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A photograph of an electric vehicle charging station. On the left, a black GE charging station is mounted on a wall. A black charging cable is plugged into the station and runs down to a white electric vehicle. The car's front wheel and a portion of its body are visible. A silver badge with the word "ELECTRIC" in a stylized font is mounted on the car's side panel. The background is a plain, light-colored wall.

Electric Vehicle Charging Station Implementation Plans for the Upstate New York I-90 Corridor

Final Report

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Final Report

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Abstract

Public charging stations allow electric vehicle (EV) owners to have the ability and confidence to drive throughout New York State, for travel within and between metropolitan areas. Incorporating EV charging station planning into broader local and regional planning processes supports increased adoption. Five EV Charging Station Plans were created – one for each municipal planning organization along the I-90 corridor, including: Capital District, Mohawk Valley, Central New York, Genesee Region, and the Greater Buffalo & Niagara Region. These Plans assessed the region’s current EV-readiness, identified areas that lack EV infrastructure, and made recommendations to establish a comprehensive network of EV charging stations to support current and future EV drivers. Based on the list of recommended locations that should have more charging infrastructure, discussions were held with municipal leaders and businesses to inform them of EVs and charging stations before gathering their input on where best to install a new charging station. With a priority list of EV charging station sites, these municipalities are prepared to capitalize on current and future funding opportunities that can support these installations.

Keywords

Electric Vehicles, Charging Stations, Infrastructure Plan

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Acronyms and Abbreviations

AC	alternating current
BEV	battery electric vehicle (all electric)
CDTA	Capital District Transit Authority
CDTC	Capital District Transportation Council
CNYRPDB	Central New York Regional Planning and Development Board
DC	direct current
EV	electric vehicle
EVSE	electric vehicle supply equipment
GBRTC	Greater Buffalo-Niagara Regional Transportation Council
GRTC	Genesee Region Transportation Committee
HEV	hybrid electric vehicle (does not plug-in)
HOCTS	Herkimer-Oneida Counties Transportation Study
kW	kilowatt
MPO	metropolitan planning organization
NYS	New York State
NYSDEC	New York State Department of Conservation
NYSDOT	New York State Department of Transportation
NYSERDA	New York State Energy Research and Development Authority
PHEV	plug-in hybrid electric vehicle
SAE	Society of Automotive Engineers
SMTCC	Syracuse Metropolitan Transportation Council

Summary

Public electric vehicle (EV) charging stations provide EV drivers the ability and confidence to use their vehicle throughout New York State, 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 this 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.

Through this project, supported by NYSERDA and NYSDOT, five regional EV charging station plans (hereafter, the Plans) were created to identify gaps where public EV charging stations are not available to support EV drivers and to suggest further EV infrastructure deployments in key locations to establish a comprehensive charging network. The Project Team also investigated EV implementation barriers and worked with municipalities to encourage and prepare for public EV charging station installations. The five regions involved in this project are in the I-90 corridor across NYS. The Project Team who led this effort and the Metropolitan Planning Organizations (MPOs) that provided valuable support are listed in Table S-1.

Table S-1. Project Regions, Team, and Supporting MPOs

I-90 Region	Project Team Lead	Metropolitan Planning Organization
Capital District	Capital District Clean Communities	Capital District Transportation Committee
Mohawk Valley	Energetics Incorporated	Herkimer-Oneida Counties Transportation Study
Central New York	Central New York Regional Planning and Development Board & Clean Communities of Central New York	Syracuse Metropolitan Transportation Council
Genesee (& Finger Lakes)	Genesee Region Clean Communities	Genesee Transportation Council
Greater Buffalo & Niagara	Clean Communities of Western New York	Greater Buffalo-Niagara Regional Transportation Council

The Plans assessed the region’s current EV-readiness including local government engagement, number and type of publicly accessible EV charging stations, number of EVs, utility programs, local EV supporters, and other incentives, some which are shown in Table S-2.

Table S-2. Project Regions, Team, and Supporting MPOs

	Capital District	Mohawk Valley	Central New York	Genesee & Finger Lakes	Greater Buffalo & Niagara
Number of Registered Battery Electric Vehicles	223	30	75	178	111
Number of Registered Plug-in Hybrid Electric Vehicles	608	222	407	883	595
Number of Charging Station Locations	69	18	31	27	36
Ratio of Plug-in Electric Vehicles to Charging Station Locations	12.0	14.0	15.5	39.3	19.6

The Plans also identified areas that lack EV infrastructure (places where there are no Level 2¹ charging stations within 20-40 miles and driver passing through the area would not have a feasible option to charge if necessary), and made recommendations to establish a comprehensive network of EV charging stations to support current and future EV drivers. The resulting proposed new EV charging station locations (Table S-3) will help create a more comprehensive network of Level 2 public EV charging stations.

Table S-3. Recommended Locations for EV Charging Stations

	Capital District	Mohawk Valley	Central New York	Genesee & Finger Lakes	Greater Buffalo & Niagara
Top Priority	Albany	Cooperstown	DeWitt	Batavia	Amherst
	Saratoga Springs	Old Forge	Syracuse	Canandaigua	Williamsville
	Schenectady	Utica	Clay	Geneseo	Niagara Falls
	Troy	Amsterdam	Fayetteville	Victor	Buffalo (North)
	Colonie	Johnstown	Camillus		Orchard Park
		Herkimer			
Lower Priority	Clifton Park	Verona	Cortland	Brighton	Cheektowaga
	Malta	New Hartford	Auburn	Brockport	West Seneca
	Bethlehem	Sylvan Beach	Cazenovia	Henrietta	Lewiston
	Guilderland	Boonville	Cicero	Geneva	Buffalo (South)
	Niskayuna	Oneonta		Penn Yan	Youngstown
		Broadalbin		Pittsford	

¹ Level 2 charging stations provide 220 volt alternating current (AC) charging up to 19.2 kW of power, Level 1 charging stations provide 110-volt AC charging up to 1.9 kW of power, and “fast charge” stations provide 200-500 volt direct current (DC) charging (enabled by an off-board inverter converting 480 volts of AC power supply) up to 100 kW of power

In addition, the Plans highlighted any region-specific issues related to EV/charging station deployment that might be restricting EV use and proposed solutions to help address these barriers. Table S-4 shows the potential EV-readiness barriers presented to each region’s working group who ranked them based on how critical of an issue it was for the region to address.

Table S-4. EV-Readiness Barriers Ranking (Highest scores are Most Critical and Highlighted for each Region)

EV-Readiness Barrier	Five Region Average	Capital District	Mohawk Valley	Central New York	Genesee Region	Buffalo & Niagara
DC fast charging infrastructure	7.2	8.1	8.5	7	5.3	7.3
Car Dealership Support	7.0	8.5	5.1	8	6.3	7.0
EV Buyer/Driver Education	6.8	7.9	7.8	6	5.0	7.3
Site planning	6.8	7.5	6.3	5	7.7	7.3
Building Regulations	6.8	6.8	5.6	6	6.0	9.3
Elected Official Education	6.6	7.1	6.4	6	7.3	6.3
Vehicle and charging station costs	6.6	5.9	6.3	8	7.0	5.7
Urban Charging Options	6.3	7.5	5.5	6	6.7	6.0
Signage	6.2	5.0	6.2	8	5.7	6.0
Parking Demand	6.0	5.5	6.5	6	4.7	7.3
Zoning Rules	5.9	4.5	5.3	7	8.0	4.7
Electric Grid/Utility	5.9	5.0	6.8	6	4.3	7.3
Charging Station Maintenance	4.9	4.3	4.8	6	3.3	6.0
Parking Ordinances	4.9	6.3	4.9	5	3.7	4.3
Permitting	4.6	4.6	6.0	4	3.0	5.3
Installers	4.4	4.5	5.5	3	4.0	5.0
City Employee Education	4.3	5.5	5.8	3	2.7	4.7

Based on the EV Charging Station Plan recommendations, the Project Team approached officials and key EV stakeholders from at least four of the key municipalities within the MPO region. In these meetings, the Team shared the EV-related resources, discussed barriers limiting EV charging station installations, and talked about the need to prepare for and encourage new charging station installations. The Project Team then held follow-up meetings with officials and key EV stakeholders from the same key municipalities to put a strategy into action for addressing key barriers preventing charging station installations and preparing for future installations. This resulted in a prioritized list of sites best suited for charging stations to be installed.

1 Introduction

For a new technology such as the EV, which requires coordinated construction of infrastructure and widespread education and outreach, careful planning is essential. Public charging stations are important to EV drivers to have the ability and confidence to use their vehicle throughout 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 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.

In 2011, the U.S. Department of Energy (DOE) funded 16 EV Community Readiness Projects for public-private partnerships to collaborate on plans to deploy EVs. NYS was part of the Northeast Electric Vehicle Network project, which developed best practice documents for siting and design, building and electrical codes, and local policymaking. Through the Northeast Electric Vehicle Network, several northeastern states are laying the groundwork for the region to lead the way in the deployment of EVs, capturing many of the associated economic, jobs, and environmental benefits. Participating states are also engaging in important planning work to remove barriers to the widespread adoption of EVs and ensure that public electric vehicle supply equipment (EVSE, more commonly called charging stations) are placed in strategic locations that both maximize usage and facilitate interstate travel. The following documents were produced by Energetics through a NYSERDA project in conjunction with the Northeast Electric Vehicle Network and were leveraged in this project: Assessment of Current EVSE & EV Deployment, EVSE Cluster Analysis, Siting and Design Guidelines for EVSE, EV Ready Codes for the Built Environment, Permit Process Streamlining, and EVSE Signage Guidance.

NYS, through the ChargeNY initiative, is helping to get more EVs on the road. ChargeNY aims to reach 3,000 EV charging stations to support an expected 30,000-40,000 EVs on the road in NYS by 2018. Since the program's inception in 2013, NYS has supported the installation of nearly 500 charging stations (bringing the statewide total to more than 1,100), revised regulations to clarify charging station ownership

rules, and supported research and demonstration projects on new EV technologies and policies. NYSERDA, the New York Power Authority, and the New York State Department of Environmental Conservation are collaborating on this initiative. NYS has been working to expand the EV market through activities such as:

- Implementing the multi-state Zero Emissions Vehicle Action Plan that NYS helped to develop in May 2014;
- Developing best practices guides for municipal regulations of charging stations, such as permitting and zoning rules and building codes;
- Reducing regulatory obstacles that prevented parking lot owners from installing charging stations;
- Educating residents, electricians, code inspectors, and municipal planners about EVs and charging stations; and
- Reducing the cost and increasing the convenience of alternative fuel vehicles by providing incentives such as high occupancy vehicle lane access and reduced tolls on bridges, tunnels, and the New York Thruway.

Metropolitan planning organizations (MPOs) devise solutions to regional transportation problems within each metropolitan area of the state, which involves addressing other important issues such as land use, air quality, energy, economic development, and commerce. The MPO's duty within each region is to engage many stakeholders, including the general public, in the planning process. By creating a vision for the region and identifying projects and investments that help achieve that vision, the MPO ensures that scarce public funds are spent moving the region towards its planning goals. This mission aligns well with the Plans that intend to identify priority locations for future EVSE installs.

Functionally, the MPOs provide a forum for cooperative decision making in the development of transportation plans, programs, and recommendations. Its committees are comprised of elected and appointed officials representing local, state, and federal governments, agencies, and organizations having interest in or responsibility for transportation planning and programming. The MPOs also provide an opportunity for citizens to participate in the discussion of specific transportation issues and projects, and encourage the public to get involved in the public involvement opportunities available. The goals of residents, businesses, and communities must be incorporated into plans and programs.

An awareness of problems to be averted and the development of innovative ways to achieve the region's goals are important to achieving and maintaining a high quality of life for all. MPOs were a key element to the success of this project and generously provided their support to develop each of the Plans.

1.1 Background Information on EVs and EV Charging Stations

There are options available for EV users to recharge vehicle batteries. Many EV users can plug in their cars at home, allowing them to recharge their vehicles regularly each night. A home charging station is affordable, convenient, and can fulfill most charging needs for the majority of users. Public charging stations are available in many areas to recharge EVs while drivers are at work, shopping, or at other destinations. These commercial charging stations are generally more robust and provide higher power to expedite vehicle charging when time is limited.

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 provides 120 volts of AC, but is limited to 1.9 kilowatts (kW) which adds two to five miles of electric range per hour of charging time. This is appropriate at home or workplace charging applications where EVs will be parked for long periods of time. AC Level 2 charging provides electrical energy at either 240 volts AC (typical for residential applications) or 208 volts AC (typical in commercial and industrial applications). These stations can provide up to 19.2 kW of power, but are commonly configured for 7.2 kW. AC Level 2 charging results in 10 to 20 miles of additional range per hour of charging time, which is appropriate for both residential and public charging locations. DC fast charging utilizes DC energy transfer and a 480-volt AC input (electricity converted from AC to DC using an inverter in the charging station) to provide extremely rapid recharges at heavily used public charging locations. DC fast charge stations can provide an 80 percent recharge in as little as 20 minutes. The industry standard for AC Level 1 and AC Level 2 charging connectors is the Society of Automotive Engineers (SAE) J1772 connector, which allow owners of most EV models to utilize the same charging infrastructure (Tesla models have their own unique connector). There are multiple DC fast charging station connectors, including CHAdeMO and SAE J1772 Combo, along with a unique connector for Tesla models.

EV charging stations are being installed at a wide variety of locations across NYS. In every town and city, large and small, urban and rural, there are sites well suited to host EV charging. EVSE can be installed at business and multi-family residential locations to support the use of business-owned, employee-owned, and resident-owned EVs. EVSE installed at public venues allow drivers to extend the range of their vehicles with easily accessible charging, so EVs can be used beyond the range of a single charge. These venues typically would not serve as the EV's primary source of electricity, but provide opportunity charging that boosts the EV's range for driver convenience.

Background information on EVs and charging stations were included in each of the Plans. This information was also often shared in presentations to the MPOs or municipalities when providing an overview on the technology. It included:

- Types of EVs, such as battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV), along with their typical characteristics;
- List of available new BEV and PHEV models sold in NYS;
- Historical trend in NYS-registered EVs from January 2013 to January 2016;
- Distribution of the current NYS-registered EVs by county;
- Number and portion of the total owned EVs for both BEV and PHEV models;
- EV charging levels, station types, and applicability to various settings;
- Location of existing EV charging stations in NYS;
- Cost factors, incentives, and installation considerations for EV charging stations; and
- Published resources and reports online for more in-depth information.

1.2 Background Information on EV-Readiness

While gasoline powered vehicles will be around for many years, there is a shift in the transportation industry towards electrification that will change how we drive and fuel our vehicles. EVs can be very beneficial to communities and their residents. Unlike gasoline powered vehicles, EVs emit no air pollution, do not require imported fuel that must be transported via tankers or pipelines (which also eliminates the risk of fuel or oil spills and leaks), and are quieter. To achieve these benefits and support residents who make the investment in cleaner cars, communities can promote the use of EVs by becoming EV-ready. The following are key components that planners and municipalities should consider and were introduced to throughout this project:

- Understand the various types of EVs, as well as the EVSE suitable for different public settings;
- Encourage EVSE deployment through municipal codes and permitting practices;
- Facilitate well-designed EV charging stations that are advantageous to EVSE hosts, EV drivers, and the public;
- Enforce the availability of EVSE for EVs (e.g., parking enforcement); and
- Incorporate EVSE into transportation planning discussions.

High-level background information on EV-readiness was included in each of the Plans, along with references to published documents available online where more in-depth information could be found. This information was often shared in presentations to the MPOs or municipalities when portraying the importance of developing and acting upon these Plans.

2 EV Charging Station Plan Development

Given that funding for EV infrastructure is quite limited, and vehicle deployment is still in the formative stages, planning for EV infrastructure will be a critical component of the successful expansion of EV use. Many states and cities have conducted planning efforts from which information can be drawn, and the DOE has made awards for these planning activities. Subjects to be considered include methods for establishing geographic areas of focus for EV deployments, methods for addressing these focus areas with strategic EVSE installations, identification of appropriate charging equipment (e.g., sufficiency of Level 2 vs. DC fast charging), and identification of strategies for dealing with EVSE in urban areas (parking garages, multi-family dwellings, on-street EVSE).

Utilizing many EVSE resources recently developed, this project was designed to actively engage these communities in understanding their EVSE infrastructure gaps and developing plans to address those.

The process to develop the plan included:

- Introducing EV-readiness to these groups and creating a working group to advise our project;
- Analyzing the regional EV-readiness level and identifying gaps; and
- Finalizing an EVSE implementation plan with discussion and input from the working group.

As noted, the regional MPOs played an essential role in the development of these deployment plans, and each provided a forum for launching these plans in addition to sharing input relevant to their particular region. Project Team members led the facilitation of input and development of the Plan in each region. This included: Capital District Clean Communities for the Capital District; Energetics for the Mohawk Valley; Central New York Regional Planning and Development Board and Clean Communities of Central New York for Central New York; Genesee Region Clean Communities for the Genesee and Finger Lakes Region; and Clean Communities of Western New York for the Greater Buffalo and Niagara Region. The specific steps taken in each region to develop the EV Charging Station Plans were:

1. Present an introduction of the project to the MPO;
2. Form a working group comprised of key stakeholders in the region to provide input to the Plan;
3. Develop region-specific information and maps on EV ownership and existing EVSE locations;
4. Share EV background along with region-specific information and maps with the working group;
5. Identify charging infrastructure gaps in the region and develop a list of locations (municipalities) where new EVSE installations could address those gaps;
6. Research potential charging station sites within those locations (municipalities) and other factors that might make them a good choice for a new charging station installation;
7. Share location (municipality) information with the working group to vote on the most critical locations to install new charging stations;

8. Expand upon location (municipality) information, particularly potential charging station sites for the top four to six locations to install new charging stations;
9. Discuss, among the working group, potential locations (municipalities) for DC fast charging stations in the region;
10. Share a list of potential barriers toward EV adoption (see below) for working group members to vote on the most important for their region to address;
11. Draft the Plan with all this information and gather any additional feedback from the working group after they review the draft;
12. Present the findings and recommendations in the Plan to the MPO; and
13. Finalize, publish online, and publicize the completed Plan.

The following list of potential barriers toward EV adoption was created by the Project Team based on EV information and knowledge gained from various reports and experiences.

Table 1. Potential Barriers Towards EV Adoption

BARRIER		DESCRIPTION OF ISSUE
1	Building Regulations	Retrofitting existing buildings or parking lots for charging stations can be expensive.
2	Car Dealership Support	Most do not providing good endorsement of EVs to potential drivers.
3	Charging Station Maintenance	Existing stations are too often not available to use or very dirty.
4	City Employee Education	Zoning Boards, Code enforcers, or inspectors are unfamiliar with the technology.
5	DC fast charging stations	Lack of quick chargers on major transportation routes for drivers to use EVs for inter-city travel.
6	EV Buyer/Driver Education	Lack of knowledge about return on investment, range reduction in winter.
7	Elected Official Education	Unfamiliar with the technology so EV-friendly policies are not promoted.
8	Electric Grid/Utility	Utilities do not have EV rates and in some areas the electric grid cannot handle the added EV load.
9	Installers	Too few experienced charging station installers, many installations are more expensive than necessary.
10	Parking Demand	Lack of demand from EV drivers for charging/parking to push more installations.
11	Parking Ordinances	Conventional vehicles are parking in charging spaces without any penalty or fine to discourage them.
12	Permitting	Cost, length, or complexity of process is preventing charging station installations.
13	Signage	Not enough or inconsistent signs helping EV drivers find charging stations or letting others know not to park.
14	Site planning	Not enough charging stations in new buildings or parking lots, not in the site plan review.
15	Urban Charging Options	Lack of good solutions or support for charging in areas that lack garages.
16	Vehicle and EVSE costs	Lack of collaborative public/private partnerships that try to reduce costs (e.g., aggregate purchases).
17	Zoning Rules	Regulations are not clear on dictating where charging stations can be installed, which causes confusion.

The following subsections describe the results for each step in the Plan development within the five different participating regions along the I-90 Corridor.

2.1 Capital District

Capital District Clean Communities led the development of the Capital District EV Charging Station Plan with support from the Capital District Transportation Committee (CDTC). The introductory MPO meeting was with the CDTC Planning Committee. A presentation provided a background on EV planning and training work that has been done in the Northeast and specifically in the Capital Region through Capital District Clean Communities. It also gave an overview of the study objective and explained how the Capital District's Plan will fit into the big picture of I-90 travel in Upstate New York. The presentation helped create interest in participating in the working group, which was comprised of key stakeholders in the region (listed in Appendix A) who provided input to the Capital District Plan.

At the end of 2015, there were 831 EVs registered in the Capital District, of which 223 were BEVs and 608 were PHEVs. The ZIP codes with the most EV owners are:

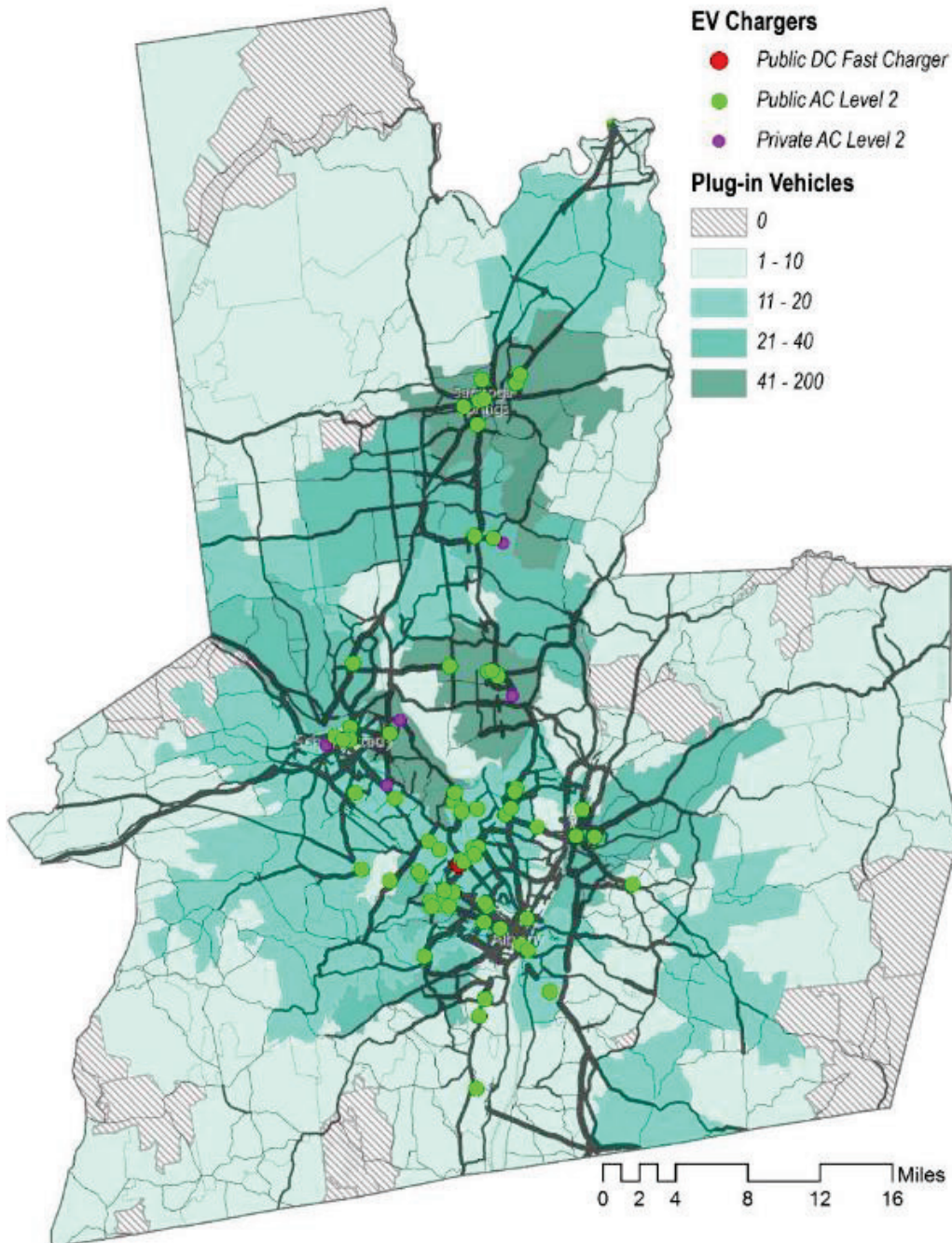
- 12866 (Saratoga Springs): 72 EVs
- 12065 (Clifton Park): 63 EVs
- 12309 (Schenectady): 53 EVs
- 12054 (Delmar): 37 EVs
- 12203 (Albany): 36 EVs

Currently there are 69 locations with public charging stations in the region with 39 in Albany County, seven in Schenectady County, 15 in Saratoga County, and eight in Rensselaer County. These include:

- Price Chopper (12 retail locations plus headquarters in Schenectady)
- Shoprite
- Century House
- Holiday Inn (Albany)
- Quality Inn
- Hampton Inn (5 locations)
- Kohl's (3 locations)
- Vent Fitness (3 locations)
- Chili's (3 locations)
- Albany Airport
- Saratoga Auto Museum
- Schenectady Museum of Innovation and Science
- Empire State College
- Rensselaer Polytechnic Institute
- Skidmore College
- Schenectady Community College
- University at Albany, Uptown & Downtown
- Union College
- Uncle Sam Parking Garage (Troy)
- Freedom Square Parking Lot (Troy)

Some workplaces and dealerships have installed private charging stations, while Tesla put in DC fast charging stations at Colonie Center Mall. Figure 1 shows EV ownership (both PHEVs and BEVs) by ZIP code as of December 31, 2015, along with the existing public EV charging locations in the Capital District. Other reference maps provided to the working group included population, income per household, and daytime population change during weekdays.

Figure 1. EV Ownership and Public Charging Station Locations in the Capital District



The working group discussed EV-readiness barriers, along with key venues/areas for new EV charging station installations to develop a list of potential municipalities in the Capital District where additional charging stations are needed. For each potential municipality a one-page overview with relevant EV and charging station information and key destinations was developed to guide the working group on voting for the municipalities. The scoring and subsequent in-person discussions among the working group members resulted in five top priority municipalities for additional charging station installations and five lower priority municipalities that should be pursued after the top five (shown in Table 2).

Table 2. Final Ranking of Capital District Areas/Municipalities Considered for Needing Additional EV Charging Stations

Area/Municipality for Additional EV Charging Stations		Average Score Based on Working Group Input
Top Priority	Albany	9.8
	Saratoga Springs	9.2
	Schenectady	8.0
	Troy	8.0
	Colonie	8.0
Lower Priority	Clifton Park	7.2
	Malta	7.0
	Bethlehem	6.4
	Guilderland	6.2
	Niskayuna	6.0
Others Considered	Cohoes	5.6
	Watervliet	5.0
	Green Island	4.8
	East Greenbush	4.4

Albany is the NYS capital and economic and cultural center of the Capital District. It is the home to a number of universities and colleges, hospitals, large businesses, non-profit organizations, and services. Albany experiences the greatest daytime population shift, increasing its population by almost 70 percent each day. There are currently 18 EV charging stations in the City, most of which are not accessible to the majority of residents and commuters. Being an older city, Albany has a lot of dense neighborhoods with attached housing and no garages or driveways. Identifying locations for convenient publicly accessible charging stations is important for Albany to overcome this barrier.

Saratoga Springs has been a popular tourist destination for over 200 years. It is home to the historic Saratoga Race Track, Saratoga Spa State Park, the Casino and Harness Race Track, museums, and performing arts venues. In addition, Saratoga Springs is also home to a number of restaurants, shops, Saratoga Hospital, and Skidmore College. Saratoga Springs has become a popular evening and weekend destination for local EV-drivers who appreciate being able to plug-in while dining, shopping, or exploring the city.

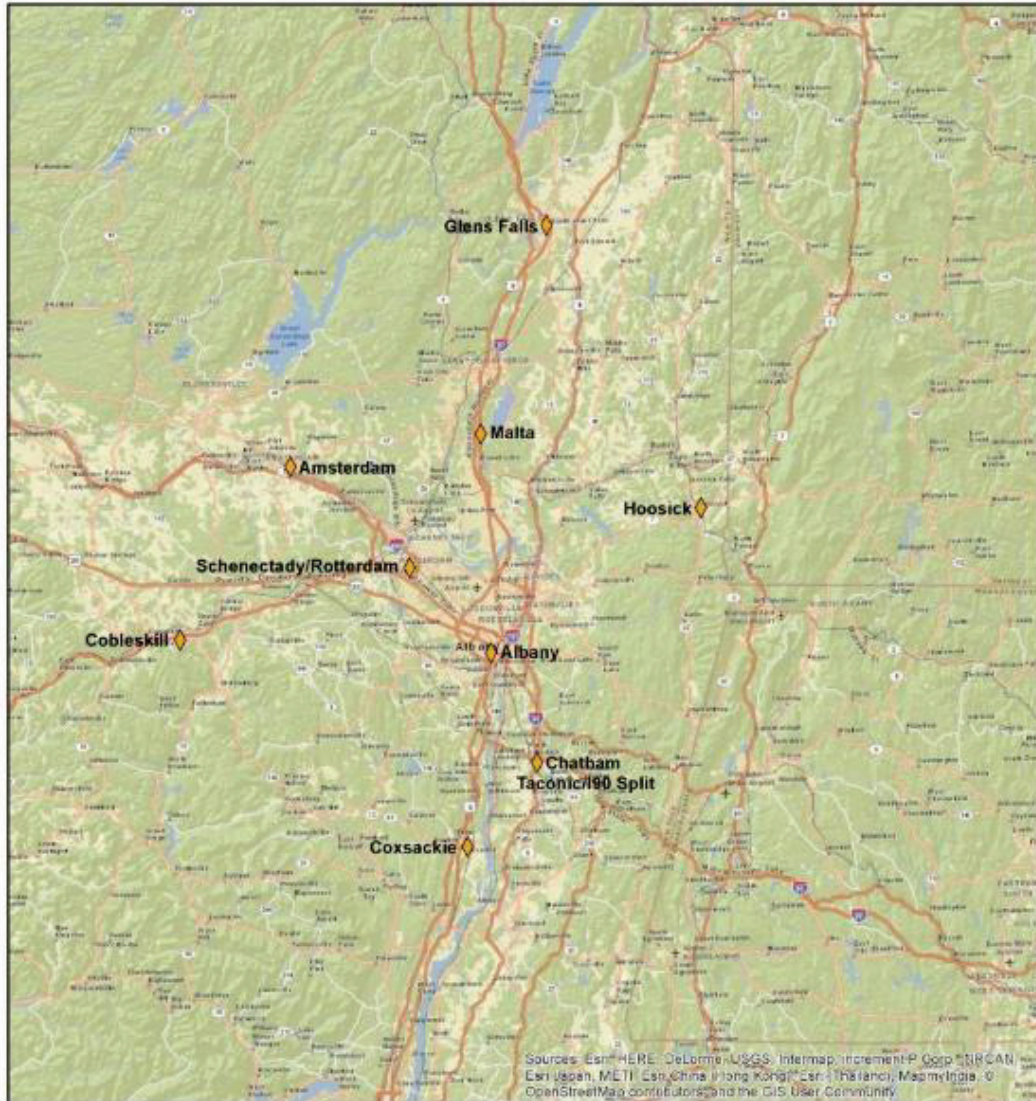
Schenectady is the second largest city in the Capital Region and the Schenectady County seat. Schenectady was a manufacturing center known as “The City that Lights and Hauls the World,” because of its two prominent businesses – General Electric (GE) and the American Locomotive Company (ALCO). Despite the closure of ALCO in 1969, Schenectady has attracted new business including Golub Corp, the Price Chopper Supermarkets headquarters, the New York Lottery, and MVP Healthcare. It is also home to some high-tech industries like Quirky and Trans Finder, Schenectady County Community College, Union College and Graduate School, and Ellis Hospital. Schenectady’s downtown is a regional destination, with Proctors Theater and a number of popular bars and restaurants.

Troy is often referred to as “Collar City” due to its history in textile production. Like other Capital Region cities, Troy suffered from the decline of the industrial era and migration of jobs to the suburbs. However, in recent years Troy has enjoyed a surge in redevelopment and new businesses. The City is home to Hudson Valley Community College, Sage College, and Rensselaer Polytechnic Institute (RPI). The dense downtown neighborhood is occupied by various bars, restaurants, shops, and a mix of single-family and multi-family homes with few driveways. Troy is a popular destination for its nightlife and entertainment. Troy Savings Bank Music Hall attracts various performances, and the Tri-City Valley Cats minor league baseball team plays at Joe Bruno Stadium at the City’s southern tip. The Troy Waterfront Farmers Market is the most popular farmers market in the Capital Region and a common weekend destination.

Colonie is the largest town in the Capital District and Upstate New York in both population and size as it includes the Villages of Colonie and Menands. The town has been the center of growth in the Capital District since 1950. Located in the heart of the Tech Valley, Colonie offers a mix of urban, suburban, and rural communities. Daytime population doubles daily as people from throughout the Capital District and beyond come to work and do business in the large office and health parks of Corporate Woods, British American, Executive Woods, Century Hill, and the Wolf Road corridor. It is a hub for travelers staying in one of the many hotels and popular shopping destination due to the large number of retail establishments including Colonie Center, Latham Farms, Northway Mall, Shoppes at Latham Circle, Newton Plaza, Colonie Plaza, and many more strip and big box retailers.

The working group also discussed the potential placement of DC fast chargers, which can provide an 80 percent charge in about 20 minutes, throughout the region, which would further extend the use of EVs throughout NYS. Strategically placing DC fast chargers in the Capital District along major routes could support both transient and local EV drivers. The Capital District Plan working group recommended that DC fast chargers be installed 25-50 miles apart along major transportation routes. The following locations shown in Figure 2 have been identified as preferred DC fast charge locations: Albany, Schenectady/Rotterdam, Chatham, Coxsackie, Malta/Saratoga Springs, Glens Falls, and Cobleskill.

Figure 2. Recommended Locations for DC Fast Charging Stations in the Capital District



Given the list of potential barriers towards EV adoption (Table 1), the Capital District Plan working group voted and discussed the most critical to address. The final ranking of these barriers is shown in Table 3. Potential strategies to address these identified barriers are summarized in section 3.

Table 3. List of Top Critical EV Barriers to Address in the Capital District

Rank	Key Barriers for Municipalities to Address to be EV-Ready
1	Car Dealership Support
2	DC fast charging infrastructure
3	EV Buyer/Driver Education
4	Urban Charging Options
5	Site planning
6	Elected Official Education

The Capital District Plan was finalized after addressing any received feedback on the draft plan from the CDTC Planning Committee and project’s working group. It was published online² with an accompanying press release³. A brochure about the Plan was also developed to support a broader dissemination of this newly published resource.

2.2 Mohawk Valley

Energetics Incorporated led the development of the Mohawk Valley EV Charging Station Plan with support from the Herkimer-Oneida Counties Transportation Study (HOCTS), Otsego County Planning Department, Fulton County Planning Department, and Montgomery County Planning Department. Input to the Mohawk Valley Plan was provided by working group members representing key stakeholders in the region (listed in Appendix A).

At the end of 2015, there were 252 EVs registered in the Mohawk Valley, 30 of which were BEVs and 222 were PHEVs. The ZIP codes with the most EV owners are:

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

² <http://capitalcleancommunities.org/wp-content/uploads/2016/09/Capital-District-EV-Charging-Station-Plan-FINAL.pdf>

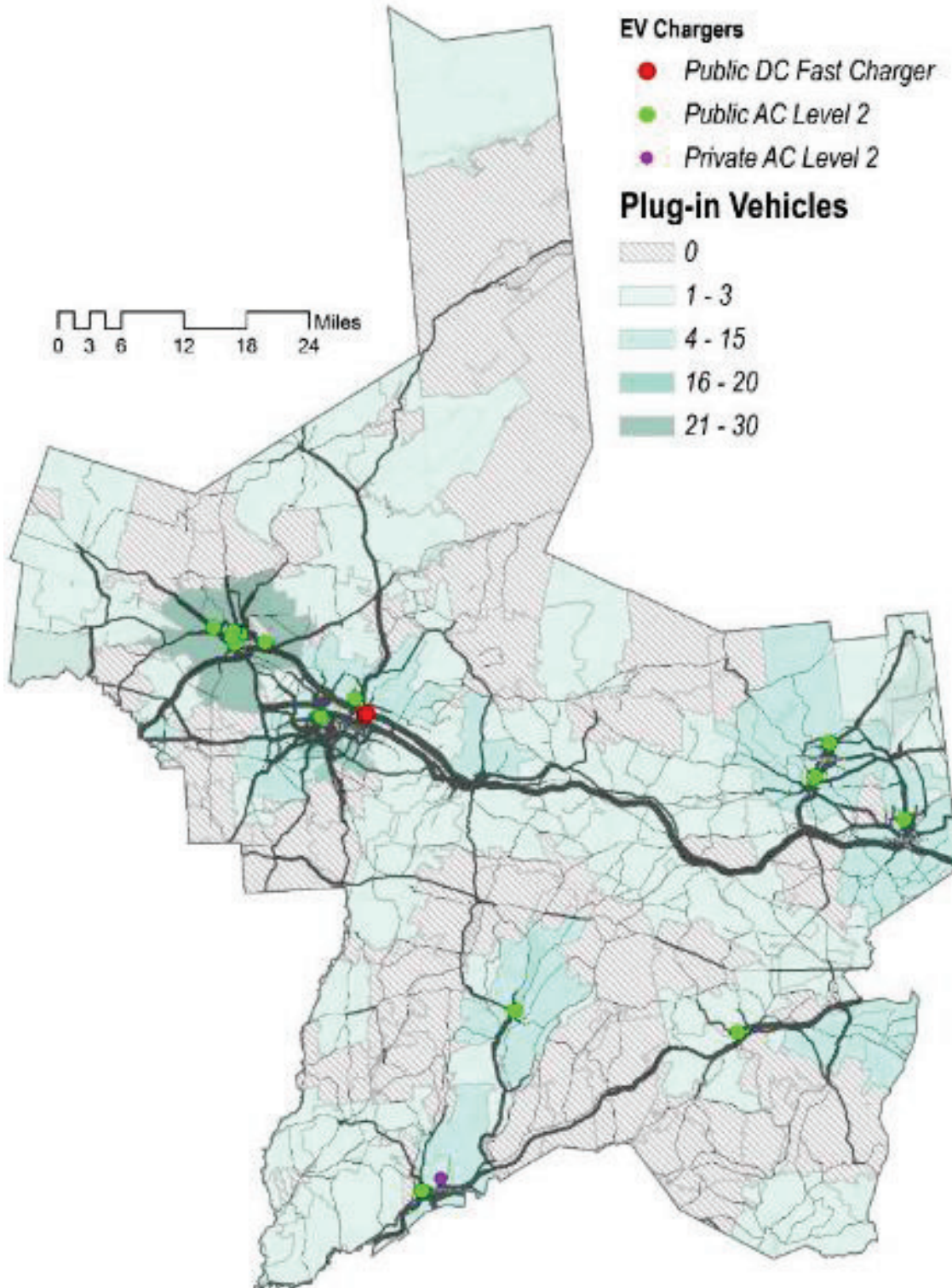
³ <http://capitalcleancommunities.org/news/happy-earth-day-capital-district-electric-vehicle-charging-station-plan-released/>

Currently there are 18 locations with public charging station in the region. These include:

- 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)

Some workplaces and dealerships have installed private charging stations, while Tesla put in DC fast charging stations at the North Utica Shopping Center, off the NYS Thruway exit 31. Figure 3 shows EV ownership (both PHEVs and BEVs) by ZIP code as of December 31, 2015 along with the existing public EV charging locations in the Mohawk Valley. Other reference maps provided to the working group included population, income per household, and daytime population change during weekdays.

Figure 3. EV Ownership and Public Charging Station Locations in the Mohawk Valley



During initial working group meetings, some EV-readiness barriers, along with key venues/areas for new EV charging station installations were discussed. A list was then created of potential municipalities in the Mohawk Valley where additional charging stations are needed. For each potential municipality a one-page overview with relevant EV and charging station information and key destinations was developed to guide the working group on voting for the municipalities most in need of additional charging stations. The scoring from this voting and subsequent in-person discussion among the working group members to slightly modify the initial scoring based on distribution among the participating counties, these recommendations resulted in six top priority municipalities for additional charging station installations and six lower priority municipalities that should be pursued after the top six (Table 4).

Table 4. Final Ranking of Mohawk Valley Areas/Municipalities Considered for Needing Additional EV Charging Stations

Area/Municipality for Additional EV Charging Stations		Average Score Based on Working Group Input
Top Priority	Cooperstown	9.1
	Old Forge	8.4
	Utica	8.4
	Amsterdam	7.6
	Johnstown	5.3
	Herkimer	7.0
Lower Priority	Verona	7.1
	New Hartford	6.8
	Sylvan Beach	6.6
	Boonville	6.2
	Oneonta	5.7
	Broadalbin	N/A
Others Considered	Fonda	5.2
	Gloversville	4.5
	Northville	4.1

Cooperstown is a “village of museums,” including the National Baseball Hall of Fame, which opened in 1939. Other cultural attractions include the Farmers’ Museum, the Fenimore Art Museum, the Glimmerglass Opera, New York State Historical Association, National Art Association Show, Gallery 53 Multi-Arts Center, Cooperstown Brush and Palette Club, and several art galleries. Cooperstown’s Main Street provides residents and visitors with shopping in unique clothing and gift emporiums, lodging in quaint bed-and-breakfast inns and working farms, and dining in a variety of restaurants. 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. 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. Employees of the large Basset Heath Care Hospital in Cooperstown likely align with the typical demographics of EV owners.

Old Forge, and the Town of Webb, offer much for vacationers during all seasons. The most popular summer destination is Enchanted Forest Water Safari, but 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. In the winter, Old Forge is referred to as the "Snowmobile Capital of the East" with wide open spaces and a trail system specifically for snowmobilers. There are also other winter sports such as downhill and cross country skiing at McCauley Mountain.

Herkimer has several attractions that draw visitors. The Herkimer Diamond Mines provide an opportunity for visitors to search for diamonds in the prospecting area, by digging through the rubble or breaking open rocks. The site offers camping and a museum. Erie Canal Cruises tour boats are docked at Gems Along the Mohawk, the Official Mohawk Valley Visitor Center, directly across from the NYS Thruway Exit 30. Several retail stores and restaurants are along State Street in Herkimer, including: Lowes, Walmart, Herb Philipson’s, Hannaford, Applebee’s, Crazy Otto’s Empire Diner, and many others. The location of Herkimer along the I-90 corridor and the multiple tourist attractions could provide a good opportunistic charging location for longer EV trips. Currently the closest public charging stations are 18 miles away in Utica.

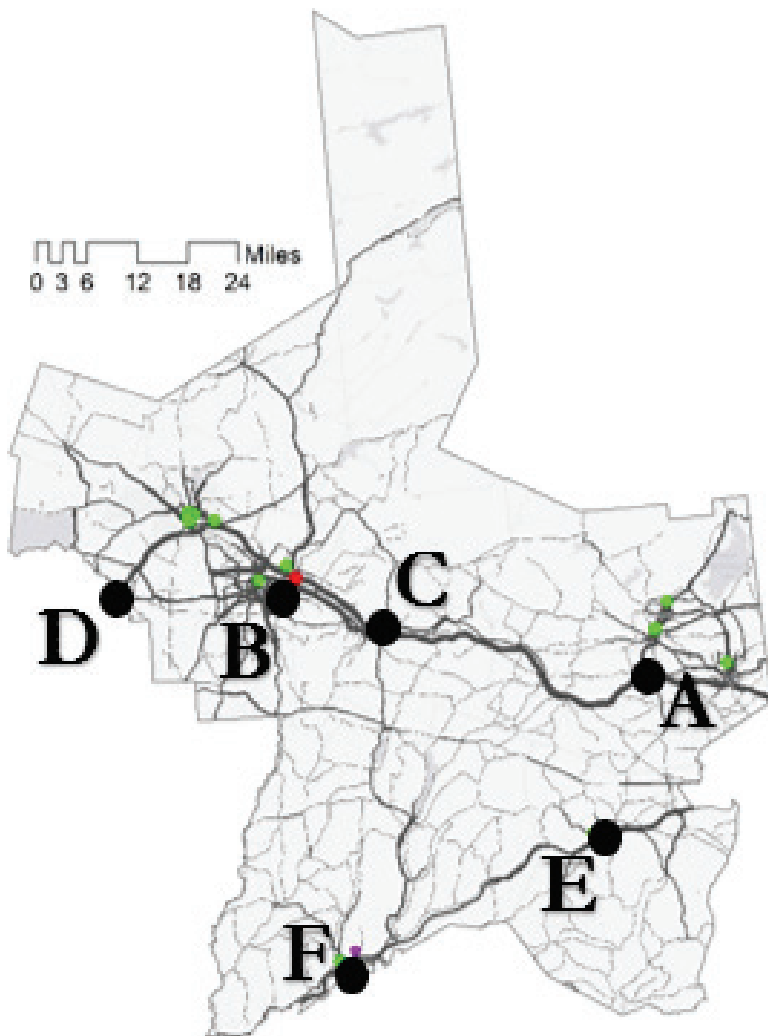
Utica offers the charm of small-city living balanced with cultural and ethnic diversity of an international urban center. Within the city limits, there are five colleges and universities: Utica School of Commerce, Mohawk Valley Community College, Pratt Institute, St. Elizabeth's College of Nursing, and Utica College, with Hamilton College and SUNY Polytechnic in neighboring towns. At the southern city limits, there are two medical campuses, St. Elizabeth and Faxton-St. Lukes hospitals. In addition to 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 NanoTech center. Major attractions include the Utica Memorial Auditorium, Saranac Brewery, Munson-Williams-Proctor Arts Institute, and Stanley Center for the Arts. There are also several popular weekend festivals, as well as the Boilermaker 15K race with over 17,000 participants from all over the world.

Amsterdam is a vibrant city dating back to the earliest days of European settlement. Located along the Mohawk River, Amsterdam was ideally placed to flourish 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 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. St. Mary's Hospital has two campuses in Amsterdam, and the Riverfront Center in the heart of downtown offers 255,000 square feet of office space.

The **City of Johnstown** has much to offer in terms of working, living, and recreation. 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 route. Johnson Hall welcomes visitors and interprets the Johnson family through guided tours of the period room settings and of the historic grounds, educational programs and special events. 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 working group discussed the potential placement of DC fast chargers throughout the region, which would further extend the use of EVs throughout NYS. Strategically placing DC fast chargers in the Mohawk Valley along major routes could support both transient and 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.

Figure 4. Recommended Locations for DC Fast Charging Stations in the Mohawk Valley



Given the list of potential barriers toward EV adoption (Table 1), the Mohawk Valley Plan working group voted and discussed the most critical to address. The final ranking of these barriers is shown in Table 5. Potential strategies to address these identified barriers are summarized in section 3.

Table 5. List of Top Critical EV Barriers to Address in the Mohawk Valley

Rank	Key Barriers for Municipalities to Address to be EV-Ready
1	DC fast charging infrastructure
2	EV Buyer/Driver Education
3	Electric Grid/Utility
4	Parking Demand
5	Elected Official Education
6	Site planning

The Mohawk Valley EV Charging Station Plan was finalized after addressing any received feedback on the draft plan from the HOCTS Planning Committee and project’s working group. It was published online⁴ with an accompanying email that was sent to several mailing lists.

2.3 Central New York

The Central New York Regional Planning and Development Board (CNYRPDB) and Clean Communities of Central New York led the development of the Central New York EV Charging Station Plan with support from the Syracuse Metropolitan Transportation Council (SMTC). The introductory meeting with the MPO was with the SMTC Planning Committee. SMTC Executive Director noted that the project fits with the goals of SMTC’s Long-Range Transportation Plan project which is currently underway and the Planning Committee members voted unanimously to support the project. Input to the Central New York Plan was provided by working group members representing key stakeholders in the region (listed in Appendix A).

⁴ [http://www.ocgov.net/sites/default/files/hoctsmo/MohawkValleyEVChargingStationPlan/Mohawk%20Valley%20EV %20Charging%20Station%20Plan%20FINAL.pdf](http://www.ocgov.net/sites/default/files/hoctsmo/MohawkValleyEVChargingStationPlan/Mohawk%20Valley%20EV%20Charging%20Station%20Plan%20FINAL.pdf)

At the end of 2015, there were 482 EVs registered in the Central New York, 75 of which were BEVs and 407 were PHEVs. The ZIP codes with the most EV owners are:

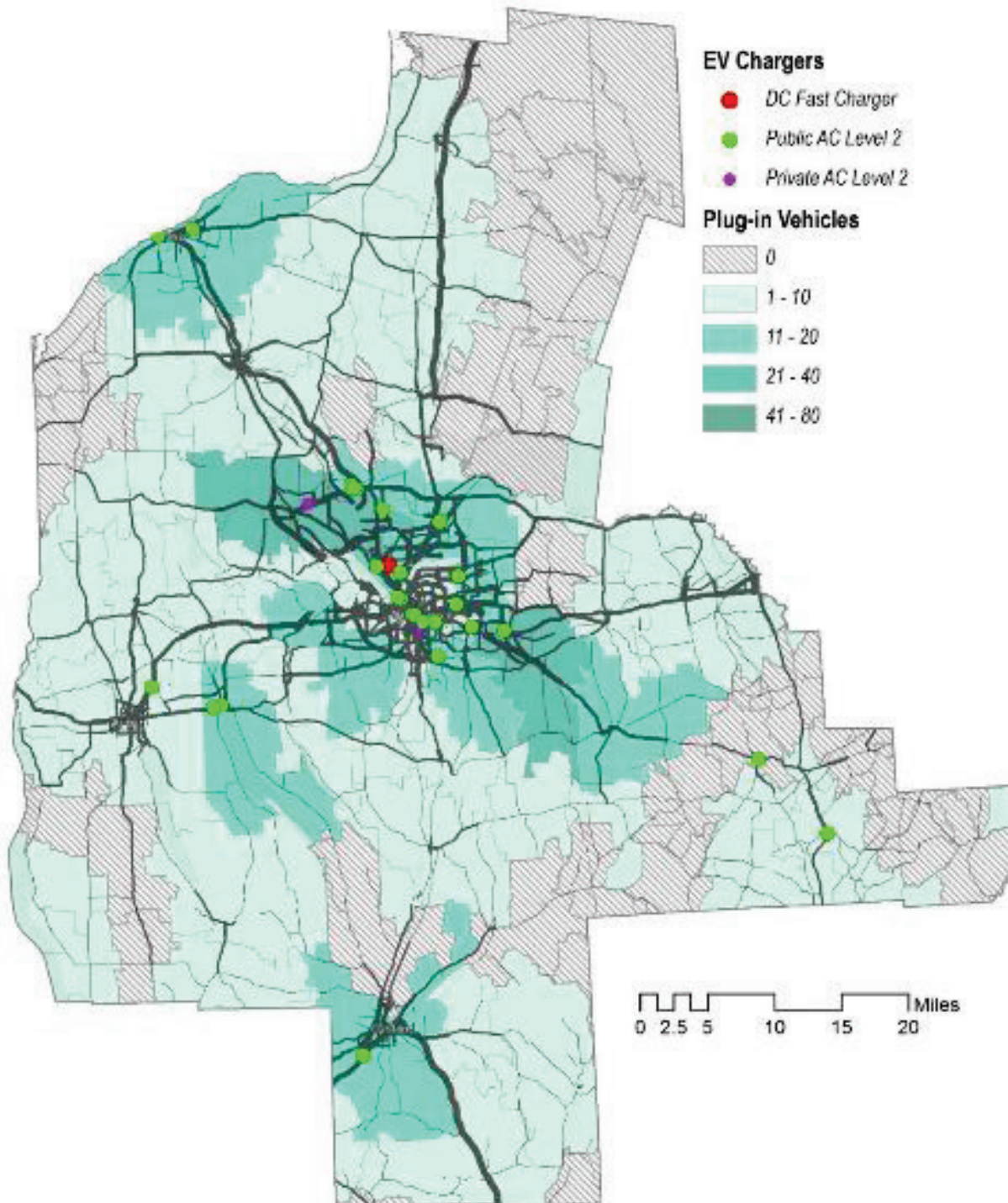
- 13027 (Baldwinsville): 28 EVs
- 13090 (Liverpool): 27 EVs
- 13104 (Manlius): 26 EVs
- 13066 (Fayetteville): 23 EVs
- 13031 (Camillus): 18 EVs
- 13201 (Syracuse): 17 EVs
- 13045 (Cortland): 17 EVs
- 13078 (Jamesville): 16 EVs
- 13035 (Cazenovia): 16 EVs
- 13039 (Cicero): 15 EVs
- 13126 (Oswego): 15 EVs

Currently there are 31 locations with public charging station in the region. These include:

- Destiny USA (North Garage, Solar Street)
- Convention Center at OnCenter
- Crouse Irving Memorial Hospital
- Farmer's Market Lot
- Onondaga Lake Park
- Skaneateles Village Hall
- Towne Center (Fayetteville)
- Colgate University
- SUNY Environmental Science and Forestry
- SUNY Morrisville
- Anheuser-Busch Brewery
- Central New York JATC
- Chili's (Liverpool, Syracuse)
- Covanta Energy
- Nichols Supermarket
- Residence Inn (Syracuse)
- Synapse Headquarters

Some workplaces and dealerships have installed private charging stations, while Tesla put in DC fast charging stations at the Holiday Inn on Electronics Parkway in Liverpool. Figure 5 shows EV ownership (both PHEVs and BEVs) by ZIP code as of December 31, 2015, along with the existing public EV charging locations in Central New York. Other reference maps provided to the working group included population, income per household, and daytime population change during weekdays.

Figure 5. EV Ownership and Public Charging Station Locations in Central New York



The working group recommended five top priority municipalities for additional charging station installations and five lower priority municipalities that should be pursued after the top five (shown in Table 6).

Table 6. Final Ranking of Central New York Areas/Municipalities Considered for Needing Additional EV Charging Stations

Area/Municipality for Additional EV Charging Stations		Average Score Based on Working Group Input
Top Priority	DeWitt	7.3
	Syracuse	6.8
	Clay	6.7
	Fayetteville	6.3
	Camillus	6.1
Lower Priority	Cortland	6.0
	Auburn	5.9
	Cazenovia	5.8
	Cicero	5.7
Others Considered	Baldwinsville	5.4
	Manlius	5.4
	East Syracuse	5.1
	Skaneateles	4.6
	Oswego	4.3

DeWitt is a suburb of Syracuse located in east-central Onondaga County, immediately east of the City of Syracuse. The number of large employers, hotels, and public attractions throughout the town creates an opportunity to provide charging for EV drivers 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. The town is a Climate Smart Community and adopted a Sustainability Plan in 2014 with the support of the CNYRPDB. The town’s plan included several sustainability strategies that support increased use of EVs including installing charging stations, purchasing EVs for municipal use, and educating the community about l

ow-carbon transportation options. A fully handicapped-accessible sports facility for youth and adults, the Willis Carrier Recreation Center, will be the first of its kind in the country, providing a home for those with special needs to participate in tournament level competitions in baseball, soccer, and lacrosse. It is expected to draw thousands of visitors each year from all across the State and beyond.

Syracuse is the fifth largest city in NYS and is the county seat of Onondaga County. The city is the region's metropolitan hub and has the largest concentration of employment, health care, higher education, and entertainment. The city is home to Syracuse University, a major research university, as well as several smaller colleges and professional schools. Syracuse stands at the northeast corner of the Finger Lakes Region and is the geographic center of NYS. Syracuse serves as the regional center of employment and is home to major employers including National Grid, Time Warner Cable, Syracuse University, SUNY College of Environmental Science and Forestry, SUNY Upstate Medical University, University Hospital, Crouse Hospital, the VA Medical Center, Hutchings Psychiatric Center, and Rosewood Heights Medical Center. Destiny USA is a super-regional retail and entertainment facility that employs approximately 4,700 people. While Destiny USA has become a focal point for visitors, other popular activities include attending athletic events at Syracuse University, viewing exhibits at the Everson Museum of Arts, renting bikes to ride around Onondaga Lake Park, cruising the Erie Canal on a tour boat, and visiting Finger Lakes wineries.

A suburb of Syracuse, **Clay** is close to Syracuse Hancock International Airport and Interstates 81 and 90. Compared to the Onondaga County average, Clay has higher median household income, lower poverty rate, lower proportion of elderly people, slightly higher average household size, slightly higher median home value, and almost equivalent mean commute times. The community is fairly affluent and Clay's residents are also well-educated. Clay is a bedroom community of Syracuse, with nearly 11,000 residents working in other communities across the county and region.

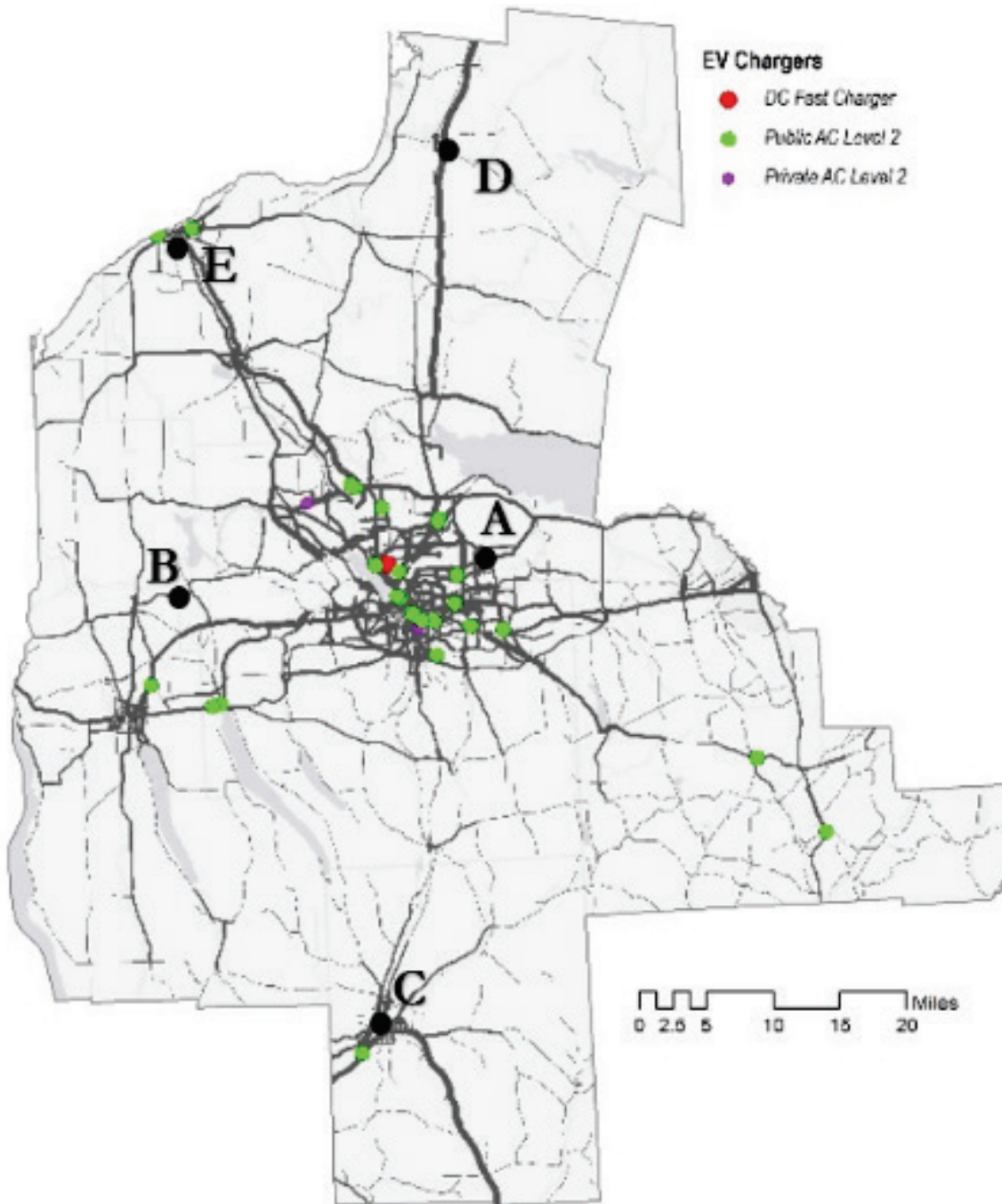
The **Town of Camillus** is the proud home to many museums, historical sites, and excellent recreational facilities including the Octagon House, Erie Canal Park/Sims Store Museum, Martisco Station Railway Museum, School House #1, and an agricultural museum. There has been significant commercial development in recent years which should facilitate more EV traffic and cost effective opportunities to install charging infrastructure. Most notably is the 66-acre Township 5 located off Hinsdale Road exit of Route 5. This \$58 million project consists of a mixture of residential apartments and retail stores in a "town center" setting. It will provide an array of shopping, dining, and indoor recreational activities that will result in having most of the services its residents require within the town. This project will also

attract new residents to Camillus because of its easy access via the Route 5 highway. Another developing commercial corridor is the area along Milton Ave and Hinsdale Road. On the Northeast corner are Home Depot, Staples, a few smaller stores, and a motor vehicle tire center. On the Southwest corner is the revitalized Elm Hill Plaza, which houses a number of smaller commercial establishments.

Fayetteville is a village located in the east-central portion of Onondaga County within the Town of Manlius. Fayetteville has a reputation as a desirable suburban community in the Syracuse metropolitan area. The village is primarily a commuter community set in the midst of suburban development surrounding the City of Syracuse. Today, homes fill the farm fields and orchards that once surrounded the village center. In each neighborhood, parks provide play space. The Erie Canal has become a recreational hiking trail and Green Lakes State Park on the eastern edge of the village preserves part of a primeval forest and two unusual lakes that provide year-round enjoyment.

The working group also discussed the potential placement of DC fast chargers throughout the region, which would further extend the use of EVs throughout NYS. Strategically placing DC fast chargers in Central New York along Interstate 90 and 81 could support transient EV drivers as well as local EV drivers. Installing DC fast chargers in Dewitt [A] near exit 35 of the NYS Thruway, and Weedsport [B] near exit 40 of the NYS Thruway could enable most EVs in good weather to travel from Utica to Rochester (Utica-Dewitt is 49 miles, Dewitt-Weedsport is 27 miles, and Weedsport-Rochester exit 45 is 52 miles). There are a number of possible locations in Dewitt at Carrier Circle that include several hotels and restaurants within a few miles of I-90. This is also near the Syracuse Airport and could potentially be configured adjacent to the Thruway plaza to serve EVs on and off I-90. Possible locations in Weedsport include the Days Inn Hotel and the NYSDOT Park and Ride facility. Cortland [C], 35 miles south of Syracuse is a logical location for a DC fast Charger on I-81 towards Binghamton. Outside of Onondaga County, there are no major towns north of Syracuse on I-81, but a DC fast charger would likely need to be placed halfway to Watertown [D], which is 75 miles from Syracuse. Oswego [E], 40 miles north of Syracuse on 481 is likely more of a final destination than a stopping point on the way to another location, but it would serve as a logical choice for a DC fast charger in that area of the State.

Figure 6. Recommended Locations for DC Fast Charging Stations in Central New York



Given the list of potential barriers towards EV adoption (Table 1), the Central New York Plan working group voted and discussed the most critical to address. The final ranking of these barriers is shown in Table 7. Potential strategies to address these identified barriers are summarized in section 3.

Table 7. List of Top Critical EV Barriers to Address in the Central New York

Rank	Key Barriers for Municipalities to Address to be EV-Ready
1	Car Dealership Support
2	Signage
3	Vehicle and charging station costs
4	DC fast charging infrastructure
5	Zoning Rules

After finalizing the working group input and recommendations, then drafting the Central New York EV Charging Station Plan, CNYRPBD and Clean Communities of Central New York presented it to the SMTC Planning Committee. The plan was endorsed by unanimous roll call vote. The Central New York EV Charging Station Plan was finalized and published [online](#)⁵ after addressing any received feedback on the draft plan from the SMTC Planning Committee and project’s working group.

2.4 Genesee Region

Genesee Region Clean Communities led the development of the Genesee Region EV Charging Station Plan with support from the Genesee Transportation Council. The introductory MPO meeting was held with the Genesee Transportation Council Planning Committee. Input to the Genesee Plan was provided by working group members representing key stakeholders in the region (listed in Appendix A).

At the end of 2015, there were 1,061 EVs registered in the Genesee Region, 178 of which were BEVs and 883 were PHEVs. The ZIP codes with the most EV owners are:

- 14534 (Pittsford): 87 EVs
- 14450 (Fairport): 85 EVs
- 14580 (Webster): 76 EVs
- 14618 (Brighton): 43 EVs
- 14612 (North Greece): 41 EVs
- 14610 (Rochester): 41 EVs

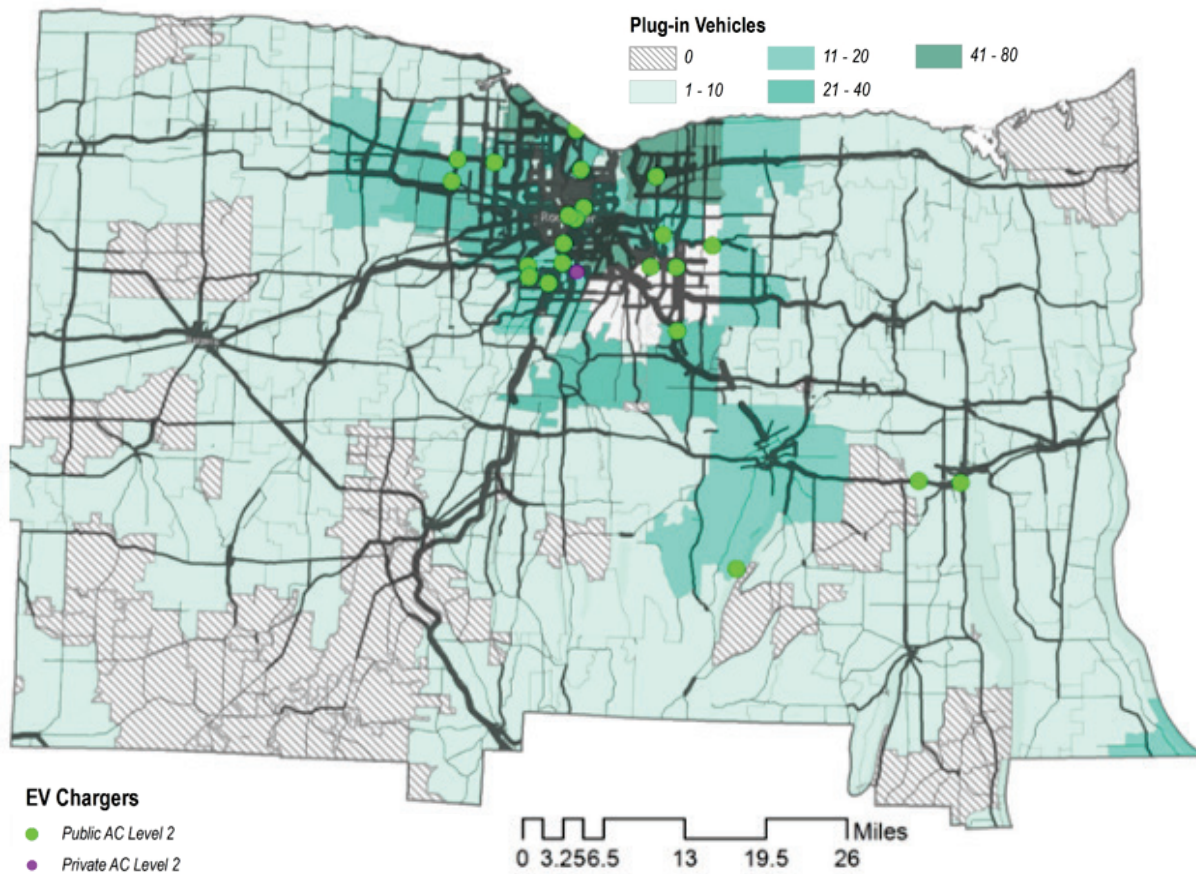
⁵ <http://www.cnyenergychallenge.org/#!/electric-vehicles/epbfz>

Currently there are 27 locations with public charging station in the region. These include:

- Bristol Harbour Resort (Canandaigua)
- Broccolo Garden Center (Fairport)
- Fairport Village Landing
- Rochester City Hall, Public Market, & Port
- Rochester City Garages (4 locations)
- The North Face (Victor)
- Town of Penfield Community Center
- Village of Spencerport - Town Hall
- Rochester Institute of Technology
- Hobart & William Smith Colleges
- I-Square (Rochester)
- JATC/IBEW (Geneva, Rochester)
- HPPR (Victor)
- Rustic Village Apartments (Rochester)

Several dealerships that sell EVs in the region also have public charging stations. Frito-Lay and some Nissan dealerships have installed private charging stations. Figure 7 shows EV ownership (both PHEVs and BEVs) by ZIP code as of December 31, 2015, along with the existing public EV charging locations in the Genesee Region. Other reference maps provided to the working group included population, income per household, and daytime population change during weekdays.

Figure 7. EV Ownership and Public Charging Station Locations in the Genesee Region



During working group meetings EV-readiness barriers, along with key venues/areas for new EV charging station installations were discussed. A list was created and ranked for potential municipalities in the Genesee Region where additional charging stations are needed. The working group recommended four top priority municipalities for additional charging station installations and six lower priority municipalities that should be pursued after the top four (shown in Table 8).

Table 8. Genesee Region Areas/Municipalities Considered for Additional EV Charging Stations

Area/Municipality for Additional EV Charging Stations	
Top Priority	Batavia
	Canandaigua
	Geneseo
	Victor
Lower Priority	Brighton
	Brockport
	Henrietta
	Geneva
	Penn Yan
	Pittsford
Others Considered	Greece
	Irondequoit
	Naples
	Rochester
	Seneca Falls
	South Bristol
	Waterloo

Batavia has been the county seat of Genesee County beginning with the town’s formation in 1802. Genesee County is located 30 minutes between both Buffalo and Rochester, and only 45 minutes from Niagara Falls. Among its many attractions is the second Holland Land Office, built in 1815 as a successor to Joseph Ellicott’s first land office, is now a museum. Other historic structures are also located in Batavia including the 1841 Court House and the former Brisbane Mansion built in 1853. Batavia is also home to the Batavia Muckdogs professional baseball team. Other nearby attractions include ghost hunting at Rolling Hills Asylum, harness racing at Batavia Downs, Darien Lake Amusement Park, and numerous golf courses. There are no public charging stations currently in Batavia, but there is strong community support for future stations, especially in the downtown area.

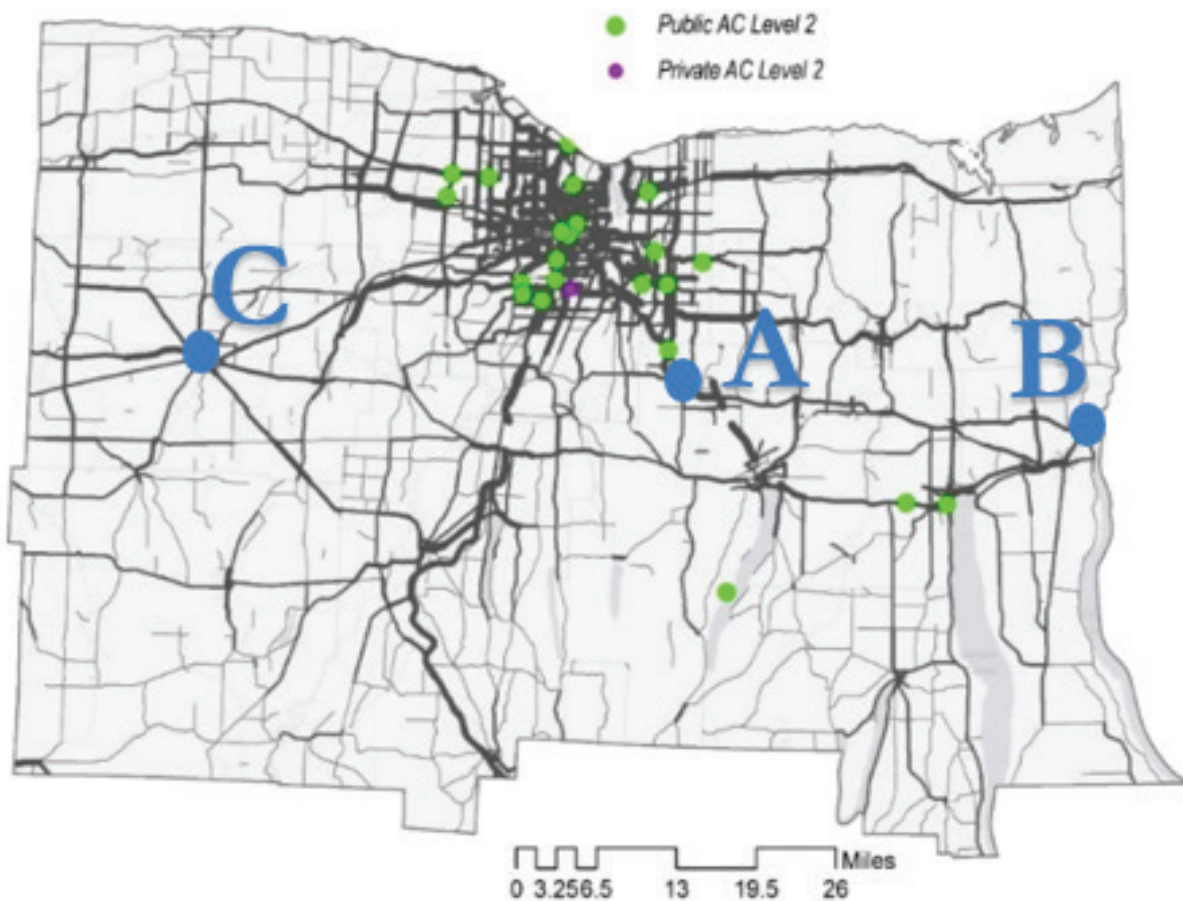
Canandaigua is a community with beautiful scenery located on one of the major Finger Lakes, Canandaigua Lake. It is a bustling resort community in the summer with an attractive waterfront with a public beach, waterpark, several marinas, the Marvin Sands Performing Arts Center, and a robust downtown with a diverse array of shops and restaurants. In addition to the summer activities, it also offers opportunities during the fall for leaf peeping, and in the winter with its proximity to Bristol Mountain, a major ski area. Year-round attractions include the New York State Culinary Center, Sonnenberg Mansion museum, the Granger Homestead museum, and numerous wineries and microbreweries nearby. The fact that it is the governmental center of Ontario County results in a lot of activity within the city, and it is also the home of Finger Lakes Community College. It serves as a commercial and retail hub for much of the outlying rural areas with a variety of national and local stores.

Geneseo is an historic community surrounded by scenic landscapes and waterways, including nearby Conesus Lake. Geneseo is a commercial center serving the needs of the college and the village, as well as the surrounding agricultural areas. Due to its central location and designation as the county seat, Geneseo serves as a central hub for government and commerce within Livingston County and contains a variety of retail and service business including chain retail stores such as Walmart and Wegmans's Food Markets. The State University of New York College at Geneseo is located in the town. This charming village is a Historic District recognized as a National Historic Landmark, one of only 24 such districts in the country. In addition to the Livingston County Historical Museum, where collections are displayed in an early cobblestone schoolhouse, Geneseo is home to the National Warplane Museum with its widely acclaimed Return to Normandy Project and its WWII era displays. Letchworth State Park or the "Grand Canyon of the East" is located only six miles southwest of the village.

Victor is one of the fastest growing towns in the region due to its proximity to the NYS Thruway and Interstate 490. The town has grown from a rural, agricultural township to a premier suburban town with rapid growth in housing and commercial development. Eastview Mall is one of the largest shopping malls in the areas and is known for its premier stores. Victor serves as a bedroom community for many commuters working in Monroe County, but it also has a healthy mix of light industrial and service industry employers as well as the significant employment opportunities in its robust retail sector. One of the oldest attractions in Victor is the Valentown Museum, which has a collection of heirlooms and artifacts on display that represent the local 19th century history of the area. Ganondagan is the 17th century site of a Native American community that was a flourishing, vibrant center for the Seneca people.

The working group also discussed the potential placement of DC fast chargers throughout the region, which would further extend the use of EVs throughout NYS. Strategically placing DC fast chargers in the Genesee Region along major routes could support both transient and local EV drivers. It is recommended that the initial DC Fast Charging stations be installed at the following locations: near Thruway Exit 45 in Victor [A], near Weedsport Exit 41 [B], and near Exit 48 in Batavia [C]. The stations are recommended to be near the Thruway exits, but not on the roadway itself. That way they would serve the needs of users within the region as well as providing convenient charging options for those travelling through the region.

Figure 8. Recommended Locations for DC Fast Charging Stations in the Genesee Region



Given the list of potential barriers towards EV adoption (Table 1), the Genesee Region Plan working group voted and discussed the most critical to address. The final ranking of these barriers is shown in Table 9. Potential strategies to address these identified barriers are summarized in section 3.

Table 9. List of Top Critical EV Barriers to Address in the Genesee Region

Rank	Key Barriers for Municipalities to Address to be EV-Ready
1	Zoning Rules
2	Site planning
3	Elected Official Education
4	Vehicle and charging station costs
5	Urban Charging Options

After finalizing the working group input and recommendations, then drafting the Genesee Region Plan, Genesee Region Clean Communities presented it to the Genesee Transportation Council Planning Committee. The Genesee Region Plan was finalized and published online⁶ after addressing any received feedback on the draft plan from the Genesee Transportation Council Planning Committee and project’s working group.

2.5 Greater Buffalo and Niagara

Clean Communities of Western New York led the development of the Greater Buffalo and Niagara EV Charging Station Plan with support from the Greater Buffalo-Niagara Regional Transportation Council (GBNRTC). The introduction to the MPO took place during the GBNRTC Planning and Coordinating Committee meeting. Hal Morse of the GBNRTC indicated to the group his interest in the project and how it aligns well with GBNRTC goals. Hal Morse indicated how GBNRTC resources were being committed to helping the project work group and making appropriate connections with local towns to disseminate the projects findings. Input to the Greater Buffalo and Niagara Plan was provided by working group members representing key stakeholders in the region (listed in Appendix A).

At the end of 2015, there were 706 EVs registered in the Greater Buffalo and Niagara Region, 111 of which were BEVs and 595 were PHEVs. The ZIP codes with the most EV owners are:

- 14221 (Buffalo): 71 EVs
- 14075 (Hamburg): 34 EVs
- 14051 (East Amherst): 41 EVs
- 14127 (Orchard Park): 32 EVs
- 14094 (Lockport): 36 EVs

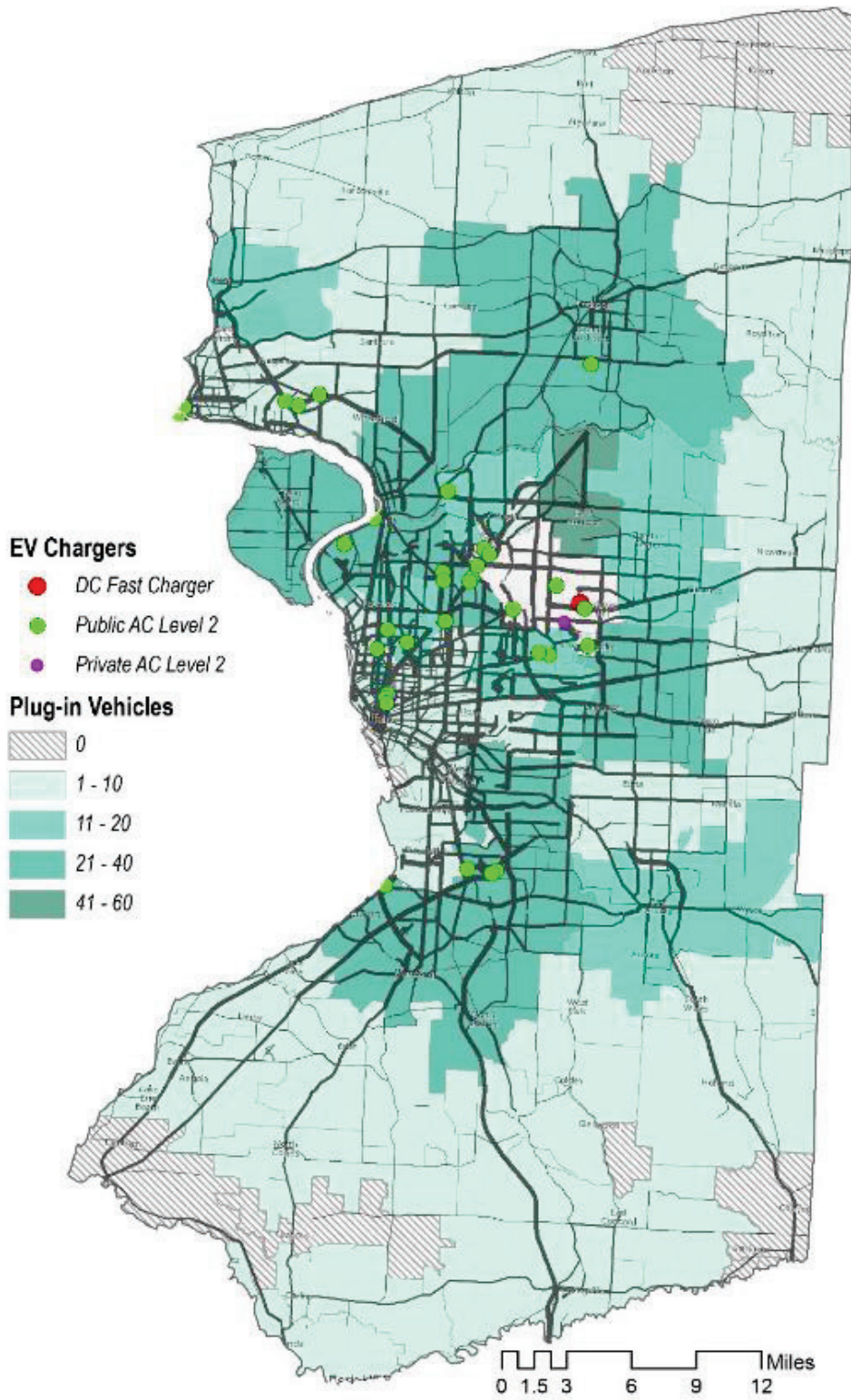
⁶ www.grcc.us/programsandprojects/

Currently there are 36 locations with a public charging station in the region. These include:

- Buffalo Airport
- Buffalo Zoo
- Niagara Falls Airport
- Niagara Falls Parking Lots
- Town of Tonawanda
- SmartHomeBuffalo
- University at Buffalo (Bissel, Bonner, and Diefendorf Hall)
- Buffalo State College
- Buffalo Niagara Medical Campus
- Chili's (Amherst, Niagara Falls)
- Comfort Inn (Buffalo)
- Country Club Manor (Williamsville)
- JATC/IBEW (Niagara Falls, Orchard Park)
- Kohl's (Amherst, Buffalo)
- NFTA (Hamburg)
- Riverview Solar
- Tops (Williamsville)
- Townplace (Cheektowaga)

Some workplaces and dealerships have installed private charging stations, while Tesla put in DC fast charging stations at the Shops at Main on Transit Road in Buffalo. Figure 9 shows EV ownership (both PHEVs and BEVs) by ZIP code as of December 31, 2015, along with the existing public EV charging locations in the Greater Buffalo and Niagara Region. Other reference maps provided to the working group included population, income per household, and daytime population change during weekdays.

Figure 9. EV Ownership and Public Charging Station Locations in Greater Buffalo and Niagara



Through interactions with working group members, EV-readiness barriers, along with key venues/areas for new EV charging station installations were discussed. From this a list was created of potential municipalities in the Greater Buffalo and Niagara region where additional charging stations are needed. For each potential municipality a one-page overview with relevant EV and charging station information and key destinations was developed to guide the working group on voting for the municipalities most needing additional charging stations. The scoring from the voting and subsequent discussions among the working group members resulted in five top priority municipalities for additional charging station installations and five lower priority municipalities that should be pursued after the top five (Table 10).

Table 10. Final Ranking of Greater Buffalo and Niagara Areas/Municipalities Considered for Additional EV Charging Stations

Area/Municipality for Additional EV Charging Stations		Average Score Based on Working Group Input
Top Priority	Amherst	9.3
	Williamsville	9.0
	Niagara Falls	8.7
	Buffalo (North)	8.0
	Orchard Park	7.3
Lower Priority	Cheektowaga	6.7
	West Seneca	6.3
	Lewiston	5.7
	Buffalo (South)	5.3
	Youngstown	5.3
Others Considered	East Aurora	5.0
	Grand Island	5.0
	Wilson	5.0
	Hamburg	4.7
	Barker	2.0
	Irving	2.0

Amherst is the largest and most populous suburb of Buffalo. The completion of the University at Buffalo campus in Amherst, along with the construction of major access roads such as 1-290 (Youngman Expressway) and 1-990 (Lockport Expressway), made it easier for people to live in Amherst and commute to jobs in Buffalo and other nearby communities. Rapid growth in population created the need for more houses, highways, shopping centers, schools, and recreational facilities. The large number of workplaces, universities, and colleges throughout the town creates an opportunity to provide charging for residents driving EVs. 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.

Williamsville is a village of the Town of Amherst. The Village of Williamsville is well known for its central location in the Buffalo and Niagara region, boasting a rich historic past. There are currently five publicly accessible charging locations in the Village of Williamsville or nearby, one of which is located at the Tops Friendly Market grocery store. Williamsville has a developing small business district down the Main Street corridor. This corridor is an excellent location to host new EVSE locations. The visual exposure and charging experience will go a long way to help educate travelers and residents on the availability of EV charging that would support an expanding EV population in the area.

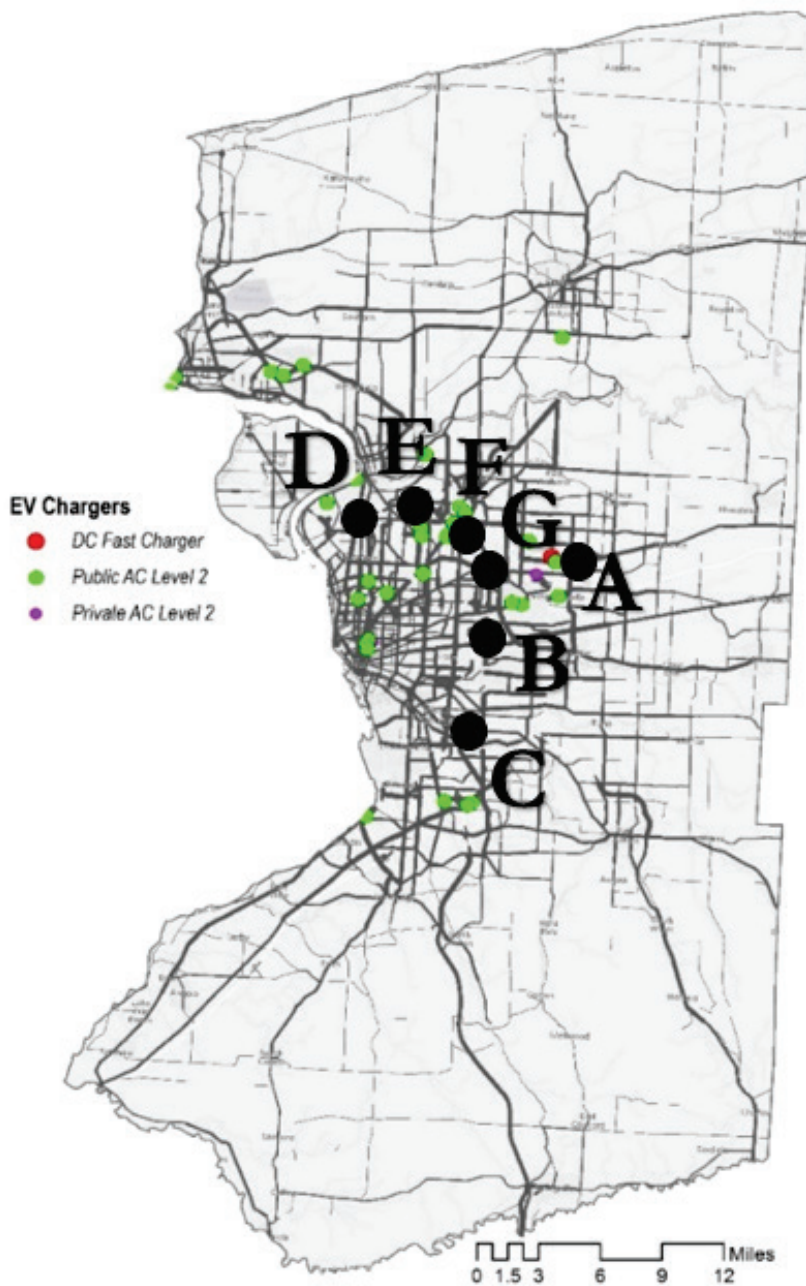
Niagara Falls is a city adjacent to the Niagara River, across from the city of Niagara Falls, Ontario, and named after the famed Niagara Falls. Despite the decline in heavy industry, Niagara Falls State Park and the downtown area closest to the falls continue to thrive on tourism. Local and state government officials have vowed to embrace the physical and cultural advantages that the region naturally possesses, such as the Niagara Gorge, wine trails, historical landmarks, Little Italy, and of course Niagara Falls itself. Currently, there are chargers located at the Niagara Falls State Park and the Niagara Falls International Airport. Additional stations sited throughout the city, major tourist areas around the falls, and within the Niagara Falls State Park system will benefit tourists who visit the scenic location and spend several hours enjoying the experience of the Falls.

North Buffalo stretches from the city's border with Kenmore to several neighborhoods to the south with Delaware Park forming the southern border. North Buffalo is heavily populated with Italian-Americans, especially along the Hertel Avenue strip, which has many Italian restaurants, bakeries, and stores. Because of its pedestrian-oriented environment (proximity to downtown Buffalo, the University at Buffalo, and suburban office parks) and high-quality 1920s-era housing stock, North Buffalo is experiencing an influx of young professionals.

Orchard Park is a small community located south of Buffalo. Orchard Park is best known as an upper middle class suburb. Ralph Wilson Stadium, home of the Buffalo Bills, drawing in fans from all over NYS, bordering states, and Canada. EV charging locations at the Ralph Wilson Stadium would be perfect for commuters heading to NFL games and other events. Orchard Park is also home to many light manufacturing companies where charging stations would be well situated for employees to charge during working hours. Other priority charging station locations include Erie Community College South Campus and the McKinley mall.

The working group also discussed the potential placement of DC fast chargers throughout the region, which would further extend the use of EVs throughout NYS. Strategically placing DC fast chargers in the Greater Buffalo and Niagara Region along major Interstates could support transient and EV drivers. Major shopping centers, transportation hubs, or tourist destinations adjacent to highway exits that are convenient for EV travelers will also serve residents and visitors in the area. Recommended locations for DC fast charging stations along I-90 are at Exit 49: Depew / Lockport [A], Exit 51: Buffalo Airport in Cheektowaga [B], and Exit 56: Milestrip Road in Orchard Park [C]. Potential options along I-290 are at Exit 2: Colvin Blvd. in Tonawanda [D], Exit 3: Niagara Falls Blvd. in Amherst [E], Exit 6: Sheridan Drive in Amherst [F], and Exit 7: Main Street in Williamsville [G].

Figure 10. Recommended Locations for DC Fast Charging Stations in the Greater Buffalo and Niagara Region



Given the list of potential barriers toward EV adoption (Table 1), the Greater Buffalo and Niagara Plan working group voted and discussed the most critical to address. The final ranking of these barriers is shown in Table 11. Potential strategies to address these identified barriers are summarized in section 3.

Table 11. List of Top Critical EV Barriers to Address in the Greater Buffalo and Niagara Region

Rank	Key Barriers for Municipalities to Address to be EV-Ready
1	Building Regulations
2	DC fast charging infrastructure
3	EV Buyer/Driver Education
4	Electric Grid/Utility
5	Parking Demand
6	Site planning

After finalizing the working group input and recommendations, then drafting the Greater Buffalo and Niagara Plan, it was presented it to the GBNRTC Planning and Coordinating Committee. Hal Morse of the GBNRTC has been a big supporter of this project and has already incorporated some EV elements into the Smart Cities Initiative and other planning efforts. The Greater Buffalo and Niagara Plan was finalized after addressing any received feedback on the draft plan from the GBNRTC and project’s working group. It was published online⁷ with an accompanying email blast to stakeholders in the region.

⁷ www.ccofwny.org/news.html

3 Potential Solutions to Critical EV Barriers

Discussions among working groups in each of the five regions resulted in potential solutions and strategies for addressing the identified critical EV barriers. The following summaries of ideas for key stakeholders in the region to implement are a collection from all working groups.

Support and better promotion of EVs by car dealerships is needed to drive adoption. Providing training and information to dealers to help talk about EVs with potential buyers could make dealers feel more knowledgeable about the vehicles. Dealer education regarding the range, function, electricity consumption, fuel costs, environmental benefits, and service needs of various EVs, as well as determining charging infrastructure requirements and costs is necessary. Also, incentives for every EV sold could motivate dealerships to market EVs better.

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 stations can also be used by local residents. The planning for fast charging stations should be coordinated at the State level and attempt to align with regular routes for government or private fleets of EVs.

Educating potential EV owners through large scale awareness efforts 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.

General education on EVs for elected officials through presentations and publications should be provided. This includes both elected officials and administrative staff including planners, zoning officials, and inspectors. Education should involve a range of professional organizations including associations for highway superintendents, town supervisors, public works officials, and parking professionals. 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.

Collaborating and partnering with the electric utilities on EV initiatives could be very effective for 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 an EV purchase.

Site planning must be addressed by creating awareness about what steps can be taken in advance to facilitate the installation of EV charging stations in the future. This includes the installation of conduits in new parking lots or structures that can later reduce the expense of EV charging station projects. Prime examples are projects at universities, medical campuses, and technology parks where employees would likely consider EVs. Policies can be developed to create incentives or requirements to affect this. Architects and planners must understand when charging stations are a good option so developers can negotiate an incentive for including an installation.

Zoning rules and building regulations that are amenable to the installation of public EV charging stations should be developed by municipalities. This may be accomplished with a multi-faceted education effort. At a minimum, zoning laws should permit the installation of each charging station type in an appropriate setting. Americans with Disabilities Act (ADA) compliance must be considered as part of the process. NYSERDA offers funding for communities to amend their zoning, permitting, and parking ordinances so they are more EV-friendly.

Urban charging options require a big picture strategy that not only addresses today's needs, but what will be necessary in five years. As roads are reconstructed and streetscapes are redesigned, EV infrastructure must be considered and coordinated to create more EV-friendly sites in downtown areas. This needs to reflect an evaluation of future infrastructure requirements to ensure that future improvement projects include new conduit and addresses smart-grid issues as well as multi-family and workplace concerns. Leadership in Energy and Environmental Design projects should always include planning for EV charging station installations. Local planning departments should define EV infrastructure in their zoning codes and adopt appropriate design guidelines to ensure future on-street EV charging stations are ADA compliant, do not pose a safety risk to others, and enhance neighborhood character rather than diminish it.

Vehicle and charging station costs are still a barrier to market development and widespread adoption. Cost-effective charging station installation examples and best practices will encourage more businesses and workplaces to offer this perk for employees or customers. It is also important to understand how future trends will affect charging infrastructure development. Given the anticipated technology changes that may drive costs down, a strategy is needed to ensure future investments in the correct technology. There is an existing income tax credit for installing publically accessible charging stations and the NYS legislature recently approved NYSERDA to facilitate a rebate program for EV purchases.

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.

Anticipated charging station occupancy should be examined for new charging locations to ensure that the installation will benefit EV drivers. It is critical to monitor and manage charging station use so a single EV does not prevent others from using the station after charging is complete. Proper signage reminds EV drivers of time limits and networked charging stations can notify the driver when the charge cycle is complete, or impose fees for longer than necessary parking.

4 EV Charging Station Plan Call-to-Action

The Project Team facilitated meetings with the top recommended municipalities/jurisdictions within the five I-90 MPO regions to help address EVSE infrastructure gaps and prepare for existing or upcoming opportunities to install EV charging stations. Potential funding could come from the NYSERDA Cleaner, Greener Communities Program Phase II Implementation Grants for communities to adopt streamlined permitting and other ordinances for EV charging stations, as well as a recently awarded NYSERDA Cleaner, Greener Communities Program grant to install charging stations based on these EV Charging Station Plans. The Project Team first met with the officials from the top recommended municipality/jurisdiction to introduce the purpose of supporting EV-readiness and summarize the EVSE resources available to them. If there was interest, a follow-up meeting was coordinated with officials from the municipality/jurisdiction and key EVSE deployment stakeholders to put a plan into action for addressing any barriers preventing charging station installations and preparing for the future installation of EVSE infrastructure.

4.1 Capital District

Capital District Clean Communities presented to the recommended municipalities and jurisdictions on the Plan. Each meeting had different outcomes, with some participants recommending shovel-ready sites, and others requesting time to identify sites and reach out to potential stakeholders. The meeting in **Albany** focused on sites the city already had in mind: the Parking Authority and developers that are active in the city. Discussions in the **Colonie** meeting related to how EVSE can be supported through policy and building zoning codes, as well as which land uses should require DC fast charge stations. In **Saratoga Springs**, meeting participants discussed parking enforcement and charging etiquette. There was also a general discussion about how the city can become more “EV-Friendly” and become recognized as an EV driver destination. **Schenectady** is actively working on developing a microgrid and sustainable transportation initiatives, including a green fleet policy, and has received funding to install a Level 2 charging station in a public lot along with the purchase of two EVs for the City’s fleet. **Troy** is interested in expanding its charging infrastructure network, but has limited capacity to do so at this time. Meeting participants felt that Troy is key for EVSE expansion due to the city’s history in tech research, and has adopted zoning that required some new development to include charging infrastructure.

Table 12. Priority Locations for New Charging Stations in the Capital District

Municipality	Priority EVSE Locations
Albany	<ol style="list-style-type: none"> 1. Albany Parking Authority Lots, such as the Quackenbush Lot, Riverfront Garage, Green & Hudson Garage, or WAMC Parking Lot 2. Albany Medical Center Garages 3. CDTA-owned properties such as the Delaware Avenue Park & Ride Lot and the Albany-Rensselaer Amtrak Station
Colonie	<ol style="list-style-type: none"> 1. Crossgates Mall 2. Colonie Center 3. Northway Mall
Saratoga Springs	<ol style="list-style-type: none"> 1. Capital District Transportation Authority-owned properties such as the Amtrak Station 2. Healthy Living Market 3. Gideon Putnam Hotel at Saratoga Spa State Park
Schenectady	<ol style="list-style-type: none"> 1. Metroplex-owned parking facilities – Broadway Parking Garage 2. CDTA-owned properties – Amtrak Station 3. Future Casino Site
Troy	<ol style="list-style-type: none"> 1. CDTA-owned lots such as the Defreestville Park & Ride Lot 2. Rensselaer Polytechnic Institute Tech Park 3. Capital Roots Urban Grow Center

4.2 Mohawk Valley

Energetics met with the recommended Mohawk Valley municipalities to review EV and EVSE technology. Each meeting outcomes varied based on the municipality’s knowledge of EV and EVSE, and their current and future needs. **Cooperstown** representatives were interested to find out if additional funding might be available soon, and if so would likely use that for a showcase installation at the Doubleday field Parking lot, which would then encourage others to follow suit. Without funding to cover the full cost of the station for the village, they would partner with local businesses to do the installation at a key venue. Discussions in **Old Forge** related to the cost to charge and whether drivers would pay for electricity, while others had questions about charging levels and costs for stations installation. The best location for a municipal charger would be at the visitor’s center if they could do an inexpensive installation of a non-networked station, otherwise they would look to partner with local attractions. There was general interest in a charging station in downtown **Utica** to showcase the city’s embrace of 21st century technology, although there were some concerns about how often it would be used and whether there should be fees for use. The City Hall parking lot is an ideal spot with plenty of power and easy access to parking spaces, but funding would need to be completely covered by the grant or provided by a sponsor. The Village of **Herkimer** would likely pursue the installation on their property if full funding is secured and would use that to encourage other businesses to follow. Several businesses in the village and town could be prospective candidates given their desire to attract tourists.

Table 13. Priority Locations for New Charging Stations in the Mohawk Valley

Municipality	Priority EVSE Locations
Cooperstown	<ol style="list-style-type: none"> 1. Lake Front Hotel 2. Village-owned Doubleday Field Parking Lot 3. Privately-owned Chestnut Street Parking Lot
Old Forge	<ol style="list-style-type: none"> 1. Town of Webb Visitors Center 2. Water Safari / Water's Edge Lodge (lodge parking spaces preferred) 3. Strand Movie Theater (right in town, but limited parking) 4. Tony Harpers, local restaurant (no current parking by building, parking lot is not paved) 5. Mountain Man Sports Store (good parking options, outside of town center) 6. Van Auken's Inn (limited parking, near train station, outside of town center)
Utica	<ol style="list-style-type: none"> 1. City Hall 2. Radisson Parking Garage
Herkimer	<ol style="list-style-type: none"> 1. Village Parking Lot 2. GEMS (at NYS Thruway exit 30) 3. Herkimer Diamond Mines / KOA Campground (several miles north of Herkimer)

4.3 Central New York

Several municipalities across central NY met with CNYRPDB, Clean Communities of Central New York, and Energetics to discuss EVSE in their jurisdictions. Attendees reviewed goals, timeline, and status of the Central New York Plan to discuss the relevance of EVSE and EVs for meeting town's energy and sustainability goals, and to identify possible public and private locations. The **Fayetteville** Village Board considered and approved the installation of up to two, dual-head charging stations at its Mill Street municipal parking lot. Costs will be a key consideration in what type of station is installed as the Village may not want to shoulder the cost of installing fully networked charging stations. **DeWitt** is considering installing EVSE at the new Carrier Park facility, which will be a suitable location given the expected visitation. Installations should be less costly since it is currently under construction. Subsequently, the Town Board agreed to allocate funds to install one charging station on town property and approved an amendment of the town's zoning ordinance to include the model EVSE installation language. Several private locations may also be suitable for new charging station installations, including major employers such as Bristol Myers Squibb and several large hotels at Carrier Circle.

Within **Syracuse**, the Syracuse University Center of Excellence is a preferred site due to the buildings status as a living, publicly accessible laboratory that has many events and would provide broad exposure to the technology. In addition, many year-round golf courses could be possible sites. **Clay** considered City Hall and its municipal lots for charging station installations, but ultimately elected not to because of cost. Major employers in **Cortland** may consider installation of EVSE, including McNeil and Co., a specialty insurance company that owns an office complex in the downtown district and is currently

expanding and renovating its parking lot. **Camillus** would consider installing EVSE at the new Splash Pad at Camillus Park recreational facility which is currently under construction. However, it is likely to be completed before grant funding is available. A number of private locations in Camillus may be suitable, including major retail shopping centers such as Fairmount Fair, Camillus Commons and the new Township 5, which is still under construction. **Auburn** may consider the installation of EVSE at City Hall or at one of its properties including the municipal parking garage, but it will depend on cost. Suitable private sites for EVSE were identified, including the Harriet Tubman Historic Site, the Finger Lakes Mall/Bass Pro Shops, and Falcon Park.

Table 14. Priority Locations for New Charging Stations in Central New York

Municipality	Priority EVSE Locations
Fayetteville	<ol style="list-style-type: none"> 1. Village Parking Lot at Mill Street 2. Wegmans Plaza on Genesee Street 3. Green Lakes Golf Course
Dewitt	<ol style="list-style-type: none"> 1. DeWitt Town Hall 2. Doubletree by Hilton 3. Challenger Field of Dreams/Willis Carrier Park 4. Drumlins Golf Club 5. DeWitt Town Center
Syracuse	<ol style="list-style-type: none"> 1. Syracuse Center of Excellence 2. Veteran’s Administration Hospital Parking Garage 3. POMCO Group 4. Bellevue Country Club
Cortland	<ol style="list-style-type: none"> 1. McNeil & Co. 2. SUNY Cortland 3. Walmart Supercenter 4. Pall Trinity Micro Corporation 5. Country Inn & Suites
Clay	<ol style="list-style-type: none"> 1. Great Northern Mall 2. Wegmans Plaza 3. Seneca Mall 4. Hampton Inn
Camillus	<ol style="list-style-type: none"> 1. Camillus Commons 2. Fairmount Fair 3. Township 5 4. Camillus Country Club
Auburn	<ol style="list-style-type: none"> 1. Auburn Parking Garage 2. Auburn City Hall 3. Wegmans 4. Finger Lakes Mall/Bass Pro Shops 5. Casey Park Recreation Center/Falcon Park 6. Harriet Tubman Home

4.4 Genesee Region

Genesee Region Clean Communities met with regional municipalities to review the EV Plan and discuss placement of new charging stations. **Canandaigua** has no public charging stations at present, but is a tourist area and destination for commercial, governmental and recreational reasons. The city is interested in supporting an EV station, especially at the lakefront and in the business district. Reception in **Geneseo** was positive to the concept of EV stations and they identified several priority locations. **Batavia** showed continued interest in an EV program and were active in discussing sites, particularly in the downtown area. They will engage in further discussion about locations as well as raise awareness about EVs and EVSE. **Victor** has a very active sustainability community and is very eager to add EVSE to the area. A jointly sponsored (Genesee Region Clean Communities and Victor stakeholders) EV Day was held in November 2015 to gauge stakeholders.

Table 15. Priority Locations for New Charging Stations in the Genesee Region

Municipality	Priority EVSE Locations
Canandaigua	<ol style="list-style-type: none"> 1. Downtown parking 2. NYS Wine and Culinary Center 3. Kershaw Park
Geneseo	<ol style="list-style-type: none"> 1. SUNY Geneseo 2. Downtown Parking Lots/Village owned 3. Livingston Co. Chamber of Commerce
Batavia	<ol style="list-style-type: none"> 1. Genesee County Chamber of Commerce 2. Batavia City Center 3. Generations Parking Lot
Victor	<ol style="list-style-type: none"> 1. Eastview Mall 2. Cobblestone Court 3. Victor/Farmington Public Library

4.5 Greater Buffalo and Niagara

Clean Communities of Western New York met with members of the Greater Buffalo and Niagara Region to present the I-90 corridor implementation project and introduce the Plan and discuss EVSE related zoning/permitting issues as well as recommended locations for installing charging stations. **Buffalo** Building Owners and Managers Association has hundreds of building owners represented as stakeholders and new construction projects are opportunities to implement the EVSE conduit and siting requirements from the beginning plan. They share information on EV charging stations in their newsletter. **Erie County** representatives feel that adoption of EVs and EVSE is a long-term project to consider, with the Parks Department most interested in EVs and the build out of EVSE. The Parks

department will be pursuing funding for EVSE vehicles and charging stations through a recent released NYS grant geared for municipalities. The town of **Cheektowaga** has some existing EVSE infrastructure in place, but they are supportive of additional charging locations. Expanding publicly accessible locations is beneficial to the Town’s ability to attract shoppers and tourists to the area. **Amherst** was very interested in the EVSE plan for the region and committed to recommending EVSE charging locations for new development projects. The Village of **Williamsville** has a potential site where condominiums are being developed that are targeting the Millennials age group, which tend to have greater adoption rates of new technologies. Other proposed new construction projects involving hotels, condos, and business building in the Village of Williamsville may also be a good fit for installing charging stations.

Table 16. Priority Locations for New Charging Stations in Greater Buffalo and Niagara

Municipality	Priority EVSE Locations
Buffalo	<ol style="list-style-type: none"> 1. Erie County Medical Center 2. Niagara Frontier Transportation Authority Lot on the University at Buffalo South Campus 3. Canalside 4. Buffalo Zoo 5. Buffalo Science Museum
Amherst	<ol style="list-style-type: none"> 1. University at Buffalo North campus 2. Daemen College 3. Park-n-Ride at Main St./Union 4. Boulevard Mall
Williamsville	<ol style="list-style-type: none"> 1. Erie Community College - North Campus 2. Amherst Town Hall 3. Eastern Hills Mall

5 Conclusions

The Project Team found the project approach to be very successful at engaging communities and key stakeholders on this topic. Each region enlisted a very engaging working group that provided valuable input to the Plans and the MPOs. Every meeting provided an opportunity to share the Team's knowledge on EVs and charging stations with the participants who were able to get answers to any questions they had on the technology or implementation strategies. In total, there were 72 working group members among the five regions that contributed to the Plans. The MPO presentations engaged approximately 100 additional key stakeholders in these regions. The Project Team held meetings with 25 different municipalities along the I-90 corridor to discuss EV charging stations that included a range of interactions from one-on-one meetings with a Mayor to presentations at public board meetings with many attendees.

The recommendations for additional EV charging stations to address each region's infrastructure needs varied between regions with priority municipalities without an EV charging infrastructure (and little to no EV population) and others prioritizing the addition of infrastructure where large EV populations need charging opportunities in key locations. There is a need for charging stations in both settings. In larger cities where people are purchasing and driving EVs, a patchwork of charging stations has popped up, but at locations where owners are willing to invest and may not always be the most convenient places for EV drivers. The placement of strategically located stations in larger cities at key venues is needed to establish charging infrastructure that can support current and future EV drivers. However, EV drivers don't want to be restricted to their own community, so there is a need for charging infrastructure throughout NYS, and particularly in key tourist destinations. Many of these communities do not currently have an EV population and aren't seeing visitors with EVs because there is no charging opportunity. Installing a charging station would likely start to attract EV drivers while being a great opportunity to expose local communities to EV technology. The expanded offering of EV models is providing electrification options that even rural drivers can benefit from.

Discussions related to the placement of DC fast charging stations through regions provided insightful suggestions on various locations, but also brought up several challenges. Due to the expense of DC fast charging stations, it is important to utilize this infrastructure to its full extent. For that reason, while placing them on I-90 rest areas seems logical, if there is an opportunity to site them near a NYS Thruway exit the local population could utilize the station in addition to the EVs in transit. These might also present an opportunity to attract EV drivers (while for a short time, but still long enough to make a purchase or two) to these cities. This situation works well for cities that are very close to the NYS Thruway, but others such as Rochester, would likely need to place the DC fast charger in a suburb that is right off I-90. This strategy of placing the DC fast chargers just off the NYS Thruway has an established precedent with Tesla who has done that throughout the State and builds off a well-established highway with several shopping plazas, truck stops, casinos, and other establishments very near the exits. However, planning the placement of the DC fast charging stations on a regional level is challenging because establishing proper distances between the stations will depend on the nearest location in a neighboring region. Therefore, a roadmap for strategically placing DC fast chargers along the I-90 corridor, and all other major NYS highway corridors, would be best compiled at a State-level rather than regionally. However, the suggested locations provided through these Plans would be a good starting point for strategically placed DC fast charging stations. The other point of discussion that came up with many of the working groups when discussing DC fast charging stations was the proper distance apart to place them. Battery and vehicle technology is changing rapidly and typical electric ranges for EVs sold last year will be significantly lower than the electric range available in EVs scheduled to be offered next year. If a significant investment into DC fast charging is made in NYS, it should be coordinated as best possible to create infrastructure that can serve both current and future EVs.

Analyzing the most critically identified EV-readiness barriers across all five I-90 corridor regions, a handful were priorities for most regions while others were not. DC fast charging infrastructure and site planning were priorities in four of the five regions. Establishing a DC fast charging infrastructure, as discussed in the previous paragraph, is something that many working group members felt would make a significant impact on EV use in these communities. It is likely premature to establish regulations that require charging infrastructure in most communities (although this was a high priority listed for the Greater Buffalo and Niagara Region), but introducing and educating developers about EV charging stations during site planning is something that would be valuable. A recently funded NYSERDA

project to work with Municipal Planning Boards on this topic will soon be underway and hopefully provide some much needed education and resources. Other highly ranked barriers among the five regions include the lack of car dealership support, lack of knowledge by car buyers to make an informed decision about whether to consider an EV, lack of EV knowledge by elected officials, and high costs for EVs and charging stations. Many upcoming ChargeNY initiatives and NYSERDA projects are providing possible solutions to many of these barriers.

The finalized EV Charging Station Plans established a strategic path for each region to expand EV charging infrastructure and facilitate increased EV use. These provided an opportunity to meet with the chosen municipalities for an introduction to EVs, charging stations, and this regional Plan. Almost every municipality agreed to meet and the Project Team was able to inform certain key stakeholders (Mayors, board members, etc.) on EV-readiness. While a small handful of these municipalities did not find sufficient support or have enough interest to hold a second meeting to discuss more specifics on installing an EV Charging Station, most locations presented sites with a strong potential to install a station during the follow-up meeting. If a municipality did not express an interest in having a follow-up meeting, another municipality from the second tier of recommended locations was approached. These meetings have produced solid leads for new charging station sites and in some locations have approved municipal funds to contribute to the costs. Although no EV charging station installations were immediately pursued, with the knowledge that funding will soon be available through either NYSERDA or NYSDEC, all are ready to move forward as soon as the funding details are known. For municipalities to install these stations themselves, there would likely be little or no upfront costs to get approval. In some cases, there may be municipality staff that can do some or part of the charging station installation to reduce out-of-pocket costs. A privately-owned site option for the EV charging station installation was also identified for most locations that could leverage the existing state and federal tax credits to lower the incurred costs. In general, municipalities and businesses are interested in having EV charging stations as they recognize their value and are noticing more EVs driven by residents and clients. However, the ultimate decision to invest in a charging infrastructure is greatly influenced by cost and will depend on the available incentives or grant funding. This is particularly true for these recommended locations because many have been selected due to the exposure and value for EV drivers and not necessarily the charging station host.

Appendix A: Working Group Members

A.1 Capital District

- Kate Lawrence, City of Albany
- Mike Williams, Capital District Transit Authority
- Ross Farrell, Capital District Transit Authority
- Joe Berman, Schenectady County Environmental Advisory Council
- Paul Dietershagen, Capital District EV Drivers Group
- Todd Fabozzi, Capital District Regional Planning Commission
- Jim Yeunger, Climate Action Associates
- Robyn Reynolds, Climate Action Associates
- Jason Jones, University at Albany
- Laura Robertson, Town of Niskayuna
- Mike Lyons, Town of Colonie
- Chuoran Wang, New York State Department of Conservation
- Nathan Putnam, New York State Department of Conservation
- Sam Wells, Capital District Transit Authority
- Thomas Ashley, Greenlots.com

A.2 Mohawk Valley

- Dana Crisino, Herkimer-Oneida Counties Transportation Study
- Jeff Quackenbush, Oneida County Department of Planning
- William Roehr, Montgomery County Department of Planning
- Sean Geraghty, Fulton County Planning Department
- Ryan Fagan, Town of Johnstown
- Tedd Riehle, Town of Webb
- Frank Tallarino, City of Rome
- Mike Dorsino, City of Rome
- Karen Sullivan, Otsego County Planning Department
- Rick Hulse, Otsego County Representative
- Dennis Davis, Oneida County Department of Public Works
- Fred Arcuri, Mohawk Valley Edge
- Sheri Ferdula, Herkimer County
- Richard Reichert, Herkimer Oneida Counties Comprehensive Planning Program
- Chris Lawrence, City of Utica
- Mary Wrege, Cornell Cooperative Extension Oneida County
- Tim Peters, Otsego Rural Housing Assistance

A.3 Central New York

- Aimee Clinkhammer – NYSDEC/Clean Communities Board
- Brian Pincelli – US Green Building Council Upstate New York Chapter
- Sarah Stephens – Synapse/Clean Communities Board
- Lauren Staniec – Pyramid/Clean Communities Board
- Sean Vormwald – Onondaga Community College Sustainability
- Jon Rauscher – City of Oneida Engineering
- John Zepko – Cayuga County Department of Planning & Economic Development
- Scott Ingmire – Madison County Planning
- Rebecca Klossner – City of Syracuse Dept. of Planning
- Sam Gordon – Town of Dewitt Planning
- Jim D’Agostino – SMTC Director
- Mario Colone – SMTC
- Chris Gorman – National Grid
- Rick Martin – Syracuse University Energy Systems & Sustainability Management
- Mark Lichtenstein – SUNY-ESF Sustainability
- Ken Elander – Burdick Motors
- Daniel Bennett – Graystone GCMS Inc.
- David Holder – Syracuse Convention & Visitors Bureau

A.4 Genesee Region

- Lora Barnhill, NYSDOT
- Rochelle Bell, Monroe County
- George Beckinghausen, Citizen and EV Owner
- Joseph Bovenzi, Genesee Transportation Council
- Enid Cardinal, Rochester Institute of Technology
- Barbara Johnston, LaBella Associates
- Bob Kanauer, LTHS Solar
- Amy Kadrie, University of Rochester
- Hugh Kierig, University of Rochester
- Bill LaBine, Renewable Energy Works
- Amy Lopez, SAFE
- Felipe Oltramari, Genesee County
- Kara Ostrander, NYS Thruway Authority
- Anne Spaulding, City of Rochester
- Greg Spaulding, Genesee Region Clean Communities

A.5 Greater Buffalo and Niagara

- Hal Morse, Greater Buffalo Niagara Regional Transportation Council
- Kelly Dixon, Greater Buffalo Niagara Regional Transportation Council
- Ali Adelman, Wendel Companies
- John Havrilla, Wendel Companies
- Gary Marchiori, Energy Mark
- Cliff Mason, National Fuel
- Bob Reynolds, National Grid

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