THE STATE TRANSPORTATION ELECTRIFICATION SCORECARD

Bryan Howard, Shruti Vaidyanathan, Charlotte Cohn, Nick Henner, Ben Jennings

RESEARCH REPORT
FEBRUARY 2021

ACEEE
American Council for an Energy-Efficient Economy

Contents

About the Authors

Bryan Howard oversees work related to research, technical assistance, and implementation of energy efficiency policy at the state level. Prior to joining ACEEE, Bryan worked as the legislative director for the U.S. Green Building Council, where he played a key role in enacting legislation to modernize federal disaster response programs, tax incentives, education and training, and government building efficiency. Before joining the Council, he served as a legislative aide in the U.S. House of Representatives. Bryan holds a bachelor of arts in political science from Mesa State College.

Shruti Vaidyanathan oversees research on vehicle efficiency and systemwide transportation efficiency. She has 10 years of experience in transportation efficiency issues, and her work has most recently focused on passenger and freight mobility best practices at the state and local levels and the role of emerging mobility options and autonomous vehicles in sustainable urban transportation systems. Shruti holds a master of science in public policy and management from Heinz College at Carnegie Mellon University and a bachelor of arts in economics and environmental studies from Grinnell College.

Charlotte Cohn conducts research and analysis on utility energy efficiency policy. Prior to joining ACEEE, she worked with the Vermont Law School Institute for Energy and the Environment on building community solar projects for low- to moderate-income communities in New Hampshire. She holds a master's degree in energy regulation and law from the Vermont Law School and a bachelor's degree from the University of Vermont.

Nick Henner conducts research and analysis on clean energy finance strategies, working within ACEEE's state policy program and collaborating with teams across the organization. Before joining ACEEE, Nick worked at the City and County of Honolulu's Office of Climate Change, Sustainability and Resiliency, where he focused on energy efficiency and equity projects. Nick earned a master of science in sustainability management from American University and a bachelor of science in finance from the University of Arizona.

Ben Jennings assists ACEEE's transportation program with various projects including research tasks related to ACEEE's *City Scorecard* and *International Scorecard*. Prior to joining ACEEE, Ben interned with the City Bureau of Planning in Lancaster, Pennsylvania, where he helped to research, write, and edit the city's Municipal Operations Climate Action Plan. Ben holds a bachelor of arts in environmental studies and politics from Oberlin College.

Acknowledgments

This report was made possible through the generous support of Xcel Energy, Consolidated Edison, and the Merck Family Fund. The authors gratefully acknowledge the external reviewers, internal reviewers, colleagues, and sponsors who supported this report.

We also thank the many individuals from national and regional organizations who participated in our advisory group and provided input on the methodology, including most of the external expert reviewers listed here. External review and support do not imply affiliation or endorsement. These include, in no particular order, Nick Nigro (Atlas Public Policy), Phil Jones (Alliance for Transportation Electrification), Jeanette Shaw (Forth), Steve

Kalland (NC Energy Tech Center), Katherine Stainken (Plug In America), Terry Travis (EVNoire), Erin K. Falquier (Chicane Labs), Grace Relf (Hawaii Public Utility Commission), Camille Kadoch (Regulatory Assistance Project), Larissa Koehler (Environmental Defense Fund), Matt Rogotzke (National Governors Association) Annie Gilleo (Greenlots), Alli Gold Roberts (Ceres), Cassie Powers (National Association of State Energy Officials), Mathias Bell (Xcel Energy), Shannon Baker-Branstetter and Nicole Wong (Green for All), Chris Nelder (Rocky Mountain Institute), Sara Baldwin (Energy Innovation), Christian Williss and Kay Kelly (Colorado State Energy Office), Alexa Voytek (Tennessee Department of Environment and Conservation), Colton Brown (Pennsylvania Department of Environmental Protection, Energy Programs Office), Joseph Halso (Sierra Club), Matt Frommer (Southwest Energy Efficiency Project [SWEEP]), Anne Blair (Southeast Energy Efficiency Alliance [SEEA]), Meredith Alexander (CALSTART), Sue Gander and Andrew Linhardt (Electrification Coalition), Leslie Aguayo and Alvaro Sanchez (Greenlining), Gregory Dierkers (U.S. Department of Energy), Nick Sifuentes and Lauren Bailey (Tri-State Transportation Campaign), Eric Coffman (Maryland Energy Administration), Katie Pegan and John Chatburn (Idaho Governor's Office of Energy and Mineral Resources), and Nathan Cleveland and Sara Canabarro (Rhode Island Office of Energy Resources).

We thank our internal reviewers, Steve Nadel, Lauren Ross, Rachel Gold, and Naomi Baum.

Last, we would like to thank Mariel Wolfson for developmental editing, Mary Robert Carter for managing the editorial process, Elise Marton for copy editing, Roxanna Usher for proofreading, Kate Doughty for assistance with publication and graphic design, and Wendy Koch, Ben Somberg, and Maxine Chikumbo for their help in launching this report.

Suggested Citation

Howard, B., S. Vaidyanathan, C. Cohn, N. Henner, and B. Jennings. 2021. *The State Transportation Electrification Scorecard*. Washington, DC: ACEEE.

Glossary of Frequently Used Terms

VEHICLE CLASSES

Light-duty (LD): Passenger cars, SUVs, and light trucks. These vehicles have a gross vehicle weight rating (GVWR) of 8,500 pounds or less. GVWR refers to the maximum weight of a vehicle safely loaded with passengers, fuel, and accessories.

Heavy-duty (HD): Medium-size and large commercial vehicles, buses, and heavy pickup trucks. These vehicles have a GVWR of more than 8,500 pounds.

TYPES OF CHARGERS

Level 1 (L1): Provides charging through a 120 V AC plug and does not require installation of additional charging equipment. For light-duty vehicles, can deliver 2 to 5 miles of range per hour of charging. Most often used in homes, but sometimes used at workplaces.

Level 2 (L2): Provides charging through a 240 V (for residential) or 208 V (for commercial) plug and requires installation of additional charging equipment. Can deliver 10 to 20 miles

of range per hour of charging for light-duty vehicles. Used in homes, at workplaces, and for public charging.

DC Fast Charge (DCFC): Provides charging through 480 V AC input and requires specialized, high-powered equipment as well as special equipment in the vehicle itself. Used largely for public charging of both light-duty and heavy-duty vehicles. Plug-in hybrid electric vehicles typically do not have fast-charging capabilities.

ELECTRIC VEHICLE INFRASTRUCTURE

EVSE: Electric vehicle service equipment. Includes charger, plug, software, and more. Also known as EV charging stations, electric recharging points, or just charging points.

Make-ready: A utility-led program that prepares a site for installation of EVSE through upgrades to electrical equipment on the customer side of the meter (Colorado PUC 2019).

COMMUNITY TYPES

Low-income: Communities where the median household income is lower than the statewide median income. The specific threshold varies by state.

Economically distressed community: A community with a high proportion of residents who are at or below the relevant poverty level.

Environmental justice (EJ) community: A community that bears a disproportionate burden of environmental harms, such as poor air quality, and suffers negative impacts as a result.

HOUSING TYPE

Multiunit dwelling (MUD): Housing where multiple units are contained within a building or complex. Also known as multifamily housing.

Executive Summary

The transportation sector is responsible for 28% of greenhouse gas (GHG) emissions in the United States.[1] Electric vehicles (EVs) stand to play a critical role in reducing emissions and achieving aggressive climate goals. However, EVs still account for only approximately 2% of the American vehicle market. U.S. states have the power and potential to remove many of the barriers to EV adoption, support the EV market, and ramp up the building of EV charging infrastructure. This report evaluates the activities of the states and ranks the top 30 plus the District of Columbia on their policy and program efforts to electrify transportation.

KEY FINDINGS

- First place goes to **California**, which has prioritized EVs as a way to reduce state GHG emissions. California led in five of the six categories used to rank states in the *Scorecard*. It is the only state to set deadlines for electrifying transit buses, heavy duty trucks, and commercial vehicles and to adopt statewide building codes for wiring most types of new buildings and houses for EV charging.
- Rounding out the top 10 are **New York**, the **District of Columbia**, **Maryland**, **Massachusetts**, **Washington**, **Vermont**, **Colorado**, **Oregon**, and **New Jersey**.
- Outside the top 10, regional standouts are **Minnesota** in the Midwest, **Connecticut** in the Northeast, **Virginia** in the Southeast, and **Nevada** in the Southwest.
- **California** and **New York** are among the few states working to ensure equitable access to electrified transportation. They are creating targeted programs for low-income, economically distressed, and environmental justice (EJ) communities. While these efforts are noteworthy, equity in EV access is an area where all states need to improve.
- With the exception of a few leaders, states are in the early stages of creating a supportive policy environment for transportation electrification. All states, even early adopters of transportation electrification, still have considerable room to improve their policies supporting EVs and EV charging infrastructure.
- State legislatures, executive agencies, and public utility commissions (PUCs) have diverse policy options to improve transportation electrification. They should look to existing state efforts for instructive examples.
- Overall, states did better in planning and goal setting for EVs and deployment of EV charging infrastructure than in other areas, reflecting the fact that most states are just in the early stages of EV policy activity.

[1] "Greenhouse Gas Emissions; Sources of Greenhouse Gas Emissions." U.S. Environmental Protection Agency. Accessed October 1, 2020. epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

- Many states also took steps to integrate EVs and EV charging infrastructure into the electric grid through rate design and continued improvement in electric system decarbonization.
- Collective multistate action including the State Zero-Emission Vehicle Programs Memorandum of Understanding (MOU) and Multi-State Medium- and Heavy-Duty Zero Emission Vehicle MOU are helping states make progress toward deployment targets and exchange best practices.

ACEEE's *State Transportation Electrification Scorecard* evaluates the progress that state legislatures and agencies (e.g., public utility commissions, departments of transportation) are making to implement policies to scale up deployment of light-duty electric vehicles (passenger cars, SUVs, and trucks) and heavy-duty electric vehicles (large commercial vehicles, such as freight trucks and buses) and the necessary charging infrastructure for personal, commercial, fleet, and public transit use.

The most common state actions to electrify transportation include planning for more EVs and EV charging options (23 states); incentives such as rebates, tax credits, and grants to buy large electric pickups and delivery trucks (27 states); using federal funds to buy electric transit buses (48 states); utility programs that offer lower electric rates at preferred times for EV (Level 2) charging (36 states); and utility funding to spur EV and EV-charging adoption in low-income areas and environmental justice communities (15 states).

POLICY AREAS

The *Scorecard* evaluates states on their actions to support transportation electrification in the light-duty and heavy-duty sectors. States received points in the following policy areas, based on a 100-point scale:

- **Electric vehicle (EV) and EV charging infrastructure planning and goal setting (17 points):**[2] government-led planning actions for transportation electrification as well as binding and nonbinding target setting for EV and charging infrastructure deployment
- **Incentives for EV deployment (30 points):** financial and nonfinancial incentives to spur EV purchases and the installation of necessary charging infrastructure
- **Transportation system efficiency (12 points):** policies that support the deployment of EVs while maximizing emissions reduction and improving accessible, cost-effective, equitable, and clean mobility options for all

[2] The *Scorecard* uses the terms *EV charging infrastructure* and *EV chargers* throughout the report. This infrastructure is also sometimes referred to as electric vehicle supply equipment (EVSE).

- **Electricity grid optimization (10 points):** actions taken by public utility commissions (PUCs) to support utility management of EV charging to maximize reliability and minimize costs and greenhouse gas (GHG) emissions
- **EV equity (10 points):** state and utility efforts to ensure access to electrified transportation in low-income, economically distressed, and environmental justice (EJ) communities
- **Transportation electrification outcomes (21 points):** metrics that track progress or evaluate results on EV adoption, infrastructure installation, and GHG emissions

SCORES

Figure ES-1 shows the state ranking divided into six tiers. Our evaluation in the *Scorecard* focuses on the states that have demonstrated some level of progress on transportation electrification. We do not present scores beyond the top 30 because states ranked lower than that each achieved no more than 15% of the total available points in the *Scorecard*. However, throughout the report we do highlight the efforts of some unranked states that have made progress in a certain category, and detailed scores for all states are available in Appendix A.

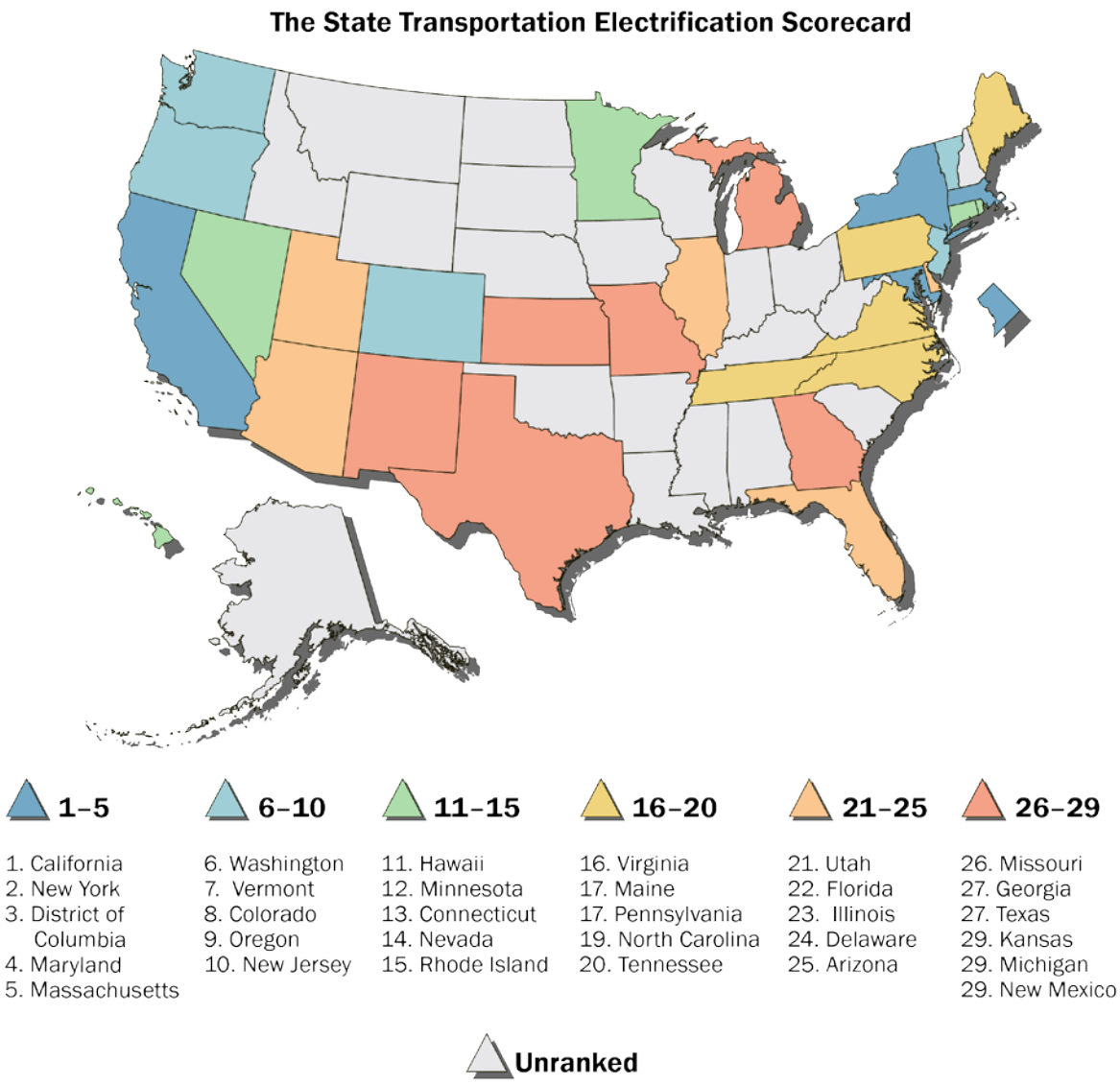

Figure ES-1. State scores in the *Transportation Electrification Scorecard*

Table ES-1 describes states that were leaders in the specific policy areas evaluated. For more information about leading states, refer to the *Scorecard* chapter corresponding to each policy area.

Table ES-1. Policy area leaders

Area	States	Achievements
Planning and goal setting	California, Oregon, Washington, New York, and Colorado	• Created plans for EV and EV charging infrastructure covering both light-duty (LD) and heavy-duty (HD) EVs • Set goals for LD EVs and have mandatory EV-supportive requirements in building codes or allow local governments to adopt such codes
Incentives for EV deployment	California, New York, Maryland, and Massachusetts	• Have a range of financial and nonfinancial incentives for LD or HD vehicle purchases and infrastructure installation • Have robust utility spending on EV charging infrastructure • Have no EV fees or lower-than-average fees relative to state gas tax revenues collected from conventional vehicles
Transportation system efficiency	California and District of Columbia	• Have sector-wide GHG goals and goals for transit agency procurement
Electricity grid optimization	California, New York, and Hawaii	• Provide signals to effectively integrate EVs into the grid through L2- and DCFC-specific rates • Make efforts to reduce carbon emissions from the electricity sector
Equity	California and New York	• Direct state and utility investment toward programs for low-income, economically distressed, or EJ communities • Demonstrate support for transitioning EV school bus fleet
Outcomes	District of Columbia, California, and Washington	• Have strong per capita EV charging infrastructure deployment, HD EV registrations, and EV deployment in transit bus fleets

POLICY RECOMMENDATIONS

States have made varying levels of progress on transportation electrification. However, more must be done to meet state EV deployment and climate targets while complementing economic development activities. **For states that are not included in the top 30, we recommend the following policy actions as important foundational steps to move transportation electrification ahead:**

- Benchmark progress on transportation electrification; engage in comprehensive planning efforts that define a coordinated strategy to build out electrified

transportation and include specific goals for EV and the deployment EV charging infrastructure.

- Collect data on key metrics to establish a baseline and track progress on EV and EV charging infrastructure deployment. The data could include EV registration information for light- and heavy-duty vehicles, location and count of EV charging locations, and demographic information on EV use by race and income. Make data publicly available, with the status of milestones shared through regular public reporting.
- Where state agencies and utilities are investing in vehicle and infrastructure deployment, begin with equity in mind. Incorporate spending carve-outs or funding adders for low-income, economically distressed, and EJ communities in state and utility EV planning to ensure that the benefits of transportation electrification are distributed equitably. Encourage community participation in mobility needs assessment to direct this funding to locations and services of greatest need.
- Leverage existing funding sources such as the Volkswagen settlement fund and the federal Low or No Emission Program to support EV and EV charging infrastructure deployment, and evaluate other funding opportunities to create sustained funding for programs.
- Establish clear policy direction to encourage utility and third-party investment in EV charging infrastructure, such as exempting third-party EV charging providers from being defined as a public utility and approving utility electric vehicle charging programs and demonstration projects such as electric school buses.

For states that are represented in our top 30 but are earlier in the process of developing a robust environment for transportation electrification, we recommend the following next steps to help accelerate their market and GHG reductions:

- Offer on-the-hood incentives for the purchase of light- and heavy-duty EVs to offset the additional upfront cost of these vehicles.
- Codify targets for EVs and the deployment of EV chargers.
- Allow utilities to make investments to support EV charging infrastructure and to implement EV rates or managed charging programs that encourage integration of EVs into the grid.
- Encourage grid-scale decarbonization by establishing clean energy and energy efficiency targets for the electric industry, thereby reducing the life-cycle emissions of every EV on the road.
- Set a GHG emissions reduction goal and commitment for the transportation sector to ensure that EV deployment complements other efforts to reduce transportation GHG emissions.

Chapter 1. Introduction, Methodology, and Results

The transportation sector is responsible for 28% of greenhouse gas (GHG) emissions in the United States and has recently overtaken the electric power sector as the largest source of GHG emissions in the country (EPA 2020b). Because they generate no tailpipe emissions, electric vehicles (EVs) can play a critical role in achieving significant GHG emissions reductions, meeting aggressive climate goals and reducing localized air pollution. If charged with clean electricity, EVs can be almost entirely zero emission. Existing literature demonstrates that electrification can lead to reductions in light-duty GHG emissions of 36 to 50% by 2050. For heavy-duty vehicles, this projected reduction can range from 22 to 43% by 2050 (EPRI 2015; Mai et al. 2018 2018).

EV sales have climbed steadily since 2010, and as of August 2020 there were more than 1.5 million of them on the road in the United States (EEI 2020). Additionally, cities and states are signaling their commitment to addressing climate change and reducing pollution through EV uptake by adopting aggressive deployment goals for the near future. However, EVs still account for only approximately 2% of the American vehicle market. Moreover, vehicle sales as a whole dropped significantly in 2020 as a result of the COVID-19 pandemic (Mock, Yang, and Tietge 2020). Together these factors suggest that there is much that needs to be done to grow and maintain the fledgling market for these vehicles. In particular, ambitious state actions will be needed to ramp up deployment of light- and heavy-duty EVs and build out the necessary charging infrastructure.[3]

States can help remove many of the barriers to widespread EV adoption. They can create supportive policy environments to reduce the higher upfront costs of EVs for both personal and fleet ownership, establish a comprehensive network of charging facilities, and encourage the creation of complementary utility programs to push EV uptake and maximize GHG reductions and societal benefits. They can also provide complementary education and outreach to support market transformation alongside private sector efforts to raise customer awareness (Barnes and Jones 2020). States can work with communities to design policies ensuring that investments center environmental justice and equity and promote broader access to EVs; such policies would address historical inequities in transportation access, environmental impacts, and economic mobility and avoid future burdens on low-income communities and communities of color.

Given the interconnected nature of our transportation systems and vehicle markets, regional efforts can also play a role in spurring EV uptake. States, through the actions of governors and executive branch agencies, often collaborate with one another or engage in regional coalitions to encourage vehicle sales and deploy the required charging infrastructure. Efforts such as the REV WEST Memorandum of Understanding (MOU) among eight western states, the Multi-State Zero-Emission Vehicle (ZEV) Task Force, and the recent Multi-State

[3] For the purpose of this *Scorecard*, the term *heavy-duty* refers to both medium- and heavy-duty vehicles.

Medium- and Heavy-Duty Zero Emission Vehicle MOU help states work toward shared deployment targets and allow the exchange of best practice policies and programs. Likewise, inventive approaches like the regional cap-and-invest program proposed by the Transportation and Climate Initiative (TCI) could create funding for EV-related programs if there is strong commitment from states in addition to an inclusive and equitable stakeholder engagement process. TCI's proposal would place a cap on emissions from transportation fuels and require distributors to purchase allowances based on the carbon content of those fuels. The revenue would then be invested in more efficient, equitable, low-carbon modes of transportation (Ceres 2020).

Currently, no existing research comprehensively tracks and benchmarks state policies to promote transportation electrification for all states. ACEEE's *State Transportation Electrification Scorecard* aims to fill that gap by evaluating the progress that state legislatures and agencies (e.g., public utility commissions, departments of transportation, state energy offices, departments of environmental protection) are making to implement policies to scale up deployment of light-duty EVs (passenger cars, SUVs, and trucks) and heavy-duty EVs (larger commercial vehicles, such as freight trucks and buses) and the necessary charging infrastructure for personal, commercial, fleet, and public transit use.[4]

This report scores states on the adoption of policies with an impact on vehicle deployment, charging infrastructure creation, and grid reliability. We prioritize policies that have clear impact on these objectives, as well as outcome-based metrics that track progress toward deployment and GHG reduction goals. We also score policy efforts to address equity.

The *Scorecard* demonstrates how EV-specific policies can work in tandem with other transportation and utility sector policies to maximize relevant GHG reduction in addition to ramping up EV deployment in the light- and heavy-duty vehicle sectors. This can help decision makers as well as stakeholders—including community organizations and businesses—to identify the most promising policies in their respective states to scale both EVs and the associated infrastructure.

The *Scorecard* is divided into eight chapters. This chapter discusses our scoring methodology and presents the overall results of our analysis. It also spotlights the leading states and key policy trends underlying the rankings. Subsequent chapters present detailed results for five major EV policy categories: state planning and goal setting for EV deployment, incentives for deployment, transportation system efficiency, optimization of the electricity system, and EV equity. We also include a chapter that evaluates the outcomes of these policies, followed by a summary of conclusions.

[4] Most ACEEE *Scorecards* are repeated every one to three years. We are unlikely to repeat the *Transportation Electrification Scorecard* at the same frequency but instead plan to incorporate new metrics and the findings from this report into future editions of our *State Scorecard* and *Utility Scorecard*.

SCORING METHODOLOGY

ACEEE's methodology for evaluating state progress on transportation electrification reflects the policies needed to ramp up EV deployment in the light-duty and heavy-duty vehicle sectors in addition to maximizing GHG emissions reductions from the transportation sector more broadly.

We evaluated states on their actions to deploy electric vehicles in the following policy areas:

- **EV and EV charging infrastructure planning and goal setting.** Metrics in this category rate states on their government-led planning actions for transportation electrification and their binding and nonbinding target-setting activity for EV and charging infrastructure deployment.
- **Incentives for EV deployment.** This category evaluates financial and nonfinancial incentives to spur EV purchases and the installation of the necessary charging infrastructure.
- **Transportation system efficiency.** Here we assess policies that support the deployment of EVs while maximizing emissions reductions and improving accessible, cost effective, equitable, and clean mobility options for all.
- **Electricity grid optimization.** We award points for actions PUCs take to support utility management of EV charging to maximize reliability and minimize costs and greenhouse gas emissions.
- **EV equity.** In this category we rate state and PUC-approved utility efforts to ensure access to and deployment of electrified transportation in low-income, economically distressed, and EJ communities.
- **Transportation electrification outcomes.** Metrics track progress or evaluate efforts on EV adoption, infrastructure installation, and GHG emissions.

Figure 1 shows the point allocation for each of these categories.

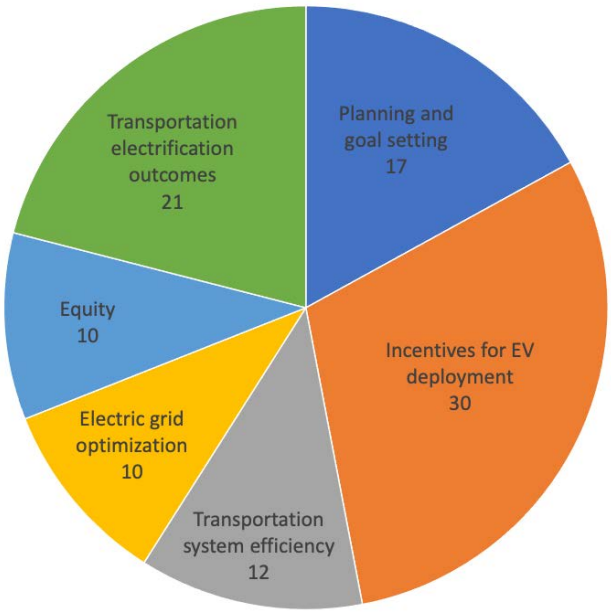

Figure 1. Total points (out of 100) by scoring category

States could earn a maximum of 100 points in the *Scorecard.* We allocated points among the policy areas to reflect the magnitude of their impact on EV deployment. To create this weighted approach, we relied on an analysis of existing literature and the judgment of ACEEE and external experts.[5] Our review of transportation electrification policy levers identified three policy areas that are likely to have the greatest impact on EV uptake: zero-emission vehicle (ZEV) mandates and EV deployment targets; financial incentives for vehicle purchases; and incentives for charging infrastructure installation (Morrison, Veilleux, and Powers 2018; Lutsey et al. 2015; Mersky et al. 2016; Schefter and Know 2018). On the basis of these findings about policy impact and feedback from subject matter experts, we gave the greatest weight to state actions on incentives and allocated 30 points out of 100 to this section.

We assigned 17 points to planning and goal setting to reflect the importance of activities that provide states with a road map and benchmarks for transportation electrification efforts, with the most points in this category going to EV deployment targets. We allotted 12 points to policies at the intersection of electrification and transportation system efficiency, which signal that states are thinking through the EV use cases that will achieve the greatest systemwide GHG reductions without stalling EV uptake.

Grid optimization was assigned 10 points. Integration of EVs into the grid is critical, and proactive attention to managed charging can allay some of the concerns that may stymie EV

[5] ACEEE convened a group of subject matter and state experts to guide the creation of our methodology. These experts provided written and verbal feedback on research questions, scoring methodology, and weighting for individual metrics.

deployment, but because those activities are more nascent, this section received fewer total points than most others. Similarly, most states are just starting to think about how to make deployment of EVs and electric vehicle service equipment (EVSE) more equitable. We recognize the importance of extending the benefits of EVs to low-income, economically distressed, and EJ communities as states embark on their transportation electrification efforts and awarded these actions 10 points.

We allocated 21 points to the outcomes section—which credits, among other things, EV registrations and public charging facilities—to evaluate whether state policies are having their intended effect on the number of light- and heavy-duty vehicles on the road, the proliferation of charging infrastructure locations, and greenhouse gas emissions.

ACEEE's methodology attempts to capture the policy landscape for both light-duty and heavy-duty vehicle deployment.[6] A number of our metrics apply to actions that cover both vehicle categories. Where possible, we have created unique light-duty and heavy-duty scoring criteria. Nevertheless, it is important to note that the heavy-duty EV market is in its nascent stages, and states are just starting to understand the policy needs for ramped-up deployment. To the best of our ability, we have captured heavy-duty EV policies that states are using to grow the market for electrified trucks, but we recognize that there is plenty of opportunity for states to expand their policy toolkits in the future. As mentioned above, light-duty and heavy-duty GHG emissions reduction opportunities are sizable, and sound policy will be needed to accelerate and sustain deployment for both markets.

Within each policy category, we developed a scoring methodology based on a diverse set of criteria that we outline in each of the subsequent chapters. States were awarded points based on data collected from centralized data sources, additional Internet research, and feedback from subject matter experts and in-state contacts during our external review process.[7] While the authors strive to provide the best information possible, this scorecard relies on a set of secondary sources of information detailed in descriptions of the relevant metric and in appendix tables, which the authors validated independently where possible. New policy developments after external review (i.e., after December 7, 2020) were not included in the report. We look forward to inclusion of these policy developments in future ACEEE publications.

The metrics reflect policies frequently discussed as necessary to address common barriers and spur EV market growth and are outlined in table 1 (Singer 2017; Shefter and Knox 2018; Bui, Slowik, and Lutsey 2020). It is important to note that data availability played a significant role in the metrics that were chosen and, subsequently, in the breakdown of points for each scoring category.

---

[6] We do not separately track activities around medium-duty vehicles because our research indicates that medium-duty vehicles are typically included in state policy actions targeting the heavy-duty vehicle sector.

[7] We used a number of centralized data sources, including Atlas EV Hub, the NC Clean Energy Technology Center's *50 States of Electric Vehicles* reports for Q2 and Q3 of 2020, and the U.S. Department of Energy Alternative Fuels Data Center.

Table 1. Scoring by policy category and metric

Metric	Maximum points
Electric vehicle and charging infrastructure planning and goal setting	**17**
EV and EV charging infrastructure plans	4
Light-duty EV adoption goals and ZEV mandates	4
Heavy-duty EV adoption goals and ZEV mandates	4
Utility EV charging infrastructure goals	2
EV-supportive building codes	2
Low-carbon fuel standard	1
Incentives for EV deployment	**30**
Light-duty EV purchase incentives	4
Heavy-duty EV purchase incentives	4
State EV incentives for L2 chargers	2
State incentives for DCFC chargers	2
EV fees*	2
Utility incentives for L2 charging	1
Utility incentives for DCFC charging	1
Utility incentives for commercial fleet charging	1
Utility spending on EV charging infrastructure incentives	6
EV charger exemption from public utility definition	1
Volkswagen settlement fund allocation for electrification	4
Nonfinancial incentives	1
Direct sales regulations	1
Transportation system efficiency	**12**
Transportation sector GHG reduction targets	2
GHG pricing policies	3
Transit agency bus goals and procurement	4
State investment for EV transit bus deployment	2
Policies to encourage shared EV fleets	1
Electricity grid optimization	**10**
Time-varying charging rates for L2 chargers	3
DCFC-specific charging rates	2
Managed charging programs	1
Electric power sector emissions goals	4
Vehicle-to-grid (V2G) programs (bonus point)	*1*

Metric	Maximum points
EV equity	10
Statewide EV investment for low-income, economically distressed, or environmental justice communities	2
Utility EV programs for low-income, economically distressed, or environmental justice communities	2
State EV programs for low-income, economically distressed, or environmental justice communities	4
State EV school bus deployment requirements	2
Transportation electrification outcomes	21
Public L2 charging facilities per 100,000 people	4
Public DCFC charging facilities per 100,000 people	4
Light-duty EV registrations per 100,000 people	4
Heavy-duty EV registrations per 100,000 people	3
Percentage change in transportation GHGs over a five-year period	4
EV transit buses per 100,000 people	2
Total	100

*For the EV fee metric, states can earn negative points if their EV fees are deemed too punitive.

Each metric has specific criteria for scoring. Depending on the metric, points may be achieved through formal actions taken by a governor, agency, state legislature, or PUC, or awarded for ongoing state planning activities or multistate coordination efforts. Given that the EV market is still young and states are in the early stages of considering strategies and policies likely to have the greatest impact on EV uptake, our scoring also recognizes state activities that are in the planning phase by awarding partial points, where possible, in a number of metrics.

STATE ACTORS

Multiple arms of state government have potential influence over the trajectory of transportation electrification in a state, and responsibility for particular policies may vary from state to state. We focus on actions that state legislatures, the executive branch (which includes governors, departments of transportation, and state energy offices), and quasi-judicial/quasi-legislative state PUCs can take. Under each policy category, we illustrate progress by different state actors and highlight leaders among each type of state policymaker. For outcome-based metrics, we do not designate a particular actor, as multiple state agencies can influence successful deployment, GHG reduction, and system efficiency metrics. Table 2 lists our metrics by actor.

Table 2. Metrics by state actor

Policy category	Metric
Legislature	
EV and EV charging infrastructure planning and goal setting	EV-supportive building codes
	EV and EV charging infrastructure plans
	Heavy-duty EV adoption goals and ZEV mandates
	Light-duty EV adoption goals and ZEV mandates
	Low-carbon fuel standard
	Utility EV charging infrastructure goals
Incentives for EV deployment	Direct sales regulations
	EV fees
	EV charger exemption from public utility definition
	Heavy-duty EV purchase incentives
	Light-duty EV purchase incentives
	State incentives for DCFC charging
	State incentives for L2 charging
	Volkswagen settlement fund allocation for electrification
Transportation system efficiency	GHG pricing policies
	Policies to encourage shared EV fleets
	Transportation sector GHG reduction targets
	State investment for EV transit bus deployment
	Transit agency bus goals and procurement
Electricity grid optimization	Electric power sector emissions goals
Equity	State EV programs for low-income, economically distressed, or environmental justice communities
	Statewide EV investment for low-income, economically distressed, or environmental justice communities
PUC	
EV and EV charging infrastructure planning and goal setting	Utility EV charging infrastructure plans
Incentives for EV deployment	Utility incentives for L2 charging infrastructure
	Utility incentives for DCFC charging infrastructure
	Utility incentives for commercial fleet charging infrastructure
	Utility investment in EV charging infrastructure
	EV charging exemption from public utility definition

Policy category	Metric
Electricity grid optimization	Time-optimized charging rates for L2 chargers
	Business-enabling charging rates for DCFC chargers
	Managed charging programs
	Electric power sector emissions goals
Equity	Utility EV programs for low-income, economically distressed, or environmental justice communities
Executive branch	
EV and EV charging infrastructure planning and goal setting	EV and EV charging infrastructure plans
	Light-duty EV adoption goals and ZEV mandates
	Heavy-duty EV adoption goals and ZEV mandates
	EV-supportive building codes
	Low-carbon fuel standard
Incentives for EV deployment	Volkswagen settlement fund allocation for electrification
	Transportation sector GHG reduction targets
Transportation system efficiency	GHG pricing policies
	Transit agency bus goals and procurement
	State investment for EV transit bus deployment
	Transportation sector GHG reduction targets
Equity	Statewide EV investment for low-income, economically distressed, or environmental justice communities
	State EV programs for low-income, economically distressed, or environmental justice communities

METRICS NOT INCLUDED

This report does not generally assess city-led or federal actions to drive EV uptake. However, where necessary, certain metrics capture policies implemented at the local level that are likely to have an impact on deployment of vehicles and charging infrastructure. This is particularly the case for home rule states, which allow local governments autonomy in the policy adoption process. As an example, EV-supportive building codes in home rule states are defined entirely at the local level; therefore, we award points to those local codes likely to ramp up EV and infrastructure deployment.

Lastly, there are a few policy areas that we do not include in our assessment of state progress on transportation electrification. These include the following:

- Community-centered stakeholder engagement processes and interagency coordination for EV deployment
- EV consumer protection issues
- Utility and government EV education offerings

- Utility and government EV marketing and promotion

While these are important topics for states to examine and consider, we decided to omit them from the scoring framework largely because they did not fit well into the state focus of our research or we could not find an existing data source that would enable us to capture information for all states without conducting a data request. ACEEE surveyed state energy offices and PUCs in 2020 for information related to the *State Energy Efficiency Scorecard*. The data already available to us from that request, the availability of quality secondary source material for key metrics, and the recognition that governments were and are still responding to COVID-19 were compelling reasons to not overburden state governments with an additional data request for the *State Transportation Electrification Scorecard*.

RESULTS

Our evaluation in the *Scorecard* focuses on the states that have demonstrated some level of progress on transportation electrification to highlight the diverse array of policies available for all states to consider. We do not present scores beyond the top 30 because states ranked below that level each achieved no more than 15% of the total available points in the *Scorecard*. A number of states earned very few points or no points at all in several categories.

However, throughout the report we do highlight the efforts of some unranked states that have made progress in a certain category. Detailed scores for all states are available in Appendix A, and information on policy and program activities for all 50 states and the District of Columbia is given in Appendixes B through G. The *Scorecard* omits the five U.S. territories due to lack of complete data and comparable program activity. For a list of scores for all 50 states and the District of Columbia, please see Appendix A.

Table 3. Top 30 scores by states and the District of Columbia

Rank	State	Planning and goals (17 pts.)	Incentives for EV deployment (30 pts.)	Transportation system efficiency (12 pts.)	Electricity grid optimization (10 pts.)*	Equity (10 pts.)	Outcomes (21 pts.)	Total (100 pts.)
1	California	17	27.5	12	11	8.5	15	91
2	New York	12.5	26.5	4	9.5	5	6	63.5
3	District of Columbia	10	13	9	7	4	16	59
4	Maryland	10	21.5	5	6	3	10.5	56
5	Massachusetts	10.5	21.5	4	7	2.5	9	54.5
6	Washington	13.5	16	4	5.5	3	12	54
7	Vermont	11.5	16	2	8	0	11.5	49
8	Colorado	11.5	14	4	6.5	1	11	48
9	Oregon	14.5	11.5	5	4.5	1	10.5	47
10	New Jersey	10	17	6	3	1	7	44

Rank	State	Planning and goals (17 pts.)	Incentives for EV deployment (30 pts.)	Transportation system efficiency (12 pts.)	Electricity grid optimization (10 pts.)*	Equity (10 pts.)	Outcomes (21 pts.)	Total (100 pts.)
11	Hawaii	6.5	12.5	1	9	0.5	11	40.5
12	Minnesota	7	15.5	3	6.5	2	5.5	39.5
13	Connecticut	10	11	6	5.5	0	6	38.5
14	Nevada	6	11.5	1	8	3	8	37.5
15	Rhode Island	10	14	2	3	1	6.5	36.5
16	Virginia	4	14	3	7	0	8	36
17	Pennsylvania	6	17	2	4	1	4	34
	Maine	7	10.5	1	7.5	0	8	34
19	North Carolina	8	11.5	1	3.5	1	6.5	31.5
20	Tennessee	7	9.5	1	5.5	2	5.5	30.5
21	Utah	3	9.5	1	3	0	10.5	27
22	Florida	4	8	1	3.5	1	6.5	24
23	Illinois	2.5	8.5	1	3.5	2	5.5	23
24	Delaware	1	8	2	5	1	5.5	22.5
25	Arizona	2	7.5	1	5	0	6	21.5
26	Missouri	0	12	1	0	1	6	20
27	Texas	0	11	1	0	2	4	18
	Georgia	0	4.5	1	4	0	8.5	18
29	New Mexico	2	6.5	1	2	0	4	15.5
	Kansas	0	3.5	1	3	0	8	15.5
	Michigan	1	8.5	1	4	0	1	15.5

*** This section includes a bonus point for states that have vehicle-to-grid pilot programs.**

Table 3 shows that states tended to do better in their efforts to plan and set goals for deployment of EVs, EV charging infrastructure, and EV incentive offerings than in other categories. Many states also took steps to integrate electric vehicles into the electricity system through rate design and improvements to the cleanliness of the grid. There is considerable room for improvement as states address equitable access to electrified transportation for low-income, economically distressed, and EJ communities. The efficiency of transportation systems is also a needed area of attention for most states.

Even states that have been early adopters of transportation electrification still have considerable room to improve policies. Indeed, only five states and the District of Columbia achieved at least half of the available points in the *Scorecard.* Figure 2 shows the geographical distribution of the top 30 states.

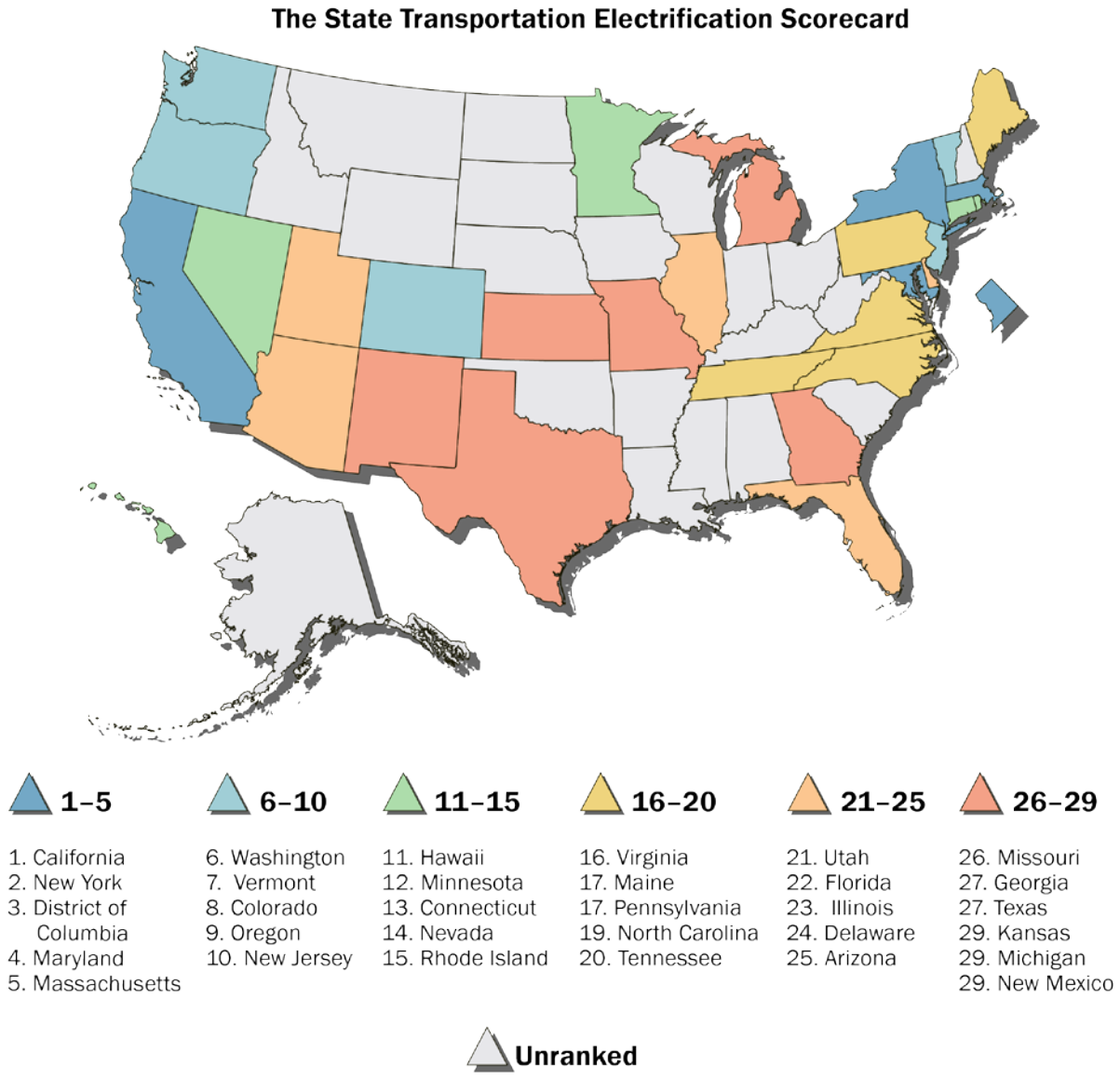

Figure 2. State scores in the *Transportation Electrification Scorecard*

National and Regional Leaders

California is far and away the national leader on transportation electrification policy and home to policies not present (or not as robust) in other states. California is the only state in the country that has an adopted a target for statewide heavy-duty (HD) EV deployment. It is also the only state to adopt statewide EV-supportive building codes for multiunit dwellings (MUDs), commercial buildings, and single-family homes. California is also the only state with a comprehensive carbon pricing policy for the transportation sector that supports investment in transportation electrification.

The state is also making progress in considering the impact of transportation electrification policy on disadvantaged communities (those that most suffer from a combination of economic, health, and environmental burdens). It is one of only a few states that direct funding streams toward increasing adoption of EVs in these communities.

The runner-up, **New York**, has taken aggressive action to provide state and utility incentives across the spectrum of light-duty (LD) and HD vehicles and EV chargers. New York is also taking steps to effectively integrate EVs into the grid through time-varying rates for DCFC charging and managed charging programs.

The **District of Columbia**, in third place, is a leader in deployment goals for LD EVs and strong investment for EV transit buses, producing positive outcomes for public level-2 (L2) and DC fast charging (DCFC) chargers. Additionally, the District requires that transportation network companies (TNCs) and other private vehicle-for-hire businesses develop greenhouse gas emissions reduction plans every two years and identify strategies to increase the proportion of zero-emission vehicles in their fleets.

In the Northwest, **Washington** has a strong track record on regulatory support for transportation electrification. The state has enacted legislation requiring that utilities file a plan for investments in EV charging infrastructure, and the PUC has issued orders to guide proposed utility funding related to charging infrastructure. The state is delivering strong outcomes in the registration of LD and HD EVs.

In the Southwest, **Colorado** has taken action to get more EVs on its roadways. The state has adopted an aggressive goal for EV adoption and has enacted legislation requiring that utilities file a plan for investments in EV charging infrastructure. Also, a suite of incentives is translating to strong penetration of LD EVs and public L2 chargers.

In the Midwest, **Minnesota** has made progress in guiding financial activity in transportation electrification. The PUC issued guidelines related to utility investment in EV charging infrastructure, resulting in $23.6 million in funding with another $1.8 million proposed. The state has also signaled its intent to adopt California's LD ZEV program.

In the Southeast, **Virginia** is making important headway on electrifying transportation. The state has a solid incentive program for HD EVs, has taken steps to effectively integrate EVs into the grid through time-varying rates for L2 chargers, and is reducing the impacts of EVs via efforts to decarbonize its electric grid.

Leaders by State Policy Actor

Although multiple arms of state government have potential influence over the trajectory of transportation electrification in a state, we find that some states use many actors to accomplish their goals while others have a particularly strong legislature, public utilities commission, or executive branch with regard to EV policy.

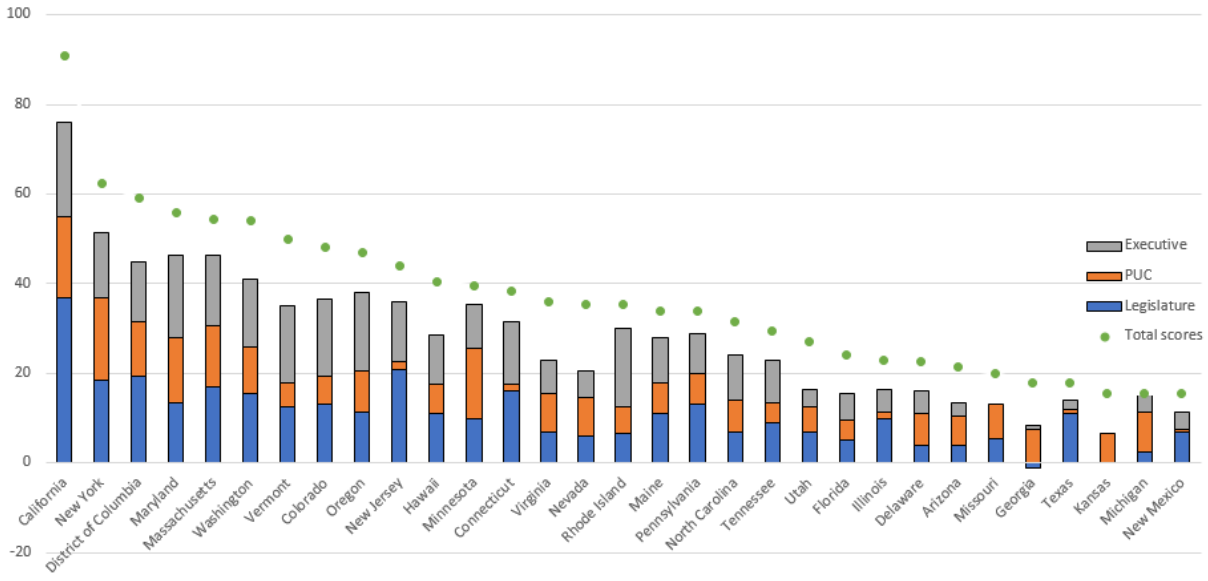

Figure 3. Scores by state actor[8]

As shown in figure 3, among the top 10, California performs exceptionally well across all branches of government. Similarly, in New York, Maryland, and Massachusetts, each arm of the state plays an active role in EV-related policymaking. In contrast, we found the legislative and executive branches in Colorado, Vermont, and New Jersey to be more proactive in supporting transportation electrification than their state PUCs.

Outside of the top 10, there are states with a dominant actor working on state transportation electrification policy and initiatives. In Rhode Island the executive branch, through actions including the ratification of numerous multistate ZEV deployment MOUs, is the clear leader on state transportation electrification. By contrast, in Minnesota and Michigan, the PUC, in part driven by requests from proactive utilities, is the leading actor in the state. The legislatures in Illinois and Texas are far and away the most active actors in those states.

[8] In this chart, where multiple actors played a role in a metric, we credited points to both actors. For example, in California both the PUC and the legislature are active in requiring and providing guidance for utility goals and EV deployment plans, so the points for that metric were allocated to the PUC and counted again for the legislature. Scores from the outcomes section and 1 point of the GHG reduction metric in the electricity grid optimization section were not included, as multiple state agencies can influence successful deployment of policies reflected by those metrics.

Chapter 2. Planning and Goal Setting

INTRODUCTION

State legislatures, governors, and PUCs are creating plans and setting targets for the number of EVs on the road in an effort to guide overall transportation electrification efforts. A systematic approach to transportation electrification should include interrelated efforts in the transportation, power generation, and buildings sectors. Although the states are in different phases of progress, every state can do more. In this chapter we review government-led initiatives to plan for transportation electrification, and we assess targets created for EV adoption and installation of EV charging infrastructure. We evaluate initiatives undertaken by state governments and PUCs to coordinate and require action through EV and EV charging infrastructure plans, EV adoption goals, and ZEV mandates; to remove barriers to EV deployment in new construction through building codes; to incentivize and create funding streams for low-emission vehicles through low-carbon fuel standards (LCFSs); and to encourage utility goal setting through EV charging infrastructure plans and filings.

Points are allotted as follows:

- EV and EV charging infrastructure plans (4 points)
- LD EV adoption goals and ZEV mandates (4 points)
- HD EV adoption goals and ZEV mandates (4 points)
- Utility EV charging infrastructure goals (2 points)
- EV-supportive building codes (2 points)
- Low-carbon fuel standard (1 point)

RESULTS AND KEY TAKEAWAYS

The scores that each state in the top 30 earned in this chapter are captured below in table 4.

Table 4. Scores for planning and goal setting

Rank	State	EV and EV charging infrastructure plans (4 pts.)	LD EV adoption goals and ZEV mandates (4 pts.)	HD EV adoption goals and ZEV mandates (4 pts.)	Utility EV charging infrastructure goals (2 pts.)	EV-supportive building codes (2 pts.)	Low-carbon fuel standard (1 pt.)	Total (17 pts.)
1	California	4	4	4	2	2	1	17
2	Oregon	4	4	2	2	1.5	1	14.5
3	Washington	4	4	2	2	1.5	0	13.5
4	New York	4	4	2	2	0.5	0	12.5
5	Colorado	4	4	2	1	0.5	0	11.5
	Vermont	4	4	2	0	1.5	0	11.5
7	Massachusetts	4	4	2	0	0.5	0	10.5
8	Connecticut	4	4	2	0	0	0	10

Rank	State	EV and EV charging infrastructure plans (4 pts.)	LD EV adoption goals and ZEV mandates (4 pts.)	HD EV adoption goals and ZEV mandates (4 pts.)	Utility EV charging infrastructure goals (2 pts.)	EV-supportive building codes (2 pts.)	Low-carbon fuel standard (1 pt.)	Total (17 pts.)
	District of Columbia	4	4	2	0	0	0	10
	Maryland	4	4	2	0	0	0	10
	New Jersey	4	4	2	0	0	0	10
	Rhode Island	4	4	2	0	0	0	10
13	North Carolina	2	4	2	0	0	0	8
14	Maine	1	4	2	0	0	0	7
	Minnesota	4	2	0	1	0	0	7
	Tennessee	4	2	0	1	0	0	7
17	Hawaii	4	0	2	0	0.5	0	6.5
18	Nevada	4	2	0	0	0	0	6
	Pennsylvania	4	0	2	0	0	0	6
20	Florida	4	0	0	0	0	0	4
	Virginia	4	0	0	0	0	0	4
22	Utah	2	0	0	1	0	0	3
23	Illinois	2	0	0	0	0.5	0	2.5
24	Arizona	1	0	0	1	0	0	2
	New Mexico	1	0	0	1	0	0	2
26	Delaware	1	0	0	0	0	0	1
	Michigan	1	0	0	0	0	0	1
28	Georgia	0	0	0	0	0	0	0
	Kansas	0	0	0	0	0	0	0
	Missouri	0	0	0	0	0	0	0
	Texas	0	0	0	0	0	0	0

In our discussion of each metric, below, we outline how states earned scores by advancing transportation electrification planning and goal setting through formal actions taken by a governor or agency, state legislature, or PUC or by continuing their state planning activities or multistate coordination efforts.

California achieved all available points in the planning and goal-setting section. The state has taken multiple steps to imbed EVs as a priority in GHG reduction. Senate Bill 350, the Clean Energy and Pollution Reduction Act of 2015, for example, initiated widespread transportation electrification efforts as a statewide policy to meet the state's 2030 and 2050 climate goals and its air quality requirements. California pulled ahead of other states in this category due to HD EV adoption goals and ZEV mandates, building codes, and an LCFS.

California is the only state in the country that has adopted a target for statewide HD EV deployment. It is also the only state that has adopted statewide EV-supportive building codes for MUDs, commercial buildings, and single-family homes. It is only one of two states to adopt an LCFS.

Regionally, Oregon in the West, Colorado in the Southwest, New York in the Northeast, North Carolina in the Southeast, and Minnesota in the Midwest are all leaders in this category. These states have developed robust individual EV action plans or participate in comprehensive multistate planning efforts. These regional leaders have also made commitments to getting more EVs on their roadways through shared executive action MOUs, legislative requirements, or agency action.

While not included in the top 30 state ranking, Iowa received full points in this chapter for its EV and EV charging infrastructure plans. In February 2019 the Iowa Economic Development Authority released *Charging Forward: Iowa's Opportunities for Electric Vehicle Infrastructure Support*. The effort engaged stakeholders to examine the current status of EVs and EV chargers in the state and made recommendations for policymakers and others to consider in order to broaden adoption in the state.

Despite these achievements, only 12 states earned more than half of the points available in this chapter. Clearly there are abundant opportunities for states across the spectrum of transportation electrification policy to make progress.

For early action the most important step is to develop a long-term, systematic planning effort around EVs and EV charging infrastructure. While the majority of states in the *Scorecard* have undertaken this as a stand-alone process, states like New Jersey and Virginia as well as the District of Columbia have included planning for EVs and charging infrastructure as a part of their broader state energy plan. This approach helps government leaders and stakeholders to create a shared understanding of the energy landscape and chart a pathway to meeting overall state energy and emissions reduction goals. As state energy planning is a recurring process, it is likely the best opportunity for states to take early action on EVs.

There are also great prospects for state legislatures and/or PUCs to establish clear policy direction to encourage utility investment in EV charging infrastructure. Only 10 states have defined the parameters for appropriate utility investment or the metrics that will be used to evaluate investments. State action in this area would prove helpful to guide long-term transportation electrification investment.

EV and EV Charging Infrastructure Plans

Several states have taken steps to guide the development, coordination, and implementation of EVs and EV charging infrastructure through coordinated planning initiatives. These plans often establish nonbinding commitments that set the parameters of a comprehensive transportation electrification strategy. These guidance efforts vary in detail and scope. Plans may consider EVs as a means of reducing environmental impacts in the transportation sector while also including grid integration, charging infrastructure, general education

efforts, and attention to low-income, economically distressed, or EJ communities. Other plans may focus on a specific segment of vehicles or on elements of transportation electrification, like charging infrastructure along interstate or highway corridors.

Planning efforts are initiated through the executive branch or the legislature, and they come in several forms. These plans can be self-contained efforts that identify barriers to adoption and set milestones for progress while creating pathways for future advancement once goals have been achieved or other obstacles have been identified. They can also be included in broader state energy planning (as discussed above) in which the goal of getting more EVs on the road is one component of the overall state energy or climate strategy. Multistate planning efforts are also underway, with varying levels of rigor. In 2014 eight states released the Multi-State ZEV Action Plan, which includes collaborative actions on education, incentives, and charging infrastructure. This plan, now covering 10 states, was updated in 2018 to reflect accomplishments made since 2014.[9] It prioritizes the next steps for participating states in meeting their collective objectives of EV and EV charging infrastructure deployment and emissions reductions from the transportation sector.

States could earn 2 points for planning efforts that included LD EV considerations and an additional 2 points for plans that included HD EVs. We awarded partial credit of 1 point for multistate coordination, for individual state planning activities that are still in progress, or for those that focus on a specific EV or charging deployment application.

Out of the top 30 states, 27 received points in the area.

Light-Duty and Heavy-Duty EV Adoption Goals and ZEV Mandates

Through executive action, regulation, and legislation, states are increasingly setting binding targets for LD EV adoption in order to meet emission reduction targets, accomplish other state priorities, and signal their dedication to electrifying the transportation sector. EV deployment targets are the most direct policy action for EV uptake. The PEV Policy Evaluation Rubric developed by the National Association of State Energy Officials indicates that such targets are among the largest-ticket policies that states can use to move the needle on EV deployment (Morrison, Veilleux, and Powers 2018). Similarly, a report from the International Council on Clean Transportation and another from the Center for American Progress found that ZEV mandates are the single strongest predictor of EV market share (Lutsey et al. 2015; Cattaneo 2018).

To date, the cooperative efforts of governors who signed the State Zero-Emission Vehicle Programs MOU pledging collective action on ZEV programs have served as important catalysts for LD EV adoption. Ten states have committed to having 3.3 million ZEVs (battery-electric, plug-in hybrid electric, and fuel cell vehicles) on their collective roadways by 2025.

[9] In 2014 the participants were California, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, and Vermont. New Jersey joined in 2018 and Maine in 2019.

Twelve states[10] have adopted California's LD ZEV program, which requires manufacturers of LD vehicles to offer a certain number of zero-emission vehicles each year and earn credits based on the vehicle type and the electric driving range of the offered vehicles. Additional states have issued or are considering regulations to join the program.[11]

Binding EV targets are manifesting themselves through other channels of state government as well. Legislation has been used to codify LD EV goals in Washington, DC, as part of the Clean Energy DC Omnibus Amendment Act of 2018. North Carolina issued Executive Order Number 80 to set a milestone for overall LD EV efforts in conjunction with state clean energy and climate change objectives. Nonbinding goals have also been included as part of state EV and EV charging infrastructure plans.

While the HD EV market is in its early stages, the potential for emission reductions is substantial. Electrification of heavy-duty vehicles could yield 22 to 43% reductions in GHG emissions by 2050 (EPRI 2015; Mai et al. 2018). States are just starting to address the policies for ramping up deployment. The California Air Resources Board (CARB) recently approved the first zero-emission commercial truck requirement in the United States, the Advanced Clean Trucks regulation. In 2024 it will begin a phased transition from trucks using diesel and gas power and replace them with zero-emission equipment over the next three decades. Other states are considering action in this area as well. Governors from 15 states and the mayor of Washington, DC, have signed an MOU to develop a Zero-Emission Medium- and Heavy-Duty Vehicle Action Plan to inform HD EV actions in their jurisdictions. They are also pledging to make sales of all new medium- and heavy-duty vehicles in their jurisdictions zero emission by no later than 2050.

States earned 4 points for adopting an LD EV target through the actions described above. They earned 2 points for signaling intention to adopt a target for LD EV deployment or for having a nonbinding LD EV deployment target, as typically found in EV and EV charging infrastructure plan. States earn 4 points for adopting HD ZEV targets, 2 points for signaling intention to adopt a target for HD EV deployment, or 1 point for a nonbinding target.

Seventeen states scored points in the LD EV category, mostly through the cooperative efforts discussed or by adopting the California LD ZEV program. Nevada and Minnesota received partial points for their intent to adopt a LD EV target. Tennessee received points in the section for nonbinding goals.

Utility EV Charging Infrastructure Goals

Planning for the impacts of EVs and EV charging infrastructure on the grid is critical to ensure efficient deployment while also preparing for the benefits and potential impacts on ratepayers. Investor-owned and other regulated utilities can play an important role in the deployment of EV charging infrastructure, but they often need clear direction on the types

[10] Colorado, Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, Vermont, and Washington.

[11] Minnesota, Nevada, and New Mexico.

of investments (e.g., in make-ready programs, utility-owned chargers, or education and outreach efforts) they are allowed to earn a return on as a part of their rate base.[12] Regulators and legislatures can encourage investment in EV charging infrastructure through requirements that utilities file plans for deployment in their service territories.

As these utility planning efforts are just beginning to emerge in states, the potential results are not yet fully realized. In a review of legislative and PUC requirements, only six legislatures and seven PUCs have taken such action to date.[13] In 2019 Minnesota's PUC issued an order finding that utilities have an important role in policy and investment strategy for transportation electrification. The order also stated that further integration of those efforts in rate design will improve system efficiency and benefit ratepayers. New Mexico recently enacted House Bill 521, which requires utilities to develop transportation electrification plans, which will be mandatory in 2021.

States earned 1 point for a PUC order that provides a policy signal encouraging investment in EV charging infrastructure and clarity about which investments are appropriate or what criteria will be used to evaluate those investments.[14] States could earn an additional point if their PUC or legislature had created a requirement that utilities file a plan for EV charging infrastructure investment. We capture whether these plans result in approved utility investments in the "Incentives for EV Deployment" chapter, so to avoid double counting, we do not take into account the outcomes of these PUC actions in this section.[15]

EV-Supportive Building Codes

Buildings have long life spans, and because renovations can be costly and logistically challenging, it is important that efficiency be incorporated in minimum building requirements to conserve resources while providing benefits like health, safety, and comfort. As EVs multiply across America, there is a growing recognition that EV charging infrastructure should be a consideration in the design and construction of buildings. To avoid the challenges of modernizing older buildings while supporting ambitious EV deployment goals, states (as well as some local governments that can set minimum building standards) are beginning to integrate elements of vehicle charging as part of their building codes.

---

[12] A utility's rate base is the net investment of a utility in property to serve the public, typically major capital expenditures; utilities can earn a rate of return on these investments. State approaches vary with regard to which types of investments are allowable in the rate base, as well as in which situations (e.g., for underserved populations or for segments with market barriers, such as multiunit dwellings).

[13] We also credit the efforts of TVA, a federally owned entity that is not regulated at the state level. Because it sets rates for the local distribution companies, TVA is considered alongside other PUCs for the purpose of this metric. Although it serves parts of seven states in the region, we award TVA's point to Tennessee because it serves most of the load in Tennessee but only in parts of other states.

[14] We did not award points for studies, investigative activities, or demonstration programs by states or PUCs.

[15] In our review of approved plans, we observed small investment in EVs; the overwhelming funding is directed toward EV charging infrastructure investment.

While including these provisions in all building codes is important, the multiunit dwellings sector is particularly critical. MUD properties often serve low-income populations and provide shared amenities, like parking, to tenants or owners. Without expanding the availability of and access to EV charging infrastructure, multiunit residents will be unable to reap the full benefits of EVs, and states that have set aggressive EV targets as a means of achieving health or climate goals will face obstacles.

Only five states have adopted requirements for charging-related infrastructure for some building types as part of their minimum construction standards. State adoption of EV-related building codes has generally taken one of two approaches. EV-capable regulations require electrical capacity and conduit for future charging build-out. EV-ready codes require not only electrical capacity and conduit but also wiring for charging stations to be installed, allowing the owner or occupant of a building to easily add an EV charging device. These requirements are being applied with varied levels of stringency[16] and to different building types. For this reason, we label these actions as *EV-supportive*.

To date, commercial buildings are more likely than other types of buildings to have EV-supportive requirements. Massachusetts requires an EV-ready parking space for every 15 parking spaces in a commercial building, while Washington requires buildings to provide EV-charging capability to 20% of parking spaces in a commercial building project. There are four statewide code requirements (in California, Oregon, Vermont, and Washington) for MUDs. California is the only state with EV-capable code requirements in place for single-family residential construction, although local governments (in Atlanta, Denver, Honolulu, and Tucson) also have such codes for single-family buildings.

We awarded states for taking proactive steps to adopt EV-supportive codes. States earned 1 point for a MUD code requirement (recognizing obstacles to reaching these properties, which often serve economically distressed populations), 0.5 points for a statewide single-family code requirement, and 0.5 points for commercial building requirements. We also awarded partial credit of 0.5 points to states with cities and counties that have adopted EV-supportive codes covering at least 20% of the state population.

Low-Carbon Fuel Standard

California and Oregon use an LCFS as a means to reduce the carbon intensity of transportation fuels that are sold or supplied in the state. Fuel suppliers may comply with the regulations by blending gasoline or diesel with fuels that have lower-carbon attributes or by purchasing credits from a category that includes electric-powered vehicles. These credits have created a pool of revenues that can be used, as in California, to support EVs and the deployment of EV charging infrastructure (as well as to promote other low-carbon fuels) (Barbose and Martin 2018). LCFS funds in California are now being used to offer a point-of-sale price reduction of up to $1,500 for the purchase or lease of an EV or plug-in

[16] Drafts of the 2021 International Energy Conservation Code (IECC) included mandatory code provisions for commercial and residential builders to wire garages and parking places for future installation of EV chargers. However, those provisions were removed through the appeals process.

hybrid electric vehicle, thereby supporting the state's progress toward its carbon reduction goals (CARB 2020a). States earned 1 point for adoption of an LCFS.

UNSCORED METRICS

Interagency Collaboration and Coordination

The impact and integration necessary to advance EVs requires agencies or branches of state government to work together to facilitate a shared vision and collective responsibility for state action. In advance of (or as a manifestation of) state EV planning, governors or agency heads are using interagency working groups, councils, and other, informal efforts to create an environment conducive to EV and EV charging infrastructure goals. The designation of an individual and/or agency to lead coordination efforts is an important element to ensure that milestones are met through state agency synchronization. Due to a lack of available data, we are unable to track how states prioritize interagency collaboration but recognize that this coordination is an integral component of any statewide transportation electrification strategy.

Chapter 3. Incentives for EV Deployment

INTRODUCTION

Despite growing EV offerings from manufacturers, the higher initial cost of purchase and the high cost of installing associated charging infrastructure remain barriers to entry into the marketplace. Over the lifetime of a vehicle, EV owners will save between $6,000 and $10,000 in ownership costs (e.g., for fuel and maintenance) relative to vehicles with an internal combustion engine (Harto 2020). Still, the first cost of EVs remains an obstacle to greater adoption. Perceived lifestyle changes that come from owning and operating an EV create another barrier. As a result, both financial and nonfinancial policies that incentivize EV purchase, use, and charging infrastructure deployment are fundamental to the uptake of EVs.

Some incentives, such as rebates and tax credits for vehicle purchases, already have a proven track record of increasing EV sales among individual consumers. Research has shown, in fact, that purchase incentives are among the most powerful policies that states can use to accelerate EV deployment (Morrison, Veilleux, and Powers 2018; Lutsey et al. 2015). Many states have tax credits and rebates in place to supplement the federal plug-in electric drive vehicle tax incentive, which provides a credit of up to $7,500 based on the battery capacity of the vehicle. Likewise, nonfinancial incentives, such as HOV lane access and priority parking, can make EVs more appealing to individual consumers.

Additionally, as more EVs become available to drivers and electric vehicles become a critical part of states' strategies for addressing transportation GHG emissions, states can help create comprehensive charging networks by providing financial incentives both for home charging and for public charging infrastructure. Several recent reports identify charging availability as directly correlated with electric vehicle deployment (Morrison, Veilleux, and Powers 2018; Mersky et al. 2016; Shefter and Knox 2018).

The policies earning points in this chapter were selected because of their impact and ability to spur greater EV adoption. The scoring for each reflects the magnitude of change in moving the market toward broader EV sales and EVSE installation. These policies apply to a diverse group of stakeholders including individual consumers, businesses, and municipalities, helping to encourage EV integration across both the public and private sectors. In this chapter, we review and score states on the following policies:

- Light-duty EV purchase incentives (4 points)
- Heavy-duty EV purchase incentives (4 points)
- State incentives for L2 chargers (2 points)
- State incentives for DCFC chargers (2 points)
- EV fees (2 points)
- Utility spending on EV charging infrastructure incentives (6 points)

- Utility incentive offerings for L2 chargers (1 point)
- Utility incentive offerings for DCFC chargers (1 point)
- Utility incentive offerings for commercial fleet charging (1 point)
- EV charger exemption from public utility definition (1 point)
- Volkswagen settlement fund allocation for electrification (4 points)
- Nonfinancial incentives (1 point)
- Direct sales regulations (1 point)

RESULTS AND KEY TAKEAWAYS

The scores that each state in the top 30 earned in this chapter are captured below in table 5.

Table 5. Scores for incentives for deployment

Rank	State	Light-duty EV purchase incentives (4 pts.)	Heavy-duty EV purchase incentives (4 pts.)	State incentives for L2 chargers (2 pts.)	State incentives for DCFC chargers (2 pts.)	EV fees (2 pts.)	Utility spending on EV charging infrastruc-ture incentives (6 pts.)	Utility incentive offerings for L2 chargers (1 pt.)	Utility incentive offerings for DCFC chargers (1 pt.)	Utility incentive offerings for commercial fleet charging (1 pt.)	EV charging exemption from public utility definition (1 pt.)	Volkswagen fund allocation for electrification (4 pts.)	Nonfinanci al incentives (1 pt.)	Direct sales regulations (1 pt.)	Total
1	California	4	4	2	1	1	6	1	1	1	1	3.5	1	1	27.5
2	New York	3	4	2	2	2	6	1	1	1	1	2.5	1	0	26.5
3	Maryland	0	4	2	1	2	6	1	0.5	0	1	3	1	0	21.5
	Massachusetts	3	0	2	1	2	5.5	1	1	0	1	3.5	0.5	1	21.5
5	New Jersey	3	4	2	1	2	1.5	0	0	0	1	2	0.5	0	17
	Pennsylvania	4	3	1	1	2	1.5	1	1	0.5	1	1	0	0	17
7	Vermont	4	3	0	0	2	0	1	0.5	0.5	1	3	0	1	16
	Washington	3	0	1	1	1	4	1	0.5	1	1	2.5	0	0	16
9	Minnesota	0	3	0	1	1	4.5	0.5	1	0.5	1	2	0	1	15.5
10	Colorado	1	1	1	2	1	3	0	0	0.5	1	2	0.5	1	14
	Virginia	0	4	0	0	1	2.5	1	1	1	1	1.5	1	0	14
	Rhode Island	0	0	1	1	2	2	1	1	1	0	4	0	1	14
13	District of Columbia	0	0	1	1	2	5	1	0.5	0.5	0	1	1	0	13
14	Hawaii	3	0	1	1	1	1	0	0.5	0	1	4	0	0	12.5

Rank	State	Light-duty EV purchase incentives (4 pts.)	Heavy-duty EV purchase incentives (4 pts.)	State incentives for L2 chargers (2 pts.)	State incentives for DCFC chargers (2 pts.)	EV fees (2 pts.)	Utility spending on EV charging infrastruc-ture incentives (6 pts.)	Utility incentive offerings for L2 chargers (1 pt.)	Utility incentive offerings for DCFC chargers (1 pt.)	Utility incentive offerings for commercial fleet charging (1 pt.)	EV charging exemption from public utility definition (1 pt.)	Volkswagen fund allocation for electrification (4 pts.)	Nonfinanci al incentives (1 pt.)	Direct sales regulations (1 pt.)	Total
15	Missouri	0	3	0	0	0	4	1	1	0.5	1	0	0.5	1	12
16	Nevada	0	3	0	0	2	1	0.5	0.5	0.5	1	2	1	0	11.5
	North Carolina	0	3	0	1	1	2.5	0.5	0.5	1	1	0	1	0	11.5
	Oregon	4	0	0	0	1	2.5	0.5	0.5	0.5	1	0.5	0	1	11.5
19	Connecticut	3	4	0	0	2	0	0	0	0	1	0.5	0.5	0	11
	Texas	3	3	1	1	2	0	0	0	0	1	0	0	0	11
21	Maine	4	0	1	0	2	1	0.5	0	0	1	0	0	1	10.5
22	Tennessee	0	3	1	1	1	0	0	0	0	0	1.5	1	1	9.5
	Utah	0	1	1	1	1	1.5	0.5	0	0.5	1	1	1	0	9.5
24	Illinois	0	3	1	1	0	0	0	0	0	1	1	0.5	1	8.5
	Michigan	0	0	0	0	1	2.5	1	1	0.5	0	2	0.5	0	8.5
26	Delaware	0	0	1	0	2	1	0.5	0.5	0	1	1	0	1	8
	Florida	0	0	0	0	2	1	0.5	0.5	0	1	2	0	1	8
28	Arizona	0	0	0	0	2	1	1	0	0.5	1	0	1	1	7.5
29	New Mexico	0	0	1	1	2	0.5	0	0	0	1	1	0	0	6.5
30	Georgia	0	0	0	0	-2	3	0.5	0.5	0.5	0	1	1	0	4.5
31	Kansas	0	0	0	0	0	3	0.5	0	0	0	0	0	0	3.5

California and New York lead the way in the incentives section. Both states have comprehensive and substantial EV tax credits and rebates and score full points for their utility spending on EV charging infrastructure. In fact, both California and New York score full points in most metrics in this chapter, earning total scores of 27.5 and 26.5 out of 30, respectively.

After these two leaders, regional frontrunners include Massachusetts in the Northeast, Virginia in the Southeast, Washington State in the Northwest, Minnesota in the Midwest, and Colorado in the Southwest. Like California and New York, these states provide consumer-friendly financial incentives for EVs and EV charging equipment and notable utility incentives and utility spending to help support the adoption of EVs statewide.

Although Ohio did not make the cutoff for the top 30, it earned a perfect score for its heavy-duty EV financial incentives. The state's Environmental Protection Agency is offering matching funds from $50,000 to $2 million for the replacement of current heavy-duty equipment with all-electric vehicles. Heavy-duty EVs can be a significant financial expense for many potential buyers, and matching fund programs like Ohio's can go a long way toward facilitating early heavy-duty EV adoption. Only nine states scored more than half of the available points in the incentives chapter, meaning that most states have opportunities to grow their programs and progress in this space.

Establishing consistent and recurring incentive offerings as the EV market picks up momentum will be important for all states moving forward. A significant number of incentives, especially for heavy-duty EVs, are currently tied to more ephemeral sources of funding such as the Volkswagen settlement fund. While incentives that draw funding from temporary sources are impactful in the short term, finding ways to establish more permanent and reliable funding sources in the future, for example by tying funding to state cap-and-trade programs, general funds, or other state programs, is imperative to the success of EV adoption moving forward nationwide.

Light-Duty and Heavy-Duty EV Purchase Incentives

Light-duty EVs will likely reach upfront cost parity with gasoline vehicles by the end of this decade (Eisenstein 2019). And the total cost of ownership is significantly lower for electric vehicles than for internal combustion engines. However, the high upfront purchase cost still acts as a key barrier to uptake. For instance, a 2020 Nissan Leaf starts at $31,600, while a 2020 Toyota Corolla starts at just $19,600 (U.S. News 2020). This is especially true for heavy-duty EVs, which can cost up to $300,000, in some cases totaling twice as much in upfront costs as a functionally comparable diesel counterpart (ACT News 2020). To encourage consumers to purchase both new and used EVs, states may offer a number of financial incentives, including tax credits, rebates, and sales tax exemptions (Tal and Brown 2017). "Cash on the hood" rebates, which are immediately redeemable upon purchase of a vehicle, and tax credits are two especially appealing forms of incentive that states should consider. Rebates that are instantly redeemable are given greater weight in our scoring, as they do a better job of directly offsetting the additional upfront cost of EVs and making them more accessible to lower-income buyers. Tax credits may be effective at attracting high-income buyers, but they are far less influential for low-income purchasers who often do not carry a sufficient annual tax burden to qualify for the full tax credit. It is important that incentives be accessible to all communities within any state,

and that the benefits that EVs provide (less air pollution, improved respiratory health outcomes, lower upkeep costs) be equitably distributed. This means that providing additional incentives for low- and moderate-income earners will be a necessary step toward achieving a state's goals for comprehensive EV integration. In Chapter 6 we capture additional incentives for these communities in metrics that measure statewide EV investment and programs for low-income, economically distressed, or environmental justice communities; utility EV programs for those communities; and state EV school bus deployment requirements.

California was the only state to earn all available points for EV purchase incentives. In the *Scorecard*, state light-duty incentives and state heavy-duty incentives are worth 4 points each. Tables 6 and 7, below, outline our methodology for assigning points for these metrics.

Table 6. Scoring for light-duty EV purchase incentives

Purchase incentives (credit given for only one or the other)	Points (4)
State has a "cash on hood" rebate program for EV purchases	3
State has a tax credit for EV purchases	1
Low-income, economically distressed, and environmental justice communities	
State provides some form of additional incentive for purchasers from low-income, economically distressed, and environmental justice communities	1

Table 7. Scoring for heavy-duty EV purchase incentives

Purchase incentives (credit given for only one or the other)	Points (4)
State has a "cash on hood" rebate program for HD EV purchases	3
State has a tax credit for HD EV purchases	1
Upfront costs covered	
The state-supported grant, rebate, or tax credit program covers at least 25% or $25,000 of total vehicle costs	1

State Incentives for L2 and DCFC Chargers

As the market for EVs continues to grow, states will need to ensure that charging infrastructure keeps up with demand. Recent research highlights that 88 of the 100 most populous cities in the United States will need to double their charging infrastructure over the next five years to meet demand (Nicholas, Hall, and Lutsey 2019). Another report, by Atlas Public Policy and the Alliance for Transportation Electrification, finds that publicly accessible charging infrastructure will need to see up to a 16-fold increase by 2025 to meet ambitious EV deployment targets (Smith 2020).

States will have a pivotal role to play in establishing reliable charging infrastructure to support vehicle adoption, and state-backed financial incentives are a reliable way for them to do so. Encouraging the proliferation of both L2 and DCFC charging for public and private use is

important as each system helps service niche needs for EV owners. L2 chargers are commonly used in homes and in public retail locations, while DCFC chargers are useful for drivers on interstate highways who may need to charge quickly at a rest stop. A comparison of chargers is provided in figure 4, below. For both the L2 and the DCFC metrics, 1 point was awarded to states that provide a rebate or tax credit toward the installation of a charging unit, and an additional point was awarded if there are greater incentives available for installation of charging in low-income, EJ, or economically distressed communities.

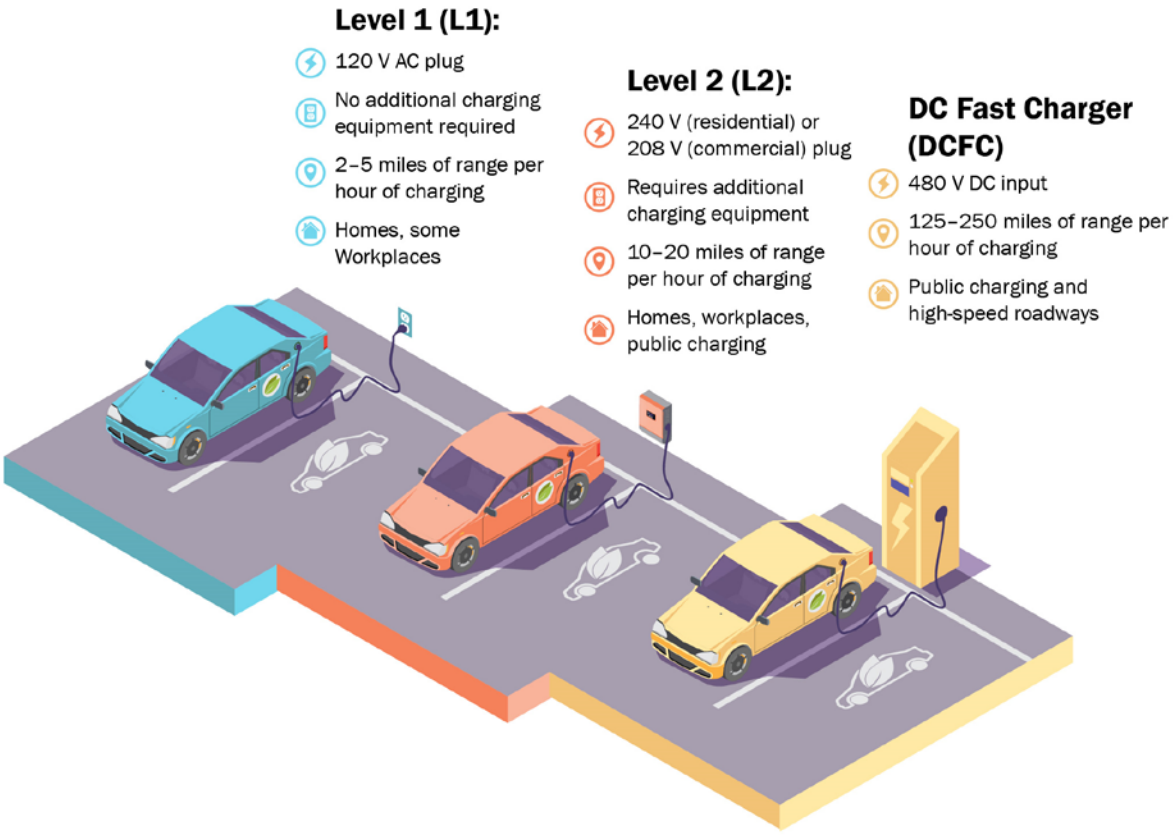

Figure 4. EV charging equipment types

EV Fees

As electric vehicle sales begin to ramp up across the country—and projections call for a steep increase in the rate of EV penetration—some states have applied additional registration fees to these vehicles. Judging from a review of a small sample of state bills, the primary motivation for these fees is to replace lost future gasoline tax revenues that fund road maintenance and related projects. To date, 28 states have imposed such fees, including Arkansas, Connecticut, Maine, North Dakota, and Rhode Island. In 2020 legislative bills across the country proposed annual fees ranging from $50 (Colorado and Hawaii) to $200 (Alabama, Arkansas, and Wyoming). A few states intend to use the funds to build out EV charging infrastructure to support increased deployment.

While all vehicle owners should contribute to the maintenance of the roads they drive on, there are several issues that these surcharges bring to light. First, EV fees can be at odds with state targets for EV deployment. Numerous states have tax credits in place to encourage EV sales (see Appendix C) yet also have high additional registration costs for EV drivers, policies that work against each other (Tomich 2019).

Moreover, these fees in some cases exceed what the driver of an average gasoline-fueled car pays in gas taxes. Some states' EV fees are based on inaccurate tax calculations that use high annual vehicle mileage figures and low average vehicle fuel economy. For example, North Carolina's proposed EV fee was set by assuming that the average vehicle in the state is driven 15,000 miles a year and gets 20 miles per gallon—and therefore pays more than $270 annually in gasoline taxes (Stradling 2019). Finally, EV fees in many states do not take into consideration that EV owners pay other taxes that owners of gasoline-powered vehicles do not.

States were evaluated by comparing their EV fees with the amount of gasoline tax revenue collected for the average internal combustion vehicle. Many states earned full points for this metric by having no EV fee at all. Of the states that do have an EV fee, only Iowa received full credit in our scoring for how the fee compares with revenues collected from internal combustion vehicles. States could earn up to 2 points or lose up to 2 points for this metric according to the methodology outlined in table 8. States that direct collected EV fee revenues toward EV charging infrastructure did not get any additional consideration in our methodology, given that any sort of significant additional fee can be detrimental to EV purchases in such a nascent market.

Table 8. Scoring for EV fees

Ratio of EV fee to gas tax revenue	Points
0–50%	2
51–100%	1
101–150%	0
151–170%	–1
> 170%	–2

Utility Programs and Incentives for EV Charging

Deploying EV charging infrastructure affordably, at scale and in a reasonable time frame, requires investment from multiple sources. The utilities that provide power for homes and businesses in America are well situated to incentivize and finance electric vehicle infrastructure in their service areas. Certain types of equipment, especially DCFC and fleet charging stations, can cost up to 10 times as much as private L1 or L2 chargers (DOE 2015). Utilities have access to funding through their rate base and may benefit from the load growth and infrastructure needs associated with EV deployment. Before ratepayer-funded utility spending plans can go into effect, they must undergo review by state regulators to ensure that the associated costs are reasonable, prudent, and aligned with the public interest. For this reason, regulated utility EV

charging infrastructure programs are an extension of the state's actions encouraging transportation electrification.

In our scoring under these metrics, we considered only infrastructure programs offered by regulated utilities. These generally include only investor-owned utilities and not municipal utilities or cooperatives.[17] Although many of these utilities provide EV-specific programs and incentives, they are not subject to regulatory approval and therefore do not represent state-level activity. However, smaller utilities play an important role in driving access to EV chargers on a local level, and particularly in more rural areas, and this supports states' efforts to reach their transportation electrification goals. The benefits of investing in EV programs flow not just to utility customers but to the utilities themselves: Both large and small utilities can benefit from EV load growth leading to more kWh sales, increasing customer engagement with targeted programs, strategic load management through smart charging, and a cleaner environment (Susser 2019). These are compelling reasons for utilities of all sizes to promote EVs and EV charging infrastructure among their customers.

Utility EV charging infrastructure metrics are divided into two categories: availability of approved programs, worth 3 points total, and spending, worth 6 points. For program availability, we considered three major EVSE categories: L2, DCFC, and commercial fleet charging programs. Each requires a unique approach to adequately serve that sector's needs.

UTILITY INCENTIVE OFFERINGS (PROGRAM AVAILABILITY)

We considered the following program offerings, shown in figure 5 below:

- **Utility service equipment:** Incentives for equipment upgrades on the utility-owned side of the meter for the purpose of serving electric vehicle charging loads.
- **Site-specific equipment:** Incentives to prepare a site for EV chargers through conduit installation, panel upgrades, or other necessary hardware improvements.
- **EV service equipment:** Incentives for hardware, network services, or other aspects of charging equipment installation in the form of rebates, grants, loans, etc.
- **Utility-owned infrastructure:**[18] EV service equipment built and operated by the utilities themselves. Can include any or all parts of the charging infrastructure described above.

For each of these EV service infrastructure categories, states earned 0.5 points for a regulated utility offering one of the four program types in an approved program, and a full point for offering two or more types. Such programs include make-ready investments, where utilities

[17] One exception is TVA, a federally owned entity that is not regulated at the state level. Because it sets rates for the local distribution companies, TVA is considered alongside other state-regulated utilities for the purpose of recognizing its achievement in this report. Although it serves parts of seven states in the region, we award TVA's points to Tennessee, because it serves most of the load in Tennessee but only in parts of other states.

[18] Although utility-owned infrastructure is not a direct "incentive" like a rebate or financing offering, increasing the availability of EV service equipment to end users is a key enabler of transportation electrification. This metric is represented as its own category due to an overall lack of specific data on which parts of the utility system were being upgraded in utility-owned infrastructure programs.

fund upgrades to utility- and customer-side electrical equipment; and EV charger incentives, such as rebates.[19] Other options are equipment leasing approaches, which are often combined with a special rate design or subscription; utility-owned and -operated programs; and hybrid program models. Utility-owned infrastructure often encompasses several of the above incentive categories, including make-ready on both the utility and the customer side and installing EV chargers; however, finding consistent data for the types of offerings associated with utility-owned infrastructure was not always feasible. For this reason, we considered utility-owned infrastructure its own category of investment alongside consumer-focused incentives such as rebates.

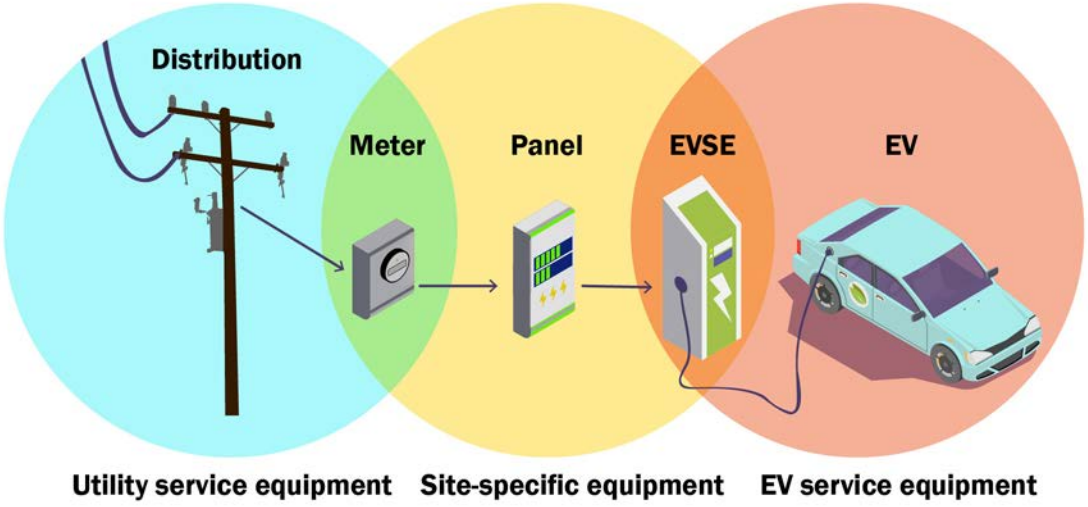

Figure 5. EV charging infrastructure

Whether utilities themselves should own and operate EV service equipment is an evolving issue without consensus in the literature. While such ownership may accelerate deployment and create ratepayer benefits, it may also limit competition for independent EVSE suppliers[20] (Khan and Vaidyanathan 2018). Some states allow such ownership, most frequently in underserved markets, such as MUDs and rural areas, which may struggle to attract private investment. Beyond underserved markets, some commissions are approving broader sets of utility-owned investments to support more rapid market transformation, leveraging utilities' low cost of capital, ease of access to grid infrastructure, and established relationship with consumers. For example, although the California Public Utilities Commission (CPUC) initially focused only on underserved markets in reviewing such applications, in 2014 it updated guidance to consider such utility requests on a case-specific basis by using a test that balances multiple factors (CPUC

[19] On-bill financing is another type of incentive that helps customers effectively manage the costs of installing specialized EV service equipment. We did not include it in the data set due to a lack of program examples.

[20] In prior reports, such as the *Utility Energy Efficiency Scorecard*, ACEEE has not awarded points for utility ownership of EVSE due to competitiveness concerns. The approach in this *Scorecard* is different, in recognition of evolving perspectives on utility ownership in state regulatory decisions. Accordingly, we award points for a variety of market development models, including utility-owned EVSE incentives.

2014). Since then, utilities have proposed, and commissioners across the country have adopted, several approaches and models for EV market development, including utility ownership. Given this diversity of approaches, and recognizing the careful PUC reviews in advance of such investments, we include ratepayer investments in utility-owned EV chargers in this EVSE investment category.

UTILITY SPENDING ON EV CHARGING INFRASTRUCTURE INCENTIVES

The EV charging infrastructure spending category, worth up to 6 points, considers utility spending on plans approved since January 1, 2017, with partial credit given for spending plans that are awaiting approval, as discussed below.[21] This spending represents all types of programs across L1/L2, DCFC, and fleets. The reason for consolidating program spending into one metric is that many utility spending plans do not specify the ratio of spending on, for example, L2 versus DCFC, but provide a flexible pool of funds from which the utility can draw to meet its EV charging targets. Points were assigned on a sliding scale based on spending per eligible customer in the utility's service territory, as shown in table 9.

Some utilities have proposed investments that have not yet been approved by the state regulatory commission. We sought to recognize the contributions these utilities can make to state action by awarding partial points for spending plans that were filed in 2019 and the first 10 months of 2020. Utilities received 0.5 points for proposed spending on utility service equipment, site-specific equipment, EV service equipment, and utility-owned infrastructure. This resulted in higher scores in certain states like Colorado and Rhode Island, where Xcel CO and National Grid, respectively, have proposed large spending packages. If approved, these plans are likely to have a far-reaching impact on EV deployment statewide.

More detailed utility program examples can be found in Appendix C.

Table 9. Scoring for utility EV charging infrastructure spending

Spending per customer	Points (approved spending)	Points (proposed spending)
$0.01–0.49	0.5	0.5
$0.50–0.99	1	0.5
$1.00–1.99	1.5	0.5
$2.00–2.99	2	0.5
$3.00–3.99	2.5	0.5
$4.00–4.99	3	0.5
$5.00–7.99	3.5	0.5

[21] This time period was chosen to reflect the limited time frame and budget under which most incentive programs operate. While this excludes utility spending from 2016 and earlier, the results from past programs are recognized in the "Transportation Electrification Outcomes" section of this report.

Spending per customer	Points (approved spending)	Points (proposed spending)
$8.00–9.99	4	1
$10.00–14.99	4.5	1.5
$15.00–24.99	5	2
$25.00–49.99	5.5	2.5
$50.00 +	6	3

EV Charger Exemption from Public Utility Definition

Just as gas stations charge their customers per gallon of gas, public EV charging stations often provide their services on a per-kilowatt-hour (kWh) basis. Gasoline is an unregulated fuel, and the owners of gas stations may freely set the prices they charge per gallon. However, the price of electricity is traditionally set through the regulatory process. Because of this, state legislatures and commissions have questioned whether public EV service providers should count as a regulated utility.[22] Classifying all EV service providers as such means that private businesses providing charging services are unable to set their own charging prices. This has a noncompetitive effect, which can make the EV service market prohibitively burdensome to all nonutility providers of EV charging (Sangi 2013). For this reason, many state legislators and regulators have exempted privately owned EV service providers from being defined as a public utility. In the interest of promoting fairness and competition in the charging market, we awarded 1 point to states that have enacted a regulatory or legal decision that exempts providers of EV charging from these requirements on a statewide basis.[23] Thirty-three states have done so, and several others are considering it, including Michigan, Kansas, and Wisconsin.

Volkswagen Fund Allocation for Electrification

- The Volkswagen (VW) Environmental Mitigation Trust was established on October 2, 2017, to mitigate diesel-related nitrogen oxide (NOx) emissions resulting from VW's use of defeat devices to overcome stringent NOx standards. The trust, stemming from a settlement between VW and the states, consists of $2.9 billion allocated to all 50 states (plus the District of Columbia and Puerto Rico) to fund eligible actions that replace mobile sources of NOx emissions with cleaner technologies. The allocation structure is based primarily on the number of registered affected VW vehicles within the boundaries of each state (EPA 2020c). Beneficiaries can choose the eligible mitigation actions that are best for their states and decide how much of the funding will go to electric transportation.

[22] When utilities themselves operate charging stations and sell electricity to the public, they are still required to receive approval for EV charging rates. This exemption applies only to third-party owners of EV chargers who are providing services in the public EV charging market.

[23] It is possible in future for charging providers to behave like utilities to such an extent that they should no longer receive this exemption. Procuring energy on the wholesale electricity market would be one such behavior. In those cases, exemption policies would need to shift.

For this metric, states were evaluated and scored on the basis of three factors: prioritization of electrification projects in the state's mitigation plan (up to 2 points), funds awarded for electrification projects to date (up to 1 point), and the mitigation plan's commitment to low-income, economically distressed, or EJ communities (1 point).

Each state was required to develop a plan on how to use its share of funds from the VW Environmental Mitigation Trust. The U.S. Public Interest Research Group (PIRG) developed an eight-question grading system to evaluate how each state's mitigation plan prioritizes electrification projects (Casale and Mahoney 2019). Table 10 lists these questions.

Table 10. Prioritization of electrification in states' VW mitigation plans

U.S. PIRG's eight-question evaluation: (+1) indicates a point awarded; (+0) indicates a point withheld
Are electric vehicles prioritized in funding? Yes (+1) or No (+0)
Are electric vehicles prioritized in stated plan goals? Yes (+1) or No (+0)
Are electric buses prioritized? Yes (+1) or No (+0)
Are diesel vehicles eligible for more than 15% of total award? Yes (+0) or No (+1)
Are diesel vehicles ineligible for funding? Yes (+1) or No (+0)
Are other "alternative fuel" vehicles, like compressed natural gas or propane, eligible for 15% of total award? Yes (+0) or No (+1)
Is charging infrastructure eligible? Yes (+1) or No (+0)
Is the state using 15% of its award on charging infrastructure projects? Yes (+1) or No (+0)

Source: Casale and Mahoney 2019

We leveraged U.S. PIRG's eight-question system to score states' prioritization of electrification in their VW mitigation plans. We recognize that the goal of the VW Environmental Mitigation Trust is to reduce NOx emissions broadly in the transportation sector through the use of various technologies, including electrification. Given that this *Scorecard* focuses on maximizing reductions in energy use, GHG emissions, and criteria pollution through EVs, this metric focuses exclusively on activities that direct VW funds toward light- and heavy-duty electrification.

Table 11 below shows the methodology used to award states a maximum of 2 points based on how well their VW plan prioritizes electrification projects.

Table 11. Scoring for prioritization of electrification in VW mitigation plans

Points awarded in U.S. PIRG's eight-question evaluation	Points
7–8	2.0
6	1.5
5	1.0

Points awarded in U.S. PIRG's eight-question evaluation	Points
4	0.5
3	0
2	0
1	0

To date, states have been awarded a total of nearly $900 million via the VW Environmental Mitigation Trust to fund various transportation projects. Table 12 shows the methodology used to award states a maximum of 1 point based on the percentage of VW trust funds awarded to date that have supported electrification projects.

Table 12. Scoring for Volkswagen Environmental Mitigation Fund awards

VW funds awarded to date to support electrification projects	Points
≥ 70%	1.0
≥ 40%	0.5

Although states have limited control over the proportion of funding requests that are focused on electrification, they entirely determine which ones to prioritize for VW funding. As a result, we believe that this metric is a useful benchmark of a state's commitment to transportation electrification more broadly.

States received 1 point if their mitigation plan includes explicit language directing funds to projects that benefit low-income, economically distressed, or EJ communities, or if such projects are given higher priority in the selection process.

Hawaii and Rhode Island were the only states to receive a perfect score of 4 points for this metric. Hawaii's plan leverages most of its funds to procure electric school, transit, or shuttle buses and the maximum amount of eligible funding, 15%, for projects that facilitate the deployment of light-duty EV chargers. To date, Hawaii has awarded funds to procure electric transit buses and build out EV charging infrastructure.

Similarly, Rhode Island's plan allocates 75% of its VW funds to replace 20 diesel-powered transit buses with zero-emission buses (ZEBs), with the remaining funds allocated for EV chargers and administration fees. Rhode Island's plan launched in 2018 with the lease of three all-electric buses, giving the Rhode Island Public Transit Authority (RIPTA) the opportunity to pilot the new technology, train staff, and test the performance of the new buses on a variety of routes. The final phase of Rhode Island's plan is scheduled to begin in 2021 and calls for RIPTA to purchase 16 to 20 electric buses as permanent additions to its fleet (RIPTA 2020).

Nonfinancial Incentives

Making EV ownership more appealing and removing barriers to installing EV chargers are important steps to increase EV adoption. Rebates and tax credits are pivotal in steering consumers toward purchasing an EV, but nonfinancial incentives—including HOV lane access, licensing incentives, streamlined permitting for EV chargers, and preferred parking—can help make EV driving and ownership more compelling.

Eleven states earned full credit for this metric, and another 7 states got half credit. Each nonfinancial incentive a state has in place was worth 0.5 in our scoring; states could earn up to 1 point in total for this metric. The Alternative Fuel Data Center (DOE 2020) was the primary source of information for this metric.

Direct Sales Regulations

Making purchasing an EV as easy as possible will help expedite adoption across the country. Many traditional dealerships do not sell or stock a large number of EVs, likely in part because of profit considerations. The lifetime maintenance costs associated with an EV can be as much as 50% less than those of their internal combustion counterparts (Hanley 2020). And dealerships make up to half their profit from servicing vehicles (Edmunds 2019). This threatens many dealerships' business model and may discourage dealerships from proactively marketing and selling EVs. There is also evidence that traditional dealers are ineffective at selling EVs because of a lack of comfort around and understanding of the product (Gerdes 2017). States can take an important step in facilitating increased EV sales by allowing EV-only manufacturers to sell directly to consumers.

We awarded 1 point to states that do not have legislation barring direct sales of vehicles to customers by manufacturers. We reviewed and vetted data for scoring from a Tesla enthusiasts' website. Only 14 states in total earned credit for this metric, meaning that there is still a significant amount of work to be done.

UNSCORED METRICS

Education

In this section, we chose not to score education-focused programs led by state agencies and utilities. Although such programs deliver an important benefit in informing consumers and businesses about how best to navigate EV ownership and charging, we decided against scoring such programs due to a lack of consistent, available data.

Chapter 4. Transportation System Efficiency

INTRODUCTION

The transportation sector is the largest source of GHG emissions in the United States and accounts for 28% of the nation's economy-wide GHG emissions (EPA 2020b). While transportation electrification will go a long way toward reducing GHGs, a true systems approach is needed to ensure that we maximize emissions reduction while also improving lives by providing accessible, cost-effective, equitable, and clean mobility options for all. A majority of past public investments and policies were made to support a transportation system built upon the internal combustion engine. Moving forward, public policy and investment should support the creation of a more efficient transportation system alongside a transition to EV technologies.

State policy actors can influence the transition to a more efficient transportation system by setting policies that address the system as a whole while also encouraging the use of electrified vehicle options. The policies discussed in this chapter are important steps states can take to promote this transition, and the scoring reflects the impact of each policy. The policy areas we chose to focus on in this chapter were selected, with input and feedback from our advisory committee, because of the clear role states play in those areas.

In this chapter we review and score states on the following policies:

- Transportation sector GHG reduction targets (2 points)
- GHG pricing policies (3 points)
- Transit agency bus goals and procurement (4 points)
- State investment for EV transit bus deployment (2 points)
- Policies to encourage shared EV fleets (1 points)

RESULTS

Table 13 presents scores for the top 30 states in the area of transportation system efficiency.

Table 13. Scores for transportation system efficiency

Rank	State	Transportation sector GHG reduction targets (2 pts.)	GHG pricing policies (3 pts.)	Transit agency bus goals and procurement (4 pts.)	State investment for EV transit bus deployment (2 pts.)	Policies to encourage shared EV fleets (1 pt.)	Total (12 pts.)
1	California	2	3	4	2	1	12
2	District of Columbia	2	1	4	1	1	9
3	Connecticut	0	1	4	1	0	6
	New Jersey	0	1	4	1	0	6
5	Maryland	2	1	0	2	0	5
	Oregon	2	2	0	1	0	5

Rank	State	Transportation sector GHG reduction targets (2 pts.)	GHG pricing policies (3 pts.)	Transit agency bus goals and procurement (4 pts.)	State investment for EV transit bus deployment (2 pts.)	Policies to encourage shared EV fleets (1 pt.)	Total (12 pts.)
7	Colorado	0	0	2	2	0	4
	Massachusetts	2	1	0	1	0	4
	New York	0	0	2	2	0	4
	Washington	2	0	0	2	0	4
11	Minnesota	2	0	0	1	0	3
	Virginia	0	1	0	2	0	3
13	Delaware	0	1	0	1	0	2
	Pennsylvania	0	1	0	1	0	2
	Rhode Island	0	1	0	1	0	2
	Vermont	0	1	0	1	0	2
17	Arizona	0	0	0	1	0	1
	Florida	0	0	0	1	0	1
	Georgia	0	0	0	1	0	1
	Hawaii	0	0	0	1	0	1
	Illinois	0	0	0	1	0	1
	Kansas	0	0	0	1	0	1
	Maine	0	0	0	1	0	1
	Michigan	0	0	0	1	0	1
	Missouri	0	0	0	1	0	1
	Nevada	0	0	0	1	0	1
	New Mexico	0	0	0	1	0	1
	North Carolina	0	0	0	1	0	1
	Tennessee	0	0	0	1	0	1
	Texas	0	0	0	1	0	1
	Utah	0	0	0	1	0	1

California earned all available points in the transportation system efficiency chapter. It is the only state to have a comprehensive carbon pricing policy in place, which allowed it to pull ahead of other states in this category. Likewise, California is the only state to receive full points for both its transit agency bus goals and procurement policy and its EV transit bus investments, exemplifying the state's commitment to transitioning its public bus fleets to ZEVs.

The District of Columbia earned the second-highest point total, with 9 points out of 12, and is the only jurisdiction besides California to receive more than half of the available points in this chapter, receiving at least partial credit for every metric.

All the top 30 states received points for their investment in EV transit buses, through the Federal Transit Administration's Low or No Emission (Low-No) grant program. State entities should continue to prioritize the Low-No program as an existing funding stream to further advance the transition to EV transit buses.

Connecticut and New Jersey tied for the third-highest score, each receiving half the available points in this chapter. Both states' scores reflect their mandates for transit agencies to procure zero-emission buses. Setting a zero-emission bus procurement target for transit agencies to reach by a specific date can drive the requisite planning efforts by municipal governments and signal market demand to bus suppliers, operators, and capital providers (C40 2020).

Six states and the District of Columbia have a GHG emission reduction goal for the transportation sector, but only California and Oregon have active programs that help incentivize GHG reductions through carbon pricing mechanisms.

Setting a GHG emissions reduction goal and commitment for the transportation sector is an important first step states can take to guide their transportation systems to be more efficient and EV-friendly. The remaining four metrics in this chapter can act as tools to compliment a state's GHG emissions reduction goal.

Transportation Sector GHG Reduction Targets

Increased transportation electrification will go a long way toward reducing energy use and GHG emissions in the transportation sector in the long term. However, EV deployment will need to be complemented by a suite of other transportation policies to ensure that states are maximizing GHG emissions reductions from the transportation sector.

Transportation-specific GHG reduction targets are a useful way for states to think about the transportation system and strategies to reduce GHG emissions holistically. Setting meaningful targets is an important step in establishing a road map of policies and providing states with specific benchmarks against which to measure progress. States earned 2 points in the *Scorecard* if they have adopted transportation-specific GHG reduction goals.

Just 7 jurisdictions out of the top 31 have transportation-specific GHG targets in place: California, District of Columbia, Maryland, Oregon, Massachusetts, Minnesota, and Washington. The District of Columbia has the most stringent reduction target; it aspires to reduce greenhouse gas emissions from transportation by 60%, using 2006 emissions as a baseline, by 2032.

GHG Pricing Policies

The emissions that result from burning fossil fuels are not just the leading factor contributing to climate change; they also represent a market failure. Carbon pricing policies aim to put a price on carbon emissions, the idea being that if emitting GHGs increases costs, then the market will

find a way to reduce emissions at the lowest possible cost (Nuccitelli 2016). However, carbon has historically been priced too low, as the price does not accurately consider all of the negative externalities associated with GHG emissions (Chen, van der Beek, and Cloud 2019).

The main types of carbon pricing structures generally used are a carbon tax or fee, cap-and-trade, or cap-and-invest. A carbon tax charges a fee for each unit of carbon dioxide (CO_2) that is emitted. A cap-and-trade system sets a limit, or cap, on the total amount of CO_2 that can be emitted and divides this total into emissions allowances that decline over time. It then distributes these allowances among GHG-emitting companies, creating a market in which allowances can be bought and sold. Cap-and-invest policies are designed to specifically direct revenues generated by the policy to complementary programs, policies, and technologies that reduce emissions. The revenue generated from carbon pricing policies can be an effective tool to advance transportation electrification and create funding streams for EVs.

States that have a carbon pricing policy for the transportation sector in place received 2 points; states that are currently in the process of developing such a policy received 1 point; and states that have a carbon pricing policy received an additional 1 point if a portion of revenue generated by the policy is directed to programs for low-income, economically distressed, and environmental justice communities. California's Cap-and-Trade Program and Oregon's Clean Fuels Program are the only adopted state GHG pricing policies that impact the transportation sector.

California's program reduces GHG emissions from major sources, including the transportation sector, by setting a cap on statewide GHG emissions while employing market mechanisms to cost effectively help achieve the state's emission reduction goal. Revenues from the program are deposited into the state's Greenhouse Gas Reduction Fund and then appropriated to state agencies to implement programs that further reduce greenhouse gas emissions, and 35% of the revenues are required by law to be directed to disadvantaged and low-income communities.[24]

A number of states are participants in the Transportation and Climate Initiative's proposed regional cap-and-invest program. The program, which is still in the design phase, will be implemented as early as 2022. Its members, including 11 Northeast and Mid-Atlantic states and the District of Columbia, are seeking to improve clean transportation options, develop the clean energy economy, and reduce carbon emissions from the transportation sector (Climate XChange 2020).

Transit Agency Bus Goals and Procurement

Transit agencies (or districts) are government agencies, or in some cases public-benefit corporations, that provide public transportation within a specific region. Although states rely on local transportation programs for planning within a region, they can establish overall policy

[24] California uses the term *disadvantaged* to refer to communities that bear the greatest economic, health, and environmental burdens.

and funding allocation for transit agencies. Buses are the backbone of most public transit systems across the country. They move people around far more efficiently than personal vehicles and provide a service that many members of low-income communities and communities of color rely on to get to work, school, and essential services.

Procurement decisions made by transit agencies have long-lasting effects, as a public bus generally has a useful life of around 14 years (FTA 2016). In addition to subsidies offered by the state, procurement guidelines and practices may also help transit agencies address upfront costs and other barriers associated with EV adoption. Transit agency procurement of electric buses may be able to make up for higher acquisition costs through lower operation and maintenance costs over the useful life of the asset. CARB estimates that an electric bus purchased in 2016 can save $458,000 in fuel and maintenance costs compared with a diesel bus over the lifetime of the asset (CARB 2017).

New Jersey's Senate Bill 2252 of 2018 mandates that zero-emission vehicles make up 10% of new bus purchases made by the New Jersey Transit Corporation by the end of 2024, 50% by the end of 2026, and 100% by 2032 (New Jersey Legislature 2018).

Although transit procurement policies are typically determined by transit agencies and cities, states still have a role to play in helping transit providers achieve their goals and dictating how quickly the transition to EVs occurs.

States that have a mandated zero-emission transit bus procurement target for transit agencies, established via legislation or executive order, received 4 points. States that have a nonbinding goal or commitment to electrify transit fleets received 2 points, as did states where a joint purchase agreement is in place among multiple transit agencies to purchase EVs. Only six jurisdictions earned points for this metric: California, Colorado, Connecticut, the District of Columbia, New Jersey and New York.

State Investment for EV Transit Bus Deployment

Currently there are few funding streams available to states to support municipal, state, and transit agency investment in EV bus deployment. Aside from the Volkswagen Environmental Mitigation Trust, discussed in the previous chapter, such funding comes predominantly from the Federal Transit Administration (FTA) through the Low-No grant program. The proportion of these funds that states allocate to EVs can be a reasonably good measure of the state's commitment to ramping up transportation electrification within their transit bus fleets. Unfortunately, transit ridership and fare revenue have drastically dropped due to COVID-19. While state investment in ZEBs may currently be a challenge for transit agencies with access to limited state resources, sustained investment in ZEBs by states will lead to a more efficient and equitable transportation system in the long term.

States were awarded 1 point if funding received through the FTA's Low-No grant program has been allocated toward the purchase of EV transit buses. States could receive an additional point if a state-administered and -funded program exists for the purchase of EV transit buses. All but three of the 50 states have utilized Low-No funds to fund ZEBs.

CARB's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP) directly invests in zero-emission transit buses by working with dealers to apply a voucher incentive at the time of purchase for eligible zero-emission vehicles. Washington's Green Transportation Capital Grant provides transit agencies in the state funds for projects that reduce the carbon intensity of the Washington transportation system, such as the purchase of EV transit buses. The New York Truck Voucher Incentive Program (NYTVIP) provides vouchers, or discounts, to fleets across the state to purchase or lease electric transit buses. Voucher incentive amounts differ by vehicle technology, vehicle weight class, and location where the vehicle is domiciled.

Policies to Encourage Shared EV Fleets

The influx of car-sharing and ride-sharing platforms in the marketplace has in recent years reduced the need for car ownership and increased the available mobility options for urban residents. As car-sharing companies and TNCs, such as Uber and Lyft, continue to grow in fleet size, usage, and inherent impact on transportation energy use and emissions, states have the opportunity to influence them to adopt policies that prioritize EVs. While we recognize that the COVID-19 pandemic has made shared transportation less viable for many individuals, we believe that such policies in the long run will be crucial to limiting emissions from ride-hailing services as the economy bounces back.

States could receive 1 point for a policy that requires or encourages EV deployment in private shared fleets. Only California and the District of Columbia earned points for this metric. Per DC Law 22-257, or the Clean Energy DC Omnibus Amendment Act of 2018, by January 1, 2022, and every two years after, private vehicle-for-hire companies, including TNCs, must develop a greenhouse gas emissions reduction plan. The plan must include proposals on how to meet goals for reducing emissions by increasing the proportion of participating drivers using zero-emission vehicles and increasing the proportion of miles completed by zero-emission vehicles relative to all miles (Council of the District of Columbia 2018). California's Clean Miles Standard and Incentive Program will implement new requirements for TNCs to curb GHG emissions and will push these companies to consider solutions such as goals for increasing the share of miles traveled using zero-emission vehicles.

UNSCORED METRICS

Electric Micromobility Solutions

We recognize the important role that electrified micromobility solutions (e.g., electric scooters, e-bikes) play in the efficiency of a robust electrified transportation system. The proliferation of such programs can add to the travel options people have in urban environments and can be used as last-mile solutions to bridge the gap in transit service. If designed correctly, these programs can also increase access to mobility options for marginalized communities. We chose not to include metrics on electric bikes and scooters because micromobility efforts and funding typically fall under local jurisdiction, making it unclear what role the state could play to further those programs.

Chapter 5. Electricity Grid Optimization

INTRODUCTION

In the modernized electric grid system, utilities are charged with delivering clean, reliable, and affordable power to all customers within their service territory. If managed effectively, electric vehicles can create a less-polluting energy and transportation system. The average EV produces no tailpipe emissions, and in many parts of the country, emissions from charging electric vehicles are lower than the emissions produced by a traditional internal combustion engine (Vaidyanathan 2016). The carbon footprint of EVs will only improve with increasing penetration of a low-carbon electricity supply (Reichmuth 2020). Further, because EVs lead to increased energy sales, their proliferation may in turn lead to reduced electricity rates for all utility customers—even those who do not own an EV (Frost, Whited, and Allison 2019).

Utilities will be an essential component of this transition. With targeted rates and managed charging, utilities can influence when EVs are plugged in, helping to make more efficient use of variable renewable resources. However, if poorly managed, a major influx of EVs could create strain on the electric distribution system and drive an increase in peak demand. This could lead to costly and avoidable infrastructure upgrades, as well as potentially more air pollution from the combustion of fossil fuels to meet peak demand. These negative consequences can be avoided or mitigated through planning and optimization of the electric vehicle load.

We evaluated state-regulated utilities that offer targeted rates and services to incentivize and manage smart EV charging in order to alleviate its impact on the grid. At the same time, utilities need to balance grid impacts with consumer-focused rates in order to keep EVs attractive for residential and business customers. Several metrics are included in this category. States earned points for offering targeted pricing for L2 charging, such as time-varying (time-of-use) rates or dedicated EV rates. For DCFC charging, we recognized states offering electricity rates that balance grid needs with better economics under low utilization to encourage development of a widespread DC fast charging network. The managed charging metric recognizes programs or pilots that deploy EV charging on demand as a grid resource; an additional, bonus point was awarded to states that are piloting vehicle-to-grid technologies. We also evaluated the carbon footprint of states' power generation and policies that lead to improvements in power sector emissions. Total scores for the top 30 states are listed in table 14.

In this chapter, we review and score states on the following policies:

- Time-varying charging rates for L2 chargers (3 points)
- DCFC-specific charging rates (2 points)
- Managed charging programs (1 point)
- Vehicle-to-grid programs (1 bonus point)
- Electric power sector emissions goals (4 points)

RESULTS

Table 14. Scores for electricity grid optimization

Rank	State	Time-varying rates for L2 chargers (3 pts.)	DCFC-specific rates (2 pts.)	Managed charging programs (1 pt.)	Vehicle-to-grid pilot (+1 bonus)	Electric power sector emissions targets (4 pts.)	Total (10 pts.)
1	California	3	2	1	1	4	11
2	New York	1.5	2	1	1	4	9.5
3	Hawaii	3	2	0	1	3	9
4	Nevada	3	2	0	0	3	8
	Vermont	3	0	1	0	4	8
6	Maine	1.5	2	0	0	4	7.5
7	District of Columbia	3	0	0	0	4	7
	Massachusetts	3	0	1	0	3	7
	Virginia	3	0	0	1	3	7
10	Colorado	3	0	0.5	0	3	6.5
	Minnesota	3	2	0.5	0	1	6.5
12	Maryland	3	2	0	0	1	6
13	Connecticut	1.5	0	0	0	4	5.5
	Tennessee	1.5	2	0	1	1	5.5
	Washington	0	2	0.5	0	3	5.5
16	Arizona	3	0	0	0	2	5
	Delaware	3	0	0	0	2	5
18	Oregon	3	0	0.5	0	1	4.5
19	Georgia	3	0	0	0	1	4
	Michigan	3	0	1	0	0	4
	Pennsylvania	0	2	0	0	2	4
22	Florida	1.5	0	1	0	1	3.5
	Illinois	1.5	0	0	0	2	3.5
	North Carolina	1.5	0	0	0	2	3.5
25	Kansas	3	0	0	0	0	3
	New Jersey	0	0	0	0	3	3
	Rhode Island	0	0	0	0	3	3
	Utah	3	0	0	0	0	3

Rank	State	Time-varying rates for L2 chargers (3 pts.)	DCFC-specific rates (2 pts.)	Managed charging programs (1 pt.)	Vehicle-to-grid pilot (+1 bonus)	Electric power sector emissions targets (4 pts.)	Total (10 pts.)
29	New Mexico	0	0	0	0	2	2
30	Missouri	0	0	0	0	0	0
	Texas	0	0	0	0	0	0

There are clear leaders among states in terms of efforts to plan for and optimize EVs on the electric grid system. California was the only state to earn a perfect score, as well as a bonus point for vehicle-to-grid pilot programs. New York came in second, earning close to full points, its score marred only by the lack of an EV-specific L2 charging rate. Other leading states included Hawaii, Nevada, and Vermont. Out of all 50 states, the largest number (36) earned points in the time-varying charging rates category, which indicates utilities are largely aware of the opportunity to reduce costs on the system by managing overall peak demand. Far fewer states earned points in the DCFC rates category, with only 11 states receiving the 2 possible points for including these types of technology-specific rates. The same number of states are offering managed charging programs and pilots, with some utilities, like Duke Energy Florida, making participation in managed charging a prerequisite to receiving other EV incentives. Due to the comparatively nascent nature of DCFC deployment and managed charging efforts, these low numbers are unsurprising, and they indicate there is strong potential for utilities to build out more options for customers to participate in EV demand management. In terms of electric power sector emissions, 34 states included some type of goal for reducing emissions over the next 15 years. This means that EVs in those states will contribute less and less life-cycle carbon emissions over time.

There are some straightforward and relatively inexpensive ways in which states, regulators, and utilities can better optimize EV charging for the grid. Time-varying EV rates for L2 charging are a recognized and effective way to deliver both lower prices to EV customers and better outcomes for the electricity system (Frost, Whited, and Allison 2019). For customers who would prefer to cede control of charging to a utility or program administrator in exchange for a rebate or other incentive, residential and public managed charging programs provide another option for load control. States should also consider policies that support economic development of DC fast charging, which otherwise can become prohibitively expensive to build and operate due to high demand charges. Lastly, as carbon-free energy sources like wind, solar, and energy efficiency become increasingly cost competitive with fossil fuels, states can further encourage decarbonization by establishing targets for the electric industry, thereby reducing the life-cycle emissions of every EV on the road.

Time-Varying Rates for L2 Chargers

Well-designed pricing and electric rates that vary according to the time of use can incentivize customers to shift their charging to off-peak hours (Khan and Vaidyanathan 2018). Currently most residential electric rates are very simply structured, with a flat per-kWh charge that does

not vary by time of day. This does not represent actual costs to generate electricity, which fluctuate based on time of day and weather conditions. The higher the total net demand on the electricity system, the more expensive it becomes to deliver power to everyone. Time-of-use (TOU) rates seek to address this by offering power more cheaply during off-peak times, such as at night, with the goal of incentivizing consumers to spread out the times when they use electricity (Chitkara et al. 2016). Because EVs can more easily shift their charging to off-peak hours, they are considered "flexible" load and are well situated to take advantage of time-varying rates. A stronger price signal is correlated with more responsive customer behavior, particularly by charging during "super-off-peak" times (Cook, Churchwell, and George 2014). Whether by offering a specific rate exclusively to electric vehicle owners or by marketing a general whole-home TOU rate to households that own a plug-in vehicle, the price of charging at home or in the workplace can be altered to more accurately represent system costs. As a result, EV owners who charge during high-demand times will pay their fair share for contributing to electric system peak demand, while those who take advantage of times when electricity—particularly clean electricity—is abundant and cheap will save on charging costs.

For our analysis of utility time-varying rate design offerings such TOU, we included only rates that:

- Were approved by a state's regulatory commission
- Contain at least two rate periods: a lower, off-peak value and higher, on-peak value. (Some rate structures have additional periods, such as "super-peak" or "super-off-peak.")
- Target the residential or commercial sector for L1 or L2 charging (not DCFC)

This metric earned states 1.5 points for a general time-of-use rate and a full 3 points for an EV-specific time-varying rate. This metric was worth more points than the DCFC metric due to the higher percentage of time spent by vehicles plugged into L1 or L2 chargers, representing a larger opportunity for load shifting. Details on the rates and managed charging programs offered by investor-owned utilities for private charging are available in Appendix E.

DCFC-Specific Rates

DCFC, which can consume a large volume of power over a very short time, can be costly to operate in some rate designs that include demand-based charges.[25] In some cases of low utilization, these account for more than 90% of a charging station's electricity costs (Nelder 2017). Because of this, some utilities are offering DCFC-specific rates or providing incentives to reduce or avoid a high demand charge in order to make the market for DCFC investment more viable.

A "DCFC business rate" should balance the need to encourage grid integration through price signals with the charger profitability and customer economics needed for market viability

[25] The cost to operate DCFC will depend on usage patterns and the particular design of the demand charge. Costs are highest 1) where DCFC station utilization is low, resulting in a power consumption profile with low average consumption and high peaks, 2) when those peaks coincide with times of high grid system demand, and 3) where rate designs include demand-based charges to discourage consumption during such peaks.

(Nelder 2017). Such a rate may take a variety of forms, including a sliding-scale volumetric rate, with per-kWh charges decreasing and demand charges increasing based on utilization; demand charge "holidays" that offer relief from high demand charges on specific off-peak days; or "subscription" rates for commercial charging.[26] Some other designs preserve the price signals from time-varying rates or demand changes but offer an incentive outside the rate design that aims to cover demand charges and provide support for operating expenses.

In our scoring, a state-regulated utility that offers an approved DCFC-oriented rate received 2 points. Although there may be differences among these rates and their effectiveness in driving adoption of DCFC, we gave them equal weight in this *Scorecard* due to the relative rarity of such rates and the importance of stimulating the emerging DCFC market in this critical stage of the industry's development.

Managed Charging Programs

Another approach to grid optimization is using EV batteries themselves as a flexible grid resource. Since the average personal vehicle spends 95% of its lifetime parked and not moving, that idle battery capacity could potentially be used to provide flexibility value to the grid. This can be accomplished by aggregating large numbers of vehicle batteries with managed (sometimes called controlled) charging technology (V1G) or through vehicle-to-grid (V2G) discharging (Khan and Vaidyanathan 2018). While most EV battery warranties currently prohibit discharging for purposes other than operating the vehicle, there is an opportunity for utilities or third parties to aggregate charging and adjust or curtail loads as necessary to provide a V1G demand-response resource. Although such demand response has not been widely adopted in private home, workplace, or public charging environments, some utilities are offering pilots or programs to allow aggregated control of EV charging demand.

We awarded 1 point for an approved program and 0.5 points for a pilot offering. Vehicle-to-grid (V2G) programs, where they exist, merited a bonus point but were not included in the overall total due to their relative scarcity in 2020. Only five states featured V2G offerings, all pilots: California, New York, Hawaii, Virginia, and Tennessee.

Electric Power Sector Emissions Goals

EVs that run exclusively on electricity do not produce tailpipe emissions. Reducing tailpipe emissions has important health benefits to communities in addition to improving the GHG impact of the broader transportation sector. That said, the power source that charges vehicles, and its associated emissions profile, have implications for the overall GHG reduction benefit and other related health benefits of EVs.

States have acted to reduce power sector emissions through strategies such as an energy efficiency resource standard, a clean energy standard, a renewable portfolio standard, or some

[26] A "subscription" rate model involves a fixed monthly payment for EV charging services. It may or may not also include a demand charge or restrict charging to off-peak hours. For an example of such a rate, in 2020 Green Mountain Power offered an eCharger Pilot program that allowed participants to charge their EVs an unlimited amount during off-peak hours for $29.99 per month, while at the same time participating in load management by agreeing to let GMP interrupt their charging during peak events (Turk 2020).

combination of the three. Through legislation and executive orders, a growing number of states are building on these existing commitments and adopting ambitious clean energy goals, aiming to zero out emissions in the power sector and, in some cases, the statewide economy. As the grid mix in states continues to decarbonize the life cycle of EVs, their GHG benefits will continue to improve.

States could earn 1 point for having a utility grid carbon dioxide equivalent (CO_2e) output rate that is below the national average.[27] This average is determined by the U.S. Environmental Protection Agency (EPA) Emissions & Generation Resource Integrated Database (eGRID) 2018 summary tables. States could earn up to another 3 points depending on the level of planned emissions reductions over a 15-year period, which is the life expectancy of a vehicle. We collected the expected proportion of the electricity grid mix from renewable energy in 2035 in states with clean electricity standards or renewable portfolio standards. We assumed that all such standards include only zero-carbon resources. For states without a 2035 target, we interpolated between the 2018 penetration of renewables from EIA State Electricity Profiles and the goal for a later year.[28]

Table 15 provides a breakdown of how states were scored.

Table 15. Scoring for GHG reduction plan over a 15-year period

GHG reduction plan over a 15-year period	Points
≥ 67% reduction	3
≥ 33% reduction	2
≥ 12.5% reduction	1
≥ 12.4% reduction	0

UNSCORED METRICS

As with other sections of this *Scorecard*, some policies that were identified by stakeholders as best practices for grid optimization were not assigned scores in this chapter. This was due to either a lack of data availability or limited state experience with such practices. A summary of such policies is below.

Electric Vehicles in Integrated Resource Planning/Distribution Planning

Electric vehicles are already having an impact on power demand and load shapes. Planning well in advance for the grid impacts of increased transportation electrification is essential so that utilities can continue to deliver reliable, affordable power. This applies on both the resource

[27] CO_2e represents an amount of a GHG whose atmospheric impact has been standardized to that of one-unit mass of carbon dioxide (CO_2), based on the global warming potential (GWP).

[28] Data from the Natural Resources Defense Council were used to support our analysis (S. Ptacek, program assistant, pers. comm., August 27, 2020).

side (transmission) and the delivery side (distribution), where large numbers of charging vehicles may require additional infrastructure such as transformer and substation upgrades. Clear and streamlined interconnection procedures and channels for communication are also an important part of planning and enabling infrastructure deployment. Planning and interconnection metrics were not scored due to difficulties in obtaining and comparing planning data across multiple time frames, in overlapping utility territories, and under various transmission authorities. Utilities within a regional transmission organization or independent system operator may not participate in the same type of resource planning as those outside a centralized planning region. For these reasons, it was difficult to accurately quantify the role of EVs in resource planning across states; however, we believe rigorous consideration of the impacts of EVs to be an important practice for utilities.

Interoperability and Open Standards

For grid system optimization, it is critical to ensure that all EV charging technologies and data-sharing tools are secure and accessible to the necessary parties and can be connected with one another. Interoperability—making sure all stations have compatible software—and open standards for data sharing among EV chargers are needed to deliver a seamless user experience, to enable communication of price signals for managed charging, and to support robust grid planning. For customers, allowing different types of chargers to communicate across networks reduces friction, helping to expand the network of available chargers. Open standards with good data-access policies can allow utilities and state and local governments to use network data for system planning. Open standards also support a more flexible, sustainable network by allowing different manufacturers to connect, letting charging station owners introduce new technologies over time.

In policy statements, the PUCs of both Washington and Minnesota have noted the importance of interoperability; Minnesota specifically encouraged the use of Open Charge Point Protocol and Open Automated Demand Response (Minnesota PUC 2019). Washington regulators found that greater interoperability serves the public interest by making data available for system planning purposes and by improving customer experience by ensuring that all utility-owned public chargers can accept payment from credit cards (Washington UTC 2017). We did not find a data source that covered all states' adoption of interoperability standards, so were not able to include it in the *Scorecard*.

Chapter 6. Equity

INTRODUCTION

As with many aspects of our energy system, the impacts of transportation electrification may have a more pronounced effect—negative or positive—on marginalized groups. The terminology used to refer to these various groups differs from state to state; in this report, we consider equity policies to include low-income, economically distressed, and environmental justice communities.[29] People who live in these types of communities and neighborhoods are more likely to pay a disproportionate share of their household income on transportation energy–related costs compared with the general public (Vaidyanathan, Jennings, and Huether 2021). These demographic sectors are also more likely to experience harmful health impacts relating to air pollution from internal combustion engines (Reichmuth 2019). In the wake of COVID-19, which has deepened existing inequalities and had a disproportionate impact on low-income communities and communities of color, it is even more necessary to deliver solutions to systemic injustice. Considering the unique needs of these groups is essential to achieving equitable and sustained GHG reductions while also ensuring that state transportation systems work for all residents.

If states and utilities are not making a deliberate effort to include these groups in EV incentives and infrastructure development plans, there is a risk that transportation electrification will reinforce existing racial and economic inequities. Rising electricity costs could disproportionately impact households that already experience high energy burdens.[30] Programs that provide tax credits and EV purchase incentives may offer little to no benefit to households that do not have the tax burden needed to claim those incentives or simply cannot afford the remaining price differential between a conventional and electric vehicle after incentives are applied. And EV infrastructure deployment may not reach disadvantaged neighborhoods or residents of multiunit dwellings without clear direction and goal setting from state government.

However, electrifying transit also represents an opportunity to address and remediate long-standing issues that affect marginalized groups, like air pollution and limited access to public transit. Even households who do not own an EV can enjoy the health benefits of improved air quality that electric vehicles provide. Research shows that just a 25% EV adoption rate could result in $16.8 billion in annual avoided health impacts nationwide (Peters et al. 2020). Broadening access to innovative transportation technologies can also be a valuable tool to address poverty and enable socioeconomic mobility by enabling communities to connect to key job centers (Bouchard 2015). This section of the *Scorecard* recognizes states and state-regulated utilities that are making specific efforts to include low-income and environmental justice communities in transportation electrification planning and investment.

---

[29] California uses the term *disadvantaged communities* (DACs) in its policies to refer to non-low-income groups that have been historically underserved.

[30] *Energy burden* is defined as the share of annual household income per year that goes toward energy and fuel costs. ACEEE considers households in which more than 6% of income is spent on energy as "energy burdened," while households that spend more than 10% are "severely energy burdened."

In this chapter, we review and score states on the following policies, shown in table 16:

- Statewide EV investment for low-income, economically distressed, or environmental justice communities (2 points)
- State EV programs for low-income, economically distressed, or environmental justice communities (4 points)
- Utility EV programs for low-income, economically distressed, or environmental justice communities (2 points)
- State EV school bus deployment requirements (2 points)

RESULTS

Table 16. Scores for equity

Rank	State	Statewide EV investment for low-income, economically distressed, or EJ communities (2 pts.)	State EV programs for low-income, economically distressed, or EJ communities (4 pts.)	Utility EV programs for low-income, economically distressed, or EJ communities (2 pts.)	State EV school bus deployment requirements (2 pts.)	Total (10 pts.)
1	California	2	2.5	2	2	8.5
2	New York	2	0	2	1	5
3	District of Columbia	2	0	2	0	4
4	Maryland	0	0	1	2	3
	Nevada	0	0	1	2	3
	Washington	2	0	1	0	3
7	Massachusetts	0	0.5	2	0	2.5
8	Illinois	0	0	0	2	2
	Minnesota	0	0	2	0	2
	Tennessee	0	0	0	2	2
	Texas	0	0	0	2	2
12	Colorado	1	0	0	0	1
	Delaware	0	0	1	0	1
	Florida	0	0	1	0	1
	Missouri	0	0	1	0	1
	New Jersey	1	0	0	0	1
	North Carolina	0	0	1	0	1
	Oregon	0	0	1	0	1
	Pennsylvania	0	0	1	0	1
	Rhode Island	0	0	1	0	1

Rank	State	Statewide EV investment for low-income, economically distressed, or EJ communities (2 pts.)	State EV programs for low-income, economically distressed, or EJ communities (4 pts.)	Utility EV programs for low-income, economically distressed, or EJ communities (2 pts.)	State EV school bus deployment requirements (2 pts.)	Total (10 pts.)
21	Hawaii	0	0.5	0	0	0.5
22	Arizona	0	0	0	0	0
	Connecticut	0	0	0	0	0
	Georgia	0	0	0	0	0
	Kansas	0	0	0	0	0
	Maine	0	0	0	0	0
	Michigan	0	0	0	0	0
	New Mexico	0	0	0	0	0
	Utah	0	0	0	0	0
	Vermont	0	0	0	0	0
	Virginia	0	0	0	0	0

Of all 50 states and the District of Columbia, only 23 scored any points in this category, and every state, including national leaders California and New York, shows room for improvement in terms of equitable transportation electrification. Seven states have state-incentivized school bus fleet electrification policies in place.[31] Whether through low-income carve-outs or targeted pilot programs, state governments and regulatory commissions have a long way to go in opening up EV access to marginalized groups.

To improve scores and outcomes in this category, states should look to program examples from leaders like California and Washington and utility programs such as those run by ConEd in New York or Ameren in Missouri, which contain minimum spending carve-outs for low-income and environmental justice communities. States should also consider the impact that a small-scale but well-publicized demonstration project, such as an EV school bus program, can have in delivering targeted benefits and increasing knowledge and awareness about EVs. Lastly, although this metric was not scored, decision makers in state, utility, and regulatory settings must engage with the communities they are seeking to assist. Having clear communication and understanding of issues that impact low-income and environmental justice

[31] Utility-run school bus electrification programs, where they exist, were counted in the utility LMI programs category if they include a special focus on LMI communities, or in the commercial fleet incentives category in chapter 3 otherwise.

communities will lead to better-designed policies and more effective implementation (Koewler et al. 2020).

Statewide EV Investment for Low-Income, Economically Distressed, or Environmental Justice Communities

Currently the upfront investment required for EVs and their charging equipment can be cost prohibitive for low-income, environmental justice, and economically distressed communities. To make EVs accessible to all, states should include goals and funding streams designed specifically to increase EV adoption within those communities. New York's EV Make-Ready Initiative, which aims to deploy more than 50,000 EV charging stations by 2025, includes $206 million set aside to benefit low-income and economically distressed communities (Office of the Governor of New York 2020).

States received 2 points if their EV policy includes explicit funding streams that benefit low-income, economically distressed, or environmental justice communities. States without explicit funding streams could earn 1 point if their EV policy or plan includes language that prioritizes these communities or includes related goals.

California, New York, Washington, and the District of Columbia are the only jurisdictions recognized to have explicit funding streams aimed at increasing the adoption of EVs in low-income, economically distressed, and EJ communities. Consistent investment and attention to the needs of these communities is crucial to ensure the benefits of EV adoption are accessible and equitable.

State Programs for Low-Income, Economically Distressed, or Environmental Justice Communities

The communities that have historically been disproportionally exposed to higher levels of pollution and other environmental harm are the same ones that are underserved by accessible, reliable, and safe transportation options, so it is critical that the benefits of transportation electrification reach low-income and communities of color. Low-income, economically distressed, and EJ communities should be prioritized and/or receive a larger share of benefits from EV programs that receive state funding.

States received 0.5 points for each qualified program specifically intended to increase access to EVs in low-income, economically distressed, or EJ communities, and 0.5 points for each program to increase access to the necessary charging infrastructure. States could receive a maximum of 4 points for this metric. Clean Cars 4 All is a program offered to lower-income California drivers to replace an older, high-polluting car with a zero- or near-zero-emission vehicle. Targeted EV programs to specifically benefit low-income, economically distressed, and EJ communities are still mostly in the planning phase; we did not award points for programs in this phase.

Utility EV Programs for Low-Income, Economically Distressed, or Environmental Justice Communities

Utilities also play an important role in funding and deploying EV incentives and infrastructure for low- and moderate-income (LMI) and disadvantaged communities. Equity in utility-funded programs is particularly important due to the ways in which utilities recover the costs of

investment through their rate base. There is a risk with utility-funded programs that the costs associated with financing EV charger incentives will lead to higher rates for those who cannot afford EV ownership (a phenomenon known as cross-subsidization). However, there is also ample evidence to suggest that well-managed and grid-optimized EV programs actually reduce costs and improve utility revenues (Frost et al. 2019). Regardless of the effects on consumer rates, however, it is essential that utilities, like states, endeavor to include all of their customers in their incentive plans.

We scored states on whether a state-regulated utility offers an equity-oriented program or has a low- or low/moderate-income spending requirement within a larger EV budget. States could receive up to 2 points in this category: 1 point for having an income-qualified program, and the full 2 points if the same program, or a different one in the same portfolio, is specifically targeting environmental justice communities. This metric was evaluated in this way because of the unique and important role utilities have in administering and delivering programs to marginalized groups. California's approach in its 2018 statewide transportation electrification plan shows how utilities such as SDG&E and PG&E might consider equity in developing their transportation electrification programs. For each plank of the programs targeting residential, medium-, and heavy-duty vehicle charging as well as DC fast charging, SDG&E and PG&E must demonstrate that their programs will deliver a positive impact in low-income and disadvantaged communities, or DACs (California's terminology for the communities that most suffer from economic, health, and environmental burdens) (SDGE 2017). To accomplish this, SDG&E's plan includes a goal of deploying 25% of EVSE in DACs. This type of results-oriented deployment goal is more measurable than a percentage carve-out and involves engagement with stakeholders and community representatives to ensure that goals are achieved.

State EV School Bus Deployment Requirements

There are tangible health benefits to eliminating exhaust from heavy-duty internal combustion vehicles in public spaces (EPA 2020a). School buses commonly idle in place for hours at a time, and youth exposure to engine particulates can have especially negative impacts on respiratory health and development (CARB 2020b). Some policies, such as idling restrictions and guidelines, are already in place to mitigate these adverse health impacts as much as possible, but replacing gasoline-powered vehicles with EV models will have direct health benefits for low-income and communities of color, particularly in the absence of other EV programs. Several states are already making efforts to incorporate EV school buses into their current fleets. For instance, the Texas Commission on Environmental Quality will award both school districts and charter schools in Texas with grant money to incrementally cover the costs of school bus fleets with cleaner, alternative-fuel vehicles (AFVs). We awarded 2 points to states that have programs or have contributed money toward the purchase of EV school buses. Only California, Illinois, Maryland, Nevada, New York, Tennessee, and Texas scored points for this metric, leaving a lot of room for improvement moving forward. New York was granted half credit for a program that is co-funded by both the state and Consolidated Edison.

UNSCORED METRICS

Inclusive Processes for Equitable Policy and Program Design

As the transportation sector continues to evolve and electrification becomes a key strategy to reduce GHG emissions, states will need to ensure that electrified transportation is accessible to

all. This is critical not only to maximizing emission reductions but also to adequately addressing the transportation needs of historically disadvantaged and marginalized communities. Today these communities are additionally disproportionately impacted by the physical and economic effects of COVID-19, further increasing the urgency to ensure that transportation electrification policies are equitable.

In addition to implementing the equity policies outlined above, states must commit to designing an equity-driven approach to transportation electrification and transportation planning more broadly that allows an inclusive decision-making process and ensures accountability in terms of equitable outcomes. The Greenlining Institute's "make equity real" efforts have laid the groundwork for operationalizing equity in state processes and, most recently, have been used to help shape the development of CPUC's Transportation Electrification Framework Equity Chapter (A. Sanchez and L. Aguayo, Greenlining Institute, pers. comm., September 25, 2020).

Guiding this overall vision is the principle that states should commit to equity as a foundational goal for all their policies and programs. If equity is prioritized from the very beginning of the policy design process, along with sustained stakeholder engagement, then well-developed and impactful policies for low-income and EJ groups will result. Finally, to measure whether programs are having the desired impacts on the targeted communities, states should come up with a methodology for measuring and evaluating the impacts of their policies through an equity lens (A. Sanchez and L. Aguayo, Greenlining Institute, pers. comm., September 25, 2020).

Developing a metric to gauge how well a state performs on integrating equity into its transportation electrification policymaking is difficult given the lack of easily accessible data and the fact that we did not undertake a data collection survey for this report. However, states can leverage specific actions to signal their commitment to equity and to ensure that equity as a practice is a crucial element in the decision-making process. These actions include structuring public engagement during policy and program planning in a way that increases feedback from marginalized groups, as well as appointing residents from these communities or community-based organization leads to formal roles in decision making to guarantee that their viewpoints and lived experiences are incorporated into program design (Ribeiro et al. 2020). Mobility needs assessments are another tool to identify the specific transportation needs and challenges that exist in a specific community (Greenlining Institute 2019). Finally, identifying performance metrics that hold state governments accountable for their commitments will ensure that planning efforts are having the desired impacts on residents of marginalized communities (Ribeiro et al. 2020).

Consumer Protection

As the transportation sector continues to electrify, states must safeguard against certain groups bearing an unequal burden of the costs associated with moving toward electric vehicles (a phenomenon known as cost shifting). While we do not score states on their activities around consumer protection, since we consider this outside the scope of a *Scorecard* that is focused on EV uptake and GHG emissions, we recognize that enacting consumer protection programs and regulations will be critical to extending the benefits of EVs to all. State regulatory commissions, and consumer advocates in particular, have a role to play in maintaining regulated rates and

creating other charging-related and vehicle purchase protection rules for susceptible customers as EVs become mainstream in the transportation system (Cohen 2017). While the large number of successful EV programs show that these policies can be implemented cost effectively and promote public welfare, it is important that they undergo careful oversight and monitoring after approval.

Chapter 7. Transportation Electrification Outcomes

INTRODUCTION

This final, outcomes-based chapter scores states on the progress they have already made. It highlights the importance of collecting outcome-related data to measure progress and set a baseline for future research. States must be able to demonstrate that the policies in place lead to the desired outcome of increasing EVs and EV charging locations throughout state, while also reducing GHG emissions.

In this chapter, we review and score states on the following outcomes:

- Light-duty EV registrations per 100,000 people (4 points)
- Heavy-duty EV registrations per 100,000 people (3 points)
- Public L2 charging facilities per 100,000 people (4 points)
- Public DCFC charging facilities per 100,000 people (4 points)
- EV transit buses per 100,000 people (2 points)
- Percentage change in transportation GHG emissions over a five-year period (4 points)

RESULTS AND KEY TAKEAWAYS

The scores of the top 30 states in this chapter are presented below in table 17.

Table 17. Scores for transportation electrification outcomes

Rank	State	LD EV registrations per 100,000 people (4 pts.)	HD EV registrations per 100,000 people (3 pts.)	Public L2 charging facilities per 100,000 people (4 pts.)	Public DCFC charging facilities per 100,000 people (4 pts.)	EV transit buses per 100,000 people (2 pts.)	Percentage change in transportation GHG over a 5-year period (4 pts.)	Total (21 pts.)
1	District of Columbia	2	2	4	3	2	3	16
2	California	4	2	4	3	2	0	15
3	Washington	3	3	2	2	2	0	12
4	Vermont	2	1	4	4	0.5	0	11.5
5	Colorado	3	1	3	2	1	1	11
	Hawaii	3	1	3	2	2	0	11
7	Maryland	2	1	2	2	0.5	3	10.5
	Oregon	3	0	2	2	0.5	3	10.5
	Utah	2	1	3	2	0.5	2	10.5
10	Massachusetts	2	1	3	2	0	1	9
11	Georgia	2	1	2	2	0.5	1	8.5

Rank	State	LD EV registrations per 100,000 people (4 pts.)	HD EV registrations per 100,000 people (3 pts.)	Public L2 charging facilities per 100,000 people (4 pts.)	Public DCFC charging facilities per 100,000 people (4 pts.)	EV transit buses per 100,000 people (2 pts.)	Percentage change in transportation GHG over a 5-year period (4 pts.)	Total (21 pts.)
12	Kansas	0	0	2	2	0	4	8
	Maine	1	0	2	2	0	3	8
	Nevada	2	1	2	2	1	0	8
	Virginia	2	1	1	1	0	3	8
16	New Jersey	2	0	0	1	0	4	7
17	Delaware	1	1	1	1	1.5	0	6.5
	Florida	2	1	1	1	0.5	1	6.5
	North Carolina	1	1	1	1	0.5	2	6.5
	Rhode Island	1	0	3	2	0.5	0	6.5
21	Arizona	3	0	1	1	0	1	6
	Connecticut	2	0	2	2	0	0	6
	Missouri	0	1	2	2	0	1	6
	New York	1	1	2	2	0	0	6
25	Illinois	2	1	1	1	0.5	0	5.5
	Minnesota	1	1	1	1	0.5	1	5.5
	Tennessee	1	1	1	1	1.5	0	5.5
28	New Mexico	1	1	0	1	1	0	4
	Pennsylvania	1	1	1	1	0	0	4
	Texas	1	1	1	1	0	0	4
31	Michigan	0	0	0	1	0	0	1

The District of Columbia leads the outcomes chapter with 16 points, showcasing its leadership and prioritization of policies and programs that reduce GHG emissions and promote transportation electrification, notably the 2018 Clean Energy Omnibus Act (Council of the District of Columbia 2018).

Strong and diverse programs and incentives, such as the California Capital Access Program's Electric Vehicle Charging Station Financing Program, have led to increased adoption of EV charging infrastructure in the state. California has by far the largest network of EV charging infrastructure in the country and received all but 1 point for the metrics that score states on the number of EV chargers.

Vermont is the only state to receive full points for available public chargers and leads in both L2 and DCFC stations and ports per 100,000 residents.

Regionally, California, Washington, and Hawaii lead in the West, the District of Columbia and Vermont top these rankings in the Northeast, and Colorado leads in the Southwest.

As this chapter scores states on progress, or outcomes, they can expect their scores in this chapter to improve as they implement the many policies, programs, and incentives that they have been scored on throughout this report.

Light-Duty and Heavy-Duty Registrations per 100,000 People

Tracking the number of EVs registered per state is indicative of how well the state policies outlined in earlier chapters have helped encourage the proliferation of passenger, freight, and transit electric vehicles. In 2017 close to 200,000 plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (BEVs) were sold nationwide. This accounted for just 1.15% of total vehicle sales for the year but was a sharp, 26% increase in total EV sales compared with EV sales from 2016 (Bellan 2018). This trend in rising EV sales and ownership continued until 2019, when sales decreased by 7–9% from the year previous, but that may have had more to do with 2018 being an outlier in terms of total sales than anything else (EVAdoption 2020). Sales still increased nationally from 2017 to 2019, so there is no indication of stagnation in the EV market.

California is the only state to have scored all available points for the light-duty metric, and Washington was the only state to score full marks for the heavy-duty metric. Several states recorded their highest scores for the chapter by virtue of their performance in these metrics. Points were awarded on the basis of how many light-duty or heavy-duty vehicles per 100,000 people are registered in each state. All data were collected between mid-September and October 1, 2020. As the heavy-duty EV market continues to expand, a better method for evaluating heavy-duty EV penetration may be to look at such registrations as a proportion of total heavy-duty registrations per state rather than the state's population. However, due to data quality and availability limitations, we did not use this method for this *Scorecard* effort.

States could earn up to 4 points for their light-duty registrations and up to 3 points for heavy-duty registrations. The scoring thresholds are shown in tables 18 and 19.

Table 18. Scoring for light-duty EV registrations per 100,000 residents

Number of LD EV registrations per 100,000 residents	Points (4)
700 +	4
300–699.99	3
150–299.99	2
90–149.99	1

Table 19. Scoring for heavy-duty EV registrations per 100,000 residents

Number of HD EV registrations per 100,000 residents	Points (3)
2 +	3
1–1.99	2
0.01–0.99	1

Public L2 and DCFC Charging Facilities per 100,000 People

Maintaining and growing a reliable network of public EV chargers will be critical to the continued expansion of the EV market. The number of publicly available charging stations per capita in a given state is indicative of the success of the state's policies to increase the uptake of electric vehicles. As a way of gauging states' efforts to support the expansion of their EV charging networks, points were awarded on the basis of how many L2 and DCFC charging ports per 100,000 people are currently available in each state. The difference in scoring thresholds for these two metrics is a reflection of the number of chargers of a particular type that are currently available for use in each state. One reason we chose to score these metrics separately rather than together relates to their potential charge rates. DCFC chargers work far more quickly than L2 chargers because of their superior kWh output. We wanted to give states credit for the variety of public chargers they have available, so scoring L2 and DCFC chargers separately can help illuminate which states are best providing EV owners with powerful and convenient options for refueling.

Vermont was the only state to earn full credit for the number of publicly available L2 and DCFC chargers per capita. Both California and the District of Columbia scored full points for L2 chargers per capita, but Vermont stands alone in scoring full points for DCFC availability. Just eight states scored more than 50% of the available points for these metrics, so there is much room for improvement in the domain of publicly accessible chargers. These metrics were worth up to 4 points each, and the scoring criteria are shown in tables 20 and 21. Proprietary chargers such as Tesla's superchargers were not included in our count.

Table 20. Scoring for public L2 charging facilities per 100,000 residents

Number of charging ports per 100,000 residents	Points (4)
50 +	4
35–49.99	3
18–34.99	2
10–17.99	1

Table 21. Scoring for public DCFC charging facilities per 100,000 residents

Number of charging ports per 100,000 residents	Points (4)
80 +	4
50–79.99	3
25–49.99	2
10–24.99	1

EV Transit Buses per 100,000 People

Transitioning transit bus fleets to EVs has numerous environmental, mobility, and, community benefits. Points were awarded on the basis of the number of zero-emission buses either operating today, on order, or funded for purchase by transit agencies within the state, as identified by CALSTART as of September 27, 2019 (Silver, Jackson, and Lee 2019). The 2,352 total ZEBs recognized by CALSTART nationwide represent just 4.2% of the 56,000 active transit buses across the country, as tracked in the FTA's National Transit Database (FTA 2020).

California and Washington lead the way with 1,016 and 211 identified zero-emission buses respectively. Washington's recent legislation to advance green transportation commits the state to all vehicles being ZEV by 2050. This legislation eliminates sales tax on the purchase of zero-emission buses and creates a grant program to make capital investments in zero-emission transit options, helping lower the costs for transit agencies (Washington State Legislature 2019).

Table 22 gives a breakdown of how states were scored for this metric.

Table 22. Scoring for EV transit buses per 100,000 people

EV transit buses per 100,00 people	Points
≥ 2.0	2.0
≥ 1.5	1.5
≥ 1.0	1.0
≥ 0.5	0.5

Percentage Change in Transportation GHG over a Five-Year Period

As noted earlier in this report, in 2018 GHG emissions from transportation accounted for around 28% of the U.S. total, making it the leading source of GHG emissions in the nation. More than 90% of the fuel used for transportation, which includes gasoline and diesel, is petroleum-based (EPA 2020b). Increased adoption of EVs, combined with a growing influx of electricity sourced by cleaner technologies, has potential to slash GHG emissions from the transportation sector.

For this metric, states were scored on the basis of the percentage change in per capita GHG emissions from the transportation sector over a five-year period (between 2013 and 2017). While

there are many drivers that contribute to the transportation sector's total GHG emissions, it is important to include progress on GHG emission reductions as that is a key purpose of EV deployment. Table 23 offers a breakdown of how the states were scored.

Table 23. Scoring for transportation GHG emissions

Percentage change in GHGs, 2013–17	Points
7.50% reduction or greater	4.0
5.00–7.49% reduction	3.0
2.50–4.99% reduction	2.0
0–2.49% reduction	1.0

UNSCORED METRICS

Access to Electrified Transportation

To the extent possible with the data available, this chapter tracks the impacts of the policies outlined in this report. However, data limitations made it impossible to measure all outcomes. In particular, we were unable to evaluate whether state policies are supporting equitable access to EVs and EV charging equipment. Understanding such factors as whether residents of marginalized communities have access to and are using charging facilities in their neighborhoods will be important to measuring the success of equitable state and local EV infrastructure investments and policies. Several states are starting to study these trends, including New Jersey and Maine (Warner et al. 2020; Cushman 2020). States will continue to play an important role in collecting the relevant geographic and socioeconomic data to conduct such assessments.

Chapter 8. Conclusions

ACEEE's assessment of state transportation electrification efforts demonstrates that, with the exception of a few leaders, states are in the early stages of creating a supportive policy environment for transportation electrification. Scores for the top 30 states range from 15.5 to 91 points out of 100. California is far and away the top performer, placing at the top of five of the six scoring categories included in the *Scorecard*. New York and the District of Columbia have also demonstrated leadership on electric vehicles, although they trail California in our rankings by 27.5 and 32 points, respectively. In particular, both provide state and utility incentives to promote EV and charging infrastructure uptake.

This review of EV policies also identifies clear regional pacesetters. States like Washington in the Northwest, Colorado in the Southwest, Virginia in the Southeast, and Minnesota in the Midwest are all leaders in their geographical regions.

Nevertheless, it is clear that most states, even those that have scored well in this *Scorecard*, can take advantage of untapped policy opportunities to electrify the transportation sector and support progress toward GHG and pollution reduction. For states that are not included in the top 30, we recommend the following policy actions as important foundational steps to move transportation electrification ahead:

- Benchmark progress on transportation electrification, engage in comprehensive planning that defines a coordinated strategy to build out electrified transportation, and include specific goals for EVs and the deployment EV charging infrastructure.
- Collect data on key metrics to establish a baseline and track progress on EVs and EV charging infrastructure deployment. These data could include EV registration information for light- and heavy-duty vehicles, location and count of EV charging facilities, and demographic information on EV use by race and income. Data should be made publicly available, with the status of milestones shared through regular public reporting.
- When investing in vehicle and infrastructure deployment, begin with equity in mind. Incorporate spending carve-outs or funding adders for low-income, economically distressed, and EJ communities in state and utility EV planning to ensure that the benefits of transportation electrification are distributed equitably. Encourage community participation in mobility needs assessment to direct this funding to locations and services of greatest need.
- Leverage existing funding sources such as the Volkswagen settlement fund and the federal Low or No Emission Program to support EVs and EV charging infrastructure deployment while evaluating other opportunities to create sustained funding for programs.
- Establish clear policy direction to encourage utility and third-party investment in EV charging infrastructure, such as exempting third-party EV charging providers from being defined as a public utility and approving utility electric vehicle charging programs and demonstration projects such as electric school buses.

For states that are represented in our top 30 but are earlier in the process of developing a robust environment for transportation electrification, we recommend the following next steps to help accelerate the EV market and reduce greenhouse gas emissions:

- Offer on-the-hood incentives for the purchase of light- and heavy-duty EVs to offset the additional upfront cost of these vehicles.
- Codify targets for EVs and the deployment of EV chargers.
- Allow utilities to make investments to support EV charging infrastructure and to implement EV rates or managed charging programs that encourage integration of EVs into the grid.
- Encourage grid-scale decarbonization by establishing clean energy and energy efficiency targets for the electric industry, thereby reducing the life-cycle emissions of every EV on the road.
- Set a GHG emissions reduction goal and commitment for the transportation sector to ensure that EV deployment complements other efforts to reduce transportation GHG emissions.

Transportation electrification is still growing into maturity. The policy landscape and emerging best practices will keep evolving as states continue to adopt and experiment with policy approaches to advance the use of EVs and EV charging infrastructure. Nevertheless, states can apply the strategies outlined above and others in the *Scorecard* as they seek to electrify transportation and combat climate change in an equitable fashion. There are abundant opportunities to learn from existing state strategies and build on policy successes to leverage positive outcomes.

References

ACT News. 2020. "Calculating TCO for EVs: Where to Find the Greatest Long-Term Cost Savings for Medium- and Heavy-Duty Vehicles." *ACT News*, August 26. act-news.com/news/calculating-tco-for-medium-and-heavy-duty-evs/.

Allen, P., G. Van Horn, M. Goetz, J. Bradbury, and K. Zyla. 2017. *Utility Investment in Electric Vehicle Charging Infrastructure: Key Regulatory Considerations*. Washington, DC: Georgetown Climate Center. georgetownclimate.org/files/report/GCC-MJBA_Utility-Investment-in-EV-Charging-Infrastructure.pdf.

Atlas Public Policy. 2020a. "Electric Utility Filings." Accessed September. atlasevhub.com/materials/electric-utility-filings/.

——. 2020b. "Public, Laws, & Regulations Dashboards." Accessed September. atlasevhub.com/materials/vw-environmental-mitigation-fund-tracking/.

——. 2020c. "VW Settlement." Accessed November. atlasevhub.com/materials/public-policy/.

Barbose, J., and J. Martin. 2018. *California's Clean Fuel Standard Boosts the Electric Vehicle Market*. Cambridge, MA: UCS (Union of Concerned Scientists). ucsusa.org/resources/californias-clean-fuel-standard-boosts-electric-vehicle-market.

Barnes, N., and P. Jones. 2020. *The Missing Piece on Meeting Transportation Electrification Goals: Utility Education and Outreach Programs*. Seattle: Alliance for Transportation Electrification. Los Angeles: Plug In America. pluginamerica.org/wp-content/uploads/2020/12/EO-White-Paper.pdf.

Bellan, R. 2018. "The Grim State of Electric Vehicle Adoption in the U.S." *Bloomberg CityLab*, October 15. bloomberg.com/news/articles/2018-10-15/the-state-of-electric-vehicle-adoption-in-the-u-s.

Bouchard, M. 2015. "Transportation Emerges as Crucial to Escaping Poverty." *New York Times*, May 7. nytimes.com/2015/05/07/upshot/transportation-emerges-as-crucial-to-escaping-poverty.html.

Bui, A., P. Slowik, and N. Lutsey. 2020. *Update on Electric Vehicle Adoption across U.S. Cities*. Washington, DC: ICCT (International Council on Clean Transportation). theicct.org/sites/default/files/publications/EV-cities-update-aug2020.pdf.

C40 (C40 Cities Climate Leadership Group). 2020. "How to Shift Your Bus Fleet to Zero Emission by Procuring Only Electric Buses." c40knowledgehub.org/s/article/How-to-shift-your-bus-fleet-to-zero-emission-by-procuring-only-electric-buses?language=en_US.

CARB (California Air Resource Board). 2017. "Slide 40." *5th Innovative Clean Transit Working Group Meeting*. Sacramento: CARB.

——. 2020a. "CARB and California Electric Utilities Partner to Offer Consumers up to $1,500 off Electric Cars." ww2.arb.ca.gov/news/carb-and-california-electric-utilities-partner-offer-consumers-1500-electric-cars.

——. 2020b. "Children's School Bus Exposure and Mitigation Studies; Children Can Be Exposed to High Levels of Air Pollutants from Buses." ww2.arb.ca.gov/resources/documents/childrens-school-bus-exposure-and-mitigation-studies.

Casale, M., and B. Mahoney. 2019. *Volkswagen Settlement State Scorecard*. Denver: U.S. PIRG Education Fund and Environment America Research & Policy Center. uspirg.org/reports/usp/volkswagen-settlement-state-scorecard.

Cattaneo, L. 2018. *Plug-In Electric Vehicles: Evaluating the Effectiveness of State Policies for Increasing Deployment*. Washington, DC: Center for American Progress. cdn.americanprogress.org/content/uploads/2018/06/06140002/EVreport-5.pdf.

Census Bureau. 2019. "State Population Totals and Components of Change: 2010–2019." census.gov/data/tables/time-series/demo/popest/2010s-state-total.html.

Ceres. 2020. "Transportation & Climate Initiative Program (TCI-P)." Accessed October. ceres.org/our-work/state-policy/northeast/TCI.

Chen, D., J. van der Beek, and J. Cloud. 2019. "Hypothesis for a Risk Cost of Carbon: Revising the Externalities and Ethics of Climate Change." H. Doukas, A. Flamos, and J. Lieu, eds., *Understanding Risks and Uncertainties in Energy and Climate Policy: Multidisciplinary Methods and Tools for a Low Carbon Society*. Cham: Springer. link.springer.com/chapter/10.1007%2F978-3-030-03152-7_8.

Chitkara, A., D. Cross-Call, B. Li, and J. Sherwood. 2016. *A Review of Alternative Rate Designs: Industry Experience with Time-Based and Demand Charge Rates for Mass-Market Customers*. Boulder: RMI (Rocky Mountain Institute). rmi.org/insight/review-alternative-rate-designs/.

Climate XChange. 2020. "Transportation and Climate Initiative." climate-xchange.org/regional-cap-and-invest/#tci.

Cohen, M. 2017. *The ABCs of EVs; A Guide for Policy Makers and Consumer Advocates*. Chicago: Citizens Utility Board. citizensutilityboard.org/wp-content/uploads/2017/04/2017_The-ABCs-of-EVs-Report.pdf.

Colorado Energy Office. 2020. "Colorado Energy Office and Bicycle Colorado Team Up to Launch Electric Bikes Pilot Program for Low-Income Essential Workers." energyoffice.colorado.gov/press-releases/colorado-energy-office-and-bicycle-colorado-team-up-to-launch-electric-bikes-pilot.

Colorado PUC (Public Utilities Commission). 2019. *Colorado PUC Electric Vehicle Working Group Report 2019*. Denver: Colorado PUC. evcharging.enelx.com/images/azura-pages/utilities/2019-01_CoPUC_Electric_Vehicle_Report.pdf.

Cook, J., C. Churchwell, and S. George. 2014. *Final Evaluation for San Diego Gas & Electric's Plug-In Electric Vehicle TOU Pricing and Technology Study*. Prepared by Nexant. San Diego: SDGE (San Diego Gas & Electric Company). www.sdge.com/sites/default/files/SDGE%20EV%20%20Pricing%20%26%20Tech%20Study.pdf.

Council of the District of Columbia. 2018. "CleanEnergy DC Omnibus Amendment Act of 2018, D.C. Law 22-257." code.dccouncil.us/dc/council/laws/22-257.html.

CPUC (California Public Utilities Commission). 2014. *Phase 1 Decision Establishing Policy to Expand the Utilities' Role in Development of Electric Vehicle Infrastructure*. Decision 14-12-079, Application 14-04-014, December 18. San Francisco: CPUC. www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=5922.

Crane, D. 2016. "Tesla, Dealer Franchise Laws, and the Politics of Crony Capitalism." *Iowa Law Review* 101 (2): 573–607. repository.law.umich.edu/cgi/viewcontent.cgi?article=2720&context=articles.

Cushman, E. 2020. *Beneficial Electrification: Barriers and Opportunities in Maine*. Augusta: Efficiency Maine Trust. efficiencymaine.com/docs/EMT_Beneficial-Electrification-Study_2020_1_31.pdf.

DOE (Department of Energy). 2015. *Costs Associated with Non-Residential Electric Vehicle Supply Equipment*. Prepared by New West Technologies. Washington, DC: DOE. afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf.

——. 2020. "Alternative Fuels Data Center." Accessed October. afdc.energy.gov.

DOT (Department of Transportation). 2020. "Energy Consumption and Energy-Related CO2 Emissions." Accessed October. bts.dot.gov/energy-consumption-and-co2-emissions.

Edmunds. 2019. "Where Does the Car Dealer Make Money? Mostly from Service, Not from Sales." www.edmunds.com/car-buying/where-does-the-car-dealer-make-money.html.

EEI (Edison Electric Institute). 2020. "Issues & Policy: Electric Transportation." Accessed October. eei.org/issuesandpolicy/electrictransportation/Pages/default.aspx.

EIA (Energy Information Administration). 2020. "Annual Electric Power Industry Report, Form EIA-861 detailed data files." eia.gov/electricity/data/eia861/.

Eisenstein, P. 2019. "EVs Will Reach Cost Parity with Gas Cars 'Sooner than People Think,' says GM's Reuss." *The Detroit Bureau*, June 7. thedetroitbureau.com/2019/06/evs-will-reach-cost-parity-with-gas-cars-sooner-than-people-think-says-gms-reuss/.

EPA. 2020a. "DERA: School Bus Idle Reduction." epa.gov/dera/school-bus-idle-reduction.

——. 2020b. "Greenhouse Gas Emissions; Sources of Greenhouse Gas Emissions." epa.gov/ghgemissions/sources-greenhouse-gas-emissions.

——. 2020c. "Volkswagen Clean Air Act Civil Settlement." epa.gov/enforcement/volkswagen-clean-air-act-civil-settlement.

EPRI (Electric Power Research Institute). 2015. *Environmental Assessment of a Full Electric Transportation Portfolio*. Palo Alto: EPRI. epri.com/research/products/3002006881.

EVAdoption. 2020. "2019 US EV Sales Decreased an Estimated 7% to 9%—6 Reasons Why." *EVAdoption Blog*, January 20. evadoption.com/2019-us-ev-sales-decreased-an-estimated-7-to-9-6-reasons-why/.

Frost, J., M. Whited, and A. Allison. 2019. *Electric Vehicles are Driving Electric Rates Down*. Cambridge, MA: Synapse Energy Economics. synapse-energy.com/sites/default/files/EVs-Driving-Rates-Down-8-122.pdf.

FTA (Federal Transit Administration). 2016. *Default Useful Life Benchmark (ULB) Cheat Sheet*. Washington, DC: FTA. transit.dot.gov/TAM/ULBcheatsheet.

——. 2020. "2018 Vehicles." Accessed October. transit.dot.gov/ntd/data-product/2018-vehicles.

Gerdes, J. 2017. "US Auto Dealerships Are Bad at Selling Electric Vehicles, Study Finds." *Greentech Media*, December 12. www.greentechmedia.com/articles/read/us-auto-dealerships-are-bad-at-selling-electric-vehicles-study-finds.

Greenlining Institute. 2019. *Making Equity Real in Mobility Pilots*. Oakland: Greenlining Institute. greenlining.org/wp-content/uploads/2019/08/Toolkit_Making-Equity-Real-in-Mobility-Pilot-Projects_Final-1.pdf.

Hanley, S. 2020. "It's Official—Consumer Reports Confirms EV Owners Spend Half as Much on Maintenance." *Cleantechnica*, September 26. cleantechnica.com/2020/09/26/its-official-consumer-reports-confirms-ev-owners-spend-half-as-much-on-maintenance/.

Harto, C. 2020. *Electric Vehicle Ownership Costs: Today's Electric Vehicles Offer Big Savings for Consumers*. Yonkers, NY: Consumer Reports. advocacy.consumerreports.org/wp-content/uploads/2020/10/EV-Ownership-Cost-Final-Report-1.pdf.

Khan, S., and S. Vaidyanathan 2018. *Strategies for Integrating Electric Vehicles into the Grid*. Washington, DC: ACEEE. aceee.org/research-report/t1801.

Koewler, M., S. Fazeli, C. Powers, R. González, and M. Gransee. 2020. "Designing Equity-Focused Stakeholder Engagement to Inform State Energy Office Programs and Policies." *Proceedings of the 2020 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington,

DC: ACEEE. www.naseo.org/data/sites/1/documents/publications/13-0376_0549_000208-KOEWLER%20FINAL%20cover.pdf.

Lutsey, N., S. Searle, S. Chambliss, and A. Bandivadekar. 2015. *Assessment of Leading Electric Vehicle Promotion Activities in United States Cities*. Washington DC: ICCT. theicct.org/sites/default/files/publications/ICCT_EV-promotion-US-cities_20150729.pdf .

Mai, T., P. Jadun, J. Logan, C. McMillan, M. Muratori, D. Steinberg, L. Vimmerstedt, R. Jones, B. Haley, and B. Nelson. 2018. *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States*. Golden, CO: NREL (National Renewable Energy Laboratory). nrel.gov/docs/fy18osti/71500.pdf.

Maryland PSC (Public Service Commission). 2019. *In the Matter of the Petition of the Electric Vehicle Work Group for Implementation of a Statewide Electric Vehicle Portfolio*. Order No. 88997, Case No. 9478, January 14. Baltimore: Maryland PSC. www.psc.state.md.us/wp-content/uploads/Order-No.-88997-Case-No.-9478-EV-Portfolio-Order.pdf.

Massachusetts DPU (Department of Public Utilities). 2018. *Petition of Massachusetts Electric Company and Nantucket Electric Company, each d/b/a National Grid, for Approval of its Electric Vehicle Market Development Program, and of its Electric Vehicle Market Development Program Provision, pursuant to G.L. c. 164, §§ 76, 94, and Acts of 2016, c. 448*. D.P.U. 17-13, September 10. Boston: Massachusetts DPU. fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/9800474.

——. 2019. *Petition of Massachusetts Electric Company and Nantucket Electric Company, each doing business as National Grid, pursuant to G.L. c. 164, § 94 and 220 CMR 5.00, for Approval of General Increases in Base Distribution Rates for Electric Service*. D.P.U. 18-150, September 30. Boston: Massachusetts DPU. fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/11262053.

Mersky, A., F. Sprei, C. Samaras, and Z. Qian. 2016. "Effectiveness of Incentives on Electric Vehicle Adoption in Norway." *Transportation Research Part D: Transport and Environment* 46 (July): 56–68. www.sciencedirect.com/science/article/abs/pii/S1361920916000407.

Minnesota PUC (Public Utility Commission). 2019. *In the Matter of a Commission Inquiry into Electric Vehicle Charging and Infrastructure: Suggested Findings and Decision Options*. Docket E999/CI-17-879, October 1. St. Paul: Minnesota PUC. www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId=%7BB084A467-0000-C718-9456-0FBA39380C85%7D&documentTitle=201812-148433-01.

Mock, P., Z. Yang, and U. Tietge. 2020. "The Impact of COVID-19 on New Car Markets in China, Europe, and the United States: V, U, W, or L?" *ICCT Blog*, August 14. theicct.org/blog/staff/impact-covid-19-new-car-markets-china-europe-and-united-states-v-u-w-or-l.

Morrison, G., N. Veilleux, and C. Powers. 2018. *PEV Policy Evaluation Rubric: A Methodology for Evaluating the Impact of State and Local Policies on Plug-In Electric Vehicle Adoption*. Prepared by Cadmus. Arlington, VA: NASEO (National Association of State Energy Officials). naseo.org/Data/Sites/1/pevpolicyrubricmethodology_naseo.pdf.

NCCETC (North Carolina Clean Energy Technology Center). 2020a. *The 50 States of Electric Vehicles: Q1 2020 Report*.

——. 2020b. *The 50 States of Electric Vehicles: Q2 2020 Report*.

Nelder, C. 2017. "Rate-Design Best Practices for Public Electric-Vehicle Chargers." *Rocky Mountain Institute Blog*, April 6. rmi.org/rate-design-best-practices-public-electric-vehicle-chargers/.

New Jersey Legislature. 2018. "Establishes Goals and Initiatives for Increased Use of Plug-In Electric Vehicles, S2252." njleg.state.nj.us/2018/Bills/S2500/2252_U2.HTM.

Nicholas, M., D. Hall, and N. Lutsey. 2019. *Quantifying the Electric Vehicle Charging Infrastructure Gap Across U.S. Markets*. Washington DC: ICCT. theicct.org/sites/default/files/publications/US_charging_Gap_20190124.pdf.

Nuccitelli, D. 2016. "95% Consensus of Expert Economists: Cut Carbon Pollution." *Guardian*, January 4. theguardian.com/environment/climate-consensus-97-percent/2016/jan/04/consensus-of-economists-cut-carbon-pollution.

Office of the Governor of New York. 2020, "Governor Cuomo Announces Nation-Leading Initiatives to Expand Electric Vehicle Use to Combat Climate Change." governor.ny.gov/news/governor-cuomo-announces-nation-leading-initiatives-expand-electric-vehicle-use-combat-climate.

Open EI. 2020. "U.S. Utility Rate Database." openei.org/apps/USURDB/.

Peters, D., J. Schnell, P. Kinney, V. Naik, and D. Horton. 2020. "Public Health and Climate Benefits and Trade-Offs of U.S. Vehicle Electrification." *GeoHealth* 4 (10). doi.org/10.1029/2020GH000275.

PGE (Portland General Electric Company). 2019. *PGE Electric Vehicle Charging Pilot Program Proposals*. Docket No. UM 1811, February 15. Salem: Oregon PUC (Public Utility Commission). edocs.puc.state.or.us/efdocs/HAD/um1811had151943.pdf.

Reichmuth, D. 2019. *Inequitable Exposure to Air Pollution from Vehicles in California*. Cambridge, MA: UCS. ucsusa.org/resources/inequitable-exposure-air-pollution-vehicles-california-2019.

——. 2020. *Electric Vehicles are Cleaner than Gasoline – and Getting Better*. Cambridge, MA: UCS. ucsusa.org/resources/cleaner-evs.

Ribeiro, D., S. Samarripas, K. Tanabe, A. Jarrah, H. Bastian, A. Drehobl, S. Vaidyanathan, E. Cooper, B. Jennings, and N. Henner. 2020. *The 2020 City Clean Energy Scorecard*. Washington, DC: ACEEE. aceee.org/research-report/u2008.

RIPTA (Rhode Island Public Transit Authority). 2020. "Zero Emissions Vehicle Program." ripta.com/projects/electric-bus/.

Sangi, E. 2013. "PUCs: Are EV Charging Stations Utilities?" *Advanced Energy Perspectives*, September 25. blog.aee.net/pucs-are-ev-charging-stations-utilities.

Schefter, K., and B. Knox. 2018. *Accelerating Electric Vehicle Adoption*. Washington, DC: EEI. eei.org/issuesandpolicy/electrictransportation/Documents/Accelerating_EV_Adoption_final_Feb2018.pdf.

SDGE (San Diego Gas & Electric Company). 2017. *Application of San Diego Gas & Electric Company (U 902-E) for Approval of SB 350 Transportation Electrification Proposals*. Application 17-01-020, 17-01-021, and 17-01-022, January 20. San Francisco: CPUC. www.sdge.com/regulatory-filing/20491/application-sdge-authority-implement-priority-review-and-standard-review.

Silver, F., J. Jackson, and B. Lee. 2019. *Zeroing in on ZEBS: The Advanced Technology Transit Bus Index*. Pasadena, CA: CALSTART. calstart.org/wpcontent/uploads/2019/10/Zeroing_In_on_ZEBs_Final_10182018-10.21.19.pdf.

Singer, M. 2017. *The Barriers to Acceptance of Plug-In Electric Vehicles: 2017 Update*. Golden, CO: NREL. nrel.gov/docs/fy18osti/70371.pdf.

Smith, C. 2020. *Investment in Public EV Charging in the United States: An Overview of Current and Historical Funding from the Public and Private Sector*. Washington, DC: Atlas Public Policy. Seattle: ATE (Alliance for Transportation Electrification). atlasevhub.com/wp-content/uploads/2020/02/Investment-in-Public-EV-Charging-in-the-United-States.pdf.

Stradling, R. 2019. "Hybrid Owners Would Pay New Annual Fee under NC Bill, and Electric Car Owners Would Pay More." *News & Observer*, April 10. www.newsobserver.com/news/politics-government/article229072449.html.

Susser, J. 2019. "5 Ways Electric Co-Ops Can Support Electric Vehicles." *Advanced Energy*, February 7. advancedenergy.org/2019/02/07/5-ways-electric-co-ops-can-support-electric-vehicles/.

SWEEP (Southwest Energy Efficiency Project). 2020. "EV Infrastructure Building Codes: Adoption Toolkit." swenergy.org/transportation/electric-vehicles/building-codes.

Tal, G., and A. Brown. 2017. "Credits and Rebates Play a Key Role in Building Consumer Market for Cleaner Electric Vehicles." *Transportation & Climate Blog*, November 8.

its.ucdavis.edu/blog-post/credits-rebates-play-key-role-building-consumer-market-cleaner-electric-vehicles/.

Tomich, J. 2019. "Some Fear Wave of EV Fees Might Swamp Emission Goals." *E&E News*, March 11. www.eenews.net/stories/1060126901.

Turk, G. 2020. "GMP's eCharger Pilot Update." *Rate Design Initiative/Distributed Energy Resources Study Stakeholder Engagement Meeting #3*. Prepared by Green Mountain Power. Montpelier: Vermont DPS (Department of Public Service). publicservice.vermont.gov/sites/dps/files/documents/RDI%233_Pnl%232-Turk_GMP.pdf.

U.S. News. 2020. "Rankings Driven by Research." cars.usnews.com/cars-trucks/.

Vaidyanathan, S. 2016. *Rating the Environmental Impacts of Motor Vehicles: ACEEE's greenercars.org Methodology, 2016 Edition*. Washington, DC: ACEEE. www.aceee.org/research-report/t1601.

Warner, M., S. Gabel, P. Frank, G. Tyson, I. Gabel-Frank, A. Fiumano, E. Gabel-Frank, and H. Reed. 2020. *Full Market Vehicle Electrification in New Jersey: The Opportunities, Impacts, and New Benefits for Light-, Medium-, and Heavy-Duty Electric Vehicles*. Prepared by Gabel Associates. Highland Park, NJ: ChargEVC. chargevc.org/wp-content/uploads/2020/10/ChargEVC-Full-Market-Electrification-Study-FINAL-Oct-7-2020.pdf.

Washington State Legislature. 2019. "Advancing Green Transportation Adoption, HB 2042." app.leg.wa.gov/billsummary?BillNumber=2042&Initiative=false&Year=2019.

Washington UTC (Utilities and Transportation Commission). 2017. *Policy and Interpretive Statement Concerning Commission Regulation of Electric Vehicle Charging Services*. Docket UE-160799, June 14. Lacey: Washington UTC. www.utc.wa.gov/docs/Pages/ElectricVehicleSupplyEquipment,DocketUT-160799.aspx.

Appendix A. Full State Scores

Table A1. Full scores by scoring category for all 50 states and the District of Columbia

State	Planning and goals (17 pts.)	Incentives (30 pts.)	Transportation system efficiency (12 pts.)	Electricity grid optimization (10 pts.)	Equity (10 pts.)	Outcomes (21 pts.)	Total (100 pts.)
California	17	27.5	12	11	8.5	15	91
New York	12.5	26.5	4	9.5	5	6	63.5
District of Columbia	10	13	9	7	4	16	59
Maryland	10	21.5	5	6	3	10.5	56
Massachusetts	10.5	21.5	4	7	2.5	9	54.5
Washington	13.5	16	4	5.5	3	12	54
Vermont	11.5	16	2	8	0	11.5	49
Colorado	11.5	14	4	6.5	1	11	48
Oregon	14.5	11.5	5	4.5	1	10.5	47
New Jersey	10	17	6	3	1	7	44
Hawaii	6.5	12.5	1	9	0.5	11	40.5
Minnesota	7	15.5	3	6.5	2	5.5	39.5
Connecticut	10	11	6	5.5	0	6	38.5
Nevada	6	11.5	1	8	3	8	37.5
Rhode Island	10	14	2	3	1	6.5	36.5
Virginia	4	14	3	7	0	8	36
Maine	7	10.5	1	7.5	0	8	34
Pennsylvania	6	17	2	4	1	4	34
North Carolina	8	11.5	1	3.5	1	6.5	31.5
Tennessee	7	9.5	1	5.5	2	5.5	30.5
Utah	3	9.5	1	3	0	10.5	27
Florida	4	8	1	3.5	1	6.5	24
Illinois	2.5	8.5	1	3.5	2	5.5	23
Delaware	1	8	2	5	1	5.5	22.5
Arizona	2	7.5	1	5	0	6	21.5
Missouri	0	12	1	0	1	6	20
Georgia	0	4.5	1	4	0	8.5	18
Texas	0	11	1	0	2	4	18

State	Planning and goals (17 pts.)	Incentives (30 pts.)	Transportation system efficiency (12 pts.)	Electricity grid optimization (10 pts.)	Equity (10 pts.)	Outcomes (21 pts.)	Total (100 pts.)
Kansas	0	3.5	1	3	0	8	15.5
Michigan	1	8.5	1	4	0	1	15.5
New Mexico	2	6.5	1	2	0	4	15.5
Montana	1	7.5	1	1.5	0	4	15
Iowa	4	4.5	1	1.5	0	3	14
Ohio	0	8	2	0	1	3	14
Idaho	1	7	1	2.5	0	2	13.5
Wisconsin	0	5.5	1	5	0	2	13.5
Alaska	0	4	1	4	0	4	13
New Hampshire	1	5	1	2	0	4	13
Oklahoma	0	7.5	1	2.5	0	2	13
Indiana	0	4	1	3	0	3.5	11.5
South Carolina	0	4.5	1	3	0	2.5	11
Louisiana	0	7	1	0.5	0	1	9.5
Alabama	0	4	1	4	0	0	9
South Dakota	0	6	0	1	0	2	9
Wyoming	1	2	1	0	0	4	8
Kentucky	0	3.5	1	1.5	0	1	7
North Dakota	0	0.5	0	1.5	0	5	7
Nebraska	0	1.5	1	0	0	1	3.5
West Virginia	0	1	0	0	0	1	2
Arkansas	0	–1	1	1.5	0	0	1.5
Mississippi	0	–1	1	0	0	0	0

Table A2. Scores for planning and goal setting for all 50 states and the District of Columbia

State	EV and EV charging infrastructure plans (4 pts.)	LD EV adoption goals and ZEV mandates (4 pts.)	HD EV adoption goals and ZEV mandates (4 pts.)	Utility EV charging infrastructure goals (2 pts.)	EV-ready building codes (2 pts.)	Low-carbon fuel standard (1 pt.)	Total (17 pts.)
California	4	4	4	2	2	1	17
Oregon	4	4	2	2	1.5	1	14.5

State	EV and EV charging infrastructure plans (4 pts.)	LD EV adoption goals and ZEV mandates (4 pts.)	HD EV adoption goals and ZEV mandates (4 pts.)	Utility EV charging infrastructure goals (2 pts.)	EV-ready building codes (2 pts.)	Low-carbon fuel standard (1 pt.)	Total (17 pts.)
Washington	4	4	2	2	1.5	0	13.5
New York	4	4	2	2	0.5	0	12.5
Colorado	4	4	2	1	0.5	0	11.5
Vermont	4	4	2	0	1.5	0	11.5
Massachusetts	4	4	2	0	0.5	0	10.5
Connecticut	4	4	2	0	0	0	10
District of Columbia	4	4	2	0	0	0	10
Maryland	4	4	2	0	0	0	10
New Jersey	4	4	2	0	0	0	10
Rhode Island	4	4	2	0	0	0	10
North Carolina	2	4	2	0	0	0	8
Maine	1	4	2	0	0	0	7
Minnesota	4	2	0	1	0	0	7
Tennessee	4	2	0	1	0	0	7
Hawaii	4	0	2	0	0.5	0	6.5
Nevada	4	2	0	0	0	0	6
Pennsylvania	4	0	2	0	0	0	6
Florida	4	0	0	0	0	0	4
Iowa	4	0	0	0	0	0	4
Virginia	4	0	0	0	0	0	4
Utah	2	0	0	1	0	0	3
Illinois	2	0	0	0	0.5	0	2.5
Arizona	1	0	0	1	0	0	2
New Mexico	1	0	0	1	0	0	2
Delaware	1	0	0	0	0	0	1
Idaho	1	0	0	0	0	0	1
Michigan	1	0	0	0	0	0	1
Montana	1	0	0	0	0	0	1
New Hampshire	1	0	0	0	0	0	1
Wyoming	1	0	0	0	0	0	1

State	EV and EV charging infrastructure plans (4 pts.)	LD EV adoption goals and ZEV mandates (4 pts.)	HD EV adoption goals and ZEV mandates (4 pts.)	Utility EV charging infrastructure goals (2 pts.)	EV-ready building codes (2 pts.)	Low-carbon fuel standard (1 pt.)	Total (17 pts.)
Alabama	0	0	0	0	0	0	0
Alaska	0	0	0	0	0	0	0
Arkansas	0	0	0	0	0	0	0
Georgia	0	0	0	0	0	0	0
Indiana	0	0	0	0	0	0	0
Kansas	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	0
Louisiana	0	0	0	0	0	0	0
Mississippi	0	0	0	0	0	0	0
Missouri	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0
North Dakota	0	0	0	0	0	0	0
Ohio	0	0	0	0	0	0	0
Oklahoma	0	0	0	0	0	0	0
South Carolina	0	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0	0
Texas	0	0	0	0	0	0	0
West Virginia	0	0	0	0	0	0	0
Wisconsin	0	0	0	0	0	0	0

Table A3. Scores for incentives for deployment for all 50 states and the District of Columbia

State	Light-duty EV purchase incentives (4 pts.)	Heavy-duty EV purchase incentives (4 pts.)	State incentives for L2 chargers (2 pts.)	State incentives for DCFC chargers (2 pts.)	EV fees (2 pts.)	Utility spending on EV charging infrastructure incentives (6 pts.)	Utility incentive offerings for L2 (1 pt.)	Utility incentive offerings for DCFC (1 pt.)	Utility incentive offerings for commercial fleet charging (1 pt.)	EV charging exemption from public utility definition (1 pt.)	Volkswagen fund allocation for electrification (4 pts.)	Nonfinancial incentives (1 pt.)	Direct sales regulations (1 pt.)	Total
California	4	4	2	1	1	6	1	1	1	1	3.5	1	1	27.5
New York	3	4	2	2	2	6	1	1	1	1	2.5	1	0	26.5
Maryland	0	4	2	1	2	6	1	0.5	0	1	3	1	0	21.5
Massachusetts	3	0	2	1	2	5.5	1	1	0	1	3.5	0.5	1	21.5
New Jersey	3	4	2	1	2	1.5	0	0	0	1	2	0.5	0	17
Pennsylvania	4	3	1	1	2	1.5	1	1	0.5	1	1	0	0	17
Vermont	4	3	0	0	2	0	1	0.5	0.5	1	3	0	1	16
Washington	3	0	1	1	1	4	1	0.5	1	1	2.5	0	0	16
Minnesota	0	3	0	1	1	4.5	0.5	1	0.5	1	2	0	1	15.5
Colorado	1	1	1	2	1	3	0	0	0.5	1	2	0.5	1	14
Virginia	0	4	0	0	1	2.5	1	1	1	1	1.5	1	0	14
Rhode Island	0	0	1	1	2	2	1	1	1	0	4	0	1	14
District of Columbia	0	0	1	1	2	5	1	0.5	0.5	0	1	1	0	13
Hawaii	3	0	1	1	1	1	0	0.5	0	1	4	0	0	12.5
Missouri	0	3	0	0	0	4	1	1	0.5	1	0	0.5	1	12
Nevada	0	3	0	0	2	1	0.5	0.5	0.5	1	2	1	0	11.5
North Carolina	0	3	0	1	1	2.5	0.5	0.5	1	1	0	1	0	11.5
Oregon	4	0	0	0	1	2.5	0.5	0.5	0.5	1	0.5	0	1	11.5
Connecticut	3	4	0	0	2	0	0	0	0	1	0.5	0.5	0	11
Texas	3	3	1	1	2	0	0	0	0	1	0	0	0	11

State	Light-duty EV purchase incentives (4 pts.)	Heavy-duty EV purchase incentives (4 pts.)	State incentives for L2 chargers (2 pts.)	State incentives for DCFC chargers (2 pts.)	EV fees (2 pts.)	Utility spending on EV charging infrastructure incentives (6 pts.)	Utility incentive offerings for L2 (1 pt.)	Utility incentive offerings for DCFC (1 pt.)	Utility incentive offerings for commercial fleet charging (1 pt.)	EV charging exemption from public utility definition (1 pt.)	Volkswagen fund allocation for electrification (4 pts.)	Nonfinancial incentives (1 pt.)	Direct sales regulations (1 pt.)	Total
Maine	4	0	1	0	2	1	0.5	0	0	1	0	0	1	10.5
Utah	0	1	1	1	1	1.5	0.5	0	0.5	1	1	1	0	9.5
Illinois	0	3	1	1	0	0	0	0	0	1	1	0.5	1	8.5
Michigan	0	0	0	0	1	2.5	1	1	0.5	0	2	0.5	0	8.5
Tennessee	0	3	1	1	1	0	0	0	0	0	0.5	1	1	8.5
Delaware	0	0	1	0	2	1	0.5	0.5	0	1	1	0	1	8
Florida	0	0	0	0	2	1	0.5	0.5	0	1	2	0	1	8
Ohio	0	4	1	0	–1	3	0.5	0.5	0	0	0	0	0	8
Arizona	0	0	0	0	2	1	1	0	0.5	1	0	1	1	7.5
Montana	0	3	0	0	2	0	0	0	0	1	1.5	0	0	7.5
Oklahoma	1	2	1	1	2	0	0	0	0	0	0.5	0	0	7.5
Idaho	0	3	0	1	0	0	0	0	0	1	0.5	0.5	1	7
Louisiana	1	4	0	0	2	0	0	0	0	0	0	0	0	7
New Mexico	0	0	1	1	2	0.5	0	0	0	1	1	0	0	6.5
South Dakota	0	4	0	0	2	0	0	0	0	0	0	0	0	6
Wisconsin	0	4	0	0	1	0	0.5	0	0	0	0	0	0	5.5
New Hampshire	0	0	0	0	2	0.5	0	0	0	1	0.5	0	1	5
Georgia	0	0	0	0	–2	3	0.5	0.5	0.5	0	1	1	0	4.5
Iowa	0	0	0	0	2	0	0	0	0	1	1.5	0	0	4.5
South Carolina	0	0	0	0	1	2.5	0.5	0.5	0	0	0	0	0	4.5
Alabama	0	3	1	1	–2	0	0	0	0	1	0	0	0	4
Alaska	0	0	0	0	2	0	1	0	0	0	0	0	1	4
Indiana	0	3	0	0	0	0.5	0.5	0	0	0	0	0	0	4

State	Light-duty EV purchase incentives (4 pts.)	Heavy-duty EV purchase incentives (4 pts.)	State incentives for L2 chargers (2 pts.)	State incentives for DCFC chargers (2 pts.)	EV fees (2 pts.)	Utility spending on EV charging infrastructure incentives (6 pts.)	Utility incentive offerings for L2 (1 pt.)	Utility incentive offerings for DCFC (1 pt.)	Utility incentive offerings for commercial fleet charging (1 pt.)	EV charging exemption from public utility definition (1 pt.)	Volkswagen fund allocation for electrification (4 pts.)	Nonfinancial incentives (1 pt.)	Direct sales regulations (1 pt.)	Total
Kansas	0	0	0	0	0	3	0.5	0	0	0	0	0	0	3.5
Kentucky	0	0	0	0	2	0.5	0	0	0	1	0	0	0	3.5
Wyoming	0	3	0	0	–2	0	0	0	0	0	0	0	1	2
Nebraska	0	0	0	0	1	0	0	0	0	0	0.5	0	0	1.5
West Virginia	0	0	0	0	0	0	0	0	0	1	0	0	0	1
North Dakota	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0.5
Arkansas	0	0	0	0	–2	0	0	0	0	1	0	0	0	–1
Mississippi	0	0	0	0	–2	0	0	0	0	0	0	0	1	–1

Table A4. Scores for transportation system efficiency for all 50 states and the District of Columbia

State	Sector-wide GHG reduction goals (2 pts.)	GHG pricing policy for transportation sector (3 pts.)	Transit agency bus goals and procurement (4 pts.)	State investment for EV transit bus deployment (2 pts.)	Policies to encourage shared EV fleets (1 pt.)	Total (12 pts.)
California	2	3	4	2	1	12
District of Columbia	2	1	4	1	1	9
Connecticut	0	1	4	1	0	6
New Jersey	0	1	4	1	0	6
Maryland	2	1	0	2	0	5
Oregon	2	2	0	1	0	5
Colorado	0	0	2	2	0	4
Massachusetts	2	1	0	1	0	4
New York	0	0	2	2	0	4
Washington	2	0	0	2	0	4
Minnesota	2	0	0	1	0	3
Virginia	0	1	0	2	0	3
Delaware	0	1	0	1	0	2
Ohio	0	0	0	2	0	2
Pennsylvania	0	1	0	1	0	2
Rhode Island	0	1	0	1	0	2
Vermont	0	1	0	1	0	2
Alabama	0	0	0	1	0	1
Alaska	0	0	0	1	0	1
Arizona	0	0	0	1	0	1
Arkansas	0	0	0	1	0	1
Florida	0	0	0	1	0	1
Georgia	0	0	0	1	0	1
Hawaii	0	0	0	1	0	1
Idaho	0	0	0	1	0	1
Illinois	0	0	0	1	0	1
Indiana	0	0	0	1	0	1
Iowa	0	0	0	1	0	1
Kansas	0	0	0	1	0	1

State	Sector-wide GHG reduction goals (2 pts.)	GHG pricing policy for transportation sector (3 pts.)	Transit agency bus goals and procurement (4 pts.)	State investment for EV transit bus deployment (2 pts.)	Policies to encourage shared EV fleets (1 pt.)	Total (12 pts.)
Kentucky	0	0	0	1	0	1
Louisiana	0	0	0	1	0	1
Maine	0	0	0	1	0	1
Michigan	0	0	0	1	0	1
Mississippi	0	0	0	1	0	1
Missouri	0	0	0	1	0	1
Montana	0	0	0	1	0	1
Nebraska	0	0	0	1	0	1
Nevada	0	0	0	1	0	1
New Hampshire	0	0	0	1	0	1
New Mexico	0	0	0	1	0	1
North Carolina	0	0	0	1	0	1
Oklahoma	0	0	0	1	0	1
South Carolina	0	0	0	1	0	1
Tennessee	0	0	0	1	0	1
Texas	0	0	0	1	0	1
Utah	0	0	0	1	0	1
Wisconsin	0	0	0	1	0	1
Wyoming	0	0	0	1	0	1
North Dakota	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0
West Virginia	0	0	0	0	0	0

Table A5. Scores for electricity system optimization for all 50 states and the District of Columbia

State	L2 grid-optimized rates (3 pts.)	DCFC rates (2 pts.)	Managed charging programs (1 pt.)	Electric power sector emissions (4 pts.)	Vehicle-to-grid pilot (1 bonus pt.)	Total (10 pts.)
California	3	2	1	4	1	11
New York	1.5	2	1	4	1	9.5
Hawaii	3	2	0	3	1	9
Nevada	3	2	0	3	0	8

State	L2 grid-optimized rates (3 pts.)	DCFC rates (2 pts.)	Managed charging programs (1 pt.)	Electric power sector emissions (4 pts.)	Vehicle-to-grid pilot (1 bonus pt.)	Total (10 pts.)
Vermont	3	0	1	4	0	8
Maine	1.5	2	0	4	0	7.5
District of Columbia	3	0	0	4	0	7
Massachusetts	3	0	1	3	0	7
Virginia	3	0	0	3	1	7
Colorado	3	0	0.5	3	0	6.5
Minnesota	3	2	0.5	1	0	6.5
Maryland	3	2	0	1	0	6
Connecticut	1.5	0	0	4	0	5.5
Tennessee	1.5	2	0	1	1	5.5
Washington	0	2	0.5	3	0	5.5
Arizona	3	0	0	2	0	5
Delaware	3	0	0	2	0	5
Wisconsin	3	2	0	0	0	5
Oregon	3	0	0.5	1	0	4.5
Alabama	3	0	0	1	0	4
Alaska	3	0	0	1	0	4
Georgia	3	0	0	1	0	4
Michigan	3	0	1	0	0	4
Pennsylvania	0	2	0	2	0	4
Florida	1.5	0	1	1	0	3.5
Illinois	1.5	0	0	2	0	3.5
North Carolina	1.5	0	0	2	0	3.5
Indiana	3	0	0	0	0	3
Kansas	3	0	0	0	0	3
New Jersey	0	0	0	3	0	3
Rhode Island	0	0	0	3	0	3
South Carolina	1.5	0	0.5	1	0	3
Utah	3	0	0	0	0	3
Idaho	1.5	0	0	1	0	2.5
Oklahoma	1.5	0	0	1	0	2.5

State	L2 grid-optimized rates (3 pts.)	DCFC rates (2 pts.)	Managed charging programs (1 pt.)	Electric power sector emissions (4 pts.)	Vehicle-to-grid pilot (1 bonus pt.)	Total (10 pts.)
New Hampshire	0	0	0	2	0	2
New Mexico	0	0	0	2	0	2
Arkansas	1.5	0	0	0	0	1.5
Iowa	1.5	0	0	0	0	1.5
Kentucky	1.5	0	0	0	0	1.5
Montana	1.5	0	0	0	0	1.5
North Dakota	1.5	0	0	0	0	1.5
South Dakota	0	0	0	1	0	1
Louisiana	0	0	0	0.5	0	0.5
Mississippi	0	0	0	0	0	0
Missouri	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0
Ohio	0	0	0	0	0	0
Texas	0	0	0	0	0	0
West Virginia	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0

Table A6. Scores for equity for all 50 states and the District of Columbia

State	Statewide low-income investment (2 pts.)	Utility-specific low-income investment (2 pts.)	State low-income programs (4 pts.)	State EV school bus fleets (2 pts.)	Total (10 pts.)
California	2	2	2.5	2	8.5
New York	2	2	0	1	5
District of Columbia	2	2	0	0	4
Maryland	0	1	0	2	3
Nevada	0	1	0	2	3
Washington	2	1	0	0	3
Massachusetts	0	2	0.5	0	2.5
Illinois	0	0	0	2	2
Minnesota	0	2	0	0	2

State	Statewide low-income investment (2 pts.)	Utility-specific low-income investment (2 pts.)	State low-income programs (4 pts.)	State EV school bus fleets (2 pts.)	Total (10 pts.)
Tennessee	0	0	0	2	2
Texas	0	0	0	2	2
Colorado	1	0	0	0	1
Delaware	0	1	0	0	1
Florida	0	1	0	0	1
Missouri	0	1	0	0	1
New Jersey	1	0	0	0	1
North Carolina	0	1	0	0	1
Ohio	0	1	0	0	1
Oregon	0	1	0	0	1
Pennsylvania	0	1	0	0	1
Rhode Island	0	1	0	0	1
Hawaii	0	0	0.5	0	0.5
Alabama	0	0	0	0	0
Alaska	0	0	0	0	0
Arizona	0	0	0	0	0
Arkansas	0	0	0	0	0
Connecticut	0	0	0	0	0
Georgia	0	0	0	0	0
Idaho	0	0	0	0	0
Indiana	0	0	0	0	0
Iowa	0	0	0	0	0
Kansas	0	0	0	0	0
Kentucky	0	0	0	0	0
Louisiana	0	0	0	0	0
Maine	0	0	0	0	0
Michigan	0	0	0	0	0
Mississippi	0	0	0	0	0
Montana	0	0	0	0	0
Nebraska	0	0	0	0	0
New Hampshire	0	0	0	0	0
New Mexico	0	0	0	0	0

State	Statewide low-income investment (2 pts.)	Utility-specific low-income investment (2 pts.)	State low-income programs (4 pts.)	State EV school bus fleets (2 pts.)	Total (10 pts.)
North Dakota	0	0	0	0	0
Oklahoma	0	0	0	0	0
South Carolina	0	0	0	0	0
South Dakota	0	0	0	0	0
Utah	0	0	0	0	0
Vermont	0	0	0	0	0
Virginia	0	0	0	0	0
West Virginia	0	0	0	0	0
Wisconsin	0	0	0	0	0
Wyoming	0	0	0	0	0

Table A7. Scores for transportation electrification outcomes for all 50 states and the District of Columbia

State	LD EVs per 100,000 people (4 pts.)	HD EVs per 100,000 people (3 pts.)	L2 stations and ports per 100,000 people (4 pts.)	DCFC stations and ports per 100,000 people (4 pts.)	EVs in transit bus fleets (2 pts.)	Percentage change in GHG over a 5-year period (4 pts.)	Total (21 pts.)
District of Columbia	2	2	4	3	2	3	16
California	4	2	4	3	2	0	15
Washington	3	3	2	2	2	0	12
Vermont	2	1	4	4	0.5	0	11.5
Colorado	3	1	3	2	1	1	11
Hawaii	3	1	3	2	2	0	11
Maryland	2	1	2	2	0.5	3	10.5
Oregon	3	0	2	2	0.5	3	10.5
Utah	2	1	3	2	0.5	2	10.5
Massachusetts	2	1	3	2	0	1	9
Georgia	2	1	2	2	0.5	1	8.5
Kansas	0	0	2	2	0	4	8
Maine	1	0	2	2	0	3	8
Nevada	2	1	2	2	1	0	8
Virginia	2	1	1	1	0	3	8

State	LD EVs per 100,000 people (4 pts.)	HD EVs per 100,000 people (3 pts.)	L2 stations and ports per 100,000 people (4 pts.)	DCFC stations and ports per 100,000 people (4 pts.)	EVs in transit bus fleets (2 pts.)	Percentage change in GHG over a 5-year period (4 pts.)	Total (21 pts.)
New Jersey	2	0	0	1	0	4	7
Florida	2	1	1	1	0.5	1	6.5
North Carolina	1	1	1	1	0.5	2	6.5
Rhode Island	1	0	3	2	0.5	0	6.5
Arizona	3	0	1	1	0	1	6
Connecticut	2	0	2	2	0	0	6
Missouri	0	1	2	2	0	1	6
New York	1	1	2	2	0	0	6
Delaware	1	1	1	1	1.5	0	5.5
Illinois	2	1	1	1	0.5	0	5.5
Minnesota	1	1	1	1	0.5	1	5.5
Tennessee	1	1	1	1	1.5	0	5.5
North Dakota	0	0	0	1	0	4	5
Alaska	1	0	0	0	0	3	4
Montana	0	1	0	1	0	2	4
New Hampshire	1	0	1	1	0	1	4
New Mexico	1	1	0	1	1	0	4
Pennsylvania	1	1	1	1	0	0	4
Texas	1	1	1	1	0	0	4
Wyoming	0	0	1	2	1	0	4
Indiana	0	1	0	0	0.5	2	3.5
Iowa	0	1	0	1	0	1	3
Ohio	1	0	0	1	0	1	3
South Carolina	0	1	0	1	0.5	0	2.5
Idaho	1	0	0	1	0	0	2
Oklahoma	0	0	1	1	0	0	2
South Dakota	0	0	0	1	0	1	2
Wisconsin	0	1	0	1	0	0	2
Kentucky	0	1	0	0	0	0	1
Louisiana	0	1	0	0	0	0	1

State	LD EVs per 100,000 people (4 pts.)	HD EVs per 100,000 people (3 pts.)	L2 stations and ports per 100,000 people (4 pts.)	DCFC stations and ports per 100,000 people (4 pts.)	EVs in transit bus fleets (2 pts.)	Percentage change in GHG over a 5-year period (4 pts.)	Total (21 pts.)
Michigan	0	0	0	1	0	0	1
Nebraska	0	0	0	1	0	0	1
West Virginia	0	0	0	1	0	0	1
Alabama	0	0	0	0	0	0	0
Arkansas	0	0	0	0	0	0	0
Mississippi	0	0	0	0	0	0	0

Appendix B. Planning and Goal-Setting Metrics

Table B1. State EV and EV charging infrastructure plans

State	State EV action plan or multistate memorandum of understanding
Arizona	REV West
California	2016 ZEV Action Plan: An updated roadmap toward 1.5 million zero-emission vehicles on California roadways by 2025 Multi-State ZEV Action Plan
Colorado	Colorado Electric Vehicle Plan 2020 REV West
Connecticut	Electric Vehicle Roadmap for Connecticut Multi-State ZEV Action Plan
Delaware	Northeast Corridor Regional Strategy for Electric Vehicle Charging Infrastructure 2018–2021
District of Columbia	Clean Energy DC
Florida	Florida Electric Vehicle Roadmap Interim Reports
Hawaii	Hawaii Clean Energy Initiative Transportation Energy Analysis
Idaho	REV West
Illinois	Illinois Electric Vehicle Advisory Council Final Report
Iowa	Charging Forward: Iowa's Opportunities for Electric Vehicle Infrastructure Support
Maine	Northeast Corridor Regional Strategy for Electric Vehicle Charging Infrastructure 2018–2021
Maryland	Multi-State ZEV Action Plan
Massachusetts	Massachusetts Zero Emission Vehicle Action Plan Multi-State ZEV Action Plan

State	State EV action plan or multistate memorandum of understanding
Michigan	Optimized EV Charger Placement Plan
Minnesota	Accelerating Electric Vehicle Adoption: A Vision for Minnesota
Montana	REV West
Nevada	Electrifying Nevada's 21st-Century Transportation System: Actions, Opportunities, Aspirations REV West
New Hampshire	Northeast Corridor Regional Strategy for Electric Vehicle Charging Infrastructure 2018–2021
New Jersey	2019 Energy Master Plan Strategies and Goals Multi-State ZEV Action Plan
New Mexico	REV West
New York	Multi-State ZEV Action Plan
North Carolina	North Carolina ZEV Plan: A Strategic Plan for Accelerating Electric Vehicle Adoption in North Carolina
Oregon	Multi-State ZEV Action Plan
Pennsylvania	Pennsylvania Electric Vehicle Roadmap
Rhode Island	State of Rhode Island Zero Emission Vehicle Action Plan Multi-State ZEV Action Plan
Tennessee	A Roadmap for Electric Vehicles in Tennessee
Utah	State of Utah Electric Vehicle Master Plan REV West
Vermont	Vermont Zero Emission Vehicle Action Plan Multi-State ZEV Action Plan
Virginia	The Commonwealth of Virginia's 2018 Energy Plan

State	State EV action plan or multistate memorandum of understanding
Washington	Washington State Electric Vehicle Action Plan 2015–2020
Wyoming	REV West

Sources: ACEEE review of state energy and EV plans and legislative, regulatory, and executive actions

Table B2. LD EV adoption goals and ZEV mandates

State	Description
California	Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
Colorado	Colorado Electric Vehicle Plan 2020 includes a LD EV goal of 940,000 by 2030
Connecticut	Zero Emission Vehicle (ZEV) Sales Requirements and Low Emission Vehicle (LEV) Standards Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
District of Columbia	The Clean Energy DC Omnibus Amendment Act of 2018 mandates a plan including recommendations for polices to achieve at least 25% ZEV registrations by 2030
Maine	Zero Emission Vehicle (ZEV) Sales Requirements and Low Emission Vehicle (LEV) Standards Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
Maryland	Zero Emission Vehicle (ZEV) Sales Requirements and Low Emission Vehicle (LEV) Standards Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025

State	Description
Massachusetts	Zero Emission Vehicle (ZEV) Sales Requirements and Low Emission Vehicle (LEV) Standards Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
Minnesota	Rulemaking: Clean Cars Minnesota Accelerating Electric Vehicle Adoption: A Vision for Minnesota includes a goal of powering 20% of the light-duty cars in the state with electricity by 2030
Nevada	Clean Cars Nevada
New Jersey	New Jersey State Department of Environmental Protection New Jersey Air Pollution Control Act Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
New York	218-4.1 ZEV percentages Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
North Carolina	Executive Order Number 80 issues a North Carolina ZEV Plan to increase the number of registered ZEVs in the state to at least 80,000 by 2025
Oregon	Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
Rhode Island	Zero Emission Vehicle (ZEV) Sales Requirements and Low Emission Vehicle Standards Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to

State	Description
	a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
Tennessee	A Roadmap for Electric Vehicles in Tennessee sets a goal to increase LD EVs to at least 200,000 by 2028
Vermont	Zero Emission Vehicle (ZEV) Sales Requirements and Low Emission Vehicle Standards Signatory to the State Zero-Emission Vehicle Programs MOU, which agrees to a collective target of at least 3.3 million zero-emission vehicles on the road in states by 2025
Washington	Washington clean car standards Washington State Electric Vehicle Action Plan 2015–2020 contains a goal of 50,000 plug-in electric vehicles by 2020

Sources: ACEEE review of state energy and EV plans and legislative, regulatory, and executive actions

Table B3. EV-ready building codes

State	Description
California	California Green Building Standards Code: Residential Mandatory Measures California Green Building Standards Code: Nonresidential Mandatory Measures
Colorado	The 2020 City of Boulder Energy Conservation Code Boulder County Building Code Amendments The Summit Sustainable Building Code The Denver Green Code Fort Collins 2019 Changes and Revisions to the Amended 2018 International Residential Code

State	Description
	City of Golden Sustainability Menu Lakewood Zoning Ordinance City of Aspen Buildings and Building Regulation
Hawaii	City and County of Honolulu, Relating to the Adoption of the State Energy Conservation Code
Illinois	Substitute Ordinance by the City Council of the City of Chicago
Massachusetts	Board of Building Regulation and Standards Meeting
New York	Local Law 130 of 2013
Oregon	Oregon Rule 918-020-0380 Electric Vehicle Ready Parking
Vermont	2019 Vermont Residential Building Energy Standards Commercial Energy Efficiency
Washington	WAC 51-50-0427 Section 427—Electric Vehicle Charging Infrastructure

Sources: SWEEP 2020, original research

Appendix C. Incentives for EV Deployment Metrics

Table C1. Light-duty EV purchase incentives

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
California	The Clean Vehicle Rebate Project offers as much as $2,000 toward the purchase of a plug-in electric vehicle (PEV) and $1,000 toward a PHEV.	Statewide programs such as the Clean Vehicle Assistance Program, as well as more localized programs such as the Bay Area and Sacramento's Driving Clean Assistance Program, help to make both used and new EVs and home chargers more accessible to low-income purchasers.
Colorado	The state's PEV Tax Credit provided as much as $4,000 toward the purchase or conversion of a light-duty EV or PHEV, or $2,000 toward the lease of a light-duty EV or PHEV in 2020. The credit also provided as much as $5,500 toward the purchase or conversion of LD electric trucks, or $2,750 for lease of LD electric trucks in 2020. The rates decrease over the next several years.	NA
Connecticut	The state's CHEAPR program provides $500 toward any PHEV, $1,500 toward an EV with a maximum range equal to or exceeding 200 miles, $500 for an EV with a range under 200 miles, and $5,000 for any fuel cell electric vehicle (FCEV).	NA
Hawaii	Hawaii's Electric Vehicle Rebate Program will contribute $2,000 toward the purchase of an EV, provided the vehicle's primary charging	NA

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
	source is grid tied and fueled primarily by renewable energy.	
Louisiana	The state's AFV tax credit can supply as much as $2,500 toward the purchase of a qualifying alternative-fuel vehicle.	NA
Maine	Maine's PEV rebate program provides anywhere from $1,000 to $7,500, depending on the purchaser's qualifications and needs.	The state's PEV rebate program provides the highest available rebate to purchases made by tribal government entities within Maine.
Massachusetts	The Massachusetts Offers Rebates for Electric Vehicles program offers as much as $2,500 toward the purchase of an EV for qualifying buyers.	NA
New Jersey	The state offers a variety of grant and rebate programs that apply to LD vehicle purchases at variable rates.	NA
New York	A rebate of up to $2,000 is available for the purchase or lease of an EV through the New York State Energy Research and Development Authority.	NA
Oklahoma	A one-time income tax credit worth up to $9,000 is available to purchasers of light-duty alternative-fuel vehicles.	NA
Oregon	The state's Clean Vehicle Rebate Program provides as	The Charge Ahead Rebate Program offers rebates to low- and moderate-income purchasers.

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
	much as $2,500 to EV purchasers.	
Pennsylvania	A $750 rebate is available to purchasers of BEVs.	An additional $1,000 rebate is available to buyers who meet specified low-income requirements.
Texas	The Light-Duty Motor Vehicle Purchase or Lease Incentive Program offers a rebate of $5,000 to the first 1,000 applicants for the purchase of an all-electric vehicle.	NA
Vermont	The state offers both a fuel-efficient emissions reduction incentive and a PEV purchase incentive worth up to $5,000.	The state's rebate program offers greater incentives to lower-income residents.
Washington	The state's Green Transportation Grant Program and Alternative Fuel Commercial Vehicle and Fueling Infrastructure Tax Credit can both help make LD EVs more affordable.	NA

Source: DOE 2020

Table C2. Heavy-duty EV purchase incentives

State	Does the state have a tax credit, rebate, or other financial incentive in place for HD EV purchases?	How much of the upfront cost does it offset for purchase of these vehicles?
Alabama	Yes	Grants are available through the Alabama Department of Economic and Community Affairs for the replacement of both medium- and heavy-duty vehicles with new alternative - fuel vehicles. The funds awarded may vary greatly on a case-by-case basis.
Alaska	No	NA

State	Does the state have a tax credit, rebate, or other financial incentive in place for HD EV purchases?	How much of the upfront cost does it offset for purchase of these vehicles?
Arizona	No	NA
Arkansas	No	NA
California	Yes	The Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project may grant anywhere from $2,000 to $315,000.
Colorado	Yes	The state's PEV Tax Credit provided as much as $16,000 for the purchase or conversion, or $8,000 for the lease, of a heavy-duty electric truck in 2020. These rates will decrease over the next several years.
Connecticut	Yes	Up to 60% of an EV and its associated charging infrastructure costs may be covered by the state's Diesel Emissions Mitigation Program.
Delaware	No	NA
District of Columbia	No	NA
Florida	No	NA
Georgia	No	NA
Hawaii	No	NA
Idaho	Yes	Rebates are available through the Idaho Department of Environmental Quality. The funds awarded may vary greatly on a case-by-case basis.
Illinois	Yes	The state EPA has an active grant program with priority funding for EV infrastructure and medium-duty, heavy-duty, public fleet, and bus electrification. The funds awarded may vary greatly on a case-by-case basis.
Indiana	Yes	The state EPA has an active grant program with priority funding for EV infrastructure

State	Does the state have a tax credit, rebate, or other financial incentive in place for HD EV purchases?	How much of the upfront cost does it offset for purchase of these vehicles?
		and medium-duty, heavy-duty, public fleet, and bus electrification. The funds awarded may vary greatly on a case-by-case basis.
Iowa	No	NA
Kansas	No	NA
Kentucky	No	NA
Louisiana	Yes	Up to 75% of the total costs associated with the purchase of a replacement HD vehicle that is fully electrified may be covered through the Department of Environmental Quality's Volkswagen eligible mitigation action program.
Maine	No	NA
Maryland	Yes	The state's Clean Fuels Infrastructure Program offers grants for the purchase of heavy-duty EVs. The maximum grant available for these EVs is $50,000.
Massachusetts	No	NA
Michigan	No	NA
Minnesota	Yes	30% of the $23.5 million set aside for phase 2 grant programs from the state's portion of the VW settlement fund is currently slated for a Heavy Duty Electric Vehicle Program. This program will provide grants to potential buyers between 2020 and 2023. The amount of each grant award may vary.
Mississippi	No	NA
Missouri	Yes	The state's Department of Natural Resources provides funding for new heavy-duty AFV acquisitions. The funds awarded may vary greatly on a case-by-case basis.

State	Does the state have a tax credit, rebate, or other financial incentive in place for HD EV purchases?	How much of the upfront cost does it offset for purchase of these vehicles?
Montana	Yes	The Department of Environmental Quality has a grant program offering funding toward the replacement of qualifying medium- and heavy-duty transit vehicles with new electric-powered models. The funds awarded may vary greatly on a case-by-case basis.
Nebraska	No	NA
Nevada	Yes	The state's Division of Environmental Protection is providing grants through the Nevada Diesel Emission Mitigation Fund for the replacement of 2009 model year and older heavy-duty vehicles. The funds awarded may vary greatly on a case-by-case basis.
New Hampshire	No	NA
New Jersey	Yes	New Jersey's Regional Truck Replacement Program covers up to 50% of port drayage trucks up to $25,000. Trucks with engines from model years 1996–2006 are eligible, and each applicant is eligible for no more than two truck replacements.
New Mexico	No	NA
New York	Yes	The state has a variety of incentive programs, the greatest of which maxes out at $25,000 per applicant.
North Carolina	Yes	The state's Department of Environmental Quality provides funding for new heavy-duty AFVs through its Diesel Bus and Vehicle Program. The funds awarded may vary greatly on a case-by-case basis.
North Dakota	No	NA

State	Does the state have a tax credit, rebate, or other financial incentive in place for HD EV purchases?	How much of the upfront cost does it offset for purchase of these vehicles?
Ohio	Yes	Matching grants of $50,000 to $2 million for the replacement of heavy-duty all-electric vehicles are available through the state's EPA. Applicants in target counties must cover at least 25% of vehicle funding and in certain scenarios may be required to contribute more.
Oklahoma	Yes	An income tax credit is available that may cover as much as $50,000 for purchase of new heavy-duty AFVs. A tax credit of 10% of the total vehicle cost, up to $1,500, is also available if the incremental cost of a new AFV cannot be determined. This also holds if the AFV is resold. Tax credits may be carried forward for up to five years.
Oregon	No	NA
Pennsylvania	Yes	The state provides both a medium-/heavy-duty vehicle rebate and a heavy-duty truck and transit bus program. The funds awarded may vary greatly on a case-by-case basis.
Rhode Island	No	NA
South Carolina	No	NA
South Dakota	Yes	A rebate worth up to 45% of a zero-emission vehicle's total costs is available through the Department of Environment and Natural Resources' Clean Diesel Grant Program.
Tennessee	Yes	The state offers grants for the purchase of new heavy-duty EV transit bus, local freight, and port drayage vehicles.

State	Does the state have a tax credit, rebate, or other financial incentive in place for HD EV purchases?	How much of the upfront cost does it offset for purchase of these vehicles?
Texas	Yes	The state offers a number of programs and rebates for the purchase of heavy-duty vehicles with variable rates of contribution.
Utah	Yes	A maximum tax credit of $15,000 per vehicle is available for each qualified heavy-duty AFV an applicant applies for. A single taxpayer may claim credits for up to 10 AFVs or $500,000 annually.
Vermont	Yes	The Department of Environmental Conservation provides funding for reducing emissions from diesel engines and vehicles. This includes vehicle replacements.
Virginia	Yes	The state provides 50% of new vehicle costs up to $30,000 for the replacement of aging port drayage trucks. The state's Clean Transportation Voucher Program offers up to 100% of class 7 and 8 transit buses. Applicant awards may not exceed $500,000 per electric bus and relevant charging infrastructure.
Washington	No	NA
West Virginia	No	NA
Wisconsin	Yes	The state provides U.S. Environmental Protection Agency Diesel Emission Reduction Act funding through its Department of Natural Resources for projects focused on decreasing diesel emissions statewide and may award funds covering 25–100% of total project costs.

State	Does the state have a tax credit, rebate, or other financial incentive in place for HD EV purchases?	How much of the upfront cost does it offset for purchase of these vehicles?
Wyoming	Yes	The state's Department of Environmental Quality is accepting grant proposals for projects targeted at reducing nitrogen oxide emissions. The funds awarded may vary greatly on a case-by-case basis.

Source: DOE 2020

Table C3. State incentives for L2 chargers*

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
Alabama	The Electric Transportation Infrastructure Grant Program offered by the state's Department of Transportation may cover any amount of potential costs associated with purchase and installation of EV charging infrastructure.	NA
Alaska	NA	NA
Arizona	NA	NA
Arkansas	NA	NA
California	Small businesses with 1,000 or fewer employees may apply to the state's Electric Vehicle Charging Station Financing Program, which offers maximum loans of $500,000 that can be insured for a four-year period.	The state mandates that all EV charging stations be equipped with a broad suite of payment options and that customers not be required to purchase subscription services to access chargers. This is meant to ensure that lower-income EV drivers who may not be able to pay through mobile apps or subscriptions are still able to reliably access EV charging infrastructure statewide.
Colorado	The Colorado Energy Office and Regional Air Quality Council administer grants for EV charging	NA

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
	infrastructure throughout the state.	
Connecticut	Low-interest loans for the purchase of L2 charging infrastructure are available through the Connecticut Green Bank. (This program did not qualify for a score given our methodology.)	NA
Delaware	L2 charger rebates are available through the Delaware Clean Transportation Incentive Program.	NA
District of Columbia	The AFV Conversion and Infrastructure Tax Credit covers up to 50% of the equipment and labor costs for the purchase and installation of AFV infrastructure. Maximum credits of $1,000 and $10,000 are available for each residential or public charging station project, respectively.	NA
Florida	NA	NA
Georgia	NA	NA
Hawaii	A maximum tax credit of 50%, up to $6,000, is available for L2 charging station purchase and installation for stations with two or more ports. A smaller tax credit of 30%, up to $2,000, is available for L2 chargers with one port.	NA
Idaho	No	NA
Illinois	The state EPA offers grants for the installation of EV charging infrastructure. The funds awarded may vary greatly on a case-by-case basis.	NA

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
Indiana	NA	NA
Iowa	NA	NA
Kansas	NA	NA
Kentucky	NA	NA
Louisiana	NA	NA
Maine	Purchase and installation of strategically located L2 chargers may be funded through the Efficiency Maine Trust.	NA
Maryland	A rebate covering up to 40% of EV charging infrastructure purchase and installation with variable maximum funding cutoffs is available through the Maryland Energy Administration.	An additional EV charging infrastructure rebate is available through the Maryland Public Service Commission's EV charging and infrastructure pilot program. This program includes provisions for multiunit dwellings and is meant to help improve equitable access to charging infrastructure.
Massachusetts	The state's MassEVIP program helps fund public EV charger and EV charging infrastructure projects.	The state provides a wide variety of grant programs tailored to different groups, and $710,000 of the $2 million spent in fall 2019 through the MassEVIP program helped fund 26 EV charging infrastructure projects within environmental justice communities.
Michigan	NA	NA
Minnesota	NA	NA
Mississippi	NA	NA
Missouri	NA	NA
Montana	NA	NA
Nebraska	NA	NA
Nevada	NA	NA
New Hampshire	NA	NA
New Jersey	Reimbursement grants, available on a first come, first served basis, cover the cost and installation	Grant funding is available through the It Pay$ to Plug In program for L2 and other EV charging and infrastructure improvements.

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
	of qualifying EV charging infrastructure projects.	Priority is given and marketing is targeted toward low-income communities and communities disproportionately impacted by air pollution.
New Mexico	Up to $20,000 is available for qualifying dual-port L2 charger purchase and installation projects through the New Mexico Environmental Department.	NA
New York	The state has a number of programs, each of which is specially tailored to serve different purchasers.	In 2020 the New York Public Service Commission ordered that $701 million total be made available through its Make-Ready Infrastructure Program, with $120 million directed toward economically and environmentally distressed communities specifically for EV charging infrastructure projects. The order also mandated that electric utilities allocate at least 20% of their EV charging infrastructure spending to sites within 2 miles of distressed communities.
North Carolina	NA	NA
North Dakota	NA	NA
Ohio	The state EPA has identified 26 priority counties across the state for L2 charging infrastructure improvements. Within these counties, various levels of reimbursement funding are available for government and nongovernment projects. For single-port stations, maximum funding is capped at 100% of total project costs, up to $7,500, for stations on government properties and 80% of total project costs, up to $7,500, for	NA

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
	stations on nongovernment properties. For dual-port stations, maximum funding is capped at 100% of total project costs, up to $15,500, on government properties and 80% of total project costs, up to $15,500, on nongovernment properties.	
Oklahoma	Competitive grants worth up to 80% of eligible project costs for eligible public EV charging infrastructure projects may be available.	NA
Oregon	NA	NA
Pennsylvania	The state offers both a grant and a rebate program for EV charging infrastructure projects.	NA
Rhode Island	The state's Office of Energy Resources offers funding in various forms for the installation of new EV charging infrastructure through the Electrify RI Program.	NA
South Carolina	NA	NA
South Dakota	NA	NA
Tennessee	EV charging infrastructure funding is available through the state's Department of Environmental Conservation.	NA
Texas	The state offers a number of programs that facilitate the implementation of EV charging infrastructure.	NA
Utah	Rebates covering 50% of total project costs at a maximum total value of	NA

State	State purchase incentive	Does the state offer additional incentives for low-income, environmental justice, and disadvantaged communities?
	$75,000 are available for EV charging infrastructure projects through the state's Department of Environmental Quality. These rebates are available only for Utah-based businesses and nonprofits.	
Vermont	NA	NA
Virginia	NA	NA
Washington	EV charging infrastructure projects with potential to bolster the West Coast Electric Highway network are eligible for competitive grant funding through the state's Department of Transportation.	NA
West Virginia	NA	NA
Wisconsin	NA	NA
Wyoming	NA	NA

Source: DOE 2020. * Any program that was in operation at the time of data collection for this *Scorecard* was given consideration in our scoring and in this appendix, regardless of funding sources.

Table C4. State incentives for DCFC chargers*

State	State purchase incentive	How much of the upfront cost does it offset for purchase of these EV charging infrastructure?
Alabama	The state DOT has grant money available for EV charging infrastructure through its Electric Transportation Infrastructure Grant Program.	The grant program may cover any amount of the potential costs associated with purchase and installation. The funds awarded may vary greatly on a case-by-case basis.
Alaska	The state is currently developing a grant program targeted toward supplementing	NA

State	State purchase incentive	How much of the upfront cost does it offset for purchase of these EV charging infrastructure?
	the costs of EV charging stations but does not have an incentive program at this time.	
Arizona	NA	NA
Arkansas	NA	NA
California	Small businesses with 1,000 or fewer employees may apply to the state's Electric Vehicle Charging Station Financing Program, which offers maximum loans of $500,000 that can be insured for a four-year period.	As much as $500,000 is available through the Electric Vehicle Charging Station Financing Program.
Colorado	The Colorado Energy Office and Regional Air Quality Council administer grants for EV charging infrastructure throughout the state.	These grants may provide as much as 80% of the total costs for DCFC charging infrastructure, up to $30,000.
Connecticut	Low-interest loans for the purchase of DCFC charging infrastructure are available through the Connecticut Green Bank. (This program did not qualify for a score given our methodology.)	NA
Delaware	NA	NA
District of Columbia	The District's AFV Conversion and Infrastructure Tax Credit covers up to 50% of the equipment and labor costs for the purchase and installation of AFV infrastructure.	Maximum credits of $1,000 and $10,000 are available for each residential and public charging station project, respectively.
Florida	NA	NA
Georgia	NA	NA

State	State purchase incentive	How much of the upfront cost does it offset for purchase of these EV charging infrastructure?
Hawaii	S.B. 438 established a tax credit for EV charging stations.	A maximum tax credit of 70%, up to $35,000, is available for DCFC charging station purchase and installation.
Idaho	Funding for DCFC charger projects is available for stations that would be located along key transportation corridors within Idaho through the state's Department of Environmental Quality. Proposed projects along specific highways and those within a half mile of major highways will be given special priority and consideration.	The funds awarded may vary greatly on a case-by-case basis.
Illinois	The state EPA offers grants for the installation of EV charging infrastructure. Priority will be given to EV charging infrastructure that services medium- and heavy-duty vehicles.	The funds awarded may vary greatly on a case-by-case basis.
Indiana	NA	NA
Iowa	NA	NA
Kansas	NA	NA
Kentucky	NA	NA
Louisiana	NA	NA
Maine	NA	NA
Maryland	A rebate covering up to 40% of EV charger and infrastructure purchase and installation costs with variable maximum funding cutoffs is available through the	Maximum total funding varies by recipient. Individual applicants are capped at $700, businesses and state or local governments are capped at $4,000, and retail service stations

State	State purchase incentive	How much of the upfront cost does it offset for purchase of these EV charging infrastructure?
	Maryland Energy Administration.	and dealers are capped at $5,000 per applicant.
Massachusetts	The state provides a wide variety of grant programs tailored to different types of potential buyers. The state's MassEVIP program helps fund public charger projects.	The funds awarded may vary greatly on a case-by-case basis.
Michigan	NA	NA
Minnesota	15% of the $23.5 million set aside for phase 2 grant programs from the state's portion of the VW settlement fund is currently slated for an electric vehicle charging station grant program. This program will provide grants to potential buyers between 2020 and 2023.	The amount of each grant award may vary.
Mississippi	NA	NA
Missouri	NA	NA
Montana	NA	NA
Nebraska	NA	NA
Nevada	NA	NA
New Hampshire	NA	NA
New Jersey	Reimbursement grants, available on a first come, first served basis, cover the cost and installation of qualifying EV charging infrastructure projects.	The funds awarded may vary greatly on a case-by-case basis.
New Mexico	Up to 75% of the costs for DCFC purchase and installation projects may be covered through the New Mexico	The funds awarded may vary greatly on a case-by-case basis.

State	State purchase incentive	How much of the upfront cost does it offset for purchase of these EV charging infrastructure?
	Environmental Department.	
New York	The state has a number of programs, each of which is specially tailored to serve different purchasers.	The funds awarded may vary greatly on a case-by-case basis.
North Carolina	The state's Department of Environmental Quality provides funding for DCFC charger projects through its Zero-Emission Vehicle Direct Current Fast Charge Infrastructure Program.	The funds awarded may vary greatly on a case-by-case basis.
North Dakota	NA	NA
Ohio	NA	NA
Oklahoma	Competitive grants worth up to 80% of eligible project costs for eligible public charging projects may be available.	Up to 80% of eligible project costs for eligible public charging projects may be available.
Oregon	NA	NA
Pennsylvania	The state offers both a grant and a rebate program for charging infrastructure projects.	The funds awarded may vary greatly on a case-by-case basis.
Rhode Island	The state's Office of Energy Resources offers funding in various forms for the installation of new charging infrastructure through the Electrify RI Program.	The funds awarded may vary greatly on a case-by-case basis.
South Carolina	NA	NA
South Dakota	NA	NA
Tennessee	Charging funding is available through the state's Department of Environmental Conservation.	The funds awarded may vary greatly on a case-by-case basis.

State	State purchase incentive	How much of the upfront cost does it offset for purchase of these EV charging infrastructure?
Texas	The state offers a number of programs that facilitate the implementation of charging infrastructure.	The funds awarded may vary greatly on a case-by-case basis.
Utah	Rebates covering 50% of total project costs at a maximum total value of $75,000 are available for EV charging infrastructure projects through the state's Department of Environmental Quality. These rebates are available only for Utah-based businesses and nonprofits.	The maximum rebate available covers 50% of total project costs up to $75,000.
Vermont	NA	NA
Virginia	NA	NA
Washington	EV charging infrastructure projects with potential to bolster the West Coast Electric Highway network are eligible for competitive grant funding through the state's DOT.	The funds awarded may vary greatly on a case-by-case basis.
West Virginia	NA	NA
Wisconsin	NA	NA
Wyoming	NA	NA

Source: DOE 2020. * Any program that was in operation at the time of data collection for this scorecard effort was given consideration in our scoring and in this appendix regardless of funding sources.

Table C5. EV fees

State	Annual EV fee amount	Average gasoline tax revenue for a passenger vehicle	Ratio of EV fee to gas tax revenue
Alabama	$200.00	$80.03	250%
Alaska		$27.81	0%
Arizona		$75.09	0%
Arkansas	$200.00	$87.16	229%
California	$100.00	$181.33	55%
Colorado	$50.00	$89.30	56%
Connecticut		$103.95	0%
Delaware		$113.50	0%
District of Columbia		$101.99	0%
Florida		$79.03	0%
Georgia	$213.00	$124.17	172%
Hawaii	$50.00	$72.70	69%
Idaho	$140.00	$132.31	106%
Illinois	$100.00	$81.25	123%
Indiana	$150.00	$122.98	122%
Iowa	$65.00	$133.20	49%
Kansas	$100.00	$99.29	101%
Kentucky		$122.77	0%
Louisiana		$92.08	0%
Maine		$136.76	0%
Maryland		$154.75	0%
Massachusetts		$105.05	0%
Michigan	$100.00	$122.75	81%
Minnesota	$75.00	$137.04	55%
Mississippi	$150.00	$83.57	179%
Missouri	$75.00	$74.50	101%
Montana		$113.00	0%
Nebraska	$75.00	$137.91	54%
Nevada		$103.83	0%
New Hampshire		$110.18	0%
New Jersey		$166.78	0%

State	Annual EV fee amount	Average gasoline tax revenue for a passenger vehicle	Ratio of EV fee to gas tax revenue
New Mexico		$71.77	0%
New York		$106.44	0%
North Carolina	$130.00	$159.46	82%
North Dakota	$120.00	$96.54	124%
Ohio	$200.00	$124.03	161%
Oklahoma		$85.44	0%
Oregon	$110.00	$115.59	95%
Pennsylvania		$249.58	0%
Rhode Island		$152.38	0%
South Carolina	$60.00	$81.60	74%
South Dakota		$125.11	0%
Tennessee	$100.00	$111.02	90%
Texas		$96.13	0%
Utah	$90.00	$111.64	81%
Vermont		$134.98	0%
Virginia	$64.00	$70.75	90%
Washington	$150.00	$190.66	79%
West Virginia	$200.00	$169.78	118%
Wisconsin	$100.00	$142.37	70%
Wyoming	$200.00	$101.06	198%

Source: Atlas Public Policy 2020b

Table C6. Utility incentive offerings for L2 chargers—approved programs

State	Eligible utilities[32]	Utility side	Customer side	EVSE	Utility owned	Program description
Alaska	Alaska Electric Light & Power		•	•		AEL&P provides incentives for privately owned L2 and offers on-bill financing and rebates of up to $1,000.

[32] Utilities were considered "eligible" if they were state regulated (i.e., investor owned) and sold more than 100,000 MWh in 2019. One exception is the Tennessee Valley Authority, which is federally regulated.

State	Eligible utilities[32]	Utility side	Customer side	EVSE	Utility owned	Program description
Arizona	Arizona Public Service Co., Tucson Electric Power		•	•		Both utilities offer incentives for prewiring homes to be EV ready, as well as a discount of up to $750 per charging station.
California	Bear Valley, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Liberty Utilities	•	•	•	•	A wide range of incentives include: PG&E's point-of-sale incentive for residential L2, SCE make-ready rebates for qualifying customer-side infrastructure, Bear Valley public L2 make-ready projects.
Delaware	Delmarva Power				•	In 2019 Delmarva was approved to install utility-owned smart L2 chargers within select neighborhoods in Delmarva's Delaware service territory.
District of Columbia	Potomac Electric	•			•	In 2019 PEPCO agreed to install make-ready public smart L2 charging stations, at least 20% of them in disadvantaged communities.
Florida	Duke Energy Florida, Florida Power & Light, Tampa Electric				•	Duke Energy Florida's utility-owned EVSE pilot will install 500 L2 chargers in MUDs, at workplaces, and in public settings.
Georgia	Georgia Power Co.			•		Georgia Power offers a $250 incentive to customers who install L2 charging in their homes and provides a $100 incentive for prewiring garages for L2 outlets.
Indiana	Duke Energy Indiana, Indianapolis Power & Light, Indiana Michigan Power	•				In 2015 Indianapolis Power & Light was approved to invest $3.7 million in equipment upgrades and line extensions to support EV car-sharing programs.
Kansas	Kansas City Power & Light				•	The KCPL Clean Charge Network Project was launched in 2018 to install 264 utility-owned L2 chargers in the service territory.

State	Eligible utilities[32]	Utility side	Customer side	EVSE	Utility owned	Program description
Maine	Emera Maine, Central Maine Power	•				In 2020 the Maine PUC approved $240,000 in make-ready investment for L2 charging by CMP.
Maryland	Baltimore Gas & Electric, Delmarva Power, Potomac Electric Co.	•	•	•	•	As part of a statewide transportation electrification initiative, BGE, Delmarva, and PEPCO were approved in 2019 to invest in L2 charging rebates and infrastructure for residential customers, including MUDs.
Massachusetts	Eversource, National Grid	•	•	•		In 2017 Eversource was approved to invest $45 million in charging infrastructure expansion projects to support public, workplace, and MUD L2 charging. National Grid's $20 million program, approved in 2018, offers rebates, line extensions, and make-ready investment.
Michigan	Consumers Energy, DTE Electric	•	•	•		In 2019 Consumers Energy was approved to offer rebates of up to $5,000 per charger for public, workplace, and MUD L2 projects, with a limit of 200 chargers total. DTE offered $500 residential rebates for "smart" EV chargers, conditioned on adoption of a TOU rate. DTE also provided a make-ready program for public-facing L2 charging.
Minnesota	Xcel Energy, Otter Tail Power			•	•	Otter Tail Power offers a $400 rebate to customers who install L2 chargers in qualified service locations. Xcel Energy was approved in 2018 for a $9 million public charging program that saw installation of L2 and DCFC service equipment in public transportation hubs.
Missouri	Ameren, Evergy, Kansas City Power & Light		•	•	•	In October 2019 Ameren's $6 million investment plan was approved. It includes public, MUD, and workplace charging infrastructure and rebates.

State	Eligible utilities[32]	Utility side	Customer side	EVSE	Utility owned	Program description
Nevada	Nevada Power		•			A demonstration program was approved in 2018 with a total budget of $380,000. Nevada Power offers rebates of $3,000 for L2 chargers that support more than one vehicle.
New York	Con Ed, National Grid, New York State Electric & Gas, Rochester Gas & Electric, Orange & Rockland, Central Hudson Gas & Electric	•	•	•		As part of a statewide program, in 2020 New York utilities offered to cover up to 90% of the make-ready costs for L2 units that meet certain access or eligibility requirements, and 100% of costs for MUDs, LMI, or EJ communities.
North Carolina	Duke Energy Carolinas, Duke Energy Progress				•	In December 2020 the Duke utilities were approved for statewide investment in utility-owned EVSE, including 50 L2 chargers at MUDs in their service territories.
Ohio	Ohio Power, Duke Energy Ohio, Ohio Edison, Toledo Edison			•		In 2018 the state PUC approved Ohio Power's $5 million rebate program focused on public EV charging, workplace charging, and MUDs.
Oregon	Portland General Electric, Pacific Power				•	The Oregon utilities were approved in 2018 to undertake several public charging pilots with utility-owned infrastructure, outreach, and education.
Pennsylvania	PECO Energy, West Penn Power, Duquesne Light	•	•	•	•	In 2018 Duquesne Light's $1.65 million EV investment plan was approved. It covers 65 make-ready public L2 chargers per year until 2022 and a $60 one-time bill credit for EV owners who register with Duquesne Light.
Rhode Island	National Grid		•	•	•	Narragansett Electric (National Grid) was approved to invest in charging ports and allowed ownership of up to 39% of charging ports in underserved segments, such as income-eligible communities and MUDs.

State	Eligible utilities[32]	Utility side	Customer side	EVSE	Utility owned	Program description
South Carolina	Duke Energy Carolinas			•		In 2020 Duke Carolinas was approved to run a pilot for up to 400 residential customers, offering a rebate for L2 charging equipment in exchange for participating in load management programs.
Utah	Pacificorp, Rocky Mountain Power			•		In 2019 RMP was approved to offer residential L2 charger rebates from $200 up to 75% of total charger/installation cost.
Vermont	Green Mountain Power			•	•	GMP provides an L2 charger at no cost ($600 value) with proof of purchase of a new or used EV. The utility is building out a statewide network of utility-owned chargers.
Virginia	Dominion, Appalachian Power		•	•		In 2019 Dominion was approved for $5.9 million of investment in rebates for make-ready infrastructure and EV charging infrastructure for MUD L2 stations.
Washington	Puget Sound Energy, Pacificorp, Avista		•	•		Puget Sound Energy offers several approved programs and financial incentives, including a $500 incentive for new EVs, a residential charging and off-peak pilot program that covers the cost of L2 chargers and up to $2,000 of installation cost for “smart” grid-integrated EV charging equipment, and a MUD /public charging pilot program. Avista offers customer rebates for wiring-related costs of EV charging infrastructure installation, up to $1,000 for residential and $2,000 for nonresidential customers.

Source: Atlas Public Policy 2020a

Table C7. Utility incentive offerings for DCFC chargers—approved programs

State	Eligible utilities	Utility side	Customer side	EVSE	Utility owned	Program description
California	Bear Valley, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Liberty Utilities	•	•	•	•	A wide range of incentives for DCFC exist, including make-ready and utility-owned programs from PG&E, SCE, and Liberty Utilities. PG&E's offerings include on- and off-grid charging ports at public parks. SCE offers a make-ready program with a 30% carve-out for underserved communities.
Delaware	Delmarva Power				•	In 2019 Delmarva Power was authorized to install utility-owned DCFC in its service area, to be powered through 100% renewable electricity.
District of Columbia	Potomac Electric				•	As part of its 2019 Transportation Electrification initiative, PEPCO plans to install 20 DCFC stations in public destinations, 20% of them in "disadvantaged" areas.
Florida	Duke Energy Florida, Florida Power & Light				•	Duke Energy Florida's transportation electrification pilot includes 30 utility-owned DCFC units located at fast-charge depots.
Georgia	Georgia Power				•	In its 2019 rate case, Georgia power was approved to install, own, and operate EV charging islands at public sites.
Hawaii	Hawaiian Electric				•	In 2019 the utility was approved to own and operate four DCFC charging stations as part of its EVohana network.
Maryland	Baltimore Gas & Electric, Delmarva Power, Potomac Electric Co.				•	As part of a statewide electrification plan, all three utilities were approved in 2019 to install utility-owned DCFC at strategically located destinations throughout Maryland.

State	Eligible utilities	Utility side	Customer side	EVSE	Utility owned	Program description
Massachusetts	Eversource, National Grid	•	•	•		Eversource's 2017 public EV infrastructure investment plan supports up to 72 DCFC stations, with 10% designated for environmental justice communities. National Grid's 2018 plan invests in 80 DCFC stations in public, workplace, and MUD locations.
Michigan	Consumers Energy, DTE Electric	•	•		•	Consumers Energy was approved in 2019 to invest $4.2 million in its Power MiDrive program, which includes 24 DCFC stations. DTE Electric offers a rebate program for public DCFC along highway corridors and showcase locations, providing rebates for service connection and supply infrastructure costs.
Minnesota	Xcel Energy, Minnesota Power, Otter Tail Power	•	•		•	In 2019 Xcel Minnesota was approved for a multiyear pilot for DCFC make-ready and utility-owned chargers, focused on infrastructure for DCFC-capable EV mobility hubs in partnership with the cities of Minneapolis and St. Paul.
Missouri	Ameren, Evergy, Kansas City Power & Light		•	•		Ameren's 2019 transportation electrification plan focuses on providing $7 million in incentives for public DCFC across the service territory, including up to $360,000 in direct financial incentives for sites with a capacity of more than 150 kW.
Nevada	Nevada Power			•		Nevada Power's 2018 EV infrastructure demonstration project includes $900,000 in direct financial incentives for DCFC charging stations.

State	Eligible utilities	Utility side	Customer side	EVSE	Utility owned	Program description
New York	Con Ed, National Grid, New York State Electric & Gas, Rochester Gas & Electric, Orange & Rockland, Central Hudson Gas & Electric	•	•	•		Multiple programs exist as of July 2020, including all regulated utilities offering an incentive for up to 100% of DCFC make-ready expenses for site interconnection and infrastructure costs. NY State E&G offers annual incentive payments to customers operating a DCFC station. Orange & Rockland offers a per-plug DCFC incentive for stations receiving service on a demand-based tariff.
North Carolina	Duke Energy Carolinas, Duke Energy Progress				•	In 2020 the Duke utilities were approved to install and operate 40 DCFC stations across their service territories.
Ohio	Ohio Power, Duke Energy Ohio, Ohio Edison, Toledo Edison			•		In 2018 Ohio's PUC approved AEP Ohio (Ohio Power) to create incentives for 75 DCFC stations throughout its service territory, including 10% in disadvantaged/LMI communities.
Oregon	Portland General Electric, Pacificorp			•		In 2018 the Oregon PUC approved Pacificorp to invest $4.6 million in three pilot programs that include 28 DCFC stations.
Pennsylvania	PECO Energy, West Penn Power, Duquesne Light		•	•		In Duquesne Light's 2018 rate filing, the utility was approved to invest $500,000 in 15 DCFC stations, with 10% earmarked for underserved communities.
Vermont	Green Mountain Power				•	Green Mountain is building out a network of utility-owned DC fast chargers as part of its statewide transportation electrification plan.
Virginia	Dominion, Appalachian Power		•	•		In 2019 Dominion was approved for $5.9 million of investment in rebates for make-ready infrastructure and charging infrastructure for public DCFC stations.

State	Eligible utilities	Utility side	Customer side	EVSE	Utility owned	Program description
Washington	Puget Sound Energy				•	As part of its transportation electrification pilot that was approved in 2018, the utility will select and install public DCFC in certain locations on an as-needed basis, with up to four DCFC chargers per site.

Source: Atlas Public Policy 2020a

Table C8. Utility EV charging infrastructure incentive offerings for commercial charging (fleets)—approved programs

State	Eligible utilities	Utility side	Customer side	EVSE	Utility owned	Program description
Arizona	Arizona Public Service Co., Tucson Electric Power			•		Tucson Electric was approved in 2019 for $450,000 in its Smart City EV Buildout Plan, focused on supporting electrification of fleet vehicles, and $663,000 for its Smart School EV Bus Pilot program. Arizona Public Service Co. offers a similar pilot to a limited number of school districts.
California	Bear Valley, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Liberty Utilities	•	•	•	•	Many programs exist, including PG&E's 2017 Transportation Electrification Pilot for Schools and Parks; SCE's 2020 Charge Ready 2 Infrastructure program; and SDG&E's make-ready investments for medium-duty/heavy-duty charging infrastructure at 50% of EV charger cost, with 30% reserved for disadvantaged communities.
Colorado	Xcel Energy		•	•		Xcel's fleet program provides potential studies and assessments for commercial fleets with five vehicles or more. Additional fleet electrification plans are pending approval by the state PUC.
District of Columbia	Potomac Electric				•	In 2019 PEPCO was approved to invest $540,000 in charging infrastructure to service electric commuter buses.

State	Eligible utilities	Utility side	Customer side	EVSE	Utility owned	Program description
Georgia	Georgia Power				•	Georgia Power was approved in 2019 to invest in its own fleet charging services for company-owned vehicles, which are also available to the public for community charging.
Michigan	Consumers Energy, DTE Electric	•	•			DTE Electric was approved for $1.89 million in its make-ready fleet investment program, focusing on schools and other categories of fleets. The program provides rebates for service connection and EV charging infrastructure costs.
Minnesota	Xcel Energy Minnesota, Otter Tail Power	•	•			Xcel offers a fleet EV service pilot to nonresidential customers including LD and MHD vehicles
Missouri	Ameren, Evergy			•		In 2019 Ameren was approved by the state PSC for its Charge Ahead EV Program, providing $2 million in incentives for workplace L2 chargers for fleet vehicles.
Nevada	Nevada Power			•		$150,000 out of Nevada Power's $4 million EVID program is allocated for incentives for fleet and residential charging stations.
New York	Con Ed, National Grid, New York State Electric & Gas, Rochester Gas & Electric, Orange & Rockland, Central Hudson Gas & Electric	•	•	•		All New York utilities are running medium- and heavy-duty make-ready pilots, which provide incentives for private owners of EV fleets by covering up to 90% of utility-side make-ready costs. Additionally, in 2020 the New York PSC directed all state-regulated utilities to establish the Transit Authority Make-Ready Program, working with transit agencies to achieve 25% electrification by 2025.
Virginia	Dominion, Appalachian Power	•		•		In Dominion Energy's 2019 rate case with the Virginia PSC, it was approved for $3.15 million in spending on make-ready infrastructure for transit buses.

State	Eligible utilities	Utility side	Customer side	EVSE	Utility owned	Program description
Washington	Puget Sound Energy, Pacificorp, Avista			•		In 2018 Pacificorp was approved for a competitive grant program for nonresidential customers to construct EV charging infrastructure, with 25% of funds to serve low-income customers.

Source: Atlas Public Policy 2020a

Table C9. Utility spending on EV charging infrastructure incentives

State	Eligible utilities	Approved spending since 2017	Proposed spending	Total customers*
Alabama	Alabama Power	–	–	1,482,061
Alaska	Alaska Electric Light & Power	–	–	34,294
Arizona	Arizona Public Service Co., Tucson Electric Power	$950,000	$3,555,000	3,319,684
Arkansas	Entergy Arkansas	–	–	689,933
California	Bear Valley, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Liberty Utilities	$1,355,462,616	$540,756,640	20,953,170
Colorado	Xcel Colorado	–	$79,514,600	1,499,065
Connecticut	Eversource CT	–	–	942,822
Delaware	Delmarva Power	$270,000	$ 540,000	562,174
District of Columbia	Potomac Electric	$2,847,500	$6,824,100	515,826
Florida	Duke Energy Florida, Florida Power & Light, Tampa Electric	$7,600,000	$9,600,000	15,239,196
Georgia	Georgia Power Co.	$19,200,000	$4,800,000	5,124,018
Hawaii	Hawaiian Electric Co.	$265,000	$1,384,400	611,830
Idaho	Idaho Power Corp.	–	–	526,547
Illinois	Ameren IL, Com Ed	–	–	3,229,217

State	Eligible utilities	Approved spending since 2017	Proposed spending	Total customers*
Indiana	Duke Energy Indiana, Indianapolis Power & Light, Indiana Michigan Power	–	$2,100,000	1,793,726
Iowa	MidAmerican Energy, Interstate Power & Light	–	–	1,184,527
Kansas	Evergy KS South, Evergy KS Central	$5,600,000	–	1,423,366
Kentucky	Kentucky Utilities, Duke Energy Kentucky, Louisville Gas & Electric	–	$2,128,900	1,075,743
Louisiana	Entergy LA, Cleco Power, Southwestern	–	–	1,596,023
Maine	Emera Maine, Central Maine Power	$240,000	$3,592,000	1,252,764
Maryland	Baltimore Gas & Electric, Delmarva Power, Potomac Electric Co.	$46,876,964	$43,376,076	2,730,064
Massachusetts	Eversource, National Grid	$58,006,482	$788,091	2,887,596
Michigan	Consumers Energy, DTE Electric	$17,957,000	$7,500,000	8,087,238
Minnesota	Xcel Energy, Minnesota Power	$23,596,000	$13,504,000	2,872,916
Mississippi	Entergy MS, Mississippi Power	–	–	634,532
Missouri	Ameren, Evergy	$16,100,000	$6,100,000	3,095,746
Montana	Northwestern	–	–	375,201
Nebraska	NA	–	–	NA
Nevada	Nevada Power	$1,430,000	–	1,898,906
New Hampshire	Public Service Co. of New Hampshire	–	$2,000,000	399,340

State	Eligible utilities	Approved spending since 2017	Proposed spending	Total customers*
New Jersey	Public Service Electric & Gas, Jersey Central Power & Light, Atlantic City Power	–	$38,039,000	2,950,427
New Mexico	El Paso Electric Co., Public Service Co. of New Mexico, Southwestern	–	$2,669,000	753,483
New York	Con Ed, National Grid, New York State Electric & Gas, Rochester Gas & Electric, Orange & Rockland, Central Hudson Gas & Electric	$581,583,868	$116,933,232	11,119,572
North Carolina	Duke Energy Progress, Duke Energy Carolinas, Dominion	$21,436,275	–	7,060,752
North Dakota	Montana-Dakota Utilities	–	–	92,973
Ohio	Ohio Power, Duke Energy Ohio, Ohio Edison, Toledo Edison	$10,000,000	$7,228,410	3,271,346
Oklahoma	Oklahoma Gas & Electric, Public Service Co. of Oklahoma	–	–	1,327,669
Oregon	Portland General Electric, Pacificorp	$7,935,000	$5,400,000	2,926,274
Pennsylvania	PECO Energy, West Penn Power, Duquesne Light	$2,000,000	$1,200,000	3,565,696
Rhode Island	Narragansett Electric	–	$9,081,008	434,667
South Carolina	Duke Energy Carolinas, Dominion Energy	$8,230,000	–	2,665,194
South Dakota	Northern States Power, Northwestern	–	–	158,095
Tennessee	Kingsport Power Co.	–	–	48,110

State	Eligible utilities	Approved spending since 2017	Proposed spending	Total customers*
Texas	Oncor Electric, Southwestern TX, Entergy TX	–	–	635,073
Utah	Pacificorp, Rocky Mountain Power	$2,000,000	–	1,628,691
Vermont	Green Mountain Power	–	$800,000	266,659
Virginia	Dominion, Appalachian Power	$17,545,205	$6,486,575	6,070,174
Washington	Puget Sound Energy, Pacificorp, Avista	$17,204,900	$6,366,100	3,089,458
West Virginia	Appalachian Power, Monongahela Power	–	–	949,173
Wisconsin	We Energies, Madison Gas & Electric, Northern States Power	–	–	3,084,294
Wyoming	Cheyenne Power, Pacificorp WY	–	–	181,625

Sources: Atlas Public Policy 2020a, NCCETC 2020a and 2020b, EIA 2020. * Customers were determined using data from EIA 861 2019 where available. If utilities did not yet have customer data available from 2019, 2018 customer data were used. Customer totals represent the sum of residential and commercial bundled or delivery-only customers of investor-owned utilities.

Table C10. Volkswagen settlement fund allocations for electrification

State	U.S. PIRG score	Total funds awarded to date (as of November 1, 2020)	% EV awards	Explicit language for funds earmarked to LMI, disadvantaged, or EJ communities and/or methodology provided for how awarded funds that benefit these communities will be prioritized in project selection
Alabama	2	$5,798,991	2%	
Alaska	3	$2,208,134	33%	
Arizona	1	$31,875,000	0%	
Arkansas	2	$0	0%	
California*	6	$112,000,000	73%	Senate Bill 92, passed in June 2017, directs CARB to strive to ensure that 35% of California's allocation benefit low-income or disadvantaged communities that are disproportionately impacted by air pollution. The approved plan exceeds that target; at least 50% of the total funding is expected to benefit low-income or disadvantaged communities.

State	U.S. PIRG score	Total funds awarded to date (as of November 1, 2020)	% EV awards	Explicit language for funds earmarked to LMI, disadvantaged, or EJ communities and/or methodology provided for how awarded funds that benefit these communities will be prioritized in project selection
				ww2.arb.ca.gov/our-work/programs/volkswagen-environmental-mitigation-trust-california/about
Colorado	5	$29,932,986	85%	
Connecticut	3	$18,441,702	41%	
Delaware	2	$995,227	0%	In the project selection process, Delaware awards 15 points (out of 100 total) on the basis of the proposed project location. One of the four considerations around location is whether the "project will address an environmental justice area or related location that receives a disparate proportion of environmental impacts." www.dnrec.delaware.gov/Air/Documents/delaware-vw-mitigation-plan.pdf
District of Columbia	3	$238,000	0%	In evaluation of potential projects, the District of Columbia includes the following: "Will the project provide a direct health benefit to vulnerable and impacted populations? For example, will the replacement vehicles be physically routed in areas of the city that have historically borne a disproportionate high share of air pollution?" doee.dc.gov/page/volkswagen-settlement
Florida	6**	$9,700,000	90%	
Georgia	5	$2,027,650	0%	
Hawaii	8	$1,765,331	100%	Hawaii estimates that nearly 70% of its actions will support the electrification of public transit, school buses, or government-owned transportation fleets that may be utilized by historically disadvantaged communities, environmental justice communities of concern, and densely populated regions, regardless of deployment location. energy.hawaii.gov/mitigation-plan-funding-requests
Idaho	3	$8,275,215	47%	
Illinois	4	$45,574,856	52%	
Indiana	3	$9,412,486	39%	
Iowa	4	$8,566,946	19%	In the project selection process, Iowa awards 5 points (out of 100 total) using a Disproportionate Share of Air Pollution criterion, which includes the following: Higher share of county mobile NOx measurements Higher share of registered noncompliant Volkswagen subject vehicles Areas of concern for vulnerable populations based on environmental justice screening tools

State	U.S. PIRG score	Total funds awarded to date (as of November 1, 2020)	% EV awards	Explicit language for funds earmarked to LMI, disadvantaged, or EJ communities and/or methodology provided for how awarded funds that benefit these communities will be prioritized in project selection
				Higher rates of asthma and heart disease hospitalizations Higher share of point source NOx measurements iowadot.gov/VWSettlement/docs/ZEV-Guidance-Cycle-1.pdf
Kansas	3	$2,628,552	0%	
Kentucky	2	$8,456,403	8%	
Louisiana	3	$2,916,837	23%	
Maine	3	$10,819,226	37%	
Maryland	5	$3,066,097	63%	Maryland's mitigation plan awards projects that fall into categories, with around 21% of funds allocated to local governments and communities; proposals from highly affected communities (communities that bear a disproportionate share of the air pollution burden) are weighted. mde.maryland.gov/programs/Air/MobileSources/Documents/Maryland-Volkswagen-Mitigation-Plan.pdf
Massachu-setts	6	$25,500,000	83%	Massachusetts's mitigation plan gives attention to projects that promote electrification of the state's transportation network, focus on areas that serve environmental justice populations, and provide equitable geographic distribution. In the first year of funding, $11 million of funds were awarded to two regional transit agencies (Pioneer Valley Transit Authority and Martha's Vineyard Transit Authority) to purchase electric transit buses; both operate within environmental justice communities. www.mass.gov/doc/massachusetts-volkswagen-settlement-beneficiary-mitigation-plan-december-2018/download
Michigan	5	$5,918,668	100%	
Minnesota	5	$11,673,589	45%	Minnesota's mitigation plan includes goals to prioritize projects that operate in areas of concern for environmental justice. In the application process to receive VW funds from Minnesota, the zip code of the place where the equipment will operate is required. Funds are awarded to projects that operate in zip codes where 50% or more are considered environmental justice areas. Environmental justice areas accounted for 37% of the $11.75 million of funds awarded in Minnesota's first of three fund phases outlined in its mitigation plan. www.pca.state.mn.us/sites/default/files/aq-mvp2-35d.pd

State	U.S. PIRG score	Total funds awarded to date (as of November 1, 2020)	% EV awards	Explicit language for funds earmarked to LMI, disadvantaged, or EJ communities and/or methodology provided for how awarded funds that benefit these communities will be prioritized in project selection
Mississippi	2	$0	0%	
Missouri	3	$14,491,958	3%	
Montana	4	$1,050,000	100%	
Nebraska	4	$8,655,100	13%	
Nevada	5	$6,634,581	81%	
New Hampshire	4	$3,130,657	40%	
New Jersey	5	$34,975,029	100%	
New Mexico	4	$10,556,745	42%	
New York	6	$82,440,000	97%	
North Carolina	3	$28,324,932	33%	
North Dakota	1	$2,700,000	100%	
Ohio	2	$28,474,846	25%	
Oklahoma	2	$6,025,100	52%	
Oregon	4	$2,037,232	0%	
Pennsylvania	2	$9,077,266	28%	A competitive grant process is one of the mechanisms Pennsylvania utilizes to evaluate funding requests, as outlined in its mitigation plan. Under competitive grants, Pennsylvania can award extra points for projects in priority areas, which include environmental justice areas. dep.state.pa.us/Air/Volkswagen/FinalBeneficiaryMitigationPlan5-4-18.pdf
Rhode Island	7	$11,500,000	100%	Reducing pollutant load in environmental justice communities is a core criterion for approving a state's plan for funding. dem.ri.gov/programs/air/documents/vwmitplanf.pdf
South Carolina	3	$9,333,136	15%	
South Dakota	1	$2,715,909	15%	
Tennessee	4	$14,071,687	30%	Tennessee developed a Disproportionate Burden Index to assist with project prioritization and selection. The index combines environmental, economic, and demographic data sets in a geospatial format to determine geographic units in Tennessee that have the highest air quality burden.

State	U.S. PIRG score	Total funds awarded to date (as of November 1, 2020)	% EV awards	Explicit language for funds earmarked to LMI, disadvantaged, or EJ communities and/or methodology provided for how awarded funds that benefit these communities will be prioritized in project selection
				tn.gov/environment/program-areas/energy/state-energy-office--seo-/tennessee-and-the-volkswagen-diesel-settlement/beneficiary-mitigation-plan.html
Texas	3	$55,676,181	2%	
Utah	2	$29,577,145	72%	
Vermont	7	$1,050,000	100%	
Virginia	4	$46,300,000	100%	
Washington	8	$60,343,000	42%	
West Virginia	1	$0	0%	
Wisconsin	1	$50,190,935	17%	
Wyoming	3	$606,022	0%	

Sources: Atlas Public Policy 2020c, Casale and Mahoney 2019. *Data for California's awarded VW funds were obtained from californiavwtrust.org, as funding details were not listed in Atlas EV Hub's VW Settlement Funding Dashboard.** ACEEE scored Florida using the methodology developed by U.S. PIRG in its *Volkswagen Settlement State Scorecard*. Florida was not scored by U.S. PIRG in that report because the state did not have a final VW mitigation plan complete at the time of PIRG's assessment.

Table C11. EVSE exemption from public utility definition

State	Does the state exempt EV charging from the definition of a public utility?	Statutory or regulatory policy source	Legislature	PUC
Alabama	Yes	Docket No. 32694		•
Alaska	No			
Arizona	Yes	Decision No. 77289		•
Arkansas	Yes	AR Code 23-1-101(9)	•	
California	Yes	CA PUC Code 216		•
Colorado	Yes	CO Statute 40-1-103.3	•	
Connecticut	Yes	CT Statute Ch. 277 Sec. 16-1	•	
Delaware	Yes	DE PSC 19-0377		•
District of Columbia	No			
Florida	Yes	FL Statute 366.94	•	
Georgia	No			
Hawaii	Yes	HI Statute 269-1	•	
Idaho	Yes	ID Statute 61-119	•	

State	Does the state exempt EV charging from the definition of a public utility?	Statutory or regulatory policy source	Legislature	PUC
Illinois	Yes	IL Statute 5/3-105	•	
Indiana	No			
Iowa	Yes	IA Admin. Code Rule 20.20		•
Kansas	No*			
Kentucky	Yes	KY PUC 2018-00372		•
Louisiana	No**			
Maine	Yes	ME Statute title 35-A, Sec. 313-A and 3201	•	
Maryland	Yes	MD PUC 1-101(j)		•
Massachusetts	Yes	MA DPU 13-182		•
Michigan	No*			
Minnesota	Yes	MN Statute 216B.02	•	
Mississippi	No			
Missouri	Yes	MO Statute 386.020	•	
Montana	Yes	MT HB 456	•	
Nebraska	No			
Nevada	Yes	NV NRS 704.021	•	
New Hampshire	Yes	NH Statute 236:133	•	
New Jersey	Yes	NJ SB 2252	•	
New Mexico	Yes	NM HB 521 (2019) and Statute 62-3-4	•	
New York	Yes	NY PUC Case 13-E-0199		•
North Carolina	Yes	NC HB 329 (2018)	•	
North Dakota	No			
Ohio	Yes	Docket 20-434-EL-COI		•
Oklahoma	No			
Oregon	Yes	OR Statute 757.005	•	
Pennsylvania	Yes	PA Code Title 52 S 68.3501		•
Rhode Island	No			
South Carolina	No*			
South Dakota	No			
Tennessee	No			

State	Does the state exempt EV charging from the definition of a public utility?	Statutory or regulatory policy source	Legislature	PUC
Texas	Yes	TX PUC 39.105		•
Utah	Yes	UT HB 180, 2020; UT Statute 54-2-1	•	
Vermont	Yes	VT Statute title 30, ch.5, section 203	•	
Virginia	Yes	VA PUC 56-1.2:1 and 56-232.2:1		•
Washington	Yes	WA PUC 80.28.320		•
West Virginia	Yes	WV PUC 24-2D-1 thru 24-2D-3		•
Wisconsin	No*			
Wyoming	No			

Sources: Atlas Public Policy 2020, NCCETC 2020a and 2020b. * This policy is currently under consideration in the legislature or in a regulatory proceeding. ** Exemption exists in certain jurisdictions but not statewide.

Appendix D. Transportation System Efficiency Metrics

Table D1. GHG reduction goals

State	Policy	GHG reduction goal
California	CA Senate Bill-375	Senate Bill 375, which was passed in 2008, sets goals for transportation emissions reduction within the state. The bill sets a target to achieve a 1% increase to an 8% decrease in per capita GHG emissions by 2020, and a 1% increase to a 16% decrease in per capita GHG emissions statewide by 2035, relative to 1990 levels.
District of Columbia	Sustainable DC 2.0	Sustainable DC 2.0 (released April 2019) has a goal to reduce greenhouse gas emissions from transportation by 60% by 2032.
Maryland	2020 Annual Attainment Report on Transportation System Performance	Maryland's 2020 Annual Attainment Report on Transportation System Performance cites a state goal for reducing on road GHG emissions 40% below 2006 levels by 2030.
Massachusetts	Massachusetts Clean Energy and Climate Plan for 2020	The state has a GHG reduction target of 25% below 1990 levels by 2020 and 80% below 1990 levels by 2050.
Minnesota	Statewide Multimodal Transportation Plan 2017 to 2036	The state Department of Transportation has formally adopted the target of reducing GHG emissions from the transportation sector by 30% from 2005 levels by 2036, in accordance with the Minnesota Next Generation Energy Act.
Oregon	Executive Order No. 20-04	Executive Order No.NO 20-04 directs state regulators to cap and reduce GHG emissions from transportation fuels.
Washington	Washington House Bill 2815	The goal is to reduce overall emissions of greenhouse gases in the state to 25% below 1990 levels by 2035. By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to 50% below 1990 levels, or 70% below the state's expected emissions that year.

Source: ACEEE review of state climate, sustainability, and transportation plans

Table D2. GHG pricing policies

State	Policy	Description
California	CARB Cap-and-Trade Program	Launched in 2013, California's Cap-and-Trade Regulation establishes a declining limit on major sources of GHG emissions throughout California. The program applies to approximately 80% of the state's GHG emissions. The California emissions cap, which stood at 358 million tons of carbon in 2018, will drop to 200 million by 2030, a 44% decrease. Revenue from the carbon market is invested

State	Policy	Description
		throughout the state: 45% invested in reducing emissions through renewable energy and energy efficiency measures, 35% rebated to households and businesses, 15% allocated to energy-intensive and trade-exposed industries, and 5% held in the state reserve.
Oregon	Oregon Clean Fuels Program	Launched in 2016, Oregon's Clean Fuels Program is designed to decrease the amount of greenhouse gases created during the life cycle (i.e., the production, processing, transportation, and consumption) of fuel used in Oregon. The program's goal is to decrease the amount of pollution allowed from transportation fuels used in Oregon by 25% by 2035 (compared with 2015 levels).
Connecticut, Delaware, District of Columbia, Maryland, Massachusetts, New Jersey, Pennsylvania, Rhode Island, Vermont, Virginia, Maine, and New York*	Transportation and Climate Initiative	The TCI is a regional cap-and-invest program under consideration for transportation emissions in the Northeast and Mid-Atlantic. The program would require fuel distributors to purchase permits according to the consumption of their product in participating states, raising revenue for clean transportation investment. Implementation by participating states is not expected until 2022.

Source: ACEEE research. * Maine and New York are observing parties in the TCI planning process.

Table D3. Transit agency bus goals and procurement

State	Mandated target in place for transit agency EV procurement or nonbinding goal to electrify transit fleets	Description
California	Zero-Emission Transit Bus Requirement	By 2040, all public transit agencies must transition to 100% zero-emission bus fleets. Zero-emission bus technologies include all-electric or fuel cell electric.
Colorado	Zero Emissions Transit Bus Goal	Per the Colorado Electric Vehicle Plan 2020, the state's Department of Transportation, Regional Air Quality Council, and Colorado Energy Office will work with transit agencies, electric utilities, and other stakeholders by July 2021 to establish timelines, identify strategies, and dedicate sufficient resources for the conversion of the state transit fleet to 100% zero-emission vehicles no later than 2050, with an interim target of at least 1,000 ZEV transit vehicles by 2030.
Connecticut	Zero-Emission Transit Bus Requirement	On and after January 1, 2030, at least 30% of all buses purchased or leased by the state shall be zero-emission buses.

State	Mandated target in place for transit agency EV procurement or nonbinding goal to electrify transit fleets	Description
District of Columbia	Clean Energy DC Act	The act mandates that 100% of public buses, public fleets, private fleets of more than 50 vehicles, and taxis and limousines are to be zero-emission by 2045, with an interim goal of 50% by 2030.
New Jersey	Zero-Emission Transit Bus Requirement	10% of new buses purchased by the New Jersey Transit Corporation must be zero-emission vehicles (ZEV) by December 31, 2024. 50% of new buses must be ZEV by December 31, 2026, and 100% must be ZEV by December 31, 2032.
New York	Zero-Emission Transit Bus Requirement	Five of the largest upstate and suburban transit authorities in New York—which currently operate 1,400 buses—will be required to electrify 25% of their fleets by 2025 and 100% by 2035.

Source: DOE 2020

Table D4. State investment for EV bus deployment

State	Program	Description
California	Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP)	The California Air Resources Board (CARB), in partnership with CALSTART, launched HVIP to accelerate the adoption of cleaner, more efficient trucks and buses. HVIP works directly with dealers to apply the voucher incentive at the time of purchase.
Colorado	ALT Fuels Colorado	Alt Fuels Colorado incentivizes the replacement and scrappage of pre-2009 vehicles with cleaner alternatives. These funds are available to all public, private, and nonprofit fleets within Colorado.
Maryland	Clean Fuels Incentive Program	The Clean Fuels Incentive Program, administered by the Maryland Energy Administration, provides grants to purchase new and converted fleet alternative fuel vehicles.
New York	NY Truck Voucher Incentive Program (NYTVIP)	NYTVIP provides vouchers, or discounts, to fleets across the state to purchase or lease electric transit buses. Voucher incentive amounts differ by vehicle technology, vehicle weight class, and location where the vehicle is domiciled.
Ohio	Ohio Diesel Emission Reduction Grant Program	The Ohio Diesel Emission Reduction Grant Program provides support to public transit systems serving Ohio counties for the early retirement and replacement of older diesel transit buses.
Virginia	Making Efficient + Responsible Investments in Transit (MERIT) program	The state Department of Rail and Public Transportation's MERIT program provides funding for capital improvement projects, including the purchase or lease of new plug-in electric vehicles.

State	Program	Description
Washington	Green Transportation Capital Grants	Green Capital Grants are provided to transit agencies to fund capital projects to reduce the carbon intensity of the Washington transportation system. Examples include electrification of vehicle fleets, capital facilities to advance fleet electrification and/or hydrogen refueling, and upgrades to electrical transmission and distribution systems.

Source: DOE 2020 and additional ACEEE research

Table D5. Polices to encourage shared EV fleet

State	Policy in place to encourage EV deployment in shared	Description
California	California Clean Miles Standard and Incentive Program	CARB will establish annual emissions reduction targets for TNCs, including goals for increasing the number of miles traveled using zero-emission vehicles. CARB must adopt targets and goals for the program by January 1, 2021, to be implemented beginning in 2023. By January 1, 2022, and every two years thereafter, each TNC must develop a greenhouse gas emissions reduction plan, including proposals on how the company will meet the program's requirements.
District of Columbia	Emissions Reduction Plan for Transportation Network Companies	By February 1, 2022, and every two years thereafter, each private vehicle-for-hire company must develop a greenhouse gas emissions reduction plan, including actionable proposals to reduce emissions, and submit it to the District of Columbia Public Service Commission. Plans must include strategies to increase the proportion of vehicle-for-hire drivers with ZEVs and to increase the proportion of vehicle miles completed by ZEVs relative to total vehicle miles traveled.

Source: DOE 2020 and additional ACEEE research

Appendix E. Electric Grid Optimization Metrics

Table E1. Time-varying rates for L2 chargers

State	Utility	EV rate name	TOU rate*	EV rate**
Alabama	Alabama Power	BEVT—Business Electric Vehicle Time-of-Use	•	•
Alaska	Alaska Electric Light & Power	Rate Schedule 93: Off-Peak Electric Vehicle Charging	•	•
Arizona	Tucson Electric Power	TEP Electric Vehicle Infrastructure Program: Residential EV Tariff	•	•
Arkansas	Entergy Arkansas	Optional Residential Time-of-Use	•	
California	Bear Valley, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Liberty Utilities	Bear Valley Experimental EV–TOU Rate Pilot, PG&E Commercial EV Rates, SCE TOU-D-PRIME, SDG&E EV-TOU, Liberty Utilities TOU-EV	•	•
Colorado	Xcel Colorado	Secondary Voltage Time-of-Use—Electric Vehicle Service (Schedule S-EV)	•	•
Connecticut	Eversource CT	Rate 7—Residential Time-of-Day Electric Service	•	
Delaware	Delmarva Power	Offering 3: Rate Schedule PIV	•	•
District of Columbia	Potomac Electric	Residential Service—Plug-In Vehicle Charging | Schedule R-PIV	•	•
Florida	Florida Power & Light	FP&L Residential Time-of-Use	•	
Georgia	Georgia Power Co.	TOU-PEV	•	•
Hawaii	Hawaiian Electric Co.	EV Pilot Rate (EV-F & EV-U)	•	•
Idaho	Idaho Power Corp.	Idaho Time of Day Plan	•	
Illinois	Ameren IL, Com Ed	Hourly Pricing Rate (BESH) & Time-of-Day Pricing Rate Pilot	•	
Indiana	Indianapolis Power & Light	IPL EVX Rate	•	•

State	Utility	EV rate name	TOU rate*	EV rate**
Iowa	MidAmerican Energy	Rate RSI—Residential Time-of-Use Service	•	
Kansas	Evergy KS South	Electric Vehicle Plan	•	•
Kentucky	Louisville Gas & Electric	Residential Time of Day	•	
Maine	Central Maine Power	Rate A-TOU	•	
Maryland	Baltimore Gas & Electric	Schedule EV	•	•
Massachusetts	National Grid	Off-Peak Charging Rebate Program	•	•
Michigan	Consumers Energy	Experimental Residential Plug-in Electric Vehicle Charging Program	•	•
Minnesota	Xcel Energy, Otter Tail Power	Electric Vehicle Subscription Service Pilot, Off-Peak EV	•	•
Montana	Northwestern Energy MT	Residential Smart Grid Time-of-Use Demonstration	•	
Nevada	Nevada Power	Nevada Energy EV Rate	•	•
New York	Con Ed	Residential Time-of-Use	•	
North Carolina	Duke Energy Progress	Duke Energy Progress R-TOU Program	•	
North Dakota	Montana–Dakota Utilities	Montana–Dakota Utilities Optional Time-of-Day Residential Electric Service Rate 16	•	
Oklahoma	Oklahoma Gas & Electric	SmartHours	•	
Oregon	Portland General Electric, Pacificorp	Schedule 50 – Retail EV, Time of Use	•	•
South Carolina	Duke Energy Carolinas, Dominion Energy	R-TOUD-61, Dominion Energy Residential Time of Use	•	

State	Utility	EV rate name	TOU rate*	EV rate**
Tennessee	Kingsport Power Co.	General Service Time-of-Day (GS-TOD)	•	
Utah	Rocky Mountain Power	Rocky Mountain Power Time-of-Use Energy Rate	•	•
Vermont	Green Mountain Power	Rate 72—Residential Off Peak Electric Vehicle Service, Rate 74—Residential Time-of-Use Electric Vehicle Service	•	•
Virginia	Dominion, Appalachian Power	Residential Electric Vehicle Charging (Experimental)	•	•
Wisconsin	We Energies, Northern States Power	Time-of-Use Savings Program, Residential Electric Vehicle Home Service Program	•	•

Sources: Open EI 2020, utility tariffs. * A time-of-use (TOU) rate varies in price depending on the time of day which the customer uses electricity. These rates generally include at least two price periods: an off-peak price and a more expensive "on-peak" price, reflecting different costs to the grid in different hours of the day. ** EV rates are time-varying rates that require customers to prove ownership of an EV in order to qualify. EV rates may be whole-home or may apply to a separately metered EV.

Table E2. DCFC-specific charging rates

State	Utility	DCFC rate name	Description
California	Pacific Gas & Electric, San Diego Gas & Electric	Schedule BEV – Business Electric Vehicle; Interim Rate Waiver for Electric Vehicle High Power Charging	Participants receive service on SDG&E's existing TOU-M rate, with the maximum demand limit waived for participants. PG&E's Business EV rate is also applicable to DCFC charging.
Hawaii	Hawaiian Electric Co.	EV-MAUI Fast Charging Service	There are time-varying prices for DC fast charging at various utility-owned stations throughout Hawaii, and three time periods, with lowest prices during the middle of the day.
Maine	Central Maine Power	DC Fast Charging Economic Business Development Incentive Program Pilot	CMP offers rate relief to DCFC customers in the form of a two-part demand rate pilot.

State	Utility	DCFC rate name	Description
Maryland	Baltimore Gas & Electric, Delmarva Power, Potomac Electric Co.	Demand Charge Credit	All 3 utilities provide a bill credit for a fixed proportion of demand-based fees, based on 50% of the maximum capacity of L2 or DCFC public chargers.
Minnesota	Minnesota Power, Otter Tail Power	Minnesota Power EV Rate Pilot	Minnesota Power's 2020 pilot program limits demand charges to no more than 30% of the customer's EV-related electricity bill. Xcel Energy offers similar rate programs that allow sporadic loads to avoid high demand-based charges. Otter Tail has begun offering a similar program beginning in December 2020.
Nevada	Nevada Power	EVCCR-TOU	Ten-year demand rate reduction applies to a portion of the DCFC user's kW time-of-use demand, to be offset with $/kWh volumetric rates.
New York	Con Ed	EV Quick Charging Station Program	In its tariff filed in 2018, Con Edison offers a seven-year rate discount for new public EV quick charging stations in its service area.
Pennsylvania	PECO Energy	PECO Energy DCFC Rate	Rate pilot—Provides a 50% fixed demand (kW) credit equal to the combined maximum nameplate capacity for all DCFCs connected to service.
Tennessee	Tennessee Valley Authority	TVA DCFC Enabling Rate	In 2020, TVA began development of a new DCFC enabling rate to avoid high demand charges.

State	Utility	DCFC rate name	Description
Washington	Pacific Power	Optional Transitional Commercial EVSE Rate	Transitional rate for commercial DCFC charger stations applies a discount to demand charges and on-peak energy charges, to decline steadily over a 13-year period.
Wisconsin	Madison Gas & Electric	Low Load Factor Provision	Reduces maximum monthly on-peak demand rates by 50% for customers taking service under schedules CG-4, CG-2, or CG-2A with an annual load factor less than 15%.

Sources: Open EI 2020, utility tariffs

Table E3. Managed charging program details

State	Utility	Managed charging program name	Description	Private	Public
California	Bear Valley, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Liberty Utilities	LADWP Charge Up L.A., PG&E EV Charge Network—Load Management Plan, SCE Charge Ready, SDG&E Power Your Drive	Variety of programs, including incentives for managed charging–capable infrastructure, make-ready with demand response, public charging with interruptible service.	•	•
Colorado	Xcel Colorado	Electric Vehicle Charging Station Pilot	A 2014 pilot program gave customers a credit in exchange for allowing Xcel to interrupt their private vehicle charging for a limited number of hours per year.	○ [33]	

[33] A hollow circle indicates a pilot program with limited participation and/or duration. Small-scale pilots/demonstrations received 0.5 points whereas larger scale pilots and programs received full points.

State	Utility	Managed charging program name	Description	Private	Public
Florida	Duke Energy Florida	Park & Plug Program	Between 2019 and 2022, Duke Florida will own and operate more than 500 privately sited EV charging stations that are DR-capable. Data from these stations will be used to better evaluate the potential for EV charging as a DR resource.	•	•
Hawaii	Hawaiian Electric Co.	Electrification of Transportation: Strategic Roadmap	HECO's 2019 EV road map includes a focus on "smart" charging for workplaces, MUDs, and buses. Pilot includes a pilot DR, V2G, and a battery reuse program.		○
Massachusetts	Eversource, National Grid	EV Market Development Program	National Grid will make ready approximately 700 L2 and 80 DCFC DR-capable charging stations in private and public sites.	•	•
Michigan	Consumers Energy, DTE Electric	Consumers Energy Smart Charging Program, OVGIP PEV DR Pilot	Consumers Energy and General Motors are deploying new technology for private EV chargers to delay charging start times until overnight hours. DTE's EV DR pilot, which began in 2018, serves to evaluate the potential of various EV-related DSM measures and may expand to a full program after 2021, depending on results from the pilot.	•	
Minnesota	Xcel Energy	EV Service Pilot	In a pilot for 100 residential customers, Xcel provides turnkey EV charging infrastructure for a monthly fee and includes load monitoring and data management.	○	

State	Utility	Managed charging program name	Description	Private	Public
New York	Con Ed	SmartCharge New York	Con Edison's pilot uses behavioral feedback and financial rewards to encourage off-peak charging. The program is available to any driver, including fleets, as well as drivers who are not Con Ed customers but charge in the Con Ed service territory. Other New York utilities filed managed charging proposals in December 2020.	•	
Ohio	Ohio Power	AEP Ohio EV Charging Incentive Program	In April 2018, AEP (Ohio Power) began offering rebates for 375 public charging stations that are managed charging–capable. Rebates apply to EV chargers and make-ready infrastructure costs.		•
Oregon	Portland General Electric, Pacificorp	PGE Workplace Smart Charging Pilot, Pacificorp EV Charging Station Grant Program	As of 2017, 20 of 69 workplace chargers installed by PGE are DR-enabled. In its grant awards, Pacificorp offers additional points to EV projects that are DR/VGI capable.	○	•
South Carolina	Duke Energy Carolinas	Residential EV Charging Program	Up to 400 customers with qualifying L2 chargers can receive a rebate for participating in demand response events.	○	
Utah	Rocky Mountain Power	Intermodal Hub Project	Project serves a diversity of electric charging needs among LD, MD, and HD vehicles and transit bus stations while also providing 400 kW of distributed capacity through a multi-megawatt managed charging system.		•

State	Utility	Managed charging program name	Description	Private	Public
Vermont	Green Mountain Power	eCharger	GMP provides a free at-home level 2 charger to new EV customers. These chargers collectively represent one of the largest residential managed charging programs in the country, with 300 customers enrolled in the program as of February 2019.	•	
Washington	Puget Sound Energy, Pacificorp, Avista	EVSE Pilot Program	This 2019 pilot allows Avista to own, maintain, and install EVSE on customer premises. The EVSE installed may be called on for DR events with advance notice to the customer.	○	

Source: SEPA 2019, ACEEE research

Table E4. Vehicle-to-grid programs

State	Utility	Vehicle-to-grid (V2G) program name	Description
California	San Diego Gas & Electric	Torrance Electric School Buses	This demonstration project, funded by the California Energy Commission and South Coast Air Quality Management District, deployed six V2G-capable school buses in the Torrance school district. When connected with buildings or specific grid outlets, the school buses are capable of delivering 96 kWh/22 kW to site buildings, allowing for demand charge management and grid services such as frequency response and load shifting.
Hawaii	Hawaiian Electric Co.	Electrification of Transportation: Strategic Roadmap / SmartMAUI	Project deployed 80 vehicle-to-home chargers which demonstrated discharge in response to grid signals over the 6–9 p.m. peak period, thereby helping manage distribution system loads and frequency events.
New York	Consolidated Edison	NYSERDA Demonstration Project	This demonstration project, funded by NYSERDA, deployed three managed-charging and two V2G-capable EVs to provide bidirectional grid services on the CUNY Queens College campus, including demand charge management and emergency backup power.
Tennessee	Tennessee Valley Authority	Nissan Energy Share	At Nissan's North American headquarters in Franklin, Tennessee, the company's fleet of Nissan LEAFs deploy vehicle-to-building energy services and provide demand charge management as well as emergency backup power.

State	Utility	Vehicle-to-grid (V2G) program name	Description
Virginia	Dominion Energy	Electric School Bus V2G	In 2020, Dominion deployed a fleet of 50 all-electric school buses that are V2G capable, replacing diesel buses in school fleets.

Source: Atlas Public Policy 2020a

Appendix F. Equity Metrics

Table F1. Utility low-income and environmental justice programs

State	Eligible utilities	Low-income*	Environmental justice**	Description
California	Bear Valley, Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Liberty Utilities	•	•	Multiple programs throughout the state include an investment requirement for underserved/disadvantaged communities and designation of up to 50% of program budgets for make-ready, rebates, and public charging as well as education and outreach.
Delaware	Delmarva Power	•		Delmarva Power installs and maintains utility-owned EV charging infrastructure in low-income areas as part of its 2019 Plug-in Electric Vehicle Charging program.
District of Columbia	PEPCO	•	•	PEPCO's 2019 transportation electrification plan calls for at least 20% of its utility-owned DCFC chargers to be deployed in communities identified as "disadvantaged," which include Wards 5, 6, and 7, identified as areas most highly affected by air pollution.
Florida	Duke Energy Florida	•		Duke Energy Florida's 2017 charging infrastructure pilot includes a 10% carve-out for income-qualified communities.
Maryland	Potomac Electric Co. (PEPCO)	•		Among the many programs proposed by PEPCO and approved in January 2019 were several focused on equity and access for low-income communities.
Massachusetts	Eversource, National Grid	•	•	Each utility included a 10% carve-out for environmental justice in its approved public charging infrastructure plan, Eversource in 2017 and National Grid in 2018.
Minnesota	Xcel Energy	•	•	The Twin Cities Electric Vehicle Mobility Network focuses on partnering with local community organizations to address adoption barriers and deploy EVSE strategically in areas that are otherwise underserved.
Missouri	Ameren	•		Ameren's Charge Ahead program, approved in February 2019, includes a 10% carve-out for low-income communities.

State	Eligible utilities	Low-income*	Environmental justice**	Description
New York	Con Ed, National Grid, New York State Electric & Gas, Rochester Gas & Electric, Orange & Rockland, Central Hudson Gas & Electric	•	•	New York utilities and NYSERDA were jointly approved in July 2020 to invest $701 million in make-ready EV charging infrastructure and environmental justice (EJ) pilot programs, with $206 million going to directly benefit low-income and EJ communities.
North Carolina	Duke Energy Progress, Duke Energy Carolinas	•		Duke's 2020 transportation electrification plan includes a specific number of utility-owned charging stations to be deployed to underserved market segments, including 80 L2 chargers for MUDs.
Ohio	Ohio Power	•		AEP Ohio's 2018 charging station investment program includes a 10% carve-out for low-income communities.
Oregon	Pacificorp	•		Pacificorp's 2018 pilot involves $4.6 million to be invested in demonstration projects, public charging, and outreach and education, with an emphasis on reaching low-income communities.
Pennsylvania	Duquesne Light	•		Duquesne Light was approved in December 2018 to invest in its EV ChargeUp pilot program, including more than $2.5 million for infrastructure, rebates, and make-ready investments. The program includes a 10% low-income carve-out and will prioritize these groups for education and outreach.
Washington	Pacificorp	•		Pacificorp's competitive grant program awards grants on a quarterly basis to nonresidential customers to address capital costs of EV charging infrastructure. Points are awarded for projects that deliver benefits to low-income customers, with up to 100% of project costs potentially covered.

Source: Atlas Public Policy 2020a. *Low-income groups are defined differently depending on the state and program, but the definition is generally based on some percentage of the federal poverty level. ** Environmental justice communities are those that bear a disproportionate burden of environmental harms and negative impacts, such as poor air quality. Certain policies, such as those in California, refer to these communities as "disadvantaged."

Table F2. State programs for low-income, economically distressed, or environmental justice communities

State	Program	Description
California	Our Community CarShare Sacramento	Our Community CarShare is a community pilot program of the Sacramento Metropolitan Air Quality Management District, funded by California Climate Investments, a statewide initiative that puts billions of cap-and-trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment, particularly in disadvantaged communities. The program currently operates in seven lower-income communities in the Sacramento region.
	BlueLA CarSharing	BlueLA CarSharing is a pilot electric vehicle sharing program that serves low-income communities of Los Angeles, funded by a grant awarded from CARB through California Climate Investments.
	Lift Line	The Lift Line Paratransit Dial-a-Ride Electric Vehicle Transition Project is part of California Climate Investments. Community Bridges operates the program, which provides 60,000 door-to-door rides a year to seniors and people with disabilities. Two existing gas-powered shuttles will be replaced with two 16-seat EV shuttles equipped with wheelchair lifts, making Lift Line the first public transportation entity to utilize EVs across Santa Cruz County.
	Clean Vehicle Assistance Program	The Clean Vehicle Assistance Program provides grants and affordable financing to help income-qualified Californians purchase or lease a new or used hybrid or electric vehicle. Its goal is to make clean vehicles accessible and affordable to all who qualify. The program is funded by California Climate Investments.
	Clean Cars 4 All	The Clean Cars 4 All program helps get lower-income consumers into cleaner-technology vehicles by retiring their older, higher-polluting vehicles and upgrading to a cleaner one.
	Clean Mobility Options Voucher Pilot Program	The Clean Mobility Options Voucher Pilot Program provides voucher-based funding for zero-emission car-sharing, carpooling/vanpooling, bike-sharing/scooter-sharing, innovative transit services, and ride-on-demand services in California's historically underserved communities. The program is funded by California Climate Investments.
Hawaii	EV Charging Station Rebates	Hawaii Energy offers bonus incentives of up to $5,000 to existing or new affordable housing facilities for AC Level 2 multiport EV charging stations.
Massachusetts	E4TheFuture EV Car Sharing Program	Funded via the Massachusetts Clean Energy Center as part of its Accelerating Clean Transportation Now initiative, this pilot program will deploy an income-tiered and equity-focused electric vehicle carshare program in Roxbury, Massachusetts.

Source: ACEEE review of state offered EV programs

Table F3. Statewide EV investment for low-income, economically distressed, or environmental justice communities

State	Program	Description
California	California Air Resources Board	At least 35% of California Climate Investments must benefit disadvantaged communities, low-income communities, and low-income households, also known as priority populations.
Colorado	Colorado EV Plan 2020	As outlined in Colorado's EV Plan 2020, state agencies will work to ensure that all Coloradans have access to the benefits of transportation electrification.
District of Columbia	Clean Energy DC Act	The Clean Energy DC Act calls for the vehicle excise tax formula to be revised to incentivize electric and fuel-efficient vehicles over less efficient vehicles, with certain provisions to protect low- and middle-income residents.
New Jersey	New Jersey Energy Master Plan	Goal 6.3 of the New Jersey Energy Master Plan: prioritize clean transportation options in low- and moderate-income and environmental justice communities.
New York	EV Make Ready	New York's EV Make-Ready initiative includes $206 million set aside to benefit low-income and disadvantaged communities.
Washington	Washington House Bill 2042: Advancing Green Transportation Adoption	Washington HB2042 includes funds to develop a grant pilot program to support clean alternative fuel car-sharing in underserved communities and low- to moderate-income members of the workforce not readily served by transit or located in transportation corridors with emissions that exceed federal or state emissions standards.

Source: ACEEE review of state offered EV programs

Table F4. State school bus EV deployment policies

State	Program	Description of state program(s) that contribute funds to EV school buses
California	School Bus Replacement Program	The Energy Commission's School Bus Replacement Program is providing more than $94 million to public school districts, county offices of education, and joint power authorities to help transition from diesel school buses to zero- or low-emissions vehicles. The Energy Commission has awarded $89.8 million of the program's funds to schools in 26 California counties.
Illinois	School Bus Retrofit Reimbursement	The Illinois Department of Education will reimburse any qualifying school district for the cost of converting gasoline buses to more fuel-efficient engines or to engines using alternative

State	Program	Description of state program(s) that contribute funds to EV school buses
		fuels. Restrictions may apply. (Reference 105 Illinois Compiled Statutes 5/29-5).
Maryland	Zero-Emission School Bus Transition Grant Program	The Maryland Department of the Environment (MDE) administers a Zero-Emission School Bus Transition Grant Program to purchase zero-emission school buses, install charging infrastructure, and transition to zero-emission school bus fleets. MDE and the Maryland Department of Transportation also provide technical assistance to county boards of education transitioning school buses to zero-emission vehicles throughout the state.
Nevada	S.B. 299	In 2019 Nevada's first school bus pilot program was established. The state's first EV school buses were expected to hit the road in 2020.
New York	NYSERDA's Truck Voucher Incentive Program	In White Plains, New York, five electric school buses are in use by the district and operated by National Express. This $1.8 million project was partially funded by $600,000 from NYSERDA's Truck Voucher Incentive Program and a $500,000 contribution by Consolidated Edison.
Tennessee	2021 RDE4HT Rebate Program	Washington County has been assigned Volkswagen settlement funding to replace diesel school buses with new EV versions. Additionally, the state's Reducing Diesel Emissions for a Healthier Tennessee Rebate Program prioritizes projects that seek to replace diesel vehicles with alternative fuel alternatives. http://www.tncleanfuels.org/wp-content/uploads/2020/10/RDE4HT_2021-RFPApplication_10-21-20_fillable.pdf
Texas	TCEQ EV School Bus Program	Any school district or charter school may receive a grant through the Texas Commission on Environmental Quality (TCEQ) to pay for the incremental costs to replace school buses or install diesel oxidation catalysts, diesel particulate filters, emission-reducing add-on equipment, and other emissions reduction technologies in qualified school buses. Funds may also be used to purchase qualifying fuels, including any liquid or gaseous fuel or additive registered or verified by the U.S. Environmental Protection Agency (other than standard gasoline or diesel) that provides particulate matter emission reductions. Additional rules and conditions apply. For more information, see the TCEQ Texas Emissions Reduction Plan website.

Source: DOE 2020 and additional ACEEE research

Appendix G: Transportation Electrification Outcomes Metrics

Table G1. Light-duty EV registrations

State	Number of LD EV registrations	State population (2019)	LD EV registrations per 100,000 residents
Alabama	2,252	4,903,185	45.93
Alaska	771	731,545	105.39
Arizona	24,805	7,278,717	340.79
Arkansas	792	3,017,804	26.24
California	365,329	39,512,223	924.60
Colorado	20,123	5,758,736	349.43
Connecticut	6,888	3,565,287	193.20
Delaware	1,440	973,764	147.88
District of Columbia	1,833	705,749	259.72
Florida	44,211	21,477,737	205.85
Georgia	19,498	10,617,423	183.64
Hawaii	9,416	1,415,872	665.03
Idaho	1,746	1,787,065	97.70
Illinois	20,076	12,671,821	158.43
Indiana	5,222	6,732,219	77.57
Iowa	1,771	3,155,070	56.13
Kansas	2,432	2,913,314	83.48
Kentucky	2,071	4,467,673	46.36
Louisiana	1,682	4,648,794	36.18
Maine	1,430	1,344,212	106.38
Maryland	14,091	6,045,680	233.08
Massachusetts	16,602	6,892,503	240.87
Michigan	7,261	9,986,857	72.71
Minnesota	6,911	5,639,632	122.54
Mississippi	589	2,976,149	19.79
Missouri	5,442	6,137,428	88.67
Montana	761	1,068,778	71.20
Nebraska	1,351	1,934,408	69.84
Nevada	8,303	3,080,156	269.56
New Hampshire	1,964	1,359,711	144.44

State	Number of LD EV registrations	State population (2019)	LD EV registrations per 100,000 residents
New Jersey	20,165	8,882,190	227.03
New Mexico	2,036	2,096,829	97.10
New York	25,433	19,453,561	130.74
North Carolina	12,845	10,488,084	122.47
North Dakota	233	762,062	30.57
Ohio	11,171	11,689,100	95.57
Oklahoma	3,539	3,956,971	89.44
Oregon	19,107	4,217,737	453.02
Pennsylvania	13,559	12,801,989	105.91
Rhode Island	1,085	1,059,361	102.42
South Carolina	3,261	5,148,714	63.34
South Dakota	368	884,659	41.60
Tennessee	6,466	6,829,174	94.68
Texas	39,504	28,995,881	136.24
Utah	8,275	3,205,958	258.11
Vermont	1,795	623,989	287.67
Virginia	14,879	8,535,519	174.32
Washington	41,934	7,614,893	550.68
West Virginia	449	1,792,147	25.05
Wisconsin	4,835	5,822,434	83.04
Wyoming	249	578,759	43.02

Sources: IHS Markit; Census Bureau 2019

Table G2. Heavy-duty EV registrations

State	Number of HD EV registrations	State population (2019)	HD EV registrations per 100,000 residents
Alabama	0	4,903,185	0.00
Alaska	0	731,545	0.00
Arizona	0	7,278,717	0.00
Arkansas	0	3,017,804	0.00
California	745	39,512,223	1.89
Colorado	44	5,758,736	0.76
Connecticut	0	3,565,287	0.00
Delaware	6	973,764	0.62

State	Number of HD EV registrations	State population (2019)	HD EV registrations per 100,000 residents
District of Columbia	14	705,749	1.98
Florida	5	21,477,737	0.02
Georgia	23	10,617,423	0.22
Hawaii	6	1,415,872	0.42
Idaho	0	1,787,065	0.00
Illinois	24	12,671,821	0.19
Indiana	32	6,732,219	0.48
Iowa	9	3,155,070	0.29
Kansas	0	2,913,314	0.00
Kentucky	19	4,467,673	0.43
Louisiana	3	4,648,794	0.06
Maine	0	1,344,212	0.00
Maryland	5	6,045,680	0.08
Massachusetts	22	6,892,503	0.32
Michigan	0	9,986,857	0.00
Minnesota	8	5,639,632	0.14
Mississippi	0	2,976,149	0.00
Missouri	3	6,137,428	0.05
Montana	2	1,068,778	0.19
Nebraska	0	1,934,408	0.00
Nevada	21	3,080,156	0.68
New Hampshire	0	1,359,711	0.00
New Jersey	0	8,882,190	0.00
New Mexico	16	2,096,829	0.76
New York	47	19,453,561	0.24
North Carolina	21	10,488,084	0.20
North Dakota	0	762,062	0.00
Ohio	0	11,689,100	0.00
Oklahoma	0	3,956,971	0.00
Oregon	0	4,217,737	0.00
Pennsylvania	25	12,801,989	0.20
Rhode Island	0	1,059,361	0.00
South Carolina	24	5,148,714	0.47

State	Number of HD EV registrations	State population (2019)	HD EV registrations per 100,000 residents
South Dakota	0	884,659	0.00
Tennessee	10	6,829,174	0.15
Texas	12	28,995,881	0.04
Utah	18	3,205,958	0.56
Vermont	2	623,989	0.32
Virginia	3	8,535,519	0.04
Washington	270	7,614,893	3.55
West Virginia	0	1,792,147	0.00
Wisconsin	5	5,822,434	0.09
Wyoming	0	578,759	0.00

Sources: IHS Markit, Census Bureau 2019

Table G3. Statewide L2 charging infrastructure

State	Total L2 ports	State population (2019)	Total L2 stations	L2 ports per 100,000 residents	L2 stations per 100,000 residents
Alabama	244	4,903,185	133	4.98	2.71
Alaska	35	731,545	20	4.78	2.73
Arizona	1,076	7,278,717	435	14.78	5.98
Arkansas	168	3,017,804	82	5.57	2.72
California	23,199	39,512,223	6,109	58.71	15.46
Colorado	2,254	5,758,736	887	39.14	15.40
Connecticut	758	3,565,287	338	21.26	9.48
Delaware	149	973,764	51	15.30	5.24
District of Columbia	401	705,749	143	56.82	20.26
Florida	2,987	21,477,737	1,306	13.91	6.08
Georgia	2,402	10,617,423	840	22.62	7.91
Hawaii	651	1,415,872	277	45.98	19.56
Idaho	134	1,787,065	63	7.50	3.53
Illinois	1,415	12,671,821	609	11.17	4.81
Indiana	383	6,732,219	185	5.69	2.75
Iowa	313	3,155,070	136	9.92	4.31
Kansas	813	2,913,314	200	27.91	6.87
Kentucky	216	4,467,673	123	4.83	2.75

State	Total L2 ports	State population (2019)	Total L2 stations	L2 ports per 100,000 residents	L2 stations per 100,000 residents
Louisiana	166	4,648,794	91	3.57	1.96
Maine	258	1,344,212	155	19.19	11.53
Maryland	1,984	6,045,680	695	32.82	11.50
Massachusetts	2,594	6,892,503	847	37.64	12.29
Michigan	926	9,986,857	402	9.27	4.03
Minnesota	687	5,639,632	307	12.18	5.44
Mississippi	119	2,976,149	68	4.00	2.28
Missouri	1,689	6,137,428	399	27.52	6.50
Montana	58	1,068,778	36	5.43	3.37
Nebraska	185	1,934,408	86	9.56	4.45
Nevada	563	3,080,156	205	18.28	6.66
New Hampshire	146	1,359,711	90	10.74	6.62
New Jersey	853	8,882,190	366	9.60	4.12
New Mexico	181	2,096,829	75	8.63	3.58
New York	3,620	19,453,561	1,591	18.61	8.18
North Carolina	1,402	10,488,084	620	13.37	5.91
North Dakota	47	762,062	28	6.17	3.67
Ohio	1,150	11,689,100	501	9.84	4.29
Oklahoma	546	3,956,971	221	13.80	5.59
Oregon	1,420	4,217,737	600	33.67	14.23
Pennsylvania	1,327	12,801,989	570	10.37	4.45
Rhode Island	392	1,059,361	127	37.00	11.99
South Carolina	431	5,148,714	219	8.37	4.25
South Dakota	40	884,659	27	4.52	3.05
Tennessee	926	6,829,174	396	13.56	5.80
Texas	3,131	28,995,881	1,215	10.80	4.19
Utah	1,122	3,205,958	338	35.00	10.54
Vermont	443	623,989	209	70.99	33.49
Virginia	1,396	8,535,519	598	16.36	7.01
Washington	2,648	7,614,893	998	34.77	13.11
West Virginia	99	1,792,147	57	5.52	3.18
Wisconsin	450	5,822,434	218	4.98	2.71
Wyoming	61	578,759	36	4.78	2.73

Sources: DOE 2020, Census Bureau 2019

Table G4. Statewide DCFC charging infrastructure

State	Total DCFC ports	State population (2019)	Total DCFC stations	DCFC ports per 100,000 residents	DCFC stations per 100,000 residents
Alabama	383	4,903,185	146	7.81	2.98
Alaska	39	731,545	22	5.33	3.01
Arizona	1,555	7,278,717	502	21.36	6.90
Arkansas	292	3,017,804	91	9.68	3.02
California	27,244	39,512,223	6,620	68.95	16.75
Colorado	2,673	5,758,736	942	46.42	16.36
Connecticut	1,012	3,565,287	384	28.38	10.77
Delaware	196	973,764	60	20.13	6.16
District of Columbia	488	705,749	157	69.15	22.25
Florida	4,180	21,477,737	1,456	19.46	6.78
Georgia	2,955	10,617,423	889	27.83	8.37
Hawaii	670	1,415,872	285	47.32	20.13
Idaho	213	1,787,065	80	11.92	4.48
Illinois	1,855	12,671,821	657	14.64	5.18
Indiana	618	6,732,219	219	9.18	3.25
Iowa	407	3,155,070	151	12.90	4.79
Kansas	907	2,913,314	215	31.13	7.38
Kentucky	336	4,467,673	140	7.52	3.13
Louisiana	289	4,648,794	105	6.22	2.26
Maine	442	1,344,212	191	32.88	14.21
Maryland	2,242	6,045,680	733	37.08	12.12
Massachusetts	2,868	6,892,503	888	41.61	12.88
Michigan	1,203	9,986,857	444	12.05	4.45
Minnesota	959	5,639,632	342	17.00	6.06
Mississippi	259	2,976,149	87	8.70	2.92
Missouri	1,904	6,137,428	434	31.02	7.07
Montana	177	1,068,778	57	16.56	5.33
Nebraska	236	1,934,408	94	12.20	4.86
Nevada	907	3,080,156	268	29.45	8.70
New Hampshire	251	1,359,711	108	18.46	7.94

State	Total DCFC ports	State population (2019)	Total DCFC stations	DCFC ports per 100,000 residents	DCFC stations per 100,000 residents
New Jersey	1,248	8,882,190	427	14.05	4.81
New Mexico	275	2,096,829	93	13.12	4.44
New York	5,070	19,453,561	1,786	26.06	9.18
North Carolina	1,747	10,488,084	668	16.66	6.37
North Dakota	84	762,062	32	11.02	4.20
Ohio	1,450	11,689,100	547	12.40	4.68
Oklahoma	634	3,956,971	240	16.02	6.07
Oregon	1,745	4,217,737	653	41.37	15.48
Pennsylvania	1,700	12,801,989	624	13.28	4.87
Rhode Island	432	1,059,361	131	40.78	12.37
South Carolina	578	5,148,714	245	11.23	4.76
South Dakota	130	884,659	42	14.69	4.75
Tennessee	1,144	6,829,174	422	16.75	6.18
Texas	4,107	28,995,881	1,376	14.16	4.75
Utah	1,328	3,205,958	381	41.42	11.88
Vermont	602	623,989	228	96.48	36.54
Virginia	1,970	8,535,519	673	23.08	7.88
Washington	3,116	7,614,893	1,078	40.92	14.16
West Virginia	221	1,792,147	79	12.33	4.41
Wisconsin	631	5,822,434	256	10.84	4.40
Wyoming	165	578,759	56	28.51	9.68

Sources: DOE 2020, Census Bureau 2019

Table G5. EV transit buses per 100,000 people

State	EV transit buses	2019 population	EV transit buses per 100,000 residents
Alabama	1	4,903,185	0.02
Alaska	2	731,545	0.27
Arizona	3	7,278,717	0.04
Arkansas	0	3,017,804	0.00
California	1,016	39,512,223	2.57
Colorado	73	5,758,736	1.27
Connecticut	6	3,565,287	0.17

State	EV transit buses	2019 population	EV transit buses per 100,000 residents
Delaware	16	973,764	1.64
District of Columbia	14	705,749	1.98
Florida	142	21,477,737	0.66
Georgia	53	10,617,423	0.50
Hawaii	30	1,415,872	2.12
Idaho	4	1,787,065	0.22
Illinois	73	12,671,821	0.58
Indiana	44	6,732,219	0.65
Iowa	5	3,155,070	0.16
Kansas	10	2,913,314	0.34
Kentucky	18	4,467,673	0.40
Louisiana	11	4,648,794	0.24
Maine	1	1,344,212	0.07
Maryland	30	6,045,680	0.50
Massachusetts	16	6,892,503	0.23
Michigan	9	9,986,857	0.09
Minnesota	27	5,639,632	0.48
Mississippi	1	2,976,149	0.03
Missouri	11	6,137,428	0.18
Montana	4	1,068,778	0.37
Nebraska	6	1,934,408	0.31
Nevada	30	3,080,156	0.97
New Hampshire	0	1,359,711	0.00
New Jersey	15	8,882,190	0.17
New Mexico	25	2,096,829	1.19
New York	40	19,453,561	0.21
North Carolina	54	10,488,084	0.51
North Dakota	0	762,062	0.00
Ohio	36	11,689,100	0.31
Oklahoma	4	3,956,971	0.10
Oregon	20	4,217,737	0.47
Pennsylvania	37	12,801,989	0.29
Rhode Island	9	1,059,361	0.85

State	EV transit buses	2019 population	EV transit buses per 100,000 residents
South Carolina	24	5,148,714	0.47
South Dakota	0	884,659	0.00
Tennessee	112	6,829,174	1.64
Texas	38	28,995,881	0.13
Utah	19	3,205,958	0.59
Vermont	4	623,989	0.64
Virginia	19	8,535,519	0.22
Washington	211	7,614,893	2.77
West Virginia	0	1,792,147	0.00
Wisconsin	21	5,822,434	0.36
Wyoming	8	578,759	1.38

Sources: Silver, Jackson, and Lee 2019, Census Bureau 2019

Table G6. Percentage change in transportation GHG emissions over a five-year period

State	2013 per capita GHG emissions (metric tons)	2017 per capita GHG emissions (metric tons)	Percentage change
Alabama	6.54	6.95	6.30%
Alaska	16.69	15.68	–6.03%
Arizona	4.69	4.68	–0.09%
Arkansas	6.32	6.46	2.29%
California	5.16	5.52	6.90%
Colorado	5.22	5.10	–2.35%
Connecticut	4.20	4.25	1.27%
Delaware	4.44	4.91	10.65%
District of Columbia	1.54	1.44	–6.38%
Florida	5.12	5.04	–1.54%
Georgia	5.61	5.51	–1.64%
Hawaii	7.03	7.16	1.86%
Idaho	5.71	6.29	10.11%
Illinois	4.94	5.35	8.36%
Indiana	6.47	6.31	–2.50%
Iowa	6.56	6.46	–1.55%
Kansas	6.74	6.22	–7.67%

State	2013 per capita GHG emissions (metric tons)	2017 per capita GHG emissions (metric tons)	Percentage change
Kentucky	6.79	7.25	6.87%
Louisiana	9.82	11.33	15.37%
Maine	6.63	6.29	–5.02%
Maryland	4.78	4.53	–5.15%
Massachusetts	4.53	4.46	–1.49%
Michigan	4.91	4.96	1.03%
Minnesota	5.54	5.53	–0.15%
Mississippi	8.33	10.14	21.69%
Missouri	6.14	6.14	–0.01%
Montana	7.99	7.60	-4.89%
Nebraska	7.18	7.25	0.99%
Nevada	5.12	5.22	2.03%
New Hampshire	5.05	5.04	–0.18%
New Jersey	6.58	6.00	–8.87%
New Mexico	6.55	7.17	9.51%
New York	3.49	3.81	9.25%
North Carolina	4.99	4.79	–3.94%
North Dakota	13.02	11.66	–10.46%
Ohio	5.41	5.39	–0.39%
Oklahoma	7.94	8.29	4.42%
Oregon	5.28	5.00	–5.34%
Pennsylvania	4.77	4.99	4.50%
Rhode Island	3.70	3.79	2.51%
South Carolina	6.49	6.57	1.33%
South Dakota	7.72	7.56	–2.02%
Tennessee	6.25	6.48	3.72%
Texas	7.87	8.20	4.23%
Utah	5.90	5.71	–3.28%
Vermont	5.27	5.29	0.30%
Virginia	6.02	5.61	–6.81%
Washington	5.94	6.36	6.95%
West Virginia	5.99	6.33	5.71%
Wisconsin	4.88	4.97	1.91%

State	2013 per capita GHG emissions (metric tons)	2017 per capita GHG emissions (metric tons)	Percentage change
Wyoming	13.23	13.47	1.86%

Source: DOT 2020