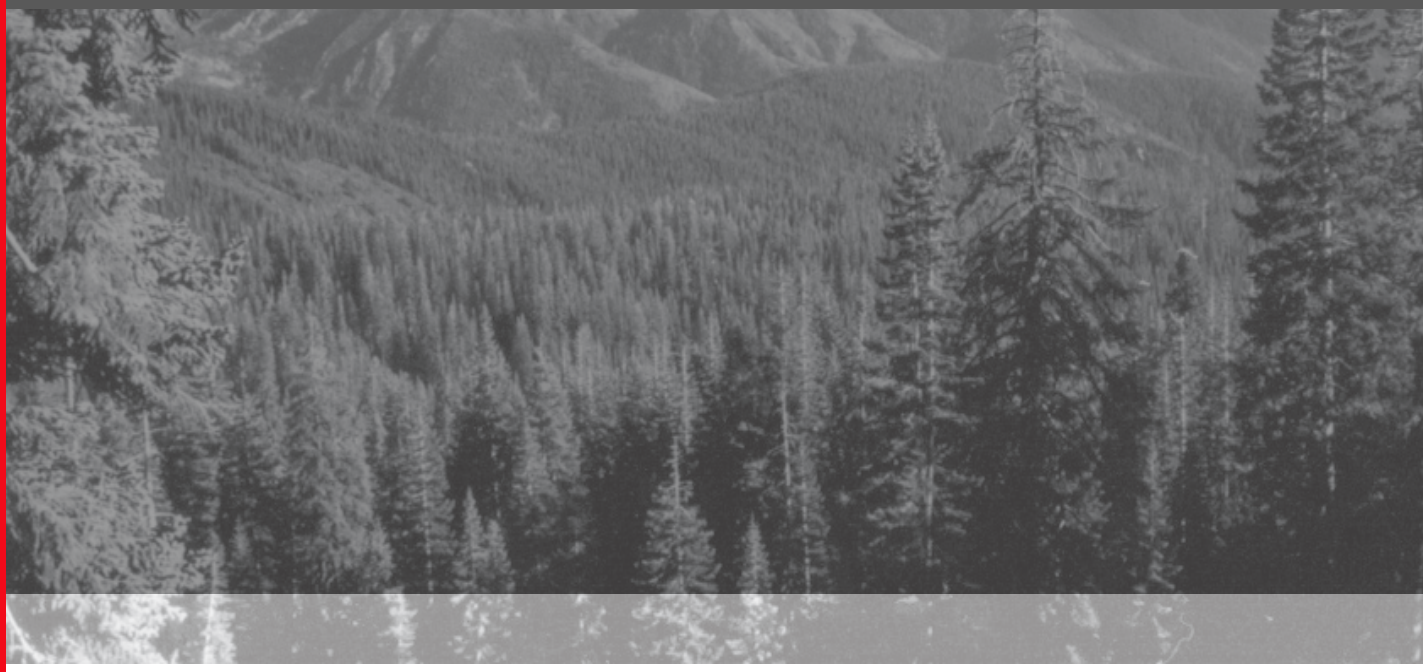
ZERO EMISSION VEHICLE TRANSITION PLAN REPORT

NEVADA COUNTY
CALIFORNIA

5.31.24



Plan for fleet transition and infrastructure analysis and recommendations prepared by Frontier Energy, DKS Associates, Sugarpine Engineering and Momentum

For Nevada County in coordination with Nevada County Transportation Commission

NEVADA • COUNTY • TRANSPORTATION NCTC COMMISSION

FRONTIER energy

DKS

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CONTENTS

1

GLOSSARY

4WD/4x4	Four-wheel drive
A	Amperes
ACF	Advanced Clean Fleets
BESS	Battery Energy Storage System
BEV	Battery electric vehicle
CapEx	Capital expense
CARB	California Air Resources Board
CORE	California Off-Road Equipment
DCFC	DC Fast Charging
DER	Distributed energy resource
EV	Electric vehicle
EVSE	Electric vehicle service equipment
FCEV	Fuel cell electric vehicle
GHG	Greenhouse gas
ICE	Internal combustion engine
kW	Kilowatt
kWh	Kilowatt-hour
LCFS	Low Carbon Fuel Standard
LD	Light Duty
Level 2/L2	240-volt charging equipment
MHD	Medium- and heavy-duty vehicles (class 3 & greater)
O&M/OpEx	Operation and maintenance (expense)
OEM	Original Equipment Manufacturer
PHEV	Plug-in hybrid electric vehicle
PV	Photovoltaic
RA	Resource adequacy
SF	Square feet
SUV	Sport utility vehicle
TCO	Total cost of ownership
V	Volt

2

EXECUTIVE SUMMARY

The California Air Resources Board (CARB) adopted the Advanced Clean Fleets (ACF) regulation in April 2023. The regulation, which applies to municipal and all other California fleets, is designed to accelerate the transition of medium and heavy-duty (MHD) vehicles (over 8,500 pounds), off-road yard tractors, and light-duty mail and package delivery vehicles to Zero-Emission Vehicles (ZEVs). The ACF is part of California's broader strategy to reduce greenhouse gas emissions and combat climate change.

The ACF requires that 50% of new MHD municipal fleet purchases for large county fleets be ZEVs starting in 2024 and 100% of new purchases be ZEVs beginning in 2027. Designated small counties, including Nevada County, are permitted to delay the implementation of ACF requirements until 2027 **when 100% of new MHD fleet purchases must be ZEVs.**

Nevada County's transition to lower-emission vehicles is underway with 12 hybrids and two electric vehicles. Nevada County's ZEV replacement plan recommendations consider the unique topography and vegetation in the County when transitioning the fleet to EVs and installing EVSE. With County fleet operations spread across Truckee, Grass Valley, and Nevada City, this project is a long-term plan that assumes purchasing primarily Internal Combustion Engine (ICE) vehicles through 2026 and ensures compliance with regulations.

270 vehicles were modeled for electrification and included in the energy demand calculations. Each vehicle was evaluated for compliance with the ACF regulation. 91 vehicles in Nevada County's fleet are subject to the regulations based on data provided regarding the "duty cycle" or major function of each vehicle, such as responding to emergencies, any "upfits" or attached equipment, and purpose.

The consulting team recommends that Nevada County focus its transition on light-duty electric vehicles for the first several years of its transition to increase operational familiarity with the technology during the period before the ACF regulation requires the County to purchase ZEVs for its medium and heavy-duty (MHD) fleet.

One Class 7 vehicle—the GMC C7500 domiciled at Nevada County Operations Center (NCOC)—is recommended for replacement during this period. The advantage of transitioning MHD vehicles earlier than required by the ACF is the ability to use currently available grants, vouchers, and tax credits to offset the purchase and realize operational savings through lower fuel costs, low carbon fuel standard credits, etc.

The team recommends implementing a measured vehicle transition strategy between 2024 and 2053 in three phases (2024-2029, 2030-2034, and 2035-2053), with corresponding charging infrastructure at 16 County facilities (See Figure 1 below). The plan is designed to meet regulatory requirements while maintaining fleet readiness and responsiveness while referencing opportunities to expedite the transition.

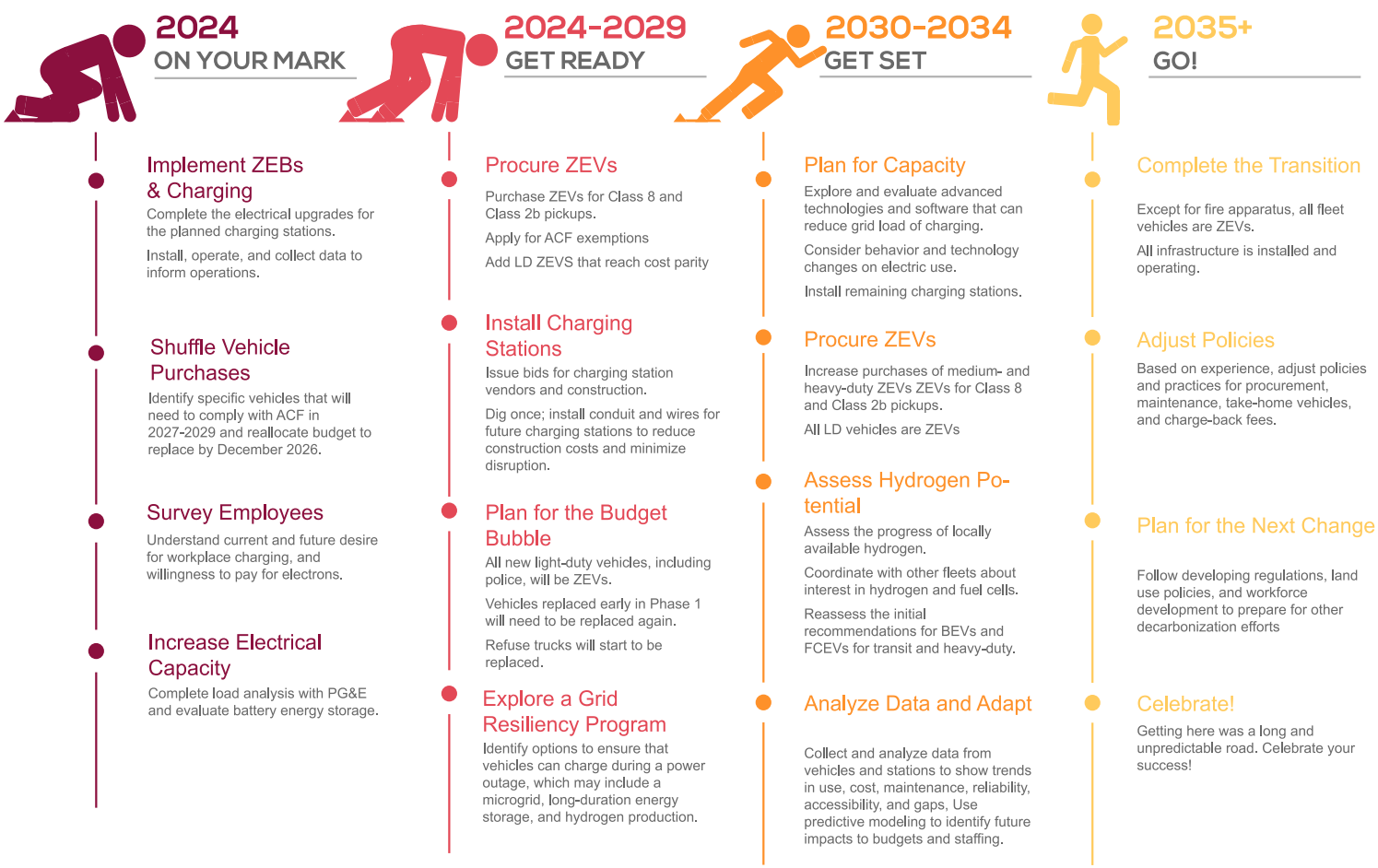

Figure 1: Nevada County Phased Fleet Transition Plan

Recommended ZEV replacement years and estimated daily energy demands for each vehicle were based on existing fleet data, including projected useful lives and the consulting team's catalog of market-ready EVs and regulatory requirements. Replaced vehicles are assumed to maintain the same activity level as the existing internal combustion vehicle.

The plan focuses on battery-electric electric vehicles (EVs) rather than hydrogen fuel cell electric vehicles (FCEVs) based on the current state of technology, lack of fueling stations in the area, and cost considerations. The team recommends considering the integration of hydrogen fuel cell vehicles around 2035, with the focus of hydrogen technology on long-range and heavy-duty capabilities vehicles that need fast fueling.

The plan recommends types, numbers, and locations of vehicle chargers at certain county facilities for the fleet, staff, and the public. It ensures the necessary infrastructure is in place to meet the demands of the increasingly zero-emission fleet. The plan provides details of the electric capacity for each county facility and identifies future maintenance needs and costs for recommended infrastructure.

The recommended charging strategy is detailed in Table 11, with three phases of installation described by the facility in Tables 12, 13, and 14. The charger deployment over the three phases contains:

- 128 dual-plug Level 2 (AC) chargers for 256 vehicles
- 24 single-plus Slow Direct Current (DC)
- Seven dual-plug Direct Current Fast Chargers (DCFC)
- 159 total charging stations with 294 total plugs
- Connected load of 4.1 MW

A summary of the number of vehicles to be transitioned to ZEVs per facility, and the recommended number of Level 2 and Fast Chargers at each facility to support those vehicles is shown in Table 1 below. The full ZEV replacement and corresponding charging infrastructure recommendations are contained in the interactive project dashboard.

The County's full transition to electric vehicles is calculated to cost an additional $10 million over the 29-year transition period, without consideration of currently abundant grant, voucher, and tax credit offerings. Most of the additional cost of the transition can be attributed to assumed price differences between conventional vehicles and EVs, where EVs are more expensive, especially for MHD vehicles. There are also additional costs for installing and maintaining EVSE. The expected operations savings from reduced fuel costs are expected to be $18.4 million, with LCFS credits reducing the cost of electricity by about $117 thousand per year. Total expected greenhouse gas reductions are over 39,000 metric tons of carbon dioxide (CO2).

Team member Momentum completed a separate County of Nevada Transit Services Zero Emission Bus Rollout Plan, as required by the California Innovative Clean Transit (ICT) Regulation.

The ICT requires all small transit operators, such as Nevada County, to transition to zero-emission buses by 2026. All new bus purchases are required to be zero-emission starting in 2029, with 100% of the fleet required to be ZEV by 2040. Nevada County's transition to ZEBs is underway with the procurement of two battery electric buses (BEB) in 2023. These vehicles will be used to assess the performance and requirements of BEBs, which will inform and adjust the rollout plan.

Facility	Address	Fleet EVs	Recommended L2s	Recommended Slow DC	Recommended DCFCs	Vehicles per plug	Recommended CapEx (2024 $)
Brighton Greens	988 McCourtney Rd. Grass Valley, CA 95949	11	6	0	0	1.0	$472,600
Crown Point	500 Crown Point Cir, Grass Valley, CA 95945	13	7	0	0	1.0	$224,800
District Attorney	201 Commercial St, Nevada City, CA 95959	7	4	0	0	1.0	$164,500
Facilities SC	10014 N Bloomfield Rd, Nevada City, CA 95959	8	4	0	0	1.0	$262,700
Joseph Center	10075 Levon Ave, Truckee, CA 96161	10	5	0	0	1.0	$187,900
Lake of the Pines Treatment Plant	10984 Riata Way, Auburn, CA 95602	5	1	4	2	1.0	$494,300
Lake Wildwood Treatment plant	12622 Pleasant Valley Rd, Penn Valley, CA 95946	15	7	2	2	1.0	$682,500
Madelyn Helling Library	980 Helling Way, Nevada City, CA 95959	1	1	0	0	1.0	$70,200
McCourtney Rd. Transfer Station	14741 Wolf Mountain Rd, Grass Valley, CA 95949	3	1	1	0	1.0	$53,700
NCOC	12350 La Barr Meadows Rd, Grass Valley, CA 95949	46	18	12	1	1.0	$1,391,500
Nevada City Veterans Hall	415 N Pine St., Nevada City, CA 95959	7	4	0	0	1.0	$43,000
Nevada County Airport	13059 John Bauer Ave, Grass Valley, CA 95945	6	1	4	0	1.0	$231,900
Rood Center(ERAC) & Wayne Brown CF	950 Maidu Ave, Nevada City, CA 95959	132	66	0	2	1.0	$2,714,600
Sheriff's Property Unit	15076 CA-49, Nevada City, CA 95959	1	1	0	0	1.0	$34,600
Station 91-McCourtney	11329 McCourtney Rd, Grass Valley, CA 95949	5	2	1	0	1.0	$195,200
TOTALS		**270**	**128**	**24**	**7**	**159**	**$7,724,000**

Table 1: Summary of Recommended ZEVs and Recommended Charging Infrastructure by Facility

3

BACKGROUND

The Nevada County Transportation Commission (NCTC) is a Regional Transportation Planning Agency (RTPA) created pursuant to Title 7.88 of the State of California Government Code, Section 67920. The mission of the NCTC is to plan, communicate, and coordinate with the citizens and decision-makers of Grass Valley, Nevada City, Nevada County, the Town of Truckee, and the California Department of Transportation (Caltrans) to identify transportation needs, propose solutions, and assist in implementing projects to create a balanced regional transportation system while protecting the rural qualities and historic character of Nevada County.

NCTC enlisted the services of a consultant team (team) to develop a plan for transitioning the County of Nevada (County) fleet to ZEVs, with supporting electric charging or hydrogen refueling infrastructure. The goals of this plan are designed to reduce emissions most cost-effectively while ensuring compliance with federal and state regulations, including the newly adopted ACF regulation and the ICT rule. Additionally, these goals aim to capitalize on the benefits of lower ownership costs. The team is led by Frontier Energy (Frontier), DKS Consultants (DKS), Sugarpine Engineering, and Momentum. This plan will help the County meet its sustainability goals, potentially reduce operating costs and carbon footprint, and provide advice for supplying public charging opportunities at public facilities.

The team's assessment used data provided by County staff and information gathered during subsequent meetings and interviews to evaluate the County's current fleet composition and recommend replacing vehicles with ZEVs. Most of the County's fleet of 285 vehicles is comprised of light-duty vehicles, with 91 vehicles in Nevada County's fleet subject to the provided ACF. At the report's outset, Nevada County identified the replacement of heavy-duty, specialized county fleet vehicles and equipment with ZEVs as a top concern, which the report addresses.

4

METHODS AND ASSUMPTIONS

The County currently has 296 vehicles and motorized equipment in the fleet within numerous departments. The team analyzed the impact and cost of electrifying 270 of the County's 285 light-, medium-, and heavy-duty vehicles and installing charging stations at 16 facilities, including 91 medium- and heavy-duty vehicles subject to the ACF regulation. Table 2 illustrates the class sizes and categories of vehicles (classes in blue are subject to ACF regulations).

GVWR (in lbs.)	Vehicle Class	Category	Description
<6,000	Class 1	Light duty	Sedan, SUV, minivan
6001-8,500	Class 2a, e, f	Light duty	Full-size and mini pick-up
8,501-10,000	Class 2b, g, h	Medium duty	Crew size pick up, utility
14,000	Class 3	Medium duty	Service body, Cargo van
16,000	Class 4	Heavy duty	Step van, Crane
19,500	Class 5	Heavy duty	Bucket truck, Snowplow
26,000	Class 6	Heavy duty	Transit bus, Flatbed
33,000	Class 7	Heavy duty	Sweeper, Water truck
>33,000	Class 8	Heavy duty	Tanker truck, Dump

Table 2: Class sizes and categories of vehicles

Replaced vehicles are assumed to maintain the same activity level as the existing vehicle based on established parameters shown in Table 2. The County currently has 296 vehicles and motorized equipment in the fleet within numerous departments, as shown in Table 5 on page 13.

The report describes the calculation methods and assumptions used in the team's fleet transition and infrastructure analysis. The analysis used existing fuel and mileage data to project energy demand for a replacement ZEV for fleet vehicles. Table 3 below outlines the standard assumptions used in the analysis.

Parameter	Assumption	Source
Beginning Year	2024	
Ending Year	2053	County staff
Annual Operating Days	250	County staff
Sales Tax Rate %	7.5%	CDTFA
Replacement Prioritization Policy	Useful life, ACF	County staff
GHG Emissions - gal of gasoline	8,887	grams CO2e/gal (EPA)
GHG Emissions - gal of diesel	10,180	grams CO2e/gal (EPA)
Non-renewable PG&E Mix GHG Emissions - gramsCO2e/kWh	0.45359	grams CO2e/kWh (EPA)
PG&E Renewable Mix	40%	PG&E
Cost per gallon of Gasoline	$5.31	EIA; 2022 Annual
Cost per gallon of Diesel	$6.25	EIA; 2022 Annual
PG&E Average Cost of Electricity per kWh	$0.20	BEV-2-S (Secondary), Off-Peak rate
LCFS Credit Price	$64.91	CARB
EV MSRP Price Increase per year	4%	County Staff
License/Registration	$65reg+$29CHP+$102TIF+VLF.65%	CA DMV
Insurance	Self-insured	County Staff
Operating Expenses	Fuel - LCFS	
EV Parity Year	2035	
Timeline	Beginning year-ending year	
Depreciation Method	Not included	
Salvage Value	Not included	
Level 2 Daily usage (for utilization calcs)	14 hours	Non-working hours
DCFC Daily usage (for utilization calcs)	10 hours	Working hours

Table 3: Baseline Assumptions for Nevada County Fleet Analysis

Vehicle Category	Light duty, medium duty, heavy duty
Configuration	Car, Pickup, SUV, Cargo Van, Work Trucks, Flatbed, Transit Van, Box Truck, 3 Axle Truck
Minimum Range	Miles per day
Range Degradation allowance (%)	The additional energy required for HVAC, PTO, etc., as a percentage of the maximum range
Dwell Time/Charging window	Hours per day available for charging
Number of seats	#
Cargo Carrying Capacity	Lbs.
Towing Capacity	Lbs.

Table 4: Duty Cycle Parameters for Energy Demand Calculations

Each vehicle was then selected for the ZEV Pathway based on whether it was required to be electrified to meet regulatory requirements. Table 5 outlines the ZEV Pathway options and the number of vehicles in Nevada County's fleet under each category.

ZEV Pathway	Number of vehicles
ACF Exempt- Dedicated Snow Removal	2
ACF Exempt- Emergency vehicle	11
ACF Exempt- Replace with EV	1
ACF Exempt- Subject to ICT	11
ACF- Intermittent Snow Removal Exemption	2
ACF- Replace with EV	70
ACF- Replace with ICE before 2026	1
ACF- Retire	5
ACF- ZEV Purchase Exemption	10
Non-ACF	183
Grand Total	296

Table 5: Nevada County Fleet ZEV Pathways

Vehicles excluded from the analysis include those noted by staff to be retired or replaced. This included seven non-ACF vehicles, one ACF-exempt emergency vehicle, and five vehicles affected by ACF regulations, for a total of 13 vehicles planned for retirement. The fleet's two dedicated snow removal vehicles were also excluded from the analysis as these vehicles are exempt from the ACF regulation. An additional 11 transit bus vehicles were excluded from the analysis as these vehicles follow a different charging approach and are planned to use separate charging infrastructure referenced in the County of Nevada Transit Services Zero Emission Bus Rollout Plan. In sum, a total of 270 vehicles were modeled for electrification and included in the energy demand calculations.

Each vehicle was evaluated for compliance with the ACF regulation.[1] A total of 91 vehicles in Nevada County's fleet are subject to the regulations based on data provided regarding the vehicles' "duty cycle" or major function, such as responding to emergencies, any "upfits" or attached equipment, and purpose.

For heavy-duty maintenance vehicles that only had annual hours operated rather than mileage data, we assumed 35 miles per hour equivalent.

4.1.1 Procurement Costs

Procurement costs for vehicles were estimated for EVs by adding the 4% annual price increase to the replacement vehicle's current price and adding the 4% annual price increase to the estimated ICE vehicle replacement cost in the same replacement year. The County sales tax rate of 7.5% is included in the EV capital costs and reflected in the vehicle CapEx.

To estimate the CapEx for recommended charging infrastructure, the following cost categories were considered:

HARD COSTS

- EV Chargers[2]
  - » Level 2 EV (e.g. ChargePoint or similar) chargers
  - » Power cords and cable management for Level 2 chargers
  - » Level 2 DC chargers ("DC slow chargers"), e.g. Wallbox Quasar 2 and ABB Terra DC Wallbox
  - » DC fast chargers (e.g. Blink/ChargePoint/Tritium chargers, or similar)
  - » Gateway Module/ Load Management Devices

[1] Advanced Clean Fleets Regulation - Snow Removal Vehicle Exemptions: https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-fleets-regulation-snow-removal-vehicle-exemptions

[2] This excludes costs for warranties because the standard warranty that the vendor offers is part of the cost estimate tool.

- Materials/Equipment (typical costs for purchasing and installing materials other than the EV chargers themselves)
  - » Wiring
  - » Conduit systems (underground and/or surface-mounted)
  - » Trenching and/or directional drilling
  - » Pull boxes (installed in the ground and/or surface mounted)
  - » Aerial wire spans
  - » Footings for installation of EV charger pedestals and electrical service panels
  - » Bollards, wheel stops
  - » Stepdown transformers
  - » Electrical service panels including sub panels
  - » Circuit breakers
  - » Signage, striping for parking stalls

- Site Restoration (costs to install civil/landscaping improvements to restore the site following excavation and other construction activities)
  - » Minor restoration for civil infrastructure such as roadway and/or sidewalk repaving
  - » Minor curb and gutter restoration
  - » Minor surface water (drainage infrastructure) restoration
  - » Minor landscaping restoration such as replanting

SOFT COSTS

- Contracting/Design (estimated 20% mark-up has been applied to the project costs excluding charger purchase costs)
  - » Engineering design fees
  - » Contractor profits

- Permitting
  - » Electrical permit fees charged by local jurisdictions, typically $6k per site plus $1k for labor and contingency.

- Utility Fees (fees charged by the electrical utility to bring additional power to the fleet charging depot to power the EV chargers)
  - » Electrical upgrade design
  - » Transformer replacement

- Contingencies
  - » 20% mark-up has been applied to the project costs for each cost category consistent with public agency capital project budgeting

To estimate the operating and maintenance expenses (OpEx) the County will incur for the recommended charging stations, the project team considered various cost categories.

As shown on the online dashboard, a major contribution to the total transition cost of $74.5M are operating expenses of the proposed chargers, amounting to $9.1M. It is important to note that this estimate includes an annualized depreciation value of the installed charging stations. It is assumed that the charger depreciate over a lifespan of 8 years and hence the eventual replacement costs for these chargers[3] are included on an annual basis.[4] This depreciation value, which is included for accounting purposes, contributes about 30-85% of the total annual OpEx, depending on the facility and specific number and type of recommended chargers. For sites with DCFC stations, depreciation makes up a large share of the total OpEx, given the high purchase price of DCFC stations. Of the overall OpEx of $9.1M across all sites between 2024 and 2053, depreciation accounts for $6.5M (71% of total OpEx).

Aside from charger depreciation, other EVSE OpEx cost categories considered are:

- **Routine maintenance:** Simple, small-scale activities (usually requiring only minimal skills or training) associated with regular (weekly or monthly) and general upkeep of charging stations against normal wear and tear.
- **Corrective maintenance:** Extended warranty for potentially repair work, truck rolls, etc.
- **Licensing fees** (for software/load management): To use charging software, typically includes a load management setup. Estimated at $100-$200 per site per month, based on scope and complexity.
- **Networking fees:** For internet connection (WiFi/Ethernet or cellular gateway), assumed to be ~$85/month per site.

It is furthermore assumed that chargers to be added in each phase are installed at the beginning of each phase, i.e. they start incurring the shown OpEx during the entirety of the phase. If the County only installs some chargers e.g. halfway through a phase, such as in 2032 during Phase 2, then the total annual OpEx in that location will only be reached then. Hence, the provided OPEX estimates generally represent the maximum to be expected values and are thus conservative.

The estimated OpEx vary by location and most importantly scale with the number of recommended charging stations in each location. Fewer charging stations at each location would also directly translate into lower OpEx. At full fleet electrification, the annual OpEx is estimated to be around $1,330 per vehicle electrified. On a per charger basis, the OpEx is estimated to be around $1,210 per year[5]. At sites with fewer fleet vehicles, the per-EV estimated OpEx is higher, whereas economies of scale allow for lower OpEx in the range of $900 per year and per future fleet EV at larger sites. Without depreciation, the OpEx at full fleet electrification are only around $370 per EV and year.

[3] About $8,400 for one dual-head Level 2 station, about $54,000 for one dual-head 50-kW DCFC station, about $140,000 for one dual-head 150-kW DCFC station

[4] Given the 8-year lifespan, the annualized depreciation amounts to about $1,050 for each dual-head Level 2 station about $6,750 for one dual-head 50-kW DCFC station, about $17,500 for one dual-head 150-kW DCFC station

[5] This number is slightly less than the OpEx per vehicle due to the slightly greater number of total charging ports than vehicles to be electrified.

4.1.2 Greenhouse Gas Reduction Calculations

Frontier uses the California-specific version of the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model CA-GREET emissions calculator developed by the Department of Energy's Argonne National Labs (which is also used by the California Air Resources Board) to calculate the carbon content of the fuel and electricity consumed by the EV fleet.[6] We only include direct emissions (Scope 1) from the County's fleet. Scope 2 & 3 emissions have not been considered. This means carbon emissions from mining, manufacturing, or disposal of vehicles and chargers are not included.

4.1.3 Electricity Consumption

For electricity consumption, the analysis assumes the County will be purchasing electricity from the PG&E Electric Schedule Business Electric Vehicle program, which is estimated to be 40% renewable and carbon-free and purchased at the BEV-2-S (Secondary), Off-Peak rate of $.0.20 per kWh.

Both baseline and transition scenarios utilize vehicle capital and operational costs from historical operational and cost data provided by the County for each vehicle in the fleet. Replaced vehicles are assumed to maintain the same activity level as the existing vehicle. Costs are in current dollars and do not reflect the time value of deferred expenditures.

4.2 Baseline Assumptions for Fleet Transition

4.2.1. Fleet Transition Plan Phases

The team worked with Nevada County to define fleet transition phases based on regulatory deadlines, expected EV cost parity, and vehicle useful life. The timeline for the replacement phases is:

- **Phase 1:** 2024-2029: Minimal LD EVs, buy EVs as ACF requires, retire vehicles.
- **Phase 2:** 2030-2034: Purchase more LD EVs and increase MHD EV purchases.
- **Phase 3:** 2035-2053: All purchases of EVs except dedicated snow removal

[6] https://greet.es.anl.gov/

ZEV Replacement Phases	LD (non-ACF)	ACF (Class 2G-H)	ACF (MHD)	Total BEVs Added
Phase 1: 2024-2029 · Purchase ZEVs for Class 8, Class 2b pickups, and light-duty ZEVs where appropriate · Retire vehicles · Apply for exemptions for eligible vehicles	82	5	6	93
Phase 2: 2030-2034 · Purchase more light-duty ZEVs · Increase purchase of MHD ZEVs	75	22	31	128
Phase 3: 2035-2053 · All purchases are ZEVs (excludes Dedicated Snow Removal vehicles)	23	6	20	49
Total:	179	33	58	270

Table 6: Fleet transition phasing

The team derived an initial replacement date as the sum of the model year and each vehicle's useful life. The initial replacement year was used to forecast a ZEV replacement year based on which Phase the vehicle was due to transition to an EV, including analysis of the vehicle type and eligibility for an ACF ZEV Purchase Exemption (see Section 2.11.2).

Phases	Total ZEVs Added	Total Added Chargers			
	BEV	FCEV	Level 2	Slow DC	DCFC
Phase 1: 2024-2029	93	0	50	3	2
Phase 2: 2030-2034	128	0	62	9	5
Phase 3: 2035-2053	49	0	16	12	0
Total:	270	0	128	24	7

Table 7: Fleet transition phases

This strategy takes a three-prong approach for achieving full fleet electrification:

1. Fiscal responsibility
2. Regulatory compliance
3. Climate goals

This is achieved by first addressing the "low-hanging fruit" vehicles that can be electrified with current market technology and adopting a reasonable timeline that addresses infrastructure and cost constraints.

5

REGULATIONS DRIVING CHANGE

5.1 Advanced Clean Fleets Regulation

The California Air Resources Board (CARB) adopted the Advanced Clean Fleets (ACF) regulation in April 2023. The regulation applies to municipal and all other California fleets and is designed to accelerate the transition of medium and heavy-duty vehicles (over 8,500 pounds), off-road yard tractors, and light-duty mail and package delivery vehicles to ZEVs. The ACF is part of California's broader strategy to reduce greenhouse gas emissions and combat climate change.

The ACF requires that 50% of new MHD municipal fleet purchases for large county fleets be ZEVs starting in 2024, and 100% of new purchases must be ZEVs beginning in 2027. Designated small counties, including Nevada County, are permitted to delay implementation of ACF requirements until 2027 when 100% of new MHD fleet purchases must be ZEVs. Alternatively, agencies may adhere to a fleet transition milestone schedule, seen in Table 8. Public agencies must opt into the milestone option by January 1, 2030.

Percentage of vehicles that must be zero-emission	10%	25%	50%	75%	100%
Milestone Group 1: Box trucks, vans, buses with two axles, yard tractors, light-duty package delivery vehicles	2025	2028	2031	2033	2035 & beyond
Milestone Group 2: Work trucks, day cab tractors, buses with three axles	2027	2030	2033	2036	2039 & beyond
Milestone Group 3: Sleeper cab tractors and specialty vehicles	2030	2033	2036	2039	2042 & beyond

Table 8: ZEV fleet milestone option

5.1.1 ACF Exemptions

Frontier evaluated County vehicles eligible for the ZEV Purchase Exemption and list that will be published by Jan 1, 2025, as well as Snow Removal Vehicle Exemptions available until January 1, 2030, and adjusted the procurement year for vehicles expected to be eligible for a waiver to reflect when a ZEV replacement would be purchased.

A total of 91 vehicles were deemed subject to ACF based on the vehicle's size and duty cycle. Vehicles deemed to be "Retired" at the end of their useful life are not shown on the dashboard and are not planned for replacement at the end of their useful life.

Most of Nevada County's fleet is comprised of light-duty vehicles, with 91 vehicles in total subject to the ACF.

The following vehicles are generally exempt from the requirements of the ACF:

- School buses
- Emergency vehicles
- Historical vehicles
- Dedicated snow removal vehicles
- Two-engine vehicles
- Heavy cranes
- Transit vehicles subject to the Innovative Clean Transit regulations CCR
- Vehicles that are subject to the Zero-Emission Airport Shuttle regulations

See Appendix A for more details on the ACF exemption categories.

6

ZEV REPLACEMENT PLAN

The team has produced an interactive digital dashboard on a password protected website that the County can continue to use to plan its ZEV transition. The transition plan includes recommended vehicle classes by year, with a dropdown menu to choose vehicles within that class and capital costs for the selected vehicles. Snapshots of these tools are shown in Figures 2-7 below.

The team recommends that Nevada County focus its transition on light-duty electric vehicles for the first several years of its transition to increase operational familiarity with the technology during the three-year period before the Advanced Clean Fleet regulation requires the County to purchase ZEVs for its medium and heavy-duty fleet.

One Class 7 vehicle is recommended for replacement during this period – the GMC C7500 domiciled at NCOC. The advantage of choosing to transition MHD vehicles earlier than required by the ACF is the allowance of using currently available grants, vouchers, and tax credits to offset the purchase. The suggested electric replacement vehicle, the Volvo VNRe, is eligible for a $120,000 voucher from the CARB Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) and a $40,000 payment from the Inflation Reduction Act Commercial Clean Vehicle Tax Credit. These incentives reduce this vehicle's net upfront capital cost by over 40%.

Similar funding opportunities exist if the County expedites its transition to other MHD vehicles. Another advantage of early replacements is operations savings from reduced fuel costs and low carbon fuel standard (LCFS) credits (see Section 12.3.1), and environmental gains from reduced greenhouse gas emissions begin earlier. Table 9 outlines several opportunities to transition other Class 8 heavy-duty trucks earlier than required to maximize funding opportunities and fuel cost savings.

The team projects that the recommended transition schedule will increase capital costs for vehicle replacements by approximately $2.6 million over the 30-year transition period, a 16% increase (see Figure 6 on page 23). This cost increase will be offset by the projected fuel savings of $18.4 million. However, EVSE capital equipment is expected to cost $7.2 million over the transition plan, and EVSE operating expenses, including annual depreciation, are assumed to be $9.1 million (see Figure 2 below).

Based on PGE's grid mix, which includes 40% eligible renewable energy sources (see Figure 8 on page 29), the fleet transition will reduce the county's CO2 emissions by 39,200 metric tons.

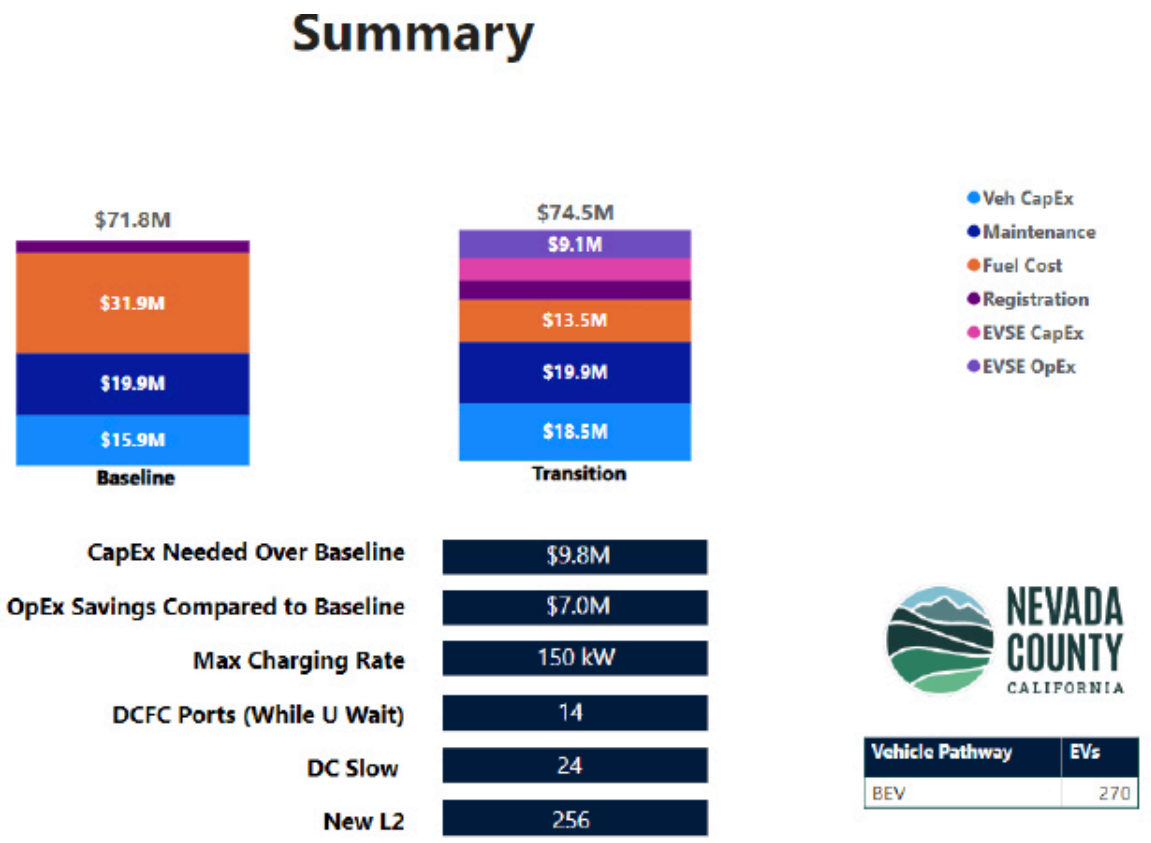

Figure 2: Summary of ZEV Transition Costs in Comparison with Baseline (Business-as-Usual)

Dept.	Vehicle	Year	ZEV Replacement	Estimated Cost	Grants, Vouchers, Tax Credits	Net Cost	Fuel Savings/ year
Public Works	Peterbilt 379	2008	Volvo VNR e	$360,000	*$160,000	$200,000	$6,196
Public Works	Kenworth T800	2008	Volvo VNR e	$360,000	*$160,000	$200,000	$2,562
Public Works	Peterbilt 359	1984	Volvo VNR e	$360,000	*$160,000	$200,000	$330
Public Works	Intl. 4800	1991	Volvo VNR e	$360,000	*$160,000	$200,000	$4,917

Table 9: Estimated vehicle costs after incentives and fuel savings.

Figure 3: Nevada County Vehicle Transition Planner

Pass/Fail	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
Procurement / Milestone													Milestone Compliance Pathway								
Group 1 ZEVs	0%	0%	10%	10%	10%	20%	30%	50%	80%	90%	90%	90%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Group 2 ZEVs	3%	3%	5%	7%	12%	25%	32%	44%	58%	73%	76%	81%	86%	86%	88%	90%	90%	92%	92%	95%	95%
Group 3 ZEVs	5%	5%	5%	9%	14%	32%	45%	50%	55%	55%	59%	59%	64%	68%	68%	68%	68%	68%	77%	86%	86%
ZEV CapEx	$228,000	$0	$113,585	$298,000	$240,000	$1,061,585	$651,585	$409,170	$638,755	$229,585	$298,000	$228,000	$283,585	$0	$0	$170,000	$0	$0	$340,000	$398,000	$0
Scenario													EVSE Utilization								
Brighton Greens	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Crown Point	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%
District Attorney	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Facilities SC	0%	0%	0%	0%	0%	0%	31%	43%	52%	68%	68%	68%	68%	68%	68%	68%	68%	68%	68%	68%	68%
Joseph Center	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Lake of the Pines Treatment Plant	0%	0%	0%	0%	0%	15%	15%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%
Lake Wildwood Treatment plant	2%	2%	2%	2%	2%	16%	16%	16%	17%	17%	17%	17%	19%	19%	19%	19%	19%	19%	19%	19%	19%
Madelyn Helling Library	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
McCourtney Rd. Transfer Station	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
NCOC	3%	3%	3%	11%	18%	28%	35%	35%	39%	39%	39%	42%	42%	42%	42%	45%	45%	45%	51%	53%	53%
Nevada City Veterans Hall	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Nevada County Airport	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%	10%	93%	93%
Rood Center (ERAC)	0%	0%	1%	1%	1%	3%	4%	6%	10%	12%	12%	14%	15%	15%	15%	15%	15%	15%	15%	15%	15%
Sheriff's Property Unit	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Station 91-McCourtney	0%	0%	0%	0%	0%	0%	0%	0%	0%	31%	31%	31%	41%	41%	41%	41%	41%	41%	41%	41%	41%
Wayne Brown CF	0%	0%	41%	41%	41%	41%	41%	41%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
% of Charging Capacity (average)	0%	0%	3%	3%	4%	6%	9%	11%	12%	16%	17%	17%	18%	18%	18%	18%	18%	18%	19%	24%	24%

Figure 4: MHD Fleet Transition Phasing by Nevada County Facility

Figure 5: ZEV Options by Replacement Year

6.1 ZEV Replacement Costs and Operational Savings

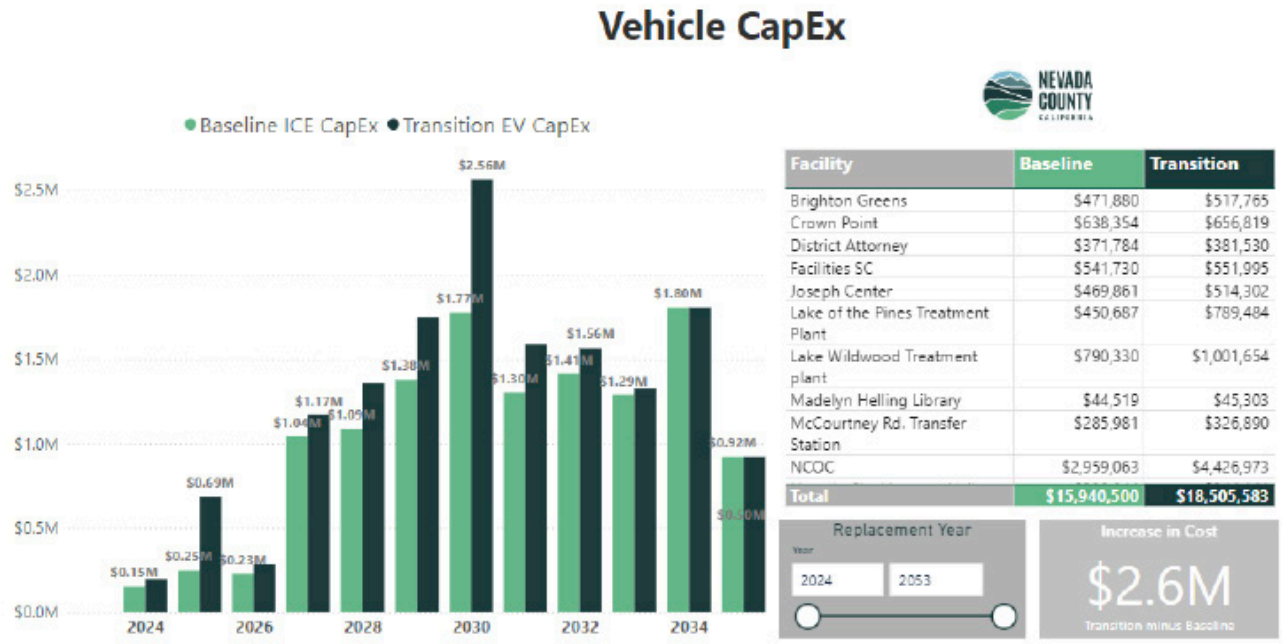

Figure 6: Nevada County ZEV CapEx Forecast

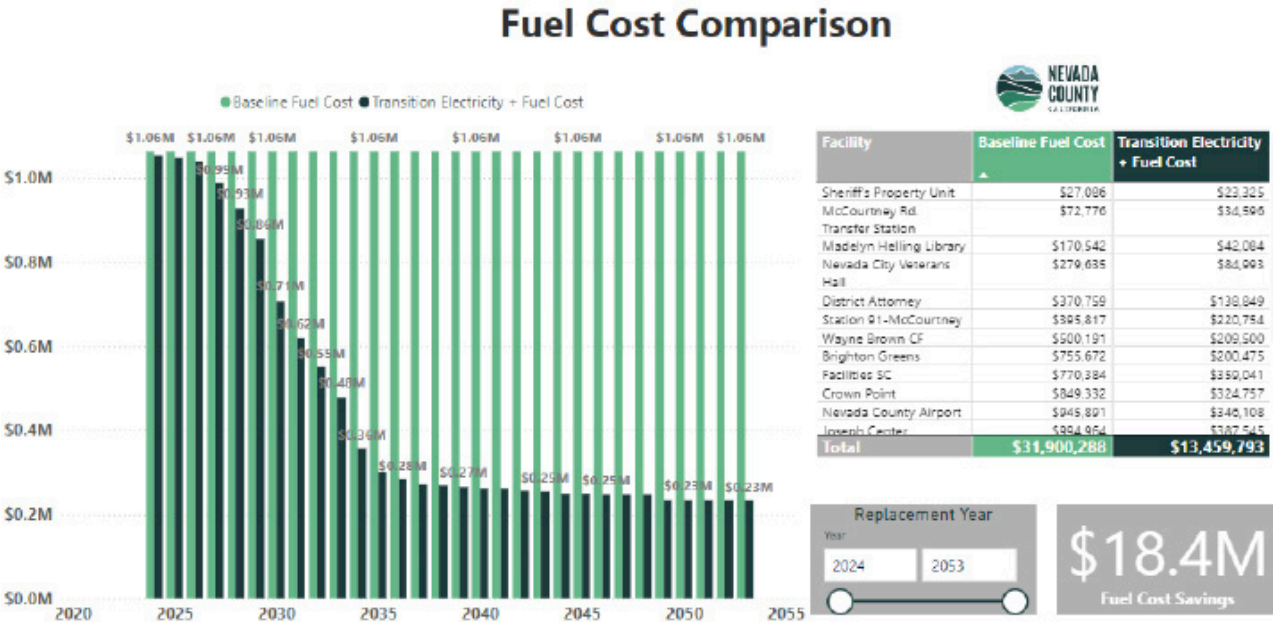

Figure 7: Nevada County ZEV Fuel Cost Savings

6.2 EVSE Capital and Operational Costs

To estimate the capital and operational costs, the team considered two primary strategies for deploying charging infrastructure for zero-emission fleets: Dedicated and Shared. The recommended charger strategy to best meet Nevada County fleet needs was determined with staff input to be the dedicated charging strategy with a mix of shared supplemental DCFC charging at key fleet locations. EVSE recommendations and costs are outlined for the full transition period in Table 10 below.

Facility	EVs	L2s	Slow DC	DCFC	CapEx	OpEx
Brighton Greens	11	6			$472,600	$344,770
Crown Point	13	7			$224,800	$352,760
District Attorney	7	4			$164,500	$227,390
Facilities SC	8	4			$262,700	$234,300
Joseph Center	10	5			$187,900	$298,500
Lake of the Pines Treatment Plant	5	1	4	2	$494,300	$849,270
Lake Wildwood Treatment Plant	15	7	2	2	$682,500	$1,032,830
LEGEND	0					
Madelyn Helling Library	1	1			$70,200	$132,000
McCourtney Rd Transfer Station	3	1	1		$53,700	$137,790
NCOC	46	18	12	1	$1,391,500	$1,707,780
Nevada City Veterans Hall	7	4			$43,000	$235,420
Nevada County Airport	6	1	4		$231,900	$256,330
Rood Center (ERAC) & Wayne Brown CF	132	66		2	$2,714,600	$3,069,080
Sheriff's Property Unit	1	1			$34,600	$93,680
Station 91 - McCourtney	5	2	1		$195,200	$167,830
TOTAL	**270**	**128**	**24**	**7**	**$7,224,000**	**$9,139,730**

Table 10: EVSE Infrastructure Recommendations

6.3 Anticipated Greenhouse Gas Emission Reductions

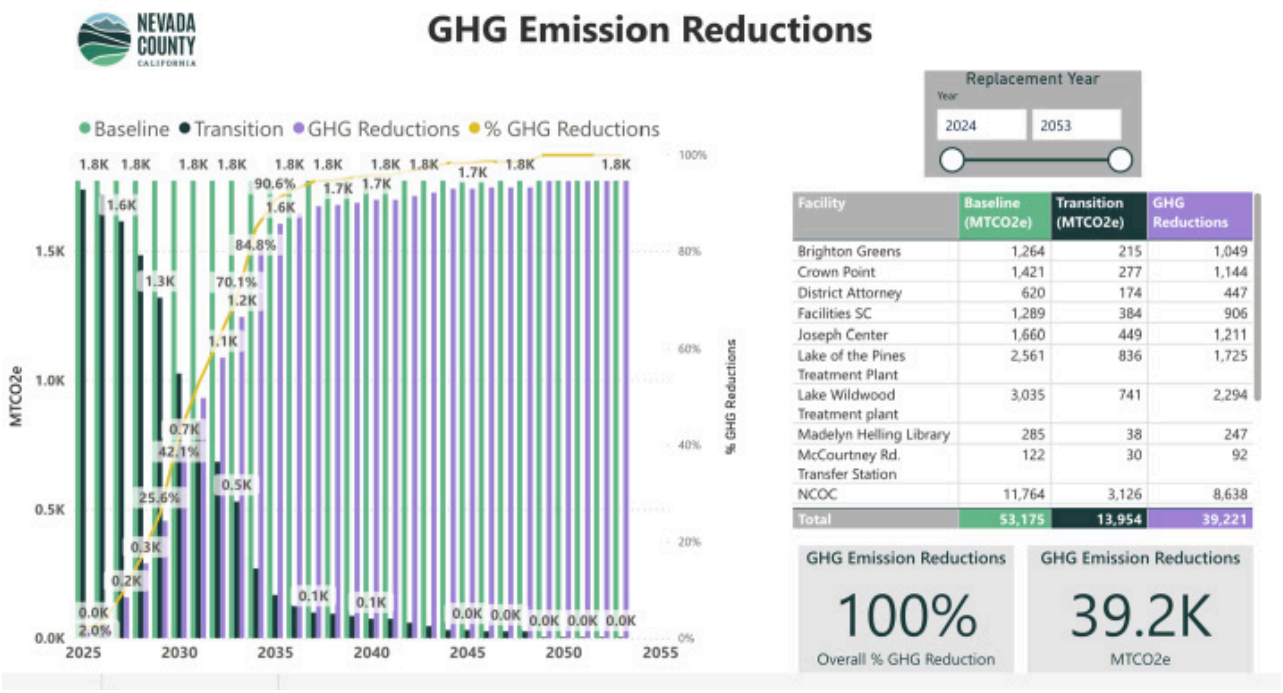

Figure 8: Expected GHG Emission Reductions

7

CHARGING STRATEGIES

To estimate the capital and operational costs, the team considered two primary strategies for deploying charging infrastructure for zero-emission fleets: **Dedicated and Shared**. The recommended charger strategy to best meet Nevada County fleet needs was determined with staff input to be the dedicated charging strategy using charger management software, as described in Appendix D.

7.1 Dedicated Charging Strategy

In the dedicated charging strategy, each vehicle has a dedicated Level 2 charger with load management, supplemented by strategically placed DC fast chargers (DCFC). The dedicated system:

- Is simplest for drivers and operations
- Has a high electrical load (but load management can reduce actual peak demand)
- Has high capital expenditures (CAPEX) & construction impacts

7.2 Shared Charging Strategy

Vehicles share level 2 chargers and supplemental DC fast chargers in the shared charging strategy. The shared system has:

- Lower electrical load
- More operational changes (charge every few nights overnight)
- Lower CAPEX & construction impacts

In the shared charger approach, up to six light-duty vehicles with low energy use can share one charging plug, although in most use cases, a maximum of 4 vehicles per plug can be used. For patrol vehicles, at most two vehicles would use each charging plug.

7.3 Recommended Charging Strategies

The recommended charging strategy (detailed in Table 11) included three phases of installations described by the facility in Tables 12, 13, and 14. Discussions with County staff informed the recommended charger deployment strategy, which contains:

- 128 dual-plug Level 2 (AC) chargers for 256 vehicles
- 14 single-plug Slow Direct Current (DC) chargers
- Seven dual-plug Direct Current Fast Chargers (DCFC)
- 159 total charging stations with 294 total plugs
- Connected load of 4.10 MW

Strategy	L2s	DC (11.5 kW)	DC (22.5 kW)	DCFC (50 kW)	DCFC (150 kW)	Total (sta-tions)	Total (plugs)	Plugs per vehicle	Connected load
Recommended	128	9	5	2	2	159	294	1	4.1 MW

Table 11: Recommended Charger Strategy

7.3.1 Recommended Charger Deployment by Phase

The team recommends the deployment of 55 charger plugs in Phase 1 (2024-2029):

- 50 dual-plug Level 2 (AC) chargers for 93 vehicles
- Three single-plug Slow Direct Current (DC) chargers
- Two dual-plug Direct Current Fast Chargers (DCFC)
- 55 total charging stations with 107 total plugs
- Connected load of 1.58 MW

Domicile Information		Phase 2			
Domicile Location	**Address**	**Fleet EVS**	**L2s**	**Slow DC**	**DCFC**
Brighton Greens	1988 McCourtney Road, Grass Valley, CA 95949	8	5	0	0
Crown Point	1500 Crown Point Circle, Grass Valley, CA 95945	4	2	0	0
District Attorney	201 Commercial Street, Nevada City, CA 95959	2	1	0	0
Facilities SC	10014 N Bloomfield Road, Nevada City, CA 95959	1	1	0	0
Joseph Center	10075 Levon Avenue, Truckee, CA 96161	4	2	0	0
Lake of the Pines Treatment Plant	10984 Riata Way, Auburn, CA 95602	0	0	3	2
Lake Wildwood Treatment Plant	12622 Pleasant Valley Road, Penn Valley, CA 95946	2	1	1	2
Madelyn Helling Library	980 Helling Way, Nevada City, CA 95959	1	1	0	0
McCourtney Road Transfer Station	14741 Wolf Mountain Road, Grass Valley, CA 95949	0	0	0	0
NCOC	12350 La Barr Meadows Road, Grass Valley, CA 95949	12	5	3	1
Nevada City Veterans Hall	415 N Pine Street, Nevada City, CA 95959	4	2	0	0
Nevada County Airport	13059 John Bauer Avenue, Grass Valley, CA 95945	1	1	0	0
Rood Center (ERAC) & Wayne Brown CF	950 Maidu Avenue, Nevada City, CA 95959	54	29	0	1
Sheriff's Property Unit	15076 CA-49, Nevada City, CA 95959	0	0	0	0
Station 91 - McCourtney	11329 McCourtney Road, Grass Valley, CA 95949	0	0	0	0
TOTAL		**93**	**50**	**3**	**2**

Table 12: Recommended Phase 1 locations by facility

The team recommends the deployment of 76 charger plugs in Phase 2 (2030-2034):

- 62 dual-plug Level 2 (AC) chargers for 127 vehicles
- Nine single-plug Slow Direct Current (DC) chargers
- Five dual-plug Direct Current Fast Chargers (DCFC)
- 76 total charging stations with 143 total plugs
- Connected load of 2.3 MW

Domicile Information		Phase 2			
Domicile Location	**Address**	**Fleet EVS**	**L2s**	**Slow DC**	**DCFC**
Brighton Greens	1988 McCourtney Road, Grass Valley, CA 95949	1	0	0	0
Crown Point	1500 Crown Point Circle, Grass Valley, CA 95945	8	4	0	0
District Attorney	201 Commercial Street, Nevada City, CA 95959	3	2	0	0
Facilities SC	10014 N Bloomfield Road, Nevada City, CA 95959	5	2	0	0
Joseph Center	10075 Levon Avenue, Truckee, CA 96161	6	3	0	0
Lake of the Pines Treatment Plant	10984 Riata Way, Auburn, CA 95602	4	1	3	2
Lake Wildwood Treatment Plant	12622 Pleasant Valley Road, Penn Valley, CA 95946	10	6	1	2
Madelyn Helling Library	980 Helling Way, Nevada City, CA 95959	0	0	0	0
McCourtney Road Transfer Station	14741 Wolf Mountain Road, Grass Valley, CA 95949	1	1	0	0
NCOC	12350 La Barr Meadows Road, Grass Valley, CA 95949	24	11	4	0
Nevada City Veterans Hall	415 N Pine Street, Nevada City, CA 95959	2	1	0	0
Nevada County Airport	13059 John Bauer Avenue, Grass Valley, CA 95945	1	0	1	0
Rood Center (ERAC) & Wayne Brown CF	950 Maidu Avenue, Nevada City, CA 95959	60	30	0	1
Sheriff's Property Unit	15076 CA-49, Nevada City, CA 95959	0	0	0	0
Station 91 - McCourtney	11329 McCourtney Road, Grass Valley, CA 95949	2	1	0	0
TOTAL		**127**	**62**	**9**	**5**

Table 13: Recommended Phase 2 locations by facility

The team recommends the deployment of 28 charger plugs in Phase 3 (2035-2053):

- 16 dual-plug Level 2 (AC) chargers for 49 vehicles
- 12 single-plug Slow Direct Current (DC) chargers
- 28 total charging stations with 44 total plugs
- Connected load of 0.45 MW

Domicile Information		Phase 3			
Domicile Location	**Address**	**Fleet EVS**	**L2s**	**Slow DC**	**DCFC**
Brighton Greens	1988 McCourtney Road, Grass Valley, CA 95949	2	1	0	0
Crown Point	1500 Crown Point Circle, Grass Valley, CA 95945	1	1	0	0
District Attorney	201 Commercial St., Nevada City, CA 95959	2	1	0	0
Facilities SC	10014 N Bloomfield Road, Nevada City, CA 95959	2	1	0	0
Joseph Center	10075 Levon Avenue, Truckee, CA 96161	0	0	0	0
Lake of the Pines Treatment Plant	10984 Riata Way, Auburn, CA 95602	1	0	1	0
Lake Wildwood Treatment Plant	12622 Pleasant Valley Road, Penn Valley, CA 95946	3	0	1	0
Madelyn Helling Library	980 Helling Way, Nevada City, CA 95959	0	0	0	0
McCourtney Road Transfer Station	14741 Wolf Mountain Road, Grass Valley, CA 95949	2	0	1	0
NCOC	12350 La Barr Meadows Road, Grass Valley, CA 95949	10	2	5	0
Nevada City Veterans Hall	415 N Pine Street, Nevada City, CA 95959	1	1	0	0
Nevada County Airport	13059 John Bauer Avenue, Grass Valley, CA 95945	4	0	3	0
Rood Center (ERAC) & Wayne Brown CF	950 Maidu Avenue, Nevada City, CA 95959	17	7	0	0
Sheriff's Property Unit	15076 CA-49, Nevada City, CA 95959	1	1	0	0
Station 91 - McCourtney	11329 McCourtney Road, Grass Valley, CA 95949	3	1	1	0
TOTAL		**49**	**16**	**12**	**0**

Table 14: Recommended Phase 3 installations by facility

Appendix E includes a detailed description of each facility, including parking and energy requirements, and fleet EV recommendations.

8

PUBLIC AND WORKPLACE CHARGING AT COUNTY-OWNED FACILITIES

The most cost-effective way for Nevada County to provide public charging is to allow public use of chargers installed for other purposes such as charging fleet EVs. Providing access to the County's fleet vehicle charging infrastructure to the public, including County employees, would help reduce community-wide emissions. In the case of County employees, providing access to EV charging at County worksites would provide a desirable employee benefit to aid staff recruitment and retention. This could be achieved by simply allowing non-fleet EVs to use the County's fleet EVSE to charge personal vehicles while the County's electric fleet is in use, typically during the day when fleet EVs are being driven. At night, this charging infrastructure would be reserved to charge fleet vehicles.

Smart chargers and their associated software can distinguish between users and track usage and collect payment accordingly. Therefore, fleet chargers can distinguish between EVs assigned to County departments for accounting purposes. When these chargers are used for charging non-fleet EVs belonging to visitors or County employees, these chargers can collect fees and data for these charging sessions and different rates can be applied facilitating management of their use by the County. For example, fleet EV drivers can be issued RFID cards or smart phone apps that ensure the respective County department pays for the right charging sessions. Employees who would like to charge their personal EVs on the same charging stations could pay via credit card or by using the respective charging network's app. The County would have the option of setting preferential rates to incentivize employees to charge their personal EVs.

8.1 Public Charging at County-Owned Facilities

The following sites appear to be especially suitable for public charging due to the availability of parking, accessibility to residences and businesses, and information about electrical demand when it was available for public charging:

- Rood Center (ERAC) 950 Maidu Avenue, Nevada City
- Nevada County Public Health, 500 Crown Point Circle Grass Valley
- Nevada County Superior Court, 201 Church St Nevada City
- Laura Wilcox, 208 Sutton Way Grass Valley
- Sutton Resource, 1105 Sutton Way Grass Valley
- Grass Valley Veterans Hall, 255 S Auburn St Grass Valley
- Nevada City Veterans Hall, 415 N Pine St Nevada City

Of the sites listed above, only the Rood Center (ERAC), Nevada County Public Health and Nevada City Veterans Hall, have fleets being electrified requiring installation of fleet chargers. Each of these are discussed below in APPENDIX E: Nevada County EVSE Recommendations.

8.2 Workplace Charging at County-Owned Facilities

As documented in the Existing Conditions report, the following County-owned worksites are rated as "High" or "Medium" for workplace charging potential:

- High: Animal Control, 14647 McCourtney Rd, Grass Valley
- High: Nevada County Public Health, 500 Crown Point Circle, Grass Valley
- High: Nevada County Superior Court, 201 Church St, Nevada City
- High: Bryan II Regional Juvenile Hall 15434 SR-49, Nevada City
- High: Rood Center (ERAC) 950 Maidu Avenue, Nevada City*
- High: Wayne Brown CF, 925 Maidu Avenue, Nevada City*
- High: (Madlyn) Helling Library; Odyssey House, and; Tobiassen Park 980-995 Helling Way, Nevada City*
- High: Truckee Government Center, 10879 Donner Pass Road, Truckee**
- High: Joseph Center, 10075 Levone Avenue, Truckee**
- High: Truckee Library, 10031 Levone Avenue, Truckee**
- Medium: District Attorney, 201 Commercial Street, Nevada City

** These facilities are adjacent and share parking lots with sufficient space for EV chargers.*
*** These facilities share a parking lot.*

However, several of these sites are not candidates for fleet charging. Table 15 lists the proposed sites as charging locations for fleet EVs and suggests that charging stations could be shared with employees.

Facility		Existing Capacity			Recommended Charging Stations (Plugs)		
Grass Valley							
Fleet Facility	Future Fleet Evs	Fleet Parking Spaces	Available Electrical Capacity	Fleet Chargers	Phase 1	Phase 2	Phase 3
Nevada County Public Health, 500 Crown Point Circle	13	50	200a(90kw)	4 (8)	1 (2)	2 (4)	1 (2)
Nevada City							
Rood Center (ERAC) 950 Maidu Avenue	130	100	160a (133kw)	68 (136)	30 (60)	31 (62)	7 (14)
Wayne Brown Cf 925 Maidu Avenue	*	7				-	-
(Madlyn) Helling Library; Odyssey House; Tobiassen Park 980-995 Helling Way	1	2+4+0	160a (57.6kw)	1 (2)	1 (2)		
District Attorney, 201 Commercial Street	7	8	100a (36kw)	4 (8)	1 (2)	2 (4)	1 (2)
Truckee							
Joseph (Center) Building, 10075 Levone Avenue	10	11	100a (36kw)	5 (10)	2 (4)	3 (6)	-

Table 15: Fleet charging facilities with chargers potentially available for workplace charging

8.3 Sample policies for shared charging stations

The following sample usage policies are proposed to manage this shared resource, and electricity usage could be tracked using charge management software.

8.3.1 Nevada County EV Charger Use Policies

The following policy is proposed to manage this shared resource, and electricity usage could be tracked using software.

> *Nevada County encourages its employees to use environmentally responsible and cost-effective modes of transportation to commute to and from county work sites. County-owned EV chargers may be available to charge employee vehicles when not being used on county-owned vehicles. County employees must abide by the County's Employee EV charger use policies and guidelines to use County-owned EV chargers.*
> *In the future, additional EVSE may be needed as demand for EV charging expands, depending on battery range and charging technology.*

1. Nevada County employees may use County-owned EV chargers at County worksites only when these chargers are not being used to charge County-owned vehicles and are available in employee parking areas.
2. All employee vehicles parked on county-owned worksites must be registered in the Nevada County Vehicle Registration System, and a county-issued car tag must be displayed before they can use the charging stations. Qualifying vehicles are issued special Nevada County Employee Vehicle (NCEV) car tags with additional parking benefits.
3. Employees parking at County EV chargers must limit charging times to no more than 4 hours per day. Employees may also use these spaces for no more than 4 hours to wait for available charging stations. Combined waiting and charging times may exceed 4 hours.
4. By using the charging stations, the EV owner consents for his/her vehicle to be unplugged when the charging station indicates their vehicle is fully charged. This will enable vehicles parked adjacent to existing charging stations to charge. Authorized personnel may disconnect your vehicle at any time.

8.3.2 County Employee EV Charging Guidelines

1. Employees should not count on available workplace charging stations when making vehicle purchase decisions. The decision to purchase or lease an EV should be based on his/her ability to charge at home and the convenience of publicly available charging stations, as daily access to charging cannot be guaranteed since the County's chargers may be used to charge municipal vehicles.
2. Employees should not use charging stations if they can drive the entire two-way commute on electricity while charging at home. We encourage EV owners who park in spaces adjacent to the charging stations to open charge-port covers to let other EV owners know they may plug in their vehicles when they are done. Employees should move their vehicles when a charge is complete so other employees can use the charging station.
3. Charging cords and charging station status indicators have matching identification numbers to show which cord goes with which charging station. Employees should neatly replace the charging cords when finished. Cords left on the ground are safety hazards.
4. A list of registered EV owners by County worksite is available on the County's infonet. The workplace EV community can use this list to collaborate on ideas to better share the County's charging stations.

9

FACILITIES

Engineers from Sugar Pine Engineering visited facilities to determine the suitability of installing EVSE and identify any site constraints.

Using vehicle energy demand and charging strategies, infrastructure needs for power delivery and charging were identified based on current spare capacity. Estimates for facility demand are based conservatively to account for not using real bill data to calculate peak demand, and more capacity may be available under further engineering review.

Building Name	Building Address	Existing EV Charger	Charger Qty	Charger Rating	Public Access	Public Parking Spaces	Existing Solar	Existing Generator	Spare Capacity
Brighton Greens	1988 McCourtney Road	No	N/A	N/A	N/A	Yes	No	No	Yes
Madelyn Helling Library	980 Helling Way	No	N/A	N/A	N/A	Yes	No	Yes	Yes
NCOC	12350 La Barr Meadows Road	Yes	1	6.7kW	No	Yes	No	Yes	Yes
Rood Center ERAC	950 Maidu Avenue	Yes	4	6.7kW (26.8kW total)	No	Yes	Yes	Yes	Yes
McCourtney Road Transfer Station	14741 Wolf Mountain Road	No	N/A	N/A	No	No	No	No	Yes
Nevada City Veterans Hall	415 N Pine Street	No	N/A	N/A	Yes	Yes	No	No	Yes
District Attorney	201 N Pine Street	No	N/A	N/A	Yes	Yes	No	No	Yes
Sheriff's Property Unit	15076 CA-49	No	N/A	N/A	No	No - No access to parking- Not viable site for charging			
Nevada County Airport	13059 John Bauer Avenue	No	N/A	N/A	Yes	Yes	No	No	Yes
Station 91 - McCourtney	11329 McCourtney Road	No	N/A	N/A	No	No	No	No	Yes
Lake of the Pines Water Treatment	10984 Riata Way	No	N/A	N/A	No	No	No	Yes	Yes
Lake Wildwood Water Treatment	12622 Pleasant Valley Road	No	N/A	N/A	No	No	No	Yes	Yes
Joseph Center - Courthouse	10075 Levon Avenue	No	N/A	N/A	Yes	Yes	No	No	Yes
Joseph Center - Truckee Library	10031 Levon Avenue	No	N/A	N/A	Yes	Yes	No	No	Yes
Joseph Center - Sheriff's Office	10879 Donner Pass Rd	No	N/A	N/A	No	No	No	Yes	No

Table 16: Evaluation of Nevada County Building Electrical Capacity

10

PUBLIC CHARGING

The California Energy Commission publishes the biennial Assembly Bill (AB) 2127 Electric Vehicle Charging Infrastructure Assessment that examines charging needs to support California's plug-in electric vehicles (PEVs) in 2030. Data tables that accompany the report show that by 2030, Nevada County will need:

- 228 Level 2 charging station ports at multifamily properties (which include mobile home parks)
- 361 Level 2 charging station ports at workplaces
- 1,141 Level 2 charging station ports at public locations
- 90 DCFC ports
- 25 DCFC charging stations for interstate travel

As noted in Chapter 8 and Appendix E, a total of 14 dual-port Level 2 and a single dual-port DCFC are intended for fleet use located at the Rood Center (ERAC), Nevada County Public Health, and Nevada City Veterans Hall could also be made available for public charging when fleet EVs are on the road. Collectively, these would provide a total of 28 Level 2 and 2 high-power DCFC charge ports. Each of these are summarized below:

Rood Center (ERAC): Three (3) dual-port Level 2 and one (1) dual-port DC Fast Charger are recommended for installation on the south side of the ERAC. These would be convenient for public and workplace charging for both the Rood Center and the adjacent Wayne Brown Correctional Facility.

Nevada County Public Health: Seven (7) dual-port L2 chargers are recommended for installation in the stalls closest to the south side of the building, convenient for fleet, employee, and public use and for electrical infrastructure installation.

Nevada City Veterans Hall: Four (4) dual-port L2 chargers are recommended along the west side of the building accessible to the public when not in use for fleet charging.

10.1 Charging fees for public use

Commercial charging stations are those that accept payment by credit card, smartphone, or through a web app. In California, commercial Level 2 charging stations installed after January 1, 2021, and DCFC installed after January 1, 2023, must sell electricity by the kilowatt hour (kWh), must display the start and stop times, the unit price charges, and the total price for the quantity of energy delivered.[8] See Appendix F for the Department of Food and Agriculture's Division of Measurement Standards (DMS) testing equipment requirements for energy sold to customers.

Some commercial charging stations can also charge additional fees for services, like a time-based fee for parking or an initial "start-up" fee. California's regulations state that all additional fees must be capable of indicating the fee, the measurement of the fee, and the total transaction price.

The operator of the charging station can set the fee for charging, which can change throughout the day to match the price of electricity. Operators can offer tiered pricing—a discount for members—as long as everyone can access the tiered prices. This resembles how a grocery store's "frequent shopper club" card works. Everyone can sign up for the club card and receive the discount.
Non-commercial charging stations are those that do not have payment systems. Some may require activation by scanning a QR code or using an RFID tag. Still, these EVSEs are exempt from California regulation because the EVSEs can't measure the amount of electricity dispensed. An operator can collect a use fee as:

- A session charge is collected on the parking space by scanning a QR code
- A surcharge on a monthly parking pass

A monthly subscription fee via a payroll deduction for employees who opt-in
Reference: https://www.cdfa.ca.gov/dms/pdfs/CA_EVSE_Regulation_Reference_Document.pdf

[8] Charging stations that are owned and operated by a municipality are exempt from this regulation. Please see https://www.cdfa.ca.gov/dms/pdfs/CA_EVSE_Regulation_Reference_Document.pdf

10.1.1 Hours for public charger use

Some charging station grants and incentives have requirements for public access and hours of operation. Read the requirements carefully before establishing a policy.

An employer or property owner can choose the hours that the charging station is available, just as a business decides its hours of operation. The operating hours should be easy to understand and evenly applied to all employees and/or all members of the public.

Operating hours should also consider a time limit for parking at the charging station, if people can unplug each other's cars, and state that charging stations are first-come, first-served. Examples include:

- Employees charging during business hours, public charging after 5:00 weekdays, and all day Saturday and Sunday must observe a four-hour limit at the charging station.
- Charging is available to all employees on a first-come, first-served basis. Employees must move their car after four hours. We have an "OK to Unplug" policy.
- Public charging between 8:00 am and 8:00 pm on a first-come, first-served basis. Fleet charging after 8:00 pm. Cars left in fleet spaces may be towed. (See below for the requirements about towing.)

11

ZERO-EMISSION VEHICLE TYPES

Several common types of low and ZEVs are available on the market today, and this plan considers all. Each vehicle type has trade-offs; some are only available for certain fleet vehicle sizes. The most deployed ZEVs are battery electric vehicles (EVs). Currently, the availability of zero-emission vehicle models varies significantly across the EV and hydrogen fuel cell electric vehicle (FCEV) categories, particularly in comparison to light-duty versus medium and heavy-duty (MHD) vehicles.

As an interim option, RNG is a non-ZEV fuel that only complies with ACF requirements and specific restrictions, including for wastewater and refuse trucks, and must be exclusively fueled with biomethane.

The market has seen substantial growth in EVs. In 2022, there were around 500 electric car models available globally, a number that has more than doubled since 2018-2019. China leads in model diversity, offering nearly 300 models, reflecting its broad portfolio of electric vehicles. The United States had fewer than 100 models available in 2022, although this number was still twice as many as before the Covid pandemic.

The MHD segment, particularly for electric trucks and buses, is also expanding. More than 900 current and announced MHD vehicle models are reported in the Global Drive to Zero Emission Technology Inventory (ZETI) database. In June 2024, about half of the ZEVs were transit and school buses, 146 were heavy-duty trucks and 200 were medium-duty trucks, mostly for freight and goods movement. Most of these MHD truck models are battery electric, with 66 models of fuel cell heavy-duty trucks currently available. The following section provides an overview of low and zero-emission vehicles.

11.1 Electric Vehicles (EVs)

11.1.1 Light Duty EVs

Overview: Light-duty EVs primarily include passenger cars and small vans. These vehicles are powered by lithium-ion batteries and are known for their high efficiency and low operational costs.

Trade-offs:

- **Fuel Availability:** Electricity is readily available and readily accessible, making it a fuel source for EVs. However, charging infrastructure distribution is uneven, with higher concentrations in urban areas.
- **Average Range:** Modern light-duty EVs can achieve ranges of over 300 miles on a single charge. However, battery capacity and vehicle efficiency vary based on performance specs, temperature, and other conditions, affecting the actual range.
- **Other Metrics:** EVs benefit from lower maintenance costs than internal combustion engine vehicles. Although the initial purchase price of EVs can be higher, government incentives and lower operational costs from fuel and maintenance savings often offset this.

11.1.2 Medium/Heavy Duty EVs

Overview: This category includes buses, trucks, and larger commercial vehicles. EVs are gaining traction because they can significantly reduce emissions from freight and public transportation.

Trade-offs:

- **Fuel Availability:** Similar to light-duty EVs, the key challenge lies in charging infrastructure, particularly for long-haul routes that require fast-charging stations.
- **Average Range:** Medium and heavy-duty EVs have a lower range than their light-duty counterparts, typically around 100-200 miles, due to the higher energy demands of larger vehicles.
- **Other Metrics:** The adoption of medium and heavy-duty EVs is constrained by higher upfront costs and the need for significant investments in charging infrastructure. However, they offer the advantage of reduced noise pollution, no tailpipe emissions, and lower operating costs from fuel and maintenance savings.

11.1.3 Hydrogen Fuel Cell Vehicles

While battery EVs are viewed as the near-term technology for transitioning vehicles to zero-emissions, hydrogen fuel cell vehicles (FCEVs) have applications for electrification, particularly for fleets with long daily duty cycles that require rapid refueling.

Overview: Hydrogen fuel cell vehicles generate electricity on-board through the chemical reaction of hydrogen with oxygen. This category includes passenger cars and is expanding into buses and trucks.

Trade-offs:

- **Fuel Availability:** The hydrogen refueling infrastructure is currently limited but growing, with stations primarily located in urban areas and along certain corridors.
- **Average Range:** Hydrogen fuel cell vehicles can offer ranges similar to or greater than conventional vehicles, with some models exceeding 400 miles per refuel.
- **Other Metrics:** Fuel cell vehicles widely in use for transit buses, particularly in cold climates and on long routes. Currently, the cost of hydrogen is higher than petroleum fuels, but California's Hydrogen Hub initiative has a goal of delivering nonrenewably produced hydrogen for $3/kg—about half the cost of diesel.

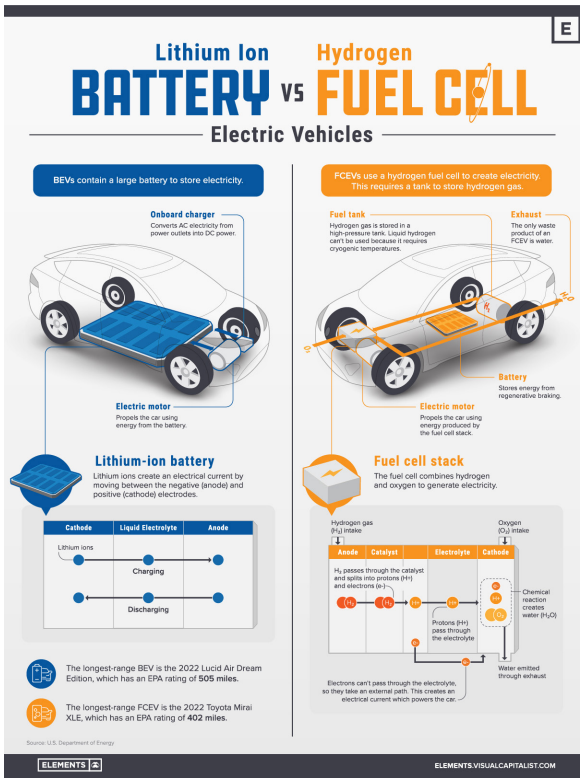

Figure 9: Battery EVs and Fuel Cell EVs

11.2 ZEV Refueling

11.2.1. Electric Vehicle Supply Equipment (EVSE)

EV charging is classified into three main types or levels, each differing in power output, charging speed, and infrastructure requirements. Understanding these types can help EV owners and potential buyers make informed decisions about charging based on their needs.

Level 1 Charging

Level 1 charging utilizes a standard 120V AC outlet, which is common in residential settings. It's the slowest form of charging, typically requiring 40-50 hours to charge an EV to 80% from empty and 5-6 hours for a Plug-in Hybrid Electric Vehicle (PHEV). Despite its slow speed, Level 1 charging can be a convenient option for overnight charging or for vehicles with smaller battery capacities.

Level 2 Charging

Level 2 charging operates at a higher rate through a 240V (in residential applications) or 208V (in commercial applications) electrical service. This level of charging can charge an EV to 80% from empty in 4-10 hours and a PHEV in 1-2 hours, making it significantly faster than Level 1. Level 2 charging stations are common for home, workplace, and public charging, providing a good balance between charging speed and infrastructure cost. The connectors used for Level 2 charging are usually the J1772 standard in the US.

Direct Current Fast Charging (DCFC) or Level 3 Charging

DCFC, also known as Level 3 charging, offers the fastest charging speeds, enabling an EV to charge to 80% battery capacity in 20 minutes to one hour. This type of charging uses high-power 400V - 1000V DC and is typically found in public charging stations along heavy-traffic corridors. Most PHEVs currently do not support DC fast charging. DCFC uses different connectors, including the Combined Charging System (CCS) for vehicles in North America and Europe, CHAdeMO for Japanese vehicles, and a formerly proprietary connector for Tesla vehicles, the North American Charging System (NACS). Several vehicle manufacturers have announced that starting in 2025, their electric vehicles in North America will be equipped with the NACS charge port.

Choosing the right charging level depends on various factors, such as the daily use of the EV, charging time requirements, and whether the infrastructure can support the chosen charging level. While Level 1 charging is slow, it requires no special installation and can be convenient for PHEVs or overnight charging. Level 2 charging offers a practical middle ground, suitable for daily use and faster charging at home or public stations. DCFC or Level 3 charging is best for quick top-ups or along transit corridors.

DCFC for MHD vehicles, such as electric trucks and buses, represents a crucial aspect of the EV infrastructure necessary to support the electrification of commercial transportation. Calculating the charging time for these vehicles involves understanding their larger battery capacities compared to light-duty vehicles and the power output of the DCFC station. The formula to estimate the charging time is relatively straightforward:

Charging Time (hours) = battery Capacity (kWh) / Charger Power Output (kW)

For example, if a medium-duty electric truck has a battery capacity of 200 kWh and is being charged at a DCFC station with a 150-kW power output, the charging time to go from empty to full (under ideal conditions) can be calculated as follows:

Charging Time = 200 kWh / 150 kW = 1.33 hours

It's important to note that charging speed can be influenced by several factors, including the vehicle's maximum charging rate, the current state of the battery (as charging speed tends to slow down as the battery approaches full capacity), and environmental conditions such as temperature. Most commercial DCFC stations can provide a range of power outputs, with newer stations offering up to 350 kW or more, significantly reducing charging times for large vehicles.

Moreover, for medium- and heavy-duty vehicles, which often operate on fixed schedules and routes, planning for charging times and infrastructure is crucial to minimize downtime and maintain operational efficiency. The development of higher-capacity chargers and battery technologies that can support faster charging rates is key to the wider adoption of electric medium- and heavy-duty vehicles.

11.2.2 Hydrogen Refueling

California was an early leader in the deployment of retail hydrogen stations to fill fuel-cell electric cars (FCEVs) and in the deployment of fuel-cell electric buses. Now, California transit, municipal, and private fleets are eyeing hydrogen as a fuel to enable medium and heavy-duty vehicles on long and challenging routes and to reduce potential electric load from charging large vehicles.

Hydrogen Fuel

Hydrogen is regulated as a motor fuel in California and throughout the U.S. It is required to meet fuel quality standards, dispensers must be type-certified for accuracy, and sales tax applies to the sale of fuel. Building and safety standards are in the State code, fire departments are required to take hydrogen safety training, and the Society of Automotive Engineers (SAE) has standards for all parts of the fueling process. All FCEVs

use hydrogen as a compressed gaseous fuel, and hydrogen is measured by weight (kilogram or kg). Fueling a car takes 5-to-7 minutes, and filling a truck or bus takes 10-to-15 minutes, comparable to filling with conventional fuel. Most stations can fill one vehicle after another (back-to-back fueling) and the number of fuelings is limited only by the station's capacity. With hydrogen, "capacity" refers both to the amount of fuel that a vehicle can store onboard and the amount of hydrogen that a station can dispense. For both vehicles and fuel stations, capacity is a limiting factor.

The Truckee hydrogen refueling station is located north of I-80 at 12105 Donner Pass, Truckee (shown in Figure 10) is in Nevada County and was funded with a grant from the California Energy Commission (CEC). The hydrogen refueling station can dispense 180 kilograms of hydrogen per day. However, the station serves only light-duty vehicles. Air Products supplies hydrogen to the station by a high-pressure delivery trailer from their production facilities in Los Angeles County, where the hydrogen is produced via steam methane reformation (SMR) using water and methane.

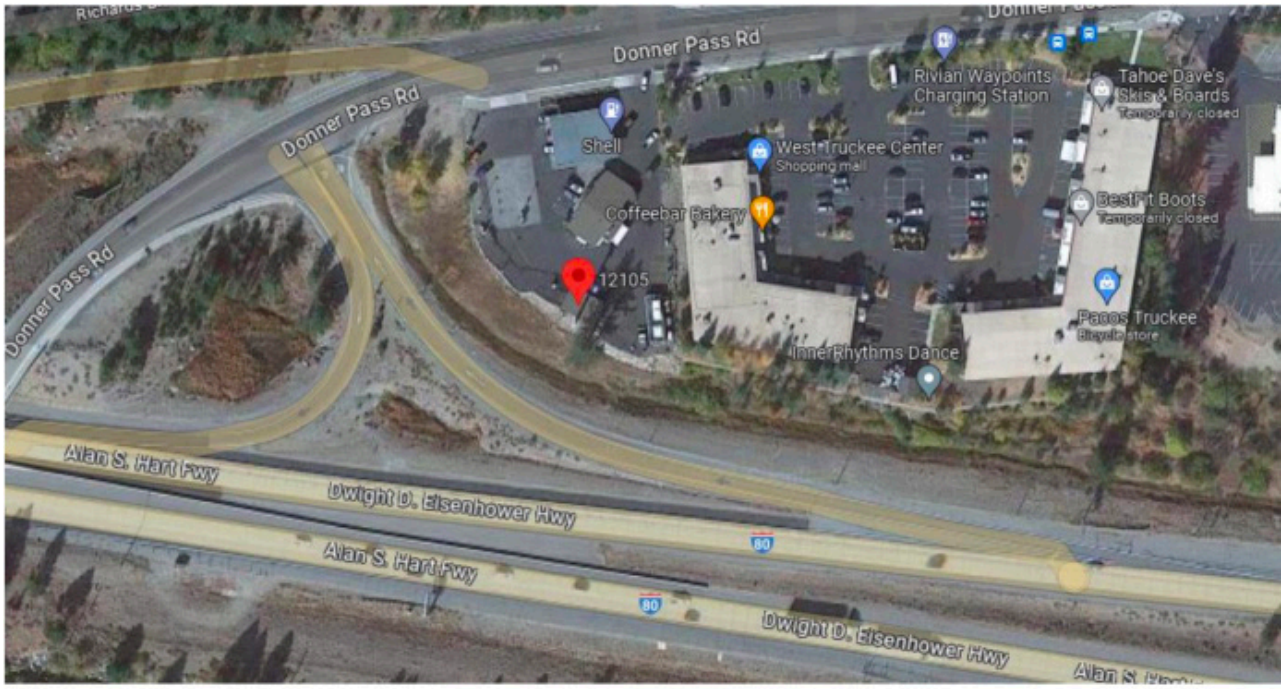

Figure 10: Location of Hydrogen Refueling Station in Truckee

Hydrogen Station Development in Nevada County

The team recommends that Nevada County and NCOG work together to identify a potential property for a hydrogen station, and then engage with a developer like Iwatani, Air Products, or Linde so that they will build a hydrogen station. We do not think the county should build and operate a hydrogen station, but it is well-poised to be an anchor tenant for a station.

Timeline for Implementation

The team's near-term recommendation is to identify potential renewable sources of hydrogen production (wastewater, forest biomass, etc.) and start engagement with hydrogen producers and station builders. This may be done by submitting a preliminary proposal to the ARCHES hydrogen hub to indicate a desire to connect with the marketplace's hydrogen suppliers, the ability to connect with infrastructure and collaboration on policy.

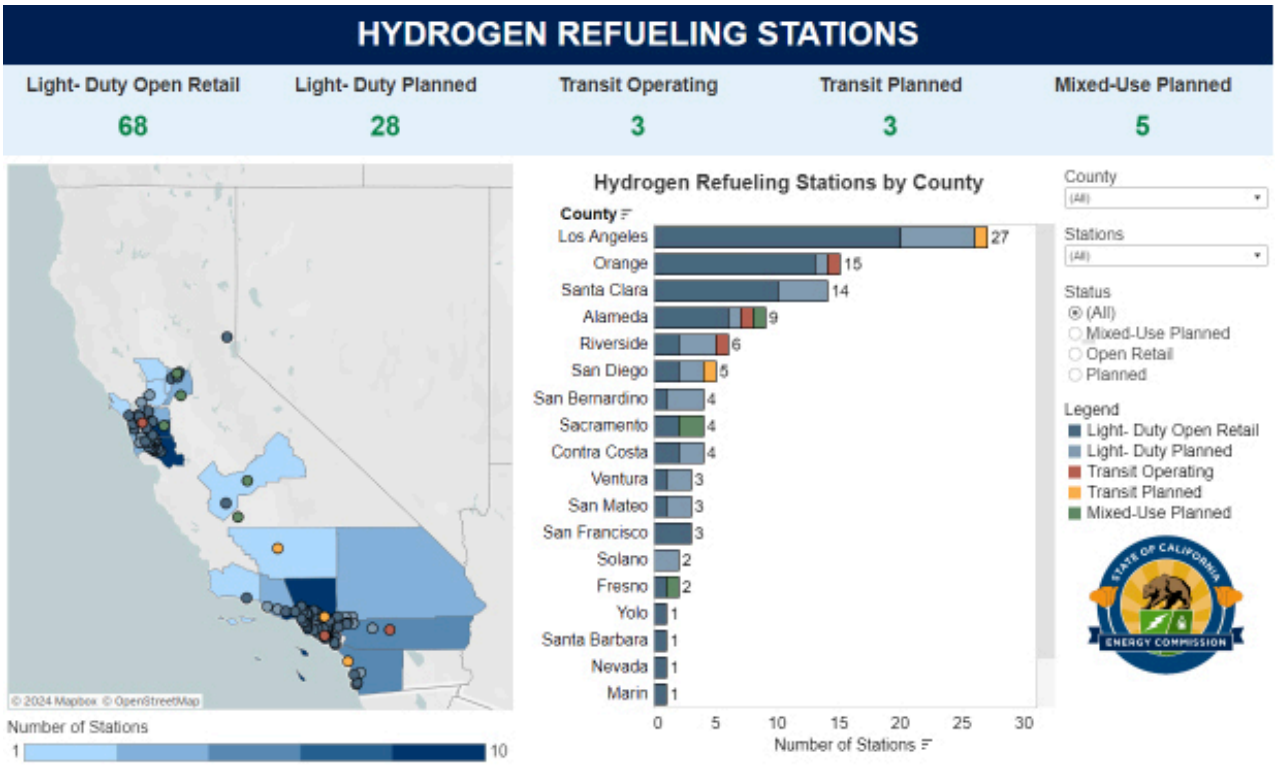

Figure 11: California Energy Commission Tracking Map

BATTERY ELECTRIC VEHICLES & CHARGING STATIONS

STRENGTHS

Existing locations: There are 19 locations for public charging and one location for Nevada County fleet charging. Charging infrastructure is being planned for transit.

Partnerships: The City of Truckee applied for a Department of Energy (DOE) grant to expand its EV fleet and for public charging. Pioneer Community Energy is expanding into Grass Valley and Nevada County. These and other entities will likely build charging infrastructure to support electric fleet expansions, to support public charging, and to take advantage of available funding

Policies: The new Advanced Clean Fleet regulation is driving the rate of adoption of electric vehicles and charging infrastructure.

Funding: Abundant utility, air district, state, and federal funding for public and fleet charging infrastructure is available.

Cost: Electricity is less expensive per mile than gasoline and diesel.

WEAKNESSES

Gaps: Charging stations are not yet concentrated in tourism locations (hotels, local sites). The I-80 corridor is 8th on the prioritization list for charging stations to be funded by the National Electric Vehicle Infrastructure (NEVI) program.

Readiness: Many of the vehicles in the Nevada County fleet are not yet available as EVs. Very heavy-duty public works and public safety vehicles, such as snowplows, are still several years away.

Speed: PG&E estimates 4-5 years to place a new substation to boost electric capacity, and routine interconnection requests are often slow to complete.

Partnerships: Nevada County does not have existing partnership with a Charging as a Service (CaaS) company like WattEV or Zeplug, and has no existing contracts with an EVSE provider or station design/build company.

OPPORTUNITIES

Locations: County facilities, including libraries and parks, are in areas that do not need extensive utility upgrades.

Equity: Almost 80% of housing units in Nevada County are owner-occupied. Coupling EV readiness with home upgrade programs could increase home charging opportunities. Several California funding programs are available for the installation of charging infrastructure at multifamily housing properties, in disadvantaged communities, etc.

Partnerships: Candidates include campgrounds, RV parks, state and national parks, agri-tourism businesses, card lock stations for truck fueling, and the SACOG Megaregion project. Tesla opening its charging network will enable new, already constructed, charging opportunities.

Funding: Numerous California and federal grants and incentives are available. Much of Nevada County falls into a Justice 40 area due to high fire risk and high personal injury from environmental hazards, which increases competitiveness for federal funding.

THREATS

Priorities: Grass Valley's two census tracts are in the 50-60th percentile on CalEnviroScreen, making the community less competitive for state or PG&E incentives.

Competition: PG&E is more focused on fire mitigation in Nevada County than on upgrading grid capacity.

Technology: Very high capacity (500 kW+) charging stations are in the early stages of commercial development. BEVs do not exist for many heavy use cases yet.

Policies: The Advanced Clean Trucks rule forces manufacturers to build zero-emission trucks in a manner that is different than the Advanced Clean Fleet regulation requires for municipalities. This will likely result in a lack of EVs in certain classes and use cases.

Table 17: BEV EVs and Charging Stations SWOT Analysis

HYDROGEN FUEL CELL ELECTRIC VEHICLE AND STATIONS

STRENGTHS

User familiarity: The overall fuel cell electric vehicle (FCEV) customer experience has been designed to be as close to that of gasoline as possible.

Partnerships: There is a Nevada County Biomass Task Force and two facilities for biomass conversion that may make renewable hydrogen.

Use Cases: Hydrogen is a good fit for vehicles that need long range and have difficult duty cycles.

Faster Refill Times: Fuel cell electric cars can fill in about five minutes, while trucks and buses can fill in less than 15 minutes.

Resilience: Depending on the hydrogen generation and handling method, the refueling station can be largely decoupled from the local electric grid.

Funding: Abundant utility, air district, state, and federal funding for public and fleet charging infrastructure is available.

WEAKNESSES

Gaps: One car-only station in Truckee. The existing station has small quantities of hydrogen delivered, and it's not accessible to residents, fleets, and businesses.

Readiness: A limited number of FCEVs are commercially available, while Nevada County has already purchased battery electric buses.

Speed: There must be sufficient functional hydrogen refueling infrastructure to make widespread adoption of FCEVs a reality. There is currently little hydrogen infrastructure (production, pipelines, etc.) in the county to supply the fuel. Hydrogen stations are construction projects, and can take up to two years to plan, permit, and build.

Cost: Hydrogen is more expensive than gasoline and diesel.

OPPORTUNITIES

Locations: Hydrogen stations can co-exist with gas stations, which can create revenue for local businesses.

Growth Forecast: The California Fuel Cell Partnership is aiming to create 200 hydrogen stations capable of supporting 70,000 heavy- duty FCEVs by 2035. It is anticipated that hydrogen demand associated with heavy-duty transit will reach 192-416 kilotons/year by 2035 in California.

Equity: Hydrogen stations do not need utility upgrades and can serve rural areas. Hydrogen can also be used as energy storage.

Funding: SB 1383 requires that green waste be composted. CalRecycle has funding for rural counties to manage organics locally instead of transporting them to a facility. Hydrogen production from biomass may be fully funded by developers.

THREATS

Priorities: Research, development, and commercialization are more focused on battery electric vehicles.

Competition: If California wins a DOE Hydrogen Hub project, it will likely be based in Los Angeles.

Technology: Hydrogen station equipment is in the early stages of commercial development. FCEVs are on a longer commercialization timeline than BEVs.

Policies: Advanced Clean Fleet regulation compliance timelines may deter investment in FCEVs due to the more advanced state of BEV development and adoption.

Table 18: FCEVs and Refueling Stations SWOT Analysis

RENEWABLE NATURAL GAS (BIOMETHANE)

STRENGTHS

Existing Locations: Renewable natural gas (RNG) is a drop-in fuel for existing stations that use compressed natural gas or liquefied natural gas. Natural gas trucks are mature technology and cost-competitive with gas and diesel.

Partnerships: Candidates include landfills, transfer stations, wastewater treatment, the Nevada County Biomass Task Force, and commercial livestock operators. Nevada County is near biogas production, from sources such as Aemetis.

Policies: The California Public Utilities Commission (CPUC) requires that natural gas utilities increase the percentage of RNG in the pipeline.

Funding: While there are fewer opportunities available than for zero-emission infrastructure, several funding sources are available, including federal REAP funding for anaerobic digester biomethane production and CEC grants for RNG truck fuel. Natural gas utilities and Carl Moyer programs offered through California air quality management districts also offer rebates for stations and trucks.

WEAKNESSES

Gaps: Nevada County does not operate natural gas vehicles, and there are no public natural gas stations in the county (there are three private stations, including two owned by PG&E).

Readiness: RNG is currently not under consideration in the fleet plan.

Speed: Building RNG production can take years.

Obsolescence: RNG vehicles will need to be replaced with ZEVs to comply with California regulations.

Partnerships: Nevada County does not have existing relationships with developers, RNG producers, or other fleets that could provide baseload fuel for a station.

OPPORTUNITIES

Locations: Could be added to transfer stations and wastewater treatment plants. The Advanced Clean Fleet regulation allows RNG for refuse trucks and water tankers.

Equity: RNG is cost-competitive with natural gas and costs less than gasoline and diesel.

Partnerships: Candidates include PG&E and independent refuse haulers

Funding: REAP, sanitation agencies.

THREATS

Priorities: Focus on ZEVs limits time and resources to deploy a different combustion fuel.

Competition: Funding for RNG stations and trucks is less than for ZEVs and declining.

Technology: ZEV refuse trucks are in development and early pilots, which could make RNG trucks moot by 2030.

Policies: State policies will change over time and may either disallow current RNG exemption or increase the types of trucks that can use RNG.

Table 19: Renewable Natural Gas SWOT Analysis

12

FUNDING AND FINANCING OPTIONS

The cost differential between a ZEV system (including the vehicle, depot, and refueling infrastructure changes) and internal combustion vehicles is often the primary concern when transitioning fleets.[16] However, an abundance of federal and California grant opportunities, tax credits, low-carbon fuel credits, and low-interest loans are available to reduce upfront capital costs. When paired with significant operating savings from lower fuel and maintenance costs, ZEVs can offer very attractive returns on investment. As California regulations continue to hasten the timetable for fleet conversions, these funding opportunities are likely to diminish over time. Early movers are likely to receive greater subsidies than those who wait until they must act.

There are a variety of state, federal, and utility funding sources available to subsidize the transition to ZEVs, along with private financing options. Table 20 is a summary of current available funding sources for public agencies in California in the form of rebates, low-interest loans, vouchers, and grants that can be used for ZEVs or infrastructure. The balance of this section provides more detail on top funding sources and program details, as well as private financial mechanisms.

Public funding opportunities and incentive programs provide resources that support the widescale adoption of cleaner technologies and compliance with regulatory requirements, with a focus on early adopters. California has the most ambitious ZEV targets and the most generous funding programs to achieve those targets of any state in the country.

[16] Welch, D. et al. (2020). MOVING ZERO-EMISSION FREIGHT TOWARD COMMERCIALIZATION. CALSTART

California has a goal to decrease GHG emissions by 40% by 2030. Because the transportation sector accounts for such a large proportion of these emissions – 27% nationwide and roughly 50% in California[17] – the state aims to end sales of new internal combustion passenger vehicles by 2035 and new diesel trucks by 2036. To reach these goals, ample state funding resources are dedicated to transitioning the transport sector to ZEVs to reduce carbon emissions from combustion engine vehicles. This shift requires replacing or repowering the vehicles themselves while also investing in resilient charging infrastructure.

Funding for ZEVs is especially important for agencies, tribal entities, or small businesses that don't have the resources to support the transition on their own. Grants, incentives, vouchers, and tax credits are available through state and local agencies. Refer to Appendix C for a list of California funding agencies.

Funding Opportunity	Agency	Type	Use Type	Funding Available	Next Submission Date/Deadline
PG&E EV Fleet Program	PGE	Rebate	EVSE & MHD MHDs	Pays for electrical work on customer side of the meter. Also provides $3,000-$4,000 per vehicle.	Ongoing
Hybrid and zero-emission truck and bus voucher incentive project (HVIP)	CARB	Vouchers	Class 2-8 ZEVs	$7,500--$120,000	Open/Ongoing
Energy Infrastructure Incentives for Zero-Emission Vehicles (EnergIIZE)_ – EV Fast Track and Public Charging Lanes	CEC	Grants	EVSE for MHD	50% of eligible EVSE costs to support MHD vehicles, up to $500,000	Funding lanes open at set times throughout year
Northern Sierra AQMD- The Carl Moyer Memorial Air Quality Standards Attainment Program	AQMD	Grants	Off-road ZEVs and EVSE	50 - 75% of project costs for depots or charging hubs (max for publicly accessible charging paired with renewable energy systems).	Currently closed. Info on program (530) 832-0102, or melissak@myairdistrict.com

[17] ICF. (2020). Caltrans Greenhouse Gas Emissions and Mitigation Report: Final Report. Caltrans

Funding Opportunity	Agency	Type	Use Type	Funding Available	Next Submission Date/Deadline
Corridor and Fueling Infrastructure (CFI)	DOT/ FHWA	Grants	MHD ZEV infrastructure on corridors and for publicly accessible light and heavy-duty charging in communities The community grant program funds projects located on any public road or in other publicly accessible locations, such as parking facilities at public buildings, public schools, and public parks	$500,000 - $15 million	5-year funding program. Round 1 closed May 30, 2023. Round 2 expected to open Q2, 2024
Rural EV Charging 2.0	CEC	Grants	EVSE in rural California communities	TBD	Expected to open Q2 or Q3, 2024.
Charging Infrastructure for Government Fleets	CEC	Grants	ZEV charging infrastructure for light-duty government fleets deploying at least 100 charging ports	Up to $12,500 per Level 2 charger or up to $100,000 per DCFC charger or up to 70% of the total project costs, whichever is less	Closed April 5, 2024. Track for renewal of program
Inflation Reduction Act	Clean Commercial Tax Credit	IRS	MHD ZEVs and EVSE	Up to $40,000 per new truck. Up to 30% or cost for charging infrastructure, up to $100,000 per site	Ongoing
VW Mitigation Trust	CARB	Grant	MHD ZEVs and EVSE	100% of cost, up to $240,000	Ongoing, but limited funding remaining
Climate Pollution Reduction Grant (CPRG)	EPA	Grant	Battery electric light, medium, and heavy-duty	GHG reduction measures, up to $500 million per project	April 1, 2024

Funding Opportunity	Agency	Type	Use Type	Funding Available	Next Submission Date/Deadline
Low or No Emission Grant Program	Federal Transit Admin.	Grant	Purchase or lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supporting facilities.	Up to 90% of costs	May 25, 2024 (annual program)
Clean Heavy Duty Vehicles Program	EPA	Grant	Replace existing non-zero-emission heavy-duty vehicles with ZEVs, support zero-emission fueling infrastructure, as well as train and develop workers.	Maximum award of $60M; $280K to $780k in funding per vehicle, depending on vehicle type	July 25, 2024

Table 20: Federal and California ZEV funding opportunities for agency fleet electrification

12.1 Top Priority State and Federal Funding Programs for Nevada County Fleets and Infrastructure

12.1.1 HVIP

California's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), administered by the California Air Resources Board (CARB), provides point-of-sale vouchers on a first-come, first-served basis. The current baseline voucher for class 2-8 battery electric vehicles ranges from $7,500 to $120,000, and $240,000 for fuel cell electric trucks.

12.1.2 EnergIIZE

The EnergIIZE (Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles) Project, implemented by CALSTART with CEC funding, provides funding for ZEV infrastructure for MHD vehicles. Funding is provided in four funding lanes, including Fast Track for projects ready to implement and a Public Charging lane.

12.1.3 VW Mitigation Trust

The Volkswagen (VW) Environmental Mitigation Trust (Trust) provides about $423 million for California to mitigate the excess nitrogen oxide (NOX) emissions caused by VW's use of illegal emissions testing defeat devices in certain VW diesel vehicles. The Trust programs generally require applicants to scrap older qualifying diesel engines to receive funding for the purchase of new battery-electric vehicles, including MHD (Class 5-8) trucks. Eligible Class 8 engine model years that qualify for the scrap and replace program are 1992 to 2012. The maximum incentive is 100% of the cost for government agencies, up to $200,000 per truck (freight, waste hauler, or dump truck).

12.1.4 PG&E EV Fleet Program

Through the EV Fleet Program, PG&E pays for all electrical infrastructure from the transformer to the customer's meter. The program also provides $9,000 per vehicle for Class 8 vehicles. To be eligible for the EV Fleet Program, applicants must be PG&E electric customers, own or lease the property, and acquire at least two EVs.

12.1.5 Northern Sierra Area Quality Management District

The Carl Moyer Memorial Air Quality Standards Attainment Program funds the replacement of old, high-polluting vehicles, engines, and equipment with new technologies that are cleaner than required or earlier than what is required by rules and regulations. Grant amounts are based on the cost-effectiveness of harmful pollutants that the project will reduce. This program also funds the installation of charging and fueling infrastructure. The Northern Sierra AQMD serves Nevada County.

12.1.6 U.S EPA Clean Heavy Duty Vehicles Program

The Inflation Reduction Act invests $1 billion to replace existing Class 6 and Class 7 non-zero-emission heavy-duty vehicles with zero-emission models. Through the new 2024 Clean Heavy-Duty Vehicles Grant Program, the EPA will improve the lives of millions of Americans by reducing pollution in neighborhoods where people live, work, play, and go to school. The program will accelerate environmental justice efforts in communities overburdened by pollution, help tackle our biggest climate challenges, and create high-quality clean energy jobs.

12.2 Credits and Incentives

The 45W Commercial Clean Vehicle Credit allows businesses and tax-exempt organizations that buy a qualified commercial clean vehicle to utilize a clean vehicle tax credit of up to $40,000. It does not have a limit on the number of credits that an organization can claim. It applies to battery and fuel cell electric vehicles that are mostly manufactured in the U.S.

The 30C Alternative Fuel Vehicle Refueling Property Credit (30C credit), which provides an income tax credit for qualified alternative fuel vehicle refueling property, was extended and amended under the Inflation Reduction Act of 2022 (IRA) to include certain property for the recharging of an electric vehicle, placed in service in eligible census tracts, which are low-income community census tracts or non-urban census tracts.[18] Government entities may be eligible for the credit through their System for Award Management (SAM) account. The County's accountants should confirm eligibility for the 30C and 40W credits.

12.2.1 Low Carbon Fuel Standard (LCFS) Program

Since 2009, the California Air Resources Board (CARB) has administered the Low Carbon Fuel Standard, or LCFS, program to help achieve statewide carbon reduction goals by decreasing the transportation sector's carbon intensity by 20 percent by 2030. CARB's LCFS program, the Clean Fuel Program, works as a market system where users and producers of clean energy, including electric vehicle fleets, earn credits through their emission reductions, while emitters purchase those credits to offset their carbon footprint.

In addition, fleets that own and operate charging stations to support their EVs can generate credits. Figure 12 shows the LCFS Credits and Revenue Opportunity.

[18] https://www.anl.gov/esia/refueling-infrastructure-tax-credit

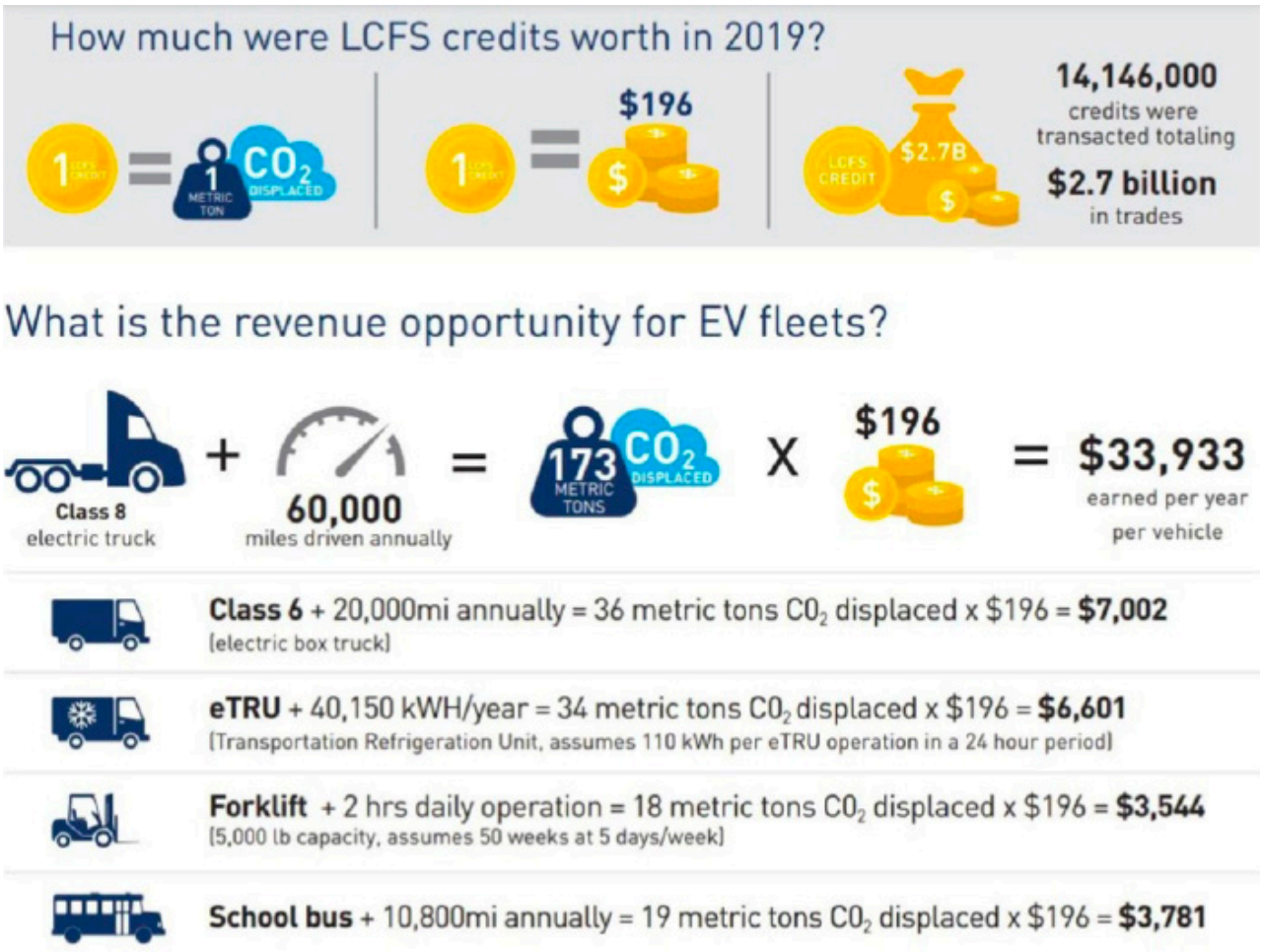

Figure 12: Low Carbon Fuel Standard Credit and Revenue Opportunity

13

PROCUREMENT PROCESSES

Several municipalities that started the transition to ZEVs found that purchasing practices limited their ability to procure ZEVs. Procurement can involve a public bid process that is often awarded to the lowest bidder and/or requires responses from multiple vendors. The following recommendations are best practices from cities and counties that have been transitioning to ZEVs, along with suggestions that are specific to ACF compliance.

- Consider ZEV replacement as part of maintenance. Record vehicle maintenance and fuel costs and determine when a ZEV becomes more cost-effective to operate.
- Consider disposing of, and not replacing, underused vehicles before creating replacement plans.
  - » For example, those that are older than 10 years and traveled fewer than 50,000 miles.
- Assess the number of days that a vehicle is out of service for repair to help determine if departments keep surplus vehicles to fill gaps while waiting for maintenance and service.
  - » One fleet found that reducing the average work order time to three days resulted in 15% of the fleet being declared surplus vehicles.
- Create a separate waiver process for vehicles that should not be replaced with ZEVs. The waiver needs clear definitions for terms like "primarily," "most common," and "regular."
  - » Figure 13 is a summary of the ZEV wavier requirements from the City of San Francisco's Light-Duty Replacement Policy

- Procurement requests/forms should include the availability of charging/hydrogen stations for the replacement ZEV. These might be at the ZEV's domicile, another facility, or a public station.
- Complete an annual fleet acquisition plan instead of procurement throughout the year. The plan must justify why the department is not buying a ZEV.
- Use the total cost of ownership instead of the purchase price for new vehicle requests so that procurement can buy vehicles with the lowest overall cost. This approach can help justify the additional expense of a ZEV without changing budgeting methods.
- Consider group buys with other municipalities, or through negotiated contracts like SourceWell. These may lower the overall costs of ZEVs and charging stations.
- Specify that improvements made to City-owned properties follow or exceed the EV Readiness in the California State Building Code. This may include upgrading the electrical panel with slots or breakers for charging stations, installing a submeter for charging stations, installing conduits and wires to parking spaces, and reconfiguring public parking lots so that future charging stations will be adjacent to ADA van-accessible spaces.
- EV Readiness specs should be included in all renovation and construction budgets and bids.
- Add charging during renovations or when moving, and work with landlords at leased facilities.
- Consider options for cost recovery from charging stations: fees for public/employee use of charging stations and charge-back fees to departments and agencies.
- Adhere to ADA requirements for charging stations.
- Types of data that agencies can (and must) collect and analyze, and requirements for using, sharing, and protecting the data.
- Analyze labor laws, OSHA requirements, IRS considerations, and other non-vehicle state and federal regulations to consider when designing and deploying ZEVs and ZEV fueling.

Exhibit 14: Zero Emission Vehicles Ordinance Waiver Requirements

Waiver 1	No approved vehicle meets safety standards and other requirements for intended use.
Waiver 2	Travel is used **primarily** outside San Francisco in locations that lack required fueling or other infrastructure.
Waiver 3	**Most common** intended use will require **regular** travel distances of more than 100 miles without being able to use a charging station.
Waiver 4	For light-duty passenger vehicles regularly stationed on city-owned property, each of the following conditions must be met: • Operational challenges, such as lack of charging infrastructure. • A plug-in hybrid vehicle will be purchased instead of a ZEV. • At least 75 percent of light-duty passenger vehicles that are regularly stationed (when not in use) on city-owned property are ZEV.
Waiver 5	For light-duty passenger vehicles regularly stationed on leased property, each of the following conditions must be met: • Operational challenges, such as lack of charging infrastructure. • A plug-in hybrid vehicle will be purchased instead of a ZEV.
Waiver 6	Adequate funds have not been appropriated in the department's budget to purchase a ZEV.

Source: CSA analysis based on San Francisco Environment Code, Section 404.

Figure 13: ZEV Waiver Requirements

14

RECOMMENDATIONS AND NEXT STEPS

The recommended next steps for the Nevada County fleet transition plan are as follows:

- Review, revise, and adopt the ZEV and charging infrastructure transition plan
- Share plan with all agencies with affected fleets
- Incorporate ZEV improvements to County strategic plan, capital improvements plan, and annual budget
- Pursue available funding opportunities for the transition
- Encourage the county to collaborate with the cities and school districts to share infrastructure and identify joint needs for additional capacity from PG&E
- Recalculate the cost of electricity and GHG reduction when NV County becomes part of Pioneer Clean Energy (the CCA). Pioneer offers a Green100 rate that is 100% renewable (compared to PG&E's 40% renewable), and the rate will be higher than PG&E's rate. (We don't need to do this, just address it in the report.)
- As FCEV technology evolves, evaluate the suitability of hydrogen-powered vehicles for fleet replacements, particularly for the airport, Transit Services, Roads Maintenance, Solid Waste/Wastewater, Sheriff's Rapid Response
- To align the integration of hydrogen fuel cell vehicles with the broader fleet electrification plan, revisit the potential for FCEVs towards 2035 for vehicles with high daily miles traveled and/or heavy-duty capabilities with short fueling window

APPENDIX

15

APPENDIX A: ACF EXEMPTION CATEGORIES

15.1 ZEV Purchase Exemption

If a fleet owner cannot comply because a ZEV or Near Zero Electric Vehicle (NZEV) is not available, the owner may purchase a new internal combustion engine (ICE) vehicle with a California-certified engine. Starting in 2025, CARB will maintain a ZEV Purchase Exemption List with common vehicle body configurations that are not available to purchase as a ZEV or NZEV. Fleet owners will be able to purchase new ICE vehicles of the listed configurations without applying for an exemption in advance. The list will not include vehicles that are already available as ZEVs like pickups, buses, box trucks, vans, or tractors.

15.2 Daily Use Exemption

If a fleet owner cannot comply because the daily usage needs can't be met by available ZEVs, the fleet owner may request an exemption to purchase a new ICE vehicle with a California-certified engine. Fleet owners will need to submit mileage and/or usage records and other information to show that the daily usage of all ICE vehicles of that type cannot be met by ZEVs that are available in that configuration.

15.3 ZEV Infrastructure Exemption

If the fleet owner begins a project to install ZEV fueling infrastructure at their facility or a dedicated parking location at least one year ahead of the next compliance date, the fleet owner may receive an extension to continue operating existing vehicles until the project is completed. The extension for a construction delay could be granted for up to two years and for a site electrification delay for up to five years depending on the specific circumstances.

15.4 Vehicle Delivery Delay Extension

If a fleet owner has ordered a ZEV for immediate delivery at least one year ahead of the next compliance date, but it doesn't arrive in time to meet their compliance requirements, the fleet owner may request this extension at the beginning of the applicable compliance year. The extension allows an existing vehicle to continue operating until the ZEV is received without affecting compliance.

15.6 Backup Vehicle Exemption

A vehicle that is designated as a backup vehicle may be excluded from the ZEV compliance requirements if it operates fewer than 1,000 total miles per year. Miles traveled under contract to support a declared emergency event do not count toward the mileage threshold.

15.7 Mutual Aid Assistance Exemption

Fleet owners that have mutual aid agreements may request an exemption to continue purchasing new ICE vehicles by excluding up to 25% of the fleet from the ZEV requirements. Fleet owners may initially apply for the exemption after the first 25% of the fleet are ZEVs. Extensions will not be granted if available ZEVs have mobile fast charging or fast fueling capabilities. This exemption does not apply to pickup trucks, buses, box trucks, vans, tractors, vehicles available as ZEVs with fast mobile fueling/charging, nor NZEVs.

15.8 Declared Emergency Response Exemption

Vehicle operation that occurs under contract to support a declared emergency event may be excluded from the California fleet.

15.9 Non-Repairable Vehicle Exemption

If a vehicle has been in a one-time catastrophic event that makes both the engine and vehicle unrepairable, the fleet owner may request an exemption to purchase a used ICE vehicle of the same configuration without affecting the compliance schedule. The replacement vehicle engine must have the same or newer model year as the non-repairable vehicle.

15.10 Intermittent Snow Removal Vehicle Exemption

Until January 1, 2030, a fleet owner may exclude an intermittent snow removal vehicle from the ZEV Milestone Option or the ZEV Purchase Schedule. An eligible vehicle is one that is equipped with a snowplow or snow blower mounting attachment and a control system for the plow or blower. Dedicated snow removal vehicles are exempt from the Advanced Clean Fleets regulation.

15.11 Waste and Wastewater Fleet Option

Qualified waste haulers and wastewater fleet owners may defer compliance for certain compressed natural

gas vehicles until 2030, if the vehicles are exclusively fueled with biomethane.

15.12 Exemption for Transit Agencies

The transit buses already subject to the Innovative Clean Transit regulation are exempt from the Advanced Clean Fleets regulation. Until January 1, 2030, transit agencies that operate other vehicles are exempt from all of the State and Local Government Fleet Requirements. Starting January 1, 2030, transit agencies must report information about their other vehicles and begin complying with the ZEV Purchase Schedule. Cities or other jurisdictions that have a transit agency division may exclude their other transit agency division vehicles until January 1, 2030.

16

APPENDIX B: SHARED CHARGING CONSIDERATIONS

Several considerations exist for providing employee charging at County-owned stations, which may be shared between fleet and staff. Offering employee charging has many advantages, from environmental benefits to helping to attract and retain staff. As a relatively new perk, guidance for employers is still evolving, as illustrated by the following examples from Federal, state, and local agencies.

For buildings owned and leased by the federal government, the Fixing America's Surface Transportation (FAST) Act requires the agency to recoup electricity costs for personally owned vehicles (POVs). DOE developed a Federal Workplace Charging Fee Calculator that helps agencies input their actual costs and determine appropriate fees. (Reference: Federal Workplace Charging Program Guide) (www.energy.gov/femp/articles/federal-workplace-charging-program-guide)

At buildings and parking lots owned and leased by the State of California, Level 1 charging is free at designated parking spaces but prohibited at undesignated parking spaces. State employees must pay for Level 2 charging at the station or through a payment account. This is a policy, not a regulation. (Reference: DGS Parking Policy (www.dgs.ca.gov))

Municipal governments may adopt their own policies about free or fee-based charging. Free charging could be an employee benefit, but the IRS doesn't provide guidance about an employer's rights or responsibilities. IRS Commuting Benefits are benefits that an employer offers to all employees, and employees do not need to report on their personal taxes:

- *A "de minimis benefit" is for public transit passes, tokens, or fare cards that an employer provides for free or at a discount to defray employees' commuting costs on the public transit system. The maximum value is $21 in any month.*
- *"Qualified benefits" are an employer's discount for riding in a commuter highway vehicle (van share), a transit pass, or parking on or near the employer's premises. This could be a reimbursement or done as a pre-tax benefit through a bona fide provider.*

If the County is considering providing free or subsidized EV charging to employees, it should consult with its benefits provider and accountant to determine if it may be a taxable benefit that employees must report on their personal taxes.

16.1 Employee reimbursement for charging a work vehicle at home

This is a new area for many employers. Employees with assigned take-home vehicles may be in different utility districts and on various rate structures that can result in a range of per-kilowatt costs. Consider the following ideas:

- ***Employer-owned charging station:*** *This is a more expensive option that may be a good fit for high-mileage vehicles. The employer installs a Level 2 charging station at the destination (home, parking lot, staging area) that is on a dedicated meter. The employer is billed for energy from that meter. Dedicated meters and hardware can eliminate the need for reimbursement.*
- ***Flat-rate reimbursement:*** *Depending on the variability and complexity of the energy rates that employees pay, the County may want to consider a consistent flat-rate reimbursement policy. This simplifies reimbursement and, if based on off-peak rates, incentivizes employees to charge the EVs using lower-cost options.*
- ***Per-mile reimbursement:*** *Similar to an IRS "cents per mile" reimbursement, this strategy pays the employee based on the miles driven that week or month. The employer needs to establish a baseline—the energy needed to travel 100 miles—and then calculate the employee's energy cost to refill 100 miles to set a cents per mile for home charging.*
- ***Auto manufacturer tools:*** *Some manufacturers' EVs track the number of kilowatts during a charging session and report each session's start and stop time. Drivers (or the employer) can generate reports to ensure drivers receive reimbursement only for the electricity consumed while charging work vehicles at home.*
- ***Energy cards (similar to gas credit cards):*** *Several vendors offer energy cards that employees can use at public charging stations and may be able to use at home chargers. Similar to fleet fueling cards, like Voyager cards, the employer receives a monthly bill for energy used at multiple sources.*

16.2 Charging an EV on-the-clock

Federal and state labor laws do not specify whether compensation is required if an employee charges an EV during a break or if plugging and unplugging an EV is de minimis time that doesn't need to be recorded for hourly employees.

Federal law does not require lunch or coffee breaks. However, when employers offer short breaks (usually lasting about 5 to 20 minutes), federal law considers the breaks as compensable work hours that would be included in the sum of hours worked during the workweek and considered in determining if overtime was worked. (Reference: US Department of Labor) (https://www.dol.gov/general/topic/workhours/breaks)

California requires that nonexempt workers have a paid 10-minute reset period every four hours worked. The employer cannot impose any restraints on the employee. In Augustus v. ABM Security Services, Inc., (2016) 5 Cal.5th 257, 269, the California Supreme Court held that "during rest periods employers must relieve employees of all duties and relinquish control over how employees spend their time." (Reference: California Department of Industrial Relations) (https://www.dir.ca.gov/dlse/FAQ_RestPeriods.htm)

Section 785.19 of the Code of Federal Regulations states:
"Bona fide meal periods are not worktime. Bona fide meal periods do not include coffee breaks or time for snacks. These are rest periods. The employee must be completely relieved from duty to eat regular meals…The employee is not relieved if he is required to perform any duties, whether active or inactive, while eating. For example, an office employee who is required to eat at his desk or a factory worker who is required to be at his machine is working while eating. It is not necessary that an employee be permitted to leave the premises if he is otherwise completely freed from duties during the meal period." (Reference: Code of Federal Regulations Part 785) (https://www.ecfr.gov/current/title-29/subtitle-B/chapter-V/subchapter-B/part-785)

In Brinker Restaurant Corp. v. Superior Court, the California Supreme Court set forth the requirement for employers to provide meal breaks: "to relieve the employee of all duty and relinquish any employer control over the employee and how he or she spends the time." 53 Cal. 4th 1004, 1038-40 (2012). "The employer satisfies this obligation if it relieves its employees of all duty, relinquishes control over their activities and permits them a reasonable opportunity to take an uninterrupted 30-minute break, and does not impede or discourage them from doing so." This precedent has been upheld in multiple suits since 2012 in California and other states.

Furthermore, in Troester v. Starbucks, the court deemed that hourly employees cannot work for even minutes off the clock. In this case, Troester established that he had to clock out the software system and then perform four (4) to ten (10) additional minutes of work to conduct the store closing procedure. The court agreed that the employer was required to compensate all Starbuck's managers for this time.

Consult with your attorney and HR department to determine if charging a fleet vehicle can be done during a rest period or meal break, and to determine if plugging and unplugging a vehicle is administrative time that needs to be captured in time-keeping systems.

17

APPENDIX C: EV MAINTENANCE AND TECHNICIAN TRAINING

17.1 EV Maintenance

EVs typically require less maintenance than internal combustion vehicles because they have fewer mechanical components. The following section provides an overview of the key components for which light, medium, and heavy duty EVs require maintenance.

- **Battery Maintenance:** The lithium-ion batteries used in EVs require minimal maintenance. However, their performance can degrade over time, affecting range and power. Monitoring and maintaining optimal charging practices can extend battery life.
- **Electric Motor and Drive System:** Electric motors have fewer moving parts than ICEs, resulting in lower wear and tear. Periodic inspections are recommended to ensure efficient operation.
- **Braking System:** BEVs often feature regenerative braking systems that can reduce wear on traditional brake components but should be inspected regularly for safety.
- **Cooling System:** Battery cooling systems require occasional checks to ensure they are functioning correctly to prevent overheating.
- **High-Voltage Electrical System:** Regular checks are crucial to ensure the safety and functionality of the high-voltage components unique to electric vehicles.

Although ZEVs have fewer mechanical components, they still need similar preventative maintenance. Table 21 compares the preventative maintenance between EVs and conventional vehicles. Fleets have various schedules for vehicle maintenance that are based on time (e.g., monthly, quarterly), miles, or operating hours. This chart recommends a schedule for EVs only.

Preventative Service Item for Conventional Vehicle	For EV
Change engine oil and filter	Not needed
Lubricate chassis, drivetrain, slack adjusters, etc.	Not needed
Inspect tires and check inflation pressures	Monthly
Rotate tires and check alignment	6 months
Change air filter and inspect air induction system	Same schedule
Service transmission filter and check fluid levels	Not needed
Inspect brakes for wear and check fluid level	6 months
Check steering components and fluid level	Same schedule
Check differential fluid level	Not needed
Inspect coolant system and check coolant level	Quarterly
Check and fill as required additional fluid levels (washer, etc.)	Same schedule
Check charging system - alternator output and battery load test	For BEV, check battery capacity and state of charge biannually For FCEV, not needed
Inspect 12V battery connections and clean	Same schedule
Check operation of all lights, horns, wipers, etc.	Same schedule
Inspect mirrors, glass, seatbelts, vehicle logos, etc.	Same schedule
Check engine belts and hoses	Check wiring and wiring harnesses for damage biannually
Inspect engine exhaust system	Not needed

Table 21: Preventative EV Maintenance

17.2 Fuel Cell Electric Vehicles (FCEVs) Maintenance

- **Fuel Cell Stack Maintenance:** The fuel cell stack, which generates electricity through the chemical reaction of hydrogen and oxygen, requires monitoring for performance degradation and potential leaks.
- **Hydrogen Fuel System:** Includes checking for leaks in the fuel storage and delivery systems and ensuring sensors and valves are functioning correctly.
- **Cooling System:** Similar to BEVs, the cooling system for the fuel cell stack and electric motor needs regular checks.
- **High-Pressure Storage Tanks:** Inspection and testing of high-pressure hydrogen storage tanks are critical for safety, with regulations dictating specific inspection intervals.
- **Auxiliary Systems:** Maintenance of auxiliary systems such as air compressors and humidifiers, which are essential for the efficient operation of the fuel cell stack.

17.3 Best Practices

Performing routine maintenance on a ZEV does not require additional space or safety systems than those systems that shops have in place for conventional vehicles. Best maintenance practices from fleets with operational EVs include:

1. **Regular Battery Health Checks:** Monitor and assess the health and state of charge of EV batteries regularly. Use diagnostic tools to check for any degradation or abnormalities in battery performance. In battery electric EVs, each make and model has a different location for the 12-volt battery and a specific process to disconnect the high-voltage battery. Those locations and processes should be documented in a place that is easily accessible to all service staff.
2. **Optimal Charging Practices:** Implement charging schedules that avoid extreme high or low states of charge. Encourage the use of smart charging solutions to take advantage of off-peak electricity rates and reduce stress on the battery.
3. **Software Updates and Diagnostics:** Regularly update EV software to improve vehicle performance, battery management, and security features. Use diagnostic tools to identify and troubleshoot any issues proactively.
4. **Tire Maintenance:** Maintain proper tire inflation and alignment, as tire condition can impact range more noticeably than on conventional ICE vehicles. Monitor for wear and tear. EVs are heavier than conventional vehicles, which can lead to faster tire wear. Rotate tires regularly to ensure even wear and extend their lifespan.

5. **Brake System Care:** Although EVs benefit from regenerative braking that reduces wear, traditional brake systems still require regular inspection and maintenance. Conduct brake inspections more frequently than with conventional ICE vehicles. As drivers and mechanics become familiar with the wear on regenerative brake systems, the need for inspections may decrease.
6. **Cooling System Checks:** Ensure the cooling system, which maintains optimal operating temperatures for the battery and electric motor, is functioning correctly. Check coolant levels and look for any leaks or blockages.
7. **High-Voltage System Inspections:** Regularly inspect high-voltage cables and connections for signs of wear, corrosion, or damage. Only qualified technicians should perform repairs or maintenance on high-voltage systems.
8. **Cabin Air Filter Replacement:** Replace cabin air filters as recommended by the manufacturer. Clean air filters improve cabin air quality and help maintain optimal HVAC system performance.
9. **Exterior and Interior Cleaning:** Keep vehicles clean to prevent rust and wear. In areas that use road salt, regular washing is important to prevent corrosion, especially on undercarriage components.
10. **Fleet Telematics Use:** Implement a telematics system to monitor vehicle health, usage patterns, and charging habits. Telematics can help identify issues before they become significant problems and optimize fleet operations.
11. **Scheduled Maintenance:** Follow the manufacturer's recommended maintenance schedule. Even though EVs generally have fewer moving parts than internal combustion engine vehicles, some components still require regular inspection or replacement.
12. **Training for Technicians:** Ensure that maintenance personnel receive training specific to electric vehicles. Understanding the nuances of EV technology is crucial for safe and effective maintenance.
13. **Emergency Response Plan:** Develop and train your team on an emergency response plan specific to EV incidents, including thermal runaway or high-voltage system accidents.
14. **Infrastructure Maintenance:** Regularly inspect and maintain charging stations to ensure they are in good working order. This includes checking connectors, cables, and the functionality of charging points.
15. **Safety Equipment:** Equip maintenance facilities with safety equipment designed for EVs, including non-conductive tools and personal protective equipment (PPE) for handling high-voltage components.

17.4 Technician Training

The transition to ZEV vehicles requires a new set of skills and specializations from vehicle mechanics. This is especially true for medium and heavy-duty ZEVs, which have significantly less market penetration than light-duty EVs. Researchers at Long Beach City College have identified workforce knowledge gaps, which are shown in Table 22.

Zero Emission Technology	Battery Theory	Battery Safety	Electrical Connections in Corrosive Environments
Determining the system-wide impact of zero-emission technology adoption on production and efficiencies. Zero emission technology adoption and scalability modeling. Master planning for facility needs of zero emission technology integration and adoption.	General overview of basic principles of batteries. Knowledge of basic battery operations. Understanding of the different types of batteries. Electrical characteristics of various battery types.	Understanding hazards associated with industrial batteries. Electrical safety precautions when working with batteries. Fire and explosion precautions. Safe handling of batteries. Proper safety equipment needed when working with batteries.	Understanding basic electrical connections. Knowledge of how corrosive environments impact electrical connections. Overview of variety of wire materials used in various corrosive environments. Working safely with electrical connections in corrosive environments.
Charging Components	**Mechanical Aptitude**	**Equipment Maintenance**	**General Electrical**
Understanding of charging components and terms. Knowledge of charging requirements and connector types. Knowledge of basic safety surrounding charging.	General aptitude for mechanical work. Knowledge of general automotive/mechanic repair skills. Use of standard tools and hardware.	Understanding component diagnostics. Safely removing non-functioning components. Safely installing new or repaired components.	Reading and understanding electrical schematics. Knowledge of common figure identifications. Overview of basic circuitry components. Knowledge and use of electrical diagnostic tools.

Table 22: EV transition workforce knowledge gaps, Source: Long Beach City College

17.5 Hand Tools for EV Servicing

Working on EVs requires voltage-proof hand tools that electricians commonly use. Individual tools and complete kits, which are widely available, range between $700 and $5,000.

All shops need insulated rubber gloves, and technicians must wear them when working with the high-voltage systems. Insulated gloves from Grainger cost approximately $135.

Fleet maintenance shops will require the use of a CAT III or CAT IV multimeter rated for at least 600V input to measure voltage throughout the vehicle. Any accessory kits (e.g., back probes, alligator clips) should also be rated for 600V. Alligator clips are particularly useful in high-voltage work to ensure that the technician has only one hand in contact with a lead or a ground point while working to prevent potential electrocution. A Fluke CAT IV multimeter costs approximately $600 from Grainger.

Many shops have a wiring harness repair kit that includes pigtails, crimp seals, and crimping tools. EVs have more variety in the size of wires, and many have specialty terminals and connectors that are not interchangeable. Check your repair kit to ensure its components are appropriately sized for your vehicles.

17.6 Diagnostic Equipment

Some manufacturers, such as Tesla, have proprietary communications and scan tools. However, most EVs work with standardized diagnostic code readers and diagnostic platforms. The drawback is that standard platforms have codes that EVs don't use (like the fueling codes), and the equipment does not have the capability to report on EV-specific codes.

Several after-market manufacturers, like Mahle and Autel, have a stand-alone EV diagnostic tool or integrated EV analysis with their conventional vehicle tool. Other manufacturers, particularly those that build EV buses and trucks, provide a custom diagnosis package for their vehicles.

17.7 Lifts

Most high-voltage batteries are underneath the EV. Shops that use wheel-engaging vehicle lifts can safely lift an EV. Shops that use frame-engaging lifts may need to change or add contact points, which are specific to the EV make and model. The Automotive Lift Institute has a digital guide to identify vehicle manufacturers' recommended lifting points for thousands of model year 2000 to 2023 cars, SUVs, vans, light-duty trucks, and EVs sold in the U.S. and Canada.

17.8 Level 2 Charging Station

When a high-voltage battery is disconnected, the stored energy starts to dissipate. When reconnected, the battery may not have enough charge to move off the lift. The maintenance shop should have a Level 2 charging station installed near the EV service bay or a portable Level 2 charger that plugs into a 220 or 240-volt NEMA plug. Ideally, the shop will have a second charging station outside. The goal is to charge the battery enough to drive out of the bay and then complete the charging session.

17.9 Servicing the High-Voltage Battery

Consult your warranty before doing preventative maintenance if you diagnose issues with battery degradation, overheating, or not accepting a charge. Some manufacturers require that their certified technicians service the battery when the vehicle is under warranty.

Removing high-voltage batteries requires a two-post surface lift or an inground lift with at least 80 inches between the posts. The contact points need to be completely clear of the battery, which is almost the full width of the vehicle and extends from the front to the rear axle. Swapping a battery requires about eight feet of space in addition to the area around the lift.

Batteries may be lifted with an engine hoist, but a portable full-rise scissor lift table is preferred. Several manufacturers make tables for EV batteries. The table is large—Ford's required table is approximately 100 inches by 40 inches—and space will be needed to store the table.

17.10 Transportation for Warranty Work

Warranties and service contracts for new BEVs often stipulate that the dealership or OEM must service and repair the power train and other electric components. It's important that the service budget includes the cost of transporting BEVs to and from the service facility. Transporting a BEV truck or bus can cost thousands of dollars.

17.11 Safety and Safety Equipment

If a high-voltage battery is removed from a vehicle, it must be stored with 50 feet of separation between the battery and a building or another vehicle. (Source: NHTSA). It also must have ventilation on all sides, including underneath. This is also true for any EV that has sustained body damage that might have damaged the battery.

When a high-voltage battery is damaged, it can leak fluoride gas, which is heavier than air, causing it to sink and not rise. This gas is highly flammable, and this situation can be created by a chemical reaction in the battery cells before a thermal runaway (or high-voltage battery fire) occurs.

When disconnecting the high-voltage (HV) battery, NFPA recommends these safety steps:

- Test your multimeter with an AA battery, and then with something inert, and then again with the battery.
- Make sure the vehicle is powered off and put the key (or fob) in a drawer.
- Wearing insulated rubber gloves, disconnect the 12v battery and put the lead in a drawer.
- Use the multimeter to confirm no current.
- Wearing insulated rubber gloves, disconnect the HV battery following the manufacturers' instruction. The disconnect is usually an orange plug that is removed; put in a locked drawer.
- Push the power button in the car and confirm that nothing turns on.
- Wait at least 10 minutes (or more, see manufacturer's instruction) for all the power to dissipate.
- Wearing insulated rubber gloves, use the multimeter in several places to confirm no current.

It's very unlikely that the HV battery will ignite. If it does ignite, call 9-1-1 immediately and clear the area. The smoke from a lithium-ion battery is toxic. Extinguishing a lithium-ion battery takes large amounts of cold water. Don't try putting it out yourself.

17.12 Technical Training

Most manufacturers offer service guides and online training for their EVs. Some of the truck and bus manufacturers offer technical training at their facilities. The three Clean Cities Coalitions in Northern California, in conjunction with the Northern California Municipal Equipment Maintenance Association, offer ongoing education for fleet operators and technical training classes hosted by various manufacturers.

SkillsCommons offers the National STEM Consortium academic certificate in Electric Vehicle Technology, is built on a 30-semester-credit model and includes two tracks: (1) Electric Vehicle Development and (2) Electric Vehicle Service. Graduates are prepared for service positions in the automotive industry. All of the courses underwent a thorough review by industry subject matter experts. Courses are recent and relevant material and free to download and distribute.

FutureTech recently launched Electrified Transportation Pro+ Training Event with Certification Exams Option. A host can request a live training event for 10-20 technicians for a fee.

17.13 Local Workforce Training

There are several workforce training programs relevant to Nevada County, including high schools, community colleges, and trade schools. Nevada County could adopt similar workforce training programs. These are detailed in Table 23.

Institution	Program Offering
American River College	AS degree in Automotive Technology, Certificates in Alternative Fuels and Green Vehicle Technology
San Joaquin Delta College	AS degree or certificate in Automotive Electric Technology
Universal Technical Institute Sacramento (UTI)	AS degree in Automotive Technology, emphasis in electric and hybrid vehicle technology
Truckee Meadows Community College	Partnered with Panasonic Energy of North America to launch a workforce development program focused on training in advanced manufacturing, production, automation, and robotics, which will support employment in the electric vehicle (EV) industry
Clean Tech Institute	Certified Electric Vehicle Technician (CEVT) training program
John F. Kennedy High School (Sacramento)	Offers a program aimed at training high school students for careers as EV technicians

Table 23: Local Workforce Training Programs

18

APPENDIX D: CALIFORNIA AGENCY FUNDING SOURCES

The following California agencies offer various programs designed to make ZEVs and their respective infrastructure more accessible to the public.

18.1 California Air Resources Board (CARB)

CARB is a department within the California EPA dedicated to protecting public health, welfare, and ecological resources by reducing air pollution through various programs. Many of these programs are specifically related to ZEV expansion and fleet electrification. The bulk of CARB funds have come from California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment — particularly in disadvantaged communities.

18.2 Air Quality Management Districts (AQMDs) or Air Pollution Control Districts (ACPDs)

AQMDs or ACPDs are local agencies under CARB that are responsible for distributing funds regionally as well as tailoring programs to fit the needs of the area. In alignment with CARB's mission, these efforts also target emissions reduction and air quality improvement. The Northern Sierra AQMD serves Nevada County (see section 8.1.2.5 below).

18.3 California Energy Commission (CEC)

The CEC is California's primary energy agency and thus plays a critical role in advancing the state's goal of 50% renewable energy usage by 2030. Incentive programs, grants, and research funding opportunities are some of the ways the CEC works to wean the state off its reliance on energy from fossil fuels. The CEC's Clean Transportation Program (CTP) provides MHD infrastructure investments focused on the infrastructure needs of medium- and heavy-duty ZEVs including charging and refueling for drayage trucks, grid integration, integrated storage solutions, and charging management.

18.4 California Department of Transportation (Caltrans)

Caltrans oversees the state highway system and supports transit systems across the state. Caltrans provides resources for sustainable planning. Certain ZEV projects are eligible for these grants due to their impact on clean energy and resilience. In addition, Caltrans is the recipient of $384 million in National Electric Vehicle Infrastructure (NEVI) funding to be deployed along top priority transportation corridors over the next four years.

18.5 California Public Utilities Commission (CPUC)

CPUC is the agency that reviews and approves utility transportation electrification programs, including the approval of Rule 29, which allows utilities to collect from ratepayers the cost of deploying utility-side electrical infrastructure. CPUC has also approved recent vehicle-to-grid pilot programs and has approved a $200 million Microgrid Incentive Program.

19

APPENDIX E
FINANCIAL STRATEGIES

Model	100% County Owned and Operated	Shared with Vendor	100% Vendor Owned and Operated (Charging as a Service)
Brief Description	County purchases and installs the charging stations	County purchases equipment, vendor installs and operates stations	Vendor purchases equipment and operates, County and/or vendor pay for construction
Grants and LCFS	County applies for grants, aggregates and sells LCFS credits	Vendor applies for grants, aggregates and sells LCFS credits, can take tax credits	Vendor applies for grants, aggregates and sells LCFS credits, can take tax credits
Maintenance	Via a maintenance contract; County staff perform hardware maintenance, EVSE vendor may offer individual driver support	Vendor provides technical support, maintenance, and operation; County staff may do some hardware maintenance	Vendor provides all technical support, maintenance, and operation
Data Management	Separate service contract with vendor and County staff	Vendor collects and reports most data	Vendor manages data
Fees	County pays all fees for networking, management software, credit card payments (if applicable)	Split between vendor and County, usually in favor of vendor	Included in contract
Revenue	County collects all fees for charging sessions and LCFS credits	Split between County and vendor	Vendor charges County a monthly fee; may collect public charging fees

Table 24: Common business models for charging station ownership and operation

Life Cycle Cost Accounting

Cities and counties often use the Life Cycle Cost (LCC) method to assess the total cost of facility ownership and account for the costs of acquiring, owning, and disposing of a building or building system in terms of the community's benefit. This method can justify the expense of a new park or fire station or improvements to water and sewer infrastructure.

19.1 Financing Models for Capital Projects

Cities and counties typically pay for capital projects using one of these methods:

Pay-as-you-go (PAYGO)

This method of financing uses general fund revenues to pay for capital projects, allowing governments to place funds leftover after operating expenditures into a "capital reserve account" and essentially "save up" for capital projects.

Pros:

- Future funds are not tied up in servicing debt payments
- Interest savings can be put toward other projects
- Greater budget transparency
- Avoids the risk of default

Cons:

- Long wait time for new infrastructure
- Large projects may exhaust an agency's entire budget for capital projects
- Inflation risk

These tools might be applied to EV charging infrastructure as a PAYGO funding source and could include costs for behind-the-meter improvements and backup power systems, including solar and battery storage.

- Special financing districts are used by municipalities across the country to fund a wide variety of infrastructure improvements and public facilities to meet the demands of both commercial and residential real estate projects. Infrastructure Financing District are allowed by California law and usually implemented as a percentage of property tax amount.
- An impact fee is typically a one-time payment imposed by a local government on a property developer. The fee is meant to offset the financial impact a new development places on public infrastructure. Most cities are trying to balance impact fees with economic development.
- Utilities may also add a tariff to allow a customer to purchase electricity solely for the purpose of charging an EV. Examples include a time-of-day or off-peak electricity rate to incentivize EV charging behavior.

19.2 Debt Financing

For projects financed with debt, neither the bond maturity nor the end of the debt repayment period should exceed the asset's useful life. By issuing long-term debt for costly infrastructure projects with long service lives, governments can increase equity between generations without disrupting the operating budget.

Pros:

- Infrastructure is delivered when it's needed
- Spreads cost over the useful life of the asset
- Increases capacity to Invest
- Capital investment's beneficiaries pay for projects

Cons:

- Potentially high borrowing rate
- Debt payments limit future budget flexibility, commonly known as "Debt Service," one of the most costly impacts on a government's operating budget
- Diminishes the choices of the future
- Generations forced to service debt requirements

Debt Options:

Loans: The Infrastructure State Revolving Fund (ISRF) Program is administered by state iBanks and Green Banks to directly provide low-cost public financing to state and local government entities. Not all states have this program! Some communities may be eligible for a revolving loan from a federal agency.
In California, ISRF financing is available in amounts ranging from $1 million to $65 million with loan terms for the useful life of the project up to a maximum of 30 years with a 1% interest rate.

Leasing: Municipalities can lease EVs and charging infrastructure from companies like Merchants Fleet and Penske. Leasing sets a flat monthly price per vehicle and charging station and can be combined with maintenance, management, telematics, data collection, load management, and procurement. Vendors offer lease-to-own as well as open-ended leases. EVSE leases may not include initial construction costs but do include monthly operating costs, maintenance, and equipment upgrades.

Shared Savings Agreement: More common in solar and energy storage, this financing program is like on-bill financing. A third party provides the up-front capital for all or part of a project, pays the client's electricity bill each month, and charges the client for the electricity costs plus a fee. The client is guaranteed that their energy use will be less, and the payment will be lower than the typical energy bill. This is unproven for EV charging because EV charging will increase the electric bill.

Bonds: Government agencies issue bonds to finance a variety of economic or public development projects for private and public entities. When investors purchase bonds, they essentially lend money to the borrower through the issuer. In return for the bond proceeds, the borrower promises to pay the investors/bondholders the principal amount plus a specified rate of interest over the life of the bonds based on the bond's debt service payment schedule. In this way, a bond is similar to a complex loan. Most states allow municipalities to issue bonds for energy efficiency improvements, including the installation of EV charging stations, and for capital purchases, which include vehicles.

19.3 Public-Private Partnership (P3)

P3s can be a good policy for governments seeking to cut costs, improve operational efficiency, fund capital costs, and reduce risk. Non-traditional, private-sector capital financing models are generally more complex and less transparent. Although the costs and benefits of pursuing capital financing should be thoroughly analyzed in a transparent manner, P3s are a viable mechanism for the public sector to crowd in private capital in the delivery of public goods and services.

Pros:

- Risk transfer
- Accelerated project delivery
- External funding
- Lower operating costs, and higher revenues
- Improved user experience

Cons:

- Loss of operational control
- Changes in scope or performance standards delay project delivery or impose additional costs
- Certain non-transferable risks (change in laws, approvals by third-party government agencies, etc.)
- Potential Loss of Revenue (for example a public-private partnership on a new toll road where the private investor gets all (or a substantial) part of the tolls.

Types of PPPs

Charging as a Service or Infrastructure as a Service is a long-term agreement between a provider and the client. The provider pays all the upfront costs for procurement and construction and sells the balance of the cost to investors. During the pay-back period, the provider will replace and repair the assets. The client typically pays the cost of electricity and transition costs for accepting payment, when applicable, separately from the XaaS payment

Government Pays: The provider determines a payback period that can be as long as 30 years. Some providers allow the client to approve the investors. Government payments can depend on the asset or service being available at a contractually defined quality (availability payments) or on volume-based payments for services delivered to users. At any time, the client can pay back the bond and take control of the assets.

User Pays: The provider determines a toll, tariff, or fee that each user pays for the services, which the government can supplement for some or all users. The payments may be conditional on the service's availability at a defined quality level. The social returns generated by user-paying PPPs may benefit the broader population through economic development activities.

	Term	User- based cost	Agreement complexity	Is it CapEx?	Continually maintained	Penalties to cancel	On balance sheet	Required guarantees
As a Service	Monthly	Yes	10 pages	No	Yes	No	No	No
Loan	5-20 Years	No	75 pages	Yes	No	Yes	Yes	Yes
Lease	5-10 Years	No	50 pages	Yes	No	Yes	Yes	Yes
PPP	3-10 Years	No	1,000 pages	Yes	No	Yes	Yes	Yes
Shared Savings Agreement	10+ Years	No	100 pages	Yes	No	Yes	Yes	Yes

Table 25: Comparison of funding options

APPENDIX F: MINIMIZING UTILITY UPGRADES

Some Nevada County locations will require more power from PG&E than is currently available. Bringing in additional power can take as long as 10 years and cost millions of dollars. The NCOC facility is using a PG&E incentive program to upgrade the transformer to support bus charging, but the line and transformer upgrade will not be enough to charge the other vehicles at this site. PG&E will not support another electrical upgrade at this site.

It's important to reduce the peak demand from buses and fleet EVs charging at the same time. Currently available options are:

- **Battery-integrated charging stations:** These EVSEs have modular batteries inside the charging station case. The batteries are connected to the grid and slowly charge between charging sessions, and can be scheduled to charge only or primarily during super-off-peak rates. When the EV uses the charging station, the EVSE pulls energy from the battery before using grid energy. Figure 12 illustrates the charge of discharge capabilities of the Freewire Boost DC

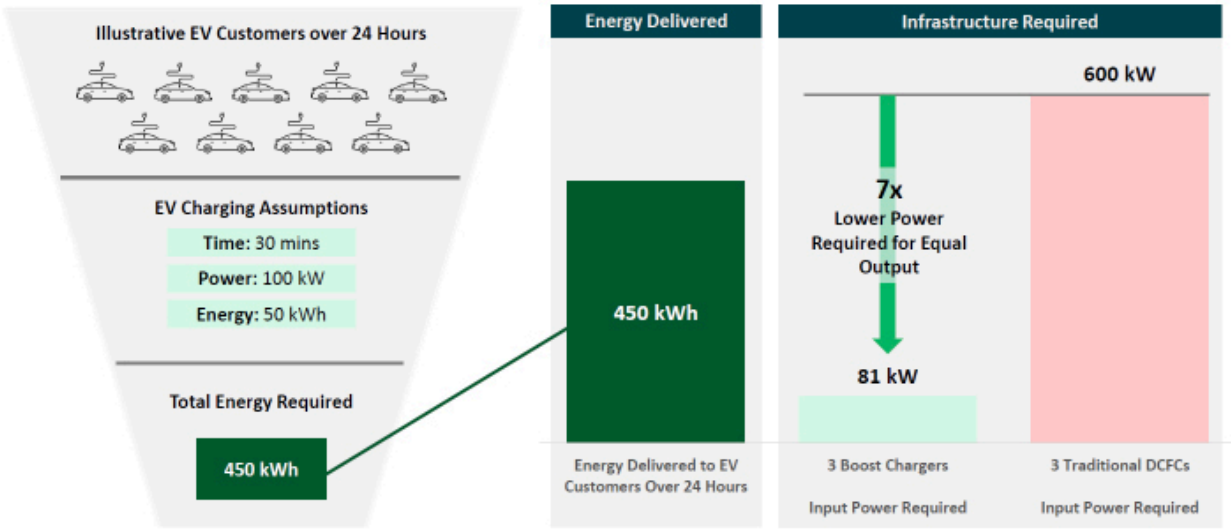

Figure 12: Illustration energy use (source: Freewire)

- **External battery energy storage systems (BESS):** BESS can be as small as a suitcase or as large as a shipping container and are typically scalable to allow for additional batteries as the need for storage grows. The batteries are grid connected and can also be directly connected to solar or wind energy sources. They may combine highly efficient lithium-ion batteries and lower-cost nickel-cadmium batteries in the same system. A controller in the BESS can respond to grid signals soak up energy when excess electrons are on the grid, and stop charging during peak or demand response events. The charging stations always charge from the BESS. Figure 13 shows two ways to deploy a Joule Case Olympus Power System.

Figure 13: Battery Energy Storage (source: Joule Case)

- **Hybrid or Islanded Microgrids:** These are never connected to grid electricity. The batteries charge from solar or wind energy, or by a fuel cell that uses delivered hydrogen. These systems, like the FlowGen microgrid in Figure 14, are ideal for remote locations. They do have a large footprint.

Figure 14: Hybrid microgrid with BESS (Source: FlowGen)

- **Load management systems:** These use a data and software approach to managing a limited amount of electricity. The controller responds to many different signals, shown in Figure 15, to schedule and manage charging so that every vehicle is charged using the available energy. Because of the tight scheduling, it is ideal for vehicles that have fixed routes or flexible schedules.

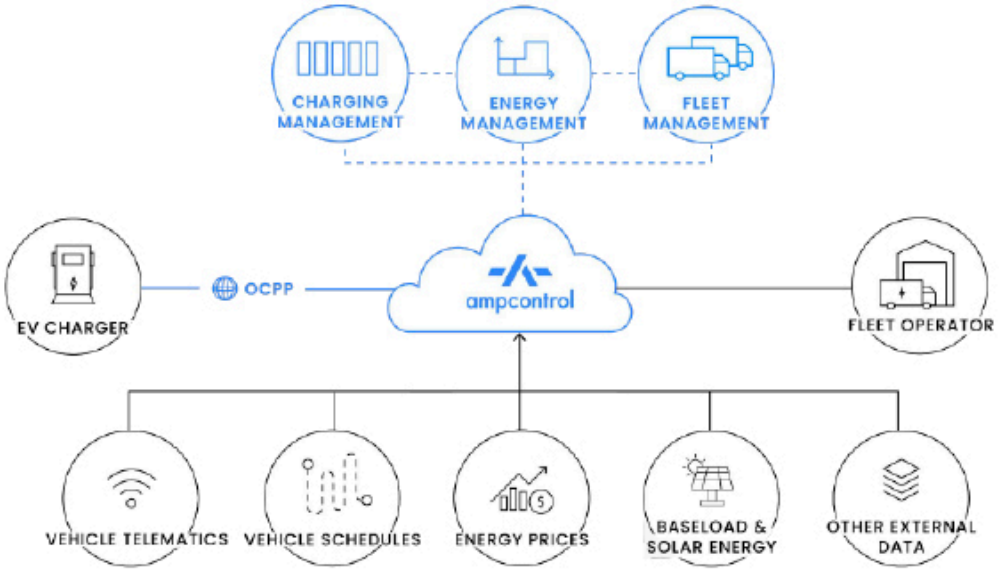

Figure 15: Load management software (Source: Ampcontrol)

21

APPENDIX G: NEVADA COUNTY EVSE RECOMMENDATIONS

This appendix documents recommendations for chargers to support fleet EVs assigned to 14 County-owned facilities. For each facility, the description and context, location and access, specific recommendations for EV chargers for fleet EVs, parking conditions, and needed electrical service upgrades are summarized. For locations deemed appropriate for public charging, a summary of recommendations includes workplace charging as needed.

1. BRIGHTON GREENS | 988 McCourtney Road, Grass Valley

Description & Context

Brighton Greens is a professional office park located on the south side of Grass Valley close to the intersection of Highway 20 and 49. This strategic location affords convenient accessibility from Penn Valley, Grass Valley, Nevada City, Alta Sierra, and Auburn. Within the premises, the Nevada County Department occupies one of the primary building units, offering essential services such as child protective services, children's behavioral health, social services eligibility, social services CalWORKs, veterans services, and programs for women, infants, and children.

Location & Access

The site is in south Grass Valley. The intersection of Highway 20 and 49 is about three miles from this location and less than one mile from a Highway 20 on/off ramp. This site can only be accessed through McCourtney Circle, which is accessible by Brighton Street and Highway 20.

Fleet Electrification

Only eleven (11) light-duty internal combustion engine (ICE) vehicles need to be replaced with electric vehicles (EVs) of comparable class. This replacement entails seven (7) class 1 vehicles, such as the Hyundai Ioniq 6 or equivalent, and four (4) class 2 vehicles, such as the Ford Mustang Mach-E or equivalent. These vehicles are parked overnight, providing a minimum of 14 hours of dwell time for nightly charging.

Parking

Existing parking stalls are on the east and west sides of the building. The ADA-accessible parking stalls are located on the south side of the building, along with a few non-ADA stalls.

Energy Requirements

The electrical demand for charging (111.0 kWh/day) is minimal. Given the cumulative average total of only 27 miles driven on average by all fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging every second day on an L2 charger should be more than sufficient.

Fleet EV charger Recommendations

Six (6) dual-port L2 chargers sharing a 6.6 kW circuit are recommended at this site. This setup would offer flexibility for charging the fleet EVs in the future, with each fleet EV charging every second day. The chargers should be positioned on the west side of the parking lot, closer to the end, to facilitate installation and maintenance and reduce the risk of theft or vandalism. The recommended charger locations are shown in the Figure 16 below.

Figure 16: Recommended Charger Locations for Brighton Greens

Five (5) dual-port L2 chargers should be installed in phase 1 of the project, along with conduit stub-outs for an additional dual-port L2 charger to be added in phase 2. A new electrical panel should be installed near the chargers to supply power to the L2 charging stations. Existing parking stalls will need to undergo restriping, clearly marked with signage indicating "EV Charging Only" and designated for exclusive use by County fleet vehicles.

Electrical Service

The existing main electrical panel that provides power to all the units is rated at 1200A, 120/208V 3-phase service. This only has 90 Amps and 25.9 kVA of spare capacity, which is insufficient to power the EV chargers for fleet EVs assigned to this site. New electrical infrastructure will be needed in the parking lot to power the

chargers with an estimated load of 82.5 kVA. Further engineering analysis is needed by PG&E to evaluate if the existing transformer has available capacity to accommodate the EV charging loads or if an entirely new transformer would be required or upgrades to the existing transformer would be needed to provide power to the EV chargers.

2. Nevada County Public Health | 500 Crown Point, Grass Valley

Description & Context

This site is a medium-sized, paved surface parking lot for the Nevada County Public Health building. It is in a 0.8-mile-long cul-de-sac with varied commercial buildings, County buildings, and medical facilities. Multiple transit stops service the lot.

Location & Access

The site is located in east Grass Valley near the intersection of SR-49 and Idaho Maryland Road. The Nevada County Airport is about 2.0 miles east of this location. This lot can only be accessed through Crown Point Circle, which is only accessible by Whispering Pines Lane.

Fleet Electrification

Only thirteen (13) light-duty ICE vehicles at this facility will need to be replaced by comparable class EVs. These could include two (2) class 1 sedans, such as Hyundai Ioniq 6 or equivalents, seven (7) class 1 and two (2) class 2 SUVs with EVs, such as the Ford Mustang Mach-E or equivalent, one (1) class 2 pick-up with Ford Lightning or equivalent and one (1) class 2 passenger van with Ford E-Transit or equivalent EVs. These vehicles are parked overnight with at least 14 hours of dwell time available for nightly charging.

Parking

According to County records, the location has 50 fleet parking spaces and 57 public parking spaces, which should be sufficient to install multiple single or dual-port EV chargers. All the parking is located on the south side of the building.

Energy Requirements

The electrical demand for charging is 197.0 kWh/day. Given the cumulative average of only 35 miles driven by all fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging every second day on an L2 charger should be more than sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, seven (7) dual-port L2 chargers are recommended for installation in the stalls closest to the south side of the building since these are convenient for fleet, employee, and public use and for electrical infrastructure installation. These chargers would provide charging capacity for up to 14 EVs to be charged simultaneously. These chargers could be made accessible to both employees and the general public during the day when fleet vehicles are in use or to the general public on weekends. The charger locations are shown in Figure 17 below.

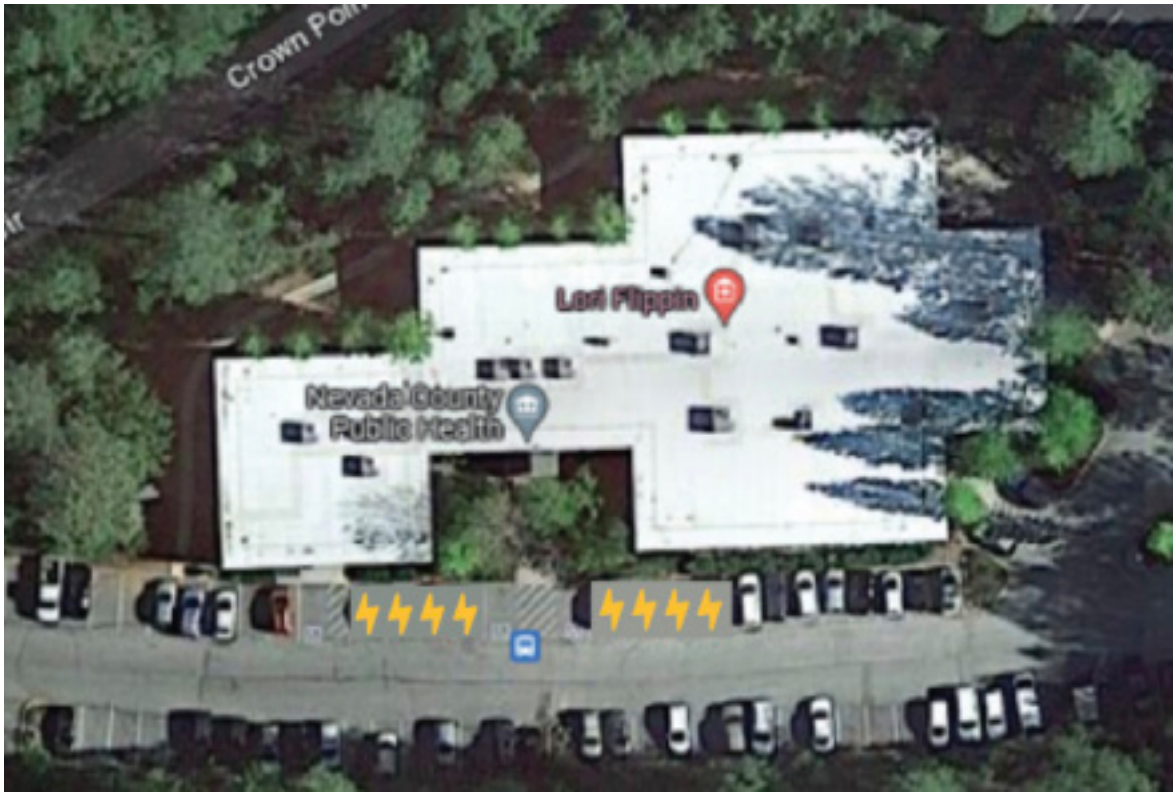

Figure 17: Recommended Charger Locations for Nevada County Public Health

These L2 chargers should be installed in three phases, with two (2) dual-port L2 chargers to be installed in phase 1 with conduit stub-outs for additional dual-port L2 chargers for phase 2 and phase 3 installations. Phase 2 would include the installation of four (4) dual-port L2 chargers and a single dual-port L2 charger for phase 3. The existing parking stalls would need to be restriped stating "EV Charging Only" stalls.

Public/Workplace Charging

These chargers could be made available to the general public, including County employees, during the day and potentially other times when fleet EVs are in use, and the chargers are not being used.

Electrical Service

The existing main electrical service providing power to the site is a 1200A, 120/208V 3-phase service, which has 200 Amps and 72.5 kVA of spare capacity to power EV chargers at this site. The maximum load from the seven (7) dual-port L2 chargers is 115.5 kVA. Assuming the chargers will be installed in phases using load management software systems, no electrical upgrades are expected to be required at this site. A new sub-panel powered from the existing main electrical cabinet located inside the building should be installed in close proximity to the chargers.

3. Nevada County Superior Court/District Attorney 201 Commercial Street, Nevada City

Description & Context

The Nevada County Superior Court, which houses the District Attorney, is located at this site. This small parking lot is located in the heart of downtown Nevada City in a mixed-use area with a variety of commercial buildings, restaurants, and residences. The block distances are very small, and there are numerous businesses, such as restaurants and bakeries, making it a very walkable area.

Location & Access

The site is only accessible through Commercial Street and can only be exited through Union Street. This location is very close to SR-20 and SR 49, providing convenient regional access.

Fleet Electrification

There are seven (7) light-duty ICE vehicles assigned to this facility that need to be replaced by comparable-class EVs, presumably one (1) class 1 sedan with an EV such as a Hyundai Ioniq 6 or equivalent, three (3) class 1 and three (3) class 2 SUVs with Ford Mustang Mach-E or equivalent EV. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Public/Workplace Charging

These chargers could be made available for use by the general public, especially Courthouse visitors including County employees, during the day and potentially other times when fleet EVs are in use.

Parking

According to County records, this site has 8 fleet parking spaces and 6 public parking spaces. However, according to Google Maps imagery, there are at least 24 parking spaces at this site with 9 dedicated fleet parking stalls. Out of the 9 dedicated stalls, three (3) are adjacent to the building on the west side, and six (6) are on the south side of the building with dedicated signage stating, "DA Parking Only."

Energy Requirements

The electrical demand for charging is only 59.0 kWh/day. Given the cumulative average total of 21 miles driven on average by all fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging every second day on a L2 charger should be more than sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, four (4) dual-port L2 chargers are recommended. Out of the four (4), three (3) dual-port L2 chargers should be installed in the parking stalls south of the building, and one (1) dual-port wall-mounted L2 charger should be installed on the west side of the building. These chargers would provide charging capacity for up to 8 EVs to be charged simultaneously. These proposed charger locations are shown in Figure 18 below.

Figure 18: Recommended Charger Locations for Nevada County Superior Court

The L2 chargers should be installed in three phases, with a single dual-port L2 charger installed in phase 1 with conduit stub-outs for additional dual-port L2 chargers for phase 2 and phase 3 installations. Phase 2 would include the installation of two (2) dual-port L2 chargers. Finally, a single dual-port L2 charger would be added in phase 3. The existing parking stalls would need to be restriped stating "EV Charging Only" stalls. Phase 1 charger installation should be wall-mounted on the west side of the building, followed by chargers on the south side of the building in phases 2 and 3.

Electrical Service

The existing main electrical is a 400A, 120/208V 3-phase service, which has 140 Amps and 50.5 kVA of spare capacity to power the EV chargers at this site. The maximum load from the four (4) dual-port L2 chargers is projected to be 66 kVA. Assuming the chargers will be installed in phases and use load management software systems, no electrical upgrades are expected to be required at this site. A new sub-panel would need to be installed on the south side of the building in proximity to the chargers powered from the existing main electrical cabinet located inside the building to provide power for chargers added in phases 2 and 3.

4. Facilities SC | 10014 North Bloomfield Road, Nevada City

Description & Context

This site contains the Nevada County Emergency Services building and its small, paved parking lot. The surrounding area includes other County buildings and a small number of single-family homes south of the site. Transit services service this location.

Location & Access

The site is in north Nevada City, only 0.3 miles west of the SR-49 and SR-20 interchange. The parking lot is only accessible through North Bloomfield Road.

Fleet Electrification

Eight (8) ICE vehicles, seven (7) light-duty, and one (1) medium-duty, will need to be replaced by comparable-class EVs. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Parking

According to County records, there are sixteen(16) fleet parking spaces at this site. The parking is on the west side of the facility. Out of the sixteen (16) fleet parking spaces, only eight (8) parking spaces will need to be converted into EV-capable spaces.

Energy Requirements

The electrical demand for charging is 177.0 kWh/day. Given the cumulative average of about 29 miles driven by all fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging every second day on an L2 charger should be more than sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, four (4) dual-port L2 chargers are recommended for installation in the parking spaces closer to the west side of the building. These chargers would provide charging capacity for up to 8 EVs simultaneously. The charger locations are shown in Figure 19 below.

Figure 19: Recommended Charger Locations for Facilities SC

The L2 chargers should be installed in three phases. A single dual-port L2 charger should be installed in phase 1, with conduit stub-outs for phase 2 and phase 3 installations. A single dual-port L2 charger and two (2) dual-port L2 chargers would follow in phase 1 and phase 3, respectively.

The existing parking stalls would need to be restriped stating "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site with a main breaker rated at 200A, 120/240V 1 phase. It has 50 Amps, 9.6 kVA of spare capacity which is insufficient to power the EV chargers recommended for this site. New electrical infrastructure or upgrades to the existing service will be needed in the parking lot to power the chargers with an estimated load of 66 kVA. PG&E needs a further engineering analysis to evaluate if the existing transformer has available capacity to accommodate the EV charging loads, if an entirely new transformer will be required, or if upgrades to the existing transformer will be needed to provide power to the EV chargers.

5. Joseph Center | 10075 Levon Avenue, Truckee

Description & Context

Several County departments and offices share this building and the surrounding paved surface parking lot. The surrounding area is mixed-use with single-family residences, varying commercial buildings, and medical facilities to the west.

The departments at this site are:

1. Truckee Branch Library
2. Nevada County Superior Court
3. Nevada County District Attorney
4. Nevada County Sheriff's Office
5. Nevada County Government Center

Location & Access

The site is located 0.5 miles northeast of the I-80 and SR-89 interchange in southwest Truckee. The site is accessible through Levon Avenue/Spring Lane.

Fleet Electrification

Ten (10) ICE fleet vehicles are assigned to this facility, nine (9) of which are light-duty and the remaining one (1) medium-duty. All of these need to be replaced by comparable-class EVs. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Public/Workplace Charging

These chargers could be made available for use by the general public, especially library patrons and County employees, during the day and potentially at other times when fleet EVs are in use.

Parking

According to County records, there are 11 fleet parking spaces and 69 public parking stalls at this location, which should be more than sufficient for at least two dual-port EV chargers for use by both fleet vehicles and the public.

Energy Requirements

The estimated electrical demand for charging fleet EVs at this location is 216.0 kWh/day. Given the cumulative average of 42 miles driven by all fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging every second day on an L2 charger should be more than sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, five (5) dual-port L2 chargers are recommended. Due to three separate electrical cabinets available on site, two (2) dual-port L2 chargers are proposed at the Nevada County Superior Court building, two (2) dual-port L2 chargers are proposed at Truckee Branch Library, and a single dual-port L2 charger is proposed at the Nevada County Sheriff's office. These chargers would provide charging capacity for up to 10 EVs to be charged simultaneously. The charger locations are shown in Figure 20 below.

Figure 20: Recommended Charger Locations for Joseph Center

These L2 chargers should be installed in two phases. Two (2) dual-port L2 chargers will be installed in phase 1 at the Nevada County Superior Court, two (2) dual-port L2 chargers at Truckee Branch Library, and a single dual-port L2 charger at the Nevada County Sheriff's Office should be installed in phase 2. Following charger installation, the existing parking stalls will need to be restriped as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel at Nevada County Superior Court has a main breaker rated at 1000A, 120/208V 3 phase service, which has 140 Amps. This provides 40.4 kVA of spare capacity to power two (2) dual-port L2 chargers at this site in phase 1.

The existing main electrical panel at Truckee Branch Library has a main breaker rated at 400A, 120/240V 1 phase service, which has 140 Amps, including 26.9 kVA of spare capacity to power two (2) dual-port L2 chargers at this site in phase 2.

The existing main electrical panel at the Nevada County Sheriff's Office has a main breaker rated at 600A, 120/208V, and 3-phase service. This breaker has 80 Amps and 23.1 kVA of spare capacity to power a single dual-port L2 charger at this site in phase 2.

6. Lake Of The Pines Treatment Plant | 10984 Riata Way, Auburn

Description & Context

Lake of Pines Treatment Plant has a capacity of 5 million gallons per day and serves 2,568 connections. A pipeline extends 42 miles from the Plant.

Location & Access

The site is in Auburn and accessible through Riata Way via Timber Ridge Drive.

Fleet Electrification

There are five (5) ICE vehicles, one (1) medium-duty and four (4) heavy-duty that need to be replaced by a comparable-class EV. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Parking

It is a gated facility with forty (40) parking spaces at this site. The potential fleet parking is on the east side of the facility. Out of the forty (40) parking spaces, only ten (10) parking spaces will need to be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is 103.0 kWh/day. Given the cumulative average of 15 miles driven by all 5 fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging every second day on an L2 charger should be more than sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, the chargers are recommended for installation in the parking spaces closer to the east side of the building. These chargers would provide charging capacity for up to ten (10) EVs simultaneously. The charger locations are shown in Figure 21 below.

Figure 21: Recommended Charger Locations for Lake of the Pines Treatment Plant

The chargers should be installed in two phases. One (1) dual-port L2, three (3) single-port 11.5 kW DC slow chargers, one (1) dual-port DC 50 kW, and one (1) dual-port 150 kW DC fast charger should be installed in Phase 2. Phase 3 will require the installation of an additional single-port 11.5 kW DC slow charger. The existing parking stalls will need to be restriped as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 1,600A, 480 V 3 phase service, 800 Amps, 532.1 kVA of spare capacity, which is sufficient to power the EV chargers at this site using load management software. However, new sub-panels and a step-down transformer will need to be installed to convert power from 480 V to 208 V 3 phase to serve the L2 and DC slow chargers.

7. Lake Wildwood Treatment Plant | 12622 Pleasant Valley Road, Penn Valley

Description & Context

Lake of Wildwood Treatment Plant has a capacity of treating 1.12 million gallons per day, which serves a population of approximately 8,100. There are 42 miles of pipeline stretching from the Treatment Plant.

Location & Access

The site is in Penn Valley and accessible through Pleasant Valley Road.

Fleet Electrification

There are fifteen (15) ICE fleet vehicles assigned to this plant that need to be replaced by comparable-class EVs. Seven (7) are light-duty, six (6) are medium-duty, and two (2) are heavy-duty. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Parking

This facility is fenced and gated, with parking spaces around each of the site's buildings. The potential fleet parking is on the east and west sides of the administration building. Twenty (20) parking stalls will need to be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is 572.2 kWh/day. Given the cumulative average of 36 miles driven by all 15 fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging every second day on an L2 charger should be more than sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, chargers are recommended for the parking stalls on the east, west, and south sides of the administration building. These chargers would provide capacity for up to twenty (20) EVs to be charged simultaneously. The recommended charger locations are shown in Figure 22 on the next page.

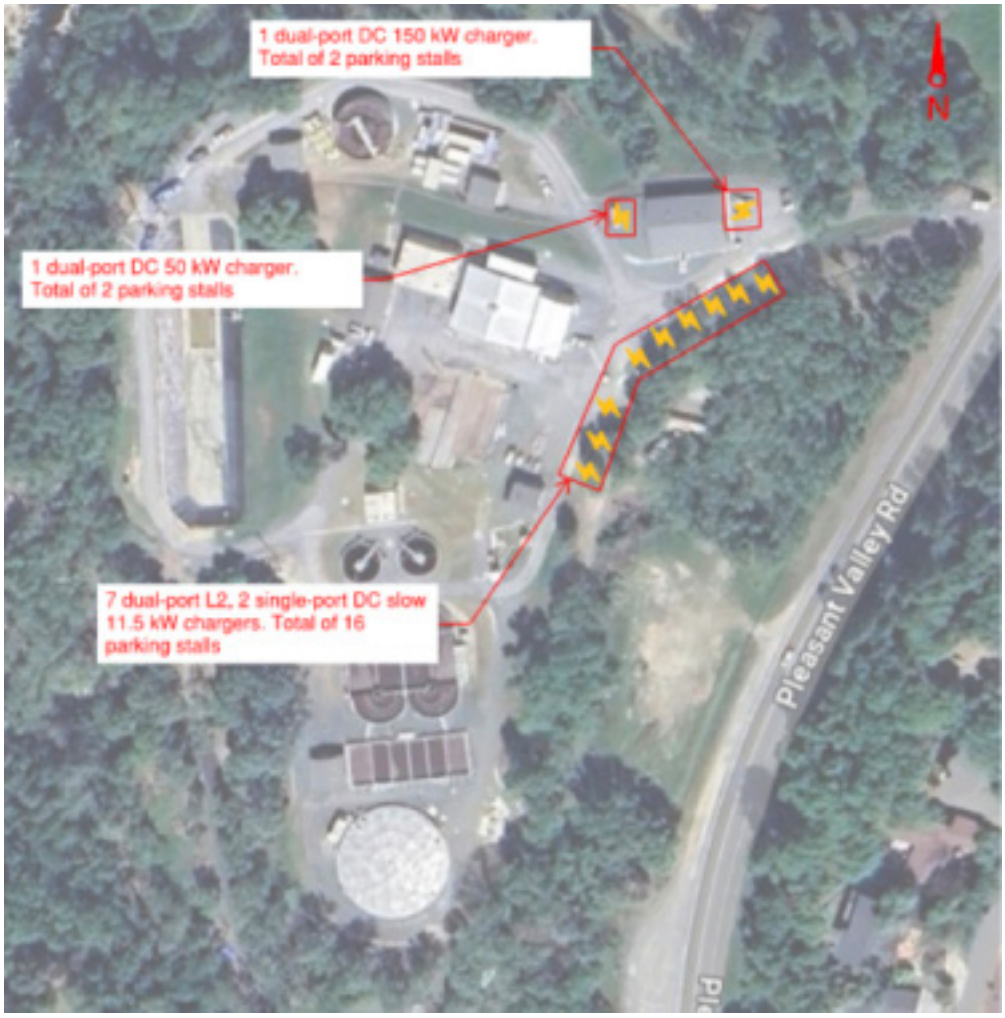

Figure 22: Recommended Charger Locations for Lake Wildwood Treatment Plant

The chargers should be installed in three phases. Phase 1 should consist of installation of a dual-port L2 charger. Phase 2 would consist of the installation of six (6) dual-port L2, one (1) single-port 11.5 kW DC slow charger, one (1) dual-port DC 50 kW charger, and one (1) dual-port 150 kW DC fast charger. A single-port DC slow 11.5 kW charger should be installed in phase 3. The existing parking stalls will need to be restriped as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 1200A, 480 V 3 phase service. It has 800 Amps and 532.1 kVA of spare capacity, which is sufficient to power the recommended EV chargers at this site using load management software. New sub-panels and a step-down transformer will need to be installed to convert power from 480 V to 208 V 3 phase to power L2 and DC slow chargers.

8. Madelyn Helling Library | 980 Helling Way, Nevada City

Description & Context

This site contains the Nevada County Madelyn Helling Library and its paved parking lot. The library is adjacent to the previously described County administrative campus. The site is in a residential area northwest of downtown Nevada City. Transit services are available.

Location & Access

This site is located near the intersection of SR-20 and SR-49, accessed from SR-49 via Maidu.

Fleet Electrification

Only one (1) ICE light-duty fleet vehicle needs to be replaced by a comparable-class EV. It is parked overnight, with at least 14 hours of dwell time available for nightly charging.

Public/Workplace Charging

These chargers could be made available for the general public, especially library patrons and employees, during the day and potentially at other times when fleet EVs are in use.

Parking

According to County records, this site has two (2) fleet parking spaces and sixty (60) public parking spaces. Both fleet parking spaces should be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is 27.2 kWh/day. Since it's the only fleet EV at the library, it will be able to charge every night.

Fleet EV Charger Recommendations

To meet fleet charging needs, the dual-port charger should be installed by the parking spaces to the south side of the library under the covered patio area available for parking. These chargers would provide charging capacity for up to two (2) EVs to be charged simultaneously. The charger location is shown in Figure 23 on the next page.

Figure 23: Recommended Charger Locations for Madelyn Helling Library

In phase 1, a single dual-port L2 charger should be installed. Both existing parking stalls will need to be designated as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 800A, 120/208 V 3 phase service, 200 Amps, and 57.64 kVA of spare capacity, which is sufficient to power a dual-port EV charger at this site.

9. McCourtney Road Transfer Station | 14741 Wolf Mountain Road, Grass Valley

Description & Context

Nevada County currently has three operating Transfer Stations: McCourtney Rd, North San Juan, and the Town of Washington. Waste Management (WM) operates the McCourtney Road Transfer Station, which serves many self-haul customers.

Location & Access

This site is located near the intersection of McCourtney Rd and Wolf Mountain Rd, accessed from T Arnold via Wolf Mountain Rd.

Fleet Electrification

Three (3) ICE vehicles are assigned to this transfer station and need to be replaced by comparable-class EVs. One (1) is light-duty, one (1) is medium-duty, and the remaining one (1) is heavy-duty. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Parking

This transfer station is a gated facility with only three (3) parking stalls that will need to be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is 18.9 kWh/day. Given the cumulative average total of only 6.3 miles driven on average by the three fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging once a week on an L2 and/or DC Slow charger would be sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, the chargers are recommended for installation in the parking spaces to the south of the facility, closer to the main electrical panels. These chargers would provide charging capacity for up to three (3) EVs to be charged simultaneously. The charger location is shown in Figure 24 below.

Figure 24: Recommended Charger Locations for McCourtney Road Transfer Station

The chargers should be installed in two phases: one (1) dual-port L2 charger should be installed in phase 2, and a single-port 11.5 kW DC slow charger should be added in phase 3. The existing parking stalls will need to be restriped and designated as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 200A, 120/240 V 1 phase service. This breaker has 100 Amps and 19.2 kVA of spare capacity sufficient to power a dual-port EV charger at this site using load management software.

10. NCOC | 12350 La Barr Meadows Road, Grass Valley

Description & Context

This is a large, paved surface lot in a semi-isolated industrial area of south Grass Valley. There are less than ten single-family residences along La Barr Meadows Road and a few commercial buildings. The lot appears to be specifically serviced by transit.

Location & Access

The site is about 2.2 miles south of the intersection of SR-20 and SR-49 in Grass Valley. The area is only accessible through La Barr Meadows Road.

Fleet Electrification

There are forty-six (46) ICE fleet vehicles that need to be replaced by comparable class EVs. Eleven (11) of these are light-duty, twenty-seven (27) are medium-duty, and eight (8) are heavy-duty vehicles. All of these vehicles are parked overnight with at least 14 hours of dwell time available for nightly charging.

Parking

According to County records, this site has ninety-eight (98) fleet parking spaces and forty-seven (47) public parking spaces. Out of the ninety-eight (98) fleet parking spaces, only forty-six (46) parking spaces will need to be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is estimated to total 2,362.4 kWh/day. With an average daily mileage of about 52 miles for this fleet and given the battery size of the likely replacement EVs, charging may be required every night using an L2 and DC Slow charger.

Fleet EV Charger Recommendations

The chargers are recommended for installation in the parking spaces to the south of the facility, closer to the main electrical panels. These chargers would provide charging capacity for up to fifty (50) EVs to be charged simultaneously. A 350 kW ultra-fast charger is recommended at this site to supplement other recommended chargers to fulfill any additional or unplanned charging. The charger location is shown in Figure 25 on the next page.

Figure 25: Recommended Charger Locations for NCOC

The chargers should be installed in three phases. Phase 1 would include the installation of five (5) dual-port L2, a single-port DC slow 11.5 kW, two (2) single-port 22.5 kW DC, and a single dual-port 350 kW DC charger. Phase 2 would consist of installing eleven (11) dual-port L2, three (3) single-port 11.5 kW DC slow, and one (1) single-port DC 22.5kW charger. Lastly, in phase 3, installation of two (2) dual-port L2, two (2) single-port DC slow 11.5 kW, and three (3) single-port DC 22.5kW chargers are recommended. The existing parking stalls will need to be restriped and designated as "EV Charging Only" stalls as part of each phase.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 1200A, 480 V 3 phase service, which has 600 Amps, 399.1 kVA of spare capacity, which is sufficient to power the EV chargers at this site for phase 1 charger installation. However, because the existing panel lacks physical space for additional breakers in the two main switchboards, a new switchboard or modification to the existing switchboard will be needed to support charging for phase 1 installations.

New electrical infrastructure or upgrades to the existing electrical infrastructure will be needed in the parking lot to power the chargers for phase 2 and phase 3 installations. PG&E needs further engineering analysis to evaluate if the existing transformer has available capacity to accommodate the EV charging loads or if upgrades to the existing transformer or possibly an entirely new transformer will be needed to provide power to the EV chargers. To serve the projected loads, modifications to the existing electrical panels or new panels will be required to power the EV chargers at this site for phases 2 and 3 installations.

11. Nevada City Veterans Hall | 415 N Pine Street, Nevada City

Description & Context

The Nevada City Veterans Hall (AKA, Veterans Memorial Building, Veterans of Foreign Wars) and its paved surface parking lot are located at this site. The immediate surroundings are single-family homes or residences converted into commercial buildings, but there are restaurants, shops, and other commercial buildings in downtown Nevada City, which is about 500 feet south of the site.

Location & Access

The site is located just north of downtown Nevada City, about 0.16 miles west of the intersection of Washington Street and SR-49. The parking lot is only accessible from Cottage Street.

Fleet Electrification

Seven (7) light-duty ICE vehicles need to be replaced at this site by comparable-class EVs. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Parking

According to County records, this site has thirty-four (34) parking spaces, out of which eight (8) are dedicated to fleet parking. Therefore, only 8 parking spaces will need to be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is 49.7 kWh/day. Given the cumulative average of only 18 miles driven by all 7 fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging once a week on an L2 and/or DC Slow charger would be sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, the parking stalls to the east of the parking area are recommended for EV charger installation. These chargers would provide charging capacity for up to eight (8) EVs to be charged simultaneously. The charger location is shown in Figure 26 on the next page.

Figure 26: Recommended Charger Locations for Nevada City Veterans Hall

The chargers could be installed in three phases. Phase 1 would include the installation of two (2) dual-port L2 chargers, whereas phases 2 and 3 would consist of a single dual-port L2 charger to be installed in each phase. The existing parking stalls will need to be restriped and designated as "EV Charging Only" stalls.

Public/Workplace Charging

These four dual-port chargers could be made available for use by the general public, including County employees, during the day and potentially other times when fleet EVs are in use.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 400A, 120/240 V 1 phase service, which has 40 Amps and 7.7 kVA of spare capacity, which is not sufficient to power the EV chargers recommended at this site. A further engineering analysis is needed by PG&E to evaluate if the existing transformer has available capacity to accommodate the EV charging loads or upgrades to the existing transformer or possibly an entirely new transformer will be needed to provide power to the EV chargers. Either modifications to the existing electrical panels or possibly a new panel will be required to power the EV chargers at this site.

12. Nevada County Airport | 13059 John Bauer Avenue, Grass Valley

Description & Context

This is a small, paved surface parking lot that serves the administrative offices for this County-owned general aviation airport. Other than the airport, there are no public amenities for drivers during charging sessions.

Location & Access

The airport's parking facility is at the end of John Bauer Avenue. It is located in an industrial area a short drive east of the center of Grass Valley.

Fleet Electrification

Of the six (6) ICE vehicles assigned to the airport, two (2) are light-duty, one (1) is medium-duty, and three (3) are heavy-duty. All six will need to be replaced by comparable-class EVs. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Parking

According to County records, this site contains four (4) parking spaces in the upper parking area and twenty-four (24) parking spaces in the lower parking area. Out of the twenty-eight (28) parking spaces, only six (6) parking spaces are to be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is estimated to be 70.2 kWh/day. Given the cumulative average of only 6 miles driven by all six fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging once a week on an L2 and/or DC Slow charger would be sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, chargers are recommended for installation in the parking spaces south of the lower parking area. These chargers would provide charging capacity for up to six (6) EVs to be charged simultaneously. The charger location is shown in Figure 27 on the next page.

Figure 27: Recommended Charger Locations for Nevada County Airport

These chargers should be installed in three phases. Phase 1 would include installing a single dual-port L2 charger, phase 2 would include installing a single-port 11.5 kW DC slow charger, and phase 3 would include installing three (3) single-port 11.5 kW DC slow chargers. The existing parking stalls will need to be restriped and designated as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 200A, 120/240 V 1 phase service, which has 40 Amps and 7.7 kVA of spare capacity, which is not sufficient to power the EV chargers at this site. PG&E needs a further engineering analysis to evaluate if the existing transformer has available capacity to accommodate the EV charging loads or upgrades to the existing transformer or possibly an entirely new transformer will be needed to provide power to the EV chargers. Modifications to the existing electrical panels or a new panel will be required to power the EV chargers at this site.

13. ERAC (Rood Center & Wayne Brown Correction Facility) 950 Maidu Avenue, Nevada City

Description & Context

The ERAC is the Nevada County Government Center, home to the Eric Rood Administration Building, the County's largest fleet facility, and a large worksite that is also an important public destination as home to Nevada County's Community Development Agency, Recorder, Department of Social Services, Sierra Nevada Regional Department of Child Support Services and tourist information center among other agencies. Across the parking lot to the southwest is the Wayne Brown Correctional Facility (County Jail), and the Madelyn Helling Library is a short walk to the southeast. Other nearby popular destinations include Pappy Brimhall and Field Hirschman Pond Trailhead.

Location & Access

The ERAC is on Maidu Ave, close to the intersection of Routes 20 and 49, the two most important travel corridors in Nevada County. It is only a short drive to downtown Nevada City.

Fleet Electrification

There are one hundred thirty (130) ICE fleet vehicles assigned to the ERAC that need to be replaced by comparable-class EVs. One hundred twenty-nine (129) of these are light-duty, and the remaining one is medium-duty. These vehicles are parked overnight, with at least 14 hours of dwell time available for nightly charging.

Public/Workplace Charging

As noted above, this is an important public destination, and these chargers could be made available for use by the general public visiting this facility or nearby parks as well as by County employees during the day and potentially other times when fleet EVs are in use. A total of 3 dual-port Level 2 and 1 dual-port DC Fast Chargers are recommended for installation on the south side of the ERAC, which would be a convenient location for public and workplace charging for both the Rood Center and the adjacent Wayne Brown Correctional Facility.

Parking

According to County records, this site contains one hundred (100) fleet parking spaces and four hundred nine (409) public parking spaces. Out of the five hundred nine (509) total parking spaces, only one hundred thirty-six (136) parking spaces need to be converted into EV charging stalls. Conduit and charger pedestals will need to be installed to support charger installation. Conduit and pedestal installation should be installed prior to or during pavement replacement. Charger installation design needs to consider the operational requirements unique to snow plows.

Energy Requirements

The electrical demand for charging is estimated to be 2,667.5 kWh/day. Given the cumulative average of about 40 miles driven by all 130 fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging once every two nights on an L2 and/or DC Slow charger would be sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, sixty-two (62) dual-port L2 chargers are recommended for installation in the parking spaces north of the building, whereas a single dual-port L2 and a single dual-port DC fast 150 kW charger are recommended on the east side of the building. Additionally, three (3) dual-port L2 and a single dual-port DC 50 kW charger are recommended on the south side of the building. These chargers would provide charging capacity for up to one hundred thirty-six (136) EVs to be charged simultaneously. The charger location is shown in Figure 28 below.

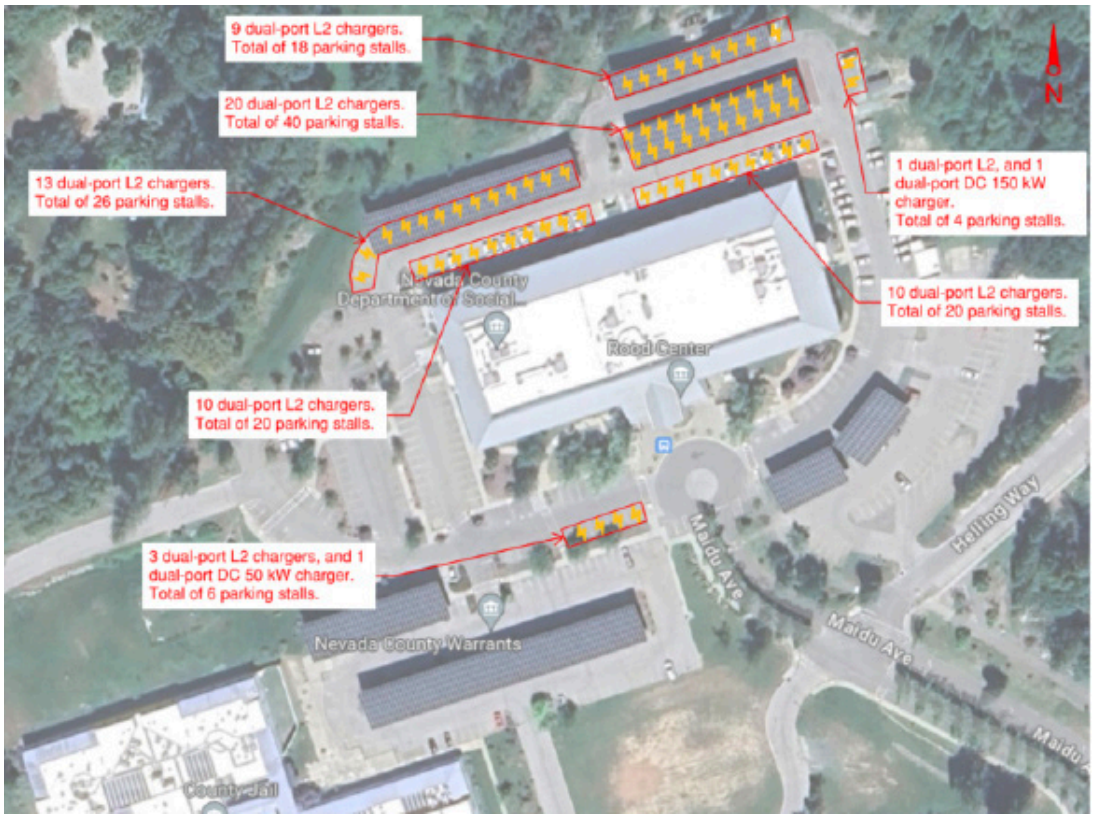

Figure 28: Recommended Charger Locations for ERAC

The chargers are to be installed in three phases. Phase 1 requires a twenty-nine (29) dual-port L2 and a single dual-port DC fast 150 kW charger to be installed. Phase 2 requires thirty (30) dual-port L2 and a single dual-port DC 50 kW charger to be installed. Phase 3 requires seven (7) dual-port L2 chargers to be installed. The existing parking stalls will need to be restriped as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 1600A, 480 V 3 phase service, which has 200 Amps and 133.0 kVA of spare capacity, which is not sufficient to power the EV chargers at this site. PG&E needs a further engineering analysis to evaluate if the existing transformer has available capacity to accommodate the EV charging loads. An entirely new transformer will be required, or upgrades to the existing transformer will be needed to provide power to the EV chargers. A new electrical panel is recommended with step-down transformers converting power from 480V to 208V to feed sub-panels that will power L2 chargers.

14. Station 91 McCourtney | 11329 McCourtney Road, Grass Valley

Description & Context

This is a small, paved surface parking lot with a small building that can hold parking for two fire trucks. Station 91 covers McCourtney Road from Allison Ranch Road to Adair Lane, which includes the Nevada County Fair Grounds, the Nevada County Landfill, Sherwood Forest, Clear Creek, and Wolf Mountain areas.

Location & Access

Station 91 is located on Genes Road, which is accessible via McCourtney Road.

Fleet Electrification

There are five (5) ICE fleet vehicles that need to be replaced by comparable class EVs at this location. Of these, one (1) is light-duty, and four (4) are medium-duty. These vehicles are parked overnight with at least 14 hours of dwell time available for nightly charging.

Parking

This site contains twelve (12) parking spaces, out of which only five (5) parking spaces are to be converted into EV charging stalls.

Energy Requirements

The electrical demand for charging is 82.1 kWh/day. Given the cumulative average of only 18 miles driven by all fleet vehicles assigned to this location and the battery size of likely replacement EVs, charging once a week on an L2 and/or DC Slow charger would be sufficient.

Fleet EV Charger Recommendations

To meet fleet charging needs, the chargers are recommended for installation in the parking spaces to the north of the paved parking area. These chargers would provide charging capacity for up to five (5) EVs to be charged simultaneously. The charger location is shown in Figure 29 on the next page.

Figure 29: Recommended Charger Locations for Station 91

The chargers should be installed in two phases. phase 2 would include installing a single dual-port L2 charger. phase 3 would consist of installing a single dual-port L2 and a single-port DC slow 11.5 kW charger. The existing parking stalls will need to be restriped and designated as "EV Charging Only" stalls.

Electrical Service

The existing main electrical panel that provides power to this site has a main breaker rated at 150A, 120/240 V 1 phase service, which has 60 Amps and 11.5 kVA of spare capacity, which is not sufficient to power the EV chargers recommended for this site. PG&E needs a further engineering analysis to evaluate if the existing transformer has available capacity to accommodate the EV charging loads or upgrades to the existing transformer or possibly an entirely new transformer will be needed to provide power to the EV chargers. Modifications to the existing electrical panels or a new panel may be required to power the EV chargers at this site.

Charging Infrastructure Placement and Installation Guidelines

To optimize operational efficiency and reduce installation costs, when planning to place or install EV chargers, consider the four factors below:

Electrical Service

- Providing power for chargers is typically the most complex and expensive part of EV charger projects, especially for large-scale charger installations like fleet depots that typically lack sufficient existing electrical capacity for the deployment of large numbers of chargers and, therefore, will require electrical service upgrades from the local utility. Depending on the site, providing power to the chargers can be simple or complex. Where appropriate, multiple options for providing power, such as from the utility-owned transformer or from the site host facility's electrical room, should be considered.
- Evaluate the capacity of electrical infrastructure (utility service and electrical panel) to support immediate and long-term vehicle charging needs. In collaboration with local utilities and/or a qualified electrician, identify costs for necessary electrical service upgrades.
- To help minimize costs, choose charging locations that are as close as possible to existing or proposed electrical service infrastructure and other EV charging stalls.
- Plan electrical raceway or conduit runs for electrical wiring and data cables from the electrical panel serving the chargers and consider a layout that minimizes linear conduit distances to all proposed EV charger-equipped parking spaces.
- If possible, install chargers during construction, remodels, or other facility upgrades planned to reduce costs and minimize construction impacts.
- Charger hosts should consider different strategies to separate meters for building and electric vehicle charging uses to manage peak load impact on the grid and minimize demand charges for electric vehicles.

Charger Location and Layout

- Key considerations for siting fleet chargers include proximity to available power, user convenience, and parking facility operations.
- Chargers should be located as close to the power source as possible to reduce the cost of conduit and conductor installation and minimize voltage drop. To maximize convenience, chargers should be placed in accessible locations as close as possible to charger-equipped parking stalls. Chargers should also be clustered together to help fleet managers, especially if they are to be shared.
- If possible, surface-mount conduit along wall surfaces to avoid more costly trenching under paved surfaces. If wall mounting is not feasible, trench beneath planting strips to reduce cutting and re-paving costs and to minimize disruptions during construction.

- Identify suitable locations with smooth, plumb surfaces for wall-mounted charging stations, if possible, or suitable floor surfaces for pedestal mount stations. If possible, use wall-mounted chargers to avoid the need for pedestals which are more costly and complex to install.
- To maximize charging capacity, consider installing dual-port pedestal mount stations with long charge cords (up to 25'). Many chargers include optional cord management systems, such as retracting reels, to minimize trip hazards. Depending on the parking configuration, a single charger or dual head charger pair can serve up to eight parking stalls.
- To comply with the Americans with Disabilities Act (ADA), charging station configuration must meet current CA Title 24 Building Code requirements, charging stations must not block ramps or pathways, and cables should not extend across ramps, pathways, or sidewalks when connected to a vehicle, sometimes called "path of travel."
- Where feasible, avoid locating chargers under trees where sap, pollen, or leaves would fall on the charging station.
- To better accommodate the varied charge port locations on different EVs, use perpendicular (90-degree) parking stalls that allow a vehicle to enter either front-first or rear-first instead of parallel or diagonal stall parking.
- Plan locations for easy and cost-effective future charger installation, typically adjacent to other EV charging stalls.
- Operational considerations, especially for publicly accessible chargers
- Provide adequate lighting activated by motion sensors for safe night-time access and consider weather protection.
- Consider sighting chargers in areas with good visibility and securely affixed to the ground or wall.
- Closed-circuit television (CCTV) surveillance is an additional option, especially in low-visibility public areas, to prevent theft and vandalism.
- Ensure chargers are easily identified and install signage or wayfinding as needed.
- Provide protective bollards and wheel blocks where appropriate, especially on sloped sites.

Data Connectivity

- Chargers recommended for public use or fleet vehicles should be smart or at least enhanced with smart charging capability with add-on technology like Cyber Switching or PowerFlex. This will provide fleet and facilities managers with data on charging and energy use and provide the benefits of load management. To be smart, chargers must be able to transmit data, which requires cellular connectivity, WiFi, or ethernet.

- In general, smart chargers use cellular signals to communicate with the cloud. Stand-alone chargers have their own integral modems, while modular chargers communicate to a central control hub using ethernet or WiFi that communicates to the cloud via a cellular modem or through the facility's internet. To ensure dependable coverage, communication systems need to be stand-alone and not be dependent on the building's WiFi system.
- Measure cellular signal levels to ensure adequate coverage where smart chargers will be installed. Underground or enclosed parking structures may require cellular repeaters to ensure adequate signal strength to chargers.

22

APPENDIX H: EV CHARGING STATION WEIGHTS AND MEASURES TESTING REQUIREMENTS

22.1 Background

The Department of Food and Agriculture establishes requirements for commercial weighing and measuring devices used in California, and the Division of Measurement Standards (DMS) is responsible for overseeing the fuel quality, dispenser accuracy, advertising, and labeling of all motor vehicle fuels sold at retail, including low- and zero-emission alternative fuels.[19]

County weights and measures officials are responsible for the annual testing of commercial devices, including motor fuel dispensers, to ensure accuracy. For motor fuels, county weights and measures are also responsible for testing the quality of the fuel to ensure it meets SAE (Society of Automotive Engineers) and American Society for Testing and Materials (ASTM) standards.[20] DMS will develop, schedule, and provide EVSE device training for county weights and measures officials.[21]

Electric Vehicle Supply Equipment (EVSE), also known as "charging stations," that transfer electricity to vehicles as retail motor vehicle fuel for a fee becomes a commercial measuring device and is subject to oversight by DMS and county weights and measures officials. However, the following EVSEs are currently exempt from DMS regulations and oversight:

1. EVSE is wholly owned and operated by public utilities, public entities, and municipalities
2. EVSE that is used for residential or workplace charging (used exclusively by employees)
3. EVSE that do not collect fees from users (are free to use)
4. EVSE that delivers wholesale electricity.

As of the writing of this report, Assembly Bill 2037 has passed the assembly and referred to the state senate. The bill's language specifies testing for EVSE owned by public agencies and allows county sealers to levy a civil penalty against a public agency or "a vendor or entity contracted by a public agency" may provide. The bill would also authorize a county board of supervisors to charge an annual registration fee for the cost of inspecting and testing EVSE operated by a public agency.[22]

County weights and measures officials have begun to test all new commercial AC EVSE devices installed on or after January 1, 2021, and new commercial DCFC EVSE installed on or after January 1, 2023. DMS is focused on working with EVSE manufacturers on type certification. Electricity does not require quality testing.

19 https://www.cdfa.ca.gov/dms/programs/zevfuels/
20 https://www.cdfa.ca.gov/dms/programs/petroleum/petroleum.html
21 https://www.cdfa.ca.gov/dms/programs/zevfuels/
22 https://legiscan.com/CA/text/AB2037/id/3007219

22.2 EVSE Specifications

Specifications apply to the equipment and are intended to ensure that customers receive the amount of fuel that they pay for. The wording from the California Code of Regulations (CCR), Sections 4000 - 4002.11, is below. It essentially establishes that:

- Electricity is sold by the kilowatt hour (kWh) or megajoule (MJ) and that the charging station will display both the units dispensed and the cost of those units. The smallest unit of delivery is 0.0005 MJ or 0.0001 kWh
- Each EVSE must display its maximum power, the current type (AC or DC), and the cost per unit. If an EVSE also charges a fee for start-up, parking, or parking after a charging session, those units and prices must also be displayed/
- The EVSE will display the total cost of energy (or parking charges) while in use and the user can stop the transaction at any time.
- EVSEs must be able to operate correctly in -40 °C to + 85 °C (-40 °F to 185 °F).

CCR language for EVSEs used to charge electric vehicles is outlined below.[22]

EVSE Units of Measurement: The value of the smallest unit of indicated delivery by an EVSE, and recorded delivery if the EVSE is equipped to record, shall be no greater than 0.0005 MJ or 0.0001 kWh.

Unit Price: An EVSE shall be able to indicate on each face the unit price at which the EVSE is set to compute or to dispense at any point in time during a transaction. A computing EVSE shall display the unit price in whole cents (e.g., $0.12) or tenths of one cent (e.g., $0.119) on the basis of price per megajoule (MJ) or kilowatt-hour (kWh). In cases where the electrical energy is unlimited or free of charge, this fact shall be clearly indicated in place of the unit price.

Equipment Capacity and Type of Voltage: An EVSE shall be able to conspicuously display on each face the maximum rate of energy transfer (i.e., maximum power) and the type of current associated with each unit price offered (e.g., 7 kW AC, 25 kW DC, etc.).

Indication of Delivery: The EVSE shall automatically display on its face the initial zero condition and the quantity delivered (up to the capacity of the indicating elements).

Temperature Range for System Components: EVSEs shall be accurate and correct over the temperature range of -40 °C to + 85 °C (-40 °F to 185 °F). If the system or any measuring system components are not

[22] https://www.cdfa.ca.gov/dms/pdfs/CA_EVSE_Regulation_Reference_Document.pdf

capable of meeting these requirements, the temperature range over which the system is capable shall be stated on the National Type Evaluation Program (NTEP) Certificate of Conformance (CC) or California Type Evaluation Program (CTEP) Certificate of Approval (COA), conspicuously, legibly, and indelibly marked on the EVSE, and installations shall be limited to the narrower temperature limits.

EVSE Identification and Marking Requirements: In addition to all the marking requirements of Section 1.10. General Code, paragraph G-S.1. Identification: each EVSE shall have the following information conspicuously, legibly, and indelibly marked:

a. voltage rating; Merged Version 2020 Edition of NIST HB 3.40. EVFS and CCR Title 4 Div 9 §§ 4000, 4001, 4002.11 Page 12 of 25
b. maximum current deliverable
c. type of current (AC or DC or, if capable of both, both shall be listed
d. minimum measured quantity (MMQ); and
e. temperature limits, if narrower than and within -40 °C to + 85 °C (-40 °F to 185 °F).

Starting Load Test: A system starting load test may be conducted by applying rated voltage and 0.5-ampere load.

22.3 Accuracy Testing

Accuracy testing is the methodology for comparing the total energy delivered in a transaction and the total cost charged as displayed/reported by the EVSE with that measured by the measurement standard.

22.3.1 Load Test Tolerances

Accuracy Class	Application or Commodity Being Measured	Acceptance Tolerance	Maintenance Tolerance
2.0	AC electricity as a vehicle fuel	1.0 %	2.0 %
5.0[1]	DC electricity as a vehicle fuel	2.5 %	5.0 %
2.0[2]	DC electricity as a vehicle fuel	1.0 %	2.0 %
[1] The tolerance values for Accuracy Class 5.0 DC EVSE are applicable to devices installed prior to January 1, 2033.			
[2] The tolerance values for Accuracy Class 2.0 DC EVSE are applicable to devices installed on or after January 1, 2033.			

Table 26: Adopted Tolerances for EVSE Load Tests

[23] California Department of Food and Agriculture Division of Measurement Standards Electric Vehicle Supply Equipment (EVSE) 2020 Reference Document (Pg. 14.https://www.cdfa.ca.gov/dms/pdfs/CA_EVSE_Regulation_Reference_Document.pdf

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