Upstate
Plug-in Electric Vehicle
Readiness Plan

CITY OF MT. SHASTA · INCORPORATED MAY 21, 1905 ·

SISKIYOU COUNTY
ECONOMIC DEVELOPMENT

SCHATZ
ENERGY
RESEARCH
CENTER

GHD

STATE OF CALIFORNIA
ENERGY COMMISSION

PROJECT TEAM

The California Energy Commission provided the funding for this project through its Alternative and Renewable Fuel and Vehicle Technology Program, which issued solicitation PON-10-602 to provide funding opportunities for California's diverse regions to develop regional plug-in electric vehicle strategic plans.

The City of Mt. Shasta is an alpine community located in the Shasta Cascade area of Northern California. Mt. Shasta is the tourism capital of Upstate California and residents prioritize quality of life, the environment, and a strong sense of community. Further, the city has been keenly interested and has worked diligently for many years on the development of "green" technologies, businesses and practices. The city conducts government affairs in an open and creative process, and encourages new sustainable energy developments to protect the pristine outdoors for which the city is reputably known.

The Siskiyou County Economic Development Council (SCEDC) is a private non-profit organization which has a long (25 year) history of working with local and regional jurisdictions through grant administration, infrastructure development, regional planning and other economic and community development activities. The SCEDC administered the award on behalf of the PEVCC and coordinated all efforts with local municipalities.

The Schatz Energy Research Center at Humboldt State University was the technical lead on this project. SERC was founded in 1989 with a mission to promote the use of clean and renewable energy resources. Over the years SERC has been involved in extensive research, planning, design, and analysis activities for the development and implementation of sustainable energy systems, including energy efficiency, solar, wind, small hydro, biomass, and hydrogen and fuel cell technology for portable, stationary, and transportation applications.

GHD is an engineering consulting firm with offices located throughout the globe, including an office in Eureka, California. GHD is one of the world's leading engineering, architecture and consulting companies. Established in 1928, GHD employs more than 6500 people across five continents and serves clients in the global markets of water, energy and resources, environment, property and buildings and transportation.

Contents

Overview

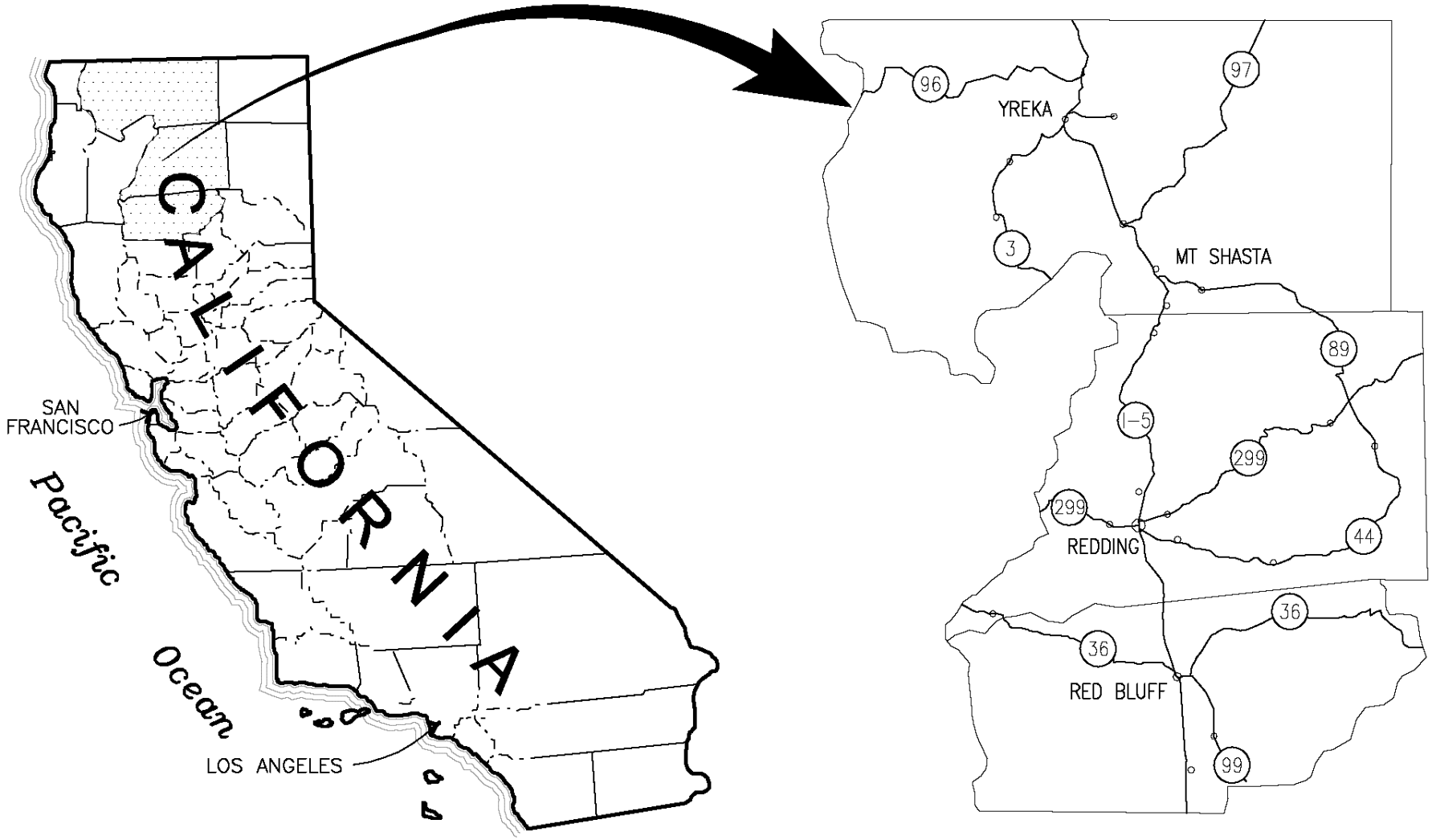
Introduction

Siskiyou, Shasta and Tehama Counties make up the “Upstate Region of California” which is preparing for the rollout of Plug-In Electric Vehicles (PEV), in part due to California’s commitment to zero emission vehicles (ZEV, Figure 1). In 2012, Governor Jerry Brown established aggressive PEV and infrastructure targets which call for 1.5 million ZEVs and easy access to infrastructure for all of California by 2025. The early development of PEVs in California has focused mainly on population centers. However the goal of this project addresses the need to extend the network along primary highway corridors between metropolitan areas and by integrating the state’s rural communities through education and planning.

The Upstate Region is a key participant in the expansion of the “West Coast Electric Highway” through the leadership of the City of Mt. Shasta. The West Coast Electric Highway is in concert with the EV Project, a $230 million US Department of Energy project to deploy electric vehicle charging infrastructure in multiple states including Washington, Oregon and California. Located at strategic points along I-5, the stations provide charging for EVs from Vancouver, British Columbia to Baja, Mexico.

Working with the California Energy Commission and the City of Mt. Shasta, the Siskiyou County Economic Development Council, GHD, and Schatz Energy Research Center coordinated an effort to meet the state targets by identifying stakeholders, conducting educational outreach, composing written guides to streamline local adoption, conducting regionally specific transportation planning, and coordinating a regional advisory council. This coordinated effort has created an infrastructure deployment plan to connect electric vehicle drivers with fast charging stations between EV-friendly communities along Interstate 5 and other major roadways.

Figure 1: Upstate California



Source: GHD, 2014

Goals & Objectives

The purpose of the Upstate Plug-in Electric Vehicle Readiness Project was to foster greater use of plug-in electric vehicles in our three county Upstate California region by preparing a plan to support infrastructure development. To address the scope of the project, the specific aims consisted of forming a collaborative and regionally representative coordinating council, producing an objective infrastructure deployment and siting plan, and developing an education plan that encouraged fleet adoption, support by transportation boards, consumer interest, and developed guidelines to facilitate an easier permitting process of electric vehicle charging stations.

As funded and outlined by the California Energy Commission, the five primary goals of the Upstate Plug-in Electric Vehicle Readiness Project are to:

- Cultivate stakeholders into a collaborative Plug-in Electric Vehicle Coordinating Council (PEVCC)
- Compose an infrastructure deployment plan
- Assess local permitting requirements for installing electric vehicle supply equipment (EVSE) and develop a plan to streamline those requirements
- Evaluate several local vehicle fleets and create a plan to accelerate plug-in electric vehicle adoption
- Plan educational outreach campaign efforts to improve plug-in electric vehicle adoption in Upstate communities and provide an example to other regions

Overview

Challenges

Plug-in electric vehicles (PEVs) offer many transportation advantages over conventional petroleum fuel vehicles, however, because of fundamental differences in fueling infrastructure, the transition of adopting PEVs for transportation requires a significant investment in planning and infrastructure conversion to meet predicted future demand and prevent stranded assets.

The Upstate California region represents many challenges to planning a PEV readiness project that are distinct from many metro region examples. These challenges include a relatively large and rural geographical area, a high number of vehicle miles traveled, low population density, and a high throughput of transitory vehicles along a major interstate highway corridor.

To address these challenges the purpose of this project was to provide educational outreach, develop a regionally coordinated advisory team, and produce a strategic readiness plan to meet PEV transportation goals.

PROJECTED BENEFITS

The adoption of electric vehicles can provide many benefits, including those outlined below:

- Energy efficient. Electric vehicles convert about 59–62% of the electrical energy from the grid to power at the wheels—conventional gasoline vehicles only convert about 17–21% of the energy stored in gasoline to power at the wheels.
- Environmentally friendly. EVs emit no tailpipe pollutants, although the power plant producing the electricity may emit them. Electricity from nuclear-, hydro-, solar-, or wind-powered plants causes no air pollutants.
- Performance benefits. Electric motors provide quiet, smooth operation and stronger acceleration and require less maintenance than ICEs.
- Reduce energy dependence. Electricity is a domestic energy source.

The Upstate PEV (UPEV) research team conducted an analysis of the greenhouse gas (GHG) reductions that are achievable in the Upstate region through adoption of PEVs and deployment of public EVSE infrastructure. The team conducted an accounting of projected 202 baseline light-duty vehicle emissions in the Upstate region using a software tool developed by the California Air Resources Board (CARB) and then used the model to simulate the impact of a .5%, 1% and a 2%. Figure 2 shows the impact of PEV penetration into the total vehicle fleet on total fleet emissions. The labels near the top of each plot annotate the percent reduction in GHG emissions associated with each scenario. For all three counties, a 1% penetration into the total vehicle fleet results in a 0.3% reduction in total fleet GHG emissions. When restricted to just light duty vehicles, a 1% penetration into the total vehicle fleet (which is a 2.3% penetration into the light duty fleet) results in a 1.5% reduction in light duty vehicle emissions.

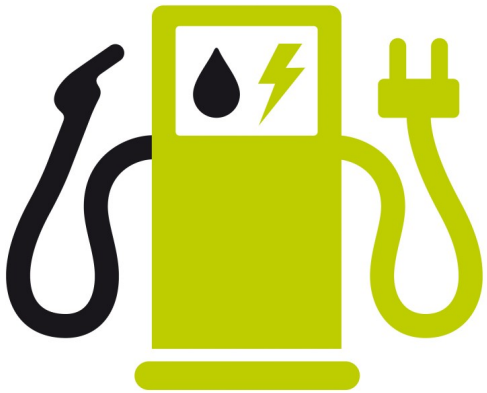
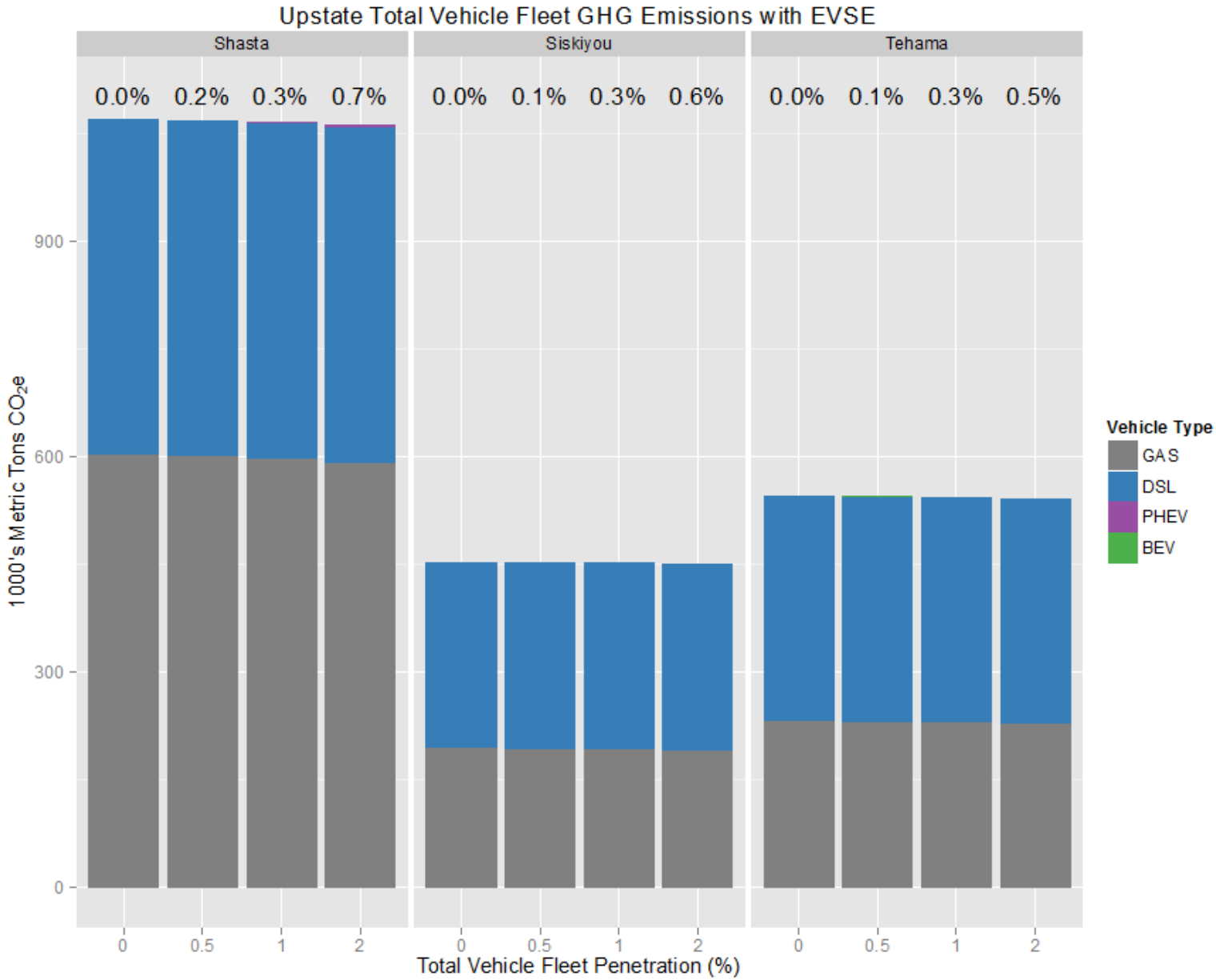


Figure 2: The impact of PEV adoption in the Upstate region on total vehicle fleet GHG emissions by vehicle type. The black percentage labels indicate the percent reduction in emissions for each scenario



Source: SERC, 2014

Source: Tammy Strobel, 2014

INTRODUCTION TO EVSE

Electric Vehicle Supply Equipment (EVSE) is the equipment needed to charge PEVs. EVSE are available at three different power levels that support three rates of charging.

- **Level 1** charging provides alternating current (AC) to the PEV from a 120-Volt, 20-Amp circuit.
- **Level 2** charging provides AC electricity to the PEV from a 240-Volt circuit with currents up to 80-Amps.
- **Level 3** charging, also referred to as **DC fast charging**, provides direct current electricity to the PEV. The AC feeder capacity for Level 3 EVSE is typically 480-Volt, 3-phase with currents up to 400-Amps.

Using two-way communication between the charger and car, the correct charging current is set based on the maximum current the charger can provide as well as the maximum current the car can receive.

As part of the protocol, a safety lock-out exists, preventing current from flowing when the charger is not connected to the car. It ensures that if a cable is not correctly inserted, power will not flow through it.

EVSE can also detect hardware faults, disconnecting the power and preventing battery damage, electrical shorts or worse still, fire.

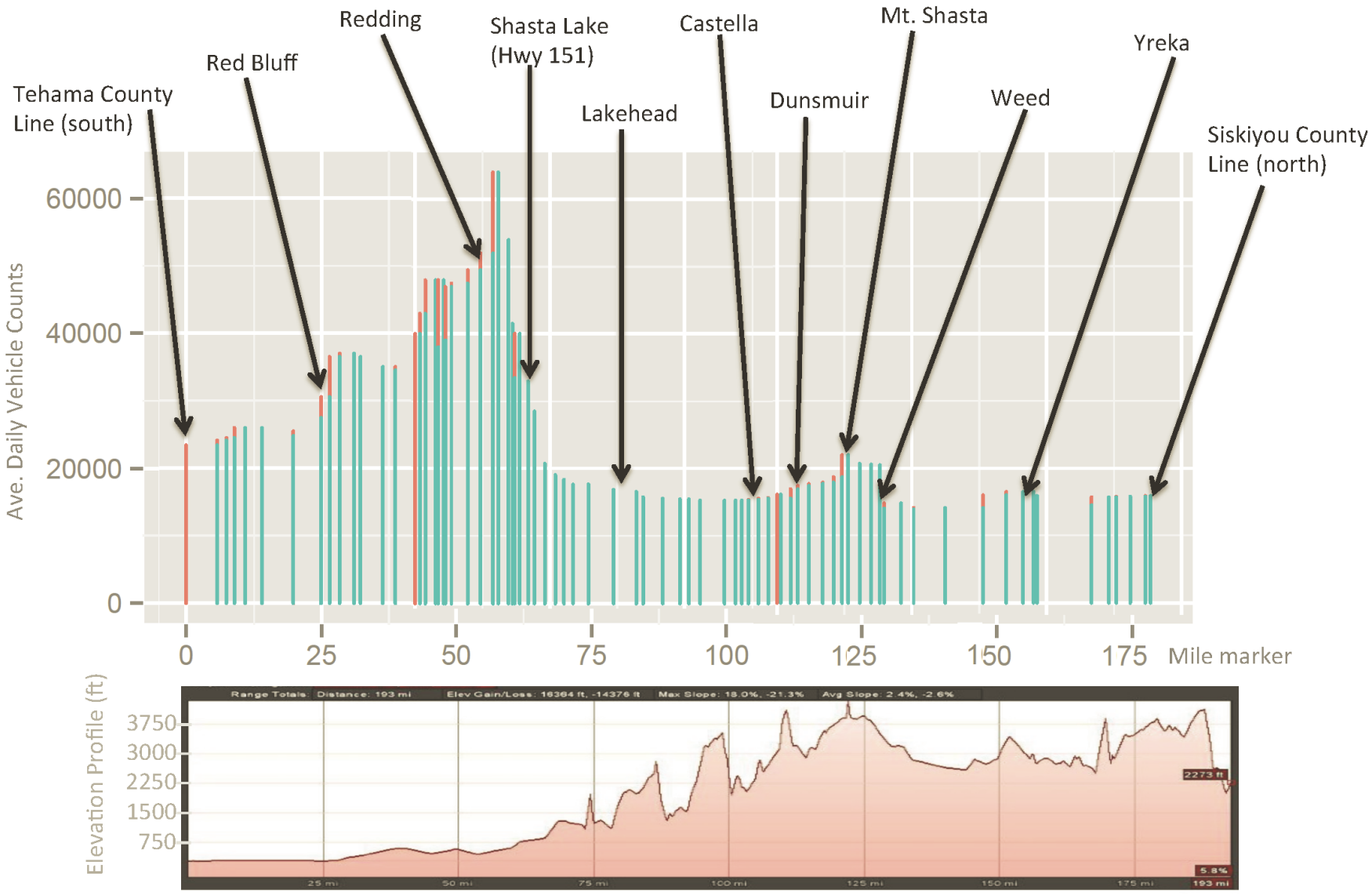
Cost of EVSE by charger type and county for three PEV penetration scenarios

Table 1: Approximate cost of recommended EVSE infrastructure by charger type and county for three PEV penetration scenarios.

	Level 2	DC Fast	Total Cost	Mitigated Delay Value
0.5% Fleet Penetration				
Shasta	$849,000	$285,000	$1,134,000	
Siskiyou	$123,000	$45,000	$168,000	
Tehama	$87,000	$105,000	$192,000	
	$1,059,000	**$435,000**	**$1,494,000**	**$25,000,000**
1% Penetration				
Shasta	$876,000	$600,000	$1,476,000	
Siskiyou	$135,000	$120,000	$255,000	
Tehama	$93,000	$195,000	$288,000	
	$1,104,000	**$915,000**	**$2,019,000**	**$50,600,000**
2% Penetration				
Shasta	$1,161,000	$2,085,000	$3,246,000	
Siskiyou	$111,000	$435,000	$546,000	
Tehama	$69,000	$375,000	$444,000	
	$1,341,000	**$2,895,000**	**$4,236,000**	**$110,400,000**

Source: SERC, 2014

Figure 3: Upstate California Regional Characteristics



Source: SERC, 2014

Macro-level Infrastructure Deployment

The purpose of the Macro-Scale EVSE Deployment Plan is to develop guidelines for the number and type of electric vehicle chargers needed throughout the Upstate region to support a given penetration of electric vehicle sales. The macro-scale guidelines consider charger siting at the level of a city or a neighborhood.

The challenge of the macro-scale siting task was to recommend the deployment of EVSE throughout the region for varying levels of PEV adoption. The project team accomplished this by answering the following key questions. How many chargers are needed for a given penetration of PEVs? Where should the chargers be located within the region? Should Level 2 chargers or Level 3 chargers (also known as DC fast chargers) be installed? How can the deployment be achieved in a cost-effective manner given limited resources for new infrastructure? Answering these questions required that the following considerations all be taken into account:

- How many PEVs do we expect in our region?
- Where within the region will the PEV drivers live?
- When do PEV drivers make their daily trips? Where and how far do they go?
- How long do drivers spend at each stop in their tour?
- If drivers have a choice of EVSE to use, which will they choose and how do drivers impact each others' access to EVSE?
- How will drivers who must charge (in order to complete their tour) be impacted by other drivers who elect to charge despite having no immediate need for the energy?
- How do drivers adapt to their circumstances (e.g. by seeking EVSE elsewhere)?
- How will a given deployment of EVSE improve the experience of drivers? Can we quantify the improvement (e.g. reduced delay)? If so, by how much does the EVSE improve their experience?

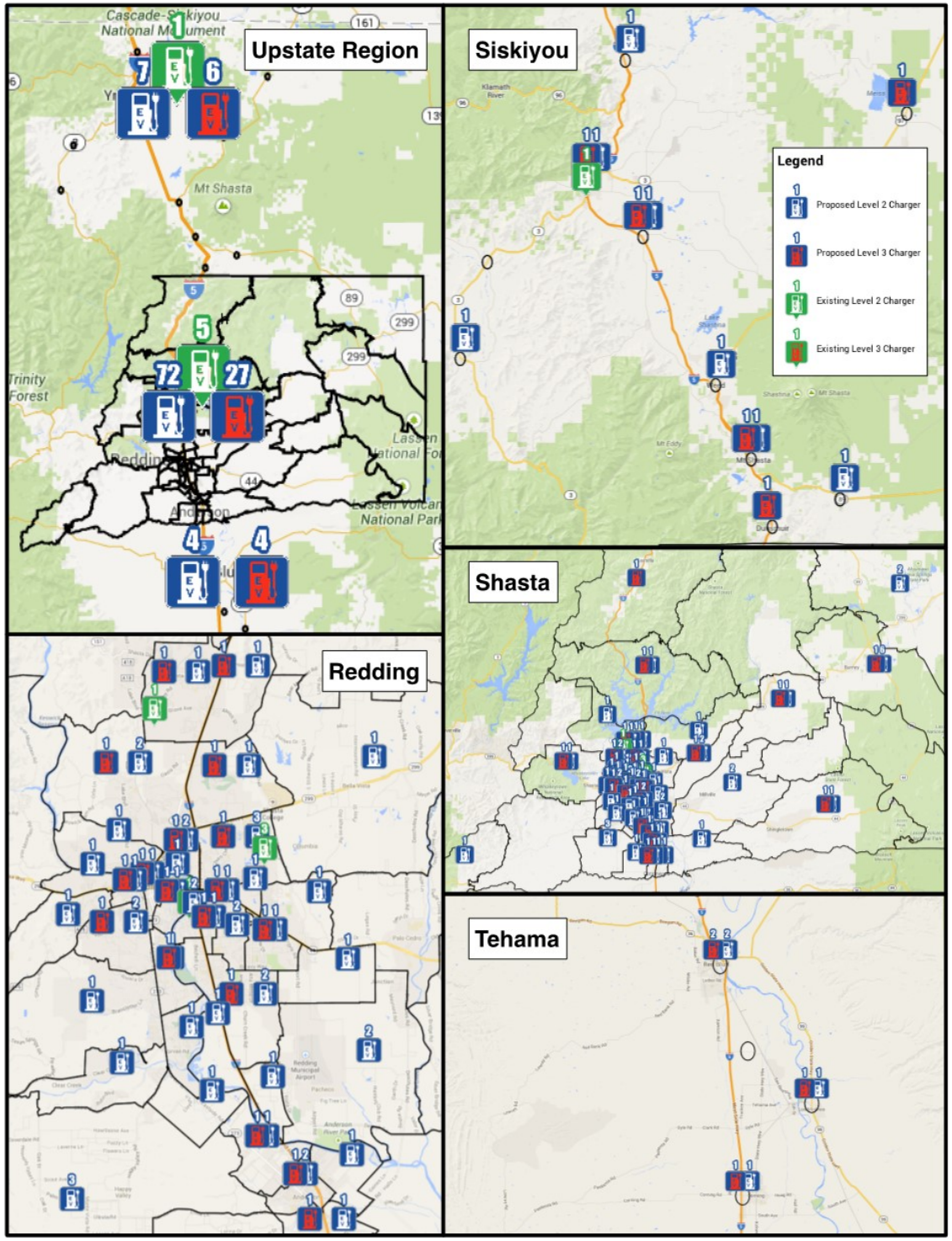
Conclusions on Macro-level Infrastructure Deployment

The Project team managed the complexity of this problem by building the detailed PEVI simulation model. PEVI is capable of simultaneously balancing all of the above considerations. The approach is called "agent-based modeling," and it provides a flexible and powerful framework for evaluating the impact of infrastructure on PEV drivers' experiences. Based on the results of the PEVI modeling analysis, we can draw some useful conclusions about the siting of EVSE in the Upstate Region.

- Overall, relatively few chargers are needed to support a large number of PEV drivers. Approximately 120 chargers were sufficient to support ~5000 drivers in the 2% penetration scenario. The total estimated cost to install these chargers is $4.2M, which is an investment of $850 per driver, a value commensurate with incentives already in place at the state and federal levels for subsidizing vehicle purchases.
- Both Level 2 and Level 3 chargers play an important role in supporting PEV drivers. Generally, Level 2 chargers are distributed throughout the region in rough proportion to traffic intensity and Level 3 chargers are concentrated along the I5 corridor and, to a lesser extent, along other principal arterials.
- The order in which EVSE is sited is meaningful. At 0.5% penetration, the algorithm sited Level 2 chargers early with Level 3 chargers being added later. At higher penetrations, Level 3 chargers played a much more prominent role, reaching 30% of the total number of recommended chargers at the 2% PEV penetration level.
- In California, 88% of Nissan Leaf owners have installed a Level 2 charger in their home. Fewer PHEV drivers have Level 2 chargers but due to the smaller battery capacity in these vehicles, the difference between Level 1 and Level 2 is negligible for overnight charging. We therefore assume in the PEVI model that every PEV driver has access to a Level 2 charger at his or her residence. If fewer future BEV owners choose to install Level 2 chargers at home, the need for publicly available EVSE infrastructure will increase.

The PEVI model and the macro-level analysis results are described in further detail the project's *Infrastructure Deployment Guidelines* report included in the appendices.

Project Approach, Methods, & Results



EVSE deployment guide-lines for 2% penetration (Target Year: 2020)

Proposed Level 2 Charger

Proposed Level 3 Charger

Existing Level 2 Charger

Existing Level 3 Charger

An interactive webmap of these macro-siting results can be found here: www.schatzlab.org/projects/policyanalysis/pev/upstate/charger-map.html?scenario=2

MICRO-SITING

Using the results of the macro-scale EVSE deployment plan, a micro-siting rubric tool was used to rank candidate EVCS sites. The rubric was developed collaboratively by the project team with input from the Plug-In Electric Vehicle Coordinating Council (PEVCC) for the purpose of ranking candidate sites based on criteria important to the community. The candidate sites were identified through a public outreach process, local knowledge, and on-the ground site surveys.

Candidate sites were scored according to our judgment regarding a scored rubric of objectives such as:

- proximity to apparently suitable electrical connection
- minimal trenching required through paved areas
- public visibility
- proximity to basic services

A total of 99 candidate sites for EVCS were identified in the planning area and assessed on the ground using the rubric.

After ranking the sites, owner consultations were initiated on 29 of the sites to determine which sites had interested owners who would likely provide a letter of support for a subsequent grant application for installing EVCS. As a result of these conversations a list of nine highly ranked sites with owners who committed to hosting an EVSE were selected for further evaluation, including development of preliminary site plans and cost estimates. These sites, which are shown in Table 4 below, will be shovel-ready upon completion of site-specific project permitting and final engineering work.

Proposed Phase 1 Charging Stations

List of Recommended Stations for Phase 1 of Upstate Plug-In Electric Vehicle Charging Network

	County	City	Description
1	Siskiyou	Yreka	Junction Shopping Center
2		Mt. Shasta	Public Parking Lot on W. Lake St.
3		Mt. Shasta	Tri Counties Bank
4	Shasta	Redding	McConnell Arboretum
5		Redding	Sundial Bridge Parking Lot
6		Redding	City Hall
7	Tehama	Red Bluff	Tehama County Visitor Center
8		Red Bluff	River Park
9		Red Bluff	Public Parking on Pine Street Downtown

Future Infrastructure Strategy (next steps)

- Continue collaborative efforts in the region across various organizations, including transportation planning boards, air pollution control districts, economic development groups, municipal government and others. Work to deploy publicly accessible EVSE and to establish a publicly owned EVSE network with an aim to transition it to a private ownership model where appropriate and desirable.
- Identify a lead organization and other key partners in PEVCC to pursue grant funding for EVSE infrastructure deployment that follows the deployment guidelines developed in this project.
- It is recommended that EVSE infrastructure be installed in phases. While an initial level of infrastructure will be important from the outset in order to provide geographic coverage, reduce range anxiety, and promote PEV adoption, full EVSE deployment can be accomplished over time as the penetration of PEVs increases. In fact, it is recommended that following each phase of EVSE deployment data be collected and evaluated to assess EVSE usage rates. In addition, PEV drivers in the region can be surveyed to assess where additional charging is needed. These types of information can then be used to refine plans for future EVSE deployment.

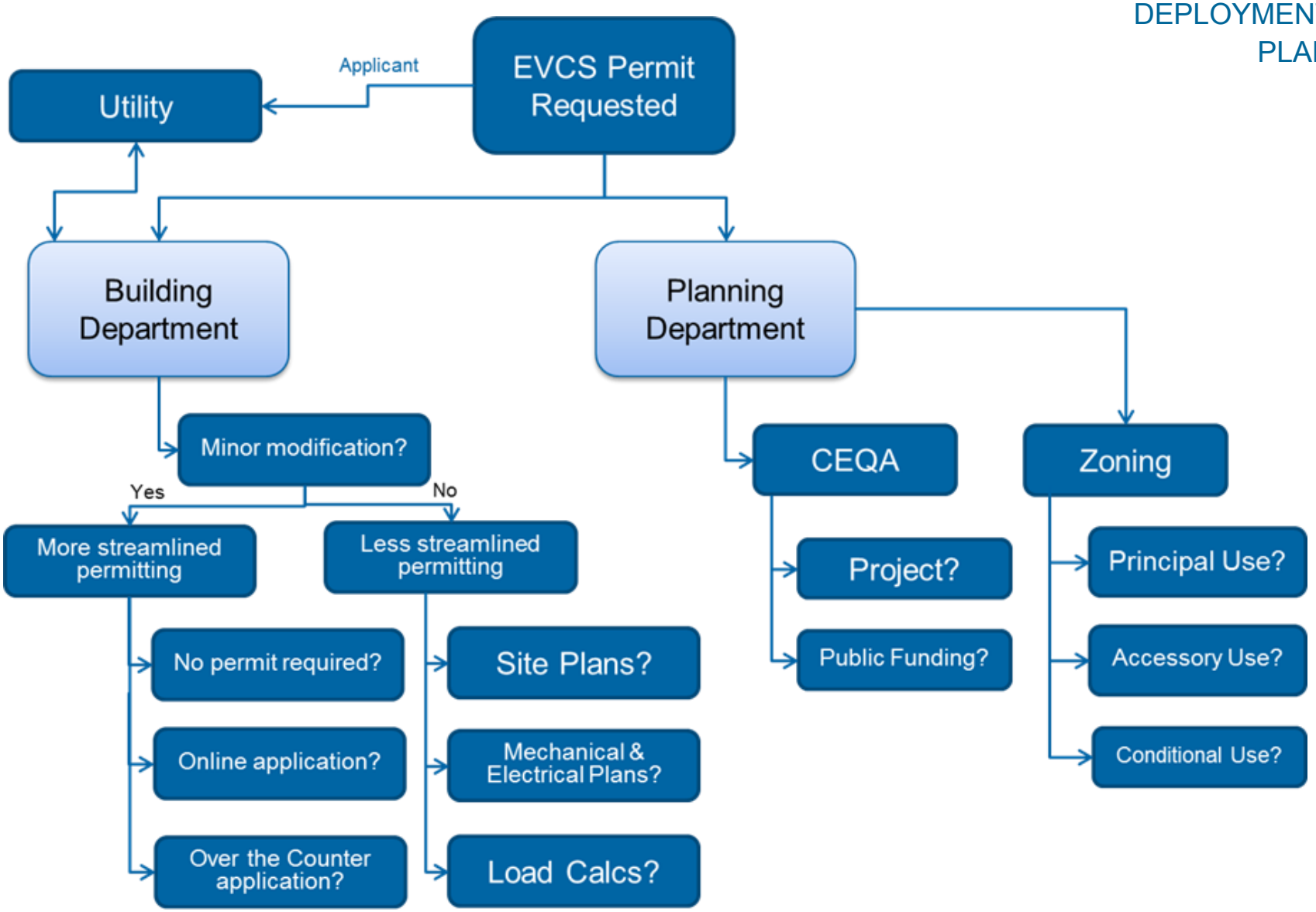
PERMITTING

In recent years, modern, mass produced plug-in electric vehicles have entered the consumer marketplace. Federal and State governments have enacted policies that incentivize the production, sale, and use of these vehicles as part of a strategy to reduce greenhouse gas emissions from the transportation sector.

Since PEV transportation and EVCS are relatively new to the mass market, local planning and building department staff are often unfamiliar with the technology, which can lead to delays and increased costs for permitting EVCS. These delays and increased costs can constitute a barrier to PEV adoption as potential PEV and EVCS owners could become discouraged by unnecessarily difficult permitting and installation processes and elect to stay with the internal combustion vehicle and fueling paradigm. In order to help meet Federal and State PEV adoption targets, it is important to streamline the ECVS installation process and reduce disincentives to consumers as much as is practical.

Summary of the EVCS Permitting Process

The general process of EVCS permitting involves the steps illustrated in the flowchart



Source: GHD, 2014

As shown in flow cart figure above, the permitting process starts with the applicant notifying the building department and the electric utility (EU). Notifying the EU may be overlooked by the applicant because the building department will involve the EU as appropriate for the type of EVCS installation under consideration. The building department will guide the applicant through the process and determine to what extent the planning department needs to be involved in the process. Ideally, for simple installations, the permit may be issued over the counter without involvement of other entities. In practice, building department staff may have difficulty guiding consumers through the process because they are unfamiliar with the technology.

A review of the general plans for the jurisdictions in the Upstate Region was conducted and the results are presented below.

Electric Vehicle Inclusion in Local General Planning Documents

Jurisdiction	EVs or alternative fueled vehicles mentioned in General Plan?
Siskiyou County	Yes
Shasta County	Yes
Tehama County	Yes
City of Yreka	No
City of Weed	No
City of Mt. Shasta	No
City of Dunsmuir	No
City of Redding	Yes
City of Red Bluff	No
City of Corning	No

The follow actions are recommended to streamline the EVCS Permitting process in the Upstate Region:

- Include policies to encourage PEV transportation in community planning documents as part of document update cycles
- List PEV charging as a permitted use across a broad range of zoning classifications
- If a zoning review is triggered, consider the EVCS as an accessory or similar use to another permitted use whenever possible.
- Develop a standard EVCS permitting process that can be used across the Upstate Region for typical residential installations that meet the following criteria:
    - ◊ EVCS is not accessible to the public
    - ◊ EVCS is located within 25 feet of main electrical panel
    - ◊ Results of load calculation worksheet indicates that the existing main electrical panel for the building is adequate
    - ◊ Advertise the standardized process for residential permits at websites, car dealerships, and building department counters
    - ◊ Allow the standardized process to be completed using an over-the-counter permitting approach
- Establish a permit fee structure specifically for EVCS installations making fees as low as possible for each jurisdiction
- Allow second meters for EVCS to enable PEV driver access to lower rates for PEV charging provided by utilities

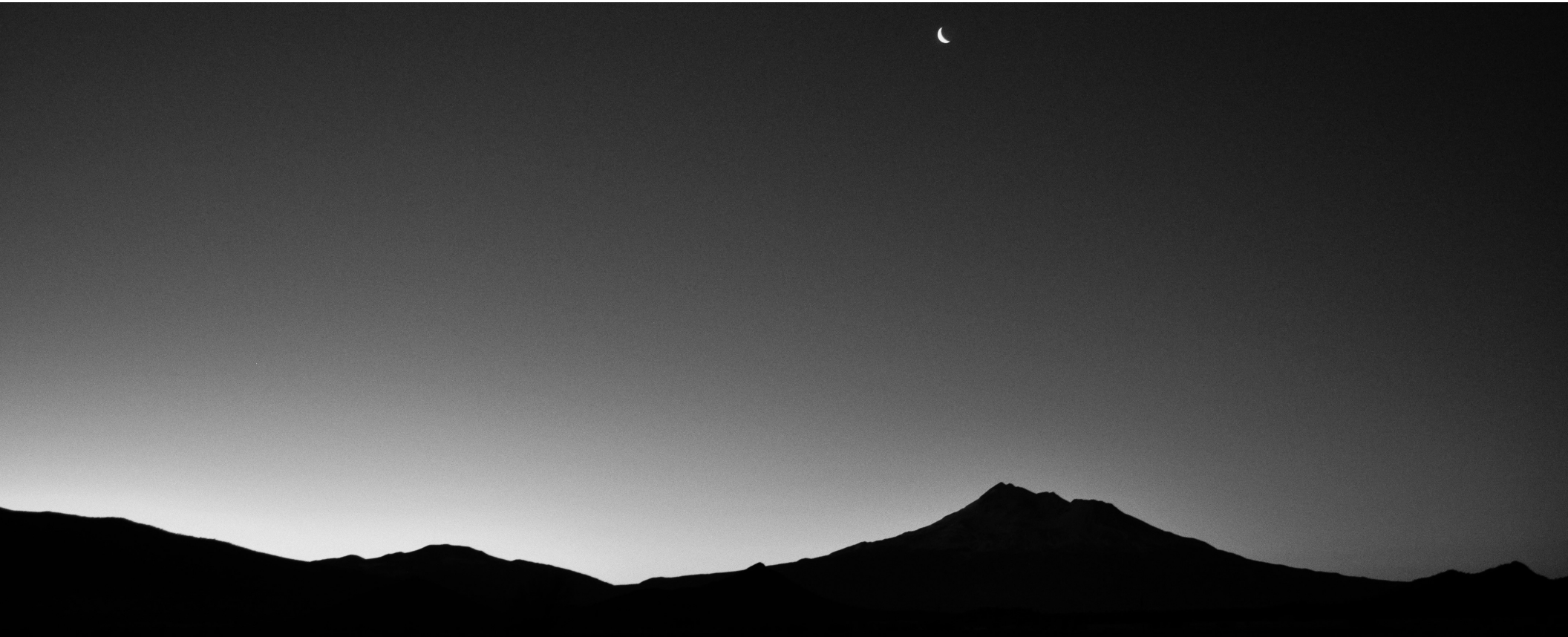
PLUG-IN ELECTRIC VEHICLE COORDINATING COUNCIL

The Upstate Plug-in Electric Vehicle Coordinating Council (PEVCC) is comprised of the key project partners that were used to maintain clear and consistent communication amongst all local stakeholders and establish a permanent framework for ongoing regional PEV promotional efforts, including implementation of the readiness plan and strategies. As a part of the project, the PEVCC formed a brief funding and sustainability plan to maintain the PEVCC and to actively pursue the implementation of plans and strategies developed through the project after the grant period is completed.

Upstate Plug-in Electric Vehicle Coordinating Council Mission Statement:

The members of the Upstate Region PEVCC will work together to promote and accelerate the local adoption of PEV technology as a key strategy for linking various parts of the West Coast and the State of California with PEV infrastructure and further develop the renewable energy resources in our region to meet our community's transportation needs.

Source: Tammy Strobel, 2014



Promoting EV Adoption

The Upstate PEVCC is made up of representatives from entities throughout the region including:

- Siskiyou County Local Transportation Commission
- Siskiyou County Board of Supervisors
- Tehama County Department of Transportation
- Tehama County Air Pollution Control
- Shasta Regional Transportation Authority (Shasta County)
- Upstate Economic Development (Redding, Shasta County)
- Superior California Economic Development (Redding, Shasta County)
- City of Redding (Shasta County)
- College of the Siskiyous (Siskiyou County)
- City of Yreka (Siskiyou County)
- City of Mt. Shasta (Siskiyou County)
- Caltrans (District 2)
- Pacific Power (Siskiyou County)
- Redding Electric Utility (Redding, Shasta County)
- Pacific Gas and Electric (Tehama County)

A complete list of the Upstate PEVCC members, in addition to the Upstate PEVCC Charter, can be found in Appendix A.

Promoting EV Adoption

A brief funding and sustainability plan was formed to continue the efforts of the Upstate PEVCC. More specifically this plan strategizes on how to actively pursue the implementation of planning assets developed through the Upstate PEV readiness project beyond the current California Energy Commission grant period.

Funding and sustainability planning strategies include:

- Incorporating staff from alternatively funded agencies, and organizations that share similar goals and commitments. Examples these agencies and organizations include, but are not limited to, transportation commissions, utilities, air pollution control boards, and economic development non-profits. In this manner, the stakeholders are contributing in a professional capacity and can contribute staff time to sustain PEVCC goals through the ups and downs of granting cycles.
- Utilizing a cooperative or a business improvement financial district model, made up of charging station owners, to self-assess a fee to fund and sustain the PEVCC. This funding model could not only sustain the PEVCC but also help improve the greater Upstate charging network. Improvement examples may include sharing similar signage, EVSE types, maintenance costs, tourism opportunities, and future planning efforts.
- Encouraging other economic development organizations in the Upstate region to pursue PEVCC related grants, zero emission vehicle education, and energy resiliency goals.

Public Education & Outreach

There has been little Plug-in Electric Vehicle (PEV) education and outreach effort in this region up to this point. Many people have incomplete or inaccurate information about PEVs and their benefits. A large segment of the population is unaware that PEVs are currently on the market and that they perform as well as, or sometimes even better, than conventional gasoline vehicles. In addition, few people realize the important link that the Upstate Region serves as a critical transportation link in the West Coast Green Highway, which runs from British Columbia, Canada to Baja, Mexico.

Without electric charging infrastructure in the Upstate Region, PEV drivers cannot make the border to border journey. In order to gain support for the deployment of PEVs and charging infrastructure in the Upstate Region, the project team developed and implemented an education and outreach campaign tailored to this largely rural area and its unique qualities. This campaign helped to raise awareness and understanding of the growing PEV market, dispel the myths about the technology, allay fears of range anxiety and cast the Upstate's adoption of PEVs as a critical part of a larger movement that can bring economic and environmental benefits to the area.

PROMOTING EV ADOPTION

The goal of the plan was to provide information on Plug in Electric Vehicles to various sectors of Siskiyou, Shasta, and Tehama Counties through a diverse approach to education and outreach. The complete plan can be found in Appendix H. A summary of the education and outreach plan is outlined below. The audience for a multi-media outreach approach includes:

- Emergency and First Responders
- Community Leadership and Local Government
    - ◊ County Boards of Supervisors, City Councils and other elected and appointed bodies
- Community Services
    - ◊ Formalized groups which include Rotary, Elks, Kiwanies, etc…
- Public Fleet Operators
- Private Fleet Operators
- Consumers
    - ◊ Buyers/Potential Buyers, other

The outreach methods used throughout the project included direct presentations, printed materials, website information, social media outreach, and email outreach.

Promoting EV Adoption

The following is a list of locations and organizations with which the project results and progress were shared:

- EV101 Workshop – Redding, CA
- Zero Emission Vehicle Conference– Sacramento, CA (2012 and 2014)
- North State Super Region Partnership, meeting presentation – April 30th, 2014 - Weaverville, CA
- Electric Vehicle Road Map 7 Conference – Portland, OR
- Local Transportation Commission – Yreka, Siskiyou County, CA
- Board of Supervisors – Red Bluff, Tehama County, CA
- Transportation Department and Air Pollution Control – Red Bluff, Tehama County, CA
- Shasta Regional Transportation Agency – Shasta Lake, Shasta County, CA
- Distributed Video Presentation of Upstate PEV Plan
- Weed Rotary Meeting – Weed, CA
- Yreka Rotary, meeting presentation – Yreka, CA
- Mt. Shasta Rotary, meeting presentation – Mt. Shasta, CA

Incentives

Incentives can be a powerful motivator for encouraging a change in consumer and commercial business behavior towards adoption of alternative transportation options like PEVs. Incentives can take many forms including economic subsidies, convenience, and distinguished status through community leadership. More specifically, these incentives include (but are not limited to):

Economic: Reduction of PEV transportation costs

- Federal, State, and City programs to reduce PEV and charging equipment (EVSE) purchase cost through tax credits and rebates
- Municipalities providing free or reduced public charging costs
- Utilities reducing private charging costs through special PEV charging rates to residential and commercial customers

Convenience:

- Municipalities constructing public infrastructure to foster charging away from home (the Upstate PEV Readiness Plan addresses this incentive)
- Providing educational materials to consumers and fleet evaluations to commercial businesses to aid in understanding adoption advantages
- Streamlining EVSE installation through reduced fees and wait times for permitting and inspections through local municipalities
- Utilities providing customer assistance and resources for purchasing, installing, or upgrading EVSE
- Municipalities providing free or advantageous parking
- Private businesses adding or allowing EVSE infrastructure installation on premises to attract tourists

Status and Community Leadership:

- Local municipalities supporting a Plug-in Electric Vehicle Coordinating Council with in-kind staff time
- Local municipalities incorporating PEV promotion policies and language into community planning efforts
- Local municipalities publically recognizing efforts of local businesses that have transitioned their fleets to PEVs
- Local community-oriented Foundations supporting public venues through PEV
- infrastructure installation at local libraries, schools, and theaters.
- Private businesses adding or allowing EVSE infrastructure installation on premises to demonstrate a commitment to improving local environmental air quality

Fleet Adoption

In today's alternative energy market, there are a number of opportunities available to the fleet decision maker to reduce carbon and energy consumption. These include technologies such as biofuel, gaseous fuels, liquefied fuels, improvements to ICEs and hybridization, as well as more fundamental improvements to fleet processes. Specifically, the adoption of plug-in electric vehicles by fleets is one opportunity that will not only offer organizations many benefits under the right circumstances, but will 56 also prove to be a critical catalyst in reaching Governor Brown's goal of having 1.5 million electric vehicles on the road by 2025.

Revenue growth, reduced energy spend, increased market share and improved corporate reputation are all benefits that can be brought about by putting in place strategies to minimize energy consumption and carbon emissions. In the right circumstances EVs can offer multiple benefits for an organization. These range from financial, operational and environmental benefits, and include:

- Whole life cost savings
- Reduction in air pollution and carbon emissions
- A smoother, quieter and more pleasant driving experience

Through detailed analysis, it is possible to identify the benefits that EVs can bring to a vehicle fleet. The scale of these opportunities will increase as the number and variety of car and commercial vehicle models escalate over time.

Promoting EV Adoption

With the intention of increasing awareness of EV opportunities, options, and benefits among fleet decision makers as well as helping guide them through fleet specific considerations (such as whole life cost modeling) that are necessary to successfully introduce EV's in their fleets, the project team executed the following activities:

- Identified fleets in the Upstate region
- Compiled resources for fleet decision makers
- Developed a methodology and spreadsheet tool for evaluating EV fleet opportunities
- Contacted local fleet decision makers
- Conducted fleet evaluations for the City of Mt. Shasta and the City of Redding (See Appendices F2 & F3, respectively).
- Prepared a plan to accelerate EV adoption in fleets

The project team worked closely with fleet managers to assess PEV opportunities within their fleets, taking into consideration fleet vehicle types, duty cycles, procurement schedules, life-cycle operational costs, and local-government environmental targets, such as climate action plans, that can be addressed through PEV adoption. The project team coordinated with vehicle and EVSE manufacturers and vendors to provide fleet decision makers with detailed information on the range of equipment options available to meet stakeholders' specific fleet needs. Using this information, the project team assisted fleet managers in developing and implementing individualized procurement strategies and timelines to acquire and integrate PEVs and install supporting EVSE.

FLEET EVALUATIONS

Municipal fleets offer good opportunities to deploy PEVs and demonstrate their benefits. PEVs can save local governments money and help them green their fleets. In addition, it allows them to lead by example and can help influence the purchase decisions of businesses and residents in the community. However, there is a need for larger, heavier duty PEV models because some areas of the Upstate Region depend more on trucks and SUVs than light-duty passenger vehicles. For example, the City of Mt. Shasta receives large amounts of snow in the winter, requiring the use of larger vehicles with four-wheel drive and high ground clearance.

The PEV FleET was used to evaluate opportunities for PEV adoption in two municipal fleets in the cities of Mount Shasta and Redding. In both cases, the project team worked with city staff to identify vehicle applications that were most likely to be suitable for PEV adoption. City staff provided required input data for the model. PEV adoption opportunities were first evaluated for specific vehicles on a one-for-one replacement basis without the inclusion of EVSE costs.

Numerous PEVs were evaluated for each application and simple paybacks were evaluated. A combined fleet analysis was then performed where multiple PEV adoptions were considered along with the purchase and installation of EVSE infrastructure. Finally, a sensitivity analysis was conducted to assess the impact to the model results caused by changes in various input parameters.

In both cases model results showed there were multiple cost-effective opportunities for adoption of PEVs. To view the full fleet evaluations, please see Appendices B and C in the full report at *www.siskiyoucounty.org/PEV*, under Electric Vehicle Infrastructure in Northern California.

Conclusions

The Upstate Plug-in Vehicle Readiness Project team, including the PEVCC, is very excited by the positive outcome of our project goals. Efforts to promote PEV adoption and develop an infrastructure plan have been successful. This project demonstrated that three counties and a coalition of private and public organizations in the Upstate region can work collaboratively to meet large goals, adopt a plan, and coordinate across disciplines. Further, with the completion of the PEV Readiness Plan, the Upstate region is now prepared to engage future funding support for implementation and infrastructure deployment.

The Upstate Plug-in Vehicle Readiness Project was a tremendous learning experience for stakeholders in our region and generally resulted in a positive project outcome. The original goals and aims of the project were achieved, and the planning documents that were produced will be a tremendous asset to future PEV infrastructure deployment and utilization. The communities representing the Upstate region have been open to PEV planning and the majority of stakeholders that participated in this PEV readiness effort have been very supportive.

For more information on electric vehicles in the Upstate California region and to view the full Upstate California Plug-in Electric Vehicle Readiness report, visit www.siskiyoucounty.org/PEV

Source: Tammy Strobel, 2014

SISKIYOU COUNTY
ECONOMIC DEVELOPMENT

Siskiyou County Economic Development Council

1512 S. Oregon St.
Yreka, California 96097

530.842.1638

www.siskiyoucounty.org