



California Energy Commission

STAFF REPORT

Assembly Bill 2127 Third Electric Vehicle Charging Infrastructure Assessment

**Assessing Charging Needs to Support Zero-
Emission Vehicles in California**

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ABSTRACT

The Assembly Bill 2127 Third Electric Vehicle Charging Infrastructure Assessment examines charging infrastructure needed to support California's vehicles in 2030 and beyond.

California will need a mix of at-home and away-from-home charging to support the charging needs of light-duty electric vehicles. The analysis presented in this report projects that to support 6.8 million light-duty electric vehicles in 2030, California will need to have a total of 478,000 public and limited access charging ports, which includes 53,000 direct-current fast charging ports, 136,000 charging ports at large multifamily housing, and 289,000 public and nonresidential limited access Level 2 charging ports at public locations, workplaces and other nonresidential sites. The CEC expects that much of the charging need will be served at single-family and small multifamily homes. This assessment notes that as of mid-2026, the statewide number of installed public and limited access charging ports is already 47 percent of the 2030 projected need.

For electric medium- and heavy-duty vehicles, California will need more than 54,000 charging ports in 2030 to support 93,000 vehicles, including buses. This includes more than 43,000 charging ports at private depots, 9,000 public depot charging ports, and 2,000 en route charging ports. This assessment notes that as of the end of 2025, the statewide number of installed charging ports for medium- and heavy-duty vehicles is already 37 percent of the 2030 projected need.

Installing these charging ports will require investments in labor and workforce training and development. Between 2026 and 2035, up to 276,000 job-years will be needed to manufacture, install, and maintain charging ports for light-duty and medium- and heavy-duty electric vehicles in California.

Keywords: Charging infrastructure, transportation electrification, electric vehicle, grid planning

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EXECUTIVE SUMMARY

Providing sufficient charging and fueling infrastructure for zero-emission vehicles is key to ensuring that California can reach its goal of eliminating harmful air pollution and greenhouse gas emissions from transportation sources. This report assesses the need for charging infrastructure for plug-in electric vehicles, including both light-duty electric vehicles and medium- and heavy-duty electric vehicles, in 2030 and beyond.

- By 2030, CEC projects there will be 6.8 million light-duty electric vehicles in California. The bulk of all charging necessary for these vehicles will be located at homes. These vehicles will require about 478,000 public and limited access charging ports, including 53,000 direct-current fast charging ports, 136,000 charging ports at large multifamily housing, and 289,000 public and nonresidential limited access Level 2 charging ports. Existing charging ports account for 47 percent of the need for public and limited access charging ports in 2030.
- By 2030, California will need about 54,000 charging ports to support 93,000 medium- and heavy-duty electric vehicles. These charging ports will be located at private depots, public depots, and en route locations. Existing deployments already meet about 37 percent of the 2030 need for medium- and heavy-duty electric vehicle charging.
- Electric vehicle charging infrastructure projects will create jobs across a range of sectors. Between 2026 and 2035, charging infrastructure manufacturing, installation, and maintenance will require 276,000 job-years in California.

Charging Needs Will Grow Across All Sectors and Fast Charging Can Provide a Large Share of Light-Duty Electric Vehicle Charging

Light-duty passenger electric vehicles will charge at a range of charging location types. While most light-duty electric vehicle drivers today live in single-family homes where they can charge their vehicle, charging at home will not be an option for all Californians. An expanded range of convenient and affordable charging options will be needed to achieve mass adoption of electric vehicles, including those who live in multifamily housing and those who are unable to charge at home. In addition, even with home charging available, most electric vehicle drivers will need public charging at some point, including charging on long commutes and trips.

This assessment considers two main scenarios for light duty electric vehicle charging infrastructure, both derived from the California Energy Commission 2025 Integrated Energy Policy Report (IEPR):

- The California Electrification Goals scenario, based on the IEPR Additional Achievable Transportation Electrification 4 scenario, projects there will be 6.8 million light-duty electric vehicles on the road in California in 2030. This scenario would put the state on track to meet the targets set by Executive Order N-79-20 and reaffirmed in Executive Order N-27-25. To support this level of electric vehicle adoption, the state will need about 478,000 public and limited access charging ports, including 53,000 direct-current fast charging ports, 136,000 charging ports at large multifamily housing, and 289,000 public and nonresidential limited access Level 2 charging ports at public locations, workplaces, and other nonresidential sites in 2030. In addition, much of the charging

for these vehicles will be provided at single-family and small multifamily homes. With 224,000 public and limited access charging ports already installed statewide by summer 2026, California is well on the way to achieving its EV charging needs. Under the Electrification Goals scenario, the state is 47 percent of the way to reaching the need for charging in 2030.

- The Federal Obstacles to EV Adoption scenario, based on the IEPR Additional Achievable Transportation Electrification 2 scenario, assumes federal obstacles and market constraints result in lower rates of electric vehicle adoption and that, consequently, fewer charging ports would be needed. This scenario projects that to support 4.4 million electric vehicles in 2030, California will need about 342,000 public and limited access charging ports, including 42,000 direct-current fast charging ports, 89,000 charging ports at large multifamily housing, and 211,000 public and nonresidential limited access Level 2 charging ports at public locations, workplaces, and other nonresidential locations. As of December 2025, California is 66 percent of the way to reaching the need for charging in 2030 under this reduced Federal Obstacles scenario.

Furthermore, this report includes a range of alternative scenarios that explore the relationship between charging behavior, infrastructure deployment strategy, and vehicle-grid integration.

Medium- and Heavy-Duty Battery-Electric Vehicles Will Need Both Private and Public Charging

For medium- and heavy-duty electric vehicles, the report evaluates the number of charging ports needed at private and public depots and at en route public locations. Depot charging ports are located at trip destinations and locations where vehicles are stored overnight, including depots owned by the vehicle operator and charging locations owned by a third party. Because vehicles spend longer periods at these locations, depots can provide a mix of charging speeds and power levels. Some vehicles make trips beyond their vehicle range or may not have access to depot charging and rely on higher-powered en route charging ports to replenish range. A wide mix of charging speeds will be necessary to ensure that all medium- and heavy-duty vehicles can meet charging requirements.

This assessment considers two main scenarios for medium- and heavy-duty electric vehicle charging infrastructure, both derived from the California Energy Commission 2025 Integrated Energy Policy Report (IEPR):

- The California Electrification Goals scenario, based on the IEPR Additional Achievable Transportation Electrification 4 scenario, projects there will be 93,000 medium- and heavy-duty (MDHD) battery-electric vehicles on the road in California in 2030. Supporting these vehicles will require roughly 54,000 charging ports: more than 43,000 at private depots, about 9,000 at public depots, and 2,000 at en route locations. With 20,000 charging ports operational or under development by September 2025, California is well on the way to achieving its MDHD EV charging needs. Under this scenario, the state is 37 percent of the way to reaching the need for MDHD charging ports in 2030.
- The Federal Obstacles to EV Adoption scenario, based on the IEPR Baseline scenario, projects 2 percent fewer medium-duty battery-electric vehicle deployment for a total

population of 91,000. These vehicles will require about 53,000 charging ports: about 43,000 at private depots, more than 8,000 at public depots, and about 2,000 at en route locations. Under this scenario, the state is 37 percent of the way to reaching the need for MDHD charging ports in 2030. Charging Infrastructure Deployment Will Create Jobs Across a Range of Industries

California has a rich culture of strong workforce development institutions among state agencies, educational providers, and employers providing qualified apprenticeships, on-the-job reskilling training programs, and other training opportunities to build career pipelines in the zero-emission transportation sector that can provide long-term quality employment. Electric vehicle charging infrastructure projects will create jobs in a variety of industries, including electrical and telecommunications contracting, manufacturing, engineering, construction, maintenance and repair, and systems and software support. Transportation electrification also presents a unique opportunity to invest in workforce development among historically excluded populations and communities who are disproportionately exposed to the pollution burden of fossil fuel power. An estimated 276,000 job-years will be needed to support the development and operations of light-duty, medium- and heavy-duty, transit and school bus charging infrastructure estimated in the California Electrification Goals scenario of this report.

CHAPTER 1:

California Transportation Electrification Goals and Progress

California Transportation Electrification Goals and Policies

California continues to make progress toward its goal of eliminating harmful air pollution and greenhouse gas emissions from transportation sources. A key part of this process is ensuring that harmful emissions from all categories of vehicles are reduced to the greatest extent feasible, including relying on the increased acquisition and usage of zero-emission vehicles across all sectors of transportation. California has set ambitious goals for this process, as set forth in Executive Order N-79-20¹ and reaffirmed in Executive Order N-27-25²:

- All in-state sales of new passenger cars and trucks to be zero-emission by 2035.
- All drayage trucks operating in the state to be zero-emission by 2035.
- All medium- and heavy-duty vehicles operating in the state to be zero-emission by 2045, where feasible.
- All off-road vehicles and equipment to be zero-emission by 2035, where feasible.

The California Air Resources Board began implementing the requirements of Executive Order N-79-20 by adopting a series of regulations affecting the sale and operation of vehicles in California, including Advanced Clean Cars II (ACCII) and Advanced Clean Trucks. In 2025, the federal government acted to repeal California's authority for key mobile source emissions programs, including ACCII and ACT, and placed other obstacles to California's zero-emission vehicle goals. Governor Newsom issued Executive Order N-27-25, in June 2025, which instructed the California Air Resources Board to develop an updated vehicle regulation that reduces criteria air pollutants, toxic emissions, and greenhouse gases from passenger cars and light-duty trucks, medium- and heavy-duty vehicles.

For California to meet its transportation electrification goals, the state must ensure that zero-emission vehicles have plentiful and reliable fueling and charging infrastructure. In 2018, Assembly Bill 2127 (Ting, Chapter 365, Statutes of 2018)³ tasked the California Energy Commission (CEC) with preparing biennial assessments of the charging infrastructure needed to meet state goals. While vehicles fueled by electricity or hydrogen are considered zero-emission vehicles, the AB 2127 assessment focuses exclusively on plug-in electric vehicles

1 Governor Gavin Newsom. [Executive Order N-79-20](https://ww2.arb.ca.gov/resources/fact-sheets/governor-newsoms-zero-emission-2035-executive-order-n-79-20). Issued September 23, 2020, <https://ww2.arb.ca.gov/resources/fact-sheets/governor-newsoms-zero-emission-2035-executive-order-n-79-20>.

2 Governor Gavin Newsom. [Executive Order N-27-25](https://www.gov.ca.gov/wp-content/uploads/2025/06/CRA-Response-EO-N-27-25-bl-formatted-GGN-Signed-6-11-954pmFinal.pdf). Issued June 12, 2025, <https://www.gov.ca.gov/wp-content/uploads/2025/06/CRA-Response-EO-N-27-25-bl-formatted-GGN-Signed-6-11-954pmFinal.pdf>.

3 [Assembly Bill 2127 \(Ting, Chapter 365, Statutes of 2018\)](https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB2127), https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB2127.

(EVs), which include battery-electric vehicles and plug-in hybrid electric vehicles. Complementary CEC reports examine how much hydrogen fueling infrastructure is needed.

State of the Electric Vehicle Market

California continues to make progress in shifting transportation from fossil fuels to electrification relying on California's expanding zero-emission electricity generation supported by executive orders and various legislative directives. Increased EV availability, better and cheaper batteries, and an expanding charging network have also contributed to Californians' willingness to adopt EVs. By the end of 2025, more than 2 million light-duty EVs were on California roads, making up more than 6 percent of all cars on the road,⁴ EV adoption is also accelerating among medium- and heavy-duty (MDHD) vehicles. By the end of 2025, about 8,900 MDHD EVs were operating in California.⁵

While California leads in EV adoption and installed EV charging infrastructure, since January 2025, the federal government has reversed many policies supporting transportation electrification and cancelled previously approved federal funding for charging infrastructure. These actions have included eliminating federal tax incentives for EV purchases, reducing funding for charging infrastructure, and attempting to override the waivers for the Advanced Clean Cars II and Advanced Clean Trucks regulations. As a result, automakers have pulled back from EV manufacturing goals, and there has been a reduction in consumer purchases of EVs. While EVs accounted for more than 25 percent of new light-duty vehicle sales in 2023 and 2024, light duty EV sales decreased in the fourth quarter of 2025 and early 2026 after the elimination of federal incentives. This assessment factors the impact of federal actions in its "Federal Obstacles to EV Adoption scenario."

Existing Charging Infrastructure

As EV adoption continues to expand in California, the state has made substantial progress providing charging infrastructure needed to support these vehicles. The CEC tracks existing charging infrastructure on the Zero-Emission Vehicle and Infrastructure Statistics EV Chargers dashboard.⁶ As of December 2025, CEC data showed more than 216,000 charging ports at publicly accessible locations, workplaces, commute destinations, and large multifamily housing, serving more than 2 million light-duty electric vehicles in California. These charging ports included more than 167,000 public and limited access Level 2 (L2) ports (Figure 1) at nonresidential locations, more than 21,000 direct-current fast charging (DCFC) ports (Figure 2), and more than 27,000 ports at multifamily homes with five or more units. In addition, the

4 California Energy Commission. 2025. "[Light-Duty Vehicle Population in California](https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/light)." Data last updated May 16, 2025. Retrieved May 28, 2025, from <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/light>.

5 California Energy Commission. 2025. "[Medium- and Heavy-Duty Zero-Emission Vehicles in California](https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/medium)." Data last updated May 16, 2025. Retrieved April 9, 2026, from <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics-collection/medium>.

6 California Energy Commission. 2023. "[Electric Vehicle Chargers in California](https://www.energy.ca.gov/zevstats)." Data last updated August 26, 2024. Retrieved February 14, 2025, <https://www.energy.ca.gov/zevstats>.

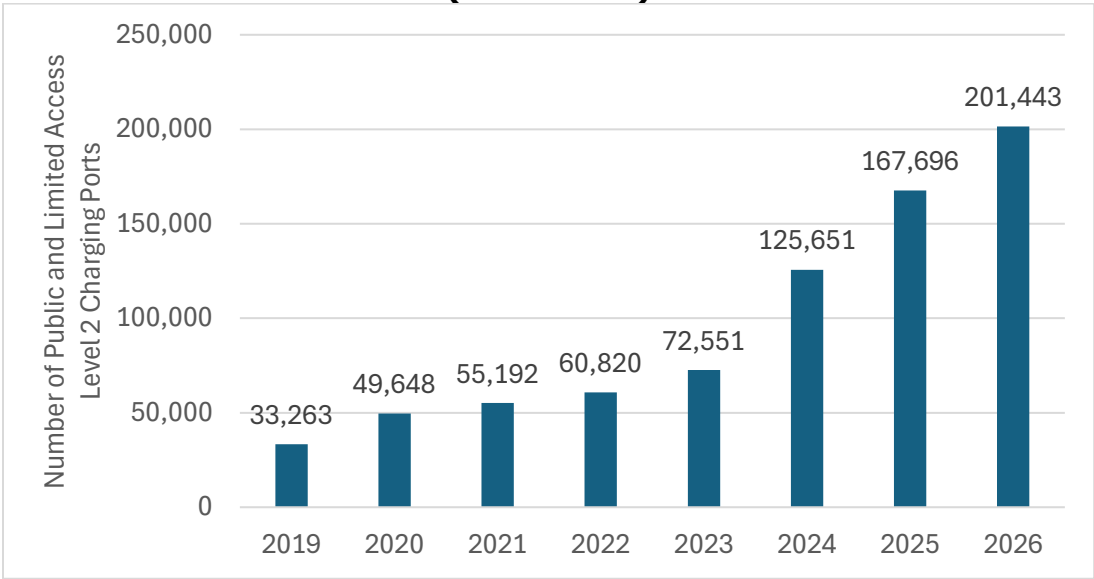
CEC identified about 20,000 operational and planned charging ports serving medium- and heavy-duty electric vehicles statewide.⁷

Beginning in 2026, the CEC will revise the way charging port counts are presented. Installed charging ports for light-duty vehicles will be presented in three categories:

- Public, meaning publicly accessible locations such as shopping areas, gas stations, and public parking lots.
- Limited access, meaning ports installed at workplaces and other nonresidential locations with access restrictions.
- Residential, meaning ports installed at single-family homes, small multifamily residences, and large multifamily properties.

For this assessment, the projected charging need to serve light-duty electric vehicles will be presented using these three categories. Staff also plans future updates to the Zero-Emission Vehicle and Infrastructure Statistics EV Chargers dashboard to align with these categories.

Figure 1: Public and Limited Access L2 Electric Vehicle Charging Ports Over Time (2019-2026)

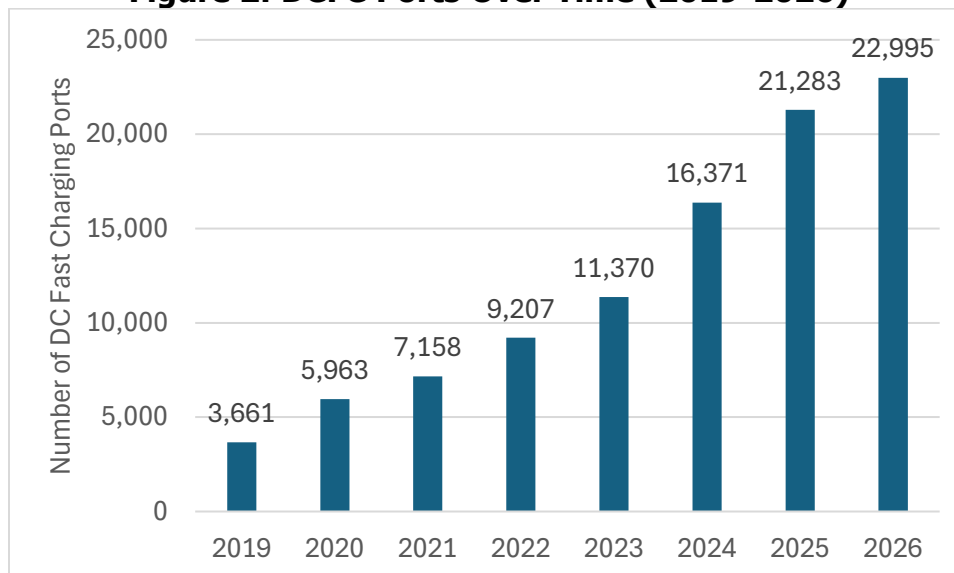


By summer 2026, there were over 200,000 public and limited access L2 charging ports in California. The large increase in charging port counts from 2023 to 2024 shown in these figures is a result of an increase in the rate of charging port deployments and the inclusion of already existing charging ports discovered by adding new datasets to the CEC Counting Chargers analysis.

Source: AFDC, Plugshare data and CEC staff analysis

⁷ California Energy Commission. "[Medium- and Heavy-Duty Infrastructure](https://www.energy.ca.gov/zevstats)." Data last updated September 16, 2025. Retrieved April 6, 2026, from <https://www.energy.ca.gov/zevstats>.

Figure 2: DCFC Ports Over Time (2019-2026)



By summer 2026, there were nearly 23,000 DC fast charging ports serving light-duty EVs in California. The large increase in charging port counts from 2023 to 2024 shown in these figures is a result of an increase in the rate of charging port deployments and the inclusion of already existing charging ports from PlugShare into the CEC Counting Chargers dataset.

Source: AFDC, PlugShare data and CEC staff analysis

Updates to the AB 2127 Third Assessment

This report is the third iteration of the AB 2127 Assessment. The first AB 2127 report was published in 2021⁸ and the second in 2024.⁹ The modeling results presented in this report include several updates compared to what was presented in previous reports. The updates which directly affect the results of this assessment or the way they are presented are explained below:

- Previous AB 2127 reports used the term “charger” to refer to a system capable of charging a single EV. This report updates that prior terminology to “charging port,” to be consistent with other CEC documents and language used by other state and federal agencies.
- This report groups small multifamily housing (up to four units) with single-family homes for the purposes of assessing charging infrastructure needs as the ability to install charging at such residences more closely mirrors that of detached single-family homes. Multifamily housing with five or more units is classified as large multifamily, a sub-

8 Alexander, Matt, Noel Crisostomo, Wendell Krell, Jeffrey Lu, and Raja Ramesh. July 2021. [Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030 – Commission Report](https://efiling.energy.ca.gov/getdocument.aspx?tn=238853). California Energy Commission. Publication Number: CEC-600-2021-001-CMR, <https://efiling.energy.ca.gov/getdocument.aspx?tn=238853>.

9 Davis, Adam, Tiffany Hoang, Thanh Lopez, Jeffrey Lu, Taylor Nguyen, Bob Nolty, Larry Rillera, Dustin Schell, and Micah Wofford. 2023. [Assembly Bill 2127 Second Electric Vehicle Charging Infrastructure Assessment: Assessing Charging Needs to Support Zero-Emission Vehicles in 2030 and 2035](https://efiling.energy.ca.gov/GetDocument.aspx?tn=254869). California Energy Commission. Publication Number: CEC-600-2024-003-CMR, <https://efiling.energy.ca.gov/GetDocument.aspx?tn=254869>.

category of limited access L2, reducing the charging port count for the multifamily category from prior assessments because of this adjusted classification.

- Two major changes have been made to the modeling approach and scenarios for light-duty EV charging infrastructure relative to the AB 2127 Second Assessment. The scenarios in this report include fewer vehicles, and assumptions about light-duty EV charging behavior away from home are shifted substantially toward DCFC and away from L2 charging. Together, these changes result in a substantial decrease in the number of L2 charging ports needed at public and limited access locations and an increase in the number of DCFC ports needed.
- The scenarios for MDHD charging infrastructure use a smaller EV population, and MDHD EVs are assumed to make more use of fast charging. These changes significantly decrease the number of charging ports needed but increase the proportion of high-speed chargers.
- Other updates to the modeling methods used in this report are detailed in Chapter 2 and Appendix A for light-duty EVs and Chapter 3 and Appendix E for MDHD EVs.
- The second AB 2127 report derived workforce projections from a bottom-up model that included only direct jobs for charging installation. This report uses Argonne National Laboratory's JOBS EVSE 2.0 top-down input-output model to estimate supply chain (direct and indirect) jobs needed to support charging infrastructure development and operations.

CHAPTER 2:

Charging Infrastructure for Light-Duty Electric Vehicles

CEC staff partnered with researchers at the National Laboratory of the Rockies (NLR) and the University of California, Davis, to model the number of electric vehicle charging ports California will need. This report uses the Electric Vehicle Infrastructure Projection tool 4 (EVI-Pro 4) to model charging infrastructure needs for routine travel, and two other models are used to assess the need for specific types of fast charging infrastructure.

EVI-Pro 4 projects the number, location, and types of charging ports required to meet the routine travel needs of California's light-duty EV drivers. EVI-Pro 4 uses travel survey data, vehicle characteristics, and charging costs to estimate the charging demand from routine travel by light-duty EVs. Changes to the EVI-Pro model for this report include a more realistic simulation of driver behavior and updated model assumptions to shift more charging load from L2 to DCFC, reflecting existing private sector deployments and driver preferences.

EVI-Pro 4 simulates a week in the life of California drivers and fits charging into each driver's schedule based on how much they drive, how long they spend parked at various locations, and what their preference is for each type of charging. As simulated drivers travel from home to other locations like work, stores, and parks, the state of charge (SOC) of their vehicle depletes. Once the SOC is low enough, drivers decide where to charge, with that choice depending on the cost, speed, and convenience of the charging options available and how much energy they need to recover, including the following considerations:

- Most drivers have access to either L1 or L2 charging at home, and for these drivers, charging at home is generally the cheapest and most convenient option.
- Some drivers have access to L2 charging while at work. Charging with L2 while at work can provide a similar amount of energy to charging overnight at home.
- Public L2 is available at many locations, but many drivers do not spend enough time at these locations for this to be a primary charging option. Public L2 can supplement other charging options, particularly at locations where EVs remain parked for several hours.
- Finally, drivers can use DCFC to add large amounts of energy relatively quickly.

Changes to Modeling Assumptions for Light-Duty EV Charging

Considering existing infrastructure deployments and the potential to expand the charging system over the next five years, CEC staff developed a set of assumptions that increase DCFC use relative to the main scenarios in previous editions of the AB 2127 Assessment.

DCFC plays a larger role in this report than in previous reports for several reasons relating to the state of the existing network, private investment, and the appeal of fast charging in an immature charging environment:

- The existing charging network shows a trend toward DCFC that is reflected in the modeling. California has installed DCFC in larger numbers than state goals set in

Executive Order B-48-18 or anticipated needs from the first two AB 2127 Assessments, while L2 installations have trailed by the same measures.

- DCFC may provide an easier path to meeting the needs of an expanding EV fleet by 2030 because charging needs can be met by a smaller total number of charging ports. As highlighted in the Zero-Emission Vehicle Infrastructure Plan (ZIP), permitting and site design costs may also be lower for a DCFC network that contains fewer total sites than a more dispersed L2 network.¹⁰
- The existing business case for DCFC may be improving at a faster pace than L2, making it easier to attract the private investment needed to expand the charging network. The private sector has already shown willingness to install significant DCFC capacity throughout the state. As discussed in the ZIP, DCFC may have potential to reach a lower cost of service than L2.¹¹

Finally, California's charging network will still be growing in 2030. In a charging environment where L2 is not ubiquitous where people park for long periods, DCFC can offer the needed access for people without home charging. Due to the amount of charging time needed, it may be challenging for L2 to support drivers who lack charging access at home and work.

Appendix A provides more detail on the modeling approach and assumptions used in the EVI-Pro 4 model.

Additional DCFC Needs for Long-Distance Travel and TNC Vehicles

In addition to the EVI-Pro 4 model, which assesses charging infrastructure needs for routine travel within 100 miles of home, this report uses two other models to project the charging infrastructure needs of light-duty EVs:

- The EVI-RoadTrip model, developed by NLR, addresses DCFC needs for travel farther than 100 miles from home. EVI-RoadTrip model structure and assumptions used for this report are consistent with those used in the EVI-RoadTrip report published in 2023.
- The Widespread Infrastructure for Ride-Hailing EV Deployment (WIRED) model, developed by UC Davis, addresses the DCFC needs for EVs operated by transportation network companies (TNC). These charging ports are assumed to be publicly accessible and mixed into the rest of the DCFC infrastructure in California, with a larger concentration of charging ports near locations where TNC trips are most common, like airports and downtown areas.

Light-Duty EV Charging Infrastructure Main Scenarios

To align the AB 2127 Assessment with other CEC modeling efforts, this report uses light-duty EV fleet size and composition from the 2025 Integrated Energy Policy Report (IEPR). The

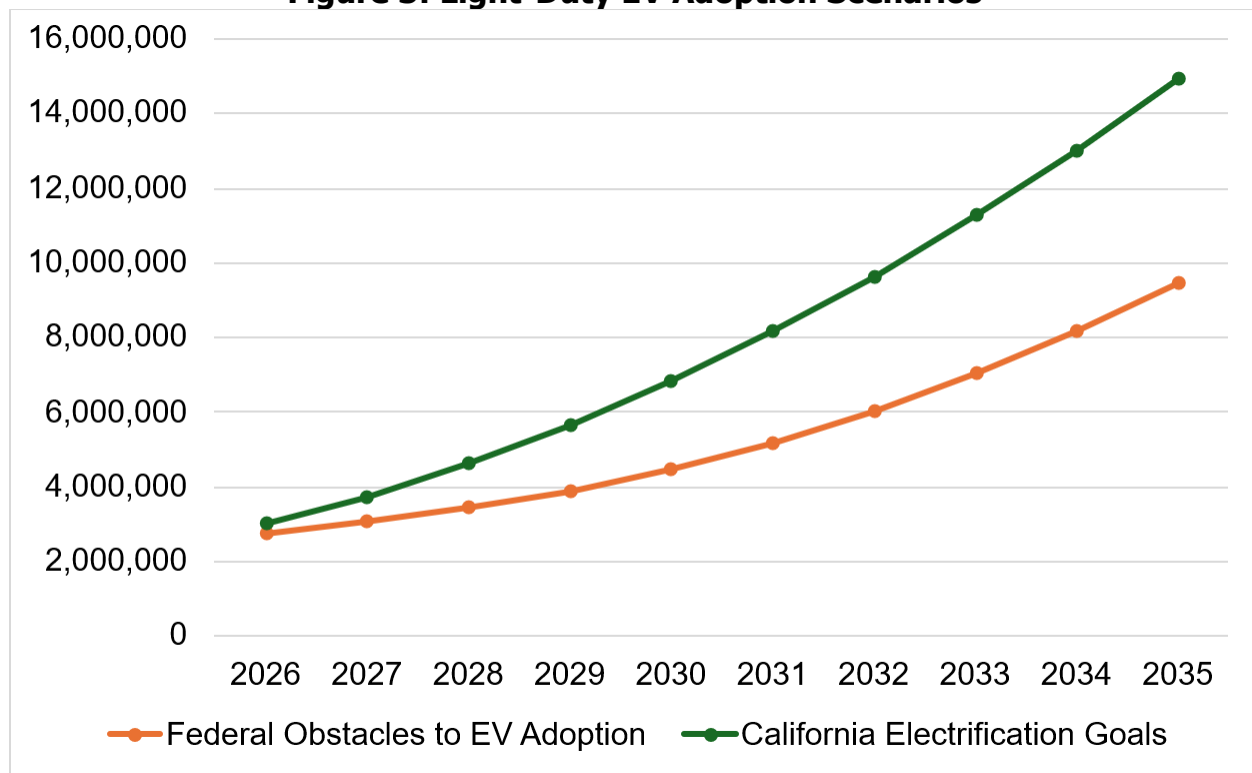
10 Lopez, Thanh, Adam Davis, Brendan Burns, and Magdulin Dwedari. 2025. [2024 Zero-Emission Vehicle Infrastructure Plan: Deployment Strategy 2025–2030](https://www.energy.ca.gov/publications/2025/2024-zero-emission-vehicle-infrastructure-plan-deployment-strategy-2025-2030). *California Energy Commission*. Publication Number: CEC-600-2025-002. p. 43, <https://www.energy.ca.gov/publications/2025/2024-zero-emission-vehicle-infrastructure-plan-deployment-strategy-2025-2030>.

11 Ibid. p. 33.

withdrawal of incentives to EV adoption and federal challenges to the Advanced Clean Cars II regulation introduced a degree of uncertainty to light-duty EV adoption and in turn, charging infrastructure needs. To reflect this uncertainty, this report includes two main scenarios for light-duty EV adoption, with a year-by-year comparison in Figure 3:

- The California Electrification Goals scenario, based on the CEC's 2025 IEPR Additional Achievable Transportation Electrification 4 scenario, includes 6.8 million vehicles in 2030 and 14.9 million vehicles in 2035. This scenario projects that California will reach 100 percent zero-emission new vehicle sales by 2035, in line with the targets set by Executive Order N-79-20.
- The Federal Obstacles to EV Adoption scenario, based on the 2025 IEPR Additional Achievable Transportation Electrification 2 scenario, includes 4.4 million vehicles in 2030 and 9.4 million vehicles in 2035. This scenario assumes that EV adoption will accelerate somewhat in the late 2020s relative to recent trends.

Figure 3: Light-Duty EV Adoption Scenarios



Source: CEC

California Electrification Goals Scenario Results

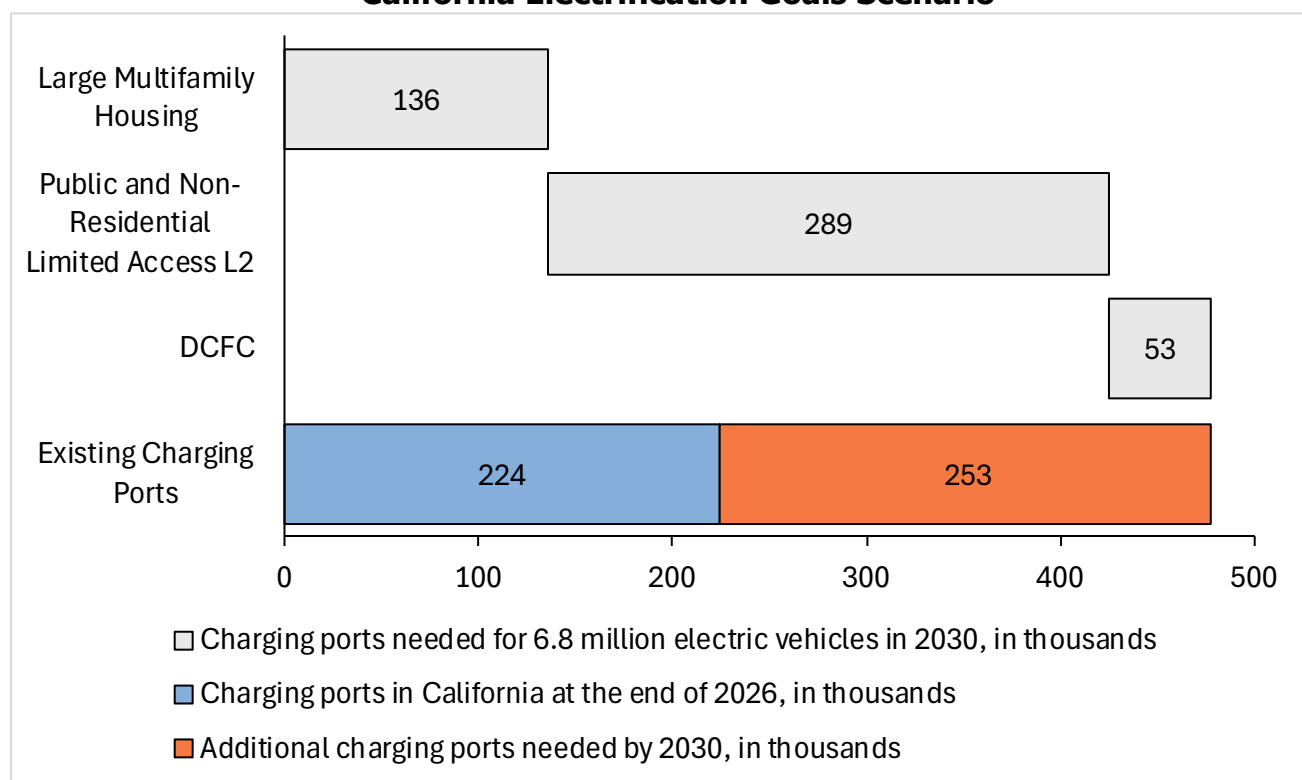
To meet California electrification goals, the state will need 478,000 public and limited access charging ports, including 53,000 DCFC ports, 136,000 charging ports at large multifamily housing, and 289,000 public and nonresidential limited access L2 charging ports at public locations, workplaces, and other nonresidential sites to support 6.8 million EVs in 2030. Most of the charging needs of these vehicles will be met by charging ports at homes, including single-family and small multifamily housing.

While the charging landscape in 2030 may look similar to today, changes to vehicle and charger technology mean that charging needs in 2035 are more uncertain. Improvements to battery technology may significantly increase the ranges of light-duty EVs available to consumers and allow faster DCFC charging speeds. Longer-range vehicles would require less away from home charging on long travel days, and faster chargers would allow a smaller number of L2 and DCFC charging ports to support the same number of vehicles. To account for this uncertainty, CEC staff provides a range for the number of charging ports.

To support 14.9 million EVs in 2035, California will need 902,000–1,059,000 public and limited access charging ports, including 78,000–110,000 DCFC ports, 321,000 charging ports at large multifamily housing, and between 502,000 and 628,000 public and nonresidential limited access L2 charging ports at public locations, workplaces, and other nonresidential sites. Regardless of vehicle range and charging speeds, home charging will remain the primary source of energy for light-duty EVs.

Figure 4 shows the number of existing charging ports and the additional charging ports needed to support 6.8 million electric vehicles in 2030. By summer 2026, California already had about 224,000 public and limited access charging ports, of which 201,000 public and limited access L2 charging ports and 23,000 direct-current fast charging ports. Existing charging infrastructure meets 44 percent of 2030 needs for DCFC and 47 percent of 2030 needs for public and limited access L2 charging ports.

Figure 4: Existing Charging Ports and Additional Ports Needed by 2030 for California Electrification Goals Scenario



Source: CEC staff and NLR

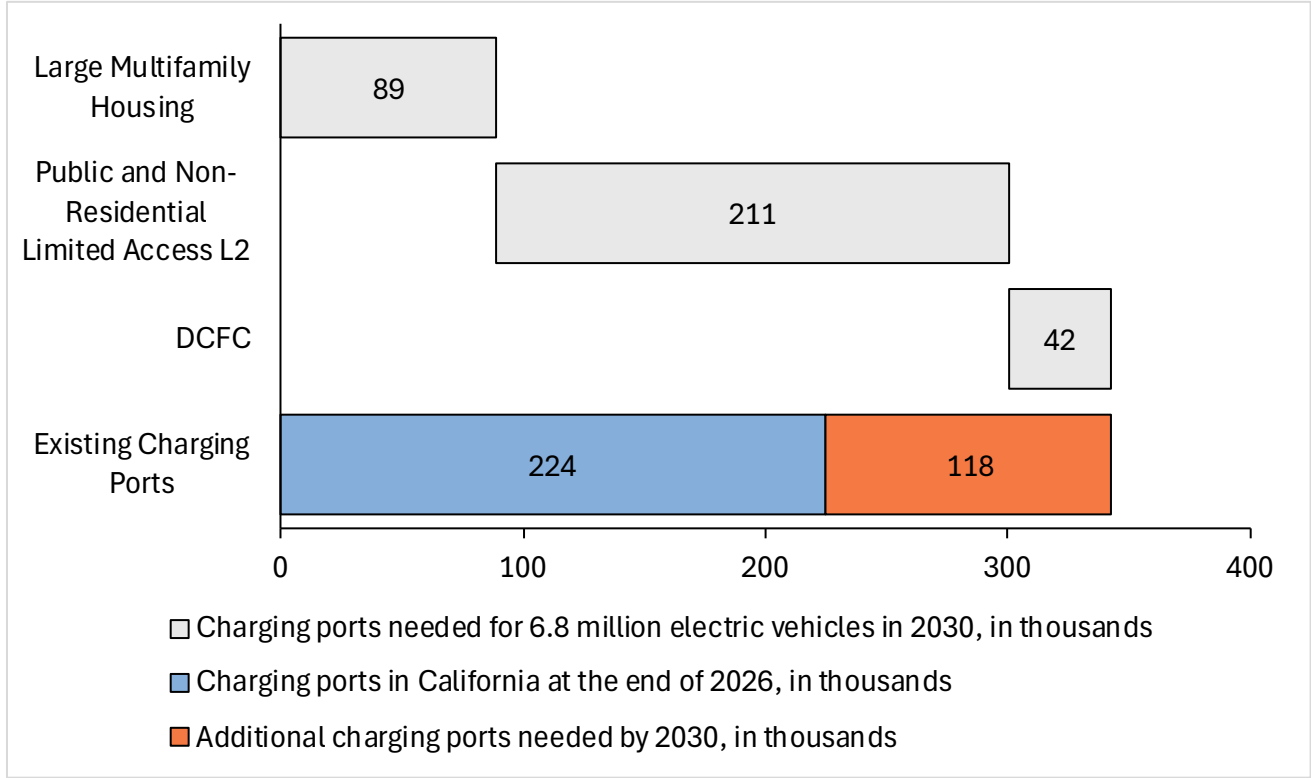
Federal Obstacles to EV Adoption Scenario Results

To account for the uncertainty created by federal policy changes and evolving market conditions, CEC staff also assessed charging infrastructure needs under a lower EV adoption scenario, based on the 2025 IEPR Additional Achievable Transportation Electrification 2 scenario. In this scenario, CEC staff assessed the infrastructure required to support 4.4 million vehicles in 2030, resulting in a need of 342,000 public and limited access charging ports, including 42,000 DCFC ports, 89,000 charging ports at large multifamily housing, and 211,000 public and nonresidential limited access L2 charging ports at public locations, workplaces, and other nonresidential sites.

Improvements to vehicle batteries and charging infrastructure mean that the number of charging ports needed per vehicle could decrease by 2035. To support 9.5 million EVs in 2035, California would need between 580,000 and 682,000 charging ports away from home, including between 48,000 and 67,000 DCFC ports, 204,000 charging ports at large multifamily housing, and between 328,000 and 410,000 public and nonresidential limited access L2 charging ports at public locations, workplaces, and other nonresidential sites.

Figure 5 shows the number of existing charging ports and the additional charging ports needed to support 4.4 million electric vehicles in 2030. In this scenario, existing chargers in California at the end of 2025 would meet 55 percent of 2030 needs for DCFC and 67 percent of 2030 needs for public and limited access L2 charging ports.

Figure 5: Existing Charging Ports and Additional Ports Needed by 2030 for Federal Obstacles to EV Adoption Scenario



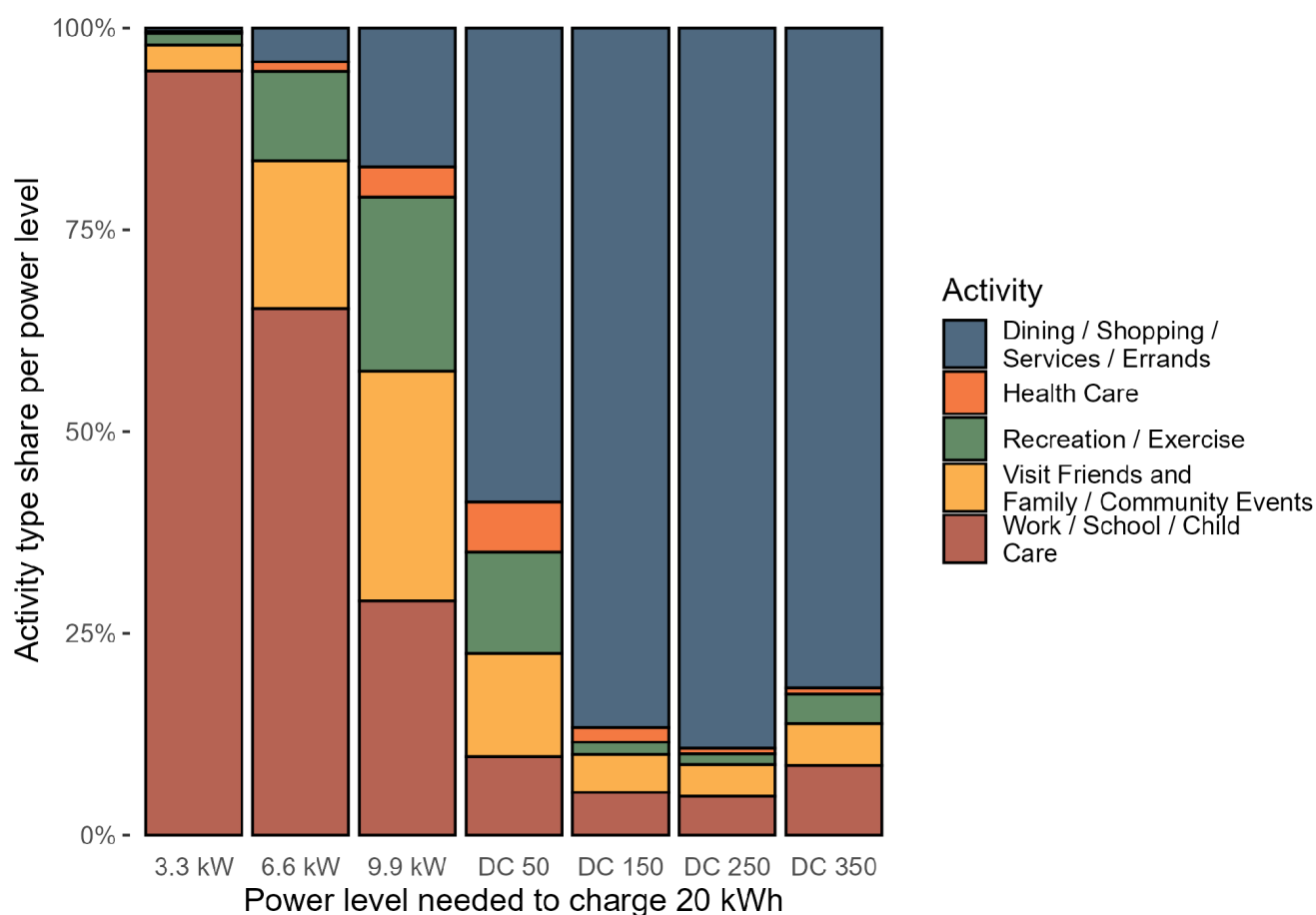
Source: CEC staff and NLR

Matching Charging Types to Dwell Times

Existing data on infrastructure deployments and charging behavior indicates that DCFC will be the most important source of charging away from home through 2030, but there is more uncertainty in how a more mature charging environment will look. DCFC provides faster charging than L2, and existing DCFC charging ports may be more flexible to incorporate into travel than L2. These attributes may be particularly important in a sparser network where many locations do not have charging available. As EV adoption expands, there may be an increased incentive to install charging at hotels, parks, entertainment venues, and parking lots in downtowns and multiuse areas, where L2 can be more convenient than fast charging.

Figure 6 shows the DCFC and L2 power levels of charging needed to recover 20 kilowatt-hours (kWh) (enough to drive about 68 miles) while parked at a range of activity types. L2 charging (3.3, 6.6, and 9.9 kW in this chart) can provide a viable substitute for home charging if it is located at schools and workplaces. Higher-speed DCFC charging is more appropriate for shopping, dining, and entertainment.

Figure 6: Power Level of Charging Needed to Recover 20 kWh of Energy for a Range of Activity Types



Lower-speed L2 charging is sufficient at workplaces and schools. Higher-speed DCFC is necessary to provide useful charging options at places where people spend less time, like stores and restaurants. At mixed-use areas and recreation sites, either high-speed L2 or lower-speed DCFC may be appropriate.

Source: CEC Staff and National Household Travel Survey

There are several use cases where DCFC is clearly the best option:

- DCFC is the only way to make EV travel possible along major travel corridors where people often drive distances beyond the vehicle range.
- TNC drivers who need to minimize time spent charging to maximize revenue will require charging that is as fast as possible, if they don't have access to overnight home charging.
- DCFC may also be the only option for people without charging at home who do not regularly spend enough time at other locations for L2 to be practical.

A case where DCFC and L2 may both play a role:

- Grocery stores and other locations that people visit regularly but where they rarely spend multiple hours could serve as routine charging locations with either high-powered (10–19.2 kW) L2 or low-powered (50–100 kW) DCFC, either of which would allow drivers to recover multiple days of range in a single session.

And a few cases where L2 may be better prioritized:

- L2 is the best option for curbside or near-home charging in areas with low home-charging access. Charging within easy walking distance of home can be nearly as convenient as home charging.
- L2 charging is well-suited to commute destinations where people spend four or more hours several times per week. As EV adoption expands, it may be especially important to support commute charging in areas where home charging access is less prevalent and for industries that pay less. In addition to workplaces, park-and-rides and parking garages in downtown areas can provide charging while people are at work.
- Installing L2 for overnight charging at hotels and daytime charging at parks and other locations supports long-distance travel by decreasing time spent on charging-only stops and decreasing the congestion at remote fast-charging sites.
- Shopping and entertainment locations where drivers spend two or more hours will have an incentive to install more charging ports as EV adoption expands.

For L2 and DCFC, charging ports deployed at convenient, accessible locations where people want to spend time will likely see higher utilization than infrastructure deployed in less desirable locations. Higher levels of utilization would allow a smaller number of charging ports to meet charging needs.

Alternative Future Scenarios

In addition to the main scenarios, the CEC and NLR developed several alternative scenarios to explore the impact of charging behavior or infrastructure deployment on infrastructure needs. These scenarios are based on the California Electrification Goals¹² main scenario for 2030, described earlier in this chapter.

¹² This scenario projects that California will reach 100 percent zero-emission new vehicle sales by 2035, in line with the targets set by Executive Order N-79-20. Governor Gavin Newsom. [Executive Order N-79-20](#). Issued

Solar Priority Scenarios

One benefit of EVs is the ability to schedule charging for periods when energy is cheapest and cleanest. In the main scenarios of this report, most charging happens at home overnight, when charging is cheapest under most currently available time-of-use rate plans. As more solar capacity is installed, it may be beneficial to prioritize charging when solar generation is high and energy demand is relatively low. CEC staff and NLR developed two scenarios assessing the temporal flexibility of home charging and are described below.

The solar priority alternative scenarios are designed to shift as much charging as possible to the period from 10 a.m. to 4 p.m. In the main scenarios, 22 percent of all charging happens during the solar window from 10 a.m. to 4 p.m., almost all away from home. The first solar priority alternative scenario shifts home charging at night to home charging from 10 a.m. to 4 p.m. for those who naturally dwell at home during those hours, enabling them to take advantage of abundant midday solar generation and relatively less congestion on the grid than during evening peaks. This scenario results in 44 percent of charging happening during that window. In a scenario that prioritized charging during the solar window at all locations, 50 percent of charging happens during the solar window, but this would require installing about 31,000 more DCFC charging ports than the California Electrification Goals scenario. The assumptions and complete results of these scenarios are detailed in Appendix C.

DCFC Strategy Scenarios

The extent to which DCFC is the dominant type of charging infrastructure away from home is a key question for the future of transportation electrification. The scenario used for this report shifts BEV charging preferences toward DCFC and away from work and public L2 relative to the second assessment. To better understand the range of potential outcomes, CEC staff worked with NLR to develop two scenarios that bookend a realistic range of outcomes for DCFC deployment, both based on the California Electrification Goals fleet size scenario. The assumptions and results of these scenarios are described in Appendix C.

- The low-DCFC alternative scenario has similar assumptions to the main scenario of the AB 2127 Second Assessment. In this scenario, California would need 154,000 more public and nonresidential limited access L2 charging ports and 11,000 fewer DCFC charging ports in 2030.
- The high-DCFC alternative scenario moves almost all public and limited access charging by BEVs to DCFC and assumes some free DCFC usage will be provided as an incentive with most newly purchased BEVs. In this scenario, California would need 78,000 fewer public and nonresidential limited access L2 charging ports and 18,000 more DCFC charging ports in 2030.

Vehicle-to-Home Scenario

Vehicle-grid integration is altering the timing, power, or location of charging to benefit the grid while meeting the driver's needs. Vehicle-to-home (V2H) bidirectional charging is one type of vehicle-grid integration that may provide benefits to the grid and EV owners. CEC staff worked

with NLR to assess a rough market size for V2H bidirectional charging. This scenario explores the potential of bidirectional-capable EVs to supply power to single-family homes during peak time-of-use rate hours in the hottest week in summer.

In a scenario that allowed vehicles to provide most of the home's electrical needs while connected to the grid, 85.7 percent of BEV owners with access to charging at a single-family home would be able to use V2H at least once per week. These vehicles would be able to meet about 21.8 percent of all home load in the 4–9 p.m. period and decrease power drawn from the grid by up to 5,000 MW. Depending on the utility that serves them and which specific time-of-use rates they participate in, the average EV owner could save more than \$250 just during summer months from V2H. The assumptions and results of this scenario are described in Appendix D.

CHAPTER 3:

Charging Infrastructure for Medium- and Heavy-Duty Electric Vehicles

CEC staff partnered with researchers at Lawrence Berkeley National Laboratory to model the number of electric vehicle charging ports California will need to support medium- and heavy-duty (MDHD) electric vehicles (Classes 3–8). The Medium and Heavy-Duty Electric Vehicle Infrastructure Load Operations and Deployment (HEVI-LOAD) model simulates the travel patterns of individual vehicles to obtain statewide charging needs. Charging needs for battery-electric buses are generated by a separate model described in Appendix F.

HEVI-LOAD

HEVI-LOAD estimates charging needs for medium- and heavy-duty EVs by simulating vehicle travel. In this model, simulated vehicles can charge either after reaching a depot or at a high-speed charger en route. HEVI-LOAD received some major updates for the AB 2127 Third Assessment:

- The second assessment assumed that charging would be available wherever a vehicle stopped, including at brief stops at locations that may not be suitable for vehicle charging. The model now accounts for location type, stop duration, and the likelihood that charging would be available at each location before determining where a vehicle will charge each day. This accounting better reflects real-world vehicle operations travel and charging needs.
- HEVI-LOAD now considers more potential locations for high-speed public charging. This expansion provides a more complete picture of charging accessibility and better aligns infrastructure projections with charging needs.
- This report identifies a need for three types of charging locations: public access depot, private access depot, and en route, allowing for a more detailed representation of charging behavior.

Charging Infrastructure Classification

HEVI-LOAD considers the following types of charging locations:

- Private access depots: These depots with dedicated charging ports for private fleets offer a mix of charging speeds ranging from 19.2 kW to 1.5 MW. Lower-speed charging ports are suitable for overnight charging and vehicles with smaller batteries, and higher-speed charging ports for vehicles that need to charge between trips. Vehicles from other fleets visiting these locations (for example, for a delivery) may charge here if no public depots are available nearby. Private depot charging is a key use case for early market adoption.
- Public access depots: These depots offer charging at speeds ranging from 150 kW to 1.5 MW. Public access depots provide charging to vehicles without access to a private depot and can offer shared access to serve vehicles from multiple fleets.

- En route charging ports: These charging locations provide rapid charging to vehicles that need to charge between destinations. En-route charging ports offer 350 kW to 1.5 MW charging.

Appendix E provides additional details on the HEVI-LOAD model and scenario development.

Medium- and Heavy-Duty Infrastructure Needs

Similar to the infrastructure scenarios for light-duty EVs, the MDHD EV analysis in this report uses fleet size and composition from the 2025 IEPR. This report includes two scenarios that reflect the uncertainty in MDHD BEV deployment and charging needs that resulted from the withdrawal of incentives to EV adoption and federal challenges to the Advanced Clean Trucks regulation:

- The California Electrification Goals scenario, based on the 2025 IEPR Additional Achievable Transportation Electrification 4 scenario, includes about 93,000 vehicles in 2030 and 320,000 vehicles in 2035. This scenario projects that California will take additional actions that accelerate the deployment of MDHD BEVs by the mid-2030s relative to the Federal Obstacles to EV Adoption scenario.
- The Federal Obstacles to EV Adoption scenario, based on the 2025 IEPR Baseline scenario, includes about 91,000 vehicles in 2030 and 277,000 vehicles in 2035. In this scenario, market forces are expected to be the main driver for the increase in MDHD BEV sales, and deployment will not increase as rapidly in the mid-2030s.

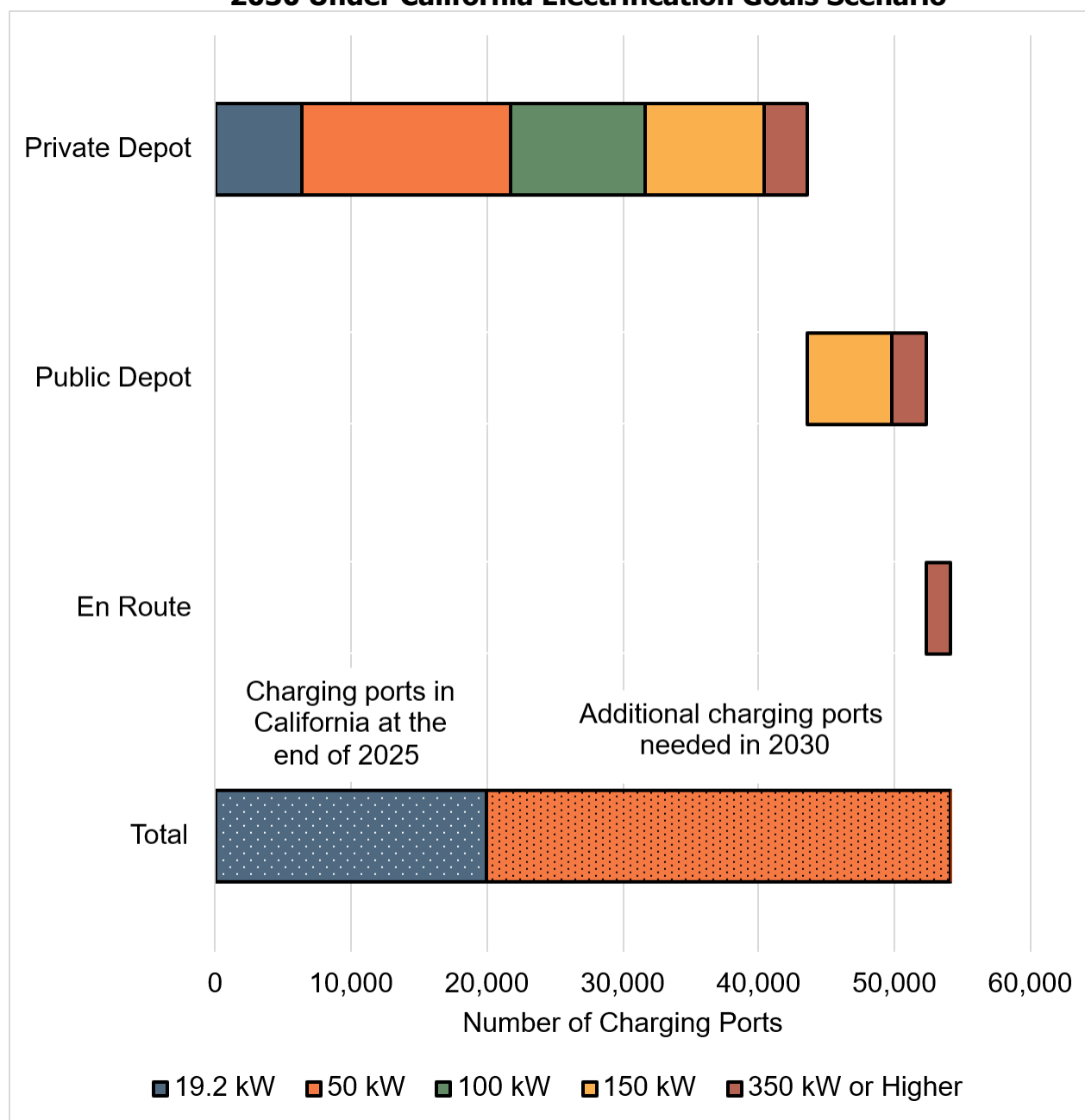
Appendix G provides results for an alternative future scenario considering higher charging port utilization, and a representation of MDHD charging load under the California Electrification Goals scenario.

California Electrification Goals Scenario Results

Under this scenario, models estimate that supporting 93,000 MDHD BEVs will require roughly 54,000 charging ports in 2030. About 43,000 of these charging ports will be needed at private depots, about 9,000 at public depots, and 2,000 at en route locations. Charging at depots, especially private depots, is expected to be the largest segment of use due to convenience, fewer operational restrictions, and a greater ability to control fuel costs through managed charging. Bus-charging ports are assumed to be installed only at private bus depots. In this scenario, the state is 37 percent of the way to meeting the need for MDHD BEV charging in 2030.

Most private depot charging ports are 100 kW or lower, while public depot and en route charging ports are mostly 150 kW and 350 kW, respectively. Most of the charging ports 500 kW or above are 500 kW and 750 kW. Figure 7 shows the number of charging ports needed in 2030 for the California Electrification Goals scenario.

Figure 7: Projected Medium- and Heavy-Duty Charging Infrastructure Needs in 2030 Under California Electrification Goals Scenario



Top three bars show 2030 charging port needs in each charging location, broken down by power level. The bottom bar shows total 2030 port needs in the context of charging ports operational or under development by the end of 2025. In addition to the 20,000 MDHD charging ports already available, 34,000 more will be needed in 2030 to meet the projected total of 54,000.

Source: CEC staff

Federal Obstacles to EV Adoption Scenario Results

This scenario considers a lower EV adoption (2 percent fewer medium-duty vehicles), projecting 1,000 fewer charging ports. Under this scenario, roughly 53,000 charging ports will be needed to serve 91,000 MDHD EVs in 2030. About 43,000 of these charging ports will be needed at private depots. Bus-charging ports are assumed to be installed only at private bus

depots. In this scenario, the state is 37 percent of the way to meeting the need for MDHD BEV charging in 2030.

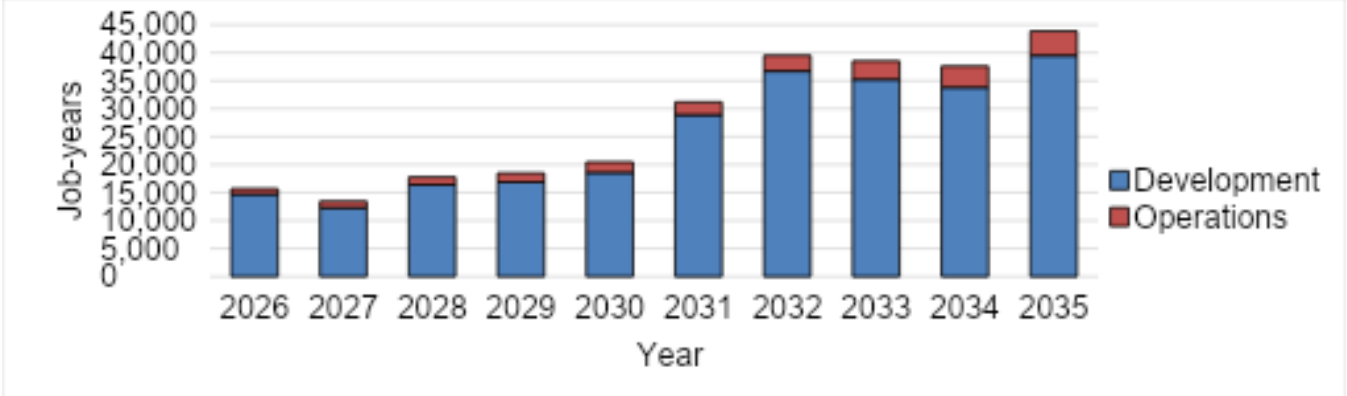
CHAPTER 4:

Labor and Workforce

Equitable labor and workforce training and development to support electric vehicle charging infrastructure deployment are critical to meeting California’s ZEV goals. Senate Bill 589 (Hueso, Chapter 372, Statutes of 2021) requires the CEC to identify workforce resources needed to meet these ZEV and climate goals.

Using Argonne National Laboratory’s JOBS EVSE 2.0 model, an estimated 276,458 job-years will be needed to deploy new charging ports and maintain new and existing charging ports through 2035. This total includes 253,069 job-years for the development¹³ of new charging ports for light-duty and MDHD EVs across all charging location types through 2035 and 23,389 job-years to support operations¹⁴ of existing ports installed as of 2025 and the new charging ports installed through 2035. Figure 8 provides a year-by-year breakdown of charging infrastructure development and operations jobs. Jobs projected in this analysis estimate long-term employment impacts from industry growth and do not equate to labor demand for specific projects or occupations. More details on the labor and workforce needs for charging infrastructure deployment can be found in Appendix H.

Figure 8: Charging Infrastructure Development and Operations Jobs



Source: CEC staff, output from JOBS EVSE 2.0

Identifying workforce trends, challenges, training needs, and gaps between labor market supply and demand is critical to targeting workforce development programs and funds effectively. Specific objectives and activities to build career pathways to support electric vehicle charging infrastructure funded by the Clean Transportation Program can be found in the *Zero-Emission Vehicle Workforce Training and Development Strategy*.¹⁵

13 Infrastructure development includes manufacturing, production, transportation, construction, and installation.

14 Operations includes electricity generation; data and networking; and warranty, maintenance, and administration.

15 McKinny, Jana. June 2024. [Zero-Emission Vehicle Workforce Training and Development Strategy: A Roadmap for Clean Transportation Program Funding](#). California Energy Commission. Publication Number: CEC-600-2024-

CHAPTER 5:

Conclusions

Transportation electrification is key to meeting California’s air pollution reduction and climate change goals. EV adoption is accelerating, and state policies and regulations set the path for transitioning to light-, medium-, and heavy-duty EVs. California will be able to meet its transportation electrification goals with a continued expanded supply of reliable charging infrastructure. This report assesses the amount of charging infrastructure needed to reach the state’s transportation electrification targets and identifies key areas for emphasis:

- California has already made substantial progress towards meeting the charging needs of light-duty EVs. By summer 2026, 224,000 public and limited access charging ports were installed statewide at large multifamily housing, public locations, workplaces, and other sites. Under the California EV Goals scenario, the state is 47 percent of the way to reaching the need for public and limited access L2 and 44 percent of the way to reaching the need for fast chargers in 2030. Under the Federal Obstacles to EV Adoption scenario, the state is 67 percent of the way to reaching the need for public and limited access L2 and 55 percent of the way to reaching the need for fast chargers in 2030.
- Recent data show growing driver usage and charging network provider deployment of DCFC compared to L2, but L2 will continue to play an important role at long-dwell locations. Drivers appreciate charging speed and the availability of DCFC, and charging providers may see a clearer business model for fast charging. DCFC may provide an easier path to meeting the needs of an expanding electric vehicle fleet by 2030 because charging needs can be met by a smaller total number of charging ports, although a smaller number of sites with higher capacity needs may pose challenges to timely energization because of the increased demand to the distribution planning system.
- Most of the medium- and heavy-duty vehicle charging ports will be needed at private depots. These charging sites will be complemented by a robust public network. Most medium- and heavy-duty charging will require DCFCs due to large energy requirements. Slower Level 2 charging makes up a small portion of charging for medium- and heavy-duty vehicles.
- California could reduce grid costs by encouraging infrastructure capable of vehicle-grid integration, which represents the largest source of potential load flexibility. Both the state and industry are making progress on several fronts, but the state must maintain strong efforts as transportation electrification accelerates to leverage this flexibility.
- Meeting California’s charging infrastructure development needs will require a growing number of skilled and well-trained workers in a range of industry sectors, including manufacturing, transportation, engineering, and construction. A robust workforce in power generation and distribution sector, electrical and equipment repair, and IT

software support will also be needed to support charging infrastructure operations. California is well-positioned to build zero-emission transportation career pipelines that provide long-term quality employment and employment opportunities to uplift priority populations.

Glossary

ADVANCED CLEAN CARS II (ACCII) — A regulation on light-duty vehicles adopted by CARB in 2022. ACCII requires an increasing proportion of new passenger vehicle sales to be ZEVs each year, reaching 100 percent in 2035.

ALTERNATING CURRENT (AC) — The flow of electricity that constantly changes direction. Almost all power produced by electric utilities in the United States moves in current that shifts direction at a rate of 60 times per second.

BATTERY-ELECTRIC VEHICLE (BEV) — Also known as an “all-electric” vehicle, BEVs use energy that is stored in rechargeable battery packs. BEVs sustain power through the batteries and therefore must be plugged into an external electricity source to recharge.

BIDIRECTIONAL CHARGING enables a PEV to export energy from the onboard battery to buildings (vehicle-to-building), homes (vehicle-to-home), or to the grid (vehicle-to-grid). When equipped with the appropriate power electronics and electrical switching, bidirectional charging can provide power to a site during a grid outage.

CALIFORNIA AIR RESOURCES BOARD (CARB) — The state's lead air quality agency consisting of an 11-member board appointed by the Governor and more than 1,000 employees. CARB is responsible for attainment and maintenance of the state and federal air quality standards, California climate change programs, and motor vehicle pollution control. It oversees county and regional air pollution management programs.

CALIFORNIA ENERGY COMMISSION (CEC) — The state agency established by the Warren-Alquist State Energy Resources Conservation and Development Act in 1974 (Public Resources Code, Sections 25000 et seq.) responsible for energy policy. The CEC has seven major areas of responsibility:

- Advancing state energy policy.
- Achieving energy efficiency.
- Investing in energy innovation.
- Developing renewable energy.
- Transforming transportation.
- Overseeing energy infrastructure.
- Preparing for energy emergencies.

CALIFORNIA PUBLIC UTILITIES COMMISSION (CPUC) — A state agency created by a California constitutional amendment in 1911 to regulate the rates and services of more than 1,500 privately owned utilities and 20,000 transportation companies. The CPUC is an administrative agency that exercises legislative and judicial powers; its decisions and orders may be appealed only to the California Supreme Court. The major duties of the CPUC are to regulate privately owned utilities, secure adequate service to the public at rates that are just and reasonable to customers and shareholders of the utilities, and oversee electricity transmission lines and natural gas pipelines. The CPUC also provides electricity and natural gas forecasting, analysis, and planning of energy supply and resources. Its headquarters are in San Francisco.

CHARGING PORT — A system that charges one EV. A charging port may have several connectors but can provide power to charge only one EV through one connector at a time.

COMMUTE DESTINATION — The location where a driver parks their vehicle while they are at work. Commute destinations include private-access lots at workplaces, shared public lots in downtowns, and park-and-ride lots at transit stations.

DEPOT CHARGING PORT — A depot charging port is a charging port used by an MDHD vehicle at a location where the vehicle returns overnight or charges after reaching a destination. These charging ports can be provided by the vehicle operator or another party and can be located at private or public access locations. The models in this report estimate depot charging needs at a range of power levels from 19.2 kW to 1.5 MW.

DIRECT CURRENT (DC) — A current of electricity that flows in one direction and is the type of power that comes from a battery.

DOMICILED VEHICLE — Vehicles operating out of a specific base.

ELECTRIC VEHICLE (EV) — A broad category that includes all vehicles that can be fully powered by electricity or an electric motor.

EN ROUTE CHARGING PORT is a charging port used by an MDHD vehicle to rapidly restore range while on a trip, rather than at an existing destination. The models in this report estimate en route charging needs at a range of power levels from 350 kW to 1500 kW.

JOB-YEAR — One year of work for one person; job-years do not account for part-time employment or employees who are serving more than one industry through their occupation.

JOBS EVSE 2.0 — A gross, input-output, economic impact analysis to calculate employment gains associated with charging infrastructure manufacturing, installation, operations, and maintenance developed by the Argonne National Laboratory.

KILOWATT (kW) — One thousand watts, a measure of power. On a hot summer afternoon, a typical home with central air-conditioning and other equipment in use might have a power demand of 4 kW.

KILOWATT-HOUR (kWh) — One kilowatt of electricity supplied for one hour, that is, a measure of energy. It is the most used unit of measure telling the amount of electricity consumed over time.

LABOR — Personal work or service required for the projects such as the construction, installation, operations and maintenance, and end-of-life recycling of charging infrastructure.

LARGE MULTIFAMILY HOUSING — Multifamily housing with at least five units in a structure. This report counts charging infrastructure needs at large multifamily housing separately from charging infrastructure needs at single-family housing and multifamily housing with four or fewer units.

LEVEL 1 (L1) CHARGING — Electric vehicle charging at 120 volts.

LEVEL 2 (L2) CHARGING — Electric vehicle charging at 240 volts.

LIGHT-DUTY VEHICLE (LDV) — A vehicle with a gross vehicle weight rating (GVWR) of 10,000 lbs. or less. Most LDVs are privately owned cars and trucks.

LIMITED ACCESS – when referring to a charger, means a charger that is not a publicly available charger and not residential (1-4 units). Residential limited access means a charger that is at large multifamily housing. Nonresidential limited access refers to a charger that is not publicly available such as at a workplace, a fleet, or other charging location restricted to certain user groups.

LOAD — The amount of energy delivered by the electrical grid at a given time, often measured in MW. The models used in this report estimate the load needed to support EV charging throughout the day.

LOAD FLEXIBILITY refers to the ability of electric customers to shift the electricity consumption of devices, appliances, or other loads in response to electricity prices or other signals. VGI can be viewed as load flexibility applied to vehicle charging.

MEDIUM-/HEAVY-DUTY VEHICLE — A vehicle with a GVWR greater than 10,000 lbs. Most MDHD vehicles are used for commercial purposes. The models in this report consider four categories of MDHD vehicles: LHDVs (vehicles with a GVWR of 10,001–14,000 lbs.), Classes 4–6, Class 7, and Class 8.

PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV) — PHEVs are powered by an internal combustion engine and an electric motor that uses energy stored in a battery. The vehicle can be plugged into an electric power source to charge the battery. Some can travel nearly 100 miles on electricity alone, and all can operate solely on gasoline (like a conventional hybrid).

PRIVATE CHARGING STATION — A private charging station has parking space(s) that are privately owned and operated, often dedicated for a specific driver or vehicle (for example, a charging port installed in the garage of a single-family home).

PUBLIC CHARGING STATION — A public charging station has parking space(s) designated by a property owner or lessee to be available to and accessible by the public for any period.

PUBLIC/LIMITED ACCESS – includes installations at shopping centers, workplaces, large multifamily, fleet yards, hotels, parks, etc.

PUBLIC – when referring to a charger, means a charger and associated parking space or spaces designated, such as by a property owner or lessee, to be available to, and accessible by, the public for any period of time. A charger designated, such as by a property owner or a lessee, to be available only to customers or visitors of the business is a publicly available charger. Chargers and associated parking spaces located in parking garages or gated facilities are considered publicly available if any member of the public can obtain vehicular access to the facility for free or through payment of a fee. If a charger and associated parking space is made available to the public for only limited time periods, that charger and associated parking space is considered a publicly available charger.

A publicly available charger does not include any of the following:

- A workplace charging station if it is clearly marked and operated as available exclusively to the organization's employees or independent contractors.
- A charger and associated parking spaces reserved exclusively to residents, tenants, visitors, or employees of: a private residence or common interest development, or a residential building adjacent to a private residence
- A research charger

TRANSPORTATION ELECTRIFICATION (TE) — The conversion of transportation system from the use of internal combustion engines and liquid fuels to ZEVs, particularly PEVs.

TRANSPORTATION NETWORK COMPANY (TNC) — A company that provides prearranged transportation services for compensation using an online-enabled application or platform (such as smartphone apps) to connect drivers using their personal vehicles with passengers.

VEHICLE-GRID INTEGRATION (VGI) — Various technologies and strategies that alter the time, charging level, or location of charging in a manner that benefits the grid while ensuring driver needs are met. VGI may appear in different forms, including, but not limited to, smart charging, bidirectional charging, automated load management, and integration with local generation or storage.

WORKFORCE TRAINING AND DEVELOPMENT — Support structures, institutions, and resources needed to develop the workforce needed for charging infrastructure deployment.

ZERO-EMISSION VEHICLE (ZEV) — Vehicles that produce no emissions from the onboard source of power (for example, hydrogen fuel cell electric vehicles and battery electric vehicles).