FINAL BUTTE PEV READINESS PLAN

MAKING THE BUTTE REGION PEV READY!

PRESENTED BY: BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

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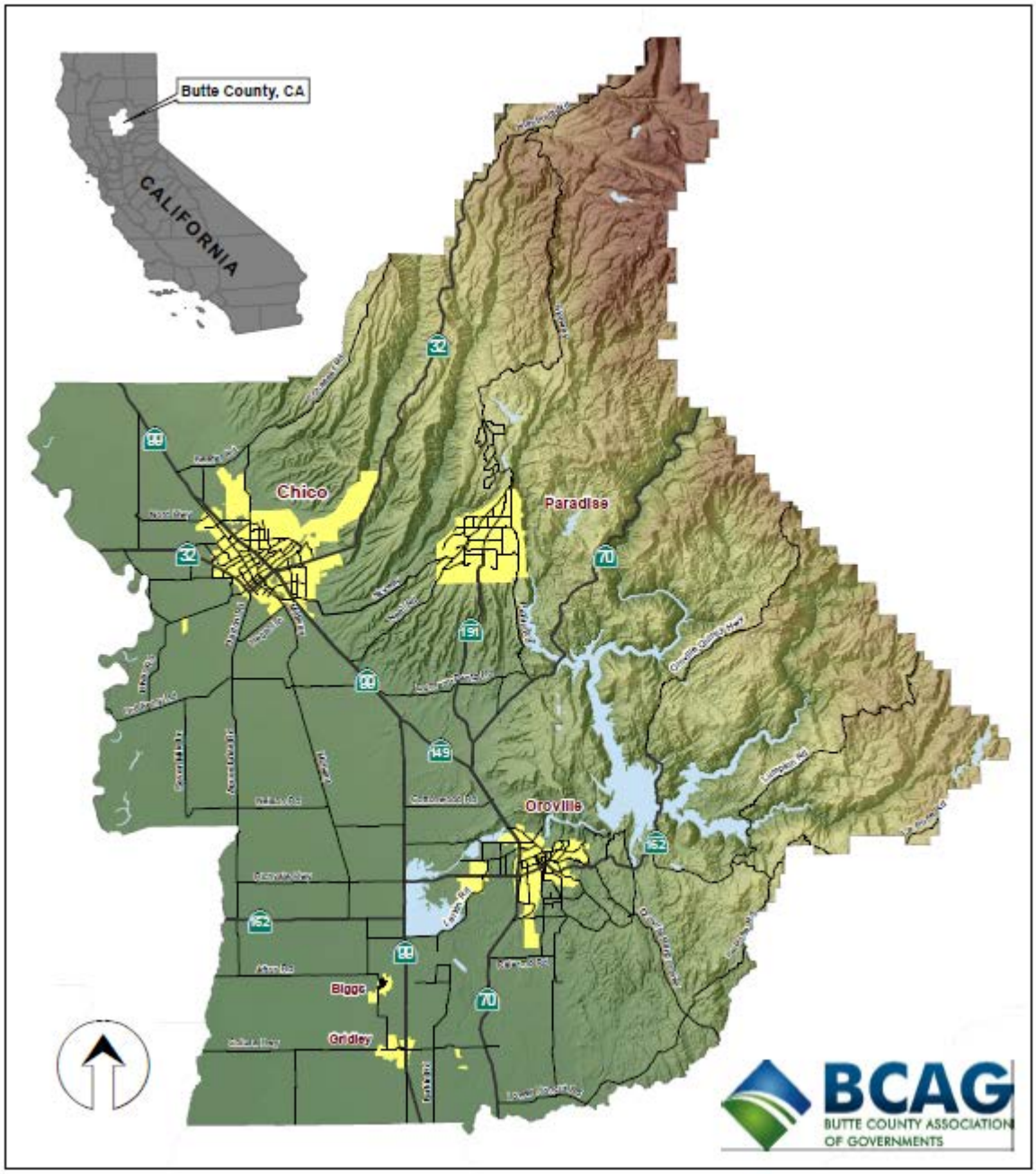


Figure A. Butte County Location Map

TABLE OF CONTENTS

FIGURES

TABLES

ACRONYMS, ABBREVIATIONS AND DEFINITIONS

The following defines the acronyms, abbreviations and terms used in the Butte PEV Readiness Plan.

AB	Assembly Bill
AC	Alternating current
ACC	Advanced Clean Cars Program
ADA	Americans with Disabilities Act of 1990, which prohibits discrimination based on disability.
Amps	A unit of electrical current
ARB	California Air Resources Board
BEV	Battery electric vehicle. A fully electric vehicle fueled only by the onboard battery. A BEV is a type of PEV.
CALGreen	California Green Building standards

CAP	Climate Action Plan
CARB (or ARB)	California Air Resources Board
CCR, Title 24	California Code of Regulations, Title 24. Commonly known as the California Building Standards Code.
CEC (or Energy Commission)	California Energy Commission
CCSE	California Center for Sustainable Energy
Charging station	A parking spot with charging equipment designed to charge batteries or other energy storage options within electric vehicles. Chargers vary in electrical voltage. Term used interchangeably with EVSE.
Charging level	Standardized indicators of voltage at which an electric vehicle's battery is recharged. Commonly, these are Level 1 (120 VAC), Level 2 (208/240 VAC) and direct current (DC) fast charging.
Circuit breaker	A device that protects an electrical circuit from damage caused by overloaded electrical current by automatically interrupting the
CPUC	California Public Utilities Commission
CVRP	Clean Vehicle Rebate Project
DC Fast Charger (DCFC)	Direct current fast charging is the quickest way to recharge a PEV, taking between 30 and 60 minutes.
DMV	Department of Motor Vehicles
DOE	U.S. Department of Energy
Dwell time	The amount of time a PEV spends charging
EMFAC	Emissions Factor Model. ARB tool for assessing the population, activity, and emissions from on-road vehicles including cars, trucks and buses.
EPRI	Electric Power Research Institute
EVITP	Electric Vehicle Infrastructure Training Program
EVSE	Electric vehicle supply equipment. This includes all components
EVSP	Electric vehicle service providers
FCEV	Fuel Cell Electric Vehicle. Fuel cell vehicles generate electricity to power the motor, generally using oxygen from the air and compressed hydrogen.
Fuel Cell	An electrochemical cell that converts the chemical energy from a fuel into electricity through an electrochemical reaction of hydrogen fuel.

GHG	Greenhouse gas. Any of the gases (e.g., carbon dioxide, methane, ozone and fluorocarbons) emitted that absorb outgoing short-wave radiation in the atmosphere,contributing to the greenhouse
HEV	Hybrid electric vehicle. A motor vehicle powered by both an electric propulsion system with a conventional internal combustion propulsion system. A hybrid electric vehicle does not plug into an off-board electrical source. HEV batteries are charged by the internal combustion engine (ICE).
HOA	Homeowners' association
HOV	High occupancy vehicle
ICC	International Code Council
ICE	Internal combustion engine. An engine that burns petroleum-based fuelto deliver power to a vehicle.
IOU	Investor-owned utility
J1772	Industrywide standard EV connector for Level 2 charging.
kW	Kilowatt. A unit of power equal to 1,000 watts.
kWh	Kilowatt-hour. A unit of energy commonly used for measuring the energycapacity of a battery. It is also the common billing unit used by electric utilities to provide energy to consumers.
Level 1	Level 1 charging uses standard 110 VAC outlets to charge PEVs. Requires longest dwell times of 8-10 hours for full charge.
Level 2	Level 2 charging uses 240 VAC chargers to charge PEVs. Requires 1-4 hours for full charge.
Local Agencies	The Cities of Biggs, Chico, Gridley, and Oroville, the Town of Paradise, and the County of Butte
LADWP	Los Angeles Department of Water and Power
MPO	Metropolitan Planning Organization
MUD	Multi-unit dwelling (apartment building, condominium, etc.)
MOU	Municipally owned utility
MUTCD	Manual on Uniform Traffic Control Devices
NEC	National Electrical Code
NEV	Neighborhood Electric Vehicle. Small electric vehicles with top speeds of approximately 25mph.
OPR	Governor's Office of Planning and Research

PEV	Plug-in electric vehicle. Includes both BEVs and PHEVs
PEVC	California Plug-in Electric Vehicle Collaborative
PG&E	Pacific Gas & Electric
PHEV	A plug-in hybrid electric vehicle (PHEV) is a hybrid electric vehicle that uses rechargeable batteries, or another energy storage device, that can be recharged by plugging it in to an external source of electric power. A PHEV shares the characteristics both of a conventional hybrid electric vehicle, having an electric motor and an
Plan	Butte Plug-in Electric Vehicle (PEV) Readiness Plan
Prewiring	Providing sufficient infrastructure, such as wiring, conduits, junction boxes, outlets and adequate electrical panel and circuitry capacity to meetanticipated future EVSE demand.
RTP	Regional Transportation Plan, a planning document required of MPOs like BCAG
RTP/SCS	Regional Transportation Plan/Sustainable Communities Strategy
SAE	Society of Automotive Engineers
SB	Senate Bill
SCE	Southern California Edison. Gas and electric provider for portions of southern California.
SCS	Sustainable Communities Strategy – required to be prepared by MPOs to contribute to reduction in regional GHG emissions
SR	State Route
TUCC	Tri-chapter Uniform Code Committee
UL	Underwriters' Laboratory
VAC	Volts alternating current
VMT	Vehicle miles traveled
ZEM	Zero emission motorcycle
ZEV	Zero-emission vehicle. A vehicle that emits no tailpipe pollutants.

EXECUTIVE SUMMARY

The Butte Plug-in Electric Vehicle (PEV) Readiness Plan was developed to serve as a voluntary toolbox for the Local Agencies (Cities of Biggs, Chico, Gridley, the Town of Paradise, and County of Butte) to ensure they are prepared for an anticipated increase in PEV use and demand in the region. An increase in PEV use can have many positive effects, including decreasing greenhouse gas emissions and localized air pollution, reducing noise pollution in downtowns, and increasing energy independence through the utilization of locally-produced energy sources. Being PEV-ready will help encourage PEV use in the region, while allowing the Local Agencies to ensure a smooth transition to increased PEV usage.

BY DEVELOPING THE BUTTE PEV READINESS PLAN, THE BUTTE REGION IS DOING ITS PART TO ALIGN WITH STATE GOALS, AND BE PREPARED FOR INCREASED DEMAND BY THE GENERAL PUBLIC FOR PEV CHARGING

Being PEV-ready will also help the region be eligible for grant funding, and align with state goals and mandates for increased PEV use. In 2012, Governor Jerry Brown established aggressive PEV and infrastructure targets which call for 1.5 million electric vehicles on the road by 2025, along with easy access to charging infrastructure. By developing the Butte PEV Readiness Plan, the Butte region is doing its part to align with state goals, and be prepared for increased demand by the general public for PEV charging.

The Butte PEV Readiness Plan was developed by the Butte County Association of Governments in cooperation with a Project Development Team (PDT) that included representatives from the Local Agencies as well as stakeholders including Butte County Air Quality Management District, California State University, Chico, Pacific Gas and Electric, Sierra Nevada Brewing Co., and the Chico Electric Vehicle Association. Funding for the project was provided by Caltrans through a Sustainable Transportation Planning grant.

This Plan focuses on steps that the Local Agencies can take to help them move towards PEV readiness. These include identifying priority locations for siting public PEV charging infrastructure, creating guidelines for installing chargers at diverse locations, and improving permitting processes, zoning ordinances, and building codes in order to remove key barriers to PEV deployment.

Public workshops were held in March 2018 to solicit public input that was used to develop the final Butte PEV Readiness Plan. BCAG held two identical public workshops in Chico and Oroville that included information contained in the Plan. Feedback received at the workshops was incorporated into the final version of the Plan.

For general background information on PEVs, please see Appendix A, *PEV 101 Information*

1. STAKEHOLDERS AND PARTNERSHIPS

The Butte Regional Plug-in Electric Vehicle (PEV) Readiness Plan (Plan) was developed in cooperation with the Butte County Association of Governments (BCAG), Local Agencies (the Cities of Biggs, Gridley, Chico, Oroville, Town of Paradise, and Butte County), and numerous public and private stakeholders from throughout the Butte County region. Caltrans District 3 was instrumental in providing funding for the Plan which included a $114,000 grant award to BCAG through the Caltrans Sustainable Transportation Planning grant program. This grant award provided the funding necessary to develop the Plan.

A Project Development Team (PDT) was formed that provided oversight during Plan development, and reviewed and commented on draft versions of the Plan. The PDT included representatives from the five incorporated cities, Butte County, Butte County Air Quality Management District, California State University Chico, Sierra Nevada Brewing Co., Pacific Gas and Electric Company, and the Chico Electric Vehicle Association. Table 1-1 below lists the various participants on the PDT.

A PDT kick-off meeting was held in August 2017 to initiate development of the project, and over the 14 months of developing the Plan, the PDT met five times to review and provide input on key components of the Plan as it was being developed.

Public workshops were held in March 2018 in both the Cities of Chico and Oroville, with identical “open house” formats at both locations. Several displays were provided highlighting the plan background, purpose and process, along with large-format maps detailing portions of the regional siting plan. Additionally, a PowerPoint presentation was provided covering various aspects of the plan. Several comments were received during the workshops that further informed the development of the Plan. Advertising for the public workshops included email notifications to numerous distribution lists, newspaper display ads in both the Chico Enterprise Record and Oroville Mercury Register newspapers, and notifications on the project website.

Table 1-1. Project Development Team Participants

NAME	AGENCY
Fletcher Alexander	CSU Chico, Sustainability Coordinator
Dan Blair	Pacific Gas and Electric
Dan Breedon	Butte County, Development Services
Pete Calarco	Butte County, Development Services
Cheri Chastain	Sierra Nevada Brewing Co., Sustainability Manager
Jon Clark	Butte County Association of Governments
Donna Decker	City of Gridley
Chris Devine	Butte County Association of Governments
Brian Lasagna	Butte County Association of Governments

Jason Mandly	Butte County Air Quality Management District
Mandi McKay	Sierra Nevada Brewing Co., Sustainability Coordinator
Tyler Smith	Chico Electric Vehicle Association
Tim Snellings	Butte County, Development Services
Luis Topete	City of Oroville
Brendan Vieg	City of Chico
Wyatt West	City of Chico
Joe Wilson	Pacific Gas and Electric

A publicly accessible website was developed for the Plan that provided information on draft documents, public workshops, and other information pertinent to the development of the Butte PEV Readiness Plan (http://www.bcag.org/Planning/Butte-PEV-Readiness-Plan/index.html).

2. INTRODUCTION

The Butte PEV Readiness Plan has been completed to ensure the Butte region is prepared for a potentially substantial increase in the number of PEVs on the roadways in the coming years. Many factors are contributing to an increased demand for PEVs in California and beyond. This new "wave" of PEV demand can be largely attributed to decreased cost of vehicle ownership, an expanding charging station network, more practical and better performing vehicles, and state mandates driving an expansion of PEV use in the state. This Plan is intended to help the Local Agencies (the Cities of Biggs, Chico, Gridley and Oroville, the Town of Paradise, and the County of Butte) implement new or improved policies, procedures and protocols to ensure they are prepared for the increase in PEV use in the coming years.

THE BUTTE PEV READINESS PLAN HAS BEEN COMPLETED TO ENSURE THE BUTTE REGION IS PREPARED FOR A POTENTIAL INCREASE IN THE NUMBER OF PEVS ON THE ROADWAYS IN THE COMING YEARS

The development of the Butte PEV Readiness Plan includes additional benefits beyond helping ensure the region is PEV-ready – it can help contribute to better air quality in Butte County and the Sacramento Valley Air Basin (Figure 2-3), contribute to reduced greenhouse gas (GHG) emissions, and assist the Local Agencies in meeting air quality and GHG reduction targets.

The plan can also enable the region to receive grant funding for implementation of additional PEV infrastructure installation and other PEV-related programs and policies. Numerous state, federal and private sector funding sources are available for advancing PEV use in California. See Chapter 10 for information on PEV costs and funding sources.

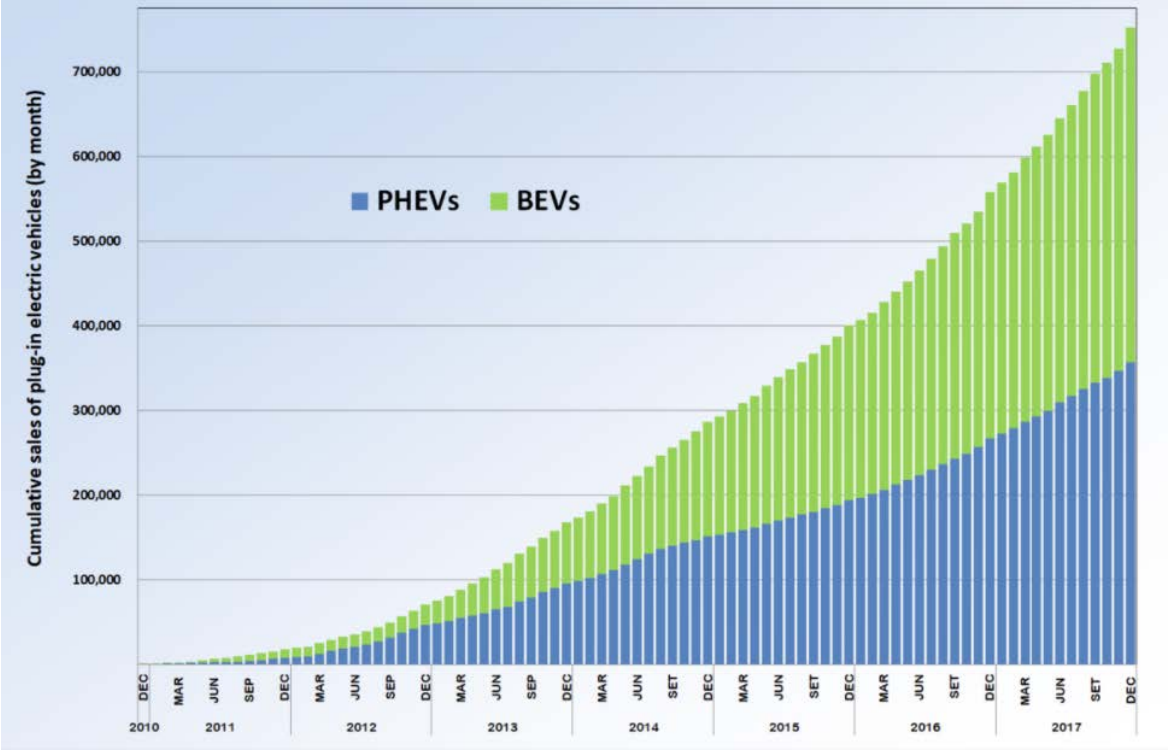
2.1 INCREASED PEV DEMAND

Most automobile manufacturers are now developing PEVs that are becoming faster, smarter, and more practical. Electric vehicles in the past were generally small in size, with poor overall performance and short driving ranges. New PEVs entering the market today often out-perform conventional gasoline-powered automobiles, have advanced technical features, can travel over 300 miles when fully charged, and come in a range of sizes and styles, from sedans and sports cars to sport utility vehicles and minivans.

With the purchase price of typical PEVs now about the same as conventional engine vehicles, and the cost of charging a PEV about one-third the cost of fueling a conventional car with gasoline, drivers are finding PEVs to be a compelling option when purchasing a new car.

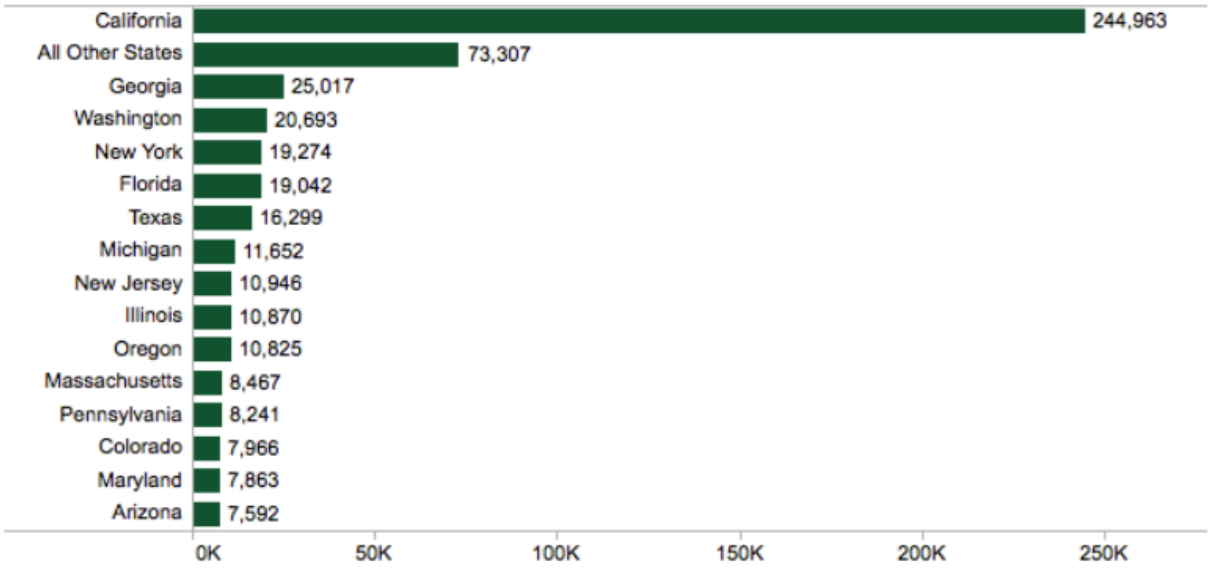
As shown in Figure 2-1, PEV sales continue to increase nationally, a trend which is also represented well in California as shown in Figure 2-2. Both California and the U.S. have seen sales increase steadily, as public demand for the next generation of automobiles continues to increase.

Figure 2-1. Cumulative Monthly U.S. Sales of Plug-in Electric Vehicles (in # of Vehicles)



Source: *Wikimedia Commons (https://commons.wikimedia.org/wiki/File:US_PEV_Sales.png)*

Figure 2-2. Total PEV Sales (in # of Vehicles) 2011-2016 by Leading States



Source: *EV Volumes (http://www.ev-volumes.com/news/usa-plug-in-vehicle-sales-for-2016/)*

As Figure 2-2 shows, the vast majority of PEV sales in the US from 2011-2016 have been in California, with Georgia, Washington, New York, Florida and Texas being the next highest states. This trend with California leading national sales of PEVs is expected to continue into the future, due in large part to the state government embracing the technology.

Recent additional highlights in PEV advancements include:

- Through May 2017, nearly 300,000 PEVS have been sold in California (Figure 2-2 shows sales from 2011-2016 only). This contributes toward the more than 700,000 PEVs in the United States and the expected 2 million PEVs around the world by year's end.
- Battery technology has improved, and battery costs (as well as other component costs) have fallen dramatically (largely due to reduced material costs, manufacturing improvements, and higher volume manufacturing), leading to an increase from 25 PEV models offered today to manufacturer announcements of more than 70 models to be released over the next five model years.
- PEV electric infrastructure in California has grown with substantial investments in the past several years, and accelerated investments are expected as new infrastructure developments emerge.
- Bloomberg New Energy Finance predicts that the number of PEVs on the road will exceed internal combustion engine vehicles by 2038.
- As part of a lawsuit settlement, Volkswagen has committed to spending $800 million over the next ten years in California promoting electric car usage. This includes spending $44 million in Sacramento to develop an electric car-sharing service, PEV charging stations, and other benefits.
- Volvo and Mazda announced in 2017 that they will phase out conventional internal combustion engines from their entire vehicle lines. All models introduced by Volvo starting in 2019 will be either gasoline-electric hybrids or purely battery-powered. Mazda's goal for achieving this is by 2030.
- Pacific Gas and Electric (PG&E) plans to install 7,500 PEV charging stations in northern and central California over the next three years, starting in late 2017.

No discussion about increasing PEV demand would be complete without mentioning the new Model 3 by Tesla. This PEV, which began initial production in the fall of 2017, has a waiting list of over 500,000 people. With a range of approximately 230 miles, innovative technological features, powerful acceleration, and a starting cost of $35,000, many industry insiders believe this vehicle will be the catalyst for significant switchover from gasoline powered vehicles to electric powered vehicles.

Most major vehicle manufacturers in the U.S. are expected to release models to compete with the Model 3 in the near future. Chevrolet released the Chevy Bolt in 2017, with most other vehicle manufactures following suit and expected to release similar vehicles in the next 5 years.

2.2 AIR QUALITY AND GREENHOUSE GAS EMISSIONS

Butte County is located in the Sacramento Valley Air Basin (Figure 2-3) and includes five incorporated jurisdictions: The Cities of Biggs, Chico, Gridley and Oroville, and the Town of Paradise.

Currently, Butte County is designated marginal non-attainment for the federal 8-hour ozone standard. Because vehicular emissions account for a significant amount of ozone pollution, replacing gasoline-powered vehicles with PEVs can have a significant effect on improving air quality in our region. Additionally, our region can do its part to help reduce greenhouse gas (GHG) emissions in part by increasing the percentage of PEVs on the roadway.

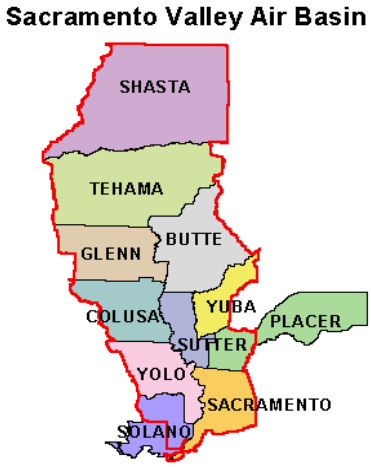


Figure 2-3. Sacramento Valley Air Basin Map

2.3 BCAG SUSTAINABLE COMMUNITIES STRATEGY AND LOCAL JURISDICTION CLIMATE ACTION PLANS

The Butte County Association of Governments (BCAG) is required to meet greenhouse gas (GHG) reduction targets set forth in its required Sustainable Communities Strategy (SCS). In September 2008, Senate Bill (SB) 375, also known as the Sustainable Communities and Climate Protection Act of 2008, was enacted by the state of California. SB 375 prompts regions to reduce GHG emissions from passenger vehicles through the coordinated planning of long range transportation plans. The legislation requires all Metropolitan Planning Organizations (MPO) in California to develop a Sustainable Communities Strategy, which meets regional passenger vehicle GHG emissions targets, as an additional element of their Regional Transportation Plans (RTPs). GHG emissions from the transportation sector is the largest of any GHG emitting sector in California (Figure 2-4). In 2010, the California Air Resources Board (ARB) set GHG targets for the BCAG region for on-road light-duty trucks and passenger vehicles as a 1% increase from 2005 emissions levels by 2020, and a 1% increase from 2005 emissions levels by 2035. The targets are currently proposed to be updated in 2017 and will apply to the 2020 update of the RTP/SCS. The targets apply to the BCAG region as a whole for all on-road light-duty trucks and passenger vehicle emissions, and not to individual cities or sub-regions.

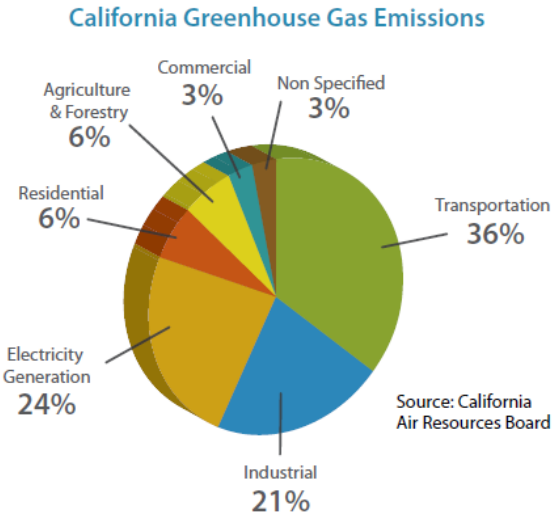


Figure 2-4. California Greenhouse Gas Emissions by Sector

Additionally, several Local Agencies have developed Climate Action Plans that include goals, policies, and programs to reduce GHG emissions, address climate change adaptation, and improve quality of life. These Climate Action Plans are consistent with and support statewide GHG emissions reduction goals identified in Assembly Bill (AB) 32 and Senate Bill (SB) 375.

By completing the Butte PEV Readiness Plan and making the region PEV-ready, the number of PEVs is likely to expand in the region more rapidly, improving air quality and reducing GHG emissions. Additionally, BCAG, the local incorporated jurisdictions, and the County of Butte can better account for the likely increase in PEVs in the total countywide vehicle fleet, and be better able to reach the targets set forth in the RTP/SCS and Climate Action Plans.

2.4 STATE MANDATES

This Plan also aligns with state policies for deploying PEVs across California. In March 2012, Governor Jerry Brown issued Executive Order B-16-2012, which calls for 1.5 million zero-emission vehicles (ZEVs) on California roadways by 2025, and directs state government agencies to incorporate ZEVs into their light-duty fleets. In addition, the governor signed Executive Order B-18-2012 that directs state agencies to "identify and pursue opportunities to provide electric vehicle charging stations, and accommodate future charging infrastructure demand, at employee parking facilities in new and existing buildings".

The Governor's Executive Order establishes several milestones organized into three time-periods:

- By 2015:
    - The State's major metropolitan areas will be able to accommodate PEVs through infrastructure plans and streamlined permitting.
    - Private investment and manufacturing in the PEV sector will be growing
    - The state's academic and research institutions will contribute to PEV market expansion by building understanding of how PEVs are used.
- By 2020:
    - The state's PEV infrastructure will be able to support up to 1 million vehicles.
    - The costs of PEVs will be competitive with conventional internal combustion vehicles.
    - PEVs will be accessible to mainstream consumers.
    - There will be widespread use of PEVs for public transportation and freight transport.
- By 2025:
    - Over 1.5 million PEVs will be on the roadways and their market share will be expanding.
    - Californians will have easy access to PEV infrastructure.
    - The PEV industry will be a strong and sustainable part of California's economy.
    - California's clean, efficient PEVs will annually displace at least 1.5 billion gallons of petroleum fuels.

The Executive Order also directs state government to begin purchasing PEVS. In 2015, 10% of state departments' light-duty fleet purchases must be PEVs, climbing to 25% of light-duty purchases by 2020.

For general, introductory information on PEVs, including types of PEVs, charging station information, etc., please see Appendix A, *PEV 101 Information*.

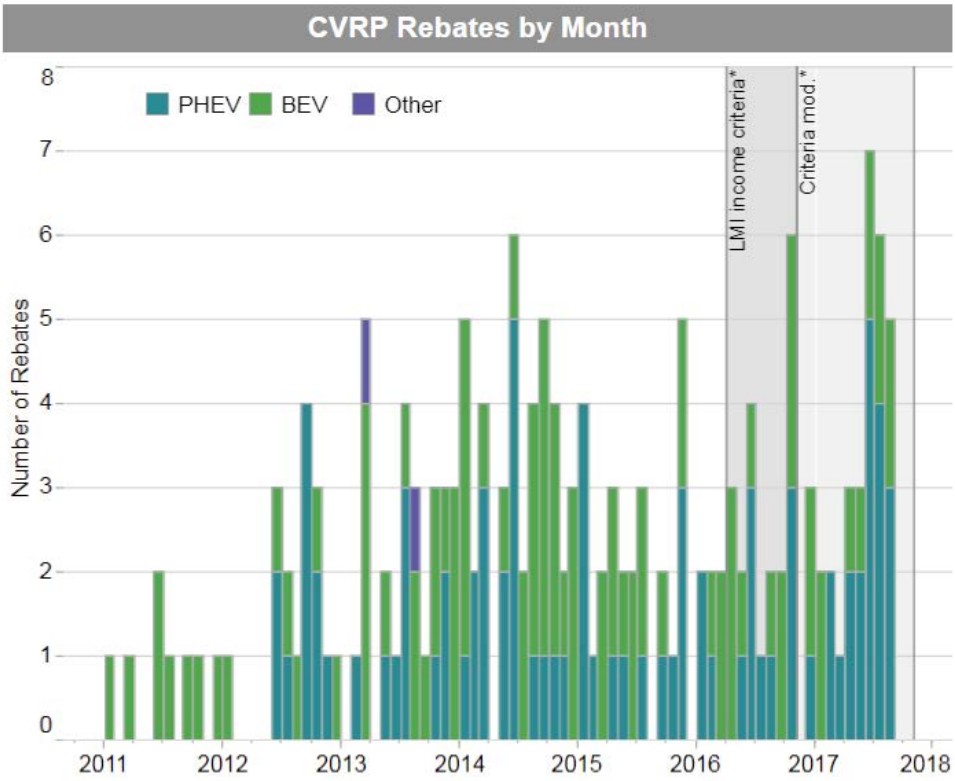
3. EXISTING PEV USE IN THE REGION

The consumer demand for PEVs in the Butte region has not been as strong to date as other more urbanized areas of the state due in part to the rural nature of much of the region, and the lack of focus on Butte County as a priority area for charging station installation (PEV charging stations are also referred to as Electric Vehicle Supply Equipment (EVSE)). The major metropolitan areas of California continue to be the focus of dollars spent on EVSE installation and have the highest amount of PEV ownership. However, the Butte County region continues to see increases in the number of PEVs purchased, and the PEV charging network continues to expand.

3.1 CURRENT PEV DEPLOYMENT

Based on rebate information from the California Air Resources Board's Clean Vehicle Rebate Project, 173 PEVs were purchased by owners in Butte County between March 18, 2010 and August 31, 2017. Of these, 90 were Battery Electric Vehicles (BEVs) and 81 were Plug-in Hybrid Electric Vehicles (PHEVs), while 2 were "other" (includes non-highway motorcycle and commercial BEVs). Figure 3-1 indicates that sales in Butte County over the last five years have remained steady, with the purchase of BEVs exceeding that of PHEVs.

Figure 3-1. California Vehicle Rebate Project (CVRP) Rebates by Month for Butte County



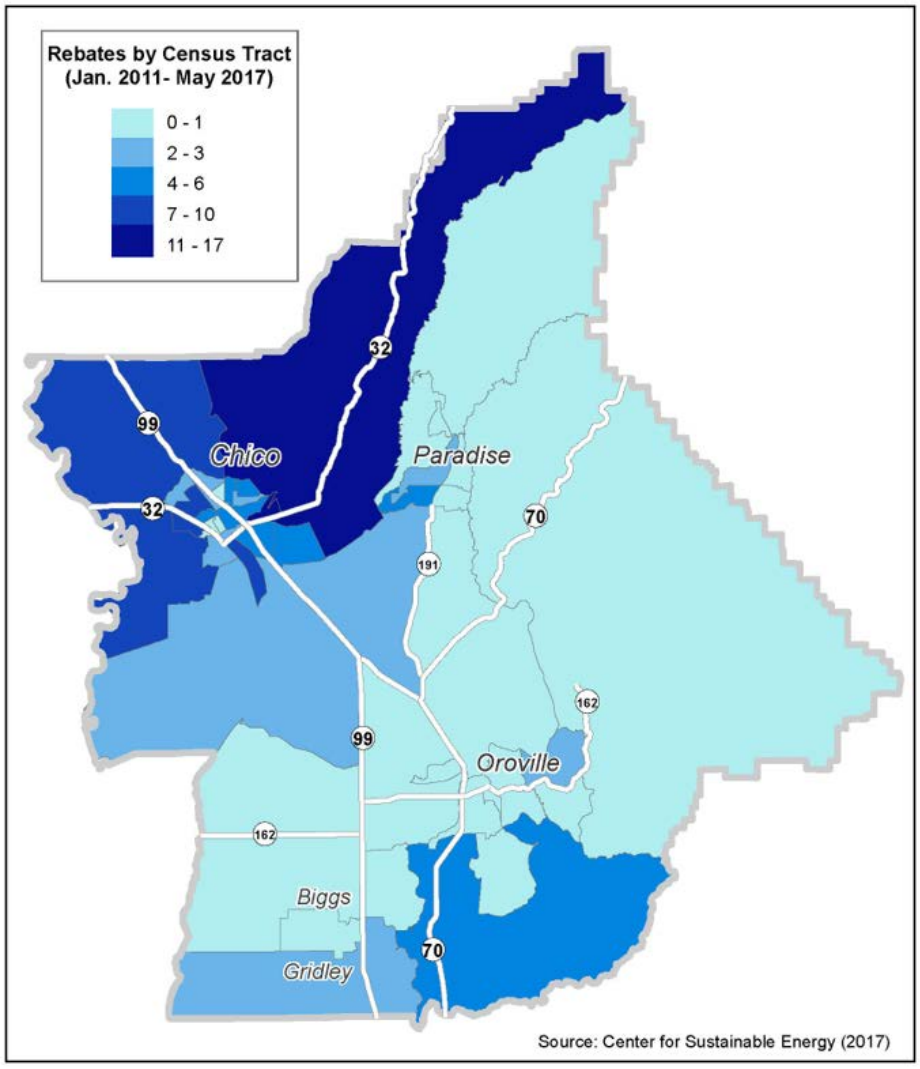
Source: California Air Resources Board Clean Vehicle Rebate Project (https://cleanvehiclerebate.org/eng/rebate-statistics) *As of March 29, 2016, higher-income consumers became ineligible to participate in the CVRP and low-to-moderate-income consumers became eligible for increased rebate amounts. On November 1, 2016, the details of these eligibility criteria were adjusted. Further detail is available here: https://cleanvehiclerebate.org/eng/income-eligibility

Although the CVRP data likely represents the majority of vehicles deployed in the region, there are several limitations to this data that likely contribute to underreporting PEVs in the region:

- The Chevrolet Volt was not eligible for the rebate. There were approximately 7,600 Volts sold nationwide in 2011, with about 30% being sold in California.
- It is possible that not all PEV purchasers opted for the California rebate incentive.
- PEVs that were purchased before the rebate debuted in 2011 were not reflected in the data.

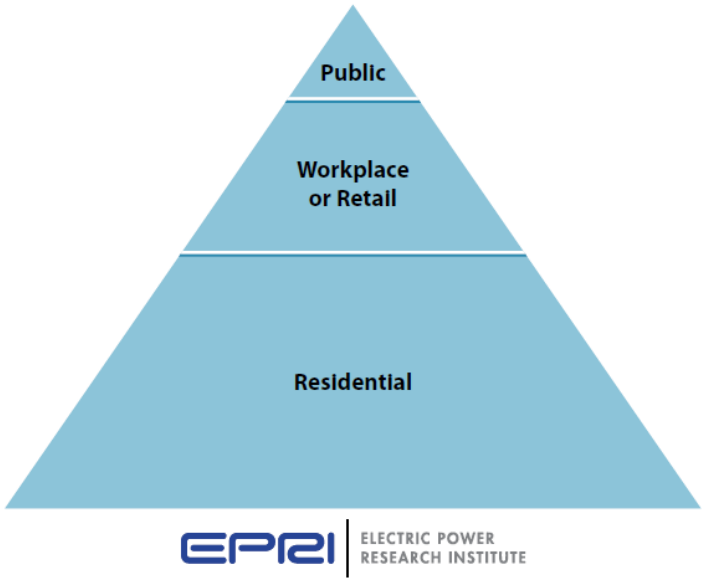
Figure 3-2 presents the same rebate information, but shown spatially by U.S. Census tract. The large size of the Census tracts makes it difficult to discern if sales are being focused in urban areas or rural areas, but the clustering of the tracts with the most rebates in the Chico area suggests that the Chico area is where the majority of PEV ownership in the region lies. This may be further substantiated by the concentration of PEV charging stations within the Chico area (see Figure 3-5).

Figure 3-2. California Vehicle Rebate Program Rebates by U.S. Census Tract



3.2 EXISTING PEV CHARGING STATIONS

While existing PEV charging stations (also referred to as Electric Vehicle Supply Equipment (EVSE)) in Butte County are still fairly limited, the network continues to expand. It is important to note that the majority of PEV charging typically occurs at home overnight while vehicles are parked (Figure 3-3). Home charging is typically achieved be either plugging the car into the existing 110-volt power outlet (Level 1 charging), or by installing a 220-volt Level 2 charger in the garage. Typical Level 1 charging times are approximately 8-12 hours, while Level 2 charging times are approximately 5 hours, and result in vehicles achieving a full charge just from parking overnight (Table 3-1).



Source: Electric Power Research Institute

Figure 3-3. Electric Power Research Institute Charging Pyramid

Public charging stations provide critical recharging for vehicles on longer trips, or for vehicles with smaller ranges, and help alleviate range anxiety which can result when drivers fear running out of battery charge while driving. By providing a large public charging network of Level 2 and DC Fast Charger stations, range anxiety can be alleviated as drivers realize they won't run out of charge while out running errands or traveling greater distances. Reducing or eliminating range anxiety is also important to ensure PEV purchasing rates can continue to increase, benefiting local air quality and contributing to reduced Greenhouse Gas (GHG) emissions.

Existing public PEV charging stations in the region are currently limited to the City of Chico area, Butte College main campus, and the Feather Falls Casino near the City of Oroville (Figure 3-5. Existing PEV Charging Stations). Within the City of Chico, public charging stations are currently clustered along the Hwy 99 corridor, with a new Level 2 charging station just opening at the new California Highway Patrol offices at Hwy 99 and Southgate Avenue.

Table 3-1. PEV Charging Levels

Type of Charging	Power Levels (installed circuit rating)	Time for Full Charge	Average Cost of Equipment & Installation
Level 1 	110/120 VAC at 15 or 20 Amps	8-12 Hours	$0-$500
Level 2 	208/240 VAC at 30 Amps 208/240 VAC at 40 Amps 208/240 VAC at 50 Amps 208/240 VAC at 100 Amps	4-6 Hours	$500-$7,000
DC Fast Charging (DCFC) 	440 or 480 VAC	30-45 Minutes	Up to $55,000

Source: Ready, Set, Charge California! A Guide to EV Ready Communities. Association of Bay Area Governments, Bay Area Climate Collaborative, EV Communities Alliance, CleanFuel Connection, and LightMoves Consulting.

Chico has DC Fast Charging stations at three locations; the Butte College Skyway Center, Chico Nissan on Cohasset Rd, and Sierra Nevada Brewing Co. on E. 20th Street. Additional Level 2 public charging stations are located at Sierra Nevada Brewing Co., Butte College Chico Center on Notre Dame Blvd, Oxford Suites on Business Lane, Enloe Medical Center parking garage on the Esplanade, Chico Volkswagen on Main Street, California State University Chico on Cherry Street and Chestnut Street, Sun Valley Acoustical on Ivy Street, and Alternative Energy Systems on Hwy 99 (Figure 3-6). For more detailed information on local public charging stations, visit www.plugshare.com.

Because Highway 99 is part of the designated electric vehicle corridor, future installation of EVSE in the region is likely to be focused along this corridor. The Regional Siting Plan in Chapter 4 identifies priority locations along this corridor for future EVSE installation as part of the region's DC fast charger siting plan.

Figure 3-5. Existing Public Access PEV Charging Stations, Butte County

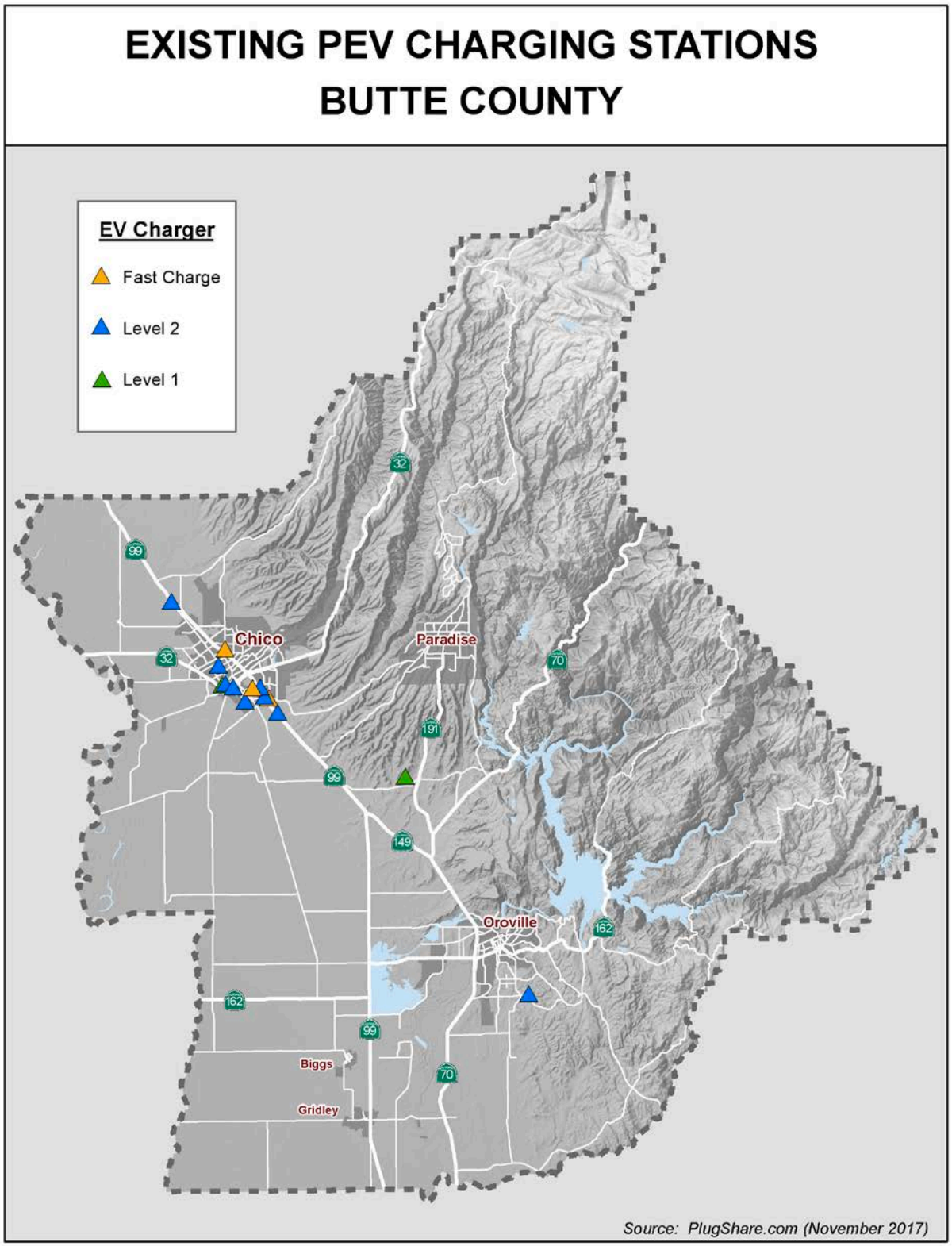
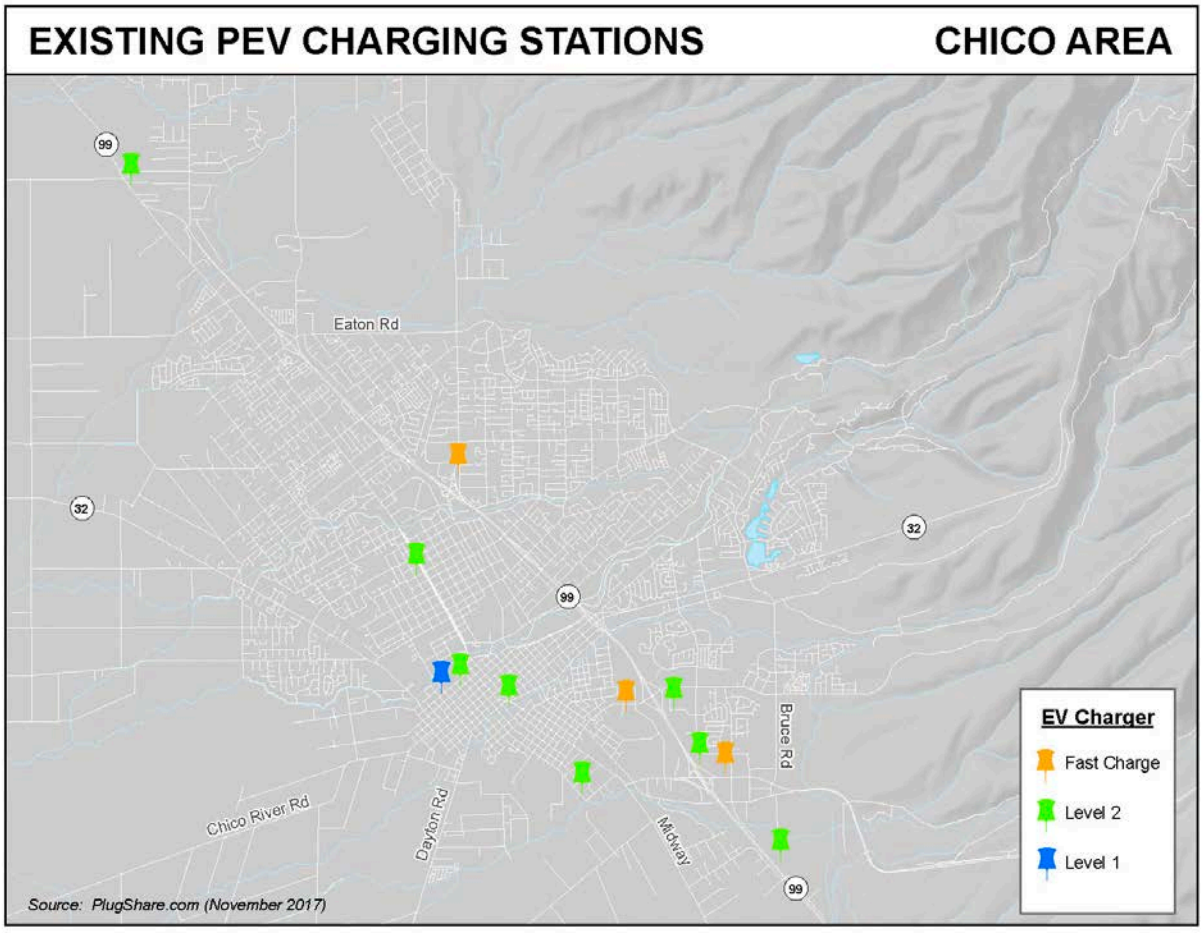


Figure 3-6. Existing Public Access PEV Charging Stations, Chico Area



3.3 REGIONAL DRIVER HABITS; OPPORTUNITIES AND CHALLENGES

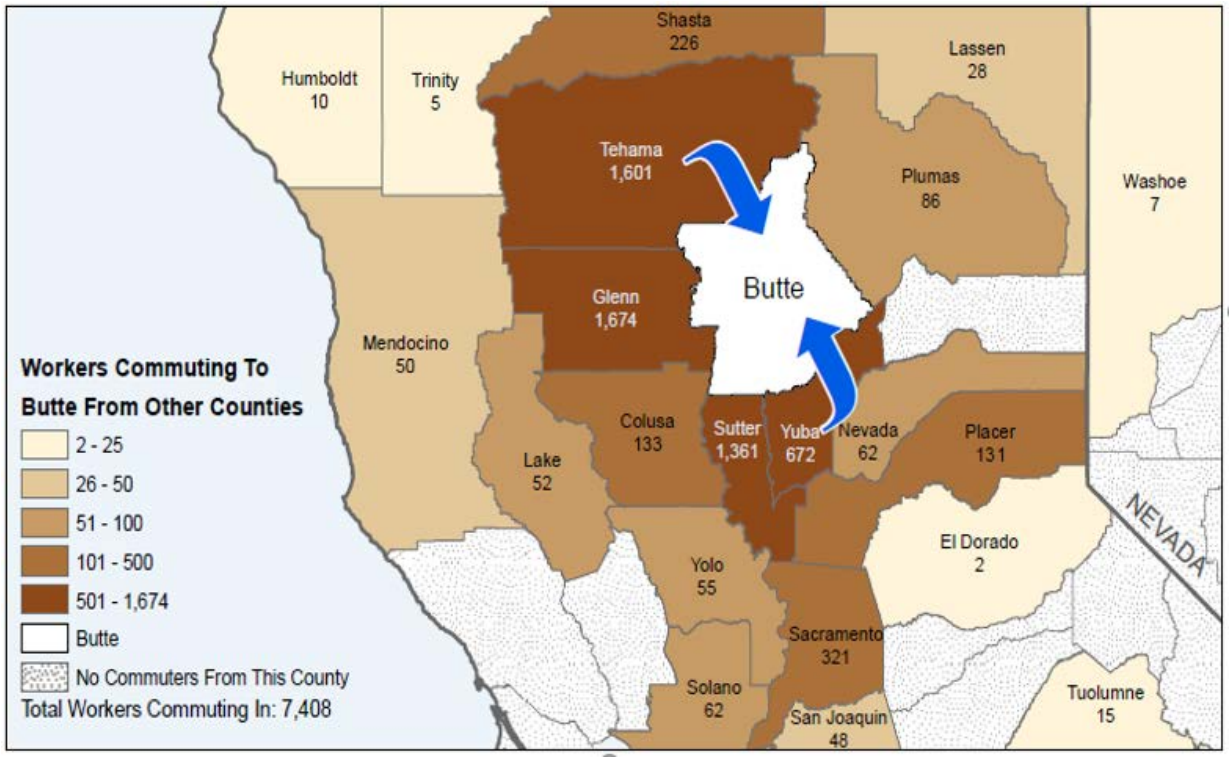
Butte County has many opportunities but also challenges when it comes to expanding the use of PEVs in the region.

COMMUTE PATTERNS

According to U.S. Census Bureau data from 2013, Butte County had approximately 7,400 workers commuting into the county and over 8,800 commuting out (Figures 3-7 and 3-8). This means that Butte County was a slight net exporter of commuters. However, the vast majority of Butte County workers (78,200) both lived and worked within the county. Of those commuting into Butte County, the largest number came from Sutter County (1,359 employees).

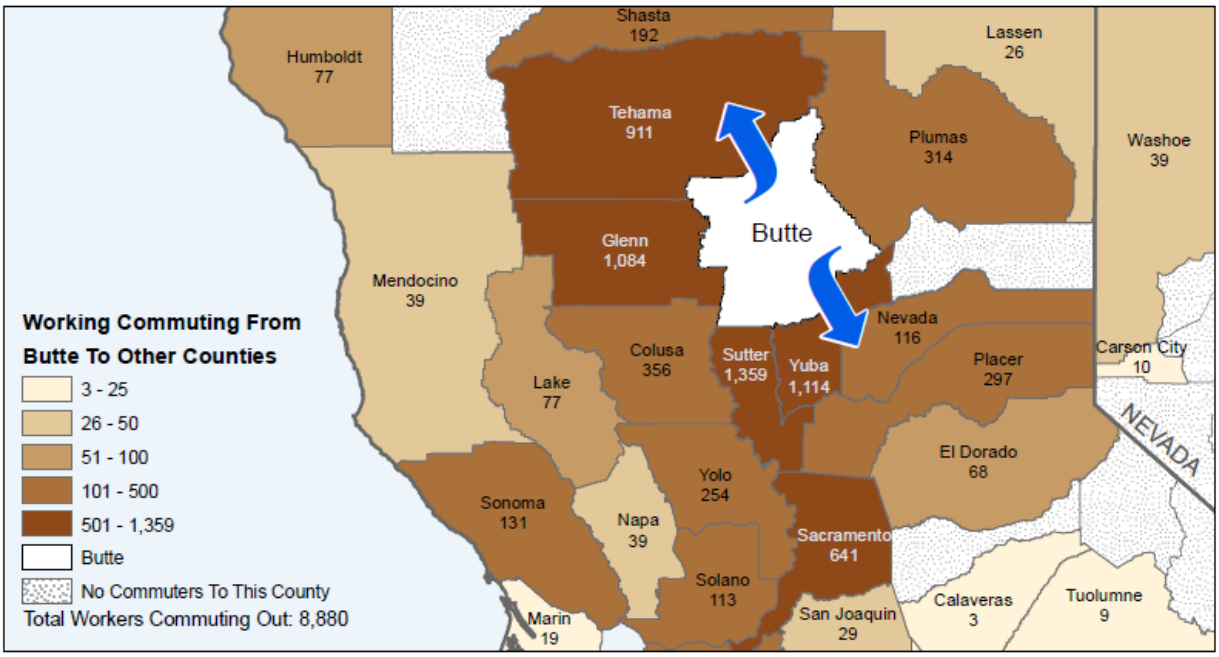
In general, employees in Butte County have a shorter average commute time than the national average, 18.8 minutes in Butte County versus the national average of 24.8. Additionally, 2.29% of the workforce in Butte County have “super commutes” in excess of 90 minutes, which is lower than the national average of 2.62%.

Figure 3-7. County to County Commuting Estimates – Commuting into Butte County



Source: Employment Development Department, State of California 2015. Based on January 2013 U.S. Census Bureau American Community Survey Report.

Figure 3-8. County to County Commuting Estimates – Commuting out of Butte County



Source: Employment Development Department, State of California 2015. Based on January 2013 U.S. Census Bureau American Community Survey Report.

Because 7,400 workers commute into Butte County, and the vast majority of Butte County workers (78,200) both lived and worked within the county, installation of workplace charging at the largest employers (Chapter 8, Table 8-1) should be prioritized to further encourage PEV use in the region. Additionally, because the majority of charging takes place at home (see Figure 3-3), the Local Agencies should streamline their permit and building code requirements and processes to make home installation as simple and fast as possible (see Chapters 5 and 6 for further information).

VEHICLE THROUGH-TRIPS IN THE REGION

Vehicle through-trips are trips that begin and end outside the region - an example is traveling from Marysville through Butte County to Quincy via Highway 70. Based on modeling completed for the 2016 RTP/SCS, vehicle through-trips represented 3.3% of all travel in the region in 2014 (as measured in "vehicle miles traveled" or VMT). By 2020, it is estimated that through-trips will decrease to 3.2% of all VMT. This declining trend continues into the year 2035 and 2040, with interregional trips estimated to make up 2.9% of all VMT.

The small percentage of vehicle through-trips in the region is largely attributable to the fact that Butte County is not on a major interstate. Hence, the region experiences significantly fewer through trips than other areas, such as the Upstate region with Interstate 5, or the Sacramento region with Interstates 5 and 80.

The lack of through-trips means that the region should focus more heavily on residential, public and workplace charging to ensure that charging opportunities are provided for the vast majority of non-through-trip vehicle travel in the region.

Despite the region having fewer through-trips than other regions, the need still exists to address charging requirements of drivers traveling through the region, and this has been covered in Chapter 4 with the DC fast charger siting plan.

RURAL/UNINCORPORATED AREAS

While data regarding PEV ownership in rural and unincorporated areas is limited, Figure 3-2 generally indicates reduced ownership of PEVs in the rural unincorporated areas of the region. This trend is not unique to the Butte County region. A lack of rural residents utilizing PEVs is a common trait throughout the state, and is likely due in part to the higher costs of PEV ownership, a lack of nearby charging infrastructure, and potentially a need/desire for vehicles with four-wheel-drive and/or larger engines that are capable of towing and/or driving on snowy or icy roads in the wintertime.

Despite these challenges, this does not mean that these residents cannot take part in the growing PEV market. Figure 4-17 in Chapter 4 identifies priority locations for public EVSE installation in the rural unincorporated communities. Installing public EVSE in these key areas can help grow the PEV market in the rural portions of the region.

LEVEL 1 CHARGING IS GENERALLY AVAILABLE IN ALL HOMES, AND CAN FULLY RECHARGE A PEV'S BATTERIES IN 8-12 HOURS

Level 1 charging (a standard 110-volt electrical outlet) is also generally available in all homes, and can fully recharge a PEV's batteries in 8-12 hours. Additionally, streamlining the Local Agency residential PEV charger installation permitting process (Chapters 5 and 6) will help encourage residents in rural and unincorporated areas to install level 2 PEV chargers at home, further growing the PEV market in the region.

In the eastern portion of Butte County, there are numerous isolated mountain communities that are vulnerable to wildfires in the summer months. Emergency evacuations of these areas can pose a concern in the event PEVs aren't charged sufficiently to allow residents to completely evacuate the area. Often times, power will be turned off to areas under immediate threat of wildfire, or transmission lines can be compromised by wildfires both near and far. Installing an on-site generator that can provide power to a home to allow level 1 charging can help mitigate some of this concern. However, rural residents who own PEVs should consider developing an alternative evacuation plan to account for this potential situation, such as relying on a second gasoline powered vehicle, coordinating with neighbors with gasoline powered vehicles, or any other alternative means to evacuate successfully.

Additionally, the Local Agencies should consider adding sections to their General Plans that include emergency evacuation plans for rural PEV owners. These plans can provide suggested alternative evacuation means, direct routes to public EVSE locations, community gathering points where stranded residents can be evacuated, and other ideas to lead to successful evacuations.

LOW INCOME/DISADVANTAGED COMMUNITIES

Based on California Vehicle Rebate Program data, less than 1% of PEV rebates in the state of California come from residents within a state designated disadvantaged community (DAC) despite the fact that residents in disadvantaged communities make up approximately 25% of

California's population and 18% of the state's light-duty auto sales. Some of the discrepancy in PEV ownership between residents in disadvantaged communities and those outside of these areas is due to the high entry cost of PEV ownership, lack of home ownership, and age of the structure (making retrofits difficult), as well as other related factors as discussed in the previous section.

Butte County has a large percentage of low-income residents, and several DACs near the cities of Chico and Oroville. These areas likely contain low PEV use as suggested in Figure 3-2. In order to increase PEV use in these areas, the continuation of PEV rebates will be important to allow this population segment to enter the PEV market. Streamlining of residential EVSE installations by the Local Agencies, and directly placing public charging stations in DACs can also increase PEV use in these areas.

LESS THAN 1% OF PEV REBATES IN THE STATE OF CALIFORNIA COME FROM RESIDENTS WITHIN A STATE DESIGNATED DAC

Source: California Vehicle Rebate Program

The Sacramento Metropolitan Air Quality Management District and affordable housing developers recently completed a PEV Car Share pilot project that locates PEVs and chargers at four affordable housing complexes in DACs, and make the PEVs available through a car share program. This is the first affordable housing PEV car share program in the state and is something that can easily be replicated in the Butte region if funding were secured.

3.4 REGIONAL PEV USE PROJECTIONS

Projections for future PEV use in the region have been developed to assist BCAG and the Local Agencies in anticipating future demand for PEVs and associated infrastructure in the region (Figures 3-9 through 3-11). The projections can also be integrated into local agency Climate Action Plans and BCAG's Sustainable Communities Strategy.

The PEV projections are based on California's Advanced Clean Cars (ACC) program which was adopted by the Air Resources Board in 2012. The Zero-Emission Vehicle (ZEV) regulation is a component of the ACC program which requires manufacturers to produce an increasing number of pure ZEVs (meaning battery electric and fuel cell electric vehicles), with provisions to also produce plug-in hybrid electric vehicles (PHEV) in the 2018 through 2025 model years. Included in the ZEV regulation is a compliance path for manufactures to meet the regulation which ultimately puts 1.4 million ZEV and PHEV on the road by 2025, making up approximately 15% of new vehicle sales in the 2025 model year.

ARB's Emissions Factor (EMFAC) model is a tool for assessing the population, activity, and emissions from on-road vehicles including cars, trucks, and buses in California and is consistent with the ACC program. Vehicle inventories included in EMFAC are periodically updated, with the latest model (EMFAC 2014) being approved in December of 2015.

Figure 3-9. Projected Plug-in Electric Vehicle Fleet Butte County

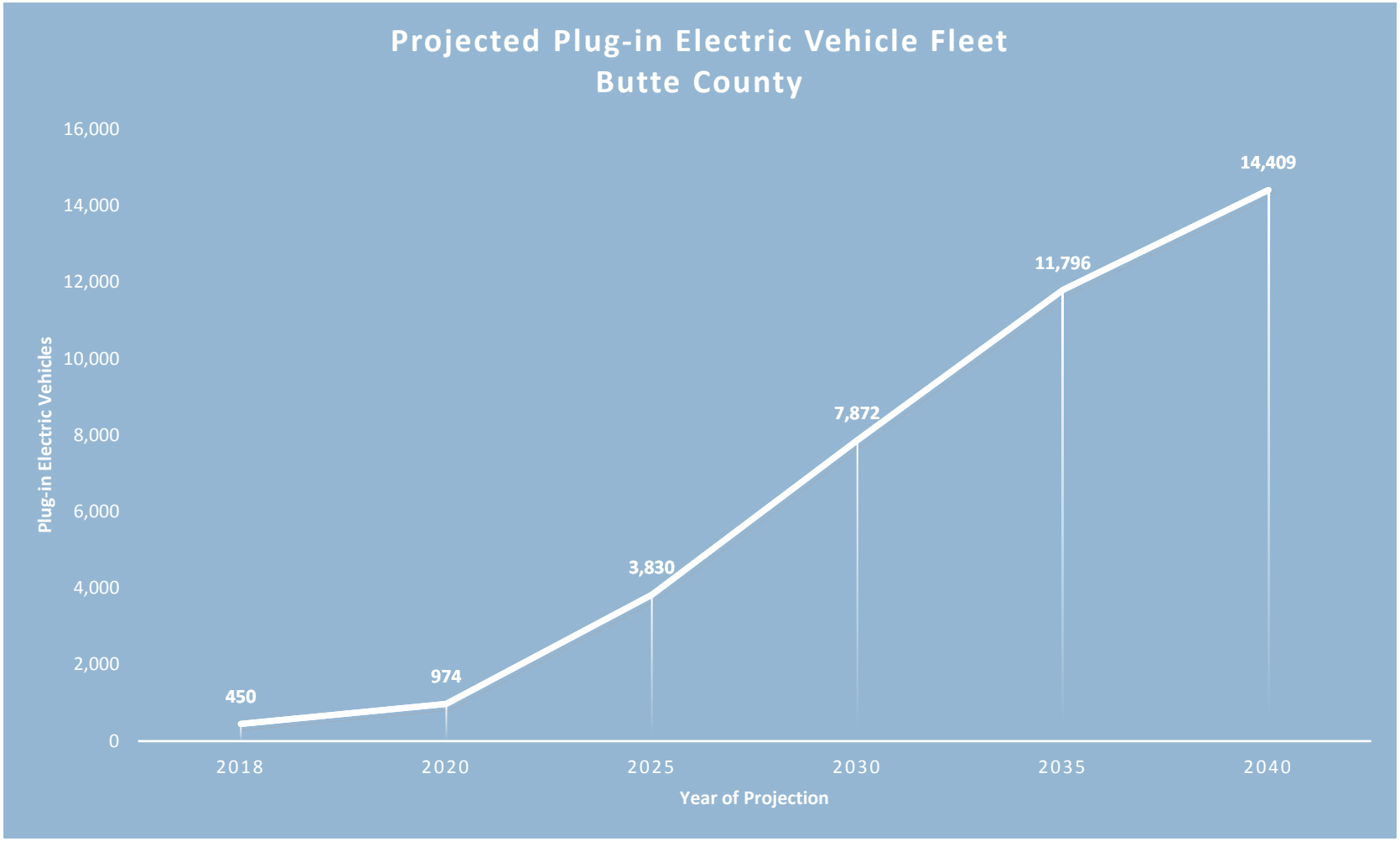


Figure 3-10. Plug-in Electric Vehicles Projected % of Total Vehicle Fleet Butte County

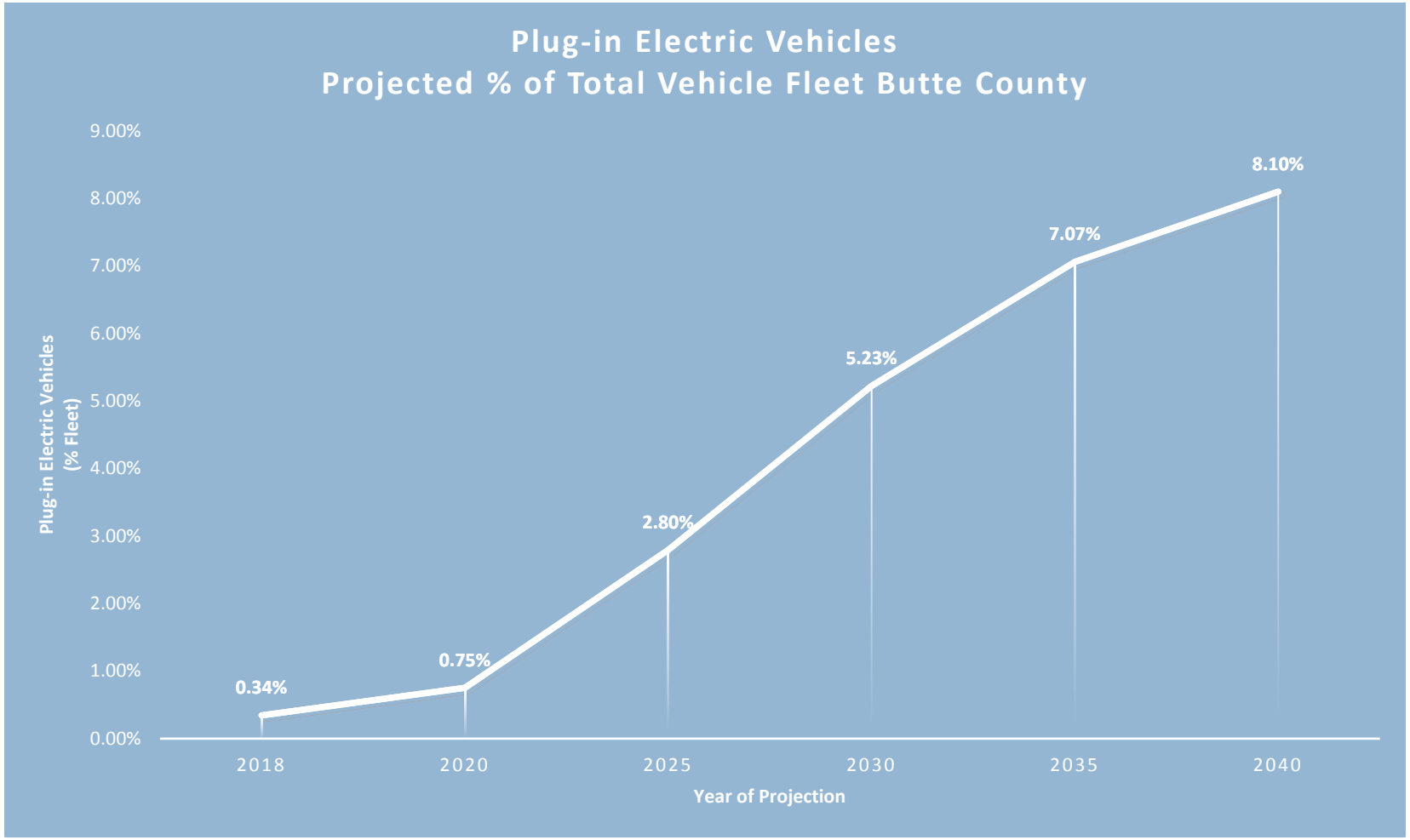
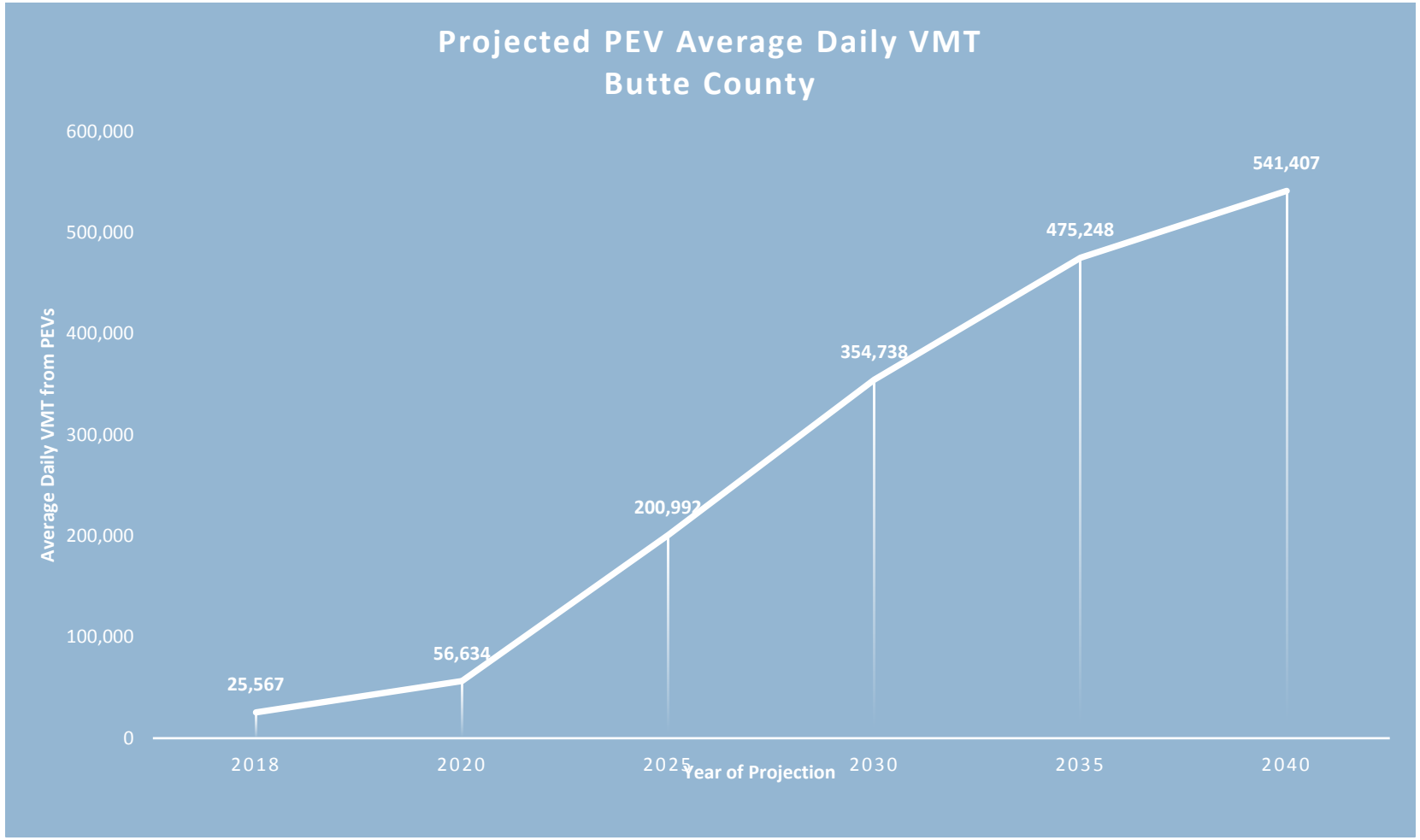


Figure 3-11. Projected PEV Average Daily VMT Butte County



For the purpose of preparing the Butte Regional PEV Projections, BCAG staff extracted the electric vehicle (EV) fleet populations and vehicle miles traveled (VMT) for each of the projected years (2018, 2020, 2025, 2030, 2035, and 2040). The EV class includes both ZEV and PHEV categories of vehicles and are only associated with the light-duty (passenger cars and light trucks) fleet included in EMFAC. In addition, the distribution of new EVs are proportional across all regions of California, with 15% of new vehicles sales being EV by year 2025. Years extending beyond 2025 stay consistent with the 15% of new vehicles sales assumption.

In January of 2017, ARB prepared a mid-term review of the ACC program and conducted an analysis of the ZEV regulation compliance scenarios. The analysis included an examination of three different scenarios which represented different rates (high, mid-range, and slow) of ZEV technology advancement. BCAG staff utilized the mid-range scenario to disaggregate the EV classification used in EMFAC 2014. The mid-range scenario projects a cumulative distribution of BEV (26%), PHEV (62%), and FCEV (12%) over the 2018-2025 new vehicle sales years. Therefore, for the purpose of preparing the regional projections, an assumption was made that 88% of the EV fleet would be classified as PEV (BEV + PHEV) and carried across all projected years.

Modeling results from BCAG's 2016 Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) were used to control the EMFAC outputs to the region based on projected VMT. By default, EMFAC 2014 has lower VMT estimates for the BCAG region in comparison to the modeling completed for the 2016 RTP/SCS.

A potential concern associated with increased PEV deployment is the potential negative impact from increased load on the local electric grid. The degree of the impact depends on parameters such as PEV penetration rates, the current condition of local distribution infrastructure, and strategies used by the local utility to manage additional load. Utilities across the country have implemented a wide variety of pilot projects and assessments to better understand consumer PEV usage patterns and how certain management tools, such as smart meters, may help mitigate impacts on the grid. Through the use of tariff structures and incentives, utilities are actively seeking solutions that maximize PEV charging to periods of lower electrical demand, such as off-peak hours, greatly reducing concerns over electrical grid impacts.

4. REGIONAL SITING PLAN

The regional siting plan identifies priority sites for future EVSE installation in the Butte region. It is broken into five focus areas identifying priority locations for: 1) DC fast charging, 2) level 2 public access charging, 3) workplace charging, 4) multi-family residential charging, and 5) rural/unincorporated charging. Each section below identifies the methodology and priority location maps for each focus area. Figure 4-1 below identifies the different charging needs of PEV drivers based on the type of location and charge time needed.

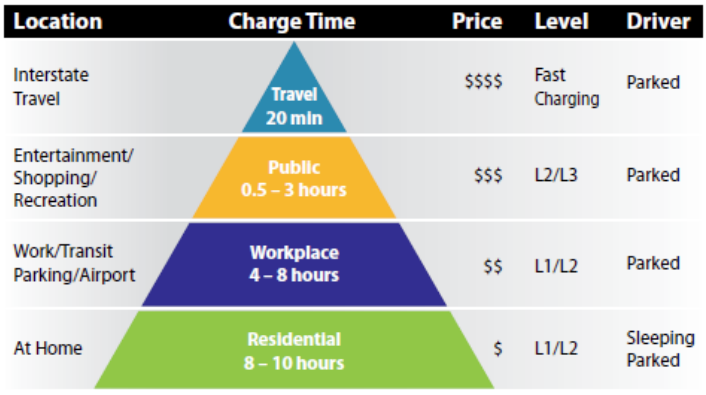
The regional siting plan is not intended to encompass every possible location for EVSE installation in the region, nor is it intended to serve the need for "micro-siting", whereby precise locations for charging stations are determined with an engineering-level analysis. Rather, the regional siting plan is intended to ensure that the highest priority areas are identified, and given greatest consideration for future installations.

THE REGIONAL SITING PLAN IS INTENDED TO ENSURE THAT THE HIGHEST PRIORITY AREAS ARE IDENTIFIED, AND GIVEN THE GREATEST CONSIDERATION FOR FUTURE EVSE INSTALLATIONS

The maps in this chapter can also guide other entities beyond BCAG and the Local Agencies who will be looking to install EVSE in the region, including PG&E, Tesla Inc., Electrify America, and others.

4.1 DC FAST CHARGER PRIORITY LOCATIONS

DC fast charge stations provide PEVs with rapid charging, usually between 30-60 minutes for a full charge. They are the most expensive to purchase and install, with costs typically averaging $55,000 for the charger and installation costs (see Chapter 10 for additional information on EVSE costs and funding sources).



Source: State of California, Governor's Office of Planning and Research, *"Zero-Emission Vehicles in California: Community Readiness Guidebook"*, 2013.

Figure 4-1. Typical PEV Charging Times by Location and Charger Level

For the DC fast charger siting analysis, priority locations have been identified along the urban areas of California State Route (SR) 99 and 70 within the region. The SR 99 and 70 corridors were chosen since they provide for the majority of through vehicle travel within Butte County. As discussed, through vehicle trips have origins and final destinations outside of Butte County, such as a vehicle traveling from Roseville to Redding

via SR 99. Vehicles may choose to stop along these corridors for the purpose of charging prior to continuing with the remainder of the trip. Charge times at these locations are generally less than 1 hour.

Locations were identified within ½ mile of an urban Highway exit or intersection. Primary destinations were identified within these ½ mile areas and summarized by retail building square footage. Primary destinations include supermarkets, department stores, malls, and restaurants. Locations were then prioritized (high to low) by the amount of total retail square footage contained within the ½ mile buffered urban Highway exit or intersection.

Data sources utilized for the DC fast charge siting include the BCAG commercial building footprints and roads geographic information systems (GIS) layers. The commercial building footprints layer is updated annually and represents the best available information as of December 2016. The roads layer is updated quarterly and represents the best available information as of July 2017.

Figures 4-2 through 4-4 identify the priority locations within the region for DC fast charger Stations.

Figure 4-2. DC Fast Charger Siting, Chico Area

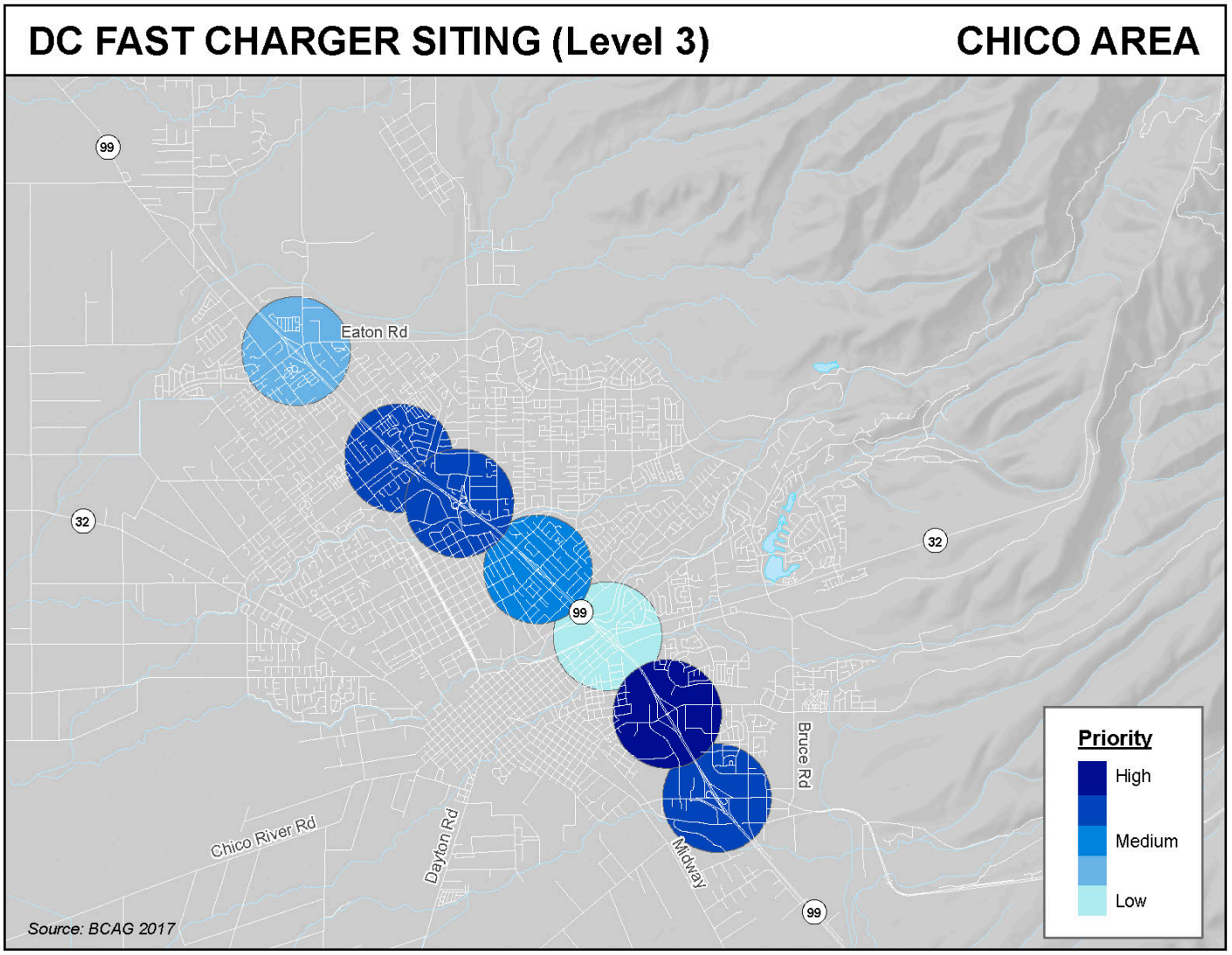


Figure 4-3. DC Fast Charger Siting, Gridley and Biggs Area

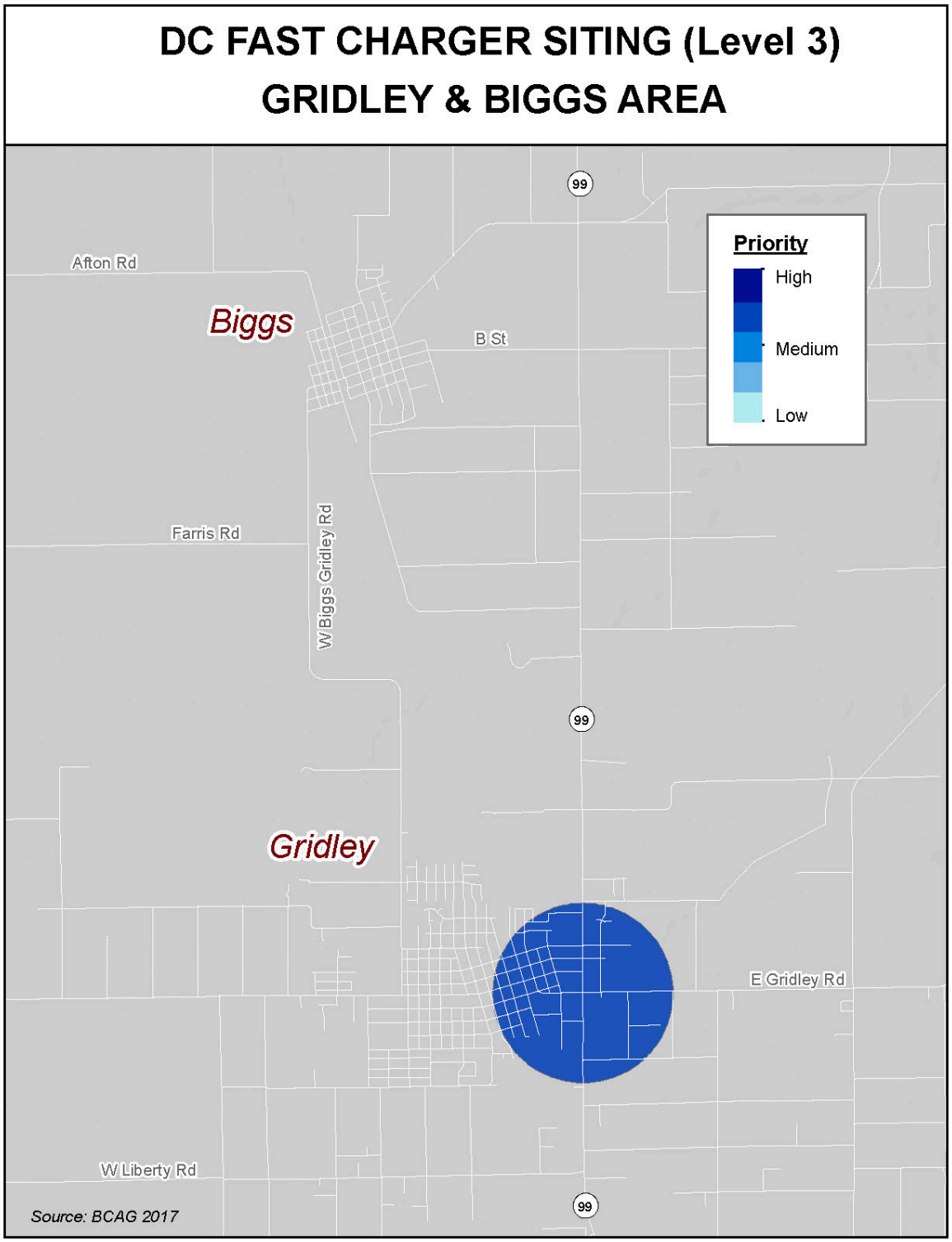
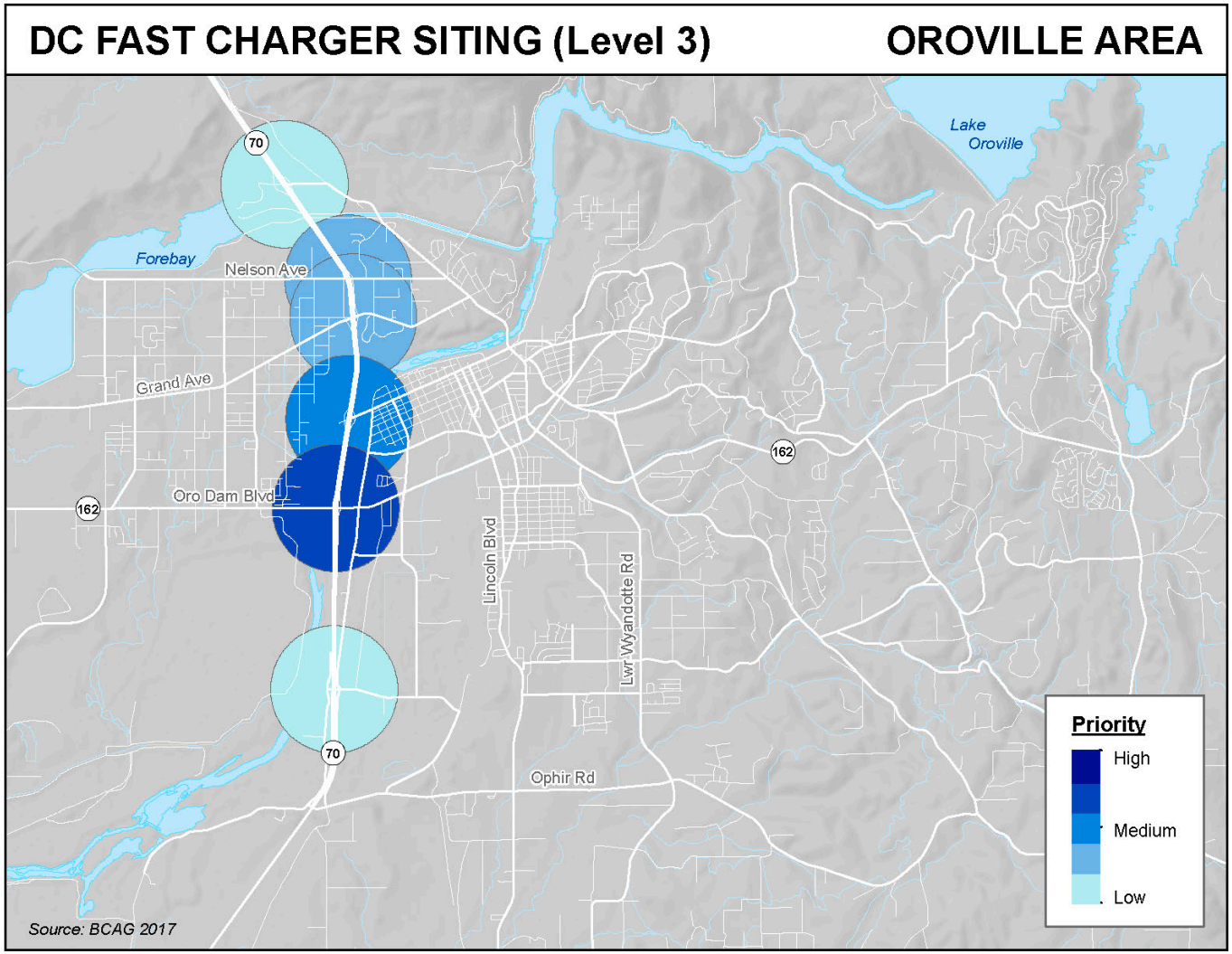


Figure 4-4. DC Fast Charger Siting, Oroville Area



4.2 LEVEL 2 PUBLIC ACCESS PRIORITY LOCATIONS

Level 2 public access charging stations provide PEVs with moderate charging rates, typically providing a substantial battery recharge in 1-3 hours. Public access charging siting analysis focused on destinations located within urban areas where drivers will park their vehicles for periods greater than 1 hour. The San Joaquin Valley Air Pollution Control District, in their siting plan, reviewed the National Household Travel Survey and identified several land use categories which attract drivers to travel "medium-to-long" distances and stay for periods greater than 1 hour.

For the Butte PEV Readiness Plan, the "medium-to-long" trip distances would represent interregional or intercity type trips. Interregional trips represent travel that originates outside Butte County and has a final destination within Butte County. Intercity trips represent travel between urban areas within Butte County.

Locations were identified and prioritized for each Butte County incorporated jurisdiction and expanded to the remaining urban area. Primary destinations include art galleries, museums, casinos, big box stores, supermarkets, hospitals, libraries, theaters, hotels, parks, restaurants, malls, universities, doctor/dental offices, and municipal buildings.

Hot spot density maps have been prepared for each urban area and locations are prioritized (high to low) based on the number of destinations in relation to each other. Destinations are weighted (scale of 1-5) based on the estimated amount of available parking, assuming these areas will attract a higher number of PEV drivers.

Data sources utilized for the public access siting include the BCAG commercial building footprints, InfoUSA database, and Google search engine. The commercial building footprints layer is updated annually and represents the best available information as of December 2016. InfoUSA database is dated 2011 and the Google search engine was accessed in September 2017.

Figures 4-5 through 4-8 identify the priority locations within the region for Public Access (Level 2) charging stations.

Figure 4-5. Public Access Siting (Level 2), Chico Area

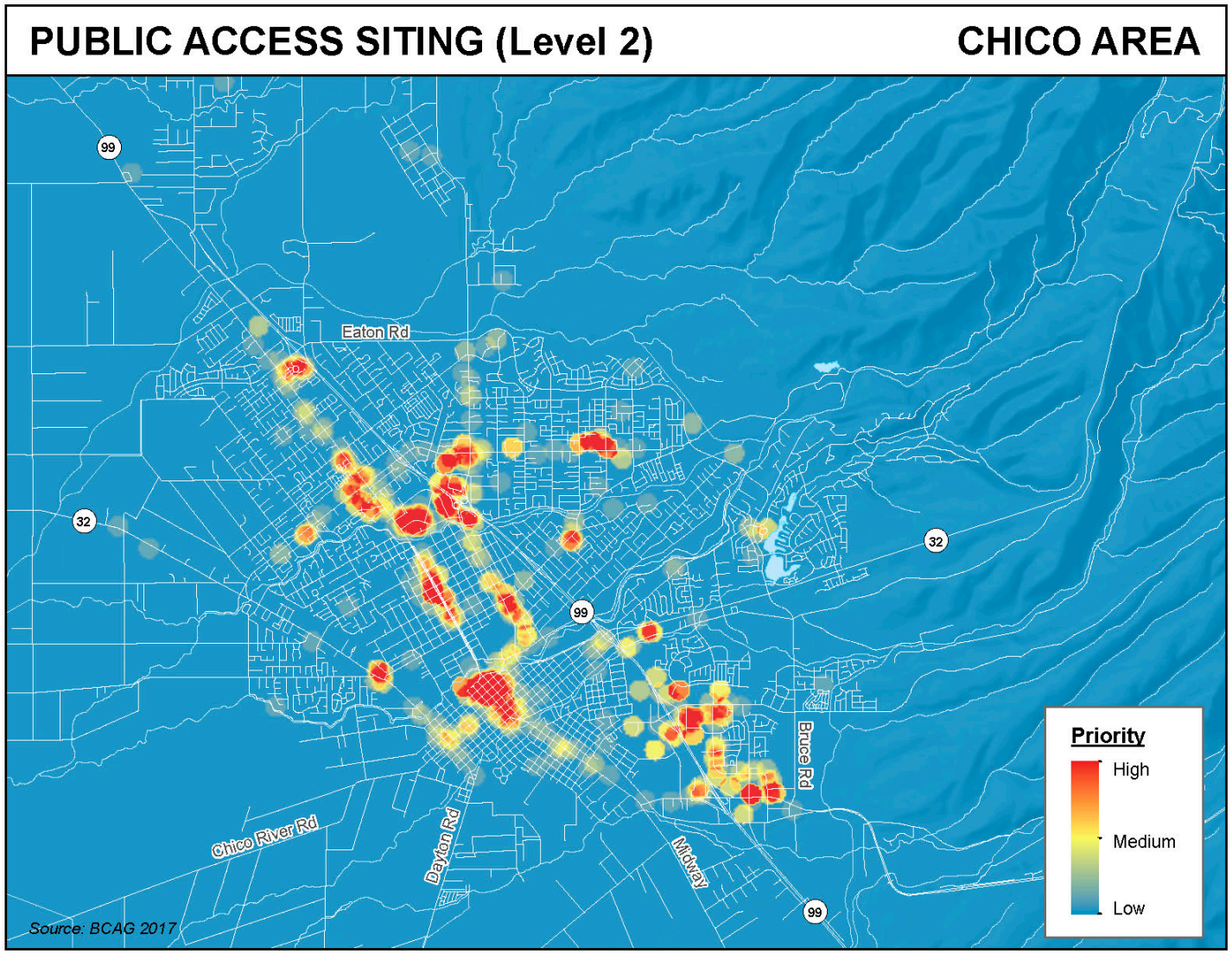


Figure 4-6. Public Access Siting (Level 2), Gridley and Biggs Area

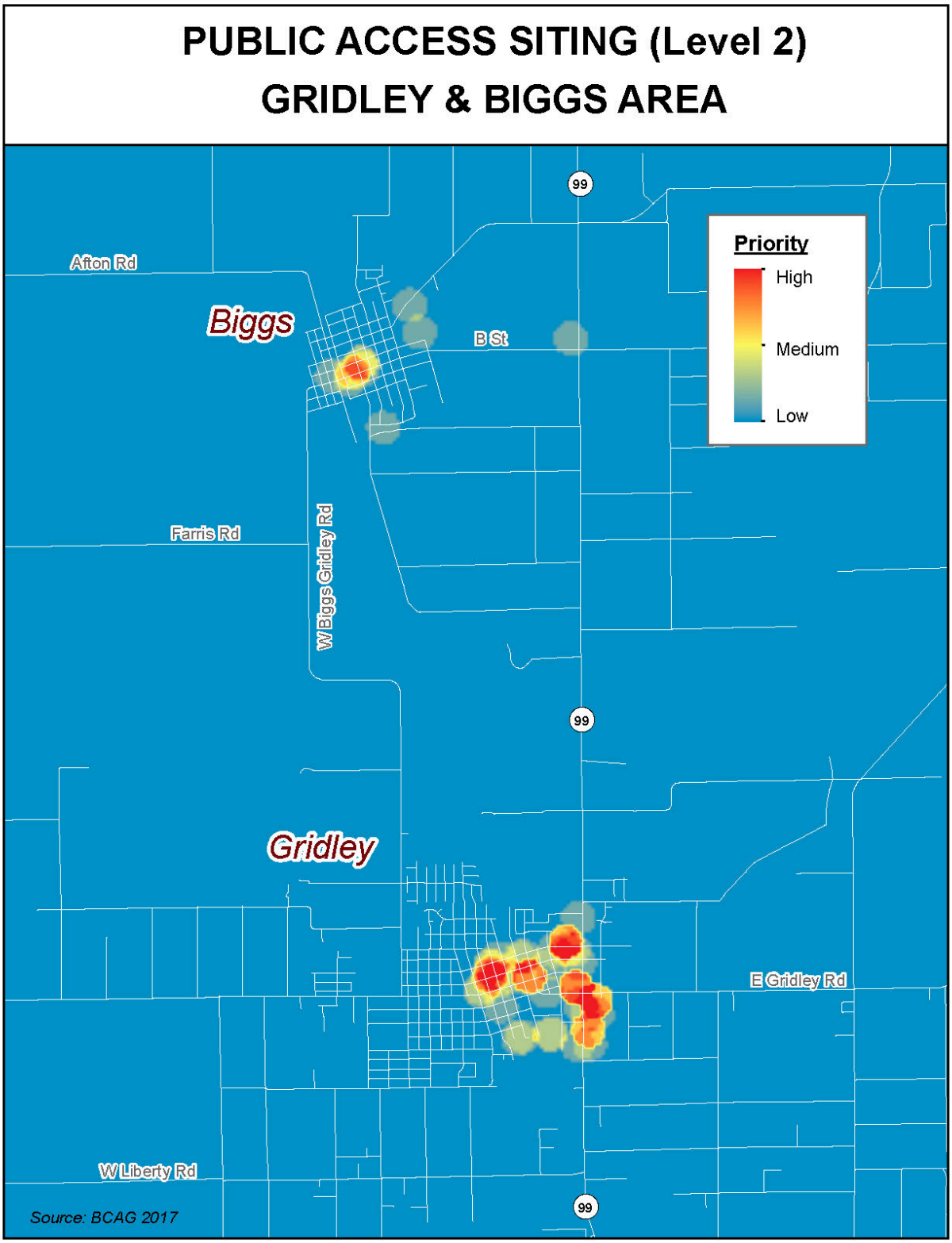


Figure 4-7. Public Access Siting (Level 2), Oroville Area

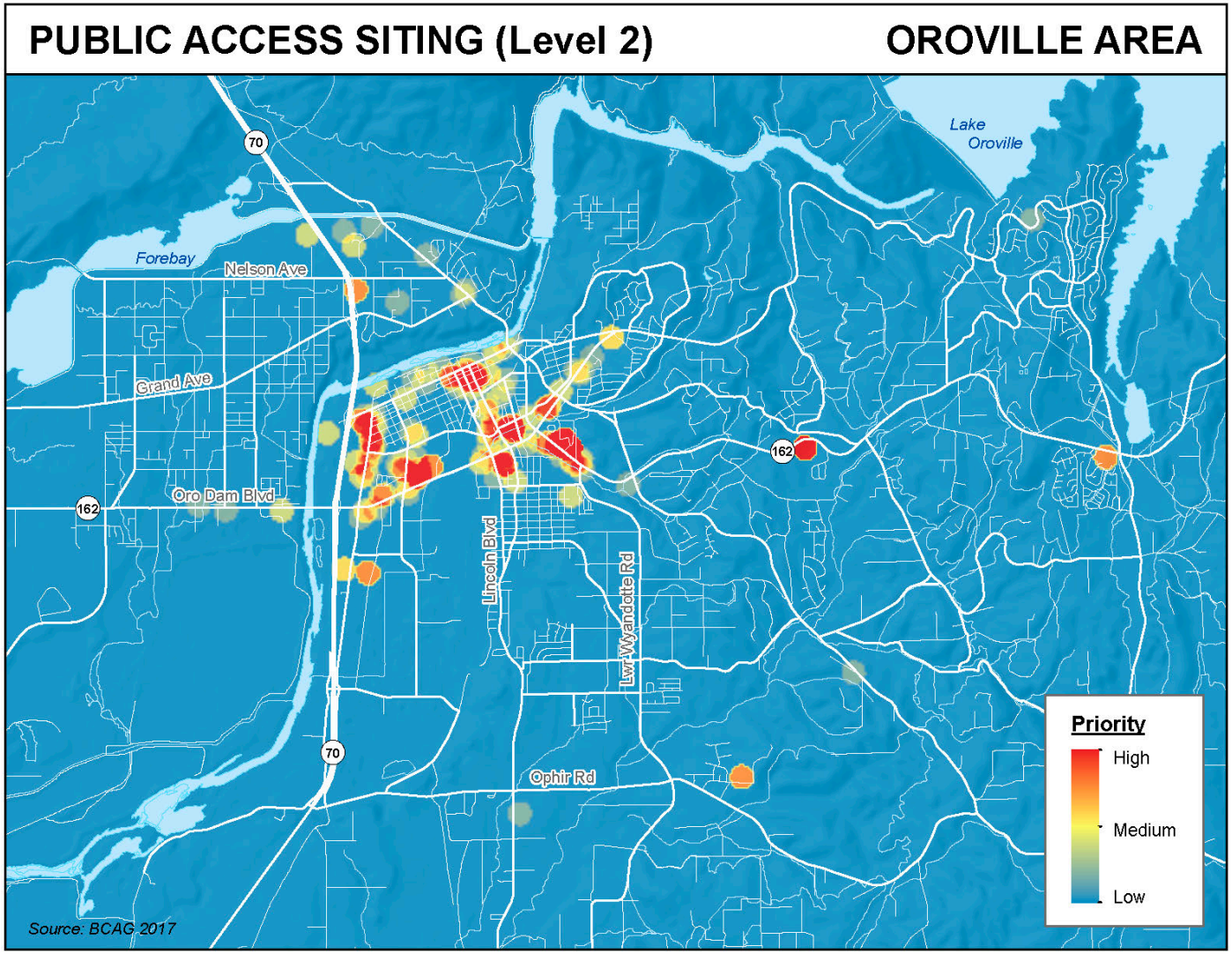
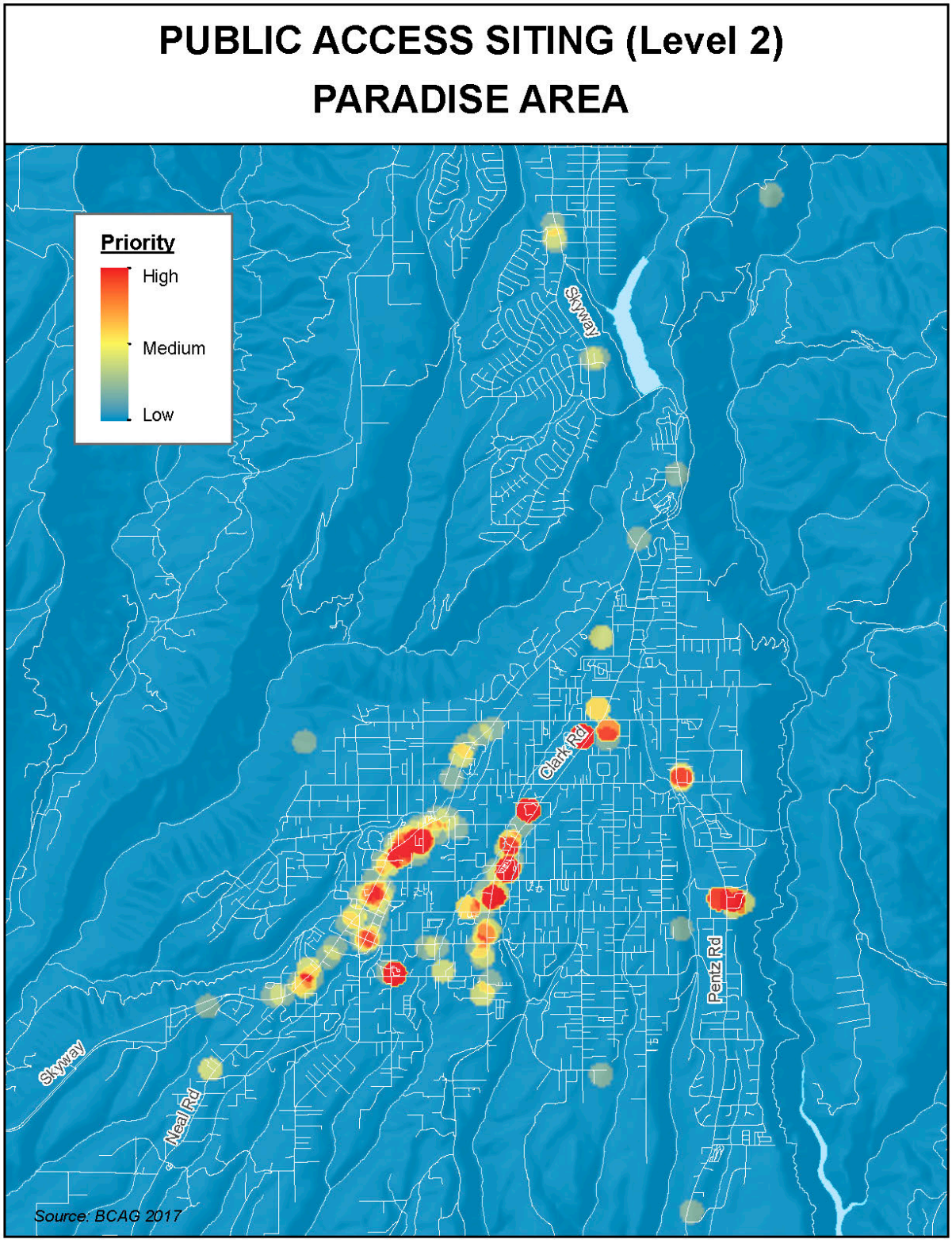


Figure 4-8. Public Access Siting (Level 2), Paradise Area



4.3 WORKPLACE PRIORITY LOCATIONS

Workplace charging siting analysis has been prioritized based on employment density and focused within the urban areas of Butte County. The workplace provides an opportunity for employees to charge their vehicles if lacking access to a residential charger, or for drivers with longer commutes who must charge in order to complete the return trip. Employees also tend to park at the workplace for periods greater than 4 hours, allowing enough time to complete a full charge (for more information on workplace charging, see Chapter 8)

Workplace locations were identified and prioritized for each Butte County incorporated jurisdiction and expanded to the remaining urban area. Primary charging locations include locations with the greatest density of employees. Hot spot density maps have been prepared for each urban area and locations are prioritized (high to low) based on the number of employees in relation to each other, assuming these areas will attract a higher number of PEV drivers.

Data sources utilized for the public access siting include the BCAG commercial building footprints, BCAG school sites, and InfoUSA employment database. The commercial building footprints layer is updated annually and represents the best available information as of December 2016. The BCAG school site database was last updated in 2014 and the InfoUSA database is dated 2011.

Figures 4-9 through 4-12 identify the priority locations within the region for workplace charging stations (Level 2).

Figure 4-9. Workplace Siting (Level 2), Chico Area

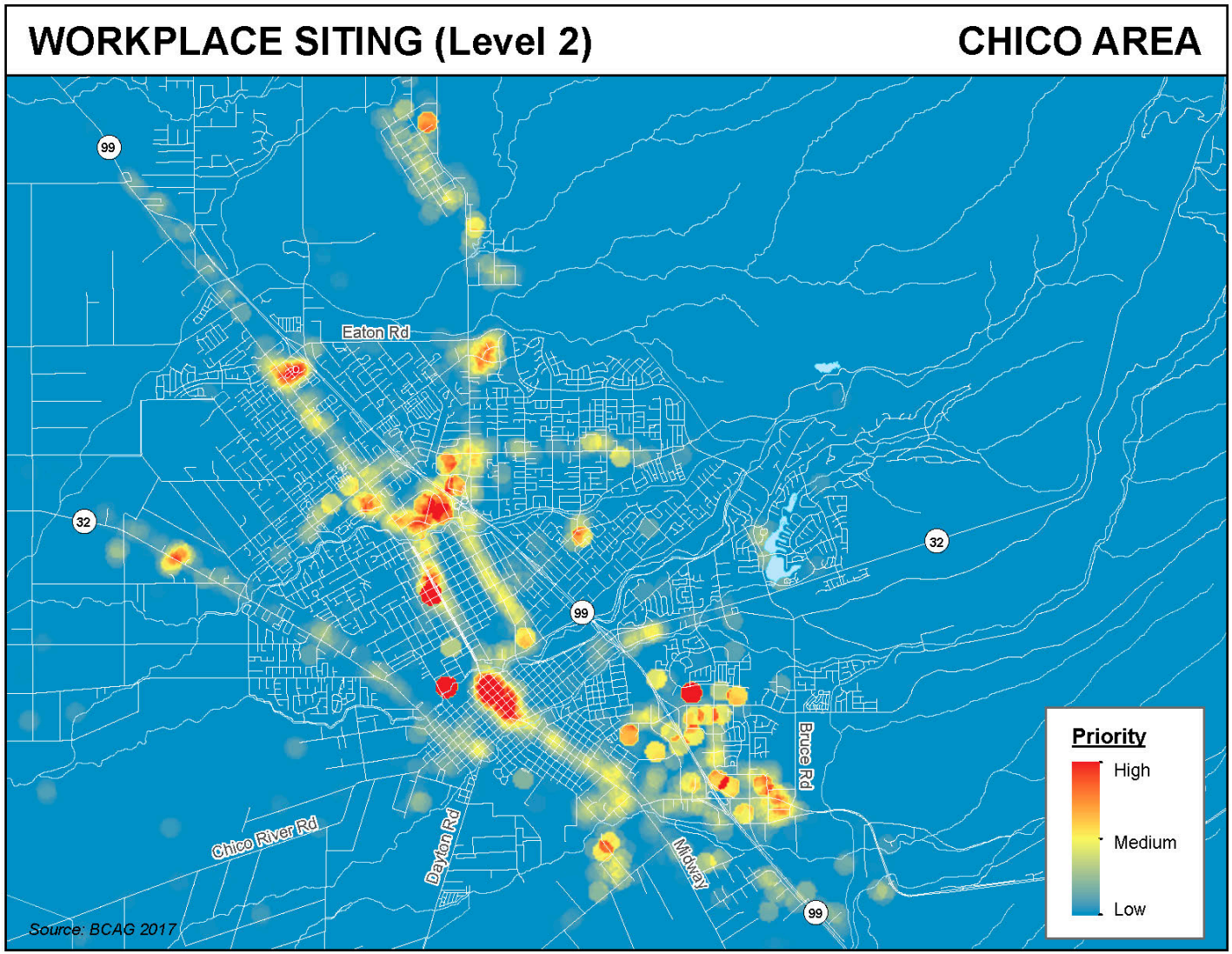


Figure 4-10. Workplace Siting (Level 2), Gridley and Biggs Area

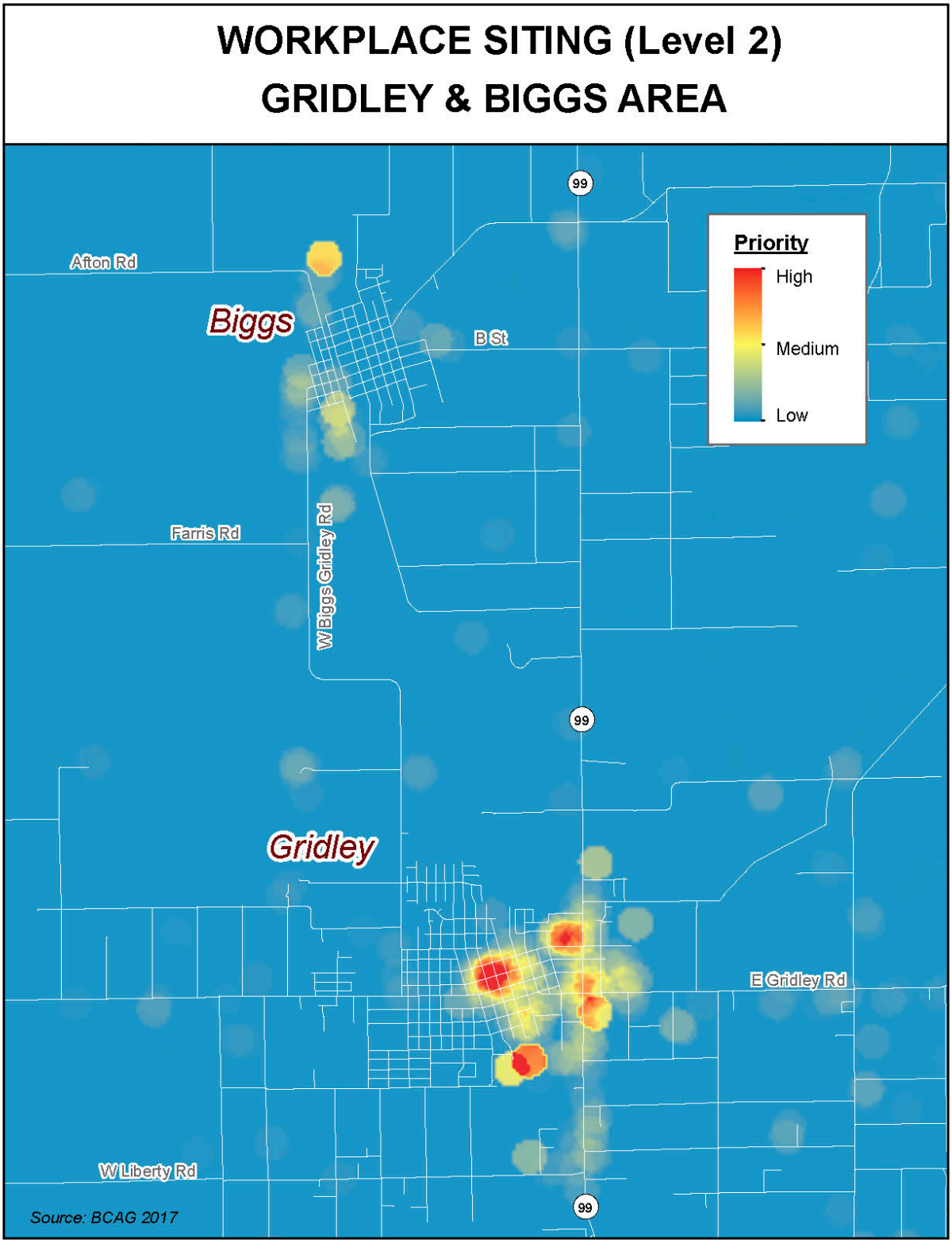


Figure 4-11. Workplace Siting (Level 2), Oroville Area

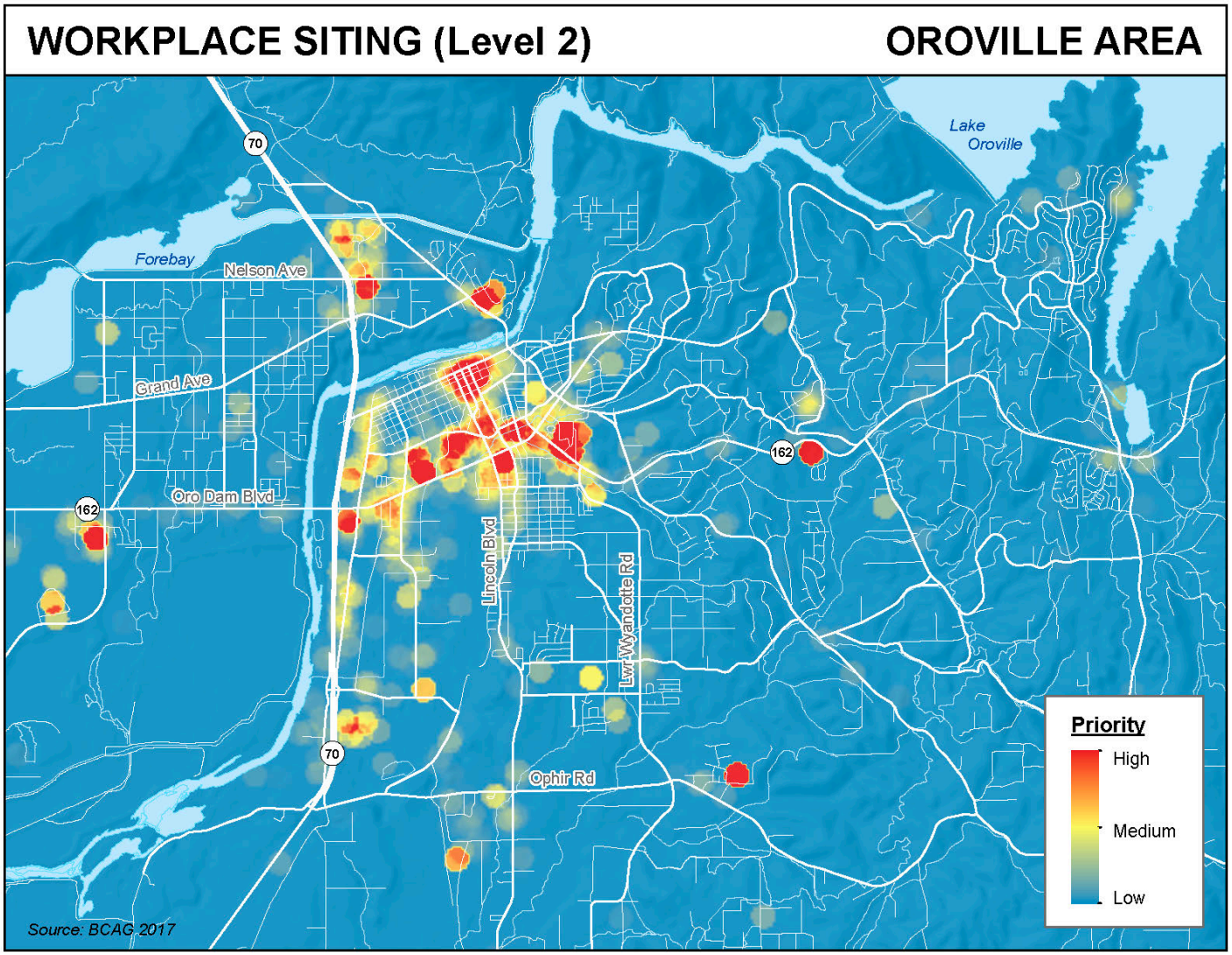
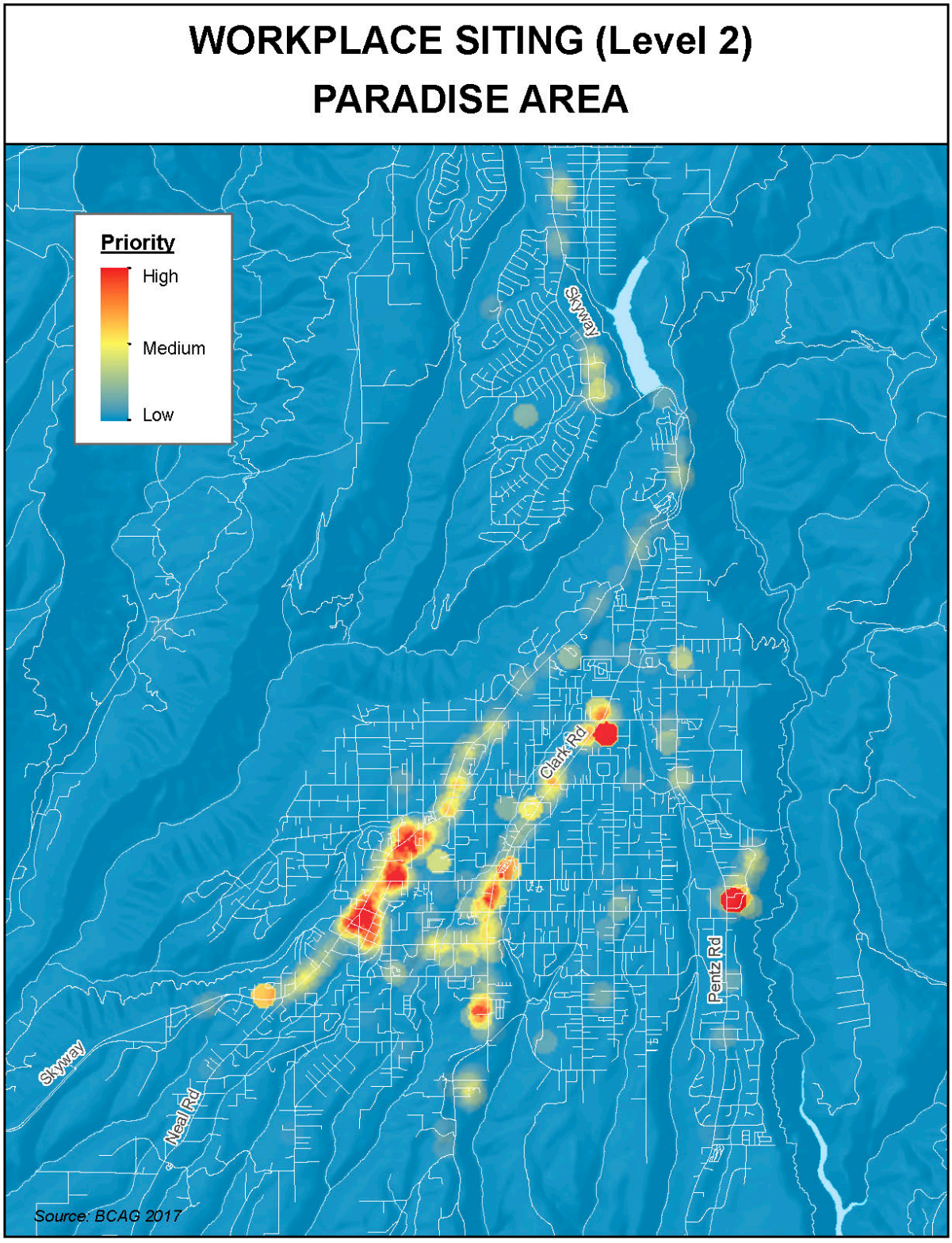


Figure 4-12. Workplace Siting (Level 2), Paradise Area



4.4 MULTI-FAMILY RESIDENTIAL PRIORITY LOCATIONS

The BCAG 2016 Regional Transportation Plan and Sustainable Communities Strategy estimates that 25% of the existing residential units within Butte County are multi-family. A driver's residence is the most frequented location for charging, however, installation of multi-family residential chargers presents unique challenges including parking and utility access, costs associated with installation and operation, and agreements between property owners and tenants.

For the purpose of the multi-family residential siting analysis, locations were prioritized based on the density of multi-family housing units within the urban areas.

Multi-family residential locations were identified and prioritized for each Butte County incorporated jurisdiction and expanded to the remaining urban area. Primary charging locations include the greatest density of multi-family residential units.

Hot spot density maps have been prepared for each urban area and locations are prioritized (high to low) based on the number of multi-family units in relation to each other, assuming these areas will attract a higher number of PEV drivers.

The data source utilized for the multi-family residential access siting was the BCAG existing land use database in GIS format. The existing land use database is updated annually and represents the best available information as of December 2016.

Figures 4-13 through 4-16 identify the priority locations within the region for multi-family residential charging stations.

Figure 4-13. Multi-Family Residential Siting (Level 2), Chico Area

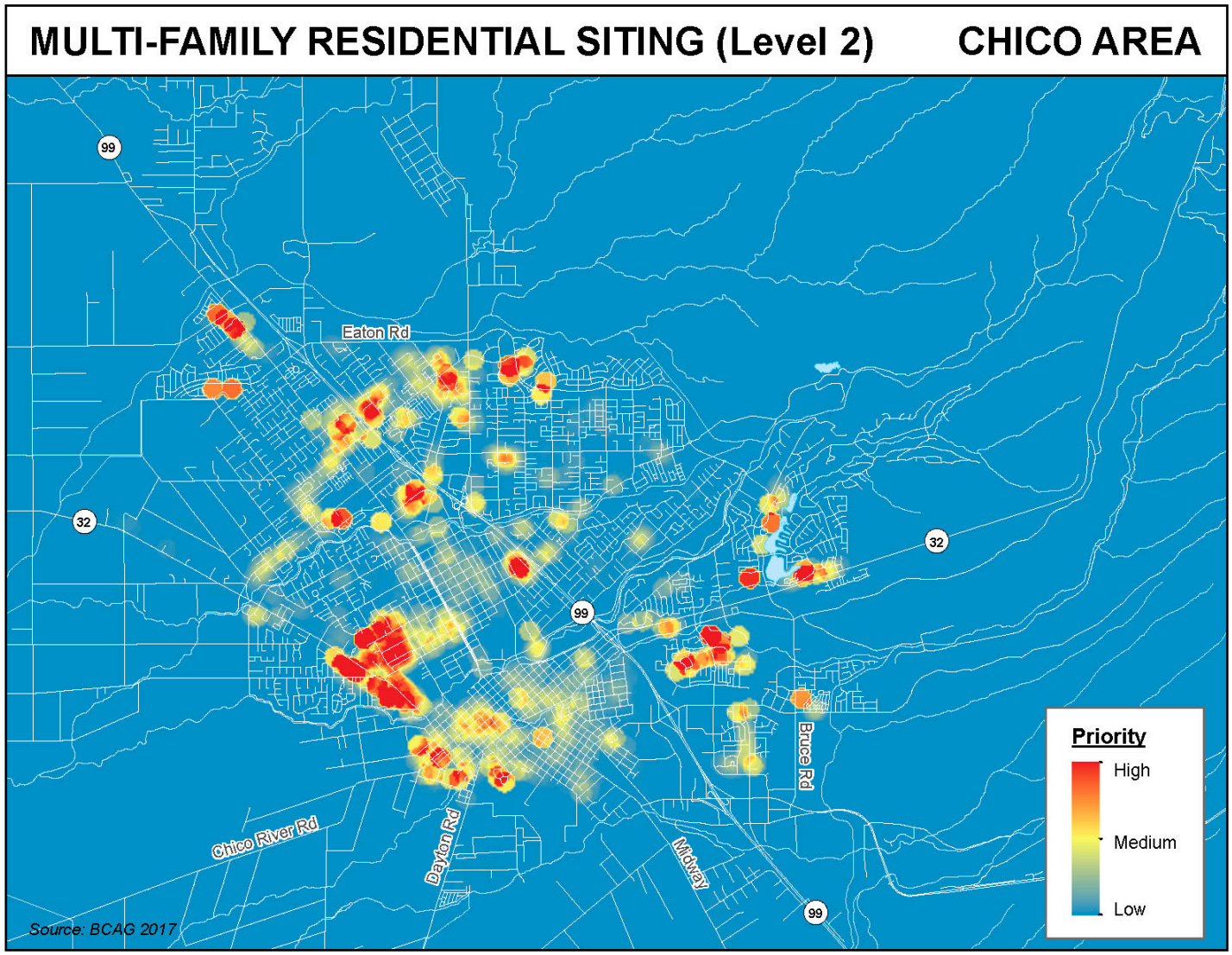


Figure 4-14. Multi-Family Residential Siting (Level 2), Gridley and Biggs Area

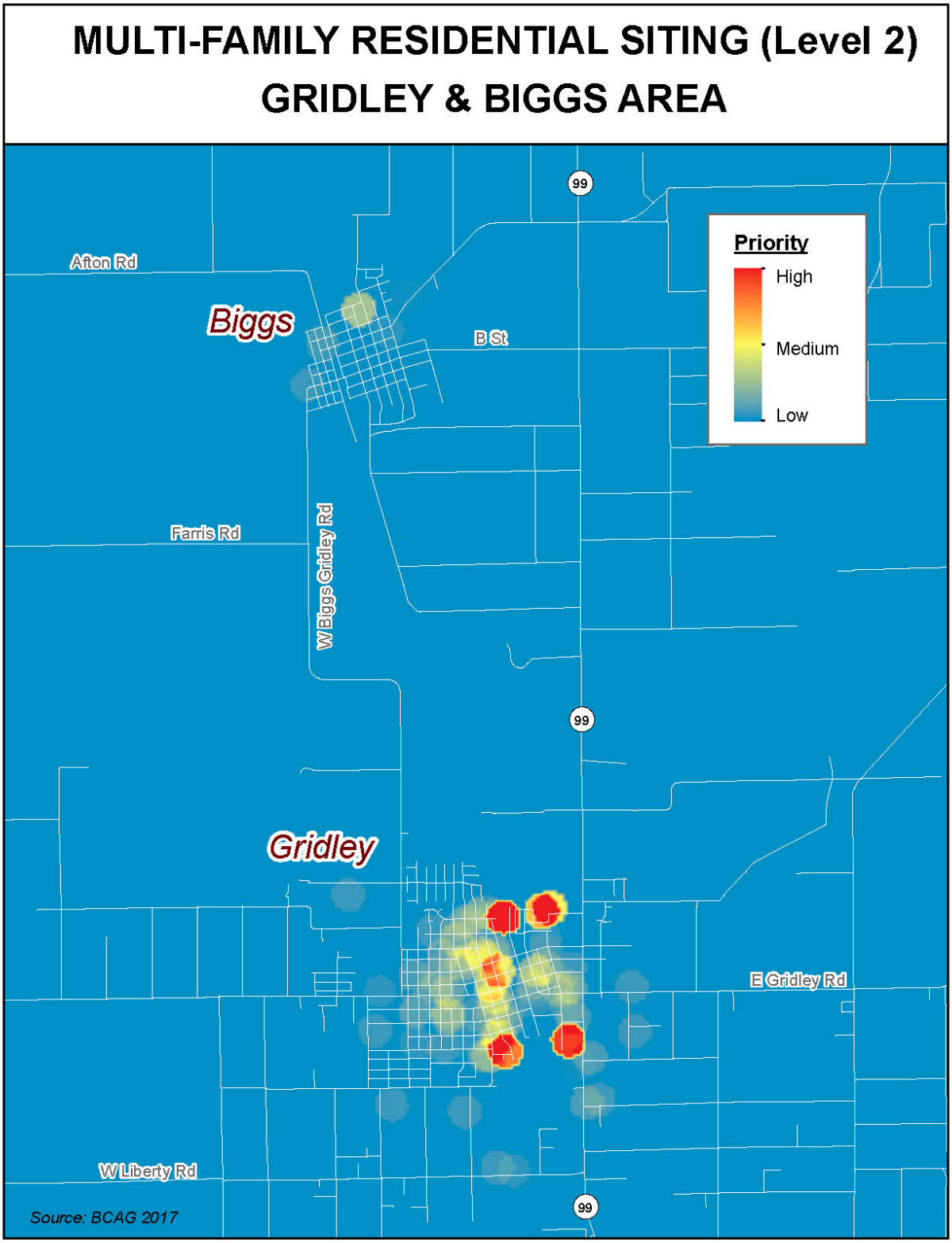


Figure 4-15. Multi-Family Residential Siting (Level 2), Oroville Area

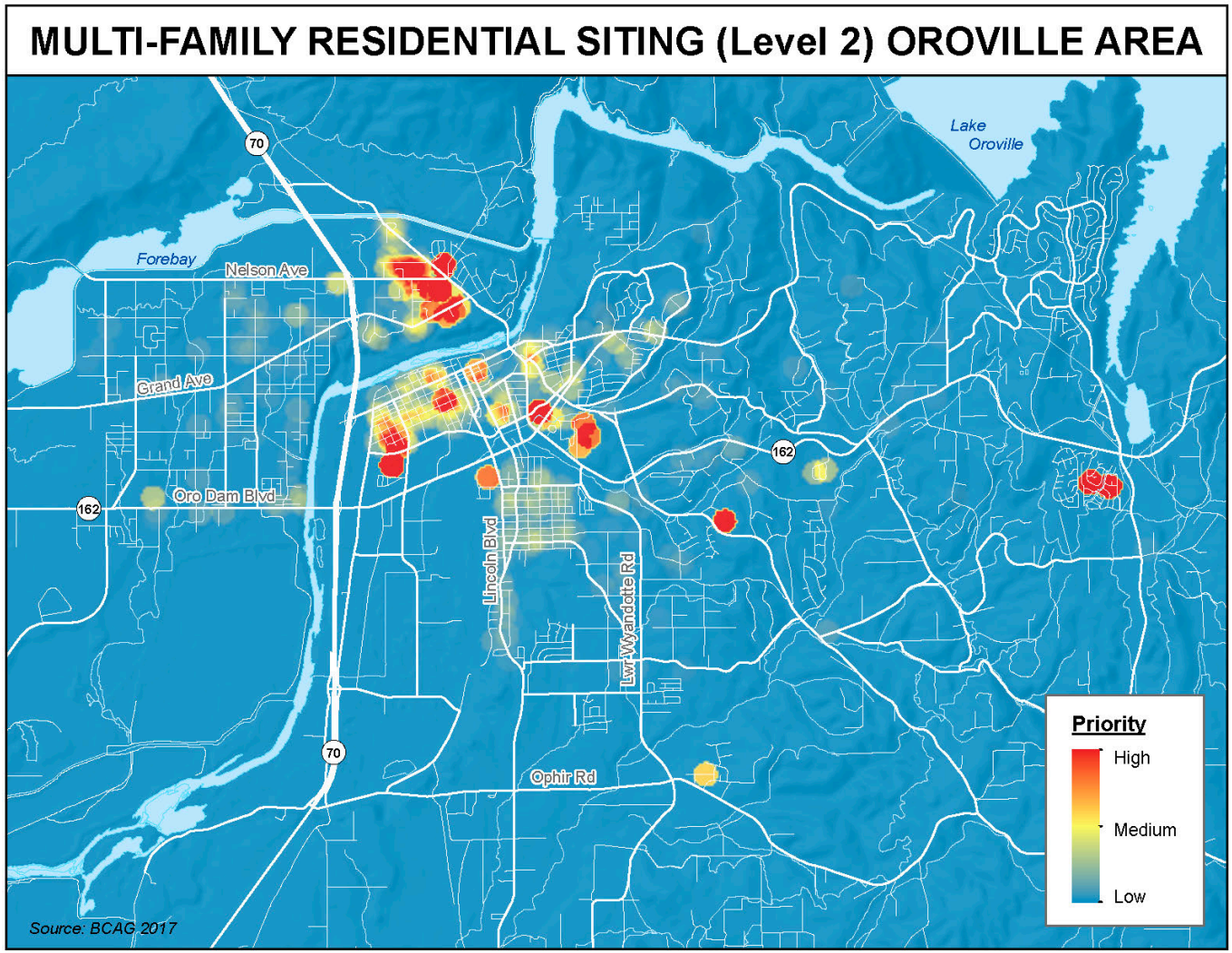
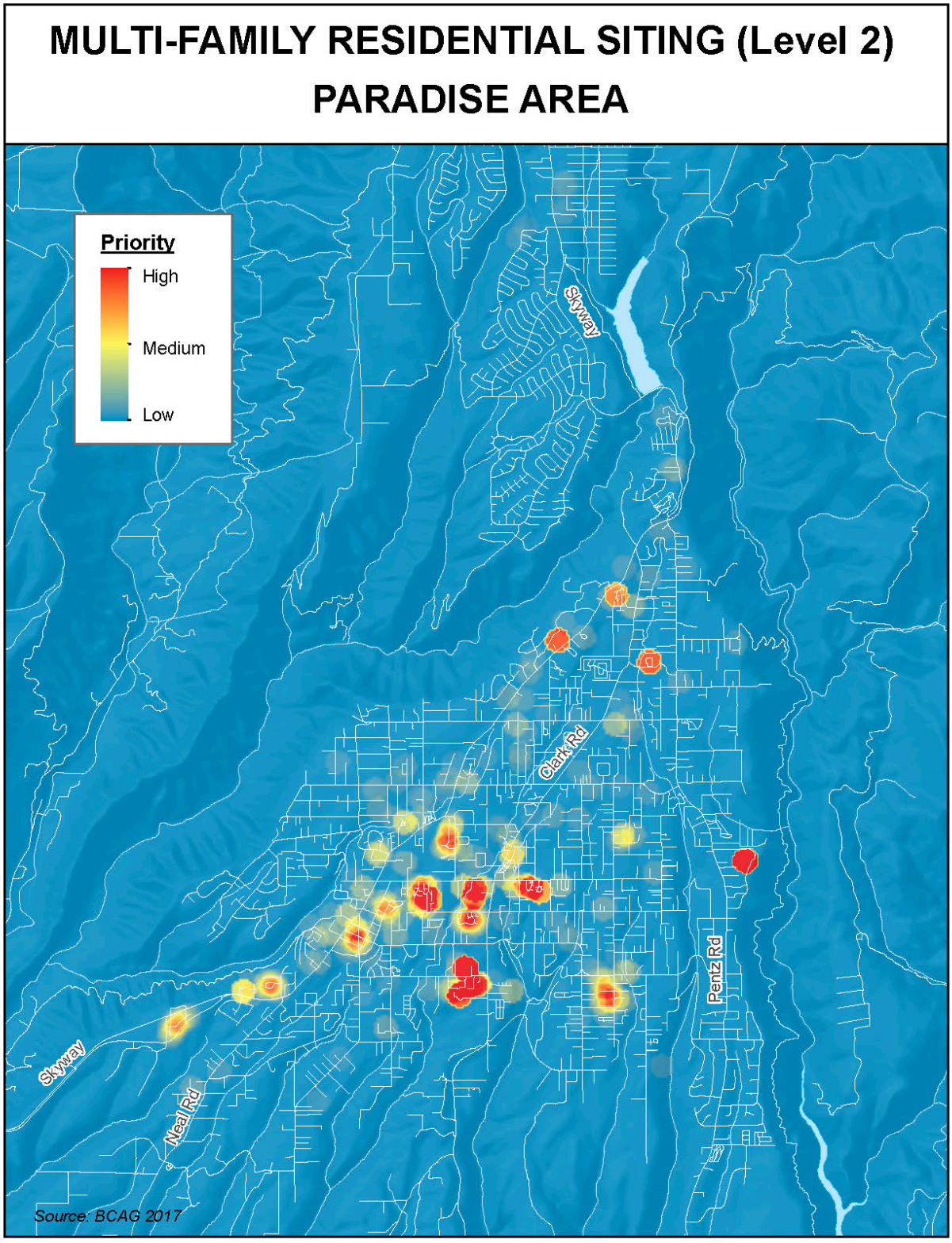


Figure 4-16. Multi-Family Residential Siting (Level 2), Paradise Area



4.5 RURAL/UNINCORPORATED PRIORITY LOCATIONS

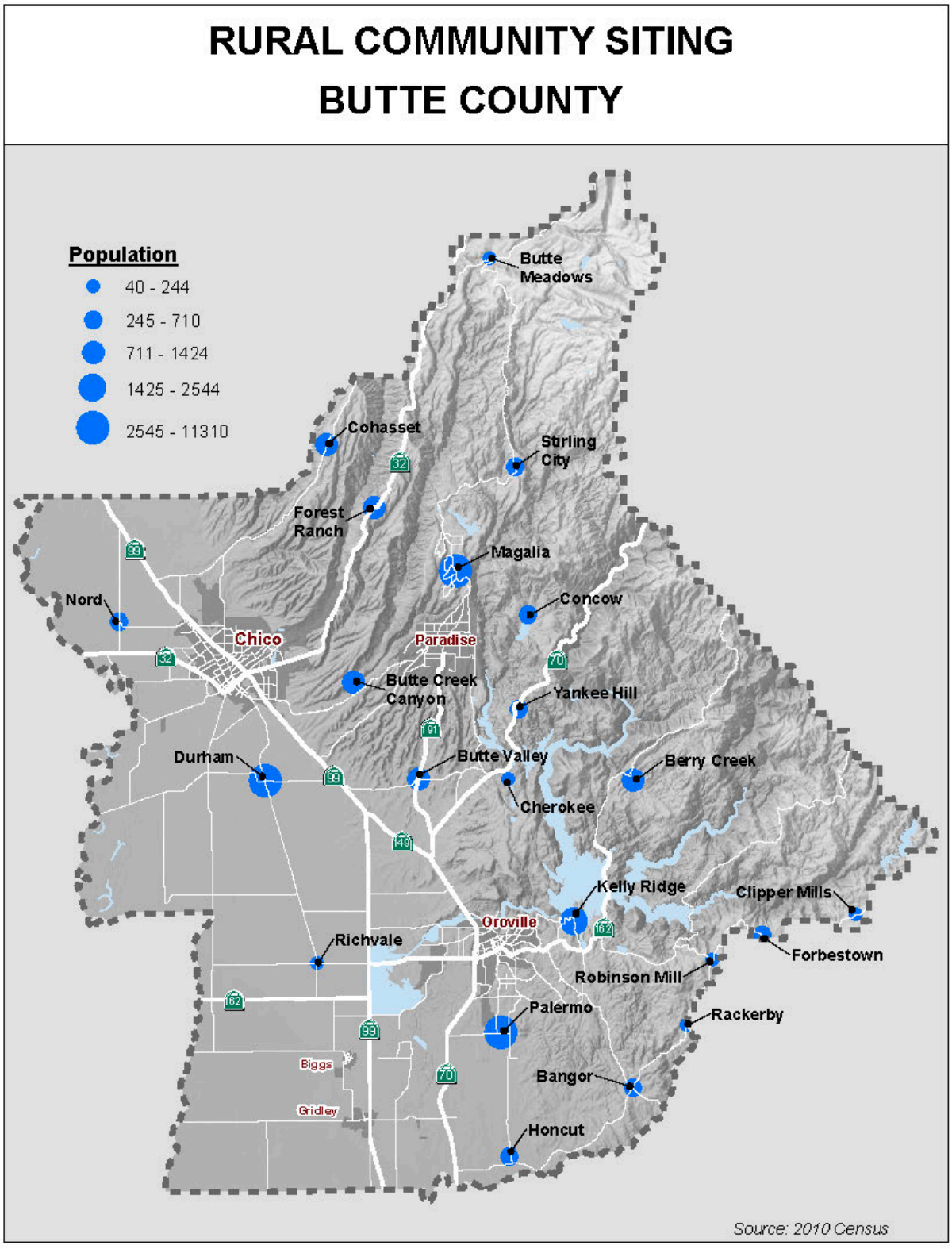
Because the regional siting plan in the previous sections focuses primarily on the urbanized areas in the region, an additional step has been taken to identify priority locations for EVSE installation in the rural, unincorporated areas (Figure 4-17).

Figure 4-17 identifies preferred locations for rural charging stations. Communities with the largest populations like Magalia, Durham and Palermo represent the highest priority locations amongst the rural communities for EVSE installation.

Within these communities, installation sites should be located within land uses that are conducive to public charging, such as retail/commercial land uses, post offices, parks, etc.

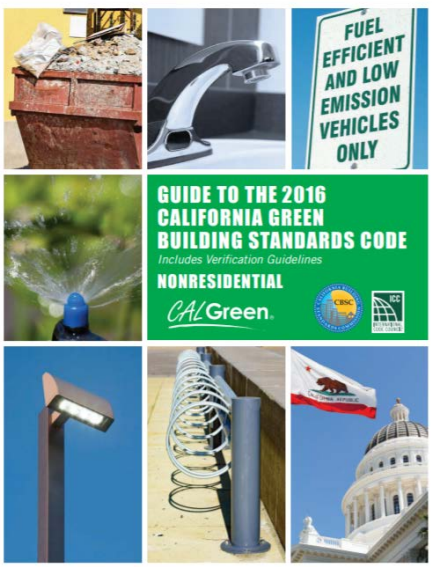
Rural unincorporated communities have unique challenges when it comes to PEV ownership including limited public charging stations, emergency evacuation concerns, and terrain and weather factors including snow and ice. PEV owners in rural areas must rely more on residential charging, and plan travel carefully to ensure their vehicles have enough charge to return home successfully from trips to urban and other outlying areas. See Section 3.3 for more information on challenges of PEV ownership in rural areas.

Figure 4-17. Rural Community Siting Map



5. BUILDING CODES

5.1 INTRODUCTION



Several building codes are currently required for Local Agencies in California to support PEV charging and future EVSE installation. There are also additional PEV-friendly building codes that are not currently required that the Local Agencies should consider implementing to encourage the further growth of PEVs in the region.

5.2 RECOMMENDATIONS FOR LOCAL AGENCY BUILDING CODES

MANDATORY PEV BUILDING CODES

The CalGreen document "*Guide to the 2016 California Green Building Standards Code"* identifies mandatory and voluntary building codes for PEVs and EVSE in California. Table 5-1 includes the CalGreen mandatory requirements for new residential and commercial construction, which generally require EV capable raceways sufficient to support EVSE installations.

CalGreen also requires that a minimum number of parking spaces be dedicated to PEVs and/or Clean Air Vehicles in multi-family residential parking lots (Table 5-1) and commercial parking lots (Table 5-2). For additional information on CalGreen building codes, see Appendix B, *Guide to the 2016 California Green Building Standards Code* and Appendix C, *Ready, Set, Charge*, Section 3.5.

Table 5-1. CalGreen Mandatory New Residential/Commercial Construction Requirements.

CalGreen Code Section	Description
4.106.4 (New Construction Only)	Mandatory Residential Requirements • New single-family and duplex: All attached private garages are "EV Capable" * • New Multi-family: 3% of parking spaces "EV Capable" * to support future PEV chargers
5.106.5.3	Mandatory Commercial Requirements • Certain # of EV spaces required per given # of parking spaces (see Table 5-2 below) • Parking spaces only required to be "EV Capable" *

*"EV Capable" = raceway and panel capacity with a label for 240V 40A service per EV space.

Table 5-2. CalGreen Mandatory New Residential/Commercial Construction Parking Space Requirements.

Total # of Parking Spaces	Total # of EV Spaces Required	Total # of Clean Air Vehicle Spaces Req'd
0-9	0	0
10-25	1	1
26-50	2	3
51-75	4	6
76-100	5	8
101-150	7	11
151-200	10	16
201+	6%	8%

In addition to the CalGreen requirements, California Assembly Bill (AB) 1236 requires that all jurisdictions must "streamline" the PEV permitting process. This bill required local jurisdictions to adopt an ordinance (by September 30, 2016 for those with resident population of 200,000 or more) with an expedited, streamlined process for permits for EVSE. Jurisdiction are free to define what this means, and how they will implement such measures. Many jurisdictions have focused on streamlining simple low-power residential installations (Level 1 and 2 charging installations). Sample ordinances and staff reports for implementing AB 1236 are available in Appendix M, *AB1236 Sample Ordinances and Staff Report*.

Other laws that address PEV charging include AB 475, authorizing local jurisdictions to require that cars located at EVSEs must be plugged into the PEV charger (see CA Vehicle Code 22511), and Senate Bill 880, which outlines rights and responsibilities of Home Owners Associations to ensure that PEV drivers are not unreasonably prohibited from installing EVSE.

NON-MANDATORY BUILDING CODES TO CONSIDER

Local Agencies should consider adopting some or all of the voluntary residential and commercial CalGreen requirements. These are included in Appendix B, *Guide to the 2016 California Green Building Standards Code* in sections A4.106.8 and A5.10.5.3.

Adopting the mandatory and voluntary EVSE requirements in Local Agency building codes can help promote and facilitate future EVSE installations and increased PEV use, and provide cost savings on future installation costs. Electrical infrastructure for charging PEVs can also be required in new industrial, public, and other non-required land uses, with sufficient size to ensure future accommodation of EVSE.

Local Agency PEV-related building code standards should also address the following issues:

- Location of EVSE, including acceptable EVSE sites on a typical property and recommended locations of EVSE relative to vehicles and electrical panels.
- Electrical and technical standards for EVSE, including construction of equipment, wiring methods, and safety protection. Relevant standards can be found in the California Electrical Code and the Underwriter's Laboratories (UL) guidance on EVSE.
- Signage and marking requirements
- Ventilation requirements
- Permitting and inspection requirements.

To facilitate the installation of EVSE by residents, it is recommended that Local Agencies develop guidance documents that summarize local building code and permitting requirements related to EVSE installations. These can be provided both online, and in hard copy form at the local agency planning counter.

An additional complimentary requirement that Local Agencies should consider is including the same infrastructure for solar systems that can be used to power PEVs, along with electrical needs of the residence.

Some municipalities have developed their own specific EVSE requirements. The City of Los Angeles' Green Building Code requires one outlet capable of accommodating a Level 2 charger in all single-family residences and townhomes, and that 5% of parking spaces in multi-family residential buildings contain Level 2 outlets. The City of Sunnyvale's Building Division requires that all garages and carports attached to single family buildings be pre-wired for Level 2 chargers, and that 12.5% of parking spaces in shared facilities at multi-family buildings be pre-wired. For more information on parking space requirements for EVSE, see Table 7-2 in Section 7.3 of Chapter 7.

6. PERMITTING AND INSPECTION

6.1 INTRODUCTION

The Local Agencies should streamline their permitting and inspection procedures to ensure a positive experience for all parties involved. Applying for a permit and waiting for an inspector can be time intensive and costly – as many as three separate visits by the installer may be required to apply for the permit, perform the work, and complete the inspection. In addition, a fourth visit by the installer is needed if the utility requires a separate inspection. All of these costs are typically passed onto the consumer.

A STREAMLINED PROCESS SHOULD BE EFFICIENT AND CONSISTENT, WHILE ENSURING SAFE INSTALLATIONS AND MINIMIZING COSTS FOR PROPERTY OWNERS

However, a variety of steps can be taken by the Local Agencies to reduce these delays and streamline the permitting and inspection processes. A streamlined process should be efficient and consistent, while ensuring safe installations and minimizing costs for property owners. Streamlined processes can also reduce complexity for all participants, allowing installers to clearly set expectations of PEV owners, providing electrical contractors with clarity on procedures and requirements, and giving Local Agency staff well-defined, repeatable actions.

6.2 RECOMMENDATIONS FOR PERMITTING AND INSPECTION BEST PRACTICES

The process of installing charging equipment involves several steps, some of which add time and could potentially discourage potential new PEV owners. Streamlining the processes for receiving local agency permits, as well as the inspection process, will provide benefits to all parties, particularly as the number of new PEV owners continues to grow.

STREAMLINE EVSE PERMITTING PROCESS

As noted in Chapter 5, California Assembly Bill (AB) 1236 requires that all jurisdictions must "streamline" the PEV permitting process. This bill required local jurisdictions to adopt an ordinance (by September 30, 2016 for those with resident population of 200,000 or more) with an expedited, streamlined process for permits for EVSE. Jurisdiction are free to define what this means, and how they will implement such measures. Many jurisdictions have focused on streamlining simple low-power residential installations (Level 1 and 2 charging installations). Sample ordinances and staff reports for implementing AB 1236 are available in Appendix M, *AB1236 Sample Ordinances and Staff Report*.

Table 6-1 below identifies recommendations for streamlining the EVSE permitting process.

Table 6-1. Recommendations for Streamlining EVSE Permitting Process

Recommendations for Streamlining EVSE Permitting Process
1. Implement online permitting. Local Agencies should enable homeowners and licensed contractors to submit PEV charger permit applications online for installations at a pre-determined complexity level to reduce the number of time-consuming trips to the local agency permitting office.
2. Provide online information describing EVSE requirements. Local Agencies should provide information on their websites describing EVSE requirements. Additional outreach material should also be considered including general information on PEV benefits and types, available EVSE options and other helpful PEV resources to prepare homeowners and licensed contractors for the permitting process.
3. Prioritize EVSE permitting. To promote adoption of PEVs, Local Agencies should consider prioritizing the processing EVSE permits to ensure faster turn-around time.
4. Utilize standard permit application forms and checklists. Local Agencies should adopt standardized permit application forms and checklists to streamline and simplify the permitting process. Appendix D, *Example EVSE Permit Application Forms and Checklists,* includes sample permit applications forms and checklists.
5. Establish flat fees for standard installations. Flat fees should be set for standard installations, rather than determining fees as a percentage of the overall cost of a project as is often the case. The flat fees can be recovery-based to ensure Local Agencies are able to recover all costs associated with EVSE permit issuance.
6. Eliminate plan check requirements for simple single-family residential installations. Local Agencies should consider eliminating the requirement for formal drawings for a standard installation that does not require re-wiring or panel upgrades. In many cases, a permit application and a sketch of the installation location can often be sufficient to obtain a permit.
7. Allow EVSE across different zoning classifications. Because EVSE is complimentary to many different land uses, it should be allowed across different zoning classifications (see Table 7-1, Chapter 7).
8. Consider Certain EVSE installations as either “not a project” or “exempt” from CEQA. Many simple EVSE installations can be considered exempt from CEQA. Consider other more complex EVSE installation projects as being exempt from CEQA on a case-by-case basis.
9. Count PEV charging stations toward meeting minimum parking requirements. This will help encourage the use of PEVs within a jurisdiction.
10. Consider allowing the installation of PEV charging stations as a mitigation measure for large projects. This requirement can help ensure the continued expansion of the PEV charging network.

STREAMLINE EVSE INSPECTION PROCESS

A streamlined process for inspection of EVSE installations is also needed to encourage PEV use in the region. Table 6-2 identifies recommendations for streamlining the EVSE inspection process.

Table 6-2. Recommendations for Streamlining EVSE Inspection Process

Recommendations for Streamlining EVSE Inspection Process
1. Remove inspections for simpler installations. For the most basic installations, consider simply removing the need for an inspection.
2. Consider spot inspections for simple installations. To speed up simple installations that do not require electrical systems upgrade, Local Agencies should consider adopting a process whereby registered, licensed, and appropriately-screened electricians can self-certify that they have installed equipment according to code. This is a similar approach as is commonly used for large appliances, such as electric water heaters.
3. Condense inspections and waive plan check requirements for certain complex installations. Local Agencies should consider eliminating progress inspections and waive plan check requirements for more complex installations that do not include panel upgrades or underground conduit.
4. Establish a flexible inspection request program. Establishing an EVSE inspection program that includes an online or 24-hour request system through voicemail is strongly encouraged for scheduling inspections. If possible, same-day inspections are encouraged.
5. Provide shorter inspection windows. If possible, establish 2-hour windows for site inspections to limit customer wait time.
6. Avoid requiring an electrician to be present during inspection to decrease consumer costs. This can make scheduling inspections easier, and decrease time and costs for the consumer.

For additional information, see Appendix E, *Streamlining the Permitting and Inspection Process for Plug-in Electric Vehicle Home Charger Installations.*

7. ZONING, PARKING AND SIGNAGE

7.1 INTRODUCTION

Efforts to improve, clarify and streamline zoning ordinance regulations that govern the access to and use of PEV charging infrastructure within a jurisdiction should be implemented by the Local Agencies. These zoning code provisions can encourage the appropriate placement of EVSE in various land-use designations. They can also include requirements regarding purpose, definitions, allowed uses, design and installation criteria, signage, accessibility, quantity, lighting and maintenance.

Local Agencies should specify where EVSE is allowed as an outright permitted use, or as an accessory to an outright permitted use, and if applicable, specify which EVSE (Level 1 or Level 2, DC fast charge, etc.) apply. Specifications for these criteria are located in Appendix C, *Ready Set Charge*, with recommendations in Table 7-1 below.

7.2 ZONING

Determining whether PEV charging should be a principal use or an accessory use will dictate what kind of permit and planning review process is needed. Table 7-1 below provides sample "Allowed Uses" for EVSE placement in typical zoning districts. Additional information on zoning, including sample zoning code and ordinance amendments, can be found in Appendix C, *Ready Set Charge,* in Section 3.2.

Table 7-1. Sample Zoning Districts and Allowed EVSE Uses.

Zoning District	AC Level 1 and 2 Charging Station	DC Fast Charging Station	Battery Swap Station
Low Density Residential	P-A	P-A	
High Density Residential	P-A	P-A or P*	
Mixed Use	P	P or P*	
Commercial	P	P	P
Industrial	P	P	P
Institutional	P	P	P
Recreational	P-A	P-A	

P = Permitted use, P-A = Allowed only as an Accessory to a principal outright permitted use, P* = Local jurisdictions may choose to allow DC fast charging stations as an outright permitted use or to adopt development standards applicable to high-density residential, mixed-use residential or other zoning districts.

Principal use refers to the main purpose of the site and the uses allowed, such as shops in a business district or houses in a residential district. Accessory uses are secondary to the principal use, such as a garage in a house. Accessory uses can avoid the need for additional planning review.

Level 1 and Level 2 charging can often be seen as accessory uses and therefore only need an electrical permit to install. DC fast charger installations require significantly greater electrical work, and typically require a longer planning and permitting process. The Local Agencies can clearly define PEV chargers as a permitted use, or list PEV charging directly as a principal or accessory use to better help guide planners on which permits are needed for the installation.

Local Agencies can also use the following methods to better address EVSE installation in their zoning code:

- Allow charging as an accessory use that does not require more than a simple planning clearance, as long as charging is not the primary purpose of the site.
- Allow installation of chargers as an outright permitted or accessory use as appropriate in zones that present the most significant local opportunities for PEV charging
- Require a minimum percentage of parking spaces in new construction be PEV-ready based on current and anticipated PEV demand.
- Zoning ordinances that allow charging as a permitted or accessory use should tailor any additional conditions of installation to the type of building specified in the ordinance.
- Allow developers to develop more intensively than zoning codes typically allow in exchange for more PEV parking spaces and EVSE.

Additional information on zoning, including sample zoning code and ordinance amendments, can be found in Appendix C, *Ready Set Charge,* in Section 3.2.

7.3 PARKING FOR PEV CHARGING

Zoning policies need to consider parking and signage for PEVs and EVSE sites to ensure consistency, and reduce conflicts and issues. Because PEVs take longer to "refuel" than a conventional internal combustion engine powered vehicle, areas where people tend to park for longer periods make ideal locations for EVSE installations. Providing adequate parking with clear, consistent charging facilities and signage will alleviate range concerns of existing PEV drivers, and can help encourage non-PEV drivers to "go electric", and help the region further achieve air quality and GHG emissions goals and targets. Proper planning can ensure that EVSE in public, retail, and residential locations is accessible, visible, and safe to use.

PARKING SPACE REQUIREMENTS FOR EVSE

Requirements that ensure parking spaces are available for charging equipment for PEVs help support the growth of the regional PEV market, and ensure that PEV drivers can successfully charge their vehicles when at home, work and when running errands. Codes and policies should provide clear definition of the number of spaces made available for charging PEVs (Table 7-2).

Ordinances for parking space requirements for EVSE should strive to strike a balance that achieves an appropriate amount of incentive for PEV use, while not burdening a developer or property owner with onerous, unjustified EVSE requirements.

Below are examples of state and municipal codes that include parking space requirements for EVSE that can be considered when developing local ordinances. These should be considered starting points for developing PEV parking requirements. Any requirements should allow for

consideration of an exemption if an applicant can provide reasonable evidence that alternate PEV parking and charging exists in the vicinity that can be used to reduce these requirements.

Alternatively, ordinances can be amended to require installation of certain infrastructure (e.g. conduit, wiring, junction boxes, electrical panels and circuitry) if it is determined that a charging station is not currently required, but may be desired in the future. It should be noted that the cost of installing EVSE with pre-existing wiring is one-third the cost of having to add wiring during installation. This would significantly lower the costs of installing chargers to meet increased demand in the future.

Table 7-2. Parking Space Requirements for EVSE

Source	Building or Land Use Type	Number/Percent of Spaces Dedicated to PEV Charging
CALGreen	One-and two-family dwellings	1 per dwelling unit
CALGreen	Multifamily dwellings	3% of all spaces; at least one space
CALGreen	Nonresidential	2% (varies by size of lot)
CALGreen	Nonresidential	10-12% (varies by tier and size of lot)
City of Sunnyvale	Single-family dwellings	1 per dwelling unit
City of Sunnyvale	Residential developments with common shared parking	12.5% of all spaces
City of Emeryville	Multifamily residential with 17+ parking spaces	3% of all spaces
City of Los Angeles	Residential with common shared parking area	5% of total number of parking spaces
City of Lancaster	New multifamily projects with 10 dwelling units or less	20% of total parking spaces
City of Lancaster	New multifamily projects with 10 dwelling units or more	10% of total parking spaces
Mountain House	New houses and buildings	220 voltage electrical outlet for recharging PEVs required in each garage

Adapted from the Bay Area and Monterey Bay Area Plug-in Electric Vehicle Readiness Plan (2012) and San Joaquin Valley PEV Readiness Plan 2016.

SITING AND DESIGN GUIDELINES FOR PEV CHARGING STATIONS

Proper siting and design of PEV charging stations can ensure easy use by PEV drivers if developed correctly. Before deciding where to place EVSE, there are several factors to take into account:

- The source of electricity and location of electrical panels/circuits
- The load level of the electrical panel and its capacity to handle the additional charging load
- The locations for disabled-accessible parking spaces for PEVs
- Placement of charging cables to reduce hazards
- Opportunity cost of parking spaces dedicated to PEV charging
- The types of parking policies to be established

For additional information on siting and design for PEV charging stations, see Appendix C, *Ready Set Charge,* Section 3.4 and Appendix E, *Accessibility and Signage for Plug-in Electric Vehicle Charging Infrastructure*.

ACCESSIBILITY REQUIREMENTS

When EVSE are provided, a certain number of stations should be accessible to those with disabilities. However, electric vehicle charging stations should not be reserved exclusively for the use of persons with disabilities – they should not be identified with signage that would mistakenly indicate their use is only for vehicles with placards or license plates for individuals with disabilities.

A PREFERRED STRATEGY IS TO CONVERT THREE STANDARD PARKING SPACES INTO TWO EVSE CHARGING SPACES – ONE THAT IS A STANDARD SPACE, AND THE OTHER THAT IS AN ACCESSIBLE SPACE

Rather, where possible, EVSE should be designed to be accessible to those with disabilities, should they need to use it, but at any time non-disabled PEV drivers are allowed to park and access the EVSE as they would any other site. A preferred strategy is to convert three standard parking spaces into two EVSE charging spaces – one that is a standard space, and the other that is an accessible space. (See Appendix F, *Accessible PEV Charging Stations*)

The Governor's Office of Planning and Research (OPR) has addressed accessibility requirements for EVSE in their document, "*Plug-in Electric Vehicles: Universal Charging Access Guidelines and Best Practices*" (Appendix G) which expands upon the California Division of the State Architect's "*Interim Disabled Access Guidelines for Electric Vehicle Charging Stations"* (Policy #97-0), dated June 5, 1997. Additional information is also provided in Appendix L, *Accessibility and Signage for Plug-in Electric Vehicle Charging Infrastructure.*

While Policy #97-03 is only applicable to facilities under the Division of the State Architect's regulatory jurisdiction, it is possible that these voluntary 2013 guidelines will eventually become regulations within *California Building Code Chapter 11B Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.*

The OPR guidelines address accessible PEV charging stations on both public and private sites and within public right of way. Table 7-3 provides OPR's guideline for the number of disabled-accessible charger spaces required.

Table 7-3. OPR Guidelines for Accessible Charger Spaces

Number of Chargers Provided at a Site	# of Disabled Accessible Charger Spaces Required
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4

7.4 SIGNAGE FOR PEV CHARGING

Signs for PEV charging should be clear, consistent and visible to ensure ease of use and reduce potential issues and conflicts. The California Manual of Uniform Traffic Control Devices (http://www.dot.ca.gov/trafficops/camutcd/) contains a series of standard signs and markings for PEV charging stations and parking stalls. Additional information on signage can be found in Appendix H, *Policy Directive MUTCD PEV Signs &Pavement Markings 2013.* For signage specific to accessible PEV charging stations, see Appendix L, *Accessibility and Signage for Plug-in Electric Vehicle Charging Infrastructure*. These resources should be used by all Local Agencies to ensure consistency of signage throughout the region. Several examples of signs for PEV charging are included below in Table 7-4.

Table 7-4. Examples of Recommended PEV Signage

Sign Example	Sign Purpose
 	PEV Charging Station Identification. Identifies charging stations, and when accompanied with arrows, assist in directing PEV drivers to charging stations from freeways, local arterial roadways, etc.
	Permissive Charging Sign. Indicates the time that charging will be available at a specific location. Many charging stations are available 24 hours a day, while other use a reduced timeframe. Establishing a time limit on charging (in this case 4 hours) helps ensure proper rotation of vehicles through a charging station. The time limit should correlate with the level of charging provided (less time permitted for a DC fast charger, more time for a Level 2 charger)

Sign Example	Sign Purpose
	No Parking Sign. Indicates no parking is allowed except for electric vehicle charging. Note that only vehicles that are actively charging are permitted to park at a PEV charging station.
	PEV Tow-Away Sign. Identifies that vehicles will be towed if not utilizing the available charging station. This sign includes the tow-away symbol with the following language: "UNAUTHORIZED VEHICLES NOT CONNECTED FOR ELECTRIC CHARGING PURPOSES WILL BE TOWED AWAY AT THE OWNERS EXPENSE".

Source: California Department of Transportation, "*California Manual of Uniform Traffic Control Devices 2014*" (http://www.dot.ca.gov/trafficops/camutcd/)

8. WORKPLACE CHARGING

8.1 INTRODUCTION

Workplaces present an important opportunity for PEV charging that can benefit both employees and employers. After residences, they are the second most important location for PEV charging. Vehicles typically have a dwell time of several hours while parked at workplaces, making it possible for them to sufficiently recharge before commuting home or making other late afternoon trips such as taking kids to practices, going shopping, or pursuing after-work recreational activities.

The ability to charge at work may also encourage PEV adoption by those that feel residential charging is cost-prohibitive or logistically difficult, particularly residents of multi-family dwellings such as apartments or condominiums where charging may simply be unavailable. If implemented properly, workplace charging can help bridge the gap between residential and publicly accessible charging.

There are many large employers in Butte County that are logical locations for EVSE installation (Table 8-1). Some of the larger employers have already installed charging stations, including California State University Chico, Enloe Medical Center and Sierra Nevada Brewing Co. in Chico, and Feather Falls Casino in Oroville. Chapter 4, Section 4.3 identifies priority locations in the region for workplace charging.

Table 8-1. Largest Employers in Butte County

Employer	# of Employees
California State University, Chico	1,000-4,999
Enloe Medical Center, Chico	1,000-4,999
Pacific Coast Producers (Canning), Oroville	1,000-4,999
Butte County, Oroville	1,000-4,999
Oroville Medical Complex, Oroville	500-999
Feather River Hospital, Paradise	500-999
Lifetouch (Photographers – Portrait), Chico	500-999
Sierra Nevada Brewing Co., Chico	500-999
Lulu's, Online Retailer, Chico	500-999

Employer	# of Employees
Feather Falls Casino, Oroville	500-999
YRC Trucking – Motor Freight, Chico	500-999
Bettendorf Trucking, Oroville	250-499
Build.com, Online Retailer, Chico	250-499
Butte Community Insurance Agency, Chico	250-499
Gold Country Casino, Oroville	250-499
National Heritage Insurance Co, Chico	250-499
Northern Ca Homes Real Estate, Paradise	250-499
Rabobank, Chico	250-499
United Healthcare, Chico	250-499
Walmart, Chico	250-499
Walmart, Oroville	250-499
Wil-ker-son Ranch and Packing Co, Gridley	250-499

8.2 BENEFITS OF WORKPLACE CHARGING

Workplace PEV charging offers many benefits to employees, employers and building owners (Tables 8-2 and 8-3). For a project to be successful, it is important for all parties to understand these benefits.

Table 8-2. Workplace Charging Benefits for Employees

Benefits for Employees
Range Security: The ability to charge at work can help alleviate "range anxiety", a driver's uncertainty about the vehicle's ability to reach a destination before depleting the battery's charge. Many workers also have after-work responsibilities and activities that require additional miles of driving, making workplace charging an extremely valuable asset to them.
Range Extensions: Charging at the workplace can potentially double daily all-electric driving range, accommodating longer commutes and additional trips between the workplace and meeting locations, site inspections, etc..
Greater Flexibility: By extending range, workplace charging opens up options drivers might not otherwise have, making it easier to manage special circumstances, unexpected meetings or inspections, and unexpected changes in plans or schedules. If an urgent meeting suddenly arises in a neighboring town or city, workplace charging can provide the missing link to allow such trips to be made and alleviate employee stress. Workplace charging also provides flexibility in the location and timing of charging, which may be helpful for drivers whose residential charging options are somewhat limited, inconvenient, or even nonexistent.

Benefits for Employees
Increased Incentive for PEV Adoption: The ability to charge at work may provide the encouragement and assurance an employee needs to make the switch from a conventional vehicle to a PEV, and to take advantage of the financial and environmental benefits of such a switch.
Thermal Preconditioning: On very hot or cold days, workplace charging allows PEV drivers to achieve a comfortable cabin temperature and to preheat or precool the battery while the vehicle is still plugged in. This extends the vehicle's range by reducing the climate-control load on the battery. Preconditioning can also help extend battery life*.

Table 8-3. Workplace Charging Benefits for Employers and Building Owners

Benefits for Employers and Building Owners
Employee Recruitment and Retention: The availability of charging sends the message that an organization stays on the leading edge of technological development, even to workers who don't drive PEVs. And employers that offer charging may be better positioned to attract and retain employees who do drive PEVs
Furthering Sustainability Goals: The availability of PEV charging can be a strong addition to an organizations larger portfolio of sustainability practices, especially if the organization has existing objectives related to employee commuting practices, transportation air quality emissions reduction goals, or greenhouse gas reduction targets in climate action plans or sustainable community strategies.
Public Image: Providing workplace charging can help demonstrate an organization's leadership in supporting cutting-edge, clean transportation technologies to customers, consumers, and the surrounding community.
Employee Satisfaction: Workplace charging can be an attractive addition to an organization's existing employee benefits package.
Tenant Attraction and Retention: Building owners that offer workplace charging at their facilities convey an image that they are interested in providing smart, proactive solutions for tenants' present and future needs.

**National Renewable Energy Laboratory (2012). NREL Reveals Links Among Climate Control, Battery Life, and Electric Vehicle Range.*

8.3 EVALUATING AND PLANNING FOR WORKPLACE CHARGING

The successful implementation of workplace charging often requires careful planning to address potential challenges, and ensure a project is successful in meeting the unique physical, cultural, and organizational needs of each workplace.

FACILITIES OWNERSHIP CONSIDERATIONS

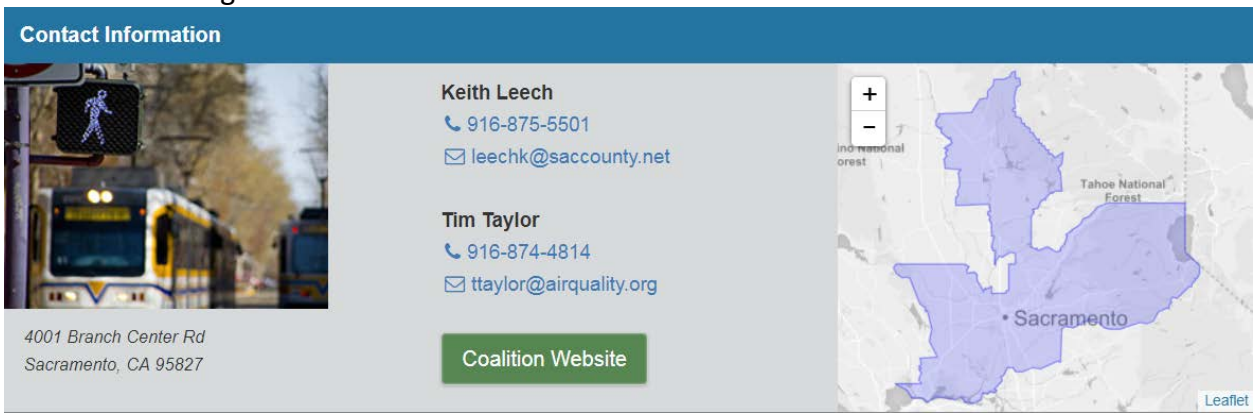
Implementing PEV workplace charging is easiest when the employer owns and operates its facility. Planning and installation will be a more straightforward process if the employer has

total control of real estate, including the affected parking area(s), building(s), and electrical infrastructure.

Planning and installation may be more complex when multiple stakeholders are involved. For example, a business may lease office space in a building that is owned by one entity, operated and maintained by another entity, with a parking facility operated by yet another entity.

For assistance with evaluating the scope of a workplace charging project in Butte County, organizations should contact the Sacramento Clean Cities Coalition, who work with vehicle fleets, fuel providers, community leaders, and other stakeholders to reduce petroleum use in transportation (Figure 8-1).

Figure 8-1 Sacramento Clean Cities Coalition Contact Information



More information on Sacramento Clean Cities Coalition:
http://www.cleancitiessacramento.org/

IDENTIFYING KEY STAKEHOLDERS

As PEV ownership increases, organizations will likely find that employees will drive the conversations for installing workplace charging stations. In small organizations and businesses, informal discussions are often all that's needed to determine whether the organization should explore the possibility of adding workplace charging. However, medium and large employers may need to follow more formal processes and protocols.

Typically, key decision makers include a management-level designee, a sustainability lead, the building owner (if different from the employer), the parking lot operator (if different from the employer), facilities operations staff, human resources staff, and legal counsel. Employers and employees with complex building ownership and/or parking arrangements should engage all relevant stakeholders to ensure that EVSE planning, installation, and operations take all parties' interests and needs into account. See Figure 8-2 for more detail about relevant stakeholders and their roles and needs.

EVALUATING EMPLOYEE DEMAND

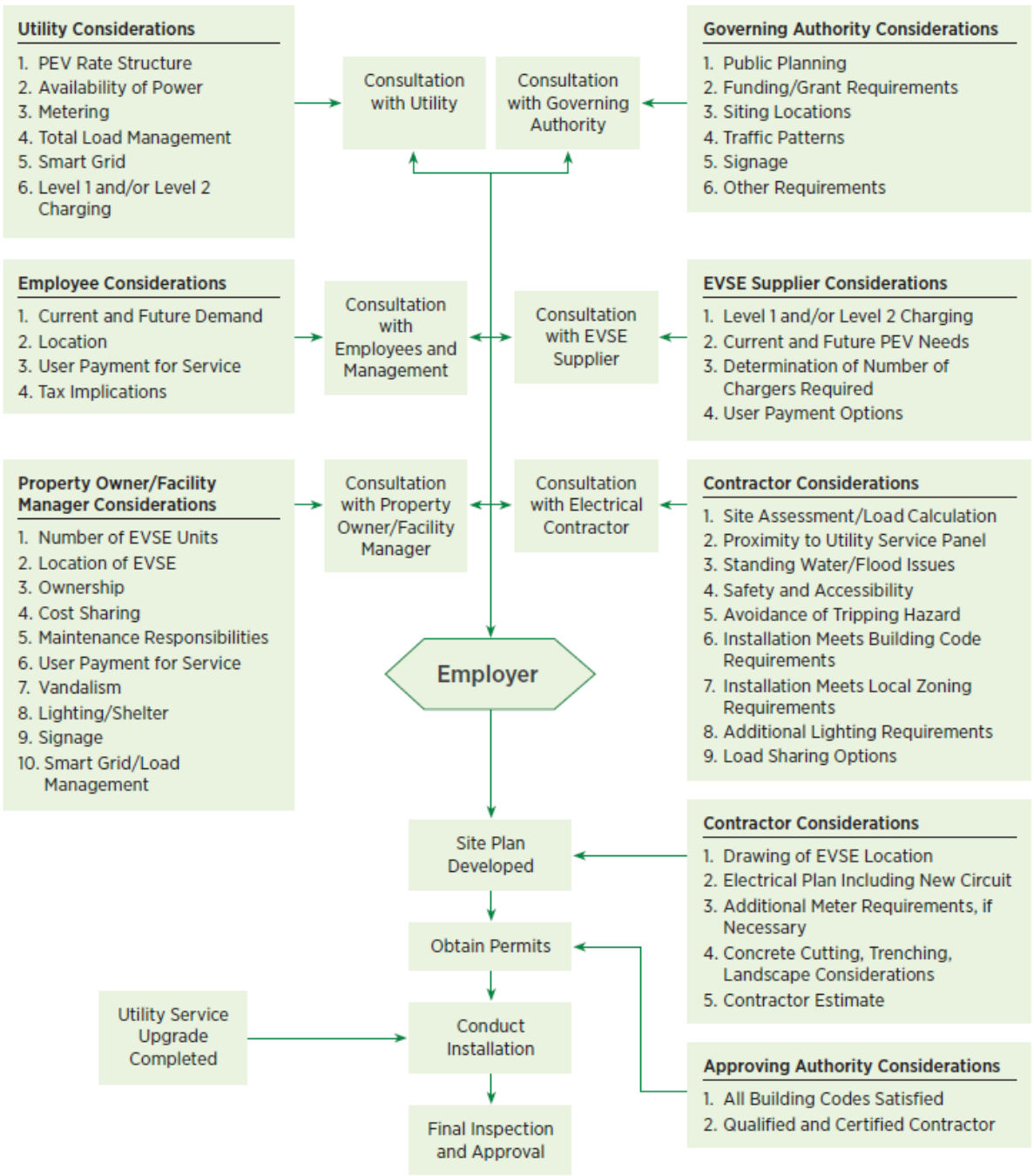
Medium and large employers often find it useful to gauge potential employee demand for workplace charging before committing the time, money and energy to such a project. Employee surveys can be useful for this purpose. A survey should not only assess existing demand, but also help predict future demand.

Possible survey questions include:

1. If you drive to work, how far is your trip (one-way)?
    a. Less than 10 miles
    b. 10–25 miles
    c. 26–50 miles
    d. More than 50 miles
2. During the workday, what is your usual travel pattern?
    a. I stay at the worksite and do not move my vehicle
    b. I leave the worksite and move my vehicle once per day
    c. I leave the worksite and move my vehicle more than once per day
3. Do you drive a PEV, or are you considering acquiring one in the future?
    a. I already drive a PEV
    b. I'm considering acquiring a PEV within six months
    c. I'm considering acquiring a PEV within 12–24 months
    d. I'm considering acquiring one but not sure when
    e. I'm not considering a PEV for personal use
4. Do you have the ability to install PEV charging equipment at your residence? (Y/N)
5. Do you think we should install PEV charging stations for employees? (Y/N)
6. If charging stations were available at work, would you use them? (Y/N)
7. Would you be willing to pay a fee to use a charging station at work? (Y/N)
8. Would availability of workplace charging increase the likelihood that you would consider a PEV? (Y/N)
9. Are you interested in participating in an employee task force on workplace charging? (Y/N)

See Appendix I, *Workplace Charging Sample Survey* for additional sample employee surveys for workplace charging.

Figure 8-2. General Procedure for Implementation of Workplace Charging.



Source: U.S. Department of Energy, Clean Cities. Adapted from: eTec (2010). Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene. EV Project publication (theevproject.com/documents.php).

The organization's decision-makers should evaluate survey results to help determine the number of charging stations that may be needed. Employers should allow for the possibility of future expansion when developing their workplace charging plans. This may include upgrading a facility's electrical service beyond what is necessary for short- term demand.

SELECTING A LEVEL OF CHARGING FOR YOUR WORKPLACE

When determining which type(s) of charging equipment to provide at your workplace, important considerations include EVSE system cost, proximity of electricity service to parking areas, potential electrical upgrade requirements, EVSE security, and potential maintenance. Perhaps most importantly, employers must take into account the commuting distances of their employees.

Level 2 charging (providing 10 to 20 miles of range per hour of charging) at the workplace can provide PEV drivers with a high level of range security, and are the most commonly installed EVSE at workplaces. A single Level 2 EVSE unit could potentially serve multiple vehicles throughout the day, as long as each PEV driver makes room for another after charging is complete.

Many available mobile applications notify PEV drivers when their batteries are fully charged. Employers must consider whether it is feasible for employees to take the time to move their cars during the work day. A company charging policy can help ensure employees move their vehicles from the charging location once charging is complete.

Level 1 charging (providing 2 to 5 miles of range per hour of charging) is also a viable option, given that PEV drivers are likely to be parked at work for several consecutive hours, and that PEVs used for commuting will most likely have a partially charged battery when they arrive at the workplace. Because Level 1 EVSE can be as simple as a three-pronged extension cord and a standard electrical outlet on a dedicated branch circuit, implementing Level 1 charging is a relatively easy and low-cost strategy to rapidly expand EVSE infrastructure at workplaces.

Using Level 1 as a stepping stone, a business can gain experience and information about how its employees are using workplace charging and gauge employee satisfaction with Level 1 EVSE. The business can then use that information to determine whether to provide faster charging options in the future.

There are many different manufacturers that offer EVSE, and product offerings vary in the types of features they include and the corresponding prices. Level 1 equipment ranges in cost from $0 to $500. The price of Level 2 equipment ranges from about $500 to $7,000 (before incentives), depending on the level of sophistication and number of stations purchased. The most basic products have only standard safety features and status lights. More advanced

products have features such as enhanced displays, charging timers, communications capabilities, keypads, and enhanced durability and ergonomics. “Intelligent” or “smart” products may have features like payment card readers, billing software, advanced displays, wireless communication, automated diagnostics, internal metering, and smart-grid compatibility and controllability.

COST CONSIDERATIONS

Employers seeking to provide workplace charging will need to consider costs associated with equipment, installation, maintenance, and electricity. As shown in Table 8-4, equipment costs for Level 1 and Level 2 EVSE range from about $0 to $7,000.

Installation costs and services vary considerably, so employers should consider obtaining several quotes before moving forward. Factors affecting installation cost (and time) include the number of circuits and EVSE units installed, indoor versus outdoor installation, required electrical upgrades, and permitting and inspection costs. If necessary for a project, trenching, replacing concrete or asphalt, and adding electrical service or panels may add the greatest cost.

Table 8-4. Levels of Charging and Cost of Equipment

Type of Charging	Power Levels (installed circuit rating)	Miles of Range per Hour of Charge	Average Cost of Equipment
Level 1 	110/120 VAC at 15 or 20 Amps	~4-6 miles/hour	$0-$500
Level 2 	208/240 VAC at 30 Amps 208/240 VAC at 40 Amps 208/240 VAC at 50 Amps 208/240 VAC at 100 Amps	8-12 miles/hour 16-24 miles/hour 32-48 miles/hour >60 miles/hour	$500-$7,000
DC Fast Charging (DCFC) 	440 or 480 VAC	~80% in <30min	Up to $55,000

Source: Ready, Set, Charge California! A Guide to EV Ready Communities. Association of Bay Area Governments, Bay Area Climate Collaborative, EV Communities Alliance, CleanFuel Connection, and LightMoves Consulting.

If an organization anticipates expanding the number of EVSE units in the future, it should consider adding extra circuits, electrical capacity, and conduit from the electrical panel to potential EVSE locations during initial installation. This is highly recommended. It is less expensive to install extra panel and conduit capacity during initial construction than to modify the site later. For the same reason, it is a good idea to consider electricity infrastructure for EVSE during the planning phases of new facilities.

A typical budget for a workplace EVSE project might include the following line items:

- EVSE unit(s)
- Contracted labor
- In-house labor
- Material/incidentals
- Equipment rental (backhoe, jackhammer, etc.)
- Sidewalk demolition and repair
- Optional EVSE equipment (e.g., card readers)
- Signage and paint
- Permitting and inspection costs
- Incentives (if available)

Typically, there are fairly few EVSE maintenance requirements, and associated costs are relatively low. Cords should be properly stored and inspected periodically for damage. Periodic EVSE inspection, testing, and preventive maintenance by a qualified technician may be recommended by the equipment manufacturer. Employers should have a clear process, budget, and schedule in place to abide by the recommendations.

Electricity costs will depend upon the type of EVSE and the extent to which it is used by PEV drivers, as well as the electricity rate structure applied to the site. Maximum potential electricity use from Level 1 EVSE will total about 4,000 kWh/year. At Level 2, use could range from 6,500 kWh to 13,000 kWh per year, depending on the vehicles using the EVSE and the electrical circuit's capacity.

Charging PEVs during peak electricity demand periods may move a customer into a higher rate category and result in higher electricity costs. However, the advanced capabilities of some EVSE products can be useful for optimizing load management. It is important to discuss the effects of PEV charging on electricity rates and loads with your utility. Ask the utility whether it offers special PEV charging rates. This is a fairly straightforward process with most utility providers due to the recent proliferation of EVSE installations.

IDENTIFYING INCENTIVES

Discounts and incentives can lower the costs associated with establishing workplace charging. Employers may be eligible for incentives from the state, city, or utility; see Chapter 10, Section 10.2 for additional information on EVSE funding sources. To find current incentives, search the

Alternative Fuels Data Center's database of federal and state laws and incentives at www.afdc.energy.gov/laws. For further information about incentives in the Butte region, contact the Sacramento Valley Clean Cities coordinator (Figure 8-1).

8.4 WORKPLACE CHARGING – MANAGEMENT AND POLICY PLANNING

It is important for employers that provide workplace charging to develop a clear internal policy that governs access, security, usage, and other issues.

ACCESS TO EVSE

Employers providing workplace charging should include internal policies that require that EVSE parking spaces are for use only by vehicles that are actively charging. If an employer adopts such a policy, parking signage should clearly indicate the requirements. The employer may decide to limit EVSE use to employees only or to allow visitor use as well. An employer or building owner may decide to place a daily limit on the amount of time a vehicle can occupy a charging space. Access policies should identify the parties responsible for enforcement. Some smart EVSE products can control access through badges or other identification systems.

REGISTRATION AND LIABILITY

Some workplace charging programs require users to register to use the equipment and sign a standard waiver of liability. A registration form could include language requiring vehicle owners to agree that the employer is not responsible for any costs related to vehicle purchase or repairs or for any damage to the vehicle that occurs while it is parked at the charging station. It could also specify a timeframe within which the employer is obligated to address maintenance issues with the charging stations upon notice of the problem.

HOURS OF USE

An employer may decide to limit EVSE use to normal business operating hours. If the employer chooses not to institute such a limitation, it should decide whether any restrictions (such as per-vehicle time limits on charging or employee-only access) are applicable outside of regular business hours.

PAYMENT FOR EVSE USE

Employers that provide workplace charging must decide whether and how employees will pay for EVSE use. Many existing workplace charging programs are free for employees. As the number of PEVs expands, providing free charging may merit reconsideration.

Some employers charge their employees a fee for using workplace charging equipment. Fees can help offset capital and operational costs associated with workplace charging and can take the form of a charge-per- use or a monthly or annual subscription rate. If an employer does decide to institute a payment system, it is important to develop a fee structure that doesn't discourage use of the EVSE. See Appendix N, *Workplace charging Station Cost Recovery Strategies* for additional information on developing fee structures for employee and general public use of PEV charging stations.

SECURITY OF EQUIPMENT

It is important for the employer and/or building owner to identify any necessary measures to prevent vandalism and theft of EVSE. The employer should also ensure that the communications and information technologies of the EVSE comply with the organization's cyber security policies

ETIQUETTE FOR SHARED EVSE

Employers should consider developing a well-defined charging etiquette policy that guides drivers in cases where the number of PEVs exceeds the number of EVSE parking spaces available. The focus of such policies is generally to encourage drivers to make room for another PEV once they have finished charging. Several solutions are shown in Appendix J, *Workplace Charging PEV Coalition* (page 14).

ADMINISTRATION OF EVSE OPERATIONS AND MAINTENANCE

Employers that provide workplace charging should designate the party responsible for ongoing operation and maintenance issues and any related costs. For example, in the case of a damaged cord, the employer's policies should clearly indicate which stakeholder should arrange for the repair and how it will be paid for.

8.5 WORKPLACE CHARGING - INSTALLATION

Many parties will be involved in the installation of workplace charging. It is important to consult with your utility, governing authority, electrical contractor, EVSE provider, and other stakeholders early in the process (Figure 8-2). Below are some of the site and equipment issues organizations must consider when installing EVSE for workplace charging. An employer should discuss these and any site-specific issues with its electrical contractor, utility, and EVSE provider, all of whom should be familiar with these topics

WORKING WITH AND ELECTRICAL CONTRACTOR

A certified electrical contractor should carry out the installation of EVSE who is familiar with the National Electric Code Guidelines found in NEC Article 625, which pertain to EVSE installation. The electrical contractor will serve as the point of contact in coordinating local permitting, inspections, utility upgrades (if needed), equipment purchasing, and installation of the EVSE. The contractor should understand the relevant codes and standards and obtain approval from the local building, fire, environmental and electrical inspecting and permitting authorities before installing EVSE. After installation, the contractor should walk through the site and review the EVSE operation with the owner of the equipment

ENGINEERING AND CONSTRUCTION

Because EVSE installations involve specialty equipment, extensive electrical work, and standard civil engineering work, select well-qualified contractors with experience in the relevant fields. The condition and location of existing electrical equipment will determine the complexity of the required electrical installations. If the existing electrical system does not

support the required EVSE input voltage range, a transformer may be required to step voltage up or down.

SIGNAGE

Signage for PEV parking spaces should clearly communicate that the spaces are only to be used by PEVs that are actively charging (See Chapter 7, Section 7.4). It can also be useful to paint the pavement of the parking space to provide an additional visual cue. In facilities where enforcement is limited or non-existent, signage may be the only deterrent against parking by drivers of conventional vehicles

9. VEHICLE FLEETS

9.1 INTRODUCTION

There are numerous public and private vehicle fleets throughout the Butte County region. Some of the larger public fleets include the County of Butte's vehicle fleet housed in Oroville, the City of Chico and Town of Paradise fleets in their respective jurisdictions, the B-Line bus fleet operated and administered by the Butte County Association of Governments in Chico, the U.S. Postal Service fleet throughout the county, and California State University, Chico's fleet near downtown Chico. Larger private vehicle fleets operating in the region include Pacific Gas and Electric (PG&E), which is headquartered in south Chico, Federal Express (FedEx) which is headquartered in central Butte County, and United Parcel Service (UPS) which is headquartered in south Chico.

PUBLIC AND PRIVATE VEHICLE FLEETS PLAY A SIGNIFICANT PART IN OUR REGION'S TRANSPORTATION EMISSIONS, AND THE SWITCH TO ELECTRIC VEHICLES AND HYBRIDS IS AN EASY WAY TO ADDRESS THE PROBLEM

Hundreds of thousands of gallons of gasoline are consumed every year from vehicle fleets, including:

- City and county police and sheriff patrols and presence at events
- Parking authority vehicles
- Park department vehicles
- Transportation services for city officials
- University service vehicles
- Package delivery services
- Fixed route transit and paratransit bus services

Public and private vehicle fleets play a significant part in our region's transportation emissions, and the switch to electric vehicles and hybrids is an easy way to address the problem. Many entities throughout the U.S. and beyond have already begun the transition, providing successful examples for others to follow. Table 9-1 identifies some of the main benefits from adding PEVs to vehicle fleets.

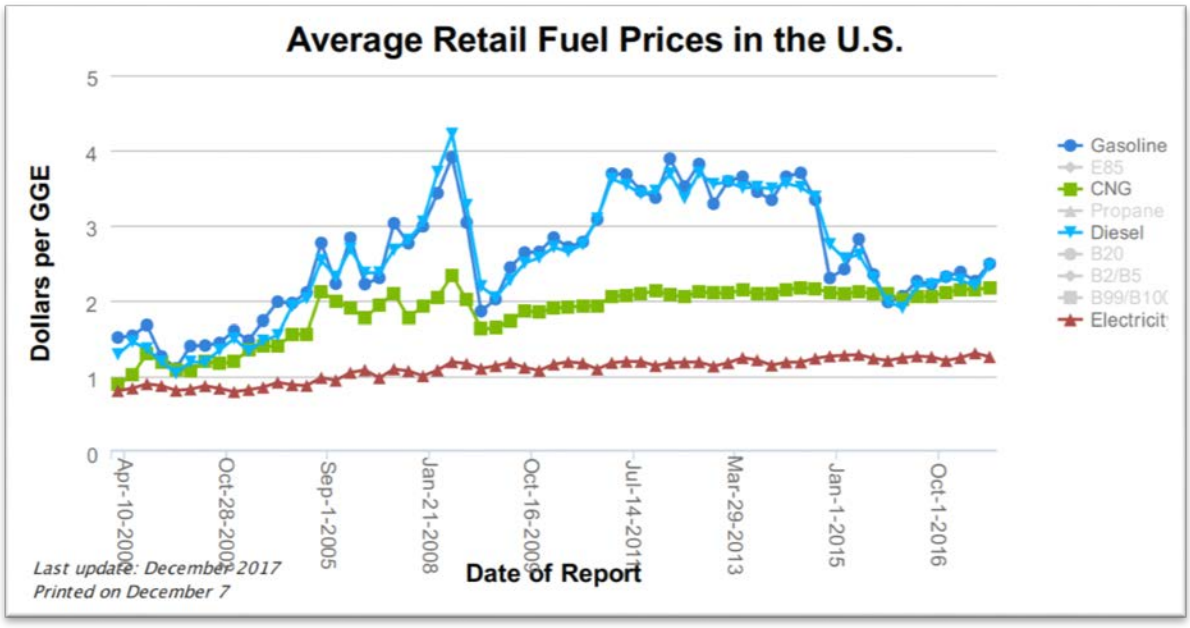
Table 9-1. Five Main Benefits from Adding PEVs to Vehicle Fleets

Five Main Benefits from Adding PEVs to Vehicle Fleets
1. Cost Savings – The City of Los Angeles, reported saving 41% for the vehicles that switched from gas engines to battery power. Compared to $0.37 for conventional city cars, PEVs would cost $0.21 to operate per mile.

Five Main Benefits from Adding PEVs to Vehicle Fleets
2. Air Quality Improvement – many vehicle fleets operate in urbanized areas where air pollution is at its worst. Putting cleaner-operating PEVs into service improves the quality of life for residents by improving air quality on city streets.
3. Reducing Noise Pollution – As our cities and communities become more crowded, noise pollution will only increase, affecting those dining at sidewalk cafes, pedestrians and sensitive wildlife. Silent PEVs create an instant impact on areas plagued by noise issues.
4. Meeting Emissions Goals – Reducing emission is a priority for all areas in California and beyond, with many agencies working towards stringent emissions reduction goals that are rapidly approaching. Converting large vehicle fleets to PEVs is a quick way to remove polluting vehicles from the roadways to get a jump start on meeting emission reduction goals.

Replacing gas-powered vehicles with PEVs in a fleet can save greatly on operations and maintenance costs. Many of the maintenance requirements of gas-powered vehicles are not necessary with PEVs; full electric powertrains never require oil changes, exhausts, air filters, spark plugs, belts, or transmission fluid. Additionally, the cost of charging PEVs compared with the price of gasoline results in substantial cost savings across the vehicle fleet. Figure 9-1 shows the cost differences between gasoline, electricity, compressed natural gas (CNG), and other fuel types.

Figure 9-1. Average Retail Fuel Prices in the U.S. (2010-2014)



Source: Alternative Fuels Data Center (https://www.afdc.energy.gov/fuels/prices.html)

9.2 GOVERNMENT SUBSIDIES

See Chapter 10 for additional funding opportunities, including the $7,500 federal tax credit for electric vehicles.

9.3 THE PLANNING PROCESS

Planning the transition to an electric fleet requires a variety of considerations. A helpful site in planning for this transition is the EV Smart Fleets website (http://evsmartfleets.com/). Created by the U.S. Department of Energy's Clean City Program, the site provides a Fleet Procurement Analysis Tool to begin the planning process. The tool provides users with information on the environmental impact and financial viability of light-duty vehicle fleet electric vehicle integration and provides side-by-side cost and emissions comparisons with differing vehicles.

Community-based social marketing campaigns and surveying fleet supervisors, city workers, drivers, and other employees, will help to identify any barriers to a PEV program. Surveys can be designed to assess things like vehicle use, comfort level, awareness, and knowledge of EV ownership.

Additionally, telematics can provide valuable data and information regarding existing vehicle fleet use, which can then be used to match the appropriate PEV types and integration strategies. Telematics and GPS fleet tracking systems provide information that helps fleet owners manage the routing and performance of a vehicle fleet. If an entity has been utilizing this technology, the data from it can be invaluable when assessing PEV integration strategies.

Evaluating vehicles currently deployed in the fleet will help to determine which PEV is the best fit for a particular vehicle fleet. Studying fuel consumption, travel patterns, driver behavior, and other metrics, can assist in an accurate selection of PEV fleet vehicles.

9.4 ESTABLISHING CHARGING STATIONS

The number of charging stations needed to accommodate a municipality's EV fleet can be determined by the number of vehicles being deployed. "Dwell time" (the amount of time a vehicle spends charging) is also taken into consideration. Estimating the amount of time that a fleet will take to charge all of their PEVs will establish where to build stations and how much electricity is needed for each (Level 1 or 2 chargers or DC fast chargers).

9.5 MEASURING PEV FLEET SUCCESS

If an entity uses telematics during the planning stages, then measuring the success of a PEV fleet is not difficult as the technology is already in place. Telematics can uniquely support the transition to PEVs because it continuously measures the success of deployment, at each step of the way. This type of technology will track metrics like:

- Electric Vehicle range
- Charging specifications
- Vehicle utilization
- Monitoring driver behavior

Detailed reporting from telematics can help an entity continuously maintain a PEV fleet to the best of its abilities.

9.6 ADDITIONAL INFORMATION RESOURCES FOR PEV FLEET ADOPTION

Additional information resources for PEV fleet adoption are identified in Table 9-2 below

Table 9-2 Additional Information Resources for PEV Fleet Adoption

Document Name/Website
Plug-in electric Vehicle Handbook for Fleet Managers, USDOE/Clean Cities
Alternative Fuels Data Center, USDOE (http://www.afdc.energy.gov/)
Plug-in Electric Vehicle Resource Center, Ca ARB (http://www.driveclean.ca.gov/pev)
California Governor's Office of Planning and Research, Zero-Emission Vehicles web page (www.opr.ca.gov/s_zero-emissionvehicles.php)
Institute for Local Government Greening Agency Fleets Resource Center (http://www.ca-ilg.org/greening-agency-fleets-resource-center)
Clean Cities 2016 Buyer's Guide (https://www.afdc.energy.gov/uploads/publication/vehicle_buyers_guide.pdf)
Clean Cities Guide to Alternative Fuel and Advanced Medium- and Heavy-Duty Vehicles (http://www.afdc.energy.gov/uploads/publication/medium_heavy_duty_guide.pdf)
Light-Duty Alternative Fuel Vehicle Search (http://afdc.energy.gov/vehicles/search/light/)
Heavy Duty Alternative Fuel Vehicle and Engine Search (http://www.afdc.energy.gov/vehicles/search/heavy)

9.7 RECOMMENDATIONS FOR NEXT STEPS

All public and private sector entities who operate vehicle fleets should consider phasing out older gasoline powered vehicles with electric vehicles. There are consultant groups available to help entities make this transition. Working with a consultant adds an additional, sometimes significant expense, but entities have found that the extra cost can be worthwhile as consultants can make the transition easier for fleet managers by providing the needed data and statistics to ensure a successful fleet conversion.

10. PEV AND EVSE COSTS AND FUNDING OPPORTUNITIES

The expanding market for PEVs is resulting in many options for consumers to choose from when purchasing a PEV or installing EVSE at home, at a workplace, or a publicly accessible site. Costs have generally decreased over the past five years, while funding opportunities have expanded, creating a perfect environment for new PEV owners, Local Agencies and others to purchase PEVs or expand the charging network to further encourage PEV use.

10.1 PEV AND EVSE COSTS

The cost for purchasing a PEV or installing EVSE continue to decrease as technologies advance and the number of producers continues to expand. Below are typical costs associated with PEVs and EVSE installations.

PEV COSTS – PURCHASING AND CHARGING

The market for Plug-in Electric Vehicles in the U.S. continues to expand. Table 10-1 below shows a sampling of typical costs for new PEVs in the U.S.

Table 10-1. Costs for New PEVs in the U.S.

PEV	Cost	Battery	Range	
2017 BMW i3	$43,395	22-33kWh	81-114 miles	
2017 Chevy Bolt EV	$37,495	60kWh	238 miles	
2017 Ford Focus Electric	$29,995	33.5kWh	115 miles	
2017 Nissan Leaf	$31,545	30kWh	107 miles	

PEV	Cost	Battery	Range	
Tesla Model X	$90,000-$140,000	75-100kWh	238-315 miles	
Tesla Model 3	$35,000-$55,000	50-75kWh	220-310 miles	

Source: Green Car Reports (http://www.greencarreports.com/news/1080871_electric-car-price-guide-every-2015-2016-plug-in-car-with-specs-updated).

The costs associated with charging PEVs varies by charging location and electrical rates. Many public and workplace charging stations provide electricity free of charge; for example, Tesla charging stations are free to Tesla vehicle owners.

According to Plug-in America, the average person driving the average PEV 15,000 miles per year pays about $540.00 per year to charge it (see https://pluginamerica.org/how-much-does-it-cost-charge-electric-car/), whereas a person driving an ICE vehicle and paying $2.35/gallon (average cost of regular gasoline in the U.S. over the past 2 years) would pay $1,400 per year. In general, the cost for "fuel" is about one-third less for PEVs, representing a significant cost savings for consumers.

EVSE COSTS – INSTALLATION AND MAINTENANCE

Installation of EVSE can vary according to charger type, location, and the amount of electrical work and trenching necessary to complete the installation. Table 10-2 shows typical costs associated with EVSE installation and represent ballpark costs that can be used for planning purposes.

Table 10-2. Typical EVSE Installation Costs

Cost Type	Level 2 Home Costs	Level 2 Parking Garage Costs	Level 2 Curbside Costs	DC Fast Charging	Description/Key Assumptions
Charge Station Hardware	$450-$1,000	$1,500-$2,500	$1,500-$3,000	$12,000-$35,000	Costs can change depending on number of chargers purchased; incentives available to reduce costs.
Electrician Materials	$50-$150	$210 - $510	$150-$300	$300-$600	$1.50-$2.50/ft for conduit and wire, plus misc. other materials.

Cost Type	Level 2 Home Costs	Level 2 Parking Garage Costs	Level 2 Curbside Costs	DC Fast Charging	Description/Key Assumptions
Electrician Labor	$100-$350	$1,240-$2,940	$800-$1,500	$1,600-$3,000	$500-$1,000 if new breaker is required. Assume 2x electrical cost for Level 3 DCFC.
Other Materials	N/A	$50- $100	$50-$150	$100-$400	$25-$1000/ft for trenching/boring depending on surface, soil, and underground complexity. Mounting, signage, protection bollards, and restoration also included here, but usually only adds a few hundred dollars.
Other Labor	N/A	$250-$750	$2,500-$7,500	$5,000-$15,000	
Transformer	N/A	N/A	N/A	$10,000-$25,000	480V transformer installed by utility.
Charger Installation	$50-$200	$250-$500	$250-$500	$600-$1,200	Home: 1-3 hours of electrician time for a typical home installation. Public: $250-$500 of time for 1-2 electricians and other labor. Work can usually be completed in a single visit.
Permitting	$0-$100	$50- $100	$50-$200	$50-$200	Varies from city to city, often a flat fee for one or several stations.
Total	**$650-$1,800**	**$3,550-$7,400**	**$5,300-$13,150**	**$29,650-$80,400**	

Source: Inside EV Website https://insideevs.com/how-much-do-public-and-home-ev-charging-stations-really-cost/ (via RMI) (https://www.rmi.org/news/pulling-back-veil-ev-charging-station-costs/)

Maintenance costs of charging stations typically runs between $0 and $300 annually.

10.2 PEV AND EVSE FUNDING

Numerous federal, state and local funding sources are available to offset the costs of purchasing PEVs and installing EVSE. Several websites provide a comprehensive list of funding options available to Californians:

- California Energy Commission: The Energy Commission provides funding (grants and contracts) for alternative fuel production and infrastructure; vehicle manufacturing, demonstration and deployment; workforce training and development; and regional planning projects in California, primarily through a competitive solicitation process. http://www.energy.ca.gov/contracts/transportation.html#GFO-16-603
- California Air Resources Board; The Air Quality Improvement Program provides funding for clean vehicle and equipment projects, research on biofuels production and the air quality impacts of alternative fuels and workforce training. https://www.arb.ca.gov/msprog/aqip/aqip.htm

- DriveClean.ca.gov: Provides information about rebates, discounts, tax breaks and other incentives available for clean technology vehicles. https://www.driveclean.ca.gov/Calculate_Savings/Incentives.php
- FundingWizard: A California Air Resources Board website, search this website for PEV funding opportunities. https://fundingwizard.arb.ca.gov/
- Alternative Fuels Data Center; Learn about federal and state incentives for PEVs. https://www.afdc.energy.gov/

Table 10-3 below summarizes programs for incentives and funding opportunities for both PEVs and EVSE. These programs are subject to change. For the most up-to-date information, visit the Plug-in Electric Vehicle Collaborative Resource Center at: http://www.pevcollaborative.org/resources.

Some of the Local Programs shown below don't apply to areas in Butte County, but are shown to demonstrate what other areas are doing locally to promote PEV use, which can be replicated in Butte County.

Table 10-3. Incentives and Funding Opportunities

Programs	Description	Amount	Eligibility
Federal Programs			
Plug-in Electric Vehicle Tax Credit	A tax credit for the purchase or lease of a new PEV, ZEV, PHEV, ZEM or NEV	$2,500 - $7,500	Individuals
Fuel Cell Vehicle Tax Credit	A tax credit for the purchase of a new light-duty FCEV; credits are based on vehicle weight	$4,000 - $40,000	Individuals
Low Speed, 2/3 Wheel PEVs Tax Credit	Tax credit for low speed and 2/3-wheel vehicles	10% of Vehicle $2,500 Limit	Individuals
Employee Corporate Incentives	Private companies and organizations offering employees assistance with purchasing new ZEVs	$1,000 - $5,000	Individuals
Alternative Fuel Vehicle Refueling Property Credit	A 30% tax credit is allowed for any qualified alternative fuel vehicle refueling property	$1,000 - $30,000	Individuals/Property Owners
State Incentive Programs			
Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act			
Clean Vehicle Rebate Project	Available rebate for ZEVs, PHEVs, NEVs and ZEMs	$900 - $2,500	Individuals/Private Fleets/Public Fleets/ Nonprofit Fleets

Programs	Description	Amount	Eligibility
California Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project	Vouchers to help fleets reduce the initial costs of converting fleets to PHEVs and ZEVs	$8,000 - $45,000	Public/Private Fleets
Hybrid Off-Road Equipment Pilot Project	Vouchers to integrate hybrid off-road construction vehicles into California	$28,500 - $75,000	Public/Private Fleets
Air Resources Board Grant Programs			
Enhanced Fleet Modernization Program	Voluntary retirement of passenger or cargo trucks with a vehicle weight rating of 10,000 pounds or less	$500 - $1,500	Individuals/Private Fleets
Carl Moyer Program	Program implemented through local air districts. Limited funding opportunities for zero-emission on-road and off-road heavy-duty vehicles as well as infrastructure	Up to $100,000 in Butte County	Public/Private Fleets
Good Movements Emission Reduction Program	ARB working with Local Agencies to reduce air pollution and health risks associated with heavy freight movement	Up to $50 million	Local Agencies
PLACE Program	Loans for fleets that can be used for fleet modernization, e.g., retrofitting diesel engines with emission control systems	$1 million	Private Fleets Less Than 500
Energy Commission Grants			
Alternative and Renewable Fuel and Vehicle Technology Program	Encourages the establishment of alternative transportation fuels infrastructure	$75,000 - $500,000	Public/Private Agencies, EVSE Manufacturers
Local Programs			
Residential Home Charger Rebate: Los Angeles Dept. of Water and Power	Provides rebates for residential, workplace and public customers who install Level 2 EVSE	$750 - $1,000	Residential and commercial LADWP Customers

Programs	Description	Amount	Eligibility
Southern California Edison (SCE) PEV Charging Rate	Provides rate reductions for SCE customers charging PEVs during off-peak and super off-peak hours	Peak time Rebates	SCE customers with residential PEV chargers
City of Corona Alternative Fuel Rebate Program	Money toward the purchase of a new or used alternative fuel vehicle	$1,000 - $2,000	Customers living in the City of Corona
City of Riverside Employee Rebate	Rebate for Riverside city employees to purchase new or used hybrid, PHEV, ZEV, or natural gas vehicle	$1,000 - $2,000	Employees of the City of Riverside
City of Riverside Rebate	Rebate for the purchase of a natural gas vehicle, PHEV or EV	$2,000	Resident of the City of Riverside
San Joaquin Valley Emission Reduction Incentive	Rebates for reducing emissions in light- and medium-duty vehicles	$1,000 - $3,000	Residents of San Joaquin Valley
Utility Rate Discounts			
LADWP	Discount per kWh for PEVs charged during off-peak hours and free DC fast charging	2.5 cents per kWh 500kW/month limit Free DC Fast Charging at 12+ DCFC sites	All
Pacific Gas and Electric	Discounted rate to charge BEVs, PEVs and natural gas vehicles	Variable, depending on times of use	Customers of PG&E
Southern California Edison	Discount Rate available for EV charging	7,825 cents per kWh for charging PHEVs, BEVs, electric golf carts and NEVs during off-peak hours	Customers of SCE

Programs	Description	Amount	Eligibility
San Diego Gas and Electric	Lowest time-of-use rates during super off-peak hours for EV charging and natural gas vehicle refueling	0.145 cents per kWh (currently)	Residential customers with a DMV registered EV or natural gas vehicle
Parking Incentives			
City of Sacramento	EV Parking	Free EV parking in designated spots	Individuals
City of Hermosa Beach	EVs and natural gas vehicles with identifying stickers	Free metered parking	Individuals
City of Santa Monica	All vehicles with white HOV access sticker	Free metered parking	Individuals
LAX Parking	Free charging station at lower level of parking structures 1 and 6	Free charging	Individuals
Other Programs			
Pacific Gas and Electric	Between 2017 and 2020, will install 7,500 EVSE stations in central and northern California. Request a charging station installation at a particular location by using online form. https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/charging-stations/ev-charging-infrastructure-program.page?WT.mc_id=Vanity_evcharge	Varies	All
Electrify America	Volkswagen settlement; Electify America will lead the effort to spend $800 million in California from 2017-2027 to increase PEV and alternative fuel vehicle use. Request funding using online form. https://www.electrifyamerica.com/our-plan	Varies	All

11. TRAINING AND EDUCATION

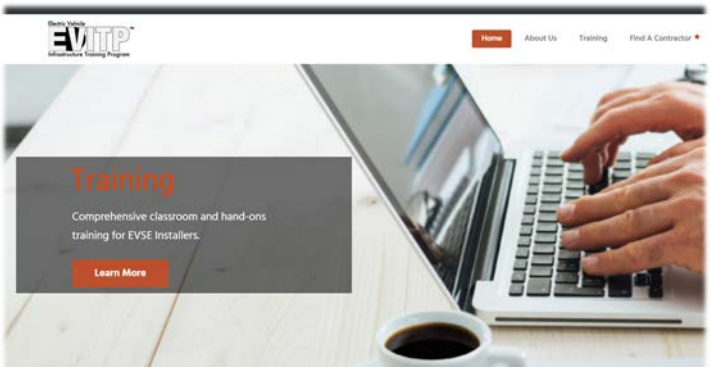
11.1 INTRODUCTION

As PEVs become more commonplace, there will be an increasing need for training and education to expand the number of industry service providers who can install EVSE and respond to the expanding market of PEV users. This chapter includes information on training and education opportunities for PEV industry service providers that are currently available.

11.2 AVAILABLE RESOURCES

There are currently numerous organizations and stakeholders leading efforts at the national, state, and regional level to develop curriculum and specialized training for electrical contractors and inspectors, workforce development training for PEV fleet technicians, public charging station owners and operators, fleet managers, dealers, and automotive shops, and first responders and other safety officials. The following is a listing of the organizations that are working to provide training opportunities

- The Electric Vehicle Infrastructure Training Program (EVITP) (www.evitp.org) - The EVITP is a 24-hour course set up to train and certify electricians throughout California to install residential and commercial scale EVSE. The training program addresses the technical requirements, safety imperatives, and performance integrity of industry partners to ensure that the equipment is properly installed and maintained, using the highest quality standards.



- Clean Cities (https://cleancities.energy.gov/working-with-us/) - At the national level, the Clean Cities program offers opportunities to industry, organizations, government, businesses, and students. The program works with both large and small organizations through partnerships, projects, and internships, as well as through its Clean Cities coalitions. Clean Cities offers internships through the Clean Cities University Workforce Development Program, which unites Clean Cities coalitions across the country with students interested in changing the future of on-road transportation. Internships with Clean Cities coalitions are available throughout the year for undergraduate (junior or senior) or graduate students studying communications, public relations, business, marketing, engineering, or environmental sciences. The Clean Cities University Workforce Development Program facilitates peer exchange and opens a direct line of education between industry experts by hosting webinars that feature current trends in

social media and best practices in the field of public relations, as well as case studies from coalitions involved in the program.

- Veloz (formerly California PEV Collaborative (www.veloz.org) -
  Veloz provides a PEV Resource Center with answers to key issues. The PEV Resource Center website targets the following audiences:
  - Vehicle Consumers and Homeowners
  - Local Government Officials
  - Fleet Managers
  - Infrastructure and Electrical Contractors
  - Emergency First Responders
  - Educators and Instructors
- Electric Power Research Institute (EPRI) – EPRI conducts research and development related to the generation, delivery and use of electricity for the benefit of the public. EPRI developed technology, policy and economic analyses to drive long-range research and development planning and to support research in emerging technologies. This includes the development of research and resource material on electric vehicles, such as installation guidelines, grid interface requirements, and life-cycle cost analysis.
- The Electrification Coalition (http://www.electrificationcoalition.org/) - A nonpartisan, not-for-profit group of business leaders committed to promoting policies and actions that facilitate the deployment of electric vehicles on a mass scale. They developed two policy reports: the fleet electrification roadmap and the electrification roadmap.
- PG&E (https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/electric/electric.page?ctx=residential) – Provides education for consumers to help increase awareness of best rate plans for home charging and the importance of coordination with the utility to ensure that the electrical grid can accommodate increased demand. Also includes an installation guide to upgrade electric service at home and a PEV electric rate calculator to estimate PG&E electricity costs for various PEV models.
- U.S. Department of Energy (https://energy.gov/eere/electricvehicles/electric-vehicles) Includes a series of training material for consumers, electrical contractors, fleet managers, and public charging stations hosts. These resources communicate benefits of PEVs and provide guidelines to installing infrastructure and maintaining PEVs.
- Ready, Set Charge, California See Appendix C, *Ready, Set, Charge* - Provides guidance to cities and counties on uniform inspection codes and PEV policy development and deployment.
- Clean Cities Training Opportunities contains additional information on training opportunities and materials (See Appendix K, *Clean Cities Training Opportunities*).

The Local Agencies are encouraged to take steps to educate elected officials and the general public of the benefit of PEVs and the availability of information regarding both PEVs and EVSE. Adding information to Local Agency websites is a good first step. Several national and state organizations are dedicated consumer advocates for PEVs and have been working to promote PEV ownership and outreach to potential and current PEV drivers to help them navigate PEV-specific ownership and operational requirements and to access available incentives and

funding. The following is a listing of established organizations that provide consumer PEV education to Local Agencies:

- Plug in America - Consumer-oriented voice in the U.S. promoting the use of electric vehicles and effective policy at the local, state and federal levels. PIA provides a range of expert assistance related to the widespread adoption of electric vehicles and conducts consumer outreach and awareness - through individual events and aggressive use of online campaigns - to connect prospective drivers to new electric vehicles now available. PIA outreach efforts include supporting National Plug-In Day, a multi-city celebration of consumer enthusiasm that brings together current and prospective drivers; the event's second year, 2012, included activities in over 60 cities. PIA maintains a consumer-focused website that provides extensive information about the emerging PEV market that features a consumer guide to new products that is updated annually and an online vehicle tracker that has the most comprehensive set of information about the products currently available in the market.
- Clean Cities and locally associated Coalitions – Clean Cities is the U.S. Department of Energy's (DOE) flagship alternative-transportation deployment initiative. Today, a nationwide network of nearly 100 Clean Cities Coalitions are working together to reduce petroleum use from the transportation sector. Clean Cities Coalitions are composed of businesses, fuel providers, vehicle fleets, state and local government agencies, and community organizations. These stakeholders come together to share information and resources, help craft public policy, consumer education and outreach, and collaborate on projects that advance use of alternative fuels. The Sacramento Clean Cities Coalition is the closest to Butte County and provides numerous resources for education and outreach.

12. APPENDICES

See project website at http://www.bcag.org/Planning/Butte-PEV-Readiness-Plan/index.html