



Mohawk Valley Electric Vehicle Charging Station Plan

ELECTRICA

Mohawk Valley EV Charging Station Plan



PREPARED BY:



IN COLLABORATION WITH:



Herkimer-Oneida Counties
Transportation Study



Planning Department



Planning Department



Planning Department

WITH SUPPORT FROM:



NYSERDA

**Department of
Transportation**

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Input to the Mohawk Valley EV Charging Station Plan was provided by these sponsors and supporters, along with other key stakeholders in the region. Members of this working group which reviewed, ranked, and provided feedback on all aspects of this plan included:

- Adam Ruder, NYSERDA
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- Colleen Smith-Lemmon, NYSDOT
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- Chris Lawrence, City of Utica
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- Tim Peters, Otsego Rural Housing Assistance



Steet-Ponte Dealership in Yorkville installed a public AC Level 2 charging stations to help promote Ford's plug-in hybrid vehicles.



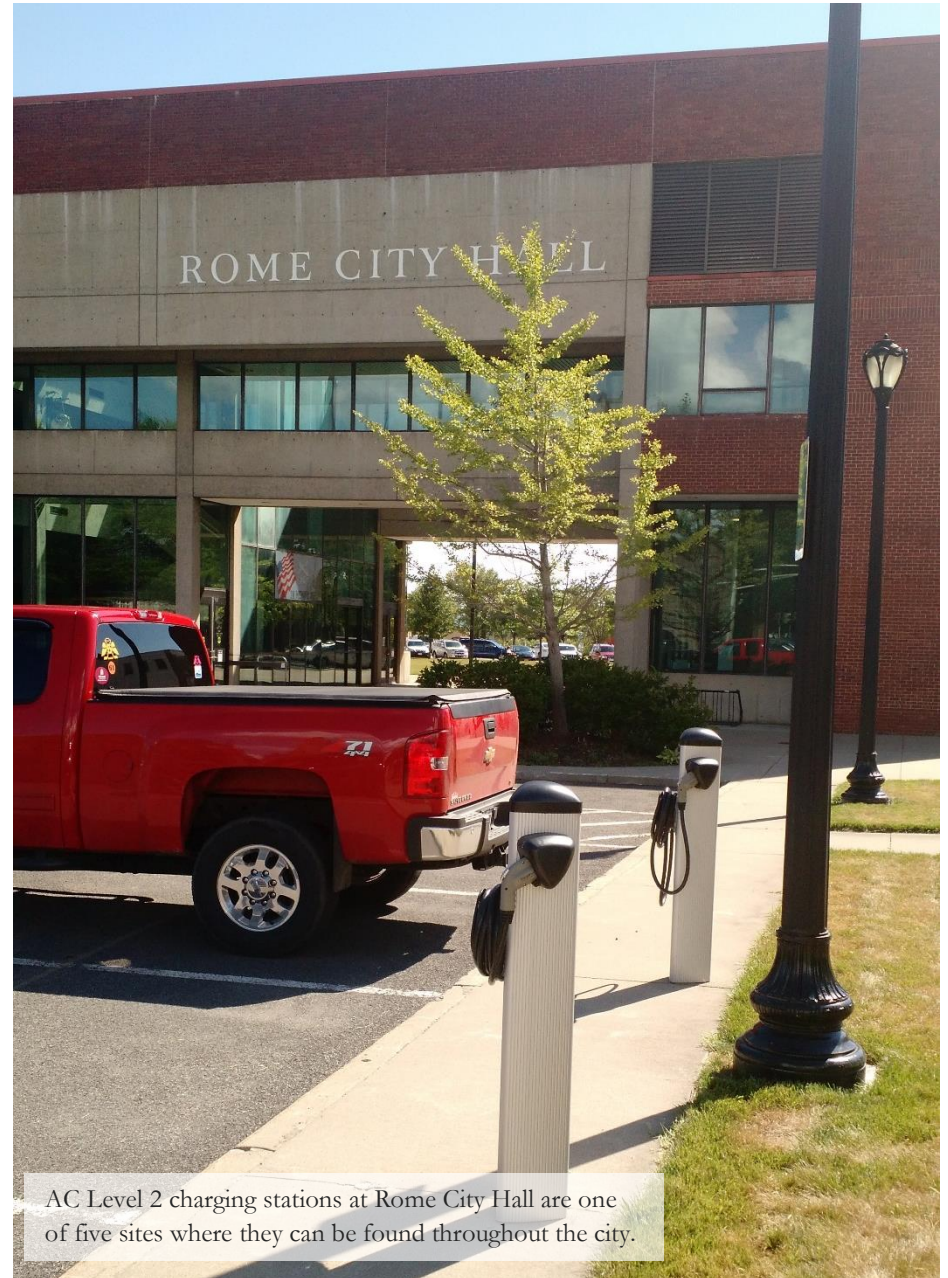
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LIST OF ACRONYMS

AC	Alternating Current
BEV	Battery Electric Vehicle
DC	Direct Current
EREV	Extended Range Electric Vehicle
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
HEV	Hybrid Electric Vehicle
ICE	Internal Combustion Engine
kW	KiloWatts
kWh	KiloWatt Hours
MPG	Miles Per Gallon
MPO	Metropolitan Planning Organization
MSRP	Manufacturer Suggested Retail Price
NYC	New York City
NYS	New York State
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
SAE	Society of Automotive Engineers
SUNY	State University of New York
PHEV	Plug-in Hybrid Electric Vehicle
VAC	Volts of Alternating Current
ZEV	Zero Emission Vehicle



AC Level 2 charging stations at Rome City Hall are one of five sites where they can be found throughout the city.

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Executive Summary

This EV Charging Station Plan assesses Mohawk Valley's current support for electric vehicles (EVs), often referred to as its EV-readiness. The Plan also provides recommendations to create a more comprehensive charging network that supports EV drivers and addresses any implementation barriers.

EVs can save money and reduce air pollution in New York State. Compared to gasoline-powered cars, EVs are more energy efficient and cost 50-70% less to operate per mile. A large portion of New York's electricity grid is powered by clean low-carbon energy sources (not oil or coal), allowing EVs to reduce greenhouse gas emissions and pollutants that cause smog and acid rain. New York State has prioritized EV market development support through its ChargeNY initiative.

A number of plug-in hybrid electric vehicle (PHEV) and battery electric vehicle (BEV) models are available in New York State due to its participation in California's zero emission vehicle (ZEV) mandate. The ZEV mandate requires all major car manufacturers to sell increasing percentages of ZEVs.

Both PHEVs and BEVs displace petroleum fuel by charging their batteries from the electrical grid. BEVs typically have a larger battery pack for more electric miles (~60-100), but have no option when the battery is depleted. PHEVs have a less electric range (~10-50), but also have a small gasoline engine that can power the vehicle if needed.

EVs replenish their batteries by connecting to charging stations at home, work, or at public locations. Various charging levels provide different rates of charge from 20 minutes to 12 hours, with faster chargers being considerably more expensive to install and operate. The station installation costs can also vary from site to site. Ideal locations are where the parking space is close to the electrical panel and the existing service is sufficient to sustain the additional electrical load.

At the end of 2015, there were 252 EVs registered in the Mohawk Valley. 30 were BEVs and 222 were PHEVs. These represent a very small but growing fraction of all registered vehicles. Currently there are only 18 public charging stations in the region with 7 sites in Rome, plus Utica, Oneonta, Amsterdam, Cooperstown, Johnstown, Gloversville, Cobleskill, and Yorkville.



Kohl's installed AC Level 2 charging stations at several store locations, including Amsterdam.

To help create a more comprehensive charging network that supports current and future EV drivers, *six additional charging station installations are recommended at key locations in Mohawk Valley:*

- Cooperstown
- Old Forge
- Herkimer
- Downtown Utica
- Downtown Amsterdam
- Johnstown Central Business District

Some other locations that could also be considered for installing more charging stations were Verona, New Hartford, Oneonta, Sylvan Beach, Boonville, Broadalbin, and any of the canal trail parking lots.

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Six barriers were identified to be critical issues limiting the expanded use of EVs in the Mohawk Valley. Municipalities, counties, and the region as a whole should lead or support initiatives that follow these recommended potential solutions and strategies.

Fast charging stations will be needed to facilitate longer EV travel distances, including inter-regional trips. They should be placed in larger cities where there is a concentrated population of EV drivers so the stations can also be used by local residents. The planning on fast charging stations should be coordinated at a state level and attempt to align with regular routes for government or private fleets of EVs. Logical locations to consider in the Mohawk Valley for fast chargers include Fonda, Herkimer, Utica, and Verona on Interstate 90; and Cobleskill and Oneonta on Interstate 88.

Educating potential EV owners through large scale awareness efforts that are coordinated with EV manufacturers and local dealerships is needed. These efforts should be directed towards key demographics of potential EV buyers rather than a broad audience. EV projects involving students in college or younger could be effective, as well as efforts that draw a connection between EVs and ongoing electricity generation initiatives (e.g., solar power installations). A dedicated webpage for promoting EVs should be developed, since online resources are excellent for providing information.

Collaborating and partnering with the electric utilities on EV initiatives could be very effective at

promoting this technology. Electric utilities can share valuable information on the source of electricity used to charge EVs and the impact it has on the environment and local jobs. They are also logical candidates to lead by example in regards to EV adoption. Consultation or guidelines issued by the electric utility specifically for EV owners would help them make more informed decisions on their EV purchase.

Establishing a network of EV drivers to voice these opinions and provide suggestions for future public charging station installations or EV initiatives would be beneficial. This network could also be leveraged to promote EV technology and expose others to electrified transportation options.

General education on EVs for elected officials through presentations and publications should be provided. Key elements of this outreach would be hands-on experiences to see and drive EVs. It is also important to draw connections between EVs and other local initiatives such as renewable electricity generation projects or even tourism.

Certain new construction projects should consider installing charging stations or providing preparations for installing them in the future. Prime examples are projects at universities, medical campuses, and technology parks where employees would likely consider EVs. Architects and planners must understand when charging stations are be a good option so developers can negotiate an incentive for including an installation.

More EVs will be utilized by Mohawk Valley residents in the near future because they provide benefits for the entire community. While current EV adoption rates are too low to pursue any charging station requirements or regulations, gradually expanding the charging network in the region and supporting the recommended strategies to help our communities become more EV-ready will prepare us for the future. Even today, attracting EV drivers from other areas of the state can complement the efforts to promote tourism in the Mohawk Valley. EVs also attract highly educated and technology savvy individuals who can help drive our emerging technology industries.

The *key next steps to implementing this EV Charging Station Plan* are:

- 1) Holding meetings with key stakeholders in the recommended locations for additional charging stations to prepare for, and encourage, new installations
- 2) Participate in any efforts to plan or deploy DC fast chargers
- 3) Distribute or post EV information at meetings, in newsletters, or on websites
- 4) Regularly discuss or bring up the topic of EVs at relevant or related activities to increase awareness
- 5) Pursue funding opportunities or other options to create a new EV website or establish a network of EV drivers
- 6) Offer assistance or support any effort promoting EV technology



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Overview

For a new technology such as the electric vehicle (EV), which requires coordinated construction of infrastructure and widespread education and outreach, careful planning is essential. Public EV charging stations are important for EV drivers to have the ability and confidence to use their vehicle throughout New York State (NYS), both to travel within and between metropolitan areas.

Incorporating EV charging station planning into broader local and regional planning processes can help ease the adoption of the new technology. EV charging station planning is complex because of the different factors considered by drivers when planning trips, including the different types and speeds of EV charging stations. Educating decision makers and key stakeholders is critical.

A number of initiatives have recently been undertaken to support EV readiness nationally (through the Department of Energy Clean Cities EV readiness grants), within NYS (chiefly through efforts by NYSERDA), and even locally in some cases. This EV Charging Station Plan, along with the process to create it, is one of the first opportunities to discuss and document EV charging infrastructure at the regional level.

OBJECTIVE

The objective of this Mohawk Valley EV Charging Station Plan is to recommend strategies for supporting current and future EV drivers travelling within the region and between NYS regions. Since EVs have a more limited range than conventional internal combustion engine (ICE) vehicles that use petroleum fuels, the most critical area of support is providing charging opportunities to EV drivers.

Therefore, this Plan identifies gaps where public infrastructure is not currently available in the region to support EV drivers and recommends charging station installations in key locations to establish a comprehensive charging network. In addition to more charging stations, this Mohawk Valley EV Charging Station Plan also outlines critical implementation barriers for charging station installations or EV adoption and recommends strategies for addressing them.

Plan Authors and Contributors

Energetics Incorporated led the development effort for this Mohawk Valley EV Charging Station Plan. Energetics is a technical consulting firm with more than 30 years of experience supporting alternative fuel vehicle development

and deployment efforts for the U.S. Department of Energy, NYSERDA, and other entities.

NYSERDA and the New York State Department of Transportation (NYSDOT) sponsored the project to develop this plan, which also created four other plans for the other regions along the Interstate 90 corridor. The Mohawk Valley EV Charging Station Plan was also supported by the Herkimer-Oneida Counties Transportation Study, the designated Metropolitan Planning Organization (MPO) for the region, and planning departments from Otsego, Fulton, and Montgomery counties.

Plan Components

This Mohawk Valley EV Charging Station Plan presents **background** information on the current technology used by EVs and EV charging stations. This information provided our working group members, along with the readers of this report, with a general understanding of what EV models are available, who is buying EVs in NYS, which types of charging stations are on the market, and how charging stations are being used.

The next section of this Plan details the **existing EV charging infrastructure** in the Mohawk

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Valley, along with the current EV owners. Maps in this section clearly show areas that lack EV infrastructure; places where there are no public charging stations and an EV driver passing through the area would not have a feasible option to charge if they need one.

Based on input from the working group, this Mohawk Valley EV Charging Station Plan presents the **recommended locations for installing new public charging stations** in this region to establish a more comprehensive charging network that will support current and future EV drivers. Potential venues for AC Level 2 charging station installations in these

recommended locations are listed and meetings with those venues and other relevant stakeholders in that location should be held to discuss the best option for pursuing a charging station installation. Coordinating this will allow these locations to capitalize on the existing NYS tax credit for charging stations or other potential funding which may become available.

Potential locations for the placement of direct current (DC) fast chargers are also presented as discussed among the working group members. These stations allow EV drivers to charge in durations similar to fueling a conventional ICE vehicle. This enables EV drivers to travel between

NYS regions while providing more convenient charging for EV drivers in the immediate area surrounding that DC fast charger.

The final section of this Mohawk Valley EV Charging Station Plan discusses barriers that are currently limiting the use of EVs in this region's communities. **Recommendations are provided that will help Mohawk Valley communities become more supportive of EVs and EV charging infrastructure.** Since we can all benefit from better air quality due to fewer exhaust emissions and importing less petroleum products, it is in our best interest to encourage EV adoption.



Charging stations at Universities or Colleges, including this one at SUNY Cobleskill, are often used by professors or staff, who have an income and education level typically for EV drivers.

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Background

Electric Vehicles

Hybrid electric vehicles (HEVs) supplement the internal combustion engine with electrical power produced by an on-board electric motor. The electrical system acts as a generator when a driver applies the brakes, converting kinetic energy into electrical energy that is stored in a small battery pack. Gasoline or diesel is still the primary fuel.

Electric vehicles (EVs) take the HEV concept further, using a larger on-board battery for extended electric-only range. The driver charges the battery by plugging the vehicle into a charging outlet. When running on electricity, EVs are able to completely offset the use of gasoline, eliminating all tailpipe emissions.

Two different types of EVs are available: plug-in hybrid electric vehicles (PHEV) and battery electric vehicles (BEV). A PHEV is an HEV with a larger battery that plugs in to charge, but it keeps a gasoline or diesel engine as a backup. Some variations are called extended range EVs, or EREVs. After the battery energy is exhausted, the engine starts and the vehicle acts like a normal HEV until it is charged again from the grid.

BEVs fully remove the gasoline or diesel powertrain and replace it with an electric powertrain consisting of an electric motor, power electronics, and a battery pack. BEVs have a longer all-electric range than PHEVs, but do not have a fuel backup when the battery is depleted.

Using electricity as a vehicle fuel is currently less expensive per mile than gasoline, and can be even more cost effective if the EV driver takes advantage of off-peak electricity rates.

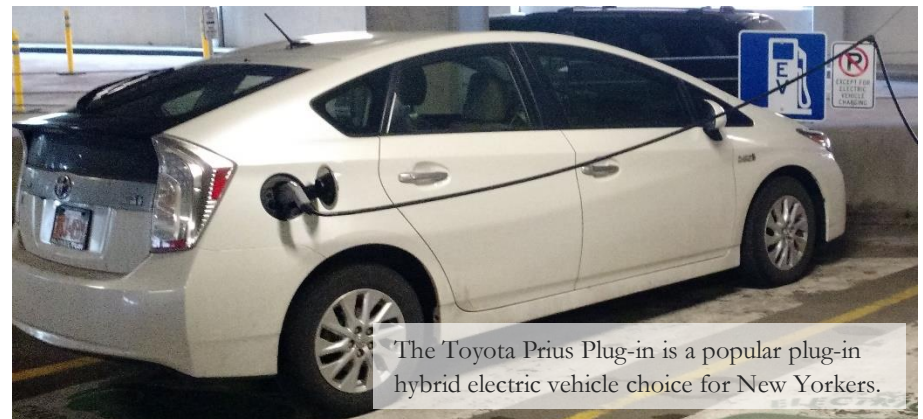
Current BEVs can travel between 60 and 265 miles on a single charge and take at least 30 minutes to recharge the battery. A gasoline vehicle will be able to travel 300-500 miles on a single tank and can fuel in less than five minutes.

This “range anxiety” can often be solved with careful planning (including being sure to plug in every night and knowing where charging stations are along your route), or through the purchase of a PHEV to have a gasoline engine in reserve. PHEVs have

ranges similar to gasoline vehicles, but typically only run on electricity for the first 10 to 50 miles.

Cold and hot ambient temperature conditions will impact the realized driving range due to added power requirements to heat or cool the interior. There is also a decrease in performance of the EV batteries. While manufacturers continue to improve the vehicle’s performance for adverse climates, a decrease in electric mileage by up to 50% on the coldest days and 20% on the hottest may occur. Pre-conditioning the EV while it is still plugged-in is a good strategy for minimizing the decline in range.

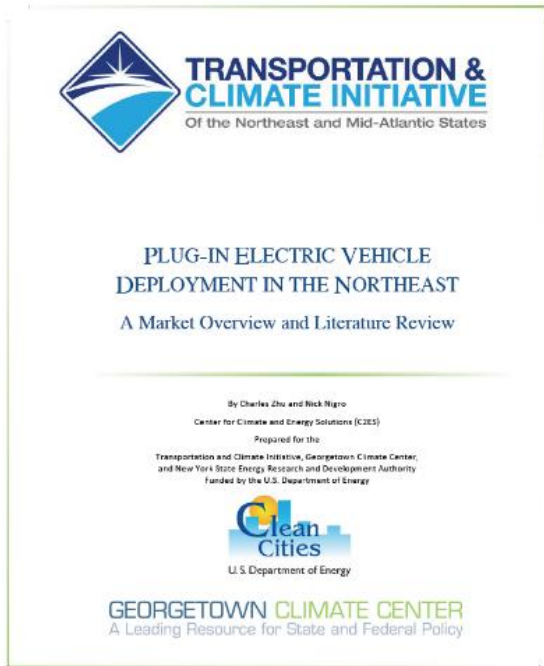
EV models available for purchase in New York State are listed in Appendix A.



The Toyota Prius Plug-in is a popular plug-in hybrid electric vehicle choice for New Yorkers.

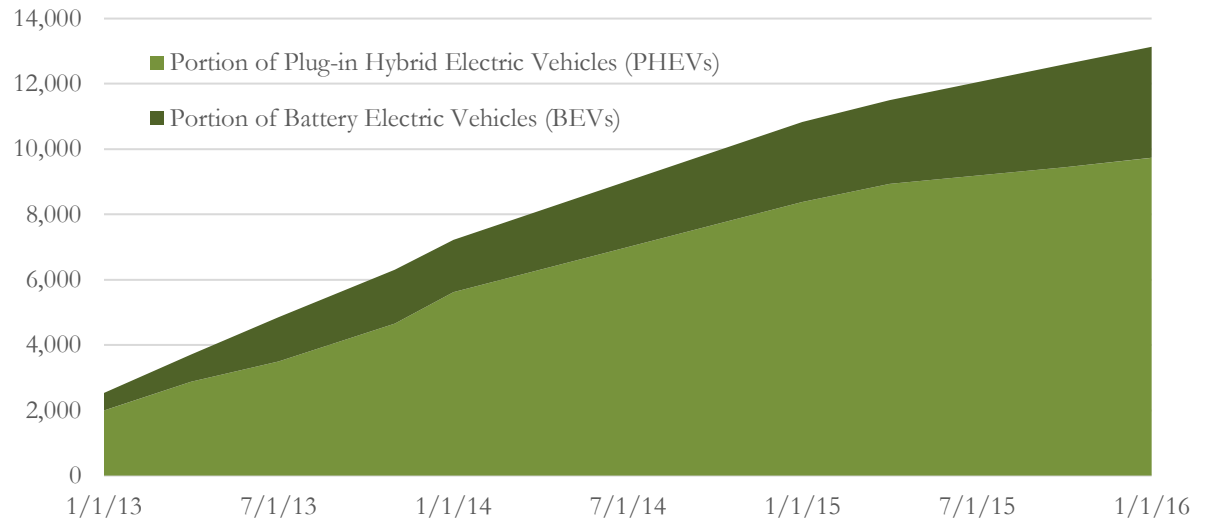
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The [Literature review of EV use in the Northeast](#) provides an overview of EV deployment in the Northeast as of 2012. The document is intended to serve as a resource for consumers and policymakers who seek to better understand the nature of and challenges facing EV deployment in the Northeast.

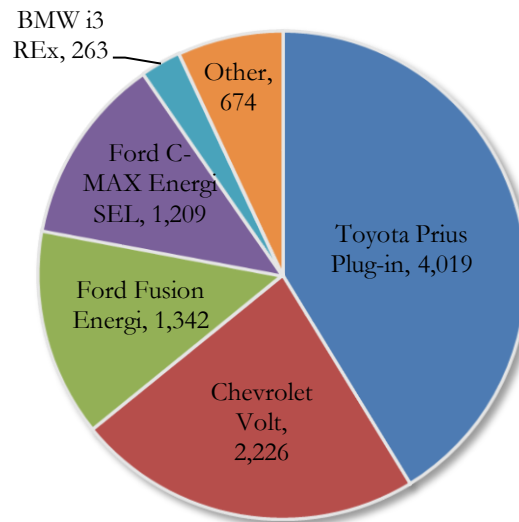


EV ownership in New York State has been increasing rapidly in the past couple of years. There are close to three times more PHEVs registered in New York State than BEVs, but a variety of models are being offered and purchased for both technologies. EVs still only account for 0.16% of all registered vehicles.

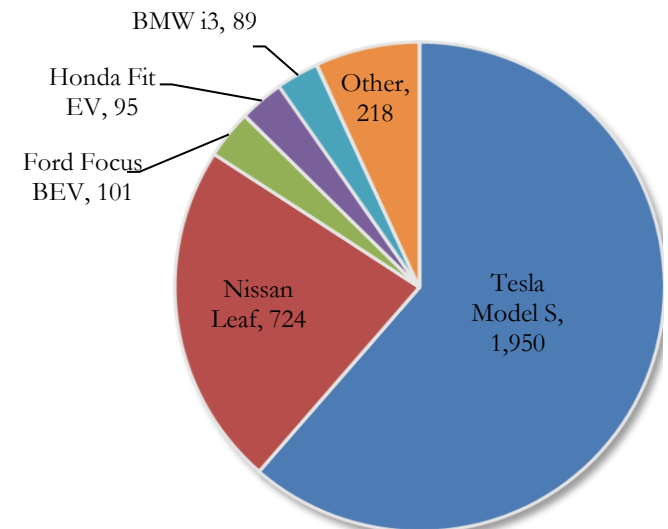
Total Registered EVs in New York State



Current PHEVs in New York State

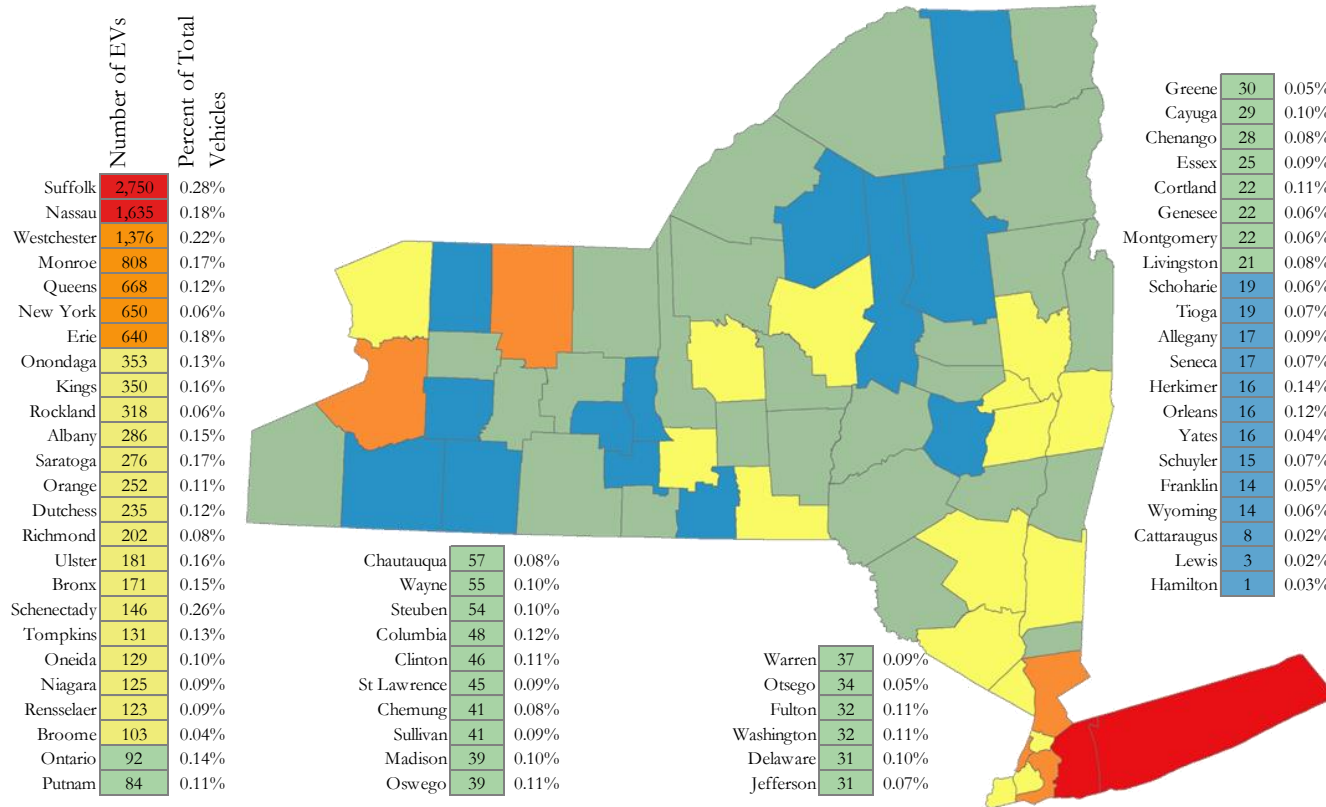


Current BEVs in New York State



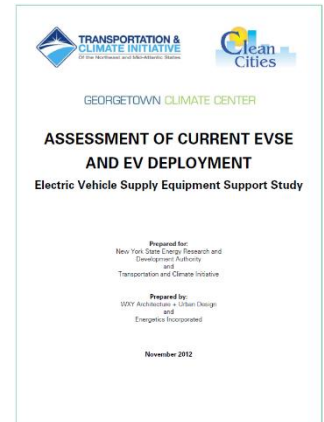
Different parts of New York State have seen greater adoption of EVs.

BEVs and PHEVs by County
(NYS Department of Motor Vehicle data as of 1/1/2016)



The [Assessment of Current Charging Station and EV Deployment for the Northeast](#) found that:

- Communities with EV ownership are significantly less dense than communities without EVs, with nearly all EV ownership located outside of urban cores. Whether driven by more straightforward EV charging infrastructure installation, more suitable automotive trips or other factors, these communities contain more single-family homes and fewer multifamily structures than communities with no EV ownership.
- Communities with EV ownership tend to be more educated and wealthier than communities without EVs. Greater incidence of EV ownership correlates with higher income and more graduate degree attainment.
- Greater access to EV dealerships and EV charging stations relates to greater numbers of EVs in communities.



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EV Charging Infrastructure

EV drivers have various options available to plug in and charge their batteries at charging stations, which are also referred to as electric vehicle supply equipment (EVSE). For the majority of users, a home charger can fulfill almost all of their charging needs. Public charging stations are used to recharge EVs while drivers are at work, shopping, or at other destinations, and help expand the functionality of electrification technology for many owners.

For many EV owners, the vehicle they select will accommodate their normal daily driving needs without needing to charge during the day. However, if that owner needs to run extensive errands one day, wants to take their EV to a recreational destination in the evening or on weekends, or is pushing the limits of their EV's battery range in the winter when it operates less efficiently, they will want to find an opportunity to get an additional charge during the day.

For some EV owners, installing a charger at their primary residence may be challenging (e.g. if they are renting or have an older house with insufficient electrical capacity to add more load) and will need charging infrastructure at their workplace or a public venue to feasibly use an EV.

Charging stations are classified by their approximate charge rates and the form of power delivered (alternating current [AC] or direct current [DC]). Charging times for each specific vehicle vary depending on power electronics, state

of charge, battery capacity, and level of charging station used.

AC Level 1 Charging is limited to 120 volts of alternating current (VAC) and uses a typical household three-prong plug. All current EVs are sold with AC Level 1 capabilities and only need a dedicated 20 amp outlet to charge. AC Level 1 stations charge slowly, and are generally used in home or workplace charging applications where EVs will be parked for long periods of time. AC Level 1 charging adds 2 to 5 miles of electric range per hour of charging time. Usually, a portable AC Level 1 charger is included in the initial vehicle purchase price. Hardware cost: Up to \$1,000.



AC Level 2 Charging provides electrical energy at either 240 VAC (typical for residential applications) or 208 VAC (typical in commercial and industrial applications). This level of charging is viable for both residential and public charging locations. Unlike AC Level 1 charging, AC Level 2 charging requires additional hardware that can be

mounted on the wall, to a pole, or as a stand-alone pedestal. It must be hard-wired to the electrical source. The increased charging rate and affordability of AC Level 2 charging stations make them the most popular choice for all EV charging applications. It provides up to 7.2 kilowatts (kW) for residential and up to 19.2 kW for commercial, which typically results in 10 to 20 miles of range added per hour of charging time. Hardware cost: \$450-\$5,000.



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DC Fast Charging utilizes direct-current (DC) energy transfer and a 480 VAC input to provide extremely rapid recharges at heavily used public charging locations. The type of station is generally cost prohibitive for home applications. However, depending on the EV, DC fast charge stations can provide an 80% recharge in as little as 20 minutes. This option is only available on certain EVs. Hardware cost: \$7,000-\$40,000.

Tesla’s Supercharger Network offers DC fast charge for free, but is only available for Tesla owners. The network currently covers many major travel corridors across North America. Each Supercharger offers 120 kW charging (about 140 miles of range in 20 minutes).



Tesla DC Fast Charge Stations

Connectors, or plugs, for AC Level 1 and Level 2 charging stations have been standardized to allow owners of all EV models to utilize the same charging infrastructure. The industry standard for AC Level 1 and AC Level 2 charging is the Society of Automotive Engineers (SAE) J1772 connector,

which provides significant safety and shock-proof design elements.

Up until 2013, the Japanese CHAdeMO connector was the only DC fast charge standard connector, available on both the Nissan Leaf and Mitsubishi i-Miev. In early 2013, the SAE J1772 connector standard was expanded to include DC fast charge with the SAE J1772 Combo connector, which is available on the Chevrolet Spark, Volkswagon e-Golf, and BMW i3.

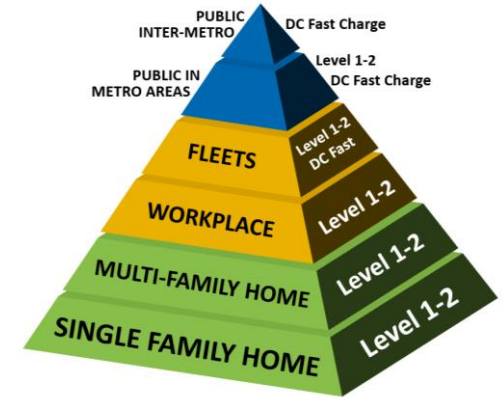


SAE J1772 Combo connector
(AC Level 1 and Level 2 connector would include the top circular plug components)

Tesla uses a different proprietary connector, but includes a SAE J1772 compliant adapter cable with each vehicle sold and offers adapters for CHAdeMO and SAE J1772 Combo connections for an additional price.

AC Level 1 charging stations are most suitable for residential overnight charging. However, because of their low cost and lower power draw from the grid, AC Level 1 can also be an effective option for locations where EVs are parked all day long, especially PHEVs that have smaller battery packs.

This includes workplaces, commuter lots, or long term parking at airports. Many AC Level 2 charging stations are designed to be more durable for an outdoor setting and work well for public venues where an EV may be parked for 2-6 hours.



DC Fast Chargers require a significant investment and draw considerable power, but they are necessary for inter-regional travel by EVs that wish to use major highways and go farther than the distance available from one battery charge. DC Fast Chargers may also be effective in urban areas with a high population of EVs because they provide convenience over AC Level 2 charging (much shorter time) and they don’t require a large number of parking spaces that would be needed to charge a lot of EVs using AC Level 2 chargers.

Higher charging station power draw can lead to increased electrical costs for the facility, but some applications may be able to take advantage of lower off-peak electrical rates with a time-of-use

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schedule if the EV charging will occur during off-peak times (night).

Most AC Level 2 and DC Fast Chargers come with an option to purchase a *subscription to a charging network* that can collect payments from users and limits use of the station to charging network members. There is often no fee for EV drivers to become a member, and there is also an option to activate the station using a toll-free number for anyone that does not have a network card. In addition to listing the station on its network maps for EV drivers, the network will track station usage so you know when and how long it is being used. Network subscriptions typically cost the station owner about \$20 to \$30 per month per charging outlet.

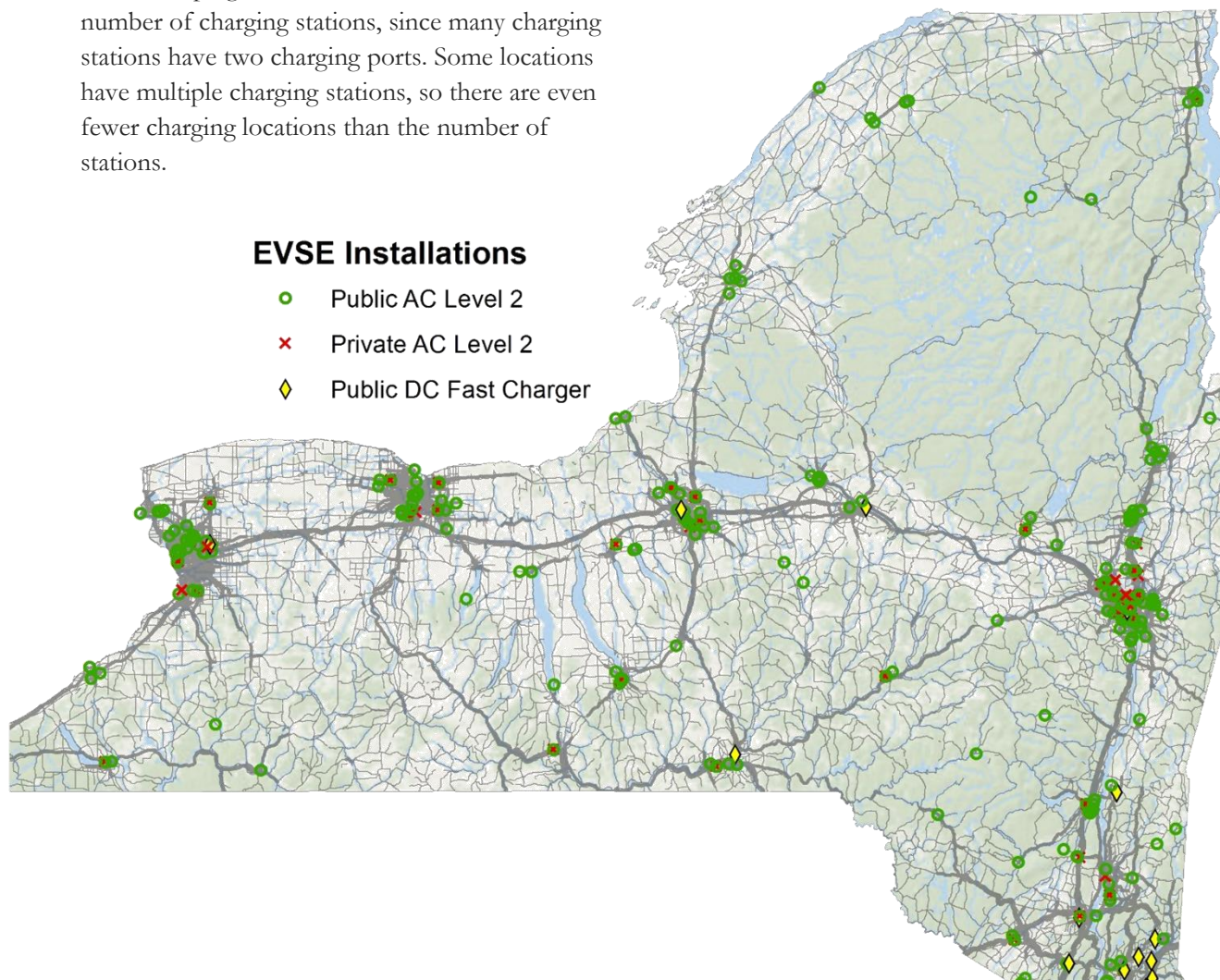
Different *ownership options* exist for charging stations with the most common model of a charging station host owning it. However, third-party charging station service providers may pay for the installation, operate the station, and share some of the profits with the host site. Some charging station manufacturers, third-party charging station service providers, or charging station network providers are considering offering the option to lease charging stations as well.

As of 2013, *New York State provides an income tax credit* for 50% of the cost, up to \$5,000, for the purchase and installation of alternative fuel vehicle refueling and electric vehicle recharging stations. The New York State Alternative Fuel Vehicle Recharging Tax Credit for commercial and

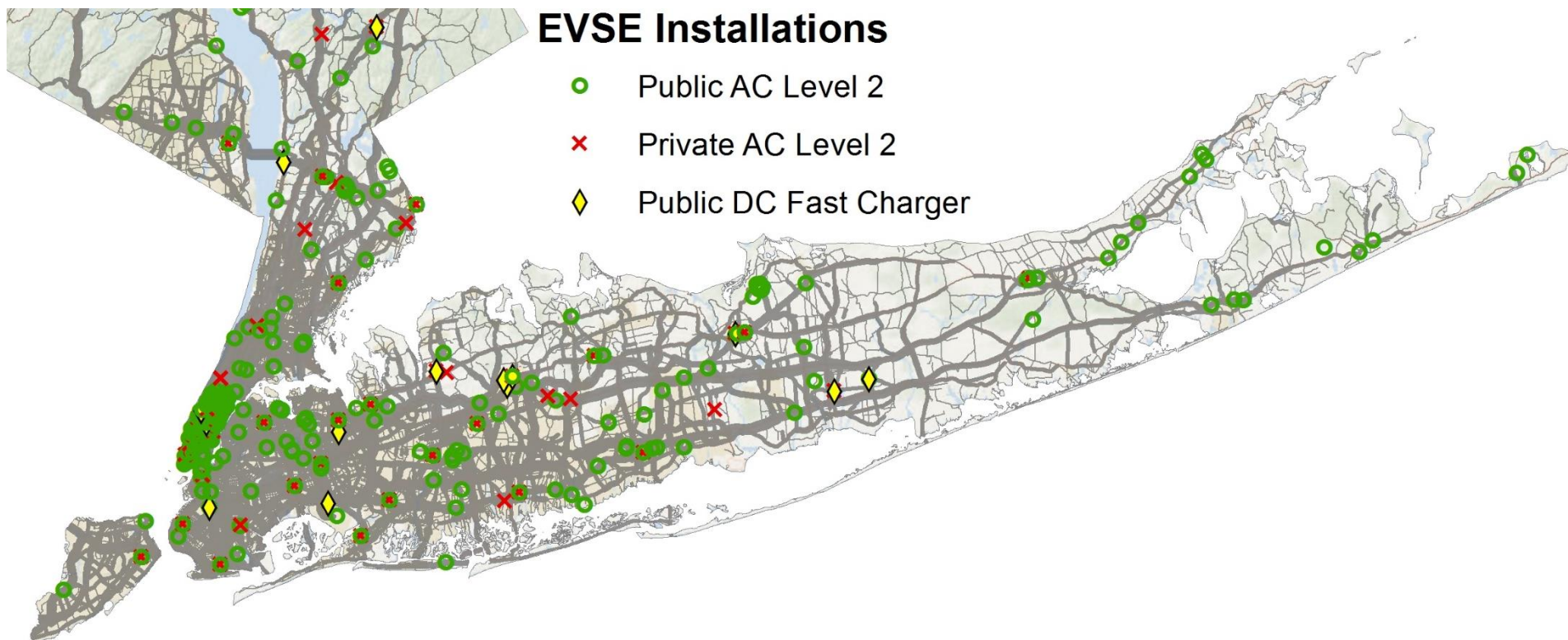
workplace charging stations is available through December 31, 2017.

As of December 2015, New York State has just over 1,200 total public EV charging outlets or ports. This number represents the number of EVs that could plug in at one time and differs from the number of charging stations, since many charging stations have two charging ports. Some locations have multiple charging stations, so there are even fewer charging locations than the number of stations.

NYSERDA has funded 634 new EV charging port installations since 2012 which has significantly increased the public EV charging infrastructure in the state. The U.S. Department of Energy maintains an [interactive map of alternative fuel station locations](#).



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For a *cost-effective and successful charging station installation*, one must factor in how much use can be expected and how much benefit EV drivers can get from charging while parked at that location. Offering charging can help businesses increase visits, keep customers for longer durations, and serve as a good perk for employees or residents. EV drivers often seek out charging locations as they go about their everyday routines at, for example, restaurants, stores, and entertainment venues.

For public installations, consider the time an EV driver would typically spend parked at that

location, because short durations may offer fewer benefits to EV drivers. Other important factors include, but are not limited to: patterns of travel in an area; an area's demographics, which may be correlated with characteristics typical of EV owners; and the nature of a potential EV charging station location, whether it is public property, private businesses such as retail companies, multifamily housing or other institutions. Building leases or third-party operated parking can complicate charging station installations and all parties should work out arrangements to clarify ownership, operation, and revenue in advance.

Installing *EV charging stations at workplaces* can be very successful at the right business and have benefits for employers and their employees alike. EV charging stations can attract and retain desirable employees. EV drivers are typically tech-savvy and highly educated, qualities many employers seek in prospective employees.

Charging stations visibly demonstrate an organization's commitment to sustainable energy consumption and complement other environmentally friendly initiatives. Some workplace charging locations are able to serve

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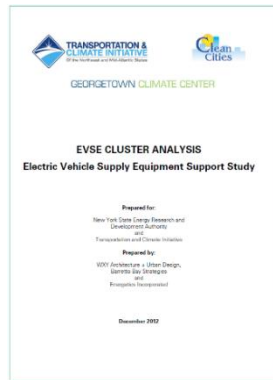
employees and visitors, as well as the general public. Two key examples are:

- Colleges or Universities
- Medical Campuses

Other examples of public venues that have successful charging station installations include:

- Regional transit (commuter lots)
- Downtown multi-purpose parking lots or garages
- Retail destinations (malls or outlets with multiple stores)
- Popular year-round leisure destinations

The [Charging Station Cluster Analysis](#) walks through the location types where EV charging infrastructure might be installed and informs decision-makers and prospective EV charging station hosts of which factors make a good EV charging location. Targeting locations for EV charging infrastructure rollout through this cluster approach can help create a system of EV charging in the critical early stages of EV adoption.



In 2012 and 2013, NYSERDA awarded \$8 million to 14 organizations through its Charging Station Demonstration Program to install AC Level 2 EV infrastructure, from Long Island to Buffalo. These

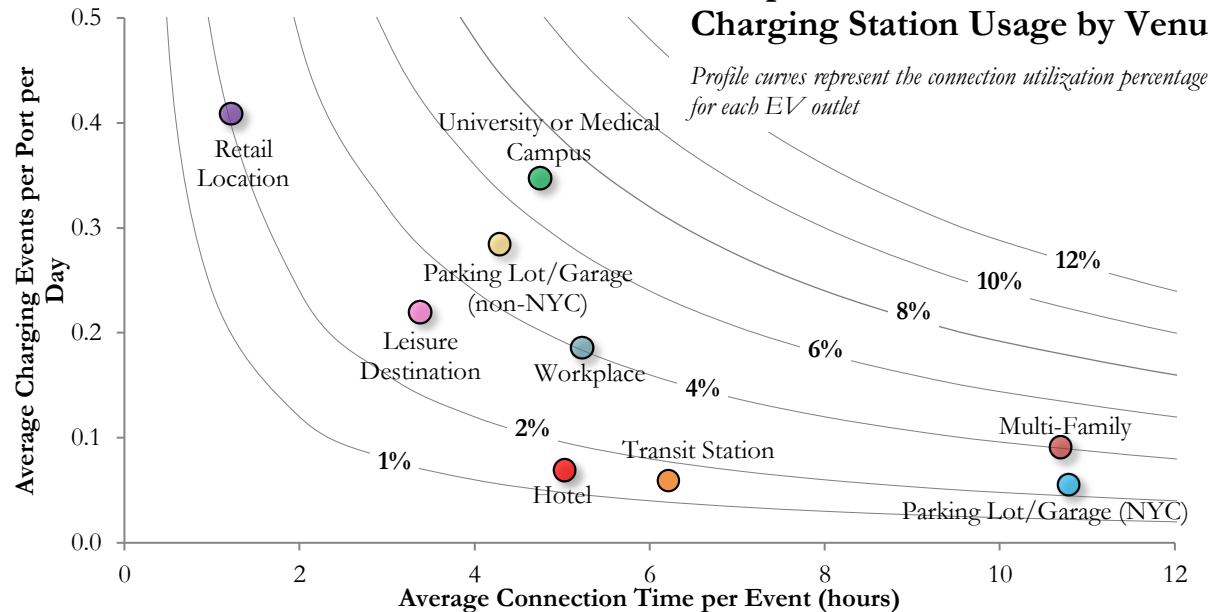
installations, which will be about 700 charging outlets in total, represent a wide range of business models and approaches to providing public charging infrastructure.

Charging station data is regularly collected and analyzed. The following results are from 2015.

- EV charging stations the Rochester/Finger Lakes region were occupied most (a vehicle was plugged into a port an average of 7.2% of the time respectively), followed by Long Island (5.6% of the time) and the Capital District (4.2% of the time).
- EV charging stations that charged a fee for use (most are NYC parking garages) followed this same trend: few charge events per day, but high energy dispensed per charge event.

- EV charging stations in New York City (NYC) parking garages, multi-family dwellings, and hotels averaged few charge events per day, but dispensed the highest amounts of energy per charge event.
- The average plug-in time per charge event differed for various location types. Shortest, by far, were the retail locations (1.2 hours), followed by leisure destinations (3.4 hours), non-NYC parking lot/garages (4.3 hours), university or medical centers (4.7 hours), hotels (5.0 hours), workplaces (5.2), and transit stations (6.2 hours). NYC parking garages and multi-family dwellings showed the longest plug-in times per charge event, with an average of 10.8 and 10.7 hours respectively.

Comparison of Public NYS EV Charging Station Usage by Venue



Mohawk Valley Electric Vehicle Charging Station Plan

In addition to the EV charging station’s location, *where it is placed onsite and how it is installed will also impact the ease of use for EV drivers and station cost effectiveness.* Charging station installation costs can exceed the cost of the hardware itself and are influenced by a number of factors that should be considered when determining if a site is good and where to install the charging station on the property.

The largest factor can be the currently available electrical service. All new charging station installations should have a load analysis performed on the facility’s electrical demand to determine if there is capacity to add EV charging stations. Upgrading electrical service would add significant cost to the installation. A longer distance between the electrical panel and the EV charging station means increased installation costs because it increases the amount of necessary trenching (and repair), conduit, and wire.

Although it is desirable to minimize the distance between the electrical panel and EV charging station as much as possible, you also need to consider the impact of placing the station at that location on the property. For example, placing charging station parking spaces in the back of a building might discourage their use, but other customers may be upset if a charging station is installed in prime parking spaces that often remain vacant because there are few EV drivers.

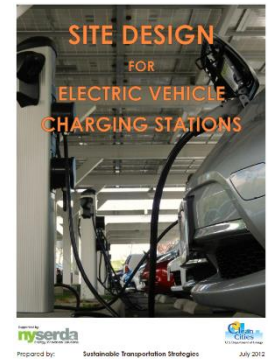
Other considerations have less impact on installation costs, but can impact how effective the station is at benefiting EV drivers and other clients. Be sure to think about the path of the charging cord when in use (so it is not a tripping hazard), parking lot management practices (will the charging station get in the way of pavement cleaning or snow plowing, or is it a space where snow is piled in the winter or where equipment might be stored), and signage (for EV drivers to easily find the station).

[Siting and Design Guidelines for Charging Stations](#) identify and diagram key siting and design issues that are relevant to local governments as well as developers, homeowners, businesses, utility



providers, and other organizations interested in best practices for EV charging infrastructure implementation.

[Site Design for Electric Vehicle Charging Stations](#) highlights best practices for designing EV parking spaces, and provides several illustrated design scenarios.



Effective signage helps EV drivers navigate to charging station spaces and helps to prevent those spaces from being occupied by a non-EV. The [Charging Station Signage Overview](#) covers general service (guidance), regulatory (enforceable), and



special (information/trailblazer) signage. Another effective strategy for distinguishing the EV charging space is to paint the entire space green or mark the pavement with an EV charging symbol.



Optimal EV Charging Station Installations are Close to the Building and Convenient for EV Drivers, but not in the Most Premium Parking Spaces.

Mohawk Valley EV Charging Station Plan



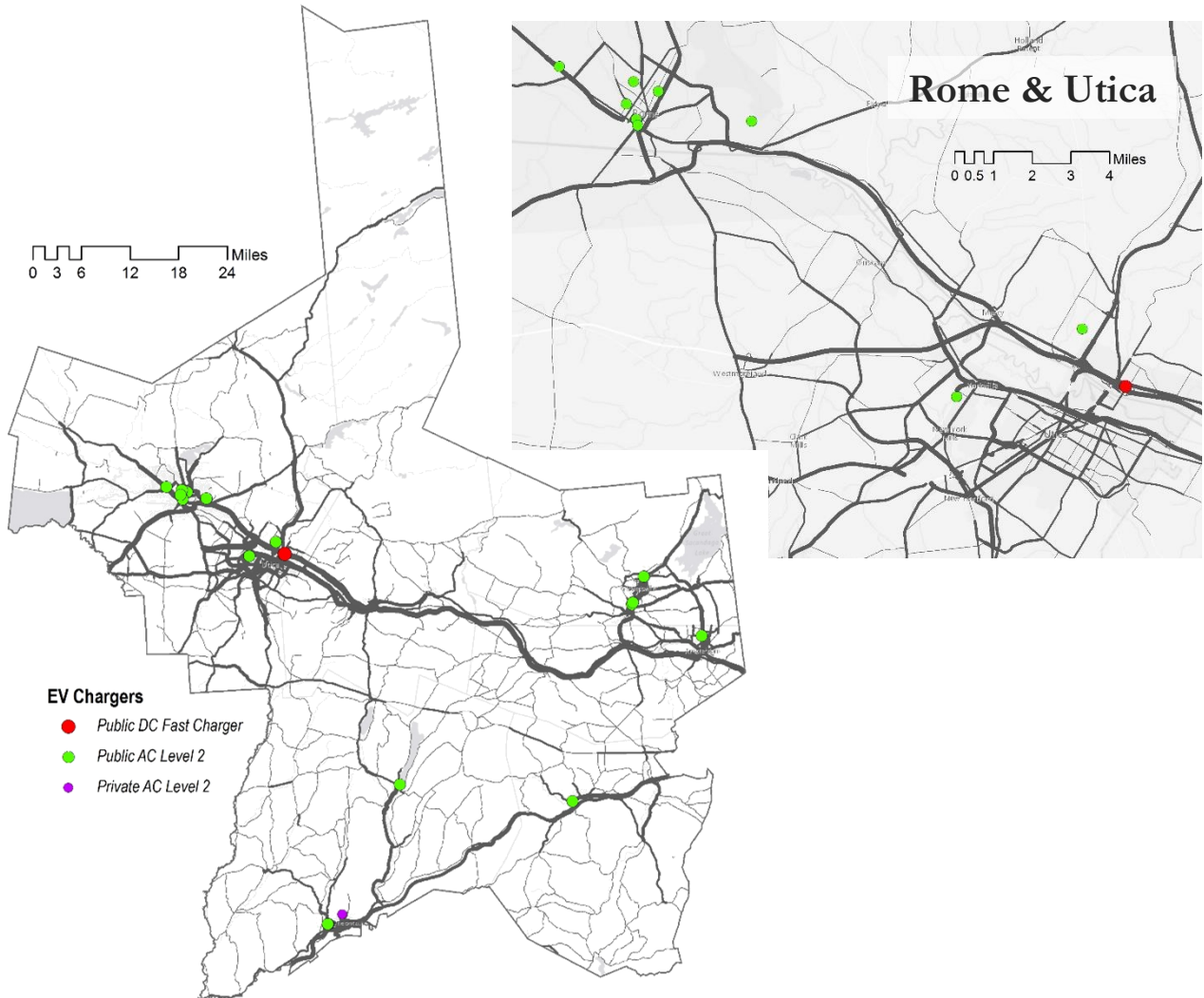
Current EV Landscape

Currently, there are 18 public EV Level 2 charging station locations in the Mohawk Valley, including:

- City of Rome (Fort Stanwix, Franklyn Field, Guyer Field, JFK Arena, City Hall)
- SUNY POLY (Utica)
- SUNY Oneonta (Oneonta)
- SUNY Cobleskill (Cobleskill)
- Kohl's (Amsterdam)
- Nathan Littauer Hospital (Gloversville)
- Griffiss Business & Technology Park (Rome)
- Holiday Inn (Johnstown)
- The Inn at Cooperstown (Cooperstown)
- Steet-Ponte Ford-Lincoln-Mazda (Yorkville)
- NYE Volkswagen (Rome)
- Herba Nissan (Johnstown)
- Country Club Nissan (Oneonta)
- Country Club Imports (Oneonta)

Tesla DC fast charging stations are at the North Utica Shopping Center, off NYS Thruway exit 31.

The Mohawk Valley has several areas where there are gaps in the EV charging network as shown in the map to the right with the existing stations.



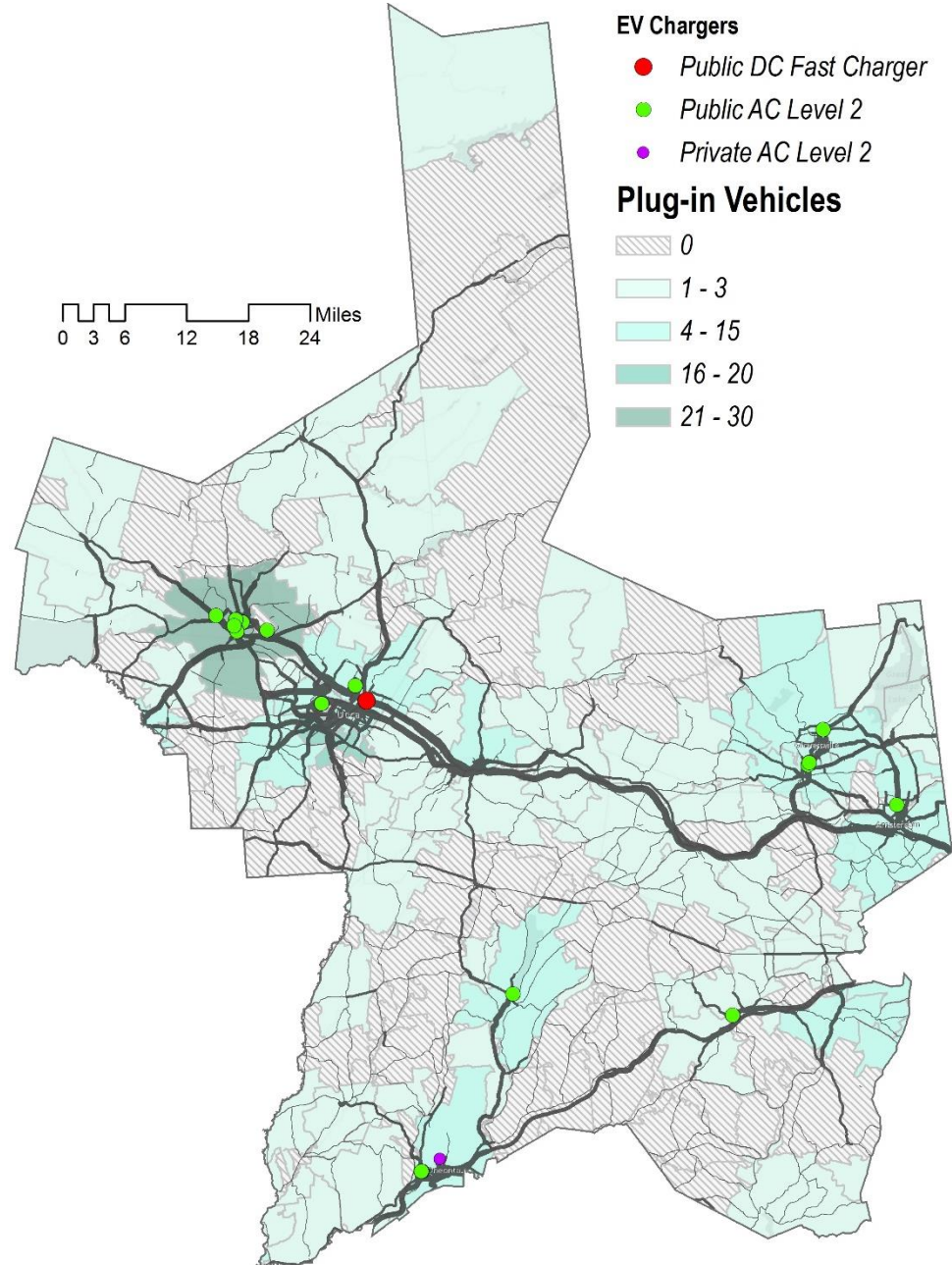
Mohawk Valley Electric Vehicle Charging Station Plan

The map of the Mohawk Valley to the right shows EV ownership (both PHEVs and BEVs) by zip code as of December 31, 2015. The zip codes with the most PEV owners are:

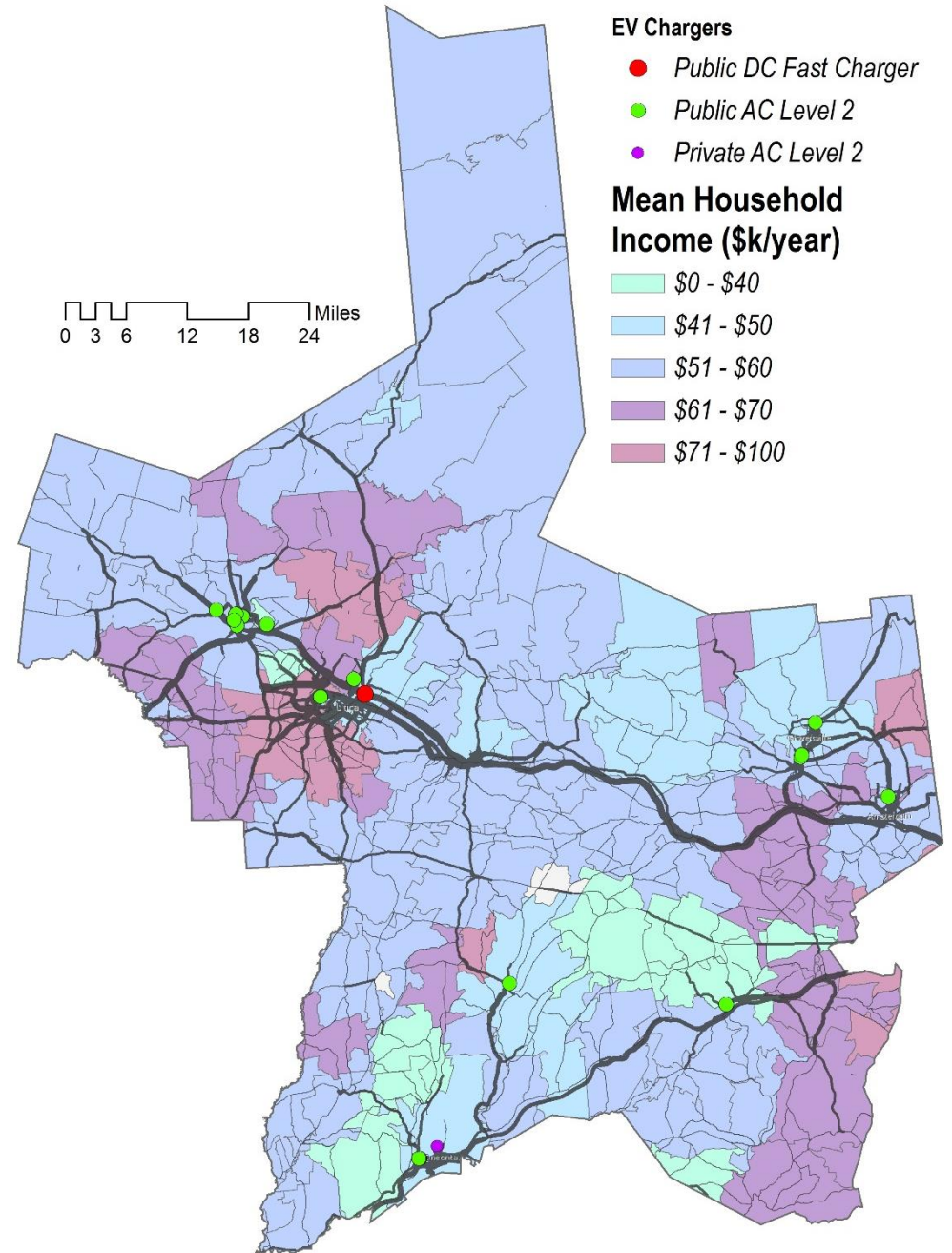
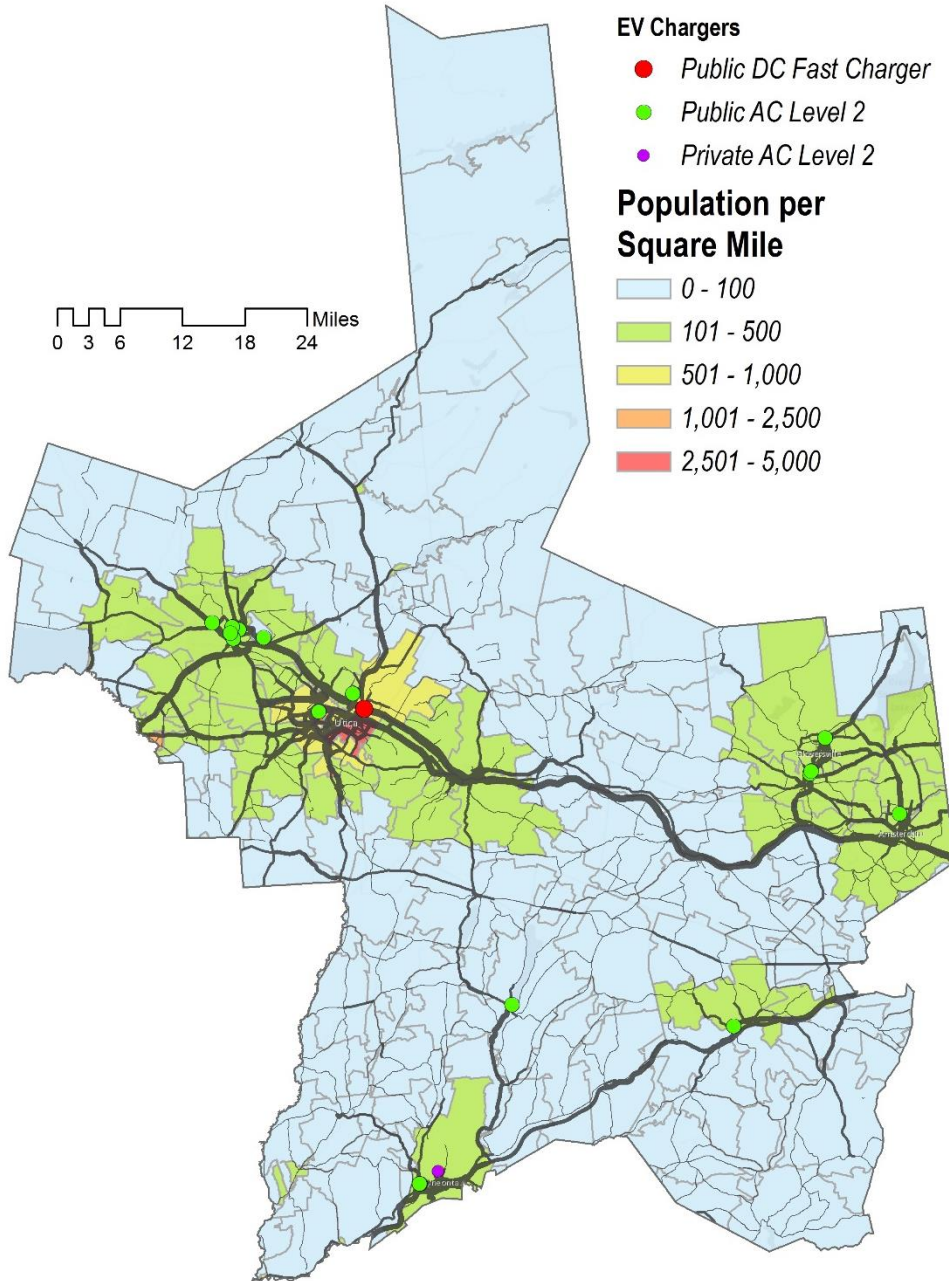
- 13440 (Rome): 23 EVs
- 13413 (New Hartford): 17 EVs
- 13501 (Utica): 15 EVs
- 12010 (Amsterdam): 15 EVs
- 13403 (Marcy): 15 EVs

Existing public EV charging locations are also included for reference. There is a correlation between the public EV charging station locations and EV ownership, but it is not clear whether the charging stations encourage EV ownership or EV ownership encourages the installation of public EV charging stations.

When compared to the Mohawk Valley maps showing population and income per household on the following page, EV ownership is more closely tied to income rather than population.



Mohawk Valley Electric Vehicle Charging Station Plan

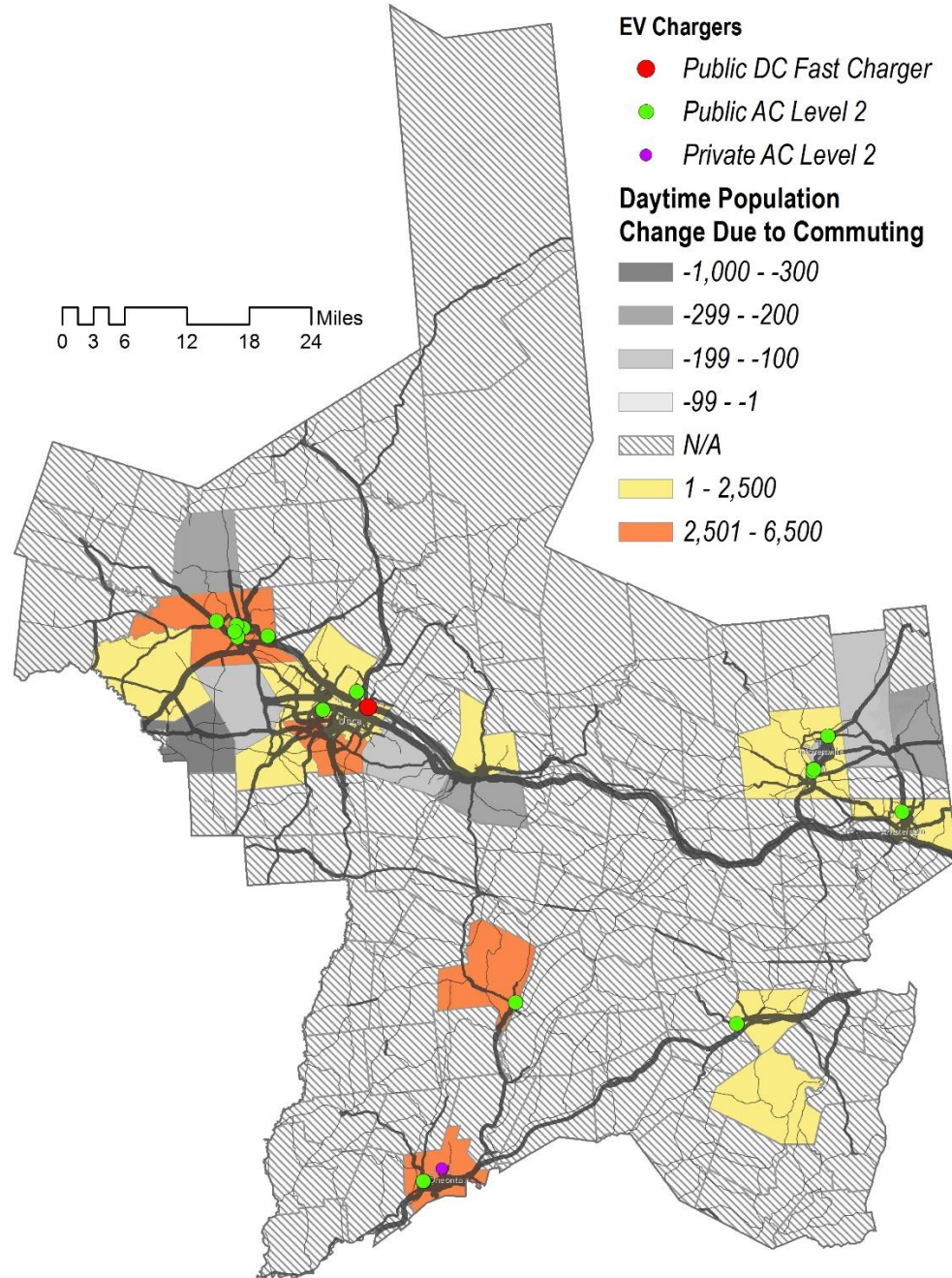


Mohawk Valley Electric Vehicle Charging Station Plan

This map shows the daytime population change during weekdays. Workplace or public chargers are likely needed more in areas that experience an influx of people each day, rather than other areas that are more residential and EV owners would charge at their home overnight.



This AC Level 2 Charging Station at Nathan Littauer Hospital in Gloversville can be used by employees or visitors that drive an EV.



Mohawk Valley EV Charging Station Plan



Recommendations for Additional EV Infrastructure

The Mohawk Valley does not currently have a comprehensive network of charging stations that would allow an EV driver to easily travel throughout the region. There are numerous areas where an EV driver passing through the area would not have a feasible option to charge.

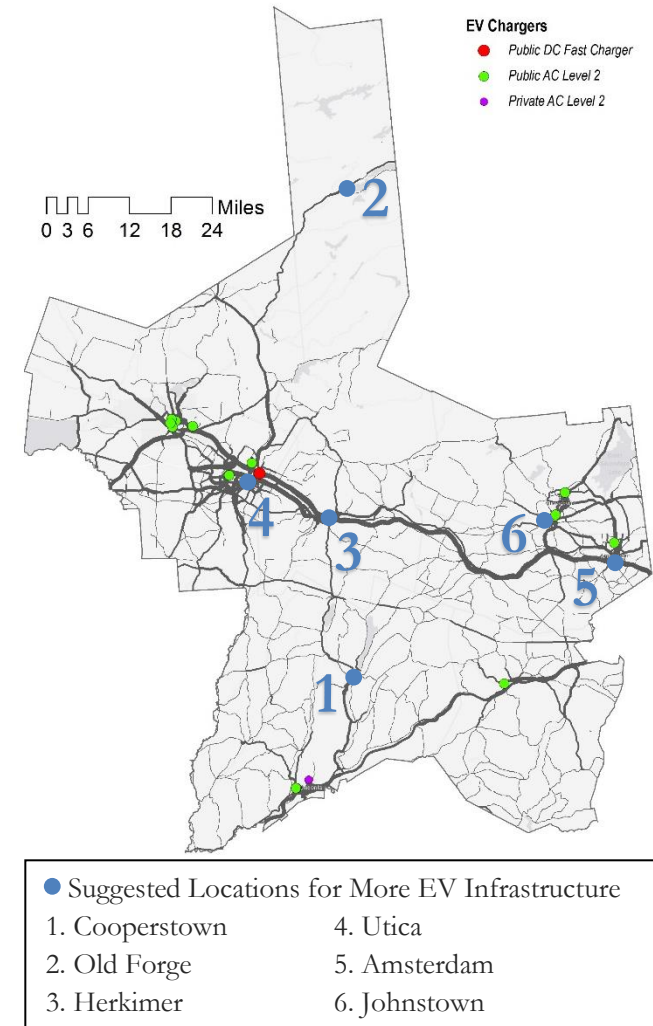
Some municipalities and organizations in the Mohawk Valley have taken the initiative to install EV charging stations which has made those locations very supportive of EV drivers. However, most of the existing public charging stations in this region have experienced very minimal use which has made it hard to justify further investments in infrastructure.

The demographics of the Mohawk Valley (lower income per household than many other areas of the state), as well as the geography (few urban centers so most commutes are longer and must accommodate some severe winter conditions) don't particularly favor EV ownership. However, continuing to expand the public charging network is needed to support residents that could use EVs, along with EV drivers that visit our region.

Six additional charging station installations are recommended at key locations throughout the Mohawk Valley to help create a more comprehensive network to support current and future EV drivers. Two locations are major tourism destinations (Cooperstown and Old Forge) that could serve EV drivers within the Mohawk Valley or beyond. Herkimer also has some tourist attractions that draw visitors, while filling a charging gap along Interstate 90.

The remaining three recommended locations (Utica, Amsterdam, and Johnstown) currently have some charging stations in their municipality, but they are not ideally located for commuters or visitors. Installing new charging stations in the downtown districts of these cities could potentially serve EV drivers that are employed nearby or those that visit for entertainment during evening or weekends.

Overviews of the six recommended locations are provided on the following pages with some potential sites where the actual installation could go. Holding key stakeholder meetings at these locations will enable the municipalities to capitalize on the available tax credit or other funding that might support new installations.



Mohawk Valley Electric Vehicle Charging Station Plan

Cooperstown is a village in and county seat of Otsego County. Most of the village lies within the town of Otsego, but some of the eastern part is in the town of Middlefield.

Overview¹

Cooperstown is a “village of museums,” including the National Baseball Hall of Fame, which opened in 1939 with the induction of Babe Ruth, Cy Young, Ty Cobb, and other baseball legends. The Farmers’ Museum, one of the country’s oldest outdoor living history museums, showcases rural life in 1845 in its village of historic trade and craft shops. The Fenimore Art Museum is home to one of the country’s premier folk art collections. Other cultural attractions include the Glimmerglass Opera, New York State Historical Association, National Art Association Show, Gallery 53 Multi-Arts Center, Cooperstown Brush and Palette Club, and several small art galleries.

Cooperstown’s Main Street provides residents and visitors with shopping in unusual clothing and gift emporiums, lodging in quaint bed-and-breakfast inns and working farms, and fine and family dining in a variety of restaurants. The town’s Trolley System features five old-fashioned trolleys that carry visitors to Main Street and the museums in town. Cooperstown’s special events range from an annual canoe regatta and baseball games at Doubleday Field to crafts shows, harvest festivals,

car shows, special Christmas activities, and golf tournaments at the Leatherstocking Golf Course.

A twice-weekly farmers market brings farmers and their wares to Main Street from June to October, and other area attractions include the Fly Creek Cider Mill and Brewery Ommegang. During the summer, hourly boat tours of Otsego Lake include viewing the scenic wetlands at the Goodyear Sanctuary. Three Mile Point Park and Fairy Spring Park bordering Otsego Lake offer picnicking and swimming, while Glimmerglass State Park offers camping, and winter sports such as cross-country skiing, ice skating, and tubing, making Cooperstown a town for four seasons.

Demographics

As of the census of 2013, there were 1,834 people living in Cooperstown. The population density was 54 people per square mile. The average income per capita is approximately \$42,000 annually, one of the highest in the region.

EV Factors

As of 2015, there were approximately fourteen EVs owned by residents of Cooperstown, with an additional three EVs neighboring towns. The large number of public attractions throughout the town creates an opportunity to provide charging for visitors driving EVs and to enhance tourism throughout the area. Additionally, local residents may become more familiar with the technology with the addition of the stations and, due to the higher income rates, purchase EVs for the environmental and energy benefits. Employees of the growing Basset Heath Care Hospital in Cooperstown likely align with the typical demographics of EV owners.

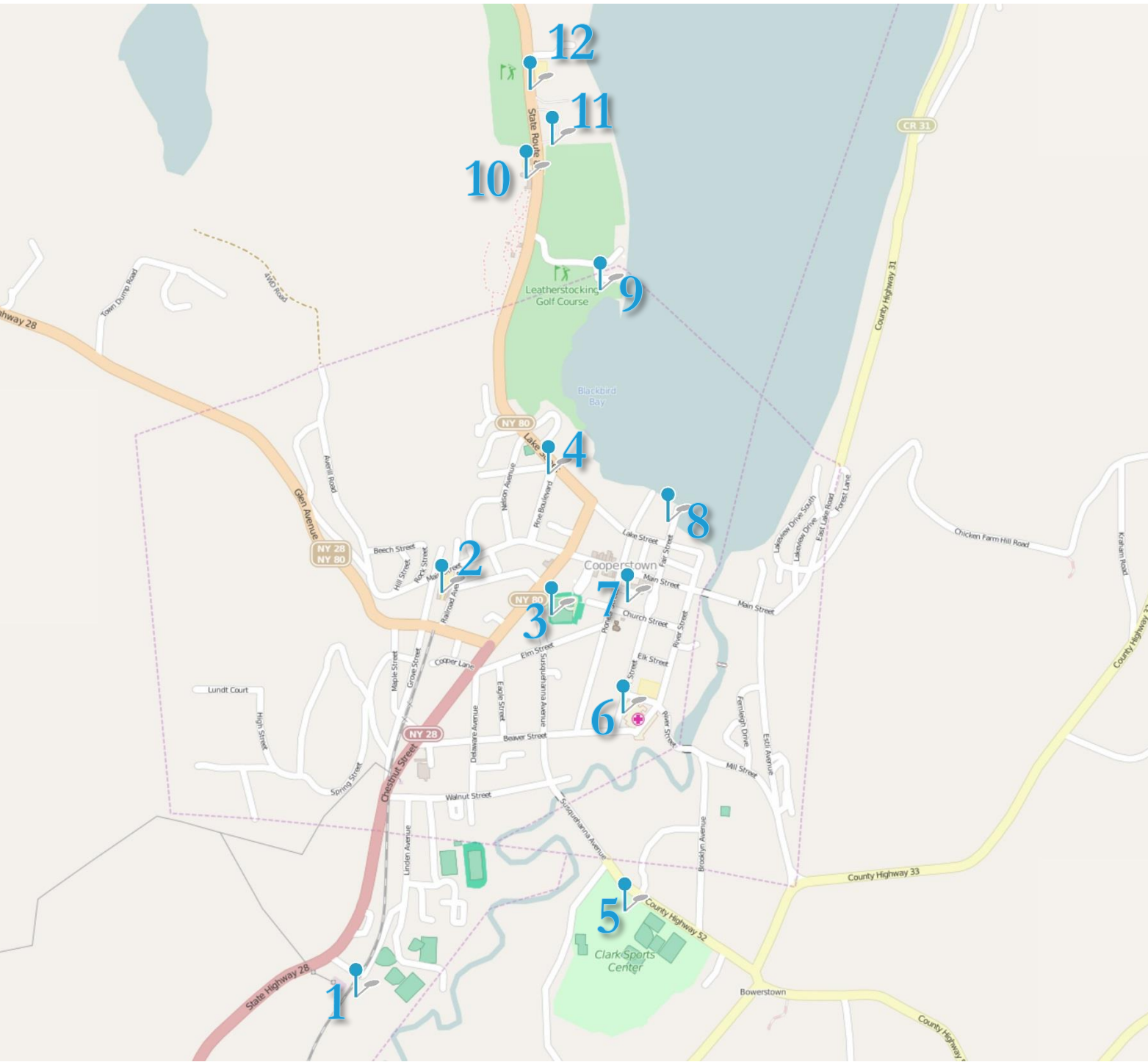
In October 2015, the Inn at Cooperstown installed a charging station with one Tesla and one universal port. This helps address the lack of charging in this area, but with the many favorable attributes in this area, additional charging stations are welcomed.



Baseball Hall of Fame on Main Street

¹ www.cooperstownny.org

Mohawk Valley Electric Vehicle Charging Station Plan



- 1 Trolley Parking Lot (Blue Lot)
- 2 Trolley Parking Lot (Red Lot)
- 3 Doubleday Field Stadium
- 4 Otesaga Resort Hotel
- 5 The Clarks Sports Center
- 6 Bassett Medical Center
- 7 National Baseball Hall of Fame
- 8 Cooperstown Marina/Lake Tours
- 9 Leatherstocking Golf Course
- 10 The Farmers' Museum
- 11 Fenimore Art Museum
- 12 Trolley Parking Lot (Yellow Lot)

Mohawk Valley Electric Vehicle Charging Station Plan

Old Forge is a hamlet on Route 28 in the town of Webb in Herkimer County. Old Forge is the principal community in the region and hosts an extensive business district, primarily directed at tourism especially during the summer months.

Overview²

Old Forge, and the Town of Webb, offers much for the vacationer during all seasons. In the summer, there are all kinds of activities including: boating, golf, water skiing, fishing, canoeing, hiking, swimming and mountain biking.

The region is the home of various recreational facilities. The most popular is Enchanted Forest Water Safari, New York's Largest Water Theme Park with over 50 rides and attractions: open mid-June through Labor Day. There is also the Adirondack Scenic Railroad, Old Forge Lake Cruises, Thendara Golf Club, View Arts Center, and the Town of Webb Historical Association's

Goodsell Museum. In addition, Old Forge has three miniature golf courses, a movie theater, public swimming beach and water rafting, canoeing and kayaking in the spring, summer and fall. McCauley Mountain operates its chair lift during the summer and fall months providing a fantastic view of the region. Sportsmen have ideal hunting for big and small game. The area is also known for its fine variety of quality restaurants, accommodations, and retail specialty shops.

In the winter, Old Forge is referred to as the "Snowmobile Capital of the East" with wide open spaces that only a snowmobiler can access. These famous trails take snowmobilers through the majestic woodlands of the Adirondack Mountains, and with hundreds of miles of groomed trails and snow from early December until March.

There is plenty of sightseeing and shopping in town as well as other winter sports such as

downhill or cross country skiing at McCauley Mountain. Other winter activities include ice skating, snowboarding, snowshoeing and ice fishing.

With all of this, Old Forge, in the Town of Webb, enjoys a continuous growing popularity as a recreational oasis all year round.

Demographics

Approximately 1,900 people live throughout this area yearlong. However, the majority of the residents are seasonal, residing in the many camps and lakefront properties throughout the area. The average annual income per capita for the Old Forge area is \$45,000.

EV Factors

As of 2015, there were no known EV owners in or around the Old Forge area. However, the majority of the population and traffic throughout this area is from visitors. The potential need for EV charging will more likely come from out-of-town residents or tourists rather than local owners. The typical individual visiting this area may be more inclined towards EV technology due to numerous natural attractions that they may be coming to see in Old Forge. With Old Forge about 50 miles north from Utica or Rome, any EV driver from those large cities would need 5-7 hours of charging at a Level 2 station to make the return trip.



Old Forge / Town of Webb: Visitor Information Center

² www.oldfor geny.com

Mohawk Valley Electric Vehicle Charging Station Plan



- 1 Adirondack Scenic Railroad
- 2 Old Forge Town Center / Shops
- 3 Visitor's Center / Beach
- 4 Enchanted Forest / Water Safari
- 5 Old Forge Lake Cruises
- 6 Old Forge View Arts Center
- 7 McCauley Mountain Ski

Mohawk Valley Electric Vehicle Charging Station Plan

Herkimer is a village on the north side of the Mohawk River in Herkimer County off the NYS Thruway's exit 30, about 13 miles southeast of Utica. Two other small villages, Mohawk and Ilion, are on the south side of the Mohawk River.

Overview

Herkimer has several attractions that draw visitors to this area. The Herkimer Diamond Mines³ provide an opportunity for visitors to search for diamonds in the prospecting area, by digging through the rubble or using crowbars, sledgehammers and heavy chisels to break open the rocks. The site has camping and a museum.

Mudville is a privately owned sports and entertainment complex located along beautiful and scenic Route 28 just outside of Herkimer. Established in 1997, Mudville is the largest high school sporting event, hosting girls softball and youth baseball tournaments. It is the longest running softball tournament and the nation's second largest high school softball tournament.⁴

Erie Canal Cruises⁵ tour boats Lil' Diamond II and Lil' Diamond III are docked at Gems Along the Mohawk, the Official Mohawk Valley Visitor Center, directly across from the New York State Thruway Exit 30. The Lil' Diamond vessels offer a fun and historically fascinating cruise, back to a time when the canal was just a vision and the barges were pulled by mules and horses. Travel

thru a hundred year old lock, relax and enjoy. Gems Along the Mohawk⁶ has shopping from over 70 retail associates and is home of the famous Waterfront Grill and Rocky's Quick Grille which offers various flavors of local foods while dining inside or waterside at the dock while enjoying life on the canal.



The Plantation Island New York State Wildlife Management Areas, consisting of approximately 300 acres of Mohawk River floodplain, lies on the opposite shore of West Canada Creek just southeast of the Village of Herkimer. Another smaller Wildlife Management site, providing access and parking for fishing on the creek, is just northeast of the Village, along Shells Bush Road, across the Donald J. Mitchell Bridge from State Route 28.

Remington Arms has a museum at their plant in Ilion for tourists and the Herkimer County Historical Society maintains the Suiter Memorial Building museum with a permanent display titled

“All In A Days Work; Working People Working Lives in Herkimer County”.

Several retail stores and restaurants are along State Street in Herkimer, including: Lowes, Walmart, Herb Philipson's, Hannaford, Applebee's, Crazy Ottos Empire Dinner, and many others.

Demographics

Herkimer has a population of 7,600 according to the 2013 census. The population density throughout the city is approximately 3,100 inhabitants per square mile.

The income per capita throughout the Herkimer area is estimated at approximately \$19,000 annually. For the population age 25 and over, 23% have a Bachelor's degree or higher and the overall unemployment rate is 7.4%. The average work commute duration is, on average, 20 minutes throughout this area.

EV Factors

As of 2015, there were six EVs owned by residents of Herkimer, with an additional nine EVs owned by individuals that live in bordering areas. The location of Herkimer along the I-90 corridor and the multiple tourist attractions, could provide a good opportunistic charging for longer EV trips. Currently the closest public charging stations are 18 miles away in Utica.

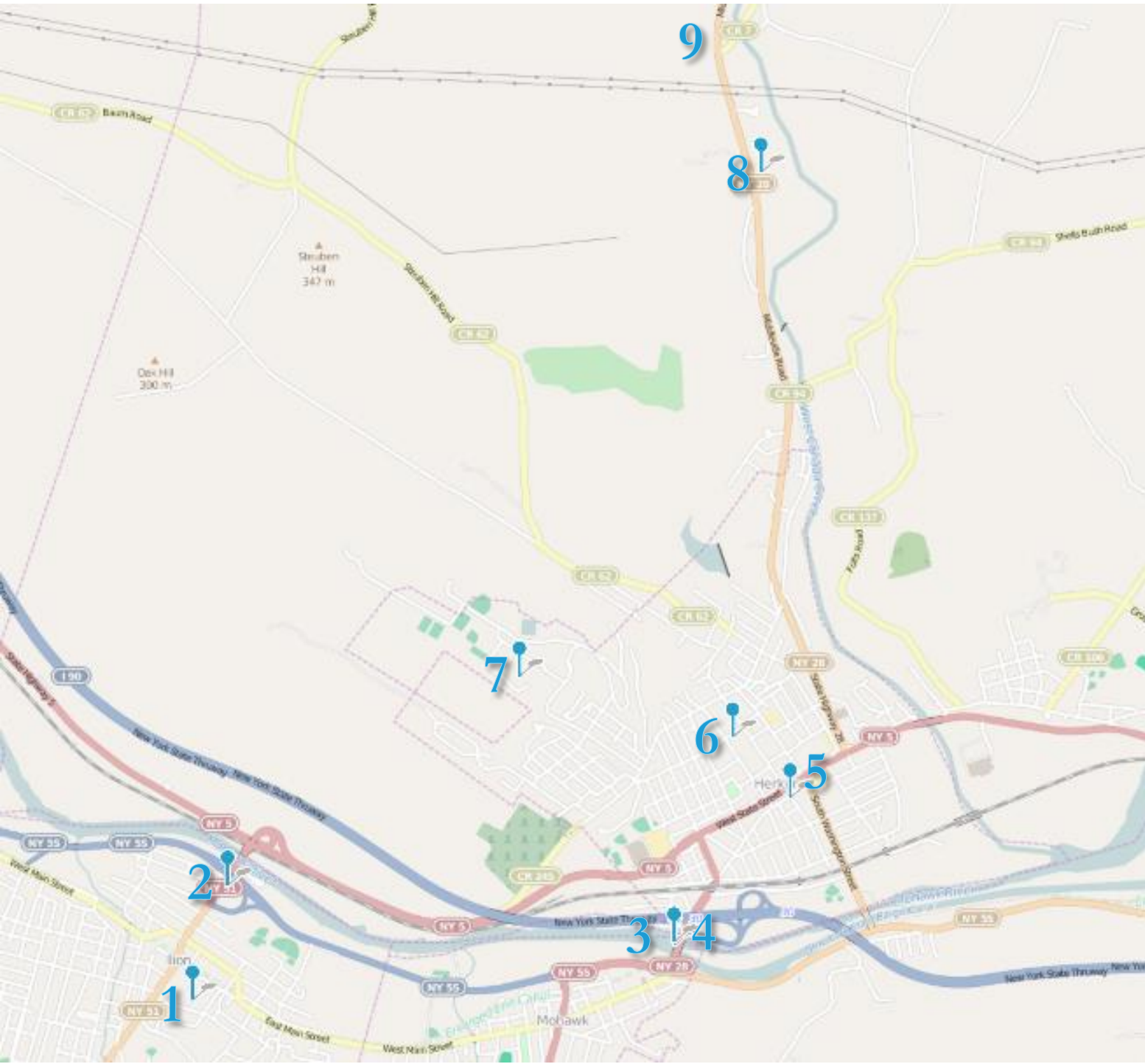
³ www.herkimerdiamond.com

⁴ <http://villageofherkimer.com/area-attractions.php>

⁵ www.eriecanalcruises.com

⁶ <http://gemsalongthemohawk.com>

Mohawk Valley Electric Vehicle Charging Station Plan



- 1 Remington Firearms Museum
- 2 Ilion Marina and RV Park
- 3 Gems along the Mohawk
- 4 Mohawk Valley and Erie Canal Cruises
- 5 Herkimer State Street Retail / Restaurants
- 6 Suiter Museum / Historical Society
- 7 Herkimer County Community College
- 8 Mudville Softball Complex
- 9 Herkimer Diamond Mines (5 miles north)

Mohawk Valley Electric Vehicle Charging Station Plan

Utica offers the charm of small-city living balanced with cultural and ethnic diversity of an international urban center. Geographically, Utica is located in the center of New York State and at the foot of the Adirondack Mountains.

Overview⁷

Utica's supports people from many cultures with over 40 languages and 50 nationalities represented. Within the city limits, there are five colleges and universities: Utica School of Commerce, Mohawk Valley Community College, Pratt Institute, St. Elizabeth's College of Nursing, and Utica College, with Hamilton College and SUNY Polytechnic in neighboring towns. At the southern city limits, there are two medical campuses for St. Elizabeth and Faxton-St. Lukes hospitals.

In addition to the educational facilities, Utica is undergoing significant redevelopment throughout the waterfront areas and a significant harbor development project is planned. SUNY Polytechnic is also constructing a Nano Tech center that will create 1,500 research, business, and support staff jobs in the Utica area.

The Utica Memorial Auditorium ("The AUD") is home to the Vancouver Canucks American Hockey League affiliate, the Utica Comets and dozens of events throughout the year. Family owned and operated in the same location since 1888, the Saranac Brewery brews over 50 varieties of beer as well as non-alcoholic soft drinks and

hosts daily tours as well as the "Saranac Thursdays" concert series.

The Munson-Williams-Proctor Arts Institute features an extensive permanent collection, as well as rotating exhibitions. The Stanley Center for the Arts is home to the Broadway Theater League of Greater Utica which brings Off-Broadway shows and performers to the Stanley stage.

Popular weekend festivals include the Utica Arts and Music Festival, the Great American Irish Festival, Remsen Barn Festival of the Arts and regular farmer's markets. However, the largest weekend event is the Boilermaker 15K with over 17,000 participants from all over the world. The race is the main reason why Utica is home to the National Distance Running Hall of Fame.



Utica's Genesee Street has government and office buildings, the Stanley Theater, and two hotels.

Demographics

The City of Utica has a population of 62,000 according to the 2013 census, an increase of 1.9% from the 2000 census. From 2000 to 2010, the

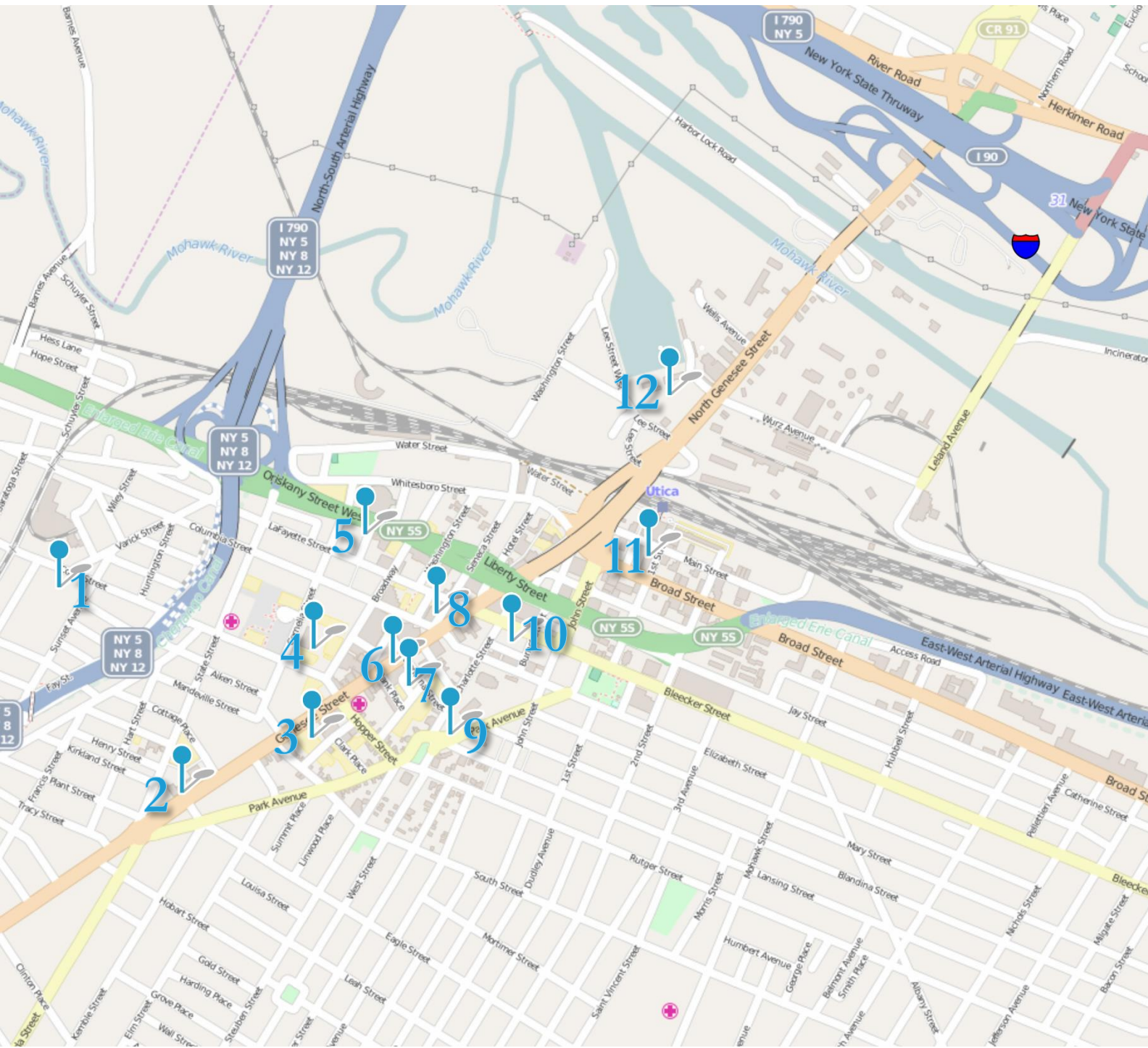
city's population of residents younger than 35 increased by 9.1 percent, according to the U.S. Census Bureau, making up 50.3 percent of the city's population in 2010.

Utica has a relatively high average population density of over 4,400 individuals per square mile (highest in the region). Utica also has one of the lowest average income rates of \$28,000 annually per resident. The population during weekdays is approximately 19% more (over 11,000 people) than nighttime numbers due to commuters.

EV Factors

As of 2014, there is approximately 23 EVs owned by residents of Utica, with an additional 50 EVs owned by individuals that live in bordering areas. While an EV may meet the driving requirements of city residents, lower income rates make EVs out of reach for many. However, employees at the universities, medical campuses, state offices, and other large corporations are potential EV drivers and the City may be able to entice them to spend more time downtown at local attractions with charging stations. Currently only SUNY Polytechnic and Steet-Ponte Ford (Commercial Drive, in neighboring Yorkville) have Level 2 charging stations, while Tesla installed DC Superchargers at the North Utica Shopping Center near the NYS Thruway exit.

⁷ www.cityofutica.com



- 1 Saranac Matt Brewing Company
- 2 Munson-Williams Arts Institute
- 3 Stanley Theater / Downtown
- 4 Hanna Park/Mayors Office
- 5 Utica Memorial Auditorium
- 6 Radisson Hotel - Utica Center
- 7 Utica State Office Building
- 8 Hotel Utica/ Conference Center
- 9 Oneida County Office Building
- 10 Utica School of Commerce
- 11 Boehlert Center at Union Station
- 12 Utica Harbor Development Project

Mohawk Valley Electric Vehicle Charging Station Plan

Amsterdam is located just minutes from exit 20 of the NYS Thruway, and serves as a major route to Sacandaga Lake and the Adirondack Mountains.

Overview⁸

Amsterdam is a vibrant city that has been around since the earliest days of European settlement. Located along the Mohawk River, Amsterdam was ideally placed to thrive in the Industrial age of American development. More recently, Amsterdam has focused its efforts on revitalizing what was once a thriving industrial locale into a business friendly community with excellent education institutions and housing for residents both young and old.

Amsterdam offers an array of community activities for residents to enjoy throughout the year. During the summer months residents can attend movies in the Park on Saturday nights, or swim in the City owned Olympic sized pool which is open 6 days a week through August.

Amsterdam has well over 25 green spaces and public parks for the residents and visitors to enjoy. Riverlink Park offers a boat dock, the Riverlink Café, a playground and hosts several events throughout the summer months.

The Professional Wrestling Hall of Fame in Amsterdam enshrines and pays tribute to professional wrestlers who have advanced this

national pastime in terms of athletics and entertainment. The Walter Elwood Museum hosts an extensive assortment of approximately 25,000 artifacts fall into four categories: multicultural, Victorian, natural history, and items that relate to Mohawk Valley's colorful industrial past.



St. Mary's Hospital

St. Mary's Hospital has two campuses in Amsterdam dedicated to improving the health of the entire community with special attention to the poor and underserved. Anchored in the heart of downtown, the Riverfront Center offers 255,000 square feet of office space. The facility is home to a variety of traditional enterprises including corporations, medical practices and attorney offices.

Demographics

The City of Amsterdam has a population of 18,206 according to the 2013 census, a slight decrease from the 2000 census. There is an average population density of 186 people per square mile. The average age of its residents is 44, with 24% of its population age 18 – 24. The

average income per capita is \$19,000. The population in the City of Amsterdam during weekdays is approximately 31% more than nighttime numbers due to commuters.

EV Factors

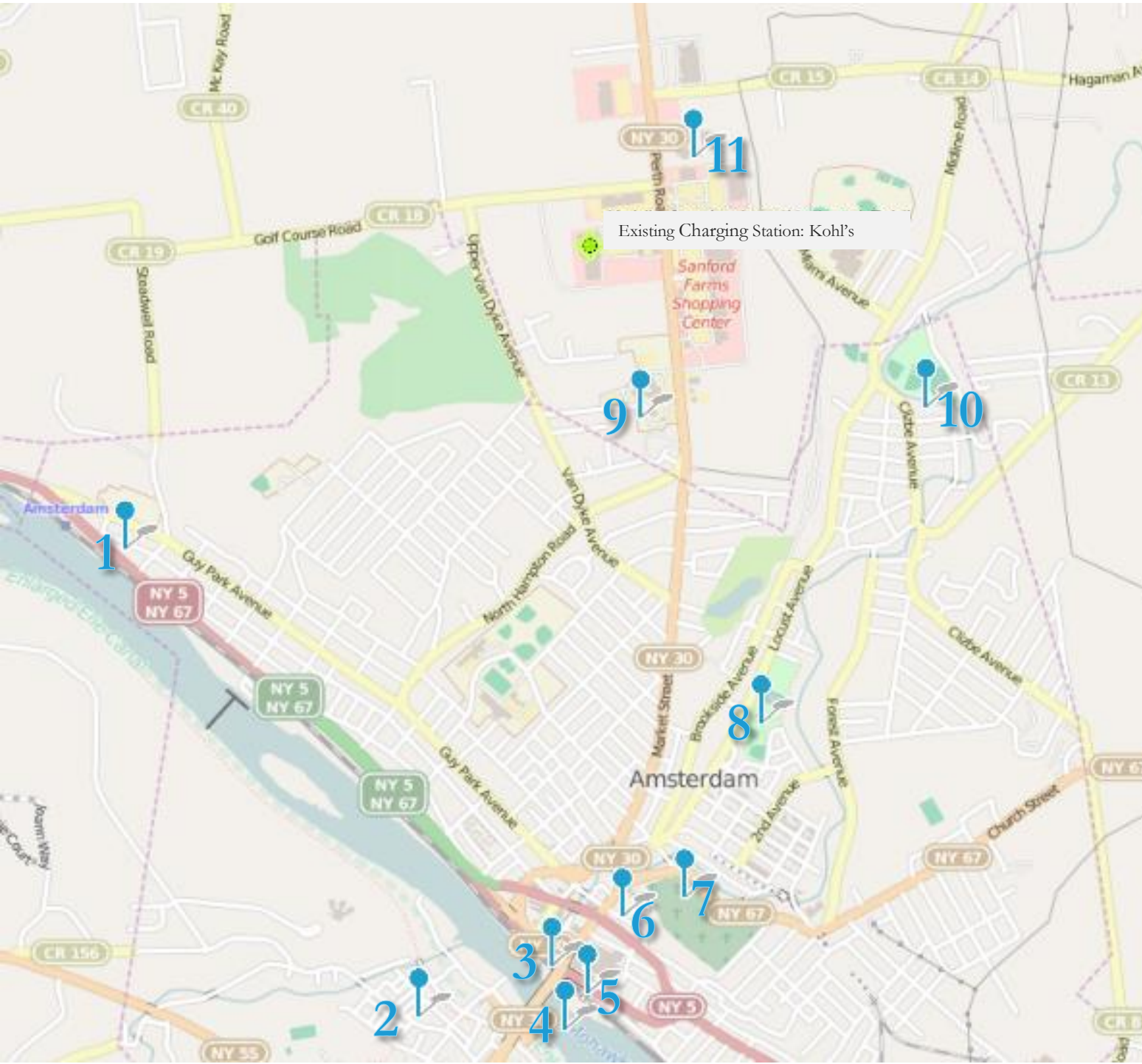
As of 2015, there were approximately 15 EVs owned by residents of Amsterdam, with an additional eight EVs owned by individuals that live in bordering areas. Conveniently located along the I-90 corridor, public EV charging in downtown Amsterdam can serve locals as well as travelers. There is also an opportunity to for commuters to use the charger during work hours, with the Hospital and Riverfront Center drawing employees that would typically purchase EVs. The only existing charger in Amsterdam is at Khol's which is north of the downtown district.



Riverfront Center

⁸ www.amsterdamny.gov

Mohawk Valley Electric Vehicle Charging Station Plan



- 1 St. Mary's Hospital at Amsterdam
- 2 Canalway Trail Parking Area
- 3 Professional Wrestling Hall of Fame
- 4 Riverlink Park / Concerts
- 5 Amsterdam Riverfront Center
- 6 Amsterdam City Hall Complex
- 7 Walter Elwood Museum
- 8 Bigelow Sanford Field/City Pool
- 9 St. Mary's Hospital Memorial Campus
- 10 Herbert L. Shuttleworth Park
- 11 Emerald Cinema

Mohawk Valley Electric Vehicle Charging Station Plan

Johnstown is a city at the crossroads of major routes into the Adirondacks; routes 29, 67, and 30A. It is also the seat of Fulton County (land of 44 lakes).

Overview⁹

Located at the foothills of the Adirondack Mountains and only 40 minutes away from some of upstate NY's most happening cities, the City of Johnstown has much to offer in terms of working, living, and playing.

Johnson Hall was the 1763 Georgian-style estate of Irish immigrant Sir William Johnson (1715 - 1774) and Molly Brant, a Mohawk Indian, and their eight children. Johnson Hall remained a private residence through 1906, when it was acquired by the State of New York and opened to the public as a State Historic Site. Today, Johnson Hall continues to welcome visitors and interpret the Johnson family through guided tours of the period room settings and of the historic grounds, educational programs and special events.



Johnson Hall

Johnstown's downtown business district along route 29 hosts several governmental agencies including the Motor Vehicle Department, Fulton County Veterans Services, Fulton County Family Court, Fulton County Economic Development, and Johnstown City Court. There are also numerous private businesses and restaurants along this street.



Business District along Route 29

Larger retail stores are found along route 30A heading towards Gloversville. Merchants include Price Chopper, Peebles, Walmart, Aldi's, and Ruby & Quiri. There is also Movieplex and several restaurants.

The Fulton County YMCA has their main facility off route 29 where many local residents participate in fitness activities including: swimming, weight lifting, aerobics, racquetball, basketball, volleyball, indoor soccer, and tennis.

Demographics

Johnstown has a population of 8,700 according to the 2010 census. The population density throughout the city is approximately 1,750 inhabitants per square mile.

The income per capita throughout Johnstown is estimated at approximately \$25,000 annually. For the population age 25 and over, 20% have a Bachelor's degree or higher and the overall unemployment rate is 4.7%. The average work commute duration is, on average, 19 minutes.

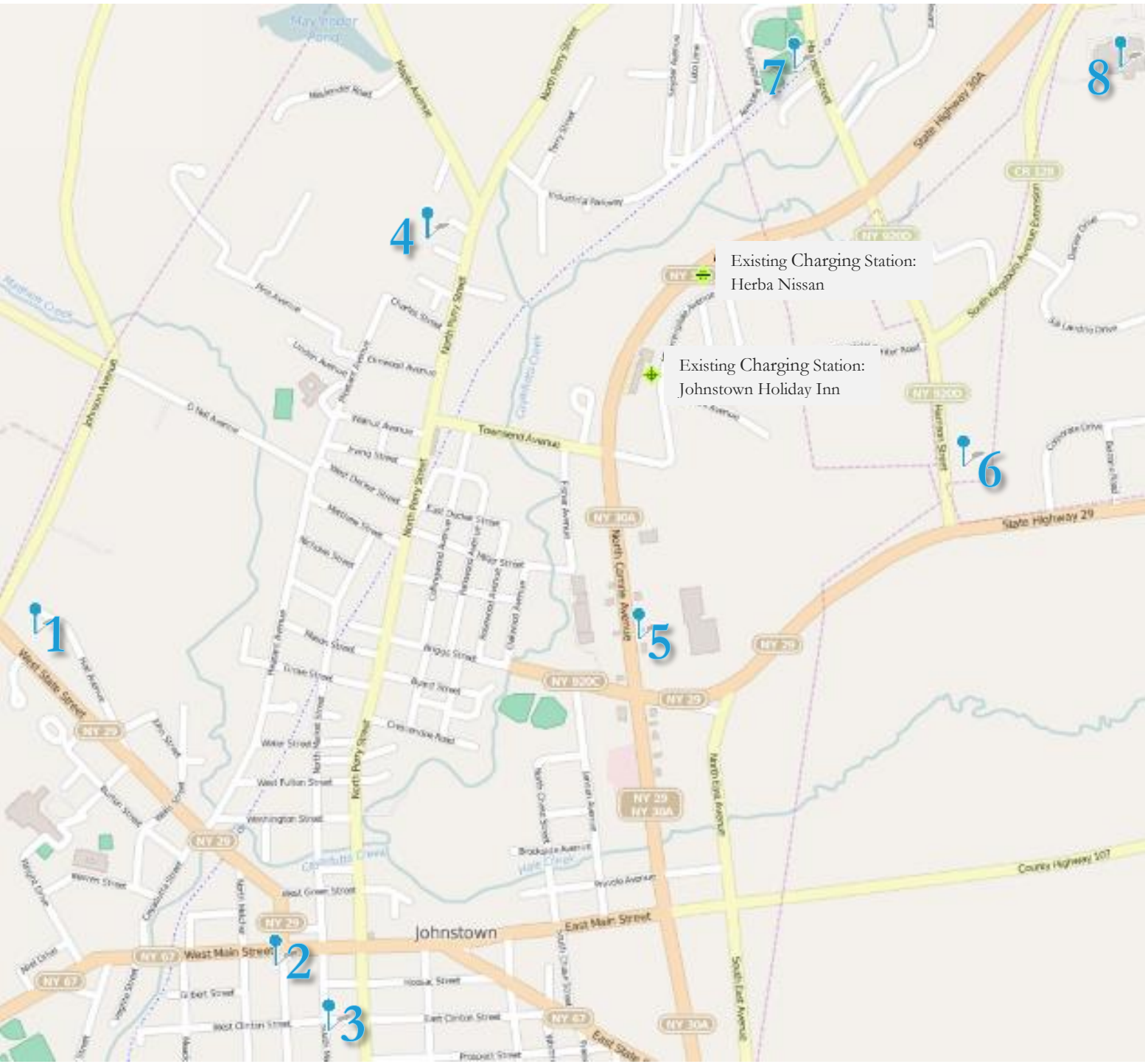
EV Factors

As of 2015, there were approximately eight EVs owned by residents of Johnstown, with an additional 40 EVs owned by individuals that live in bordering areas. Chargers located in Johnstown could provide opportunistic charging for longer EV trips. Currently the only existing public charging stations are located at Herba Nissan and Holiday Inn along 30A, but these are not well situated for EV drivers to work or shop while their car is charging.



City Hall

⁹ <http://cityofjohnstown.ny.gov>



- 1 Sir William Johnson Park
- 2 Downtown Business / Retail District
- 3 Johnstown Public Library
- 4 Lexington Center
- 5 Johnstown Shopping Center
- 6 YMCA
- 7 Parkhurst Field
- 8 Walmart

Mohawk Valley Electric Vehicle Charging Station Plan

Other Potential Level 2 Charging Station Installation Locations

Seven additional locations have good potential for installing charging stations. As EV use expands in this region, these locations should be considered.

Verona is a small town of 6,293 in Oneida County, west of Utica. Located at exit 33 of the Thruway, it is home to the Turning Stone Resort & Casino drawing many tourists for entertainment and sports. Vernon Downs harness racing track and the Utica-Rome Speedway are also nearby.

New Hartford is a town of 22,166 in Oneida County, southwest of Utica. It has a relatively affluent population within the region and is home to some larger corporations and a few business parks. It also has a lot of retail stores with Sangertown Square Mall, New Hartford Consumer Square, and New Hartford Shopping Center, among numerous other small shops in the village.

Oneonta in southern Otsego County is advantageously located along Interstate 88. While there are currently charging stations at SUNY Oneonta and the Country Club dealership, these are not convenient to Hartwick College, Cooperstown All Star Village, or the National Soccer Hall of Fame.

Sylvan Beach is a popular tourism destination along the shores of Oneida Lake. In addition to the beach, it has an amusement park, camping facilities, marinas, and a wide variety of restaurants

and shops. However, it is a seasonal destination that is only very active in summer.

Boonville is a popular destination for area residents for certain events during the year. Its fairgrounds host the Oneida County Fair and Woodsman Field Days during the summer, while Boonville is a snowmobile tourist destination in the winter with its Snow Festivals.

The Fulton County Visitors Center with a park-n-ride lot at the intersection of routes 29 and 30A near *Broadalbin* is regularly used by commuters who might be interested in owning a plug-in electric vehicle if they could charge at this location during the day while they carpool with a colleague. This is also a gateway to the Adirondacks.

The Mohawk River and Erie Canal which flow through this region have a multi-use trail that is frequently used by residents. Many municipalities have established small parking areas to provide access to the path and the demographics of trail users aligns well with potential EV owners. Providing chargers at some of the more popular parking spaces might be welcomed by visitors.

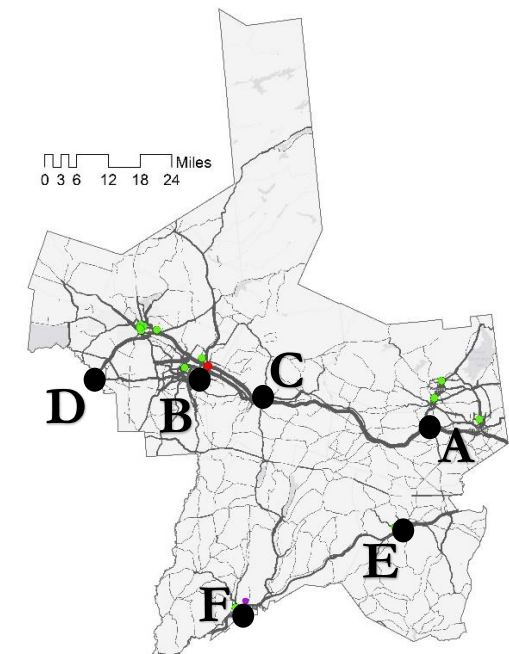
DC Fast Charging Infrastructure

AC Level 2 charging stations are useful for extending the daily use of EVs, but they are not practical for enabling inter-regional travel. DC fast chargers, which can provide an 80% charge in about 20 minutes, are needed to further extend the use of EVs throughout NYS. Strategically placing DC fast chargers in the Mohawk Valley

along Interstate 90 could support transient EV drivers as well as local EV drivers.

Installing DC fast chargers in Fonda [A] and Utica [B] could enable most EVs in good weather to travel from Albany to Syracuse (Albany-Fonda is 44 miles, Fonda-Utica is 55 miles, and Utica-Syracuse is 55 miles). To reduce the 55 mile distance between DC fast chargers, two could be placed between Fonda and Syracuse (at Herkimer [C] and Verona [D]) instead of just one in Utica.

Cobleskill [E] and Oneonta [F] are logical choices for DC fast chargers on Interstate 88 to create reasonable distances of 46 miles from Albany to Cobleskill; 37 miles from Cobleskill to Oneonta; and 59 miles from Oneonta to Binghamton.



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Recommendations for Community EV Readiness

Although gasoline-powered vehicles will be around for many years, a shift in the transportation industry toward electrification will change how people drive and fuel vehicles. EVs can be very beneficial to communities and their residents. Unlike gasoline-powered vehicles, EVs are quiet, emit no direct air pollution, and do not require imported fuel that must be transported with the risk of spills or leaks.

To enjoy these benefits and support residents who make the investment in cleaner cars, communities can promote the use of EVs by becoming EV-ready. Municipalities can prepare for EVs and the infrastructure that is used to charge them with the following best practices guides for amending local rules and regulations to be EV-friendly.

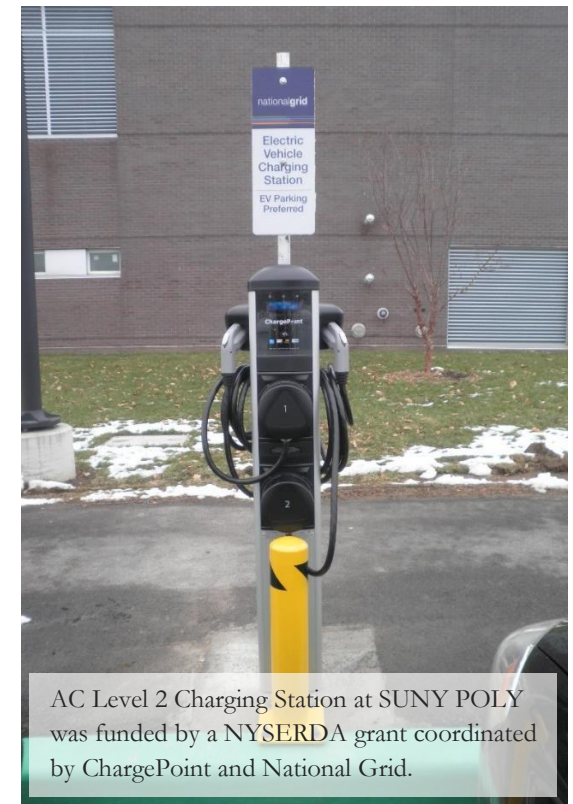
Understanding which level and how many charging stations are feasible for different settings based on expected EV use is critical. The type and number of EVs in a community will help shape how many and what kind of charging station an EV owner might need. The different types of charging stations will charge EV batteries at

different rates. The type of EV charging infrastructure at each site should correspond with the amount of time a vehicle might be parked there while the driver is shopping, working, or enjoying entertainment. As a municipality, zoning laws must permit the installation of each charging station type in an appropriate setting.

Zoning and parking ordinances have a wide impact on how and where public charging stations are installed and used. Zoning rules can help determine what types of land uses are appropriate for AC Level 1, AC Level 2, and DC fast charging stations and how they should be sited. Parking rules dictate who is allowed to park in parking spaces adjacent to charging stations, and whether cars parked there illegally can be fined or towed. One of the most frustrating situations for an EV driver in need of a charge is to pull up to a charging station, only to find it is occupied by a conventional vehicle.

Examples of zoning and parking policies from across the country can be found in the [Planning Policy Tool Guide](#), which also addresses local permitting practices and building codes. This guide highlights best practices and introduces policy options for public officials and private-

sector leaders to prepare their communities, jurisdictions, states, or organizations for EVs.



AC Level 2 Charging Station at SUNY POLY was funded by a NYSERDA grant coordinated by ChargePoint and National Grid.

Simple and consistent EV charging station *permitting processes* can make installing EV infrastructure much easier. Current national

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building and electrical codes neither inhibit nor facilitate the implementation of EV charging stations. But at a municipal level, the adoption of certain provisions in local codes has successfully encouraged EV-readiness in some jurisdictions.

[EV Ready Codes for the Built Environment](#)

provides current codes for charging stations and what code provisions could be incorporated into local code to encourage a basic or advanced level of EV-readiness. It highlights best practices from around the world to make recommendations for jurisdictions in the Northeast and mid-Atlantic.

How charging station installation work is classified within a jurisdiction can impact the time and cost of the permitting process. An overview on [Permit Process Streamlining](#) reviews best practices for charging station permitting and presents sample

application forms. While residential installations were the focus on this investigation, the results and findings also apply to commercial charging station installations.

Residential EVSE Permit Process Best Practices

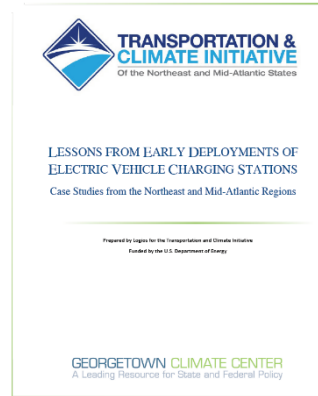


Prepared by:
Energetics Incorporated
Prepared for:
New York State Energy Research
and Development Authority
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NYSERDA has funding available for communities to amend their permitting, zoning, and parking ordinances so they are more EV-friendly, along with other opportunities available to support EV and charging station use. Through the [Cleaner, Greener Communities program \(Phase 2, Category 1\)](#), up to \$5,000 per municipality is available.

[Lessons from Early Installations of Charging Equipment](#)

documents EV charging infrastructure installations in the Northeast and Mid-Atlantic, and uncovers some of the related challenges and opportunities.



- In general, preparing the charging sites as part of a new development is more cost effective than incorporating EV charging infrastructure into an existing structure. The cost of electric system upgrades also tends to increase with the age of the building.
- Installations in public spaces, such as sidewalk right of way, can be administratively burdensome and formalizing clear procedures for permitting and approval will help expedite installations.
- Standardization of signs, both regulatory (on-site) and directional (wayfinding) will not

only improve communication to drivers but also reduce the burden on site owners and designers.

- Site owners, current and prospective, often struggle with the question of return on investment on EV charging equipment.
- Cords without a management system are often left spread about on the ground and may potentially become a hazard for users or the equipment.
- The Northeast and Mid-Atlantic regions have not yet formally adopted guidelines or recommendations on the definition of ADA-accessible charging space and the minimum number of charging stations that need to meet that definition.
- A careful evaluation of the possible spaces where the EV charging equipment could be located and their impact on the economics of the installation should be part of the planning process before a commitment to installing the equipment is made.
- Public-private partnerships to fund the installation of charging stations help the host construct a more attractive economic case to install the equipment, while enabling government to pursue their community goals.
- Before entering into agreements to install charging stations, prospective hosts should make sure they understand who will pay for maintenance, electricity, and other ongoing costs after installation.

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Barriers and Solutions

Establishing a more comprehensive network of AC Level 2 charging stations, as recommended in the prior section, is one key strategy to encourage more drivers to consider owning an EV. Public charging stations could make EV ownership more feasible for some, while the exposure to this technology from having public charging infrastructure will expose others to EV options.

Public AC Level 2 charging stations may also allow current EV drivers to use their vehicle more, rather than relying on a secondary conventional ICE vehicle for trips that require charging while in route. More electric miles results in cost savings for the EV owner and more environmental benefits for the community.

Six barriers were determined to be critical issues limiting the expanded use of EVs in the Mohawk Valley. For each, potential solutions and strategies for addressing these are presented and it is strongly recommended that municipalities, counties, and the region as a whole lead or support initiatives that follow these recommendations.

DC Fast Charging Infrastructure

EVs will likely always have a more limited range than conventional ICE vehicles because battery technology does not have as high energy density as petroleum fuels. With advancements, the EV driving range will continue to increase, but regular charging will still be necessary. Restricted to only AC Level 1 or Level 2 charging, EVs will always

need an extended period to fully replenish the batteries. This limits EV use to local driving within the region. For greater EV acceptance, faster charging options are needed.

DC fast charging infrastructure enables EV drivers to replenish a large portion of their battery capacity in a shorter stop, similarly to fueling a conventional ICE vehicle. Installing these stations along major transportation routes facilitates inter-regional travel by EVs. If DC fast charge stations can also be *placed in larger cities where there is a concentrated population of EV drivers, the stations could be used by local residents* as well.

A few suggested locations for DC fast charge stations were mentioned in the previous section, but optimally placing these is a task that must *look at this issue state-wide*. Installing these at certain locations in the Mohawk Valley would only be beneficial if they align with DC fast charge station placement in the neighboring regions.

Regular utilization is needed to maximizing the investment into DC fast charging infrastructure. This is currently challenging with the limited number of EVs in some parts of the state, Mohawk Valley being one of those. It would be beneficial to *coordinate DC fast charge station installations with government or private fleets of EVs* that could be regular users of this infrastructure in their daily travels.

Educating Potential EV Owners

Currently, many people looking to purchase a new vehicle are not knowledgeable about EVs or whether EV technology would be appropriate for them. Anyone interested in EVs would likely have to do their own research and investigation because there is little EV information available or promoted at local dealerships. It is challenging to find an EV for a test drive and almost impossible to compare multiple EV options side-by-side in person.

EV education and awareness should be coordinated on a large scale (regionally or state-wide), focusing on the most likely consumers. Whenever possible these efforts should be *coordinated with the EV manufacturers and local dealerships*, which should have an interest in promoting their cars, to leverage existing advertising budgets.

Cost savings should be emphasized more than environmental benefits and promotional efforts should be *directed towards key demographics of potential EV buyers* rather than a broad audience. For example, vehicles are a status symbol for various demographics in this region (e.g. immigrants) and EVs may never be as appealing as a truck. A better audience to target would be residents drawn to the farmer's markets or other initiatives surrounding sustainability or embracing the natural environment (e.g. hiking).

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Students in College or younger should be targeted to pass on what they learn to their parents or to “plant a seed” about EVs in their mind for when they consider a vehicle purchase. Colleges or BOCES might also be good partners to become involved in projects or studies related to EVs, some of which might task them with promoting this technology.

When possible, it is also useful to *draw a connection between EVs and electricity generation initiatives* (e.g., solar power installations). Consumers tend to understand technology better when they relate it to something they know or can see the bigger picture and how that benefits them.

Online resources are best for providing information to consumers and webpages often provide as little or as much information as is desired by the consumer. [NYSERDA has recently created webpages dedicated to providing EV information](#), but it might not be the most effective webpage for promoting this technology.

While the NYSERDA pages could be linked to for those wanting more in-depth information, a *dedicated webpage promoting EVs* that can be easily found or linked to from other pages should be developed. One suggested option was leveraging the I♥NY webpage which has a “Travel Tools” section. Alternatively, a generic EV promotion page could be made available for any organization in the state to place on their own site and draw more attention to this topic.

Electric Utilities

Electric utilities are the energy supplier for EVs and supporting the transportation industry is a market in which they have not traditionally been involved. While the increased demand from charging stations can be concerning, providing electricity to vehicles is also a growth opportunity for electric utilities.

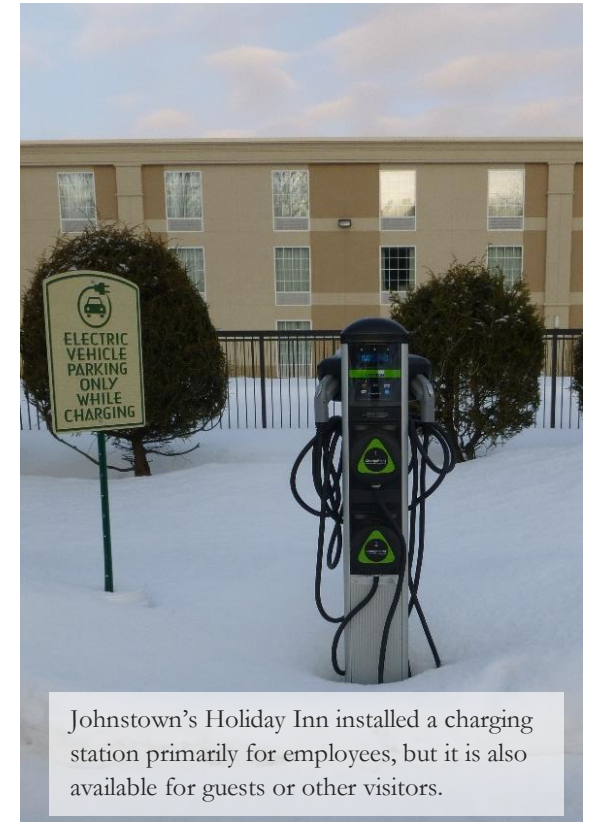
The electric utilities are involved in EV adoption every time a charging station is installed or a vehicle is drawing power to charge its battery. To date, the utilities in this region have taken a very passive role in EV readiness. *Collaborating and partnering with the electric utilities on EV initiatives* could be very effective at promoting this technology and helping to maximize benefits for both consumers and the utility itself.

Many EV drivers adopt this technology to have a positive impact on the environment and a key factor in that is how the electricity to charge the batteries is generated. This is obvious if the EV owner has their own solar panels, but for most others the source of electricity is unknown. Electricity generation is tracked and published at the state level, but *sharing the electricity sources and its impact on EV use* to current or potential EV owners would be useful.

The electric utilities are logical candidates to *lead by example in regards to EV adoption*. Their fleet, where appropriate, could include EVs and some

of their facilities or buildings could host public charging stations.

There are no specific electricity rates for EV owners offered by local electric utilities, but charging at night under time-of-use rate schedules could result in cost savings for the consumer and benefit the utility as well. *Consultation or guidelines issued by the electric utility specifically for EV owners* would help them make better informed decisions on optimizing their EV purchase.



Johnstown’s Holiday Inn installed a charging station primarily for employees, but it is also available for guests or other visitors.

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Public Charging Station Demand

Several public AC Level 2 charging stations have been installed throughout the Mohawk Valley, but many are seeing very infrequent use. This makes it hard to justify further investments into charging infrastructure. It is very likely that there is additional demand for public charging stations or cases where public charging stations would facilitate more EV purchases, but documenting that demand is challenging.

It would be advantageous to better understand where EV owners drive and during which trips they really need public charging. *Establishing a network of EV drivers* to voice these opinions and provide suggestions into future public charging station installations or EV initiatives would be beneficial.

This network of current EV drivers can also be leveraged to promote EV technology and expose others to electrified transportation options. Such a group could *anchor an event for the National Drive Electric week* which has been promoting EV use through critical awareness activities in many places across the US. With a limited supply of new EVs at local dealerships, this EV driver network may also help showcase the technology in coordination with other regional education and awareness initiatives.

Educating Elected Officials

EV adoption in the Mohawk Valley is still very limited. There is currently little need and no desire

for passing policies that require EV charging infrastructure in new construction projects or make it illegal for conventional ICE vehicles to park in EV charging station spaces. There are much higher priorities for our communities and these are not currently the critical issues that are limiting EV adoption.

However, like many residents of the Mohawk Valley, most elected officials are not even properly educated on EV technology or the benefits they can provide to our communities. *General education on EVs through presentations and publications* should be provided in coordination with their existing meetings and conferences. The development of this Plan served as an initial introduction to EVs for the elected officials that were involved in this project.

Key elements of this outreach to elected officials would be *hands-on experiences* where they have the chance to see and ideally drive EVs. It is also important to *draw connections between EVs and other local initiatives* such as renewable electricity generation projects or even tourism.

Site Planning

As previously mentioned, requiring all new construction projects to install EV charging stations or even the conduit in preparation for future installations is likely premature for Mohawk Valley municipalities that currently have very few EV owners. However, there are some new

construction projects where charging stations or the preparations for them should be considered.

Universities, medical campuses, and technology parks are some examples of logical host sites for charging stations. The demographics of employees at those organizations align with typical EV owners and charging stations have been credited with attracting or retaining highly educated and technology savvy employees.

Ensuring that architects and others involved in the planning process of new construction projects *understand when charging stations might be a good option* to incorporate is important. Discussing EV readiness in site planning will likely enable cost effective charging station installations to expand the charging network in the Mohawk Valley.

Once the importance of EV readiness is understood by architects and planning boards, developers could be given an *incentive for installing charging stations* which could allow compromises on other aspects of the new construction design.

Other EV Readiness Considerations

In addition to the six barriers to EV adoption in the Mohawk Valley described previously, a few other issues were raised during the discussions held to support the development of this Plan. These are not the most critical barriers that should be actively addressed right away, but should be

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considered as other EV initiatives and strategies are undertaken.

Vehicle and charging station costs restrict many Mohawk Valley residents from purchasing EVs. Collaborative public/private partnerships that *help reduce initial EV costs* (e.g. aggregate purchases) or any grant programs that *incentivize EVs* should be supported. It is also very important to document and promote the cost savings that EVs will provide to their owner over time.

EV drivers sometimes find it challenging to locate charging stations. While online maps and phone applications can help them, physical signage at the location is also useful. Having *consistent signage* so EV drivers and others easily recognize which parking spaces are specified for those charging and which parking lots have chargers.

In some jurisdictions, the cost, length, or complexity of the permitting process prevents charging station installations. *Streamlining the permitting process* is one option and NYSERDA currently provides funding to help do so through the [Cleaner, Greener Communities program \(Phase 2, Category 1\)](#). More importantly, however, is just to clearly *establish protocols for EV charging station permits* (e.g., which form and classification it falls under) so developers can plan for and then complete the permitting process required for new installations.

During the planning and permitting of an EV charging station, the developer, host site, and/or

installer will interact with several municipal employees. To facilitate the process and establish a favorable impression as an EV supportive community, the *zoning board members, clerks, code enforcers, and inspectors should be knowledgeable of EV technology*. In addition to helping the process go smoother, properly educated municipal employees will ensure that the charging station installation is done properly.

The *key next steps to implementing this EV Charging Station Plan* are:

- 1) Holding meetings with key stakeholders in the recommended locations for

additional charging stations to prepare for, and encourage, new installations

- 2) Participate in any efforts to plan or deploy DC fast chargers
- 3) Distribute or post EV information at meetings, in newsletters, or on websites
- 4) Regularly discuss or bring up the topic of EVs at relevant or related activities to increase awareness
- 5) Pursue funding opportunities or other options to create a new EV website or establish a network of EV drivers
- 6) Offer assistance or support any effort promoting EV technology



The City of Rome installed several AC Level 2 charging stations at parks and recreational facilities, including this one at the J.F. Kennedy Civic Arena and municipal pool.

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Appendix A: EV Models Available in NYS

PHEVs

Audi A3 Sportback e-tron

Starting MSRP: \$37,900
Federal Tax Credit: \$4,168
MPG Equivalent: 95
Electric Range (miles): 31

BMW i3 w/ Range Extender

Starting MSRP: \$46,250
Federal Tax Credit: \$7,500
MPG Equivalent: 117
Electric Range (miles): 81

BMW i8

Starting MSRP: \$136,500
Federal Tax Credit: \$3,793
MPG Equivalent: 76
Electric Range (miles): 15

BMW X5 xDrive40e

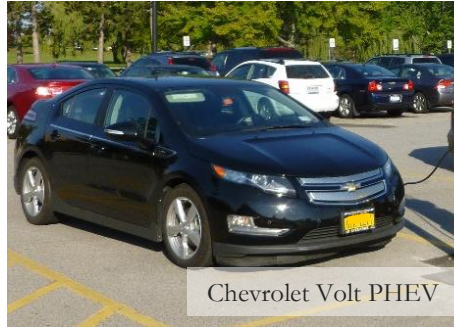
Starting MSRP: \$62,100
Federal Tax Credit: \$4,168
MPG Equivalent: 59
Electric Range (miles): 13

Cadillac ELR

Starting MSRP: \$65,000
Federal Tax Credit: \$7,500
MPG Equivalent: 82
Electric Range (miles): 37

Chevrolet Volt

Starting MSRP: \$33,170
Federal Tax Credit: \$7,500
MPG Equivalent: 106
Electric Range (miles): 53



Ford C-Max Energi

Starting MSRP: \$31,770
Federal Tax Credit: \$4,007
MPG Equivalent: 88
Electric Range (miles): 21



Ford Fusion SE Energi

Starting MSRP: \$33,900
Federal Tax Credit: \$4,007
MPG Equivalent: 88
Electric Range (miles): 21



Honda Accord PHEV

Starting MSRP: \$39,780
Federal Tax Credit: \$3,626
MPG Equivalent: 115
Electric Range (miles): 13

Hyundai Sonata PHEV

Starting MSRP: \$34,600
Federal Tax Credit: \$4,919
MPG Equivalent: 93
Electric Range (miles): 22

Mercedes-Benz S-Class PHEV

Starting MSRP: \$95,650
Federal Tax Credit: \$4,168
MPG Equivalent: 58
Electric Range (miles): 20

Porsche Cayenne S E-Hybrid

Starting MSRP: \$77,200
Federal Tax Credit: \$5,335
MPG Equivalent: 47
Electric Range (miles): 14

Porsche Panamera S E-Hybrid

Starting MSRP: \$96,100
Federal Tax Credit: \$4,751
MPG Equivalent: 50
Electric Range (miles): 16

Toyota Prius PHEV

Starting MSRP: \$29,990
Federal Tax Credit: \$2,500
MPG Equivalent: 95
Electric Range (miles): 11



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BEVs

BMW i3 BEV

Starting MSRP: \$42,400
 Federal Tax Credit: \$7,500
 MPG Equivalent: 124
 Electric Range (miles): 81

Chevrolet Bolt

Starting MSRP: N/A
 Federal Tax Credit: \$7,500
 MPG Equivalent: N/A
 Electric Range (miles): 200

Ford Focus Electric

Starting MSRP: \$29,170
 Federal Tax Credit: \$7,500
 MPG Equivalent: 104
 Electric Range (miles): 76

Kia Soul EV

Starting MSRP: \$31,950
 Federal Tax Credit: \$7,500
 MPG Equivalent: 112
 Electric Range (miles): 105

Mercedes B Class Electric Drive

Starting MSRP: \$41,450
 Federal Tax Credit: \$7,500
 MPG Equivalent: 84
 Electric Range (miles): 87

Mitsubishi i MiEV

Starting MSRP: \$22,995
 Federal Tax Credit: \$7,500
 MPG Equivalent: 112
 Electric Range (miles): 62

Nissan Leaf

Starting MSRP: \$29,010
 Federal Tax Credit: \$7,500
 MPG Equivalent: 115
 Electric Range (miles): 84

Smart Electric Drive

Starting MSRP: \$25,000
 Federal Tax Credit: \$7,500
 MPG Equivalent: 107
 Electric Range (miles): 68

Tesla Model S

Starting MSRP: \$71,070
 Federal Tax Credit: \$7,500
 MPG Equivalent: 95
 Electric Range (miles): 265

Tesla Model X

Starting MSRP: \$80,000
 Federal Tax Credit: \$7,500
 MPG Equivalent: 89
 Electric Range (miles): 230

Volkswagen e-Golf

Starting MSRP: \$28,995
 Federal Tax Credit: \$7,500
 MPG Equivalent: 116
 Electric Range (miles): 83



Smart Electric Drive BEV



Tesla Model S BEV



Ford Focus BEV



Nissan Leaf BEV