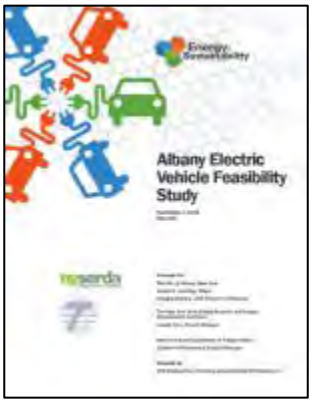
OVERVIEW

BACKGROUND

For a new technology such as the electric vehicle (EV), which requires coordinated construction of infrastructure and widespread education and outreach, careful planning is essential. Public EV charging stations are important to EV drivers to have 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 the new technology. EV charging station planning is complex because of the different factors considered by drivers when planning trips, including the different types and speeds of EV charging stations. Educating decision makers and key stakeholders is critical. A number of initiatives have recently been undertaken to support EV readiness nationally (through the Department of Energy Clean Cities EV readiness grants), within New York State (chiefly through efforts by NYSERDA), and even locally in some cases.

OBJECTIVE

The objective of this project is to develop a regional EV Charging Station Plan that identify gaps where public infrastructure is not available to support EV drivers and suggest further infrastructure deployments in key locations to establish a comprehensive charging network. Capital District Clean Communities and Energetics Incorporated will lead this effort for the Capital District. They will help address any implementation barriers and work with municipalities to encourage and prepare for public EV charging station installations.



Completed in May 2012, the **Albany Electric Vehicle Feasibility Study** is a related activity that was done for the City of Albany. The Capital District EV Charging Station Plan will include some similar aspects and approach of the Albany Electric Vehicle Feasibility Study, but address EV infrastructure planning at a regional level. Since 2012, there have been a lot more EV charging stations installed and lessons learned from where EV infrastructure is most used. www.albanysustainability.com/documents/Albany_EV_Final%20Plan.pdf

THE EV CHARGING STATION PLANS

The EV Charging Station Plan will assess the region's current EV-readiness (including local government engagement, number and type of publicly accessible chargers, number of EVs, utility programs, local EV supporters, and other incentives), identify areas that lack EV infrastructure (places where there are no Level 2 charging stations within 5-20 miles and an EV driver passing through the area would not have a feasible option to charge if they need one), and make 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 should create a comprehensive network to support EV drivers that includes public Level 2 charging stations and DC fast chargers. The plans will describe networks that support both intra-regional and inter-regional travel in Upstate New York. Elements of the EV Charging Station Plans are;

- Define **objectives** (based on promoting EV travel both within and between regions)
- Identify **key EV infrastructure deployment stakeholders** in the region
- Briefly present **background information on EVs and chargers** with references to the previously created documents assembled by the Northeast Electric Vehicle Network
- Highlight any **region-specific issues related to EV or infrastructure deployment** that will need to be addressed (i.e. utility rates that discourage EV charging, zoning laws that restrict the placement of EV charging stations, or demographics that would not be supportive of successful deployments [high rates of copper theft for example that might require additional precautions])
- Provide information (with GIS maps) on the **current EV infrastructure landscape and EV use** in the region to determine locations where Level 2 or higher charging infrastructure is not readily available within 5-20 miles
- Develop **recommendations** that address the identified EV charging station network gaps and would make each region more EV-accessible

APPROACH AND TIMELINE

Introductory Presentation [May]: The Project Team shall introduce the project of developing a regional EV Charging Station Plan to each MPO region and summarize the EV infrastructure currently available to support EV-readiness.

Plan Development [May-August]: A regional working group will be established to serve as advisory committees to the development of the EV Charging Station Plan for each region. Invited members of the working group may include MPO staff, municipalities, developers, utilities, retailers, employers, universities, and other interested parties. The working group members will receive preliminary materials and provide input at the following stages:

- **Preliminary investigation [June]:** given documentation on the current EV infrastructure landscape and EV use, the working group shall provide input on potential locations for new EV charging stations and region-specific issues related to technology deployment
- **Developing recommendations [July]:** a comprehensive list of potential locations, issues, and partnerships will be compiled and shared for the working group to prioritize
- **Draft EV Charging Station Plan [August]:** a draft of the complete EV Charging Station Plan will be shared for feedback and comments.

Presentation of the EV Charging Station Plan [September]: The Final EV Charging Station Plan will be presented to the MPO region to share the results and obtain approval for publication.

Initial Dissemination Meetings [October-December]: Based on the EV Charging Station Plan recommendations, the Project Team shall approach officials and key EV stakeholders from four key municipalities/jurisdictions within the MPO region to share the EV-related resources available to them, discuss barriers limiting EV infrastructure installations, and talk about the need to prepare for and encourage new EV charging station installations.

Follow-up Dissemination Meetings [December-February]: The Project Team shall hold follow-up meetings with officials and key EV stakeholders from the same four key municipalities/jurisdictions to put a strategy into action for addressing key barriers preventing EV infrastructure installations and preparing for the future EV charging station installations.

Preliminary Investigation Information

Electric Vehicles

Hybrid electric vehicles (HEVs) supplement the internal combustion engine with electrical power produced by an on-board electric motor. The electrical system acts as a generator when a driver applies the brakes, converting kinetic energy into electrical energy that is stored in a small battery pack. Gasoline or diesel is still the primary fuel. Electric vehicles (EVs) take the HEV concept further, using a larger on-board battery for extended electric-only range. The driver charges the battery by plugging the vehicle into a charging outlet. When running on electricity, EVs are able to completely offset the use of gasoline, eliminating all tailpipe emissions.

Two different types of EVs are available: plug-in hybrid electric vehicles (PHEV) and battery electric vehicles (BEV). A PHEV is an HEV with a larger battery that requires a plug to recharge, but it keeps a gasoline or diesel engine as a backup. Some variations are called extended range EVs, or EREVs. After the battery energy is exhausted, the engine starts and the vehicle acts like a normal HEV until it is plugged in to recharge. BEVs fully remove the gasoline or diesel powertrain and replace it with an electric powertrain consisting of an electric motor, power electronics, and a battery pack. BEVs have a longer all-electric range than PHEVs, but do not have a fuel backup when the battery is depleted.

Using electricity as a vehicle fuel is currently less expensive per mile than gasoline, and can be even more cost effective if the EV driver takes advantage of off-peak electricity rates. Current BEVs can travel between 60 and 265 miles on a single charge and take at least 30 minutes to recharge the battery. A gasoline vehicle will be able to travel 300-500 miles on a single tank and can refuel in less than five minutes. This “range anxiety” can often be solved with careful planning (including being sure to plug in every night and knowing where charging stations are along your route), or through the purchase of a PHEV to have a gasoline engine in reserve. PHEVs have ranges similar to gasoline vehicles, but typically only run on electricity for the first 10 to 40 miles.

PHEV models available for purchase in New York State;

BMW i8 w/ Range Extender
Starting MSRP: $135,700
Federal Tax Credit: $3,793
MPG Equivalent: 76
Electric Range (miles): 15

Cadillac ELR
Starting MSRP: $75,000
Federal Tax Credit: $7,500
MPG Equivalent: 82
Electric Range (miles): 37

Chevrolet Volt
Starting MSRP: $34,170
Federal Tax Credit: $7,500
MPG Equivalent: 98
Electric Range (miles): 38

Ford C-Max Energi
Starting MSRP: $31,770
Federal Tax Credit: $4,007
MPG Equivalent: 88
Electric Range (miles): 21

Ford Fusion SE Energi
Starting MSRP: $34,800
Federal Tax Credit: $4,007
MPG Equivalent: 88
Electric Range (miles): 21

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

Porsche Panamera S E-Hybrid
Starting MSRP: $96,100
Federal Tax Credit: $4,751
MPG Equivalent: 50
Electric Range (miles): 16

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

BEV models available for purchase in New York State;

BMW i3 BEV
Starting MSRP: $42,400
Federal Tax Credit: $7,500
MPG Equivalent: 124
Electric Range (miles): 81

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

Telsa Model S
Starting MSRP: $71,070
Federal Tax Credit: $7,500
MPG Equivalent: 95
Electric Range (miles): 208

Ford Focus Electric
Starting MSRP: $29.170
Federal Tax Credit: $7,500
MPG Equivalent: 104
Electric Range (miles): 76

Nissan Leaf
Starting MSRP: $29,010
Federal Tax Credit: $7,500
MPG Equivalent: 115
Electric Range (miles): 75

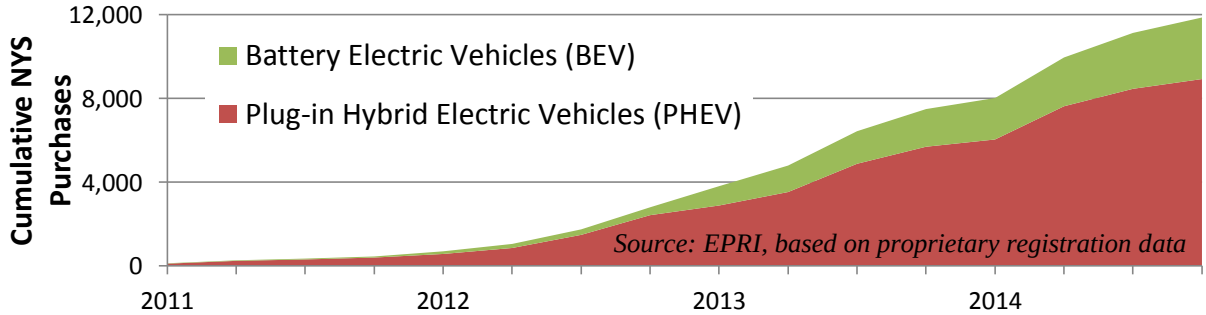
Volkswagen e-Golf
Starting MSRP: $35,445
Federal Tax Credit: $7,500
MPG Equivalent: 116
Electric Range (miles): 83

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

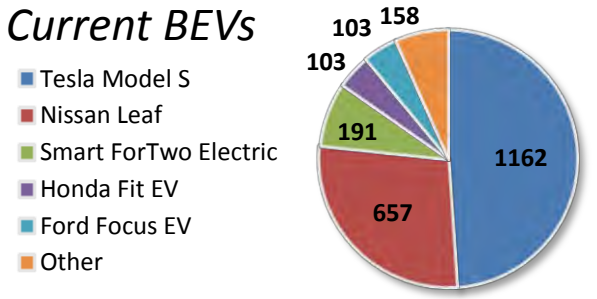
Smart Electric Drive
Starting MSRP: $25,000
Federal Tax Credit: $7,500
MPG Equivalent: 107
Electric Range (miles): 68

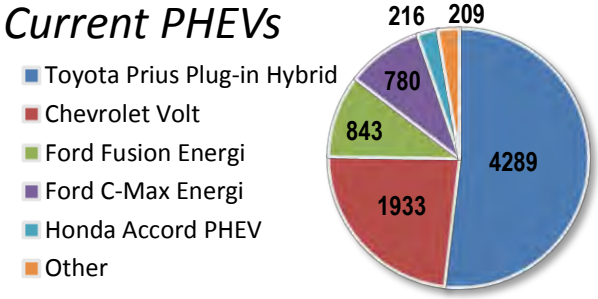
The **Literature review of EV use in the Northeast** is a market summary and literature review provides an overview of EV deployment in the Northeast as of 2012. The document is intended to serve as a resource for consumers and policymakers who seek to better understand the nature of and challenges facing EV deployment in the Northeast.
www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/PEV-Deployment-in-the-Northeast.pdf

EV ownership in New York State has been increasing rapidly in the past couple of years.

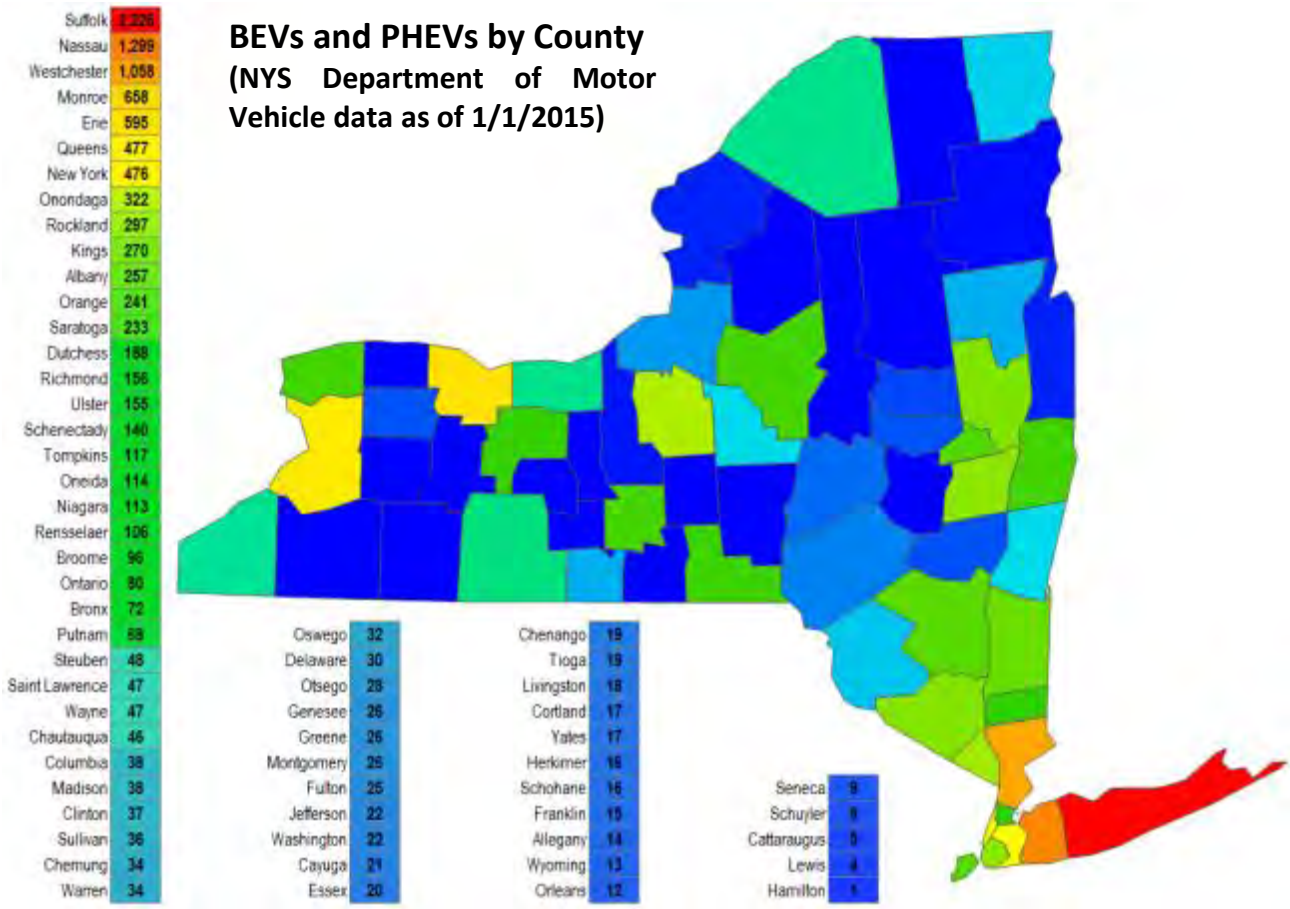


Three PHEVs are registered in New York State for every BEV, but a variety of models being purchased for both technologies. In 2014, EVs accounted for less that half a percentage (0.45%) of all vehicle sales, while HEV sales were at 2.3% of all vehicle sales.





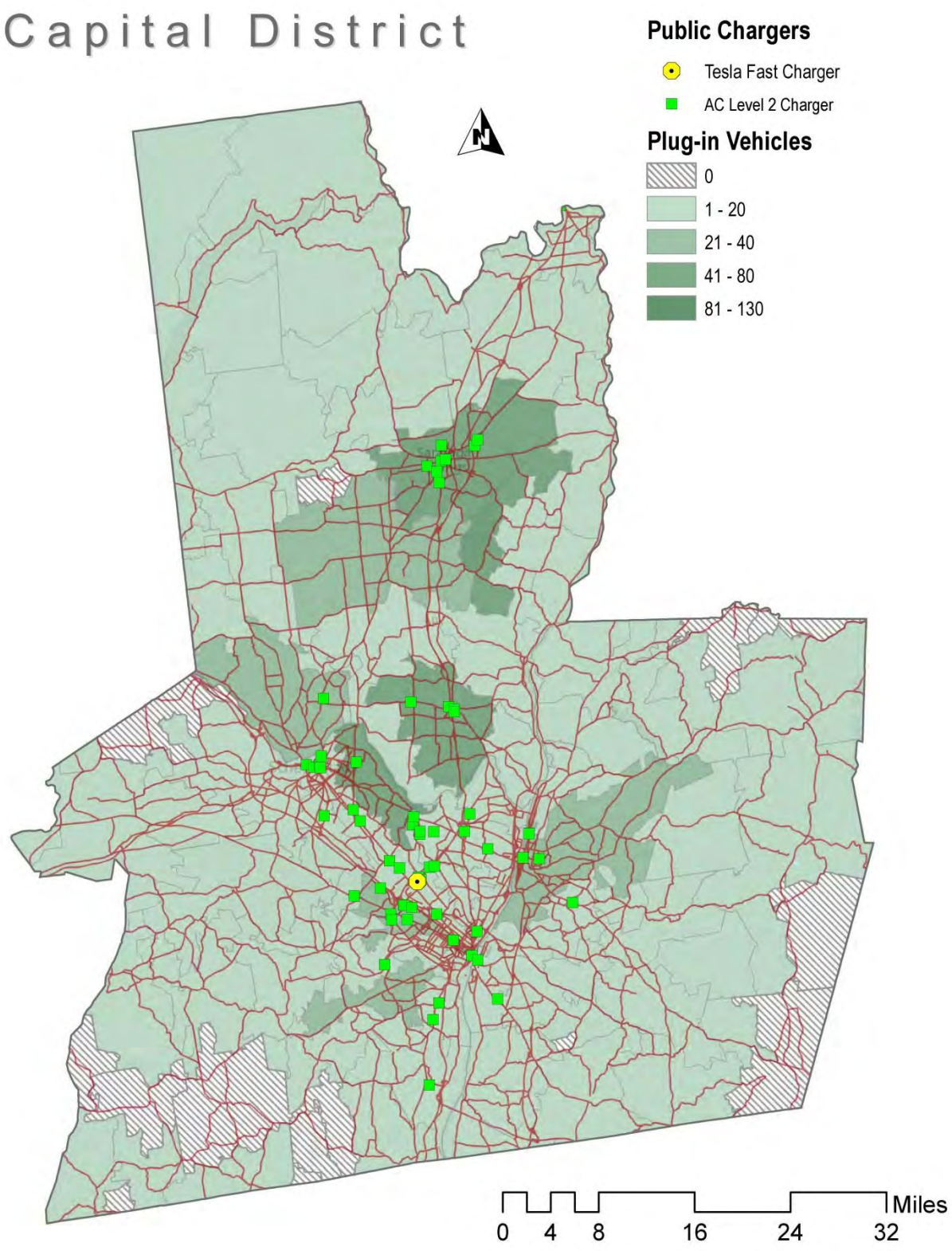
Different parts of New York State have seen greater adoption of EVs.

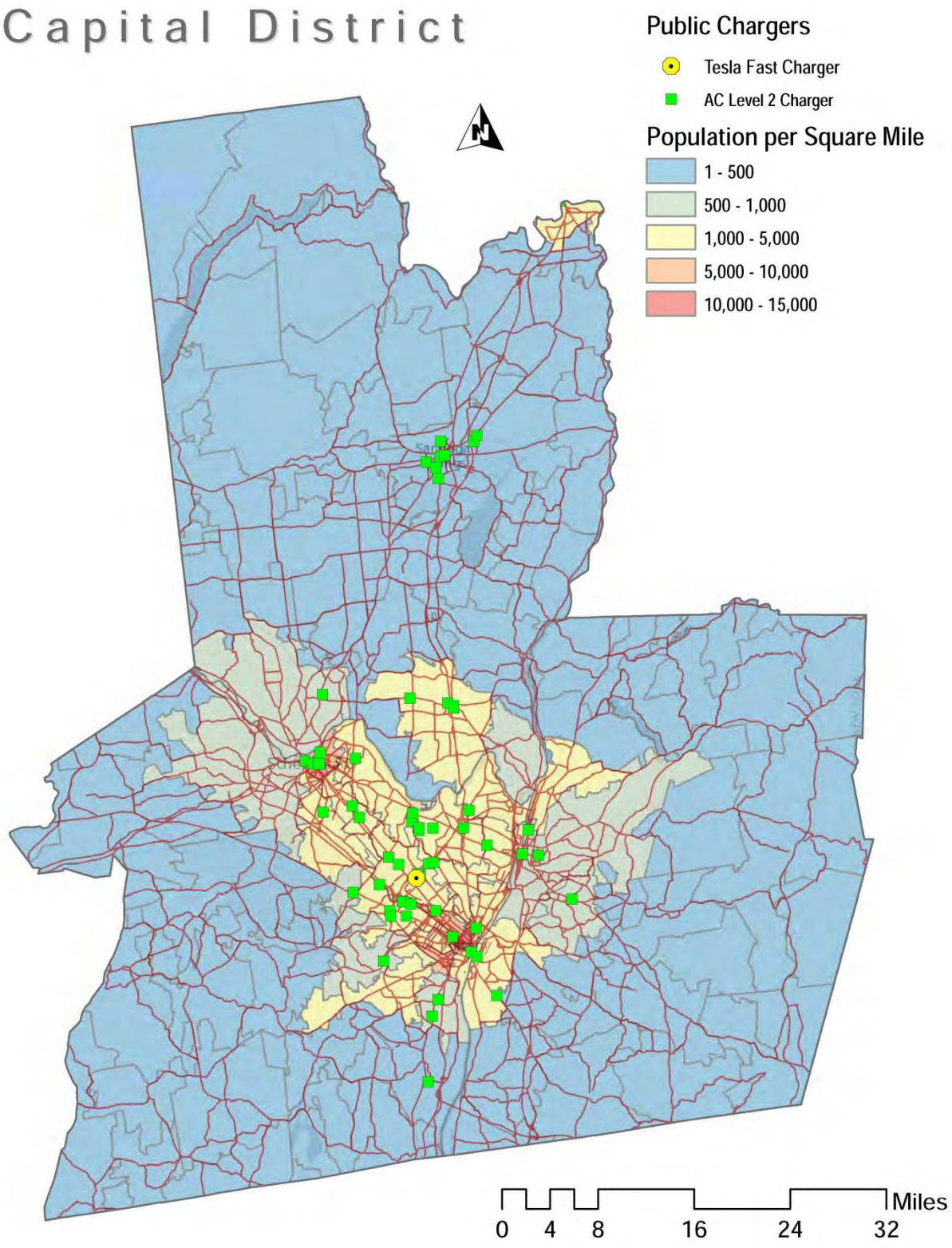


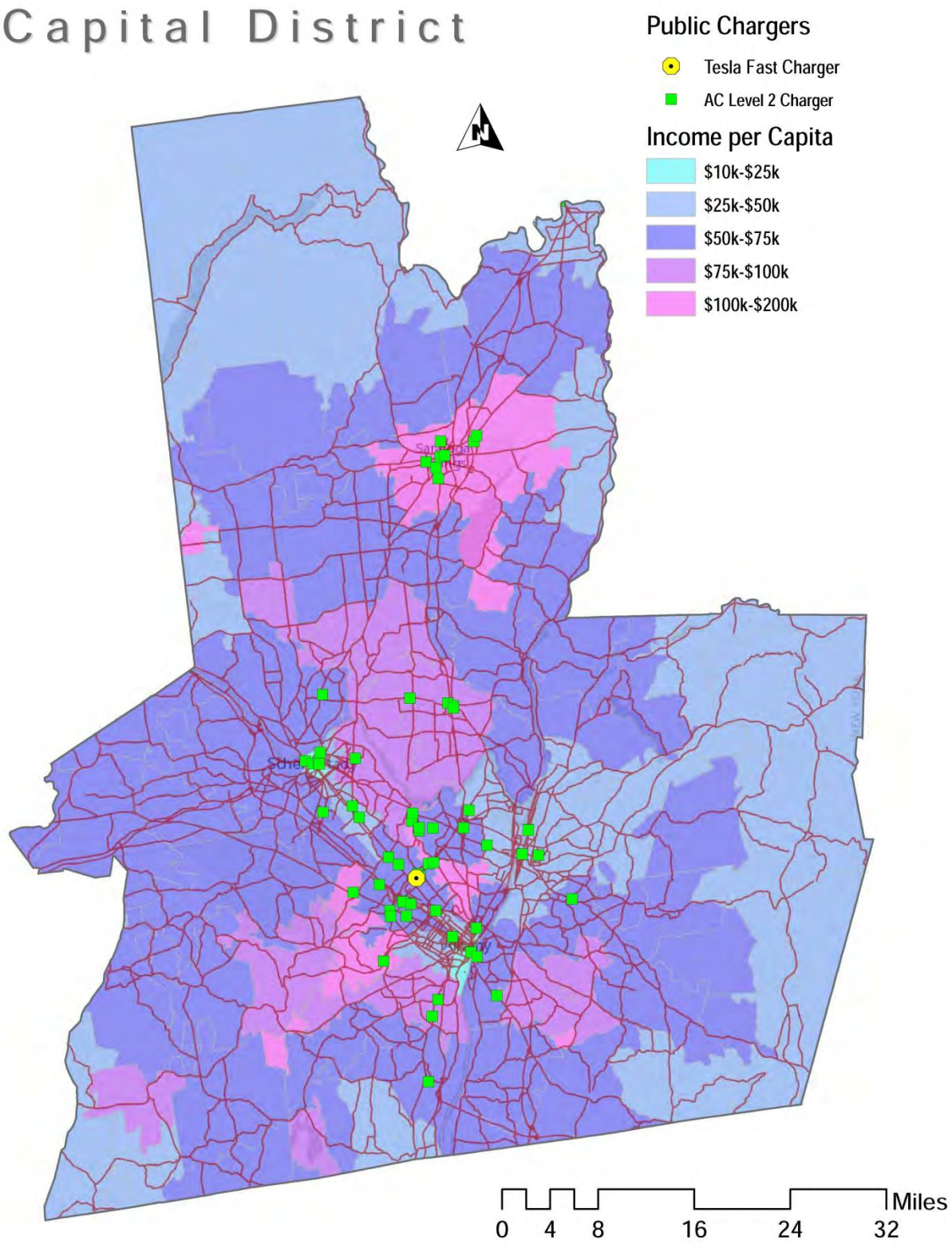
The **Assessment of Current Charging Station and EV Deployment** for the Northeast found that;

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

The maps of the Capital District on the following pages show plug-in electric vehicle ownership by zip code as compared to population and income per capita. Public EV charging locations are also included for reference.


Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Plug-in Vehicles
0
1 - 20
21 - 40
41 - 80
81 - 130
N
Miles
0 4 8 16 24 32


Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Population per Square Mile
1 - 500
500 - 1,000
1,000 - 5,000
5,000 - 10,000
10,000 - 15,000
N
Miles
0
4
8
16
24
32


Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Income per Capita
$10k-$25k
$25k-$50k
$50k-$75k
$75k-$100k
$100k-$200k
Miles
0
4
8
16
24
32

EV Charging Infrastructure

EV drivers have various options available to plug in and charge their batteries at charging stations, which are also referred to as electric vehicle supply equipment (EVSE). For the majority of users, a home charger can fulfill almost all of their charging needs. Public charging stations are used to recharge EVs while drivers are at work, shopping, or at other destinations, which help expand the functionality of electrification technology for many owners. For many EV owners, the vehicle they select will accommodate their normal daily driving needs without needing to charge during the day. However, if that owner needs to run extensive errands one day, wants to take their EV to a recreational destination in the evening or on weekends, or is pushing the limits of their EV's battery range in the winter when it operates less efficiently, they will want to find an opportunity to get an additional charge during the day. For some EV owners, installing a charger at their primary residence may be challenging (e.g. if they are renting or have an older house with insufficient electrical capacity to add more load) and will need charging infrastructure at their workplace or a public venue to feasibly use an EV.

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

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

AC Level 2 Charging provides electrical energy at either 240 VAC (typical for residential applications) or 208 VAC (typical in commercial and industrial applications). This level of charging is viable for both residential and public charging locations. Unlike AC Level 1 charging, AC Level 2 charging requires additional hardware that can be mounted on the wall, to a pole, or as a stand-alone pedestal. It must be hard-wired to the electrical source. The increased charging rate and affordability of AC Level 2 charging stations make them the most popular choice for all EV charging applications. It provides up to 7.2 kilowatts (kW) for residential and up to 19.2 kW for commercial, which typically results in *10 to 20 miles of range added per hour of charging time*. Hardware cost: $450-5,000.

DC Fast Charging utilizes direct-current (DC) energy transfer and a 480 VAC input to provide extremely rapid recharges at heavily used public charging locations. The type of station is generally cost prohibitive for home applications. However, depending on the EV, *DC fast charge stations can provide an 80% recharge in as little as 20 minutes*. This option is only available on certain EVs. Hardware cost: $7,000-$40,000. Tesla's Supercharger Network offers DC fast charge for free, but is only available for Tesla owners. The network currently covers many major travel corridors across North America. Each Supercharger offers 120 kW charging (about 140 miles of range in 20 minutes).

Connectors, or plugs, for AC Level 1 and Level 2 charging station plugs have been standardized to allow owners of all EV models to utilize the same charging infrastructure. The industry standard for AC Level 1 and AC Level 2 charging is the Society of Automotive Engineers (SAE) J1772 connector, which provides significant safety and shock-proof design elements. Up until 2013, the Japanese CHAdeMO connector was the only DC fast charge standard connector, available on both the Nissan Leaf and Mitsubishi i-Miev. In early 2013, the SAE J1772 connector standard was expanded to include DC fast charge with the SAE J1772 Combo connector, which is available on the Chevrolet Spark, Volkswagon e-Golf, and BMW i3. Tesla uses a different proprietary connector, but includes a SAE J1772 compliant adapter cable with each vehicle sold and offers adapters for CHAdeMO and SAE J1772 Combo connections for an additional price.

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

AC Level 1 charging stations are most suitable for residential overnight charging. However, because of their low cost and lower power draw from the grid, AC Level 1 can also be an effective option for locations where EVs are parked all day long, especially PHEVs that have smaller battery packs. This includes workplaces, commuter lots, or long term parking at airports. AC Level 2 charging stations are more durable and work well for public venues where an EV may be parked for 2-6 hours. DC Fast Chargers require a significant investment and draw considerable power, but they are neccesary for inter-metro travel by EVs that wish to use major highways and go father than the distance available from one battery charge. DC Fast Chargers may also be effective in urban areas with a high population of EVs because they provide

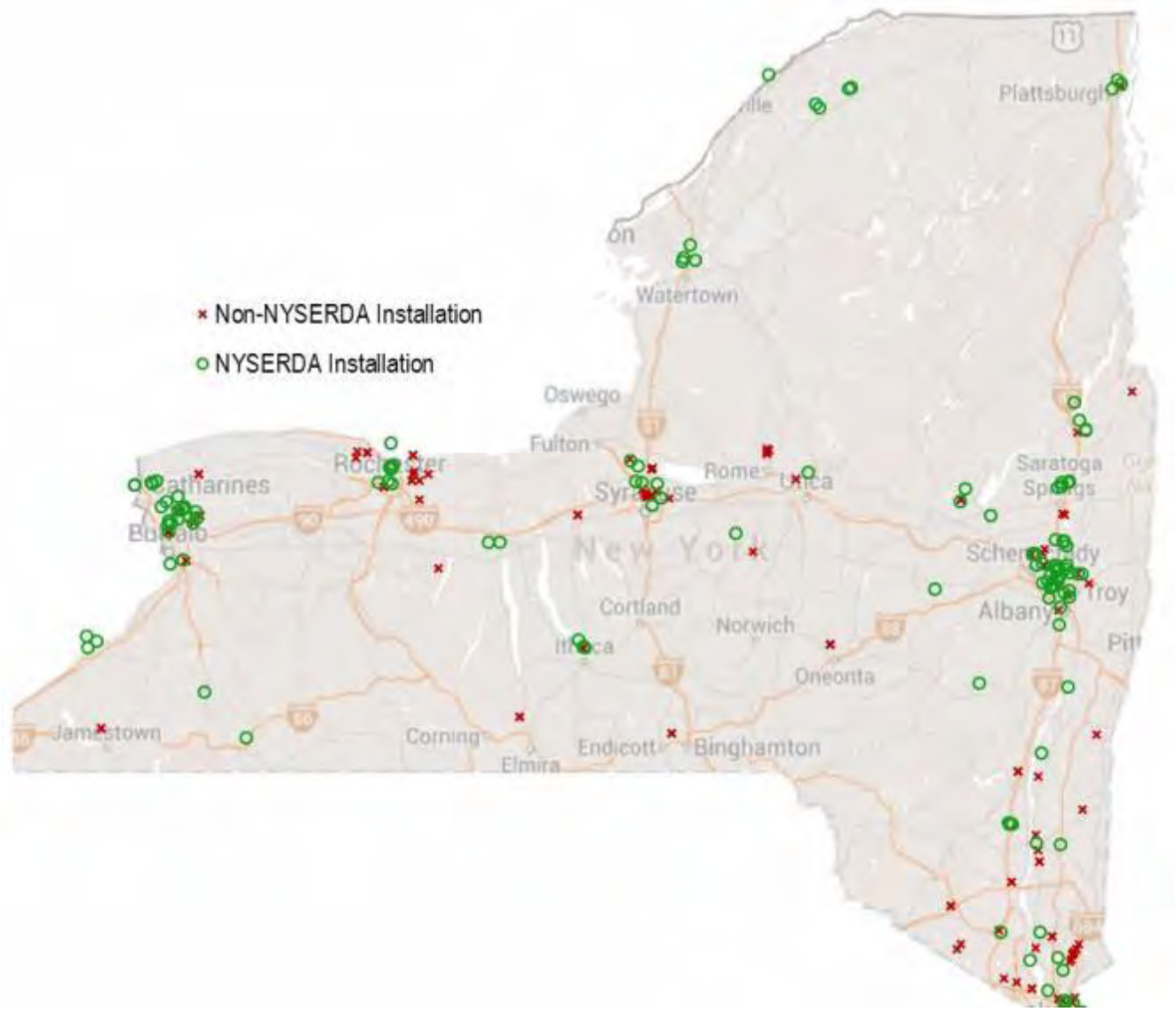
convineince over AC Level 2 charging (much shorter time) and they don't require a large number of parking spaces that would be needed to charge a lot of EVs using AC Level 2 chargers. Higher power draw by a charging station can lead to increased electrical costs for the facility, but some applications may be able to take advantage of lower off-peak electrical rates with a time-of-use schedule if the EV charging will occur durign off-peak times (night).

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

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

As of 2013, New York State provides an **income tax credit for 50% of the cost, up to $5,000**, for the purchase and installation of alternative fuel vehicle refueling and electric vehicle recharging stations. The New York State Alternative Fuel Vehicle Recharging Tax Credit for commercial and workplace charging stations is available through December 31, 2017.

As of January 1, 2015, **New York State had 973 total public EV charging outlets** or ports. This number represents the number of EVs that could plugin at one time and differs from the number of charging stations, since many charging stations have two charging ports. Some locations have multiple charging stations, so there are even fewer charging station locations than number of stations. NYSERDA has funded 431 new EV charging port installations since 2012 which has significantly increased the public EV charging infrastructure in the state. In addition to the maps below, the U.S. Department of Energy maintains an interactive map of alternative fuel station locations (which includes EV charging in New York: www.nyserda.ny.gov/Cleantech-and-Innovation/Electric-Vehicles/Tools/Electric-Vehicle-Station-Locator).



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

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

Installing EV charging stations at workplaces can be very successful at the right business and have benefits for employers and their employees alike. EV charging stations can attract and retain desirable employees. EV drivers are typically tech-savvy and highly educated, qualities many employers seek in prospective employees. Charging stations visibly demonstrate an organization's commitment to sustainable energy consumption and complement other environmentally friendly initiatives. Some workplace charging locations are able to serve employees and visitors, as well as the general public. Two key examples are;

- Colleges or Universities
- Medical Campuses

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

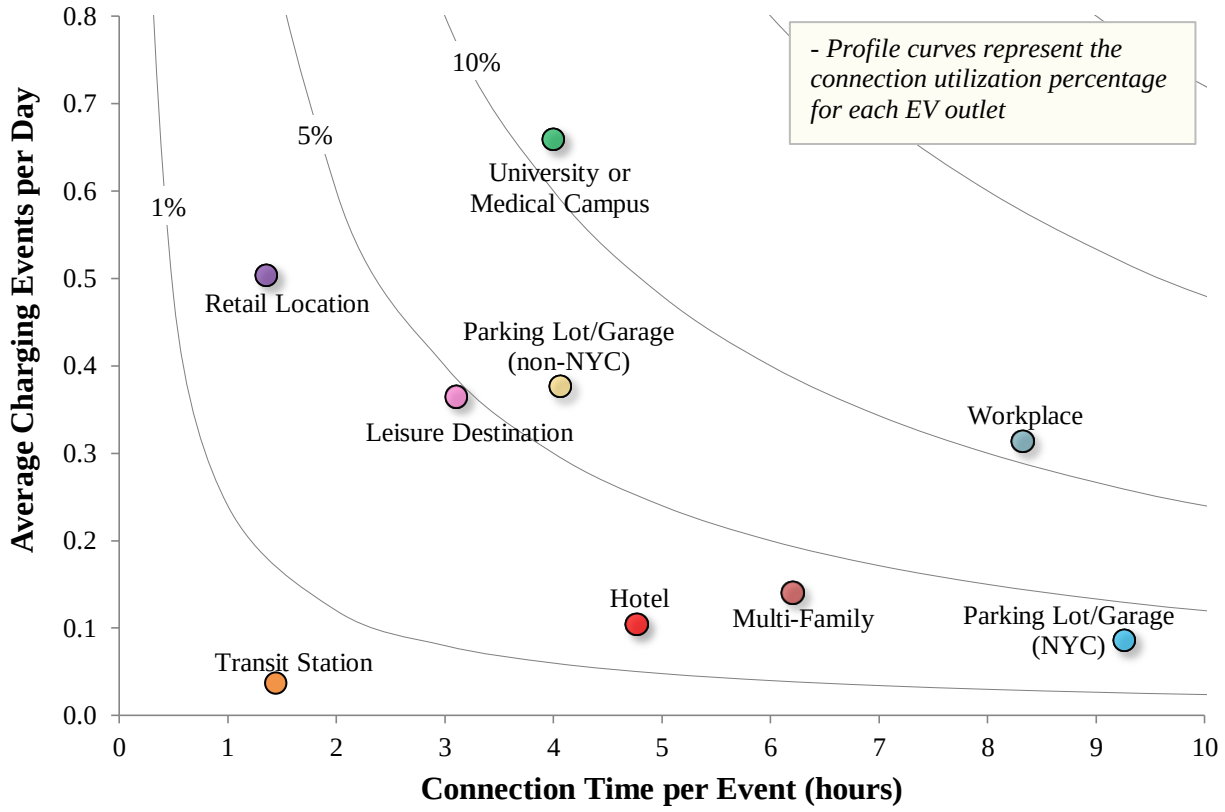
- Regional transit (commuter lots)
- Downtown multi-purpose parking lots or garages
- Retail destinations (malls or outlets with multiple stores)
- Popular year-round leisure destinations

The **Charging Station Cluster Analysis** walks through the location types where EV charging infrastructure might be installed and informs decision-makers and prospective EV charging station hosts of which factors make a good EV charging location. Targeting locations for EV charging infrastructure rollout through this cluster approach can help create a system of EV charging in the critical early stages of EV adoption. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/EVSE-Cluster-Analysis.pdf

In 2012 and 2013, NYSERDA awarded $8 million to 14 organizations through its Charging Station Demonstration Program to install AC Level 2 EV infrastructure, from Long Island to Buffalo. These installations, which will be about 900 charging outlets in total, represent a wide range of business models and approaches to providing public charging infrastructure. Charging station data is regularly collected and analyzed. The following results are from 2014 data.

- EV charging stations in **New York City (NYC) dispensed approximately 3 times more energy per charge event** than EV charging stations in most other parts of the State.
- EV charging stations in **Western NY and Rochester/Finger Lakes areas were occupied more** (a vehicle was plugged into a port an average of 11.2% and 9.9% of the time respectively) than EV charging stations in other parts of the State.
- EV charging stations that **charged a fee for use** (most of which were in NYC) had **fewer charge events per day** (0.08 verses 0.36 charge events per day at free stations), but dispensed **more energy per charge event** (21.7 kWh verses 6.5 kWh per charge event at free stations).
- The **average plug-in time per charge event differed for various location types.** Shortest was the Retail locations (1.4 hours) and Transit Stations (1.5 hours), followed by Leisure Destinations (3.1 hours), non-NYC Parking Lot/Garage (4.0 hours), and University or Medical Centers (4.0 hours). NYC Parking Garages and Workplaces showed the longest plug-in times per charge event, with an average of 9.3 and 8.3 hours respectively.

Comparison of Public NYS EV Charging Station Usage – *by Venue*



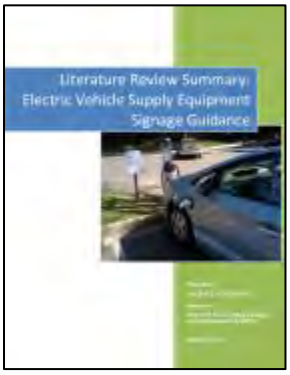
In addition to the EV charging station's location, **where it is placed onsite and how it is installed will also impact the ease of use for EV drivers and station cost effectiveness**. Charging station installation costs can exceed the cost of the hardware itself and are influenced by a number of factors that should be considered when determining if a site is good and where to install the charging station on the property. The largest factor can be the currently available electrical service. All new charging station installations should have a load analysis performed on the facility's electrical demand to determine if there is capacity to add EV charging stations. Upgrading electrical service would add significant cost to the installation. A longer distance between the electrical panel and the EV charging station means increased installation costs because it increases the amount of necessary trenching (and repair), conduit, and wire.

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

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

Siting and Design Guidelines for Charging Stations identify and diagram key siting and design issues that are relevant to local governments as well as developers, homeowners, businesses, utility providers, and other organizations interested in best practices for EV charging infrastructure implementation. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/Siting-and-Design-Guidelines-for-EVSE.pdf

Site Design for Electric Vehicle Charging Stations highlights best practices for designing EV parking spaces, and provides several illustrated design scenarios. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/Site-Design-for-EV-Charging-Stations.pdf

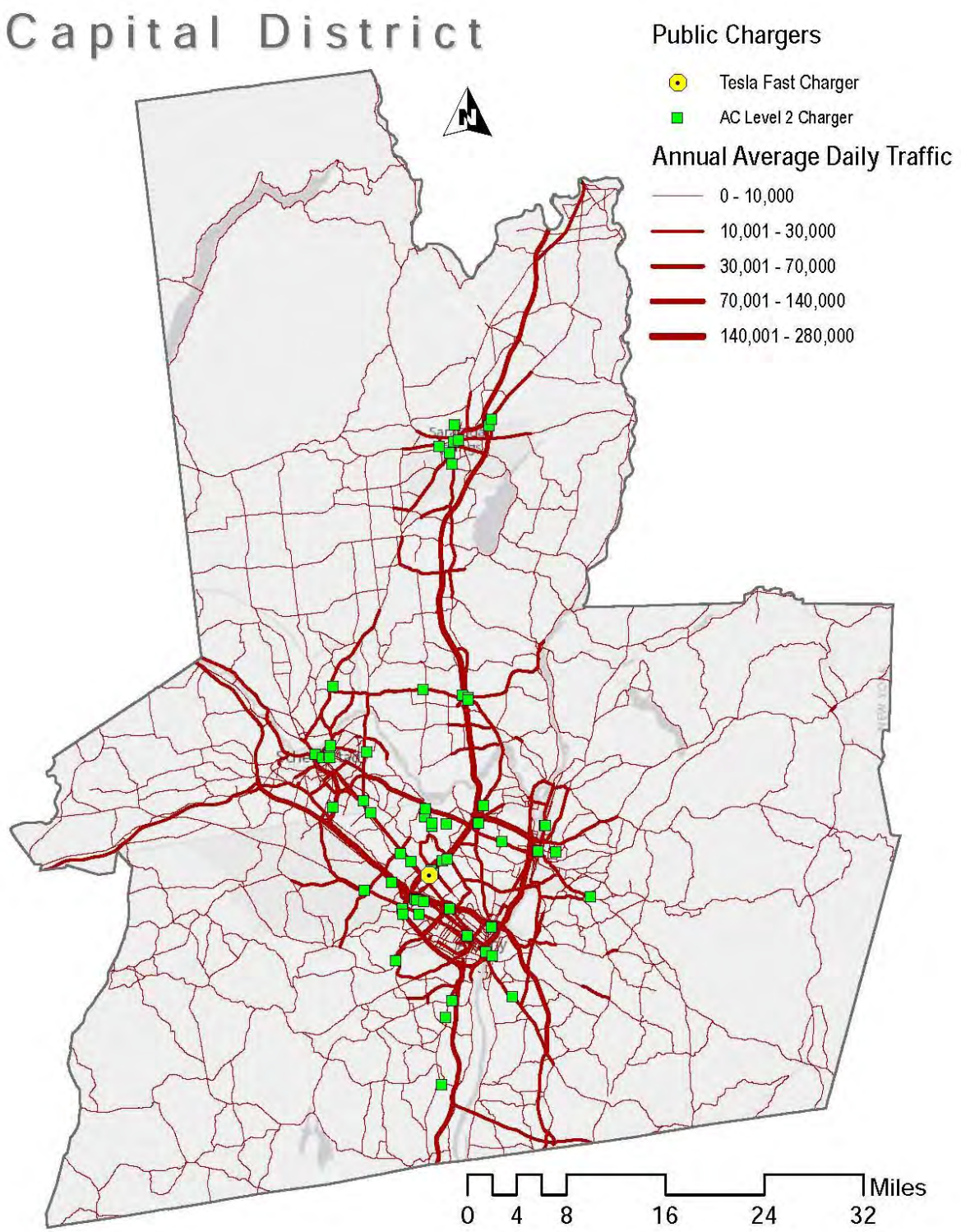


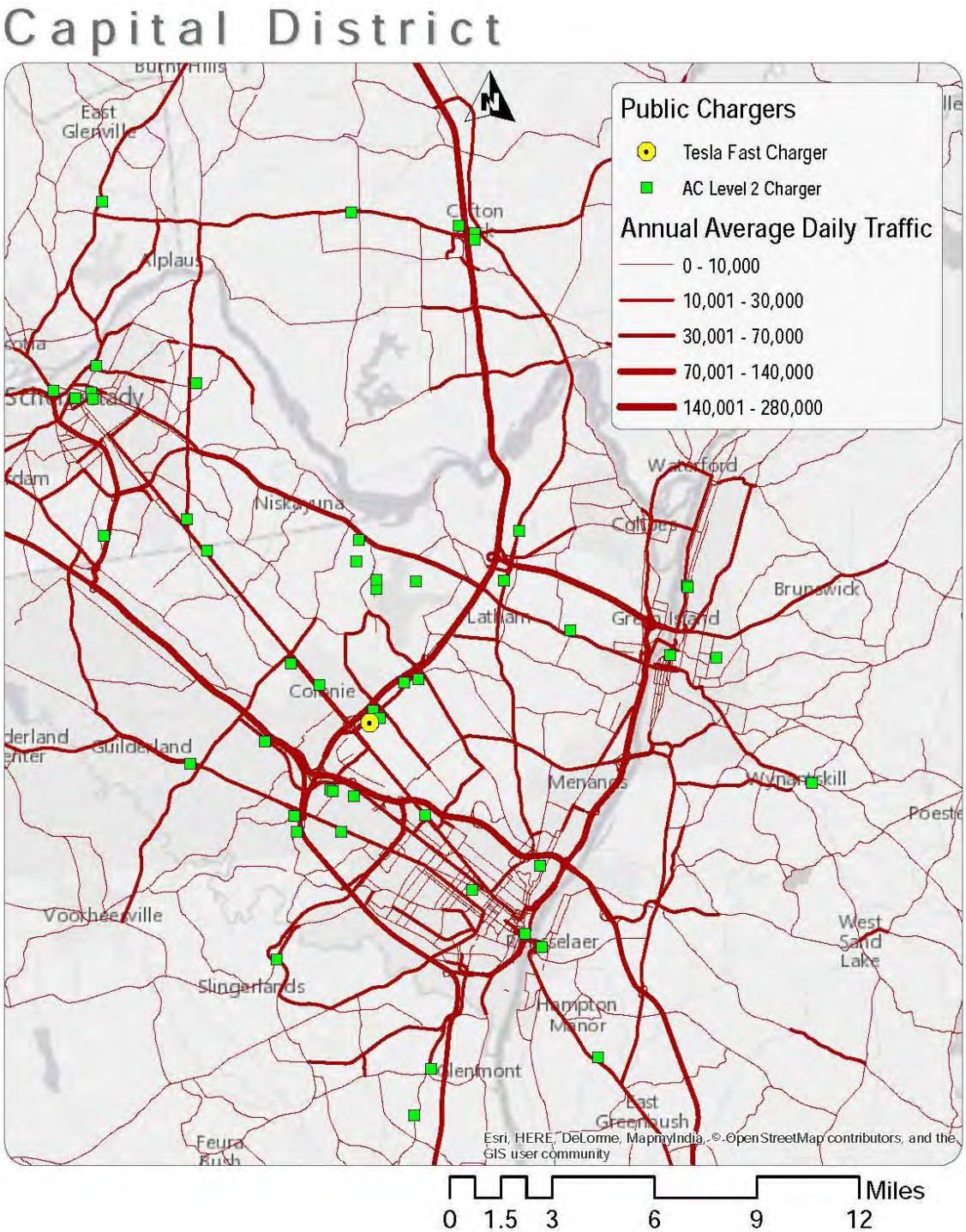
Effective signage helps EV drivers navigate to EV charging station spaces and helps to prevent EV charging spaces from being occupied by a non-EV. The **Charging Station Signage Overview** covers general service (guidance), regulatory (enforceable), and special (information/trailblazer) signage. Another effective strategy for distinguishing the EV charging space is to paint the entire space green or mark the pavement with an EV charging symbol. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/EVSE-Signage-Overview.pdf

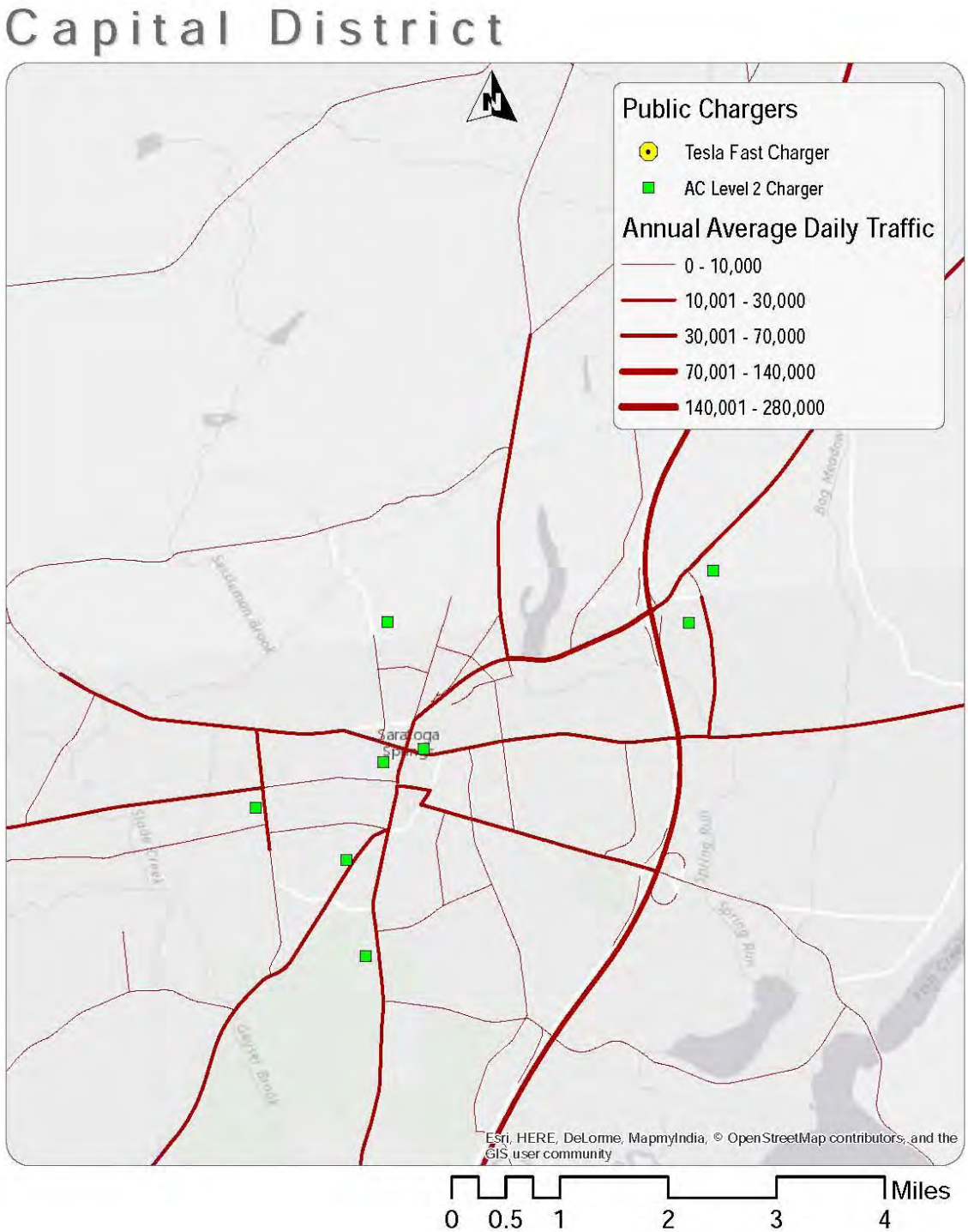
Currently, there are 58 public EV charging station locations in the Capital District, including;

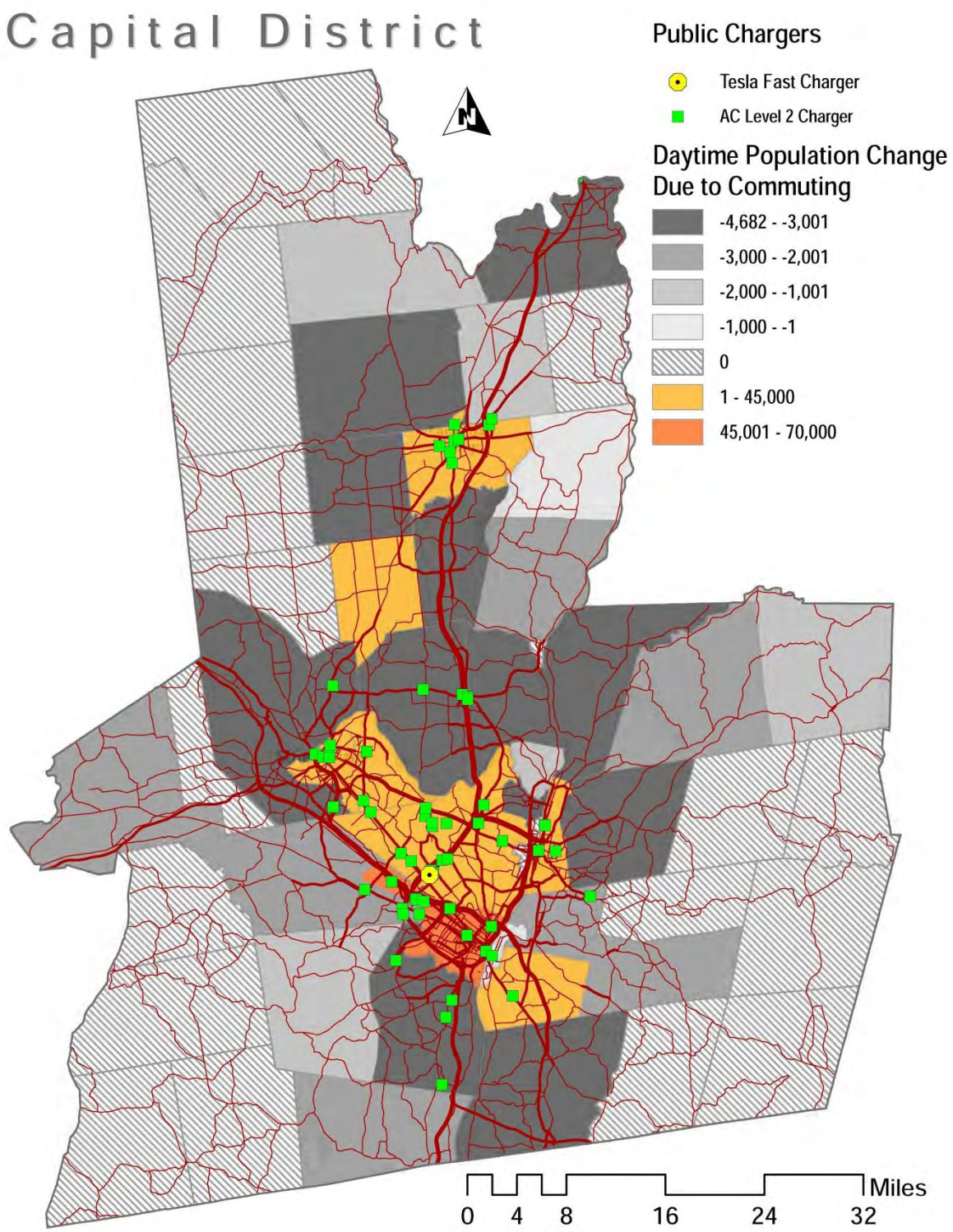
- Price Chopper (Saratoga, Rensselaer, Latham, Slingerlands, Schenectady)
- Hampton Inn (Latham, Clifton Park, Saratoga, Schenectady, Albany)
- Kohl's (Albany, Clifton Park, Saratoga)
- Vent Fitness (Clifton Park, Guilderland, Latham)
- Chili's (Albany, Clifton Park, Glenmont)
- Colonie Center - Tesla
- 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
- Union College
- Uncle Sam Parking Garage (Troy)
- Time Warner Cable (Schenectady)
- Best Western Sovereign Hotel (Albany)
- British American (Latham)
- Century House (Latham)
- Freedom Square Parking Lot (Troy)
- Holiday Inn Express (Albany)
- Homewood Suites (Albany)
- Rosenblum (Albany)
- ShopRite Plaza (Niskayuna)
- Staybridge (Albany)
- Woodlake Apartments (Albany)

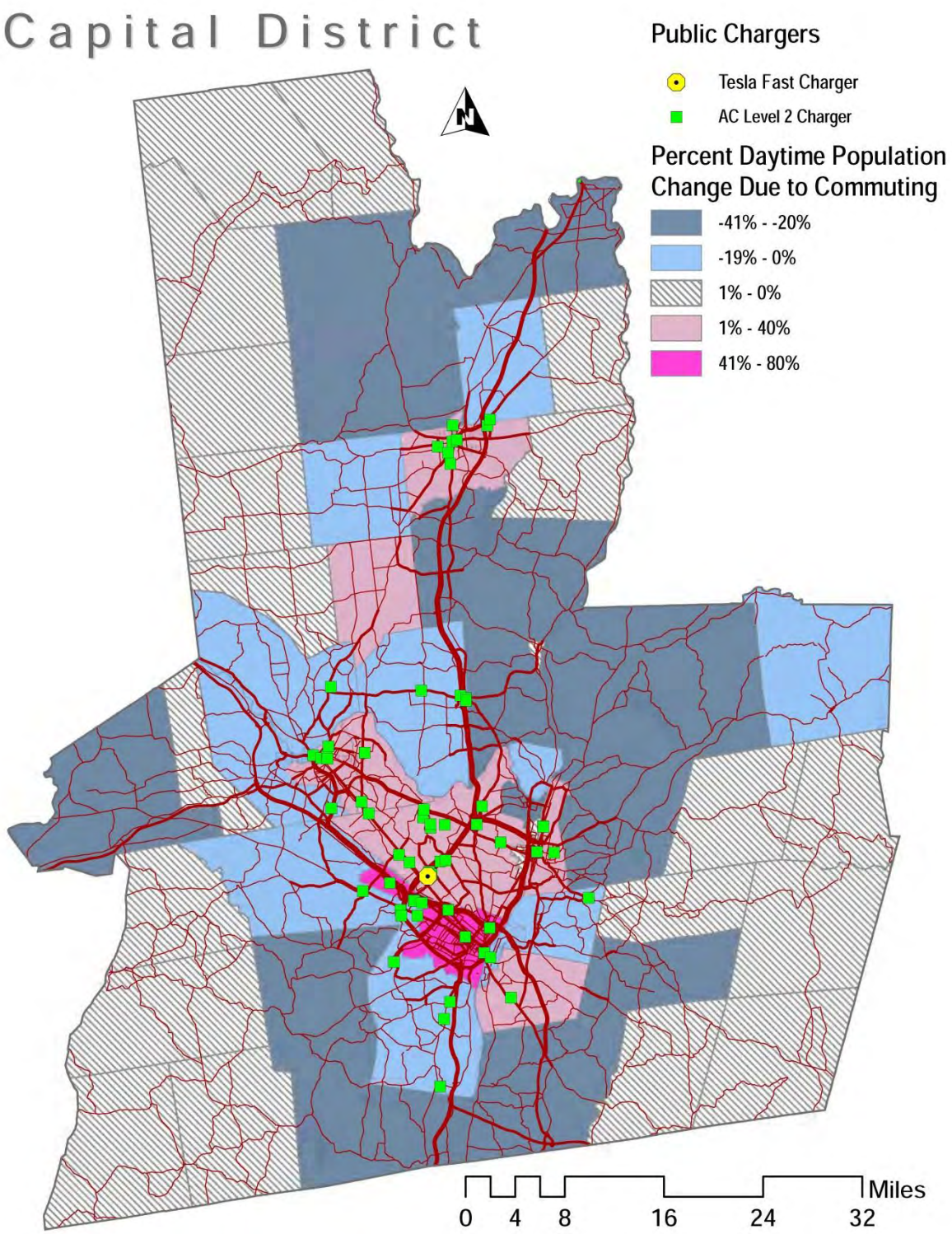
The maps of the Capital District on the following pages show the location of the public EV charging stations along with the annual average daily traffic on major roads to portray travel patterns. Distance radiuses (geographical only and not driving distances) of 5 and 10 miles from existing EV charging stations were added to some maps to show coverage. The last map shows the ratio of EVs to charging stations by zip code within the region.

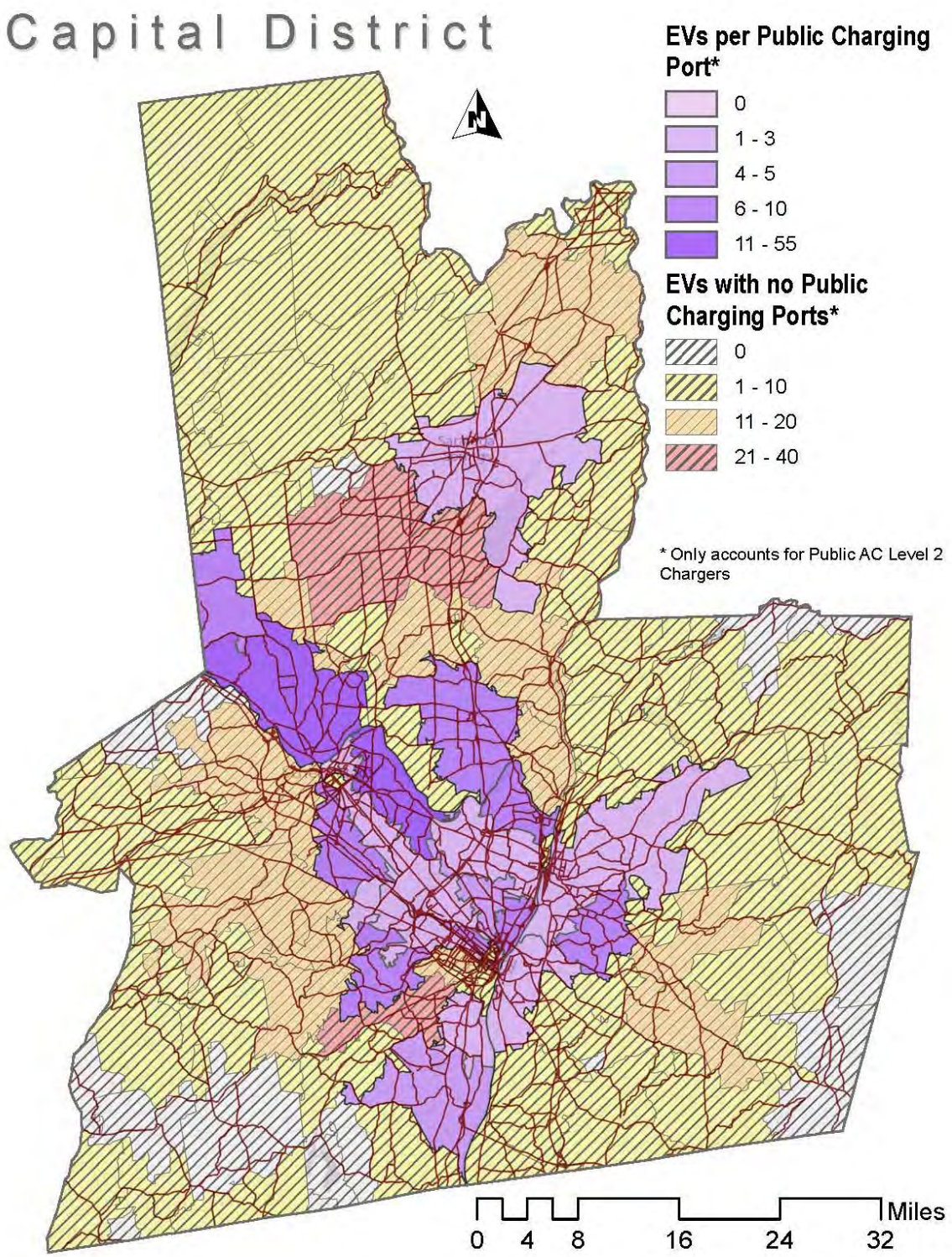

Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Annual Average Daily Traffic
0 - 10,000
10,001 - 30,000
30,001 - 70,000
70,001 - 140,000
140,001 - 280,000
Miles
0
4
8
16
24
32

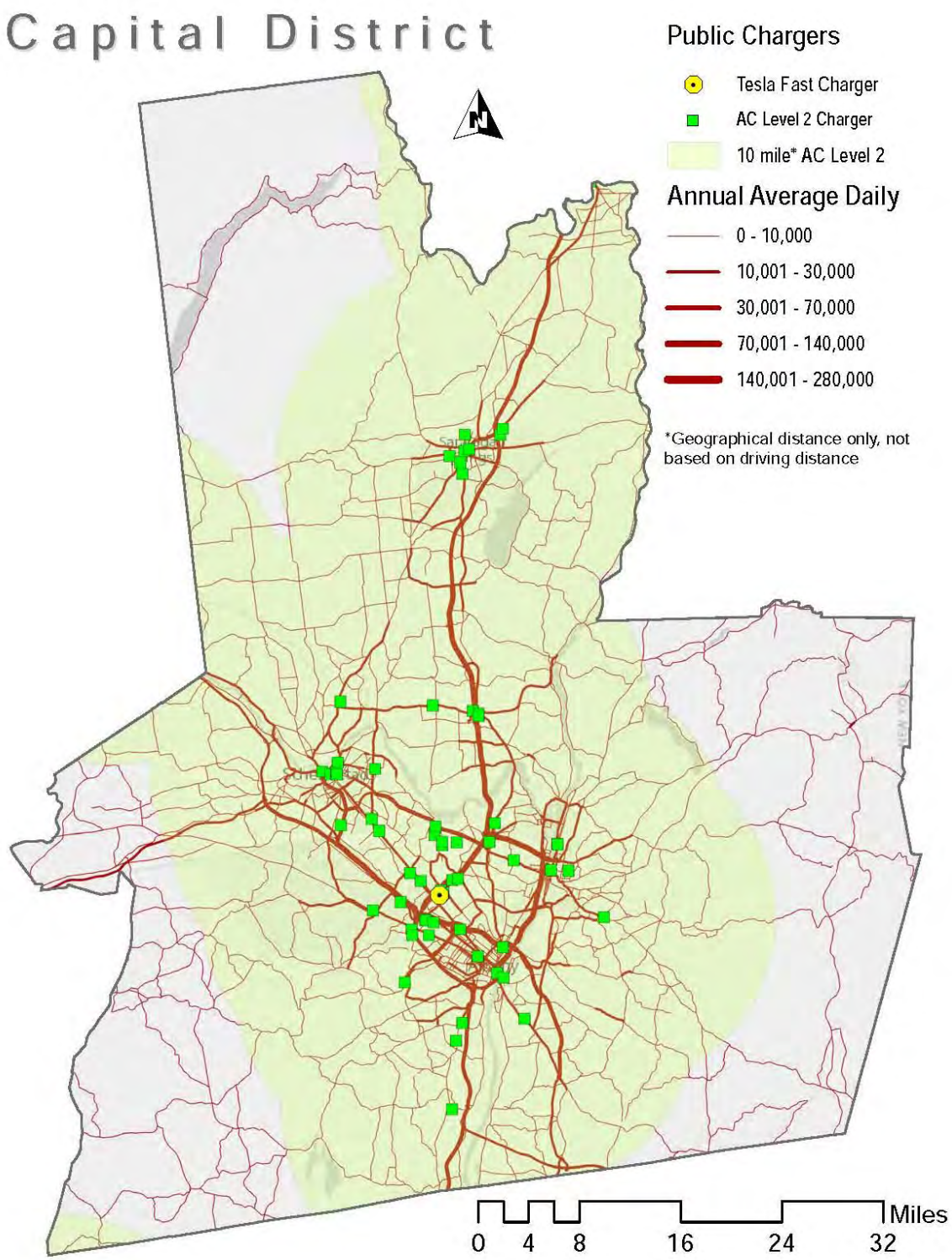

Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Annual Average Daily Traffic
0 - 10,000
10,001 - 30,000
30,001 - 70,000
70,001 - 140,000
140,001 - 280,000
East Glenville
Alplaus
Niskayuna
Latham
Colonie
Guilderland
Menands
Brunswick
Vorheesville
Selaer
Slingerlands
Hampton Manor
Glenmont
West Sand Lake
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
Miles
0 1.5 3 6 9 12

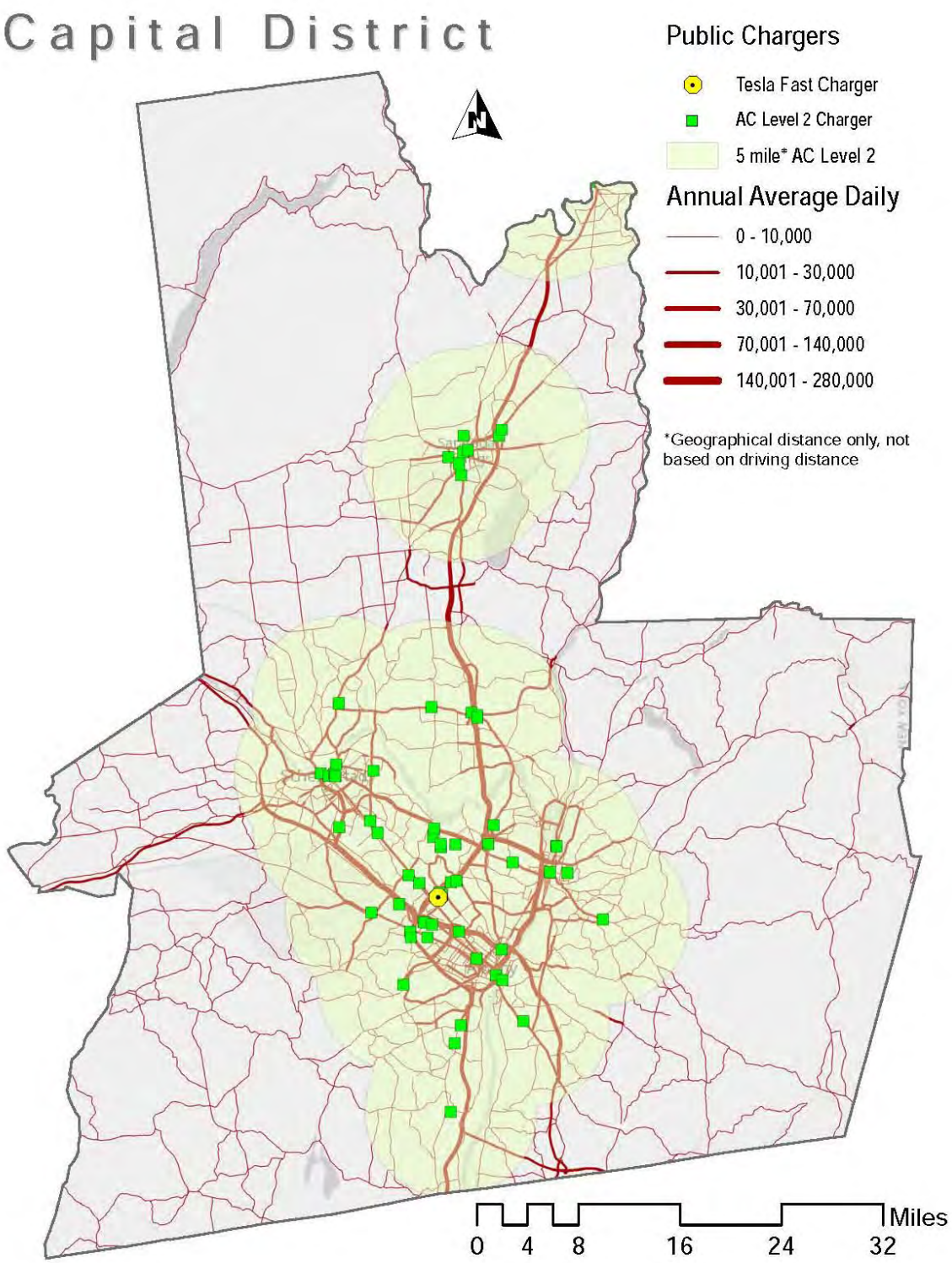

Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Annual Average Daily Traffic
0 - 10,000
10,001 - 30,000
30,001 - 70,000
70,001 - 140,000
140,001 - 280,000
Saratoga Springs
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
0 0.5 1 2 3 4 Miles


Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Daytime Population Change Due to Commuting
-4,682 - -3,001
-3,000 - -2,001
-2,000 - -1,001
-1,000 - -1
0
1 - 45,000
45,001 - 70,000
N
0 4 8 16 24 32
Miles


Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
Percent Daytime Population Change Due to Commuting
-41% - -20%
-19% - 0%
1% - 0%
1% - 40%
41% - 80%
N
Miles
0
4
8
16
24
32


Capital District
EVs per Public Charging Port*
0
1 - 3
4 - 5
6 - 10
11 - 55
EVs with no Public Charging Ports*
0
1 - 10
11 - 20
21 - 40
* Only accounts for Public AC Level 2 Chargers
N
0 4 8 16 24 32
Miles


Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
10 mile* AC Level 2
Annual Average Daily
0 - 10,000
10,001 - 30,000
30,001 - 70,000
70,001 - 140,000
140,001 - 280,000
*Geographical distance only, not based on driving distance
Miles
0 4 8 16 24 32


Capital District
Public Chargers
Tesla Fast Charger
AC Level 2 Charger
5 mile* AC Level 2
Annual Average Daily
0 - 10,000
10,001 - 30,000
30,001 - 70,000
70,001 - 140,000
140,001 - 280,000
*Geographical distance only, not based on driving distance
N
Miles
0 4 8 16 24 32

Supporting EV-Readiness and Future Charging Station Installations

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

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

Understanding which level and how many charging stations are feasible for different settings based on expected EV use is critical. The type and number of EVs in a community will help shape how many and what kind of charging station an EV owner might need. The different types of charging stations will charge EV batteries at different rates. The type of EV charging infrastructure at each site should correspond with the amount of time a vehicle might be parked there while the driver is shopping, working, or enjoying entertainment. As a municipality, zoning laws must permit the installation of each charging station type in an appropriate setting.

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

Examples of zoning and parking policies from across the country can be found in the **Planning Policy Tool Guide**, which also addresses local permitting practices and building codes. This guide highlights best practices and introduces policy options for public officials and private-sector leaders seeking to prepare their communities, jurisdictions, states, or organizations for EVs. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/Planning-and-Policy-Tool-Guide.pdf

Simple and consistent EV charging station **permitting processes** can make installing EV infrastructure much easier. Current national building and electrical codes neither inhibit nor facilitate the implementation of EV charging stations. But at a municipal level, the adoption of certain provisions in local codes has successfully encouraged EV-readiness in some jurisdictions.

EV Ready Codes for the Built Environment provides current codes for charging stations and what code provisions could be incorporated into local code to encourage a basic or advanced level of EV-readiness. It highlights best practices from around the world to make recommendations for jurisdictions in the Northeast and mid-Atlantic. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/EV-Ready-Codes-for-the-Built-Environment.pdf

How charging station installation work is classified within a jurisdiction can impact the time and cost of the permitting process. An overview on **Permit Process Streamlining** reviews best practices for charging station permitting and presents sample application forms. While residential installations were the focus on this investigation, the results and findings also apply to commercial charging station installations. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/Permit-Process-Streamlining.pdf

NYSERDA has funding available up to $5,000 through its Cleaner, Greener Communities program (Phase 2, Category 1) for communities to amend their permitting, zoning, and parking ordinances so they are more EV-friendly, along with other opportunities available to support EV and charging station use. www.nyserda.ny.gov/-/media/Files/About/Statewide-Initiatives/CGC-Plans/Guidance/Category-1-Fact-Sheet.pdf

Lessons from Early Installations of Charging Equipment documents EV charging infrastructure installations in the Northeast and Mid-Atlantic, and uncovers some of the related challenges and opportunities. www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/Lessons-Early-Deployments-of-EVSE.pdf

- In general, preparing the charging sites as part of a new development is more cost effective than incorporating EV charging infrastructure into an existing structure. The cost of electric system upgrades also tends to increase with the age of the building.
- Installations in public spaces, such as sidewalk right of way, can be administratively burdensome and formalizing clear procedures for permitting and approval will help expedite installations.
- Standardization of signs, both regulatory (on-site) and directional (wayfinding) will not only improve communication to drivers but also reduce the burden on site owners and designers.
- Site owners, current and prospective, often struggle with the question of return on investment on EV charging equipment.
- Cords without a management system are often left spread about on the ground and may potentially become a hazard for users or the equipment.
- The Northeast and Mid-Atlantic regions have not yet formally adopted guidelines or recommendations on the definition of ADA-accessible charging space and the minimum number of charging stations that need to meet that definition.
- A careful evaluation of the possible spaces where the EV charging equipment could be located and their impact on the economics of the installation should be part of the planning process before a commitment to installing the equipment is made.
- Public-private partnerships to fund the installation of charging stations help the host construct a more attractive economic case to install the equipment, while enabling government to pursue their community goals.
- Before entering into agreements to install charging stations, prospective hosts should make sure they understand who will pay for maintenance, electricity, and other ongoing costs after installation.