RMI IREC SEAC Sustainable Energy Action Committee

PLANNING AND ZONING GUIDANCE FOR ELECTRIC VEHICLE CHARGER DEPLOYMENT

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under the auspices of
IREC Sustainable Energy Action Committee Electric Vehicle Charging Working Group—Mike Stone, Chair

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ABOUT IREC AND SEAC

The Interstate Renewable Energy Council (IREC) builds the foundation for rapid adoption of clean energy and energy efficiency, toward a 100% clean energy future that is reliable, resilient and equitable. IREC is an independent not-for-profit organization leading transformational work since 1982.

The Sustainable Energy Action Committee facilitates the efficient use of clean, sustainable energy through collaborative development and distribution of codes, standards, and best practices. SEAC membership is open to all, including AHJs, engineers, first responders, suppliers, utilities, and test labs. Join our monthly general meetings, attend one of our 11 working groups, or visit sustainableenergyaction.org to learn more.

ABOUT RMI

RMI is an independent nonprofit that transforms global energy systems through market-driven solutions to align with a 1.5°C future and secure a clean, prosperous, zero-carbon future for all. RMI's Carbon-Free Transportation team identifies and scales transportation system interventions that will catalyze a carbon-free and equitable transportation future. To do this, RMI leverages cutting-edge thought leadership, convening expertise, deep knowledge of the electric transportation space, and data science in collaboration with businesses; local, state, and national governments; regulators; communities; and NGOs.

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CONTENTS

OVERVIEW

Electric vehicle (EV) sales are growing, and the need for EV chargers is burgeoning. This document provides guidance that is based on the practices of leading municipalities to make the local approval process for siting and installation of charging infrastructure clear, predictable, and equitable. A clear and fair approval process reduces the cost and time to install the EV charging infrastructure that residents, businesses, and visitors need. It also helps ensure that charging is available for all who need it.

This document presents practical guidance for municipalities and other Authorities Having Jurisdiction (AHJs) on planning and zoning for the installation of electric vehicle charging stations. It is offered as a resource both for AHJs as they develop and update regulations to facilitate EV chargers in their communities and for private companies that are working with AHJs to install chargers. Broad implementation of these best-practice guidelines will lower the costs and the time required for both AHJ staff and EV charging providers to install this critical infrastructure by creating a clearer, more predictable process. It will also facilitate a fair distribution of chargers throughout communities, serving areas outside those with the highest EV adoption rates, creating an accessible charging network for all who need it.

For context, the federal government is spending $7.5 billion on charging infrastructure through the Bipartisan Infrastructure Law (BIL).[1] All this infrastructure requires local approval. An effective and efficient approval process will bring the environmental and economic benefits of EV more quickly to the U.S.

Local regulatory approval is a key element of local EV readiness, as illustrated in Figure 1. Of the three aspects of local regulatory approval shown in Figure 1, this document focuses on the two that are shaded in red: *Plans, Zoning Ordinances, and Development Regulations* and *The Approval Process*. AHJs require charging equipment permit applicants to adhere to building, electrical, and fire codes and to meet inspection criteria that address

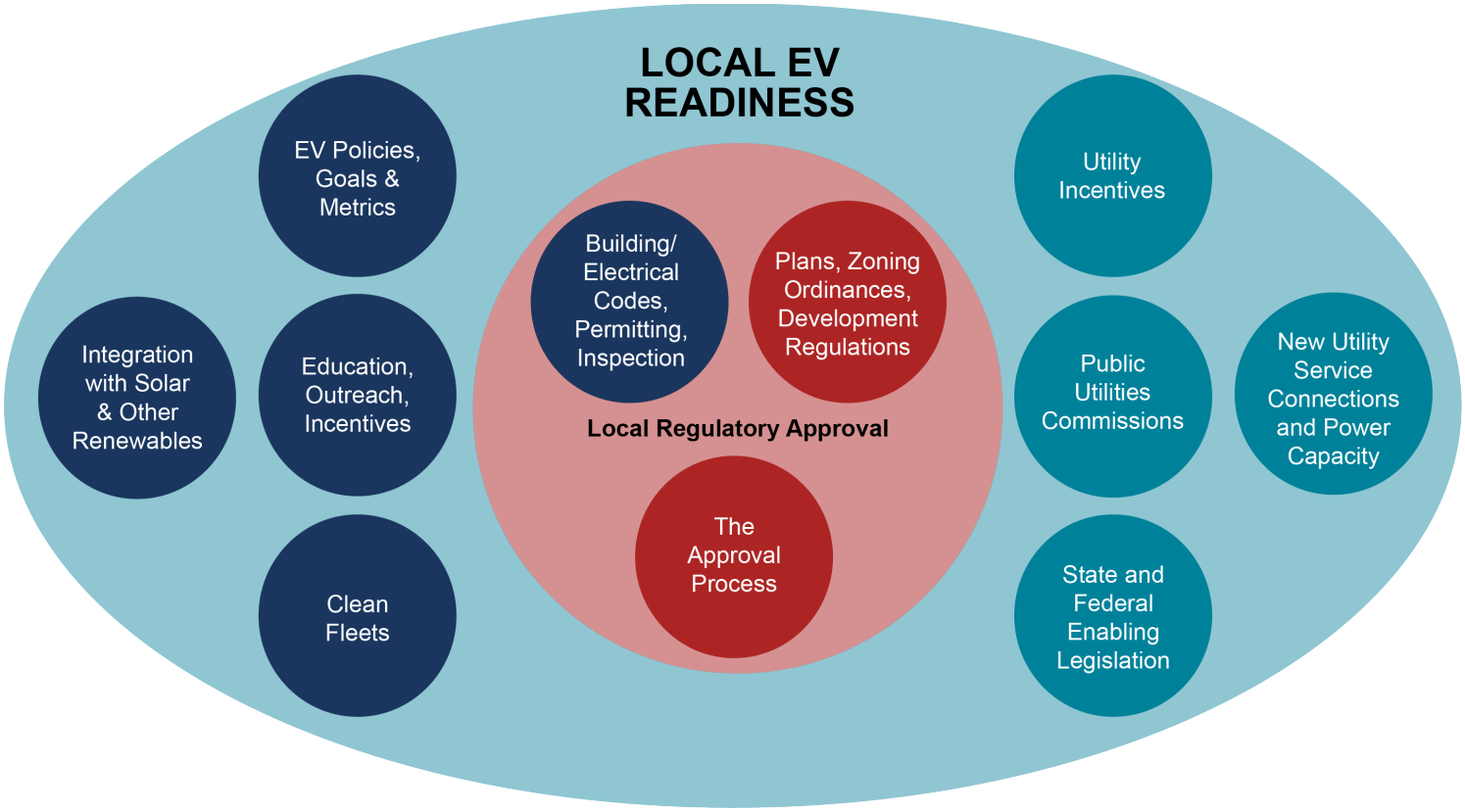


Figure 1. Key Components of Local EV Readiness

1 The BIL established both the $5 billion National Electric Vehicle Infrastructure (NEVI) Formula Program and the $2.5 billion Charging and Fueling Infrastructure (CFI) Discretionary Grant Program. For more information, go to https://driveelectric.gov/states-communities/.

health and safety concerns. These criteria are informed by model codes that are facilitated by entities such as the International Code Council (ICC) and the National Fire Protection Association (NFPA). However, local approval often goes beyond code review to include planning and zoning review for land use, parking, traffic, design, aesthetics, and related issues. This guidance document addresses these issues and other local policies, such as station development in the public right-of-way, that have local planning and zoning implications. It also provides guidance on improving the approval process for permits, including application and review.

HOW WAS THIS GUIDANCE DEVELOPED?

This document was developed by the Planning, Zoning, and Permitting Subcommittee established by the EV Charging Working Group of the Interstate Renewable Energy Council (IREC) Sustainable Energy Action Committee (SEAC).[2] Robert Graff, CC-P, Senior Technical Advisor, Carbon-Free Transportation, RMI, served as the subcommittee chair.[3] Ed Gilliland, AICP, Senior Director of IREC, served as the subcommittee facilitator. On May 4, 2023, SEAC approved this guidance.

Subcommittee members were recruited from the SEAC EV Charging Working Group, the American Planning Association Sustainable Communities Division, national electric vehicle service providers (EVSPs), leading EV policy organizations, and organizations that were recommended by the National Renewable Energy Laboratory (NREL) and others. The subcommittee included members from a wide range of communities, representatives of EV charging companies, representatives of planning and environmental nonprofit organizations, and others. Appendix D lists subcommittee participants.

The Planning, Zoning, and Permitting Subcommittee met monthly from March through December 2022 to identify and to discuss the topics that are addressed herein. These meetings were informed by a thorough literature review that was carried out by staff to identify the best practices of a wide range of municipalities and other AHJs.

Participants discussed these topics in breakout groups and participated in a joint review of their discussions. Staff developed potential guidance based on those meetings and active discussion and on solicitation of comments on drafts of this document from September through December 2022.

The subcommittee released an *Exposure Draft* of this document in February 2023 to elicit comments from a broad group of additional stakeholders to help refine the guidance. The organizations and individuals who generously provided this helpful final round of comments are listed in Appendix E.

Note that the authors endeavored to balance and to incorporate the range of perspectives from the organizations and individuals who participated on the subcommittee or who provided comments as reviewers of the *Exposure Draft.* Their participation does not imply endorsement of the recommendations in this document.

HOW TO USE THIS DOCUMENT

This document is designed to serve the wide range of individuals and organizations in the vehicle electrification ecosystem. The ecosystem includes not only municipal officials and EV charging companies, but also officials from the many state, regional, and county agencies and the utilities that are involved in planning for and funding this critical infrastructure. As such, it is written for stakeholders who have various degrees of knowledge about EVs, EV charging, and the local regulatory approval process.

The document opens with a discussion about the importance of using best-practice guidance to inform local regulatory approval for installation of EV chargers. This section is followed by a brief discussion on the key characteristics of EVs and EV chargers and an overview of the local regulatory approval process.

The section on regulatory requirements guidance for EV chargers covers the following topics:

- Planning documents
- EV charger zoning and permitted accessory use

2 To learn more about IREC, visit https://irecusa.org. To learn more about SEAC, visit https://sustainableenergyaction.org.
3 To learn more about RMI, visit https://rmi.org.

- Parking requirements—parking count, charger accessibility, and EV charger readiness
- Design, aesthetics, and equipment location
- On-street charging

Each topic provides:

- An overview of the challenges that are currently faced by both local regulators and EVSPs
- A set of recommendations to overcome these challenges that will provide predictability and transparency for EVSPs, as well as flexibility to address community concerns and EV aspirations
- Additional discussion of the topic
- Relevant language from existing ordinances and full source citations and links to facilitate creation of local ordinances

The Approval Process Guidance section provides recommendations for how the application and approval review processes can be made more predictable and transparent.

The document concludes with a short section on other considerations for local jurisdictions that are preparing for EVs. This section is followed by appendices that contain additional information as referred to in the document.

A FLEXIBLE APPROACH

There are roughly 23,000 AHJs in the U.S., with varying degrees of local autonomy, size, technical ability, anticipated uptake of EVs, and relative need for public charging. To enable this document to be relevant to a wide range of AHJs, it presents a variety of recommendations to allow each AHJ to establish requirements that are appropriate for its community. It also helps ensure that the regulatory structure in each AHJ will be composed of common elements to provide predictability for EVSPs.

Key terms and acronyms that are used in this document are defined starting on page 52.

WHY IS THIS DOCUMENT NEEDED?

THE CURRENT PROCESS TO APPROVE EV CHARGERS NEEDS FIXING

Electric vehicle (EV) sales are growing, and the need for EV chargers is burgeoning. Successfully providing these vehicles with sufficient charging requires a clear and predictable local approval process for siting and installation of charging infrastructure. This approach will reduce the cost and time to install the EV charging infrastructure that residents, businesses, and visitors need. It is particularly important now to help ensure the success of the large federal investments to provide infrastructure where it is needed in an equitable manner.

Building, fire, electrical, and other construction codes generally provide clear guidance and requirements to municipalities and to electric vehicle service providers (EVSPs) for safe, reliable, and code-compliant installation and siting of EV chargers. However, local zoning and other development requirements are not generally written to accommodate relatively new vehicle charging infrastructure. Clearly articulated local guidance can reduce the time and number of municipal parties, such as both a zoning board and planning staff, that need to be involved, resulting in a more effective and efficient process and reducing the load on municipal staff members. For Authorities Having Jurisdiction (AHJs), the opportunity cost that is associated with delay of EV charging projects is great and may hinder achievement of local and regional EV goals. For EVSPs, delays may cause hesitancy to work in certain jurisdictions and could even render projects infeasible.

A PROCESS THAT NEEDS IMPROVEMENT

One major EVSP reported a wide range of permitting experiences across AHJs. For 924 permitted projects, 25% were permitted in less than 5 weeks. These projects were in the jurisdictions that (a) permit projects administratively or (b) had a very efficient review that likely included a single round of comments and feedback, if any.

The median time frame for project permitting was 51 business days—easily more than 2 months. With best practices in place, that time should be able to be reduced to 35 days or less.

The third quartile of permitting time frames was 95 business days, or well over 4 months. At the highest end, there are projects that have been stuck in permitting for over a year.

This EVSP expressed hope that this best-practice guidance will have the dual impacts of:

- Reducing the median permitting time frame, and
- Preventing the types of processes that result in permitting delays of several months to more than a year.

EVs ARE HERE, AND MORE ARE COMING

EVs are the most rapidly growing sector of U.S. light-duty vehicle sales. Between 2021 and 2022, U.S. sales of fully electric vehicles grew by 65%, to more than 800,000 vehicles. In 2022, 5.8% of all passenger vehicle sales were EVs, almost doubling in 1 year, while total auto sales decreased by 8%.[4] Demand for EVs is increasing, as drivers recognize their comfort, environmental and public health benefits, convenience in charging mostly at home, and low operating and maintenance costs. Of course, for those not able to charge at home, charging can be a challenge. Alleviating this challenge is a key goal of this guidance: to accelerate the installation of chargers for those who are not able to charge at home.

The overall lifetime cost of purchasing, operating, and maintaining an EV in some markets is now lower than for comparable gasoline vehicles.[5] EV sales forecast for 2030 range from 26 million to 48 million, as lower-priced

4 Mike Colias, *U.S. EV Sales Jolted Higher in 2022 as Newcomers Target Tesla*, Wall Street Journal (Jan. 6, 2023), https://www.wsj.com/articles/u-s-ev-sales-jolted-higher-in-2022-as-newcomers-target-tesla-11672981834.

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

EVs, including used EVs, continue to enter the market.[6,7] BloombergNEF projects that the 2022 federal Inflation Reduction Act has put the U.S. on track to have 52% of new passenger vehicle sales be battery electric, plug-in hybrid, or fuel cell–powered by 2030.[8]

EVs also deliver considerable public and environmental benefits,[9] because they do not produce tailpipe emissions. This benefit helps reduce ground-level air pollution, protecting residents' health and reducing greenhouse gas (GHG) emissions. Although EVs are responsible for emissions associated with generating the electricity that they use, those emissions are much lower than from comparable internal combustion engine (ICE) vehicles and continue to decline as the electric grid becomes cleaner.[10] The U.S. Department of Energy notes that a typical gasoline car emits more than 4 times as much carbon dioxide per mile than does an all-electric vehicle that is charged by using the average U.S. mix of electricity generation.[11,12]

In addition to federal goals,[13] many states, counties, and municipalities have strong climate and other air quality goals (e.g., ozone or particulate matter) that include increasing the number of EVs. All but 3 states offer incentives for electric or hybrid vehicles,[14] and 24 states plus the District of Columbia have adopted specific GHG reduction targets to address climate change.[15] As discussed in the next section, meeting these goals will require a significant increase in the number of charging stations, primarily at the workplace and at homes, but also available to the public at large. Planning for an EV future is critical for municipalities to serve the needs of their residents, businesses, and visitors. It is not an issue simply for local governments that have state climate goals; it is a key element of economic development.

EV CHARGING INFRASTRUCTURE IS CRITICAL

The single biggest local government consideration for an EV future is planning for equitable deployment of the chargers that are required to support the anticipated growth of EVs in our communities.

The energy that is stored in EV batteries is replenished by connecting the batteries to a charger. Because batteries charge significantly more slowly than gasoline tanks can be filled, EVs are generally charged while they are parked unattended. For those EV owners with a dedicated off-street place to park at their residence, this charging primarily takes place at home, usually overnight with a standard 120-volt (120 V) or 240 V outlet or a hardwired charger in the garage or near the driveway. Local jurisdictions generally make it easy for residents to install home charging stations, simply ensuring that it complies with the electrical code.

Importantly, however, renters or residents without dedicated off-street parking and residents of multi-unit buildings are likely to have more difficulty in finding convenient and affordable places to charge. In addition, employees or customers of local businesses and tourists may need to charge their EVs to travel back home,

6 Gordon Bauer et al., *Charging Up America: Assessing the Growing Need for U.S. Charging Infrastructure Through 2030*, International Council on Clean Transportation (ICCT) White Paper (July 2021), https://theicct.org/wp-content/uploads/2021/12/charging-up-america-jul2021.pdf ("ICCT Charging Up America").

7 Philipp Kampshoff et al., *Building the Electric-Vehicle Charging Infrastructure America Needs*, McKinsey & Company (April 18, 2022), https://www.mckinsey.com/industries/public-and-social-sector/our-insights/building-the-electric-vehicle-charging-infrastructure-america-needs ("McKinsey & Company Building the EV").

8 Ira Boudway, *More Than Half of US Car Sales Will Be Electric* by 2030, Bloomberg (Sept. 20, 2022), https://www.bloomberg.com/news/articles/2022-09-20/more-than-half-of-us-car-sales-will-be-electric-by-2030#xj4y7vzkg.

9 Note that because state and federal gasoline taxes fund government transportation investments, EVs reduce those funds while still getting the full benefits of road usage. Some states have implemented other fees for EVs, and many are looking to move to a mileage-based user fee to ensure that transportation departments do not lose funding because of EV growth. In addition, like ICE vehicles, EVs cause congestion, require space to park, and can get into crashes.

10 Information about EV emissions that are associated with electricity generation can be found at https://afdc.energy.gov/vehicles/electric_emissions.html.

11 U.S. Department of Energy Alternative Fuels Data Center (AFDC), *Emissions from Electric Vehicles*, https://afdc.energy.gov/vehicles/electric_emissions.html.

12 Union of Concerned Scientists, *State Electric Vehicle Benefits* (April 8, 2019), https://www.ucsusa.org/resources/state-electric-vehicle-benefits.

13 U.S. Environmental Protection Agency (EPA), *Climate Change*, https://www.epa.gov/climate-change.

14 Austin Igleheart, *State Policies Promoting Hybrid and Electric Vehicles*, National Conference of State Legislatures (April 26, 2022), https://www.ncsl.org/energy/state-policies-promoting-hybrid-and-electric-vehicles.

15 Center for Climate and Energy Solutions, *State Climate Policy Maps*, https://www.c2es.org/content/state-climate-policy/.

particularly if they have traveled long distances. Workplace charging can be a viable option for drivers who lack off-street parking at home. Even those with home chargers need public charging on those occasions when their home chargers are not available or when they are traveling longer distances, such as for intercity travel or travel in rural areas.

According to experts, supporting the number of private passenger EVs expected in 2030 will require 18 million to 28 million home chargers, over 1 million public chargers, and between 550,000 and 1.2 million workplace chargers.[16] In 2019, the International Council on Clean Transportation (ICCT) reported that of the 100 most populous U.S. metropolitan areas, 88 had less than half of the needed charging infrastructure in place for 2025 based on expected EV growth.[17] As of 2021, in the U.S. there were about 1.3 million home chargers, fewer than 200,000 public chargers, and about 100,000 workplace chargers installed.[18] Figure 2 illustrates the growth in installations that is required to meet this demand—an annual growth in installations of just under 30%.[19]

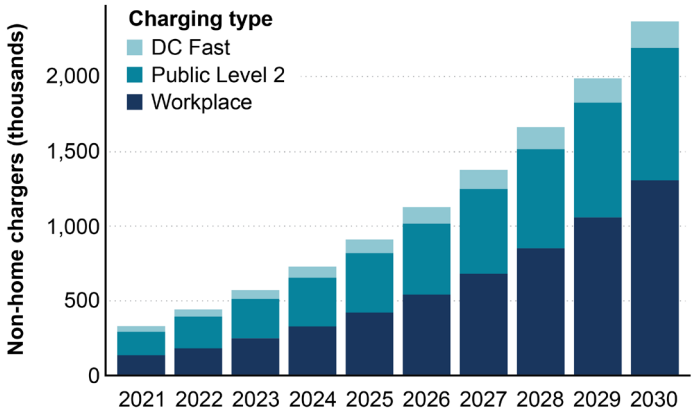


Figure 2. Non-Home Charging Infrastructure That Is Needed to Support the U.S. EV Market Through 2030

To achieve the required level of growth in charger installations, municipalities and EVSPs need transparent and predictable requirements for charger installation and a straightforward approval process. This transparency and predictability will make it simpler and less expensive for this critical infrastructure to be installed, which should result in more chargers, increasing availability and lowering prices.

The National Electric Vehicle Infrastructure (NEVI) Formula Program,[20] a provision of the 2021 Bipartisan Infrastructure Law (BIL), provided all 50 states, the District of Columbia, and Puerto Rico with $5 billion of funding to develop and to deploy plans to establish a network of EV chargers along designated alternative fuel corridors. The BIL established the Joint Office of Energy and Transportation[21] to facilitate collaboration between the U.S. Department of Energy and the U.S. Department of Transportation and to manage the NEVI program. All 50 states, the District of Columbia, and Puerto Rico submitted plans that were approved by the Joint Office in fall 2022.

The BIL also established an additional $2.5 billion Charging and Fueling Infrastructure (CFI) Discretionary Grant Program to provide grants to develop additional EV charging infrastructure where people live and work.[22] Funds associated with these programs generally will be administered by state Departments of Transportation, often in coordination with regional organizations as discussed previously.

One goal of developing this best-practice guidance is to assist in smoothing the permitting process for installation of chargers that are funded under these programs.

EQUITABLE DEPLOYMENT OF EV CHARGERS

Ensuring that the benefits and impacts of EV charger installation are shared equitably within a community is important.

Equitable deployment of EV charging infrastructure begins at the planning stage. When writing plans regarding where EV charging infrastructure must be located, it is essential for municipal, regional, and state officials to consider a

16 See McKinsey & Company Building the EV, and ICCT Charging Up America.
17 Michael Nicholas et al., *Quantifying the Electric Vehicle Charging Infrastructure Gap Across U.S. Markets*, ICCT White Paper (Jan. 23, 2019), https://theicct.org/wp-content/uploads/2021/06/US_charging_Gap_20190124.pdf.
18 McKinsey & Company Building the EV.
19 ICCT Charging Up America.
20 U.S. Department of Transportation Federal Highway Administration, *National Electric Vehicle Infrastructure Formula Program*, Fact Sheets, https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nevi_formula_program.cfm.
21 For more information, go to the Joint Office of Energy and Transportation website, https://driveelectric.gov/.
22 U.S. Department of Transportation Federal Highway Administration, *Charging and Fueling Infrastructure Discretionary Grant Program*, https://www.fhwa.dot.gov/environment/cfi/.

PLANNING EQUITABLE CHARGER DISTRIBUTION

The economic logic of charging deployment is simple: Follow the EVs. By placing chargers close to where EVs currently drive to and from, chargers are more likely to capture revenue and make money for their owners. As RMI showed in its report *EV Charging for All*,* this approach leads to a distribution of chargers that is largely clustered around the homes and workplaces of current (wealthy) EV owners. To enable increased EV ownership by low- and middle-income individuals—who often do not have a garage or off-street parking where they can place a privately owned charger—a different approach is required. In these cases, an EV charger is not purely an asset that is seeking out a superior financial return. It is a piece of critical infrastructure that enables mobility, connectivity, and economic activity—more like a road or a bridge. Planners must design these parts of the network as they do all other critical public infrastructure: with an eye toward the provision of basic services to all residents.

** Edward J. Klock-McCook et al., EV Charging for All (June 2021), https://rmi.org/insight/ev-charging-for-all/.*

wide range of issues, including the following, to ensure equitable deployment:

- Baseline air quality in the area that will be served by the proposed chargers
- Impact of transportation electrification on local air quality
- Other local environmental and health impacts of transportation electrification (e.g., noise and safety)
- Community concerns regarding potential increases in local property values and rents and changes in development patterns, especially in the context of displacement of the members of historically underserved communities
- Impacts on curb access and parking for residents
- Opportunities to tie EV charger deployment with other recognized community mobility needs, such as improved transit, cycling facilities, sidewalks, and crosswalks
- Placement of charging infrastructure where it best serves the community, rather than the EVSP

Including community members from impacted neighborhoods and historically underserved communities is a critical component of the EV charging infrastructure planning process—as it is for any municipal plan development.

THE VALUE OF BEST-PRACTICE GUIDANCE

Best-practice guidance for municipal planning, zoning, and permitting for EV chargers provides significant benefits for municipalities and for EVSPs. Without such guidance, each municipality (or other AHJ) must spend time learning about EVs and reflecting on their community needs regarding issues such as parking, aesthetics, Americans with Disabilities Act (ADA) accessibility, and review processes—resulting in costly delays and significant staff time requirements for both AHJs and EVSPs. The extra time required can slow and make more expensive the installation of EV chargers that residents and visitors need to operate their EVs confidently.

A predictable and transparent local approval process that is based on best-practice guidance can help attract station developer investment and spur charging-station growth. As multiple municipalities base their local regulations on this best-practice guidance, EVSPs will find it much easier to prepare for and to meet local requirements, saving them a tremendous amount of time, frustration, and staff cost.

STATE PREEMPTION

State preemption of local authority occurs when a state law limits or eliminates the power of a lower level of government to regulate a specific issue. State preemption of local regulations related to EV charging is being actively pursued by some policy advocates to standardize local regulations. State preemption of local government authority to regulate EVs has occurred in California[23] and in New Jersey.[24] In these states, all municipalities must

23 California Legislature, *AB-1236 Local Ordinances: Electric Vehicle Charging Stations* (approved Oct. 8, 2015), California Legislative Information, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB1236, and *AB-970 Planning and Zoning: Electric Vehicle Charging Stations* (approved Oct. 8, 2021), California Legislative Information, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB970 ("California AB 970").

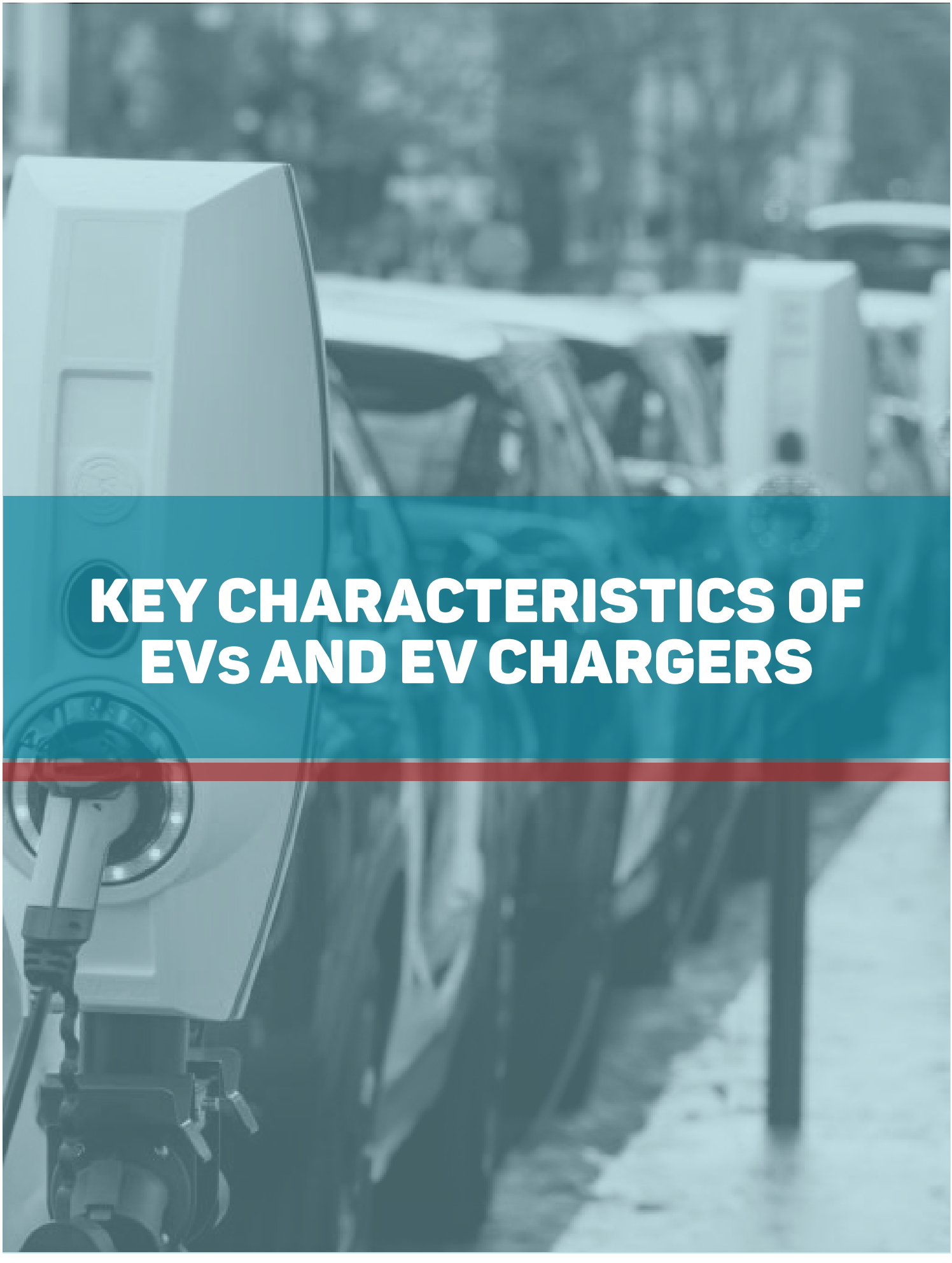
24 State of New Jersey, *New Jersey P.L. 2021*, Chapter 171, https://pub.njleg.gov/bills/2020/PL21/171_.HTM.

have in place ordinances for permitting EV chargers that comply with state regulations.

State preemption of local authority is an important dynamic in the state-local relationship that goes beyond EV charging regulations. Historically, state preemption has touched on many issues, including firearms, rent control, paid leave, and public heath responses (e.g., with COVID-19). An in-depth discussion of state preemption is beyond the scope of this work.[25] However, it should be noted that state preemption related to EV charging is not always in support of EV charger installation. In Florida, for example, state law prohibits AHJs from requiring gasoline stations to install EV chargers.[26] In some states, municipalities have limited the targets and purview of local EV readiness ordinances out of concern that more ambitious ordinances might fall victim to preemption.

25 An overview of preemption can be found in ChangeLab Solutions, *Fundamentals of Preemption* (June 2019), https://www.changelabsolutions.org/product/understanding-preemption, and in Christiana McFarland, Exploring the Impacts of Preemption, National League of Cities, https://www.nlc.org/article/2021/11/02/exploring-the-impacts-of-preemption/ (accessed on 11/2/2022).

26 The Florida Senate, CS/CS/HB 839: *Express Preemption of Fuel Retailers and Related Transportation Infrastructure* (effective June 16, 2021), https://www.flsenate.gov/Session/Bill/2021/839/BillText/er/PDF.



KEY CHARACTERISTICS OF EVs AND EV CHARGERS

This section is primarily for readers who may be unfamiliar with the key attributes of EVs and EV chargers.

HOW DO EVs DIFFER FROM TRADITIONAL VEHICLES?

EVs operate on the road like traditional gasoline vehicles do, but they use electric motors rather than gasoline engines. Rather than carrying energy as a liquid in a tank, an EV carries energy as electricity in a battery. The battery is charged by plugging the car into a charger, which can be as simple as a standard 120 V outlet or be a sophisticated, specialized piece of electrical equipment. From an operator's standpoint, EVs tend to have higher acceleration, run more quietly than gasoline vehicles, and are significantly less expensive to operate and to maintain than their gasoline counterparts are.[27]

WHAT KINDS OF EVs ARE THERE?

Electric motors in vehicles can be used to fully replace an ICE or to supplement it. EVs fall along a wide spectrum of electrification.[28] This document focuses on the following types of EVs:

- All-electric vehicles, referred to as "EVs" or "battery electric vehicles" (BEVs), run only on electricity from a rechargeable onboard battery. They use no gasoline. New BEVs have batteries that are large enough to provide a typical range of about 250 miles,[29] with several providing over 300 miles on full batteries. **The EV chargers that are discussed in this document are primarily used by BEVs.**
- A plug-in hybrid electric vehicle (PHEV) has both an electric drive and an ICE. A PHEV usually has a battery that is able to handle a typical day's drive (under 40 miles) on electricity and shifts seamlessly to gasoline when the battery is depleted. PHEVs produce tailpipe emissions when their ICE is running. PHEVs also use EV chargers, but because of their ICE engines, they use public chargers less often than BEVs do.

BEVs and PHEVs are sometimes referred to as "plug-in electric vehicles" (PEVs) or simply as "EVs." For simplicity, this document uses the term "EVs" for both BEVs and PHEVs.

HOW ARE EVs CHARGED?

Charging a battery is fundamentally different from fueling a car with gasoline. Gasoline fueling is carried out by pumping liquid gasoline into a tank in the vehicle, which—when full—allows the typical gasoline vehicle to travel just over 400 miles.[30] Although fueling takes only a few minutes, it must be done at a gasoline filling station.

A battery produces electricity through a controlled chemical reaction in the battery. When that chemical reaction is completed, the battery is depleted. Recharging the battery by connecting it to a battery charger reverses the chemical reaction in a highly controlled manner, allowing the battery to begin producing electricity again. Modern BEV batteries can be recharged many, many times and are required by federal law to have a minimum warranty of 8 years or 100,000 miles.[31] A fully charged battery allows the typical EV in the U.S. to travel 234 miles.[32] An EV battery charges faster with a higher-powered charger, as discussed later in this section.

Unlike gasoline-powered-car owners, in the *ideal* EV world, EV owners would generally recharge their vehicle at a place where they are carrying out another activity, such as while at home, at work, shopping, visiting a park, or at other typical car destinations. The use of specialized high-speed charging locations would be limited to special

27 Roberto Baldwin et al., *EV vs. Gas: Which Cars Are Cheaper to Own?*, Car and Driver (Oct. 28, 2022), https://www.caranddriver.com/shopping-advice/a32494027/ev-vs-gas-cheaper-to-own/.

28 Electric bicycles (e-bikes), scooters, and similar small EVs are not addressed in this document. Fuel cell electric vehicles (FCEVs) also use only electric motors to turn the wheels, with the power provided by a hydrogen fuel cell. Hydrogen is stored in a tank that is refilled at a hydrogen fueling station. FCEVs are not addressed in this document. Also not addressed are hybrid electric vehicles (HEVs) which have a battery-powered electric motor to help the vehicles' ICEs to improve fuel efficiency. HEVs do not use chargers because their batteries are charged by regenerative braking.

29 The median EPA-estimated range for all EV models that were offered in the 2021 model year was 234 miles. From U.S. Department of Energy Vehicle Technologies Office (VTO), *FOTW #1221, January 17, 2022: Model Year 2021 All-Electric Vehicles Had a Median Driving Range About 60% That of Gasoline Powered Vehicles* (Jan. 17, 2022), https://www.energy.gov/eere/vehicles/articles/fotw-1221-january-17-2022-model-year-2021-all-electric-vehicles-had-median ("VTO FOTW #1221").

30 VTO FOTW #1221.

31 California requires a minimum warranty of 10 years or 150,000 miles

32 VTO FOTW #1221

occasions such as long intercity trips or unanticipated needs. In this scenario, when chargers are available where they are needed, EV charging typically takes less of a *driver's* time than fueling with gasoline does, because the driver can leave the vehicle charging and carry out other tasks. The driver parks their car without having to deviate from their planned route and plugs in their vehicle regularly. With readily available charging, an EV can be charged long before the battery is drained. This is easy to do for those who charge their EVs overnight at home or during the day at work. Because people drive 40 miles or less on a typical day, this charging practice often leaves an EV with its full range available at the start of every day.

However, charging an EV can be more challenging for those who are not able to charge at work or at home, such as renters, people without a dedicated off-street parking place, or those living in multi-unit dwellings. Ensuring that these EV owners have access to a reliable, affordable, and convenient source of charging is critical to a successful transition to broad adoption of EVs.

The speed of charging depends on the type of charger that is used and the vehicle that is being charged. A battery's capacity is measured in kilowatt-hours (kWh). A light-duty EV typically travels about 3 miles on 1 kWh of electricity. Thus, a vehicle needs about 13 kWh of charging to go the typical 40 miles of daily travel.

There are three basic categories of EV chargers,[33] based on the maximum amount of electric power, measured in kilowatts (kW), that the charger provides to the vehicle:[34]

- **Level 1 (AC)** 1 kW to 2 kW: Uses a common residential 120 V alternating current (AC) outlet and connects to the charging cord that is supplied by the vehicle manufacturer. Level 1 delivers about 5 miles of range per hour of charging and is used in homes and occasionally at workplaces. Many EV owners find Level 1 charging adequate to ensure that their vehicle is fully charged daily if they plug in overnight or during their workday. Level 1 charging provides between 1 kW and 2 kW of power, about the same as a blow-dryer uses. Forty miles of distance can be added to a vehicle in 6 to 12 hours.
- **Level 2 (AC)** 7 kW to 19 kW: Provides charging through a 240 V (for residential) or 208 V (for commercial) plug or hardwiring and usually requires installation of additional charging equipment. Residential Level 2 charging generally delivers about 7 kW of power (about the same as an electric stove with all the burners and the oven on). Commercial Level 2 chargers deliver about 19 kW, or about what is recommended for a home electric generator. Level 2 chargers deliver 10 to 50 miles of range per hour of charging. Used in homes, workplaces, and for most public charging, 40 miles of distance can be added to a vehicle in 40 minutes to 2 hours.
- **Direct Current fast chargers (DCFCs)** 50 kW+: Sometimes referred to as "Level 3 chargers," DCFCs use specialized, high-powered equipment that typically requires 480 V three-phase AC power. The upper range of DCFCs has been increasing, with some chargers providing 350 kW or more. Depending on the charger's power, the EV's power acceptance limit, and other factors, DCFCs can deliver from 60 to over 200 miles of range in 20 minutes. DCFCs enable rapid charging for long-distance trips and for charging large trucks. DCFCs cost more than Level 1 and Level 2 charging do, so many drivers limit their use of them to times when the speed of charging is important (e.g., for long-distance travel, high-value driving such as for transportation network companies [TNCs] like Uber or Lyft, or other delivery services).[35] Most new EVs can use DCFCs; however, not all can use the highest-power DCFCs. Larger or more powerful DCFC installations may require additional electrical equipment to be installed outside the parking area, remote from the charger itself.

33 Technically, Level 1 and Level 2 EV supply equipment (EVSE) supplies AC electricity to an onboard vehicle charger that converts it to DC electricity. DC fast chargers (DCFCs) provide DC current directly to the battery, bypassing the onboard charger.

34 U.S. Department of Energy AFDC, *Developing Infrastructure to Charge Electric Vehicles*, https://afdc.energy.gov/fuels/electricity_infrastructure.html ("AFDC Developing Infrastructure").

35 Research by RMI indicates that many TNC drivers live in areas with little access to private chargers at night and, therefore, rely heavily on public DCFCs. The careful siting of DCFCs can facilitate the transition of these high-mileage vehicles from internal combustion vehicles to EVs. From Edward J. Klock-McCook et al., *EV Charging for All,* RMI (June 2021), https://rmi.org/insight/ev-charging-for-all/.

The four charging connectors that are used in the U.S. are shown in Figure 3. In the U.S., 96% of EVs can use one of two types of connectors to charge at all levels:[36]

- The Combined Charging System (CCS) connector can be used by almost all EVs that are sold in the U.S.[37]
- The Tesla connector, branded as the North American Charging Standard (NACS), can be used by all Tesla vehicles.[38] Other vehicles can use some of Tesla's Level 2 Destination Chargers by using an adapter. Just prior to the publication of this document, Ford[39], GM[40], and Rivian[41] announced agreements with Tesla that will allow their EVs to charge at Tesla's DCFC ("Supercharger") network starting in 2024. In addition, Tesla has announced plans to open their network to other vehicles.[42] As of the publication date (late August 2023), access to the Tesla Supercharger network is evolving rapidly.

Two other charging standards are also present in the market:

- All EVs that are sold in the U.S. can use the SAE J1772 connector to charge at Level 1 and Level 2 only.[43]
- The CHAdeMO[44] connector is an international standard for DCFC charging that is widely used in Japan. It has been largely superseded by CCS on Japanese EVs that are sold in the U.S.[45]

WHAT DO MUNICIPAL OFFICIALS NEED TO KNOW TO REGULATE EV CHARGERS?

EV chargers are simply electrical appliances that are sited where cars park. They are listed by Nationally Recognized Testing Laboratories, such as UL Solutions (formerly Underwriters Laboratories), and their safe installation is covered by the *National Electrical Code*®, as well as by applicable state electrical codes that are adopted

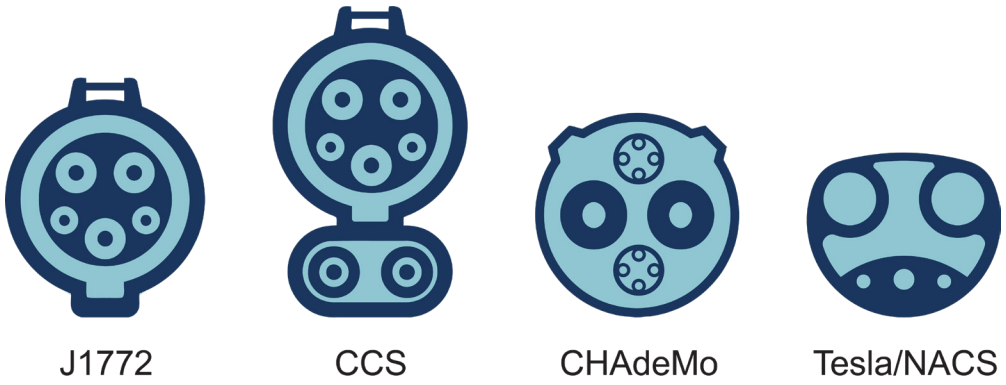


Figure 3. The Four EV Charging Connectors That Are Used in the U.S.[46]

36 This section is drawn from Joni Finkle, *Can I Use Any Charger System With My EV?,* Kelly Blue Book (June 2, 2022, 4 p.m.), https://www.kbb.com/car-advice/what-charger-for-ev/. The CHAdeMO connector comprises the remaining 4%. The connector illustrations are from AFDC Developing Infrastructure.
37 An adapter is required for Tesla vehicles and some older models of other vehicles.
38 Note that Tesla manufactures a J1772 version of its Wall Connector that can be purchased by anyone.
39 Jay Ramey, Autoweek. "Here's When Ford EVs Can Start Using Tesla Chargers". May 30, 2023. https://www.autoweek.com/news/green-cars/a44037218/ford-ev-tesla-supercharger-network-adapter/.
40 Jay Ramey, Autoweek. "GM EVs Will Get To Use Tesla Superchargers". June 9, 2023. https://www.autoweek.com/news/green-cars/a44155118/gm-tesla-supercharger-network-nacs-station-adapter/.
41 Jay Ramey, Autoweek."Rivian Is The Latest To Adopt Tesla NACS Connector". June 21, 2023. https://www.autoweek.com/news/green-cars/a44282390/rivian-tesla-supercharger-nacs-connector/.
42 At the time of publication, the Tesla Supercharger and Destination Charging network were accessible only to Tesla drivers, although the company announced plans in February 2023 to open at least 7,500 chargers in its U.S. Supercharger and Destination Charger network to non-Tesla EVs by the end of 2024. A very limited number were open by April 2023. This is in addition to the announcements made regarding Ford, GM, and Rivian vehicles noted in this paragraph. In addition, Nissan, Mercedes, and Volvo announced agreements with Tesla similar to those by Ford, GM, and Rivian.
43 Tesla provides an adapter that allows Tesla owners to use J1772 connectors.
44 "CHAdeMO" is an abbreviation of "CHArge de MOve," which is equivalent to "charge for moving." It is a pun on "O cha demo ikaga desuka" in Japanese, which means "Let's have a cup of tea while charging." From CHAdeMO, FAQ, https://www.chademo.com/faq.
45 The Mitsubishi Outlander PHEV and the Nissan LEAF are the only EVs for sale in North America that are equipped with CHAdeMO.
46 The connector illustrations are from AFDC Developing Infrastructure.

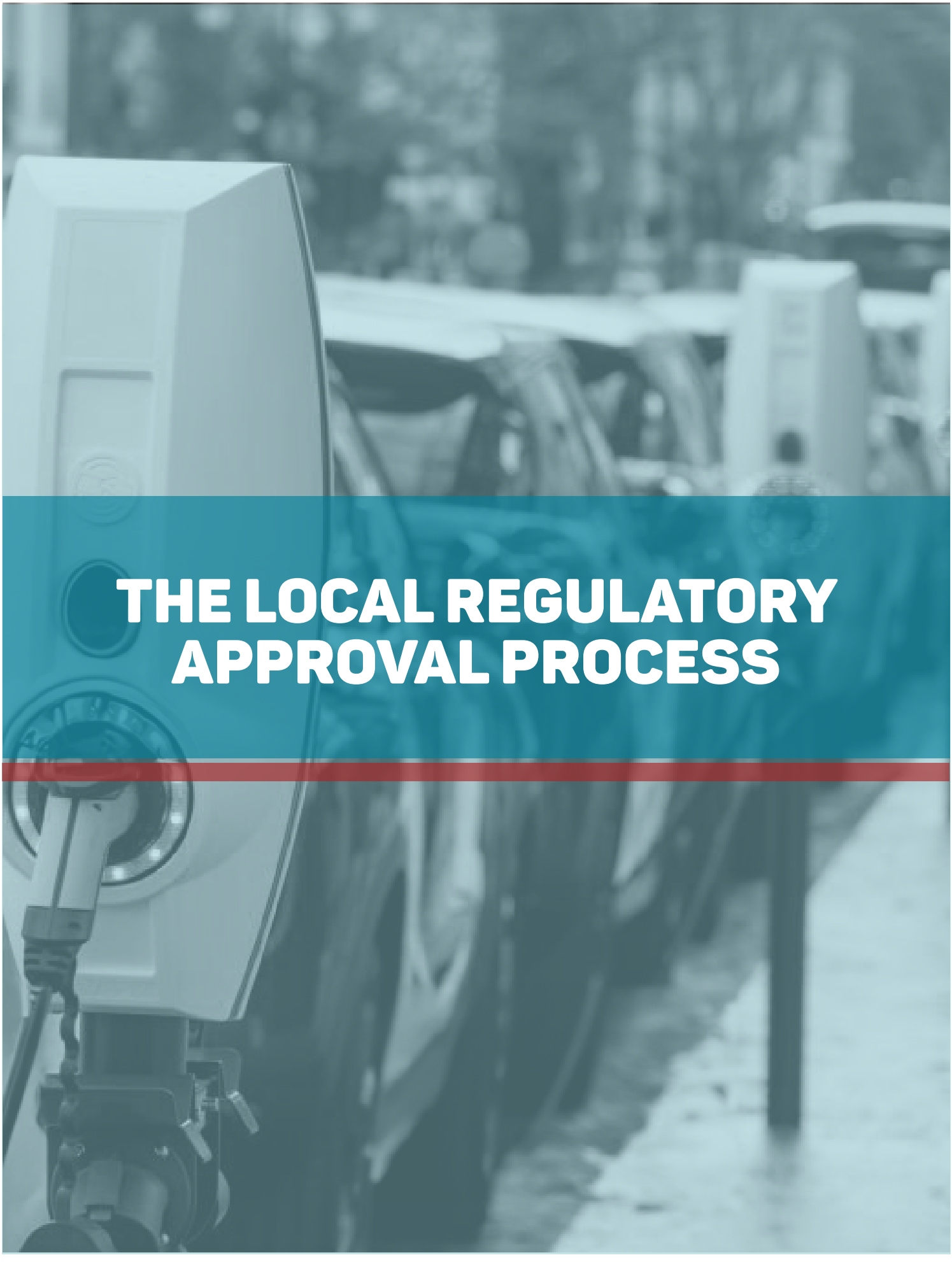
and enforced within the jurisdiction of installation. From a zoning standpoint, EV chargers for private homes with designated off-street parking and those sited in commercial parking lots are generally considered an accessory use. EV charger installations that require upgrade of electrical equipment (e.g., transformers/ service panels), extension of electrical service wires, trenching, excavating, and installation of equipment that modifies the municipal landscape warrant municipal regulation.

The remainder of this document explores topics that are associated with EV chargers, including:

- The circumstances in which it may be appropriate for EV chargers to be considered a primary use rather than an accessory use
- How to address parking minimums
- ADA considerations
- Use of the public right-of-way for charging
- Aesthetic considerations
- EV charger readiness requirements
- Other issues, such as making permit application and review processes more transparent, predictable, and timely.

OTHER CONCERNS

Municipalities may also need to address additional administrative concerns associated with the development of EVs and EV charging. These concerns include update of parking regulations to differentiate between vehicles charging versus those not charging and adoption of signage regulations to address EV charger wayfinding. These concerns are called out as they arise in this document but are not comprehensively addressed. They are also briefly addressed in the Other Considerations section.



THE LOCAL REGULATORY APPROVAL PROCESS

This section is primarily for EVSPs and others who may be unfamiliar with the local regulatory approval process.

WHY DO LOCAL JURISDICTIONS HAVE AUTHORITY REGARDING PLACEMENT OF EV CHARGERS?

States generally give local governments broad and comprehensive control of development and land use projects. Local governments adopt comprehensive land use plans, zoning laws, subdivision and site plan regulations, and other land use laws.[47] Local jurisdictions exercise this control to reflect local priorities. For the siting of chargers, these priorities can include equitable siting and incorporation of standard safety and payment measures to ensure a streamlined and consistent charging process in the community.

States can elect to preempt local authority for specific issues, ranging from minimum wage laws to gun regulation. However, with a few exceptions, the placement of EV chargers is governed at the local level.

OVERVIEW OF THE REGULATORY APPROVAL PROCESS

The regulatory approval process has several components, as outlined in this section.

REGULATORY REQUIREMENTS

Built projects, including EV charger installations, must comply with building codes. In general, building codes incorporate fire, electrical, plumbing, and other health and safety requirements. These codes are based on national or international standards, are adopted at the state or local level, and are enforced at the local level during the permitting and inspection process. Compliance with these codes has generally not been a source of conflict for EV charger installations.

In addition, projects must comply with local zoning codes and development regulations, which in turn usually must be in accordance with a local comprehensive plan that describes the community's overall vision for land use. These documents generally fall within the purview of local planners. As noted, many local plans, zoning ordinances, and other regulations do not contain provisions for EV chargers. The consequent unclear regulatory approval process results in significant time and effort for both the AHJ and the EVSP. One of the key purposes of this document is to provide guidelines to address EV chargers as part of these regulatory documents.

WHAT IS ZONING?

The basis of zoning is the designation of areas in a jurisdiction where land may be used for specified purposes. Zoning may be done to manage traffic flow, to control noise levels, to set aside neighborhoods as living space for residents, to minimize conflicts between uses, and to protect resources.

Examples of zoning classifications include residential, agricultural, industrial, commercial, and schools. Each of these classifications may be further refined, for example, light industrial, heavy industrial, single-family 1+ acre, multifamily. These classifications are often further subdivided. For example, the city of Philadelphia has 15 residential classifications.

A zoning map specifies the geography where each of these classifications applies. An example of a zoning map is in Figure 4.

In addition, AHJs often apply overlay districts, such as historic districts or a central city district, that further define how land may be used.

Projects that comply with all the provisions of the zone in which they will be built are generally issued permits as a simple administrative matter. Noncomplying projects may be permitted by special exception or variance by the AHJ's zoning board.

47 John R. Nolon, Counsel, State and Local Jurisdiction: Local Land Use Solutions, Land Use Law Center (Oct. 2019), https://law.pace.edu/sites/default/files/LULC/State and Local Jurisdiction.pdf (accessed on 9/13/2022).

THE APPROVAL PROCESS

The project developer, in this case the EVSP, needs to document that the project meets all the regulatory requirements. The appropriate local official(s) must review and approve this documentation. For routine projects, such as reroofing or enclosing a porch, these documents are designed for easy completion, and for proposed projects that follow regulations, the review process approves and permits them quickly. The approval process in AHJs without provisions for EV chargers can be confusing and unpredictable both for the AHJ and the EVSP. A more transparent and less time-consuming approval process will result in more EV chargers installed at a lower cost per charger for both parties.

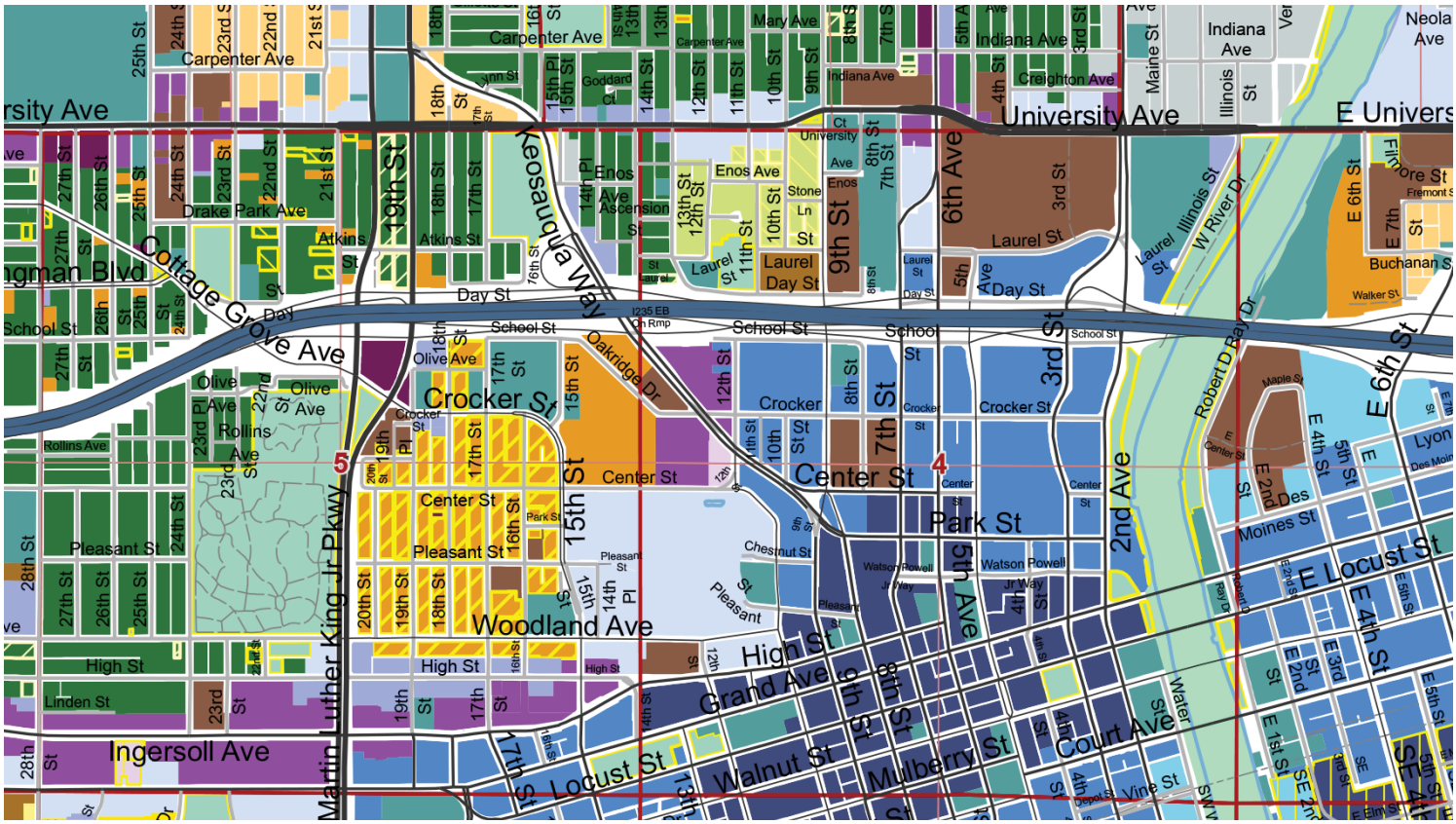


Figure 4. Excerpt from a Zoning Map for Des Moines, Iowa; Each Color Represents One of the More Than 50 Different Zoning Districts

Source: City of Des Moines, Des Moines, Iowa, Zoning Map, https://maps.dsm.city/docs/maps/ZoningMap.pdf (accessed on 11/28/2022).

REGULATORY REQUIREMENTS GUIDANCE

The following sections provide guidance on challenges within the local regulatory approval process for EV chargers:

- Planning Documents
- EV Charger Zoning and Permitted Accessory Use
- Parking Requirements
  - Parking Count and Mandates
  - Charger Accessibility
  - EV Charger Readiness
- Design, Aesthetics, and Equipment Location
- On-Street Charging

Each of these sections provides:

- An overview of the challenges that are currently faced by both local regulators and EV charger developers
- A set of recommendations to overcome these challenges that will provide predictability and transparency for EVSPs and flexibility to address community concerns and EV aspirations
- Additional discussion of the topic
- Where applicable, relevant language from existing ordinances and links to full citations

PLANNING DOCUMENTS

CHALLENGES

- Municipal planning documents often do not address EV chargers. The absence of EV chargers from municipal planning documents (such as comprehensive or general plans, capital improvement plans, climate action plans, transportation plans, design guidelines, municipal codes, and zoning codes) can result in little or no guidance for AHJs on regulations. As a result, what should be a predictable and transparent process to regulate EV charger development can be difficult and time-consuming.
- Many local jurisdictions have had few requests for public EV charger installation. As a result, they have not dedicated staff time to explore and to understand the issues. In addition, in times of historically low funding levels, municipal officials and staff may give planning activities lower priority in resource allocation than actively managing day-to-day municipal operations.
- Jurisdictions may be overwhelmed with requests. As a result, they may be unable to devote time to make changes to planning documents.

RECOMMENDATIONS

- Address EV chargers in comprehensive plans, supporting plans, zoning codes, and design guidelines in a manner that equitably serves the community.
- Conduct an inclusive planning process, paying particular attention to residents who do not have access to dedicated off-street parking.
- Collaborate with regional planning organizations and utilities as part of the planning process.
- Inventory existing and proposed locations of public EV charging infrastructure.

DISCUSSION AND ADDITIONAL CONSIDERATIONS

Ideally, planning documents should include EV chargers as part of a consolidated effort to address and to expand renewable energy, clean transportation, battery storage, building electrification, resilience, and hazard mitigation, as well as improved air quality and public health. The comprehensive plan might lay out the broad goals while the supporting plans are more specific, including targets and timelines for implementation. Such plans include climate action plans, emergency resilience plans, transportation management plans, community plans, or small area or sector plans. (Note that some jurisdictions may use different names for comprehensive and supporting plans.)

Planning should ensure an inclusive process to avoid inequities that are related to charger placement and access, especially for residents who are without access to dedicated off-street parking.[48,49] See the text box titled On-Street Charging and Equity.

48 An excellent overview of equity in planning is available on the City of Baltimore's Department of Planning website, https://planning.baltimorecity.gov/Equity.

49 The City of Columbus applied procedural equity principles in developing its EV Ready Parking Ordinance. A detailed overview of that process can be found on the City's website, https://www.columbus.gov/sustainable/evreadyparking/.

AHJs within a region should work together with their counties, regional planning organizations, councils of government, metropolitan planning organizations, and similar coordinating organizations to ensure that regional plans address EVs and EV charging. Federal and state funding is allocated for transportation improvements based, in part, on these regional plans. Well-coordinated regions are better positioned to attract EVSP investment and to win discretionary funds for EV charging infrastructure. Regional organizations can also be a reliable source of information and technical assistance, especially for smaller jurisdictions with limited staff capacity.

AHJs should coordinate with utilities to ensure grid capacity for the projected demand; to develop renewable energy goals; and to ensure that utility plans align with the goals of city, county, and regional plans. Furthermore, local staff should participate in the development and review of utility Integrated Resource Plans (IRPs), which assess future electricity needs and provide a plan to meet those needs. Localities should also participate in more specific utility e-mobility plans.

It is important to inventory existing and proposed charging to ensure that siting is achieved throughout the community and not just where EVs are registered and to build a reliable and resilient network of chargers and not a haphazard deployment. The U.S. Department of Energy Alternative Fuels Data Center (AFDC) has up-to-date information about existing EV charging locations.[50] To plan for EV charging infrastructure, local planners should project EV charger demand by use case. The NREL Electric Vehicle Infrastructure–Projection (EVI-Pro)[51] tool can assist in such projections. Local planners should collaborate with utilities, regional and metropolitan planning organizations, transit agencies, ports, and local Clean Cities coalitions[52] to help project this demand.

REFERENCES FROM COMPREHENSIVE PLANNING DOCUMENTS

City of Chicago

Climate Action Plan, 2022[53]

To better serve communities that disproportionately experience the chronic stress of the changing climate and the shocks of extreme weather events, the 2022 Chicago Climate Action Plan puts forth climate strategies to help mitigate climate impacts with the objective to create a more just and equitable city. The city plans to install 2,500 new public passenger EV charging stations (EVCSs) in Chicago to help them reach their climate goals.

City of Phoenix

Zero-Emission Vehicle Roadmap, 2022[54]

The City of Phoenix's ZEV Roadmap is a set of guidelines and principles that will help facilitate the transition to EVs in Phoenix, based on state and national forecasts of up to 280,000 EVs on the road in Phoenix by the year 2030. The guidelines that are set out in the ZEV Roadmap provide support for a just transition to EVs by removing barriers to EV adoption and by satisfying the public and business need for services.

City of Austin

Climate Equity Plan, 2020–2021[55]

The *Austin Climate Equity Plan* proposes a set of strategies to achieve the city's goal of equitably reaching net-zero community-wide GHG emissions by 2040. Getting to net zero means that the Austin community would emit zero GHGs into the atmosphere. The new proposed goal updates the city's previous goal, set by the city council in 2015, to reach net zero by 2050. The city plans to expand the adoption of EVs by equitably building out Austin's charging network and by listening to community needs, offering incentives, and collaborating on solutions that are less costly, easier, and better for the environment.

50 Information about EV charger locations is at https://afdc.energy.gov/fuels/electricity_locations.html#/find/nearest?fuel=ELEC.
51 NREL, *EVI-Pro: Electric Vehicle Infrastructure—Projection Tool*, https://www.nrel.gov/transportation/evi-pro.html.
52 More information is on the U.S. Department of Energy Clean Cities Coalition Network website, https://cleancities.energy.gov/.
53 Chicago Office of the Mayor, *2022 CAP: Chicago Climate Action Plan* (2022), www.chicago.gov/content/dam/city/sites/climate-action-plan/documents/Chicago-CAP-071822.pdf.
54 City of Phoenix, A Roadmap to Prepare for 280,000 Electric Vehicles in Phoenix by 2030 (April 12, 2022), https://www.phoenix.gov/sustainabilitysite/Documents/Final%20Draft%20Roadmap.pdf.
55 City of Austin, *Austin Climate Equity Plan* (2020–2021), https://www.austintexas.gov/sites/default/files/files/Sustainability/Climate%20Equity%20Plan/Climate%20Equity%20Plan%20Summary-web_FINAL.pdf.

City of Boston

Zero-Emission Vehicle Roadmap, 2020[56]

The *Zero-Emission Vehicle Roadmap* is a supplemental set of guidelines to assist in Boston's efforts to reduce GHG emissions and to improve air quality. The roadmap prioritizes policies and programs that encourage the adoption and use of zero-emission vehicles (ZEVs), such as EVs and e-bikes, while ensuring equitable access to the benefits of electrification and involving vulnerable populations in the planning process.

City of Los Angeles

Green New Deal, 2019[57]

The *City of Los Angeles's Green New Deal* is an expanded vision of the 2015 *Sustainable City Plan* and aims to secure clean air and water as well as a stable climate, improved community resilience, expanded access to healthy food and open space, and promoted justice for all. In regard to EVs, the city aims to install 28,000 EV chargers citywide by 2028, to expand electric car-sharing options, and to investigate new technology such as a bidirectional smart grid to prepare for large-scale adoption of EVs.

City of Denver

80 x 50 Climate Action Plan, 2018[58]

The City of Denver climate action plan sets out numerous strategies that can be implemented in the city to address growing concerns around climate change, and to address other environmental issues such as air and water pollution, all while improving the quality of life for Denver residents. Denver aims to increase the number of EVs on the road, both city fleet vehicles and personal passenger vehicles. The city will do this by advocating for policies that set ZEV standards, by creating rate-based charging infrastructure, and by increasing the number of publicly available charging stations.

EV CHARGER ZONING AND PERMITTED ACCESSORY USE

CHALLENGES

- Land use and zoning codes often do not reference or properly categorize electric vehicle supply equipment (EVSE). Zoning officials may misclassify charging stations as traditional gas fueling stations, or they may conclude that a property is not zoned for hosting a charging station or that a zoning classification for a charging station does not even exist. This misclassification can trigger zoning reviews and result in delays that can add months to the lifetime of a project and increase its cost significantly.
- EV charger applications subjected to a conditional or special use permit process that requires zoning board approval and/or city council approval can add significant staff time to the project and result in delays and increased costs.

RECOMMENDATIONS

- Adopt zoning language that defines the terms and requirements that are associated with EV charging.
- In most cases, classify EV chargers as an accessory use to a site, not as a traditional fueling station, and as allowable in all zones.[59]
- When they are clearly a primary use, allow EV chargers as an approved use of a site with streamlined permit and zoning review, subject to clearly articulated design standards.
- Amend zoning codes to identify which levels and locations of EV charging may be approved administratively, and clearly identify those exceptions that require zoning board approval.
- Update zoning codes.
- Remove any restrictions on commercial activity in industrial zones that apply to EV chargers, absent health and safety concerns.

56 City of Boston, *Zero-Emission Vehicle Roadmap* (2020), https://www.boston.gov/sites/default/files/file/2020/10/Boston%20ZEV%20Roadmap_1.pdf.
57 City of Los Angeles, L.A.'s Green New Deal: *Sustainable City Plan* (2019), https://plan.lamayor.org/sites/default/files/pLAn_2019_final.pdf.
58 Denver Public Health & Environment, 80 x 50 *Climate Action Plan* (July 2018), https://www.denvergov.org/files/assets/public/climate-action/documents/ddphe_80x50_climateactionplan.pdf.
59 Unlike gas stations, EV charging facilities contain no hazardous materials.

DISCUSSION AND ADDITIONAL CONSIDERATIONS

The determination of primary and accessory (or subordinate) use is important because accessory uses are generally permitted by right. As such, EVSE that is defined as an accessory use is likely to experience little or no zoning-related delays for approval. However, other factors could impact the regulatory process. For example, local regulations might allow administrative relief from the setback requirements for either the primary or the accessory use but not for both.[60]

The use case and location of the charging station are important considerations in determining zoning status. For example, 10 DCFCs that are located on a service station–sized lot at a busy intersection may cause traffic circulation issues, warranting designation as a primary use and thus requiring further review. In contrast, those same charging stations on the side of a large shopping mall surface lot should raise few concerns. In the former case, vehicles likely are coming to the site solely to charge and, like a service station, could generate related traffic as cars turn over relatively quickly. In the latter case, vehicles are coming to the site to park and to stay while the driver shops. Turnover is lower, and because of the more isolated location, related traffic is less of a concern.

Major DCFC charging hubs, where EV charging is the main activity on a site, could warrant a primary use designation. Municipalities may be concerned about changes in traffic patterns, particularly for charging hubs that are likely to result in vehicle queuing for charging stations. AHJs will review such applications with more attention to health and safety considerations and may require development standards such as restrictions on the size of the stacking lanes. A traffic or circulation study may also be required. Note, however, that many rules governing gasoline stations should not be applied to EV chargers, because EV chargers have lower environmental and health impacts. Subject to the concerns noted previously, a primary use charging hub should be an enabled use in most zones and should not be required to complete a conditional use permit.

Local zoning ordinances, development regulations, building codes, and inspection practices should all be updated with language that promotes EV charging and anticipates EV charging needs. Where allowed by the state, updates should be made to the local building codes by adopting the latest national codes and/or updates through local actions. Even if the national code does not specifically address EV charging, code updates can support development practices that can better accommodate infrastructure that includes EVs and EV charging. Although the use of model codes has benefits, they can be counterproductive if they are not updated on a periodic basis. Where state codes preempt local codes, it is particularly critical that state codes be updated regularly.

The zoning code should limit the review process and specify exceptions that trigger zoning board reviews. In general, zoning review should not factor into the permit process unless the project would pose a substantial health and safety risk. For example, a project might create a visual hazard, such as blocking an important sight line, that requires addressing.

While the additional utility load of a single charging station is generally not a direct regulatory concern of the AHJ, the utility is a critical partner in developing a successful local EV plan. The utility knows where it is most cost-effective and technically feasible to install charging stations on the existing grid. The AHJ should be in regular touch with the utility to ensure that the utility is aware of EV charger developments. Broad uptake of EVs and installation of EV chargers can add significant load to local electrical infrastructure, but utilities monitor usage to understand and to mitigate such risks to electrical infrastructure.

Some municipalities do not allow retail activity in industrial zones. Such restrictions should be removed for EV chargers, because these constraints generally are intended for gasoline sales. Similarly, to ensure equitable access to charging for residents who are without home-based charging, any restrictions on retail activity in residential areas should not apply to EV charging.

Zoning can be used to encourage EV charging. Overlay zones can be used to expedite charger approval or to provide other incentives such as density bonuses in designated areas across different land uses.

60 An example is the Pittsburgh, Pennsylvania, zoning code. For more information, see Carolyn Ristau, *What's the Use? Primary vs. Accessory* (Feb. 5), https://www.detailsreviewed.com/blog/use-primary-accessory.

REFERENCES FROM EXISTING LEGISLATION AND CODES

Zillah, Washington[61]

Chapter 17.19, *Infrastructure for Electric Vehicle Charging, Subsection 17.19.030, Where Permitted:* Electric vehicle charging stations shall be considered an allowed use in association with a primary permitted use in every zoning designation.

Township of Edison, New Jersey[62]

Section 14-7, Electric Vehicle Charging Stations (EVCS) in New and Modified Developments Required, Subsection 14-7 b.: Electric vehicle charging equipment (EVCE) and electric vehicle charging stations (EVCS) shall be considered permitted accessory uses in all zoning districts. Electric vehicle charging equipment and electric vehicle charging stations shall be permitted accessory uses in all zoning districts of the Township of Edison, subject to the limitation that an electric vehicle charging station located on the property of a one- to four-family home shall not be made available for use of the general public.

New Jersey[63]

Model Ordinance, Section C, Approvals and Permits, Subsection C.1. (required for local jurisdictions): An application for development submitted solely for the installation of EVSE or Make-Ready parking spaces shall be considered a permitted accessory use and permitted accessory structure in all zoning or use districts and shall not require a variance pursuant to C.40:55D-70.

Maine[64]

Proposed Ordinance Language, Subsection 5.1.: Level 1, Level 2, and Level 3 EVSCs [sic] are permitted in every zoning district, when accessory to the primary permitted use. Such stations located at single-family, two-family, and multi-family land uses shall be designated as private restricted use only.

Saratoga Springs, New York[65]

Unified Development Ordinance, Section 9.5., Accessory Structures and Uses, Subsection I, Electric Vehicle Charging Station:

Section I.2.: Electric vehicle charging stations are permitted as an accessory use within any principal or ancillary parking facility, or gas station, located within the area of designated vehicle parking spaces.

Section I.5.: Private charging stations are permitted as an accessory use to all residential uses to serve the occupants of the dwelling(s) located on that property. Residential charging stations must provide a dedicated circuit in close proximity to vehicle parking.

Fairfax County, Virginia[66]

Applicable Zoning Provisions for Electric Vehicle Charging Spaces: All EVC spaces, whether permitted as an accessory or a principal use, may be subject to electrical and/or building permit approval and may require site plan approval if there is land disturbance of more than 2,500 square feet.

PARKING REQUIREMENTS

EVs are generally charged while they are parked, with the driver not present. Thus, the issues of EV charging and vehicle parking are deeply intertwined. This document addresses three key issues in the following sections:

- **Parking Count and Mandates:** Many AHJs require that a minimum number of parking spaces be provided with

61 Verbatim from Zillah City Council, *City of Zillah, Washington, Planning and Development Regulations*, Chapter 17.19, "Infrastructure for Electric Vehicle Charging," Code Publishing Company (passed February 6, 2023), https://www.codepublishing.com/WA/Zillah/html/Zillah17/Zillah1719.html.

62 Verbatim from Township of Edison, New Jersey, *Township of Edison, NJ / Municipal Code*, Chapter 14, "Building and Construction," eCode360, https://ecode360.com/36876907?highlight=section&searchId=4572620303429190 4#36876907

63 Verbatim from State of New Jersey, Department of Community Affairs, *An Ordinance Authorizing and Encouraging Electric Vehicle Supply/Service Equipment (EVSE) & Make-Ready Parking Spaces* (July 9, 2021), https://www.nj.gov/dca/dlps/home/modelEVordinance.shtml (accessed on 6/26/2023). The section noted is mandatory. The full ordinance can be downloaded at https://www.nj.gov/dca/dlps/pdf/modelEVordinance_08321_FinalDraft.docx ("New Jersey Ordinance").

64 Verbatim from Southern Maine Planning & Development Commission & Maine Clean Communities Coalition, *Municipal EV Readiness Toolkit* (2021), https://smpdc.org/vertical/Sites/%7B14E8B741-214C-42E2-BE74-5AA9EE0A3EFD%7D/uploads/Zoning_and_ordinances_guide_FINAL_(1).pdf ("Southern Maine Toolkit"). Note that the cited document incorrectly says "EVSC" rather than "EVCS."

65 Verbatim from City of Saratoga Springs, NY, Unified Development Ordinance: Article 9, On-Site Development Standards, p. 9-9 (updated Aug. 10, 2022), https://www.saratoga-springs.org/DocumentCenter/View/14432/Article-9-On-Site-Development-Standards ("Saratoga Springs Ordinance"). Combines zoning ordinance, subdivision regulations, and stormwater management regulations.

66 Verbatim from County of Fairfax, Virginia, Applicable Zoning Provisions for Electric Vehicle Charging Spaces (January 2021), https://www.fairfaxcounty.gov/planning-development/sites/planning-development/files/assets/documents/zoning/ev-charging-stations-zoning-guidelines-1-2021.pdf. The document uses "EVC" as an acronym for "electric vehicle charging."

development. These requirements typically differ with building use category and zoning district. Converting a standard space to a dedicated EV charging space may be seen as reducing available parking in violation of minimum parking requirements.

- **Charger Accessibility:** Individuals with disabilities need access to EV charging. Regulations concerning such access are, for the most part, still evolving. The configuration of parking facilities and availability of electrical infrastructure can present challenges.
- **EV Charger Readiness:** To ensure that properties are developed with access to EV charging, many localities are requiring that developers prepare for future installation of EV chargers by providing EVSE or EV-Ready charging in newly built or renovated parking facilities.

PARKING COUNT AND MANDATES

CHALLENGES

- The addition of EV charging spaces to existing parking may violate the minimum parking requirements.
- Permit approval is contingent on the parking minimum requirements and EVSE impact.
- ICE vehicles or noncharging EVs that park in EV charging spaces prevent EVs from charging.
- Areas of parking scarcity may generate significant community opposition to EVSE.

RECOMMENDATIONS

- Allow stalls with EVSE and charger-ready parking spaces to count toward minimum parking mandates. Reduce the minimum parking count by the number of stalls that are used to accommodate the charging station and any associated equipment (if the equipment cannot be accommodated outside the parking area).
- To further incentivize EVs and charging, allow all EV-Ready stalls (with or without chargers) to count as more than one space for minimum parking requirements. Allow accessible stalls to count as two spaces to account for the wider stall and required landing zone.
- Allow each electric car-share space to count as more than one space (e.g., two spaces) for minimum parking requirements, up to a fixed percentage (e.g., 25%) of total non-ADA parking, provided that the electric car-share spaces are EVSE-Installed or EV-Ready spaces.
- Update municipal parking ordinances to limit parking in EVSE spaces to charging EVs and enforce the ordinances with clear signage, including towing, impoundment, and citation information.[67]

DISCUSSION AND ADDITIONAL CONSIDERATIONS

To support EV charger deployment, AHJs should reduce the minimum number of required parking spaces by the amount that is necessary to accommodate EV charging stalls.

California mandates that this reduction apply even if the EV chargers and associated equipment interfere with, reduce, eliminate, or in any way impact the required parking spaces for existing uses.[68] For chargers that are installed outside the parking area (e.g., on an unpaved surface at

CHARGING VERSUS PARKING

It is easy to confuse "charging" and "parking" when applying local zoning requirements for the number of parking spaces. Within the context of zoning requirements, cities or counties should help enable charging projects by clarifying that charging stations count as one or more parking spaces. This approach ensures that charger installation does not take a site out of zoning compliance.

In contrast, building codes may have specific requirements that address charging stations as charging stations, because accessible parking stalls (i.e., the accessible parking stalls that are required at any public parking location) have their own set of separate regulatory provisions.

Drawn from California Governor's Office of Business and Economic Development, Electric Vehicle Charging Station Permitting Guidebook, Second Edition, p. 21 (Jan. 2023).

67 AHJs may wish to require that public EV chargers clearly indicate whether they are actively charging a plugged-in vehicle.
68 California AB 970.

the edge of a lot or on a sidewalk for a curbside space), charging equipment may not require any extra space. For higher-powered chargers that require large electrical equipment to be installed in the parking area, equipment may require an entire parking space.

However, some AHJs may choose to permit this use only if such equipment cannot reasonably be accommodated outside the parking area. In general, the trend in planning is to reduce parking to encourage transportation modes other than cars. Parking dedicated to EV charging that reduces available ICE spaces or even total spaces is consistent with this trend.

Additionally, a jurisdiction could establish a parking multiplier to address EVSE impacts on parking requirements. For example, in New Jersey, EV charging stalls, both standard and accessible, not only count toward satisfying the minimum parking mandates, but they also provide a two-for-one credit for up to 10% of the total required parking. Alternatively, an AHJ may provide a two-for-one credit just for new ADA-compliant accessible EV spaces.[69]

When counting charging stalls, jurisdictions should include the number of EV spaces that can be simultaneously charged by the charger. For example, where an EV charger can simultaneously charge two vehicles, the number of EV charging stalls should be two.

To encourage other modes of transportation, some jurisdictions have enacted policies to reduce parking spaces, especially in more congested urban areas. Such parking reduction programs should consider requiring that existing parking (including curbside parking) support EV charging.

To address the lack of sufficient parking, especially in urban areas or communities, AHJs often vary parking requirements by neighborhood. Community-based organizations should be engaged in developing regulations for on-street EV parking. In general, parking regulations should be more restrictive in congested commercial areas where high parking turnover is needed and be less restrictive in residential areas. Parking costs should be more affordable in low-income areas. (see On-Street Charging)

In general, parking in EVSE spaces should be limited to actively charging EVs. This limitation is important to ensure that EVs have spaces to charge. And although such spaces may sometimes or often be vacant, the vacancies signal to the public that spaces are available and incentivize drivers to switch to EVs. Furthermore, spaces that are occupied by noncharging vehicles prevent EV drivers, some of whom may be in dire need of a charge, from charging. Such circumstances also spread misinformation because the apps that EV drivers use to find EVSE register only active charging spaces. EV drivers will seek out noncharging spaces only to find them occupied. To help prevent such occurrences, signs and towing information should be clear and enforced regularly.

In neighborhoods where parking is scarce and EV ownership is low, restricting parking in this way can foster or exacerbate local opposition to reserved parking for EV charging. One municipality addressed this dilemma in its municipal parking lots by allowing any type of vehicle to park in the EV charging space stall, but it requires charging payments whether the vehicle is charging or not. There are visual cues to encourage drivers of ICE vehicles or EVs that are not actively charging to use other, less expensive spots, including signage at EV charging stalls (e.g., "EV Parking Preferred"). The combination of signage and pricing differences helps ensure that the EV charging spots are the last spots filled, maximizing the availability of these spots for EV drivers who need to charge, without removing parking from the available inventory for visitors to local businesses.[70] As the number of EV drivers increases, the municipality is removing this flexibility to minimize the chances that an EV charger space will be occupied by an ICE or an EV that is not actively charging.

Jurisdictions should incentivize customers to leave EV charging stalls after they have finished charging. One way to accomplish this is to provide options for various levels of charging so that drivers can match their level of charging with the length of time that they want to park their vehicle. Allowed charging times should depend on the level of charging, the needs of the customer, and the

69 New Jersey Ordinance, Section E.2.
70 Delaware Valley Regional Planning Commission, *Municipal PEV and Charging Equipment Case Studies,* https://www.dvrpc.org/energyclimate/alternativefuelvehicles/evmuniresource/casestudies (accessed on 6/15/2022).

use at the site. For example, retail shopping locations may have short- or long-term EV parking depending on how large the facility is and whether the chargers are Level 2s or fast chargers. Malls may need longer short-term parking than smaller retail locations do. Although disincentives for longer-term parking may support retail parking management objectives, they may conflict with the needs of residents who are without home charging. (see On-Street Charging and Equity) They can also conflict with employee needs. Provisions should be made for retail employees to charge without having to move their cars during their working hours.

For private parking, the ability of jurisdictions to enforce municipal regulations varies quite a bit depending on the state, the neighborhood, and the lot owner. The nuances of these factors are beyond the scope of this document.[71] Some states have passed legislation to prevent "ICEing" (parking of an ICE vehicle that blocks the use of an EV charger). However, the applicability of such legislation in private lots is not always clear. Jurisdictions should encourage clear[72] signage for parking restrictions on private property, including towing, impoundment, and municipal citation information.

REFERENCES FROM EXISTING LEGISLATION AND CODES

New Jersey[73]

New Jersey has a comprehensive ordinance regarding EV chargers that is to be adopted by each AHJ. The following sections are relevant to parking:

> *Section C.8.:* A permitting application solely for the installation of electric vehicle supply equipment permitted as an accessory use shall not be subject to review based on parking requirements.
>
> *Section E.1.:* All parking spaces with EVSE and Make-Ready equipment shall be included in the calculation of minimum required parking spaces, pursuant to **{Section number for Parking Requirements}** [Instruction to AHJ].
>
> *Section E.2.:* A parking space prepared with EVSE or Make-Ready equipment shall count as at least two parking spaces for the purpose of complying with a minimum parking space requirement. This shall result in a reduction of no more than 10 percent of the total required parking.

In addition, *Charge Up Your Town: Best Management Practices to Ensure Your Town Is EV Ready*, from the New Jersey Department of Environmental Protection, the Department of Community Affairs, and the Board of Public Utilities, contains several links to ordinance language, as well as other information.[74]

California

California Assembly Bill 1100 (2019) Section 22511.2[75] requires that a parking space served by EVSE be counted as at least one standard parking space and that an accessible parking space with an access aisle serving EVSE be counted as two standard parking spaces for the purposes of complying with minimum parking requirements established by local jurisdictions.

California Assembly Bill 970 (2021) Section 65850.71[76] expands on CA AB 1100 (2019) and instructs jurisdictions to reduce the number of required parking spaces for existing uses by the amount that is necessary to accommodate EVSE and any associated equipment (transformers, switchboards, and power cabinets).

71 Enforcement may depend, for instance, on whether the lot is on property that is leased from the municipality or incorporates a public road. It may also be different if a lot is generally open to the public versus open to employees or residents only.

72 Plug-In Sites, Legislation Reference—*Reserved Parking for Plug-In Vehicle Charging,* https://pluginsites.org/plug-in-vehicle-parking-legislation-reference/ (accessed on 9/27/2022).

73 Sections verbatim from New Jersey Ordinance. Sections noted are mandatory.

74 New Jersey Department of Community Affairs, New Jersey Department of Environmental Protection, and New Jersey Board of Public Utilities, *Charge Up Your Town: Best Management Practices to Ensure Your Town Is EV Ready* (Feb. 2022), https://dep.nj.gov/wp-content/uploads/drivegreen/pdf/chargeupyourtown.pdf.

75 California Legislature, *California Assembly Bill 1100*, LegiScan (passed Oct. 12, 2019), https://legiscan.com/CA/text/AB1100/id/2056934.

76 California AB 970.

CHARGER ACCESSIBILITY[77]

CHALLENGES

- The number and characteristics of accessible EV charging spaces that are required by the AHJ are frequently unclear.
- Host preferences for the location of EV chargers may conflict with local/state preferences for accessible spaces.
- The source of three-phase power (needed for DCFCs) at a property may be located far from the front door of the building or from the accessible route leading to the building's front door. Increased trenching and other costs can make some accessible spaces very costly to power.
- Accessible-only EVSE may experience lower use than chargers that are open to all, reducing their financial viability.

RECOMMENDATIONS

- Place accessible EV chargers on an accessible route to the entrance of the facility, but do not require them to be on the shortest accessible route.
- Deploy a scaled approach, basing the number of accessible EV chargers that are required on the total parking count.

DISCUSSION AND ADDITIONAL CONSIDERATIONS

The Americans with Disabilities Act (ADA) requires that the construction of public parking and private parking that are open to the public meet standards for accessibility. Although ADA applies to all parking, including EV charging spaces, there are no federal standards specific to EVSE. California has established state standards that serve as a good model for accessible EVSE parking. The following recommendations are based on the *California Building Code* requirements for public housing, public accommodations, commercial facilities, and public buildings as of January 1, 2023.[78]

Accessible chargers should be required to be on an accessible route to the entrance of the facility that is served by the parking. However, reasons such as power supply location, space, and conflicting uses may not allow accessible chargers to be on the shortest route to the facility entrance. If they are not serving a particular facility, they should be accessible to a public way (e.g., a sidewalk). Generally, DCFCs need to be installed close to three-phase power to avoid high construction costs. Installation of DCFCs over a relatively long distance (which may include grading, paving, curb cutting, striping, etc.) can add significantly to construction costs.

The California code bases the required number of accessible charging spaces on the total number of charging spaces that are provided for a given facility. Accessible spaces comprise van accessible, standard accessible, and ambulatory. For example, for a facility with 26 to 50 charging spaces, there must be 1 of each of these three types of accessible spaces. In contrast, a facility with 1 to 4 charging spaces requires only 1 van-accessible space.

The code also varies the requirement for signage. For example, a sign with an International Symbol of Access (ISA) is not required for the van-accessible space in the parking area with only 1 to 4 charging spaces, but it is required for such a space if there are 5 or more charging spaces. The lack of signage has raised concerns with some local officials because of potential confusion since accessible drivers are accustomed to having ISA signs in accessible spaces. To address these concerns, "use last" signs could be posted. They "indicate that accessible charging spaces may be used by any driver but should be used last by non-disabled drivers."[79] The U.S. Access Board (discussed in the following section) has designs for "use last" signs.

The count for the number of charging spaces is based on the number of spaces that can simultaneously be served by charging ports. One charging post may be able to serve multiple charging spaces. See Appendix A for details on specifying numbers of accessible charging spaces based on the number of total charging spaces.

77 General accessibility requirements for EVSE are addressed in Section 1107 of the 2021 *International Building Code*®.
78 California Governor's Office of Business and Economic Development (GO-Biz), *Electric Vehicle Charging Station Permitting Guidebook*, Second Edition (Jan. 2023), https://business.ca.gov/wp-content/uploads/2019/12/GoBIZ-EVCharging-Guidebook.pdf ("GO-Biz EV Guidebook").
79 GO-Biz EV Guidebook.

The footprint and design for the accessible parking and the surrounding area should consider different access needs and limitations. Also, the design of the station itself needs to be accessible to all users and consequently may limit mobility, reach, strength, and more.

REFERENCES FROM EXISTING LEGISLATION AND CODES

In a technical assistance document, the U.S. Access Board provides recommendations (not regulations)[80] on accessible EV charging space design. The document alludes to a forthcoming rulemaking on ADA requirements for EVSE. Following are notes about several items related to the document; the full document provides a more comprehensive understanding of design issues. The U.S. Access Board material does not address the number of accessible spaces. Information about the minimum number of EVSE accessible spaces required by California code is summarized in Appendix A.

From the U.S. Access Board Recommendations

> *EV Charging Station Location within a Site:* An EV charging station must connect to an accessible route that leads to an accessible entrance of the building or facilities on the same site. Additionally, the accessible EV chargers should be on the shortest accessible route to the accessible entrance relative to other chargers at the same charging station.

Appendix A in this guidance document contains sample designs for accessible EV charging parking spaces.

For existing parking lots:[81]

> *Adding EV Charging Stations to Existing Parking Lots:* Converting accessible parking spaces to EV charging spaces is not recommended, especially when use will be restricted to electrical vehicle charging only. The ADA and ABA standards prohibit an alteration that decreases accessibility below the requirements for new construction (§202.3.1). If an existing accessible parking space is converted to an EV charging space, the minimum number of accessible parking spaces required by table 208.282 must be recalculated based on the total number of parking spaces provided, and accessible parking spaces may need to be added elsewhere.

For on-street charging:[83]

> *On-Street EV Charging Stations Design:* EV chargers installed on the sidewalk for on-street parallel parking should locate chargers with mobility features at the end of the block, or at the closest curb ramp. … Chargers can be placed on narrow sidewalks but should be oriented facing the sidewalk and not the street in order to ensure there is adequate clear floor or ground space in front of the charger to allow for a person with a disability to approach and operate the charger.

EV CHARGER READINESS

CHALLENGES

- EV charger readiness costs are site specific and thus are very difficult to estimate.
- Building developers express concerns about added costs.
- It can be difficult to determine the appropriate proportion of EV-Capable, EV-Ready, and EVSE-Installed (defined in the "Discussion and Additional Considerations" section) parking spaces required for residential and commercial uses for both new construction and property rehabilitation.

RECOMMENDATIONS

- Enact an EV charger readiness ordinance or building code requirement that clearly specifies EV charger readiness requirements for new developments and major renovations.
- In developing and publicizing the ordinance, provide information about the average costs and benefits of compliance.
- Collaborate with the utility on grid capacity and complementary programs.

80 U.S. Access Board, *Design Recommendations for Accessible Electric Vehicle Charging Stations* (updated Aug. 11, 2022), https://www.access-board.gov/tad/ev/ ("U.S. Access Board Design Recommendations").
81 Verbatim from U.S. Access Board Design Recommendations.
82 U.S. Access Board, *About the ADA Accessibility Standards*, https://www.access-board.gov/ada/#ada-208_2.
83 Verbatim from U.S. Access Board Design Recommendations.

- Specify EV-Capable and EV-Ready installation technical requirements as minimum rather than maximum requirements so that systems may be sized to support DCFC EVSE to future-proof installations.
- Consider adjustments for the power difference between Level 2s and DCFCs and new technologies such as automatic load management systems (ALMS).

DISCUSSION AND ADDITIONAL CONSIDERATIONS

Recognizing that the least expensive time to install EV charging is during building construction, many jurisdictions have adopted EV charger readiness ordinances or codes for new construction and property rehabilitation. These codes generally require a certain number of parking spaces at specified property types to meet one of three requirements to ensure that the property is developed for charging EVs:[84]

- **EV-Capable:** A designated automobile parking space that is provided with electrical infrastructure, such as, but not limited to, raceways, cables, electrical capacity, and panelboard or other electrical distribution equipment space, necessary for the future installation of an EVSE.
- **EV-Ready:** An automobile parking space that is provided with a branch circuit and either an outlet, junction box or receptacle, that will support an installed EVSE.
- **EVSE-Installed:** An automobile parking space that is provided with a dedicated EVSE connection.

In lay terms, EV-Capable means that the property is all set to do the wiring that is needed; EV-Ready means that the wiring has been done; and EVSE-Installed means that the charger is in place.

While it is not in the 2021 *International Energy Conservation Code*® (IECC), EV charger readiness is under consideration for the 2024 IECC. The inclusion of EV-Ready requirements in the main body of the IECC code will make adoption easier for many states and localities. The proposed (draft #1) IECC 2024 residential and commercial EV charger readiness requirements are presented later in this section.[85]

EV charger readiness requirements are best presented for commercial/nonresidential use in a table that is formatted like the following. For single-family housing, the best practice is to provide 100% of the housing units (not spaces) with at least one EV-Ready or EVSE-Installed space. Sample code language is included in Appendix B.

PRESENTATION FORMAT: EVSE-INSTALLED, EV-READY, AND EV-CAPABLE SPACE REQUIREMENTS[86]

Total Number of Parking Spaces	Minimum number or % of EVSE-Installed Spaces[a]	Minimum number or % of EV-Ready Spaces[b]	Minimum number or % of EV-Capable Spaces
[range 1]			
[range 2]			
[range 3]			
[range 4]			
Top of range +			

a. Where EVSE-Installed Spaces installed exceed the required values, the additional spaces shall be deducted from the EV-Ready Spaces requirement.

b. Where EV-Ready Spaces installed exceed the required values, the additional spaces shall be deducted from the EV-Capable Spaces requirement.

84 The definitions for EV-Capable, EV-Ready, and EVSE-Installed were taken verbatim from draft text for the 2024 IECC that was provided by Tesla. The content of the 2024 IECC is currently in development and is not final until it has been published.

85 The content of the 2024 IECC is currently in development and is not final until it has been published.

86 ICC, 2021 Electric Vehicles and Building Codes: A Strategy for Greenhouse Gas Reductions, Building Code Amendments for Electric Vehicle Charging, Table R401.4.3 (Oct. 2021), https://codes.iccsafe.org/content/ICCEVBCSGGR2021P1/building-code-amendments-for-electric-vehicle-charging.

The jurisdiction should set parking space thresholds in the first column. AHJs may wish to create separate tables for different land uses. For instance, parking facilities for shopping centers may merit different EV charger readiness requirements than parking facilities for houses of worship do. The requirements for how many spaces need to be EV-Capable, EV-Ready, or EVSE-Installed may be expressed either as a percentage or a number. If a percentage is used, a rule, such as rounding up, is needed to determine the number of spaces required.

Localities often struggle to determine the number of spaces that are required to be EV-Capable, EV-Ready, and EVSE-Installed. Over the past few years, the percentage of EV charger–ready spaces required has been increasing. For example, while it was common to see 10% to 20% of multifamily spaces required to be EV-Ready or EV-Capable a few years ago, recent activity suggests that 20% to 50% of spaces be so designated, as discussed in the *California Green Building Standards Code (CALGreen®)* example in the following section.[87] The CALGreen example for multifamily specifies 35% EV-Capable/EV-Ready (10% EV-Capable and 25% EV-Ready) and 5% EVSE-Installed for new construction. Soon after the January 1, 2023, effective date of the law, an amendment was introduced to remove the 10% EV-Capable requirement and to increase EV-Ready to 40% and EVSE-Installed to 10%.[88] Stakeholders argued that the EV-Capable requirement was limiting conversions to EVSE-Installed because of the greater cost to convert EV-Capable compared with that of EV-Ready.

The proposed (draft #1) 2024 IECC residential code for multifamily stipulates 40% EV-Capable, and the proposed IECC commercial code for multifamily, which applies to complexes greater than three floors, has EV charging requirements for 100% of the spaces (75% EV-Capable, 5% EV-Ready, and 20% EVSE-Installed). The proposed IECC commercial code for commercial is 30% EV-Capable and 15% EVSE-Installed (see Appendix B). The proposed (draft #1) IECC requirements tend to favor EV-Capable over EV-Ready to allow more flexibility for future technological improvements[89].

As part of the process to inform decision-makers as they consider local requirements for EV charger readiness, the locality should provide information about the savings from installing required EV charger readiness infrastructure in new construction versus in later retrofits. For example, it costs about 4 times more to add EV-Ready elements post-construction than during new construction or a major renovation.[90] Despite the difficulties in estimating the costs for a given charger installation, costs or ranges of costs can be estimated for several use cases (e.g., single family, multifamily, commercial) to demonstrate savings.

The locality should also consult with the utility on grid capacity and the potential for the utility to offer programs to complement the EV ready ordinances. Because utilities view EV charging as a revenue stream, they will often collaborate with the jurisdiction on the ordinance development and related efforts to build community support.

EV charger readiness ordinances need not specify the type of chargers that are required for EVSE-Installed spaces. Although it is important that the EV-Ready components of the installation be required to handle a minimum of Level 2 power, the power of the charger that is installed should be appropriate for the typical user at the location. This power level is better judged by those who are installing the chargers than by the AHJ. In many cases, they will be Level 2 or DCFCs. However, there are locations such as train stations, park-and-ride lots, workplace parking, apartment buildings, overnight residential on-street parking, and airports where drivers typically remain plugged in for extended periods and typically need to replenish a charge after a short drive. In such cases, the entity may want to initially install a combination of Level 1 and Level 2 chargers to minimize both installation and costs to users, while allowing the option to upgrade to Level 2 chargers or DCFCs if needed.

87 Brian Ross et al., Preparing for the Electric Vehicle Surge, Zoning Practice (Oct. 2022), https://planning.org/publications/document/9257171/ (accessed on June 26, 2023)

88 State of California Building Standards Commission, *Initial Statement of Reasons for Proposed Building Standards of the California Department of Housing and Community Development Regarding the 2022 California Green Building Standards Code California Code of Regulations, Title 24, Part 11 (HCD 04/22) (Feb. 8–10, 2023,* Code Advisory Committee review meetings).

89 The content of the 2024 IECC is currently in development and is not final until it has been published.

90 Dory Larsen, *EV Readiness—Why We Need It Now,* Southern Alliance for Clean Energy (March 25, 2021), https://cleanenergy.org/blog/ev-readiness-and-why-we-need-it-now/.

Multiple types of charging systems and technologies are evolving. An ordinance that is tied to one or more technologies could soon become obsolete. For example, an ordinance that specifies electrical requirements for a Level 2 charger could preclude the installation of a DCFC.

A technology-neutral ordinance should account for the differences in cost, power requirements, and functionality of different technologies. These considerations are especially important in commercial areas where businesses may want to provide higher-powered charging to allow faster space turnover. Strategies for maintaining technology neutrality between DCFC and Level 2 requirements include setting requirements in terms of the total required kilowatts of charging power, rather than a required number of parking spaces. Another strategy is to establish a ratio in which a requirement for a particular number of Level 2 charging spaces can be satisfied by a single DCFC. For example, the City of Denver has adopted an ordinance that allows substitution of Level 2 chargers for DCFCs at a 10:1 ratio to achieve compliance with its energy code.[91] Also, the California Building Standards Commission has proposed a power-level equivalence option that allows the requirement for a certain amount of Level 2 charging to be satisfied with the equivalent charging power of DCFC.[92]

If an EV charger readiness ordinance is adopted as part of the local building code, it typically applies to all geographical areas. In states where localities must adopt the national model building codes or a state version of those national codes, an EV charger readiness ordinance may be missing and thus be absent from the local ordinance. Consequently, localities would need to adopt such ordinances as part of their zoning code. Localities could then choose to vary the code requirements by land use and/or geography.

EV charger ready policies should consider new technologies such as ALMS. ALMS are designed to manage load across one or more EV chargers to share electrical capacity and/or to automatically manage power at each connection point. They are typically used with multiple Level 2 chargers to minimize the need to add new site electrical capacity, or with public DCFC sites that use energy storage systems.[93] For example, an agency that is reviewing multifamily and commercial property applications with multiple chargers may be required to evaluate them at full load rather than be allowed to consider reduced load that is enabled by an ALMS. Their review would result in stricter EV electrical supply requirements, making the installations more expensive. The benefits of ALMS need to be considered in EV charger readiness systems. However, given the rapidly changing technology, ALMS should be an optional, not a required, approach to meet the requirements of an EV charger readiness ordinance.

California's EV Charging for All Coalition maintains that each multifamily household that has access to parking should have access to power for EV charging at their residence.[94] As such, 100% of the spaces at a multifamily development with one space per unit would be EV-Ready. It would ensure accessibility to convenient, lower-cost home charging for all, placing multifamily on par with single-family residences where 100% EV-Capable/EV-Ready is required in most ordinances. Home charging tends to be less expensive than public charging—particularly "public" commercial charging that is located in a residential environment, without market competition to keep prices in check. Thus, this approach would ensure greater equity, because multi-unit housing often includes lower-income households. Charging spaces need to be wired directly to a housing unit's meter to ensure equitable residential utility rates for charging. EV charger readiness requirements should also apply to older apartment buildings as a condition of renovation.

91 City and County of Denver, 2022 Denver Building Code & Denver Fire Code, First Printing, Section C405.13, "Electric Vehicle Supply Equipment," pp. 276–279 (Jan. 2023), https://www.denvergov.org/files/assets/public/community-planning-and-development/documents/ds/building-codes/2022-denver-building-and-fire-code.pdf ("Denver 2022 Codes").

92 State of California Building Standards Commission, 45-Day Express Terms for Proposed Building Standards of the California Building Standards Commission Regarding the 2022 Intervening Code Adoption Cycle, California Code Of Regulations, Title 24, Part 11 (BSC 04/22), 5.106.5.3.6, "Electric Vehicle Charging Stations (EVCS)-Power Allocation Method," pp. 7 and 8 (March 8, 2023), https://www.dgs.ca.gov/-/media/Divisions/BSC/03-Rulemaking/2022-Intervening-Cycle/Public-Comments/GREEN-45-Day/BSC/BSC-04-22-ET-PT11-45day.docx?la=en&hash=6EFD5E9735106132AF408DDC2755E2E4B719F39D.

93 See, for example, *Electrify America, Electrify America Unveils Its First Application of Megawatt-Level Energy Storage to Enhance Customer Experience* (Oct. 19, 2022), https://media.electrifyamerica.com/en-us/releases/199, and the FreeWire Technologies website, https://freewiretech.com/.

94 EV Charging for All Coalition, https://www.acterra.org/ev-charging-all.

THE FOUR PRINCIPLES OF AN EQUITY-CENTERED MULTIFAMILY EV READINESS CODE

1. Provide each household unit that has parking with at least one EV-Ready space.
2. Require at least low-power, [EV-Ready] Level 2 [chargers] and receptacles, not necessarily EVSE.
3. Wire receptacles of EVSE directly to the corresponding unit's meter or panel.
4. Install prominent signage at each EV-Ready or EV-Capable space.

Source: Plug In America, EV Charging for All, https://pluginamerica.org/policy/ev-charging-for-all/.

REFERENCES FROM EXISTING LEGISLATION AND CODES

Appendix B contains sample tables that present EV charger readiness requirements, drawn from a variety of sources. In addition, the Southwest Energy Efficiency Project (SWEEP) maintains a database of EV charger readiness codes in the southwestern U.S., which provides details on the codes and links to relevant documents.[95]

Seattle, Washington

Zoning Code Updates, 2019[96]

In 2019, the City of Seattle amended its municipal code to set guidelines for EV-Ready parking spaces for new construction. Under the municipal code, for parking on surface lots, developers must include at least 20% of parking as EV-Ready for multifamily (25+ units) and 10% for nonresidential. Requirements can be reduced if there is "substantial evidence substantiating that the added electrical load that can be attributed to meeting the requirements will:

1. Alter the local utility infrastructure design requirements on the utility side of the legal point of service, so as to require on-property power transformation; or
2. Require an upgrade to an existing residential electrical service."

In 2022, King County, Washington, passed legislation requiring both new construction and substantially remodeled apartments in the unincorporated areas of the county to provide 25% EV-Ready and 10% EVSE-Installed spaces.[97]

CALGreen

CALGreen is a state-mandated California code that includes an EV charger readiness section. The 2022 code, effective January 1, 2023, includes the following requirements.[98]

For Residential Construction

- All new one- and two-family homes and townhomes with private garages must be EV-Capable.
- For new multifamily dwellings, hotels, and motels:
  - 10% of parking spaces must be EV-Capable.
  - 25% of parking spaces must be EV-Ready for 20-amp (20 A) service.
  - Occupancy of 20+ units: 5% of parking spaces must be EVSE-Installed for 40 A service.
- 10% of new or altered parking spaces at existing buildings must be EV-Capable.

For Nonresidential Construction

- It varies with the number of spaces, but essentially for new construction, 20% of parking spaces must be EV-Capable, and of those, 25% must be EVSE-Installed. (See Appendix B.)[99]
- CALGreen also allows a DCFC compliance option. Section 5.106.5.3.2, "Electric vehicle charging stations (EVCS)," says:
  - The installation of each DCFC EVSE shall be permitted to reduce the minimum number of required EV capable spaces without EVSE by five and reduce proportionally the required electrical load capacity to the service panel or subpanel.[100]

95 SWEEP, SWEEP Guide to EV Infrastructure Building Codes, https://www.swenergy.org/ev-infrastructure-building-codes/.
96 City of Seattle, SDCI Electric Vehicle Readiness ORD D4a (n.d.), https://www.energy.wsu.edu/documents/EVReadinessOrdinance_Seattle_2-19.pdf.
97 King County Council, Council Approves Requirement for Electric Vehicle Charging in New Development (July 13, 2021), https://kingcounty.gov/council/mainnews/2021/July/7-13-electric-vehicle-charging.aspx.
98 Summarized from Gary Welch, 2022 CalGreen Code EV Charging Requirements, CalGreen Energy Services (Aug. 20, 2022), https://calgreenenergyservices.com/2022/08/20/2022-california-ev-charging-requirements/. Note that this is a very abbreviated summary of a code with many additional provisions. It is provided to illustrate EV charger readiness concepts.
99 Therefore, the number of required EVSE-Installed spaces counts toward the total number of required EV-Capable spaces.
100 CALGreen compliance option 5.106.5.3.2 https://codes.iccsafe.org/content/CAGBC2022P2/chapter-5-nonresidential-mandatory-measures

CALGreen has additional requirements for specific types of construction for the installation of EVSE for medium- and heavy-duty vehicles. These building types include grocery stores, retail, and warehouse buildings with planned off-street loading spaces.

California jurisdictions are allowed to exceed the state's requirement with reach codes, as shown in the following information about San Francisco.

San Francisco, California

San Francisco requires 100% of parking spaces in new residential, commercial, and municipal buildings and in major alterations to be EV-Capable (70%), EV-Ready (20%), or EVSE-Installed (10%). But, in anticipation of the technological benefits of EV load management systems (also referred to as ALMS, discussed previously), the code notes:

> Branch circuit panelboard(s) shall be installed at each parking level with service capacity to deliver a minimum 40 amperes at 208 or 240 volts multiplied by 20% of the total number of EV spaces.[101]

San Francisco also required publicly accessible commercial garages and lots with 100+ parking spaces to install EVSE in 10% of the parking spaces by January 1, 2023.[102]

Orlando, Florida

Zoning Code Updates, 2021[103]

In 2021, the City of Orlando updated its municipal code to set EV-Ready parking requirements for all new development or substantial enlargement of structures. Under the municipal code, developers must include 20% EV-Capable or EVSE-Installed spaces for multifamily and 10% for commercial. If the number of spaces reaches 50 for multifamily or 250 for commercial, two of spaces must be EVSE-Installed. Commercial projects for fuel retailers in which automotive services are the primary use are excluded from requirements.

Orlando Sec. 61.361–Applicability: The requirements of this Part shall apply to new development or substantial enlargement of structures. Only the new parking spaces added as part of a substantial enlargement are subject to the requirements of this Part.

Oregon

Implementation Guidance, 2022

> As of April 1, 2023 (with the Climate-Friendly and Equitable Communities add-on), conduit must be sufficient to serve:
>
> > 20% of parking spaces in commercial building garage or parking area
> >
> > 40% of parking spaces in mixed-use or residential building garage or parking area
>
> Statute precludes local governments from requiring EV infrastructure for housing developments of four or fewer units or other development types not listed in ORS 455.417(3)(a).

These percentage requirements are similar to the EV-Capable definition that is in this guidance document. The Implementation Guidance further states:

> Electrical service capacity, as defined in ORS 455.417, has two parts:
>
> 1. **a designated location or space for electrical service**, if not actual service
> 2. **a conduit system** from that location to parking spaces. That conduit system must be able to support wiring to for installation of Level 2 or above electric vehicle charging stations.[104]

101 City and County of San Francisco, 2019 San Francisco Building Inspection Commission Codes, Chapter 4.106.4.2.4(b) (approved Sept. 13, 2019), American Legal Publishing, https://codelibrary.amlegal.com/codes/san_francisco/f34d8cdf-0811-4e2d-8768-67a15f4b6738/sf_building/0-0-0-47581.

102 San Francisco Environment Department, Factsheet: Commercial Garage Electric Vehicle Charging Ordinance, Ordinance No. 244-19 (March 2023), https://sfenvironment.org/sites/default/files/sfe_gb_factsheet_ev_garage_ordinance.pdf.

103 Code section verbatim from City of Orlando, Council Agenda Item: Ordinance. No. 2021-47, Documentary 2108231202 (Aug. 23, 2021), https://library.municode.com/fl/orlando/ordinances/code_of_ordinances?nodeId=1102742 ("Orlando Ordinance 2021-47").

104 Parts verbatim from Oregon Department of Land Conservation & Development, Implementation Guidance, OAR 660-012-0410, Electric Vehicle Charging (Oct. 14, 2022), https://www.oregon.gov/lcd/CL/Documents/Guidance0410_EVs.pdf.

Portland, Oregon

Portland's 2023 EV Ready Code Project amendment goes further than the state law.[105]

The EV Ready Code Project amended the code to:

1. Require developments with five or more new dwelling units, when including parking spaces, to provide electric vehicle-ready infrastructure as follows:
   - 100% of parking spaces when six or fewer spaces are provided.
   - 50% of parking space when more than six spaces are provided.
2. Add development standards (e.g., placement) for all EV-ready installations.
3. Clarify how EV-ready installations are categorized in land use code; they are generally an accessory use, but occasionally they could be a primary use.
4. Exclude the cost of EV improvements in the value of the site's improvements for retrofits.

Denver, Colorado

Subsection 6 of the Denver energy code below addresses the adjustment for required EV-Ready if DCFCs are offered instead of L2 chargers. (See previous discussion of EV charger readiness.)

Denver's 2022 energy code for new parking facilities requires 60% EV-Ready for multifamily (40% EV-Capable, 5% EV-Ready, and 15% EVSE-Installed) and 25% for commercial (10% EV-Capable, 5% EV-Ready, 10% EVSE-Installed).[106]

Section C405.13.1, Quantity:

2. Where one shared parking facility serves multiple building occupancies, the required number of spaces shall be determined proportionally based on the floor area of each building occupancy.
6. The number of *EVSE Installed* Spaces for Groups A, B, E, I, M and S-2 Occupancies may be reduced by up to ten per *DCFC EVSE* provided that the *building* includes not less than one parking space equipped with a *DCFC EVSE* and not less than one *EV Ready space*. A maximum of fifty spaces may be reduced from the total number of *EVSE Installed spaces*.

Columbus, Ohio

On July 22, 2022, Columbus, Ohio, modified its zoning code with requirements that are "intended to provide equitable electric vehicle charging access distributed throughout the City to support electric vehicle adoption, improve air quality, and achieve City climate and equity goals." These requirements are presented in a tabular format.[107] The ordinance will go into effect on January 1, 2024. The ordinance requires 20% EV-Capable and 2% EVSE-Installed chargers for offices and multifamily housing (four or more units) and for standalone parking facilities. Retail and affordable multifamily housing requires 15% EV-Capable and 1% EVSE-Installed chargers.

The following building types are exempt from the ordinance:

1. Very Low Income Housing, where 50% or more of the units are constructed to serve tenants with incomes 50% or below the Area Median Income.
2. Permanent Supportive Housing, as defined by the U.S. Department of Housing and Urban Development.
3. Transitional Housing, as defined by the U.S. Department of Housing and Urban Development.

The exclusion for Very Low Income Housing takes effect only if the city is unable to provide funding from its Green Bank–style funding to cover the purchase and installation of charging.[108] Because the city intends to provide such funding, the stipulation is intended to hold the city accountable rather than to exclude Very Low Income Housing from charging.

105 Verbatim from City of Portland, Oregon, About the Electric Vehicle (EV) Ready Code Project, https://www.portland.gov/bps/planning/ev-ready/about.
106 Section verbatim from Denver 2022 Codes, Section C405.13.1, p. 277.
107 List verbatim from City of Columbus, Columbus City Codes, Supplement Section 3312.55 (n.d.), https://columbus.legistar.com/View.ashx?M=F&ID=11080292&GUID=EE7D4F6A-91DB-4665-9192-49D92D28A5E7.
108 Email from Matt Stephens-Rich, Director of Technical Services, Electrification Coalition, to Robert Graff (April 3, 2023).

2024 Draft IECC

2024 IECC Residential Draft #1[109]

Section R404.7, "Electric Vehicle Power Transfer Infrastructure," addresses EV charger readiness. The following subsection addresses single-family and multifamily (R-2, three-family or greater units with three or fewer stories):

> *R404.7.1, Quantity:* New one- and two-family dwellings and townhouses with a designated attached or detached garage or other onsite private parking provided adjacent to the dwelling unit shall be provided with one EV-capable, EV-ready, or EVSE installed space per dwelling unit. R-2 occupancies or allocated parking for R-2 occupancies in mixed-use buildings shall be provided with an EV capable space, EV ready space, or EVSE space for 40 percent of each dwelling units or automobile parking spaces, whichever is less.

See Appendix B in this guidance document for the IECC draft commercial provisions.

DESIGN, AESTHETICS, AND EQUIPMENT LOCATION

CHALLENGES

- The location that is preferred by the AHJ for aesthetic considerations may differ from the most cost-efficient, optimal, and feasible EVSE EVSP locations:
  - EVSE at greater distances from the power source and interconnection results in higher costs, an additional permitting burden, and longer and more complicated construction timelines.
  - Placing EVSE away from the public right-of-way may make the EVSE more difficult for potential users to find and may increase personal safety concerns and the potential for vandalism.
  - Jurisdictions may prevent EVSE in the setback, which is often the optimal location for equipment to minimize the impact on parking count.
- AHJ height limitations and screening requirements may make some EV charging projects unworkable.
- AHJs may misconstrue aesthetic and design impacts as health and safety concerns.
- Guidance for compliance to design requirements is often unclear.
- EV charger signage concerns are often not addressed separately from other signage restrictions.
- Design and sensitive zoning requirements may make proposed EV charging projects infeasible.

RECOMMENDATIONS

- Do not impose aesthetic requirements for surface parking with EV charging that exceed the aesthetic requirements for surface parking without EV charging. Ideally, EV charging projects should not trigger additional aesthetic and design requirements that are not related to the charging equipment itself.
- Provide clear, readily available guidelines on all design and aesthetic requirements that apply to EVSE, including illustrations of acceptable and unacceptable designs. This clarity is especially important in sensitive zoning areas, such as historic districts. Design and aesthetic guidance should not exceed the requirements for other amenities or infrastructure in such zones.
- Consider lighting and shelter to increase the safety, comfort, and convenience of those who are charging EVs.

DISCUSSION AND ADDITIONAL CONSIDERATIONS

Aesthetic regulations primarily address concerns about charger installations at public locations, including multifamily residential, retail, office, hotel, and institutional land uses.

It is important to have transparent and predictable standards for design, aesthetics, and equipment location so that the utility, EVSP, and AHJ avoid delays in the design, permitting, and installation process. Transformer siting can be especially challenging when the location that was approved by the landlord or EVSE owner is challenged by a zoning and review board or

109 Verbatim from the 2024 IECC Residential Draft #1, https://www.iccsafe.org/wp-content/uploads/IECC2024-PCD1-102022.pdf. The content of the 2024 IECC is currently in development and is not final until it has been published.

planning department. AHJs should allow for EV chargers and supporting equipment (including transformers, switchboards, and power cabinets) within building, property, or landscaping setbacks to ensure that the equipment is in the optimal location on the property.[110] Clear guidelines should facilitate siting that complies with AHJ requirements.

The line between an aesthetic design concern and a safety concern is not always clear. Therefore, ordinances, including state ordinances that preempt and supersede local ones, can be subject to interpretation. Also, codes regarding electrical equipment setbacks and screening often were developed prior to the advent of EV charger electrical support equipment, and thus they may need to be revised to appropriately address this specialized equipment.

Under the provisions of California AB 1236, which preempts local authority related to EV charger siting, all levels of EV charging are allowed in all zones, subject only to health and safety requirements. Aesthetics may not be considered. However, the published state guidance for AB 1236 notes: "In areas with sensitive design standards, station developers and AHJs are encouraged to collaborate on practical design elements that can be implemented with minimal expense, minimal complication, and without impacting the project timelines …."[111] Thus, it may be reasonable for zoning documents to explicitly lay out the expected design elements for zones or areas that the AHJ considers as meriting sensitive design standards. If these expected design elements can be drawn from a common set that is shared by all municipalities, it will make the siting process more predictable and transparent for the EVSP and make the drafting of standards simpler and less expensive for the AHJ.

To help EVSPs, AHJs should provide pictures that illustrate designs that comply and that do not comply with such design standards. For example, to integrate EV chargers with form-based codes, show examples of acceptable designs, including graphics, to convey the intent of the code. This illustration is especially important for retrofits and for multifamily housing. Information often needs to be presented visually to be clearly understood.

Onsite signage for specific directions to EV chargers is also needed. Simply providing the address of the host site is insufficient. Large locations, such as malls and parking garages, are especially challenging. The federal *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD) has some guidance as it relates to public roadways and signage,[112] but there are no site directional signage recommendations yet. MUTCD does have two General Service signs with interim designs that have been approved for charging stations (D9-11bp and D9-11b). These signs can be combined with directional arrows to create wayfinding signage.[113] Special paint to delineate the space may also be used, which draws attention to the intent for the space.

Charger installations in industrial locations that serve medium- and heavy-duty vehicle fleets generally present fewer aesthetic concerns because of their location, although they may have unique design issues. For example, trucks, especially those with trailers, typically need a pull-through space such as those at gas stations rather than head-on parking to charge. Similarly, medium- and heavy-duty vehicles may simply be too large to use the standard parking spaces for light-duty vehicles.

Lighting and shelter increase the safety, comfort, and convenience of those who are charging EVs. Lighting should enable those who are charging to read the signs and instructions and to operate the charger easily. Although not typically required for outdoor-rated chargers, a shelter that blocks rain, snow, and wind can increase the convenience and comfort of the customer when they are initiating and concluding their charging session.

110 Connect the Watts, Best Practices for Charging Infrastructure Program Design: The EV Charging Ecosystem (n.d.), https://site-assets.evgo.com/f/78437/x/0a6d0c7746/connect-the-watts-compendium.pdf.

111 GO-Biz EV Guidebook, p. 46.

112 U.S. Department of Transportation Federal Highway Administration, MUTCD: Regulatory Signs for Electric Vehicle Charging and Parking Facilities (June 17, 2013), https://mutcd.fhwa.dot.gov/resources/policy/rsevcpfmemo/.

113 U.S. Department of Transportation Federal Highway Administration, MUTCD: 2009 Edition Part 2, Figure 2I-1, General Service Signs and Plaques, https://mutcd.fhwa.dot.gov/htm/2009/part2/fig2i_01_longdesc.htm.

REFERENCES FROM EXISTING LEGISLATION AND CODES

New Jersey[114]

Section F.1. [The section is not mandatory for local jurisdictions.]:

> Location and layout of EVSE and Make-Ready parking spaces is expected to vary based on the design and use of the primary parking area. It is expected flexibility will be required to provide the most convenient and functional service to users. Standards and criteria should be considered guidelines and flexibility should be allowed when alternatives can better achieve objectives for provision of this service.

Orlando, Florida[115]

Sec. 61.365(g), Design:

> Additional landscape screening may be required for mechanical equipment such as transformers associated with charging equipment, consistent with mechanical equipment screening requirements.

Bloomington, Minnesota[116]

This example shows general parking design requirements that impact EVSE followed by requirements more specific to EVSE.

> *21.302.14 (c) (1) Design:*
>
> Parking must meet standards set in § 21.301.06,[117] Parking and Loading. 21.301.06 provides requirements for location (e.g., within 400 feet of the main entrance to the principal building that serves multifamily dwellings), design (e.g., space and drive aisle dimension requirements), concrete curbs, access (parking aisles off driveways and not directly off a public street), fire and public safety access and circulation, light pollution and glare, parking islands and their trees, and further details on EVSE, as follows.
>
> *21.301.06 (c) (4) Electric vehicle chargers:*
>
> (A) *Protection*. Electric vehicle chargers must be:
>
> (i) Located in a parking island;
>
> (ii) Mounted to an adjacent structure; or
>
> (iii) Protected by bollards, structures, or curb if located directly in parking lot.
>
> (B) Obstruction. Electric vehicle chargers must not encroach on the minimum unobstructed, walkable sidewalk width specified in § 21.301.04 (d).

Ann Arbor, Michigan[118]

Section 5.19.11.C:

> Where Parking Lots are separated into distinct areas or when Parking Structures have more than one level, the Electric Vehicle parking facilities shall be evenly distributed among the separate areas or levels.

The Ann Arbor code goes on to encourage solar-powered EV charging:

> In order for Electric Vehicles to provide the maximum environmental and, in most cases, financial benefits, to their owners and in support of the City of Ann Arbor's carbon neutrality goals, it is recommended that Electric Vehicle Charging Stations be powered by a renewable energy source. Options can be on-site solar power generation or subscribing with a utility or a third party for renewable energy.

Saratoga Springs, New York[119]

> *Section 9.5, Accessory Structures and Uses, Subsection I., Electric Vehicle Charging Station:*
>
> 6. Public electric vehicle charging station spaces must be posted and painted with a sign indicating the space is only for electric vehicle charging purposes. Days and hour[s] of operations must be included if tow away provisions are to be enforced by the owner of the property. Information identifying voltage and amperage levels and/or safety information must be posted.

114 Verbatim from New Jersey Ordinance.
115 Orlando Ordinance 2021-47.
116 Sections verbatim from City of Ann Arbor, Michigan, Unified Development Code (adopted July 16, 2018, amended Feb. 26, 2023, https://www.a2gov.org/departments/planning/Documents/UDC%20Edition%208%202-26-2023.pdf.
117 Bloomington Code of Ordinances, Section 21.301.06, https://codelibrary.amlegal.com/codes/bloomington/latest/bloomington_mn/0-0-0-109945#JD_21.301.06.
118 Sections verbatim from City of Ann Arbor, Michigan, Unified Development Code (adopted July 16, 2018, amended Feb. 26, 2023, https://www.a2gov.org/departments/planning/Documents/UDC%20Edition%208%202-26-2023.pdf).
119 Verbatim from Saratoga Springs Ordinance, p. 9-9.

ON-STREET CHARGING

CHALLENGES

- Often there is resistance against EV reserved spaces on streets with low parking inventory relative to demand.
- Coordination is required among multiple authorities that control curb access or construction on public property.
- ADA compliance has historically not been clear for chargers that are installed in the right-of-way.
- Signage and parking enforcement are concerns.
- A clear business model may be lacking for the financing, installation, and operation of on-street charging, given often limited local jurisdiction budgets, staff, and resources, particularly for DCFCs.
- There may be legal questions about the use of public property for a private entity to generate revenue.
- Potential hazards and related liability from charging cords that go across sidewalks may be concerns.
- Vandalism to or theft of equipment might occur, particularly in the public right-of-way.
- Customer access may be limited by subscription-based or membership-required accounts to pay for charging.
- Different chargers employ different aesthetics. Some with large, changeable LCD screens may be deemed distracting or out of compliance with local advertising ordinances.

RECOMMENDATIONS

- Set deployment goals and priority locations for equitable on-street charging. Such goals signal to charging companies that the community is open to partnership and investment.
- Start the planning process by reaching out to the community and to impacted city departments and utilities to assess demand as well as land use, pricing, and equity considerations.
- Review the capital improvements plan to consider opportunities to install charging as streets are rebuilt or as utility lines are improved.
- Explore business models with municipalities, utilities, EVSPs, and third-party operators. On-street charging can be financed, installed, and operated by a local government, a charging company, a utility, or a hybrid of two or more parties. For example, a municipality might purchase chargers from an EVSP, who then installs and maintains the charging on behalf of the locality.
- Involve impacted neighborhoods in the planning process to hear their questions and concerns about placing curbside chargers in the community. Community voices should be allowed to help decide what types of chargers are deployed, how many, and the best locations to serve local needs.
- Become "curbside ready" by identifying the sites and existing infrastructure with the highest potential and by posting that information online via a map.[120]
- Publish online the process, requirements, and timelines for right-of-way permit review and approval. [121]
- Use chargers that are truly compatible with vehicles that are parallel-parked at the curb. A charger that is "fit for purpose" for the curb takes into consideration proper height and cable length, unique ADA specifications, proper setback to avoid damage from snowplows and garbage trucks (if applicable), and unit display angles and specifications to make it user-friendly.[122]
- Specify which charger aesthetic characteristics fall within and which fall outside of local safety and advertising ordinances.

120 For example, the City of Sacramento has a "curbside ready" map, http://www.cityofsacramento.org/-/media/Corporate/Files/Public-Works/Electric-Vehicles/MAP-CurbsideChargerPotential120318.pdf.

121 For example, the Washington, DC, Department of Transportation Electric Vehicle Charging Station Program specifies its process at https://ddot.dc.gov/es/node/1590091.

122 For guidance on selecting curbside chargers, see Cory Bullis, Public Affairs Director, FLO, Choosing and Deploying the Curbside Charger That Is "Just Right": The Goldilocks Endeavor, FLO Insights (Nov. 28, 2022), https://www.flo.com/insights/choosing-and-deploying-the-curbside-charger-that-is-just-right-the-goldilocks-endeavor/.

DISCUSSION AND ADDITIONAL CONSIDERATIONS

Municipalities need to consider two primary on-street parking use cases:

1. Commercial districts with limited off-street parking where visitors may wish to charge for limited periods of time. In these areas, greater turnover can be expected of spaces that are reserved for EV charging.
2. Residential areas with limited off-street parking where residents may wish to charge on-street overnight. These areas will experience limited turnover because of both the time of night and the duration of charging sessions. Many residents lack access to off-street charging at home or work and thus must rely on on-street charging for convenient charging near their homes.

COMMERCIAL AREAS

In more developed commercial areas, where demand for on-street charging is likely to be greatest, multiple authorities typically control curb access or construction on public property, including public works, street departments, water/sewer authorities, utilities, and transit agencies. On-street charging requires close coordination among these authorities and within departments, because there can be many competing uses for the public right-of-way (curb) and multiple utilities may be impacted by construction (e.g., water pipes, sewage pipes, natural gas lines). Effective coordination among these many entities can lower costs and shorten the permitting process, which can better serve the charging public's needs.

Other factors may compound the challenge. For instance, in cities that require utility infrastructure to be underground, costly trenching to provide power for charging stations could be necessary. In addition, projects may face high electrical infrastructure costs that cannot be covered or rate-based by the utility. Where there is existing electrical infrastructure such as utility poles, streetlights, and adjacent transformers, on-street pole-mounted charging potentially can be installed at a lower cost than for comparable ground-mounted chargers.[123]

RESIDENTIAL AREAS

Providing on-street charging for residents who do not have dedicated off-street parking is among the most challenging charging use cases. It is difficult in part because often it is as much a vehicle parking issue as it is a vehicle charging issue, particularly in the most populous areas of cities or in older cities that were laid out before the ubiquity of cars. Densely populated areas with limited parking may require more considerations than areas with plentiful parking do.

Some EV owners without off-street parking run an electric extension cord from a home 110 V (Level 1) outlet to charge their EV at the curb. This practice presents a hazard to pedestrians and other sidewalk users, because the cord must cross the sidewalk either on the ground or elevated above ground level. A few municipalities, including Seattle, Washington, and Portland, Oregon, have addressed this hazard by allowing residents to extend a 110 V extension cord across the sidewalk only while actively charging and using an ADA-compliant cord cover.[124],[125] Such regulations provide access to low-cost, convenient charging for many residents, including many low-income residents, who do not have off-street parking. There are concerns about compliance and enforcement. Cities may be concerned about liability if cords are not properly configured under the cord cover.[126]

OTHER

Streetlight networks could support EV chargers, depending on the specifics of the lighting system, whether there is enough available electricity, and whether utility rate structures allow for it. As cities switch to LED lighting, there is potentially more power available for EV charging.

123 An excellent resource on this issue is Emmett Werthmann and Vishant Kothari, Pole-Mounted Electric Vehicle Charging: Preliminary Guidance for a Low-Cost and More Accessible Public Charging Solution for U.S. Cities, World Resources Institute (Nov. 2021), https://files.wri.org/d8/s3fs-public/2021-11/pole-mounted-electric-vehicle-charging-preliminary-guidance.pdf.

124 Seattle Department of Transportation, Electric Vehicle Charging Cord Guidance for Crossing the Public Right-of-Way [Ground Floor Residential Use] (revised Oct. 1, 2019), https://www.seattle.gov/Documents/Departments/SDOT/CAMs/CAM2119.pdf.

125 City of Portland, Oregon, Charging Your Electric Vehicle, https://www.portland.gov/transportation/electric-vehicles/charging-your-ev#toc-home-charging-without-a-garage-or-driveway-.

126 For a deeper discussion of this issue and a discussion of options, see Joe Wachunas, Confessions of a Sidewalk Charger, CleanTechnica (June 21, 2021), https://cleantechnica.com/2021/06/21/confessions-of-a-sidewalk-charger-cleantechnica-version/.

However, it may not be sufficient, and other loads may compete, such as powering of holiday lights. Some jurisdictions have used streetlighting upgrades as a good time to analyze charging needs and curbside feasibility. Seattle has a pilot program for chargers on light poles. In Charlotte, North Carolina, a new technology pilot program, PoleVolt, uses existing streetlight infrastructure to reduce the costs associated with installation of charging stations by as much as 50%.[127]

Jurisdictions need authority to designate and to enforce on-street parking exclusively for EVs, such as that provided by California AB 1452.[128] However, the locality may initially choose to use signs that discourage but do not prohibit parking without charging. (See the discussion in the Parking Count and Mandates section.)

Additional information about on-street charging may be found on the Clean Cities Coalition Network website.

REFERENCES FROM EXISTING LEGISLATION AND CODES

Portland, Oregon

Proposed draft:[129]

> This report details the Portland Bureau of Transportation's process to work collaboratively across groups to update Portland City Code and Administrative Rules to set location and siting requirements for the installation of Level 2 electric vehicle chargers in the right-of-way in select areas of Portland. These challenges are accompanied by a clear permit process for companies interested in providing public charging services. …
>
> All EV Charging Only spaces shall be four (4) hour time limited during the hours when parking is time limited.

- In areas where parking is already managed, EV chargers shall only be allowed in spaces that are already limited to four (4) hour stays and hours when parking is time limited shall reflect the rules of the surrounding area.
- In areas where parking is not managed, the EV Charging Only parking space shall default to a four (4) hour stay between the hours of 8:00 am and 6:00 pm.
- As stated in Chapter 16.20.290, parking in EV Charging Only spaces is permitted only for electric vehicles and plug-in hybrids actively charging, which is defined in Chapter 16.90.111.
  - Any vehicle found occupying an EV charging only space while not actively charging is subject to fine and tow under Title 16.10.050.

Atlanta, Georgia

Section 16-28.017, Design Standards and Other Criteria for Electric Vehicle Parking and Charging Facilities:[130]

> (3) Criteria for electric vehicle parking and charging stations on private streets
>
> (a) On-street parking spaces designated and equipped to be electric vehicle charging stations spaces for which any parking incentive was granted on private streets shall be for the exclusive purpose of electric charging.
>
> (b) For the purpose of reducing cable management issues and placing the electric vehicle charging station closer to crosswalks and curb ramps, such charging stations shall be installed to use the last space on a block face in the direction of travel wherever possible.

Other code language addresses perpendicular or angle parking configurations.

127 Duke Energy, UNC Charlotte, City of Charlotte, Centralina Regional Council, Duke Energy win prestigious Diversity, Equity and Inclusion in Cleantech Award for curbside electric vehicle charging technology (Nov. 10, 2022) https://news.duke-energy.com/releases/unc-charlotte-city-of-charlotte-centralina-regional-council-duke-energy-win-prestigious-diversity-equity-and-inclusion-in-cleantech-award-for-curbside-electric-vehicle-charging-technology (accessed on June 26, 2023)

128 California Legislature, AB-1452 Parking: Exclusive Electric Charging and Parking on Public Streets (approved Oct. 10, 2017), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB1452.

129 Verbatim from Portland Bureau of Transportation Policy, Planning & Projects Group, Electric Vehicle Charging in the Public Right-of-Way Code Project (updated March 2023) https://www.portland.gov/transportation/electric-vehicles/documents/electric-vehicle-charging-public-right-way-code-project/download.

130 Section verbatim from City of Atlanta, Code of Ordinances, Chapter 28, "General and Supplemental Regulations," eLaws, http://atlanta.elaws.us/code/coor_ptiii_pt16_ch28_sec16-28.017.

ON-STREET CHARGING AND EQUITY[a]

Equitable access to charging is a critical issue in the transportation electrification landscape. As minimum parking requirements change and, in some cases, disappear, the pressure is on to locate parking for personal vehicles. There are many multifamily and single-family households without access to off-street parking, but even those with off-street parking may find themselves unable to install home chargers. Their panel capacity may be limited, and the costs to upgrade the electrical service to accommodate home charging may be a significant barrier. Or, in rental housing, tenants may not have their landlord's assent to install charging.

There are many such challenges that cause residents to look to on-street charging opportunities to solve their lack of access at home. Cities can help create on-street charging opportunities through a combination of charger siting requirements, curbside programming, expedited permitting, and incentives to help direct charger placement in the areas of most need. For instance, cities can:

- Start by evaluating neighborhood characteristics. Map out existing EV charging to identify charging deserts where there is little or no charging available. Identify areas with limited off-street parking, poor air quality, high commuter traffic, and low levels of public transit. In many cases, they will be areas with a concentration of low-income and minority residents. Use this analysis to prioritize on-street charging station locations. For example, target charging toward low-income neighborhoods and neighborhoods with limited public transit because those residents are likely to rely more on cars to commute to work.
- Take an inclusive approach to charger siting rather than focusing only on neighborhoods with high levels of EV ownership. The EV market is expected to change dramatically over the next 5 years with more EVs, including used EVs, and prices comparable to ICE vehicles. EV owners will benefit from lower fuel and maintenance costs, and their vehicles will help improve air quality. Chargers sited in low-income neighborhoods will help the residents experience these benefits. Cities can place minimum threshold percentage requirements for charger placement within these communities.
- Consider ways to keep public charging affordable. Ideally, EV owners who rely on on-street charging should not have to pay more than those who are able to charge off-street. Thus, there will likely be the need for subsidies for on-street charging to narrow or to eliminate this gap, especially early on when there may be limited demand for charging and thus little revenue per charger.
- In neighborhoods where on-street parking is especially tight, seek to incentivize charger placement in adjacent commercial areas with shorter-term daytime parking restrictions. Adjust those parking regulations to encourage shorter-term daytime charging by visitors and lower-cost overnight charging for residents. Also, localities can work with nonresidential property owners, such as for public properties, places of worship, workplaces, and retail locations, to arrange for residents to charge at their off-street parking at night.[b]
- Engage the community, gather their input, and reflect their feedback throughout the siting process. Start by sharing information about EVs and public charging goals, EV benefits, and concerns. Dispel common myths. Gather resident feedback on proposed sites and share information about the final selected sites. Promote use of the sites through education and outreach at community events, on city webpages, and on social media.
- Finally, offer incentives for more affordable, transit-supportive modes such as ride-sharing, e-bikes, and other micromobility options to encourage a modal shift away from cars. Plan for ways to deploy and to charge these options to serve community needs. This effort may include providing public L1 chargers.

a Partially derived from Adam Lubinsky, PhD, AICP, Planning for On-Street EV Charging Infrastructure, Planning Advisory Service Memo #115, American Planning Association (March 1, 2023), www.planning.org/publications/document/9266315/.

b Prateek Suri, Equity-Forward Passenger Electric Vehicles Infrastructure Plan for the City of Cincinnati, Environmental Defense Fund (Aug. 22, 2022), www.cincinnati-oh.gov/sites/oes/assets/EV%20Equity%20Report%20(August%2022,%202022).pdf.

APPROVAL PROCESS GUIDANCE

APPLICATION PROCESS

CHALLENGES

- The application process is unclear or inconsistent and does not include guidance documents and timelines.
- The application process is not standardized.
- There are no EVSE-dedicated application forms.
- Wet signatures are required on forms.

RECOMMENDATIONS

- Provide a user-friendly, all-electronic application process, with an online checklist and intake form for all permit requirements.[131]
- Provide online information that clearly identifies the location of the applications, application materials, application processes, fees, average application review timelines, and point(s) of contact.
- Make EV charging forms available for single-family, multifamily, workplace, public, and commercial medium- and heavy-duty charging in cases where requirements differ.
- Accept electronic signatures for permit applications.
- Offer preapplication meetings to developers to discuss the project approval process.

DISCUSSION AND ADDITIONAL CONSIDERATIONS

A clear, straightforward application process is essential to EVSE permitting and deployment. AHJs should clearly communicate their application process with detailed guidance on their website, including required documents, expected timelines, and online plan submittal.

AHJs should designate a point of contact or liaison to guide the EV charger permit application and approval process. Without a transparent process with online status updates, applicants may be confused about where the application is in the process. Alternatively, the AHJ could host an online platform that allows the EVSP to determine their status in the process in real time. Because this approach does not rely on the single point of contact, there is no single point of failure.

The online processes should be consistent across AHJs in their naming of data fields, which will make it easier for EVSPs who are applying in multiple AHJs. The lack of consistency in application form design across different jurisdictions creates delays and adds to costs. Appendix C includes examples of EV charger permitting application forms.

Plan requirements should consider the level of charging, the land use, and the number of proposed chargers and charging ports, among other project elements. AHJs sometimes use standard requirements, which can introduce unneeded complexity. For example, in residential EVSE permitting, full site plans and bollards are probably not necessary. In fact, where panel capacity is available, residential permits for one or two Level 2 chargers should require the same approval time frame as for common 240 V household appliances such as an electric clothes dryer or an induction cooktop, because the electrical requirements are similar.

DCFC projects are more complex than Level 2 installations are, and they often require more coordination between the EVSP, local utility, and AHJ. Because these projects require more power, installation may require electrical

Determining the ownership for a permit application can be challenging. The contractor and owner of the EV charger may be different, as well as the building owner or manager. Most likely the contractor will submit the permit application on behalf of the customer.

Maintenance is a consideration. EV chargers need ongoing maintenance for uptime, compliance with codes and regulations, and insurance requirements. Operators who have skill and experience in EV chargers may be reliable for maintenance, but building managers may not have sufficient expertise.

131 See, for example, the City of Fresno, California, online process at https://lmsaca.fresno.gov/CitizenAccess/Welcome.aspx?TabName=Home&TabList=Home%7C0%7CBuilding%7C1%7CDPUDPW%7C2%7CPlanning%7C3%7CCannabis%7C4%7CFire%7C5%7CParks%7C6%7CCurrentTabIndex%7C0, or the City of West Hollywood, California, website, https://www.weho.org/city-government/city-departments/community-development-department/building-and-safety/ev-charge-up-west-hollywood.

service upgrades, which may trigger the need for a right-of-way permit to deliver more power from the grid to the site. AHJs and station developers should plan for such challenges and include the right-of-way permit in the application package.[132]

Preapplication meetings between EVSPs, AHJs, and utilities are a great practice that can ease the permitting process, especially for complex and large projects. In these meetings, EVSPs can get feedback on equipment location, permit process application requirements and expectations, information about a certified EVSE installer, and a point of contact in the jurisdiction. For AHJs and utilities, offering early guidance can reduce the staff time that is spent on the project later.

Localities should collaborate with regional and metropolitan planning organizations to offer standard processes. Even in states such as California that preempt local approval with a state mandate, jurisdictions may vary in their knowledge and in the level of guidance that they provide on the application process. Regional organizations are well suited to work with local jurisdictions to align application and approval processes.

APPLICATION REVIEW

CHALLENGES

- Sequential multiple-department reviews, clearances, and inspections are sometimes involved.
- Additional reviews by an architectural review board, planning commission, and/or council might be required.
- Common-interest association reviews might be necessary.
- New issues are sometimes introduced by AHJs after the initial review comments have been provided.
- Requirements to address legacy issues with the host site are unrelated to the current application, including changes in the parking count.
- Interpretation of codes and ordinances can be inconsistent among different AHJ staff.

RECOMMENDATIONS

- Have concurrent reviews across appropriate departments to reduce or to eliminate sequential reviews.
- Administratively approve EV charger permit applications that meet all the requirements.
- Remove zoning board approval requirements for all levels of EV chargers, other than for clearly defined exceptions such as EVSE in historic or sensitive zones.
- Assign a point person to help applicants through the entire permitting process.
- Set goals for approval timelines to include reviews with no changes and those that require amended applications.
- Train plan reviewers and inspectors on EVSE-specific codes and ordinances to ensure that these requirements are interpreted and applied consistently.

DISCUSSION AND ADDITIONAL CONSIDERATIONS

In some AHJs where multiple authorities review and approve applications, paperwork often must be physically moved through different departments—planning and zoning, fire, and building—with sign-offs required from each department. Such sequential reviews should be reduced or eliminated where feasible. Instead, AHJs should conduct concurrent building, electrical, accessibility, and fire-safety departmental reviews and consolidate cross-departmental questions and comments so that applicants can resolve them quickly. Alternatively, departments could schedule concurrent live reviews so that everyone can voice their concerns for joint resolution. EV charger permit applications that meet all the requirements should be administratively approved through a building or similar nondiscretionary permit.

See Figure 5 for a flowchart that lays out an ideal permit application approval process.

Note that the AHJ is not always responsible for delays. For example, EVSPs may submit incomplete applications, which would need another initial review for the amended application. Other complications arise with smaller jurisdictions that contract out permitting and inspections to a consultant or where these tasks are handled by

132 GO-Biz EV Guidebook.

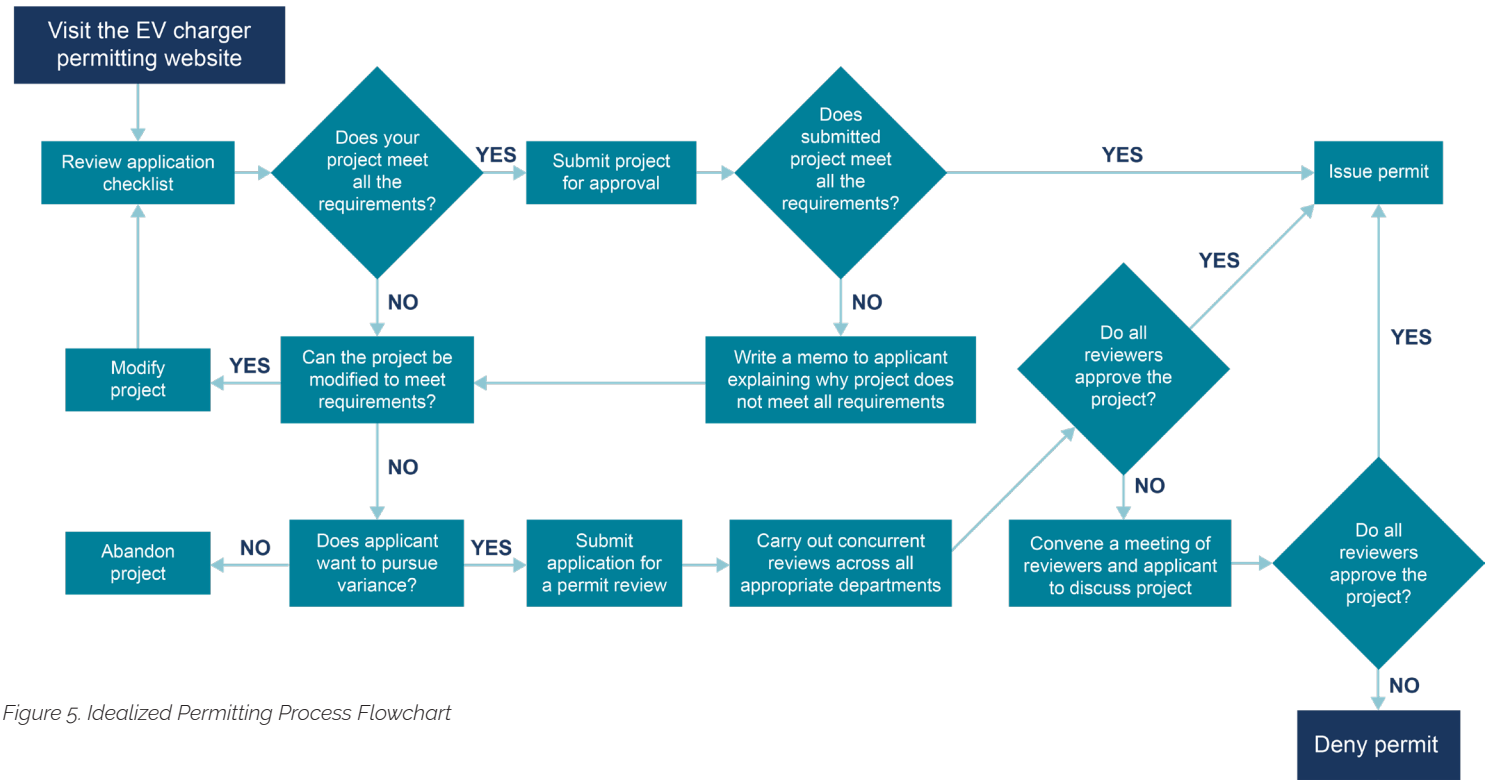


Figure 5. Idealized Permitting Process Flowchart

the county or state. In some smaller, often wealthier communities, AHJs handle aesthetics separately from the county, splitting the approval process.

In some instances, AHJ plan checkers may approve EV charging permits with elements that may differ from the inspection department's interpretation of the code. When this occurs, the AHJ should work to find consensus between the plan checkers and the inspectors so that they agree to a unified approach and interpretation of the codes.

Homeowners' associations (HOAs) can be especially challenging to get approval from, so AHJs and EVSPs should engage them early. Some states have right-to-charge laws, which restrict an HOA's influence in blocking EVSE deployment. AHJs can reduce an HOA's power by limiting the allowed response time for feedback.

REFERENCES FROM EXISTING LEGISLATION AND CODES

Boston, Massachusetts[133]

Installation, Permit Acquisition:

For the City of Boston, there is a separate process for new and existing development. An electrical permit is required to install EVSE for existing development. However, installation of a charging station associated with a new development project of a new residential or non-residential property can be processed in association with the underlying permit(s).

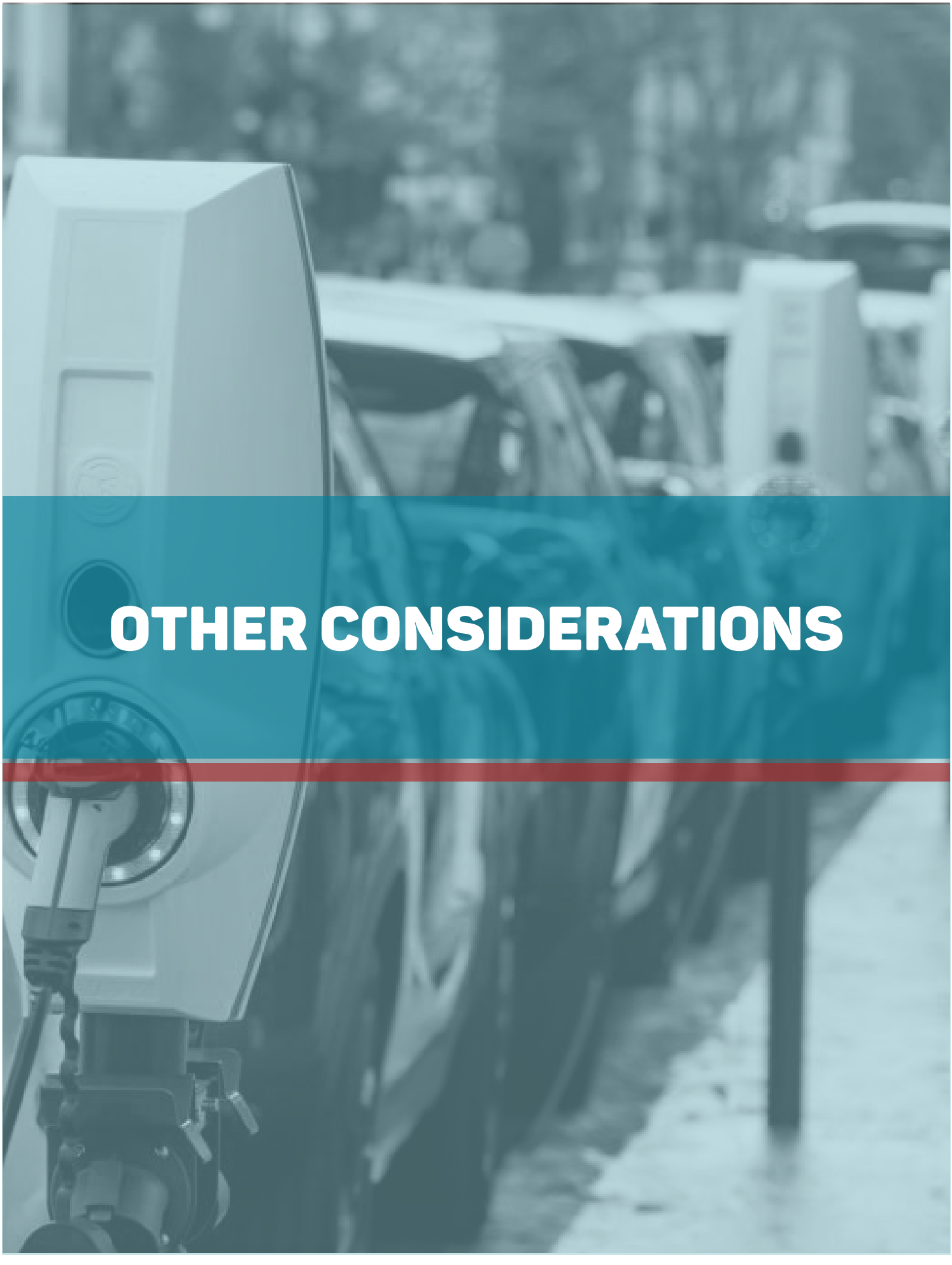
Fresno, California[134]

Municipal Code and Charter of the City of Fresno, California, Section 11-113(e)(6), Electric Vehicle Charging Stations Review Process:

> The Director may not deny an application for a conditional use permit unless it makes written findings based upon substantial evidence in the record that the proposed installation would have a specific, adverse impact upon the public health or safety, and there is no feasible method to satisfactorily mitigate or avoid the specific, adverse impact. The Director's written findings shall include the basis for the rejection of potential feasible alternatives or conditions for preventing the adverse impact. The decision of the Director may be appealed to the City Planning Commission in accordance with the procedures of Section 15-5017.

133 Verbatim from City of Boston, *How-to Guide: Electric Vehicle Charger Installation*, p. 21 (n.d.), https://www.boston.gov/sites/default/files/file/2020/06/How%20To%20Install%20an%20EVSE%20.pdf.

134 Verbatim from City of Fresno, *Code of Ordinances*, Chapter 11, Section 11-113(e)(6), https://library.municode.com/ca/fresno/codes/code_of_ordinances.

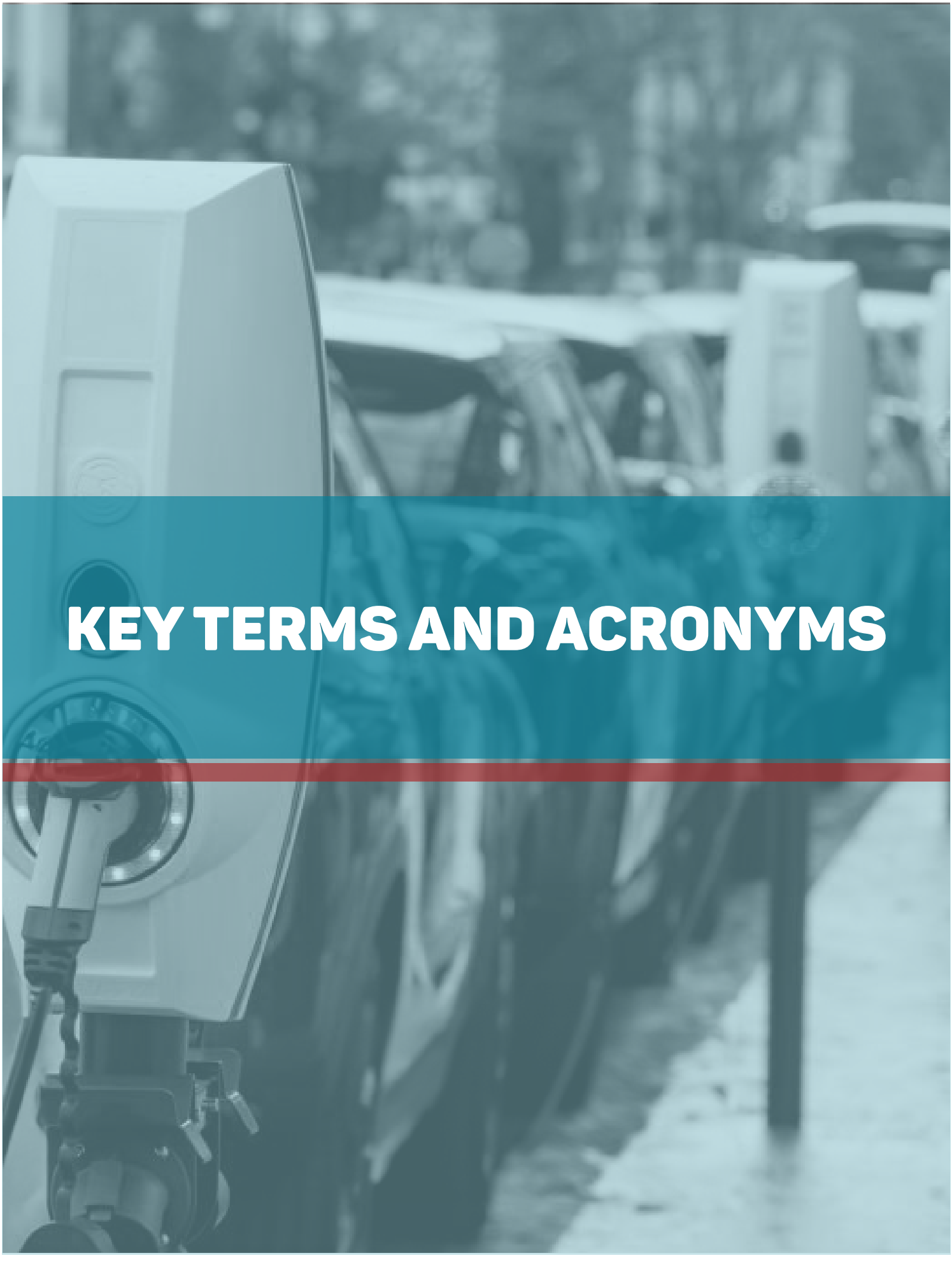


OTHER CONSIDERATIONS

There is a wide range of issues related to EV charging that are not addressed in this document. They include:

- **Regulations for inductive charging installations:** Inductive charging uses a powerful magnetic field to transfer energy wirelessly from a ground-mounted transmitter pad to a receiver on the underside of the vehicle, which in turn transfers that energy to the vehicle battery. Inductive charging is typically used for private fleets (e.g., transit buses, shuttle buses, and taxis) that equip their vehicles with receivers matched with transmitters that are installed in specific locations where vehicles are likely to be stopped for sufficient time to charge. It may also be used by an individual at a dedicated charging location. There are currently no EVs sold with original equipment manufacturer (OEM) inductive systems. If inductive charging becomes more widespread and standardized, there may be a demand for public installations.
- **Regulations regarding payment access to permitted chargers:** Some EV chargers use payment systems that require a membership or unique smartphone app, and they do not accept payment with a credit card. Municipalities may want to require that all public chargers accept credit cards for ease of use.[135]
- **Proprietary chargers:** AHJs may wish to treat the deployment of chargers that are not usable by all brands of EVs differently from chargers that can be used by all brands of EVs.
- **Vehicle-to-grid and vehicle-to-building:** EV batteries can provide convenience and economic value to buildings and to the wider electric grid by supplying energy. These uses present technical issues that are addressed in building codes and should not affect the placement of chargers.
- **Charging of fleets and medium- and heavy-duty vehicles at depots:** Charging fleet vehicles—whether light duty, medium duty, or heavy duty—at depots are subject to the same electrical code issues that any similar developments for private facilities are. Regulations for public chargers do not apply.
- **Configuration of charging sites to accommodate vehicles towing trailers or trucks:** Many EV chargers are configured for "head-in" parking. As such, they do not accommodate vehicles that are towing trailers. In addition, many commercial EVs are too wide to fit into parking spaces that are designed for passenger vehicles. Designing some spaces so that vehicles can pull through can alleviate this challenge.
- **Utility tariffs:** Some utilities have rates that are specifically for EV charging. If a charger wants to take advantage of that rate, it may require a meter that is only for EV charging or, in some utility service territories, may be able to use an embedded submetering capability. Before changing tariffs or utility providers, it is important to understand how it will affect any grants or incentives.
- **Ownership and pricing:** Some municipalities own and operate chargers. However, many leave that role to EVSPs and have a contractual arrangement to share revenue or have a lease payment for chargers on municipal property. In cases where the municipality is involved in setting the pricing, it is important to incorporate all costs (capital, demand charges, etc.) to understand what pricing level is needed for cost recovery.
- **Weights and measures:** Like any other commercial transaction that is based on the accuracy of a weighing or measuring device, EV charging that is sold on a $/kWh basis in a commercial transaction is subject to certain requirements. Pricing may also vary with the charging power that is provided.

135 The California Air Resources Board provides language that addresses this issue in *Electric Vehicle Supply Equipment Standards Regulation Background and FAQs*, https://ww2.arb.ca.gov/resources/documents/electric-vehicle-supply-equipment-standards-regulation-background-and-faqs.



KEY TERMS AND ACRONYMS

The following terms and acronyms that are used in this document are defined below.

Authority Having Jurisdiction (AHJ): "An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation or a procedure."[136] This entity is generally a municipal government. However, it may also be a county, state, or other entity.

EV charger readiness[137] generally requires a certain number of parking spaces at specified property types to meet one of three types of requirements for building permit sign-off:[138]

- **EV-Capable:** A designated automobile parking space that is provided with electrical infrastructure, such as, but not limited to, raceways, cables, electrical capacity, and panelboard or other electrical distribution equipment space, necessary for the future installation of an EVSE.
- **EV-Ready:** An automobile parking space that is provided with a branch circuit and either an outlet, junction box or receptacle, that will support an installed EVSE.
- **EVSE-Installed:** An automobile parking space that is provided with a dedicated EVSE connection.

Electric vehicle (EV): An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles, and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, EVSE, a rechargeable storage battery, a fuel cell, a photovoltaic array, or another source of electric current.

Electric vehicle supply equipment (EVSE): Equipment for plug-in power transfer including the ungrounded, grounded and equipment grounding conductors, and the electric vehicle connectors, attachment plugs, personal protection system and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

Electric vehicle charging station (EVCS): Many jurisdictions use the term "EVCS" rather than "EVSE." Because of this, these terms are sometimes used interchangeably in this document.

EV Charger Infrastructure Terminology

This document uses the following charging infrastructure definitions, taken directly from the U.S. Department of Energy AFDC.[139] Note that some jurisdictions use other terminology or apply some of these terms differently:

- **Station Location:** A station location is a site with one or more EVSE ports at the same address. Examples include a parking garage or a mall parking lot.
- **EVSE Port:** An EVSE port provides power to charge only one vehicle at a time even though it may have multiple connectors. The unit that houses EVSE ports is sometimes called a charging post, which can have one or more EVSE ports.
- **Connector:** A connector is what is plugged into a vehicle to charge it. Multiple connectors and connector types (such as CHAdeMO and CCS) can be available on one EVSE port, but only one vehicle will charge at a time. Connectors are called plugs.

The following diagram, also from AFDC, illustrates this terminology. Note that one charging station can have multiple EVSE ports, and each EVSE port can have one or more connectors.

EV charger: For familiarity, this document uses the terms "EV charger" and "charger" to refer to both EV charging stations and the unit that houses EVSE ports and related equipment. The preceding terminology from AFDC is used where precision is required.

Electric vehicle service provider (EVSP): "EVSP" is the technical term that is used for the providers of EVSE. An EVSP is a public or private entity that develops charging stations and often is a station development company, manufacturer of EVSE, investor-owned or publicly owned utility, automaker, nonprofit, or other interested party.[140]

136 NFPA 1 Fire Code 2021, 3.2.2. p. 35
137 Some jurisdictions (e.g., New Jersey) use the term "Make-Ready" instead. This document avoids that term because of possible confusion with utility make-ready programs.
138 The definitions for EV-Capable, EV-Ready, EVSE-Installed, electric vehicle, and electric vehicle supply equipment are taken verbatim from draft text for the 2024 IECC that was provided by Tesla. The content of the 2024 IECC is currently in development and is not final until it has been published.
139 AFDC Developing Infrastructure.
140 GO-Biz EV Guidebook, Footnote 5, p. VI.

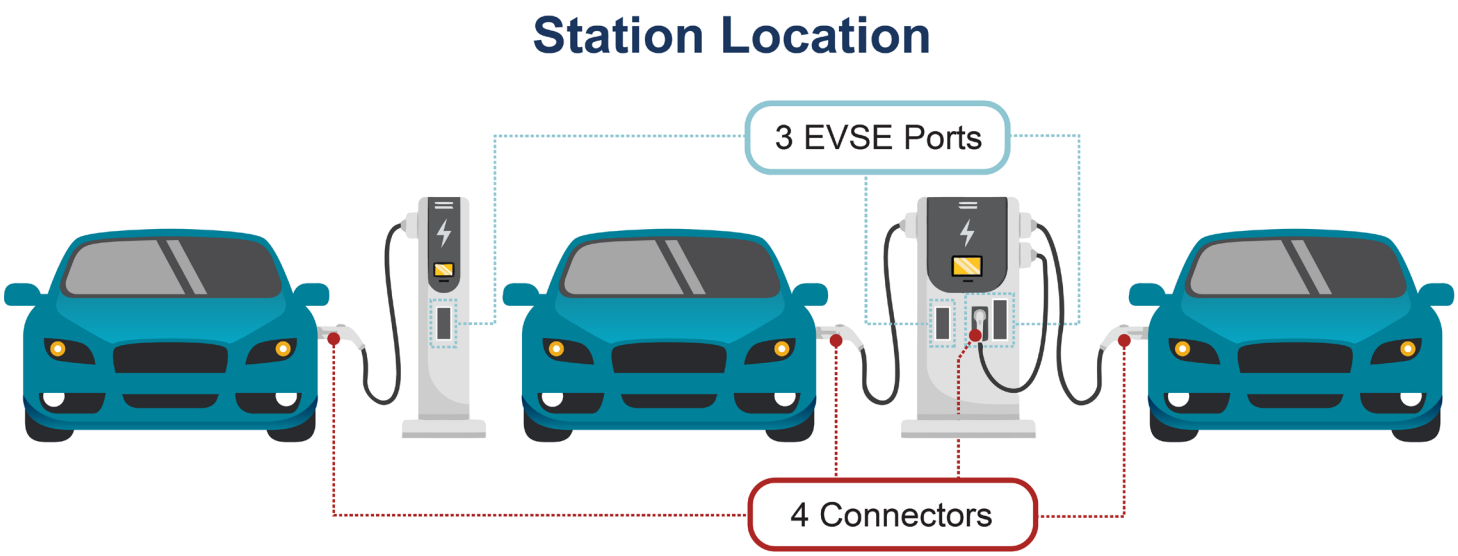


Figure 6. The U.S. Department of Energy Alternative Fuels Data Center defines the components of EV charging infrastructure.

Public and Private EV Chargers[141]

The *Municipal EV Readiness Toolkit* from the Southern Maine Planning & Development Commission & Maine Clean Communities Coalition provides the following definitions:

Electric vehicle charging station – private restricted use means an electric vehicle charging station that is:

- Privately owned and restricted access (e.g., single-family home, executive parking, designated employee parking, assigned parking at multi-family residential buildings); or
- Publicly owned and restricted (e.g., fleet parking with no access to the general public).

Electric vehicle charging station – public use means an electric vehicle charging station that is:

- Publicly owned and publicly available (e.g., Park & Ride parking, public library parking lot, on-street parking); or
- Privately owned and available to visitors of the use [sic] (e.g., shopping center parking).

Zoning Use Cases

- **Primary use:** A primary use is the principal or dominant use of the parcel of land (e.g., a restaurant, office, retail sales and service, or commercial parking).
- **Accessory use:** A use that is incidental and subordinate to the principal use of the parcel of land on which it is located.
- **Permitted use:** Use of property and structures in manners consistent with those that are listed as permissible in the zoning district in which the property is located. A permitted (aka "by-right") use is not subject to special review and approval by a local government. A development proposal may still be required to obtain a zoning permit to demonstrate that the project owners are developing the property as the zoning ordinance intended.
- **Conditional use:** A use that is permitted subject to compliance with a set of conditions or requirements set forth in the zoning ordinance, a limited exception to the zoning ordinance, or a use that allows someone to use their property in nonconforming ways. Approval is subject to a conditional use permit.
- **Conditional use permit:** A permit that requires discretionary approval from the local jurisdiction for a use that is not allowed as by-right in a zone. Permit approval often requires the AHJ to consider concerns from neighboring property owners and to evaluate the project's consistency with local plans. Conditional use permits are typically reviewed and approved by local zoning boards or commissions.

141 Definitions verbatim from Southern Maine Toolkit.

APPENDIX

APPENDIX A: CALIFORNIA REQUIREMENTS FOR EV CHARGING STATION ACCESSIBLE SPACES

ACCESSIBLE EV CHARGING STATION (EVCS) REQUIREMENTS

Total Number of EVCS at a Facility[1]	Minimum Number (by type of EVCS Required to Comply with Section 11B-812)		
	Van Accessible	Standard Accessible	Ambulatory
1 to 4	1	0	0
5 to 25	1	1	0
26 to 50	1	1	1
51 to 75	1	2	2
76 to 100	1	3	3
101 and over	1, plus 1 each 300 or fraction thereof, over 100	3, plus 1 each 60, or fraction thereof, over 100	3, plus 1 each 50, or fraction thereof, over 100

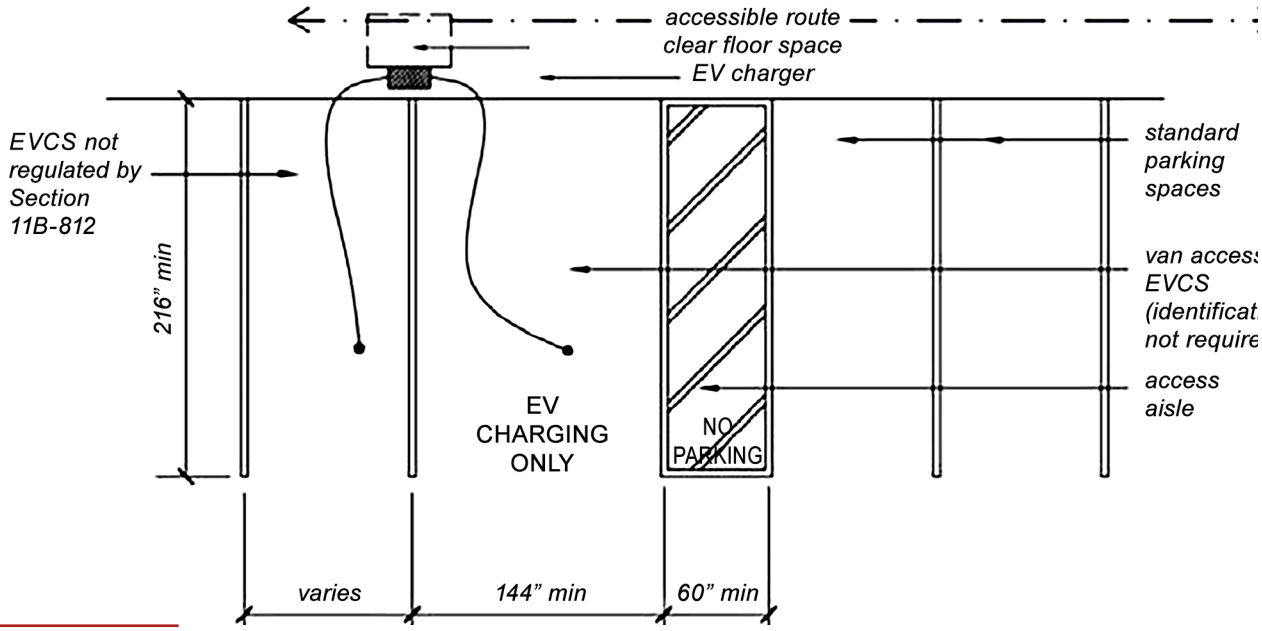
[1] Where an EV charger can simultaneously charge more than one vehicle, the number of EVCS provided shall be considered equivalent to the number of electric vehicles that can be simultaneously charged.

Source: GO-Biz, Electric Vehicle Charging Station Permitting Guidebook, Second Edition, Table 1.

SAMPLE EV CHARGING STATION LAYOUTS

The following illustrations are from the GO-Biz Electric Vehicle Charging Station Permitting Guidebook, Second Edition.[142]

FIGURE 1: TWO EVCS = ONE VAN ACCESSIBLE EV SPACE REQUIRED



142 GO-Biz EV Guidebook.

FIGURE 2: FIVE EVCS = TWO ACCESSIBLE EV SPACES REQUIRED

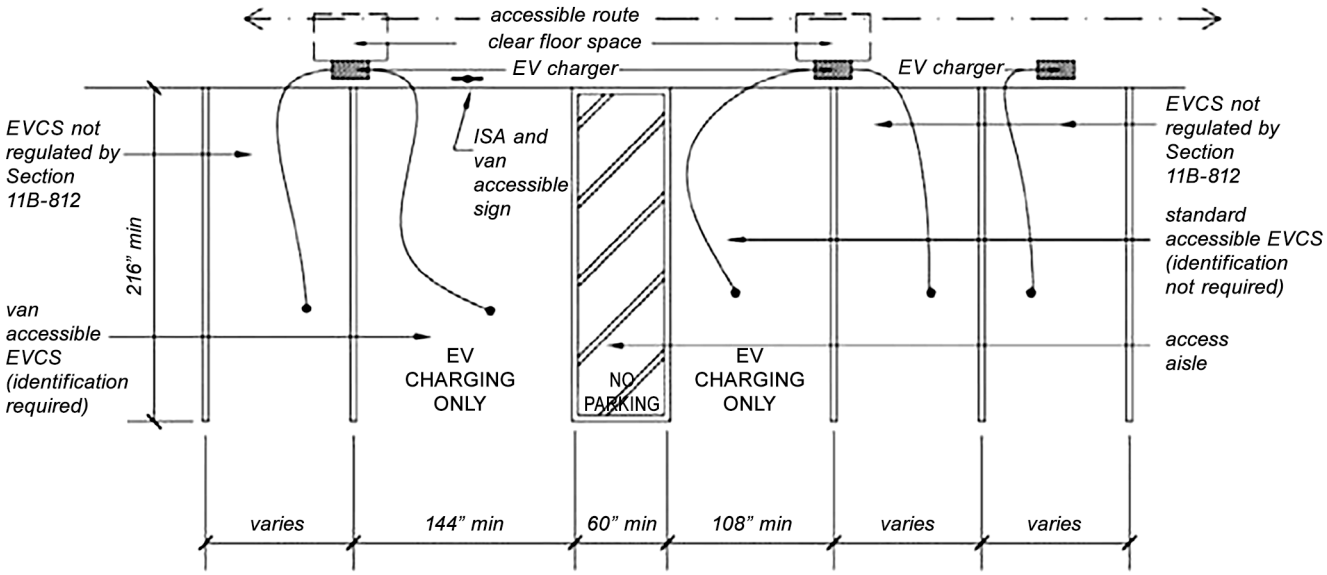


FIGURE 3: 26 EVCS = THREE ACCESSIBLE EV SPACES REQUIRED

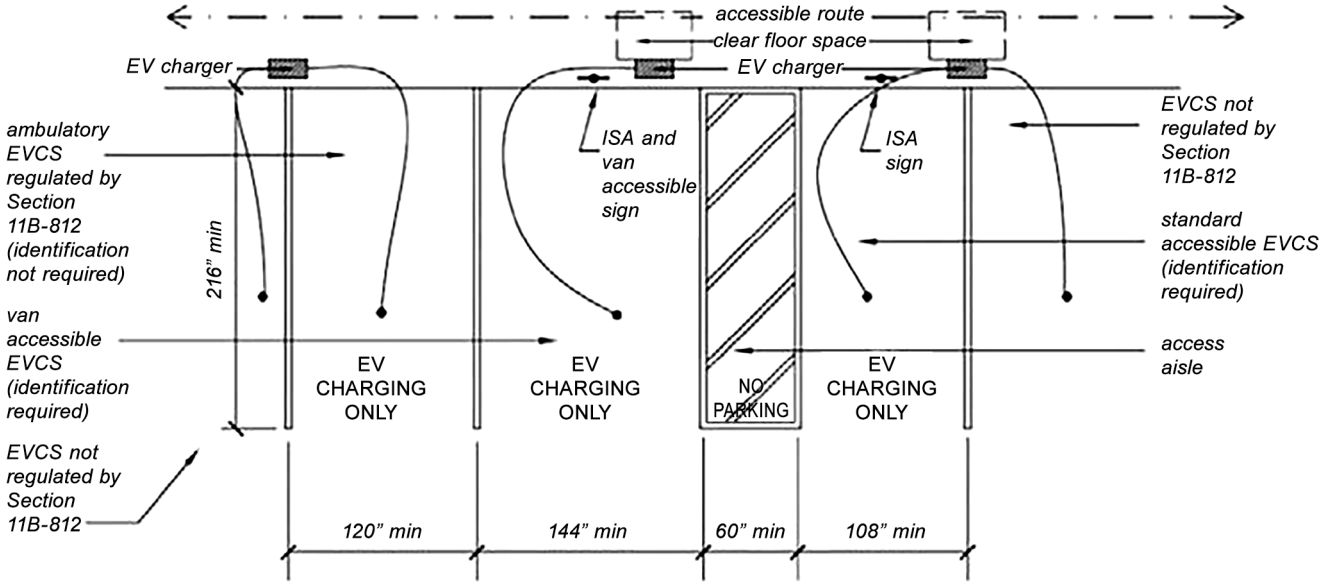
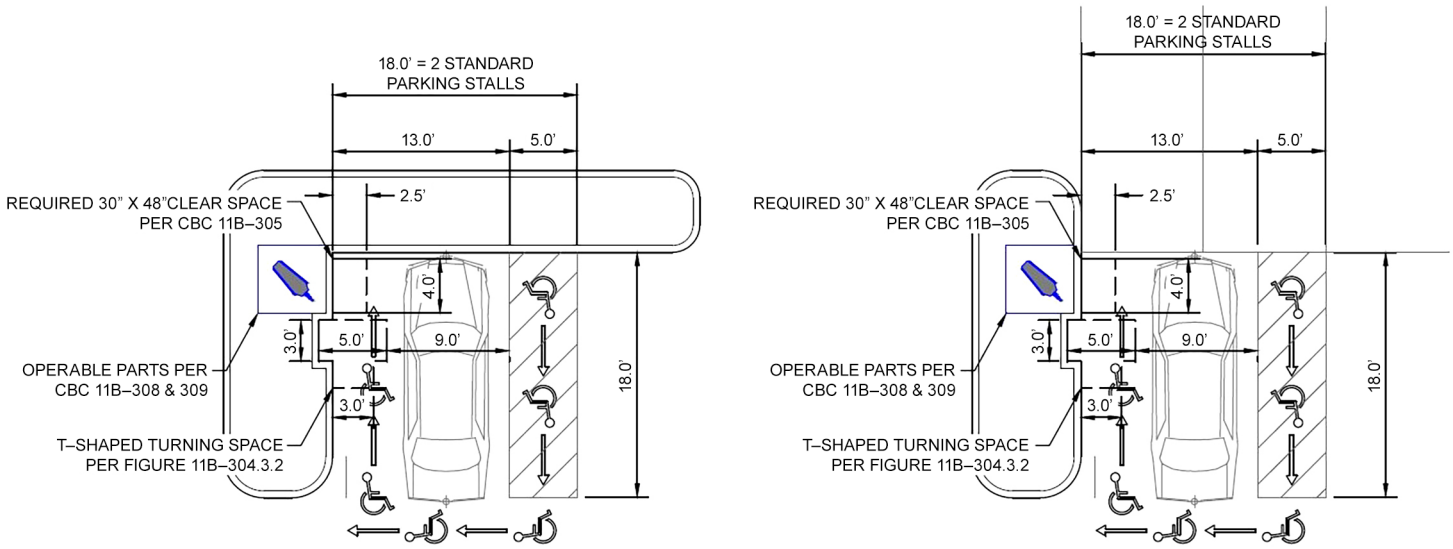


Figure 4: Curb Cut Design



APPENDIX B: EXAMPLES OF EV CHARGER READINESS STANDARDS

PROPOSED IECC 2024 COMMERCIAL PROVISIONS—TABLE C405.14.1

C405.14.1 Quantity The number of required EV spaces, EV capable spaces and EV ready spaces shall be determined in accordance with this Section and Table C405.14.1 based on the total number of automobile parking spaces and shall be rounded up to the nearest whole number. For R-2 buildings, the Table requirements shall be based on the total number of dwelling units or the total number of automobile parking spaces, whichever is less.

EV-READY INFRASTRUCTURE REQUIREMENTS

TABLE C405.14.1, REQUIRED EV POWER TRANSFER INFRASTRUCTURE[143]

Occupancy[a]	EVSE Spaces	EV Ready Spaces	EV Capable Spaces
Group A (Assembly)	10%	0%	10%
Group B (Business)	15%	0%	30%
Group E (Educational)	15%	0%	30%
Group F (Factory and Industrial)	2%	0%	5%
Group H (High Hazard)	1%	0%	0%
Group I (Institutional)	15%	0%	30%
Group M (Mercantile)	15%	0%	30%
Group R-1 (Residential–Hotels)	20%	5%	75%
Group R-2 (Multiunit Dwellings)	20%	5%	75%
Group R-3 and R-4 (Misc. Housing)	2%	0%	5%
Group S (Storage) exclusive of parking garages	1%	0%	0%
Group S-2 parking garages	15%	0%	30%

a. Each of the groups in this column represents a different occupancy classification as defined by the 2021 International Building Code. For full group descriptions see https://codes.iccsafe.org/content/IBC2021P2/chapter-3-occupancy-classification-and-use

143 Verbatim from The International Energy Conservation Code-Commercial Proposed Legislative Changes to Public Comment Draft #1 Based on Committee Action Report (5/8/23), pp. 175 and 176, https://www.iccsafe.org/wp-content/uploads/IECC-CE-PCD1-CAR-legislative.pdf. The content of the 2024 IECC is currently in development and is not final until it has been published.

FLAGSTAFF, ARIZONA, EV-READY INFRASTRUCTURE REQUIREMENTS[144]

Parking Spaces Provided	EV-ready Parking Spaces Required
1-19	None
20-50	One (1)
51-100	Two (2)
100+	Three (3)

2022 CALGREEN

NONRESIDENTIAL MANDATORY MEASURES EV CHARGER READINESS STANDARDS[145]

Total Number of Actual Parking Spaces	Number Of Required EV Capable Spaces	Number of EVCS (EV Capable Spaces Provided with EVSE)[1]
0-9	0	0
10-25	4	0
26-50	8	2
51-75	13	3
76-100	17	4
101-150	25	6
151-200	35	9
201 and over	20 percent of total[2]	25 percent of EV capable spaces

1 The number of required EVCS (EV capable spaces provided with EVSE) in column 3 count toward the total number of required EV capable spaces shown in column 2.

2 Calculation for spaces shall be rounded up to the nearest whole number.

144 City of Flagstaff, Flagstaff City Code, Title 4, Building Regulations, Table 429.1, p. 8 (May 14, 2019), https://www.flagstaff.az.gov/DocumentCenter/View/61147/2019-AMENDMENTS-TO-FLAGSTAFF-CITY-CODE-TITLE-4-BUILDING-REGULATIONS-FINAL?bidId=.

145 ICC, 2022 California Green Building Standards Code, Title 24, Part 11, Table 5.106.5.3.1 (July 2022), https://codes.iccsafe.org/content/CAGBC2022P1/chapter-5-nonresidential-mandatory-measures.

APPENDIX C: SAMPLE EV CHARGER APPLICATION FORMS

West Hollywood, California, EV Charger Permitting Checklist, From

https://www.weho.org/home/showpublisheddocument/36249/636602505562930000

After it has been completed, the application is submitted online or in person.

Permitting Checklist for Electric Vehicle Service Equipment

City of West Hollywood California 1984

WEST HOLLYWOOD
8300 Santa Monica Boulevard West Hollywood, CA 90069-6216

Building & Safety Division
tel 323 848.6475 fax 323.848.6569

PERMITTING CHECKLIST FOR ELECTRIC VEHICLE SERVICE EQUIPMENT FOR Existing RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

Please complete the following information related to permitting and installation of electric vehicle chargers/ electric vehicle service equipment (EVCS / EVSE) as a supplement to the application for a electrical and/or building permit. This checklist contains the technical aspects of EVSE installations and is intended to help expedite permitting and use for electric vehicle charging.

This checklist substantially follows the *"Plug-In Electric Vehicle Infrastructure Permitting Checklist"* contained in the *Governor's Office of Planning and Research "Zero Emission Vehicles in California: Community Readiness Guidebook"* and is purposed to augment the guidebook's checklist.

Qualifying EVCS / EVSE will be processed similarly to nondiscretionary permits (zone clearance). New EVCS / EVSE that are found to adversely impact public health and safety will not qualify for the streamlined permitting process. A Zone Clearance permit (granted by the Planning Division) shall not be conditioned on approval of an application of an association (*https://www.opr.ca.gov)*.

Job Address:	Permit No.
☐ Single-Family ☐ Multi-Family (Apartment) ☐ Multi-Family (Condominium) ☐ Commercial (Single Business) ☐ Commercial (Multi-Business) ☐ Mixed-Use ☐ Public Right-of-Way	
Location and Number of EVSE to be Installed: Garage _____ Parking Level(s) _____ Parking Lot _____ Street Curb _____	
Description of Work:	

Permitting Checklist for Electric Vehicle Service Equipment

1

Permitting Checklist for Electric Vehicle Service Equipment

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California 1984

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tel 323 848.6475 fax 323.848.6569

Applicant Name:	
Applicant Phone & email:	
Contractor Name:	License Number & Type:
Contractor Phone & email:	
Owner Name:	
Owner Phone & email:	

EVSE Charging Level: ⊓ Level 1 (120V) ⊓ Level 2 (240V) ⊓ Level 3 (480V)	
Maximum Rating (Nameplate) of EV Service Equipment = _____ kW	
Voltage EVSE = _____ V	Manufacturer of EVSE: _____
Mounting of EVSE: ⊓ Wall Mount ⊓ Pole Pedestal Mount ⊓ Other _____	

System Voltage: ⊓ 120/240V, 1ϕ, 3W ⊓ 120/208V, 3ϕ, 4W ⊓ 120/240V, 3ϕ, 4W ⊓ 277/480V, 3ϕ, 4W ⊓ Other _____
Rating of Existing Main Electrical Service Equipment = _____ Amperes
Rating of Panel Supplying EVSE (if not directly from Main Service) = _____ Amps
Rating of Circuit for EVSE: _____ Amps / _____ Poles
AIC Rating of EVSE Circuit Breaker (if not Single Family, 400A) = _____ A.I.C. *(or verify with Inspector in field)*

Permitting Checklist for Electric Vehicle Service Equipment

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Specify Either Connected, Calculated or Documented Demand Load of Existing Panel:
• Connected Load of Existing Panel Supplying EVSE = _____ Amps
• Calculated Load of Existing Panel Supplying EVSE = _____ Amps
Demand Load of Existing Panel or Service Supplying EVSE = _____ Amps *(Provide Demand Load Reading from Electric Utility)*
Total Load (Existing plus EVSE Load) = _____ Amps
For Single Family Dwellings, if Existing Load is not known by any of the above methods, then the Calculated Load may be estimated using the "Single-Family Residential Permitting Application Example" in the Governor's Office of Planning and Research "Zero Emission Vehicles in California: Community Readiness Guidebook" https://www.opr.ca.gov

EVSE Rating _____ Amps x 1.25 = _____ Amps = Minimum Ampacity of EVSE Conductor = # _____ AWG
For Single-Family: Size of Existing Service Conductors = # _____ AWG or kcmil or - : Size of Existing Feeder Conductor Supplying EVSE Panel = # _____ AWG or kcmil *(or Verify with Inspector in field)*

I hereby acknowledge that the information presented is a true and correct representation of existing conditions at the job site and that any causes for concern as to life-safety verifications may require further substantiation of information.

Signature of Permit Applicant: _____ Date: _____

Permitting Checklist for Electric Vehicle Service Equipment

Fresno, California, Submittal Requirements for EV Charging Station Applications, From

https://www.fresno.gov/darm/wp-content/uploads/sites/10/2022/06/Electric-Vehicle-Charging-Submittal-Checklist.pdf

City of FRESNO

Planning & Development Department
Development Services Division
2600 Fresno Street, Third Floor, Room 3043
Fresno, CA 93721-3604

Submittal Requirements for Electric Vehicle Charging Station Applications

Required	
	Please use this as a checklist to assemble the materials required for your development application when submitting the application through the Accela Citizen Access (ACA) portal. The following items must be submitted in order to process your application. **If the plans are not legible, or do not contain the information listed below, your application will be deemed incomplete and rejected**. Prior to submitting, check if you qualify for the Electric Vehicle Charging Stations Streamlined Planning Process. If so, you do not need to submit the information below. If you do not qualify, provide the information below.
☐	**Instructions:** 1. All plans and documents must be uploaded in PDF format. 2. A separate PDF document is required for each plan type (i.e., one PDF required for ***all*** site plan documents; one PDF for ***all*** elevation plans; etc.). 3. If ACA portal requires a document type not included on this checklist, upload blank PDF document called "Dummy Document". Make sure you select the required document "Type" from the dropdown list. 4. Please review the EV Charging Stations Handout for examples of information required on the site plan and fees. Once you obtain approval from the Current Planning Division and comply with the conditions, submit plans to the Building Division for building permits.
☐	**Complete Application in ACA portal** A Major Revised Exhibit – Development Permit is required. ☐ Provide full contact information including email addresses for all applicants and/or owners who are stakeholders of the project.
☐	**All Required Fees Paid** **Fees** will be invoiced after application is submitted. All fees must be paid before application is deemed complete. Fees must be paid within three days of fees being invoiced (e-mail will be sent). Please note fees are updated annually on July 1st.
☐	**Deed Documents (Electronic)** (for verification of owner authorization)
☐	**Letter of Owner Authorization** (If Owner is not the Applicant) **(Electronic)** Shall include name phone, address and email.
☐	**Operational Statement:** ☐ Project address & APN ☐ Project description (scope of work) ☐ Number of parking spaces proposed to be removed (if any) ☐ Landscaping/Trees proposed to be removed

Submittal Requirements for EV Charging Station Applications
Updated May 2022

☐	**Overall Site Plan (Electronic, uploaded into ACA portal – does not need to be to scale but shall be legible)** ☐ Outline the entire parcel with an area indicating the scope of work ☐ Property line dimensions & easements ☐ Vicinity map with north arrow ☐ Project address & APN
☐	**Detailed Site Plan (Electronic, uploaded into ACA portal)** Plans shall include (at a minimum) items below.

☐ 1"= 30' scale ☐ North Arrow correctly shown ☐ Easements, both existing and proposed	☐ Fully dimensioned parking stalls that depict the equipment is not in the 9 ft. x 18 ft. stall
☐ Provide the aisle width behind the stall and the opposite stall size if there is parking behind the proposed EV stall.	☐ Add this note: Any survey monuments within the area of construction shall be preserved or reset by a person licensed to practice land surveying in the state of California.
☐ Add this note: Repair all damaged and/or off-grade concrete street improvements as determined by the construction management engineer prior to occupancy.	☐ Add this note: Two working days before commencing excavation operations within the street right-of-way and/or utility easements, all existing underground facilities shall have been located by Underground Services Alert (USA). Call 1-800-642-2444
☐ Accessible EV charging stalls shall comply with Sections 11B-228.3 and 11B-812 of the California Building Code	☐ Property lines and dimensions of property lines

☐	**Elevations (Electronic, uploaded into ACA portal):** Include the height of all stations, transformers, etc.

The application completeness review process is no more than 30 days. If all items on this checklist are not submitted, the application will be deemed incomplete and rejected. If all required items on this checklist are submitted and determined to meet all requirements outlined in this document, the application shall be deemed complete and accepted for processing. Within five days of acceptance, the applicant will be sent an Introduction Letter (via e-mail) discussing the process and the target completion date.

APPENDIX D: IREC SEAC EV CHARGING WORKING GROUP PLANNING, ZONING, & PERMITTING SUBCOMMITTEE PARTICIPANTS

AHJs

American Forest Foundation
Tatiana (Tots) Height

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Crystal Rain

City of Cambridge, MA
Bill Deignan

City of Columbus, OH
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City of Detroit, MI
Tim Slusser

City of Oakland, CA
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Sami Real

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Allison van Pelt

Key Biscayne, FL
Olga Garcia, AICP, CFM

Northbrook, IL
Tessa Murray

St. Louis Park, MN
Sean Walther

Upper Arlington, OH
Justin Milam, AICP

EV Charging Infrastructure Companies/Installers

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Electrify America
Andrew Dick
Chris Kane
Anthony Willingham

EVgo
Sami Ghantous*
Mandeep Guragain

FLO
Cory Bullis

FreeWire Technologies
Jeff Moore
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General Motors
Jamie Hall

Sunrun
Christopher Biron*
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Tesla
Noelani Derrickson
Tessa Sanchez

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Burton Planning Services

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NREL
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NY State Energy R&D Authority (NYSERDA)
Jason Zimbler*

SWEEP
Matt Frommer

UL
Chris Jensen–**EV Charging Working Group Vice Chair**

Vehicle-Grid Integration Council (VGIC)
Zach Woogen

Project Staff

IREC
Toyah Callahan
Ed Gilliland, AICP – **Subcommittee Facilitator**

RMI
Robert Graff–**Subcommittee Chair**

* No longer at organization

APPENDIX E: ORGANIZATIONS AND INDIVIDUALS WHO PROVIDED COMMENTS AND EDITS ON THE *EXPOSURE DRAFT* VERSION OF THIS GUIDANCE

RMI and IREC thank the following individuals and organizations for generously providing thoughtful comments and proposed edits on the *Exposure Draft* version of this document. The authors carefully considered each comment and proposed edit and substantially revised this document in response. The document is greatly improved as a result. The inclusion of a name here does not imply either organizational or individual endorsement of the final document, but simply the authors' appreciation.

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Zach Woogen, VGIC

RMI IREC SEAC
Sustainable Energy Action Committee

Ed Gilliland and Robert Graff. Planning and Zoning Guidance for Electric Vehicle Charger Deployment. Sustainable Energy Action Committee with RMI and the Interstate Renewable Energy Council. August 2023.

https://sustainableenergyaction.org/resources/planning-and-zoning-guidance-for-electric-vehicle-charger-deployment/