CHARGE LOCAL
A GUIDE TO INSTALLING EV CHARGING STATIONS FOR MUNICIPALITIES IN MORRIS COUNTY
Charge Local

A Guide to Installing EV Charging Stations for Municipalities

Written by:
Margaret Berei, Hayley Berliner and Matthew Schantin
Environment New Jersey Research & Policy Center

November 2021
# Table of contents

**Become A Leader of Electric Charging** ................................................................. 1  
**An Introduction to Electric Charging Stations** ................................................. 2  
  - Types of Chargers ............................................................................................... 2  
  - Costs .................................................................................................................... 3  
    - Purchase Costs per unit .................................................................................. 3  
    - Installment Costs ............................................................................................ 3  
    - Operation and Maintenance Costs .................................................................. 4  
  - Incentives .......................................................................................................... 5  
**EV Charging Access and Infrastructure** ............................................................ 6  
**Reforming Zoning, Codes, and Permits for Electric Charging** ......................... 8  
**Electric Vehicle Parking Spaces Guide** ............................................................ 10  
**Denville Electric Vehicle Highlight** .................................................................. 12  
**Case Study with The Borough of Madison’s Lisa Ellis** .................................... 13  
**Case Study with the Morristown Parking Authority** ......................................... 14  
**Charge Local Municipality Resolution Template** ............................................. 16
Become A Leader of Electric Charging

The Problem

• The transportation sector makes up 42% of the state’s greenhouse gas emissions

• Emissions given off by vehicles greatly worsen communities’ health

• To further expand electric vehicle use, we need to expand our charging infrastructure

The Solution: Electric Charging Stations

• Public charging stations allow drivers to refuel their vehicles while out of their homes

• With the continued expansion of charging infrastructure, range anxiety will be limited, expediting the transition to EVs

The Benefits

• Improve your communities’ overall health

• Increase your appeal to tourists and residents through a quieter and cleaner environment

• Bolster cleaner energy by working to reduce our oil dependence and increase grid resiliency

• Help effectively combat climate change

Incentives Offered

• **Clean Fleet EV Incentive Program**
  
  ° $1,500 toward the purchase of an EV charging station

• **It Pay$ to Plug In**
  
  ° Level 1 and Level 2 charging station incentives for both public and private location
An Introduction to Electric Charging Stations

Types of Chargers

Level 1
• 120 Volt AC
• Adds 2-5 miles of range per hour
• Primarily home chargers, workplace

Level 2
• 240 Volt AC
• Adds 10-20 miles of range per hour
• Grocery stores, retail parking lots, public parking garages, offices, malls

DC Fast
• 480 Volt DC or 208 Volt AC
• Converts high voltage AC (alternating current) power to DC (direct current) power to store directly in the electric battery
• Adds 60-80 miles of range per 20 minutes
• Heavy traffic corridors (highways), gas stations, larger businesses
**Costs**

**Purchase Costs per unit**
- **Level 1**
  - In 2015, the U.S. Department of Energy listed the range as $300-$1,500

- **Level 2**
  - In 2015, the U.S. Department of Energy listed the range as $400-$6,500
  - Higher power, public chargers are often above $3,000

- **Level 3**
  - In 2015, the U.S. Department of Energy listed the range as $10,000-$40,000

**Installment Costs**
- Charging station hosts often have an electrical contractor complete a site evaluation to best determine the specific location for the station
- During the installation process, the contractor:
  - Purchases the station
  - Installs, upgrades or connects the station to an electric service
  - Installs the charging station
- Installation costs increase with more complex installation including
  - Trenching to connect the station to an electrical panel
  - Installing a new electrical service
  - Upgrading the current electrical service

### INSTALLMENT COST RANGES AND AVERAGES

<table>
<thead>
<tr>
<th>EV Charging Station Type</th>
<th>Installment Cost Range</th>
<th>Average Installment Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>$0-3,000</td>
<td>N/A</td>
</tr>
<tr>
<td>Level 2</td>
<td>$600-12,700</td>
<td>$3,000</td>
</tr>
<tr>
<td>DC Fast</td>
<td>$4,000-51,000</td>
<td>$21,000</td>
</tr>
</tbody>
</table>

*Source: U.S. Department of Energy*
Operation and Maintenance Costs

Operation Costs
- Costs for the electricity to charge vehicles
  - Amount will vary depending on
    - The electric utility’s specific rate
    - The volume of vehicles
    - Time spent charging by vehicles at the station
- Using Level 2 or DC chargers could lead to higher demands on the electric facility, leading to additional demand charges
  - Will vary based on location and charger type
- If the charging stations are networked online, hosts will have to pay for the network’s communications and office support
  - Fees will range from $100-900 annually
- Capital Costs
  - Potential warranties for hardware or labor
  - Costs to purchase or lease land or parking spaces

Maintenance Costs
- Basic units often do not require regular maintenance as owners often replace the damaged component
- More complex units may require periodic maintenance due to the increased amount of components that could fault
- Here are examples of maintenance costs for each level of charging station
  - Level 1
    - Replacement of an electrical outlet ($1-$40 plus electrician fee)
    - Minimal maintenance
  - Level 2
    - Often can replace individual malfunctioning components alone
    - Minimal maintenance
  - DC Fast
    - Require periodic maintenance due to complex components including cooling systems and filters
    - Highest maintenance costs
Incentives *

Clean Fleet EV Incentive Program
- $1,500 towards the purchase of one fleet level 2 charging station (not available to the public)
- $2,000 towards the purchase of a public level 2 charging station
  - Depending on the size of the municipality, your town may be eligible for up to four level 2 charging stations
  - To apply, must have purchased a dual port charger with the ability to capture data (networked charger)
- $4,000 toward the purchase of an eligible battery electric vehicle
- Rolling basis application, form to apply in the link above
  - Applications can be found here
  - The application deadline is 5 p.m. on May 1, 2022, unless funds are exhausted earlier.

It Pay$ to Plug In
- Level 1 and Level 2 charging stations exclusively public
  - Up to $750 for each level 1 charging port
    - Minimum of 5 charging ports
  - Up to $4,000 for each level 2 charging port
    - 2-20 charging ports per location
    - Money can be used towards purchase, installation and/or other fees
    - Rolling basis application
      - Follow these application steps
  - Exclusively public DC Fast chargers, especially for prioritized NJ corridors
    - Up to $200,000 in reimbursement
    - Chargers must have 2 ports at minimum
    - Must be located within one mile driving distance from an exit or intersection along designated major travel corridors
    - Currently closed for applications since July 22, 2020, but is likely to open again soon
      - Follow these application steps when reopened
    - More information on It Pay$ to Plug In can be found here and here

To learn more about additional NJ grant and incentive programs, refer to Sustainable Jersey and New Jersey's Clean Energy Program.

*The Clean Fleet EV Program and It Pay$ to Plug In cannot be used for the same charger*
EV Charging Access and Infrastructure

Streamlined EVSE Permitting Process
Ensure permits for EVSE are accessible and quick to obtain through expedited, over the counter, or online review services to streamline the town's review process in regards to installing electric charging stations.

- **New Jersey Guide for Residential EV Charging Permits**
- **City of Chicago: Easy Permit Process Ordinance**

EV Ready Building Codes
Building codes that account for EV charging stations at the time of construction can drastically lower costs for residents and business owners to install such stations. By requiring a set amount of charging stations per parking lot or requiring the proper electrical infrastructure in building codes, towns can eliminate a large barrier to installing charging stations later on, the upfront cost.

- Montclair Township **Alternative Fuel Vehicle Readiness Guide (pg 34-37)**
- Sustainable Jersey **Guidance for Creating Plug-In Vehicle Friendly Ordinances**

City EVSE Installation Guidelines and Best Practices
Cities can provide guidelines and best practices for the installation of EV charging stations. By maintaining physical brochures and pamphlets as well as online guides, citizens will be able to access resources for easy installation in both residential and commercial situations.

- **City of Atlanta: EV Readiness Workbook**
- **City of Chicago: How to Install Electric Vehicle Charging Stations at Multi-Unit Dwellings**

City Owned Public Charging Stations
By providing charging stations, cities can encourage further EV adoption in their communities and beyond. Cities can also apply for both state and federal grants to afford the charging station installation and keep costs low for users. Implementation of charging stations can be customized to the town or specific location, and can achieve greater charging turnover and efficiency through new technology.

- **Township of Princeton Charging Stations**
- **Township of Woodbridge Charging Stations**
- **Jersey City Charging Stations**
City EV Charging Station Incentives
To increase the installation of both public and private charging stations, cities can offer tax credits or rebates for both the equipment and labor costs. Cities can also direct and encourage citizens to take advantage of existing grant programs like the “It Pay$ to Plug In” program that offers grants to residents, businesses and even government agencies if the city itself wanted to take advantage of it.

- Washington D.C. EV Charger Incentives

Workplace Charging Incentives
Higher EV adoption rates have been statistically linked to the availability of charging stations at workplaces. Therefore cities should direct local businesses to utilize charging station grant programs and incentives, and also consider recognizing businesses that build charging stations.

- New Jersey’s It Pay$ to Plug In Grants

Multi-Family Dwelling EVSE Support and Incentives
Installation of charging stations in the multifamily housing sector has traditionally been low compared to other applications. However, by providing guides and resources, along with help in regards to administrative barriers, cities can combat the existing challenge. Further, cities have the ability to increase incentives for MFD’s and provide resources for building owners.

- Multi-Family Dwellings are able to apply for It Pay$ to Plug in Grants

Right of way Access for Curbside Charging; Streetlight and Power Pole Charging Access
Cities can develop guides and permitting processes for curbside EVSE installation in areas where residents and businesses do not have off-street parking. New technology also allows for the installation of charging stations on streetlight poles to maximize space and existing infrastructure.

- Kansas City Right of Way Streetlight Charging
- Los Angeles Bureau of Street Lighting EV Charging Stations

Pair EV Charging Stations with Renewables
Cities should consider partnering with private companies or investing in renewable energy options like solar to offset emissions from the grid associated with EV charging. Renewable energy solutions could include on or offsite solar PV generation focused on offsetting emissions from EV charging off the grid.

- City of Pittsburgh partners with EnvisionSolar (now BEAM) to provide 5 EV Arc Solar Chargers
- New York City partners with EnvisionSolar (now BEAM) to provide 50 EV Arc Solar Chargers to charge the city’s electric fleet across their departments

Photo courtesy of “Ken Fields” www.kenfields.net
Reforming Zoning, Codes, and Permits for Electric Charging

Zoning

By defining EV charging stations in zoning laws, municipalities can separate EV charging from traditional gasoline filling stations and allow for their installation in all zoned areas. These actions will eliminate confusion and barriers for developers to implement charging stations in their building plans. Through zoning, municipalities can also both incentivize and require developers to install EV charging stations by offering extended floor area in a zone or by simply mandating a certain percentage of parking spots to have EV charging. By requiring future installation of EVSE, zoning can become a useful tool for municipalities to shape future development to both accommodate and encourage the use of EV’s. However, municipalities should also be aware of limitations as zoning alterations run the risk of stifling development and over regulating the use of EVSE. Some landlords may also be uncomfortable being forced to both install and maintain charging stations on their property. Therefore, zoning has potential according to the unique needs of various municipalities and local representatives should keep in mind the need to include the public when amending zoning ordinances.

- Consider using Sustainable Jersey’s guide for example ordinances
- New York City has also updated many of their zoning ordinances to be more sustainable, the initiative is “Zone Green” and at the bottom of page 3 is an explanation of EV charging station updates.

Codes

Altering municipal codes is an efficient process for municipalities to begin encouraging the installation of new EV charging stations. One code change for instance could include requiring a percentage of new parking spots to be EV ready to maintain preparedness for EVSE. Another example includes amending existing codes to require EV ready wiring for all new homes as well as increasing residential electric service to 220 V in order to accommodate level 2 charging. By making new development EV ready municipalities can begin removing barriers to a swift transition towards EV adoption. Codes could also be revised to streamline the permitting process and reduce administrative fees to better incentivise EV charging stations. Further, during code revisions governing bodies can include voluntary compliance standards that would encourage more ideal development for property owners better equipped to scale up their EVSE installation. Municipalities should also keep in mind the 3 year cycle for codes to be revised and ensure they are prepared to manage the results of a code change no matter how major or minor they might be.

- Montclair Township, NJ updated their codes to enforce parking for EV charging station spots as seen here.
- An example of municipal code amendments can be seen in Seattle’s 2017 electrical code amendment document on pg: 52, 57, and 159.
On September 8th, the Murphy Administration instituted a **model statewide ordinance** to standardize the ordinance language across all of New Jersey's 565 municipalities. This ordinance ensures that all towns have acceptable electric vehicle parking and installation minimums and guidelines to follow, effectively streamlining the process for municipalities to install charging stations across the state. The statewide ordinance supersedes any weaker electric vehicle ordinances implemented by municipalities; however, municipalities can still undergo the usual amendment process under the “Reasonable Standards” section of the ordinance.

Our zoning, codes, and permitting section of the guide was drafted before this legislation was signed into law. These sections are here at your disposal to supplement the information provided in the new legislation. We are emphasizing to you, municipal leaders, that this piece of legislation does exist and is here to help aid the transition to electric vehicles within your domain. Importantly, the information in this guide also goes beyond what is provided by the sample ordinance to highlight the basics of zoning, codes, and permitting and specific resources available on each topic.

### Permitting

Three main priorities of efficient EVSE permitting for municipalities include: permit filing, installation, and inspection. To streamline the filing process of EVSE permits, municipalities should consider decreasing the cost of permits as well as classifying chargers for single-family homes as “minor work” or appliances to reduce the amount of paperwork and procedural steps to obtain a permit. Currently under New Jersey code EVSE installation qualifies as “minor work,” so municipalities should consider matching the state code and potentially adding EVSE installation in more explicit terms within their own code. Providing an online permitting option can also make the permit process more efficient and allow for easier inspection coordination. In order to cater the permitting process to the complexity of different types of chargers, level 2 and DC fast charging should likely require a more detailed inspection process. In regards to inspections, municipalities should make a strong effort to train all of their inspectors for a quick inspection and to provide a wider availability in scheduling inspections in a timely manner. Ultimately the goal for municipalities should be to make the permit and inspection process as quick and accessible as possible, especially in the case of less complex installations like the level 1 home chargers. This streamlining will allow for more flexibility and oversight when it comes to inspecting and installing level 2 and DC fast chargers.

- Utilize **Drive Green New Jersey’s one pager** with links to streamlined permitting examples and NJ codes to outline permitting requirements.

---

**For Additional Information on all Three:**

Refer to page 7-23 of the *Creating EV-Ready Towns and Cities: A Guide to Planning and Policy Tools*
Electric Vehicle Parking Spaces Guide

Steps to Create Successful EV Parking Spaces

1. Selecting the location
   • Long, wide parking spots are ideal for EVSEs (electric vehicle charging stations)
     ◦ The minimum parking spot size must not be compromised by the charging station
     ◦ Extra space will be needed for ADA accessible parking spots
   • Locate the spot in a prominent place where it will be of use
   • To minimize costs, consider locations as near as possible to existing electrical services
   • Further site evaluations are often done by a hired electrical contractor

2. Accessibility Considerations
   The ADA (Americans With Disabilities Act) recommends that EVSE hosts follow this chart to determine the ratio of non-ADA accessible spots to accessible spots
   • Accessible spots are for people using wheelchairs and other physical accommodations
   The spots must include an access aisle at least 60” wide as shown in the image to the left
   • Specific regulations are still being formed around the needed amount of accessible EVSE parking spots
     ◦ There are some potential tripping hazards involving EV cords and other components of the station
   • It is important to work to minimize hazards for passengers as a means to limit liabilities and ensure public safety

3. EV Installation and Mounting
   • Once the location is selected, the charging station must be installed by the electrical contractor
     ◦ See installment costs in the introduction for further information
   • Depending on the site, the station can be mounted either on a wall or on the ground to maximize square footage
     ◦ Chargers should be installed in the front of the parking spot to minimize the distance between the charger and the vehicle’s port
4. Lighting
• Chargers should be placed in areas with adequate lighting to maximize driver safety and limit charging station damage
• Depending on the location, lighting upgrades or installations may be necessary

5. Signage and Aesthetic Design
After the parking lines and potential ADA accommodations are met, it is highly recommended to incorporate elements to help draw attention to EVSE location
• Signage
  ° The Manual on Uniform Traffic Control Devices (MUTCD) sets the standards for federal signage on public and private roadways
    ▪ The image to the right indicates a standard symbol for charging stations
  ° Directional signs to the charger are recommended to increase volume
  ° Signs are often located at the spot to identify it as EV only
  ° Local regulations will further dictate signage placement
• Design
  ° The color green has become the industry standard for paint designs at charging locations
  ° Numerous stencils and designs are available to use on the spot itself to appeal to users

6. Police Communication
• To ensure spaces are only occupied by EVs, the local police should be involved once charging stations are completed
• Municipalities can decide how to treat non-EVs parked in EV only parking spaces, but something must be done to discourage this to make sure charging stations are accessible
  ° Parking tickets and/or towing the vehicles are commonly used methods
Denville's Mayor, Tom Andes, and Township Administrator, Steven Ward, shared with campaign coordinator, Margaret Berei, the interesting story of their electric vehicle charger's installation process. High school student Max H. came to speak with the Mayor, asking him to install a charging station in Denville's downtown for his Eagle Scout Community Service Project. The Mayor knew this was needed, but could only respond to Max by saying that they needed some time to consider how they could possibly make this happen due to the expenses of the proposed station.

The Mayor then explained a shocking twist in the story: just 3 days later, he received an email about the Green Sustainability Grant, funded by the non-profit Sustainable Jersey. After applying and receiving the grant of $10,000, Max's work continued with Steven, Township Professionals, the Denville Rotary Club and the Green Sustainability Committee. The total project, including all installation, permit, and service fees, cost around $14,000, with the additional $5,000 for the project provided by the Denville Rotary.

One year later when the electric vehicle charging station was fully installed and operational, “it was the 2nd public Electric Vehicle Charging Station owned and maintained by a municipality in the entire State of New Jersey” according to Steven Ward. Today, Max's charging station project is still making an impact. Steven explained to me that on average, the station boasts 35 unique users monthly, with double the amount of charging sessions due to regular chargers. Reflecting on this long lasting project, the Mayor concluded, “I have seen many Eagle Scout Community Service Projects. There have been several as ambitious, none as expensive or technical.”
Case Study with The Borough of Madison’s Lisa Ellis

In August of 2021, Lisa Ellis, the Director of Business Development from the Borough of Madison, communicated with Margaret Berei, a campaign coordinator with Environment New Jersey, to better understand their past and ongoing experiences with electric vehicle charging station installation.

Madison’s electrification process began in late 2018 when the Environmental Commission came to the Borough Administration with compelling information. They spoke passionately about the necessity for Madison to create public electric vehicle charging infrastructure to help prepare their citizens and town moving forward. This event sparked Madison’s installation process.

In February 2019, guided by dedicated and knowledgeable local volunteers, the town applied for the It Pay$ To Plug In grant sponsored by the New Jersey Department of Environmental Protection (NJDEP). The town was awarded the full amount requested, and then they used these funds to purchase 5 dual port charging stations. These stations were installed, with the advisers mindful of their location. When choosing the charging locations, Lisa explained that they considered the spot’s visibility, accessibility, and, potentially, the ease of moving electric infrastructure to the site. However, even after selecting the locations, station placement can be moved if necessary. Later during the installation process, Lisa described how the original location of one of the five stations had to be reconsidered due to an issue with electricity access.

Another factor municipalities must consider during electric vehicle charging installation is the source and cost of labor. Unlike other towns, Madison has its own electric utility. This allowed the Borough to limit installation costs by utilizing their own municipal staff. With the installation process coming to an end, charging stations were all fully operational by the fall of 2020.

When asked about any major issues during their installation process, Lisa responded that the installations went smoothly and were met with no opposition. Looking towards the future, Madison wants to increase their charging infrastructure. The aforementioned five stations are currently the extent of Madison’s public electric vehicle infrastructure, but the town is in the works of acquiring 5 more, once again aided by a grant from the It Pay$ To Plug In program.

Concluding our communication with Lisa, we asked her, based on Madison’s experiences, what municipalities should know in Morris County that are beginning their installation process. She responded that towns should remember to look for available grants, as did Madison, especially through the New Jersey Department of Environmental Protection that would help fund the charging infrastructure. Finally, Lisa explains that since electric vehicles are the future of automobility, “Setting up the infrastructure as soon as possible will help your community be prepared going forward.”
In November of 2021, Nicole Fox, Executive Director of the Morristown Parking Authority, and Greg Deal, Director of Facilities for the Morristown Parking Authority, discussed with Hayley Berliner, Clean Energy Advocate with Environment New Jersey, to better understand their obstacles and advice on electric vehicle charging installation.

Morristown’s leadership, as the county seat, does not disappoint on electric vehicle charging stations. Currently, the town boasts 2 chargers in every garage and 3 in their newest facility. Furthermore, the Parking Authority plans on further increasing their charging infrastructure within the following years to keep up with its rising demand. However, as they discussed, the demand was not always there.

Around four or five years ago, Morristown began to install electric vehicle chargers as a “pilot program”. The first chargers came in response to a state program where the town was able to lease, for free, electric vehicles for town use. After the lease ended, residents started requesting public electric vehicle chargers in their numerous garages. The town’s charging infrastructure therefore hinged initially upon town demand, and later the demands of numerous residents. This demand has continued and is now calling for more electric vehicle charging stations. Due to their history of installing electric vehicle charging stations, Morristown has a more knowledgeable outlook on the obstacles facing municipal charging station installation.

They explained that the first thing municipalities should do in the installation process is to connect with their local power company. From their experience, sourcing power to the building or area is one of, if not the largest, costs of the entire process because most buildings or locations do not have enough power capacity, especially for a larger number of chargers. While the dual-chargers (two ports) they purchased from JuiceBar cost around $5,000 each without grants or incentives, their installation cost was around $11,000 per charger. Collaborating with your power company and understanding the cost and plan of action is the first major hurdle.

When Morristown began their “pilot program” for charging stations, they decided not to charge users for their usage of the stations.
However, in the current, higher demand electric vehicle market, municipalities like Morristown are more in favor of having a paid system for charging. This can be set up, they explained, using a company which specializes in electric vehicle payment options. Additionally, with the data supplied from the payment, municipalities will be better able to track the charger’s hourly usage, and potentially even power usage, depending on the company. Deal noted that many companies use a sub-meter system to record both sessions and power usage separately from the larger power unit. Therefore, by “charging to charge”, municipalities can help cover a part of the installation fees as well as being supplied with accurate and varied data for their records and consideration.

While charging installation is growing in demand, a big obstacle for many towns are the high starting costs for total charger purchase and installation. For Morristown’s first installation phase 4 to 5 years ago, there was less funding and grants available. Today, however, they both noted that there is more public and private funding accessible to municipalities and that they plan on taking advantage of some of these opportunities during their upcoming installations.
Charge Local Municipality Resolution Template

This sample resolution language below can be modified for your community according to the needs and transportation priorities for your community.

[MUNICIPALITY LOGO]

Whereas, the transportation sector accounted for 42% of carbon dioxide emissions in New Jersey in 2018 and is a contributing factor to air pollution and climate change, threatening the health of our citizens and the sustainability of our planet; and

Whereas, gasoline will continue to become a financial burden on everyday citizens and overall economic growth as fossil fuel prices increase from an escalating worldwide demand; and

Whereas, the transportation sector needs support, beyond state-offered rebates, to move toward adoption of plug-in electric vehicles (EVs) that reduce our dependence on foreign fuels and supports a healthy environment and economy; and

Whereas, electrification of cars, trucks and buses is needed in order to achieve deep reductions in carbon pollution, and the benefits grow over time as electricity generation in New Jersey gets cleaner; and

Whereas, New Jersey has a statewide municipal model ordinance that guides municipalities in the installation of electric vehicle charging infrastructure, providing minimum requirements and guidelines; and

Whereas, [MUNICIPALITY] is dedicated to being a leader in the use of clean energy, establishing policies and programs, such as the EV Rebate Program, that conserve energy, promote sustainability, and support New Jersey’s goal of 2,000,000 registered EVs by 2035;

Now, therefore, I, [NAME], declare [TITLE] of [MUNICIPALITY] a Charge Local City and pledge to develop an Electric Vehicle Action Plan over the next 18 months, including the goals and implementation strategies required to transition the local transportation sector to zero emissions vehicles. The EV Action Plan will include the following goals:

- Transition the municipal fleet to zero emission vehicles
- Work to build access to EV charging stations on both public property and through partnerships with the private sector
- Work with the community to transition all vehicles in [MUNICIPALITY] to zero emission vehicles

[NAME], [TITLE] [DATE]