RMI

Increasing Equitable EV Access and Charging: A Path Forward for States

Recommendations for US Policymakers and Projected Impacts on Equitable Access to EV Adoption and Charging

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About RMI

RMI is an independent nonprofit founded in 1982 that transforms global energy systems through market-driven solutions to align with a 1.5°C future and secure a clean, prosperous, zero-carbon future for all. We work in the world's most critical geographies and engage businesses, policymakers, communities, and NGOs to identify and scale energy system interventions that will cut greenhouse gas emissions at least 50 percent by 2030. RMI has offices in Basalt and Boulder, Colorado; New York City; Oakland, California; Washington, D.C.; and Beijing.

Table of Contents

Abbreviations

AB: Assembly Bill
AGI: adjusted gross income
CALeVIP: California Electric Vehicle Infrastructure Project
CARB: California Air Resources Board
CARB MSS: CARB'S 2020 Mobile Source Strategy (a California program)
CBO: community-based organization
CC4A: Clean Cars for All (a California program)
CEC: California Energy Commission
CPUC: California Public Utilities Commission
CVRP: Clean Vehicle Rebate Program (a California program)
DAC: disadvantaged community
DCFC: direct current fast charger
DMV: department of motor vehicles
EJ: environmental justice
EV: electric vehicle
EVSE: electric vehicle supply equipment
EVSP: electric vehicle service provider
FPL: federal poverty level
GHG: greenhouse gas
HD: heavy duty
HDV: heavy-duty vehicle
ICCT: International Council on Clean Transportation
ICE: internal combustion engine
IIJA: Infrastructure Investment and Jobs Act (federal)
IRA: Inflation Reduction Act (federal)
LCFS: Low Carbon Fuel Standard (a California program)
LDV: light-duty vehicle
LMI: low and moderate income
MOU: memorandum of understanding
MD: medium duty
MUD: multiunit dwelling
NESCAUM: Northeast States for Coordinated Air Use Management
NEVI: National EV Infrastructure Formula Program (federal)
TCO: total cost of ownership
TE: transportation electrification
TNC: transportation network company
ZEV: zero-emissions vehicle

Executive Summary

State policymakers play a critical role in reducing greenhouse gas emissions from transportation, the highest-emitting sector of the US economy,[1] and accelerating electric vehicle (EV) adoption that benefits all state residents equitably. Transportation electrification (TE) in the United States has the potential to improve local air quality in vulnerable communities and spur manufacturing and innovation along the entire EV value chain, from domestic sourcing of battery materials to providing industry jobs.

We propose approaches that state governments can take to eliminate key barriers to US consumers choosing an EV, with a focus on helping lower-income drivers access EVs. Key steps include reducing up-front EV costs through incentives; educating residents about EVs to relieve range anxiety; offering public charging, especially along highway corridors; and implementing sufficient charging infrastructure at home and work. Although 80% of EV charging today occurs at home,[2] over 40% of Americans in the top 100 metropolitan areas live in multiunit dwellings (MUDs) and have limited access to on-site chargers.[3]

In addition, low-income individuals who live in MUDs are already burdened by housing costs,[4] adding to concerns around equity. Solving the challenge of MUD charging would pave the way for the 1 million MUD chargers that the United States is estimated to need by 2030, and provide tangible benefits for low-income households.[5]

All states can do more to catalyze TE and mitigate carbon emissions. We compared EV policy activity for five states representing diverse geographic, demographic, and political characteristics: California, Oregon, Michigan, New Jersey, and Texas. In benchmarking these states' policies, we found a series of key focus areas for state policymakers to ensure that EV adoption and charging are affordable and accessible. The focus areas start with upgrading and maintaining the grid to accommodate the increase in electricity demand for the least cost, setting sales targets for zero emissions vehicles (ZEVs) to track and drive progress along a clear time line, engaging community-based organizations and environmental justice (EJ) advocates, and developing more effective transportation policies by designing holistic state programs for clean mobility.

Federal policy can harmonize individual state requirements by providing a foundation for performance and technology standards, as well as directing TE investments to low- and moderate-income (LMI) community members.

Finally, we evaluated the impact of one proposed policy in California: the November 2022 ballot measure Proposition 30 (Prop. 30), which is designed to spur EV adoption and charging infrastructure by allocating half of its funding to low-income and disadvantaged community members. Prop. 30 has the potential to prepare California for its estimated 8 million EVs by 2030 by covering the total investment needed for nearly 20% of required fast charging infrastructure and almost half of the required MUD charging infrastructure. When administered through programs such as California's Clean Cars 4 All (CC4A), Prop. 30 can help to bridge the total cost of ownership (TCO) differential between a new EV and a typical car purchased by LMI community members, creating a more equitable distribution of EVs across income levels.

Introduction

In the United States, transportation emits more carbon dioxide than any other sector, with cars and trucks dominating transportation emissions.[6] The transportation sector is responsible for over 50% of nitrogen oxide emissions, 15% of volatile organic compounds, and about 4% of particulate matter (i.e., PM2.5) emissions.[7] Healthcare costs associated with air pollution from traffic range from $70 billion to $110 billion per year (in 2022 dollars).[8] Across the United States, the federal government, states, and cities are working to accelerate the adoption of EVs to both reduce local air pollution and meet greenhouse gas (GHG) emissions reduction targets.

Initial policies focused on reducing EV costs through tax incentives. More recently, states have begun passing laws and regulations that take a more holistic approach to overcoming the diverse barriers slowing a transition to EVs from the gasoline- and diesel-powered vehicles that dominate today's fleet.

In the year leading up to June 2022, states enacted 130 EV policies and had proposed 20 new laws.[9] In addition, the federal government provides financial aid to states and consumers through the National EV Infrastructure (NEVI) Formula Program and the recently passed Inflation Reduction Act (IRA) EV tax credits.[10] In this dynamic policy landscape, states and cities can create faster EV uptake with their limited budgets if they carefully target their policies at the most limiting barriers to EV adoption.

For electric vehicles to be a compelling option for all drivers, states must ensure not only that EVs are affordable, but also that drivers have access to reliable, convenient charging. Unfortunately, charging infrastructure is often inaccessible to lower-income communities.[11] Furthermore, many organizations have reported on the challenges of providing at-home charging for those without private, off-street parking, such as residents of multifamily buildings and row homes where occupants cannot easily install their own chargers.[12] Although this is a challenge for anyone, low-income households are less likely to have private parking than the population as a whole. Without targeted policies, the unique challenges in lower-income communities are likely to slow overall EV adoption.

Slower EV adoption in lower-income communities would be especially unfortunate given that these communities are often the most polluted and would see large direct health benefits from the pollution reduction brought by vehicle electrification. Studies consistently show that pollution exposure near major roadways from mobile sources contributes to and exacerbates asthma, impairs lung function, and increases cardiovascular mortality.[13]

Low-income communities of color that disproportionally bear the environmental harm and economic burdens of the energy system yet do not receive its benefits equitably are often referred to as disadvantaged or under-resourced communities. The federal government has identified specific criteria that indicate disadvantages, including lower income levels, higher energy and housing burden, higher incidence rates of cancer, and more.[14]

In April 2021, the University of California, Berkeley's Goldman School of Public Policy released a study quantifying the society-wide benefits of electrifying all new cars and trucks by 2035 when combined with a 90% renewable energy grid.[15] This scenario would:

- Prevent 150,000 premature deaths and avoid $1.3 trillion in environmental and health costs through 2050 by reducing air pollution, especially in communities near major roads, transit centers, or freight hubs
- Save consumers $2.7 trillion by 2050, equivalent to about $1,000 for every household per year over the next 30 years
- Support a net increase of over 2 million jobs by 2035

In this report, we summarize the barriers to replacing internal combustion engine (ICE) vehicles with EVs and how state policies can help overcome these barriers. In our evaluation of state policies, we focus on the specific barriers faced by lower-income drivers and how policy can encourage equitable EV access. We evaluate EV policies in five states — California, Oregon, Michigan, New Jersey, and Texas — and examine how well each is addressing the barriers to EV adoption. Our research indicates that in states with strong EV policies, sufficient public funding leads to higher per capita registrations of EVs. Finally, as a timely case study, we examine California's Prop. 30, or the California Clean Cars and Clean Air Act, and discuss how it could work with existing federal and California EV policies to increase EV adoption and improve charging access within LMI communities.

State Policies Can Overcome EV Adoption Barriers and Optimize Beneficial Outcomes

The real and perceived barriers to EV adoption are well understood:[16]

High vehicle purchase price

Insufficient knowledge about EVs to feel comfortable switching

Availability of public fast charging, especially along highways, to mitigate "range anxiety," or the concern for being stranded with an empty battery[17]

Access to charging at home and/or work

To accelerate EV adoption, state policies should address these barriers as well as the underlying infrastructure that supports both home and public charging. In the following sections, we describe each barrier and provide examples of actionable policy that can mitigate or eliminate the barrier.

We identify leading policies or gaps in policy based on findings from our comparison of five states: California, Oregon, Michigan, New Jersey, and Texas. We examined these states because they are geographically, demographically, and politically diverse. We surveyed each state's existing legislated or regulated requirements related to EV adoption and charging, including the role of utilities in planning for an increased grid load. We also conducted forecasting exercises or included future action plans to be undertaken because of state government directives or existing policies. For instance, in Oregon, Governor Kate Brown's Executive Order 20-04 directed the Department of Transportation to lead a Transportation Electrification Infrastructure Needs Analysis (TEINA) study in collaboration with other agencies and entities, which we reference. **Exhibit 1** (on the next page) indicates which states have existing or proposed policies in place as of July 2022, focusing on indicators generally cited as priority focus areas.[18]

Exhibit 1 Table of State Policy Features That Promote EV Adoption

Enacted legislation or available incentive program ☐ No policy exists

Proposed legislation or rulemaking in progress

Policy Focus Area	Description	Selected States, Multistate Memorandums of Understanding (MOU), or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Regulatory Activity to Set EV Adoption Targets	Government focus on GHG emissions reduction across different sectors							
	Vision for future mobility, defined roles for electric mobility, and public authority in implementation (includes ZEV sales targets)							
	Utilities legally authorized and obligated to plan for and support EV charging needs							
Infrastructure Needs Assessments and Targets	Locally adapted metrics that consider housing statistics, vehicle sales, and average miles driven							
Infrastructure Investment Strategy	Co-investment strategy by private sector, including automotive industry and labor unions, energy sector, and EV charging infrastructure players like EV Service Provider (EVSP) and site hosts			**			**	
Stakeholder and EJ Community Engagement	Provisions for private member organizations or CBOs to represent driver voices in policy development alongside voices of charger industry and vehicle manufacturers and sellers				*			

* Targets set but not yet enforceable

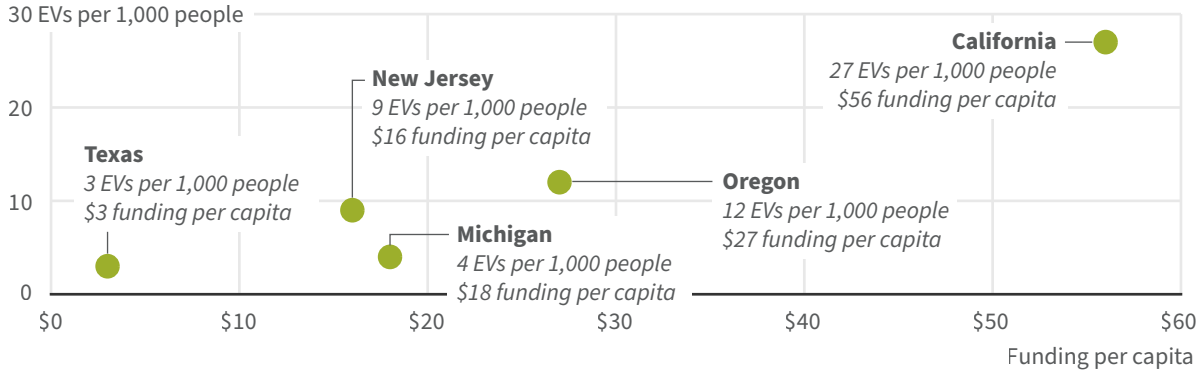
** Multiple MOUs exist: Regional Electric Vehicle Midwest MOU (MI), Section 177 Coordinated ZEV program to follow CA ZEV and Electric Vehicle Supply Equipment (EVSE) standards (NJ), Transportation and Climate Initiative (NJ), Northeast States for Coordinated Air Use Management (NJ), West Coast Electric Highway (CA, OR)

Source: RMI analysis

As shown in **Exhibit 2** (on the next page), states that have dedicated funding for EV adoption have a higher number per capita of EVs registered. States with dedicated funding also tend to enforce policies that are more aligned to ZEV targets (e.g., CA and OR).

Appendix A (on page 34) presents a complete list of relevant policies by focus area and state.

Exhibit 2 EVs per Capita by Allocated State Funding



Source: Alliance for Automotive Innovation, **https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard**; Atlas EV Policy, **https://www.atlasevhub.com/materials/state-policy-dashboard/**; United States Census Bureau, **https://www.census.gov/content/dam/Census/library/working-papers/2021/demo/pop-twps0104.pdf**

Reducing Up-Front Vehicle Cost

The International Council on Clean Transportation (ICCT) recently reported that many of today's EVs already have a lower total cost of ownership than comparable ICE vehicles due to lower fuel and maintenance costs.[19] However, the higher initial purchase price of EVs remains a barrier to car buyers, especially lower-income buyers who are less likely to have access to cash for a down payment or other vehicle financing options, or are more likely to buy a used vehicle. In **Exhibit 3**, we compare the total cost of ownership (or TCO, including purchase price, fuel costs, maintenance, and insurance premiums) of a new ICE vehicle, a used ICE vehicle, and a comparable new EV purchased in the United States in 2022.

Exhibit 3 Total Cost of Ownership in 2022 Dollars of New and Used ICE Vehicles and New EVs

	New ICE	Used ICE	New EV	Cost Difference Between New EV and Used ICE
Purchase Cost (without incentives)	$25,966	$12,983	$30,779	$17,796
Five-year TCO	$45,694	$34,060	$44,779	$10,719*

* Estimated incentive needed to cover TCO gap

Note: Five-year TCO includes purchase costs (without incentives) and fueling, maintenance, and insurance costs. Costs are only for the car segment (sedans, hatchbacks, and coupes), based on ICCT findings. SUVs and trucks, which are not included here, would cost significantly more. The cost of used ICE vehicles as a proportion of new ICE vehicles can vary significantly. Prepandemic data indicates this can be anywhere in the range of 23%–66%, as discussed in **Appendix C** (on page 47). In this analysis, we assumed that a used vehicle would cost 50% the price of the new vehicle.

Source: ICCT, **https://theicct.org/publication/when-might-lower-income-drivers-benefit-from-electric-vehicles-quantifying-the-economic-equity-implications-of-electric-vehicle-adoption/**; Cars.com, **https://www.cars.com/articles/when-will-used-car-prices-drop-3-things-car-shoppers-should-know-446525/**; RMI analysis

State policies that address up-front cost barriers

The difference between the TCO of a new EV and a used ICE vehicle shows the challenges faced by lower-income car buyers and should guide the design of purchase incentives intended to support this group. States play a role in administering programs that can make EVs more affordable for all residents, including LMI households. **Exhibit 4** presents policies related to EV affordability and incentives in the five states we benchmarked as well as federal programs. Most programs provide direct incentives to purchase new EVs and, in some cases, retire older, less efficient ICE vehicles. Lower-income households are more likely to buy higher-emitting and/or used vehicles because of their lower purchase costs, to hold on to these vehicles longer, and to bear a disproportionate burden of transportation-related air pollution compared with higher-income households.[20] Retiring old ICE vehicles amplifies the reduction of both GHG emissions and local air pollutants by permanently removing vehicles from operation.

Based on the structure of existing incentive programs for LMI community members and related vehicle purchase behaviors, additional incentives are required to enable equitable EV adoption for those who primarily purchase lower-priced used ICE vehicles.[21] **Exhibit 4** summarizes key features that promote affordable EV adoption and highlights which states have implemented active policies to ensure EV accessibility.

Up-front incentives substantively increase the likelihood of consumers to purchase EVs, with increased impact on low-income groups. Without incentives, the transportation burden for LMI communities — the percentage of income that goes toward transportation costs — is higher for new EVs than for used ICE vehicles.

Exhibit 4 Table of State and Federal Policies That Address EV Affordability

Enacted legislation or available incentive program ☐ No policy exists

Proposed legislation or rulemaking in progress

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Accessibility and Affordability: LMI, DAC Funding	Targets for a just transition through additional funds for LMI, DAC EV adoption and infrastructure and clean mobility through community-based needs assessments, engaging community in development process and metrics to measure and analyze results				*			
Governance and Incentives: Vehicle Rebates	Up-front cost-reduction incentives for vehicles and chargers							

* Targets set but not yet enforceable

Source: RMI analysis

Even in states that are leading in climate action, such as California, accessible and affordable TE is a pressing and relevant priority. Half of all Californians, or approximately 21 million people,[22] are below the 400% federal poverty level (FPL). In addition, data from the 2016 American Community Survey shows that greater than 90% of low-income households in California have at least one car in their household and the average LMI household owns approximately two.[23] A 400% FPL is often used as an income threshold to limit eligibility in benefits and incentive programs.[24]

State incentive policies can be designed to integrate with the recently passed IRA, which offers a federal incentive up to $7,500 per vehicle through 2032. The IRA EV tax credit applies only to cars priced less than $55,000 and SUVs priced less than $80,000, and can be claimed only by individual tax filers earning an adjusted gross income (AGI) less than $150,000 or joint filers earning an AGI less than $300,000 annually.

There are several examples of state EV incentives that specifically support lower-income car buyers, such as CC4A and the California Vehicle Rebate Program (CVRP). CC4A incentives targeted LMI households residing in disadvantaged communities (DAC), and reached only approximately 13,000 California households with an average incentive of $8,000 per EV.[25] By contrast, the CVRP, which until recently had an income cap of $150,000 for single tax filers and $300,000 for joint tax filers, funded nearly half of the 1 million EVs currently on the road in the state, with an average incentive of $2,300 per EV.[26]

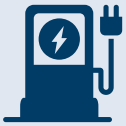
The differences between these two programs in the number of EVs each funded and their respective incentive eligibility requirements reveals an opportunity for state policymakers to redirect and increase funding for LMI households. Doing so would prioritize increasing EV adoption for the LMI community rather than funding households that might purchase an EV even without an incentive. For example, according to the *New York Times*, Tesla — an EV brand popular among more affluent car buyers — has outsold other EV makers as recently as in 2021 despite having lost access to the federal EV tax credit several years ago. Tesla's market performance suggests that luxury-car buyers would buy electric cars whether they receive a tax break or not.[27]

Educating Residents about EVs and Relieving Range Anxiety

Range anxiety remains a barrier to EV adoption, as drivers understandably fear being stranded without nearby charging. Today's EVs may also feel unfamiliar to drivers with many decades of experience driving gasoline cars. There are both real and perceived components to this barrier, and each has a different solution.

Policy solutions that can address driver education and range anxiety

State programs can support or fund driver education on the EV driving experience as well as the actual (and diminishing) risks of being stranded without charging. For example, the New Jersey Department of Environmental Protection organizes events that expose new audiences to EVs and allow participants to test-drive an EV.[28] States need not be the primary provider of community outreach and education programs for EVs; with appropriate community engagement, states can identify trusted organizations and outlets to share information with residents. Of course, there is no substitute for states continuing to ensure that public charging is ubiquitous and visible. They can leverage financial commitments and holistic infrastructure strategies to spur the development of public charging infrastructure networks that meet the needs of the whole community and reduce range anxiety.



Offering Public Fast Charging

Publicly accessible fast chargers (i.e., direct current fast chargers [DCFC] capable of more than 150 kW) are essential for widespread EV adoption, including EV charging for the long road trips that are often top-of-mind for Americans when purchasing a vehicle.[29] In a *Consumer Reports* survey, "public charging stations along highways" is the top policy that would increase drivers' interest in choosing an EV.[30] RMI estimates that the United States would need 500,000 fast chargers by 2030 to support 70 million EVs.[31] Today, the United States has deployed about 22,000 fast chargers (less than 5% of the expected 2030 need), and 60% of them are Tesla Superchargers that are unavailable to non-Tesla drivers.[32]

This lack of fast chargers has the potential to limit transportation electrification in the United States just as more affordable EVs are coming to market. Ultimately, this would limit EV ownership to those with easy access to home charging and those with a second car for long-distance trips. This excludes the nearly one-third of US residents who do not own a garage in which to install a charger or have reliable access to a charger at their workplace.[33] For rental housing units, the situation is worse: only 39% have a garage or carport.[34]

Policy solutions that support fast charging

States are well positioned to leverage federal funding and design policies that prioritize public fast charging to encourage more equitable access to charging infrastructure for residents who cannot reliably charge at home or work. States can also monitor and mitigate EV charging deserts — areas of a community that provide little to no fast charging. Disparities in access to public chargers are even higher in areas with a higher proportion of MUDs. In California, for example, one study showed that residents of high-income census block groups with high MUD density have more than twice the probability of having access to public charging than residents of the poorest census block groups with high-density MUDs.[35]

Exhibit 5 (on page 16) shows the state and federal policies we identified that address fast charging deployment holistically, from affordability to charger performance standards. We note one clear policy gap: we did not find any dedicated funding for affordable fast charging. Although some states have established clear charging performance standards and requirements and the federal government is proposing national standards through the NEVI Formula Program, there is ample opportunity to improve affordability and accessibility of fast charger access by directing more funding to LMI communities for fast chargers in EV charging deserts and DACs.

States can also develop affordable charging plans for drivers in LMI communities, such as transportation network company (TNC) drivers who typically have lower household incomes, do not have a lot of downtime during which to charge, and usually do not have access to a private charger at night.[36] Furthermore, no state we benchmarked currently addresses managed charging or accessibility for the unbanked who cannot make a payment with a smartphone — areas where additional policy is critical.

To ensure that the imminent wave of EVs is successful and enjoyed by everyone, states must adapt local performance metrics to consider housing types, vehicle sales, and average miles driven to develop charging infrastructure implementation plans that support overarching EV goals and are tailored to local conditions. Oregon's TEINA is a great example of a state building an infrastructure strategy that supports its 2035 goals.[37] A clear infrastructure strategy provides critical design parameters to individual infrastructure projects and sets a course toward creating a comprehensive system that benefits communities. To further leverage limited state resources, this strategy should be codesigned with the public and private sectors, including the automotive industry, labor unions, the energy sector, EVSPs, and charging site hosts to set the stage for investment of private dollars to complement public funds.

Supporting Charging Infrastructure at Home and Work

In the United States today, 90% of EV owners have a private garage,[38] and the US Department of Energy reports that 80% of EV charging occurs at home.[39] However, 41% of Americans in the top 100 metropolitan areas live in MUDs, and providing home charging at MUD sites remains challenging.[40] MUD residents are also more often income constrained, making dedicated charger installations financially difficult, beyond any lease or permitting requirements that could preclude on-site charger installations at MUDs.[i]

As the EV market expands beyond early adopters, the proportion of people who can easily charge at home will decrease and, according to ICCT, by 2030 more than one-third of all EV owners will not have access to home charging while roughly 1 million chargers are expected to be needed at MUDs. Communities with households that are less likely to have charging at home or be able to afford to install home charging, that have smaller budgets for vehicle purchase, and that have fewer vehicles are also less likely to have a regular place of work, which means they may not have workplace charging access as an alternative to home charging.[41] States will need to make charging convenient for these Americans so everyone can enjoy the benefits of EVs.[42]

i The US Department of Housing and Urban Development defines cost-burdened households as those that spend more than 30% of their income on housing, yet in cities such as Los Angeles, MUD renters spend an average of 32% of their income on housing.

Policy solutions that address home and work charging

To make home and work charging possible for all drivers, policymakers need to support a strategic combination of home, curbside, and workplace charging. Solutions will need to be tailored to the local context. Charging will look different in urban and suburban areas and from region to region.

State governments can support home charging by directing funding to underserved communities, including MUD residents. Policy options to enable home and workplace charging can include:

- Building codes that require a certain percentage of parking spaces in public or private buildings to be charger ready

- Requirements that landlords and homeowners associations approve tenant requests to install EV charging (known as "right-to-charge")[43]
- Curbside charging programs
- Blended pricing policies at workplaces that consider the time and parking space occupied during a charging session, including gradual rate increases[44]

Exhibit 5 shows that California, Oregon, and New Jersey have introduced policies that create a right-to-charge in residential and commercial settings and/or create mandatory building standards. Furthermore, New Jersey has designed a state incentive program to fund MUD charging, and California administers funding for charger rebates that can be deployed regionally for private installations at MUDs. At the municipal level, there are programs designed to support Level 2 charging. For example, outside of the states we benchmarked, New York City's Department of Transportation and Mayor's Office of Sustainability have partnered to expand access to public Level 2 charging, with 120 charging ports at curbside locations.[45]

Exhibit 5 Table of State and Federal Policies That Address Charger Accessibility and Performance

Enacted legislation or available incentive program
No policy exists
Proposed legislation or rulemaking in progress

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Accessibility and Affordability: LMI, DAC Funding	EV charging desert: Standards to guide EV charging investments to identify and address charging deserts							
	DCFC charging affordability for LMI: Affordable charging plans for drivers most dependent on DCFC hubs (TNC drivers, taxi drivers, and drivers without home charging)							
	MUD charging: Funding for charger installations in MUDs with low rents	■			■			
	New residential and commercial building requirement for EVSE	■	■		■			

Exhibit continued on the next page

Exhibit 5 Table of State and Federal Policies That Address Charger Accessibility and Performance, Continued

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Charger Performance	Guaranteed reliability through technical and contractual means with visibility to users to build confidence in the network							
	Standardized communication protocol and charging access; engagement with national, regional, other multistate actors to harmonize the EV charging experience							
	Standardized payment, pricing structure, and access; engagement with national, regional, other multistate actors to harmonize the EV charging experience							
	Consistent signage; engagement with national, regional, other multistate actors to harmonize the EV charging experience and labeling for EV fueling							
	Infrastructure accessibility at rural locations, in travel corridors, and at points of interest and tourist attractions							
	Accessible infrastructure for people with various cultures/languages and that doesn't require banking or a smartphone							
	Managed charging through smart and networked chargers							

Source: RMI analysis

Additional Planning Is Needed for Successful EV Adoption

The following state policy focus areas could, if addressed, enable equitable distribution and optimized financial impacts of state and private investment in making EV ownership and charging accessible and affordable for all.

Grid Management to Support EV Charging

EV charging will add significantly to total electricity demand, but the impact on electricity costs from EVs will depend on the extent to which EV charging is managed. Because EVs are often plugged in for much longer than is needed to adequately charge, EV loads can be incredibly flexible. Generators on the grid deliver electricity to the customer via a network of transmission and distribution substations and wire circuits. No matter the generation source (e.g., fossil fuels, renewables), the grid must be able to carry the electrical load safely at all times and to all places on the grid, including to the point of delivery. In certain areas, the local distribution grid has plenty of available hosting capacity to carry additional new load from EV charging. However, in other places (and most often, disproportionately impacted communities),[46] the distribution grid is already at maximum capacity, and hosting additional charging may trigger the need for utility upgrades, which can be costly and time consuming.

A recent report from the University of California, Berkeley Haas School of Business evaluated substation and circuit upgrade costs for different grid upgrade needs on a dollar-per-kilowatt basis using Pacific Gas & Electric Company's planned upgrade cost data.[47] These estimates show a wide range of varying costs for upgrades.

To ensure that EV charging infrastructure is placed in areas that both enable an equitable uptake of EVs and keep costs to a minimum, EV policy should:

- Require hosting capacity transparency so that charging stations can easily be sited where capacity exists
- Identify sections of the grid in LMI communities that need expanded capacity to support charging and prioritize those grid upgrades
- Encourage home and work charging infrastructure funded with public dollars to be managed by the utility to minimize charging during peak grid hours and to minimize grid upgrade costs

Regulatory ZEV Adoption Targets

State governments can establish regulatory requirements for systemic transportation electrification that create clear goals for all stakeholders, from state departments of transportation to the auto industry. With regulatory goals for EV sales or adoption, states have a clear objective to guide their implementation strategy, ensuring integration across initiatives. This regulatory focus must include a vision for future mobility and define the implementation role of public authorities. Critically, successful policy requires setting ZEV sales targets and providing utilities with the legal authority and obligation to plan for and support EV charging needs.

Texas and Michigan have not set ZEV adoption targets and have fewer EVs registered per capita than the other states we benchmarked. In Michigan, this is notable because the state has relatively high EV funding per capita and strong auto industry engagement, yet a low EV adoption rate. Thus, we conclude that among the states we benchmarked, higher EV registrations occur in states that not only offer sufficient funding (market stimuli) but also send EV demand signals by implementing policy standards (regulations).

Texas demonstrates an alternative pathway to greater EV adoption in which city and county governments lead initiatives to establish clear ZEV targets and funding programs. Although Texas does not have state-regulated policies in place related to EV adoption, the state's largest urban areas have implemented incentive and education programs that have promoted EV adoption and charging infrastructure installations. For example, Austin Energy, a department of the City of Austin, provides EV purchase and charger resources, including EV charger rebates.[48] Travis County, where Austin is located, has the highest number of EVs registered in the state by county.[49]

With over 80% of Texans living in urban areas,[50] this city-led approach may be an effective alternative in the absence of state leadership. However, state-level planning and execution are preferable so that residents have a consistent driver experience across the state.

Multistakeholder and Environmental Justice Community Engagement

Equitable EV adoption and charging access cannot occur without the intentional and integrated engagement of multiple stakeholders in developing state EV strategies that work in local contexts. Successful community engagement provides a means for member organizations and community-based organizations (CBOs) to represent driver voices alongside the voices of the charging industry, vehicle manufacturers, and car dealers in policy development.

Engaging affected communities in the policymaking process is essential in developing effective and equitable policies. This engagement process is commonly known as procedural equity. Historically, policymakers have failed to include community perspectives in their process, which has led to systematic injustices. Collaborating with disadvantaged and LMI communities is critical in producing equitable policies, including TE governance. Pollution and air quality affect everyone, but bad pollution and poor air quality disproportionately affect LMI people living in DACs. Any policies that aim to reduce pollution should also consider how they could be used to address historical harms to underserved communities. Engaging with communities directly is the only way to understand how to best achieve both goals.

Assessing the intended impacts of any policy will help guide policymakers in identifying which stakeholder groups to engage with and prioritize for consultation. Once the goals are identified, building a coalition of individuals and organizations that operate at the community level will help bring the right voices into the room. Finding key representatives that have the right experience can be done through direct community outreach or through nonprofits and other organizations already working on the topic in question, such as TE.

Depending on their expertise, larger nongovernmental organizations may also be able to provide support in building this coalition. For example, the Greenlining Institute, a nonprofit committed to building a just economy through new policy ideas, partnerships, and advocacy, has developed a toolkit for policymakers to help make EVs accessible to underserved communities. Greenlining's toolkit is designed to build capacity for and partner with CBOs that serve as trusted groups familiar with the priorities, concerns, and barriers of their communities.[51]

The federal government is also working to address the inequitable distribution of benefits from certain federal investments to communities that are marginalized, underserved, and overburdened by pollution. President Joe Biden signed Executive Order 14008 in 2020 to allocate a minimum of 40% of all climate-related investments to disadvantaged communities, including LMI communities, through the Justice40 Initiative. Justice40 requires covered programs to consult with and meaningfully involve community stakeholders in determining program benefits. Additionally, these programs must report data on benefits to DACs.[52]

California's Clean Energy and Pollution Reduction Act of 2015 (SB 350) calls upon the California Public Utilities Commission (CPUC) to help improve air quality and economic conditions in DACs. Accordingly, CPUC has adopted an Environmental and Social Justice Action Plan to guide its decisions and ensure involvement of all community members in developing, implementing, and enforcing CPUC environmental policies, recognizing the disproportionate impacts of environmental hazards in DACs.[53]

Policy Harmonization across States

For successful EV adoption and charging infrastructure deployment across the country, state governments will need to harmonize varying requirements within each state in a way that offers in- and out-of-state residents a clear and easy way to charge an EV. Otherwise, differences in state policies and especially in standards for EV charging may exacerbate the EV knowledge barrier. **Exhibit 6** (on the next page) presents examples of state and federal programs that promote harmonization and standardization.

Successful TE state policy implementation relies on cross-sector collaboration and investment and multistakeholder engagement. Policy features that complement and amplify the effective implementation of policies that address EV barriers vary by different application and include:

- Accessibility and affordability
- Charger performance
- Governance and incentives
- Utilities coordination
- An explicit commercial vehicle focus (class 3 and above)[ii]

Appendix B (on page 44) describes in detail each application and the related requirements that can strengthen a state's policy landscape according to the relevant feature.

ii The US Department of Transportation Federal Highway Administration applies class 3 categorization to vehicles with a gross weight vehicle weight rating — or the maximum operating weight of the vehicle — between 10,001 and 14,000 pounds and six tires or more ("Figure 21. Law Enforcement Vehicle Identification Guide," US Department of Transportation Federal Highway Administration, **https://ops.fhwa.dot.gov/publications/fhwahop10014/long_f21.htm**).

Exhibit 6 Table of State and Federal Policies That Address Coordinated Governance

Enacted legislation or available incentive program ☐ No policy exists

Proposed legislation or rulemaking in progress

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Governance and Incentives for Coordinated Policy and Best Practice Sharing	Coordinated multilevel strategy for air quality and/or public health improvements	■						
	Coordinated multilevel strategy for implementation of residential local public infrastructure							
	Networks and systems to share best practices among authorities, industry, and government							■
	EV charging needs assessment exercise initiated	■	■					

Source: RMI analysis

Given the importance of setting ZEV standards in implementing effective policy that accelerates EV adoption and charging infrastructure installation, one approach many states have used is joining multistate MOUs that require participating states to adopt similar ZEV standards. These multistate MOUs include:

- Regional Electric Vehicle Midwest MOU for Illinois, Indiana, Michigan, Minnesota, and Wisconsin to accelerate electrification of medium-duty (MD, between 10,001 and 26,000 pounds) and heavy-duty (HD, above 26,000 pounds) fleets,[54] elevate economic growth and industry leadership, and advance equity and clean environment

- Transportation and Climate Initiative for California, Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont to identify joint cooperative actions to accelerate the rate of ZEV adoption

- Northeast States for Coordinated Air Use Management (NESCAUM) for California, Connecticut, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont to identify joint cooperative actions to accelerate the rate of ZEV adoption

- Section 177 Coordinated ZEV program to follow CA ZEV and electric vehicle supply equipment (EVSE) standards in Colorado, Connecticut, Delaware, Maryland, Minnesota, New Jersey, New York, Massachusetts, Maine, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington

Although the MOUs above are notable and have provided critical demand signals to the vehicle industry, the majority of states have not established ZEV targets or standards.[55]

Standardizing EV charging installation, operation, and maintenance at a federal level can also minimize the risk of varying state standards resulting in sparse charging stations and poor customer experience at a charging station. The federal government is allocating funds to states for EV charging infrastructure through the NEVI Formula Program for highway corridors and the Infrastructure Investment and Jobs Act (IIJA). The Federal Highway Administration will establish minimum standards and requirements for projects funded under the NEVI Formula Program and certain other publicly accessible EV charging programs. The standards and requirements will apply to the installation, operation, and maintenance of EV chargers; their interoperability, traffic control, data sharing, network connectivity, pricing, and real-time availability; and accessibility through mapping applications.[56] Federal programs and standards like NEVI can mitigate disparate state-level implementation.

The federal government has also passed the IRA, which will provide up to $7,500 per vehicle in up-front incentives for lower-income individuals if the EV manufacturer meets certain critical domestic sourcing requirements for minerals and battery components.[57] These federal programs do not relieve states of their duty to direct EV infrastructure policy and investment equitably but rather serve as a framework upon which to standardize approaches and accelerate the build-out of EV charging infrastructure.

Clean Transportation for the Public

Beyond owning an EV, many other clean mobility options exist to meet transportation needs. These needs are universal regardless of mode: reliability, safety, convenience, affordability, and options. Investing in electric public transportation, including subways and electric buses, is the best way to support LMI communities and build toward a decarbonized future. Beyond providing safe and reliable public transportation, other forms of electric mobility, such as micromobility and ridesharing, can be cost-effective transit options for the public. In a separate study, RMI published recommendations for the State of Connecticut to implement micromobility, carshare, and microtransit programs. We also evaluated how to electrify each of these modes in a cost-effective way.[58]

We have also explored how the US network of thousands of state and local departments of motor vehicles (DMVs) could help align the cost of vehicle ownership with climate and equity goals by encouraging clean mobility patterns. DMVs can restructure vehicle title and annual registration fees to reflect vehicle characteristics that most affect the environment, infrastructure, and public safety. New fee structures for personal vehicles could help:[59]

- Incentivize EV purchases.
- Encourage a shift toward public transit and other alternatives to personal vehicles.
- Encourage ownership of smaller, lighter vehicles that take up less road space, are less resource intensive to manufacture, and are safer for pedestrians and cyclists.
- Incentivize less driving on a per-vehicle basis by assessing road use charges during vehicle registration renewals.
- Take an already significant revenue stream for departments of transportation and make it both bigger and more equitably sourced.

Summary of State Policy Recommendations

State policies can optimize outcomes for successful EV adoption and charging network implementation by setting enforceable ZEV sales targets, conducting locally driven EV infrastructure needs assessments, and developing EV infrastructure targets and co-investment strategies. To ensure procedural equity when designing EV policies, state governments must strive to integrate appropriate stakeholder and EJ community engagement in the policymaking process. Targeted state policies and dedicated funding for EV adoption and charging infrastructure will create more equitable EV adoption. Additional features that help states design comprehensive policy include EV and charger accessibility and affordability, charger performance requirements, strong governance, financial incentives, robust utility coordination, and an explicit commercial vehicle focus (class 3 and above).

In states where strong policy and central funding are absent, cities and counties can assume greater leadership roles to encourage EV adoption. However, this decentralized approach does not contribute to ongoing intrastate policy and standards harmonization, and the lack of a common set of targets and requirements risks diluting state efforts to encourage transportation electrification.

In addition to state policy development, federal policy is a key enabler of equitable funding of programs that support EV adoption and infrastructure (e.g., the NEVI Formula Program). Regardless of what entity administers a certain policy, individual policies must still be evaluated to determine the effectiveness of dedicated funding allocations to specific applications, such as EV buying incentives or charging infrastructure installation.

Case Study: California

Background

State agencies, such as the California Air Resources Board (CARB), California Energy Commission (CEC), and California Public Utilities Commission (CPUC), have undertaken meaningful initiatives to accelerate EV adoption, including among lower-income Californians. These California-based agencies have set goals and forecasted infrastructure needs, identified barriers to low-income household transportation electrification, and designed incentive programs for up-front rebates and financing important for lower-income households.

Goal setting: CARB'S 2020 Mobile Source Strategy (CARB MSS) describes the state's plan to achieve an 85% ZEV share of the passenger vehicle fleet and a 77% ZEV share of heavy-duty vehicles by 2045. The CARB MSS used scenario planning to identify technology trajectories and design programs to meet goals for the reduction of criteria pollutants, GHG emissions, and toxic air contaminants from mobile sources through 2050.[60] CEC's inaugural AB 2127 Electric Vehicle Charging Infrastructure Assessment report identifies California's shared private and public EV charging infrastructure goals to support state ZEV goals (5 million ZEV light-duty vehicles [LDVs] in 2030) and CARB MSS targets (7.9 million light-duty ZEVs in 2030). The report specifies the number of Level 2 and DCFC connectors required at MUDs, workplaces, and public locations, providing a clear set of goals.[61]

Low-income transportation electrification barrier identification: CARB, directed by SB 350, has also undertaken a study to identify barriers to transportation electrification among lower-income Californians. The findings guide programmatic approaches to increase access to clean transportation options for low-income households.[62] The study also emphasizes procedural equity through community-based needs assessments for clean mobility, which provides the foundation for various public investment programs in California.

Rebates and incentives: California has several programs designed to direct public investment toward air quality improvements, ZEV incentives, and ZEV infrastructure development:

- California Assembly Bill (AB) 617 is a comprehensive piece of legislation that directs investments for air quality improvements in critically impacted communities across California. These include investments to reduce pollution from stationary industrial and residential sources, as well as emissions from shipping and on-road and off-road vehicular sources.

- CVRP provides up-front ZEV purchase incentives. The program has income caps for higher-income consumers for standard rebates and offers increased rebates to households below 400% FPL.

- CC4A provides greater incentives to lower-income Californians living in disadvantaged communities to retire older, high-polluting ICE vehicles and replace them with cleaner vehicles or transit options.

- California Electric Vehicle Infrastructure Project (CALeVIP) rebates are available for property owners, EVSE manufacturers, and EVSPs primarily to install EV chargers at publicly available sites across the state. These funds can also be accessed through regional programs to install shared private chargers at MUDs, businesses, and workplaces.

- The Low Carbon Fuel Standard (LCFS) offers infrastructure and fueling credits for installing cleaner fueling stations and dispensing clean fuels, including EV charging.

Depending on the incentive program, car buyers may not receive incentives at the time of purchase; instead, the state refunds buyers after verifying proof of purchase. For LMI communities, this delay can create a barrier to using the incentives because many LMI households do not have access to the extra cash for an up-front purchase.

Sufficient Charging Infrastructure Is Critical for California to Meet Its EV Targets

Implementing CARB's 2020 Mobile Source Strategy will create a tenfold increase in electric LDVs and a hundredfold increase in electric heavy-duty vehicles (HDVs) by 2030. We estimate that achieving these targets for 2030 could help avoid approximately 500 deaths and almost $6 billion in public health costs.[63] **To support the CARB MSS goal of 7.9 million light-duty ZEVs on the road by 2030 shown in Exhibit 7, California needs 1.2 million public chargers by 2030[64] — 15 times the 79,000 chargers to date.[65]**

For California to achieve these goals, MUD residents will need convenient charging access. CARB's 2018 study on low-income barriers to transportation electrification concluded that EVs were not a feasible option for most LMI individuals, with lack of convenient charging at home, work, or public locations being an important reason. Public investments in charging infrastructure will remain critical in order to encourage ongoing market experimentation, growth, and maturation. For example, CEC's infrastructure investment program, CALeVIP, is oversubscribed by as much as hundreds of millions of dollars and therefore will require additional investment to support growth of an adequate public network.

Exhibit 7 CARB MSS ZEV Targets for California

		2022	2030 Projections Based on the CARB MSS
Light-duty vehicles	**ICE vehicles on road**	29 million	28 million
	ZEVs on road	1 million	7.9 million
	ZEV % of LDV stock	3.4%	28%
Heavy-duty vehicles	**ICE vehicles on road**	700,000	850,000
	ZEVs on road	1,675	200,000
	ZEV % of HDV stock	0.2%	23%

Source: CEC, **https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle**; Alliance for Automotive Innovation, **https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard**; CARB, **https://ww2.arb.ca.gov/sites/default/files/2021-09/Proposed_2020_Mobile_Source_Strategy.pdf**

Spotlight on a Key Policy Proposal: California Clean Cars and Clean Air Act (Proposition 30)

Prop. 30, a measure on the November 2022 California state election ballot, would introduce funding capable of installing over 90% of the MUD chargers needed and about 25% of the public fast chargers needed in the state. Based on projected state funding availability, Prop. 30 could potentially allocate four times more dedicated funding for EV purchase incentives for LMI community members than available in the existing state budget through 2024. This would be implemented through a new $2.4 billion annual fund for clean mobility infrastructure and affordability — for low income and disadvantaged community members — that CARB and CEC would have authority to distribute. Prop. 30 presents a timely opportunity to evaluate proposed policy impacts and funding allocation efficiency in a state with established regulatory and market goals for TE.

Prop. 30 Would Direct Funding to LMI Communities to Accelerate the EV Transition

In November 2022, Californians will vote on Prop. 30, the Clean Cars and Clean Air Act. Prop. 30 would increase both EV purchase incentives and charging infrastructure investment. To pay for the investments, Prop. 30 adds a 1.75% income tax on California annual incomes over $2 million. The California Secretary of State estimates the tax will raise $3 billion to $4.5 billion per year.[66] Specifically, Prop. 30 allocates the revenue into three new funds:

- 35% to a ZEV Infrastructure Investment Plan Fund, with half directed to lower-income Californians
- 45% to a ZEV and Clean Mobility Affordability Fund, with half directed to lower-income Californians
- 20% to a Wildfire GHG Emissions Reduction Fund

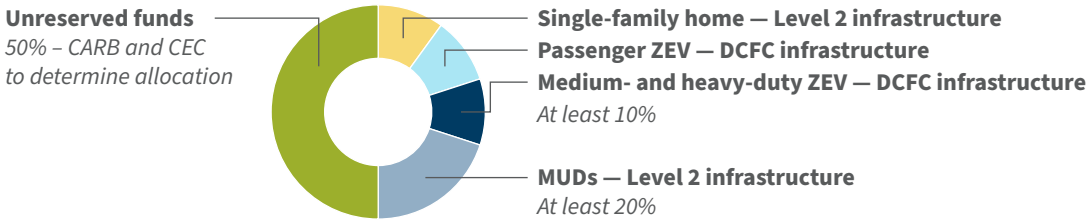
With managed EV charging and grid strengthening, Prop. 30 has the potential to close the EV affordability gap for LMI community members and to increase accessibility to charging infrastructure in areas most critical for LMI community members, such as MUD and public fast charger hubs.

A scenario for analyzing the impact of Prop. 30 on EVs

Prop. 30 gives significant flexibility to CARB and CEC to disburse funds in a way that will achieve the law's goals while also being able to adjust to market conditions as they evolve over the next 10 years. Below, we evaluate the potential for the policy to accelerate EV adoption through up-front incentives and infrastructure investments. We chose to illustrate this by defining a scenario that directs funds toward LDV purchase incentives and EV charging infrastructure required to make EVs a feasible option for lower-income Californians.

To estimate Prop. 30's EV infrastructure impact, we considered the minimum allocation Prop. 30 requires for MUD charging, single-family home charging, and fast chargers for passenger ZEVs or light-duty ZEVs.

Exhibit 8 Prop. 30 ZEV Infrastructure Investment Funding Allocation



Source: Office of the Attorney General, **https://oag.ca.gov/system/files/initiatives/pdfs/21-0037A1%20%28Electric%20Vehicle%20Funding%20%29.pdf**

This constitutes only 40% of the ZEV infrastructure fund available, leaving an additional 10% for medium- and heavy-duty DCFC infrastructure and 50% to be allocated by CARB and CEC. **Exhibit 8** illustrates the investment distribution for Prop. 30 ZEV infrastructure funds.

To understand Prop. 30's potential to transform EV adoption among LMI communities, we modeled a $3,000 purchase incentive from Prop. 30 funding supplemented by the federal IRA credit as the amount needed to make an EV purchase viable by closing the TCO gap between a new EV and a used ICE car, as shown based on estimates in **Exhibit 3** (on page 11).

The Secretary of State estimates a minimum of $3 billion in annual revenue from Prop. 30, which means a total of $8.1 billion would be available as funding for ZEVs and clean mobility from 2025 through 2030. The Prop. 30 ZEV and Clean Mobility Sub-Fund could be used to supplement the CC4A funds or be distributed through a similarly designed program that aims to retire older, higher polluting ICE vehicles and provide high incentives for LMI individuals to purchase EVs. In the absence of any definitive guideline, we assumed 50% of the ZEV and Clean Mobility Sub-Fund would be allocated toward LMI purchase incentives. **This translates to $675 million in annual funding from Prop. 30 to CC4A or similar programs.**

Exhibit 9 Existing Funds Directed at Light-Duty EV Incentives and Infrastructure Development

Program	Funding to Date	Number of Projects Funded	Multiyear Funding Allocated
CALeVIP	$147.7 million	1,775 DCFC connectors; 7,295 L2 connectors	$314 million (2021–24)
CVRP	$1,107 million	478,364 ZEVs	$525 million (2021–24)
CC4A	$108 million	13,335 retired ICE vehicles; 8,657 ZEVs purchased	$510 million (2021–23)

Source: CEC & CSE, **https://calevip.org/rebate-statistics**; CEC, **https://www.energy.ca.gov/publications/2021/2021-2023-investment-plan-update-clean-transportation-program**; CSE, **https://cleanvehiclerebate.org/en/rebate-statistics**; CARB, **https://ww2.arb.ca.gov/news/carb-approves-15-billion-investment-largest-date-clean-cars-trucks-mobility-options**; CARB, **https://ww2.arb.ca.gov/resources/documents/efmp-statistics-tables-2021q4**; CARB, **https://ww2.arb.ca.gov/sites/default/files/2022-07/fy2223_draft_funding_plan_accessible.pdf**

Currently, the California state budget allocates nearly $3.9 billion for a three-year ZEV acceleration package to build on existing investments. The specific allocations to public light-duty EV infrastructure and purchase incentives are shown in **Exhibit 9**. For our assessment of Prop. 30 impacts, we considered only confirmed funding sources based on the current timing for fund distribution and administration. In the case of Prop. 30, the earliest implementation year would be 2025, and funding would be guaranteed until the bill sunsets or California achieves its GHG reduction targets.

Prop. 30 impacts on EV charging infrastructure

Exhibit 10 shows the number of chargers required by 2030 by type of charging based on the AB 2127 Electric Vehicle Charging Infrastructure Assessment report to support 7.9 million ZEVs.[67] We estimated the hardware and installation costs per 7.7 kW Level 2 and 150 kW DCFC based on existing literature references,[68] and compared them against minimum funding guidelines in the Prop. 30 text. We present the results of our cost assessments and the percentage of total costs Prop. 30 could cover in **Exhibit 10**. Electrical distribution grid upgrade costs can vary widely depending upon location and EV charging load management; we estimate this range to be between $0 and $166 billion. A detailed discussion of these estimates is provided in **Appendix D** (on page 49).

Exhibit 10 Portion of Potential LDV EV Charging Infrastructure Costs Covered Under Prop. 30

	Existing Number of Chargers in 2022	PROJECTED VALUES		Min. Funds Possible from Prop. 30, 2025–30	Portion of Infrastructure Costs Covered by Prop. 30
		Number of Chargers Needed in 2030	Hardware, Installation Costs		
Single-Family Home	902,556	5,530,000	$9.72 billion	$0.63 billion	6%
MUDs	71,236	329,828	$2.69 billion	$1.26 billion	47%
Workplace		327,012	$2.66 billion	Not specified	Not specified
Public		470,015	$3.25 billion	Not specified	Not specified
Passenger ZEV DCFC	7,158	30,572	$3.25 billion	$0.63 billion	19%
Unallocated Funds	–	–	–	$3.15 billion	–
Total	–	–	$21.57 billion	$5.67 billion	26%

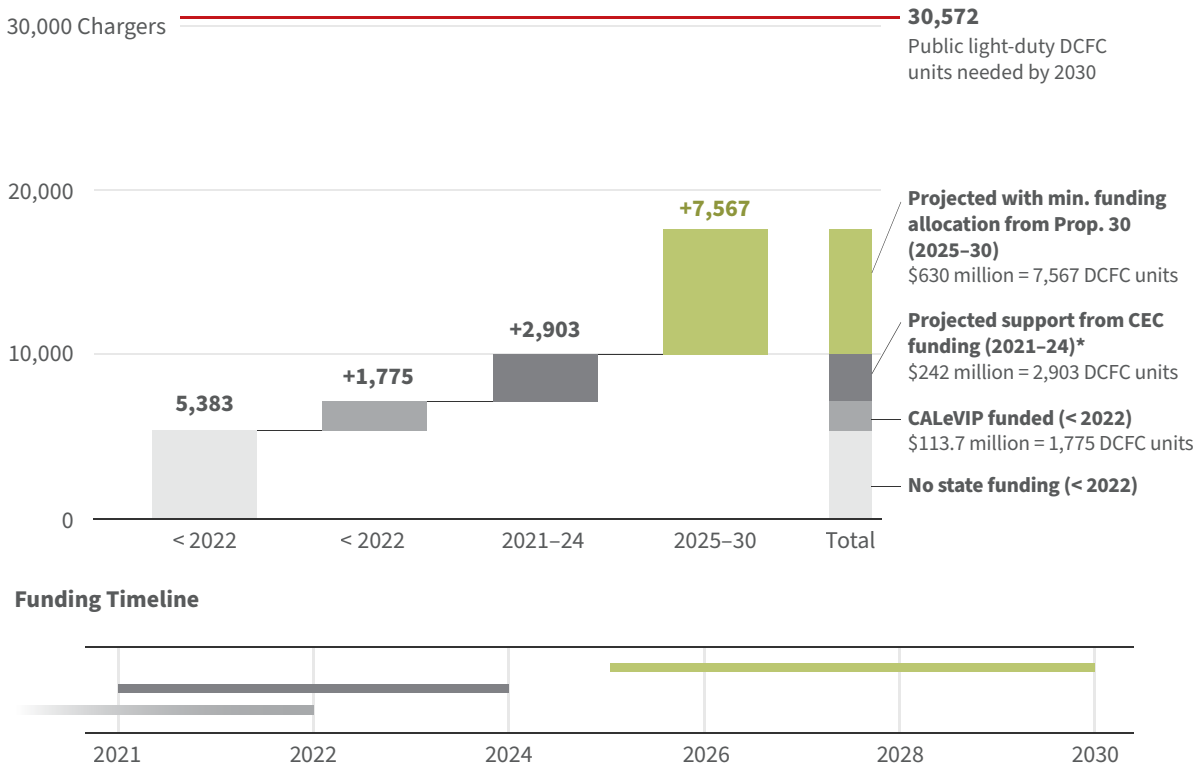
Note: The number of single-family home chargers is approximated from the number of light-duty vehicles. We assume 90% of EV owners today and 70% of EV owners in 2030 rely on home charging. Prop. 30 funding and infrastructure cost estimates reflect the minimum funds reserved in the bill. Depending on the funding allocation determined by CARB and CEC, the impacts might be higher than estimated here. Another 10% of Prop. 30 ZEV Infrastructure Investment Funding is reserved for medium- and heavy-duty ZEV charging, equivalent to an additional $0.63 billion. Detail of hardware and install cost per EVSE can be found in **Appendix D**

Source: CEC, **https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/electric-vehicle**; CEC, **https://www.energy.ca.gov/programs-and-topics/programs/electric-vehicle-charging-infrastructure-assessment-ab-2127**; RMI analysis

The state's current EV charging incentive program, CALeVIP, funds 50% of project costs for Level 2 chargers and 60% of project costs for DCFCs.[69] If Prop. 30 funds are used to provide incentives similarly to CALeVIP and cover partial costs, the program has the potential to support 94% of needed MUD chargers and 25% of needed light-duty DCFCs in the state. This would address a critical gap in EV charging accessibility for LMI households. It would fund nearly 2.5 times more light-duty DCFCs and 17 times more Level 2 chargers than what is possible with the currently available CEC funding. Notably, our estimates represent a minimum threshold: it is possible that CARB and CEC would allocate additional Prop. 30 revenue to Level 2 and DCFC charging.

Exhibit 11 and **Exhibit 12** (on the next page) illustrate the forecasted impacts of Prop. 30 on public DCFC charging and private or public Level 2 charging installations in the state, respectively, compared with installations from CALeVIP funding, based on our assumptions. The number of chargers that current CEC funding can support plus the baseline of existing chargers funded from CALeVIP cover only 15% of the total DCFCs needed. Prop. 30 would cover an additional 25% of total DCFC needed if allocated in the same manner as CALeVIP. Similarly, the current baseline of Level 2 chargers for private or public charging plus any added chargers from current CEC budget allocations would cover only 2% of total needed chargers. Prop. 30 would cover an additional 27% of the total charging units needed if funds are allocated in the same manner as CALeVIP.

Exhibit 11 Number of Public Light-Duty DCFCs by 2030

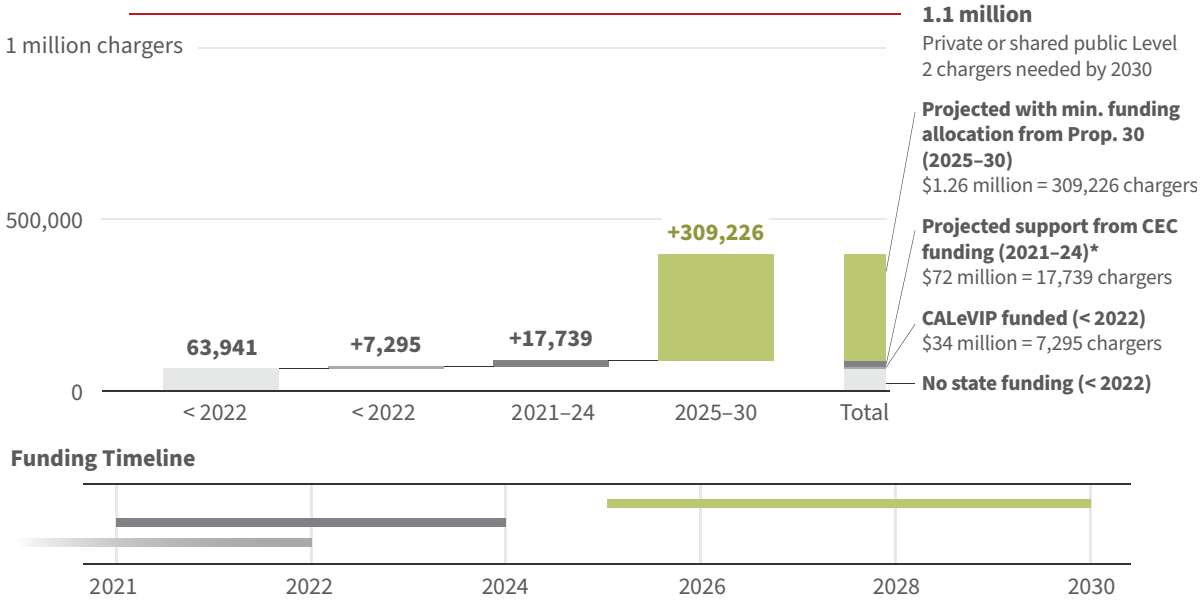


*CA state funds toward EV charging infrastructure have been allocated only until 2024. Future allocation from state budget may be possible.

Note: Detailed analysis for number of DCFC chargers projected in 2030 is available in **Appendix D**.

Source: CEC, **https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/electric-vehicle**; CSE, **https://calevip.org/rebate-statistics**; CEC, **https://www.energy.ca.gov/publications/2021/2021-2023-investment-plan-update-clean-transportation-program**; CA SOS, **https://www.sos.ca.gov/administration/news-releases-and-advisories/2022-news-releases-and-advisories/proposition-numbers**; RMI analysis

Exhibit 12 Number of Level 2 Shared Private or Public Chargers Today, and Projected Increase from State Funding by 2030



*CA state funds toward EV charging infrastructure have been allocated only until 2024. Future allocation from state budget may be possible.

Note: Detailed analysis for number of public Level 2 chargers projected in 2030 is available in **Appendix D**.

Source: CEC, **https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/electric-vehicle**; CSE, **https://calevip.org/rebate-statistics**; CEC, **https://www.energy.ca.gov/publications/2021/2021-2023-investment-plan-update-clean-transportation-program**; CA SOS, **https://www.sos.ca.gov/administration/news-releases-and-advisories/2022-news-releases-and-advisories/proposition-numbers**; RMI analysis

The addition of such a large amount of utility and EV charging infrastructure in California has the potential to create thousands of well-paying, skilled, local, and lasting jobs.

Based on modeling from the Energy Policy Simulator, the investments in EVs and chargers from Prop. 30 would result in at least 10,321 net new "job-years" in California.

Job-years are the standard for reporting jobs modeling. Job-years are used to evaluate this policy rather than the absolute number of jobs so that short-term construction jobs are not overcounted and long-term maintenance jobs are not undercounted.

Jobs associated with EV and charger manufacturing and construction tend to be high-paying jobs, often supported by unions. Beyond the jobs directly associated with EVs and chargers, this policy will result in even more indirect jobs to support the electrical and cloud infrastructure required to support and maintain these new devices. Additionally, these new manufacturing sites may help bring other indirect jobs into the state to support increased demand for goods and services in those communities.

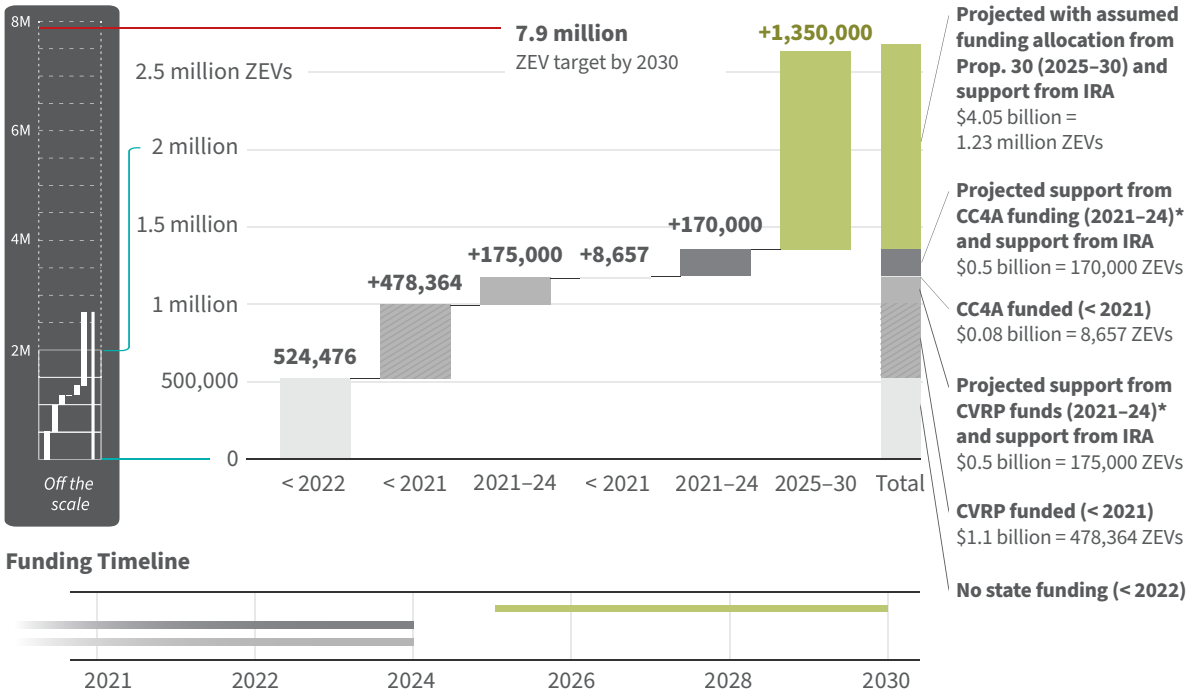
Investment in energy infrastructure is a critical piece to building strong and sustaining communities, and jobs associated with that investment can help economically rebuild communities that have been harmed by historically inequitable practices.

Prop. 30 impacts on ZEV adoption among LMI communities

LMI communities often experience a disproportionately large energy burden (when household energy expenditures exceed a certain portion of household income), including both electricity and transportation. When a car owner switches from an ICE vehicle to an EV, the elimination of gasoline or diesel costs more than compensates for increased electricity costs, partly because EVs are much more efficient than ICE vehicles.[70] Therefore, the total energy burden for EV owners will decrease and result in overall lower TCOs. Over five years, the TCO of a new EV is approximately $1,000 less than the TCO of a new ICE vehicle. Despite this cost savings, a study from UCLA found that most LMI drivers are purchasing used ICE vehicles.[71] We compared five-year TCOs between new EVs and used ICE vehicles to understand how much incentive is required to achieve TCO parity. As described earlier in this report, based on a five-year TCO comparison between a new EV and a used ICE vehicle, we estimate that an incentive of approximately $10,500 could close the price gap for LMI individuals.

If 50% of Prop. 30 ZEV and Clean Mobility Sub-Fund dollars (approximately $4 billion from 2025 to 2030) were made available as $3,000 EV purchase incentives in addition to up to $7,500 made available through IRA, it could result in 1.35 million additional EVs for LMI drivers. This number is in addition to allocated state program funds from CVRP ($525 million, 175,000 EVs) and CC4A ($510 million, 170,000 EVs), as shown in **Exhibit 13**.

Exhibit 13 Number of ZEVs Today, and Projected Increase from Funding by 2030



*CA state funding for ZEV incentives has been allocated only until 2024. Additional allocation from future state budget may be possible.

Note: Detailed analysis for impact of additional funding on ZEV adoption is available in **Appendix D**.

Source: CSE, **https://cleanvehiclerebate.org/en/rebate-statistics**; CARB, **https://ww2.arb.ca.gov/news/carb-approves-15-billion-investment-largest-date-clean-cars-trucks-mobility-options**; CARB, **https://ww2.arb.ca.gov/sites/default/files/2022-07/fy2223_draft_funding_plan_accessible.pdf**; CARB, **https://ww2.arb.ca.gov/sites/default/files/2022-04/EFMP%20and%20CC4A%20Participating%20data_through_2021_Q4_1.xlsx**; CA SOS, **https://www.sos.ca.gov/administration/news-releases-and-advisories/2022-news-releases-and-advisories/proposition-numbers**; RMI Analysis

Additional Considerations for Prop. 30

To evaluate the impact of funds available from Prop. 30, our California case study considered a specific scenario focused primarily on fund allocation toward light-duty EV adoption among LMI households. However, the scope of the bill is not limited to light-duty vehicles and associated infrastructure, nor does it define how the funds must be allocated. Prop. 30 covers multiple facets of transportation electrification in the state. Accordingly, Prop. 30 presents additional opportunities:

1. **Alignment with California state policies and regulations:** The funds from Prop. 30 can be used for personal EVs, micromobility, and public transit, as well as medium- and heavy-duty vehicle infrastructure. Prop. 30 only stipulates that a minimum of 50% of the total ZEV funds are directed toward lower-income Californians. The bill authorizes CARB and CEC to determine fund allocation for various clean mobility and infrastructure programs. This would allow the funds to be used in a manner consistent with California's focus on procedural equity through the CARB and CEC programs.

2. **Harmonization with federal policies:** Funds from Prop. 30 can complement the funds directed by the federal government to address outstanding gaps. For instance, neither NEVI nor IIJA funds are explicitly directed exclusively toward infrastructure investment for EV charging deserts in urban areas, although $2.5 billion in discretionary IIJA funding is generally designated for underserved urban and rural communities (and we previously demonstrated a gap in policy to eliminate EV charging deserts). When it comes to purchasing incentives, our analysis indicates the need for greater incentives than the maximum $7,500 possible with IRA to enable LMI individuals to buy an EV. Additionally, Prop. 30 allocates half of ZEV funding to benefit LMI communities, which is aligned with the Justice40 directive for federal investments.

3. **DAC air quality impacts, including MD and HD truck emissions mitigation:** LMI communities and communities of color are disproportionately affected by air pollution that puts them at higher risk for illness.[72] AB 617 aims to reduce air pollution and associated health impacts in highly impacted communities. Prop. 30 funding can also be used for air quality improvement projects in conjunction with AB 617 and other air quality improvement policies.

4. **Electric utility infrastructure considerations:** Electric distribution upgrade costs vary by location and magnitude of electric load. To ensure that EV charging infrastructure is placed in areas that both enable equitable EV adoption and keep costs to a minimum, those implementing EV policy should incorporate equity, grid hosting capacity, and managed charging into their planning analyses and considerations. Prop. 30 funds can also be directed to cover utility interconnection costs, if needed.

Conclusion

The United States is at a crossroads for implementing timely initiatives that will help drive mass adoption of EVs while ensuring that all Americans have a comparable, smooth, and affordable experience driving and charging their vehicles at home and across state lines. State policymakers play a critical role in accelerating EV adoption in a way that benefits all residents equitably while reducing greenhouse gas emissions from transportation, the highest-emitting sector of the US economy.

In California, the ballot measure known as Prop. 30 could serve as a landmark state policy by ensuring that half of the mobility-allocated funds benefit LMI community members. Evaluating new legislative opportunities like Prop. 30 reveals areas to alleviate national financial, educational, and infrastructure challenges often associated with EVs. Enhanced stakeholder engagement on the role EVs can play in improving air quality, providing jobs, and lowering residents' transportation costs are key enablers for increasing EV uptake and charger installations.

The barriers to owning an EV among US consumers may be well known, but methods to quantify and address them are not so obvious. States can take numerous approaches to eliminating those barriers. We have identified the following policy solutions:

- Reducing up-front EV costs through incentives
- Educating residents about EVs to relieve range anxiety
- Offering sufficient public charging, especially along highway corridors
- Focusing on charging infrastructure at home and work

EV adoption and charging must be made affordable and accessible to all residents. Studies show that prioritizing public fast charging and installing charging infrastructure at MUDs can improve accessibility for LMI community members, and states can work to make charging prices affordable. Implementation of these state policy programs are guaranteed greater success by upgrading and managing the grid, setting ZEV sales targets, engaging community stakeholders to inform and codesign programs, and coordinating policies across states for a more consistent driving and charging experience.

Although not immediately apparent, offering clean mobility solutions that do not rely exclusively on EVs also leads to a more comprehensive and holistic approach to establishing effective transportation networks. All policies active at the state level stand to benefit by aligning with or complementing federal EV adoption and charging infrastructure priorities, including mirroring the value system of Justice40 to dedicate a significant portion of transportation investment to disadvantaged communities.

No matter how strong state requirements for ZEV adoption currently are, every state can do more to catalyze transportation electrification and mitigate carbon emissions. State policies can open the door to support critical focus areas by distributing funds that benefit people of all income levels and increase the proliferation of EVs on highways and within residential neighborhoods across the United States.

Appendices

Appendix A — State Policies That Address Identified Barriers to an EV Transition

Exhibit 14 Table of State Policy Features That Promote EV Adoption with Links to References

Enacted legislation or available incentive program

Proposed legislation or rulemaking in progress

No policy exists

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels, Including Links to Specific Policies						
		CA	OR	MI	NJ	TX	MOU	US
Regulatory Activity to Set EV Adoption Targets	Government focus on GHG emissions reduction across different sectors	1	12	18	21			27 28
	Vision for future mobility, defined roles for electric mobility, and public authority in implementation (includes ZEV sales targets)	2 3	13	19	22			29
	Utilities legally authorized and obligated to plan for and support EV charging needs	4	14 15		22			30
Infrastructure Needs Assessments and Targets	Locally adapted metrics that consider housing statistics, vehicle sales, and average miles driven	5	16					31*
Infrastructure Investment Strategy	Co-investment strategy by private sector, including automotive industry and labor unions, energy sector, and EV charging infrastructure players like EVSPs and site hosts	6 7 8 9	17	20**			24 25 26**	30 32
Stakeholder and EJ Community Engagement	Provisions for private member organizations or CBOs to represent driver voices in policy development alongside voices of charger industry and vehicle manufacturers and sellers	10 11	16		23*			33

Note: Numbers in the table are linked to and reference the following list of policies.
Although Texas does not have state-regulated policies related to EV adoption, the state's largest urban areas have implemented incentive and education programs that have promoted EV adoption and charging infrastructure installations. For example, Austin Energy, a department of the City of Austin, provides EV purchase and charger resources, including EV charger rebates (**https://ev.austinenergy.com/**). Travis County, where Austin is located, has the highest number of EVs registered in the state by county.

* Targets set but not yet enforceable

** Multiple MOUs exist: Regional Electric Vehicle Midwest MOU (MI), Section 177 Coordinated ZEV program to follow CA ZEV and Electric Vehicle Supply Equipment (EVSE) standards (NJ), Transportation and Climate Initiative (NJ), Northeast States for Coordinated Air Use Management (NJ), West Coast Electric Highway (CA, OR)

Exhibit continued on the next page

California

1. AB 32 California Global Warming Solutions Act — **https://ww2.arb.ca.gov/resources/fact-sheets/ab-32-global-warming-solutions-act-2006**

2. EO N-79-20 Zero Emission by 2035 — **https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf**

3. Individual Agency ZEV Action Plan — **https://business.ca.gov/industries/zero-emission-vehicles/zev-strategy/agency-zev-action-plans**/

4. AB 841 Transportation Electrification Utility Regulations — **https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201920200AB841**

5. AB 2127 Infrastructure Needs Assessment — **https://www.energy.ca.gov/programs-and-topics/programs/electric-vehicle-charging-infrastructure-assessment-ab-2127**

6. SB 1014 Clean Miles Standard — **https://ww2.arb.ca.gov/our-work/programs/clean-miles-standard/about**

7. GFO-21-605 Zero-Emission Transportation Manufacturing — **https://www.grants.ca.gov/grants/gfo-21-605-zero-emission-transportation-manufacturing/**

8. ZEV Credits from Advanced Clean Cars Program — **https://ww2.arb.ca.gov/our-work/programs/zero-emission-vehicle-program/about**

9. Low Carbon Fuel Standard (LCFS) Credit Program — **https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/lcfs-credit-generation-opportunities**

10. SB 350 Accessible Transportation Options — **https://ww2.arb.ca.gov/our-work/programs/accessible-clean-transportation-options-sb-350**

11. California Public Utilities Commission Environmental and Social Justice Action Plan — **https://www.cpuc.ca.gov/news-and-updates/newsroom/environmental-and-social-justice-action-plan**

Oregon

12. EO 20-04 GHG Emissions Reduction Goals — **https://www.oregon.gov/gov/Documents/executive_orders/eo_20-04.pdf**

13. SB 1044 ZEV Sales Targets — **https://olis.oregonlegislature.gov/liz/2019R1/Downloads/MeasureDocument/SB1044/Enrolled**

Exhibit continued on the next page

14. EO 2017-21 Transportation Electrification Acceleration — **https://www.oregon.gov/gov/eo/eo_17-21.pdf**

15. SB 1547 Transportation Electrification Program — **https://olis.oregonlegislature.gov/liz/2016R1/Downloads/MeasureDocument/SB1547/Enrolled**

16. Transportation Electrification Infrastructure Assessment Needs Analysis (TEINA) — **https://www.oregon.gov/odot/Programs/Pages/TEINA.aspx**

17. EO 2017-21 Awards for Business Support of EV Adoption — **https://www.oregon.gov/gov/Documents/executive_orders/eo_17-21.pdf**

Michigan

18. Executive Directive 2020-10 Building a Carbon-Neutral Michigan — **https://www.michigan.gov/whitmer/news/state-orders-and-directives/2020/09/23/executive-directive-2020-10**

19. Executive Order 2020-2 Creating the Michigan Council on Future Mobility and Electrification — **https://www.michigan.gov/whitmer/appointments/oma/all/2/michigan-council-on-future-mobility-and-electrification**

20. MOU for New Michigan Central Innovation District Between State of Michigan, City of Detroit, and Ford — **https://www.michiganbusiness.org/press-releases/2022/02/whitmer-joins-new-michigan-central-innovation-announcement/**

New Jersey

21. 80x50 Global Warming Response Act — **https://www.nj.gov/dep/climatechange/docs/nj-gwra-80x50-report-2020.pdf#page=5**

22. New Jersey Statutes 48:25-3 EV and Electric Vehicle Supply Equipment Targets — **https://pub.njleg.gov/bills/2018/S2500/2252_U2.PDF**

23. Provisions in Energy Master Plan* — **https://www.nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf**

Multistate MOU

24. West Coast Electric Highway Public Private Partnership — **http://www.westcoastgreenhighway.com/electrichighway.htm**

25. Northeast States for Coordinated Air Use Management (NESCAUM) Multistate ZEV Action Plan — **https://www.nescaum.org/documents/multi-state-zev-action-plan.pdf**

Exhibit continued on the next page

26. Regional Electric Vehicle Midwest —
https://www.michigan.gov/-/media/Project/Websites/leo/REV_Midwest_MOU_master.pdf?rev=6dd781b5a4eb4551b3b3a5b875d67fb9

Federal

27. EO 14008 Tackling the Climate Crisis at Home and Abroad —
https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad

28. US Environmental Protection Agency GHG Emissions Reduction Standards —
https://www.epa.gov/regulations-emissions-vehicles-and-engines/regulations-greenhouse-gas-emissions-passenger-cars-and

29. National Electric Vehicle Infrastructure Plan (NEVI) —
https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/resources/nprm_evcharging_unofficial.pdf

30. HR 3684 Infrastructure Investment and Jobs Act (IIJA) Utility EV promotion measures —
https://www.congress.gov/bill/117th-congress/house-bill/3684/text

31. Electric Vehicle Infrastructure (EVI) Pro Lite Tool —
https://afdc.energy.gov/evi-pro-lite

32. Infrastructure Investment and Jobs Act (IIJA) EV Working Group —
https://driveelectric.gov/files/ev-working-group-charter.pdf

33. Justice40 Initiative —
https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf

Exhibit continued on the next page

Enacted legislation or available incentive program ☐ No policy exists

Proposed legislation or rulemaking in progress

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Accessibility and Affordability: LMI, DAC Funding	Targets for a just transition through additional funds for LMI, DAC EV adoption and infrastructure and clean mobility through community-based needs assessments, engaging community in development process and metrics to measure and analyze results	**34**	**39**		**23***			**33**
	EV charging desert: Standards to guide EV charging investments to identify and address charging deserts							
	DCFC charging affordability for LMI: Affordable charging plans for drivers most dependent on DCFC hubs (TNC drivers, taxi drivers, and drivers without home charging)							
	MUD charging: Funding for charger installations in MUDs with low rents	**35**			**43** **44**			
	New residential and commercial building requirement for EVSE	**36** **37** **38**	**40** **41** **42**		**45** **46** **47** **48**			

Note: Numbers in the table are linked to and reference the following list of policies.

* Targets set but not yet enforceable

California

34. Equity Engagement and Implementation Plan — **https://static.business.ca.gov/wp-content/uploads/2021/12/Equity_Engagement_Plan_12-15-21_FINAL.pdf**

35. California Electric Vehicle Infrastructure Project (CALeVIP) Funding — **https://calevip.org/find-project**

36. EV Charging Station Policies for Multiunit Dwellings — **https://afdc.energy.gov/laws/9579**

37. Mandatory EV Charging Station Building Standards — **https://afdc.energy.gov/laws/11068**

Exhibit continued on the next page

38. SB 1482 Building Standards for EV Infrastructure in MUDs (Bill in CA Assembly on August 15, 2022) — **https://leginfo.legislature.ca.gov/faces/billStatusClient.xhtml?bill_id=202120220SB1482**

Oregon

39. Provisions in HB 2165 Transportation Electrification — **https://olis.oregonlegislature.gov/liz/2021R1/Downloads/MeasureDocument/HB2165/B-Engrossed**

40. HB 2180 (2021) EV Charging Station Building Standards for New Construction — **https://afdc.energy.gov/laws/11941**

41. Oregon Revised Statutes 90.462 Right to Charge at Rental Properties — **https://afdc.energy.gov/laws/11876**

42. Oregon Revised Statutes 94.762 and 100.627 Right to Charge for Associations — **https://afdc.energy.gov/laws/11065**

New Jersey

23. Provisions in Energy Master Plan* — **https://www.nj.gov/emp/docs/pdf/2020_NJBPU_EMP.pdf**

43. MUD Charger Incentive — **https://njcleanenergy.com/ev**

44. BPU Docket No. QO20050357 (Minimum Requirements for Publicly Accessible Light-Duty Vehicle Public Charging) — **https://www.nj.gov/bpu/pdf/boardorders/2020/20200923/8F%20-%20ORDER%20Electric%20Vehicle%20MFRs.pdf**

45. New Jersey Statutes 45:22A-43 Right to Charge at Condominiums — **https://afdc.energy.gov/laws/12569**

46. SB 3223 EV Charging Make Ready Requirements at MUDs — **https://afdc.energy.gov/laws/12680**

47. SB 3223 EV Charging Make Ready Requirements for New Developments — **https://afdc.energy.gov/laws/12679**

48. New Jersey Statutes 52:27D-141.11 EV Charging Installation Policies at Single Family Homes — **https://afdc.energy.gov/laws/12570**

Federal

33. Justice40 Initiative — **https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf**

Exhibit continued on the next page

Enacted legislation or available incentive program

Proposed legislation or rulemaking in progress

No policy exists

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Charger Performance	Guaranteed reliability through technical and contractual means with visibility to users to build confidence in the network							29
	Standardized communication protocol and charging access; engagement with national, regional, other multistate actors to harmonize the EV charging experience	49						30
	Standardized payment, pricing structure, and access; engagement with national, regional, other multistate actors to harmonize the EV charging experience	50	53					29
	Consistent signage; engagement with national, regional, other multistate actors to harmonize the EV charging experience and labeling for EV fueling	51	54**		55		25**	
	Infrastructure accessibility at rural locations, in travel corridors, and at points of interest and tourist attractions	24** 52	24**				24**	29
	Accessible infrastructure for people with various cultures/languages and that doesn't require banking or a smartphone							
	Managed charging through smart and networked chargers							

Note: Numbers in the table are linked to and reference the following list of policies.

* Targets set but not yet enforceable

** Multiple MOUs exist: Regional Vehicle Midwest MOU (MI), Section 177 Coordinated ZEV program to follow CA ZEV and Electric Vehicle Supply Equipment (EVSE) standards (NJ), Transportation and Climate Initiative (NJ), Northeast States for Coordinated Air Use Management (NJ), West Coast Electric Highway (CA, OR)

California

24. West Coast Electric Highway — **http://www.westcoastgreenhighway.com/electrichighway.htm**

49. SB 454 EV Charging Stations Open Access — **https://ww2.arb.ca.gov/our-work/programs/electric-vehicle-supply-equipment-evse-standards/about**

Exhibit continued on the next page

50. California Code of Regulations Title 4, Sections 4001 and 4002.11 EV Charging Station Billing Requirements — **https://afdc.energy.gov/laws/12511**

51. Caltrans ZEV Signage — **https://dot.ca.gov/programs/safety-programs/ev-signs**

52. AB 1083 EV Charging Infrastructure at State Parks and Beaches — **https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB1083**

Oregon

24. West Coast Electric Highway — **http://www.westcoastgreenhighway.com/electrichighway.htm**

53. Public Utility Commission of Oregon Order No. 12-013, 2012 EV Charging Rate Regulations — **https://afdc.energy.gov/laws/10072**

54. West Coast Electric Highway EV Signs — **http://www.westcoastgreenhighway.com/evsigns.htm**

New Jersey

55. Department of Environmental Protection Guidelines for Signage and Markings — **https://nj.gov/dep/drivegreen/accessibilityguidelines.pdf**

Multistate MOU

24. West Coast Electric Highway — **http://www.westcoastgreenhighway.com/electrichighway.htm**

25. Northeast States for Coordinated Air Use Management (NESCAUM) Multistate ZEV Action Plan — **https://www.nescaum.org/documents/multi-state-zev-action-plan.pdf**

Federal

29. National Electric Vehicle infrastructure Plan (NEVI) — **https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/resources/nprm_evcharging_unofficial.pdf**

30. HR 3684 Infrastructure Investment and Jobs Act (IIJA) Utility EV promotion measures — **https://www.congress.gov/bill/117th-congress/house-bill/3684/text**

Exhibit continued on the next page

Enacted legislation or available incentive program

Proposed legislation or rulemaking in progress

No policy exists

Policy Focus Area	Description	Selected States, Multistate MOU, or Federal Policy Benchmarking Levels						
		CA	OR	MI	NJ	TX	MOU	US
Governance and Incentives: Vehicle Rebates	Up-front cost-reduction incentives for vehicles and chargers	**56**	**57**	**58**	**59**	**60**		**61**
Governance and Incentives for Coordinated Policy and Best Practice Sharing	Coordinated multilevel strategy for air quality and/or public health improvements	**11**						
	Coordinated multilevel strategy for implementation of residential local public infrastructure							
	Networks and systems to share best practices among authorities, industry, and government						**24****	**62**
	EV charging needs assessment exercise initiated	**5**	**16**					

Note: Numbers in the table are linked to and reference the following list of policies.

** Multiple MOUs exist: Regional Electric Vehicle Midwest MOU (MI), Section 177 Coordinated ZEV program to follow CA ZEV and Electric Vehicle Supply Equipment (EVSE) standards (NJ), Transportation and Climate Initiative (NJ), Northeast States for Coordinated Air Use Management (NJ), West Coast Electric Highway (CA, OR)

California

5. AB 2127 Infrastructure Needs Assessment — **https://www.energy.ca.gov/programs-and-topics/programs/electric-vehicle-charging-infrastructure-assessment-ab-2127**

11. California Public Utilities Commission Environmental and Social Justice Action Plan — **https://www.cpuc.ca.gov/news-and-updates/newsroom/environmental-and-social-justice-action-plan**

56. Clean Vehicle Rebate Program, Clean Cars for All, Other Programs — **https://driveclean.ca.gov/search-incentives**

Oregon

16. Transportation Electrification Infrastructure Assessment Needs Analysis (TEINA) — **https://www.oregon.gov/odot/Programs/Pages/TEINA.aspx**

Exhibit continued on the next page

57. Oregon Clean Vehicle Incentives and Rebates — **https://goelectric.oregon.gov/incentives-rebates**

Michigan

58. Michigan EV Purchase and Charger Rebates — **https://www.michigan.gov/whitmer/news/press-releases/2022/01/26/gov--whitmers-plan-to-lower-the-cost-of-electric-vehicles**

New Jersey

59. Charge Up New Jersey — **https://njcleanenergy.com/ev**

Texas

60. Texas Light-Duty Motor Vehicle Purchase or Lease Incentives — **https://www.tceq.texas.gov/airquality/terp/ld.html**

Multistate MOU

24. West Coast Electric Highway PPP — **http://www.westcoastgreenhighway.com/electrichighway.htm**

Federal

61. Inflation Reduction Act (IRA) EV Tax Incentive (Income Limited) — **https://www.democrats.senate.gov/imo/media/doc/summary_of_the_energy_security_and_climate_change_investments_in_the_inflation_reduction_act_of_2022.pdf**

62. EO 14057 Greening Government Initiative — **https://www.sustainability.gov/ggi/index.html**

Source: RMI analysis

Appendix B — State Policy Features by Application

Exhibit 15 State Policy Features by Application

Category or Application	Policy Landscape Feature	Requirement Description
Accessibility and Affordability	LMI, DAC funding	Targets for a just transition through additional funds for LMI, DAC EV infrastructure through community-based needs assessments, engaging community in development process, and metrics to measure and analyze results
	EV charging desert	Standards to identify and address charging deserts and guide EV charging investments
	DCFC charging affordability for LMI	Affordable charging plans for drivers most dependent on DCFC hubs (TNC drivers, taxi drivers, and drivers without home charging)
	MUD charging	Funding for charger installations in MUDs with low rents
	EVSE building codes	New residential and commercial building requirement for EVSE
	Accessibility needs	Universal access through Americans with Disabilities Act compliance
Charger Performance	Reliability of public chargers	Guaranteed reliability through technical and contractual means with visibility to users to build up confidence in the network
	Interoperability and harmonization	Standardized communication protocol and charging access; engagement with national, regional, and multi-state actors to harmonize the EV charging experience
		Standardized payment, pricing structure, and access; engagement with national, regional, and multi-state actors to harmonize the EV charging experience
		Consistent signage
	Rural locations and corridors	Infrastructure accessibility at rural locations, in travel corridors, and at points of interest and tourist attractions
	Accessibility	Accessible infrastructure for people with various cultures/languages and that doesn't require banking or a smartphone
	Managed charging	Managed charging through smart and networked chargers

Exhibit continued on the next page

Exhibit 15 State Policy Features by Application, Continued

Category or Application	Policy Landscape Feature	Requirement Description
Governance and Incentives	Coordinated policy and best practice sharing	Coordinated multilevel strategy for air quality and/or public health improvements
		Coordinated multilevel strategy for implementation of residential, public infrastructure
		New residential and commercial building requirement for EVSE
		Networks and systems to share best practices between and among local authorities, industry, and central government
		EV charging needs assessment exercise initiation
	Business case	Funding support for private operators, municipal corporations, and public agencies, for ownership and operation
		Market-based incentives such as LCFS to help with cost recovery
	Location coordination	Colocation of DCFC hubs for LDVs, MD/HD vehicles, and two- and three-wheelers to minimize costs
	Vehicle	Up-front cost-reduction incentives
		Manufacturer incentive for domestic production
		Provisions for battery recycling
	Workplace charging	Tax breaks to incentivize employers to invest in workplace charging
	High-occupancy vehicle (HOV) incentive	Access to HOV lane for EVs regardless of number of occupants in vehicle
	State-owned fleet	Leadership by example with state fleet electrification
	Initiation with publicly owned chargers	Leadership by example with deployment of EV charging ports at all state-owned properties, and collaboration with federal agencies for charging ports on federal lands
	Streamlined permitting	Efficient and cost-effective installation time lines
	Education and outreach	Educational and technical resource availability
		Education to grow skilled local workforce

Exhibit continued on the next page

Exhibit 15 State Policy Features by Application, Continued

Category or Application	Policy Landscape Feature	Requirement Description
Utilities	Capacity upgrade	Distributed energy resource (DER) and on-site renewables supports
		Focuses public investment on network upgrades, possibly through funding upgrade costs for utility interconnect at charging sites
	EV tariffs	Innovative rate designs and DCFC rate schedules that mitigate the impact of demand charges through deployment
	Charging service provider definition	Regulatory or legal certainty for third-party service providers regarding their ability to sell charging services on a per kWh basis without being subject to utility-style regulations
	Electrical network capacity publication	Requires utilities to publish detailed electricity network capacity data to facilitate infrastructure planning
	EV charging support	EV specialists or departments to prioritize and fast-track connection requests
Commercial Vehicle Focus for Class 3 and Above	Electric truck adoption	MD/HD truck charging incentive
		MD/HD truck sales requirement
		MD/HD truck vehicle incentive
	Standardization of charging infrastructure	Standardization of charging technology (e.g., fuel cells, catenary solutions, wireless charging) solutions and deployment scenarios with flexibility for development of cost-effective options
	Electrical network	Electrical network upgrades coordinated with transportation needs
	Colocation considerations	Reduced upgrade, install, and maintenance costs while considering space requirements and dedicated spaces for commercial vehicles to avoid costly downtime; use of 1 MW rapid chargers

Source: RMI analysis

Appendix C — Used ICE Vehicle Purchase Cost and Five-Year TCO Discussion

The cost of used vehicles can vary widely depending on age, mileage, and other factors. We used prepandemic used ICE vehicle cost estimates in our analysis. In July 2019, a 3-year-old used car (i.e., model year 2016) had a median list price of $22,675, a 5-year-old car had a median list price of $15,999, and a 10-year-old car had a median price of $7,997, as shown in **Exhibit 16**. In late 2018, the average transaction price on a new car was $34,292.[iii,73]

We estimated TCO over a five-year period by including purchase costs, fueling costs, maintenance costs, and insurance premiums. For an LMI individual deciding whether to purchase a new EV or a used ICE light-duty vehicle, an incentive of approximately $10,500 would close the TCO gap and make buying the EV viable, as shown in **Exhibit 17** (on the next page). With up to $7,500 made available through the IRA, the remaining amount of approximately $3,000 could be provided through Prop. 30 funding.

Exhibit 16 Used Car Cost Compared with New Car Cost

Cost Category	Median Price	Used ICE Vehicle Cost Compared with New ICE Vehicle Cost
New vehicle cost in late 2018	$34,292	–
3-year-old used car cost in July 2019	$22,675	66%
5-year-old used car cost in July 2019	$15,999	47%
10-year-old used car cost in July 2019	$7,997	23%

Source: Cars.com, **https://www.cars.com/articles/when-will-used-car-prices-drop-3-things-car-shoppers-should-know-446525/**

iii Sedans, coupes, and hatchbacks are collectively referred to as the car segment.

Exhibit 17 TCO Differences Between New EVs and New and Used ICE Cars

Cost Category	New EV (Model Year 2022)	New ICE (Model Year 2022)	Difference Between New EV and New ICE	Used ICE (Model Year 2016)	Difference Between New EV and Used ICE
Purchase cost without incentives	$30,779	$25,966	$4,813	$12,983	$17,796
Fuel costs	$5,685	$9,678	-$3,993	$11,028	-$5,343
Overhead and maintenance costs	$1,735	$3,469	-$1,734	$3,469	-$1,734
Insurance cost	$6,580	$6,580	–	$6,580	–
5-year TCO	$44,779	$45,694	-$915	$34,060	$10,719

Notes:
2022 prices were estimated from 2020 prices in reference, using 4.7% inflation for 2021, and 6.9% inflation for 2022. For estimating fueling costs, we considered annual costs for a 2022 MY Honda civic to be representative of new ICE vehicles, a 2016 MY Honda Civic as representative of a used ICE vehicle, and a 2022 MY Chevrolet Bolt EV representative of a new EV. Fuel cost was estimated assuming 13,746 annual miles (average annual mileage from U.S. DOT), gasoline cost to be $5.4 per gallon per California average gasoline cost in August 2022, and cost of charging to be $0.30 cents/kWh)

Source: ICCT, **https://theicct.org/publication/when-might-lower-income-drivers-benefit-from-electric-vehicles-quantifying-the-economic-equity-implications-of-electric-vehicle-adoption/**; Cars.com, **https://www.cars.com/articles/when-will-used-car-prices-drop-3-things-car-shoppers-should-know-446525/**; EPA, **https://www.fueleconomy.gov/feg/savemoney.jsp**; Consumer Reports, **https://advocacy.consumerreports.org/wp-content/uploads/2020/09/Maintenance-Cost-White-Paper-9.24.20-1.pdf;** ValuePenguin, *Average cost of car insurance*, **https://www.valuepenguin.com/average-cost-of-insurance** ;RMI analysis

Appendix D — Prop. 30 Impact Analytical Approach Discussion

This section describes the metrics we calculated and methods we used to determine the impact of Prop. 30 in accelerating EV adoption and charging infrastructure installation in California.

EV Charging Infrastructure Funded

Exhibit 18 illustrates the inputs we considered to model projected EV charging infrastructure resulting from the passage of Prop. 30. In **Exhibit 19**, we also estimated the hardware and installation costs of a 7.7 kW Level 2 and 150 kW charger based on existing literature references.[74]

Exhibit 18 **Inputs for EV Charging Infrastructure Projection Modeling**

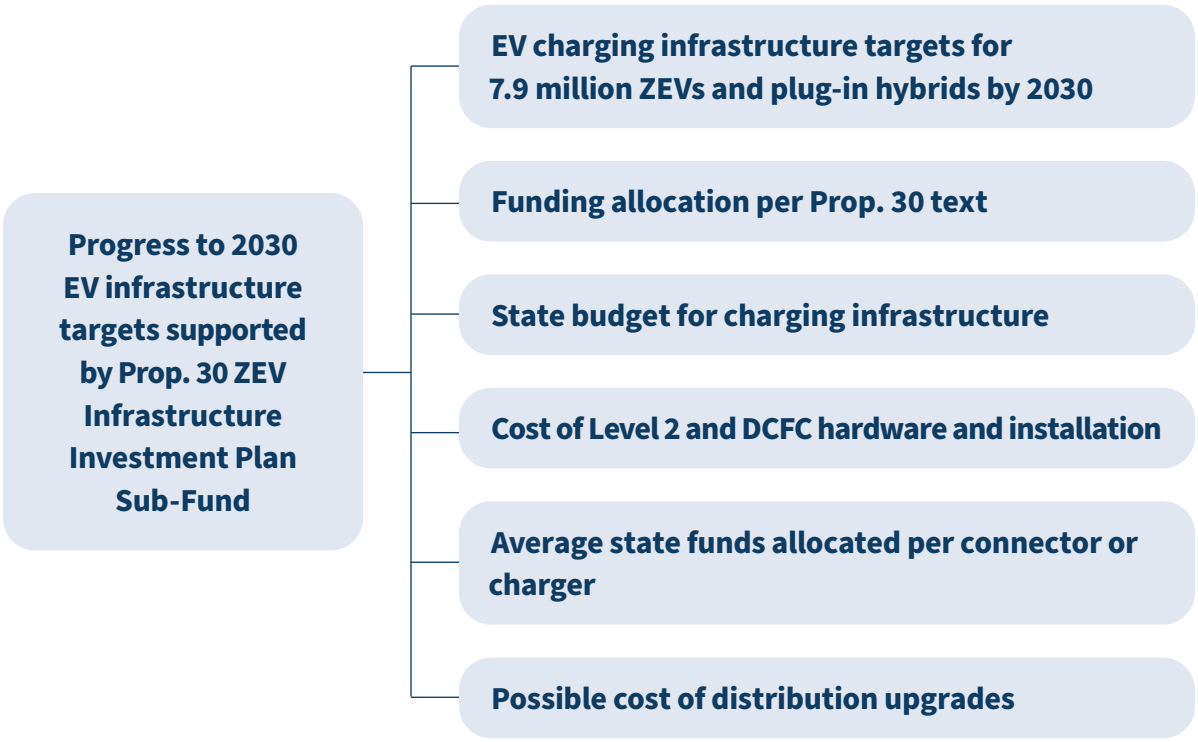


Exhibit 19 **EV Charging Infrastructure Hardware and Installation Cost Estimates**

Charger Type	Hardware and Installation Cost per Unit
Single-family home Level 2 – 7.2 kW	$2,100
Shared private or public Level 2 – 7.7 kW	$8,149
Light-duty ZEV public DCFC – 150 kW	$138,753

Source: RMI, **https://rmi.org/insight/reducing-ev-charging-infrastructure-costs**; ICCT, **https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf**; RMI analysis

Exhibit 20 CALeVIP Rebates Versus Total Project Cost

	Number of Connectors or Chargers	Average Rebate Paid	Average Total Cost	Portion of Project Cost Funded by Rebate
Public Level 2	**≤4 connectors**	$4,395	$10,022	40%
	5–7 connectors	$4,146	$8,542	50%
	≥8 connectors	$4,460	$9,312	50%
Public DCFC	**1 charger**	$61,767	$111,874	60%
	2 chargers	$66,569	$114,674	60%
	3 chargers	$72,107	$117,659	60%
	≥4 chargers	$69,307	$103,958	60%

Source: CEC, **https://www.energy.ca.gov/programs-and-topics/programs/clean-transportation-program/california-electric-vehicle**

Assumptions

We assumed the cost associated with the hardware and installation of a Level 2 charger at an MUD is similar to that of a public Level 2 charger. Networked operations, payment technologies, and weatherproofing might be required for MUD Level 2 charging, making the cost similar to a Level 2 charger at a public location.

We assumed the portion of connector hardware and installation costs funded by rebates was similar to the portion funded by CALeVIP rebates,[75] as shown in **Exhibit 20**. The CALeVIP amounts are over an extended time line and with varying charger power ratings. We applied the portion of project costs funded to inform the funding per connector for future rebates (i.e., 50% of project costs are funded for Level 2 chargers and 60% of project costs are funded for DCFC chargers).

Based on information from **Exhibit 19** and **Exhibit 20**, we estimated the per charger rebate for a public Level 2 charger to be $4,075 and for a public DCFC charger to be $83,252. We also assumed 100% of the $2,100 hardware and installation costs of a residential Level 2 charger at a single-family home was funded by rebate.

We assumed future CEC funds for light-duty EV infrastructure would be distributed among public Level 2 and public DCFC chargers similar to how CALeVIP funds have been distributed to date, as shown in **Exhibit 21** (on the next page).

Based on these estimates, the $314 million in CEC funding in fiscal year 2021–24 for light-duty ZEV infrastructure could lead to the installation of 20,642 connectors, as shown in **Exhibit 22** (on the next page). Similarly, we estimate the total number of EV connectors enabled by funds allocated from Prop. 30 to be closer to 616,793, as shown in **Exhibit 23** (on the next page).

Exhibit 21 Distribution of CALeVIP Funds Through May 2022

	Number of Connectors	Total Incentive Dollars	Portion of Total Funding
DCFC	1,775	$113.7 million	77%
Level 2	7,295	$34.0 million	23%
Total	9,070	$147.7 million	100%

Source: CEC and CSE, **https://calevip.org/rebate-statistics**

Exhibit 22 Projected Number of Connectors from Additional California State Funds

	CEC ZEV Infrastructure Funding Support (FY2021–24)	Funding per Charger	Projected Number of Connectors Funded
Public Level 2 chargers	$72,281,652	$4,075	17,739
Public DCFC chargers	$241,718,348	$83,252	2,903
Total	$314,000,000	–	–

Source: RMI analysis

Exhibit 23 Projected Number of Connectors from Additional Prop. 30 Funds

	Projected Support from Prop. 30 (2025–30)	Funding per Charger	Projected Number of Connectors Funded
Single-family home Level 2 chargers	$630,000,000	$2,100	300,000
MUDs Level 2 chargers	$1,260,000,000	$4,075	309,226
Light-duty DCFC chargers	$630,000,000	$83,252	7,567
Total	$2,520,000,000	–	–

Source: RMI analysis

Increased EV Adoption Among LMI Communities

Based on a five-year TCO comparison between a new EV and a used ICE vehicle, we estimated that an incentive amount of approximately $10,500 could help LMI individuals afford an EV purchase. We assumed 50% of Prop. 30 ZEV and Clean Mobility Sub-Funds (approximately $4 billion in 2025–30) would be made available as $3,000 incentives, which together with IRA incentives total $10,500 in EV purchase incentives for LMI households. These funds could complement similar incentives from the state budget for CVRP ($525 million) and CC4A ($510 million). The impact on EV adoption among LMI households thus calculated is shown in **Exhibit 24** and **Exhibit 25**.

Exhibit 24 Inputs for EV Adoption Projection Modeling

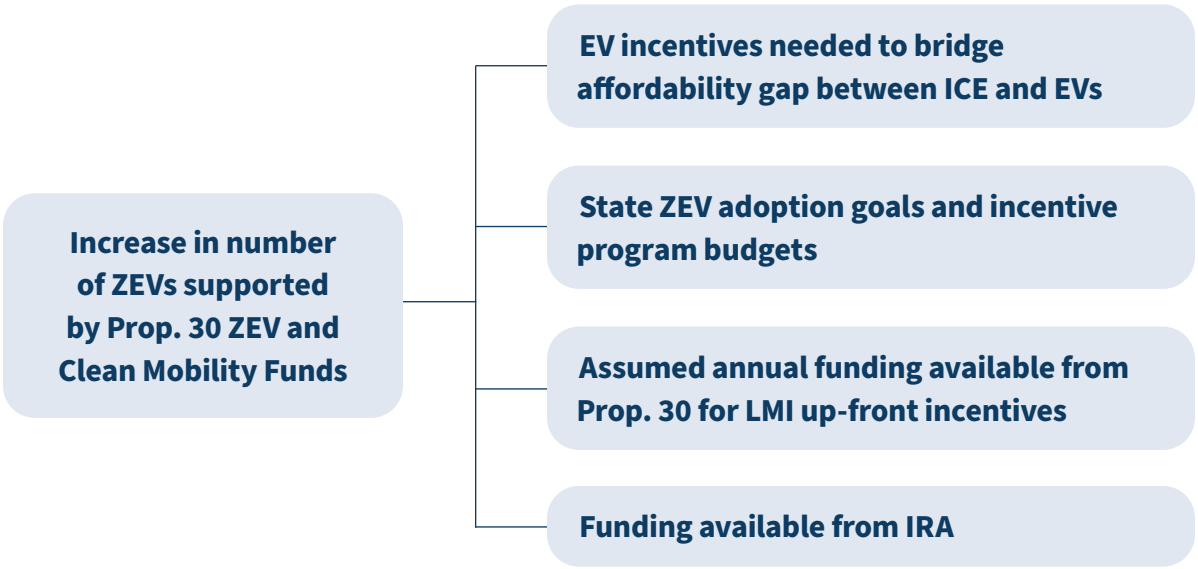


Exhibit 25 Projected Increase in Number of EVs with CA State Budget Allocation Versus Prop. 30

	CVRP (FY2021–24)	CC4A (FY2021–23)	Prop. 30 (2025–30)
Funds available	$525,000,000	$510,000,000	$4,050,000,000
Funding per vehicle	$3,000	$3,000	$3,000
Projected increase in number of ZEVs with future funding	175,000	170,000	1,350,000

Note: Assumes a $7,500 incentive is available from IRA, and the remaining $3,000 is made available through CVRP, CC4A, or Prop. 30 budgets to make up the $10,500 incentive required to support LMI purchases of EVs.

Source: CARB , **https://ww2.arb.ca.gov/news/carb-approves-15-billion-investment-largest-date-clean-cars-trucks-mobility-options**; CARB, **https://ww2.arb.ca.gov/sites/default/files/2022-07/fy2223_draft_funding_plan_accessible.pdf**; CEC, **https://www.energy.ca.gov/publications/2021/2021-2023-investment-plan-update-clean-transportation-program**; CA SOS, **https://www.sos.ca.gov/administration/news-releases-and-advisories/2022-news-releases-and-advisories/proposition-numbers**

Appendix E — Prop. 30 Screening Against Desired State EV Policy Features

Exhibit 26 Prop. 30 Screening Against Desired State EV Policy Features

Fully addresses Partially addresses Does not address

Category or Application	Policy Landscape Feature	Prop. 30 Coverage
Accessibility and Affordability	LMI, DAC funding	
	EV charging desert	
	DCFC charging affordability for LMI	
	MUD charging	
	EVSE building codes	
	Accessibility needs	
Charger Performance	Reliability of public chargers	
	Interoperability and harmonization	
	Rural locations and corridors	
	Accessibility	
	Managed charging	
Governance and Incentives	Coordinated policy and best practice sharing	
	Business case	
	Location coordination	
	Vehicle incentives across value chain	
	Workplace charging	
	High-occupancy vehicle (HOV) incentive	
	State-owned fleet	
	Leadership by example with state-owned public chargers	
	Streamlined permitting	
	Education and outreach	

Exhibit continued on the next page

RMI did not solicit campaign input for this report and conducted its research and impact analysis on Proposition 30 while maintaining academic independence from the Yes on 30 campaign. The Clean Air California coalition notified RMI about Proposition 30 before the measure qualified for the November 2022 state ballot in California. Clean Air California provided RMI with updates on the measure qualification process and clarified questions about the measure text. RMI did not receive any financial contributions from the coalition for this report. Report recommendations are in alignment with RMI's mission to transform the global energy system to secure a clean, prosperous, zero-carbon future for all.

Exhibit 26 Prop. 30 Screening Against Desired State EV Policy Features, Continued

Category or Application	Policy Landscape Feature	Prop. 30 Coverage
Utilities	Capacity upgrade	
	EV tariffs	
	Charging service provider definition	
	Electrical network capacity publication	
	EV charging support	
Commercial Vehicle Focus for Class 3 and Above	Electric truck adoption	
	Standardization of charging infrastructure	
	Electrical network	
	Colocation considerations	

Source: RMI analysis

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