

Proposed Massachusetts Electric Vehicle (EV) Ready Code

Summary of Proposed EV Requirements¹

Proposed requirements for residential new construction – dedicated 40-ampere branch circuit in a raceway and panel capacity to accommodate a Level 2 electric vehicle supply equipment (EVSE) station at one location for single and two family homes and one space for every 2 units in multi-family housing.

Proposed requirements for commercial new construction – at least one dedicated 40-ampere branch circuit per parking space in a raceway and panel capacity for 4% of parking spaces at some commercial locations with more than 3 dedicated parking spaces.²

Background

- The ability to efficiently charge a plug in electric vehicle or “EV” is a service that contemporary building structures can provide. The statutory authority for regulating building construction identifies general objectives including the adoption of modern technical methods which may *reduce the cost of construction* and be compatible with *energy conservation* and *public safety*.³
- When EV readiness is considered in the design of a building, decisions about the lowest cost layout can be made - allowing building owners and operators to reduce the financial burden of modifying or upgrading electrical systems later as well as avoid the construction costs and mess of trenching or boring to lay conduit for EVSE installation. The costs associated with installing an EVSE vary widely, depending on the site location and available electrical capacity. What is certain is that it is significantly *less expensive* to prepare for charging EVs as buildings are designed and constructed.
 - The U.S. Department of Energy⁴ reports installation costs that range from \$600 - \$12,700. The study mentions that special work such as trenching or boring were about 25% more costly than sites that did not need special work. Of the commercial installations studied, 72% required work on the electrical panel due to insufficient capacity.
 - The California Air Resources Board finds that EV-ready codes avoid \$3,750 to \$6,975 per parking space in later retrofit costs.⁵
 - System installers in MA report an average commercial retrofit cost of around \$7,000 but for new construction, the price drops to an estimated average of \$1,000 (varying from \$700-\$1,200/space).
- The electric motor is three times as *energy efficient* as an internal combustion engine and Level 2 charging is more efficient than a wall plug (Level 1)⁶. By facilitating charging at workplaces and locations where the public can charge at commercial locations, we are also making our transportation system more energy efficient and less wasteful.
- When an EVSE is hard-wired or plugged in, it keeps the public *safe* while charging. A charger has a safety lock-out system to prevent current from flowing when the charger is not connected or when charging is complete. The charger also detects hardware faults to disconnect the power and prevent battery damage or electrical problems.⁷

¹ The draft regulation does **not** require installation of charging station equipment. Future occupants will purchase and pay for installation by licensed electricians. It also does **not** require delineation of parking spaces on pavement or interfere with handicapped parking requirements.

² Building Use Groups include Assembly, Business, Education, Institutional, Mercantile and Residential groups such as theatres, concert halls, movie theatres, animal hospitals, banks, barber and beauty shops, outpatient clinics, dry cleaners, laboratories, post offices, print shops, professional services, schools, day care facilities, institutions such as hospitals and nursing homes, department or drug stores, residential group homes, dorms, hotels and apartment houses. These locations are where cars park for extended periods.

³ M.G.L. Chapter 143 Section 95

⁴ U.S. Department of Energy (DOE) “Costs Associated with Non-Residential Electric Vehicles Supply Equipment, November, 2015
http://www.afdc.energy.gov/uploads/publication/evse_cost_report_2015.pdf

⁵ California Air Resources Board – EV Charging Infrastructure, July 9 2015 <http://www.documents.dgs.ca.gov/bsc/2015TriCycle/CAC/GREEN/Exhibit-B-CARB-Cost-Analysis-and-Technical-Report.pdf>

⁶ Idaho National Laboratory, Advanced Vehicle Testing Fact Sheet, 2015

⁷ The U.S. DOE notes that safety standards for standard residential and commercial outlets were not developed for repeated operations like charging EVs. The current safety standard requires testing plug insertion and removal 250 times under varying conditions without “sustained flaming”. EV owners plugging in directly to an outlet will likely use the outlet more than this and exceed the UL national standard. http://www.afdc.energy.gov/uploads/publication/evse_cost_report_2015.pdf

EVSE Regulatory Standards - States and Municipalities

California has implemented increasingly stringent mandatory EV-capability (conduits or raceways without the wiring installed) in homes and commercial facilities since 2015. Voluntary EV-ready codes that go beyond the state minimum have been adopted by many communities. Some communities are already considering increased requirements for EV-ready parking and requiring installation of electric and plug in hybrid electric charging infrastructure.

MA has statutory commitments to reduce greenhouse gas and EV policies must be adopted to meet those requirements. Besides CA and MA, each of the other six states in the 8-state Governor's Zero Emission Vehicle Memorandum of Understanding and Action Plan seek to adopt these types of codes.

The state of Washington requires 5% EV readiness coverage in multifamily units and some commercial buildings.

In Boston, electric vehicle charging is required for developments that trigger either a Transportation Access Plan Agreement or a Parking Freeze Permit. The policy calls for a minimum of 5% of total parking spaces with sufficient infrastructure capacity such that the installation of future EVSE does not require an upgrade to service or panels for future accommodation of at least 15% of total parking spaces. Signage at the parking entrances and other appropriate locations are also required.

New York City requires EVSE installation at 20% of new and expanded spaces for off-street parking.

Additional Information

Battery prices have fallen about 35% in the past year and continue to drop even more steeply in the coming years allowing for mass adoption.⁸ Massachusetts has adopted policies to accelerate EV ownership so that 15% of the passenger fleet will be EVs by 2025, and anticipates that by 2050, every new passenger car sold will be a zero emission vehicle. Nationally, EV sales are expected to comprise almost 35 percent of the market by 2040. (Grist). Since buildings last for many decades, now is the time to ensure that they meet occupant needs.

While MA residents can save money on fueling, they have a concern of the distance they can travel without "fueling" up on electricity. Most EVs on the market today go about 100 miles on a full charge (and more makes and models of vehicles will shortly be available that can exceed a 200 mile range) which is more than enough because well over 90% of drivers average far less mileage each day. According to a recent study by the Union of Concerned Scientists, more than 40% of American households could make the switch to a pure electric vehicle without making any changes in their driving habits, other than remembering to conveniently plug in the car at night.

Almost 90% of charging events happen at home overnight. Considering only workdays, employees driving EVs performed 98% of their charging at home or work. People without access to home charging tended to use workplace charging as their only means to complete their daily commute. On weekends and other non-working days, drivers charged at public locations available to them on their routes and where vehicles were typically parked for longer time periods.⁹ Visible public charging also advertises the convenience of plug in EVs and the availability of "fueling" for electric vehicles.

⁸ Bloomberg New Energy Finance Report

⁹ Idaho National Laboratory, Plugged In: How Americans Charge Their Electric Vehicles, 2015 <https://avt.inl.gov/sites/default/files/pdf/arra/SummaryReport.pdf>