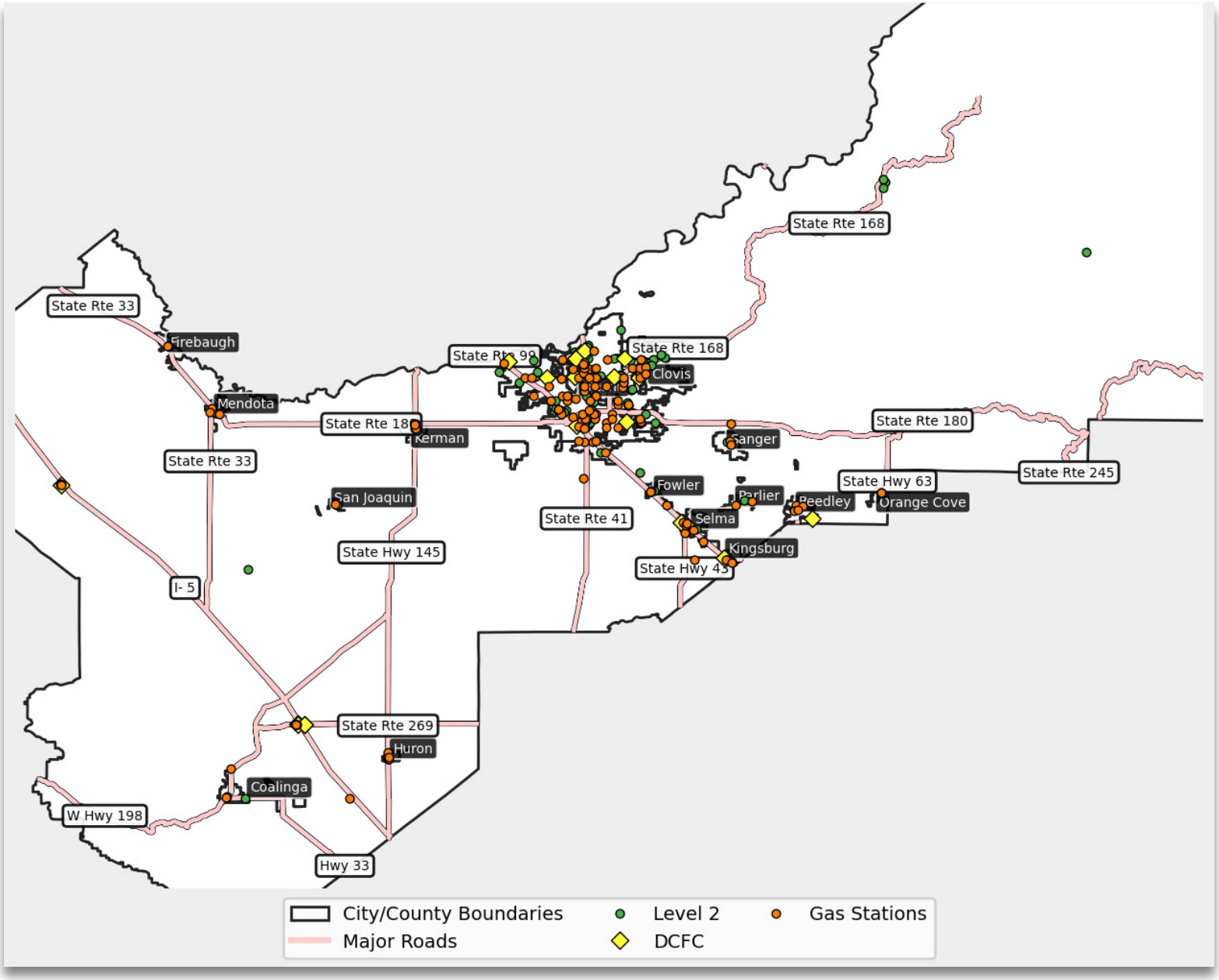
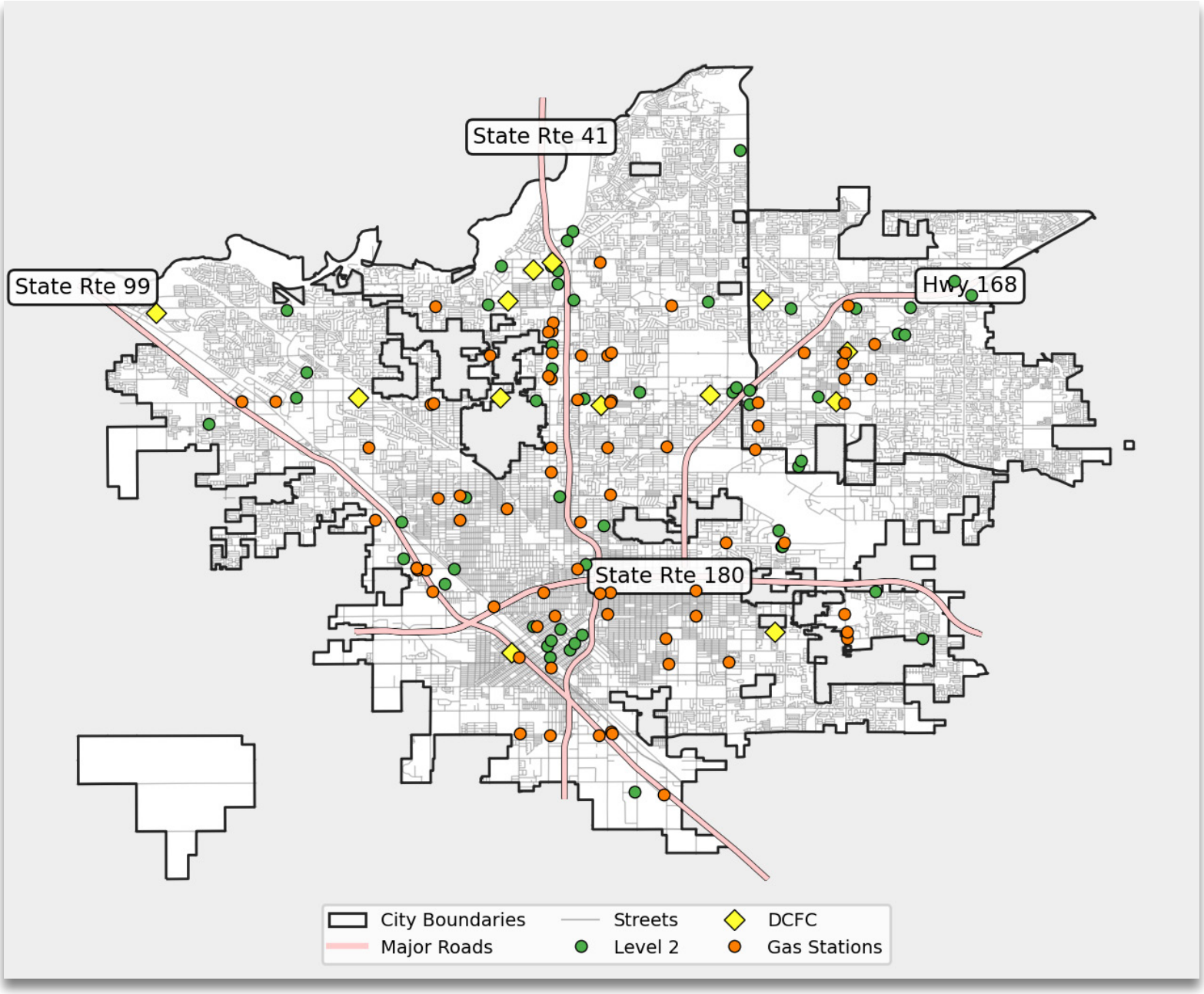


Figure 14. Existing Infrastructure in the Fresno/Clovis Urban Area

While the overall density of chargers is lower, the ratio of Level 2 to DCFC in the county are consistent with the California ratio for cities that have installed DCFC infrastructure. As reflected in the figure, the majority of DCFC are located along major highway corridors or within major city centers, a similar pattern as existing gas stations in the county. Siting charging stations near existing gas fueling infrastructure allows PEV adoption without significant changes to drivers' routes.



6.5 Existing Air Quality and Emission Conditions

The effects of poor air quality have been shown to have a serious impact on citizens' health conditions. Tailpipe emissions from internal combustion engines are a large contributor to local air pollution and thus assessed in this report to inform policymakers on priority areas that would benefit the most from a transition to PEVs, particularly for buses.

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[82] are reported[83] in Figures 15-17. The figures demonstrate that pollution continues to improve but at a decreasing rate, almost stagnating after 2015. Still, the majority of Fresno County is listed in the 90-100th percentile on CalEnviroScreen 3.0 PM2.5 concentration, illustrated in Figure 18, making it an issue local jurisdictions need to address in the coming years.

Figure 15. Yearly Nitrous Oxide Emissions in Fresno County

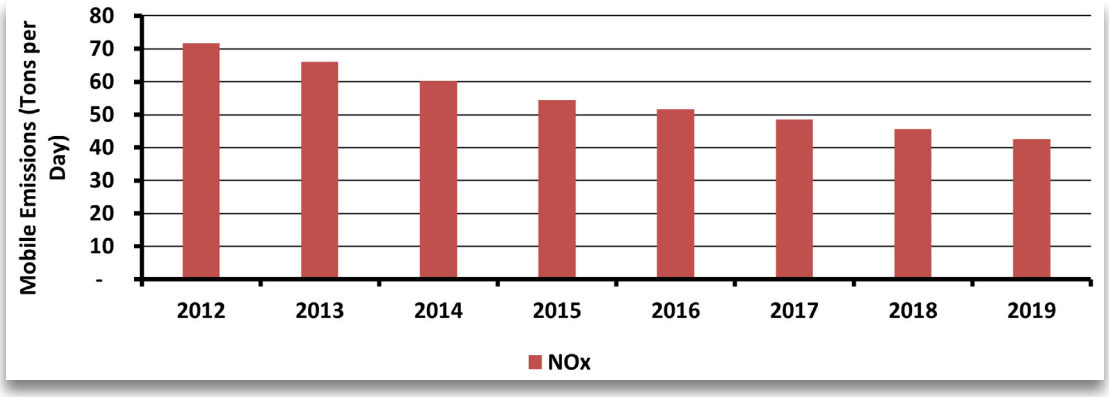


Figure 16. Yearly Particulate Matter 2.5 and 10 Emissions in Fresno County

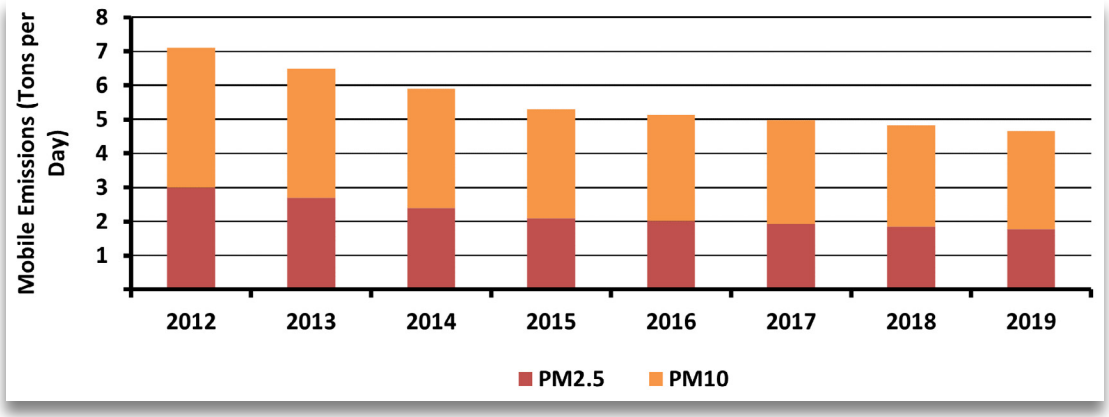
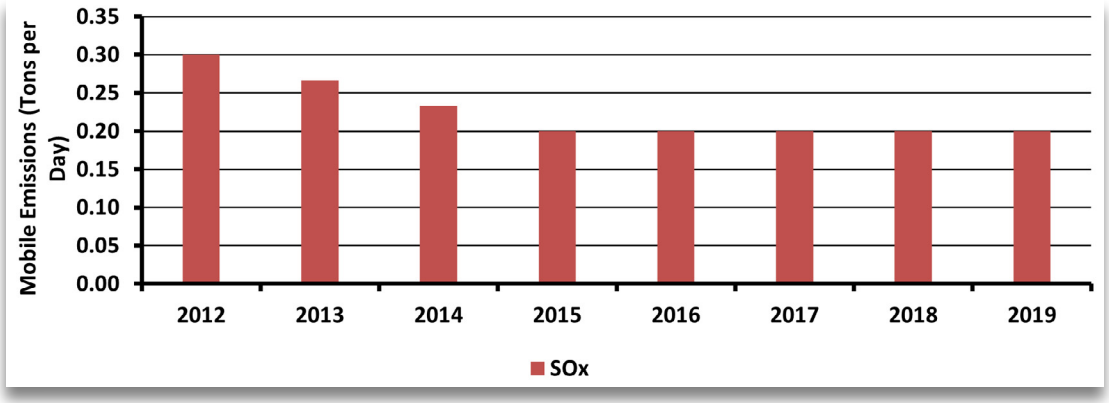


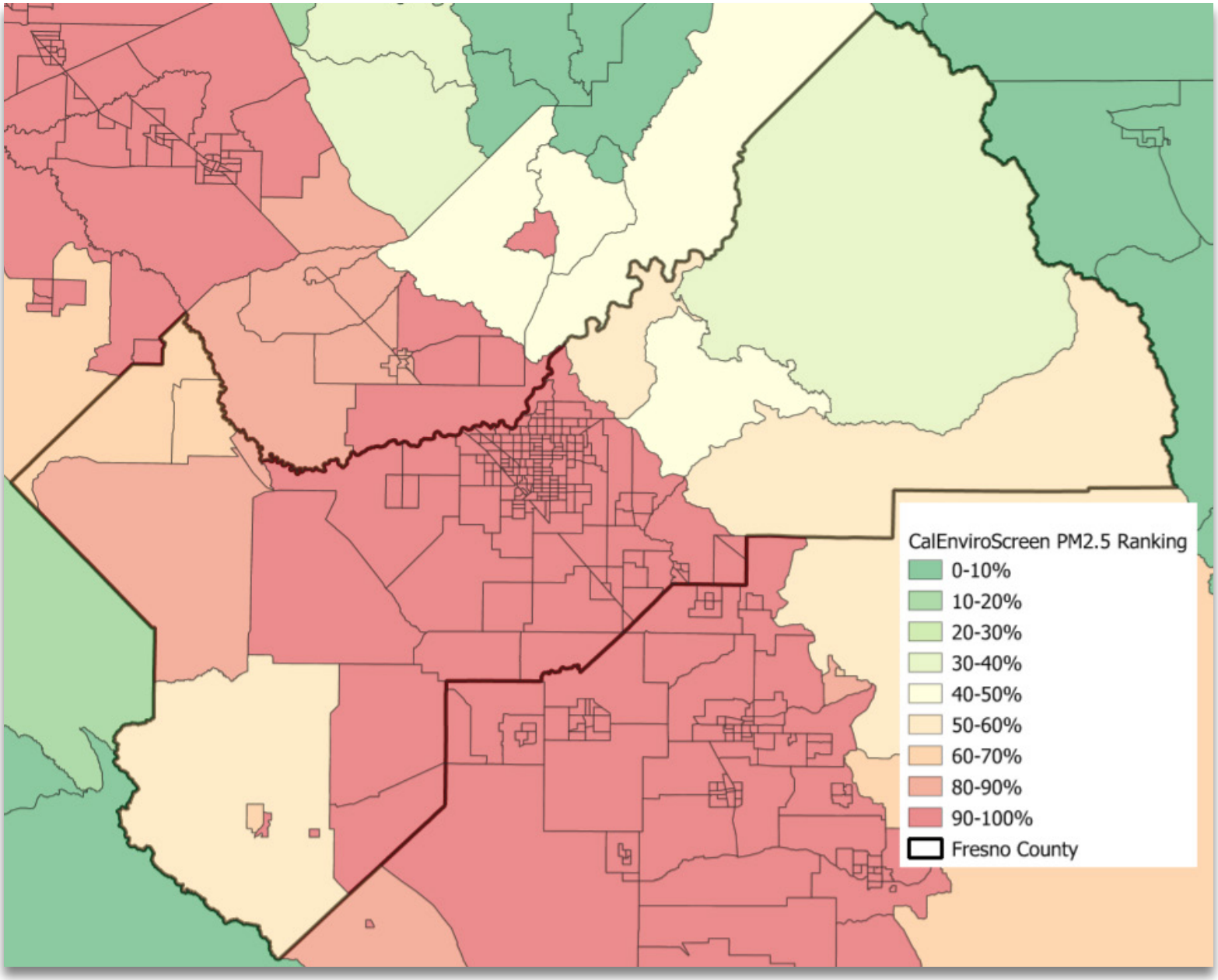
Figure 17. Yearly Sulfur Dioxide Emissions in Fresno County



82 An 8-10 year historical period was selected based on the 10-year forecast period of the Plan.

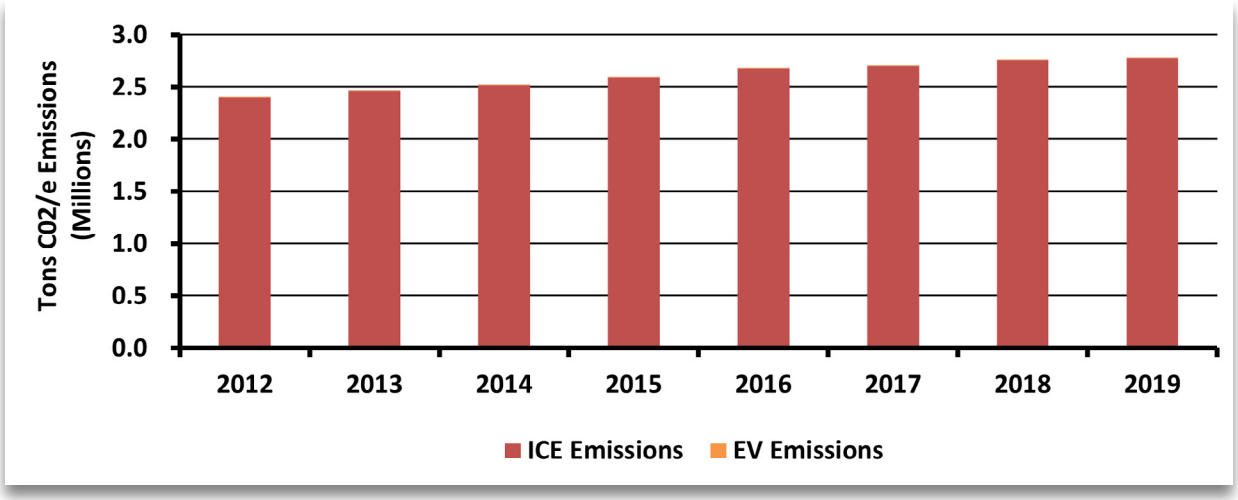
83 SOx, NOx, P10 and P2.5 are the most commonly analyzed tailpipe and environmental emissions.

Figure 18. Particulate Matter$_{2.5}$ Emissions Map



Due to California's aggressive emission targets, existing transportation-related greenhouse gas emissions were also reviewed as part of this analysis. While air quality has improved, transportation CO_2 emissions continue to rise. PEV emissions are tied to the emissions from electricity generation needed to charge the vehicles, as a state's energy portfolio becomes cleaner, so do the PEV emissions. In California, a typical gasoline powered vehicle will release 11,435 pounds of equivalent CO_2 (to account for other emissions such as N2O) compared to 1,922 pounds for a BEV[82]. Figure 19 shows CO_2 emissions[83] trends from 2012-2019 from passenger vehicle driving.[84] These are calculated based on per vehicle emissions estimates and the historical vehicle registration count for the County.

Figure 19. Yearly Carbon Dioxide Emissions from Vehicles in Fresno County



6.6 Recommendations and Findings

From analysis of existing conditions, it is evident that air quality and emissions generated from the transportation sector are a key issue for Fresno County. As the existing fleet is primarily comprised of ICE vehicles, a transition to an electrified fleet would significantly reduce emissions. Key findings from the analysis include:

- 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 help mitigate the aforementioned barriers faced by residents

Recommended actions from the results are:

- Consider innovative ways to provide electric vehicles to residents renting a home. This includes neighborhood electric vehicles or adopting a newer green energy code, which requires home garages or parking lots be prewired that can then be an amenity for renters.
- Work to provide electric charging station transportation corridors to provide reliable, easily accessible chargers. Both Fresno County residents as well as other drivers passing through the county would reap the benefits.
- Identify emission "hot spots" would especially benefit from increased electric vehicle adoption and the associated reduction in emissions. Prioritize charging in these locations.

82 https://afdc.energy.gov/vehicles/electric_emissions.html
83 CO_2 intensity is based on a constant U.S. Department of energy assumption for EV and ICE vehicles.
84 Emissions are directly correlated to the on-road vehicle count, which has been steadily increasing in Fresno County

07 FORECASTING

This chapter reports on the regional PEV adoption modeling results, including the number of vehicles that are forecast to require public charging infrastructure, and the associated forecast reduction in tailpipe emissions expected from meeting that need.

7.1 Process and Analysis

The PEV uptake model applied for the technical analysis presented in the EVRP forecasts the adoption of PEVs by segment based on policy, model availability and financial drivers. The forecast was configured based on current and forecast conditions in Fresno County over the next 10 years.

Details of the modeling methodology and key inputs and assumptions are provided in Appendix A.

7.2 Regional PEV Forecast Adoption

The regional forecast of PEV adoption in Fresno County over the next 10 years is reported in Figure 20, alongside historical adoption since 2012, recent pro-rata state forecasts by the California Energy Commission (CEC), and pro-rata state PEV adoption targets.

The regional forecast developed for this project, which is based on more recent, regionally specific PEV adoption drivers, becomes higher than the most recent CEC forecast and state target levels by 2025. This is largely due to Energeia's treatment of model availability as a driver of uptake, a factor that the CEC forecast considers, but does not weigh as strongly. Energeia predicts that more than 50% of vehicle models on the market will have an electric variant by 2025, and that this will lead to much more uptake than predicted by a traditional model based primarily on return-on-investment. According to this forecast, Fresno County could have over 170,000 PEVs on the road by 2030.

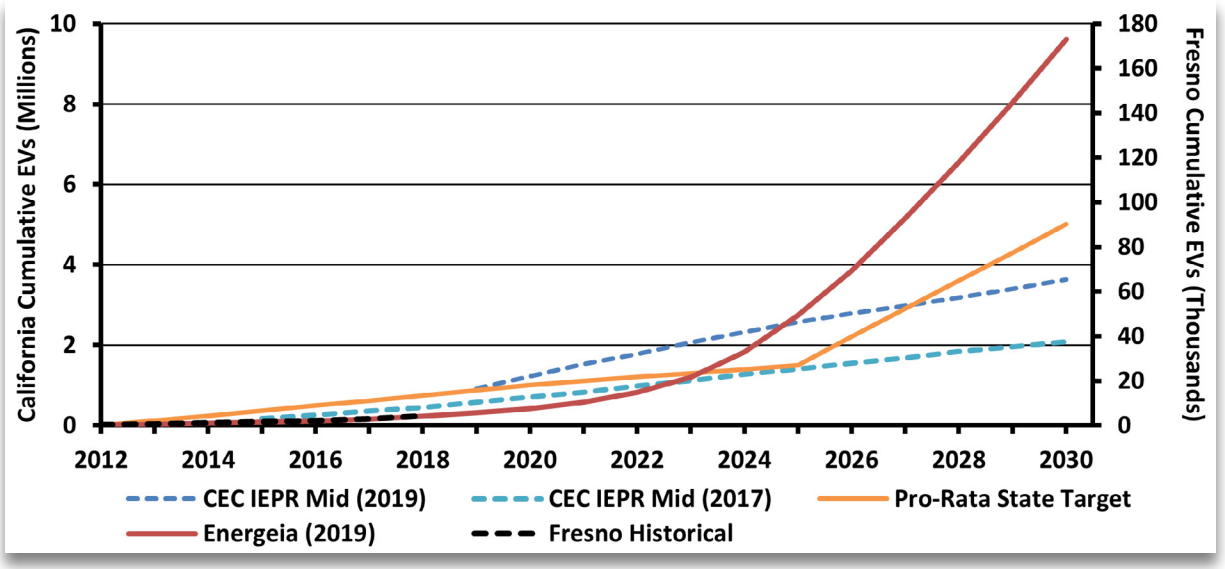
Importantly, the Figure 20 forecast assumes the full and timely implementation of required levels of public charging infrastructure solutions. Figure 21 shows that barriers due to a lack of public charging infrastructure could reduce the forecast adoption to over 75%.[82]

7.3 Future Air Quality Benefits

The forecast reduction in CO_2 emissions given the forecast adoption of PEVs in Fresno County is shown in Figure 22 in gross and net terms.

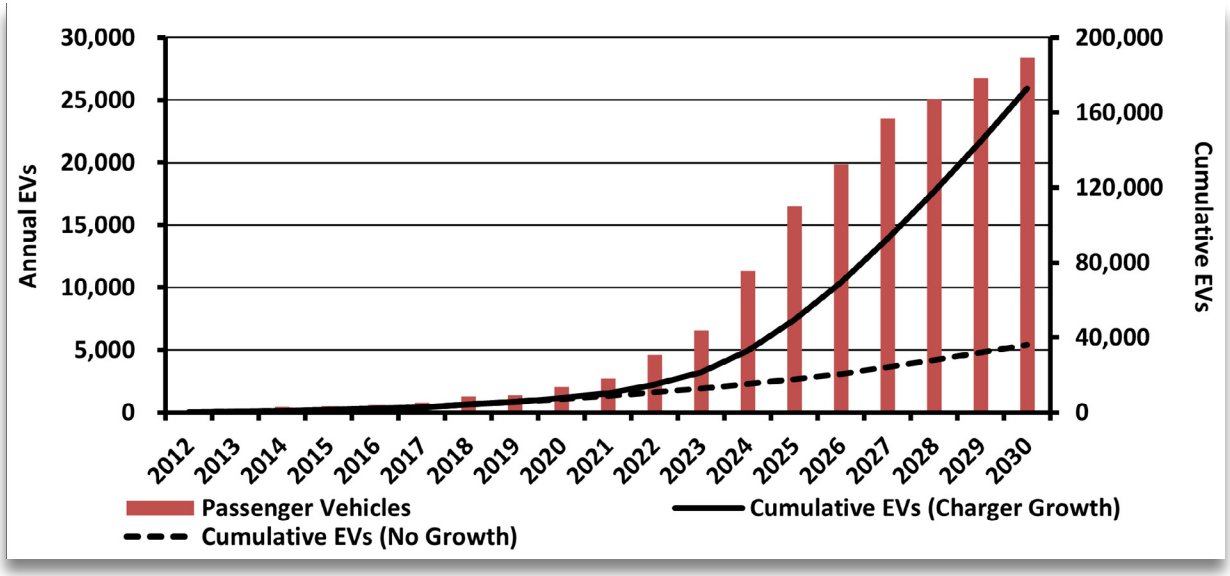
The modeling demonstrates that PEV adoption will increase CO_2 emissions in Fresno County by over 0.5 billion pounds by 2030 due to the effect of increased electricity consumption. However, this will be more than offset by avoiding nearly 2.5 billion pounds of CO_2 emissions from burning gasoline. The net effect is estimated to be just over 1.5 billion pounds of CO_2 saved by 2030.

Figure 20. PEV Adoption by Forecast



Source: CEC IEPR (2017, 2019), CARB (2017), Energeia analysis

Figure 21. Forecast PEV Adoption by Scenario



Source: Energeia Analysis

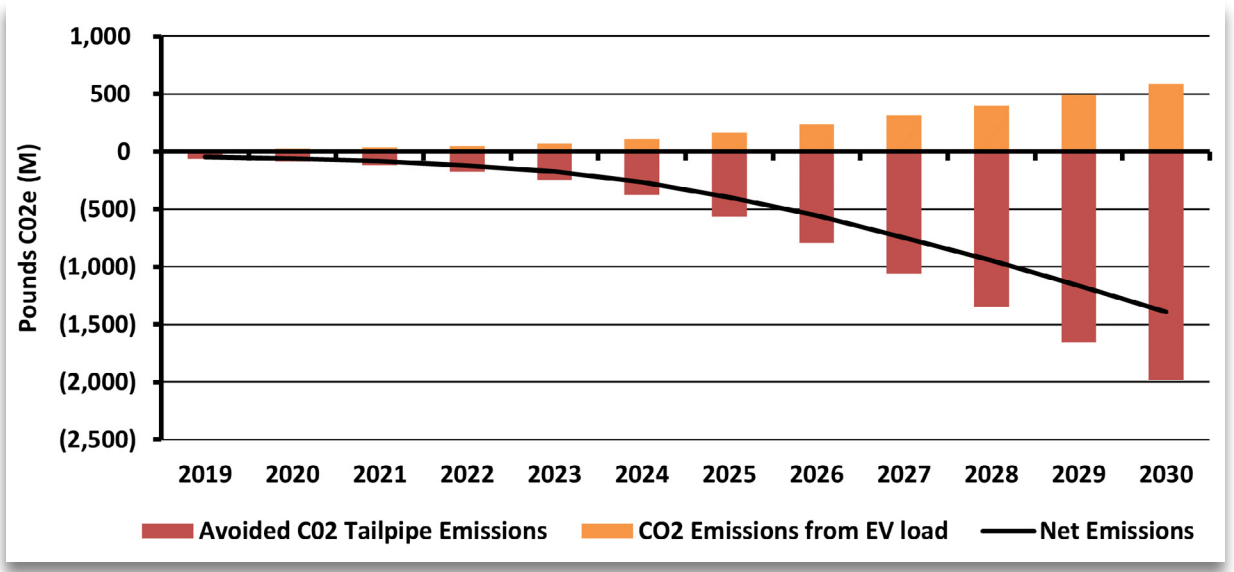
82 Drivers that own their own home are assumed to be able to charge one PEV at home on average.

The forecast reduction in tailpipe NOx, PM2.5 and PM10 emissions is shown in Figure 23. The modeling shows avoided NOx rising to over 2,500 tons by 2030, while P2.5 emissions fall by 80 tons and PM10 emissions fall by 200 tons.

7.4 Findings and Recommendations

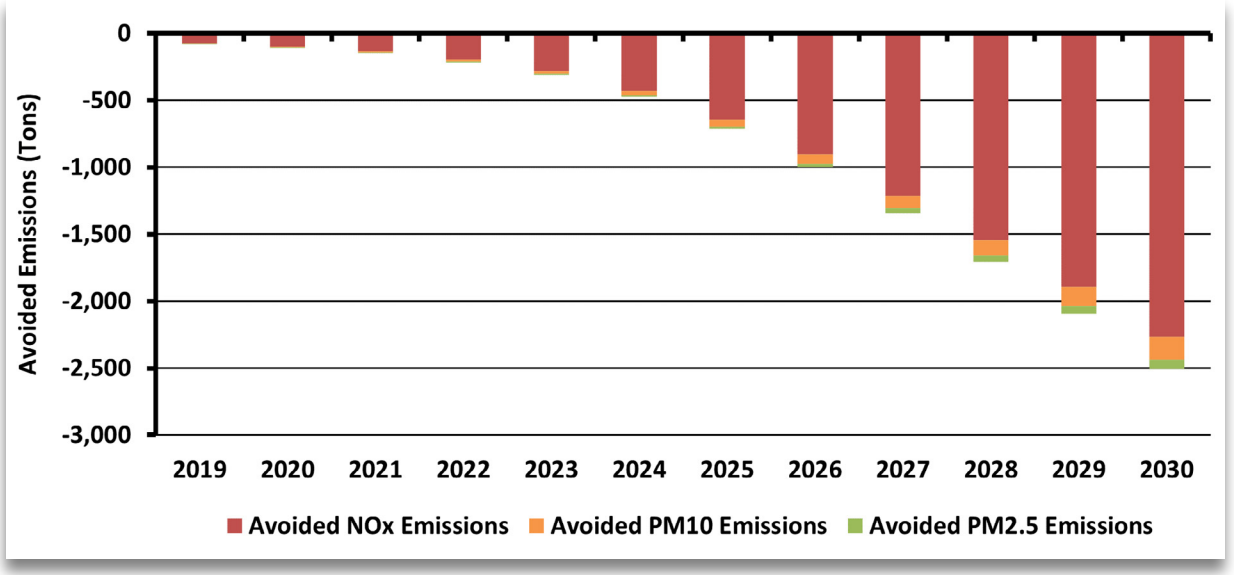
Modeling of Fresno County's specific conditions and PEV adoption drivers and barriers completed for this report found that the availability of targeted levels of public charging infrastructure is necessary to hit the forecast rate of PEV adoption and meet pro-rata California targets by 2030. If this infrastructure is not available, the modeling shows that PEV adoption will fall by 75%, missing the pro-rata California target for the county. In addition, the lower forecast PEV adoption in the absence of adequate public charging infrastructure will see CO_2 emissions increase by a million pounds to 2030.

Figure 22. Forecast Cumulative CO_2 Emissions Impacts



Source: AFDC (2016), Energeia analysis

Figure 23. Forecast NOx, PM10, and PM2.5 Benefits of Public Charging PEVs



Source: CARB (2016), Energeia analysis

08 PROPOSED PUBLIC INFRASTRUCTURE

8.1 Process and Analysis

The approach to optimizing and recommending charging infrastructure within the EVRP seeks primarily to answer the following two questions:

1. **How many of the forecasted population of PEV adopters require a public charging solution?**
2. **For each key segment of that population, what kind of charging solution will best meet their specific needs at lowest cost?**

After identifying the potential options and then determining the optimal mix of charging infrastructure solutions, the overall cost of implementation was estimated. Finally, locational analysis using Graphical Information System (GIS) software was used to determine how to best distribute the identified charging solutions spatially, in order to maximize the number of drivers whose charging needs are met.

8.2 Regional PEV Forecast Requirements

This section explains the basis for the projected number of PEV drivers needing public charging infrastructure, and their segmentation.

8.2.1 Factors and Drivers

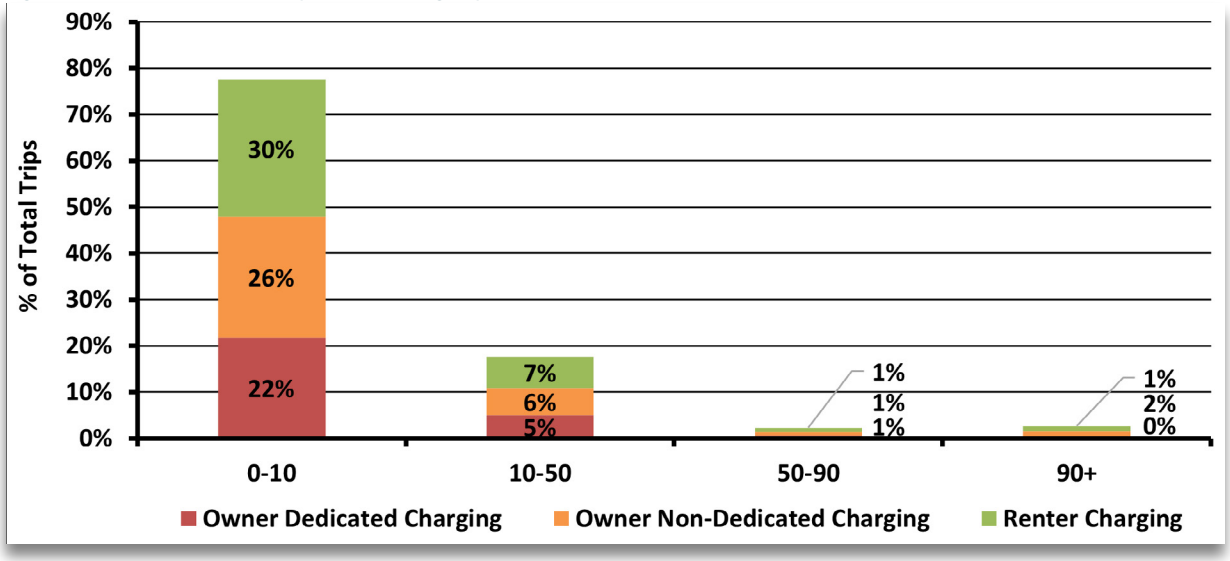
Functionally speaking, home ownership, numbers of vehicles per household and the number of long-distance trips are among key factors that drive the number and nature of charging solutions that are optimal for a given population of drivers.

Figure 24 illustrates the distribution of trips in Fresno County, from which a few key conclusions can be drawn. The drivers identified as needing public infrastructure the most are those without dedicated parking spaces, and those who travel more than 90 miles – this amounts to 75% of drivers in the county. In other words, 75% of potential PEV drivers, without assured public charging, will not be able to meet their travel needs with an electric vehicle and will likely resort to ICE-based options.

Each column of the figure represents the percentage of total trips in Fresno County that fall within a particular distance bracket. Each of the four brackets is expressed in terms of mileage (e.g. the 10-50 bracket represents trips between 10 and 50 miles long). These allocations are based on available Caltrans survey data. Each column is then further segmented based on population analysis, to identify what portion of the total driving demand can be met by each class of charging solution, if all the vehicles were to be electric. Each resulting block represents an intersection of driving distance and required charging solution. For example, the 22% block appearing in the lower left can be interpreted as such: "22% of trips taken in Fresno County are less than 10 miles in distance and can be served with owner dedicated charging."

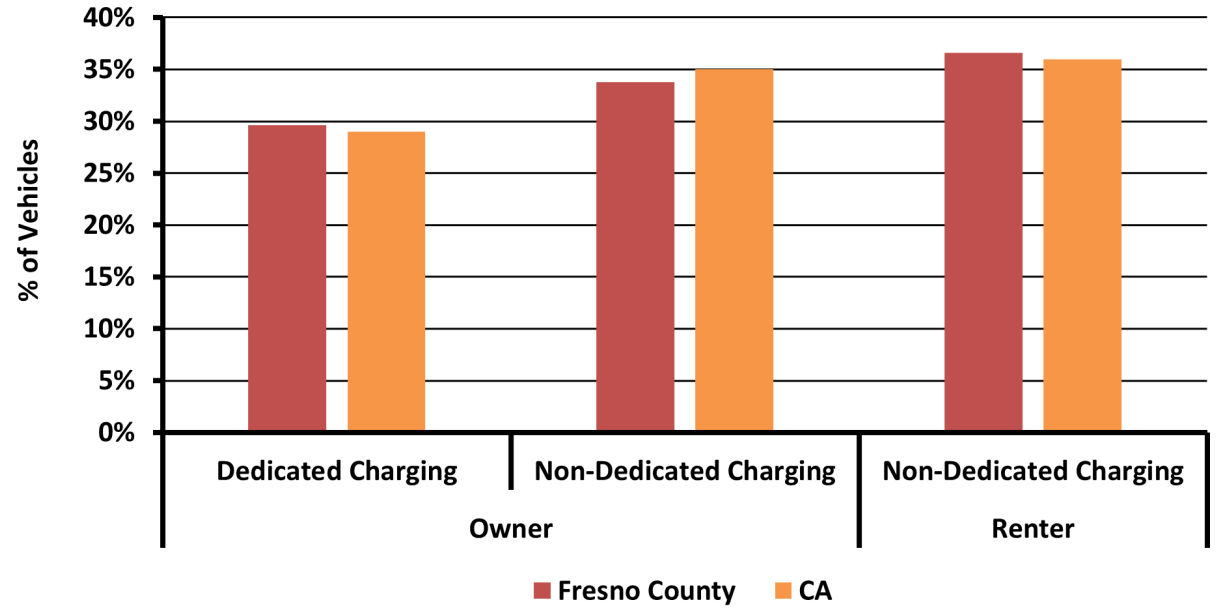
Figure 25 compares the size of key public charging segments in Fresno county to the California average, and shows a close three-way split between owners with dedicated charging, owners without dedicated charging, and renters. The latter two groups require public charging infrastructure to fully realize their PEV adoption potential.

Figure 24. Fresno County Trip Category Breakdown



Source: Caltrans Survey (2012), Energeia analysis

Figure 25. Drivers by Public Charging Requirements



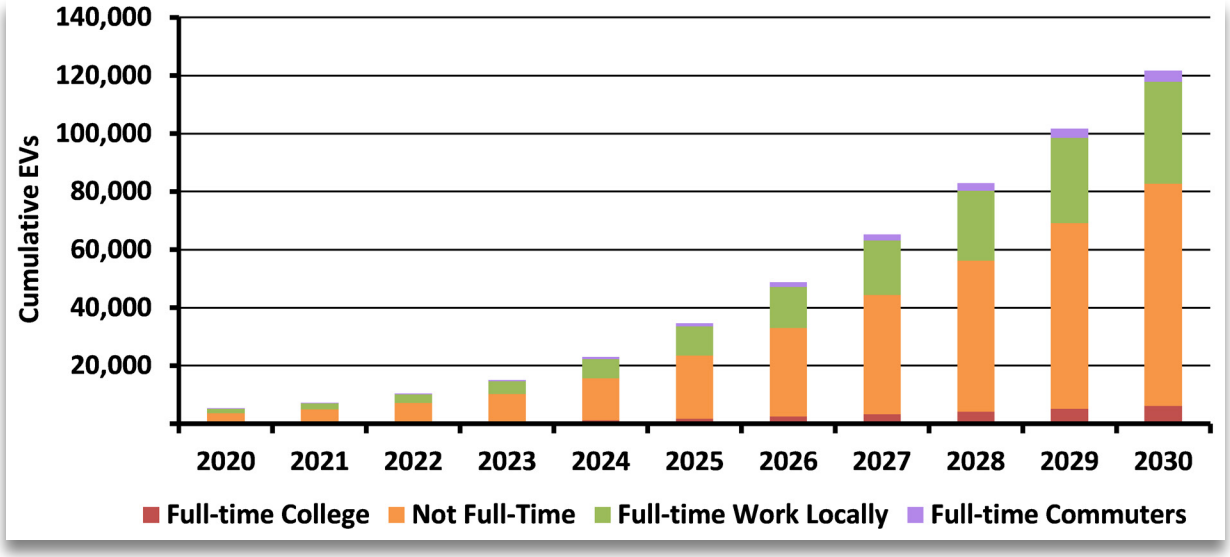
Source: DOT (2017), FCOG (2019), Energeia analysis

8.2.2 Forecast Requirements

The methodology for optimizing public charging infrastructure for Fresno County begins at the driver level, using census data to identify the likely mix of drivers requiring an assured public charging solution, which is reported in Figure 26. The largest segment, 'Not Full-Time', includes retired or unemployed drivers, for whom a workplace solution does not apply. Local full-time workers who can utilize a workplace solution are the second-largest segment. The smaller two segments are full-time college students, who can utilize a charger on campus, and full-time commuters, who work outside of Fresno County and may be best served by a DCFC solution along their commute.

The analysis shows that a significant number of drivers, more than two-thirds, will not be able to rely on Level 2 workplace charging solutions to meet their charging needs. They will need to be able to access public charging near where they live, or via a convenient, gas station-like quick charging model, potentially where they routinely shop in order to reliably recharge their vehicle conveniently.

Figure 26. Estimated Public Charging Drivers by Charging Segment



Source: Energeia Analysis

8.3 Disadvantaged Communities

The need to ensure the proposed charging solution meets the needs of Fresno's disadvantaged community segments was raised during stakeholder engagement as an important metric for ranking the prioritization of public charging infrastructure.

The project optimization modeling has therefore accounted for two community recognized designations for disadvantage:

- Environmental Justice (EJ) areas
- Vulnerable Community (VC) areas

These designations are defined in Chapter Three of FCOG's 2018 Regional Transportation Plan. EJ areas are designated such that they comprise 35% of the county's population, and 65% of the EJ-designated community consist of minority and low-income (at or below 150% of the federal poverty level) households. VC areas are a further subset of EJ areas, defined as having a majority population that meet two or more of the following criteria:

- Elderly
- No vehicle availability
- Single-parent household
- Housing cost burden greater than 30% of household income
- Over 25 years old without a high school diploma
- Linguistic isolation: no one in the household speaks English "very well"
- Minority or low-income status

In the spatial allocation of recommended charging infrastructure, these two designations received 30% and 5% of the total number of chargers, respectively, commensurate with their community representation. Figure 27 illustrates a combined county-level view of EJ and VC areas.

8.4 Public Infrastructure Options and Solutions

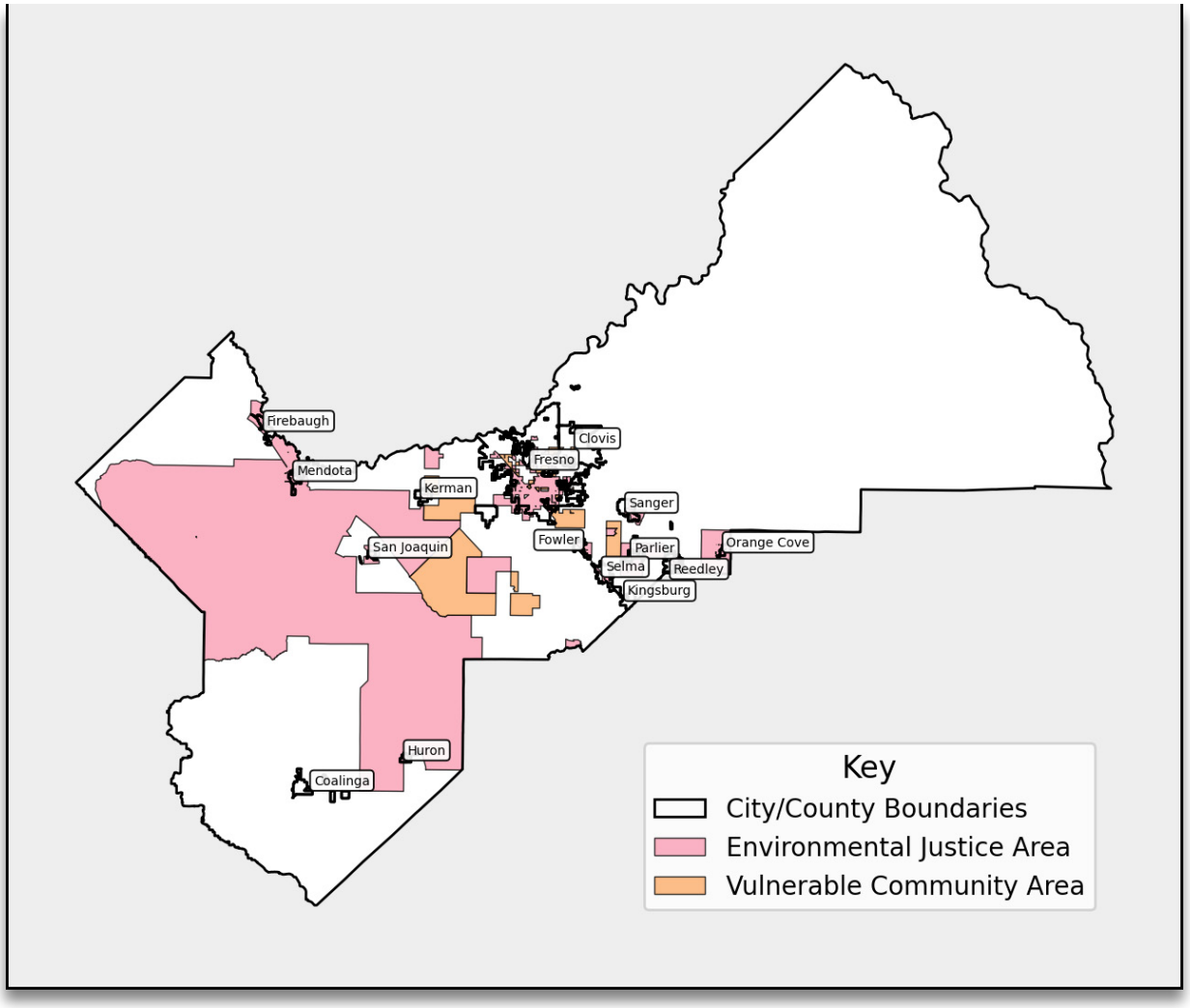
This section reviews options for meeting public charging infrastructure needs, including key technologies and locations to consider, as well as how those characteristics are mapped to real-life solutions.

8.4.1 Methodology

The team's public charging infrastructure optimization model was configured with Fresno County specific conditions, to forecast the number of required public charging stations and ports by public charging infrastructure solution type. The modeling process itself has six key steps:

1	Configure public charging solution options, e.g. a Level 2 charger in an apartment complex
2	Develop driver to public charging solution allocation rules
3	Allocate forecast drivers to public charging solutions
4	Estimate number of chargers and hoses to meet forecast demand
5	Estimate price of solution based on forecast costs and forecast utilization
6	Estimate investment by solution based on prices and volumes per year

Figure 27. Environmental Justice/Vulnerable Community Designated Areas in Fresno County



Source: Fresno County GIS files, FCOG Regional Transportation Plan and Sustainable Communities Strategy (2018)

Importantly, the project engaged the Fresno community during the development of the public charging solution development and assessment methodology, and again to review its results, as part of the project's community engagement workstream.

Additional information regarding modeling methodology and key inputs and assumptions is presented in Appendix B.

8.4.2 Solution Options

A public charging solution brings together technology and location options to address the requirements of a specific driving segment, e.g. disadvantaged, full-time workers, or full-time college students.

Table 2 lists the main public charging solution options and provides a summary of key differences between them in terms of their:

Operating Hours	The typical operating hours for the site; the longer the operating hours, the more charging that can potentially be done per site
Accessibility	Whether the site can be accessed by the public, or whether the access is limited to private business or housing groups
Technology Type	Whether a Level 2 (L2) or DC Fast Charger (DCFC) is offered
Charging Power	Expected charging power, reducing the length of time required to recharge, which also increases the number of drivers that can be served from the charger

The numbers of PEVs able to be supported per charging port is estimated based the solution option's operating hours, accessibility, and charging power.

Table 2. Public Charging Solution Options

Category	Workplace	College	Business Curbside	Business Parking Lot	Destination Parking Lot	Multi-Family	Residential Curbside	Gas Station
Total Sites	8,341	358	3,762	206	150	11,662	2,014	122
Typical Hours	7am-7pm	7am-9pm	7am-7pm	7am-7pm	7am-10pm	6am-12am	6am-12am	6am-12am
Hours per Day	12	14	12	12	15	18	18	18
Days per Week	M-F	M-F	M-F	M-F	All	All	All	All
Potential PEVs	2	1,000	20	11	5,000	10	20	5,000
Public	No	No	Yes	Yes	Yes	No	Yes	Yes
PEV Only	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Connection Cost	Low	Low	Low	Low	High	Low	Low	High
Type	Level 2	Level 2	Level 2	Level 2	DCFC	Level 2	Level 2	DCFC
kW (2020)	7.2	7.2	7.2	7.2	125	7.2	7.2	125
kW (2029)	17.2	17.2	17.2	17.2	500	17.2	17.2	500
Dependable	Yes	No	No	No	Yes	Yes	No	Yes

Source: Energeia Modeling

DCFC technology has been rapidly evolving over the past 10 years, as shown in Figure 28, which traces the fall in recharging times by charger power level. As recharge rates increase, the number of PEVs able to be served by a single charger increases, as do the types of locations that could be used as a DCFC charging location based on dwell time. However, higher recharging rates come with higher costs.[82]

8.4.3 Location Options

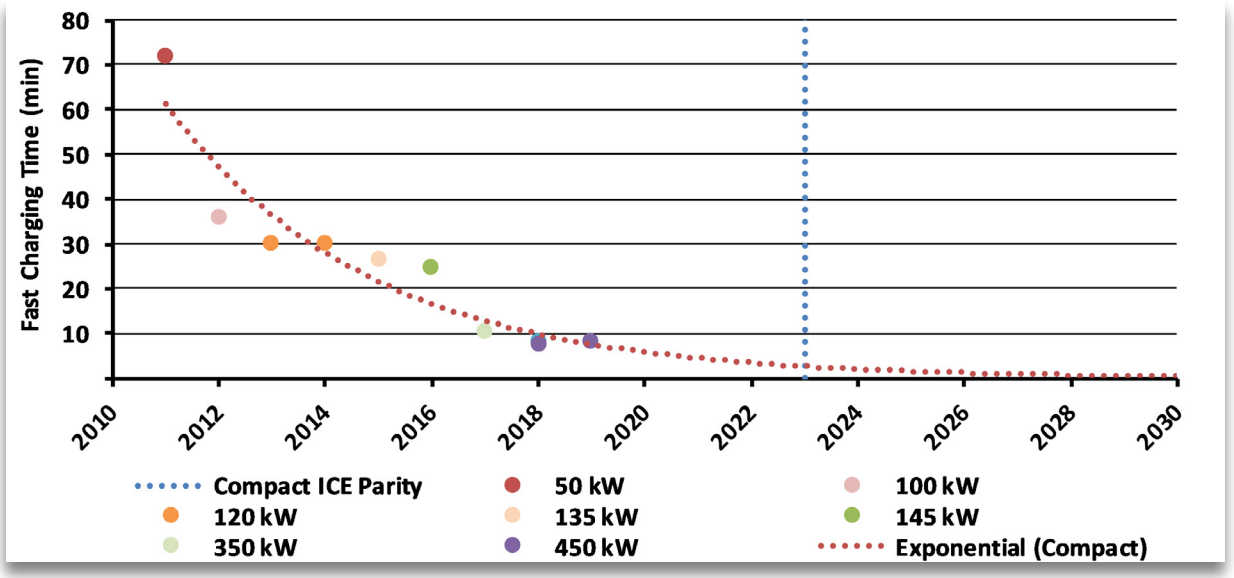
Potential public charging location options were identified[83] assuming a half-mile maximum walk between charging locations and home or workplace locations. A half-mile walking distance has been identified in stakeholder engagement as a reasonable amount of walking when considering parking locations.[84]

8.4.3.1 Level 2 – Residential Locations

Potential residential locations were identified based on nearby single family and multi-family dwellings. Curbside Level 2 solutions were assumed for low density areas, and private parking lot-based Level 2 charging or curbside Level 2 solutions were identified for multi-family locations.

The Figure 29 provides real-world examples of the main types of residential charging solution options identified by the project.

Figure 28. Trends in DCFC Technology Recharging Times



Source: Energeia, Manufacturer websites

Figure 29. Level 2 Multifamily Dwelling Level and Residential Curbside Charging Solution Examples

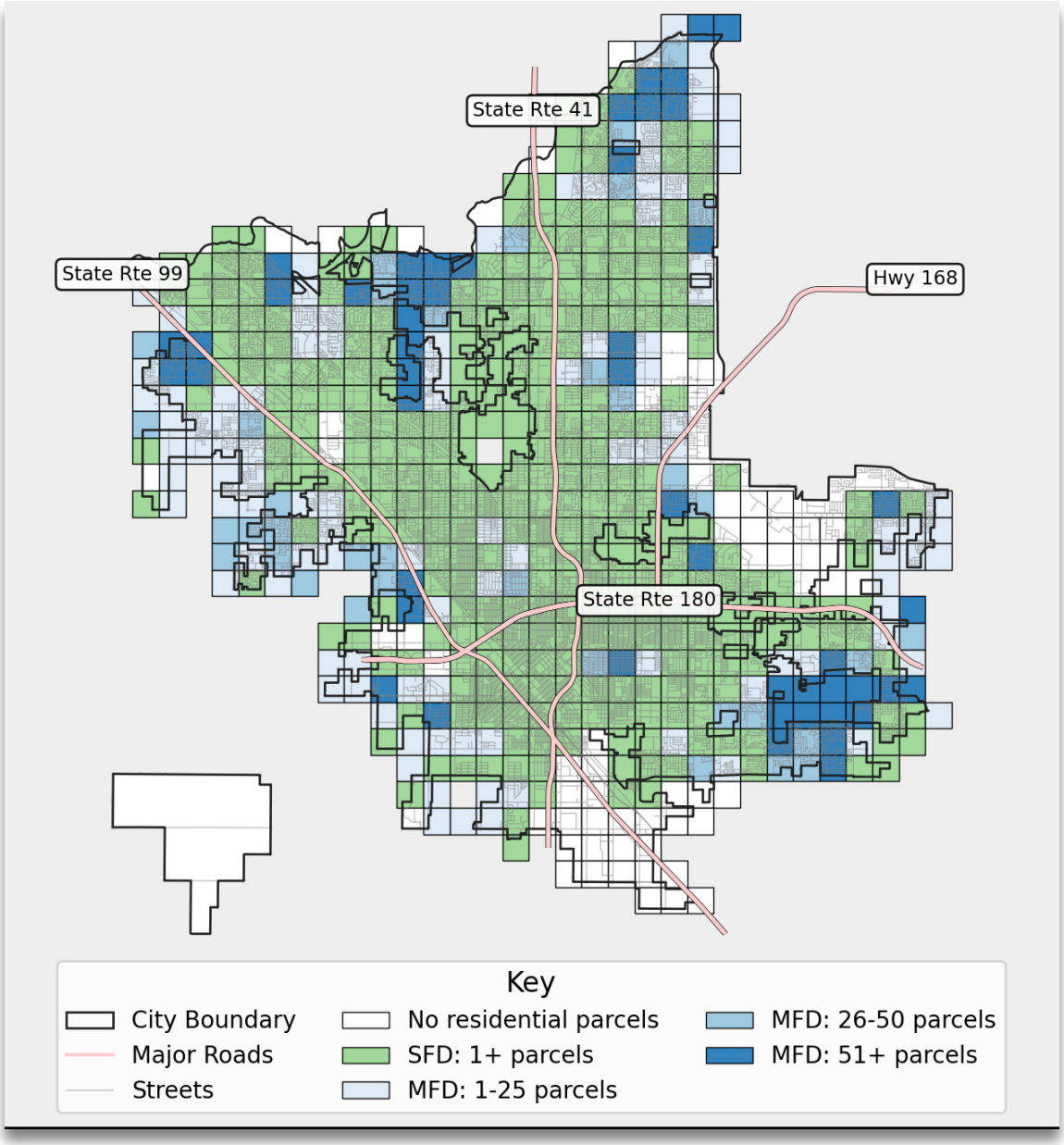
Curbside Level 2 Charging can be used to support needed charging at multi-family dwellings and provide residential charging options.
Source: Image by (Joenomias) Menno de Jong from Pixabay

82 Detailed charging cost analysis is provided in Appendix B.3.
83 Each square on the map is a half mile by a half mile.
84 Capital City Development Corp (2016)

Figure 30 shows the locations of potential residential charging sites by type of location in Fresno City based on the half mile by half mile walking assumption.[85] A total of 11,662 multifamily locations and 2,014 residential curbside locations were identified.

Analysis completed for the study showed that providing charging services exclusively using residential Level 2 charging solutions would require a high level of Level 2 chargers to meet PEV driver needs. This is mainly because of the relatively low density of residential areas compared to business and college areas.

Figure 30. Identified Residential Charging Location Options (Fresno City Example)



Source: County Assessor Data, Public Domain Data, Energeia Analysis

85 Locations were identified for all incorporated cities in Fresno county.

8.4.3.2 Level 2 – Workplace, Government and Educational Locations (i.e. Non-Residential)

Potential non-residential locations were identified based on nearby businesses, government or educational buildings and parking lots. Curbside Level 2 charging solutions were identified for areas (cells) without private or public parking lots.

Figure 31 provides real-world examples of the main types of business location charging solution options identified by the project, including with solar PV canopies.

Figure 31. Level 2 Parking Lot, Business Curbside and Solar PV Charging Solution Examples

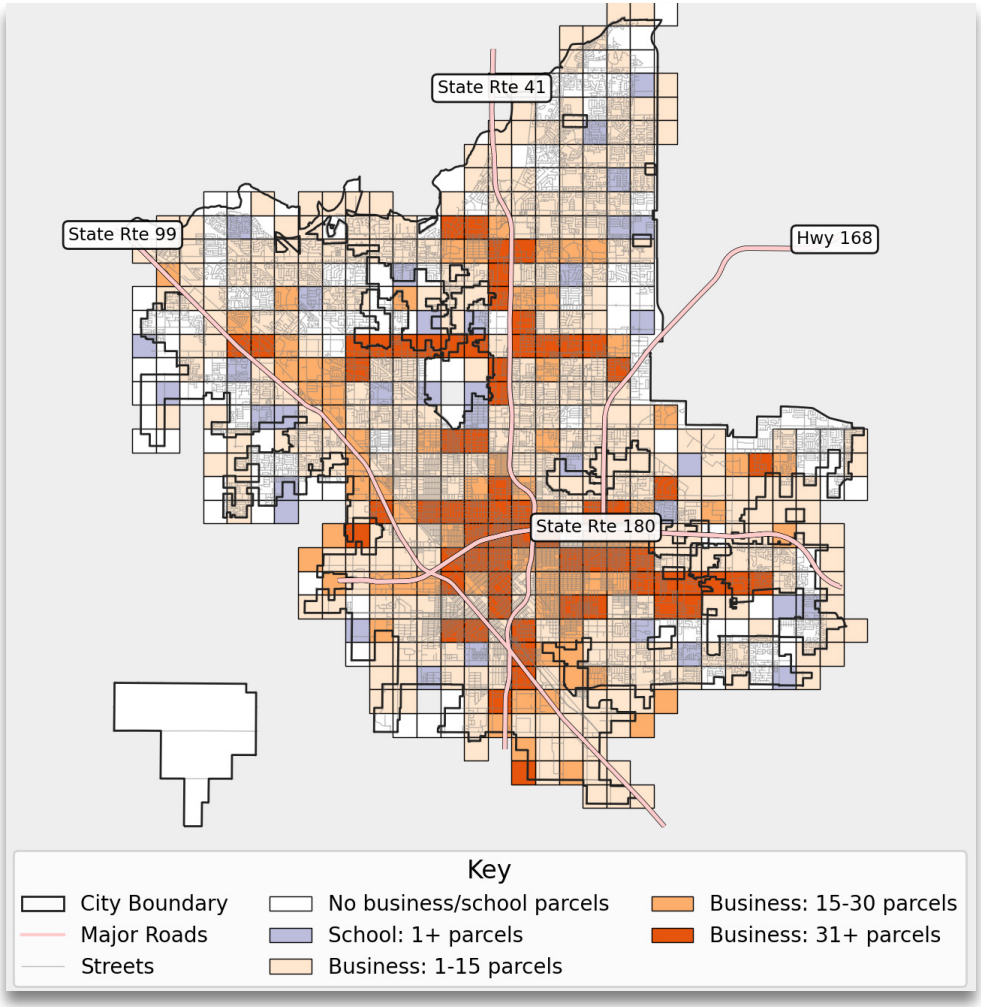
Image by Eveline de Bruin from Pixabay

CC licensed: Visitor 7

CC licensed: Sass Peress, Renewz Sustainable Solutions Inc.

Figure 32 shows the locations of potential business and college charging sites by type of location based on the half-mile by half-mile walking assumption. A total of 206 business parking lot, 3,762 business curbside and 358 college locations were identified.

Figure 32. Identified Business Charging Location Options



Source: County Assessor Data, Public Domain Data, Energeia Analysis

Analysis completed for the project showed that providing charging services using non-residential Level 2 charging solutions would require fewer Level 2 charging sites compared to low density residential options. This assumes higher than average utilization of the non-residential charging ports, and higher numbers of charging ports for station, helping to reduce average charging costs.

8.4.3.3 DCFC – Gas Station and Parking Lot Locations

Potential DCFC locations were identified based on gas stations and public parking lots. While access to higher voltage power lines is essential for these sites, analysis reported in Figure 33 shows that the high voltage system runs nearby to virtually all of these sites.[86]

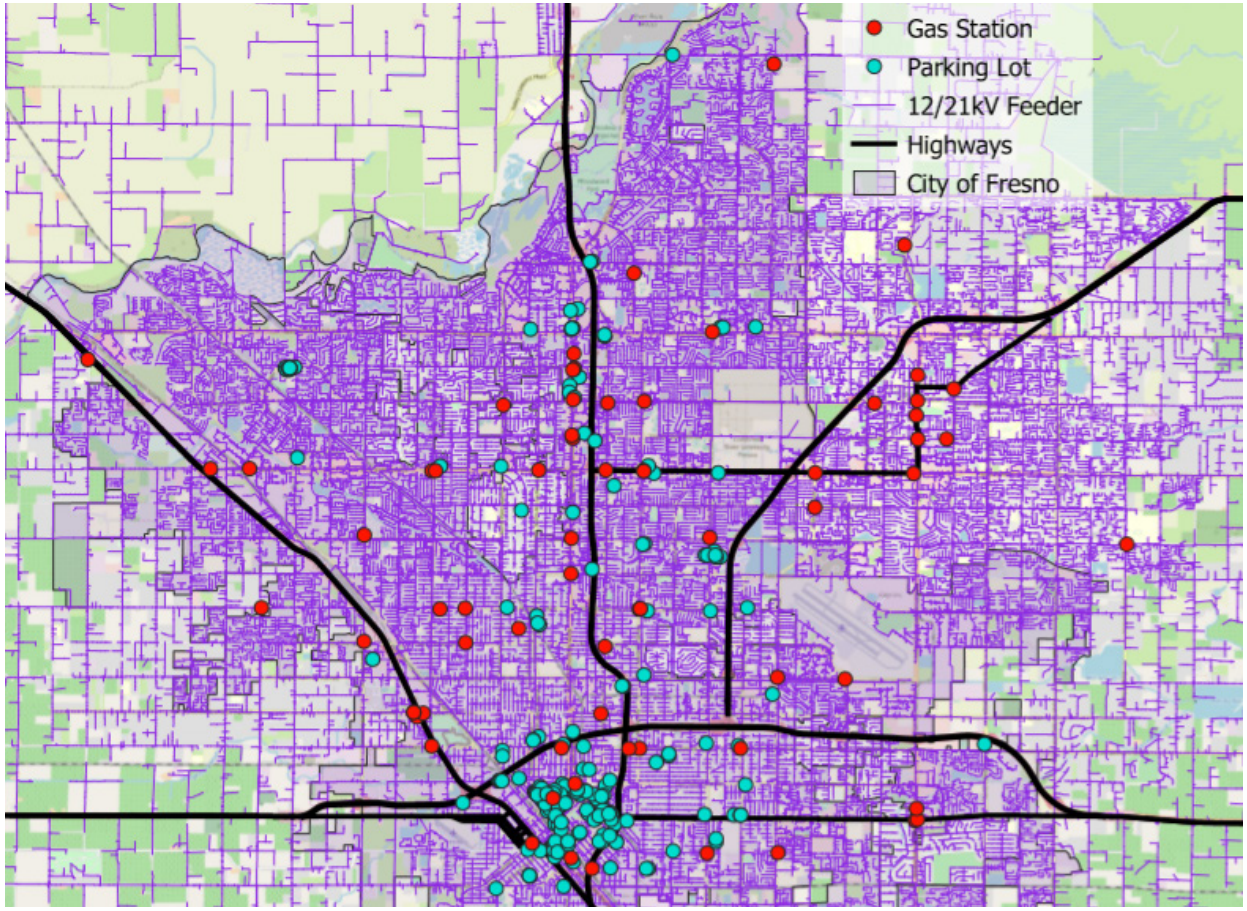
Figure 33 provides an example of the main types of DCFC charging solution options identified by the project.

Figure 33. Direct-Current Fast Charger Gas Station/Transport Hub, Direct-Current Fast Charger Retail

Image by Stan Petersen from Pixabay

Figure 34 shows the locations of potential DCFC gas station and major retail parking lot sites by type of location for Fresno City.[87] A total of 122 gas stations and 4,739 parking lots at major retail centers locations were identified across the county.

Figure 34. Identified Gas Station and Major Retail Center Parking Lot Location Options (Fresno City Example)



Source: County Assessor Data, Public Domain Data, Energeia Analysis

Analysis completed showed that, compared to Level 2 charging solutions, the higher recharging power of DCFC technology means that far fewer sites will be required[88] to meet forecast PEV public charging requirements due to their ability to serve a much greater number of drivers per port.

86 Whether or not there is spare capacity is a key question. Data on load hosting capacity was unavailable.
87 Locations were identified for all incorporated cities in Fresno county.
88 See Section 11.4.3 for the forecast requirement by 2030.

8.5 Charging Infrastructure Costs

The project estimated charging solution costs per year per vehicle and by solution type based on the forecast cost of electricity, site costs, and forecast site utilization. The results of our cost modeling are reported in the following sections.

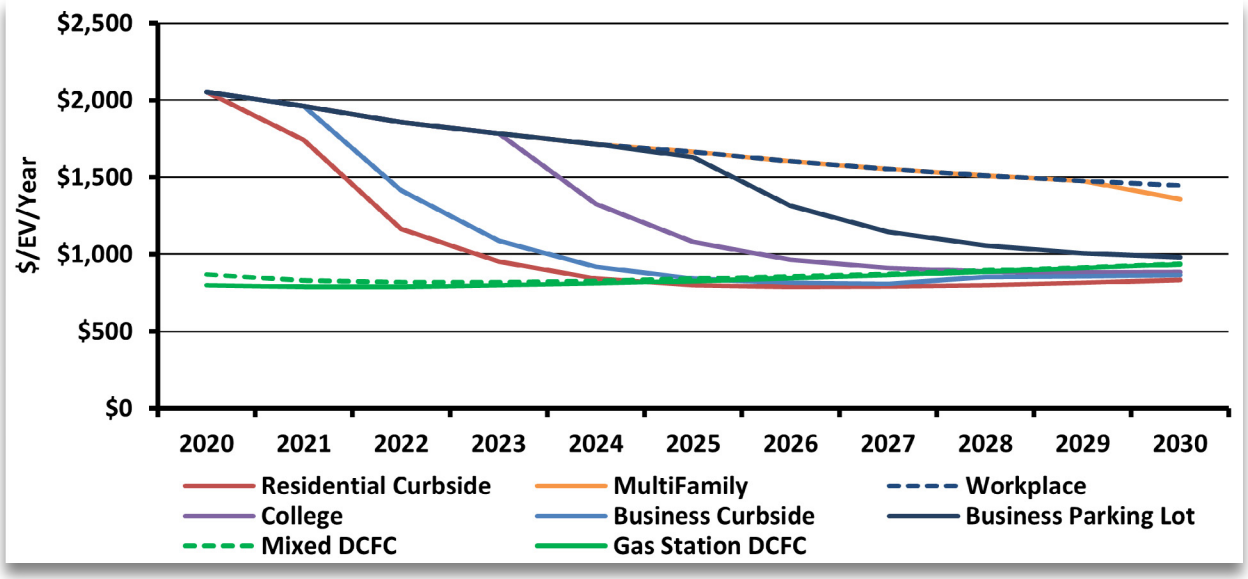
Figure 35 reports on the modeling results by public charging solution option over time. A key finding of the study is that DCFC charging solutions are consistently the most economic public charging solution, only matched by certain L2 chargers beginning in 2025 as rising PEV adoption increases utilization, lowering their average cost of service.

The decline in the annual cost per PEV per annum is mainly due to:

- Forecast declines in the cost of charging equipment and installation costs
- Assumed number of drivers to the charging solution
- Rising utilization over time due to rising PEV adoption

Differences between different charging options start out relatively high but compress over time. Solutions with relatively low driver watersheds and limited hours, e.g. private workplace charging is the highest cost due to relatively low levels of utilization per charging port. Solutions with relatively high numbers of potential PEV drivers and long, seven day per week operating hours, e.g. residential curbside, see a relatively low cost per PEV per year.

Figure 35. Forecast Annual Public Charging Costs by Option (incl. Electricity)



Source: Census Data (2017), ICCT (2019), Energeia analysis

It is important to note that the applied model assumes a relatively uniform distribution of adoption over the next ten years across driver types. Greater clustering of drivers around public charging infrastructure would accelerate annual cost reductions due to higher utilization rates. The model also assumes charging services will enable efficient sharing of public charging assets.

Appendix B provides more detail regarding cost modeling methodology, inputs and assumptions.

8.6 Recommendations and Considerations

This section reports on the results of the public charging infrastructure optimization process, which involved the development of an optimization framework, validation of the optimization criteria and weightings, and analysis and assessment of potential public charging solution options.

The final step in the technical analysis was the development of an optimized, 10-year forecast of public charging infrastructure deployment by solution type, year and location. The highest-ranking sites were also identified as candidates for near-term targeting.

8.6.1 Optimization Framework

The final optimization criteria and weighting agreed with stakeholders for ranking potential charging solutions included:

TOTAL COST	Lower cost solutions were scored higher than higher cost solutions
WALKING DISTANCE	Solutions closer to work or home, e.g. private workplace, college or multi-family charging, were ranked the highest
RECHARGE TIME	Higher power, DCFC based solutions that can recharge PEVs the fastest were scored higher than slower, Level 2 based solutions

Each of the criteria was equally weighted in final scoring.

The assessment of charging solutions based on the above ranking criteria is reported in Table 3, including the specific scoring criteria. The assessment found DCFC charging solutions to be the highest ranked at the category level, followed by college and business parking lot solutions. Private apartments, curbside chargers (residential or business), and workplaces scored lower overall.

The 'Business' categories in this table also include other non-residential locations previously mentioned in the study, including hotels, community centers, and parks, because they follow the same charging model and serve the same segment of drivers.

Table 3. Public Charging Solution Option Ranking (lower is better)

	Technology	Total Cost per PEV	Walking Distance	Recharge Time	Total
College	Level 2	1	1	3	**1.7**
Workplace	Level 2	3	1	3	**2.3**
Business Curbside	Level 2	3	2	3	**2.7**
Business Parking Lot	Level 2	2	2	3	**2.3**
Multi-Family	Level 2	3	1	3	**2.3**
Res Curbside	Level 2	1	2	3	**2**
Mixed DCFC	DCFC	1	N/A	1	**1**
Gas Station DCFC	DCFC	1	N/A	1	**1**

Source: Energeia

	Total Cost per Driver	Walking Distance	Recharge Time
1	Lowest 25%	< 100 Ft	< 1 hour
2	25%-75%	100-200 Ft	1-3 hours
3	Highest 25%	> 200 Ft	3 hours

The above ranking results reflect the chosen criteria and weighting, and different criteria and weighting could product alternative rankings. The scoring of specific locations will vary due to specific conditions, e.g. walking distance.

8.6.2 Optimized Public Charging Infrastructure Targets

An optimized public charging infrastructure for Fresno County was developed by allocating the key driving segments reported in Section 8.2.2 by year to the highest ranked charging solutions, taking utilization levels into account.

Table 4 shows how drivers were allocated to charging solutions using eligibility assumptions and ranking results.

Table 4. Solution to Drive Segment Mapping and Ranking

	Level 2					DCFC					
	Business			Residential		Community					
Driver Segment	College	Workplace	Curbside	Hotel/ Motel	Parking Lot	Multi-Family	Curbside	Community Centers	Parks	Gas Station	Retail Center
Full-time College	●					●	●			●	●
Retired, Not Full-Time						●	●	●		●	●
Full-time Work Locally		●	●		●	●	●			●	●
Full-time Commuters						●	●			●	●
Visitors				●					●	●	●

● Top Ranked Solution ● Lower Ranked Solution

Source: Energeia

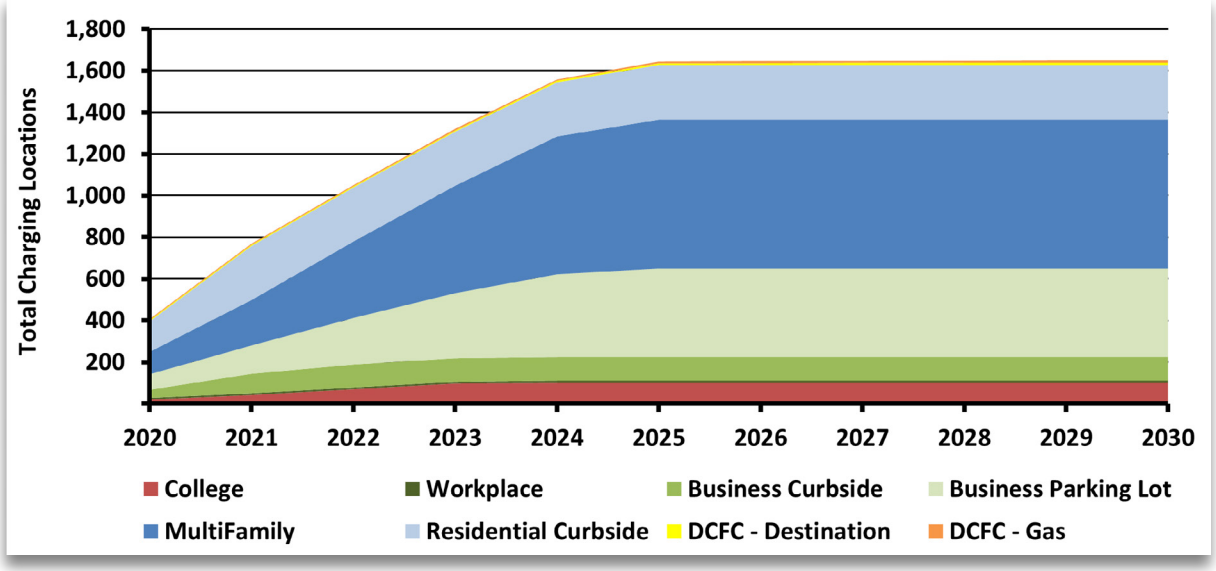
The following four graphics report on the resulting optimized public charging infrastructure deployment by target driver segment, geographic area, disadvantage category, and charger type.

Targets for public charging infrastructure sites by driver type over time reflect the forecast relative demand for each drive segment, and their relative density, which together results in a forecast number of locations needed.

For Figures 36-39, it should be noted that the flattening of the growth curve after 2025, in terms of charger counts, is due to the analysis that after 2025, the optimal set of chargers should be fully DCFC and no additional L2 chargers are required. This is also due to the fact that DCFC can serve many more customers than L2, and consequently, far fewer of them are needed.

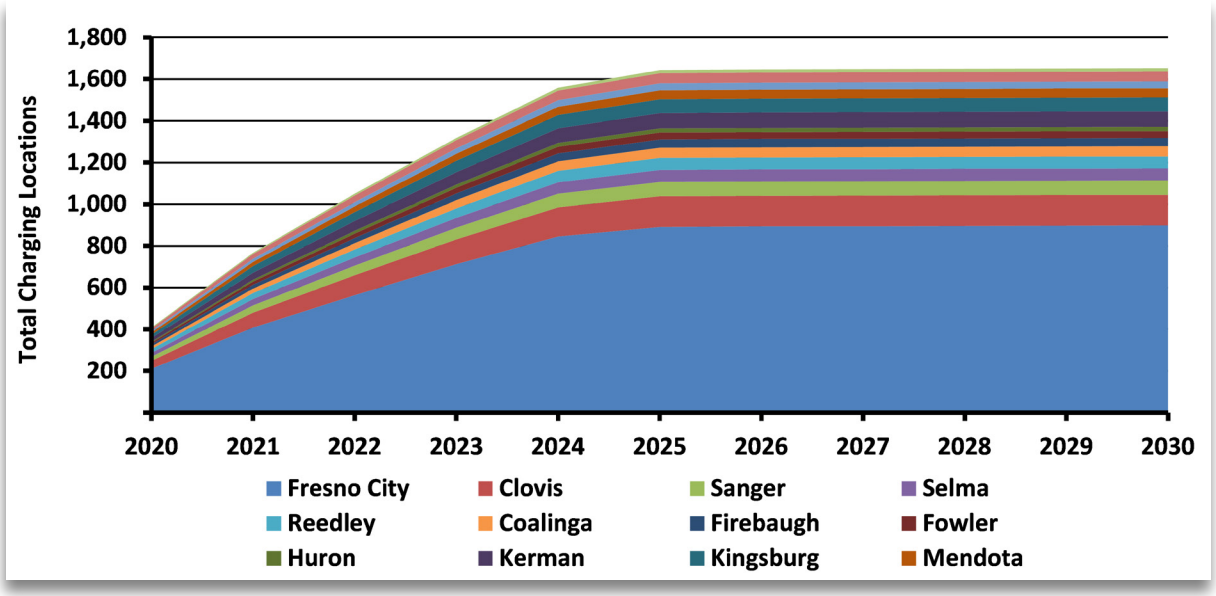
Targets for public charging infrastructure sites by incorporated city over time shown in Figure 37 and mainly reflect differences in population between cities. The total height of each chart represents the total number of chargers in Fresno County, with the colors illustrating the proportions according to the legend items. For example, in Figure 37, in 2030, the total target for incorporated cities in Fresno County is just over 1,600 locations, with around 900 of those sited in the City of Fresno. An additional 220 charging stations will be needed in unincorporated Fresno County to support rural EV adoption.

Figure 36. Public Charging Infrastructure Targets by Driver Segment and Year



Source: Census Data (2017), Energeia analysis

Figure 37. Public Charging Infrastructure Targets by City and Year

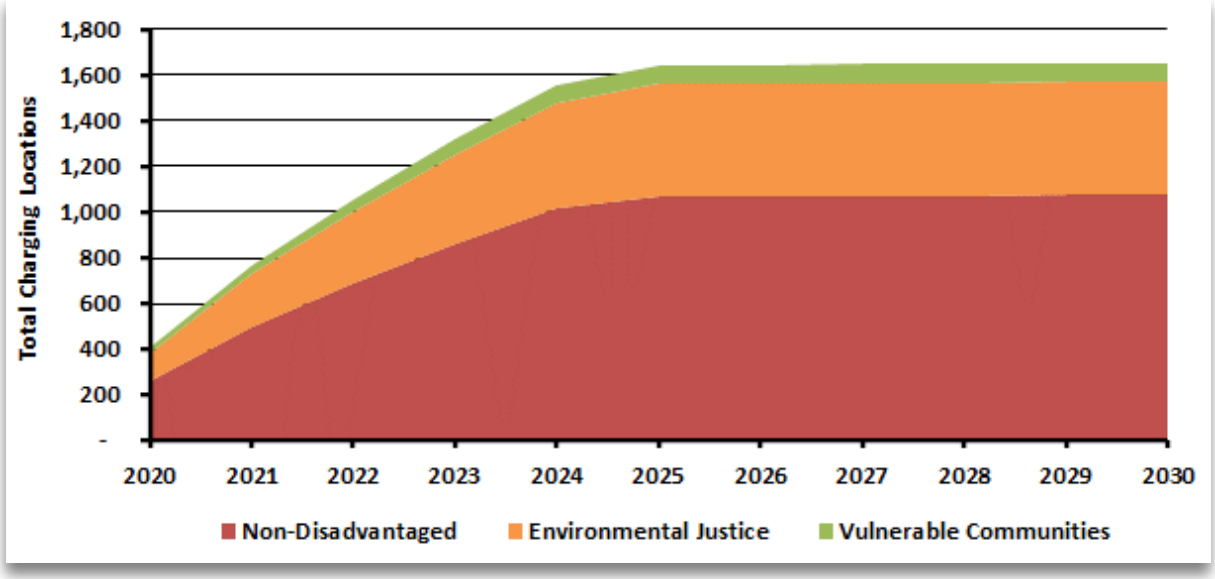


Source: Census Data (2017), Energeia analysis

Disadvantaged status was a major consideration in allocating charging infrastructure to ensure equitable investment. The details of this consideration are discussed in Section 8.3 of the report, but Figure 38 illustrates the final breakdown of chargers by disadvantaged status.

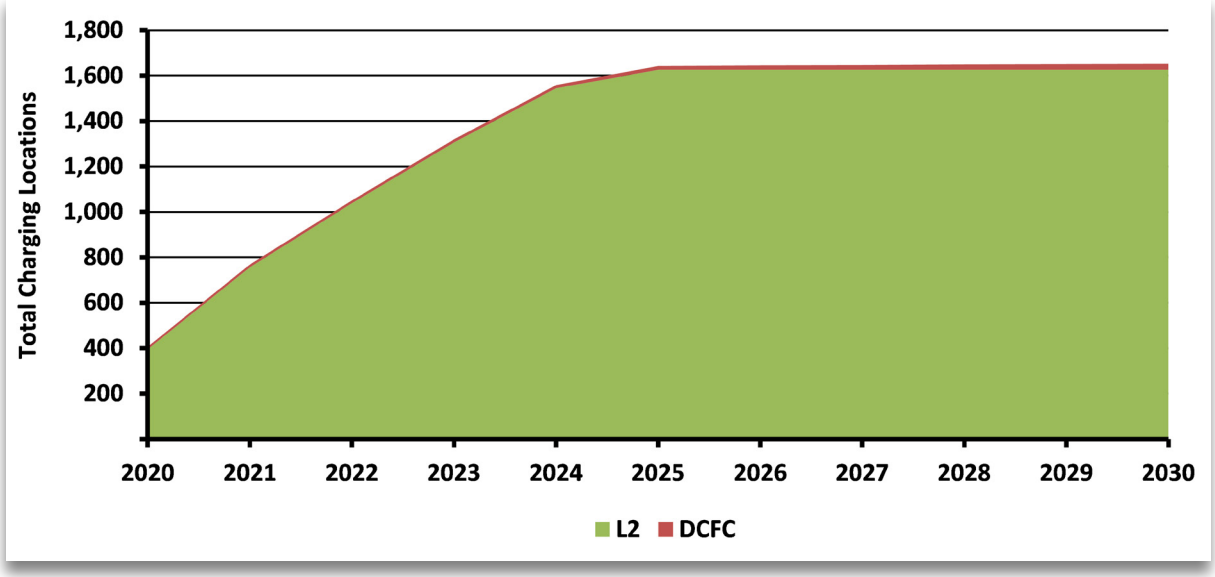
Targets for public charging infrastructure sites by charging technology type over time shown in Figure 39 reflect changes in technology costs and performance over time, particularly for DCFC technology. Over the next 5 years, most public charging infrastructure will be Level 2, but this will transition to DCFC from 2024 onwards.

Figure 38. Public Charging Infrastructure Targets by Disadvantaged Segment and Year



Source: Census Data (2017), Energeia analysis

Figure 39. Public Charging Infrastructure Targets by Charger Type and Year

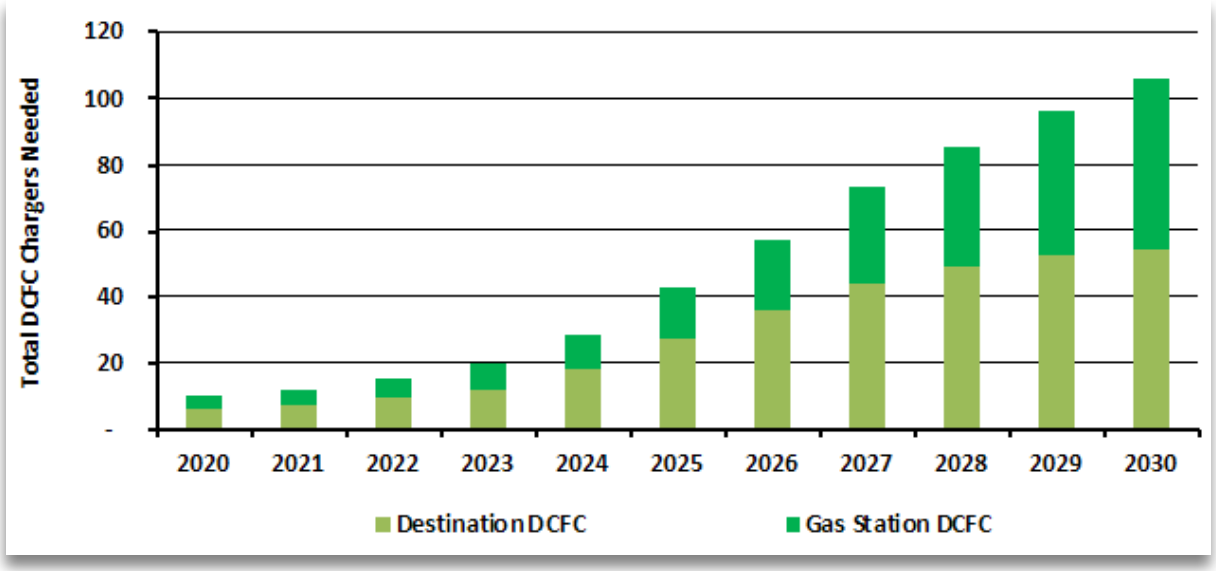


Source: Census Data (2017), Energeia analysis

Figure 40 reports on the optimal level of DCFC charging ports needed each year, based on the above allocations. The initial level of ports needed is driven by an assumed need to place at least one DCFC charger in every incorporated city, with the target growing over time based on population. While the assumption of at least one DCFC charger per incorporated city is not a rule, it is important to have enough customers to support the high installation costs of chargers. For analysis outside of incorporated cities, population density is a suitable substitute metric. It should also be noted that most residents that reside outside of incorporated cities currently drive to their nearest city for gas, so DCFC installation at these locations can still meet parity with gas service in that regard. Additional charging installations can be used to support unincorporated areas beyond this as well.

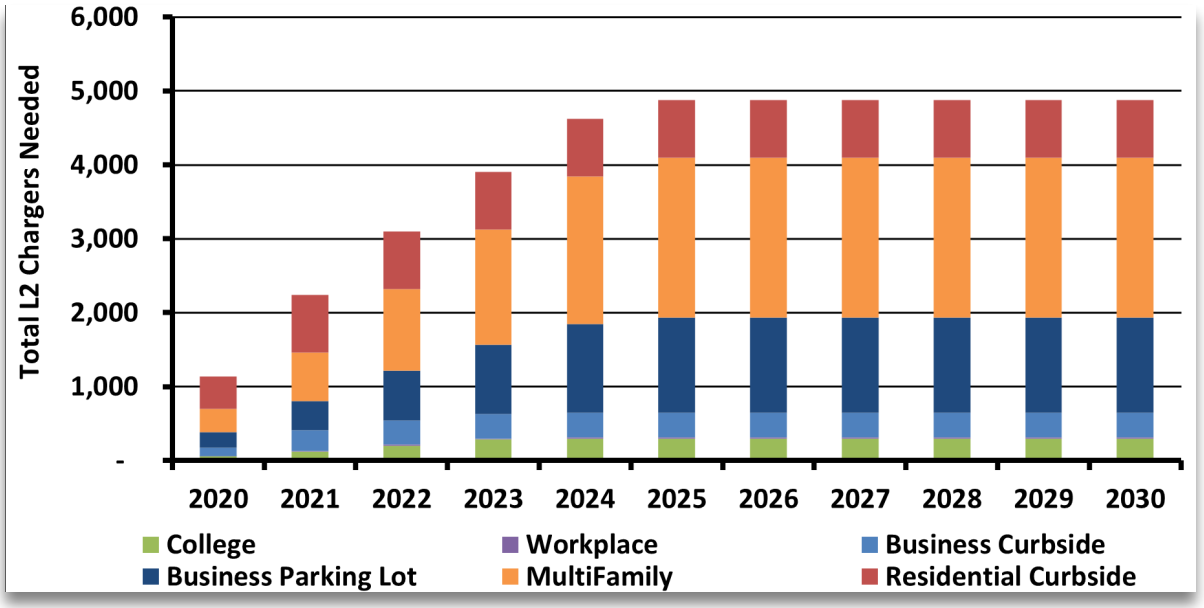
Figure 41 displays the optimal number of Level 2 charging ports to meet public charging needs through 2030 by solution type. The optimized Level 2 based public charging infrastructure sees most public charging sites located at workplaces and multifamily sites, with around 20% of sites being residential curbside and business curbside solutions. A total of 4,983 charging ports are recommended by 2030 for charging stations sited within incorporated Fresno County cities. Note that most sites will have multiple ports.

Figure 40. Optimal DCFC Charging Ports Needed per Year



Source: Census Data (2017), Energeia analysis

Figure 41. Optimal Level 2 Charging Ports Needed by Solution Type per Year



Source: Census Data (2017), Energeia analysis

8.6.3 Investment Required to Meet Target

The required level of cumulative investment to meet forecast demand for the optimized DCFC public charging infrastructure is reported in Figure 42. The estimates reflect the annual number of new public charging ports and their respective price by charging solution type.

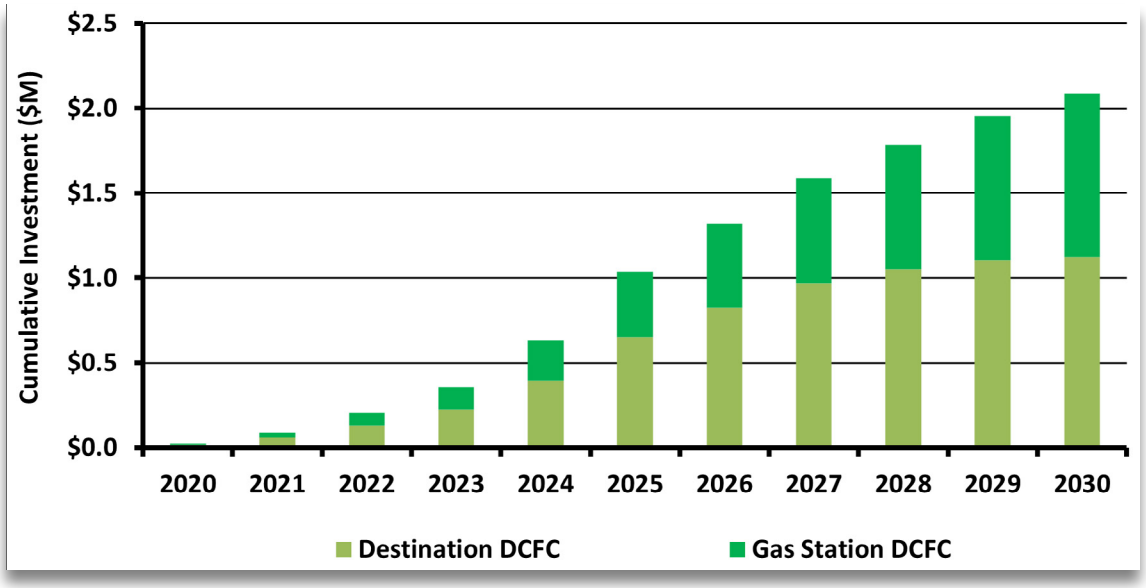
Figure 42 reports the cumulative investment for DCFC to meet state targets.

Figure 43 reports the cumulative investment required for the Level 2 component of the optimized solution to achieve state targets.

The analysis shows that the DCFC share of investment is expected to cost a fraction of the cost of the Level 2 share. This is in part due to the selection of relatively high cost, but more convenient, workplace and MFD public charging solutions. It is also due to the later timing, when the charging technology is expected to be significantly lower cost.

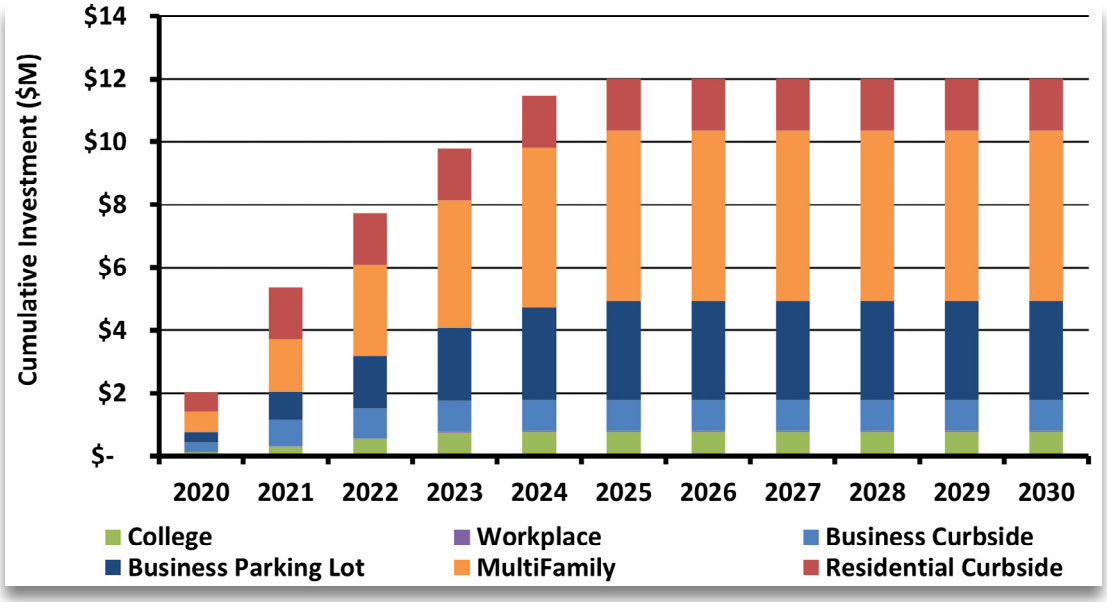
The estimated total required investment is $14.1 million by 2030. This total is for the entirety of Fresno County, both incorporated and unincorporated areas. Options for securing the estimated level of investment needed are presented in Appendix E.

Figure 42. Optimal DCFC Investment Needed per Year



Source: Census Data (2017), ICCT (2019), Energeia analysis

Figure 43. Optimal L2 Investment Needed per Year



Source: Census Data (2017), ICCT (2019), Energeia analysis

8.6.4 Near-Term Priority Locations

The final step in the public charging infrastructure planning process was to identify the top ranked locations in each of Fresno County's fifteen incorporated cities to target for near-term programs.

Figures 44-58 display the top Level 2 and DCFC sites for each city, based on their potential PEV density, i.e. the number of PEV drivers they are expected to be able to serve. Each cell is shaded based on the recommended number of chargers within its boundaries. These recommendations were determined by spatially allocating the city-level figures by parcel type and density, while also meeting or exceeding required minimum sites in disadvantaged areas. The figures are in alphabetical order by city.

The highest ranked locations presented are based on the framework presented in Section 8.6.1, and do not account for opportunistic drivers including:

THE OPPORTUNITY TO LEVERAGE GOVERNMENT INSTALLATIONS	These can represent a great opportunity to increase access to public charging infrastructure, and will ideally be located near the highest number of potential PEV drivers where possible
GROUPS COMING FORWARD OFFERING TO ELECTRIFY	A group of potential PEV drivers can significantly reduce the cost per driver per year by increasing asset utilization, however, it is not often known in advance where these groups may arise, e.g. park and ride parking lot users
POTENTIAL HOSTS COMING FORWARD OFFERING THEIR LOCATIONS	Mixed use parking sites are particularly useful, which might otherwise take more time and effort to secure in the absence of an owner coming forward
AVAILABLE INCENTIVES	Some locations may be lower cost than assumed in the analysis due to being eligible for government funding or other sources of incentives and should therefore be prioritized.

Each of the mentioned locations should be considered in light of the framework presented in this section, as they may provide a better near-term opportunity than the sites listed.

Figure 44. Allocation Results, Clovis

Clovis is largely residential, with two residential chargers being recommended for many cells. There are also a handful of nonresidential and mixed opportunities, located in the vicinity of various shopping centers and the medical campus just south of Highway 168 on the east side of town.

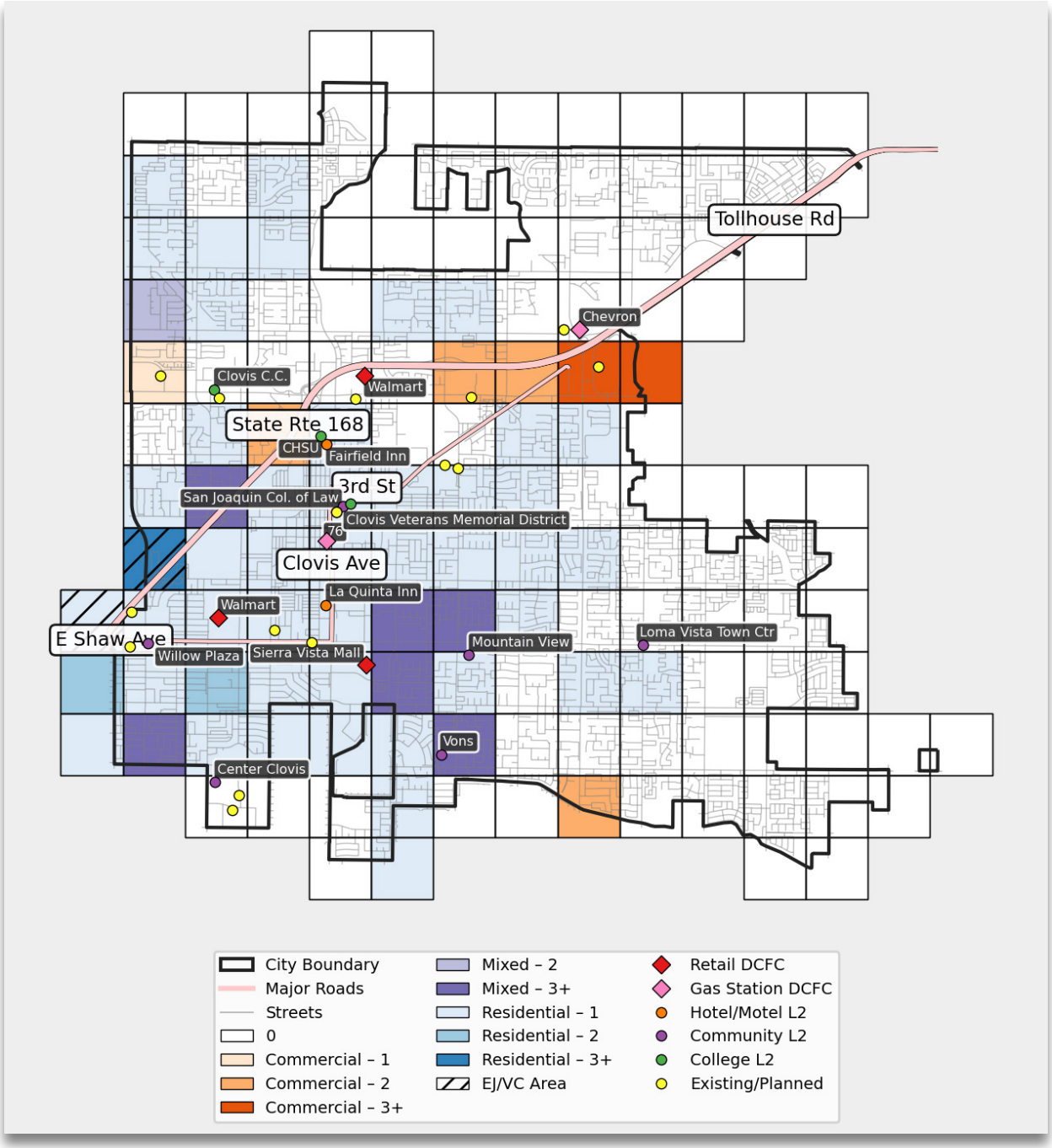


Figure 45. Allocation Results, Coalinga

Coalinga has opportunities for residential chargers throughout the central 12 cells of town, with additional business opportunities along Highway 198. Specific locations of interest also fall in this region, including the community center, West Hills College, the library, and the senior center.

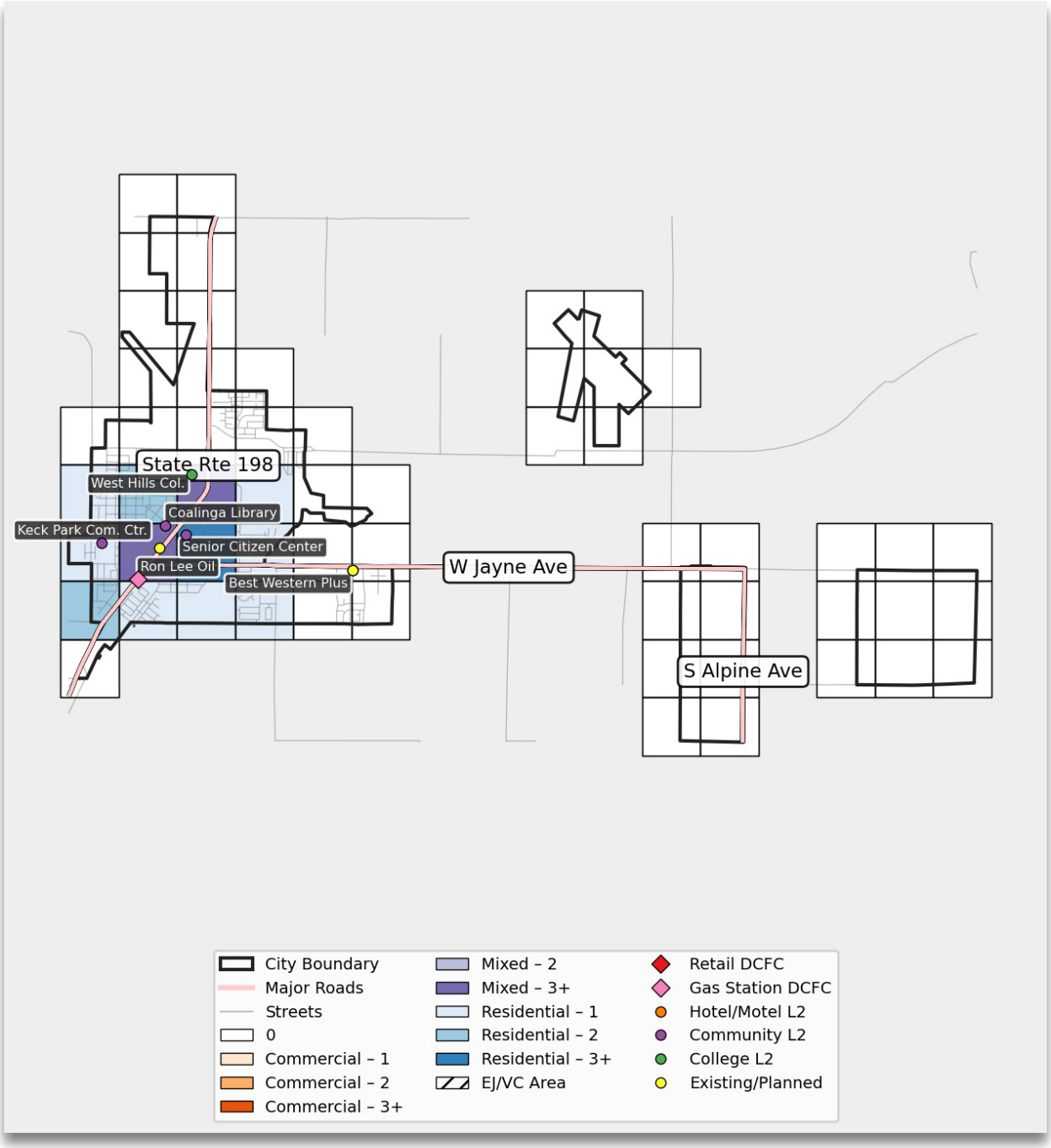


Figure 46. Allocation Results, Firebaugh

Firebaugh is largely built around Highway 33, and the greatest density of recommended sites falls near the highway's intersection with Firebaugh Blvd in the middle of town. Outside of that business-dense area, a scattering of residential-focused L2 chargers is recommended.

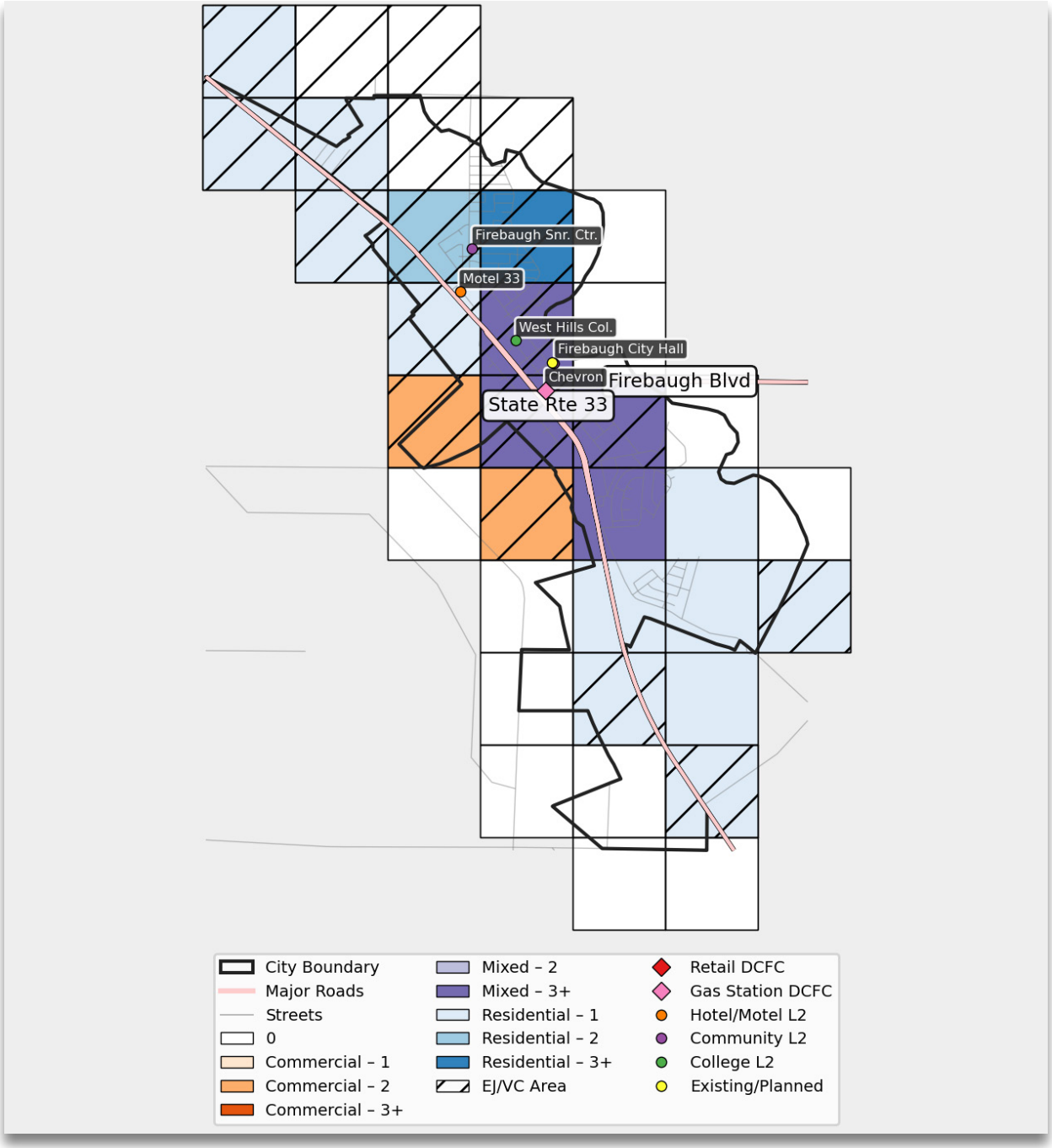


Figure 47. Allocation Results, Fowler

Fowler has a fairly even distribution of residential parcels, and the optimal spread of chargers reflects that. There are pockets of more business-dense cells along Highway 99 that could benefit from additional chargers as well.

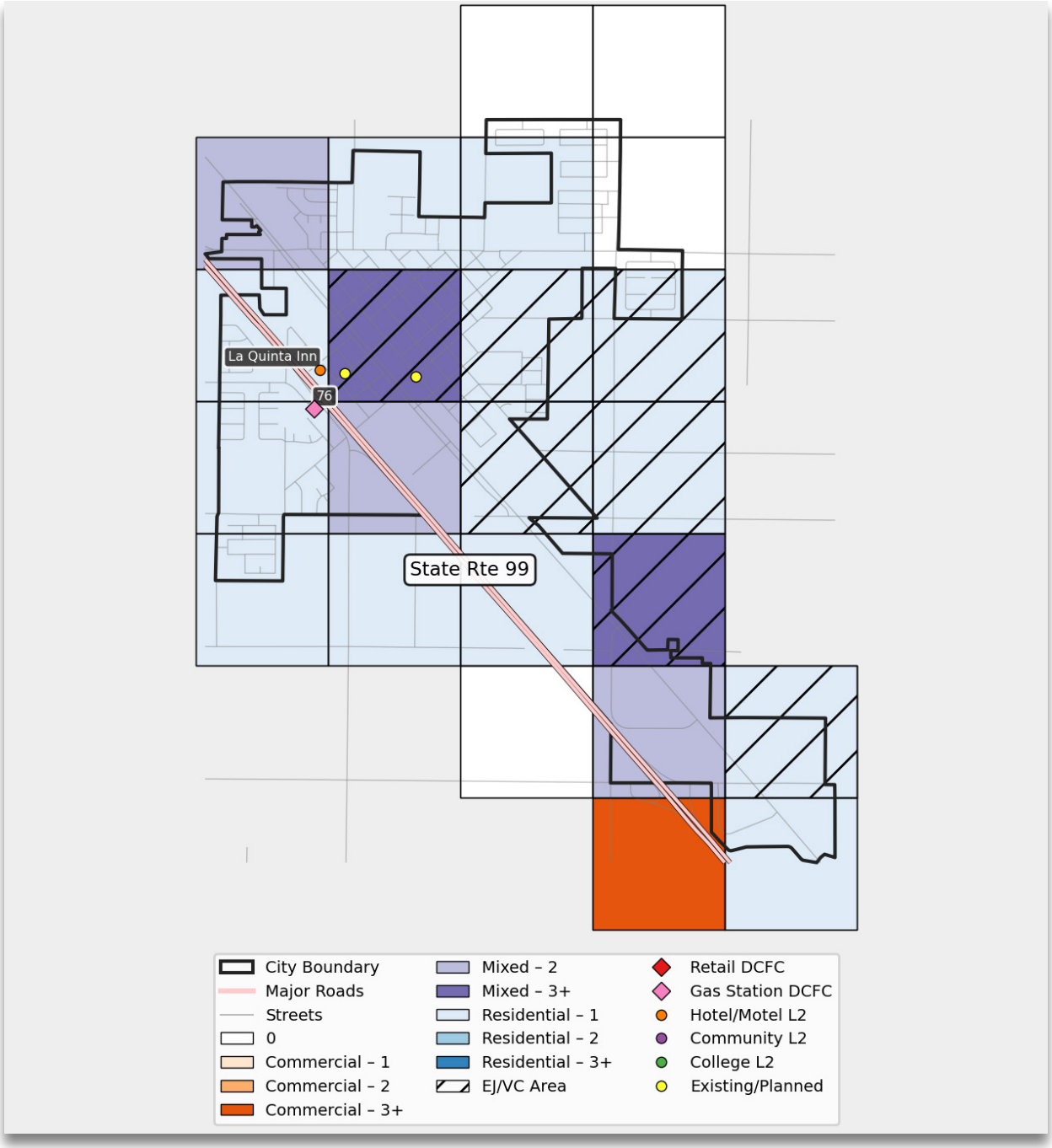


Figure 48. Allocation Results, Fresno City

Fresno already has a large concentration of existing chargers in the downtown area, but there are still many opportunities for new locations. Much of Fresno could benefit from a mix of new residential and non-residential public charging, as indicated by the purple cells, and at least one new DCFC has been recommended for every major thoroughfare.

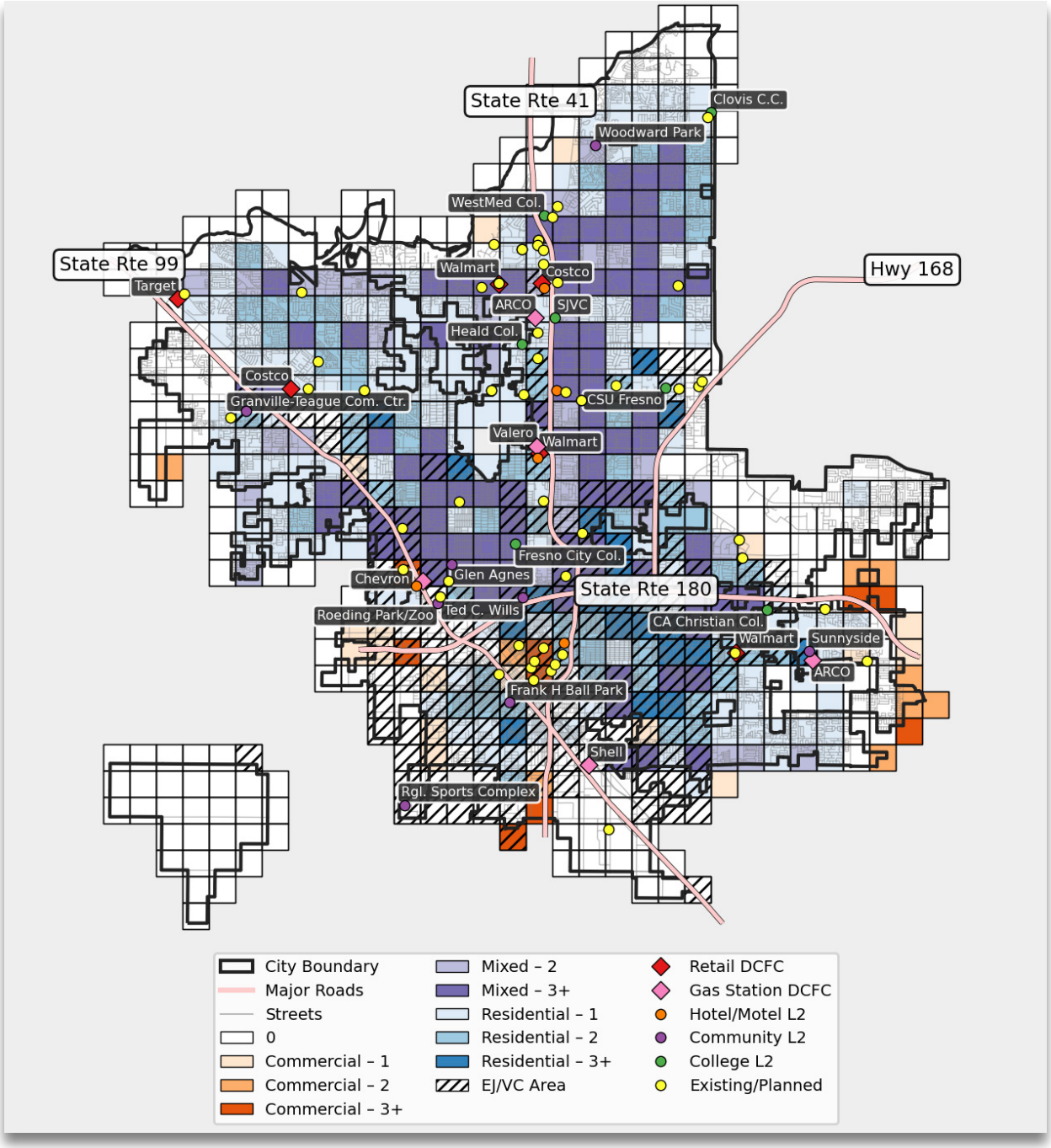


Figure 49. Allocation Results, Huron

Huron is largely residential, and residential chargers should be distributed fairly evenly across town accordingly. A gas station along Highway 269 and the community center are also indicated as specific opportunities for new public chargers.

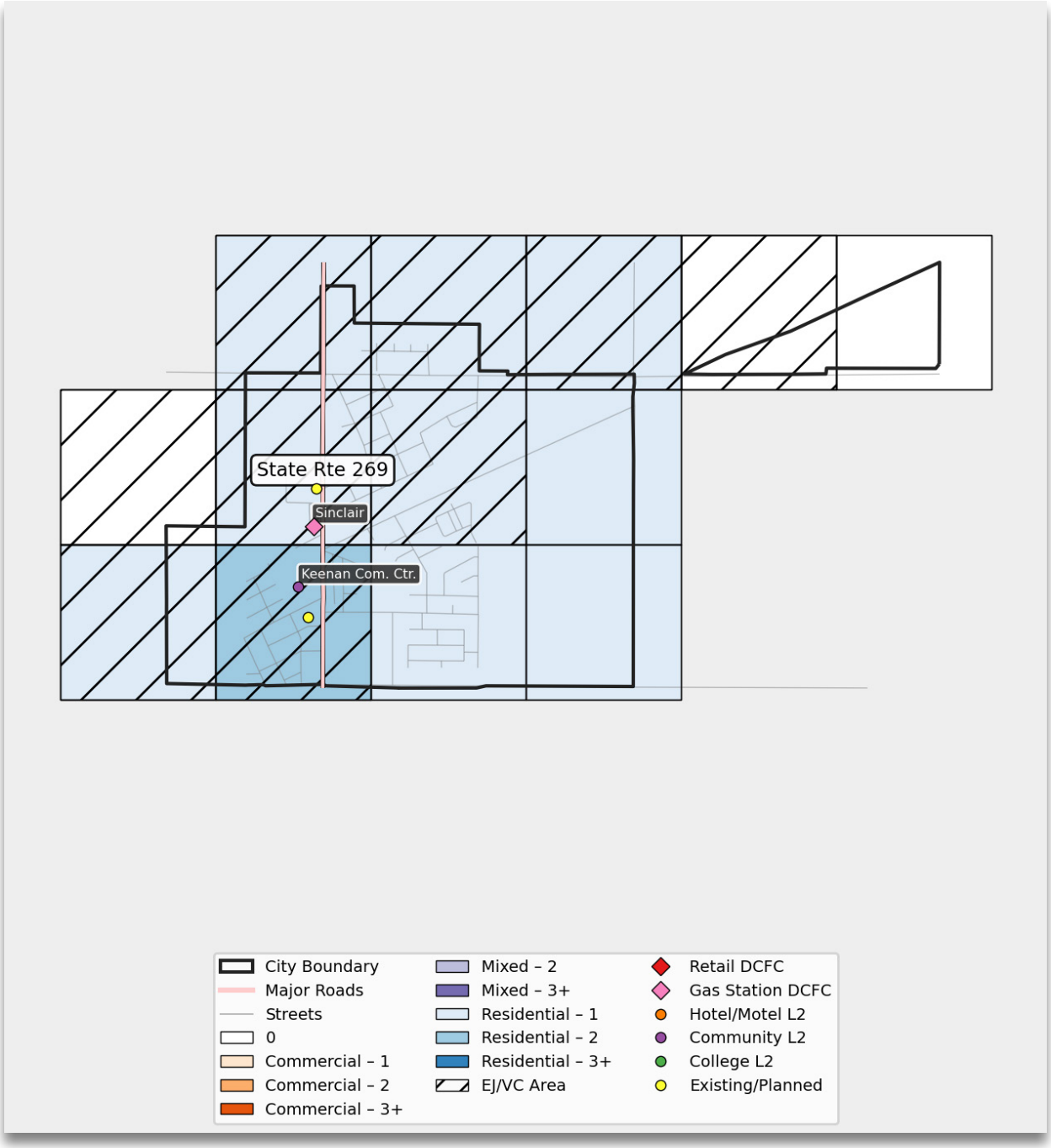


Figure 50. Allocation Results, Kerman

At least one residential-focused charger has been recommended for every cell in Kerman. Business locations along Highway 145 are also high priorities, to serve the busiest thoroughfare in town.

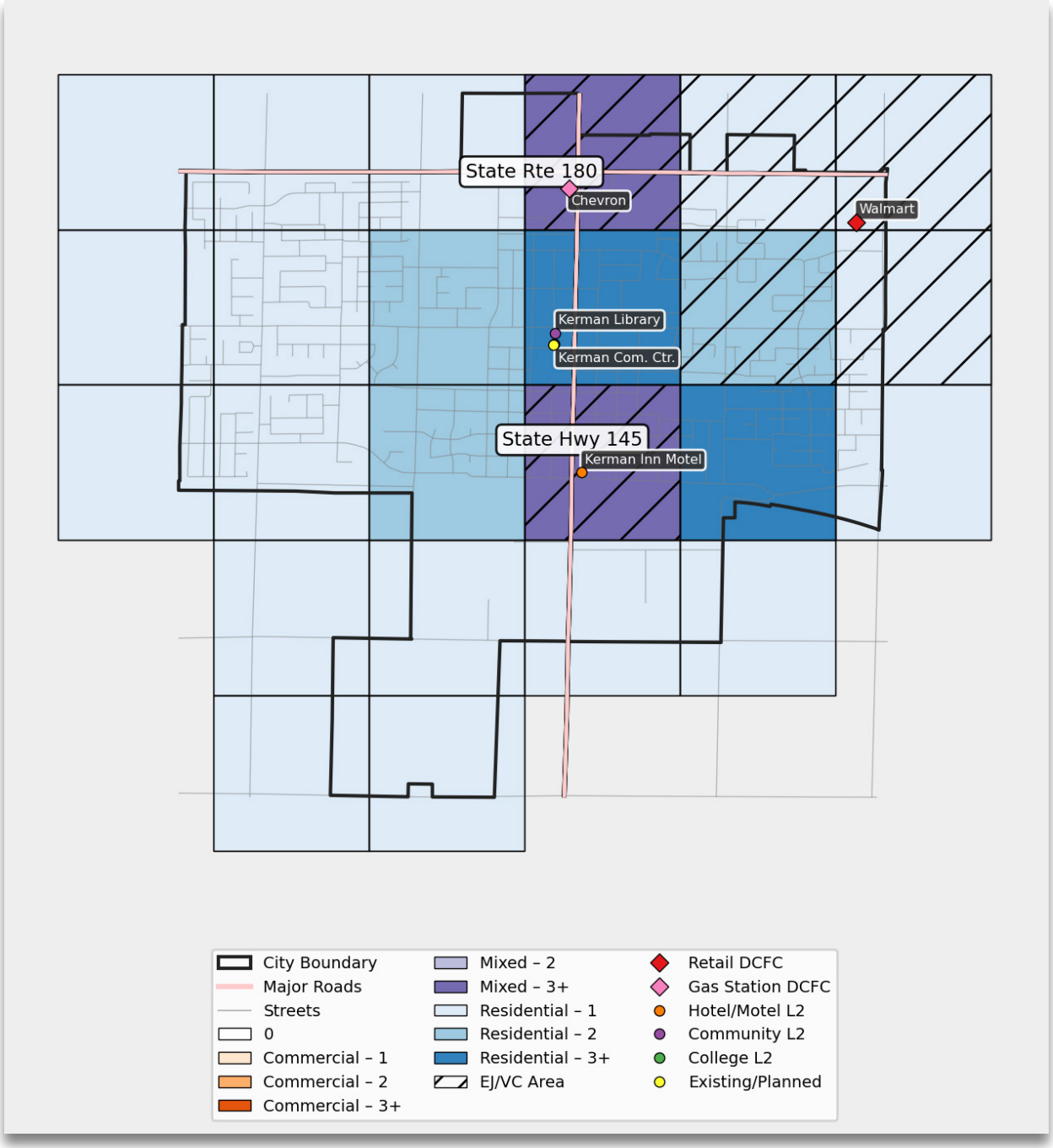


Figure 51. Allocation Results, Kingsburg

Kingsburg can be characterized by a few pockets of dense non-residential opportunities along the two major roads in the town, Highways 99 and 201. Two or more residential chargers are also recommended in eight cells to serve residents.

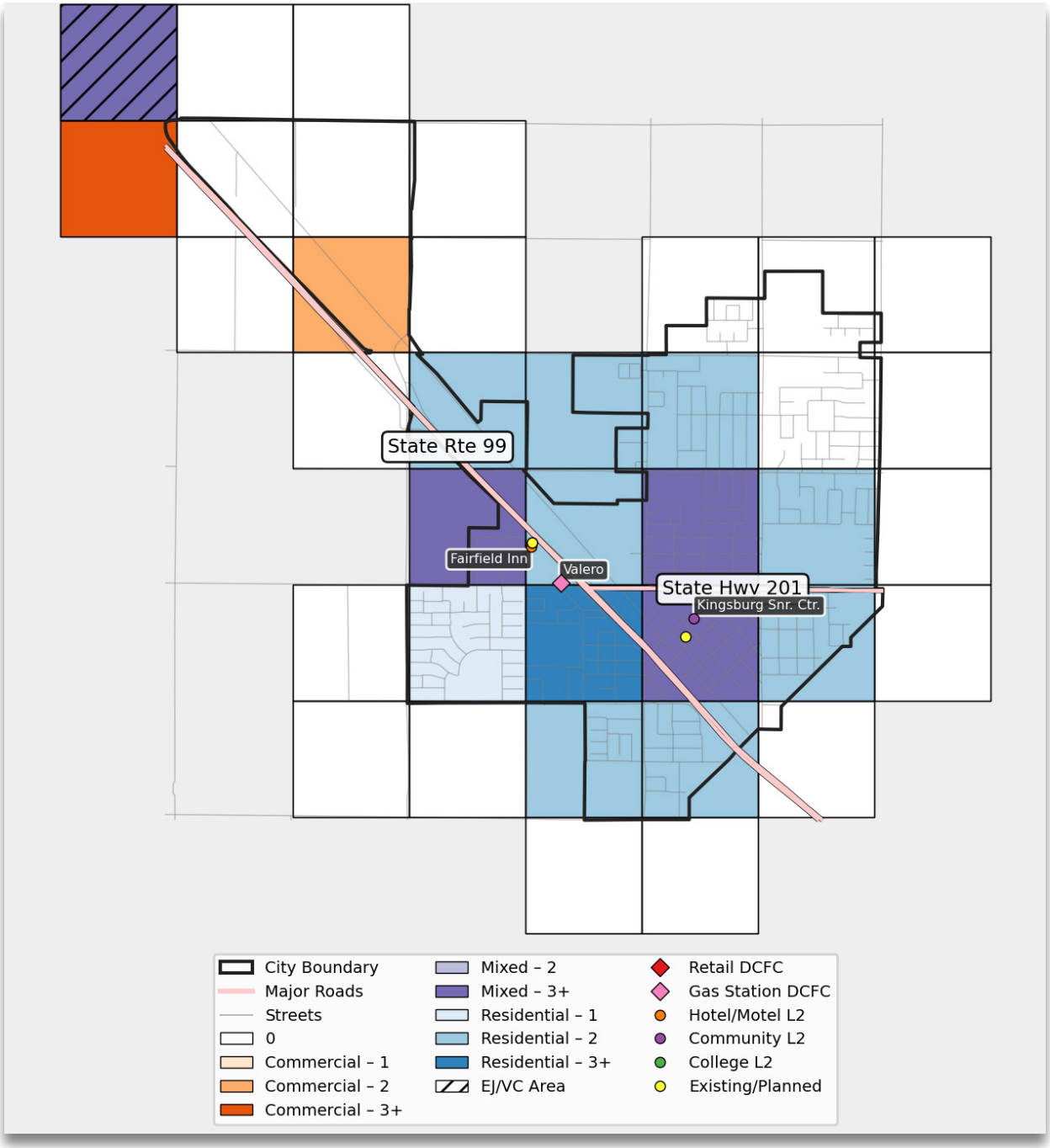


Figure 52. Allocation Results, Mendota

State Route 33 is the central focus of the recommendations for Mendota, extending to a commercial-dense cell on the south side of town. A gas station near State Route 33's intersection with State Route 180 is a prime location for a new DCFC, serving traffic along both routes.

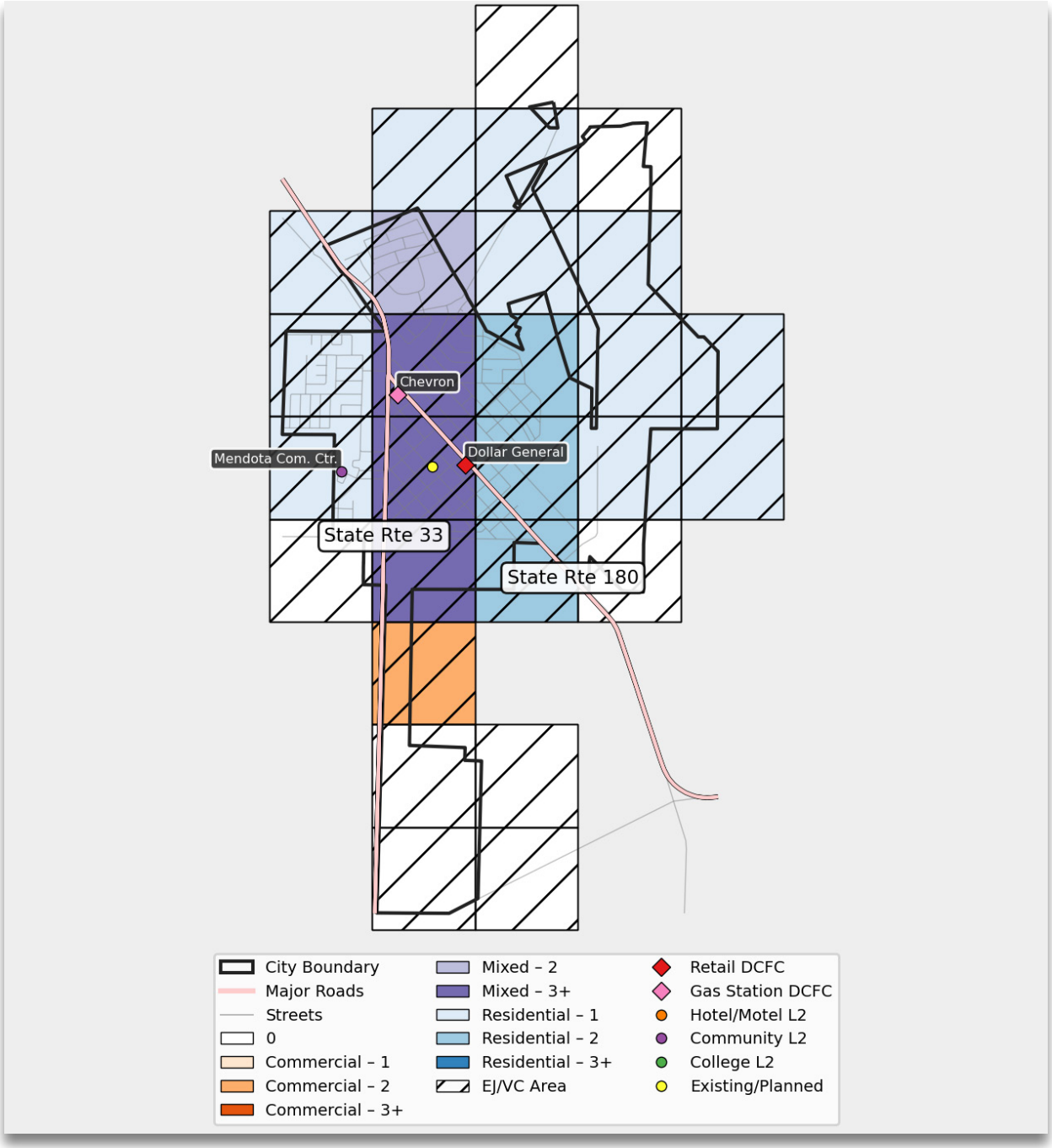


Figure 53. Allocation Results, Orange Cove

Orange Cove is largely residential, with a handful of businesses along Park Blvd cutting east-west across town, including an existing L2 charger in a central location. The community center on the south side of town is also a good potential location for a public charger.

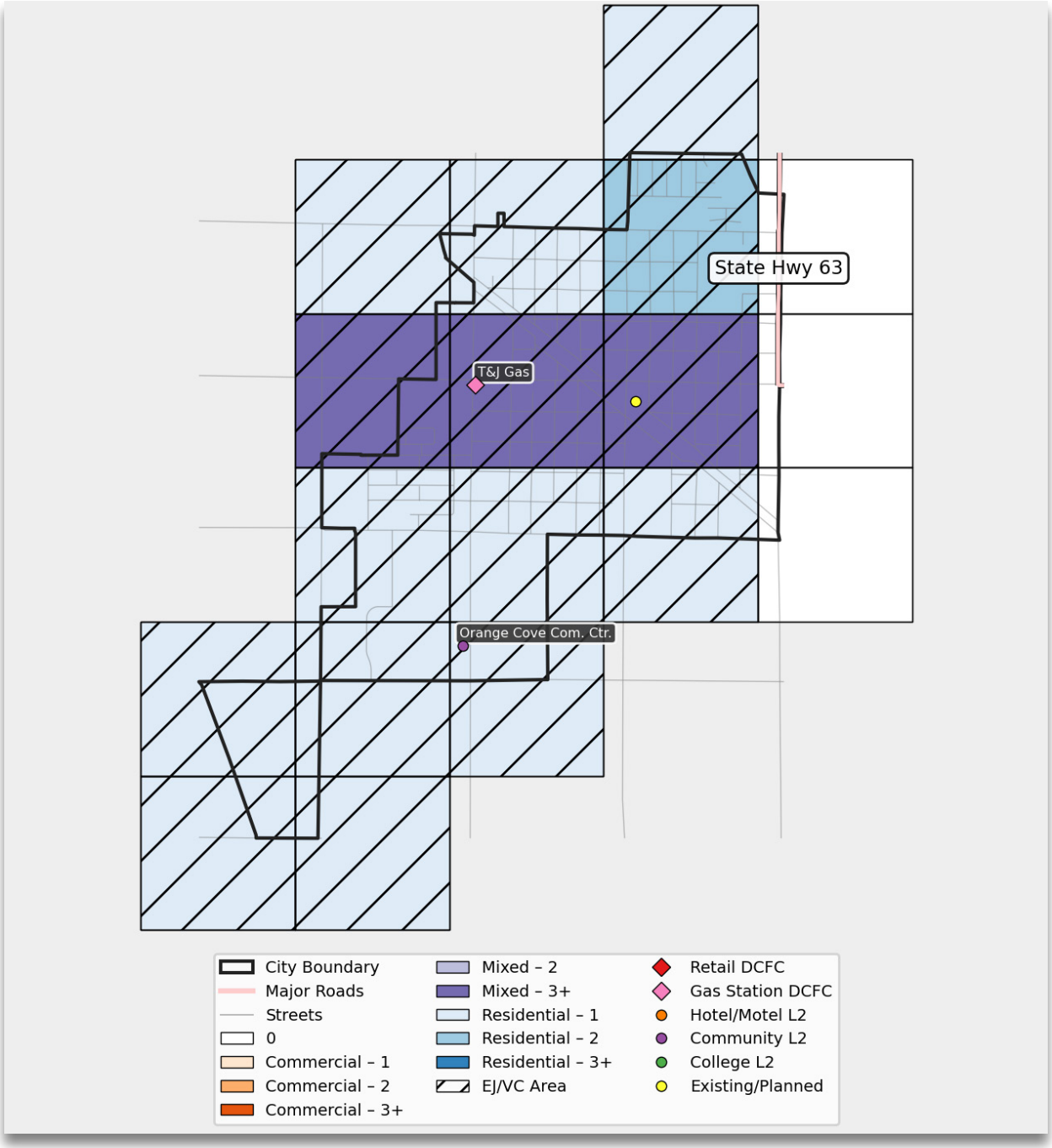


Figure 54. Allocation Results, Parlier

Parlier has an even blend of residential and non-residential opportunities for public charging, many of them along Parlier Ave, where the community center is located.

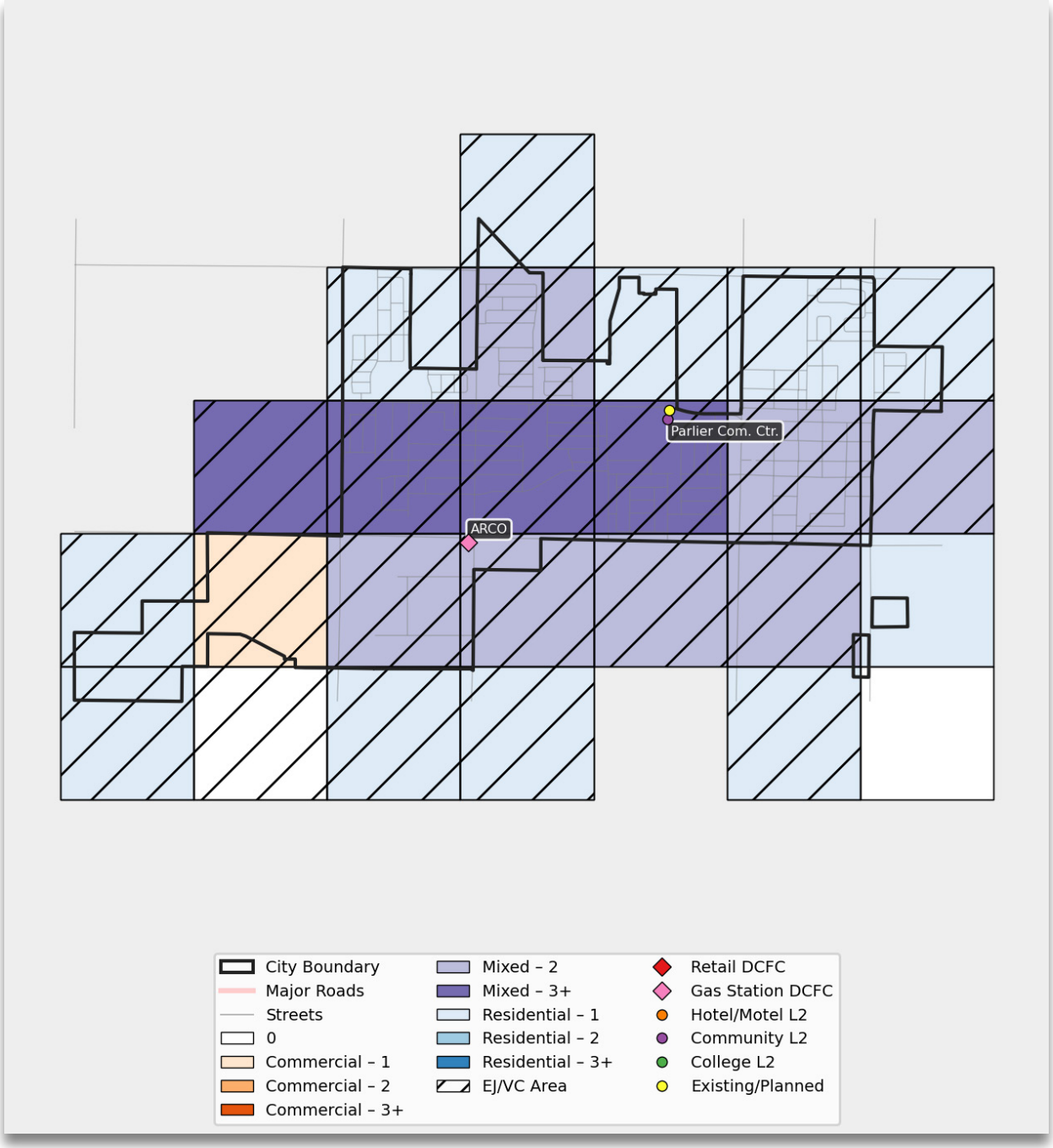


Figure 55. Allocation Results, Reedley

Along with many residential opportunities throughout town, especially downtown, Reedley also has a number of specific locations that may be good public charging opportunities, including the community center, the grocery store, and the airport to the north of town.

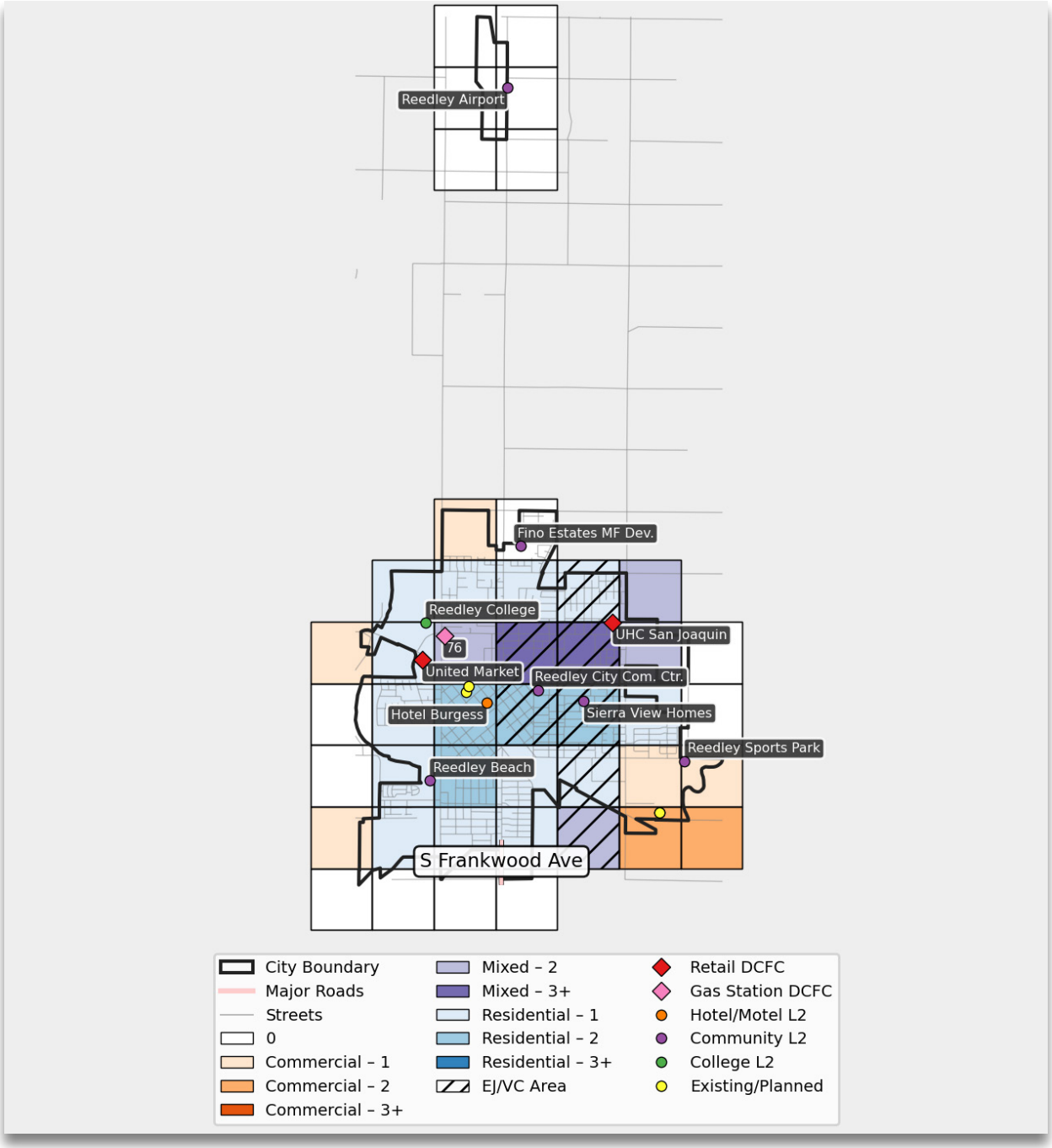


Figure 56. Allocation Results, San Joaquin

San Joaquin has a handful of opportunities along its main thoroughfare, Colorado Avenue, including its community center and a gas station, in addition to its existing L2 charger. Residential areas throughout the town would also benefit from approximately one new charger per cell.

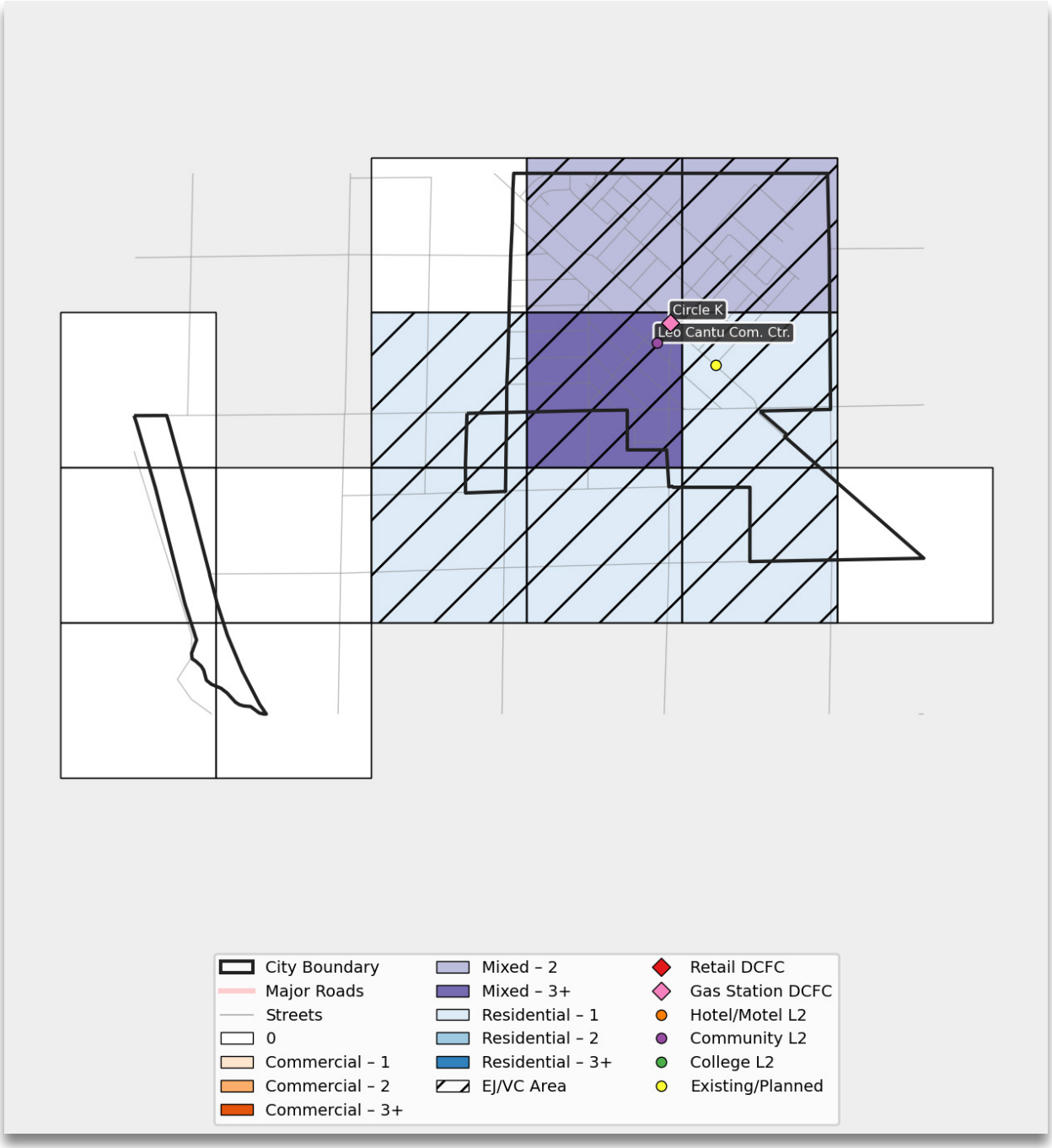


Figure 57. Allocation Results, Sanger

Sanger has few purely non-residential areas, so most of the cells covering the town have at least one recommended residential charger. The north-south Academy Avenue and east-west Jensen Avenue have relatively high business density along them, so there are additional nonresidential recommendations in the purple cells along those roads.

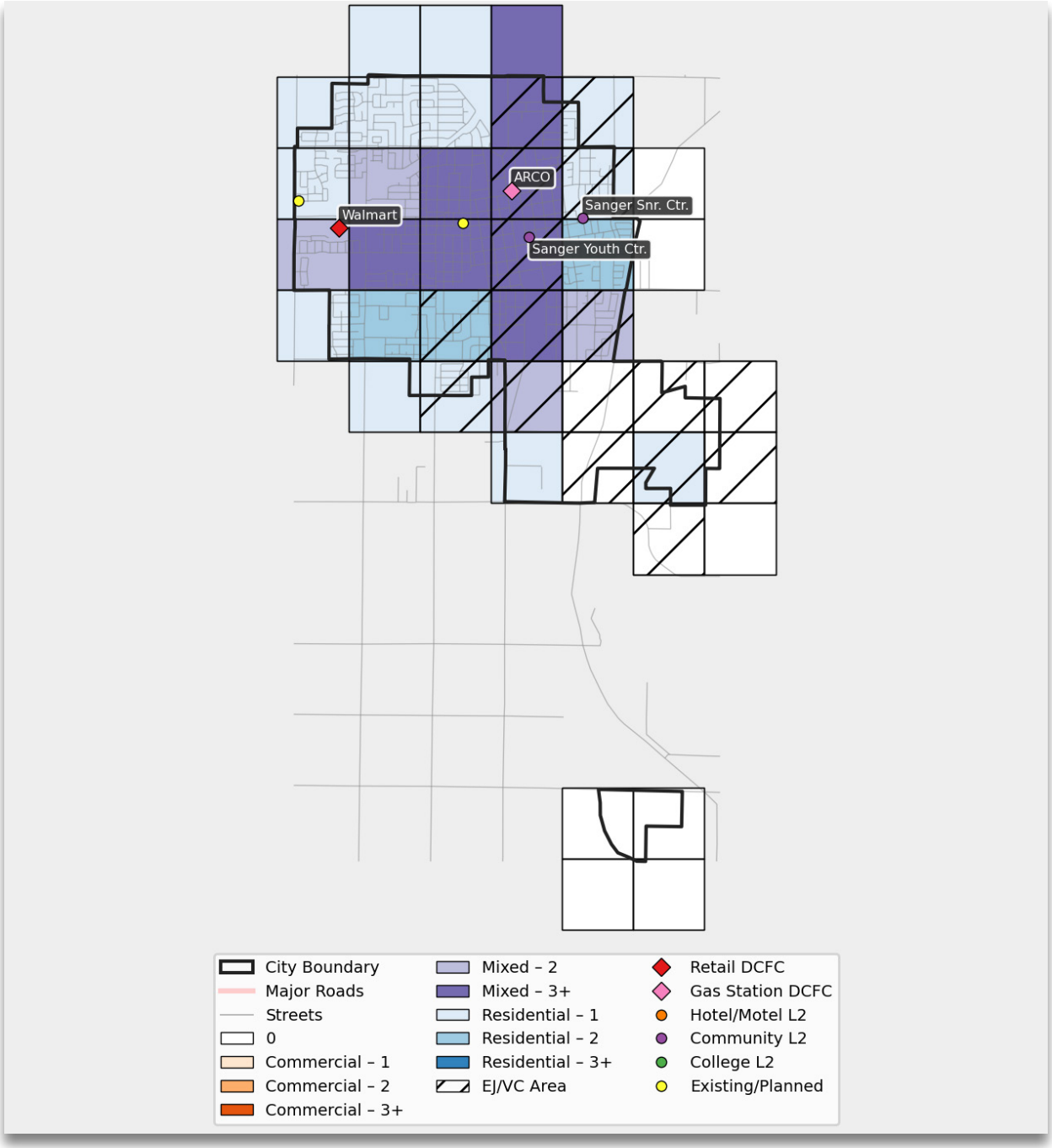
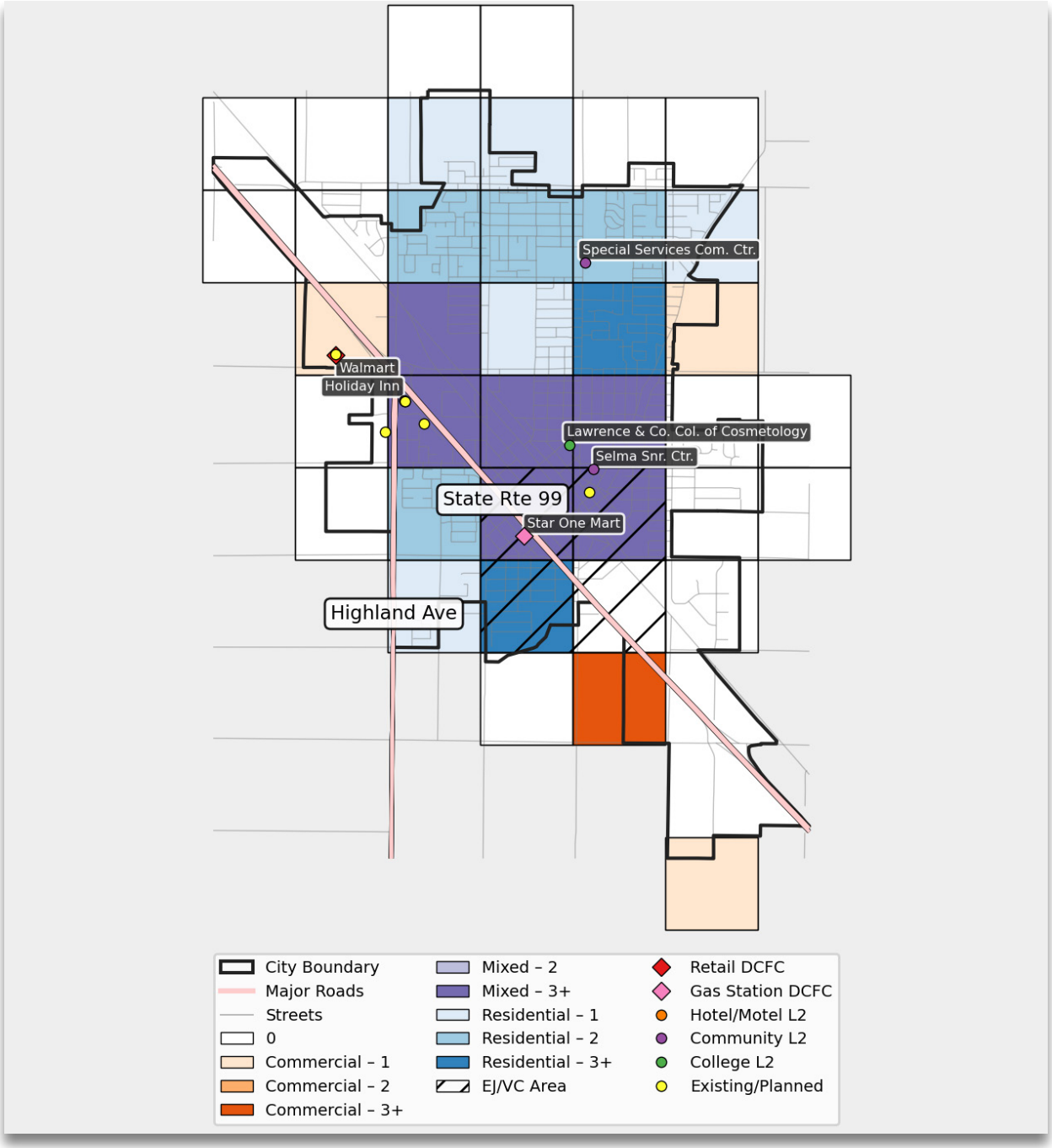


Figure 58. Allocation Results, Selma

Central Selma north of Highway 99 features a large concentration of residential and nonresidential parcels alike. These purple cells and the specific recommendations within them should be the focus of new installations, along with a scattering of residential chargers throughout town.



There are two important common threads in the recommendations illustrated in the maps above. First, major thoroughfares, due to their traffic, tend to have businesses that present good opportunities for chargers to serve that same traffic. These streets should be prioritized, especially for high-speed DCFC infrastructure. Second, geographic diversity is still important, as shown by the even spread of residential parcels in nearly every town. Not every resident will regularly drive along the major streets of their town, making it important to ensure coverage with a network of strategically scattered L2 chargers. These two precepts are the foundation of optimal siting decisions.

Table 5 summaries the charging capacity of the top ranked location for each city in Fresno County in 2025 and 2030. Numerous charging stations or ports can be placed at an identified location to meet the capacity needs. It should be noted these counts are cumulative, chargers needed in 2030 include those that were needed in 2025.

Image by Gerd Altmann from Pixabay

Table 5. Estimated Needed Near Term Charging Capacity in Fresno County by 2025 and 2030

2025 Optimal Public Charger Count						
City	**Business L2**	**Residential L2**	**Community L2**	**College L2**	**Retail DCFC**	**Gas Station DCFC**
Clovis	49	87	6	9	1	1
Coalinga	16	29	3	3	0	0
Firebaugh	13	24	2	2	0	0
Fowler	12	21	1	0	0	0
Fresno	299	533	8	54	3	2
Huron	8	12	1	0	0	0
Kerman	26	46	2	0	0	0
Kingsburg	24	42	1	0	0	0
Mendota	15	27	1	0	0	0
Orange Cove	12	20	1	0	0	0
Parlier	17	31	1	0	0	0
Reedley	19	32	6	4	1	1
San Joaquin	5	10	1	0	0	0
Sanger	25	42	2	0	1	1
Selma	23	38	2	0	1	1
Fresno County	69	131	15	0	1	1
2025 Cumulative Charger Count	**632**	**1125**	**53**	**72**	**8**	**7**
2030 Optimal Public Charger Count						
City	**Business L2**	**Residential L2**	**Community L2**	**College L2**	**Retail DCFC**	**Gas Station DCFC**
Clovis	49	87	6	9	3	2
Coalinga	16	29	3	3	0	1
Firebaugh	13	24	2	2	0	1
Fowler	12	21	1	0	0	1
Fresno	299	533	8	54	6	5
Huron	8	12	1	0	0	1
Kerman	26	46	2	0	0	1
Kingsburg	24	42	1	0	0	1
Mendota	15	27	1	0	0	1
Orange Cove	12	20	1	0	0	1
Parlier	17	31	1	0	0	1
Reedley	19	32	6	4	2	1
San Joaquin	5	10	1	0	0	1
Sanger	25	42	2	0	1	1
Selma	23	38	2	0	1	1
Fresno County	69	131	15	0	2	3
2030 Cumulative Charger Count	**632**	**1125**	**53**	**72**	**15**	**23**

Prices are expected to be lower in rural areas and reduced over the years from technology improvements and standardization of the installation process, upfront costs can be reduced significantly from local, state, and federal incentives. These costs do not consider associated fees for permitting, environmental studies, or improve grid infrastructure in each county. Table 6 calculates the associated charger installation costs of Level 2 chargers are $6,389 in 2025 and $4,213 by 2030[82] and DCFC at $69,436 and $45,783 in each year, respectively. These costs are based on a Fresno City installation with a projected cost decline.[83] The analysis estimates an investment of just over $13 million will be needed by 2025 to develop the near term public charging infrastructure. By 2030, an additional $1 million will be needed to build out an enhanced public DCFC network in the county.

Table 6. Estimated Costs Needed to Cover Near Term[84] Charging Capacity

2025 Charger Installation Costs						
City	**Business L2**	**Residential L2**	**Community L2**	**College L2**	**Retail DCFC**	**Gas Station DCFC**
Clovis	$313,061	$555,843	$38,334	$57,501	$69,436	$69,436
Coalinga	$102,224	$185,281	$19,167	$19,167	$0	$0
Firebaugh	$83,057	$153,336	$12,778	$12,778	$0	$0
Fowler	$76,668	$134,169	$6,389	$0	$0	$0
Fresno	$1,910,311	$3,405,337	$51,112	$345,006	$208,309	$138,873
Huron	$51,112	$76,668	$6,389	$0	$0	$0
Kerman	$166,114	$293,894	$12,778	$0	$0	$0
Kingsburg	$153,336	$268,338	$6,389	$0	$0	$0
Mendota	$95,835	$172,503	$6,389	$0	$0	$0
Orange Cove	$76,668	$127,780	$6,389	$0	$0	$0
Parlier	$108,613	$198,059	$6,389	$0	$0	$0
Reedley	$121,391	$204,448	$38,334	$25,556	$69,436	$69,436
San Joaquin	$31,945	$63,890	$6,389	$0	$0	$0
Sanger	$159,725	$268,338	$12,778	$0	$69,436	$69,436
Selma	$146,947	$242,782	$12,778	$0	$69,436	$69,436
Fresno County	$440,841	$836,959	$95,835	$0	$69,436	$69,436
					TOTAL	**$13,065,645**

82 Data provided by the City of Fresno.
83 Labor, permits, and material costs are typically lower in rural areas but transportation costs and applicable charging costs may be higher.
84 Near term refers to a 10 year projection with estimated costs presented for both 2025 and 2030.

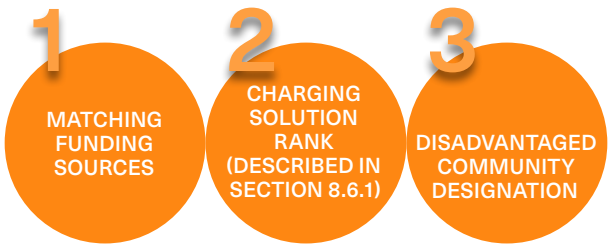
Table 6 Estimated Costs Needed to Cover Near Term Charging Capacity (Cont.)

2030 Charger Installation Costs *						
City	**Business L2**	**Residential L2**	**Community L2**	**College L2**	**Retail DCFC**	**Gas Station DCFC**
Clovis	$0	$0	$0	$0	$91,566	$45,783
Coalinga	$0	$0	$0	$0	$0	$45,783
Firebaugh	$0	$0	$0	$0	$0	$45,783
Fowler	$0	$0	$0	$0	$0	$45,783
Fresno	$0	$0	$0	$0	$137,350	$137,350
Huron	$0	$0	$0	$0	$0	$45,783
Kerman	$0	$0	$0	$0	$0	$45,783
Kingsburg	$0	$0	$0	$0	$0	$45,783
Mendota	$0	$0	$0	$0	$0	$45,783
Orange Cove	$0	$0	$0	$0	$0	$45,783
Parlier	$0	$0	$0	$0	$0	$45,783
Reedley	$0	$0	$0	$0	$45,783	$0
San Joaquin	$0	$0	$0	$0	$0	$45,783
Sanger	$0	$0	$0	$0	$0	$0
Selma	$0	$0	$0	$0	$0	$0
Fresno County	$0	$0	$0	$0	$45,783	$91,566
					TOTAL	**$1,053,013**

* 2030 costs are additive to 2025 infrastructure costs.

8.6.5 Near-Term Prioritization Tiers

Sections 8.6.2 and 8.6.4 identified optimal public charging station installation locations to reach state targets. This section expands on those results by developing a ranking tier to assist jurisdictions in determining which locations should be prioritized. The following criteria is considered in this ranking system:



8.6.5.1 Matching Funding Sources

One of the primary barriers to installing charging stations are the initial capital costs. For the City of Fresno, which these cost assumptions were based on, incentives covered an average of 85.6% of capex costs. Thus, charging stations locations that are have aligned funding sources should be prioritized.

To develop a ranking system, funding sources were grouped into the land use the fund targets – either business, residential, community, college, retail DCFC, and gas stations DCFC or a combination of them . Each land use was comparatively ranked in five categories based on the sum of the maximum funding amount per program. The five categories include:

- Funding for disadvantaged communities to install PEV charging infrastructure
- Funding to install PEV charging infrastructure, not in disadvantaged communities
- Funding for disadvantaged communities for PEV purchases
- Funding for PEV purchases, not in disadvantaged communities
- Additional funds that are currently closed or waitlisted but intended to be refunded in the future

Table 7 compiles a list of available funding sources and relevant incentives within the FCOG geography. Additionally, the table details the results of how each fund met the categories listed above. Further details on each funding source can be found in Appendix E.

Table 7. Funding Allocation for Near Term Prioritization Ranking

Source	Disadvantaged Community	Ceiling Funding Amount	EVSE or EV	Charger Level	Target Sector
CARB - Clean Vehicle Assistance Program	Yes	$2,000.00	Both	Level 2	Residents
CARB - Clean Vehicle Rebate	Yes	$4,000.00	EV	N/A	Residents
CARB - HVIP	Yes	$190,000.00	EV	N/A	Transit
CPCFA - EVSE Loan	Yes	$75,000.00	EVSE	Both	Businesses, Residents
PG&E - Clean Fuel Rebate*	No	$800.00	EV	N/A	Residents
PG&E Charge Network	Yes	$11,500.00	EVSE	Level 2	Residents, Businesses
PG&E - EV Fleet	No	$42,000.00	Both	DCFC	Colleges, Public
SCE - Clean Fuel Reward	No	$1,000.00	EV	N/A	Residents
SJVAPC - Alternative Mechanic Training	No	$15,000.00	Neither	Neither	Auto shops
SJVAPC - Electric School Bus Incentive	No	$400,000.00	EV	N/A	Transit
SJVAPC - Charge Up!	No	$25,000.00	EVSE	Both	Residents, Businesses, Colleges, Community
SJVAPC - Drive Clean!	No	$3,000.00	EV	N/A	Residents
SJVAPC - Public Benefit	No	$100,000.00	EV	N/A	Community
CEC - EVSE Incentive	Yes	$80,000.00	EVSE	Both	Businesses, Gas Stations, Residential, Colleges, Community
DOE – SEP**	No	$3,300,720.00	Both	Both	Program Development
FHWA – CMAQ***	No	$1,062,106.21	EVSE	DCFC	Gas Stations
FHWA – NHPP****	No	$16,628,443.00	EVSE	DCFC	Gas Stations
FTA - Low No****	No	$2,225,713.00	Both	Both	Transit
FTA - Bus Program****	No	$4,773,111.00	Both	Both	Transit

* Funds are waitlisted. ** Ceiling amount based on average of 2019 project funds for California *** Ceiling amount based on average of 2019 project funds in Fresno
**** Ceiling amount based on average of 2019 project funds across US

Public charging solutions that had equal amount of funding received tied scores. The final score for each land use was calculated from the average of each category rank, and results are shown in Table 8.

Table 8. Funding Rank to Support Charging Installations on Each Charging Solution Option (Lower is Better)

Charging Solution	Funding Rank
Residential L2	1.80
College L2	2.00
Business L2	2.40
Community L2	2.40
Gas Station DCFC	2.80
Retail DCFC	3.80

From the results, residential and college charging locations rank highest, meaning they have numerous funding sources that can support onsite charger installations. Retail and gas stations rank on the lower end due to a lack of funding options. It should be noted that program funds can drain and as such, jurisdictions should sign up for alerts on when funds are renewed in order to secure them early.

8.6.5.2 Charging Solution Rank

Charging locations that are eligible for local, state, and federal funds for charger installations are attractive locations to target; however, chargers should also be conveniently located for the public. Chargers should be easily accessible, minimize the required recharge time, and be a cost-effective solution. Additional criteria to account for these considerations is added to further improve the ranking system, as described in Section 8.6.1.

Combining the solution rank and funding rank leads to an overall ranking, which is calculated from the average between the two values, as shown in Table 9.

Table 9. Overall Charging Station Funding and Solution Rank (lower is better)

Category Rank	College L2	Gas Station DCFC	Residential L2	Community L2	Retail DCFC	Business L2
Funding Rank	2.0	2.8	1.8	2.4	3.8	2.4
Solution Rank	1.7	1.0	2.2	1.7	1.0	2.4
Overall Rank	1.9	1.9	2.0	2.1	2.4	2.4

In the near term, colleges, gas stations, residential, and community centers are optimal charging station locations. The next section will identify which areas of Fresno County should be prioritized for development at these locations.

8.6.5.3 Prioritization Tier

The applied ranking system was developed to prioritize optimal charging station development at specific areas in the county designated as disadvantaged communities. Cities were assigned a disadvantaged community tier based on the portion of land designated as such (1 being the most land, 3 being the least land).

The final prioritization rank is calculated as the average of the disadvantaged community tier and the overall charging station rank; results are shown in Table 10. Blue locations are the areas where jurisdictions should promote charging infrastructure development at. While the orange locations are needed to promote PEV adoption, they are not immediate priorities.

Table 10. Near Term Charging Station Prioritization (Please note that lower numbers indicate higher priority)

City	Business L2	Residential L2	Community L2	College L2	Retail DCFC	Gas Station DCFC
Clovis	3	2	3	2	3	2
Coalinga	3	2	3	2	N/A	2
Firebaugh	2	1	2	1	N/A	1
Fowler	2	1	2	N/A	N/A	1
Fresno	2	2	2	2	2	2
Huron	3	2	3	N/A	N/A	2
Kerman	2	1	2	N/A	N/A	1
Kingsburg	3	2	3	N/A	N/A	2
Mendota	2	1	2	N/A	N/A	1
Orange Cove	2	1	2	N/A	N/A	1
Parlier	2	1	2	N/A	N/A	1
Reedley	2	2	2	2	2	2
San Joaquin	2	1	2	N/A	N/A	1
Sanger	2	1	2	N/A	2	1
Selma	2	1	2	N/A	2	1
Fresno County	2	1	2	N/A	2	1

8.6.5.4 Findings

This analysis presents the results of the infrastructure prioritization assessment analysis to inform the electric vehicle charging siting locations for public use within Fresno County. As a result of this analysis, the following preliminary findings are presented:

Funding needed for each tier of the top ranked locations is shown in Table 11. This could align with funding goals or allocations for each jurisdiction to implement the preliminary charging infrastructure.

Table 11. Funding Amount by Prioritization Tier

	Level 2 Charging Stations			DCFC Charging Stations		
City	**Tier 1**	**Tier 2**	**Tier 3**	**Tier 1**	**Tier 2**	**Tier 3**
Clovis	$0	$613,344	$351,395	$0	$115,220	$161,003
Coalinga	$0	$204,448	$121,391	$0	$45,783	$0
Firebaugh	$166,114	$95,835	$0	$45,783	$0	$0
Fowler	$134,169	$83,057	$0	$45,783	$0	$0
Fresno	$0	$5,711,766	$0	$0	$621,882	$0
Huron	$0	$76,668	$57,501	$0	$45,783	$0
Kerman	$293,894	$178,892	$0	$45,783	$0	$0
Kingsburg	$0	$268,338	$159,725	$0	$45,783	$0
Mendota	$172,503	$102,224	$0	$45,783	$0	$0
Orange Cove	$127,780	$83,057	$0	$45,783	$0	$0
Parlier	$198,059	$115,002	$0	$45,783	$0	$0
Reedley	$0	$389,729	$0	$0	$184,656	$0
San Joaquin	$63,890	$38,334	$0	$45,783	$0	$0
Sanger	$268,338	$172,503	$0	$69,436	$69,436	$0
Selma	$242,782	$159,725	$0	$69,436	$69,436	$0
Fresno County	$836,959	$536,676	$0	$161,003	$115,220	$0
Total Investment	**$2,504,488**	**$8,829,598**	**$690,012**	**$620,358**	**$1,313,200**	**$161,003**

- This analysis does not consider the opportunity to leverage government installations or transition bus fleets to all electric; however, these can be great options to increase access to public chargers and ensure vehicle miles traveled through public transit are cleaner. Additionally, numerous funding sources are available for these opportunities.
- In the near term, jurisdictions should prioritize Level 2 charging stations at residential buildings, community centers, and colleges and DCFC at gas stations. Particularly implementation should be focused in Firebaugh, Fowler, Kerman, Mendota, Orange Cove, Parlier, San Joaquin, Sanger, and Selma. The EVRP provides details on how jurisdictions can promote installations through improved planning, education of available funds, and outreach methods in the following sections.

09 BEST PRACTICES TO EXPAND EQUITY

California has been at the forefront of national PEV adoption due to strong regional policies; however, residents of disadvantaged communities often face the largest barriers to PEV adoption and are impacted the most from poor air quality. Therefore, PEV adoption strategies should be rooted in a lens of equity. Local jurisdictions can support equitable projects, aim program funds, and direct outreach efforts in these communities to fully realize improvements in local pollution. This section will first outline best practice policy priorities to expand education programs, perform inclusive community engagement, and prioritize technologies that will be most impactful to disadvantaged communities. In addition, an implementation framework and model ordinances for jurisdictions to utilize are presented.

9.1 Regional and Municipal Priorities

In 2017, California created a system to redirect investments to communities facing the harshest environmental impacts by designating disadvantaged communities, which are defined as areas scoring in the top 25% of pollution with a low population. The majority of areas within Fresno County are considered disadvantaged[82]. Therefore, prioritizing based on this metric alone is insufficient and it is recommended that local jurisdictions should consider other local priorities to help identify sites for PEV charging infrastructure implementation. Such considerations can include population density, areas of anticipated growth, funding eligibility, and areas where enhanced mobility access is critical. Engaging with communities to help determine these priorities is critical and can include providing easily accessible educational materials, engaging local non-profits that have deep-rooted connections to the community, and electrifying public transit fleets.

9.1.1 Education Programs

In 2019, J.D. Power found that PEVs had a Mobility Confidence Index of 55, or a neutral score. Attributes causing the most concern were reliability, cost, charging station availability, and range[83]. In disadvantaged communities, the lack of confidence is exacerbated due to lower income and disinvestment of educational programs on general PEV knowledge and employment and income stressors. Interestingly, customer education is an effective, low-cost approach to drive PEV adoption.

Consumers who are familiar with PEVs are 2.5 times more likely to purchase one[84]. As such, outreach program improvements should help residents understand general PEV knowledge, cost comparison to ICE, public charging locations, available incentives, available PEV models (particularly how to obtain secondhand vehicles), and how to compare performance. Events such as

82 https://oehha.ca.gov/calenviroscreen/sb535
83 https://www.jdpower.com/business/press-releases/2019-q2-mobility-confidence-index-study-fueled-surveymonkey-audience
84 https://www.ibm.com/downloads/cas/R6AZDA8E

PEV tailgates, showcases, parades, ride-and-drives, or virtual "under the hood" videos are excellent methods to provide education to the public.

In 2019, Clovis held a National Drive Electric Week event at the local farmer's market, a popular event in the city. The event had 34 PEV owners attend to share personal information on owning an PEV[85] . Government agencies should consider partnering with utilities, non-profits, advocacy groups, or automakers to develop education events and materials aimed specifically at disadvantaged communities. Materials should be easily accessible, such as being offered in various languages (e.g. Spanish) and leverage non-traditional media outlets such as social media.

CASE STUDY – COLUMBUS, OHIO

As part of the Smart Columbus Electrification Program, the city partnered with 100 organizations to host online Rides & Drive events that focused on providing general information on EVs, charging accessibility and vehicle range, affordability and incentives, and performance. To increase education of the events, the city issued a request for proposals. The selected vendor marketed the campaign through TV, online ads, social media, online searches, and Waze navigation app. Within 2 weeks, the events saw a 95% increase in web traffic, estimated at generating one car dealer lead per day for an PEV purchase[34] .

9.1.2 Community Engagement

Understanding community needs is essential for local jurisdictions to develop aligned policies and programs. Providing public charging infrastructure without properly engaging the public about the technology, or it's intended goals, can lead to communities feeling disengaged and as if they are unintended users of the infrastructure.

Effective community engagement processes should follow a high-level process that includes the following key components:

1 DEVELOP A STEERING COMMITTEE

A steering committee should consist of community-based organizations that represent the diversity of the county. This committee would be responsible for advising on engagement tactics, marketing materials, and community needs.

2 HOLD WORKSHOPS

In collaboration with the Steering Committee and point of contacts from the jurisdiction, a series of workshops can be held to present and discuss potential projects aimed at transportation electrification (education outreach, public charging station installations, NEV, fleet electrification). The goal of the workshops should be to ensure that projects align with community needs (education programs in low income areas, public chargers that offer alternative payment methods and are easily accessible, NEV programs that offer low-income rates, fleet routes are in areas with high local pollution, etc.). During these workshops, the co-benefits of projects should be discussed such as economic development, improved mobility, and job creation – often key priorities for communities.

3 DEVELOP AND IMPLEMENT ENGAGEMENT PLAN

Once a project approach has been identified that meets the community needs, the Committee is responsible for developing engagement tactics, setting outreach goals, and an implementation plan. Surveys, ambassadors, flyers, door-to-door outreach, and ribbon cutting ceremonies are tactics that can be used to engage the community.

An example of a successful community engagement is New York Power Authority's "Evolve NY Accelerator Community". The village of Fairport, a population of 5,353 in 2005, was the first community in this initiative to install 28 Level 2 public PEV charging stations. In partnership with NYSERDA, EPRI, and the Village of Fairport, chargers were installed to support the village's goal of reduction greenhouse gas emissions and reach 100% awareness among residents. Ride and drives, charger demonstrations, school outreach, public forums, and engagement with local businesses were held to meet these goals. Since November 2019, 166 unique drivers have used the chargers, saving 5,777 kg of CO_2. The village plans on expanding the project to improve resilience and reliability of the grid[8788].

85 https://driveelectricweek.org/event?eventid=2091
86 https://smart.columbus.gov/playbook-assets/electric-vehicle-consumer-adoption/growing-demand-for-electric-vehicles-through-online-education
87 https://www.village.fairport.ny.us/quick_links/fairport_ev_model_community.php
88 https://www.nypa.gov/news/press-releases/2019/20191122-fairport

9.1.3 Prioritizing Technologies

Initial capital costs can make installing charging stations and purchasing electric vehicles challenging for jurisdictions and community members, exacerbating difficulties in achieving wide-spread electric vehicle adoption. When considering which technologies to implement, especially for public charging infrastructure, jurisdictions should consider the long-term benefits for each option. For example, DCFC are more expensive than Level 2 or Level 1 chargers; however, faster chargers that require less charging time charging are more desirable and appealing to the public. Utilities can also provide insight on new charging technologies and test them in pilot projects.

It is important to note that disadvantaged communities should not be discounted when it comes to identifying areas to introduce advanced technologies. Testing state of the art technologies in disadvantaged communities can even offer opportunities to uniquely measure impact, such as the impact of upgrading infrastructure of connections to existing air quality issues. Local jurisdictions can collaborate to share pilot learnings in combination with outreach methods to understand community preferences. For disadvantaged communities, consider which technologies would be most cost effective and impactful from their point of view, such as electrifying mass transit systems or discounted carshare programs.

CASE STUDY – FRESNO COUNTY, CALIFORNIA

REV-UP is an all-electric rideshare service operated by Inspiration Transportation in rural unincorporated communities in Fresno County. The service offers $5 round trips to fill in the gaps of the existing transit system. Funding for the program was provided by FCRA through measure C, Central Valley Community Foundation, and Beneficial State Bank. Such a pilot project is an example of private and public partnerships developing innovative solutions to meet community needs.

CASE STUDY – LOS ANGELES, CALIFORNIA

BlueLA is an electric car sharing program operating in low income housing developments in Los Angeles. The service has a low-income renting rate at $0.15 per minute or $1 per month compared to the standard $0.20 per minute or $5 per month rate. BlueLA has been largely successful, avoiding 260 tCO_2 over 12,00 trips with 2,000 members in 2018. Funding for the service was provided by a CARB grant.

9.2 Regional Regulatory Framework

Many of the best practices discussed in this EVRP apply across Fresno County and its local jurisdictions. As such, a broad, regional policy framework can be developed and adopted to address PEV adoption goals and incorporate such practices. An aligned policy pools resources across jurisdictions, leading to more impactful results.

The City of Antioch and other Contra Costa County jurisdictions encourage pooling of resources in their Climate Action Plan, particularly for short term investments that lack immediate funding resources. Their plan aims at using funds to expand charging stations downtown, providing outreach programs, incentives for PEV adoption, and creating an PEV buying guide[89] . A potential framework for Fresno County could include standardized permitting, zoning, and building codes to provide consistency for developers and residents and designating a certain portion of funds to PEV installations. An aligned policy would also be extremely beneficial for specific transportation related projects that span across the county. Examples include neighborhood electric vehicle networks, charging corridors, and rural bus electrification. A method to develop this framework could be FCOG hosting workshops with local jurisdictions to allow for continued progress toward meeting state goals and implementing best practices.

89 https://www.antiochca.gov/fc/environment/climate/draft-city-of-antioch-carp.pdf

9.3 Model Ordinances

Initial capital costs remain one of the largest barriers to entry for consumers[90] . Table 12 outlines example ordinances other jurisdictions have passed that specifically aim to reduce the costs of owning PEVs. While some of the ordinances may not be applicable for certain jurisdictions, they can be used as a launchpad to address current or future needs.

Table 12. Ordinances to Reduce Cost of PEV Ownership

Ordinance	Location	Description	Benefit to Disadvantaged Communities
Free Charging	County of Santa Clara[91]	The county offered free charging for residents at government facilities.	Low-income residents typically aren't able to charge overnight with a home charger, when electricity is cheap, therefore relying on public chargers during the day, when prices are higher. Free charging at public facilities can provide a low-cost alternative.
Increase EV Capable Requirements	Chicago[92]	Enhance an existing building code to require more EV capable spots.	Increased public charging reduces the need to install a charger at home.
Reduced Registration Fees	Vermont[93]	Reduced the fee for EVs by 50% compared to ICE vehicles.	Reduced upfront cost of purchasing an PEV.

9.4 Recommendations & Findings

Disadvantaged communities should be the priority of policymakers as they are faced with the largest barriers to PEV adoption as well as higher air pollution burden. This section recommended that policies focus on educational outreach and community engagement to familiarize users with technology. To progress on these polices, jurisdictions can align their frameworks across the county; creating transparency and consistency for their constituents.

90 https://www.mckinsey.com/~/media/McKinsey/Industries/Automotive%20and%20Assembly/Our%20Insights/Electrifying%20insights%20How%20automakers%20can%20drive%20electrified%20vehicle%20sales%20and%20profitability/Electrifying%20insights%20-%20How%20automakers%20can%20drive%20electrified%20vehicle%20sales%20and%20profitability_vF.pdf

91 https://www.sccgov.org/sites/faf/AnalyticsReports/EV%20Charging%20Stations%20at%20County%20Facilities%205.19.pdf

92 https://www.chicago.gov/city/en/depts/cdot/provdrs/conservation_outreachgreenprograms/news/2020/april/chicago-city-council--approves-ordinance-to-increase-chicago-s-e.html

93 https://www.dmv.org/vt-vermont/green-driver-state-incentives.php

10 COST RECOVERY MODELS

Cost recovery of electric vehicle charging stations is a critical consideration in developing and implementing public electric vehicle service equipment (EVSE) in Fresno County. Any cost recovery model will need to weigh both the importance of financial viability for EVSE as well as equity and affordability for Fresno County residents. While there has been limited work to date in advancing equitable access to public charging infrastructure, there are a range of ownership and revenue models which can be hybridized and adapted to meet the needs of disadvantaged communities.

This section identifies the costs most applicable to public EVSE in Fresno County and outlines potential ownership and revenue models which may be applied for current or future public charging infrastructure, with the goal of providing value to public EVSE users while limiting the financial impact on EVSE owners.

Equity is a critical consideration in choosing a cost-recovery model, as FCOG seeks to ensure all Fresno County residents are able to access and benefit from a public charging network. Already disadvantaged communities, though they could greatly benefit from the economic and public health benefits of PEV adoption, have increased dependence on a public charging network as they are less likely to be able to install charging at home. These same communities face specific barriers to accessing public charging as they are less likely to have credit cards or access to the digital tools typically required to use typical public charging networks. This document identifies strategies FCOG may adopt to reduce these barriers.

10.1 Utility Costs

Electric utility costs are a primary operational expense for ESVE. Generally, there are three main components to any electric rate tariff:

- Fixed customer charges which are flat monthly fees and do not change based on usage
- Energy charges based on the number of kilowatt-hours (kWh) used. The charge per kWh may vary by time of day, day of the week, or season.
- Demand charges which are based on the peak amount of power used at the facility or site. Demand is measured in kilowatt (kW).

While the cost of charging an electric vehicle is low compared to the cost of fueling an internal combustion engine, operators of EVSE should still be mindful of how time of use charging and demand charges can impact the cost of charging, particularly when charging may be occurring during the day or peak hours. Such costs can be mitigated through selecting a tariff which is designed for EV charging use.

PG&E currently offers two commercial EV-charging tariffs, a low use rate (BEV1) and a high use rate (BEV2)[82] . Each rate requires separate metering for the PEV chargers. The rates are designed to allow commercial PEV customers to subscribe to "blocks" of electric demand in 10 kW increments. Higher fees are charged for usage over the subscribed amount. Customers in these programs are also separately charged for their energy (kWh) according to a time-of-use rate, where different prices are charged at different times of day.

10.2 Operations and Maintenance Costs

There are a range of operations and maintenance costs[83] associated with operating public EVSE that should be considered when establishing fee structures, including:

- Transaction costs for processing debit or credit card payments
- Networking fees to connect the unit to cellular or Wi-Fi communications networks
- Station management activities
- Rent or lease payments for parking spots
- Repair of damaged units

10.3 Digital and Financial Barriers

Many existing charging network operators require users to be registered in advance of using the EVSE. Charging is only activated through an app on the user's smart phone or a card unique to the network operator[84] . Payment via these accounts is generally limited to credit cards. This structure can present a number of barriers for EVSE users, especially those with limited digital access and those without credit card access. With the exception of simply offering free access to public chargers, there are limited examples of charging networks or programs that have sought to remove these barriers.

One notable program in this area is Austin Energy's Plug-In EVerywhere Network[85] , which allows Austin Energy customers to access its network of 800 stations located throughout the City. The program is affordable, providing six months of unlimited access for $25 billed on the customer's standard electric bill. Once registered, users must setup an account online with ChargePoint to access the network.

One possible mechanism to reducing barriers posed by access to credit cards would be to create a pre-paid card program for public chargers which can be loaded using cash at machines, government agency offices, or community partner locations or by credit or debit card online or by phone. This program could be built off or coordinated with an existing fare card programs for public transportation in the region creating an accessible, cross-agency mobility payment platform. Los Angeles's TAP card program provides an example of how such a program would function. While the card does not currently connect to PEV charging networks, it does connect across 25 different transit agencies[86] , including bicycle share.

10.4 Revenue Models

Various revenue models have been developed by the PEV charging industry to support recovery of utility and other public EVSE operating costs. A core consideration when selecting a revenue model is the ownership structure for the station, either a network operator structure or site owner operator structure[87] . Under a network operator structure, a third-party organization, such as ChargePoint or EVgo, is primarily responsible for processing payments. Typically, this network operator will charge a fee per charging transaction, either a flat rate, a percentage of the payment, or both. The network operator also typically provides customer service functions for EVSE users. In some cases, the network operator may also be responsible maintenance of the EVSE. The site owner may also choose to directly operate the station. There is also a hybrid model, in which a network operator would simply lease the space from the site owner. In this model, the network operator would take on all costs of operating the EVSE, including installation

82 https://www.pge.com/en_US/small-medium-business/energy-alternatives/clean-vehicles/ev-charge-network/electric-vehicle-rate-plans.page
83 US Department of Energy, Energy Efficiency & Renewable Energy. Costs Associated with Non-Residential Electric Vehicle Supply Equipment. November 2015.
84 Per a recently-passed California Air Resources Board regulation, stations in will need to will need to have credit card readers, with rules taking effect starting in 2022. https://www.sfchronicle.com/business/article/Most-electric-car-chargers-don-t-take-credit-14496919.php
85 https://austinenergy.com/ae/green-power/plug-in-austin
86 https://www.taptogo.net/TAPAgencies
87 University of California – Luskin School of Public Affairs. Financial Viability of Non-Residential Electric Vehicle Charging Stations

and electric costs, and would retain all revenue collected.

Other considerations when selecting a revenue model include:

- Need to recover fixed operating costs
- Need to recover usage-based or other variable operating costs
- Management of vehicles left EVSE for extended periods or other misuse patterns;
- Incentivizing charging during lower-cost off-peak hours
- Ability of targeted users to access or enable the EVSE
- Ability of targeted users to pay for and afford charging rates
- Need for networked versus non-network stations to apply charges and process payment

Table 13 outlines possible revenue models for consideration in Fresno County. The models listed may be hybridized to allow for allocation of both fixed and variable operating costs or incentivize appropriate use of the EVSE.

Table 13. Revenue Models for Public Charging Stations

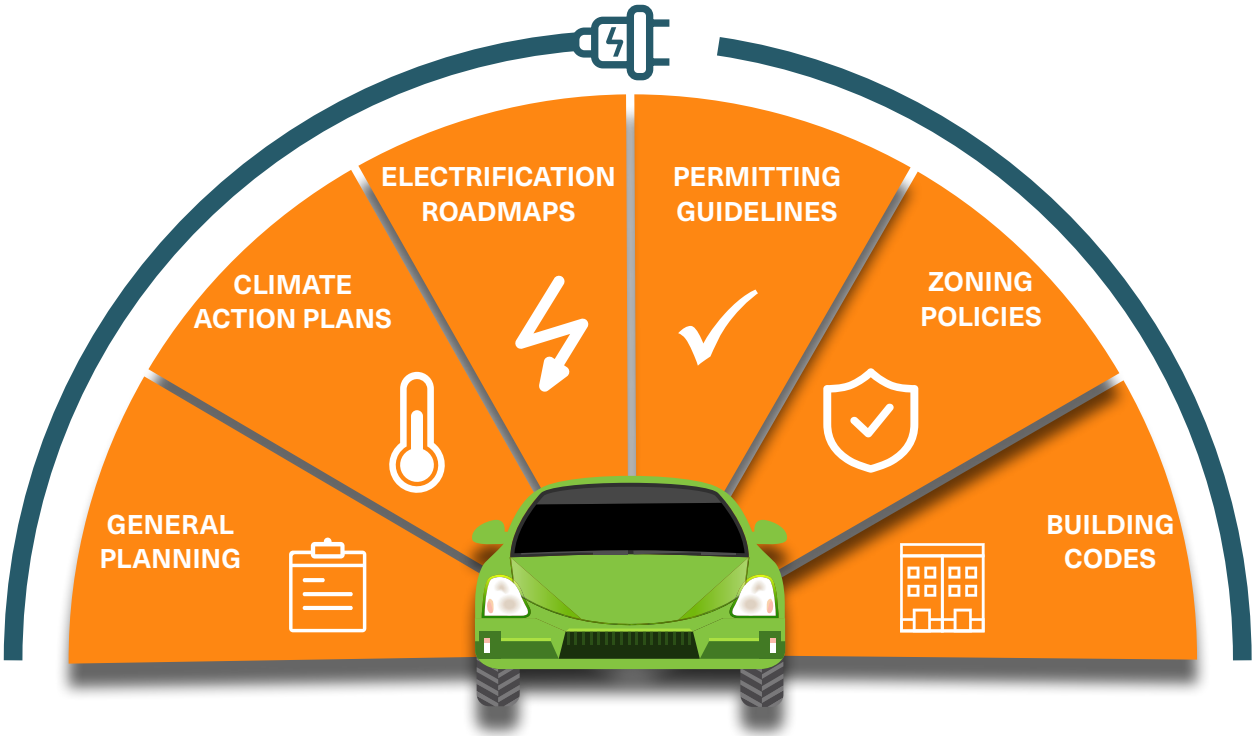
Revenue Model	Description	Ownership Structure	Considerations for Fresno County
Free	No charge for charging.	Owner-operated	• May be appropriate and feasible for Level 1 or Level 2 charging with low consumption and/or in disadvantaged neighborhoods. • No mechanism to manage time spent at station.
Prepaid	All-access to charging network with payment of flat monthly fee	Typically used by network operator, though could apply for owners with many sites	• Opportunity to accept a range of payment types if owner operated. • Access cards could be purchased at government offices, machines, or community partner locations. • Limited ability to recover variable costs. • No mechanism to manage time spent at station.
Membership	Small fee plus usage-based costs	Network operator	• Allows for some recovery of variable costs. • Membership for such programs generally require online accounts and automatic credit card payment.
Pay-per-session	Flat fee charged per charging session.	Network operator or owner-operated	• No mechanism to manage time spent at station. • No recovery of variable costs.
Pay-per-hour	Fees charged by hour. Can be the same cost per hour or change with length of charging session, time of day.	Network operator	• Hourly costs can vary following utility TOU rates. • Can increase costs for additional hours to incentivize moving vehicle off charger. • Networked system would be required.
Pay-per-electric	Fees charged per kWh used.	Network operator	• High recovery of variable costs which are evenly distributed according to use. • Infrastructure costs may increase. • Networked system would be required.
Hybrid pay-per-use	Combination of pay-per-use programs. For example, small flat fee for session start plus electric costs.	Network operator	• Can be used to balance the benefits and drawbacks of pay-per-use programs. • Increased payment system complexity would require a networked system.
Advertising	No cost to users. Advertisements at the charging station fund operation.	A network operator would develop business model and attract advertisers	• Limited revenue potential in less populated areas.

11

ELECTRIFICATION PLANNING

Successful transition to electric vehicles can be a daunting process for communities. Utility operators, consumers, and developers are all impacted by the permitting policies cities have adopted for charging installations. Local jurisdictions can play a critical role in mitigating community concerns with effective planning.

This section briefly details the importance of general planning, climate action plans, electrification roadmaps, permitting guidelines, zoning policies, and building codes in supporting electric vehicle adoption. The section also provides an overview of the current plans that each of the fifteen cities in Fresno County and the unincorporated areas have implemented. Finally, recommendations based on plans and best practices are presented. Exact language or results found in each of the planning documents are found in Appendix F for policymakers to reference as needed.



11.1 Municipal General Plans

General planning is rooted in a basic framework or vision to inform a local jurisdiction's future actions. To that end, many municipalities develop General Plans that outline goals and priorities for a fixed future time frame. Table 14 provides an overview of relevant goals and policies adopted for municipalities within Fresno County that aim to increase electric vehicle adoption.

Table 14. Overview of Each Jurisdiction's General Plan Policies

Jurisdiction	Policy Focus					
	Electric Fleet Vehicles	Streamline Permitting Process	Encourage Private Charging Station Installations	Support PEV Adoption or NEVs	Update Building and Zoning Ordinances	Improve Standardization or Mitigation Measures
Clovis			●			
Coalinga	●				●	
Firebaugh	●					
Fowler						
Fresno	●	●				●
Huron	●					●
Kerman	●	●	●	●	●	●
Kingsburg						
Mendota	●			●		
Orange Cove						
Parlier						
Reedley	●		●	●		
San Joaquin	●					
Sanger						●
Selma	●					
Fresno County	●					

11.1.1 Best Practices

The following are examples of best practices jurisdictions can reference when updating their municipal General Plans to support PEV adoption.

1

Local municipalities have extensive knowledge of the community and future development plans. Policymakers should identify high-value parking locations that would benefit from a charging station and include it in their plans. High visibility, convenient locations such as transit stations, churches, fitness centers, shopping malls, and movie theaters are potential starting points.

2

Cities and agencies within the county should strive to adopt policies that specifically aim to promote PEV adoption; the California General Plan Guidelines[48] is a comprehensive resource that outlines policy recommendations for the jurisdiction to use.

3

To improve effectiveness, jurisdictions should identify policies aimed at increasing PEV adoption that have a complementary funding source to support implementation.

Table 15. Policy Recommendations with Aligned Funding Sources

Policy	Implementation Example	Aligned Funding Source
Replace public fleet vehicles and trips with electric or alternative fueled vehicles as much as feasible and provide EV chargers in public spaces.	The City of Raleigh has promoted a policy to replace old fleet vehicles with new EVs. The public-facing vehicles are not only highly visible to the community, but more cost effective[83] as well.	• PG&E's EV Fleet Incentive • SJVAPC's Electric School Bus Incentive Program • FTA's Low or No Emission Vehicle Program
Require on-site EV charging capabilities for parking spaces serving individual projects.	Numerous cities in the United States require a specific number of parking spaces in new construction be pre-wired to be "electric vehicle-ready), drastically reducing the price to install a charger in the future.	• CEC's Electric Vehicle Supply Equipment (EVSE) Incentive Program • CPCFA's EVSE Loan and Rebate Program

11.2 Electrification Roadmaps

From a fleet perspective, the shift from largely gasoline to all-electric fleets can be a multifaceted endeavor. It requires rapid adoption of electric vehicles while simultaneously ensuring adequate charging capacity in place to meet needs, with a consideration of grid impacts. Electrification Roadmaps can be used as planning documents for policy makers and local utilities to holistically present effective installation strategies for charging infrastructure, funding opportunities, incentives, and other critical considerations.

The FCOG EVRP is the first comprehensive electrification roadmap within Fresno County. However, an Energize Fresno Report[84] was prepared for downtown Fresno in 2018, which prioritizes projects that increase local energy and water efficiency. The approach to developing an advanced energy community focuses on improving grid resilience and reducing emissions through energy efficiency, renewable energy, and smart grid technologies. The report highlighted the need to align local planning to meet state goals, especially in disadvantaged communities. Within the proposed plan, five direct current fast chargers (DCFC) and five solar powered chargers would be installed in downtown Fresno and along the Blackstone Corridor. Chargers were estimated to save 320 million tons of CO_2e/yr and recommended a subsequent master electrification roadmap to articulate broader impacts, benefits, and strategies.

Similarly, California's Public Utility Commission (CPUC) proposed requiring all state utilities to compile a transportation electrification roadmap[85]; which presents an opportune moment for Fresno County municipalities to develop plans alongside the local utility.

82 https://www.opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf
83 https://cityofraleigh0drupal.blob.core.usgovcloudapi.net/drupal-prod/COR27/EV%20Study_Final.pdf
84 https://ww2.energy.ca.gov/2018publications/CEC-500-2018-027/CEC-500-2018-027.pdf
85 https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M326/K281/326281940.PDF

11.2.1 Best Practices

The proposed transportation electrification framework from the CPUC lists the following best practices for utilities working with local jurisdictions, transit agencies, or regional agencies:

1. Utilities can share lessons learned from previous electrification pilots to better inform jurisdictions how incentives and other programs may impact PEV adoption rates
2. Identify infrastructure gaps where future charging stations are planning to be installed.
3. Develop workforce training programs to meet future demand of PEV charging infrastructure and drive economic development in disadvantaged communities.

11.3 Climate Action and Greenhouse Gas Reduction Plans

Climate Action or Greenhouse Gas Reduction Plans enable local governments to document and share their respective progress on meeting emissions targets. These plans are typically rooted in baseline modeling and projected greenhouse gas emissions by using directives outlined in a General Plan. The Climate Action or Greenhouse Gas Reduction Plans developed by Fresno County jurisdictions have found that the transportation sector is by far the highest source of emissions. The data provides quantified information that can be used by local governments to determine additional environmental measures required to meet targets and goals. Table 16 illustrates the progress Fresno County has made on their plans.

Table 16. Overview of Each Jurisdiction's Emission Plans

Jurisdiction	Plan		
	Greenhouse Gas Emission Plan	Climate Action Plan	Climate Change Adaption Plan
Clovis	●		
Coalinga			
Firebaugh			
Fowler			
Fresno	●		
Huron			
Kerman			
Kingsburg			
Mendota			
Orange Cove			
Parlier			
Reedley		●	
San Joaquin			
Sanger			
Selma			
Fresno County			●

The plans recognize that although emissions can be reduced in several ways; cities and local jurisdictions typically only have direct control over municipal fleets and buildings. Therefore, recommendations typically include procuring alternative fueled vehicles or installing public charging stations at government buildings. In Reedley's Climate Action plan, the procurement of three compressed natural gas garbage trucks reduced emissions by 13 metric tons. However, it is imperative to recognize that meaningful reductions must also include recommendations in which cities create a supportive regulatory environment and play the role of a partner in supporting private efforts. For example, city efforts should encourage adoption of similar measures by the private sector and require target environmental thresholds be reached for new construction projects. Measures related to PEV adoption include Neighborhood Electric Vehicle Access, which the San Joaquin Climate Change Action Plan[86] estimates can achieve between 0.5-1.5% reduction in emissions, and EV charger installations, estimated to achieve a 0.11% reduction by the City of Reedley. For reference, developers typically target 29% reduction of a project. It should be noted these savings assume low penetration of PEVs and therefore can be expected to have a larger impact as adoption increases. Including clear, predetermined emission reduction measures can help make the environmental review process less tedious and encourage the strategies be implemented.

11.3.1 Best Practices

1. Jurisdictions should work with FCOG to include and quantify innovative transportation measures that developers can use as part of their environmental review process. Projects that include public charging stations or electric vehicles should be given credit for their installations.

2. Collaboration between government organizations to reduce vehicle miles traveled of their employees or other actions that can be included in the Climate Action Plan. San Diego Association of Government (SANDAG) is promoting an iCommute Program to encourage county employees to work remotely [53].

3. Develop emissions plans that track both municipal and private emissions for the county. Only tracking one or the other makes it difficult for policy makers to truly understand progress on California State targets.

Due to the impacts of COVID-19, organizations have discovered employees can efficiently work remotely, making programs similar to iCommute a realistic and potentially favorable option for the future workforce. Jurisdictions can go a step further and share best practices with local companies to expand remote work beyond the public sector.

86 https://www.valleyair.org/Programs/CCAP/12-17-09/1%20CCAP%20-%20FINAL%20CEQA%20GHG%20Staff%20Report%20-%20Dec%2017%202009.pdf
87 https://www.sandiegocounty.gov/content/dam/sdc/pds/advance/cap/publicreviewdocuments/CAPfilespublicreview/Draft%20Climate%20Action%20Plan%20(LOW%20RESOLUTION).pdf

11.4 Permitting

Permitting is a required process for charger installations to ensure safety procedures are upheld and the utility can adequately plan for the necessary electrical capacity. Despite this, the process has historically been lengthy and arduous, with many stakeholders citing the permitting process as a main obstacle for increasing charging implementation. The lack of a streamlined process complicates technical review periods and complicates coordination with local utilities, often causing significant delays. These delays are particularly detrimental in cases where projects are being funded by grants with specific end dates. To address these issues, California's Assembly Bill 1236 (AB 1236), introduced in 2015, now requires cities and counties to adopt an ordinance and streamline the permitting process, details of the process are shown.

1 ORDINANCE

Adopt an ordinance for an expedited, streamlined permitting process for Level 2 and DCFC charging stations. Model ordinances for small and large (200,000 residents or more) jurisdictions can be found in Appendix C.

2 CHECKLIST

Provide easy access to a checklist on the city's website. The checklist should provide all the necessary information needed to receive a permit.

3 ADMINISTRATIVE APPROVAL

Projects that meet the checklist are approved through a building or non-discretionary permit. Permits should not use a discretionary permit. This approval process language is included in the model ordinance.

4 HEALTH AND SAFETY

When administration reviews the permit, it should be limited to health and safety concerns. Aesthetics should not be considered. This language is included in the model ordinance.

5 E-SIGNATURE

The permit and checklist should be able to be uploaded or submitted online and electronic signatures should be accepted. This language is included in the model ordinance.

6 NO ASSOCIATION

Permit approval is not subject to approval by an association. This language is included in the model ordinance.

7 ONE NOTICE

If issues are identified in the checklist, the AHJ provides one complete response that details all deficiencies. This language is included in the model ordinance.

California monitors progress toward meeting the AB 1236 requirements through the PEV Charging Station Permitting Streamlining Map[88] . California Governor's Office of Business and Economic Development (GO-Biz) has developed resources such as checklist templates, ordinance language and best practice timelines to help jurisdictions comply with AB 1236 requirements[89] . An overview of each jurisdiction's progress toward AB 1236 is shown in Table 17.

Table 17. Permitting Policy Overview for Major Fresno County Cities

Jurisdiction	Requirement								
	Streamlined	Ordinance	Checklist	Admin Approval	Health & Safety	e-Signature	No Association	One Notice	Bonus - Timelines
Clovis	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No
Coalinga	Partially	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Firebaugh	No	No	No	No	No	No	No	No	No
Fowler	No	No	No	No	No	No	No	No	No
Fresno	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Huron	No	No	No	No	No	No	No	No	No
Kerman	Partially	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Kingsburg	No	No	No	No	No	No	No	No	No
Mendota	No	No	No	No	No	No	No	No	No
Orange Cove	No	No	No	No	No	No	No	No	No
Parlier	No	No	No	No	No	No	No	No	No
Reedley	No	No	No	No	No	No	No	No	No
San Joaquin	No	No	No	No	No	No	No	No	No
Sanger	No	No	No	No	No	No	No	No	No
Selma	No	No	No	No	No	No	No	No	No
Fresno County	No	No	No	No	No	No	No	No	No

88 https://business.ca.gov/industries/zero-emission-vehicles/plug-in-readiness/
89 https://www.calbo.org/post/electric-vehicle-charging

11.4.1 Best Practices

1

Encourage collaboration between jurisdictions to share knowledge on permit constraints, particularly those jurisdictions who have installed DCFC. This can be extremely helpful for smaller jurisdictions that may lack resources needed to dedicate a specific employee for charger installations. As an example, Fresno has held a workshop to share their lessons learned, technology differences, and various siting considerations [56].

2

Having a clearly articulated and timely process for permitting is just as important as meeting the requirements of AB 1236. Fresno requires DCFC permits be reviewed within 15 business days [57]. Delays significantly impact an applicant's ability to install charging infrastructure, particularly if they are relying on time-sensitive grant funding to support their initiatives. Such delays can also lead the public to perceive the process as a barrier instead of a safety measure. California's AB 2168 is a supplementary bill that requires all jurisdictions to issue permits within 5 to 15 days, depending on whether comments are required [58].

3

Collaboration with utilities to achieve PEV goals. It would be especially beneficial to identify projects that advance the state's goals early on and place on an expedited track. Steps a local jurisdiction can take to collaborate with the utility are:

- Ensure the applicant has contacted the local utility as early as possible in the design efforts.
- Determine expected timelines for interconnection.
- Ensure that utility needs and requirements are included in the permit checklist.
- Highlight utility resources available (transform/capacity data, site maps) on developed plans and roadmaps.

4

Consider waiving permit fees, as Anaheim did for their traditional $147.67 building permit cost [59].

90 https://www.fresnocog.org/wp-content/uploads/2016/06/EV-Workshop-Slides-for-FCOG-Website.pdf
91 https://librarystage.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH11BUPERE_ART1CABUREELMEPLENCO
92 https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB2168
93 http://www.anaheim.net/3474/Electric-Vehicle-Charger

11.5 Zoning

Another hurdle for PEV adoption is determining where chargers should be installed and how PEV parking spots impact the minimum parking requirements. Zoning approvals for charging stations are a lengthy process due to a lack of understanding and undefined language or classifications for the technology. Outdated zoning ordinances view PEV chargers as an equivalent development as a traditional gas fueling station, limiting areas of the city they can be installed in.

AB 1236 classifies charging equipment as an accessory use to the site, unlocking the potential to install chargers on various land uses. In each municipality, specific land uses are required to meet a certain number of parking spaces. Typically, PEV spots are excluded in the count of parking spots; thus, additional parking needs to be developed for every PEV designated spot, costing the owner money and land. However, local jurisdictions are granted the power and flexibility to consider innovative alternatives such as including them in the count or offering additional floor area.

Zoning policies also detail the designated locations of PEV parking spots, enforcement, and fees. PEV spots can be given preferred locations, such as at storefronts, to incentivize adoption. In addition, jurisdictions can remove parking permit or usage fees to further encourage the public. While these policies are attractive, communities with low adoption rates may discover low utilization of the parking spots. This can lead other vehicles to utilize the parking space and restrict access to the charging station; particularly if a proper enforcement mechanism is not in place. Current zoning laws for Fresno municipalities are shown in Table 18.

Table 18. Overview of Each Jurisdiction's Zoning Policies

Jurisdiction	Zoning Ordinances		
	Permitted Zones	Count Toward Minimum Parking Requirement	Additional Benefits (Area, Fees, etc.)
Clovis	●	●	
Coalinga	●		
Firebaugh			
Fowler			
Fresno	●		
Huron			
Kerman	●		
Kingsburg			
Mendota			
Orange Cove			
Parlier			
Reedley			
San Joaquin			
Sanger			
Selma			
Fresno County			

11.5.1 Best Practices

1. Count PEV parking spots towards the minimum parking requirement.
2. Count PEV parking spots as additional floor area that can count towards future build out and development. The City of San Carlos allowed a 10% increase in floor area ratio (FAR) for mixed use developments that included car-share or electric car facilities.
3. Allow preferred locations for PEV parking spots, as done in Menlo Park [61].
4. For smaller jurisdictions, consider waiving parking fees for PEVs; however, there should be caution about the potential of added street congestion.

City of Clovis is demonstrating a best practice by permitting and requiring a specific portion of parking area be EV designated spots. Additionally, they include the spots toward the parking requirement.

CASE STUDY – INDIANAPOLIS

Indianapolis[94] counts each EV charging station as two off-street parking spots. This encourages developers to actually install a charging station rather than simply designate a parking spot.

Image by andreas160578 from Pixabay.jpg

94 https://library.municode.com/in/indianapolis_-_marion_county/codes/code_of_ordinances?nodeId=TITIIIPUHEWE_CH744DEST

95 https://www.codepublishing.com/CA/MenloPark/html/MenloPark16/MenloPark1645.html

11.6 Building Codes

Building codes are adopted regulations for new construction or major renovation projects. Due to resource constraints, many rural communities are often unable to regularly enforce building codes or update them consistently. As a new technology, charging infrastructure is not accounted for under older codes and developers are not currently required to install supporting infrastructure.

Building codes can be a primary lever for policy makers to require installation of chargers or necessary infrastructure for future installations. Section 8.6.4 will focus specifically on the California Green Buildings Standards Code (CALGreen) which is the first-in-the-nation green building code that was developed to assist California in achieving its state targets. The code specifically requires that a certain number of PEV capable spots be developed.

Each jurisdiction can adopt a version of CALGreen, which is updated annually; Table 19 indicates the latest version that has been adopted by the jurisdictions and the pre-wired requirements for each code version.

Table 19. Overview of Each Jurisdiction's Building Codes

Jurisdiction	Building Code
Clovis	2019
Coalinga	2019
Firebaugh	2010
Fowler	2017
Fresno	2019
Huron	2013
Kerman	2016
Kingsburg	2019
Mendota	2019
Orange Cove	2016
Parlier	2019
Reedley	2013
San Joaquin	2019
Sanger	2010
Selma	2016
Fresno County	2019

Building Code	Code Pre-wiring Requirements
2010	None
2013	None
2016	3% of multi-family parking spaces
2017	3% of multi-family parking spaces
2019	6% of parking spaces

The top table illustrates the building code each city and the county has currently adopted. The bottom table compares the differences of the pre-wiring requirements of the various codes.

11.6.1 Best Practices

1. Encourage jurisdictions to adopt more recent CALGreen codes. An updated code aligns more with state goals and provides more guidance on how to properly provide PEV capable spots.

2. Adopt a voluntary tier or ordinance that requires more aggressive PEV capable installations for construction projects or requires installation of physical chargers.

CASE STUDY – ST. PAUL, MINNESOTA

St. Paul, MN considered requiring developments that received over $200,000 in public funds to equip a portion of parking spaces with charging equipment [62]. This would guarantee accessible public charging infrastructure without the need to enhance building codes

96 https://www.betterenergy.org/wp-content/uploads/2019/06/GPI_EV_Ordinance_Summary_web.pdf

11.7 Summary and Findings

This section outlined planning mechanisms for jurisdictions to encourage PEV adoption. While each municipality is different, understanding and sharing learnings can help determine the most impactful tools. Local governments should be leaders within their communities in this regard by encouraging the infrastructure needed to align with future PEV adoption and promote development in areas where rates are slower, such as disadvantaged communities. The bullets below summarize key findings from this section:

1. Jurisdictions can incorporate findings and recommendations from the EVRP into their General Plan to promote PEV adoption and leverage locations suggested for installation prioritization. Section 8.6.4 provides a detailed analysis of recommended charging sites which should be considered in combination with the extensive community-specific knowledge of local jurisdictions.

2. Utilities are starting to develop electrification roadmaps, presenting an opportunity for utilities and jurisdictions to collaborate on. A roadmap is critical to plan for the necessary infrastructure capacity needed for widescale charging installations. In addition, co-developing transportation and building electrification plans can help optimize the electrical grid system and associated impacts from electrification.

3. Generally, municipalities that have implemented a streamlined permitting process for PEV charging infrastructure and newer building codes have a higher density of PEV chargers installed, as shown in Table 20. This demonstrates the importance and impact of implementing AB 1236 and value in adopting the most recent CALGreen code.

Table 20. Comparison of PEV Adoption Rates to Permitting and Building Codes

Municipality	Building Code	Streamlined Permitting Process	PEV Charging Stations per 1,000 Residents
Clovis	2019	Yes	11.4
Coalinga	2019	Partially	0
Firebaugh	2010	No	0
Fowler	2017	No	0
Fresno	2019	Yes	6
Huron	2013	No	0
Kerman	2016	Partially	1.6
Kingsburg	2019	No	2.1
Mendota	2019	No	0
Orange Cove	2016	No	0
Parlier	2019	No	0
Reedley	2013	No	3.9
San Joaquin	2019	No	0
Sanger	2010	No	3.3
Selma	2016	No	1.4
Fresno County	2019	No	5.9

12 CONCLUSIONS

A robust public electric vehicle charging network is critical to increasing electric vehicle adoption in Fresno County. In order to meet local need and state targets for increased electric vehicle adoption, the FCOG EVRP was developed to serve as a regional resource in guiding implementation of electric vehicle charging infrastructure installation. Development of the EVRP included a holistic analysis of existing local conditions, a data-driven forecast, funding sources, and stakeholder engagement to develop recommendations for priority sites of charging infrastructure as well as policy and permitting recommendations.

A priority of the technical analysis conducted was to mitigate range anxiety and support PEV adoption rates. A forecast of expected electric vehicle adoption and an analysis for potential sites for electric vehicle charging infrastructure was included for jurisdictions to incorporate and align with their planning documentation. The analysis also addressed environmental justice and vulnerable communities to ensure that recommendations accounted for local equity. The technical analysis conducted in this effort has validated the immense need for a ubiquitous charging network across Fresno County and surrounding areas. Results estimated that an insufficient charging network could miss the California pro-rated target by 75%.

The technical analysis determined that just over 1,600 publicly accessible charging stations locations within incorporated Fresno County cities would be needed by 2025 to be on trend to meet 2030 state targets. An additional 217 charging stations will be needed in unincorporated Fresno County to support rural EV adoption. The vast majority of charging stations would be Level 2 technology, costing an estimated $12 million dollars in investment. Following 2025, a robust DCFC network is recommended to support long distance trips and reduced charging duration. By 2030, a network of 35-40 DCFC stations should be installed, with at least one in each city. A cumulative total of $14.1 million dollars in funding is estimated to cover the needed public charging infrastructure across Fresno County.

In order to ensure that recommendations for sites have the necessary funding support, subsequent analysis was conducted to overlay identified funding sources with potential charging infrastructure sites to determine priority tiers that would be most eligible for near term funding. The results yielded recommendations for chargers at community centers, gas stations, and dense residential developments for increased accessibility combined with funding eligibility. Best practices, case studies, and recommended actions have been provided for local jurisdictions to reference when considering

strategies they can leverage to encourage charging stations installations and drive PEV adoption at both locations identified in the EVRP and locations that arise out of future need. Some of these strategies presented in the EVRP are to:

We recommend jurisdictions evaluate these strategies, in combination with their extensive local knowledge, for implementation in their community to reap the benefits of transitioning to electric vehicles.

1. **ADOPT POLICIES** across jurisdictions to align the prioritization of electrified transportation
2. **ENHANCE MONITORING AND REPORTING** of progress on emission reduction and progress toward transportation electrification
3. **STREAMLINE PERMITTING PROCESSES** of charging stations to reduce cost and time of developments
4. **UPDATE BUILDING CODES** to newer versions of CalGreen to expedite charging infrastructure and reduce future improvement costs
5. **EXPAND COMMUNITY OUTREACH** to disadvantaged communities who often encounter the largest barriers to PEV adoption yet face the harshest consequences from pollution
6. **ENHANCE COLLABORATION BETWEEN STAKEHOLDERS** such as private developers, utilities, and other jurisdictions or government agencies to improve planning and identify barriers early in the process
7. **IMPROVE EDUCATION** of PEV technologies and available funding mechanisms to reduce barriers to entry and mitigate public concerns.

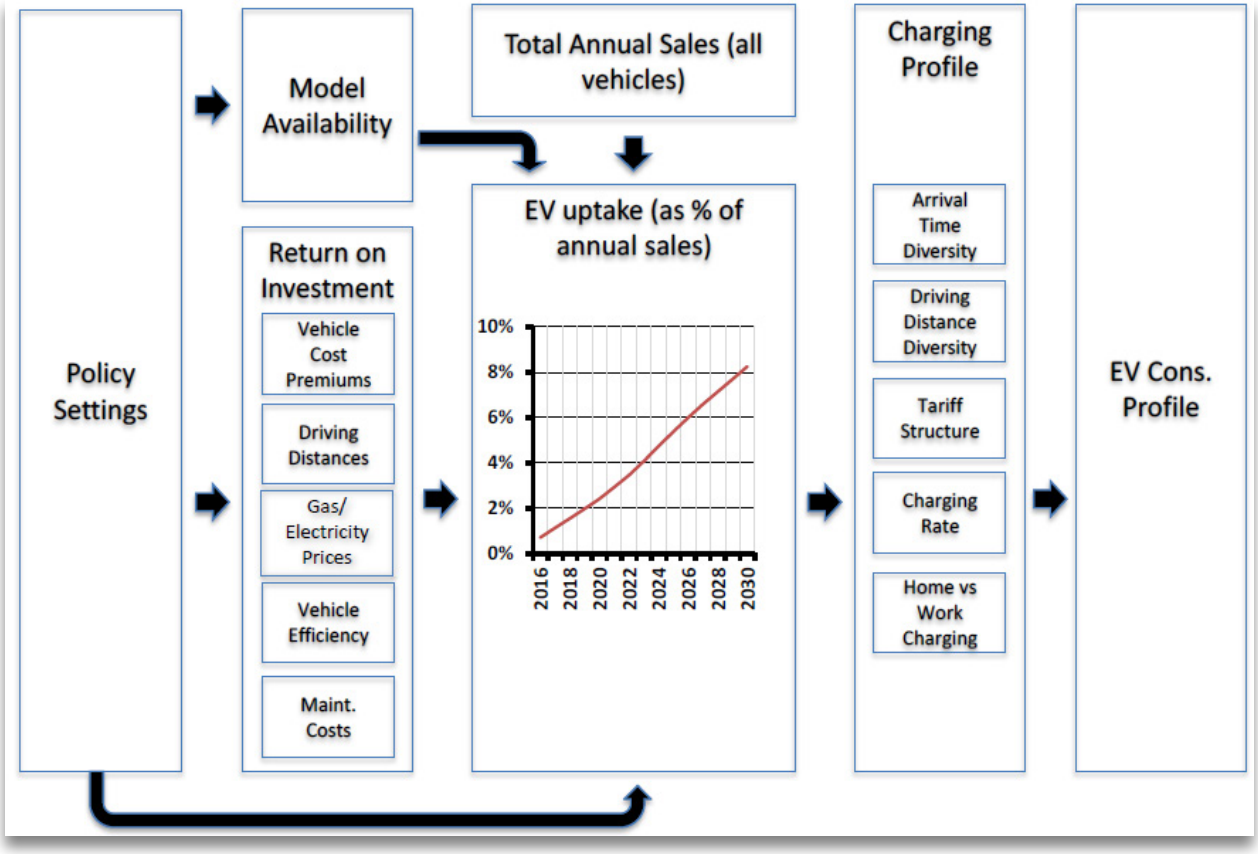
To complement the technical analysis, stakeholder engagement was conducted utilizing a number of different platforms. Feedback consistently placed funding and accessibility as primary barriers for electric vehicle adoption. The diversity and quantity of available funding sources reinforces California's status as a national leader in creating an environment supportive of driving forward electric vehicle adoption. However, some of the funding sources identified in the EVRP have already been exhausted at the time of writing. While they may be replenished for a subsequent funding cycle, it is not certain. This affirmed that a number of community members are taking advantage of available funding but also reinforced the need for increased funding targeted at public charging infrastructure development as well as long-term funding options that are more stable in their availability.

APPENDIX A

UPTAKE FORECASTING METHODS, INPUTS AND ASSUMPTIONS

Energeia's PEV uptake model, depicted in Figure 59, forecasts the adoption of PEVs by segment based on policy, model availability and financial drivers. It was configured based on current and forecast conditions in Fresno County over the next 10 years.

Figure 59. Electric Vehicle Adoption Forecasting System



Source: Energeia Analysis

The following sections detail the forecasting methodology and key inputs and assumptions.

A.1 Forecasting Methodology

Energeia's PEV uptake model forecasts PEV uptake by vehicle type, driver type and charging requirements based on two factors:

FINANCIAL INCENTIVE	Vehicle cost premiums and differences in annual running costs are used to calculate this factor.
MODEL CHOICE/ AVAILABILITY	This factor is calculated based on the total number PEV models divided by total ICE models available.

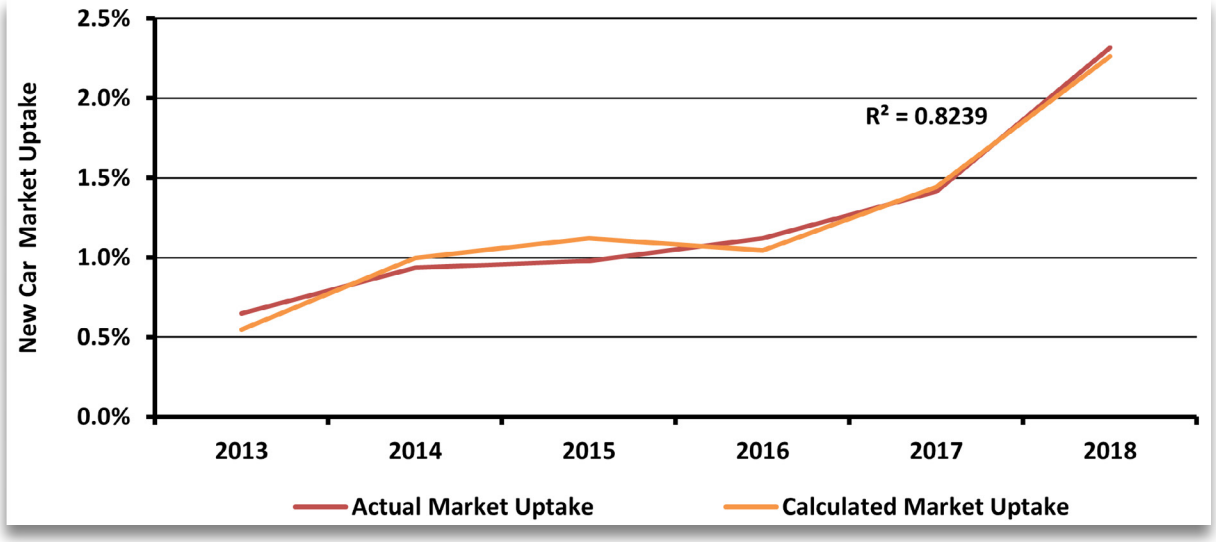
Energeia has developed its proprietary uptake model over the past ten years based on our consulting experience and ongoing research and development efforts. We have found it delivers a higher level of accuracy and configurability than other types of models.

The model is configured for a given market using regression to identify the correct factor parameterization. Figure 60 shows the model's relatively high level of fit to Fresno County's historical PEV adoption rates.

A.2 Forecast Vehicle Availability

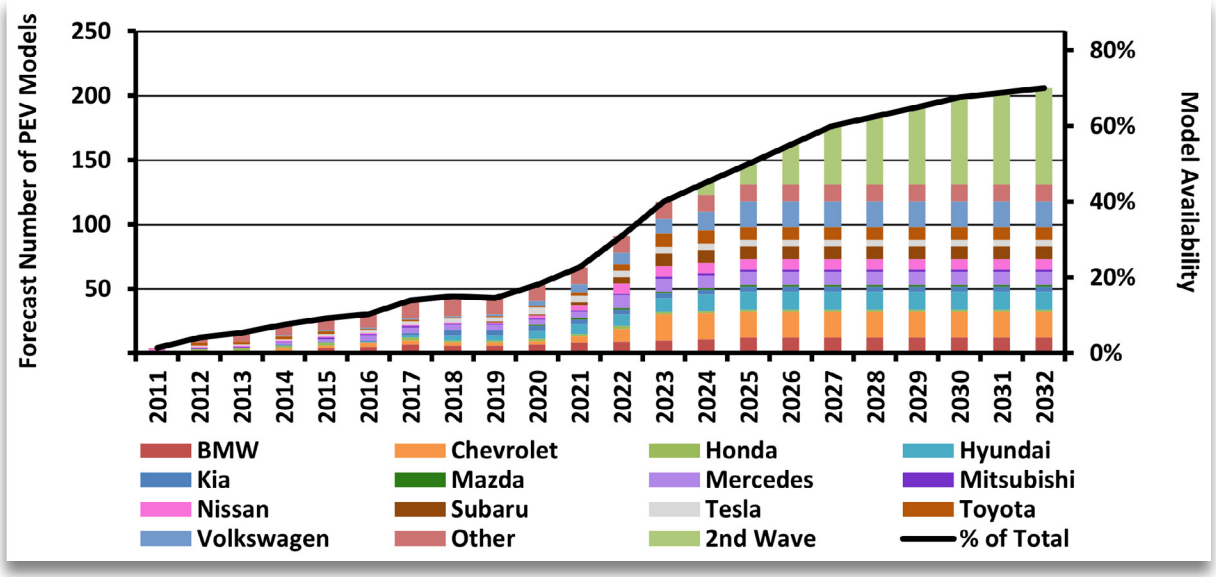
Figure 61 shows Energeia's forecast of model availability over the period to 2030. The forecast is

Figure 60. Backcast of PEV Adoption Compared to Actual Historical Adoption



Source: Energeia Analysis
2019 was excluded from the parameterization due to partial data availability at the time of modeling

Figure 61. Forecast of PEV Model Availability by Vehicle Manufacturer



Source: Energeia Analysis

based on vehicle manufacturer announcements up to 2023. Energeia has made assumptions about the trend from there, indicated in the figure as the '2nd Wave'.

The reason for the estimate is that no manufacturer makes market announcements over 4-5 years out, and an assumption of how the trend will evolve is therefore necessary. Energeia's assumption is that PEV models will continue to be introduced, reaching 70% of ICEs by 2030.

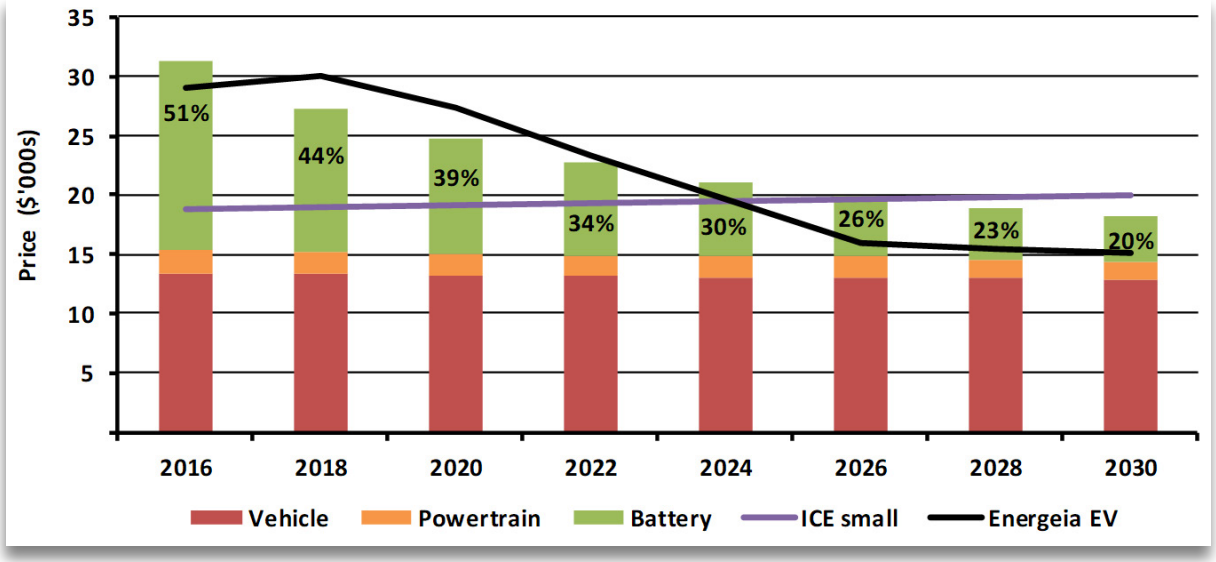
This is a key assumption, and a significantly higher or lower level of model availability would result in a significantly higher or lower forecast uptake rate.

A.3 Forecast Electric Vehicle Premium

Energeia's forecast of PEV vehicle price forecast for a compact passenger vehicle is provided in Figure 62 as a black line. Also shown are the estimated cost of a PEV from 2016 to 2030, broken out by battery, power train and vehicle costs. The forecast ICE cost for a comparable, compact passenger vehicle is shown in the purple line.

The forecast shows the underlying cost of the PEV at scale to be about 20% below that of the ICE, including the power train but excluding the battery. As the cost of the battery falls, which is driven by lower $/kWh unit prices, offset by increasing battery sizes, the overall purchase premium declines. The overall price forecast sees PEV price parity by 2026.

Figure 62. Forecast of PEV Cost Premium by Component



Source: AFDC (2016), Energeia analysis

A.4 Forecast Electricity, Gas and Diesel Prices

Retail electricity prices for PG&E, SCE, gasoline and diesel are provided in Figure 63.

A.5 Vehicle Efficiency, Maintenance Costs and Annual Driving Distances

Table 21 provides the key assumptions and their sources.

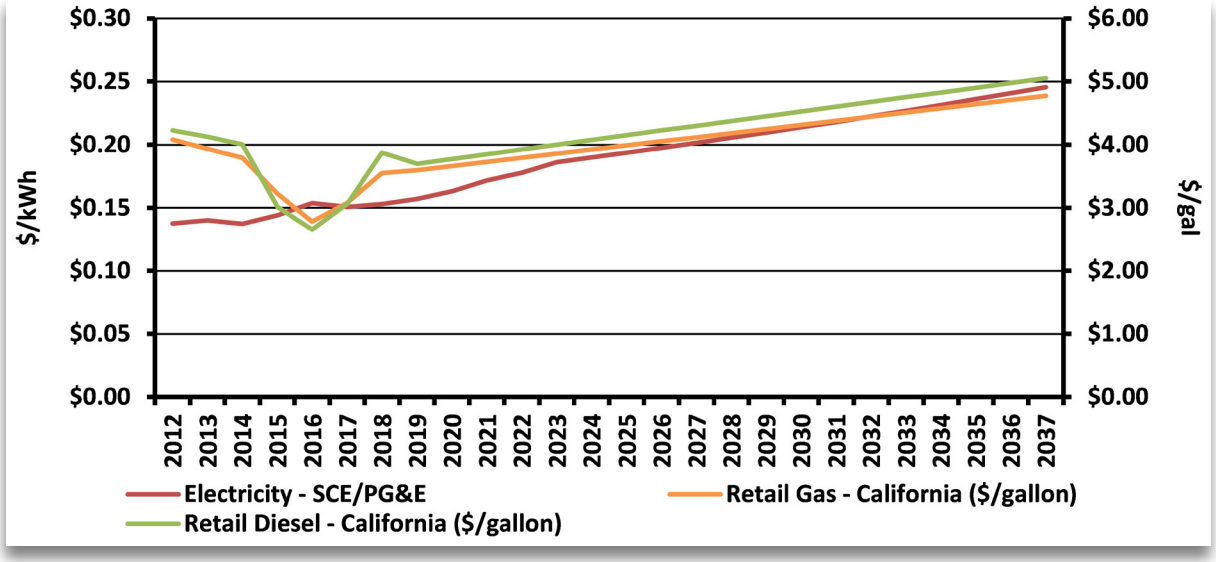
Table 21. Key Modeling Assumptions

Assumption	Value
PEV Efficiency (MPGe)	124
ICE Efficiency (MPG)	31
Miles per Year (Passenger Vehicles)	7,418
PEV Maintenance Cost Savings	25%

Sources: EV Manufacturer Statistics (2019), DMV (2019), California Public Road Data (2017)

Although vehicle efficiency is likely to improve over time, it is not expected to be a material driver of uptake compared to other factors, and it held constant over the forecast period.

Figure 63. Forecast of Electricity, Gasoline and Diesel Prices



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

APPENDIX B
CHARGING INFRASTRUCTURE OPTIMIZATION MODEL

Energeia configured its public charging infrastructure optimization model with Fresno County specific conditions, to forecast the number of public charging stations and ports by solution type.

The following sections detail the forecasting methodology and key inputs and assumptions.

The process may be iterated as allocation rules are generally informed by solution costs, and solution costs are in turn impacted by allocation rules. For example, by allocating drivers to the solutions with the highest charging watersheds, it helps reduce prices per PEV per year.

B.1 Forecasting Methodology

Energeia's public charging infrastructure cost forecasting model includes the following key modeling steps:

CONFIGURE PUBLIC CHARGING SOLUTION OPTIONS

The model was configured for a wide range of Level 2 charging options in residential and non-residential parking locations, and two key DCFC charging options.

DEVELOP DRIVER TO PUBLIC CHARGING SOLUTION ALLOCATION RULES

The allocation rules were based on the agreed optimization framework, actual allocation of drivers to solutions will depend on the types of programs and services available at the time.

ALLOCATE FORECAST DRIVERS TO PUBLIC CHARGING SOLUTIONS

The modeling assumed a random allocation, a conservative assumption. A higher clustering assumption would result in fewer public charging stations in the near to medium term.

ESTIMATE NUMBER OF CHARGERS AND HOSES TO MEET FORECAST DEMAND

The number of chargers needed is largely based on the forecast number of drivers at a given charging station, with some high-density solutions needing more than one charger at a given site.

ESTIMATE PRICE OF SOLUTION BASED ON FORECAST COSTS AND FORECAST UTILIZATION

The price per year per PEV is calculated based on the cost of the electricity, utilization rate and investment, which is turned into an annual capital charge.

ESTIMATE INVESTMENT BY SOLUTION BASED ON PRICES AND VOLUMES PER YEAR

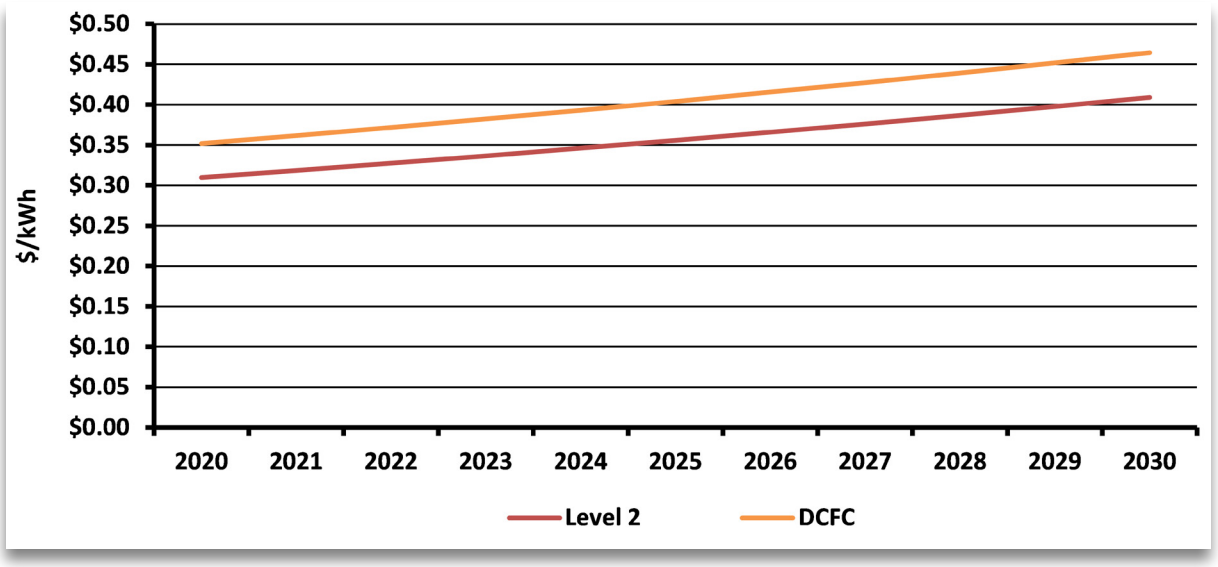
The price of each solution is multiplied by the number of charging stations needed.

B.2 Forecast Electricity Costs

Figure 64 shows the forecast electricity price for Level 2 and DCFC based charging. The DCFC assumes a high voltage rate, while the Level 2 charging assumes a standard business rate for low voltage connected customers.

Although the cost of a higher voltage connection is typically cheaper per kWh than a lower voltage connection, the PEV charging has a relatively low load factor, and therefore incurs a relatively high peak demand charge, increasing average $/kWh costs.

Figure 64. Electricity Costs per kWh



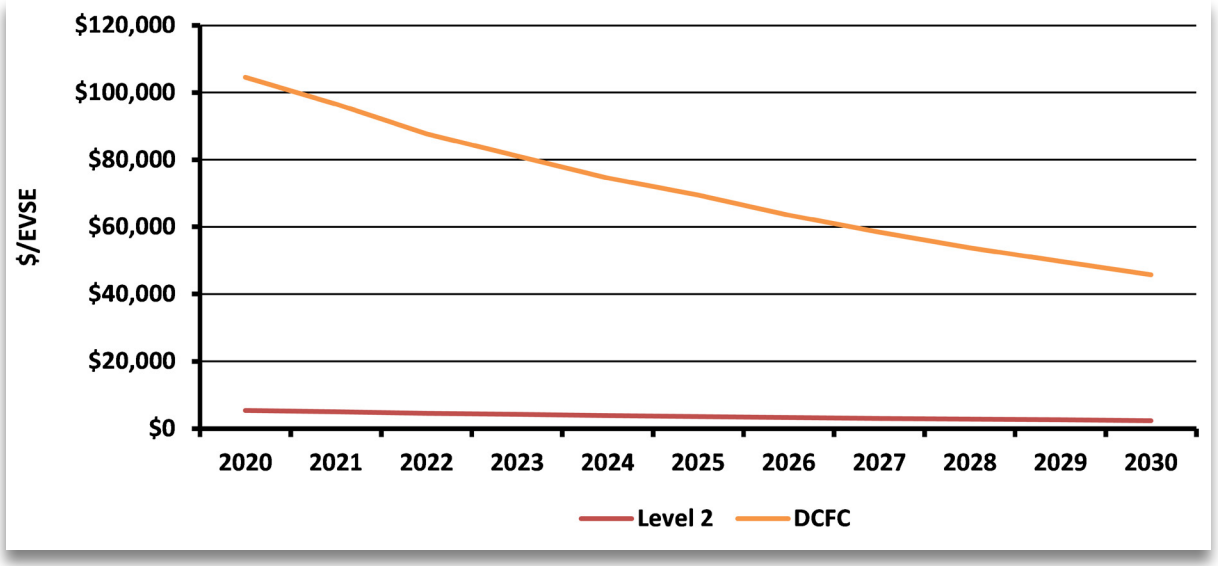
Source: CPUC (2019), CEC (2019), Energeia analysis

B.3 Forecast Equipment and Installation Costs

The forecast cost of charging equipment and technology costs are provided in Figure 65. The price is per charging station, assuming a single charging port. Stations with multiple ports are typically lower cost per charging port than single port charging stations.

The forecast cost declines reflect the expected rapid evolution of the technology, even as its forecasted rate of charging rises. The cost reductions seen for Level 2 charging technology are roughly the same in relative terms.

Figure 65. Level 2 and DCFC Investment Costs ($/Port)



Source: ICCT (2019), Energeia analysis

APPENDIX C

STAKEHOLDER ENGAGEMENT PROCESS

C.1 Methodology

Five primary activities served as the foundation for stakeholder engagement to ensure a diverse range of stakeholders were included in the development of FCOG's EVRP. This approach was aimed at developing communications opportunities that improved and facilitated effective decision making, created an atmosphere of understanding internally and externally, and engaged stakeholder participation throughout the process.

The external-facing approach was based on five primary activities:

By demonstrating iterative materials that respond to feedback and demonstrate project progress, stakeholders are more likely to participate fully in the engagement process. For each engagement, materials were developed to effectively drive conversations surrounding PEV needs, siting and infrastructure. The materials delivered critical messaging, project progress, and feedback from prior engagements.

C.1.1 Request for Information (RFI Process)

The RFI was distributed to members of the Working Group to identify data sets their respective organization may be able to provide. This information served as an important data source for technical analysis. In addition, stakeholders were asked to provide an overview of the size, scope, and format of the data along with any helpful comments. The stakeholders also provided information about other organizations being engaged in order to avoid any duplicative or overlapped efforts. Data obtained from the RFI process was used as a data source for the technical forecasting and modeling.

C.1.2 Working Group Meetings

FCOG identified a group of stakeholders to serve on the EV Charging Network Working Group. Feedback and input from the Working Group informed the development of the Plan and provided primary levels of feedback. It was comprised of representatives from local governments, public

agencies, electric utilities, industry groups, civic organizations, and non-profits. The following were engaged to serve as members of the Working Group:

- FCRTA
- City of Fresno
- Fresno County
- City of Reedley
- Clovis Transit
- PG&E
- San Joaquin Valley Air Pollution Control District
- Inspiration Transportation
- Caltrans
- City of Mendota
- Fresno Area Express (FAX)

Working Group members convened regularly to discuss project progress. Each working group meeting included updates on technical analysis and stakeholder engagement. Feedback from the Working Group was consolidated and used to inform interim deliverables of EVRP document.

C.1.3 Focus Groups

Focus groups were developed to target specific groups of stakeholders to maximize participation and feedback on certain topics. Four focus groups were held throughout the duration of the development of the EVRP. During each focus group, participants discussed priorities, obstacles, and perceptions regarding electric vehicle chargers.

The focus groups held included:

Auto-Focused Focus Group
Hedrick's Chevrolet
San Joaquin EV Valley Partnership
Fresno State Transportation Institute

Local Colleges Focus Group
Fresno City College
Reedley College
San Joaquin Valley College – Fresno
West Hills College - Coalinga

School District Focus Group
Fresno Unified School District
Central Unified School District
Clovis Unified School District
Fresno County Superintendent of Schools
Southwest Transportation Agency

Community Organizations Focus Group
Valley LEAP
Fresno Metro Black Chamber of Commerce
Leadership Counsel
California Rural Legal Assistance
Central California Legal Services
Inspiration Transportation
Self Help Enterprises
Fresno Housing Authority
CALSTART

C.1.4 One-on-One Meetings

One-on-one meetings focused on agencies and organizations that are currently funding and deploying PEV charging within Fresno County. The information gathered informed the assessment of existing PEV charging programs. The meetings also supported identification of obstacles and opportunities for PEV in the region, ongoing PEV funding or implementation efforts, and supplemented the findings of the Working Group meetings and focus groups.

The one-one-one meetings included representatives from:

- CalVans
- Caltrans – Division of Environmental Analysis
- Building Industry Association
- San Joaquin Valley Air Pollution Control District

APPENDIX D

AB 1236 MODEL ORDINANCES AND PERMITTING CHECKLIST

California Building Officials

AB 1236 SAMPLE ORDINANCE TEMPLATE - ADMINISTRATIVE FOR LARGE JURISDICTIONS

ORDINANCE NUMBER ____

AN ORDINANCE OF THE CITY COUNCIL / COUNTY BOARD OF SUPERVISORS OF THE CITY OF _____ / COUNTY OF _____

SETTING FORTH PROCEDURES FOR EXPEDITING PERMITTING PROCESSING FOR ELECTRIC VEHICLE CHARGING SYSTEMS

WHEREAS, the State of California and the City of _____ / County of _____ has consistently promoted and encouraged the use of fuel-efficient electric vehicles; and

WHEREAS, the State of California recent adopted Assembly Bill 1236, which requires local agencies to adopt an ordinance that creates an expedited and streamlined permitting process for electric vehicle charging systems; and

WHEREAS, creation of an expedited, streamlined permitting process for electric vehicle charging stations would facilitate convenient charging of electric vehicles and help reduce the City's / County's reliance on environmentally damaging fossil fuels.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF _____ / COUNTY BOARD OF SUPERVISORS OF THE COUNTY OF _____ DOES ORDAIN AS FOLLOWS:

SECTION 1. TITLE, WORDS AND PHRASES

This Ordinance shall be known as the City of _____ / County of _____ Electric Vehicle Charging Station Permit Expediting Ordinance. The terms, phrases, and words used in this Ordinance shall be construed in compliance with the definitions set forth by California Government Code Section 65850.7.

SECTION 2. Section _____ of the City of _____ Municipal Code / County of _____ County Code is hereby added to read as follows:

Section _____ Expedited Electric Vehicle Charging Station Permitting

Electric Vehicle Charging Stations which qualify for expedited permit processing, pursuant to Government Code Section 65850.7, shall be subject to the administrative permitting procedures set forth in the City's Electric Vehicle Charging Station Permit Expediting Ordinance.

SECTION 3. EXPEDITED REVIEW PROCESS

Consistent with Government Code Section 65850.7, the Building Official shall implement an expedited administrative permit review process for electric vehicle charging stations and adopt a checklist of all requirements with which electric vehicle charging stations shall comply with in order to be eligible for expedited review. The expedited administrative permit review process and checklist may refer to the recommendations in the checklist prescribed by the most current version of the "Plug-In Electric Vehicle Infrastructure Permitting Checklist" of the "Zero-Emission Vehicles in California: Community Readiness Guidebook" published by the Governor's Office of Planning and Research. The City's / County's adopted checklist shall be published on the City's / County's website.

SECTION 4. ELECTRONIC SUBMITTALS

Consistent with Government Code Section 65850.7, the Building Official shall allow for electronic submittal of permit applications covered by this Ordinance and associated supporting documentations. In accepting such permit applications, the Building Official shall also accept electronic signatures on all forms, applications, and other documentation in lieu of a wet signature by any applicant.

SECTION 5. ASSOCIATION APPROVAL

Consistent with Government Code Section 65850.7, the Building Official shall not condition the approval for any electric vehicle charging station permit on the approval of such a system by an association, as that term is defined by Civil Code Section 4080.

SECTION 6. PERMIT APPLICATION PROCESSING

A permit application that satisfies the information requirements in the City's / County's adopted checklist shall be deemed complete and be promptly processed. Upon confirmation by the Building Official that the permit application and supporting documents meets the requirements of the City / County adopted checklist, and is consistent with all applicable laws, the Building Official shall, consistent with Government Code Section 65850.7, approve the application and issue all necessary permits. Such approval does not authorize an applicant to energize or utilize the electric vehicle charging station until approval is granted by the City / County. If the Building Official determines that the permit application is incomplete, he or she shall issue a written correction notice to the applicant, detailing all deficiencies in the application and any additional information required to be eligible for expedited permit issuance.

SECTION 7. TECHNICAL REVIEW

It is the intent of this Ordinance to encourage the installation of electric vehicle charging stations by removing obstacles to permitting for charging stations so long as the action does not supersede the Building Official's authority to address higher priority life-safety situations. If the Building Official makes a finding based on substantial evidence that the electric vehicle charging station could have a specific adverse impact upon the public health or safety, as defined in Government Code 65850.7, the City / County may require the applicant to apply for a use permit.

SECTION 8. Any provision of the City of _____ Municipal Code / County of _____ County Code or appendices thereto, inconsistent with the provisions of this Ordinance, to the extent of such inconsistencies and no further, are hereby repealed or modified to that extent necessary to effect the provisions of this Ordinance.

SECTION 9. If any section, subsection, sentence, clause, or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of any competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council / County Board of Supervisors hereby declares that it would have passed this Ordinance, and each and every Section, subsection, sentence, clause, or phrase not declared invalid or unconstitutional without regard to whether any portion of the Ordinance would be subsequently declared invalid or unconstitutional.

SECTION 10. The Mayor shall sign and the City / County Clerk shall attest to the passage of this Ordinance. The City / County Clerk shall cause this Ordinance, or a summary thereof to be published once in the official newspaper within 15 days after its adoption. This Ordinance shall become effective on September 30, 2016.

APPROVED AS TO FORM:

_____

NAME

City Attorney / County Counsel

AB 1236 SAMPLE ORDINANCE TEMPLATE - ADMINISTRATIVE FOR SMALL JURISDICTIONS

ORDINANCE NUMBER ____

AN ORDINANCE OF THE CITY COUNCIL / COUNTY BOARD OF SUPERVISORS OF THE CITY OF _____ / COUNTY OF _____

SETTING FORTH PROCEDURES FOR EXPEDITING PERMITTING PROCESSING FOR ELECTRIC VEHICLE CHARGING SYSTEMS

WHEREAS, the State of California and the City of _____ / County of _____ has consistently promoted and encouraged the use of fuel-efficient electric vehicles; and

WHEREAS, the State of California recent adopted Assembly Bill 1236, which requires local agencies to adopt an ordinance that creates an expedited and streamlined permitting process for electric vehicle charging systems; and

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SECTION 7. TECHNICAL REVIEW

It is the intent of this Ordinance to encourage the installation of electric vehicle charging stations by removing obstacles to permitting for charging stations so long as the action does not supersede the Building Official's authority to address higher priority life-safety situations. If the Building Official makes a finding based on substantial evidence that the electric vehicle charging station could have a specific adverse impact upon the public health or safety, as defined in Government Code 65850.7, the City / County may require the applicant to apply for a use permit.

SECTION 8. Any provision of the City of _____ Municipal Code / County of _____ County Code or appendices thereto, inconsistent with the provisions of this Ordinance, to the extent of such inconsistencies and no further, are hereby repealed or modified to that extent necessary to effect the provisions of this Ordinance.

SECTION 9. If any section, subsection, sentence, clause, or phrase of this Ordinance is for any reason held to be invalid or unconstitutional by a decision of any court of any competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council / County Board of Supervisors hereby declares that it would have passed this Ordinance, and each and every Section, subsection, sentence, clause, or phrase not declared invalid or unconstitutional without regard to whether any portion of the Ordinance would be subsequently declared invalid or unconstitutional.

SECTION 10. The Mayor shall sign and the City / County Clerk shall attest to the passage of this Ordinance. The City / County Clerk shall cause this Ordinance, or a summary thereof to be published once in the official newspaper within 15 days after its adoption. This Ordinance shall become effective on September 30, 2016.

APPROVED AS TO FORM:

_____

NAME

City Attorney / County Counsel

(REPLACE WITH CITY OR COUNTY LOGO)

CITY OR COUNTY OF _____

RESIDENTIAL AND NON-RESIDENTIAL CHECKLIST FOR PERMITTING ELECTRIC VEHICLES AND ELECTRIC VEHICLE SERVICE EQUIPMENT (EVSE)

Please complete the following information related to permitting and installation of Electric Vehicle Service Equipment (EVSE) as a supplement to the application for a building permit. This checklist contains the technical aspects of EVSE installations and is intended to help expedite permitting and use for electric vehicle charging.

Upon this checklist being deemed complete, a permit shall be issued to the applicant. However, if it is determined that the installation might have a specific adverse impact on public health or safety, additional verification will be required before a permit can be issued.

This checklist substantially follows the "Plug-In Electric Vehicle Infrastructure Permitting Checklist" contained in the Governor's Office of Planning and Research "Zero Emission Vehicles in California: Community Readiness Guidebook" and is purposed to augment the guidebook's checklist.

Job Address:			**Permit No.**
☐ Single-Family	☐ Multi-Family (Apartment)	☐ Multi-Family (Condominium)	☐ Commercial (Single Business)
☐ Commercial (Multi-Businesses)	☐ Mixed-Use	☐ Public Right-of-Way	

Location and Number of EVSE to be Installed:			
☐ Garage	☐ Parking Level(s)	☐ Parking Lot	☐ Street Curb
Description of Work:			

Applicant Name:	
Applicant Phone & email:	
Contractor Name:	**License Number & Type:**
Contractor Phone & email:	
Owner Name:	
Owner Phone & email:	

EVSE Charging Level:	☐ Level 1 (120V)	☐ Level 2 (240V)	☐ Level 3 (480V)
Maximum Rating (Nameplate) of EV Service Equipment = _____ kW			
Voltage EVSE = _____ V	**Manufacturer of EVSE:**		
Mounting of EVSE:	☐ Wall Mount	☐ Pole Pedestal Mount	☐ Other:

System Voltage:	☐ 120/240V, 1ϕ, 3W	☐ 120/208V, 3ϕ, 4W	☐ 120/240V, 3ϕ, 4W
	☐ 277/480V, 3ϕ, 4W	☐ Other:	
Rating of Existing Main Electrical Service Equipment = _____ Amperes			
Rating of Panel Supplying EVSE (if not directly from Main Service) = _____ Amps			
Rating of Circuit for EVSE: _____ Amps / _____ Poles			
AIC Rating of EVSE Circuit Breaker (if not Single Family, 400A) = _____ A.I.C. **(or verify with Inspector in field)**			

Specify Either Connected, Calculated or Documented Demand Load of Existing Panel:
Connected Load of Existing Panel Supplying EVSE = _____ Amps
Calculated Load of Existing Panel Supplying EVSE = _____ Amps
Demand Load of Existing Panel or Service Supplying EVSE = _____ Amps
(Provide Demand Load Reading from Electric Utility)
Total Load (Existing plus EVSE Load) = _____ Amps

For Single Family Dwellings, if Existing Load is not known by any of the above methods, then the Calculated Load may be estimated using the "Single-Family Residential Permitting Application Example" in the Governor's Office of Planning and Research "Zero Emission Vehicles in California: Community Readiness Guidebook" *https://www.opr.ca.gov*

EVSE Rating _____ Amps x 1.25 = _____ Amps = Minimum Ampacity of EVSE **Conductor = # _____ AWG**
For Single-Family: Size of Existing Service Conductors = # _____ AWG or kcmil **or - : Size of Existing Feeder Conductor Supplying EVSE Panel = # _____ AWG or kcmil** **(or Verify with Inspector in field)**

I hereby acknowledge that the information presented is a true and correct representation of existing conditions at the job site and that any causes for concern as to life-safety verifications may require further substantiation of information.

Signature of Permit Applicant: _____ Date: _____

APPENDIX E

FUNDING OPPORTUNITIES & INCENTIVES

This appendix presents funding sources that are available both to the private and public sectors, through state and federal initiatives. As such, identical funds may be repeated in different action sections due to funds that different types of stakeholders are eligible to apply for. Each funding source is presented with information regarding the providing agency, brief description, action to be taken by the applicant, funding amount, stakeholders impacted, and target locations for PEV charging infrastructure that the funding is targeting. It is important to note that the descriptions are not intended to be comprehensive and the presented programs may have additional requirements and restrictions that should be accounted for by applicants. It is suggested that applicants considering a specific funding source follow up directly with the sponsoring entity as they proceed with applications or detailed planning.

E.1 California Air Resources Board (CARB)

The focus of CARB is to promote and protect public health by developing programs that combat the impacts from climate change and air pollution. The Clean Vehicle Assistance Program funds offsets initial costs for eligible PEVs as well as lower Level 2 charger costs for private citizens and businesses[82]. The applicant needs to be from California, be below a designated income level, and complete an online application. The funding must be secured before the applicant purchases the vehicle. A $1,000 prepaid card for EVGO stations can be provided in lieu of Level 2 charger installation.

82 https://cleanvehiclegrants.org/

Table 22. Income Bracket Eligibility 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

Table 23. Incentives Offered 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 (PHEV)	Up to $5,000	Up to $2,000 for Level 2
Hybrid Electric Vehicle (HEV)	Up to $2,500	N/A

Another program, the Clean Vehicle Rebate Project[83] , provided rebates up to $4,000 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 24. Income Bracket Eligibility for the Clean Vehicle Rebate Project

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

Finally, the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP)[84] provides vouchers directly through vehicle dealers for zero emission trucks and buses and is 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. Approved zero emission vehicles include school buses, coach buses, transit buses, as well as vans and medium to heavy duty trucks. A full catalog of approved vehicles can be found on the program website. Funds vary from $20,000 to $190,000 per vehicle based on type and size with increased funding available for disadvantaged communities.

E.2 California Pollution Control Financing Authority (CPCFA)

The Electric Vehicle Supply Equipment (EVSE) Loan and Rebate Program[85] provides funds for the design, development, purchase, and installation of EVSE at small business locations and multi-family dwellings in California. A partnering financial program encourages funding institutions to offer loan for EVSE equipment. The Program may provide up to 100% coverage, up to $500,000, to lenders on certain loan defaults with the borrower receiving a rebate, between 10-15%, based on their loan amount. Rebates can be used for Level 2 charging, DC fast chargers, and medium/heavy duty chargers.

E.3 Pacific Gas and Electric Company (PG&E)

PG&E's Clean Fuel Rebate[86] offers an $800 rebate for owning or leasing an eligible electric vehicle within the service territory. It should be noted that limited funds are available and are on a first-come first-serve basis.

They also offer an EV Fleet[87] program where the 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 and the owner is required to provide charging data for at least 5 years and operate the chargers for at least 10 years.

Table 25. Incentives Offered 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

83 https://cleanvehiclerebate.org/eng/eligible-vehicles
84 https://www.californiahvip.org
85 https://www.treasurer.ca.gov/cpcfa/calcap/evcs/index.asp
86 https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/electric/clean-fuel-rebate-for-electric-vehicles.page
87 https://www.pge.com/en_US/large-business/solar-and-vehicles/clean-vehicles/ev-fleet-program/ev-fleet-program.page

E.4 Southern California Edison (SCE)

For communities within SCE service territory, a Clean Fuel Reward Program[88] a rebate for up to $1,000 is offered 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.

E.5 The San Joaquin Valley Air Pollution Control District (SJVAPC)

This District provides an Alternative Mechanic Training program[89] to fund educational trainings for mechanics on alternative fueled vehicles. Applications are 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. Up to $15,000 in funds are available for the trainings.

Additionally, an Electric School Bus Incentive Program[90] provides incentives of up to $400,000 to replace existing diesel school buses (at least 2 years old) with electric buses. Buses must service a public school and have not yet purchased the replacement bus.

SJVAPC also offers the Charge Up! EV Charger[91] voucher to reduce the cost 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 the time of Roadmap issuance.

Table 26. Incentives Offered Through the Charge 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

Private sector drivers can apply for the Drive Clean! Rebate[92], which provides up to $3,000 for purchasing a new, eligible electric vehicle. Rebates are offered within 18 months from when the vehicle was purchased.

Finally, the Public Benefit Grant Program[93] provides funding up to $100,000 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.

E.6 California Energy Commission (CEC)

CEC's Electric Vehicle Supply Equipment (EVSE) Incentive Program[94] offers rebates 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, 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.

88 https://www.sce.com/residential/electric-vehicles/ev-rebates-incentives/cfrp
89 http://valleyair.org/grants/mechanictraining.htm
90 http://valleyair.org/grants/electric-school-bus.htm
91 http://valleyair.org/grants/chargeup.htm
92 http://valleyair.org/drivecleaninthesanjoaquin/rebate/
93 http://valleyair.org/grants/publicbenefit.htm
94 https://calevip.org/incentive-project/san-joaquin-valley

Table 27. Incentives Offered Through the EVSE Program

Charger Type	Disadvantaged Community (DAC)	Outside DAC
DC Fast Charger	$80,000 or 80% of project cost, whichever is less	$70,000 or 75% of project cost, whichever is less
Level 2	$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

E.7 U.S. Department of Energy/Energy Efficiency and Renewable Energy

The State Energy Program[95] (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. Total funds are $56M for 2020 with the State matching 20% of federal funding.

E.8 U.S. DOT Federal Highway Administration (FHWA)

The Congestion Mitigation and Air Quality Improvement (CMAQ)[96] 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. FCOG sponsors CMAQ requests and has received bids for the 2020 application. The FCOG document does plan for ~15% of funds to go to cleaner fuel technology.

Another program offered through FHWA is the National Highway Performance Program (NHPP)[97] which supports the condition and performance of the National Highway System (NHS) and for the construction of new facilities along the NHS, including PEV charging stations.

E.9 U.S. DOT Federal Transit Administration

The Low or No Emission Vehicle Program[98] 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. Grant applications ended in March but are expected to reopen under the next funding cycle. Funding for FY 20 is $130M, 15% of cost to be shared by local or state government.

FTA's Buses and Bus Facilities Program[99] assists 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.

E.10 Recommendations and Summary of Funding Options

California is certainly a national leader in providing a number of funding sources to support electrification. The different funding sources available have varying target recipients, such as single-family residents or small businesses. The EVRP has organized 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
3. DEVELOP PARTNERSHIPS WITH LOCAL GOVERNMENTS TO EXPAND PEVS AND PEV- RELATED INFRASTRUCTURE ADOPTION

95 https://www.energy.gov/eere/wipo/state-energy-program-guidance
96 https://www.fresnocog.org/project/congestion-mitigation-air-quality-cmaq-program/
97 https://www.fhwa.dot.gov/specialfunding/nhpp/160309.cfm#Funding
98 https://www.transit.dot.gov/funding/applying/notices-funding/low-or-no-emission-program-low-no-program-fy2020-notice-funding
99 https://cms7.fta.dot.gov/bus-program

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.

Table 28. FCOG Role for Utilizing Funding Sources

Funding Organization	Program Name	FCOG Role		
		Encourage Private Adoption	Leverage Public Investment	Develop Partnerships with Local Jurisdictions
CARB	Clean Vehicle Assistance Program	●		
	Clean Vehicle Rebate Project	●		
	Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program (HVIP)	●		
CPCFA	EVSE Loan and Rebate Program	●		
PG&E	Clean Fuel Rebate	●		
	EV Fleet	●	●	
SCE	Clean Fuel Reward Program	●		
SJVAPC	Alternate Fuel Mechanic Training	●	●	
	Public Benefit Grant Program		●	
	Electric School Bus Incentive Program	●	●	
	Charge Up! EV Charger	●	●	
	Drive Clean! Rebate	●		
CEC	EVSE Incentive Program	●	●	
EERE	State Energy Program			●
FHWA	CMAQ			●
	NHPP			●
FTA	Low or No Emission Vehicle Program			●
	Buses and Bus Facilities Program			●

Five key considerations are presented in this section:

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 sources that would complement county needs.

5 Numerous funding sources can be received for a single project to drastically reduce overall costs. When developing a project or explaining funding mechanisms to stakeholders, it is critical to convey the importance of applying for as many funding sources that are applicable to the project. An example of this is a charging station installation at a Fresno bank[100] . The project received a total of $90,000 funds from the CEC and SJVAPC for ten Level 2 chargers.

100 https://thebusinessjournal.com/fresno-bank-unveils-electric-vehicle-chargers/

APPENDIX F

ELECTRIFICATION PLANNING DETAILS

F.1 General Plans

Table 29. General Plan Overview for Major Fresno County Cities

Municipality	Goals	Policies
Clovis[82]	A local environment that is protected from air pollution and emissions.	Encourage public and private activity and employment centers to incorporate electric charging and alternative fuel stations.
Coalinga[83]	Effective communication, cooperation and coordination in developing and operating community and regional air quality programs.	Continue to replace or convert conventional fuel for City vehicles with clean fuel vehicles as feasible.
	The City shall encourage sustainable employee commuting and municipal transportation practices.	Encourage alternatives to employees commuting as occupants of individual vehicles powered by non-sustainable fuels.
		As feasible, offer free parking for alternative fuel vehicles and fuel-efficient cars.
		Retire old and under-used municipal vehicles, as feasible, and promote replacement purchases of compact and hybrid vehicles.
Firebaugh[84]	City fleet vehicle operators shall replace or convert conventional fuel vehicles with clean fuel vehicles as rapidly as feasible.	Budget for clean fuel vehicles in capital expenditure plans. • Participate in the San Joaquin Valley Clean Cities Coalition to identify fleet vehicle purchase and shared infrastructure investment opportunities. • Incorporate infrastructure to facilitate the use of clean-fuel vehicles, such as a L/CNG refueling stations for clean fuel vehicles.
Fowler	none	none
Fresno[85]	In cooperation with other jurisdictions and agencies in the San Joaquin Valley Air Basin, take necessary actions to achieve and maintain compliance with State and federal air quality standards for criteria pollutants.	Expand the use of alternative fuel, electric, and hybrid vehicles in City fleets.
		Develop standards to facilitate electric vehicle charging infrastructure in both new and existing public and private buildings, in order to accommodate these vehicles as the technology becomes more widespread.

82 https://cityofclovis.com/planning-and-development/planning/master-plans/general-plan/
83 http://www.coalinga.com/DocumentCenter/View/120/Coalinga-General-Plan-2025-PDF
84 https://firebaugh.org/wp-content/uploads/2014/07/COSPR.pdf
85 https://www.fresno.gov/darm/wp-content/uploads/sites/10/2019/07/Consolidated-GP-7-2019.pdf

General Plan Overview for Major Fresno County Cities (Continued)

Municipality	Goals	Policies
Huron[86]	Develop transportation systems that minimize vehicle delay and air pollution.	Encouraging economy clean fuel for City vehicle fleets, when feasible
	Develop consistent and accurate procedures for mitigating transportation emissions from new and existing projects.	
Kerman[87]	To insure the design, construction, and maintenance of a safe, efficient, and complete roadway system that is well-designed, virtually attractive, and provides access to all parts of Kerman	Include on-site EV charging capabilities as a VMT mitigation measure for projects in the city.
	To promote bicycling, walking, and using public transit, as functional alternatives to single-passenger automobile travel.	The City shall support the installation of electric vehicle charging stations at County facilities, parking lots, park-and-ride lots, and truck stops.
	To minimize energy consumption and reduce greenhouse gas emissions as part of the statewide effort to combat climate change.	The City shall encourage and support expanding Electric Vehicle (EV) charging stations and the purchase of electric vehicles.
	Adopt a standardized permitting application form for electric vehicle charging stations for individually zoned end-uses	
	Update local building and zoning codes to require electric vehicle charging station prewiring in new construction and major retrofits	
	Ensure electric vehicle charging stations are eligible under local Property Assessed Clean Energy (PACE) program	
	Encourage local retailers and employers to install electric vehicle charging stations for customers and employees	
	Organize a regional initiative for government fleets to procure low-emitting vehicles as well as fuels and charging stations	
Kingsburg	none	none
Mendota[88]	Provide a transportation system that is cost effective, energy-efficient and environmentally sensitive.	Encourage the use of alternative fuel vehicles.
	Minimization of the generation of air pollutants, greenhouse emissions and toxic air emissions in the community	City fleet vehicle operators shall consider replacement or conversion of conventional fuel vehicles with clean fuel vehicles when vehicle procurement decisions are made

86 http://cityofhuron.com/wp-content/uploads/2014/08/City-of-Huron-General-Plan-2025-Policies-Statement1.pdf
87 http://kermangp.com/images/docs/kpgu_general_plan_draft_eir_2019_11.pdf
88 http://ci.mendota.ca.us/wp-content/uploads/2014/06/City-of-Mendota-General-Plan-Update.pdf

General Plan Overview for Major Fresno County Cities (Continued)

Municipality	Goals	Policies
Orange Cove	none	none
Parlier	none	none
Reedley[89]	Effective communication, cooperation, and coordination in developing and operating community and regional air quality programs.	The City will establish a replacement policy and schedule to replace fleet vehicles and equipment with the most fuel-efficient vehicles practical, including gasoline hybrid and alternative fuel or electric models.
		Incorporate infrastructure to facilitate the use of clean-fuel vehicles, such as electrical plug-in stations and L/CNG refueling stations for clean fuel vehicles.
	Reduce emissions related to energy consumption and area sources.	Support the use of electric vehicles, including golf carts and NEVs, where appropriate.
	Develop innovative transportation systems that incorporate alternative transportation modes into existing system design.	Require new commercial and retail developments to provide prioritized parking for electric vehicles and vehicles using alternative fuels.
		Develop the necessary infrastructure to encourage the use of zero emission vehicles and clean alternative fuels, such as development of electric vehicle charging facilities and conveniently located alternative fueling stations.
San Joaquin[90]	The reduction of VMT, GHGs, and criteria air pollutants to achieve air quality standards.	Reduce GHG emissions from municipal fleet operations by purchasing or leasing high MPG, low carbon fuel (compressed natural gas [CNG]/ biodiesel), hybrid or all-electric vehicles, and/or by using an external car sharing program in lieu of city/ county fleet and encouraging walking and bicycling.
Sanger[91]	Reduce health risks in disadvantaged neighborhoods, related to air pollution.	Health and air quality issues shall be considered as a part of all land use decisions. Require stationary sources of emissions to use feasible mitigation measures to minimize emissions that could have potential impacts on air quality.
Selma[92]	The City shall encourage the use of energy efficient and non-polluting fuels and modes of transportation.	Utilizing clean fuel for city vehicle fleets, when feasible

89 http://reedley.wpengine.com/wp-content/uploads/2019/12/Reedley-General-Plan-2030-Adopted-February-18-2014-1.pdf
90 http://www.cityofsanjoaquin.org/generalplan.html
91 https://www.ci.sanger.ca.us/DocumentCenter/View/1203/Draft-2035-General-Plan
92 http://www.cityofselma.com/PDFs/Web%20Site%20Applications/Comm%20Devlopment/2035%20Selma%20General%20Plan%20-%20Policies%20Statement.pdf

General Plan Overview for Major Fresno County Cities (Continued)

Municipality	Goals	Policies
Fresno County[93]	To improve air quality and minimize the adverse effects of air pollution in	The County fleet vehicle operators shall implement vehicle replacement practices that place a priority on replacement of older higher-emission vehicles and on purchasing new vehicles with engines using best available technologies and advanced fuels where feasible, consistent with cost effective management of the program.

F.2 Climate Action and Greenhouse Gas Reduction Plans

Table 30. Climate Action and Greenhouse Gas Reduction Plan Overview for Major Fresno County Cities

Municipality	Year Published	Development Partners	2035 BAU Transportation Emissions (% total)	2035 ABAU Transportation Emissions (% total)
Fresno[94]	2014	FirstCarbon Solutions, Michael Brandman Associates	~50%	45%
Clovis[95]	2018	PlaceWorks	57%	45%
Municipality	**Year Published**	**Development Partners**	**2005 Government Vehicle Fleet Emissions**	
Reedley[96]	2020	City of Reedley	28%	
All Other Jurisdictions				
No Plans Available				

93 https://www.co.fresno.ca.us/home/showdocument?id=18117
94 https://www.fresno.gov/darm/wp-content/uploads/sites/10/2016/11/F-2-Greenhouse-Gas-Reduction-Plan.pdf
95 https://cityofclovis.com/wp-content/uploads/2018/10/Chapter-05-07-Greenhouse-Gas-Emissions.pdf
96 https://reedley.ca.gov/download/city-of-reedley-climate-action-plan/

F.3 Zoning

Table 31. Zoning Policy Overview for Major Fresno County Cities

Municipality	Permitted Zones	Minimum Parking Policy	Impact of Zoning Policy
Fresno[97]	Permitted in all zones	No reduction	Clearly defined locations for charging equipment but no incentives for developers.
Clovis[98]	Permitted in residential, commercial, and industrial zones. Requires PEV designated zones for numerous building types. Chargers cannot be placed directly in front of storefronts, specific PEV space requirements for numerous building types	Counts as 1 traditional spot	Clearly defined locations that can have charging infrastructure and provides incentives for developers to have PEV parking spots. Avoiding charging stations in front of storefronts ensures public right of way usage but may be more costly to run wiring and limit visibility.
Coalinga[99]	Permitted in all zones	No reduction	Clearly defined locations for charging equipment but no incentives for developers.
Kerman[100]	Permitted in all zones	No reduction	Clearly defined locations for charging equipment but no incentives for developers.
All Other Jurisdictions	No EVCS ordinance	No reduction	Unclear where chargers are permitted and no incentives for development.

97 https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE_PTIIIREAPSOALDI_ART24PALO_S15-2411CARESP

98 https://cityofclovis.com/wp-content/uploads/2018/09/Checklist-for-Permitting-Electric-Vehicles-and-EVSE.pdf

99 https://library.municode.com/ca/coalinga/codes/code_of_ordinances?nodeId=CD_ORD_TIT9PLZO_CH4ADUSDERE_ART1MEDE

100 https://www.codepublishing.com/CA/Kerman/