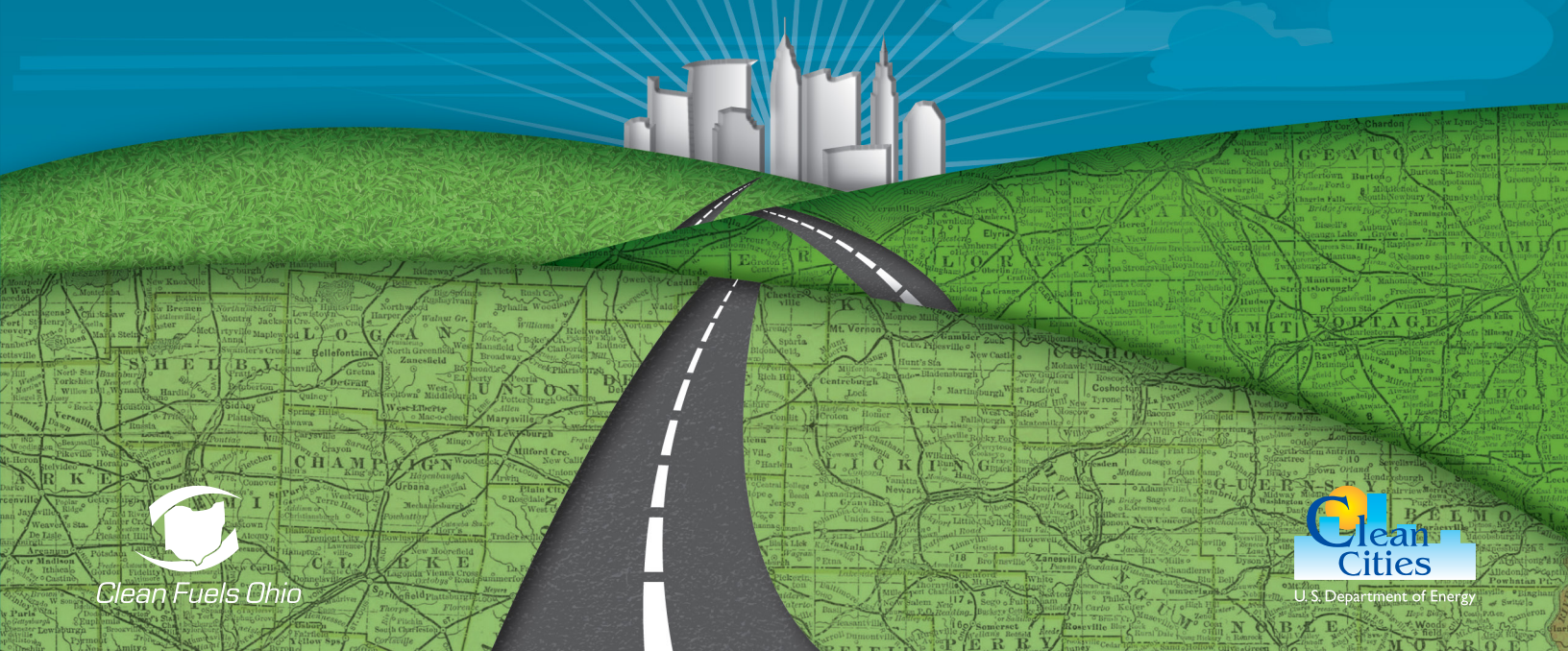
ELECTRIC VEHICLE READINESS PLAN FOR OHIO

Drive Electric Ohio

Supplemental Section:
Model Ordinance and Policy Templates



Clean Fuels Ohio

Clean Cities
U.S. Department of Energy

This page left intentionally blank

ACKNOWLEDGEMENTS

Project Funded by:
U.S. DEPARTMENT OF ENERGY
Dennis A. Smith, National Clean Cities Director
Linda Bluestein, National Clean Cities Co-Director
Erin Russell-Story, Clean Cities Great Lakes Regional Manager

Clean Fuels Ohio
Sam Spofforth, Executive Director
Cynthia Maves, Director of Grant Administration
Charlene Brenner, Grants Coordinator

AECOM Team
Chris Brewer, AECOM, Vice President
Chris Stark, AECOM, Senior Analyst
Grace Troccolo Rink, Quercus Consulting, President
Carolee Kokola, Quercus Consulting, Associate
James Aloisi, KCUS, Inc., Senior Vice President

Special thanks to the City of Columbus Department of Building and Zoning Services for review and comment of the Model Ordinance and Policy Templates.

DISCLAIMERS

This material is based upon work supported by the Department of Energy under Award Number DE-EE0005554.

The Model Ordinance and Policy Templates are designed to provide general guidance to be tailored specifically to needs of a given jurisdiction. Interpretation or adoption of any policy recommendations shall be done in accordance with the guidance of a jurisdiction's corporation counsel or city/county attorney, to ensure that recommendations conform with other municipal codes and policies and meet the goals of the jurisdiction. The adopting jurisdiction will be responsible for ensuring that any recommendations adopted in whole or in part shall meet all other code requirements, even if not specified or referred to herein, to reflect the procedures of the jurisdiction.

Adoption or other use of these recommendations will require monitoring of related policies and updates as needed to reflect advancements of related codes and findings of other standard-setting organizations or federal policies, including but not limited to the National Highway Traffic Safety Administration, National Electric Code, or any other organizations with jurisdiction over codes and standards who may be developing guidelines to address EVs. Excerpts of existing codes or standards are not included in this guide, to ensure that this resource is not made obsolete by future updates to referenced codes as well as to facilitate incorporation by communities that have not adopted the latest version of a code or standard. When adopting policy recommendations, jurisdictions may wish to specify any federal or state codes or other references that dictate the standards for EVSE installation, as well as other municipal regulations that apply, for ease of reference.

This page left intentionally blank

Contents

CODES AND POLICIES SUPPORTING ELECTRIC VEHICLES 1

GENERAL APPROACHES TO USING THE RECOMMENDATIONS 2

DESIGNING A SPECIFIC STRATEGY: A MENU OF OPTIONS FOR CUSTOMIZING EV POLICIES 2

MODEL PERMITTING AND INSPECTION PROVISIONS 4

BACKGROUND AND RATIONALE 4

MODEL PROCEDURAL PROVISIONS 4

CALIBRATION OF RECOMMENDATIONS 9

MODEL ZONING CODE PROVISIONS 11

USE REGULATIONS 11

Model Ordinance and Policy Provisions 12

Calibration of Recommendations 12

PARKING REGULATIONS 12

Model Ordinance and Policy Provisions 12

Calibration of Recommendations 14

MODEL RIGHT-OF-WAY STANDARDS 15

SIGNAGE REGULATIONS 15

Model Ordinance and Policy Provisions 15

Calibration of Recommendations 16

DESIGN STANDARDS FOR ON-STREET ELECTRIC VEHICLE CHARGING STATIONS 17

Model Ordinance and Policy Provisions 17

Calibration of Recommendations 18

MODEL BUILDING CODE PROVISIONS 19

MODEL ORDINANCE AND POLICY PROVISIONS 19

CALIBRATION OF RECOMMENDATIONS 20

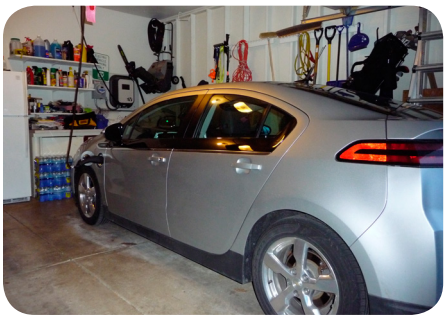
HANDOUTS 21

EV RESIDENTIAL READINESS CHECKLIST 22

EV PERMIT APPLICATION AND INSPECTION PROCESS 24

This page left intentionally blank

Codes and Policies Supporting Electric Vehicles



Introduction

Regardless of where they currently stand in terms of electric vehicle (EV) adoption levels, local jurisdictions throughout Ohio will benefit from engaging EV preparedness on multiple levels. Plug-in electric vehicles are no longer a concept of the future; they are available as real options to consumers across the country, well beyond the cities and metropolitan areas that have been considered established leaders in the planning and implementation processes. The impulses that are contributing to the growth of EV adoption, including the strong national desire to reduce reliance on foreign oil consumption, will continue to energize the movement away from fossil fuels and toward hybrid and all-electric vehicles. The templates offered in this section provide a tool kit for Ohio municipalities seeking to prepare for this ongoing transition.

This is an excellent time to establish clear policies, or to evaluate and revise existing strategies to remove obstacles to Ohio residents choosing EVs or EVs. Even those jurisdictions that aren't ready to specifically encourage EVs can benefit from the ordinance and policy templates in this document, which are designed to not only provide specific recommendations but also serve as guidance to remove real or perceived barriers to existing policies. Whether a municipality considers itself an EV champion, with an existing EV infrastructure network and strong momentum to expand, or more of an observer watching to see how EV adoption and readiness strategies evolve in similar communities, the following recommendations will provide the tools to get a community where it wants to go in terms of EV preparedness and policy.

Just as no two municipalities will have exactly the same goals, there is no one right path to take that leads to EV readiness. This document is structured to tailor a customized path based on the goals and preferences of a local jurisdiction and its stakeholders. The preferred strategies will be selected from a broad menu of options that reflects the spectrum of policy and implementation choices. Complementary strategies are also included to guide local jurisdictions with their decision-making processes and with tracking increases in EV adoption. This document is also designed to allow local jurisdictions to revisit their strategies and facilitate establishing a more aggressive policy strategy as EVs gain further momentum and as local adoption increases.

Overview of the Templates

This chapter contains model ordinance language and policy templates addressing the following four topics:

- Permitting and inspection processes, including procedural recommendations as well as a residential readiness checklist for potential EV owners, to prepare consumers for the required interaction with their jurisdictions.
- Zoning provisions addressing two topics: use and parking standards. Also mentioned in this section are issues that may arise within covenants for homeowner associations and condominium boards that regulate beyond municipal ordinances.
- Right-of-Way provisions addressing two topics: signage and design standards.
- Building Codes, addressing opportunities to integrate EV readiness into local building codes.

The U.S. Department of Energy's (DOE) National Renewable Energy Laboratory (NREL) has launched a new tool to help local and regional leaders assess the readiness of their communities for the arrival of plug-in electric vehicles (PEVs). Available online at DOE's Alternative Fuels Data Center (HYPERLINK "https://www.afdc.energy.gov/pev-readiness" www.afdc.energy.gov/pev-readiness), the PEV Scorecard walks users through a variety of PEV readiness topics, including permitting and inspection processes for charging equipment installations, incentives and promotions, education and outreach, coordination with utilities, likely PEV adoption rates, and long-range infrastructure planning.

These topics are presented in order of anticipated priority for implementation. Residential inquiries for electrical permits for residential charging equipment will likely serve as the first indicator a municipality will receive for increased interest in EVSE installation, therefore reviewing and updating permitting and inspection processes to ensure that the procedure is clear, and to enable permit tracking, will generally take the highest priority. A jurisdiction may then wish to use zoning, right-of-way, and building standards as guidance, with formal amendment upon increasing EV adoption rates that signal demand for implementation.

General Approaches to Using the Recommendations

A Tool for Evaluation: Ensuring that EV Infrastructure is Allowed

When taking the first steps in the readiness process, a municipality may conduct an informal policy audit using these recommendations as a benchmark to determine whether any current policies impede EV implementation and should be targeted for revision. Input from a broad section of stakeholders, ideally serving as an ongoing, advisory EV Task Force, will be useful during this process to ensure that any policy or code revisions will appropriately reflect and support the community's goals.

At a minimum, it is recommended that all Ohio jurisdictions use the ordinance and policy templates to evaluate their existing policies. Population centers, jurisdictions with known EV registrations or infrastructure installations, and other municipalities with interest in facilitating EV adoption should then move beyond this step and begin the process of integrating appropriate provisions within their regulations as guidance or code.

Policy Guidance: Facilitating EV Infrastructure

As an interim step while EV adoption rates increase, a jurisdiction may apply the ordinance and policy templates as general guidance as situations arise. Initially, a jurisdiction may use the recommendations as guidelines for implementation while EV adoption increases; in particular, a jurisdiction may apply select recommendations as design guidelines or as special requirements for projects seeking public funds. Then, after the recommendations have been tested locally as guidelines, the municipality can consider formally adopting or codifying key provisions.

It is recommended that all Ohio jurisdictions interested in facilitating EV readiness, and any Ohio jurisdiction that has received interest or inquiries about EVs, use these ordinance and policy templates as guidance, at a minimum, and consider taking the next steps of formally adopting key provisions.

Adopting Policy Provisions: Actively Encouraging EV Infrastructure

Municipalities experiencing momentum or strong interest in EV infrastructure planning will be likely to benefit from formal adoption of the ordinance and policy templates. For any provisions that are adopted or codified, conformance would be required upon substantial redevelopment, use changes, or in accordance with other triggers as determined by the community's codes/ordinances.

It is recommended that all Ohio jurisdictions interested in actively encouraging EV readiness, and any Ohio jurisdiction that has received interest or inquiries about EVs, should focus on adopting the ordinance and policy templates in whole or in part, calibrated to the degree most in keeping with the goals of the jurisdiction.

Selecting an Approach

Generally, it is recommended that the following jurisdictions be considered priorities for actively encouraging EV implementation; they should take an assertive approach for policy and code revisions.

- Cities that are already actively planning for EV implementation such as Columbus, Cleveland, Cincinnati, Akron, and Bowling Green;
- Jurisdictions along interstate corridors that are anticipated to be midpoint recharging opportunities between population centers; and
- Other municipalities demonstrating commitment or whose residents and other stakeholders are expressing interest or meeting other factors determined in the market study component of this report. Examples would include high existing rates of hybrid vehicle adoption, presence of employers or institutions with EVs in their fleets, and average local vehicle miles traveled of less than 50 miles a day.

A jurisdiction need not choose a single approach and feel compelled to stick to the track initially deemed appropriate. An increased local adoption rate taking place over the coming months and years will be a factor in determining when and how aggressively a jurisdiction should act; a municipality with limited EV interest or readiness plans in place today may transition to an EV champion tomorrow. Jurisdictions should anticipate ongoing evaluation and amendment of EV planning strategies as needed to reflect market realities over time; in the meantime, the Model Ordinance and Policy Templates will help local jurisdictions plan for these next steps.

Designing a Specific Strategy: A Menu of Options for Customizing EV Policies

Recognizing that EV policies and strategies are not one-size-fits-all, the recommendations included within the model ordinance and policy templates are designed to provide a menu of options to be tailored to the specific needs of a given municipality. Each topic should be considered for use separately, and each recommendation should be calibrated separately, as not all provisions will apply to all municipalities.

For example, the recommended zoning provisions include two sections, Use Regulations and Parking Regulations. A jurisdiction may determine that Use Regulations are not applicable if existing code interpretation permits Level 1 and 2 charging stations as of right and there is no anticipated need to incorporate requirements for higher levels of charging infrastructure. That same jurisdiction may see a need for adopting provisions that address Parking Regulations. In this instance, the jurisdiction can adopt the specific provisions in the Parking Regulations section, in whole or in part, to allow, facilitate, or actively encourage the specific provisions, depending on the goals of the jurisdiction.

The following components are included for each topic in the four model ordinance and policy templates below:

Background and Rationale

This section provides a brief explanation of why the topic is important and identifies the contexts for which the recommendations will be most useful.

Model Ordinance and Policy Provisions

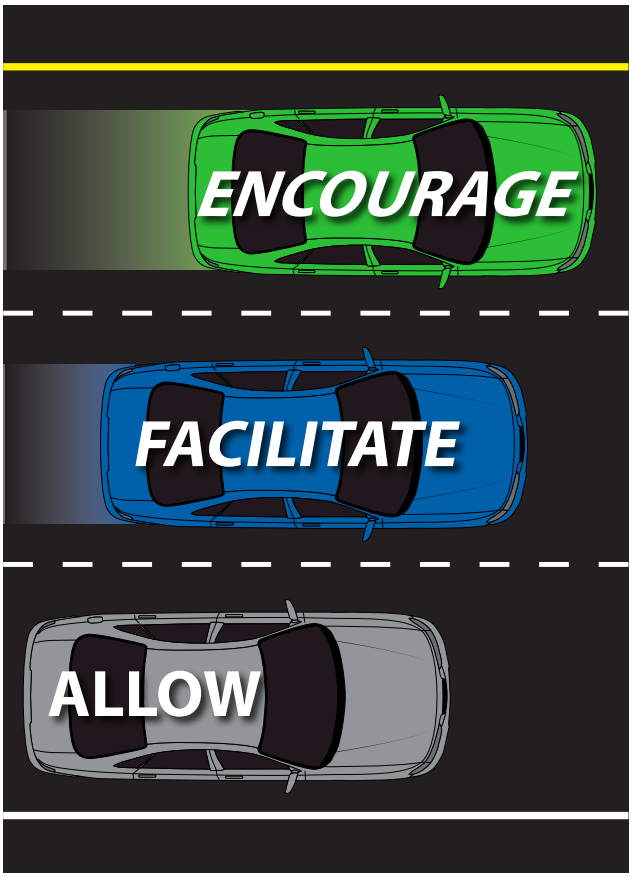
This section includes the actual policy and code provisions to be considered for adoption by the jurisdictions, and addresses related considerations as appropriate. Italicized text is provided for clarification purposes and/or indicates placeholder text to be customized to the jurisdiction.

In the Permitting and Inspection Process policy template, this section is called "Model Procedural Provisions" since its focus is on establishing a streamlined process rather than a specific policy or ordinance.

Calibration of Recommendations

The recommendations are organized to assist a jurisdiction with customizing the provisions framed out in the Model Ordinance and Policy Provisions. Different "lanes" are identified to guide a local jurisdiction with the policy revision process and ensure that the choices made will meet the goals of the jurisdiction.

Recommendations are organized and designated with the use of graphic symbols for ease of reference; the calibration is described as follows:



Slow Lane: Recommendations included in this track ensure that policies and practices supporting EV implementation are ALLOWED. This minimum level of recommendation allows local jurisdictions to identify real or perceived barriers to EV adoption and serves as a tool to remove them. Although this may be considered the "slow lane" of EV readiness, it represents getting on the road, therefore resulting in progress. It is appropriate for local jurisdictions that envision themselves as **followers** in terms of EV planning, who are cautious about readiness preparations but recognize the need to plan for the eventual local adoption of the technology.

Middle Lane: Recommendations included in this track ensure that policies and practices supporting EV implementation are FACILITATED. It builds on the policy guidance of Slow Lane and moves beyond it by promoting the advancement of EV technologies. The Middle Lane is appropriate for local jurisdictions that envision themselves as **fast or aggressive** followers in terms of EV readiness and planning.

Fast Lane:

This track ensures that policies and practices supporting EV implementation are **actively** ENCOURAGED. It includes the most aggressive recommendations appropriate for the levels of EV adoption currently underway in Ohio, and it can be considered the most assertive for setting the stage for widespread adoption. The Fast Lane is appropriate for local jurisdictions that envision themselves as current or future **champions or leaders** of EV implementation.

All Lanes:

Other symbols included in the recommendations will reflect choices appropriate for multiple lanes. For example, the adjacent symbol indicates that a policy decision is appropriate for all municipalities, regardless of how aggressively they wish to plan for or encourage EV readiness.

The recommendations are calibrated with sufficient flexibility to take a more aggressive approach to policy changes determined to be immediate priorities, while allowing a "lighter touch" for lower priorities. For example, a municipality with strong momentum that is eager to be an EV leader may choose the Fast Lane for permitting and zoning purposes, but the Middle Lane or even Slow Lane for Building Codes if it does not foresee a need to exceed existing standards.

Definitions

In the sections addressing model ordinances and policy provisions, all terms that refer to a specific definition are defined in the Appendix. Municipalities adopting recommendations as either guidance or code should consider including applicable definitions within the sections adopted.

This page left intentionally blank

Model Permitting and Inspection Provisions

Background and Rationale

Given the degree to which early adopters will rely on charging equipment at home, establishment of a clear and straightforward municipal permitting process for home chargers ought to be a high priority focus for municipalities.

Recommendations in this section are intended to assist a municipality with reviewing and enhancing its existing permitting process as applicable to EV charging stations. They are also designed to assist municipalities with effectively informing the public of the requirements and setting their expectations for the process.

Model Procedural Provisions

The Model Procedural Provisions, which include the Residential Readiness Checklist for Potential EV Owners and the Permit Application and Inspection Process, form a two-pronged approach to informing potential EV owners about their options for charging and the impact of these choices on the local approval process, while clarifying the overall procedure for the jurisdiction itself. Used together, these provisions will create a tool that facilitates the process from the perspective of both the EV owner and local permitting and inspection bodies. It is recommended that these provisions are developed simultaneously and made readily available on a jurisdiction's website, both on the page of the department with jurisdiction over the review process as well as via intuitive keyword searches.

Step 1. Residential Readiness Checklist for Potential EV Owners

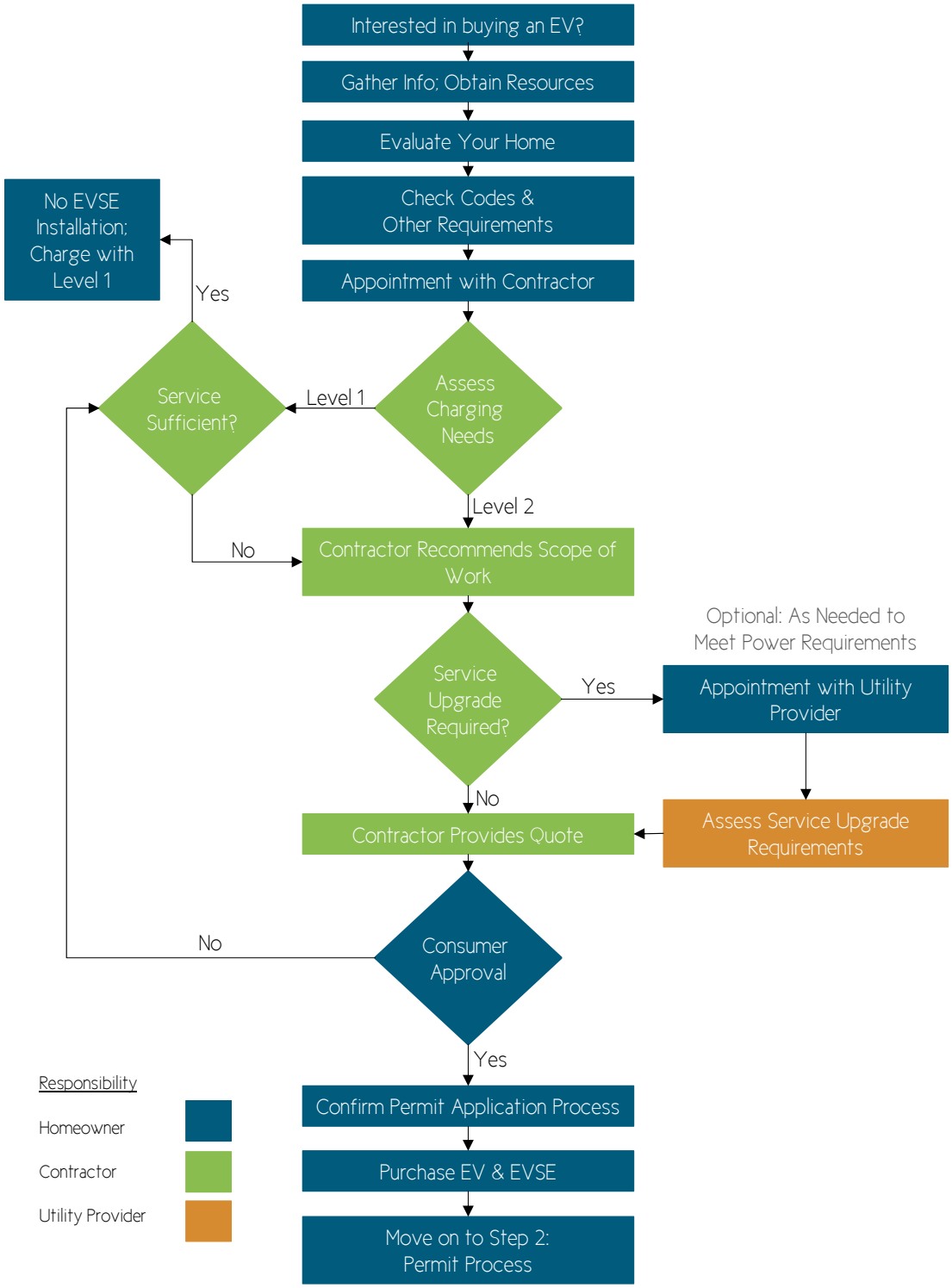
The Residential Readiness Checklist for Potential EV Owners is intended to serve as a resource to inform a potential electric vehicle buyer of typical preparations that will facilitate coordination with the appropriate municipality and power company. This checklist focuses on considerations to guide informed decisions about an EV purchase and evaluation of personal charging needs, while laying the groundwork on appropriate expectations regarding municipal and utility requirements.

Ideally, this Readiness Checklist will be publicized and available to consumers before the electric vehicle is purchased. Outreach to auto dealerships by municipalities or regional planning organizations may be an opportunity to proactively clarify expectations and requirements for charging equipment in a residence, which can benefit both the jurisdiction and the dealership by enhancing the expertise of the sales force.

Level 1: A Viable Alternative to Home Charging Stations

Level 1 charging remains an important and viable option for EV owners who plan to charge overnight at home, a strategy that should be strongly considered especially for single-family homeowners who will be parking in garage spaces that are already wired. A dedicated standard AC circuit within the garage's existing electrical service may be determined to be appropriate for use for regular Level 1 charging. A Level 1 charging cord set is typically provided with the purchase of an EV, so the EV owner would not need to purchase additional charging equipment, and there would be minimal effect to the electrical service of the surrounding neighborhood due to the slower power draw, especially during off-peak usage times.

Figure 1: Residential Readiness Checklist



Step 2: Permit Application and Inspection Process

The Permit Application and Inspection Process builds off the preparatory steps completed by the prospective EV owner in Step 1, outlining the recommended permitting and inspection procedures themselves. This resource is designed to assist municipalities as they evaluate their existing procedures, identify opportunities for efficiencies, and tailor the procedures as needed in accordance with the goals and staffing capacity of the jurisdiction. Jurisdictions should tailor the model template to include their own contact information, website links, utility information, timeframes, and costs. Once established, the process should be publicized to inform the public of the procedures and requirements.

Considerations for Home Owners' Associations and Multi-Family Residential

If your home is part of a home owners' association (HOA), condominium association, or other residential agreement, you will need to consider whether your charging accommodations will require coordination with or approval from management of your residence. Or, if you are involved with management and enforcement of private residential covenants, you may need to evaluate your organization's requirements or your property's configuration to determine how best to address EV charging. In both situations, the considerations can assist with decision-making to address this new technology, if a current or prospective resident is interested in home charging for an electric vehicle, or proactively to address future demand.

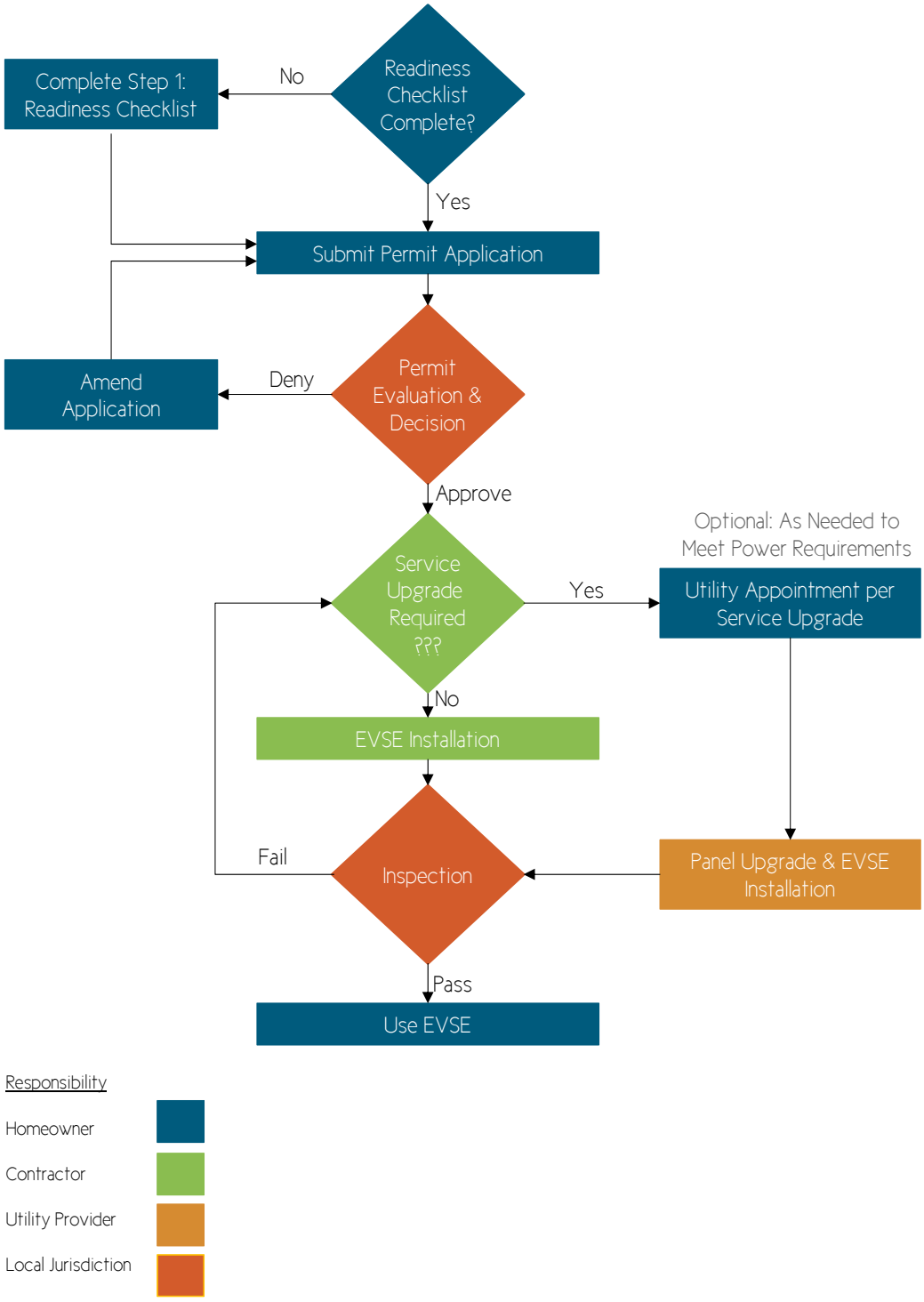
Conflicts between existing agreements and the recommendations mentioned below may create obstacles to the consumer choice of purchasing an EV, so any overly or inadvertently restrictive policies should be evaluated for potential revision or waiver.

Check your covenants or residential agreements to see whether the following points are addressed:

- Charging within a private, dedicated garage should be permitted by right. Any improvements would be the responsibility of the homeowner.
- Charging within a shared garage or parking lot should be accommodated by designating a space for the EV charging station close to existing electrical service to reduce infrastructure costs.
  - Usage agreements should designate whether the managing organization or the EV owner would own any charging equipment installed at the site; raceway and panel upgrades would be retained at the site.
  - Costs such as panel or service upgrades, separate metering, and installation may be shared to reflect the long-term investment in the amenity and short-term use by the interested EV owner, or as otherwise negotiated between managing organization and the resident.
- Requirements that restrict parking in side yards, driveways, or public drives are likely appropriate to remain without revision; charging infrastructure in such locations is less preferable than designated parking areas.

Carefully evaluate all governing provisions, particularly those addressing parking and use of electrical equipment, and check with your building management or governing board to ensure that your plan for EV charging will not conflict with covenants or other agreements. With collaboration and advance planning, there should be opportunity to accommodate the EV pioneer in any residential context.

Figure 2: Recommended Permit and Inspection Process



Related Considerations

Types of Permits

Jurisdictions should review requests for residential or non-residential EVSE installations through their existing standard electrical permit process. Permitting would be required for all installations of Level 2 and, in non-residential situations, DC Fast Chargers, as well as for Level 1 charging only when service must be extended to an unwired garage.

Complex projects involving a scope of work beyond that of a single or stand-alone electrical permit would be handled in a broader construction/development review.

For communities that differentiate types of electrical permits based on level of work required, the following permit scenarios would apply:

Minor/Limited Electrical Permit

A minor or limited electrical permit would allow the installation of a single outlet in a garage with existing adequate service and the connection of a charging station into that outlet, and it would typically involve a single inspection visit. In most cases, the permit would be obtained by a State-licensed, locally registered electrical contractor, in coordination with occupying owners of a dwelling, although some jurisdictions may allow the owners to apply and perform the work themselves.

Full Electrical Permit

A full permit allows partial and full upgrades to a home's electrical service. This could include improvements to accommodate extra power used by the charger, to add or improve service to a garage, or to install a charger on a separate meter if requested by the utility or home owner.

Enhancing the Permit Application and Improving Data Collection

Enhancements to a jurisdiction's permit application will facilitate the review process through a more complete application, and enable a municipality to track local interest and adoption and to plan effectively for community-wide readiness as EV usage increases.

Enhancements to the Electrical Permit Application

In addition to standard information required on a typical electrical permit application, several items are recommended for the permit application form or as an attachment to the application. At a minimum, a check box should be included on permit applications indicating whether the application involves installation of Electric Vehicle Supply Equipment, spelling out the term in text rather than abbreviating. A brief worksheet may be developed as a separate attachment instead of adding the list of items to the electrical permit application itself. A local jurisdiction may also choose to include the Residential Readiness Checklist as a cover page to the worksheet.

Item for addition to existing permit applications:

- Does the scope of work include installation of Electric Vehicle Supply Equipment; if yes, also complete EVSE worksheet and submit with this application *(yes/no check boxes, added below description/scope of work or similar item)*

Items for Electric Vehicle Supply Equipment worksheet:

- Type of Supply Equipment: Level 1, Level 2, DC Fast Charger *(as check boxes)*
- Manufacturer and model number
- Building type: single-family home/townhome, condo, apartment, mixed-use, commercial, industrial, civic/public *(list appropriate building types, as check boxes)*
- For publicly available charging stations, provide information on the station's geographic location
- EV charging station will be located indoors/outdoors *(as check boxes)*
- Is an upgrade to existing service required? *(yes/no check boxes)*
- Name of electricity provider
- Date utility notified of work completed *(Include if utilities request the information to track approvals)*
- Date of installation; date of activation *(for completion by Inspector)*

Additional Opportunities for Data Collection

Data captured from electrical permits will provide a good start to understanding local EV adoption rates. However, municipalities should consider additional opportunities to track usage patterns because Level 1 home charging will not trigger an electrical permit, thereby excluding information on EVs relying on Level 1 usage from the data collection process. Methods for encouraging all EV owners to report basic information about their vehicles or charging needs will improve the local jurisdiction's ability to plan for community-wide readiness. Providing nominal perks to residents in exchange for basic reporting on EV usage is a common strategy for benefitting the EV user as well as the local jurisdiction.

Allowing free parking for plug-in electric vehicles at municipal parking facilities, including garages, lots, and on-street parking spaces, is a low-cost benefit involving a simple application process, with monitoring via a window sticker to qualifying vehicles. Specifically, the benefit should be extended to "plug-in electric vehicles" to ensure that all EVs are included, even those with gasoline-powered range-extending technology. This incentive attracts participation by new EV adopters as well as owners of converted vehicles, the latter of whom are less likely to rely on Level 2 charging or public infrastructure but are important in the broader context of EV usage.

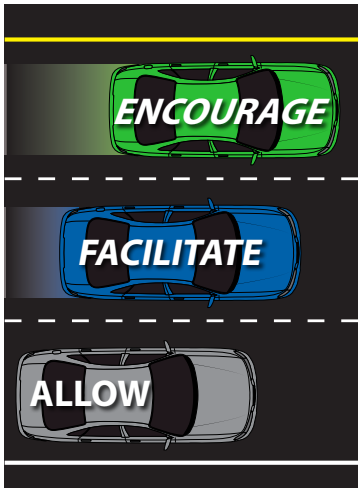
Partnering with utility companies to raffle a Level 2 charging station for home use may be another option for enhancing data collection. This strategy is particularly effective when, in exchange for the charging station, the winner is required to grant permission for the utility and municipality to collect and analyze charging data, in addition to data on the vehicle and building type in which the EVSE is installed.

Establishing a Review and Approval Timeframe

In addition to recommending a clear review and inspection procedure for home EV chargers, this process provides a framework for implementing a 48-hour approval process, in keeping with current expectations nationwide for expediting the approval process. Even those municipalities that are able to process electric permits within this timeframe under their current procedures and workloads are encouraged to set an anticipated turn-around time and emphasize the quick review and approval process for EVSE installation. This will assure residents that, should they choose to purchase an EV, they will be able to charge their vehicles and get on the road quickly. Permit expediting is recommended for municipalities with longer review processes, in accordance with a jurisdiction's capacity, as well as its permitting and planning requirements. Recommendations are provided for streamlining the process, in keeping with national precedents.

Calibration of Recommendations

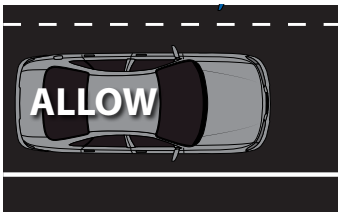
The permitting and inspection process should be calibrated to reflect the goals of the jurisdiction, in accordance with the following options.



All Lanes: Allowing/Facilitating/Encouraging EV Infrastructure

The following recommendations apply to all local jurisdictions. The goal is for communities to evaluate existing policies and establish tools that will guide all EV readiness activities.

- Establish an advisory Task Force comprised of members of the local municipal and/or county permitting and inspection team; electrical contractors; utility providers; EV dealerships; regional entities, businesses, or non-profits seeking to advance EV implementation; and other identified stakeholders. Input from the Task Force will be useful for the following activities:
  - Consider all the partners and steps required within the community and ensure that all interests are represented on the Task Force.
  - Review and test the existing permitting and inspection process that would apply to electrical permits for EVSE.
  - Establish how a municipality would handle straightforward as well as complicated requests, such as for complementary technologies such as a solar canopy powering the EVSE.
  - Determine potential barriers to implementation, and use recommendations as a tool to facilitate the permitting and inspection process.
  - Refer also to the recommendation for an advisory Task Force in the Model Building Code Provisions, which is proposed to address related concerns.
- Enhance information sharing about permitting and inspection procedures, regardless of whether the process is revised, for both municipal/inter-departmental and customer service purposes. Strategically promote the established procedures through the local jurisdiction's website and other avenues deemed appropriate.
- Train inspectors on specialized procedures as adoption increases, in accordance with the capacity of the local jurisdiction. Considerations may include:
  - Establishing an electric vehicle division; a specialized division can assist when permit volumes increase, to meet goals for processing times.
  - Designating specialists within the inspection department, to meet the anticipated permit volumes.
- Explore alternative options to facilitate the process as permitting for EV technology becomes more commonplace, such as the following:
  - Requiring inspection for a designated sample of charging stations installed by an electrical contractor, after sufficient experience is demonstrated such as completion of pertinent courses/training and subsequent successful installation of charging stations.
  - Eliminating plan review (as applicable, if required by current practice); train inspectors on the EVSE technology and allow them to grant permits on-the-spot.
  - Issuing permits instantly to licensed, certified electricians over-the-counter or, if available, online.

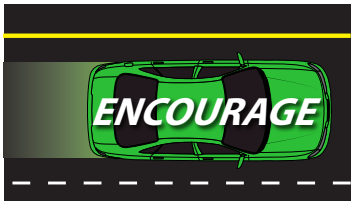


Slow Lane: Allow EV Implementation

Follow recommendations for All Lanes, above. Clarify the permitting and inspection process to ensure that it is appropriate for EV charging stations and adopt accordingly.

Middle Lane: Facilitate EV Implementation

Follow recommendations for All Lanes, above. Streamline the permitting and inspection process with the goal of meeting a 48-hour review and approval timeframe, from application submittal to inspection.



Fast Lane: Encourage EV Implementation

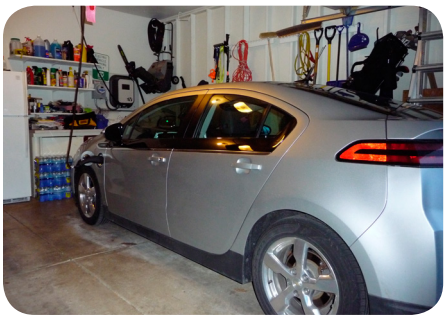
Follow recommendations for All Lanes, above. Streamline and expedite the permitting and inspection process, prioritizing EVSE permit application processing and inspection scheduling, with the goal of meeting a 48-hour or faster review and approval timeframe, from application submittal to inspection. Consider incentives such as waiving permit and inspection fees for installation of residential EVSE.

Key Resources and References

- Advanced Energy, *Community Planning Guide for Plug-In Electric Vehicles,* 2011.
- Alternative Fuels and Advanced Vehicles Data Center, *Permit for Charging Equipment Installation,* Dec. 2011.
- Friends of the Earth, *A Survey of Bay Area Permitting Procedures for Electric Vehicle Charging Infrastructure,* Feb. 2010.
- Puget Sound Regional Council, *Electric Vehicle Infrastructure: A Guide for Local Governments in Washington State,* July 2010.
- City of Columbus, OH, *Residential EV Charging Station Permitting,* 2012.
- City of Raleigh, NC, *EVSE Installation Process for Single-Family Homes,* 2011.
- National Fire Protection Association. *NFPA 70: National Electric Code (NEC).* 2007.

This page left intentionally blank

Model Zoning Code Provisions



Two separate topics are addressed in the recommended zoning code provisions: Use Regulations and Parking Regulations.

It is anticipated that, for code purposes, many jurisdictions will address new EVSE for private use in accordance with the established process for permitting new wiring to support a first-time installation of a major appliance such as an electric stove or dryer, which would require an electrical permit but otherwise be allowed as of right for zoning purposes. In this instance, only the provisions addressing publicly accessible infrastructure need be considered for incorporation into codes. Parking Regulations will become more important for a jurisdiction to address as EV adoption increases, however, Accessible Parking Requirements will apply to most non-residential settings and Design Requirements are strongly recommended for use as guidelines. Further, the Parking Regulations section includes additional guidance typically not appropriate for formal incorporation into a zoning code; this supplementary language is italicized and may be appropriate for inclusion in parking lot standards or design guidelines.

Use Regulations

Typically, Level 1 and Level 2 chargers used in a private residence are allowed in zoning codes as of right by many municipalities. However, zoning codes may need to be revised to address more intensive uses such as DC Fast Charging and other uses supporting EV infrastructure, such as battery exchange stations. Specifying EV uses in zoning codes explicitly allows particular types of EV-related uses in designated districts either as a primary or accessory use.

Municipalities should consider use issues within the context of their zoning codes, but it may be appropriate to wait to adopt provisions until EV adoption advances to the point that there are inquiries about DC Fast Charging, battery exchange stations, or similar services to the department with jurisdiction over electrical permits.

Table 2: Accessory Uses

EV Use	General Zoning Classification						
	Residential: Low/Med Density	Residential: Med/High Density	Mixed-Use; Neighborhood Retail	Commercial	Industrial	Institutional	Public/Civic
Level 1 or 2 Charging Stations	P	P	P	P	P	P	P
DC Fast Charging	C	C	C	P	P	P	P
Battery Exchange Facility (or similar)	–	–	–	C	P	P	–

P = Permitted as of right; subject to compliance of all other municipal regulations
C = Conditional or Special Use; subject to additional review or restriction (as determined by municipality)
– = Not permitted

The recommendations use general zoning designations to establish continuity among jurisdictions. These general terms must be tailored to match the specific districts adopted by the municipality.

Model Ordinance and Policy Provisions

Primary Uses

Any electric vehicle charging station, battery exchange facility, or similar facility serving as a primary land use shall meet the requirements of an auto service station per the requirements of this code.
Add "Electric Vehicle Charging Stations and Battery Exchange Facilities" to appropriate Use category, if needed.

Accessory Uses

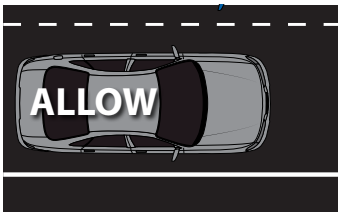
Any electric vehicle charging station, battery exchange facility, or similar facility serving as an accessory use shall be permitted as follows (see Table 2 below):

Related Considerations

- Jurisdictions whose codes permit Level 1 and Level 2 charging stations for private or residential uses as of right do not need to adopt provisions for these technologies, provided they do not function as a primary land use.
- EV chargers in low-density residential districts are allowed only for private ownership and use; publicly shared charging stations may be installed as an amenity, similar to car-share spaces, in all other districts.

Calibration of Recommendations

Zoning provisions addressing use regulations should be calibrated to reflect the goals of the jurisdiction, in accordance with the following options.

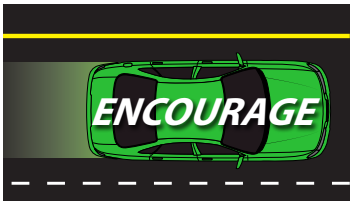


Slow Lane: Allow EV Implementation

If Levels 1 and 2 are allowed as Accessory Uses in all zoning districts as of right, no amendment suggested; otherwise, adopt Accessory Use provisions addressing Levels 1 and 2.

Middle Lane: Facilitate EV Implementation

Adopt all applicable Accessory Use provisions.



Fast Lane: Encourage EV Implementation

Adopt all applicable Primary and Accessory Use regulations.

Parking Regulations

As EV adoption increases, municipalities will benefit from guidance and, over time, adopting regulatory language to establish parking regulations that address EV charging stations. Clear guidelines will also assist business owners who are considering installing charging stations as a service to their customers and employees, in keeping with the current trend for providing this amenity.

This section addresses parking lot configurations, including recommended layout and location of spaces, signage, and other features.

Although directional signage is standardized in the Manual for Uniform Traffic Control Devices, federally adopted regulatory signs addressing electric vehicles have not been established. Recommended regulatory signage adapted from existing federal standards is provided; refer to Right-of-Way standards for signage examples. The provisions recommended within the zoning code are specific to application within a private site.

Consideration of requirements for EV charging station design under the Americans with Disabilities Act is needed, as there are currently no federally mandated requirements guiding compliance for parking spaces incorporating EVSE under the ADA. However, the State of California has developed standards that interpret general guidance of the ADA provisions to EV charging stations, which several states have adopted. The recommendations provided herein also follow this existing policy precedent, and additional guidance for preferred site layout is included in EV Charging for Persons with Disabilities (Sustainable Transportation Strategies, 2012). Further, parking facilities accessible for persons with disabilities shall be in compliance with or better than the most recent standards of the accessibility provisions of the Ohio Building Code, including number, dimensions, location, and related features.

For the near-term, until EV ownership and use become more commonplace locally, these provisions will be useful to municipalities as guidance rather than mandatory regulations that are adopted into codes. These model parking regulations are designed to apply to both new construction and retrofits.

Model Ordinance and Policy Provisions

Ratio / Minimum Requirements

No minimum number of EV charging stations is required for new construction or redevelopment. Any parking space accommodating an EV charging station shall meet all requirements applying generally to parking spaces, per other provisions of the Zoning Code, including but not limited to side yards, setbacks, and driveways, as applicable by zoning district. The first of any EV parking spaces shall be accessible in accordance with the provisions of the Americans with Disabilities Act; refer to Accessible Parking Requirements below for information on required ratios and design.

Considerations for Calculation of Parking Ratio

Parking spaces dedicated for EV charging shall be included in the calculation for minimum required parking spaces that are required pursuant to other provisions of code.

Additional Guidance: Existing policy precedents currently in place allow an EV charging station to be included in the calculation for minimum

Future Considerations: As adoption levels increase, determine ratio of parking spaces to be EV-ready for multi-family residential, commercial, or specific uses such as office, hotel, or municipal uses. The ratio should be determined in keeping with experiences of other communities with established code provisions, although the ratio will depend on market conditions and demand specific to a municipality or region. Current practice amongst EV leaders in the U.S. is for the market to guide the provision of EVSE and EV-ready parking spaces, and it is recommended that this practice continue until such time that EV adoption rates are significant enough to warrant mandating infrastructure planning in every development.

required parking spaces, since the primary function of the parking space is for parking, rather than charging. If anticipated demand for the charging station is expected to be limited in the near term, a jurisdiction may choose to either exclude a charging station from the minimum required parking spaces or allow parking, rather than specifically charging, at a space served by EVSE associated with new construction. However, for retrofitted parking lots, installation of a charging station should be permitted in existing spaces, although restriping to add spaces is encouraged for parking facilities that experience significant parking demand during regular business hours.

For municipalities with codes that establish a maximum number of parking spaces for a specific use, this clause may be revised as needed to reflect related code provisions.

Design Requirements

All parking spaces accommodating EVSE shall include the following design features:

a. Signage

i. Regulatory Signage

Each space accommodating EVSE shall be designated with signage specifying that the space is for electric vehicle parking only while charging. Any time limits and tow-away provisions should be clearly designated on the signage.

Note: refer to recommended Right-of-Way Standards for regulatory and informational signage examples that conform with the Manual on Uniform Traffic Control Devices Supplementary pavement markings shall indicate "Electric Vehicle Only" for standard, non-accessible charging stations; lower edge of the last word should align with the bottom of the stall striping to be visible beneath a parked vehicle.

Additional Guidance: Refer to Figure 1 for illustration of recommended locations for signage and pavement markings.

ii. Directional Signage for Site Orientation

For parking lots with charging stations sited in more than one location or area within the parking lot, directional signage shall be installed at each parking lot entrance and at appropriate decision points to effectively guide motorists to the charging station.

Additional Guidance: Directional signage may otherwise be required by the Zoning Administrator for large development sites or Planned Developments. Directional signage conforming with the standards included herein may be installed at the discretion of the property owner.

b. Location and Visibility

Location of parking spaces designed for EVSE access shall meet all applicable requirements of this code, including required setbacks, yards, and other provisions as required by zoning district.

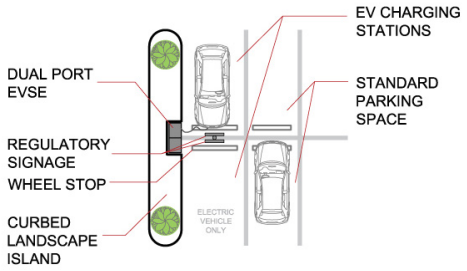
Additional Guidance: EVSE may be sited at any location within a parking facility. Spaces need not be prioritized adjacent to the destination unless required to facilitate electrical service; instead, consideration should be given to the physical security and visibility of the charging station.

c. Pedestrian Access

i. The use of bollards or curbs to protect the equipment should not unduly restrict access to the EVSE or create clutter.

Additional Guidance: Integration of the EVSE into design features that can physically protect the equipment is recommended. Refer to Figure 3 for an option to protect the EVSE installed adjacent to a curbed landscape island.

Figure 3: Recommended Parking Lot Configuration[1]



ii. For locations where a charging station is planned for installation adjacent or within a public or private pedestrian route, EVSE shall be sited to provide as much pedestrian clearance as feasible. Refer also to Accessible Parking Requirements below where a charging station is planned adjacent to a designated accessible route.

d. Lighting

Adequate site lighting shall exist per (refer to Lighting provisions in existing code), unless EVSE is at a location accessible during daytime hours only.

e. Shelter

Any structures designed to shelter the EVSE shall be in accordance with accessory use provisions of the Zoning Code and applicable provisions of the prevailing Building Code.

Identification and Information Requirements

Appropriate identification shall be listed on the EVSE, including vendor, voltage, amperage levels, fees, safety information, and customer service contact information.

[1] Adapted from Electric Transportation Engineering Corporation, *Electric Vehicle Charging Infrastructure Deployment Guidelines for British Columbia.*

Accessible Parking Requirements
Where electric vehicle charging stations are provided for public use, accessible parking spaces with EVSE shall be provided as follows. Refer to Figure 4 for a sample configuration.

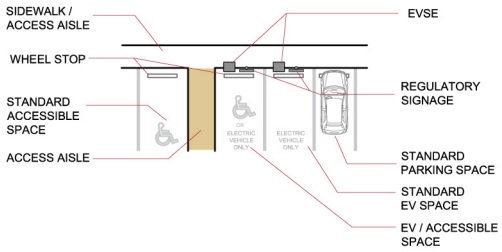
a. Ratio
Accessible electric vehicle charging stations shall be provided in the ratios shown on the following table. The first EV parking space shall be designed to accommodate van access. Although the charging station must meet accessible design standards, the parking space is not for exclusive use by persons with disabilities.

Table 3: Ratio of EVSE to ADA Spaces

Number of charging stations provided	Required ADA-accessible charging stations
1–50	1
each additional increment of 50 EVSE	1 additional ADA-accessible EVSE

Source: Puget Sound Regional Council, *Electric Vehicle Infrastructure: A Guide for Local Governments in Washington State*, July 2010.

Figure 4: Sample Configuration: Accessible EV Charging Station

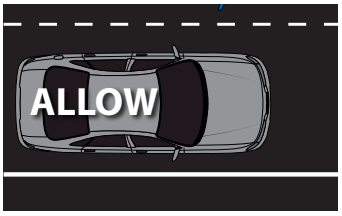


b. Dimensions
Accessible parking spaces shall measure a minimum of 9' wide by 18' deep (or as otherwise established per the existing code; include appropriate reference). One in every eight accessible charging stations thereafter, including the first EV parking space provided, shall be van-accessible and include an eight-foot access aisle; additional charging stations shall be accessible with a five-foot aisle.

Accessible charging stations shall be located as close to the destination entrance as feasible. For charging stations in indoor garages, or in retrofits of existing parking facilities, the accessible charging station need not be sited immediately adjacent to the destination or to other accessible parking spaces, due to the interpretation of the accessible space served by EVSE as a charging facility rather than a parking facility.

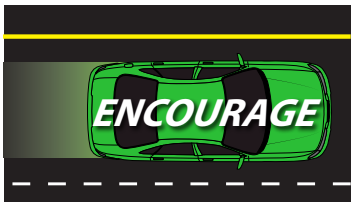
c. Usage and Signage
i. Accessible EV charging stations are not reserved exclusively for the use of disabled persons and shall not include signage as required for an accessible parking space. Where more than one charging station is provided, an informational sign shall be posted which reads, "Parking for EV (Charging) Only; This Space Designed for Disabled Access; Use Last."
ii. Standard accessible spaces may also include an informational sign which reads "Additional Accessible Parking Available at Electric Vehicle Charging Station".

Calibration of Recommendations
Zoning provisions addressing parking regulations should be calibrated to reflect the goals of the jurisdiction, in accordance with the following options.



Slow Lane: Allow EV Implementation
Adopt Section B5, Accessible Parking Requirements within existing parking provisions. Adopt all remaining provisions as guidance.

Middle Lane: Facilitate EV Implementation
Adopt all provisions. Where design requirements to screen parking areas are already established, jurisdictions should extend applicable requirements to chargers that are installed outdoors, such as to buffer sidewalks or property lines.



Fast Lane: Encourage EV Implementation
Adopt all provisions. Where design requirements to screen or buffer auto uses are already established, jurisdictions should extend applicable requirements to chargers that are installed outdoors, such as to buffer sidewalks or property lines. Adopt italicized Additional Guidance provisions into applicable existing guidelines or standards for the jurisdiction.

Key Resources and References

- American Planning Association, *Zoning Practice: Electric Vehicle Infrastructure*, July 2010.
- County of Sonoma, General Services Department, *EV Charging Station Program and Installation Guidelines*, July 2011
- Electric Transportation Engineering Corporation, *Electric Vehicle Charging Infrastructure Deployment Guidelines for British Columbia*, July 2009.
- Puget Sound Regional Council, *Electric Vehicle Infrastructure: A Guide for Local Governments in Washington State*, July 2010.
- State of California, Department of General Services, Division of the State Architect, *California Access Compliance Policy 97-03, Interim Disabled Access Guidelines for Electrical Vehicle Charging*, June 5, 1997.
- Sustainable Transportation Strategies, *EV Charging for Persons with Disabilities*, Feb. 2012.
- U.S. Department of Transportation, Federal Highway Administration, *Manual on Uniform Traffic Control Devices*, December 2009 version, with revisions May 2012

Model Right-of-Way Standards

As charging stations for public use become more readily available, municipalities will benefit from guidance and, over time, adopting regulatory language to establish standards for design features to be installed within the public right-of-way. This section addresses directional signage to guide drivers to the EV charging station, regulatory signage examples, and design guidance for on-street charging stations.

Signage Regulations

Standard regulatory signs will be needed to provide information on designating parking spaces for EV charging and for establishing time limits. Although federal standards do not currently address regulatory signage for EV charging and parking, the recommended regulatory signs are adapted from existing federal standards. Regulatory signs provided herein are appropriate for charging stations both within the public way as well as in private parking facilities.

Anticipated demand should be determined for communities or businesses installing regulatory signage, and time limits should reflect anticipated peak charging demand time to reduce perception of a "wasted space." Initially, a space may not have time limits established until the host of the charging station can determine the demand for charging. As long as electrical access is not compromised, dedicated EV spaces can be located in non-prime areas of the parking lot (i.e., further from the entrance) which may reduce incidents of conventional vehicles parking in EV spaces.

Directional signage sited within the right-of-way will serve as wayfinding devices to assist drivers with locating EV charging stations. Directional signage examples addressing electric vehicles are included in the Manual on Uniform Traffic Control Devices; however, the recommended signage is an approved alternative that has been adopted in several states due to its clarity beyond the federal example.

Model Ordinance and Policy Provisions

1. Regulatory Signage

   a. Designation of Parking Spaces as EV Charging Stations
   Each space served with EVSE shall be designated with signage specifying that the space is for electric vehicle parking only while charging.

   b. Provisions
   Any time limits and tow-away provisions should be clearly designated on the signage.

This page left intentionally blank

2. Directional Signage

Directional signage shall be installed at the discretion of the (Department of Transportation, City Engineer, or other appropriate authority) to guide drivers from major thoroughfares to publicly available charging stations. A directional arrow shall be provided when used at decision points such as highway exits, intersections, or parking lot entrances.

Additional Considerations: Directional signage is recommended for installation at strategic locations within the public way to guide drivers to charging stations. Strategic locations for directional signage placement may include downtowns, highway exits, or corridors adjacent to large parking facilities with EV charging stations, such as shopping malls.

Local agencies with jurisdiction over transportation planning may wish to develop a comprehensive strategy for siting and financing EV signage in partnership with owners/operators of charging stations.

Note: Although the MUTCD includes a text-based sign to designate charging stations (MUTCD, FHWA Sign D9-11bP), the graphic sign designated is recommended for enhanced legibility and uniformity for directional signage within both highway and low-speed contexts, as well as for informational signage identifying a parking space designated for EV charging only.

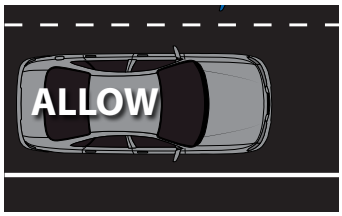
Additionally, the alternate D9-11b sign is recommended rather than the standard version because it emphasizes the plug, further differentiating it from other types of fuel that are based on the standard pump symbol, particularly the E85 symbol (D9-11c). The alternate version may be adopted by a State or local jurisdiction in accordance with the Conditions of Interim Approval; several states including Washington, Oregon, and Michigan have been approved to use the sign at the State and local level.

3. Informational Signage

Standardized informational signage shall be used to designate a specific parking space as a charging station, using FHWA D9-11b (alternate) as shown in figures below.

Calibration of Recommendations

Right-of-way standards addressing signage should be calibrated to reflect the goals of the jurisdiction, in accordance with the following options.



Slow Lane: Allow EV Implementation

Statewide recommendation: Ohio Department of Transportation should apply to adopt the alternate D9-11b sign, in accordance with the Federal Highway Administration's Conditions of Interim Approval. Alternatively, jurisdictions would need to apply individually for local use.

Local recommendation: Adopt all provisions as guidance, following designated Slow Lane options in italics. Include italicized "Additional Considerations" text only as appropriate for clarification. Apply to adopt the alternate D9-11b sign, in accordance with the Federal Highway Administration's Conditions of Interim Approval, if ODOT is not pursuing statewide adoption.

Middle Lane: Facilitate EV Implementation

Adopt all provisions as guidance, following designated Middle Lane options in italics. Include italicized

Figure 5[2]: EV-Only Parking

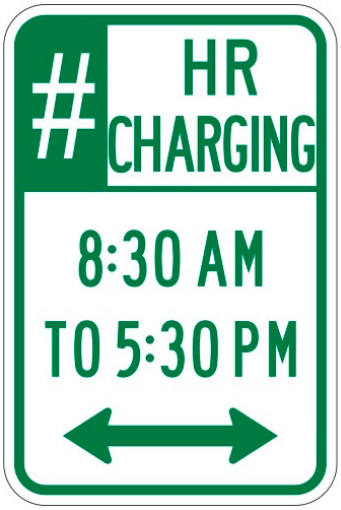
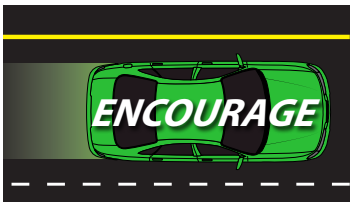


Figure 6[3]: Sample time limit sign

Figure 7[4]: EV Fueling Location

[2] Adapted from MUTCD Sign R8-3a for guidance only, pending MUTCD-approved standards. Appropriate for siting within public right-of-way or private parking facility.
[3] Adapted from MUTCD Sign R7-108 for guidance only, pending MUTCD-approved standards. Appropriate for siting within public right-of-way or private parking facility.
[4] FHWA D9-11b (alternate), U.S. Department of Transportation, Federal Highway Administration; *Manual on Uniform Traffic Control Devices.* May be used as informational signage or with directional arrow; sample arrow M6-1 shown.

"Additional Considerations" text only as appropriate for clarification. Apply to adopt the alternate D9-11b sign, in accordance with the Federal Highway Administration's Conditions of Interim Approval, if ODOT is not pursuing statewide adoption.



Fast Lane: Encourage EV Implementation

Adopt all provisions as guidance, following designated Fast Lane options in italics. Include italicized "Additional Considerations" text only as appropriate for clarification. Apply to adopt the alternate D9-11b sign, in accordance with the Federal Highway Administration's Conditions of Interim Approval, if ODOT is not pursuing statewide adoption.

Design Standards for On-Street Electric Vehicle Charging Stations

For jurisdictions anticipating electric vehicle charging station installations as an amenity for on-street parking spaces or otherwise within the public right-of-way, the standards included herein will be useful to guide signage and design criteria for on-street charging stations. These standards may be integrated within a municipality's street and sidewalk regulations or other standards as appropriate for the given jurisdiction.

Model Ordinance and Policy Provisions

On-street electric vehicle charging stations shall incorporate the following features:

1. Dimensions
   An electric vehicle charging station may be accommodated in a standard parking space.

2. Clearance
   EVSE shall be installed or otherwise mounted as close to the curb as feasible to facilitate pedestrian clearance of 36 inches or greater, while maintaining a minimum of 24 inches from the face of the curb.

3. Accessibility
   EVSE installed on a sidewalk or otherwise adjacent to an on-street parking space shall not conflict with the provisions of the Ohio Accessibility Code.

4. Location
   Where feasible, the first or last parking space along a block face shall be priority locations for an electric vehicle charging station serving an on-street parking space. The EVSE shall be installed near the front of a parking space.

   a. Parallel Parking
   For one-way streets with parallel parking configurations, a charging station shall be sited on the side of the street adjacent to the passenger side of the vehicle, where feasible.

   b. Angled or Perpendicular Parking
   For angled or perpendicular parking configurations, wheel stops shall be installed to provide additional protection for the charging equipment. Signage shall specify whether back-in parking is permitted.

   c. Multiple Spaces on a Block
   Multiple charging stations provided along a single block face shall be installed to serve adjacent spaces.

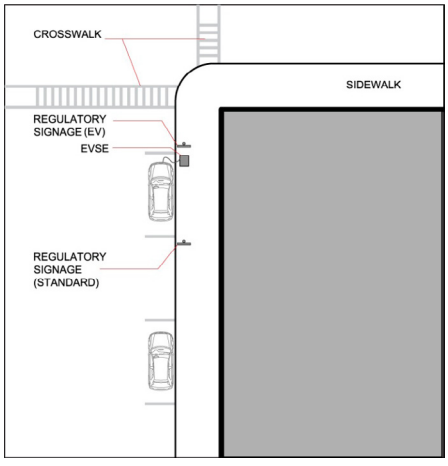
5. Equipment
   EVSE sited within the right-of-way shall include a cord of an appropriate length to accommodate connectors on all sides of a vehicle. The equipment serving the charging station shall include a retractable cord or shall accommodate storage of the cord off the sidewalk or surface upon which the EVSE is installed. No cords or other EVSE equipment installed on a private site shall be permitted to cross or otherwise obstruct the public right-of-way.

   Considerations: Siting a charging station at the beginning or end of a block facilitates ramp access at crosswalks, increases visibility of identification signage, and benefits from street lighting at a corner. However, siting EVSE within the public way may depend on the location of the electrical service; therefore, location of an on-street charging station may be more appropriate elsewhere to reduce the distance from the power source. In such cases, attention should be given to ensure that accessibility requirements are met and that signage and lighting are enhanced.

6. Signage
   Individual spaces shall be designated with regulatory and informational signage in accordance with the Signage provisions outlined above.

7. Identification and Information Requirements
   Appropriate identification shall be listed on the EVSE, including vendor, voltage, amperage levels, fees, safety information, and customer service contact information.

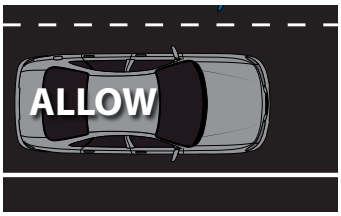
Figure 8: On-Street EV Charging Station[5]



[5] Adapted from Puget Sound Regional Council, Electric Vehicle Infrastructure: *A Guide for Local Governments in Washington State.*

Calibration of Recommendations

Right-of-way standards addressing on-street charging stations should be calibrated to reflect the goals of the jurisdiction, in accordance with the following options.



Slow Lane: Allow EV Implementation

Adopt all provisions as guidance.

Middle and Fast Lanes: Facilitate/ Encourage EV Implementation

Adopt all provisions within right-of-way or other applicable development standards.

Key Resources and References

- City of Davis, California, *Municipal Code Section 22.16.080 Electric Vehicles: Violations/Penalties.*
- Puget Sound Regional Council, *Electric Vehicle Infrastructure: A Guide for Local Governments in Washington State,* July 2010.
- U.S. Department of Transportation, Federal Highway Administration, *Manual on Uniform Traffic Control Devices,* December 2009 version, with revisions May 2012
- U.S. Department of Transportation, Federal Highway Administration, *Memorandum: MUTCD – Interim Approval for Optional Use of an Alternative Electric Vehicle Charging General Service Symbol Sign,* April 2011.
- Sustainable Transportation Technologies, *Siting Electric Vehicle Charging Stations,* April 2011

Model Building Code Provisions



The purpose of the Model Building Code Provisions is to ensure that codes addressing new construction and renovation support the operation of plug-in electric vehicles.

Any code issues and recommended revisions to national or state codes should be evaluated and proposed by an advisory Task Force of licensed electrical contractors, municipal/county inspectors, and other safety professionals.

Model Ordinance and Policy Provisions

Option A. Provide Capacity for Electric Vehicle Charging

1. Residential Uses
   For new single- and two-family homes with dedicated garage parking, provide electrical capacity with appropriate conduit from the service panel to the garage.

   For new multi-family construction with a common parking area, including mixed-use with residential as a component, provide electrical capacity with appropriate conduit from the service panel to the parking area, appropriate for future installation accommodating a minimum of 2% of parking spaces.

2. Non-Residential Uses
   For new non-residential construction, provide electrical capacity with appropriate conduit from the service panel to the garage, appropriate for serving a minimum of 2% of parking spaces. For each space with electrical service, provide the following:

- One 120V 20 amp and one 208/240V 40 amp grounded AC outlet OR
- Panel capacity and conduit to accommodate a minimum of Level 2 charging, to facilitate future installation of charging stations.

Option B. Provide Wiring for Electric Vehicle Charging

1. Residential Uses
   For new single- and two-family homes with dedicated garage parking, install wiring from the service panel to the garage and provide appropriate receptacle to accommodate electric vehicle charging equipment.

   For new multi-family homes with a common parking area, install wiring from the service panel to the parking area and provide appropriate receptacles to accommodate electric vehicle charging equipment for a minimum of 2% of parking spaces.

2. Non-Residential Uses
   For new non-residential construction, install wiring from the service panel to the garage and provide appropriate receptacles to accommodate electric vehicle charging equipment for a minimum of 2% of parking spaces. For each space with electrical service, provide the following:

- One 120V 20 amp and one 208/240V 40 amp grounded AC outlet OR
- Panel capacity and conduit to accommodate a minimum of Level 2 charging, to facilitate future installation of charging stations.

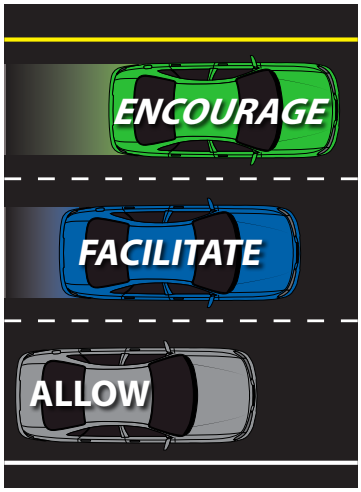
3. Related Considerations
   Installation of the EV charger must comply with the NFPA 70, National Electrical Code (NEC), Article 625, Electric Vehicle Charging System (and/or applicable electrical code adopted and enforced by the jurisdiction). The most recent version of the NEC is the 2011 Edition; this version and past editions may be found at www.nfpa.org/70. The next edition of the NEC will be released in 2014 and is anticipated to address discrepancies

that have arisen due to advancement of technology, such as ventilation requirements that may not apply to new vehicles.

Contractors should be referred directly to the applicable edition of the NFPA for the requirements for installing charging stations. Municipalities should ensure that any related codes/requirements specific to their jurisdictions are easily available to contractors/homeowners. Additional resources available through the NFPA include the Electric Vehicle Emergency Guide (2012) and emergency responder training.

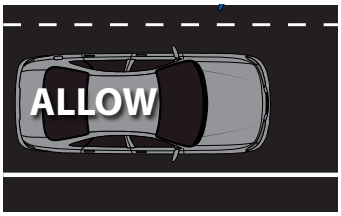
Calibration of Recommendations

Building codes and standards should be calibrated to reflect the goals of the jurisdiction, in accordance with the following options.



All Lanes: Allowing/Facilitating/Encouraging EV Infrastructure

An advisory Task Force involving local, regional, and state entities is recommended to evaluate applicable codes from the perspectives of electrical contractors and inspectors and consider whether revision of codes at the State level is appropriate. Given that the 2008 version of the NEC is still in general use in Ohio, the State should ensure that applicable provisions from the 2011 version (and, upon release, the 2014 version) are considered for special adoption within State codes. See also the recommendation for an advisory Task Force in the Model Permitting and Inspection Provisions, which is proposed to address related concerns.

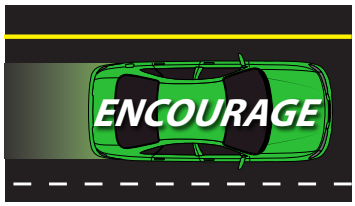


Slow Lane: Allowing EV Infrastructure

Follow recommendations for All Lanes, above. Ensure that building codes do not restrict the provisions outlined within Option A (Provide Capacity for Electric Vehicle Charging), above.

Middle Lane: Facilitating EV Implementation

Follow recommendations for All Lanes, above. Follow Option A (Provide Capacity for Electric Vehicle Charging) as guidance for all new construction and substantial redevelopment. Apply the provisions in Option A as guidance for new development as appropriate; for example, a local jurisdiction may wish to require developers to meet these requirements for projects relying on public funding.



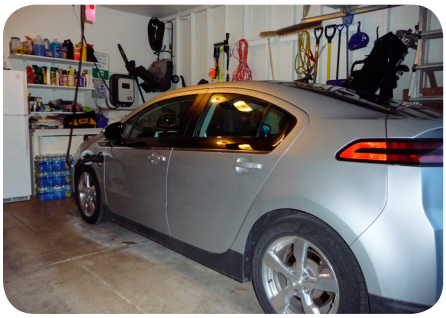
Fast Lane: Encouraging EV Implementation

Follow recommendations for All Lanes, above; adopt Option A (Provide Capacity for Electric Vehicle Charging) as a requirement for all new construction and substantial redevelopment. Apply the provisions in Option B (Provide Wiring for Electric Vehicle Charging) as guidance for new development as appropriate; for example, a local jurisdiction may wish to require developers to meet these requirements for projects relying on public funding.

Key Resources and References

- Electric Transportation Engineering Corporation, *Electric Vehicle Charging Infrastructure Deployment Guidelines for British Columbia*, July 2009.
- State of California, *California Building Code, Section 406.7 (Electric Vehicle)*, 2010.
- State of California, *California Green Building Standards Code (CALGreen)*, 2010.
- USGBC, *LEED 2009 for New Construction and Renovations Rating System*, 2009.

Sample Handouts



The following flyers have been provided for use by municipalities. Editable InDesign files can be obtained from Clean Fuels Ohio (please e-mail cynthia@cleanfuelsohio.org). There are two handouts, one each addressing electrical requirements and permitting, and two versions of each are provided: a single-page version and a two-page version. While the basic content is the same, the versions with more text provide more detailed information.

Step 1 Residential Readiness Checklist for Potential EV Owners in (Anytown)

Option 1
Single-Page
Handouts

Are you thinking about buying a plug-in electric vehicle? Follow this readiness checklist, which will take you through important steps to prepare your home and facilitate coordination with the (Anytown) and (specify power company).

This checklist is not an exhaustive list of considerations for your EV purchase, but it will complement your research on vehicles and charging infrastructure and help you understand any requirements for charging equipment in (Anytown).

To help you get ready for your purchase and get your EV charging without delay, complete the steps outlined in this checklist before you buy your electric vehicle.

1. Gather information, and obtain resources from auto dealerships; be sure to ask about the following:
   - Specifics on charging requirements for the car, including manufacturer's charging specifications, information to help you decide whether Level 1 or Level 2 charging is more appropriate for your situation
   - Support for getting set up with home charging equipment, such as recommended siting of a home charger, assistance coordinating with your municipality.
   - Recommendations for electrical contractors familiar with home chargers.
   - Lead time between electric vehicle purchase to delivery.

2. Evaluate your home for compatibility with your charging needs, giving attention to the following considerations:
   - Where will charging take place? Does your parking area already have electrical service or will you need to expand your service? Based on your research, do you expect your home to accommodate the charging level you are considering?
   - Do you have a private garage or parking space? If you have shared parking, consider whether you will need a designated parking space close to existing electrical service. If you have a carport or unsheltered parking space, consider locations that will be best protected from the elements.
   - When will charging occur? Consider whether you can time the charging to take place at night to ease loads on power grid and pay lower rates. Check your the electric utility website for resources addressing EV chargers.

3. Check your home's zoning designation and any applicable requirements to ensure that anticipated improvements do not conflict with the provisions of the zoning code or any other requirement.
   - Potential restrictions may include where you are allowed to park and, therefore, charge; for example, you may find it convenient to install a charger outside your garage, but zoning or requirements of a home owners' association (HOA) may not permit the associated parking space in a driveway or side yard.
   - Consider whether you will need approval from an HOA, condo board, or building manager to install a charging station, or even to charge at home using a Level 1 cord set. If so, investigate this process right away, to confirm whether you are permitted to charge.

4. Contact a licensed electrician to evaluate your electrical service and recommend a scope of work if needed.
   - Confirm whether Level 1 or Level 2 will be most appropriate for your electrical capacity and vehicle charging needs.
   - Determine whether service upgrades are required for your preferred charging configuration, and whether/when you need to request a service upgrade assessment from your the electric utility.
   - Request an estimate for any work required

5. Contact the (Anytown) Permit Department to confirm the permit application process and timing
   - Verify whether there are any other considerations or coordination required.

6. You are ready to purchase an electric vehicle and charging station equipment.

Once this checklist is complete (you have addressed any anticipated issues and understand your municipal and utility requirements and timeframes) you can charge forward with your EV purchase and coordinating the installation of your charging station (including any required electrical upgrades). You are ready to move on to Step 2, the Permit Application and Inspection Process for (Anytown).

Drive Electric Ohio

Step 2 Permit Application and Inspection Process for Electric Vehicle Charging Equipment in (Anytown)

Thinking about buying an electric vehicle? The (name of jurisdiction and applicable department) has prepared this resource to inform residents about the permitting and inspection process required when planning for installation of a Level 2 charging station.

Before you get started, make sure that you have completed the preliminary planning process outlined in the Residential Readiness Checklist for Potential EV Owners in (Anytown) (provide link). Remember, not all charging equipment requires a permit or electrical upgrade; be sure to evaluate your anticipated charging needs and your existing home electricity service, to determine whether Level 1 or Level 2 charging is most appropriate for you and whether your home will need improvements for your charging needs.

The following steps are required for permitting and inspection involving a Level 2 charging station. The homeowner is responsible for coordinating with the contractor, the electric utility, and local jurisdiction; close coordination will reduce the likelihood of delays.

Typical Cost Estimates

Expense	Low Estimate	Typical Estimate	High Estimate	Cause for Variance
Permit/Inspection Fee	$50	Varies	$200	Fees vary by jurisdiction; some differentiate between limited and full scopes. Additional fees may apply for re-inspecting installations that fail initial inspections.
Level 2 Home Charging Equipment	$750	$1,500	$4,000	Complexity of equipment and special options; programmable Level 2 home chargers are readily available for under $1,500.
Installation	$300	$1,200	$3,500	Presence of existing, sufficient wiring vs. running service to an unwired parking space and/or panel upgrades.
Service Upgrade (optional; as needed)	$1,000	Varies	$10,000	Complexity of existing service, age of home and existing wiring, etc.

1. Contractor/Homeowner: Prepare and submit electrical permit application, including
   - Completed application, available at (provide link and/or department with jurisdiction).
   - (Specify equipment specs, plan set, or other requirements)
2. (Name of jurisdiction and applicable department): Review and decision on permit application. Decision will be to approve, deny, or request modification of permit.
   - Approvals move forward to next step; set time for inspection, if no service upgrade required.
   - Denials or modifications require re-submittal and review.
3. The electric utility and contractor: Coordinate power interruption for service/panel upgrade, if required; set time for inspection if not previously scheduled.
4. Contractor: Install charging station.
5. (Name of jurisdiction and applicable department): Conduct inspection; schedule a follow-up inspection if needed.
6. EV Owner: Initiate use of charging station per manufacturer's instructions.

Drive Electric Ohio

Step 1 Residential Readiness Checklist for Potential EV Owners in (Anytown)

Option 2
2-Page Handouts

Are you thinking about buying a plug-in electric vehicle?

Follow this readiness checklist, which will take you through important steps to prepare your home and facilitate coordination with the (Anytown) and (specify power company).

This checklist is not an exhaustive list of considerations for your EV purchase, but it will complement your research on vehicles and charging infrastructure and help you understand any requirements for charging equipment in (Anytown).

To help you get ready for your purchase and get your EV charging without delay, complete the steps outlined in this checklist before you buy your electric vehicle.

Drive Electric Ohio

Step 1 - Residential Readiness Checklist

1. Gather information, and obtain resources from auto dealerships; be sure to ask about the following:
   - Specifics on charging requirements for the car, including manufacturer's charging specifications, information to help you decide whether Level 1 or Level 2 charging is more appropriate for your situation
   - Support for getting set up with home charging equipment, such as recommended siting of a home charger, assistance coordinating with your municipality, or even complementary installation of a Level 2 charger.
   - Recommendations for electrical contractors familiar with home chargers.
   - Lead time between electric vehicle purchase to delivery.

2. Evaluate your home for compatibility with your charging needs, giving attention to the following considerations:
   - Where will charging take place? Does your parking area already have electrical service or will you need to expand your service? Based on your research, do you expect your home to accommodate the charging level you are considering?
   - Do you have a private garage or parking space? If you have shared parking, consider whether you will need a designated parking space close to existing electrical service. If you have a carport or unsheltered parking space, consider locations that will be best protected from the elements.
   - When will charging occur? Consider whether you can time the charging to take place at night to ease loads on power grid and pay lower rates. Check your the electric utility website for resources addressing EV chargers.

3. Check your home's zoning designation and any applicable requirements to ensure that anticipated improvements do not conflict with the provisions of the zoning code or any other requirement.
   - Potential restrictions may include where you are allowed to park and, therefore, charge; for example, you may find it convenient to install a charger outside your garage, but zoning or requirements of a home owners' association (HOA) may not permit the associated parking space in a driveway or side yard.
   - Consider whether you will need approval from an HOA, condo board, or building manager to install a charging station, or even to charge at home using a Level 1 cord set. If so, investigate this process right away, to confirm whether you are permitted to charge.

4. Contact a licensed electrician to evaluate your electrical service and recommend a scope of work if needed.
   - Confirm whether Level 1 or Level 2 will be most appropriate for your electrical capacity and vehicle charging needs.
   - Determine whether service upgrades are required for your preferred charging configuration, and whether/when you need to request a service upgrade assessment from your the electric utility.
   - Request an estimate for any work required

5. Contact the (Anytown) Permit Department to confirm the permit application process and timing
   - Verify whether there are any other considerations or coordination required.

6. You are ready to purchase an electric vehicle and charging station equipment..

Once this checklist is complete (you have addressed any anticipated issues and understand your municipal and utility requirements and timeframes) you can charge forward with your EV purchase and coordinating the installation of your charging station (including any required electrical upgrades). You are ready to move on to Step 2, the Permit Application and Inspection Process for (Anytown).

Drive Electric Ohio

Step 2 Permit Application and Inspection Process for Electric Vehicle Charging Equipment in (Anytown)

Are you thinking about buying a plug-in electric vehicle?

The (name of jurisdiction and applicable department) has prepared this resource to inform residents about the permitting and inspection process required when planning for installation of a Level 2 charging station.

Before you get started, make sure that you have completed the preliminary planning process outlined in the Residential Readiness Checklist for Potential EV Owners in (Anytown) (provide link). Remember, not all charging equipment requires a permit or electrical upgrade; be sure to evaluate your anticipated charging needs and your existing home electricity service, to determine whether Level 1 or Level 2 charging is most appropriate for you and whether your home will need improvements for your charging needs.

The following steps are required for permitting and inspection involving a Level 2 charging station. The homeowner is responsible for coordinating with the contractor, the electric utility, and local jurisdiction; close coordination will reduce the likelihood of delays.

Typical Cost Estimates

Expense	Low Estimate	Typical Estimate	High Estimate	Cause for Variance
Permit/Inspection Fee	$50	Varies	$200	Fees vary by jurisdiction; some differentiate between limited and full scopes. Additional fees may apply for re-inspecting installations that fail initial inspections.
Level 2 Home Charging Equipment	$750	$1,500	$4,000	Complexity of equipment and special options; programmable Level 2 home chargers are readily available for under $1,500.
Installation	$300	$1,200	$3,500	Presence of existing, sufficient wiring vs. running service to an unwired parking space and/or panel upgrades.
Service Upgrade (optional; as needed)	$1,000	Varies	$10,000	Complexity of existing service, age of home and existing wiring, etc.

1. Contractor/Homeowner: Prepare and submit electrical permit application, including
   - Completed application, available at (provide link and/or department with jurisdiction).
   - (Specify equipment specs, plan set, or other requirements)
2. (Name of jurisdiction and applicable department): Review and decision on permit application. Decision will be to approve, deny, or request modification of permit.
   - Approvals move forward to next step; set time for inspection, if no service upgrade required.
   - Denials or modifications require re-submittal and review.
3. The electric utility and contractor: Coordinate power interruption for service/panel upgrade, if required; set time for inspection if not previously scheduled.
4. Contractor: Install charging station.
5. (Name of jurisdiction and applicable department): Conduct inspection; schedule a follow-up inspection if needed.
6. EV Owner: Initiate use of charging station per manufacturer's instructions.

Drive Electric Ohio

530 West Spring Street, Suite 250
Columbus, Ohio 43215
Phone: (614) 884-7336
cynthia@cleanfuelsohio.org
www.driveelectricohio.org

CleanFuelsOhio

Clean Cities
U.S. Department of Energy