BALTIMORE METROPOLITAN COUNCIL

Baltimore Regional Transportation Board

# Electric Vehicle Community Charging Hubs for Multi-Unit Dwellings *Planning Guide*

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# Abstract

This guide helps jurisdictions in the Baltimore region understand the needs of electric vehicle (EV) drivers who do not have access to charging at their residence and the benefits of community charging hubs. The guide provides a Community Charging Hub Planning Toolbox that explains how to engage with community stakeholders, select locations for charging hubs, plan for the design, operations, and maintenance of charging hubs, and support workforce development. Five fact sheets accompany this guide and are available at https://baltometro.org/transportation/planning-areas/multi-modal-planning/emerging-technologies.

# Executive Summary

Electric Vehicle (EV) ownership is on the rise. EVs are a type of zero-emission vehicle that help reduce transportation-related climate impacts. Maryland anticipates a rapid increase in EV registrations. Today, EVs make up about 1% of all registered vehicles in Maryland. By 2035, 100% of new passenger car and light truck sales in Maryland need to be electric (Advanced Clean Cars II program).

Charging an EV can be a **barrier** to EV ownership. 80% of current EV owners charge at home overnight. In many cases, people who purchase an EV must install charging equipment in their private garages or driveways. Many single-family homes have designated parking spaces or garages where outlets could be installed for EV charging. However, many residents in the Baltimore region live in multi-family dwellings with shared or no parking. These residents will rely on public-access chargers and community charging hubs near homes or workplaces.

The **benefits** of EVs affect individual users and their communities through:

- Reduced air and noise pollution.
- Lifetime cost savings on fuel and maintenance compared to gas and diesel vehicles.
- Convenient charging at home, work, or in public areas, especially as the charging network expands.
- New economic and workforce development opportunities.

**Community charging hubs** are designated locations where community members can reliably charge their EV near multi-family housing, high-density employment centers and have access to local destinations, or additional transportation options (i.e., rideshare, transit, micromobility).

**Local governments** can contribute to the planning, operations, and maintenance of successful community charging hubs by:

- Developing best practices and guidance to share with constituents, private developers, and other localities
- Building public-private partnerships to develop programs that prioritize more difficult market areas, such as curbside charging stations or multi-unit dwellings
- Distributing local funding
- Coordinating with utility providers
- Engaging stakeholders in identifying charging hub locations
- Expanding equitable access to electric mobility
- Keeping codes and design standards current

**This guide helps local jurisdictions understand how to plan community charging hubs to serve the needs of their constituents who drive EVs and have barriers to charging their vehicles where they live.**

[1] National Renewable Energy Laboratory (NREL), 2021, Incorporating Residential Smart Electrical Vehicle Charging in Home Energy Management Systems.

# Definitions & Acronyms

**Electric Vehicle (EV):** All-electric vehicles—also referred to as battery electric vehicles (BEVs)—plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs) all use electricity to improve vehicle efficiency (US Department of Energy).

**Electric Vehicle Supply Equipment (EVSE):** Commonly called charging stations, EVSE systems are the electrical, hardware, software, and communications equipment that provide electricity to charge an EV. They could charge only one vehicle at a time, or they could have multiple connectors to charge two or more vehicles at a time (AFDC).

### Charger Types:

- **Level 1 charger:** The equipment can be connected to typical 120 Volt (V) Alternating Current (AC) wall outlets found in most homes. They can give an electric range of about 2-5 miles per hour of charging.
- **Level 2 charger:** The equipment offers an electric range of about 10-20 miles per hour of charging. They are usually 240 V AC outlets for residential applications or 208 V AC outlets for commercial applications.
- **Level 3 charger or Direct Current Fast Charge (DCFC) station:** These are direct-current fast charging (DCFC) equipment and have been mainly deployed along heavy traffic corridors. They offer about 180-240 miles of electric range per hour of charging and require inputs of about 400-1000 V.

### Readiness Levels:

- **EV-capable** areas have sufficient electrical panel capacity and have already installed conduit for future power.
- **EV-ready** areas have all the required hardware in place for future EVSE equipment.
- **EV-installed** areas have EV equipment ready for use.

# Why plan for EV charging needs?

## EVs are Integral to Reducing Transportation Emissions

The transportation sector is the largest source of greenhouse gas (GHG) emissions in Maryland. Most of these emissions come from light-duty passenger cars and trucks. Maryland has a goal of reducing GHG emissions by 60% from 2006 levels by the year 2031, and a goal to attain net-zero GHG emissions by 2045 (Maryland Climate Solutions Now Act of 2022). Widespread adoption of electric vehicles (EVs) is an integral part of attaining these goals.

## EV Adoption is Increasing

In 2012, there were 609 EVs registered in Maryland. As of September 30, 2024, there were 118,682 EVs registered in Maryland—most are in the Baltimore-Washington region (MDOT). Maryland's goal is to have 1.1 million zero-emission vehicles (ZEVs) registered in Maryland by 2030 (Maryland 2024 Attainment Report). The Maryland Department of Transportation (MDOT) and the Maryland Department of the Environment (MDE) have projected that Maryland will far exceed the goal of 600,000 registrations, achieving between 1.3 million and 1.5 million registrations by 2031 (MDE).

## Demand for Public Charging Infrastructure is Increasing

The growing number of EVs in Maryland will increase the demand for EV charging infrastructure. Today, 80% of EV owners conveniently charge their vehicles at home after work to ensure they have a full battery for the day ahead (NREL). However, **not all residences have designated parking spaces or garages to accommodate charging infrastructure**. Many residents in the Baltimore region live in multi-family dwellings or dense urban environments that do not offer parking or offer parking that is shared with other residents. These residents will rely on public chargers, such as the ones available at community charging hubs to provide accessible and convenient charging infrastructure near their homes or workplaces.

As EVs decrease in price and purchases increase, there may also be changes in typical charging practices observed in early purchasers who might have higher access to home charging than the average US driver. More public-access chargers are needed in residential areas, as the demand for charging at home will continue to increase (US Department of Energy). As the EV market continues to expand, demand is increasing for public charging stations at workplaces, fuel stations, retailers, and other sites.

# Community Charging Hubs

## What are community charging hubs?

**Community charging hubs** are designated locations near high-density employment centers or multi-family housing where community members can reliably charge their EVs and access local destinations (including their residences) or additional transportation options (like rideshare, transit, micromobility) while their vehicles charge. **Figure 1** is an illustration of a community charging hub and shows how public charging infrastructure can be integrated with other community assets and transportation services.


***Figure 1.*** *Schematic of Community Charging Hub (MTC Mobility Hub Implementation Playbook)*

Charging hubs can be as small as two shared charging stations or include dozens—or hundreds—of ports. They can include multiple amenities and charge a variety of vehicles from e-bikes to large trucks. They may be stand-alone or added to an existing facility.

## Why do communities need charging hubs?

The type of parking offered at multi-family dwellings impacts what EV charging infrastructure can be installed, operated, and accessed. The diagram below (**Figure 2**) shows the different types of parking offered at multi-family dwellings. Detailed considerations for each type of parking can be found in the Community Charging: Emerging Multi-Family, Curbside, and Multimodal Practices published by the Joint Office of Energy and Transportation in early 2024.

Community charging hubs are designed for EV owners that do not have access to chargers at home or work. They are also intended to provide EV chargers to community members that do not have garages, driveways, or dedicated parking spots at home.

The focus for this study is the opportunities for dedicated community charging hubs (parking type 1) to serve the needs of residents in multi-family dwellings who do not have access to onsite parking. This study will also provide guidance for local governments on how to update zoning codes to include EV charging spaces in new developments or major reconstructions.

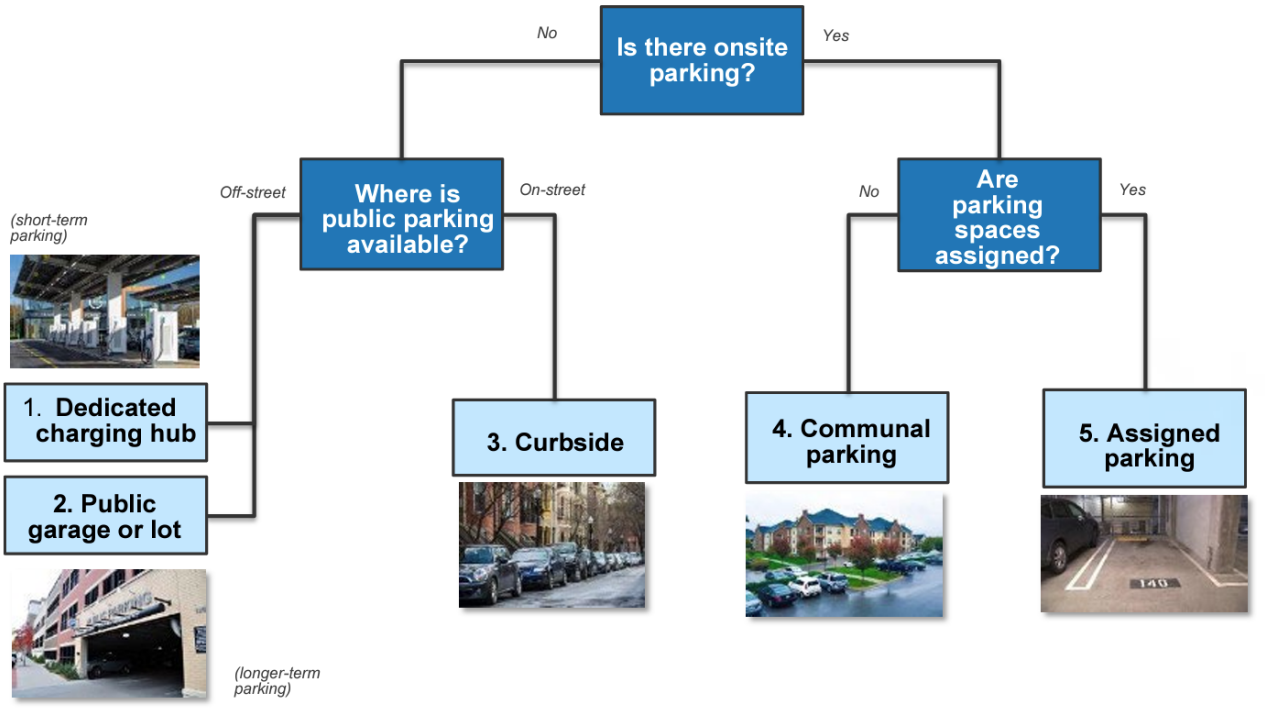


***Figure 2.*** *Types of Parking Available to Multi-Family Residents (USDOT Volpe Center)*

Though EV owners benefit from the public charging infrastructure, other community members can benefit from the multimodal transportation options and amenities offered at the hubs. The hubs could provide services that might otherwise be unavailable.

# What are the key features of a community charging hub?

## Key features of community charging hubs include:

**Reliable charging infrastructure** – Community charging hubs should have several charging points to accommodate multiple vehicles simultaneously. The chargers should work consistently and be well-maintained.

**Convenient location to high-density multi-family housing, employment centers, and/or other destinations such as shopping centers or community centers** – Community charging hubs should be located near where people live, work, or spend considerable amounts of time so community members can conveniently charge their vehicles while they work, sleep, run errands, or do other local activities. Having a hub in residential areas makes it more convenient for EV owners to charge their vehicle at the start or end of their trip, eliminating the need for lengthy trips to distant charging stations.

**Connections to transit or other transportation services** – Community charging hubs should offer connections to transit or other transportation services that community members can use while their vehicle is charging for several hours or more. The hub design should also consider other power needs, such as charging for e-bikes, ride-hailing, or car-sharing services.

**Accessible public space with integrated wayfinding, travel information, and payment options** – Community charging hubs should integrate travel information, such as transit travel times and wayfinding to nearby amenities, into the hub design. Users should be able to access the charging hubs using multiple types of payment systems. Jurisdictions should not assume that all EV owners will have credit cards or smartphones. Charging stations should be accessible to people with disabilities and non-English speakers.

**On-site amenities** – If possible, community charging hubs should offer other on-site amenities, such as restrooms, benches, garbage cans, security lighting, or convenience stores. The amenities allow community members to be comfortable while they wait or to complete essential tasks while their vehicle charges. The amenities also benefit community members that do not own EVs and can spur local economic development for business owners.

**Smart charging capabilities** – If possible, community charging hubs should incorporate smart charging capabilities to optimize charging schedules, manage energy consumption, and provide real-time monitoring and control. Controlled charging facilities were found to yield between 1.7% and 3.1% more revenue than uncontrolled charging (Institute of Energy and Sustainable Development, De Montfort University).

**Equitably distributed throughout communities** – Jurisdictions should consider who the community charging hub will serve and identify opportunities to provide EV chargers to populations that do not have existing access to EV chargers. A low rate of EV registrations is not always an indicator that the community is unwilling to convert to EVs. Inadequate or inaccessible charging infrastructure can be a barrier to EV adoption.

*Case Study:*

# Where are Community Charging Hubs Today?

Community charging hubs have been successfully implemented in Europe and are being piloted in several locations in the United States. In Europe, the following cities have successfully implemented innovative solutions to provide EV charging opportunities in urban areas and for multi-family housing:

- London, United Kingdom – London installed on-street pop-up charge points and both public and taxi-dedicated rapid chargers.
- Amsterdam, Netherlands – Amsterdam piloted a mobile, on-demand, off-grid charging service (**Figure 3**).
- Oslo, Norway – Oslo has 2,300 public charging ports and has plans to increase the number of ports. The Norwegian Environmental Agency allows community members to request locations for charging stations.
- Cologne, Germany – Cologne is piloting curb stone chargers (**Figure 3**) that address charging needs in dense, urban environments that have street parking only.


***Figure 3.*** *Mobile charger in Amsterdam (left) and charging stone in Cologne (right)*

There are also a few local examples of community charging hubs:

- Pennsylvania Avenue Market Lot – Baltimore City
- Saint Frances Academy – Baltimore City
- Michael E. Busch Annapolis Library – Anne Arundel County

## St. Frances Academy EV Charging Station

The St. Frances Academy EV Charging Station in Baltimore Maryland is an example of a local urban community charging hub (**Figure 4**). Baltimore Gas and Electric (BGE) in collaboration with the Mid-Atlantic Electrification Partnership, Lyft, St. Frances Academy, and the Johnston Square neighborhood planned this charging hub. The hub provides three Level 3 fast chargers (150 kWh)

and two dual-port Level 2 chargers (7.2 kWh). This hub is in a neighborhood impacted by air pollution and is close to a rental facility that offers 100 rideshare vehicles for Lyft drivers to rent. The location provides convenient charging for Lyft drivers between trips or before/after rental car pickup. The hub was funded by a grant from the US Department of Energy. BGE is responsible for operating and maintaining the hub. Learn more about the partnerships that made this charging hub possible here.


***Figure 4.*** *St Frances Academy EV Charging Hub in Baltimore (Source: EVgo)*

Vancouver, Canada, installed an electrified bike-share station and DCFC and Level 2 charging stations at Rainbow Park (**Figure 5**). The program strategy includes "digging once" to build a network of conduit and power connections that the film industry, food trucks, special events, and e-bike and EV charging stations can all use. The installation coincided with a complete streets project that constructed an all-ages-and-abilities protected bikeway and was funded by the City of Vancouver.

***Figure 5.*** *Multimodal EV hub in Vancouver, Canada (Source: Google Maps)*

In addition to EV charging stations, community hubs near parks or areas that host food trucks or other vendors can provide outlets to reduce noise and emissions from generators (Figure 6).


***Figure 6.*** *Outlets for food trucks in Stowe, VT and Southwest Harbor, ME*

# Community Charging Hub Planning Toolbox

There are five high-level steps to planning and installing community charging hubs in your jurisdiction: engaging stakeholders, selecting the hub location, designing the hub, operating and maintaining the hub, and supporting workforce development (**Figure 7**). The following sections walk you through these steps. Each section includes references to key publications, questions to consider, and examples to get you started.

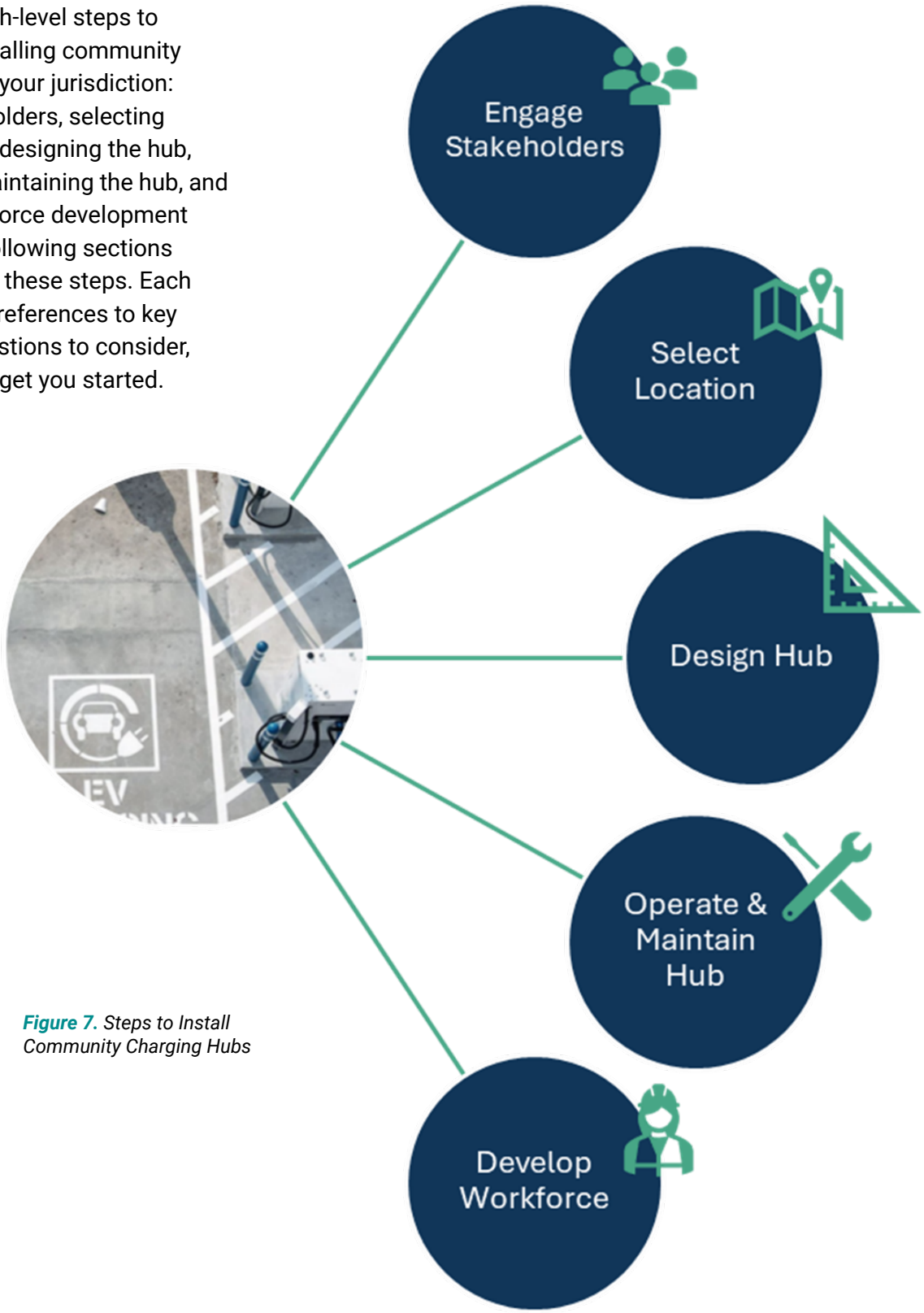


***Figure 7.*** *Steps to Install Community Charging Hubs*

# Engage Stakeholders

Stakeholder engagement is essential to the success of community charging hubs and adoption of EV technology. In preparation for stakeholder engagement, local jurisdictions first must understand their roles in the process as well as the roles of other key stakeholders.

## What is the role of local governments in planning, operating, and maintaining community charging hubs?

Local governments should prepare and plan for community charging hub needs. The local government will likely manage the charging needs for their government fleet vehicles. Governments can work with the private sector to determine who is better suited to operate and maintain public charging hubs. They can help their jurisdictions prepare for the growing number of EVs through the following steps illustrated in **Figure 8**.

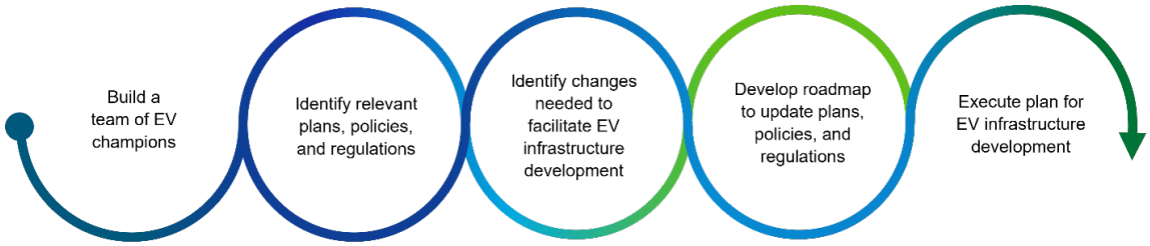


***Figure 8.*** *Local Government Role in EV Planning (US Department of Energy)*

Local jurisdictions can also contribute to the planning, operations, and maintenance of successful community charging hubs by:

- Developing best practices and guidance to share with constituents, private developers, and other jurisdictions.
- Building public-private partnerships to develop programs that prioritize more difficult market areas, such as curbside charging stations or multi-unit dwellings.
- Distributing local funding.
- Coordinating with utility providers.
- Engaging stakeholders in identifying charging hub locations.
- Expanding equitable access to electric mobility.
- Keeping codes and design standards current.

In 2023, Maryland HB 830/SB 477 “Residential Construction or Significant Renovation” established or altered requirements related to the installation of EV charging equipment during new construction or significant renovation of certain housing units or multifamily residential buildings. Some best practices that could be incorporated into future local code and permitting updates include:

- **EV Parking Requirements:**
  - Add requirements for EV-Capable infrastructure for new multifamily housing and for EV-Ready or EV-Installed infrastructure for commercial parking.
  - Add allowance for certain use cases which reduces the number of required Level 2 EV-Installed parking spaces if a DC Fast Charger space is installed.
- **Accessibility:** Follow the US Access Board's Design Recommendations for Accessible Electric Vehicle Charging Stations.
- **Signage and Pavement Marking:** Require that EV parking space signage and pavement markings follow the Manual of Uniform Traffic Control Devices (MUTCD) and Alternative Fuels Data Center requirements and best practices.
- **Landscaping:** Provide more guidance related to EV supply equipment (EVSE) placement and landscaping.
- **Triggers for Upgrades:** Identify a threshold (such as a dollar amount or percentage of the building area) to trigger EV upgrade requirements.
- **Site Design Guidance:** Consider publishing site design guidance for developers.
- **Permitting:** Consider streamlining, standardizing, and digitizing the permit application and review process for EV charger installation.

**Dig once, and coordinate with utility early.** Advanced planning will reduce the costs of EV chargers, which includes equipment, installation, electrical upgrades, and soft costs (including planning, design, marketing, opportunity costs, costs associated with permitting and other delays, etc.). Early coordination with Baltimore Gas and Electric (BGE) can help identify the ideal location of EV chargers on a site and can help BGE plan for their own potential electrical equipment upgrades to meet the anticipated load demands.

- Dig Once / Dig Smart policies are designed to reduce the number and scale of repeated excavations by requiring conduit installation during local construction projects, such as resurfacing parking lots, repairing pipes, or constructing new roads or buildings.

## What are the roles of other key stakeholders in planning, operating, and maintaining community charging hubs?

The key stakeholders and their roles in planning, operating, and maintaining community charging hubs are:

**Elected Officials:**

- Set environmental and economic goals.
- Create policies that encourage EV readiness.
- Advocate for funding.
- Distribute federal and state funding.
- Expand equitable access to electric mobility.

**Private Developers:**

- Design parking facilities to accommodate charging infrastructure today and in the future.
- Comply with zoning requirements and building specifications.

**Utility Providers:**

- Provide electricity necessary for community charging hubs.
- Partner with local jurisdictions or the private partner on EV initiatives.

**Community Members:**

- Identify needs, opportunities, and concerns associated with EV charging.
- Benefit from community charging hubs and new EV jobs.

## Opportunities for Economic Development

One of the most compelling arguments to present to stakeholders is the opportunity for economic development. Researchers from the Massachusetts Institute of Technology found that businesses within 100 meters (328 feet) of newly installed chargers experienced a 3.2% per year increase in customer spending (Nature Communications). Though 3.2% may seem small, the cumulative impact of adding a charger is substantial when all nearby businesses are considered. The increase in customer spending can even help to offset the initial cost of the EV chargers.

## Tools for Engagement

In addition to this guide, there is a series of fact sheets to share with stakeholders about EV charging and community charging hubs. The fact sheets are available on BMC's website. They cover the following topics:

- Electric Vehicles 101: An Overview for the Baltimore Region
- Community Charging Hubs
- Preparing for the Next Grant Opportunity
- Tax Credits/Rebates
- Workforce Development

*Case Study:*

## Engage Communities

The Maryland Zero Emission Electric Vehicle Infrastructure Council (ZEEVIC) works to increase consumer awareness and demand for ZEVs through public outreach. As part of this directive, ZEEVIC attended events and festivals across Maryland to engage key stakeholders including rural, underserved, or historically disadvantaged communities. ZEEVIC provided information about EVs and EV incentives and even hosted vehicle demonstrations (**Figure 9**).


***Figure 9.*** *ZEEVIC at Taste of Southern Maryland (Source: Maryland ZEEVIC Annual Report 2023)*

## Select Location

Jurisdictions should prioritize locations for community charging hubs where there is existing or planned electric utility infrastructure and customer amenities to minimize installation costs and maximize convenience for EV users. Other factors such as visibility, ease of entry and exit for users, and proximity to destinations, employment centers, and housing should also be considered. The Joint Office of Energy and Transportation created a Public EV Charging Station Site Selection Checklist to assist with site selection for publicly available EV charging stations. Maryland Department of Transportation created this EV Charger Siting Tool.

## EV Charging Basics

The wiring and electronics components that convey electricity from an external power source, such as the electric grid, to an EV's onboard battery are collectively referred to as Electric Vehicle Supply Equipment (EVSE). EVSEs are classified into three levels based on the amount of current and power they convey to an EV battery as discussed below and in **Table 1** (USDOT).

***Check out this introductory video on EV technology for more information (NREL).***

- **Level 1:** The equipment can be connected to typical 120 Volt (V) Alternating Current (AC) wall outlets found in most homes. They can give an electric range of about 2-5 miles per hour of charging.
- **Level 2:** The equipment offers an electric range of about 10-20 miles per hour of charging. They are usually 240 V AC outlets for residential applications or 208 V AC outlets for commercial applications.
- **Level 3/DCFC:** These are direct-current fast charging (DCFC) equipment and have been mainly deployed along heavy traffic corridors. They offer about 180 -240 miles of electric range per hour of charging and require inputs of about 400-1000 V.

***The vehicle (not the charging station) dictates recharging speed.*** *Each vehicle has a maximum acceptance rate and will charge only at that rate no matter how many amps the charger can use!*

**Table 1. Summary of EV Charging Levels** (USDOT)

| Characteristics | Level 1 | Level 2 | Level 3/DCFC |
|---|---|---|---|
| **Speed** | Full charge in up to 24 hours | Full charge in 8 to 12 hours | Full charge in 60 to 90 minutes |
| **Average Cost** | $0.13/kWh | $0.20/kWh | $0.35/kWh |
| **Common Locations** | Residential | Parking garages, grocery stores, malls, hotels, workplaces | Adjacent to major interstate highways to enable EV road-trips |

## How long do users park and charge at a community charging hub?

The duration of time an EV user spends at a community charging hub depends on the type of charging hub. There are three different types of community charging hubs to consider that offer different types of charging (Joint Office of Energy and Transportation) (**Table 2**). Hubs can also offer a mix of charging types like St. Frances Academy in Baltimore, Maryland that offers both Level 2 and Level 3 chargers.

**Table 2. Types of Community Charging Hubs**

| Type of Charging Hub | Description | Type of Charging Offered | Estimated User Time Spent at Hub | Example |
|---|---|---|---|---|
| **Fast-Charging** | Provides quick charging in short duration | Level 3 | Less than an hour | The first giga-hub site, a fast-charging hub built to support ride-hail, taxi, and rental car fleets, will be built near LAX with funding from the California Energy Commission. |
| **Destination-Oriented** | Offers lower-powered charging over several hours and is located near other amenities or home/work that people can access while their vehicle charges | Level 2 | Several hours or overnight | The Connecticut Post Mall offers EV chargers for customers while they shop and dine at the mall. |
| **Pop-Up** | Provides a semipermanent or portable fast-charging solution for special events or locations that cannot access the grid | Battery integration or portable charger | Less than an hour | The Glastonbury Festival of Contemporary Performing Arts partnered with Octopus to help EV drivers identify chargers along their routes and offer an emergency recovery charging facility for vehicles in need of a charge. |

## Matching Land Use & EV Charging Types

Land use plays a key role in determining which type of EV charger to install. For example, most EV drivers charge their vehicles overnight, using a Level 1 or Level 2 charger. Level 1 or Level 2 chargers are appropriate in residential areas, because EVs are likely parked for 8 or more hours in the same location. Similarly, Level 1 or Level 2 chargers at a community charging hub near transit will work for people who are leaving their vehicles while they commute and work for 8 or more hours. People can also benefit from Level 2 chargers in commercial areas where they can park their cars for a few hours and charge their vehicles while running other errands. In contrast, Level 3 chargers/DCFC work best adjacent to major interstate highways or in areas where users need a quick charge and most likely will not be leaving their vehicles. Access to other transportation modes or errands is less important in areas that offer Level 3 chargers. However, it is important to consider offering amenities like bathrooms or convenience stores within walking distance of the chargers.

As jurisdictions invest in EVSE upgrades for public or municipal fleet use, they should plan for Level 2 or Level 3 chargers instead of Level 1 to get the greatest return on investment. However,

there are use cases where Level 1 chargers can meet the needs of some EV and PHEV users, so Level 1 charger options shouldn't be ignored as temporary solutions while the EVSE supply is being built out.

*Case Study:*

## Matching Land Use and Charger Types

Potential locations for community charging hubs in lower density or suburban areas of the Baltimore region include shopping centers, malls, and new retail developments that provide amenities to the surrounding communities. A mix of Level 2 and Level 3 chargers would best serve community charging hubs in these locations, because users could leave their vehicles charging for several hours while running errands or could quickly charge their vehicles while grabbing something to eat or a few groceries nearby.

An example of a community charging hub that would benefit from a mix of charging types is the Metro Centre at Owings Mills in Baltimore County. Metro Centre is a mixed-use development that offers numerous stores and restaurants as well as apartments and condos. There are both surface parking lots and parking garages available for employees, patrons, and residents with space to accommodate EV chargers.

Jurisdictions can use high-level land use maps, such as the map of Metro Centre shown in **Figure 10** to identify potential locations and to better understand which charger types would best serve the location.


*Figure 10. Potential Community Charging Hub Location – Metro Centre at Owings Mills (Google Maps)*

## Location Selection Checklist

To identify potential sites for a community charging hub, your jurisdiction can:

- Focus on multi-family **housing without dedicated parking spaces**.
- Identify **mobile home parks**, which are often affordable housing for many underserved segments of the population, where the residents often own one or more vehicles, and will benefit from lower transportation costs. Mobile homes are also difficult to upgrade for home charging stations.
- Identify neighborhoods of **homes that were built before 1960** and have had fewer-than-average permits issued or census data indicates at least 50% of residents are renters. Use GIS data or local information to identify potential hosts, which include houses of worship, recreation centers, and parks that are within a short walk of many homes.
- Engage with **neighborhood associations** for condos and townhomes, particularly older communities that tend to have smaller (or no) garages and common areas for parking.
- In **collaboration** with BGE, other utility providers, and city/county facilities staff, identify facilities that can meet the following criteria:
  - Parking lot/parking spaces that are available to the community 24/7 and that dedicated EV parking spaces will not impede use of the facility.
  - The parking lot/spaces are configured so that one EV charging port will be adjacent to a van-accessible ADA parking space.
  - The EV charging spaces would be visible so that EV drivers do not feel isolated and vulnerable while charging.
  - The electrical supply at the facility (electric panel, conduit, etc.) can accommodate the electric load of two DCFCs.
  - The utility electrical supply (transformer, feeder lines, switchgear, meter) can accommodate or be upgraded to accommodate the electric load of four cars charging simultaneously.
  - Optionally, the location could accommodate shared EVs, micromobility, and potentially mobile services that could visit the site to activate it. For example, a parking spot for an EV bookmobile or mobile vet clinic.

To get started, ask the following questions when selecting a community charging hub location:

Does the location have electricity or is electrification possible at this location?

Does your jurisdiction own the property? If not, does the property owner approve of installing EV chargers?

Is this location in a floodplain? If the location is in a floodplain, consider another location or consider the resilience in the design if flooding is possible.

Is this location convenient to high-density multi-family housing, employment centers, and/or other destinations such as shopping centers or community centers?

Are there multimodal connections at this location? Is there room for other charging needs, such as e-bikes, ride-hailing, car-sharing, or transit charging needs?

Who will this location serve? Is there an opportunity to serve populations that do not have existing access to EV chargers?

*Case Study:*

## Apply the Location Selection Checklist

The surface parking lot at 101 Birckhead Street is owned by Baltimore City and is surrounded by row houses and multi-family housing. Most houses do not have designated parking and most


residents park on nearby streets. Though there are a few public chargers in the neighborhood, there are not enough to meet the demand of the area. Baltimore City has started piloting community charging hubs and plans to convert monthly parking permits at this lot to a community charging hub that is pay-by-hour for the duration of the charging session.

***Figure 11.*** *Potential Community Charging Hub Location (Google Maps)*

This is how the Location Selection Checklist was applied to identify this potential site:

| Location Selection Criteria | Does this location meet the criteria? |
|---|---|
| Does the location have electricity or is electrification possible at this location? | Yes, the Baltimore City Parking Authority has already coordinated with BGE. |
| Does your jurisdiction own the property? If not, does the property owner approve of installing EV chargers? | Yes, the City of Baltimore owns this parking lot. |
| Is this location in a floodplain? If the location is in a floodplain, consider another location or consider the resilience in the design if flooding is possible. | No, this location is not within a floodplain. |

| | |
|---|---|
| Is this location convenient to high-density multi-family housing, employment centers, and/or other destinations such as shopping centers or community centers? | Yes, approximately 20,000 multifamily units are within a mile of this location. |
| Are there multimodal connections at this location? Is there room for other charging needs, such as e-bikes, ride-hailing, car-sharing, or transit charging needs? | Yes, bus service is available on neighboring streets as well as ride-hailing and micromobility options. |
| Who will this location serve? Is there an opportunity to serve populations that do not have existing access to EV chargers? | Yes, Justice40 census tract is within a mile of this location. |

# Design Hub

In the planning phase, evaluate the spatial constraints of the site, demand for EV charging in the community, and cost of installation when determining the number of EV chargers to install at a community charging hub. Also, be aware of funding requirements. For example, the National EV Infrastructure Standards and Requirements require a minimum of four charging ports to be installed at a charging station. Though it is important to maximize the available space, jurisdictions should thoroughly evaluate the accessibility of the layout to ensure the hub and chargers are accessible for all users. Design sites to be accessible for the vehicles that are expected to use the site, which may have different sizes, turning radii, and charger port locations. Additional design considerations include sustainable design practices, such as energy-efficient lighting and solar panels. Reach out to the local utility company early to collaborate to find the best or most efficient strategies for each site.

For more details on site design, refer to the webinar hosted by the Joint Office of Energy and Transportation that outlines key considerations in the design of EV charging stations including accessibility, security, parking, operations, and maintenance.

## Amenities

Amenities near reliable EV chargers encourage longer stays at the community charging hubs and provide additional benefits to community members that do not own EVs. In the Mobility Hub Implementation Playbook, the Bay Area MTC outlines four types of amenities that should be included at community charging hubs:

- **Mobility** – Mobility amenities include features that encourage connectivity and sustainable transportation options. Examples include transit stops/shelters, long- and short-term bike parking, clear connections to pedestrian and bicycle networks, and micromobility (shared e-scooters and e-bikes) stations.

- **Public Realm** – Public realm amenities provide services that are relevant and needed in the community and support public life. Examples include vending/ retail space, green space, street furniture with lighting, trash cans, and bathrooms (**Figure 12**).
- **Customer Experience** – Customer experience features improve the charging and waiting experience for community charging hub users. Examples include different types of payment systems (i.e., cash payment) and digital screens for trip planning.

*Figure 12. EV charging station in Roanoke Rapids, NC with garbage cans and windshield washing station.*

- **Information** – Information provides real-time communication and gives users an understanding of how to use the EV chargers, phone number to call to report a maintenance issue, available amenities, nearby transportation options, and parking restrictions (durations and rates). Examples include real-time travel information, maps, bulletins, and digital and physical wayfinding.

## Do community charging hubs look different in urban and suburban environments?

Yes, community charging hubs might look different in dense, urban areas than in less dense, suburban or rural areas. Planning for charging infrastructure in urban and suburban areas requires several considerations due to population density and land use patterns. In dense urban areas, charging hubs are often located in high-traffic commercial areas or near dense residential areas. Community charging hubs are also more spatially constrained in urban environments than in suburban areas.

In contrast, suburban areas offer more space for charging stations with existing facilities, such as shopping centers and office parks that have larger parking garages or surface parking lots. The Towson Town Center in Towson, Maryland, offers 50 public chargers with ten chargers available in each of the mall's parking garages. Drivers can use the chargers for two hours while visiting the mall or other nearby businesses.

Urban hubs will likely offer different features and services than suburban hubs. Suburban hubs provide important regional connections and offer features, such as park-and-ride access, connections to local or regional bus services, and carshare services. Urban hubs are local centers of economic and cultural activity that offer higher frequency transit services, access to carshare and shared micromobility services (bike share stations and scooter share), and have strong demand for taxis, Transportation Network Companies (ride hailing), and pedestrian and bicycle facilities (Bay Area MTC). Table 3 outlines additional transportation services to incorporate in the charging hub design.

**Table 3.** **Transportation Services to Consider by Hub Type**

| Hub Type | Short- and long-term parking | Transit | Shared micro-mobility | Bicycle parking | Ride-hailing services | Carshare services |
|---|---|---|---|---|---|---|
| **Urban** | X | X | X | X | X | X |
| **Suburban** | X | X | | | X | X |

*Case Study:*

## Coordinate with Existing and Planned Projects

Shopping centers, malls, and new retail developments can be great locations to install chargers as these locations are frequented by many community members. These locations also offer lighting, security, and ample parking that provide a better user experience. Instead of installing new amenities as part of the charging hub design, design hubs around existing amenities or partner with ongoing and planned projects.

For example, Howard County has a 30-year plan to redevelop the area around the mall in Columbia. The redevelopment plan includes adding multi-use pathways, regional transit bus centers, new apartment buildings, and headquarters for healthcare, education, and corporations. Additionally, Howard County is advocating for affordable housing options, a new public library, and a new fire station. These additions provide public land ownership opportunities that could also provide opportunities to install community charging hubs.

## Accessibility

When designing new EV charging spaces, follow the US Access Board's Design Recommendations for Accessible Electric Vehicle Charging Stations. Follow the Manual of Uniform Traffic Control Devices (MUTCD) and Alternative Fuels Data Center requirements and best practices for EV parking space signage and pavement markings.

The US Access Board created the Design Guidance for Accessible EV Charging Spaces, which addresses mobility and communication needs, tripping hazards, among other guidance. Other accessibility standards that apply to EV charging stations include:

- ADA Accessibility Standards
- ABA Accessibility Guidelines
- Section 508 Standards

Many of these standards address how to design EV chargers that serve people who use mobility devices or who have visual or hearing disabilities. Accessible EV charging spots should be at least 11 feet wide and 20 feet long with an adjoining access aisle of at least 5 feet (**Figure 13**).

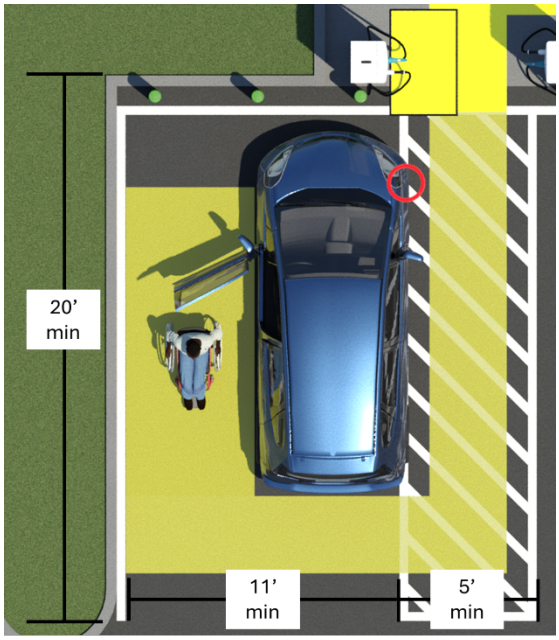


***Figure 13.*** *Accessible EV Charging Spot (Source: US Access Board)*

## Equity

Jurisdictions should consider the needs of diverse communities, including low-income neighborhoods and disadvantaged populations. Disadvantaged populations as defined by the Joint Office of Energy and Transportation for the NEVI Formula Program are "groups of individuals living in geographic proximity (such as census tract) or a geographically dispersed set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions facing high rates of environmental pollution, those whose economies are highly dependent on fossil energy sources, and those with high rates of social vulnerability."

To identify disadvantaged populations, jurisdictions can use American Community Survey (ACS) 5-Year Estimates and US Census data. To facilitate equity analysis, jurisdictions can use USDOT tools, such as the Justice40 Initiative, the Equitable Transportation Community (ETC) Explorer, and the Climate and Justice Screening Tool (CJEST). Maryland Department of Transportation's EV Charger Siting Tool also provides some Maryland-specific equity layers.

The Northeast States for Coordinated Air Use Management (NESCAUM) compiled examples of local programs and initiatives to improve equitable EV access. The programs and initiatives focused on:

- Lower financial barriers to EV ownership
- Expanding access to charging infrastructure
- Conducting outreach and education to reach disadvantaged communities

One of the most important steps a jurisdiction can take to expand equitable EV access is conducting outreach. General lack of awareness about the benefits of EVs and purchase incentives available remain barriers for EV adoption among disadvantaged communities. Community outreach can help jurisdictions overcome these barriers by providing educational opportunities. EV for All: Electrifying Transportation for Low-Income Communities and the Community Engagement Tips for EV Infrastructure Deployment provide tips to address these barriers and conduct community engagement to support EV infrastructure planning. Suggested steps include:

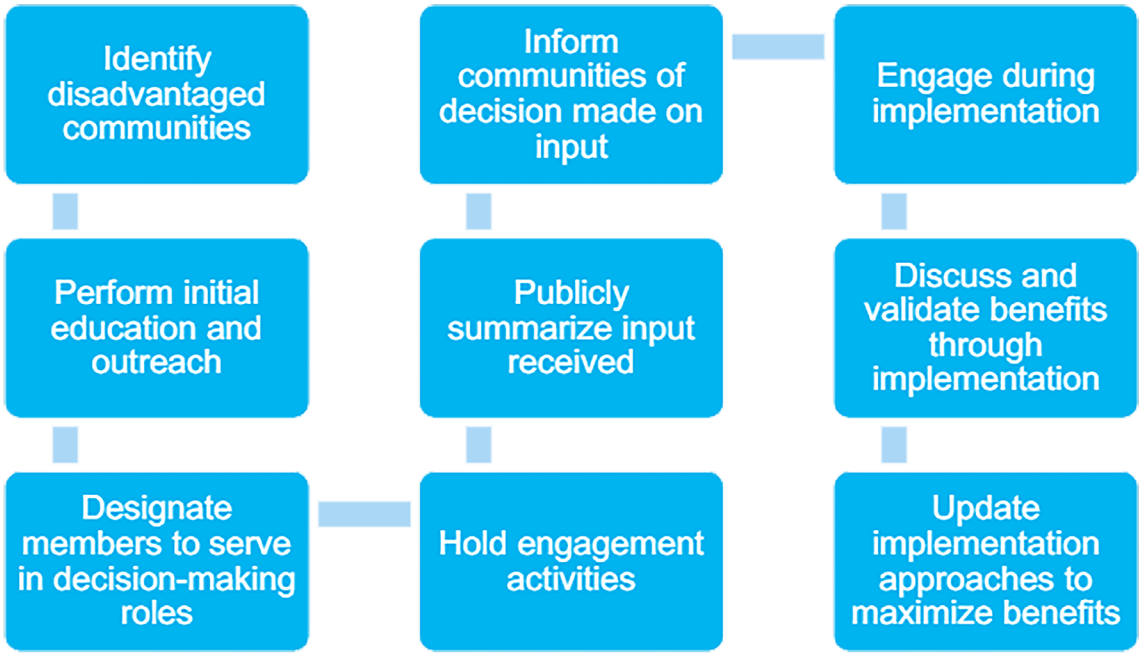


***Figure 14.*** *Process for Designing, Implementing, and Tracking Community Engagement (Joint Office of Energy and Transportation)*

# Operate & Maintain Hub

Operations and maintenance protocols for a community charging hub are as important as a hub's design. Without proper oversight and maintenance to keep the EV chargers up and running, a community charging hub cannot achieve its full potential.

## Operations and Maintenance

When planning community charging hubs, establish comprehensive maintenance protocols to ensure the safety and reliability of the charging facilities. Also, establish partnerships with utility providers to facilitate regular inspections and repairs.

Following the installation of a community charging hub, the jurisdiction in partnership with the management entity should establish a system for collecting user feedback and communicating needed repairs. New Jersey has a Best Management Practices that provides clear information on inspection requirements.

## Parking Duration Policies

Each jurisdiction should assess its charging policies as EV charging needs change due to longer-range EVs, more charging stations, and charging stations that require payment. In February 2022, Maryland Department of General Services revised its policy for charging stations that are owned by the state, including the following provisions[2]:

- Charging stations available for both State-owned fleet vehicles and private vehicles may be used by employees, contractors, and visitors between the hours posted on the station signage, for a maximum of 4 hours at Level 2 chargers and 1 hour at DC fast chargers. Exact times will be determined by the site's parking coordinator.
- Vehicles may pay a fee per kilowatt hour used. After a 30-minute grace period, an idle or "overstay" charge may be incurred. A placard on the charging station will provide fee details. Vehicles may be towed after the grace period, at owners' cost, at the discretion of the parking coordinator or law enforcement to free up spaces for others' use.

Several Maryland cities adopted this policy. This is a policy, however, and not a regulation or requirement. The policy originated with the U.S. Department of Energy's Workplace Charging Challenge in 2015.[3] At the time, EVs had 100 miles or less range and few charging stations were available. Nearly all charging stations were free. Early adopters of EV charging stations implemented this policy to make sure that every EV commuter could make it back home.

The four-hour charging limit can incentivize vehicle turnover at chargers. It may also be sufficient for vehicles with short commutes. If a community charging hub installs low-power chargers, the parking policy should allow EVs to charge for longer than four hours. Additionally, if chargers are located further away from multi-family dwellings, allowing vehicles to park for longer in the spaces will reduce the burden to move the vehicle for residents who will park their vehicle for longer than four hours (such as when they sleep).

## Fee-based Pricing Structures

Your jurisdiction will need to find sustainable funding sources for EV chargers. Grants are helpful, but future federal funding is uncertain. You will need revenue to cover the costs of electricity, maintenance and repair, software subscriptions, and replacing out-of-date equipment.

Pricing structures should be transparent and affordable. The pricing structures can be based on electricity usage, charging speed, membership fees, and time of use. Flexible and affordable pricing structures will attract more users and help expand EV access in the community. Additional options, such as flexible payment options, pay-per-use, bundle services, and cash payment options for unbanked users enhance the customer experience and can accommodate varying user preferences and usage patterns.

[2] https://dgs.maryland.gov/Documents/ElectricVehicle/ElectricVehicleChargingStationPolicy.pdf

[3] https://afdc.energy.gov/files/u/publication/Sample_Workplace_Charging_Policy.pdf

EV charging pricing strategies should align with your jurisdiction's sustainability goals and consider the following pricing mechanisms:

- Tiered pricing based on charging levels. For example, Level 1 and low-speed Level 2 could be free while high-speed Level 2 and DCFC are priced by the kilowatt hour (kWh).
- Use dynamic pricing and demand management to set rates higher during peak periods, stop or slow charging to avoid demand charges, and potentially to encourage charging during off-peak hours.
- Bundle charging station access into parking permits. This can also help you understand where and when to increase the number of charging stations.
- Idling fees when a vehicle is parked but not charging to incentivize drivers to move their vehicles when they're finished charging to free the space for other vehicles to use.
- Charge a start-up fee (often less than $1.00) that helps to fund maintenance.

If your jurisdiction requires users to pay for EV charging, common payment options are:

- Credit card/NFC
- RFID
- Smart phone
- Plug & Charge
- QR code or website access

Your jurisdiction's EV Charging Team and IT departments will need to coordinate to understand potential security risks and verify that vendor-proposed strategies comply with jurisdiction policies and procedures.

## Support Workforce Development

The Baltimore region has an economic opportunity to fill new jobs created by the transition to EVs. Public agencies and private companies have crucial roles in building a strong, local, and diverse workforce to ensure these job opportunities benefit all communities.

The region's workforce needs to be trained or retrained ahead of Maryland's EV transition, which requires all new light-duty vehicle sales be electric or zero-emission by 2035. EVs and EV charging equipment create a wide variety of new job and training opportunities for the region, including (Bureau of Labor Statistics):

- Scientific Research
- Design and Development
- Manufacturing and Maintenance
- EV Infrastructure Development
- Sales and Support

To promote equitable workforce development in the EV sector, public agencies and private companies can implement several strategies:

- **Workforce Development in the Procurement Process:** Set disadvantaged business enterprise (DBE) goals in your requests for proposals to create opportunities for local business development.
- **Targeted Outreach:** Inform underrepresented communities about contracting and career opportunities in the EV sector through targeted outreach programs.
- **Training Programs:** Collaborate with local colleges and technical schools to provide subsidized training in EV technologies.
    - Baltimore City Public Schools' Career and Technical Education (CTE) program offers Automotive Technician training in some area high schools.
    - Montgomery College's Automotive Electrical Systems Specialist Certificate prepares students for the Automotive Service Excellence (ASE) L3 Light Duty Hybrid/Electric Vehicle technician certification exam, as well as other automotive, electrical, and wiring skills.
    - Carroll Community College's 90-hour Hybrid/Electric Vehicle Technician Program prepares students for the ASE L3 and the ASE Engine Performance (A8) exams. Prior coursework in automotive electrical systems is required.
    - VETWorkS offers automotive training courses and certifications in Baltimore, including training on EV charger maintenance.
- **Mentorship and Apprenticeship Programs:** Establish internal mentorship and hands-on apprenticeship programs for underrepresented groups, focusing on minority and low-income individuals in the EV industry.
- **Workforce Diversity:** Implement inclusive hiring practices and ensure job postings reach a diverse pool of applicants.
- **State and Federal Support:** Advocate for policies that fund equitable training programs and workforce development in the EV sector. See the GUMBO Initiative for a federally supported example.

There is a fact sheet on workforce development to share with communities and elected officials about the economic opportunities related to EVs available here.

## *Case Study:*
# Develop Workforce

The GUMBO (Guaranteeing Access to Underserved and Marginalized Populations by Building Employment Opportunities) initiative provides EV educational curriculum to regional and national training partners. Initially developed by Louisiana Clean Fuels and Baton Rouge Community College, it received Department of Energy funding. Now, multiple partners, including Greater Washington Region Clean Cities Coalition and Virginia Clean Cities, are involved. Maryland Clean Cities and Communities Coalition may also benefit from exploring this partnership.
Key points of workforce development from the GUMBO initiative include:

- Practical Training: Hands-on training in installing, maintaining, and servicing electric vehicle supply equipment (EVSE), directly addressing the growing need for skilled technicians in the EV sector.
- Career Opportunities: New career pathways in the EV infrastructure, with technicians specializing in EVSE installation and maintenance potentially earning between $40,000 and $65,000 annually.
- Supporting Underserved Populations: Access to training and employment opportunities explicitly targeting underserved and marginalized populations.
- Curriculum Development: Curriculum for EVSE installation and operations will be made publicly available, enabling broader access to education and skill-building.

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*Case Study:*

## Workforce Development Collaboration

The State and Local Electric Vehicle Workforce Collaborative, a joint effort by the National Governors Association (NGA) and the National League of Cities (NLC), is shaping the future of the EV workforce by building strategies to create a skilled and diverse talent pipeline. Co-chaired by Justine Johnson, Michigan's Chief Mobility Officer, and Mayor Stephanie Piko of Centennial, Colorado, this initiative brings together state and local perspectives. Launched to harness the economic potential of expanding EV charging infrastructure, the initiative has strong backing from federal agencies, including the Departments of Energy, Transportation, and Labor.
Here are the key focuses of the Collaborative's workforce development approach:

- **Practical Training:** With the demand of skilled EV technicians, this collaborative emphasizes hands-on training for installation, maintenance, and service of electric vehicles and their associated equipment.
- **Career Pathways:** The initiative is committed to creating career paths that are accessible and support family-sustaining jobs in the EV infrastructure industry.
- **Inclusive Workforce Support:** This initiative emphasizes addressing the needs of underserved communities with a focus on reducing non-skill barriers to aid in decreasing the barrier of entry for underserved communities.
- **Standardized Curriculum Development:** To support consistency and scalability, the Collaborative is developing a shared set of skills and pathways that regions across the country can adopt to build robust EV talent pools.

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*Case Study:*

## Technician Training

Wake Tech Community College's EVSE (Electric Vehicle Supply Equipment) Field Technician Certificate program trains technicians to install and maintain EV charging stations. Launched as a statewide pilot in North Carolina, the program is funded through the Siemens Foundation's EVeryone Charging Forward Initiative, with support from the North Carolina Business Committee for Education (NCBCE). Graduates will be ready to pursue the EVSE Field Technician credential through the Society of Automotive Engineers (SAE), enhancing their credentials in the field. With

Siemens Foundation funding and partnerships with major EV investors like VinFast and Toyota, this program is integrated into North Carolina's broader EV landscape, supporting a sustainable and inclusive workforce ecosystem. Key aspects of the Wake Tech EVSE program's approach to workforce development include:

- **Hands-On Training:** This six-week, non-degree program blends online learning with hands-on instruction, equipping students with practical skills in electrical systems, EV technology, and charging station installation and maintenance.
- **Pathways to High-Demand Careers:** As North Carolina's battery and EV sectors grow, the program prepares students to meet the increasing demand for skilled EV technicians, paving the way for new career opportunities in this emerging industry.
- **Equitable Access:** One of the goals for this program is widen job access for people from all backgrounds, create pathways into the EV sector, and ensure that underserved communities have access to this field.
- **Comprehensive Curriculum:** The curriculum is robust, covering electrical systems, EV technology, codes and regulations, and the configuration and maintenance of charging stations. Designed to be scalable, this curriculum could serve as a model for similar programs nationwide.

In conclusion, as the EV industry rapidly expands, it brings with it vast job opportunities across manufacturing, maintenance, and infrastructure development. Equitable workforce development must be a priority to ensure that these opportunities are accessible and beneficial to all communities. Community charging hubs stand out as essential components—not only in providing accessible infrastructure, but also in fostering an inclusive workforce ecosystem. Dedicated efforts and strategic policies are needed to address the current diversity gaps in the EV workforce and to make underserved communities decision makers, implementers, and users of this technology. By prioritizing equity and inclusion, the Baltimore region can support diverse talent and deliver sustainable economic benefits from this growing industry.

# Next Steps

Get started today. Begin taking the five steps for planning and installing community charging hubs in your jurisdiction: engage stakeholders, selecting a pilot hub location, designing the hub, operate and maintain the hub, and support local workforce development.

**Understand the benefits, opportunities, and challenges for your community.** Each community is different, and each community will have different land use and charging needs. Engage with your local stakeholders and community organizations to understand what is working well, what barriers to EV charging or EV ownership exist in your community, and who might be potential site hosts for community charging hubs. Explain the needs and opportunities to your decision makers and elected officials.

**Coordinate Across Jurisdictions.** As you select a location, identify partners, and look for funding; coordinate with neighboring jurisdictions, Baltimore Metropolitan Council (BMC), Maryland Energy Administration (MEA), the Greater Washington Region Clean Cities Coalition (GWRCCC), and Baltimore Gas & Electric (BGE). Sharing plans and information will help you implement reliable charging infrastructure that meets your community's needs and may reduce your costs by finding new funding opportunities or efficiencies.

**Continually Monitor EV Technology and Adoption.** As with any innovative technology, EV model options, battery, and charging technology will continue to evolve. Monitoring their evolution will be paramount to meeting future demands.

- Vehicles are becoming less expensive and used models are becoming available. As EVs become more affordable, adoption rates should increase.
- Charging technology is evolving. There are now:
  - Mobile charger services that provide portable, on-demand, off-grid charging. They could serve parking garages, special events, and emergency uses. A mobile fast-charging pilot led by L-Charge is being tested in Amsterdam, Netherlands.
  - Wireless charging roads are being tested using inductive charging. Examples of pilot projects include Michigan Department of Transportation's one-mile-long section of 14th Street in Detroit, the Central Florida Expressway Authority's initiative on S.R 516, and the Pennsylvania Turnpike Commission's plan for the new Mon-Fayette Expressway Project.
- Federal funding initially focused on long-distance charging needs. New funding is focused on supporting residents who will have the hardest time charging at home—residents without off-street parking.
- Future federal funding is uncertain. Agencies will need to find sustainable funding sources for EV chargers.

For more information, check out the EV Fact Sheets:

- Electric Vehicles 101: An Overview for the Baltimore Region
- Community Charging Hubs
- Preparing for the Next Grant Opportunity
- Tax Credits/Rebates
- Workforce Development

# Appendix A: Additional Resources

In recent years, several agencies and organizations have published guidance to facilitate installing EV chargers at multi-family housing and community charging hubs. The following table summarizes the key publications to review when considering community charging hubs.

| Agency or Organization | Resource | Use this resource to… |
|---|---|---|
| Joint Office of Energy and Transportation | Community Charging: Emerging Multi-family, Curbside, and Multimodal Practices | Learn agency's role in bringing EV charging to residents in multi-family housing, residents dependent on curbside or on-street parking, and those without access to privately owned electric vehicles |
| California Plug-In Electric Vehicle Collaborative | Plug-in Electric Vehicle Charging Infrastructure Guidelines for Multi-Unit Dwellings | Understand the considerations and charging options for multi-unit dwellings |
| Transportation Energy Institute | Installing and Operating Public Electric Vehicle Charging Infrastructure | Find a summary of considerations for public EV charging sites and review several case studies that detail funding and partnerships needed to move public chargers forward |
| Argonne National Laboratory | Electric Vehicle Charging Equity Considerations | Ensure EV charging infrastructure is benefiting disadvantaged communities and review the NEVI Formula Program methodology for defining "disadvantaged" |
| US Department of Energy \| Alternative Fuels Data Center | Procurement and Installation for Electric Vehicle Charging Infrastructure | Find examples of how other organizations have completed the charging procurement process, and identify the factors that should be considered in the procurement process |
| Atlas Public Policy | EV Charging at Multi-Family Dwellings | Find recommendations on the type of chargers, equipment, infrastructure, and administration efforts that will be needed to install EV chargers at multi-family dwellings |
| Electrification Coalition | EV Funding Finder | Find available funding and review hypothetical case studies that detail possible funding options |

# Appendix B:
# EVSE Timeline: Concept to Development

The timeline for implementing EV charging stations from concept to development can vary greatly depending on several factors, including the scale of the project, the local regulatory environment, and the specific needs of the site. Here is a general timeline that outlines the major steps[4]:

1. **Concept Development** (1-3 months): This includes market research, feasibility studies, and the initial design of the EV charging station.

2. **Detailed Design, Planning, and Site Selection** (3-12 months): This stage involves selecting the site and more detailed design work, which may include site surveys, evaluating existing electric infrastructure, detailed design drawings, and other technical specifications. This stage requires coordination with BGE to verify existing grid access meets the site needs or may require BGE to complete electrical or construction work to upgrade the grid.

3. **Permits and Approvals** (1-3 months): This stage involves obtaining any necessary permits or approvals. The permit and approval process may vary depending on the level of the chargers, the complexity of the project, and the jurisdiction's permitting process.

4. **Procurement** (1-3 months): This involves sourcing and ordering the necessary equipment, including the charging stations themselves, any necessary electrical equipment, and possibly construction materials. Selecting equipment from an approved product list can expedite the procurement process.

5. **Installation and Testing** (1-3 months): This includes the physical installation of the charging stations, as well as any necessary electrical work. The schedule will depend on the complexity of the project and availability of equipment. This stage may also include testing of the equipment to ensure it is functioning properly.

6. **Commissioning and Launch** (1 month): This is the final stage, where the charging stations are officially brought into service. This may involve a launch event or public campaign to raise awareness of the new facilities.

It might take six months to a year or more from concept to launch of a commercial-grade EV charging station. However, this is just a general estimate—the exact timeline can vary greatly depending on the specifics of the project.

[4] SparkCharge, How Long Does it Take to Install Commercial EV Charging Stations?

# Appendix C: EVSE Budgeting Guidance

A typical budget for EV charging station implementation will include one-time capital expenses (CapEx) and ongoing operational costs (OpEx). Grants and incentives can reduce some of the costs. These costs include:[5]

- **One-Time Capital Expenses (CapEx):**
  - **EVSE units and installation costs –** Equipment and installation costs can vary depending on the vendor and the site. Locating charging stations close to power transmission equipment can save construction costs. This also includes electrical upgrades, like adding an electrical panel or submeter.
  - **Site restoration –** This includes curbs, sidewalks, striping parking spaces, adding signs, ADA access, lighting, bollards, wheel stops, landscaping. Consider bundling costs into existing surface paint projects or ongoing maintenance processes.
  - **Labor (contracted or in-house) –** A licensed electrician or UL-certified staff is required to install Level 2 or Level 3 charging stations. Many grants require that at least one electrician with Electric Vehicle Infrastructure Training Program (EVITP) certification be on the installation team.
  - **Design and engineering –** EVSE installation requires that a licensed electrician create site plans and conduct a load analysis according to local electrical codes. Sites may also require civil engineering and ADA engineering to prepare plans to submit with permits. Design and engineering are usually budgeted at 20% labor and site restoration costs.
  - **Utility "Make-Ready" fees –** BGE may need to make infrastructure improvements that include feeder lines, transformers, switchgear, meters, and substations. Currently, BGE offers up to $15,000 for make-ready upgrades.
  - **Permitting costs –** Electrical permits are required, and jurisdictions may require additional permits for stormwater, lighting, and increased traffic.
  - **Networking –** Charging stations require dedicated, secure Wi-Fi or cellular networks or improvements to existing networks. Vendors may also require a separate payment gateway for charging stations that accept credit cards for payment.
  - **Commissioning –** A one-time fee per port to connect the charging station to the electrical supply and network and run a series of tests to ensure optimal operation.
- **Ongoing Operational Expenses (OpEx):** Charging station operating costs fall into three main categories: Cost of electricity from the utility, charging station parts and repair, and subscription fees:
  - **Maintenance –** Vendor agreements typically include five years of software maintenance and limited repairs due to faulty parts. Site hosts should plan for parts replacement due to wear-and-tear, negligence, and vandalism; preventive hardware maintenance; and site maintenance, like snow removal and trash clean up.
  - **Networking and credit card processing –** Many vendors include 2-to-5 years of networking fees in their initial price. After the contract period, site hosts need to pay a per-port charge for access to cloud-based software. Additionally, most vendors charge a swipe fee for credit card transactions.

[5] Host of Boston, 2020. How-To Guide: Starting an electric vehicle workplace charging program.

- **Electricity–** BGE does not offer a special EV rate for commercial accounts. The jurisdiction or the vendor will purchase electricity by the kilowatt hour (kWh) and may pay an additional cost for peak energy periods or demand charges. The jurisdiction or its vendor may pass the cost of electricity on to the public users.
- **Customer support –** Many charging station vendors have online customer support through a website and chatbot. Some site-hosts contract with a third-party to provide in-person and telephone customer training, education, and support or assign a staff person to provide support during business hours.
- **Program management –** Site hosts can integrate charging station operation and data collection with other software platforms and/or use vendor provided tools. Organizations with a large number of charging stations may hire a full- or part-time person to collect data, schedule maintenance, and make sure that station uptime meets grant requirements.

## Strategies for Reducing Charging Station Operating Costs

Most charging station vendors include five years of warranty and maintenance in their contracts, which mostly address software updates, remote monitoring, online customer support, and replacing defective parts. It does not include replacing LED screens, keypads, cords, connectors, and pedestals from wear and tear and damage, and warranties rarely include sending a technician to replace a broken part.

Three ways to reduce the costs associated with maintenance are to:

1. Choose a charging station that accepts payment through a web application or a central kiosk. LED screens, keypads, and credit card readers are at the mercy of weather and mishandling. Select stations that use RFID or cell phones, like this PowerFlex station that uses a QR code for activation.

2. Stock connectors and cords for DCFC and Level 2 and make sure that TU facilities staff know how to install them. All vendors offer training, and swapping a cord or connector requires simple tools and basic knowledge of electrical systems.

3. Choose pedestals that are buried in the ground instead of mounted to a sidewalk. Place wall mounted charging stations higher than the hood or truck of the target vehicle. Although bollards can protect the charging station from being hit by a car, they can also prohibit access for people that use personal mobility devices (walkers, wheelchairs, etc.)

## Charging Station Standards & Procurement Requirements

Most charging station vendors include 2-to-5 years of software fees in the initial contract. Once the contract is up, the client will pay (on average) $400 a year per port for software services. Your procurement documents should require vendors to install charging stations that use the Open Charge Point Protocol (OCPP), a developing standard for communication between charging stations and management systems. Using a standards-based system makes sure that you have future flexibility to choose management software that fits your needs and your budget.

All charging stations that accept payment should use the Payment Card Industry (PCI) standard, which allows you to choose the credit card processor and ensures compliance with cybersecurity. When contracting with a vendor, pay careful attention to the vendor's terms and conditions. For example, one vendor collects and processes all credit card transitions and pays the site host monthly. The vendor retains 10% of the net charging session fees, but the site host is responsible to pay the state sales tax. A different vendor provides the payment gateway, but the site host chooses the processor.

To ensure **maximum interoperability**, procurements should follow the charging station standards and requirements in Federal funding opportunities:

- **Connectors:** J1772 standard for Level 2, CCS for DCFC, options for the NACS (usually through an integrated adaptor)
- **Payment:** Accept contactless payment that accept major credit cards
- **Certification:** UL and EnergyStar certified
- **Security:** Stations must have physical strategies for location and cybersecurity strategies to protect consumer data.
- **Uptime:** Stations must maintain 97% uptime
- **Maintenance:** Stations must be operational and maintained for a minimum of five years
- **Non-proprietary:** Stations must be non-proprietary – this includes using the Open Charge Point Protocol (OCPP) for communication and Open Automatic Demand Response (OpenADR) for utility demand management.
- **Open access:** Stations must be authorized to charge vehicles from all major automakers.

# Appendix D: Funding and Procurement Options

This section outlines common business models for charging station ownership and operation, procurement options under the National Association of State Procurement Officials, federal tax credits, local incentives, and federal NEVI funding. To get up to date information on federal funding programs, check out the EV Funding Finder created by the Electrification Coalition.

## Common business models for charging station ownership and operation

| Model | 100% Host Owned and Operated | Shared with Vendor | 100% Vendor Owned and Operated (Charging as a Service) |
|---|---|---|---|
| **Brief Description** | Host purchases and installs the charging stations | Host purchases equipment, vendor installs and operates stations | Vendor purchases equipment and operates, Host and/or vendor pay for construction |
| **Grants and LCFS** | Host applies for grants, aggregates and sells LCFS credits | Vendor applies for grants, aggregates and sells LCFS credits, can take tax credits | Vendor applies for grants, aggregates and sells LCFS credits, can take tax credits |
| **Maintenance** | Via a maintenance contract—Host staff perform hardware maintenance, EVSE vendor may offer individual driver support | Vendor provides technical support, maintenance, and operation; Host staff may do some hardware maintenance | Vendor provides all technical support, maintenance, and operation |
| **Data Management** | Separate service contract with vendor and Host staff | Vendor collects and reports most data | Vendor manages data |
| **Fees** | Host pays all fees for networking, management software, credit card payments (if applicable) | Split between vendor and Host, usually in favor of vendor | Included in contract |
| **Revenue** | Host collects all fees for charging sessions and LCFS credits | Split between Host and vendor | Vendor charges Host a monthly fee; may collect public charging fees |

## National Association of State Procurement Officials (NASPO)

Consider utilizing the State of Maryland National Association of State Procurement Officials (NASPO) contract to order EVSE. Maryland is the "Lead State" Department of the General Services (DGS) Master Agreement for Electric Vehicle Charging Stations and Support Services.

The State of Maryland DGS contract is intended to provide comprehensive EV Charging Station Solutions and Support for Participating Entities within three Award Categories:

- Level 2 EV Chargers (Hardware/Software/Support Services)
- Level 3 / DC Fast Chargers (Hardware/Software/Support Services)
- The scope for the above two Award Categories includes all hardware (inclusive of original equipment purchases and replacement parts), software, and support services (i.e., training, repair, professional services, consulting services, project development) to develop, install, maintain, and repair charging stations.

Participation in NASPO Value Point Master Agreements is convenient and cost-effective for eligible entities—including state departments, institutions, agencies, and political subdivisions; federally recognized tribes; and other eligible public and nonprofit entities in the 50 states, the District of Columbia, and U.S. territories—and suppliers, with no membership or registration required. The June 2024 contract constitutes the first iteration of a NASPO Value Point established portfolio for Electric Vehicle Charging Stations and Support Services. The expiration date is May 31, 2027, and the renewal process is through May 31, 2029.

*Sixty-six (66) EVSE Vendors submitted bids, and 13 offerors were awarded a contract: ABM, AutoFlex Fleet, Blink, Connected Kerb, District, EO Charging, ezVoltz, InCharge Energy, IoTecha, National Car Charging, OpConnect, Winn-Marion, and ZEF Energy.*

More information about NASPO, NASPO Value Point, and NASPO Value Point "Lead State" Model can be found at www.naspo.org and www.naspovaluepoint.org.

## Federal Tax Credit

The 30C Alternative Fuel Vehicle Refueling Property Credit (30C credit), which provides an income tax credit for qualified alternative fuel vehicle refueling property, was extended and amended under the Inflation Reduction Act of 2022 (IRA) to include certain property for the recharging of an electric vehicle placed in service in eligible census tracts. The tool identifies census tracts that are "anticipated to remain eligible through 2029 because it meets the definition of 'low-income community' in Internal Revenue Code section 45D(e), using the 2016-2020 New Markets Tax Credit (NMTC) designations and the 2020 census tract boundaries ("2016-2020 NMTC tracts")."

*Your jurisdiction's accountants should confirm eligibility for the 40W credits.*

## Local Incentives

### *Maryland Energy Administration EVSE Rebate Program*

The Maryland Energy Administration (MEA) Electric Vehicle Supply Equipment (EVSE) Rebate Program seeks to support the installation of charging stations and increase EV adoption. This program provides funding assistance for purchasing and installing EVSE to cover 50% of the total project costs with a cap of $5,000 for each commercial charger. The project may not receive awards exceeding $125,000, and this rebate does not apply to Level 1 charging stations.

### *Baltimore Gas and Electric Company Commercial Customer Charger Rebate*

Baltimore Gas and Electric (BGE) is offering $30,000 in rebates for each commercial property in the service territory to support the purchase and installation of qualified Level 2 and DCFC chargers. This program will support 50% of the charger costs for the purchase, warranty, and installation of EVSE equipment. The L2 chargers have a cap of $5,000 per charging port, and the DCFC chargers have a cap of up to $15,000.

### *Other Incentives and Partnerships*

BMC and local jurisdictions could coordinate with the MEA to potentially partner on grant applications or to take advantage of MEA funding and resources for EV procurement and EV charger procurement and installation.

The Maryland Excise Tax Credit no longer has funding available for this fiscal year. Consumers should check for tax credits and other discounts before making a purchase of an EV or EV charger.

## NEVI Funding

*The National Electric Vehicle Infrastructure Formula (NEVI) is a bipartisan law managed by the Federal Highway Administration. It provides formulaic funding to each state to deploy EV charging infrastructure and additional funding through Charging and Fueling Infrastructure (CFI) competitive grants.*

Through the Bipartisan Infrastructure Law, Maryland will receive approximately $63 million in National Electric Vehicle Infrastructure (NEVI) Program formula funding over five years to deploy public charging infrastructure first along Maryland's 23 designated EV Alternative Fuel Corridors and then in communities. Maryland's NEVI Plan describes how the state, through the Maryland Department of Transportation, intends to strategically invest these funds to create a convenient, reliable, and accessible public charging network alongside partners and stakeholders.[6] NEVI-funded corridor stations must have a minimum of four DCFC ports and be within one-mile of a highway/interstate on-ramp/off-ramp and not adjacent to residential areas, sensitive environmental areas, or vulnerable populations. NEVI-funded community stations have more flexible siting requirements. All NEVI-funded stations must maintain at least 97% uptime for high charging reliability. On July 10, 2024, MDOT announced 23 conditional awards totaling $12.1 million of formula funds for Round 1 of Maryland's NEVI Program. Look out for future funding opportunities through Maryland's NEVI Program.

[6] https://evplan.mdot.maryland.gov/?doing_wp_cron=1723676871.4102880954742431640625