Capital District
Zero Emission Vehicle Plan

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CDTC
CAPITAL DISTRICT
TRANSPORTATION COMMITTEE

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1 Executive Summary

The Capital District Zero Emission Vehicle (ZEV) Plan builds upon the previous Capital District Electric Vehicles Charging Station Plan released in March 2016 by the Capital District Clean Communities Coalition (CDCC) and assesses the Capital District's current support for ZEVs. The Plan also provides recommendations to create a more comprehensive Electric Vehicle (EV) charging network that supports ZEV drivers and addresses barriers to ZEV adoption in the Capital District, and includes specific recommendations for corridors to be designated as Alternative Fuel Corridors under the FHWA's Alternative Fuels Clean Corridors program.

This plan primarily addresses conditions for light duty EVs that are equipped with on-board batteries or fuel cells which are capable of powering the vehicle drivetrain. When running on electricity these vehicles are able to completely offset the use of gasoline, eliminating all tailpipe emissions, hence the term Zero Emission Vehicle (ZEV). Zero Emission Vehicles have a variety of benefits, including saving drivers money on fuel and maintenance costs and reduced air pollution in New York State.

There are three different types of EVs currently available, plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEV), and fuel cell electric vehicles (FCEV). Both PHEVs and BEVs displace petroleum fuel by charging their batteries from the electrical grid, and FCEVs are powered by hydrogen which is stored in an on-board fuel tank and turned into electricity via a fuel cell. Currently, there are no registered FCEVs or public hydrogen fueling stations located in the Capital District, or in New York State. Plug-in hybrid vehicles (PHEV) and BEVs replenish their batteries by connecting to charging stations at home, work, or at various other public locations. Different charging levels offer different rates of charge anywhere from 2-5 miles of range per hour of charge time, up to 80 miles of range per 20 minutes of charge time. Station installation costs can vary from site to site however; faster chargers are considerably more expensive to install and operate but are necessary for inter-regional travel by EVs that wish to use major highways and go farther than the distance available from one battery charge.

As of the end of 2019, there were 3,086 EVs on the road in the Capital District, 2,012 were PHEVs and 1,074 were BEVs. Market share of EVs in the Capital Region is growing, but is still less than 1% of all registered light duty vehicles. Currently there are over 480 public Level 2 charging outlets in the Capital District, with 357 in Albany County, 77 in Schenectady County, 149 in Saratoga County, and 57 in Rensselaer County.

Overall, the Capital District is currently a great place for ZEV owners and is in excellent position to support future ZEV adoption. There are multiple policies are in place that support ZEV ownership and have the ability to shape the future adoption of ZEV technology. Currently, the cost of owning an EV in the region can be supplemented by combined state and federal rebates of up to $9,500 and recently passed legislation in New York has prioritized the reduction of greenhouse gas emissions state-wide by the year 2050. Travel trends in the region align well with the capabilities of the majority of EVs currently available, resulting in a population that could achieve a high level of EV adoption, even at current technology levels.

Although current conditions are favorable for existing ZEV owners and future ZEV adoption in the Region, the following recommendations were identified to continue to improve conditions for ZEVs in the coming years.

1. **Identify Alternative Fuel Corridors** – CDTC and CDCC must continue to work with NYSDOT and municipalities within the I-90 and I87 corridors to maintain designation in FHWA's Alternative Fuel Corridor Program.

2. **Additional Public Level 2 Charging** – Although the amount of EV charging infrastructure has increased in the Capital District since 2015, there are still gaps in charging infrastructure that can make it difficult to travel through the region on all electric power and prevent further adoption of ZEVs.

3. **Additional Public DC Fast Charging** – Like public level 2 charging in the region, DC Fast charging is becoming more prevalent, but its presence is still lacking with only 11 public stations (41 outlets) in the region currently. DC Fast charging is necessary for inter-regional travel by EVs that wish to use major highways and go farther than the distance available from one battery charge.

4. **Municipal EV Readiness Policy** – Municipalities can prepare for EVs and the infrastructure that is used to charge them by incorporating EV readiness policy into their local rules and regulations. Integrating EV-ready policies into local development processes can streamline installation of new charging infrastructure and reduce the cost of future charging station installations.

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

6. **Elected Officials Education and Outreach** – Like many residents of the Capital District, most elected officials are not properly educated on EV technology or the benefits they can provide to our communities. General education on EVs through presentations and publications should be provided in coordination with their existing meetings and conferences.

7. **Fuel Cell Technology** – The next generation of alternative fuel and advanced vehicle technology that has not yet been deployed in any large numbers in the region is fuel cells. The FCEV market is still in its infancy, but the transportation fuel industry and government partners are working toward clean, economical, and safe hydrogen production and distribution for widespread use in fuel cell electric vehicles.

Municipalities, counties, and other regional partners are encouraged to lead or support initiatives that advance these recommendations for improved ZEV readiness in the Capital District. More information on these recommendations can be found in Section 8 of the Plan.

Contributors to the Plan

The Capital District Zero Emission Vehicle (ZEV) Plan was developed by the Capital District Clean Communities Coalition (CDCC) and supported by the Capital District Transportation Committee (CDTC), the designated Metropolitan Planning Organization (MPO) for the Capital Region.

Input to the Capital District Zero Emission Vehicle (ZEV) Plan was provided by members of a working group assembled from key stakeholders who reviewed, and provided feedback on all aspects of this plan. The working group included:

- Jacob Beeman, Capital District Transportation Committee
- Jen Ceponis, Capital District Transportation Committee
- Paul Dietershagen, Capital District Electric Vehicles Drivers Group
- Mark Mcgrew, Lion Electric
- Todd Fabozzi, Capital District Regional Planning Commission
- Tara Donadio, Capital District Regional Planning Commission
- Lawrence D'Arco, NYS Department of Environmental Conservation
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- Scott Kolaya, Capital District Electric Vehicles Drivers Group
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- Glen Shefkowitz, NYREER
- Brian Stanley, NYREER
- Stacey Hughes, National Grid

2 Background

The Capital District Zero Emission Vehicle (ZEV) Plan builds upon the previous *Capital District Electric Vehicles Charging Station Plan* released in March 2016 by the Capital District Clean Communities Coalition (CDCC). The following will act as an update, with the objectives of:

- Expanding the scope of the original document to integrate all Zero Emission Vehicles, beyond battery electric vehicles (i.e. Fuel Cell Electric Vehicles and shared E-mobility options).
- Highlighting changes in Electric Vehicle technology and infrastructure since 2016
- Documenting the current climate for ZEVs in the Capital District
- Identifying new EV-Ready corridors based on United States Department of Transportation's (USDOT) Alternative Fuel Corridor Program
- Recommending strategies to improve conditions for ZEVs in the Capital District

This plan uses vehicle registration data from the New York State Department of Motor Vehicle (NYSDMV) accessed through the New York State Energy Research and Development Authority (NYSERDA) EValuate New York data portal to analyze current Electric Vehicle (EV) ownership trends. Electric Vehicle charging station data was collected from the United States Department of Energy (USDOE) Alternative Fuels Data Center (AFDC). Throughout the plan the terms "Capital District" and "the Region" are used to reference the study area. For the purpose of this plan, these terms are referencing all of Albany, Schenectady, Saratoga, and Rensselaer Counties.

3 Zero Emission Vehicle Technology

Electric vehicles (EVs) are vehicles that are equipped with an on-board battery which is capable of powering the vehicle drivetrain. When running on electricity provided by the on-board battery, EVs are able to completely offset the use of gasoline, eliminating all tailpipe emissions, hence the term Zero Emission Vehicle (ZEV). Zero Emission Vehicle technology has recently expanded to include Electric mobility (E-mobility) transportation options which include electric assist bicycles and electric assist scooters. In addition to the vehicles themselves, charging infrastructure must also be included in the discussion of ZEV technologies. The following sections provide a brief summary of the current ZEV technology available and some terms that are often mentioned in the discussion of ZEVs.

3.1 Electric Vehicles

There are three different types of EVs currently available, plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEV), and fuel cell electric vehicles (FCEV). Each of these technologies provide drivers with unique advantages and varying levels of all electric range. Although the majority of PHEVs, BEVs, and FCEVs on the market today are light duty vehicles, there are a growing number of medium and heavy duty models available in some markets.

Plug-in Hybrid Electric Vehicles (PHEV)

A PHEV uses an on-board battery which must be plugged in to be charged, and keeps a gasoline or diesel engine to add

Toyota Prius Prime - PHEV

to the vehicles range. After the battery energy is exhausted, the traditional internal combustion engine (ICE) starts and the vehicle acts like a typical hybrid vehicle until it is charged again from the grid. Some variations of PHEVs are called extended range EVs, or EREVs which use a small ICE motor to recharge the on-board battery if it is depleted. Currently, PHEVs can have an all-electric range of up to approximately 50 miles depending on the model.

Battery Electric Vehicles (BEV)

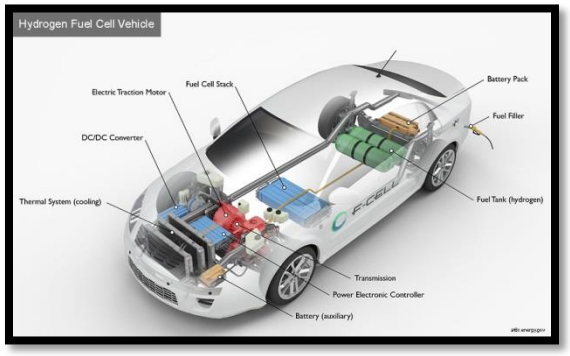
Battery Electric Vehicles fully remove the gasoline or diesel powertrain and replace it with an electric powertrain consisting of an electric motor, power electronics, and a battery pack. BEVs have a longer all-electric range than PHEVs, but do not have a fuel backup when the battery is depleted, contributing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

Chevrolet Bolt - BEV

Battery electric vehicles can now travel up to 370 miles on a single charge and can be completely recharged in around 10 hours using a standard level 2 charger at 240 volts, or much faster when using DC fast charge technology. At the end of 2015 BEV technology allowed vehicles to travel between 60 and 265 miles on a single charge and vehicles with a range of 265 miles cost around $70,000, putting them out of reach of the average consumer. Currently, there are BEVs available with over 300 miles of range that cost around $40,000, before any available rebates or incentives, making BEV technology much more affordable than it was just a few years ago.

Fuel Cell Electric Vehicles (FCEV)

Fuel cell electric vehicles are powered by an electric motor, similar to BEVs; however they are not fueled by a battery pack. Fuel cell electric vehicles are powered by hydrogen which is stored in an on-board fuel tank. The hydrogen is then turned into electricity via a fuel cell which is then used to drive the electric motor. Fuel cell vehicles are the most similar to traditional (ICE) vehicles, in that they have a range of over 300 miles and can be refueled in as little as five minutes, but unlike ICE vehicles FCEVs produce no tailpipe emissions, only water vapor. Currently, there are no registered FCEVs or public hydrogen fueling stations located in the Capital District, or in New York State.



Fuel Cell EV Technology

Medium / Heavy Duty ZEV Options

In addition to light duty ZEV options there are also an increasing number of medium and heavy duty options available in some markets. One market in particular that experiencing considerable growth is electric transit vehicles and school busses. Electric transit and school busses offer significant environmental benefits to the often congested urban areas

where they operate and can help reduce a city's overall greenhouse gas emissions.[1] Similar to light-duty ZEVs, initial vehicle costs are higher than traditional diesel powered busses, but the reduced fuel and maintenance costs over the life cycle of the vehicle and rebate programs (if available) can offset the additional costs. As of 2018, there were approximately 300 electric transit busses operating nation-wide in the United States and that number is expected to grow in the coming years. Locally, Capital District Transportation Authority (CDTA) expects to add four electric busses to their fleet in 2020. Electric vehicle technology is also improving for heavy duty trucks, however, use is primarily limited to pilots and test studies at this time.

Range Anxiety

An ICE vehicle will be able to travel 300-500 miles on a single tank and can fuel in less than five minutes at frequently used gas stations. Due to the technology used in EVs and their reduced range compared to most ICE vehicles, new EV drivers often experience "range anxiety". Range anxiety is term typically associated with EVs, referencing the drivers uncertainty about how far their EV can travel and where they will be able to recharge. This range anxiety can often be reduced with careful planning (including being sure to plug in every night and knowing where charging stations are along your route). Range anxiety is more prominent among BEV owners, as owners of PHEVs have a gasoline engine in reserve which can be refueled as a traditional vehicle.

Range anxiety can be worse in extreme temperatures. All EV battery range can be impacted by cold and hot ambient temperature conditions due to added power requirements to heat or cool the interior of the vehicle. There is also a decrease in performance of the EV batteries in extreme temperatures. While manufacturers continue to improve the vehicle's performance for adverse climates, a decrease in electric mileage by up to 50% on the coldest days and 20% on the hottest may occur. Pre-conditioning the vehicle while it is still plugged-in is a good strategy for minimizing the decline in range.

3.2 Other Zero Emission Vehicles (Shared E-Mobility Options)

Other ZEV options are beginning to be available for personal or shared electronic mobility (E-mobility). Most notably, these options include electric-assist bicycles (E-Bikes) and electric assist scooters (E-scooters). E-bikes and E-scooters are growing in popularity for private individual use, as well as among shared mobility or "micromobility" providers. Shared micromobility is growing faster than other shared mobility services in the United States. According to the National Association of City Transportation Officials (NACTO), people took 36.5 million trips on station-based bike share systems and 38.5 million trips on shared e-scooters in 2018. As e-bikes and e-scooters gain popularity, shared mobility companies are updating their fleets with a focus on e-bikes and e-scooters instead of pedal bikes. With e-scooter trips overtaking pedal bike trips, cities have to act quickly to ensure that micromobility is shared legally, safely, and equitably. In April 2019, NYS legislature passed a bill legalizing E-bikes and E-scooters in the state of New York, opening the door for their use in the public right-of-way. The Governor vetoed this bill in December 2019 and noted safety concerns as one of the primary reasons for the veto. CDCC will

[1] https://uspirg.org/sites/pirg/files/reports/ElectricBusesInAmerica/US_Electric_bus_scrn.pdf

continue to monitor the progress of micromobility legislation in New York and assist local municipalities according when a final ruling is made.

As per the proposed legislation, E-bikes must have operable pedals and an electric motor less than 750 watts. Batteries on e-bikes and e-scooters can be removed from the vehicle and recharged within 6 hours by a 110 volt outlet. An e-bike or e-scooter can get about 50 miles on a single charge. E-bikes are categorized into the three classes outlined below.

- **Class One -** A bicycle with electric assist which has an electric motor that provides assistance only when the person operating such bicycle is pedaling, and that will not provide assistance when the bicycle reaches a speed of twenty miles per hour.
- **Class Two -** A bicycle with electric assist which has an electric motor that may be used exclusively to propel the bicycle and that is not capable of providing assistance when the bicycle reaches a speed of twenty miles per hour.
- **Class Three -** Solely within a city having a population of one million or more, a bicycle with electric assist which has an electric motor that may be used exclusively to propel the bicycle and that is not capable of providing assistance when such bicycle reaches a speed of twenty-five miles per hour.

Electric scooters in NYS are defined as:

Electric Scooter - Every device weighing less than one hundred pounds that (a) has handlebars, a floorboard that can be stood upon by the operator, and an electric motor, (b) can be powered by the electric motor and/or human power, and (c) has a maximum speed of no more than twenty miles per hour on a paved level surface when powered solely by the electric motor.

3.3 Charging Options & Infrastructure

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

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

For some EV owners, installing a charger at their primary residence may be challenging (e.g. if they are renting or have an older home with insufficient electrical capacity to add more load especially in dense urban areas without private garages and older infrastructure) 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, but may cost up to $1,000 in some rare cases[2].

Level 1 Charging Station

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. Additionally, many AC Level 2 charging stations are designed to be more durable for an outdoor setting and work well for public venues where an EV may be parked for 2-6 hours. Level 2 stations provide 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 and installation costs can vary from $450-$5,000, however, typically costs around $1,000.

Level 2 Charging Station

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. Fast charging requires a significant investment and draws considerable power, but is necessary for inter-regional travel by EVs that wish to use major highways and go farther than the distance available from one battery charge. DC Fast Chargers may also be effective in urban areas with a high population of EVs because they provide convenience over AC Level 2 charging (much shorter time) and

DC fast Charging Station

[2] https://www.nyserda.ny.gov/Researchers-and-Policymakers/Electric-Vehicles/Basics/Charging-Station-Options

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. DC Fast Charging generally adds 60-80 miles of range per 20 minutes of charging, however, is cost prohibitive for most home applications. Fast charging is not available on all EVs. Hardware and installation costs can vary from $7,000-$40,000 depending on location.

Tesla offers its own networks for Level 2 and DC Fast charging exclusively for Tesla owners. Tesla's supercharger network provides DC fast charging at over 1,600 "Superchargers" nationwide. Superchargers offer up to 120 kW charging (about 140 miles of range in 20 minutes).The supercharger network is primarily focused on major travel corridors across North America and includes two locations in the Capital District (Colonie Center and Crossgates Mall). Tesla also offers level 2 charging options at "Destination Charging" locations. Currently, there are six Destination Charging locations in the Capital District.

Charging Networks

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

Plug Types

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

Up until 2013, the Japanese CHAdeMO connector was the only DC fast charge standard connector, available on both the Nissan Leaf and Mitsubishi i-Miev. In early 2013, the SAE J1772 connector standard was expanded to include DC fast charge with the SAE J1772 Combo connector. 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.

EV Charger Plug Types

EVSE Maintenance

Electric Vehicle Supply Equipment generally has very few maintenance costs and will depend on the location of the station; however, over time, some maintenance will be necessary, especially at public charging stations that may be exposed to severe weather or public vandalism. Easily accessible and often used EVSE parts like charging chords and plugs are most likely to require maintenance and should be periodically cleaned, cleared of snow or debris and inspected for damage. If damaged, replacement of charging chords and plugs could range from $100-$200. For commercial applications, some vendors also offer annual maintenance plans that provide on call service and cover all maintenance issues. These kinds of services can range in cost depending on the types and number of changing stations at a particular location.

4 Capital District ZEV Trends

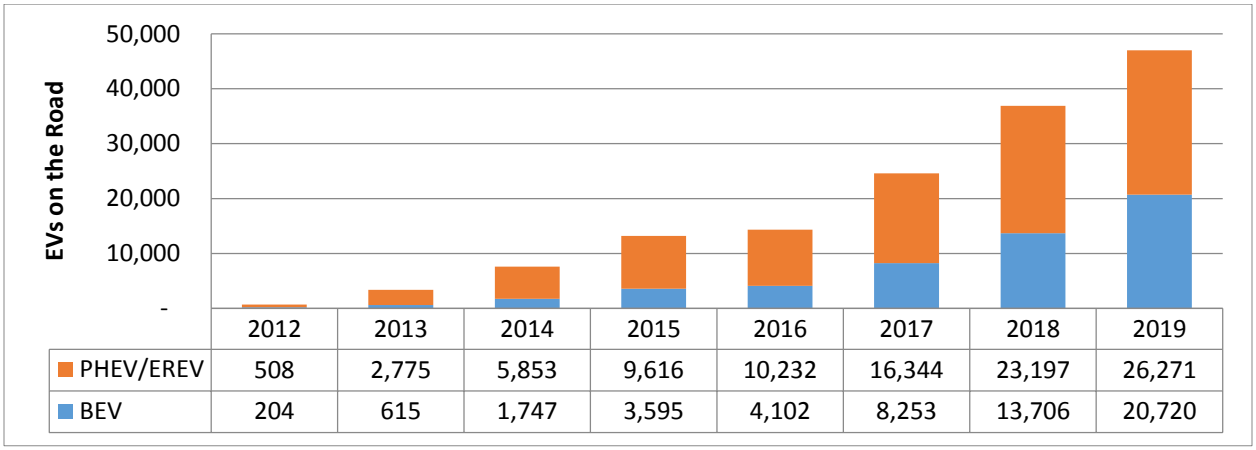
The Capital District Electric Vehicle Charging Station Plan began development in 2015 and was released by Capital District Clean Communities in 2016. Data shown in the plan was primarily a snapshot of NYS Department of Motor Vehicle (DMV) registration data and United States Department of Energy (USDOE) Alternative Fuel Data Center (AFDC) station data from December 2015. This update highlights the changes in ZEV conditions in New York State and the Capital Region since December 2015. The data summarized in the following sections reflects metrics from the NYSDMV snapshot from January 2020 and USDOE AFDC station data pulled in January 2020. NYSDMV registration data was accessed through the Evaluate NY data dashboard managed by the New York State Energy Research and Development Authority (NYSERDA).

4.1 ZEVs on the Road

EV ownership across the State of New York has been steadily increasing since 2011. There are currently 46,991 registered EVs in the State of New York. Of these, 20,720 are BEVs and 26,271 are PHEVs. Electric Vehicles currently occupy a small, but growing market share of all vehicle registrations in the State at less than 1%. Electric vehicle ownership in the Capital Region has shown a similar increase over the past few years compared to NYS as a whole. Currently, there are 3,086 registered EVs in the Capital Region compared to approximately 800 at the end of 2015, an increase of over 200%. Market share of EVs in

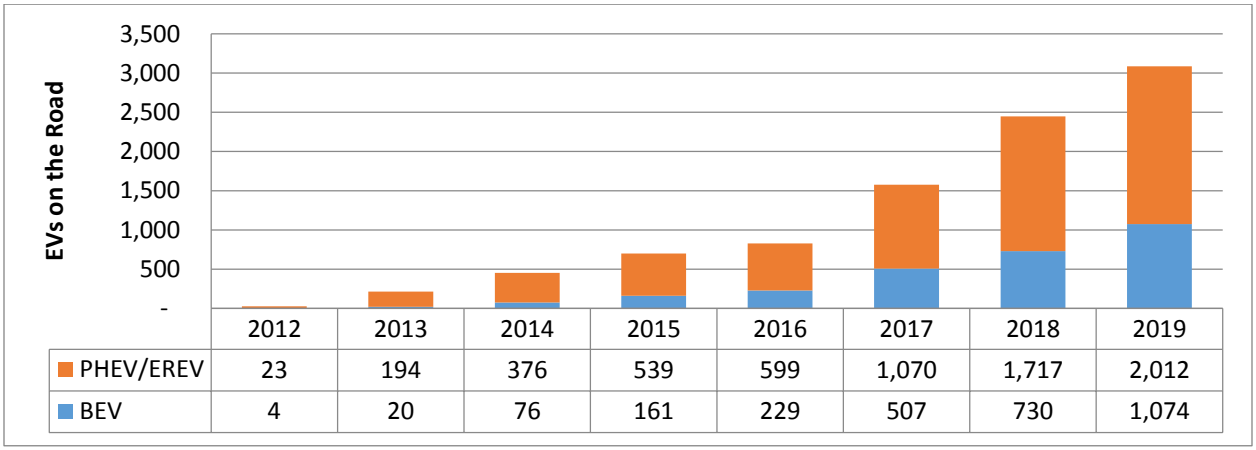
the Capital Region is growing, but is still less than 1%. Figures 1 and 2 display the growth of EV registrations in the State and Capital District since 2012, and Figure 3 displays the current numbers of Electric Vehicles on the road in each Capital District County.

Figure 1 –EVs on the Road – New York State



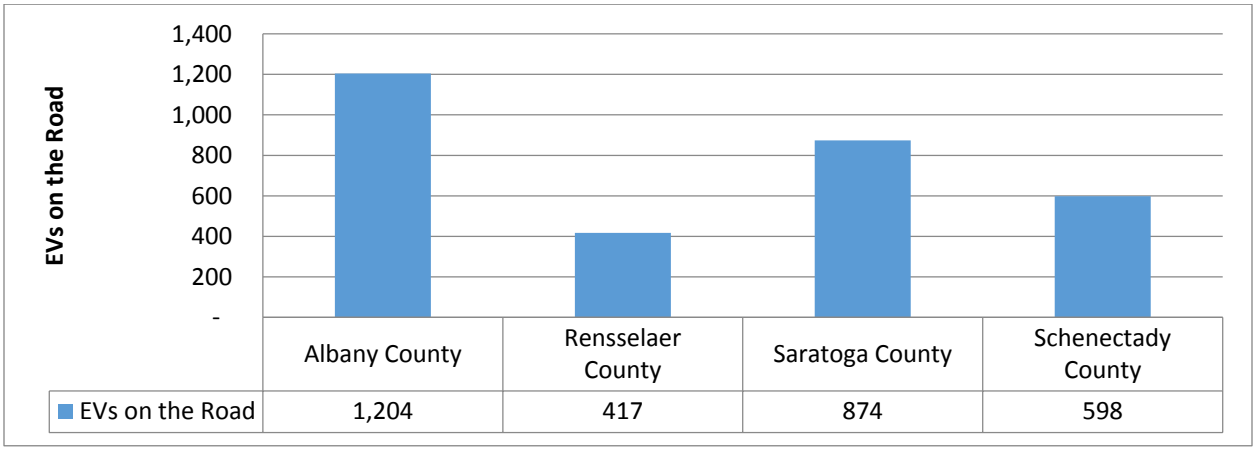
	2012	2013	2014	2015	2016	2017	2018	2019
PHEV/EREV	508	2,775	5,853	9,616	10,232	16,344	23,197	26,271
BEV	204	615	1,747	3,595	4,102	8,253	13,706	20,720

Figure 2 – EVs on the Road – Capital District



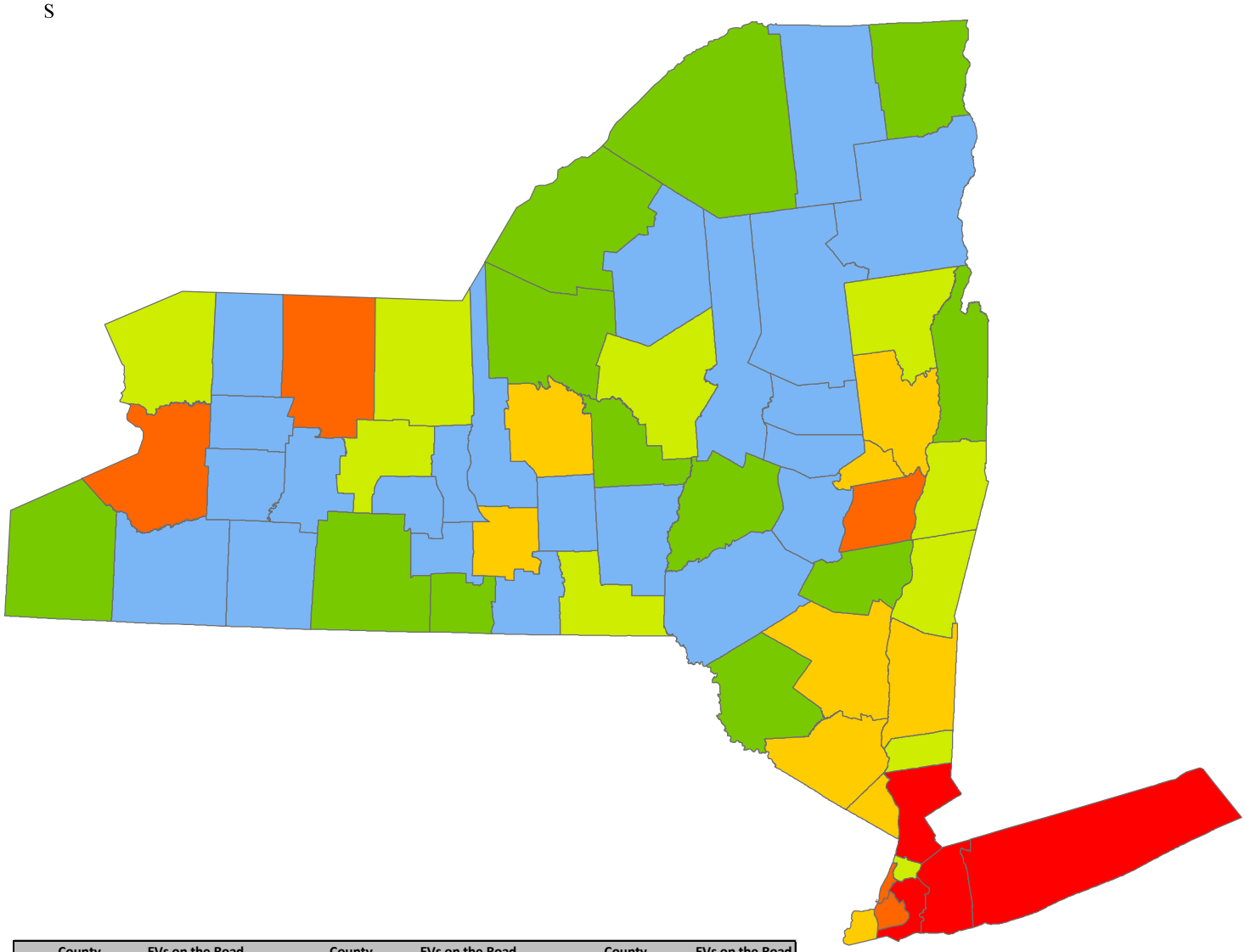
	2012	2013	2014	2015	2016	2017	2018	2019
PHEV/EREV	23	194	376	539	599	1,070	1,717	2,012
BEV	4	20	76	161	229	507	730	1,074

Figure 3 – EVs by County - Capital District



	Albany County	Rensselaer County	Saratoga County	Schenectady County
EVs on the Road	1,204	417	874	598

Map 1: EVs on the Road - New York State



County	EVs on the Road	County	EVs on the Road	County	EVs on the Road
Suffolk County	7,907	Oneida County	382	Essex County	89
Nassau County	5,981	Broome County	368	Genesee County	87
Westchester County	4,866	Putnam County	353	Tioga County	82
Queens County	3,285	Ontario County	335	Delaware County	81
New York County	2,903	Columbia County	206	Fulton County	79
Monroe County	2,649	Wayne County	203	Montgomery County	76
Kings County	2,207	Warren County	197	Cortland County	73
Erie County	1,924	Chautauqua County	169	Schoharie County	63
Albany County	1,204	Steuben County	162	Chenango County	60
Onondaga County	1,066	Clinton County	156	Orleans County	59
Dutchess County	973	Madison County	156	Cattaraugus County	57
Rockland County	956	Chemung County	143	Franklin County	56
Richmond County	901	Jefferson County	137	Allegany County	45
Saratoga County	874	St. Lawrence County	136	Herkimer County	44
Orange County	809	Sullivan County	132	Seneca County	44
Ulster County	792	Oswego County	127	Schuyler County	39
Tompkins County	655	Washington County	124	Yates County	38
Schenectady County	598	Greene County	110	Wyoming County	30
Bronx County	513	Otsego County	101	Lewis County	13
Rensselaer County	417	Livingston County	100	Hamilton County	10
Niagara County	403	Cayuga County	90	**Total**	**46,895**

Legend

EVs On The Road

- < = 100
- 101 - 185
- 186-584
- 585-1,100
- 1,001-3,030
- > 3,030

CAPITAL DISTRICT CLEAN COMMUNITIES

0 40 80 120 160 Miles

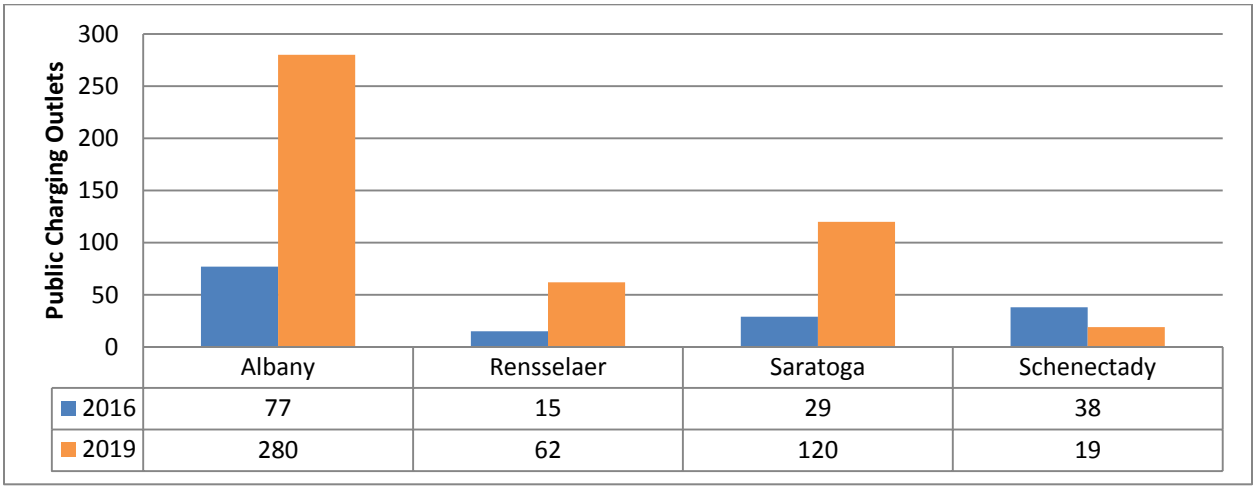
Data Sources:
NYSERDA EValuate NY
(January 2020)

CDTC

4.2 Charging Infrastructure

Similar to EV ownership, charging infrastructure across New York State and in the Capital Region has increased and improved since the previous plan was completed in 2016. Public Level 2 charging outlets throughout the state have increased over 30% from over 2,800 charging outlets at the end of 2015 to over 3,800 as of January 2019. Public level 2 charging outlets in the Capital Region have increased at a much higher rate, growing approximately 190% during the same time period from 165 to over 480 charging outlets. Access to DC fast charging in the region has also increased, with over 40 DC Fast charging outlets now available in the Capital Region (including Tesla Superchargers). There were no DC fast charging outlets at the time the previous report was published. In total, there are over 500 combined level 2 and DC Fast Charge outlets located throughout the Region. Maps 2 and 3 on the following pages show the distribution of charging stations throughout the State and Capital Region respectively.

Figure 4 - EV Charging Outlets by County - Capital District



	Albany	Rensselaer	Saratoga	Schenectady
2016	77	15	29	38
2019	280	62	120	19

As part of the 2016 report CDCC made broad recommendations for areas in the Capital Region that could benefit from additional EVSE. The recommendations were focused on filling gaps and providing a comprehensive infrastructure network through the Capital Region. The report identified the following areas of the Capital Region as focus areas for additional EV charging infrastructure; City of Albany, City of Saratoga Springs, City of Schenectady, City of Troy, and Town of Colonie.

To help expand charging station access in the identified strategic locations, CDCC worked to obtain funding, along with several partners, from the NYSERDA Cleaner Greener Communities program. Funding was used to offer dual port Level 2 charging stations to five local partners. As part of this effort, five stations (listed below) were installed in the spring of 2018, three of which were in the previously identified EV focus areas. The program funding required that each station be publicly-accessible and the site hosts provide electricity to operate the station.

- City of Saratoga Springs: Woodlawn Avenue Parking Garage, Saratoga Springs
- City of Troy: 5th Avenue Parking Garage, Troy
- Schenectady County: Schenectady County Public Library, Schenectady

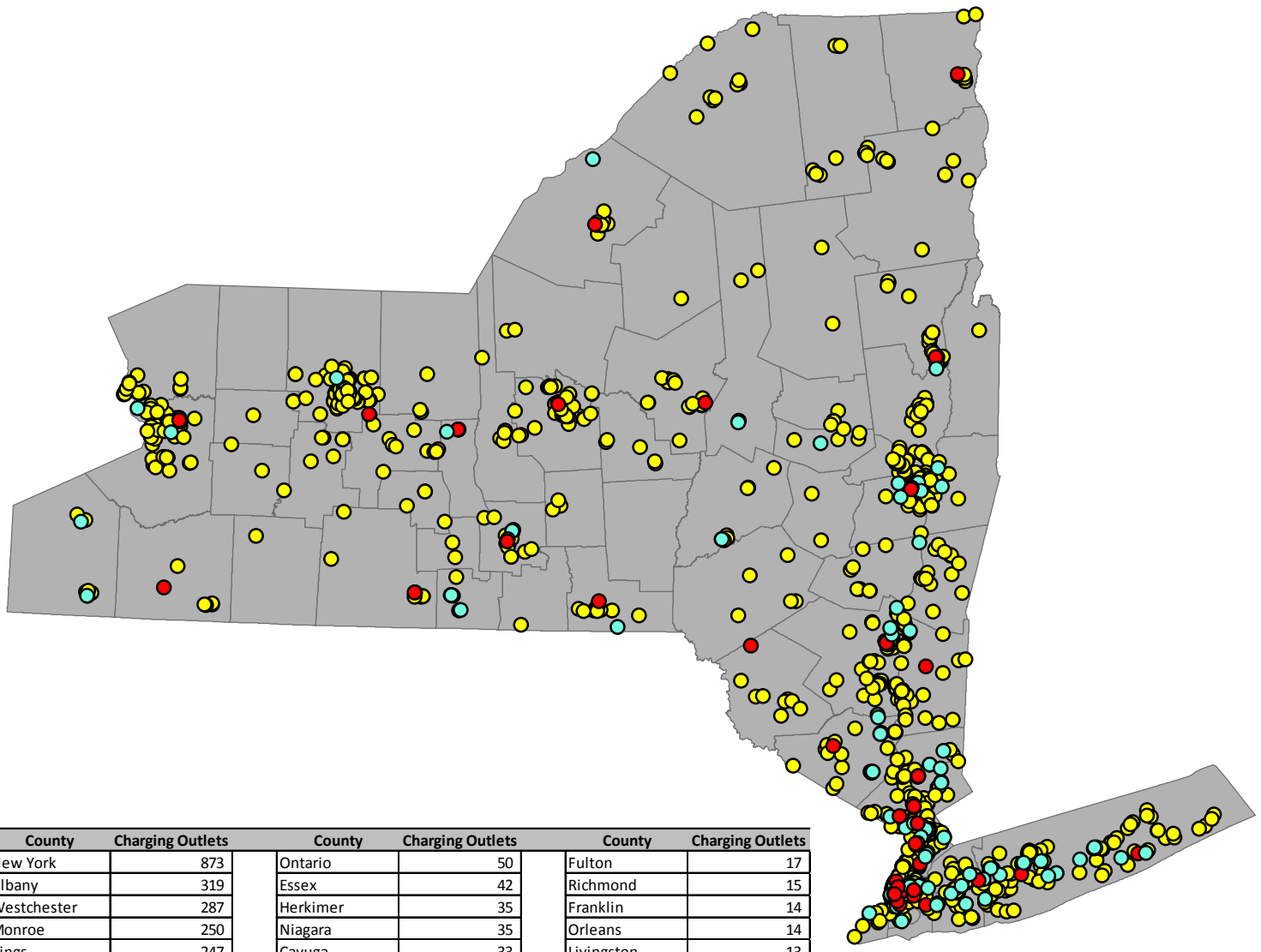
- CDTA: Route 4 and Bloomingrove Drive Park-n-Ride Lot, East Greenbush
- CDTA: Rensselaer Amtrak Station, Rensselaer

Overall, EV charging infrastructure in identified focus areas has increased over 50% since 2016. Table 1 summarizes the change in charging stations in these municipalities since they were identified the previous plan.

Table 1 – EV Charging Stations in 2016 Focus Areas

Municipality	Charging Stations 2016	Charging Stations 2019
City of Albany	13	23
City of Saratoga Springs	19	29
City of Schenectady	9	9
City of Troy	13	17
Town of Colonie	20	42
Total	**74**	**120**

Map 2: EV Charging Stations - New York State



County	Charging Outlets	County	Charging Outlets	County	Charging Outlets
New York	873	Ontario	50	Fulton	17
Albany	319	Essex	42	Richmond	15
Westchester	287	Herkimer	35	Franklin	14
Monroe	250	Niagara	35	Orleans	14
Kings	247	Cayuga	33	Livingston	13
Queens	247	Broome	29	Genesee	8
Suffolk	228	Chemung	29	Montgomery	7
Erie	194	Jefferson	28	Otsego	7
Ulster	162	Delaware	27	Tioga	6
Nassau	123	Clinton	26	Allegany	5
Saratoga	120	Schuyler	24	Putnam	5
Onondaga	118	Oneida	23	Steuben	5
Warren	80	Greene	22	Hamilton	4
Rensselaer	64	Cattaraugus	21	Yates	4
Dutchess	61	St. Lawrence	21	Wyoming	3
Rockland	61	Madison	19	Cortland	2
Orange	60	Schenectady	19	Schoharie	2
Columbia	58	Sullivan	19	Washington	2
Tompkins	58	Seneca	18	Wayne	2
Bronx	50	Chautauqua	17	Lewis	1
				Total	**4,333**

Legend

- Public DC Fast Charging
- Tesla Fast Charging
- Public Level 2 Charging

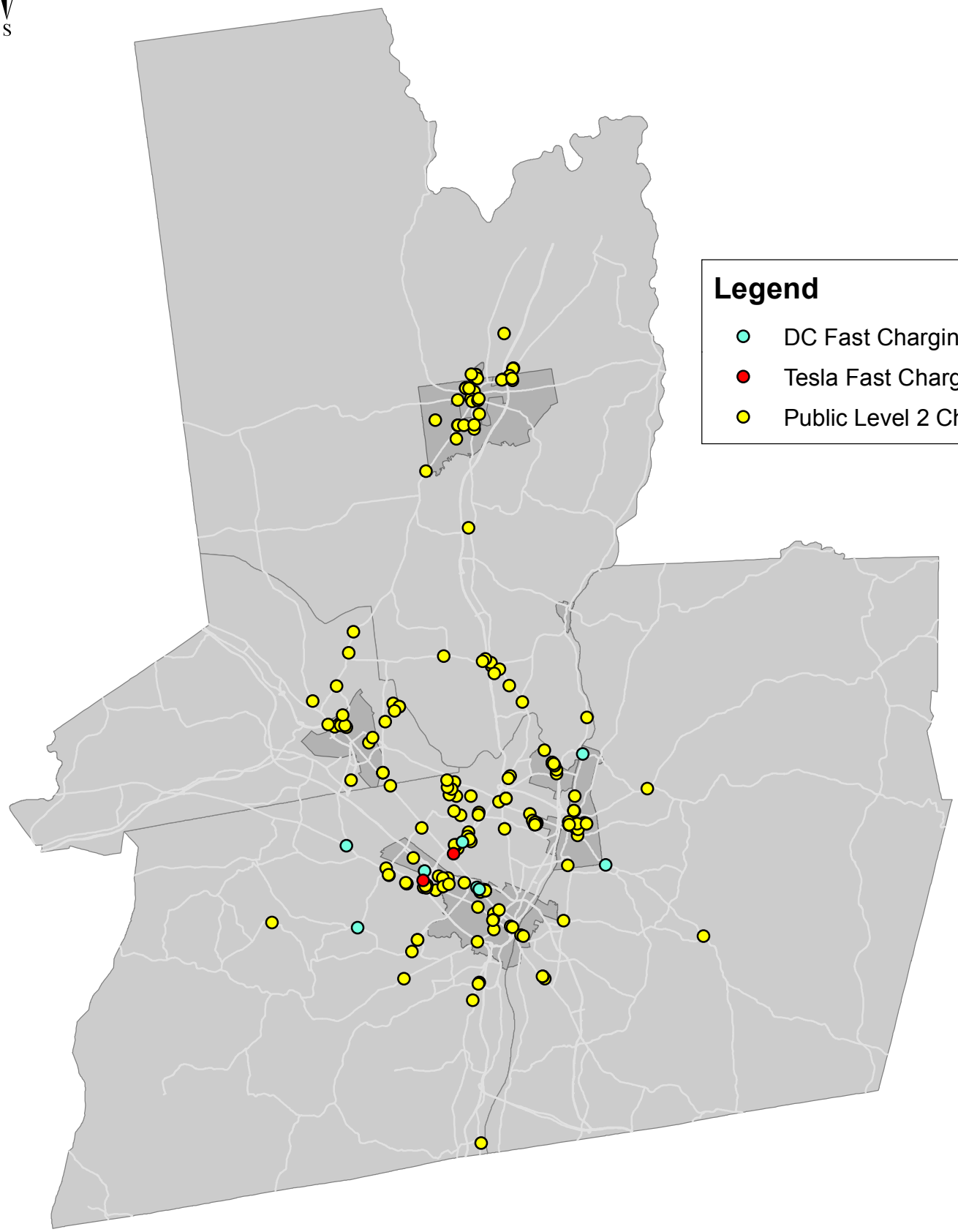
CAPITAL DISTRICT CLEAN COMMUNITIES

0 40 80 120 160 Miles

Data Sources:USDOE Alternative Fuel Data Center (January 2020)

CDTC

Map 3: EV Charging Stations - Capital District



CAPITAL DISTRICT CLEAN COMMUNITIES

0 5.5 11 16.5 22 Miles

Data Sources: USDOE Alternative Fuel Data Center (January 2020)

CDTC

5 ZEV Readiness

The Capital District is currently a great place for ZEV owners and is in excellent position to support future EV adoption. The cost of owning an ZEV in the region can be supplemented by combined state and federal rebates of up to $9,500 and recently passed legislation in New York has prioritized the reduction of greenhouse gas emissions state-wide by the year 2050. Travel trends in the region align well with the capabilities of the majority of ZEVs currently available, resulting in a population that could achieve a high level of EV adoption even at current technology levels. The following sections outline the policies in place that create an ZEV-Friendly Capital District.

5.1 ZEV Policy

Throughout the country EV adoption is being influenced by state and federal policy that can shape the development and adoption of new fuel efficient technologies including ZEVs. Incentive programs offered at the state and federal levels offer point of sale discounts or tax credits on new EV and EVSE purchases, and environmental policies set goals for fuel efficiency and greenhouse gas emissions that can guide the adoption of new fuel efficient technologies. The following section highlights EV policy and incentives that influences ZEV adoption in New York State.

5.1.1 New York State ZEV Incentives

The ChargeNY program was implemented in March 2017 with the primary goal of getting at least 40,000 new EVs on the road and installing over 2,500 new charging stations in the State of New York by 2018. Through ChargeNY, the “Drive Clean Rebate” program provides a point of sale rebate of up to 2,000 dollars for new BEV or PHEV car purchases or leases depending on the all-electric range of the vehicle.

To date, ChargeNY and the Drive Clean Rebate program has issued over 22,000 rebates, totaling over 29 million dollars statewide since its inception in 2017. In the Capital Region there have been over 1,700 rebates issued, totaling over 2.4 million dollars. New York State also provides additional grant funding for municipalities who are adding new ZEVs to their municipal fleets. Plug-in hybrid electric, all-electric and hydrogen fuel cell vehicles are all eligible for rebates of $2,500 for vehicles with a 10 to 50-mile electric range, and rebates of $5,000 for vehicles with greater than 50-mile electric range. Table 2 outlines rebate levels for the Drive Clean Rebate Program. There are over 60 vehicle models eligible for the Drive Clean Rebate. A full list of eligible vehicles can be found in Appendix A.

Table 2 – Charge NY Rebate Levels

EPA All – Electric Range	Drive Clean Rebate $
Greater than 120 Miles	$2,000
40 – 119 Miles	$1,700
20 – 39 Miles	$1,100
Less than 20 Miles	$500
Electric Vehicles with MSRP >$60,000	$500

The New York Truck Voucher Incentive Program (NYTVIP) was initiated in October 2019 in order to make clean bus and truck technology more accessible throughout New York State. The NYTVIP provides

discounts or vouchers to New York State fleets that are looking to purchase or lease BEV, PHEV, conventional hybrid electric, compressed natural gas, or propane medium and heavy duty vehicles, which includes weight classes 3-8. Voucher amounts are based on a percentage of the incremental cost of the vehicle, which is the difference in cost between the alternative fuel vehicle and a comparable diesel vehicle, up to a per-vehicle cap. Voucher incentive amounts may differ by vehicle technology, vehicle weight class, and location where the vehicle is owned and operated, but can cover up to $185,000 for class 8 BEVs.

Other NYS incentive programs include, Charge Ready NY, which offers rebates of $4,000 per charging port to public and private organizations that install Level 2 EV charging stations at public parking facilities, workplaces, and multifamily apartment buildings, and the new Truck Voucher Incentive Program, which will provide vouchers, or discounts, to NYS fleets that purchase or lease all-electric (BEV), plug-in hybrid electric (PHEV), conventional hybrid electric (HEV), compressed natural gas (CNG), or propane medium- and heavy-duty vehicles (weight class 3 through 8). A full list of NYS ZEV policies and incentives can be found on the USDOE Alternative Fuels Data Center website at https://afdc.energy.gov/fuels/laws/ELEC?state=ny.

5.1.2 Federal ZEV Incentives

The Federal government provides tax credit incentives for purchasing all electric and Plug-in hybrid vehicles that can be combined with NYS assistance for additional rebates on new Electric Vehicles. The federal program, known as the Qualified Plug-In Electric Drive Motor Vehicle Credit, offers federal tax credits between $2,500 and $7,500 based on the battery capacity and gross vehicle weight of the vehicle purchased. The federal tax credit begins to phase out for vehicles at the beginning of the second calendar quarter after the manufacturer has sold 200,000 eligible plug-in electric vehicles in the United States as counted from January 1, 2010. Currently, tax credits have not been completely phased-out for any vehicle models, however, reduced tax credits have been applied to various Tesla models, and the Chevrolet Bolt. A full list of federal ZEV policies and incentives can be found on the USDOE Alternative Fuels Data Center website at https://afdc.energy.gov/fuels/laws/ELEC?state=US.

5.1.3 NYS Climate Bill and GHG Emissions

The Climate Leadership and Community Protection Act (CLCPA) was signed into New York State law July 22, 2019. The law requires New York State to achieve an 85% reduction in greenhouse gas emissions (below 1990 levels) by 2050, and offset the remaining 15%, possibly through measures to remove carbon dioxide from the atmosphere. These goals are for all emission sources, but transportation represents a significant portion of total emissions. It also requires New York State electricity to be 100% carbon-free by 2040. To meet these ambitions goals, NYS will need to continue investing in clean energy and transportation options which will support the future adoption of EVs and reduce greenhouse gas emissions.

Capital District Transportation Committee (CDTC) staff, in cooperation with NYSERDA, developed multiple scenarios that depict how New York's new climate change legislation could impact future vehicle miles traveled (VMT) and GHG emissions using the VisionEval Rapid Policy Assessment Tool (VERPAT) modeling software.

Using employment and land-use forecasts that are incorporated into CDTC's travel demand model, a current trend, optimistic EV and pessimistic EV scenarios were all evaluated to gauge how future EV market penetration could impact GHG emission reductions.

The pessimistic EV market share scenario considered approximately 40% EV market share by the year 2050 which could result in GHG reductions of up to 61% (compared to 1990). The optimistic EV market share scenario considered 100% EV market share by 2050. This scenario showed the potential to result in GHG reductions of up to 85% (compared to 1990 values) pushing NYS towards the goals of the CLCPA. Table 3 below shows the estimated reductions of the various scenarios evaluated. Figures 5 and 6 show the Vehicle Type Market share by year for the pessimistic and optimistic EV scenarios.

Table 3 – GHG Emissions Scenarios

Scenario/Year	EV Market Share	VERPAT VMT	GHG Emissions	GHG Reduction from 1990
1990	NA	14,673,091	15,509,305	None
2015	NA	17,476,681	13,960,139	-10%
2030 Trend	NA	18,442,823	8,269,093	-47%
2050 Trend	NA	18,708,916	4,275,491	-72%
2050 Optimistic EV	100%	18,540,313	2,275,467	-85%
2050 Pessimistic EV	42%	18,694,324	5,976,415	-61%

Figure 5 – Pessemistic EV Market Share Scenario

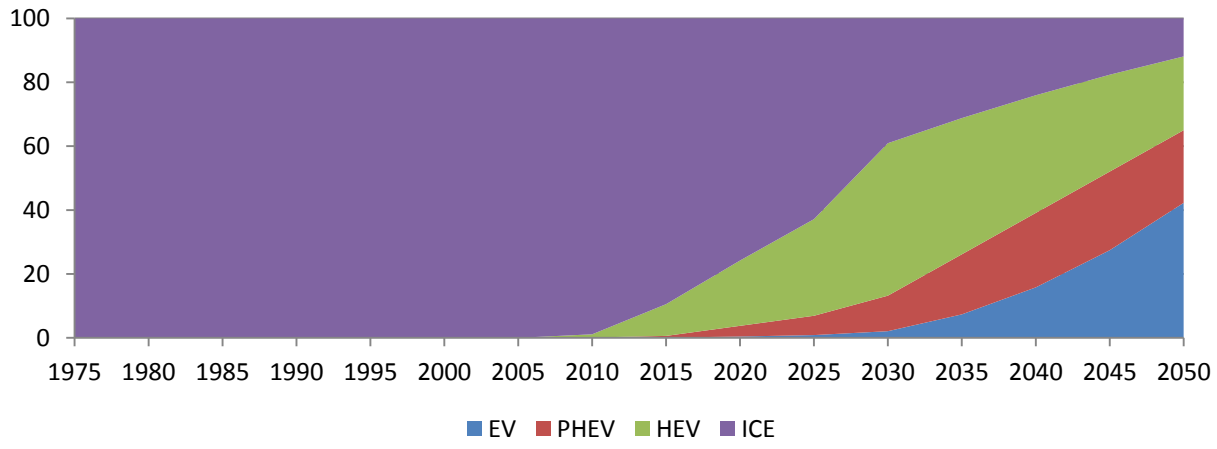
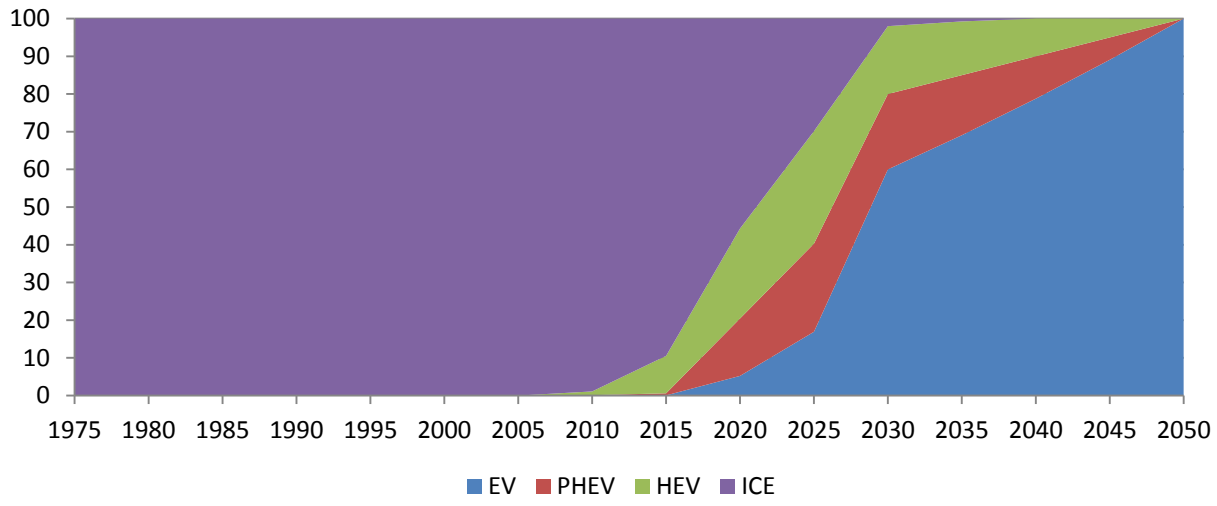


Figure 6 – Optimistic EV Market Share Scenario



5.1.4 Municipal ZEV Policies

Local building codes, zoning ordinances, and parking regulations also have the ability to impact the rate of ZEV adoption by making EVSE more accessible. A simple and consistent EV charging station permitting processes can make installing EV infrastructure much easier for interested developers, which leads to fewer gaps in charging infrastructure throughout a region. 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.

Specifically in the Capital District, the City of Albany has incorporated EV charging into their Unified Sustainable Development Ordinance (USDO) by proactively identifying EV charging stations as a permitted accessory use in Residential-M, Residential-V, and all Mixed Use districts. The Town of Clifton Park also integrates EV readiness into their development review process requiring new construction includes accommodations to install the conduit under the pavement to designated parking stalls for preparation of future EV Charging Stations.

Other examples of EV policies being implemented across the United States include:

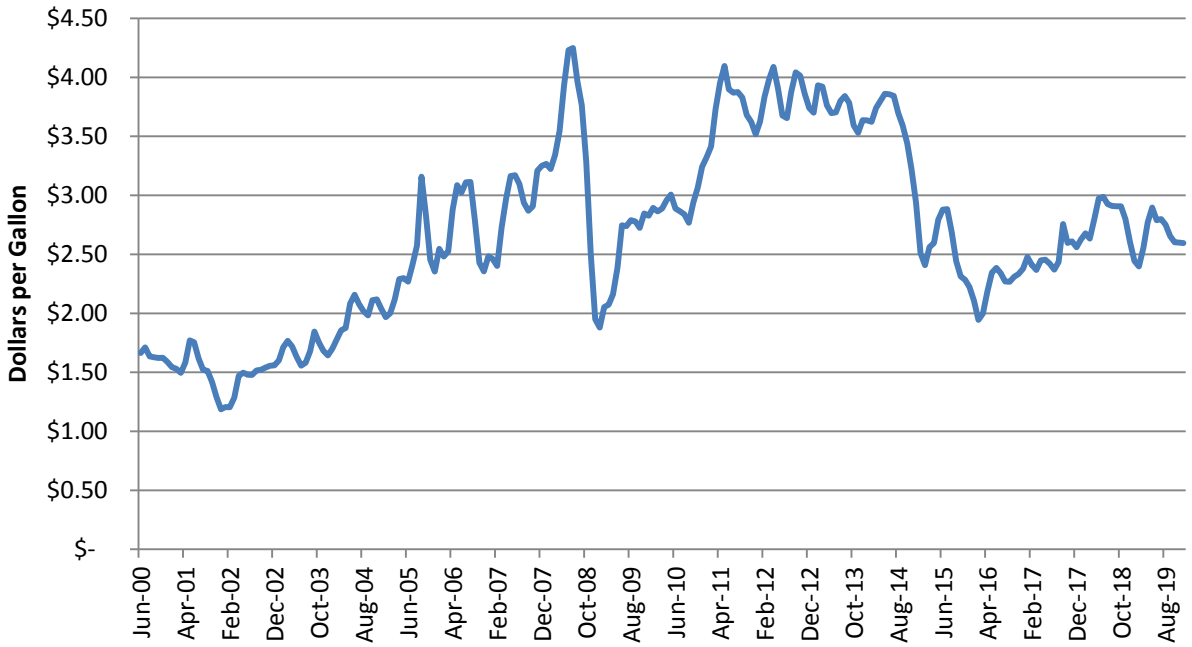
- Atlanta, Georgia – City council ordinance requires all new residential buildings and public parking to accommodate EVs by 20% of parking spaces in all new commercial or Multi Family parking be EV Ready.
- California, Statewide – A multifamily community cannot prohibit the installation of EVSE, if residents designated parking space is not capable a community space can be used. Appropriate approvals and design standards must apply but they cannot be outright prohibited.
- Arizona, Statewide – Parking an ICE vehicle in a designated EV charging space can be fined up to $350.

Including accommodations such as the ones listed above can significantly reduce the cost of installing EV charging stations in the future and help fill gaps in the EV charging network throughout the region, and State.

5.2 Cost of Ownership

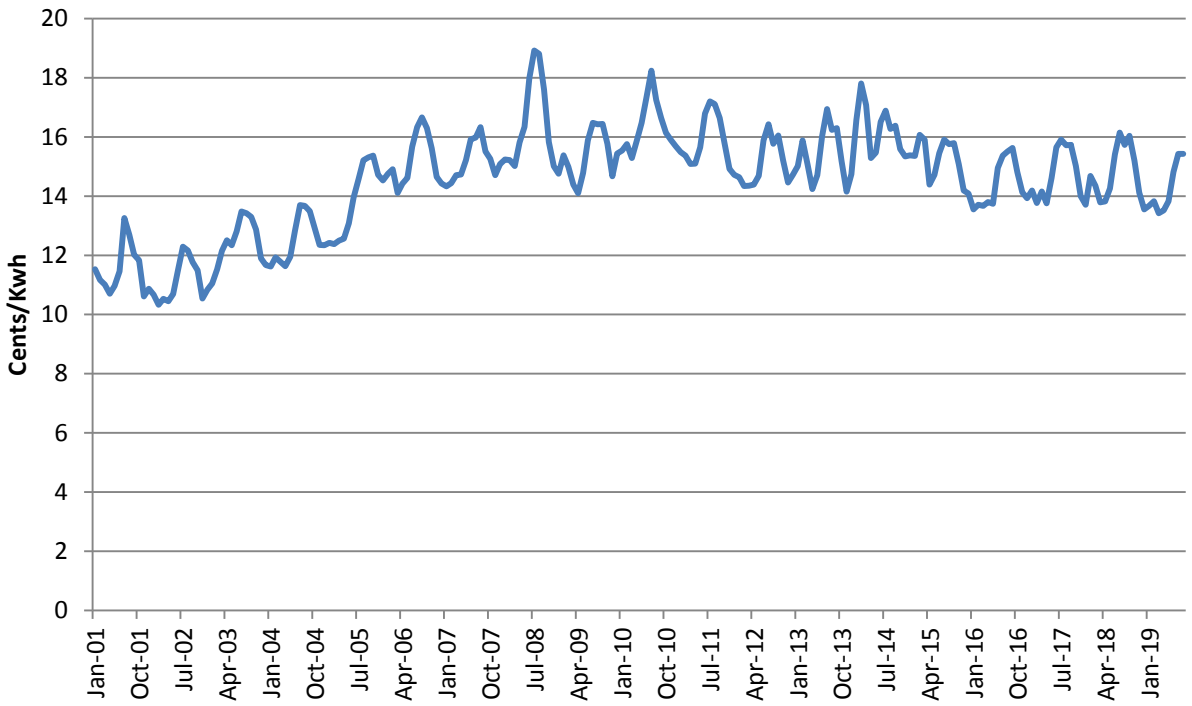
In addition to state and federal incentives available, daily commute times and distances, and fuel costs can also influence the rate of ZEV adoption in a region. As of December 2019 the national average retail fuel price was $2.55 per gallon. In New York State, the average cost of a gallon of gasoline was slightly higher at $ 2.59 per gallon statewide and $2.68 per gallon in the Capital District, based on fuel data from the US Energy Information Administration and local fuel price data collected by Capital District Clean Communities. In comparison, the average retail price of electricity in New York, is currently around 15 cents per kilowatt hour. Using these prices as an estimate, it would cost around $30 for a gasoline vehicle to travel 310 miles at 26 miles per gallon, comparatively, an electric vehicle with a 75 kilowatt hour battery could travel that same distance for around $13. Not only is electricity often the more affordable fuel, but its prices are historically less volatile than gasoline, resulting in more predictable fuels costs from year to year. Figures 7 and 8 show the historic average costs of gasoline and electricity in New York State.

Figure 7 – NYS Regular Retail Gasoline Prices (2000-2019)



Source: U.S. Energy Information Administration

Figure 8 - NYS Avg. Retail Electricity Costs (2002-2018)

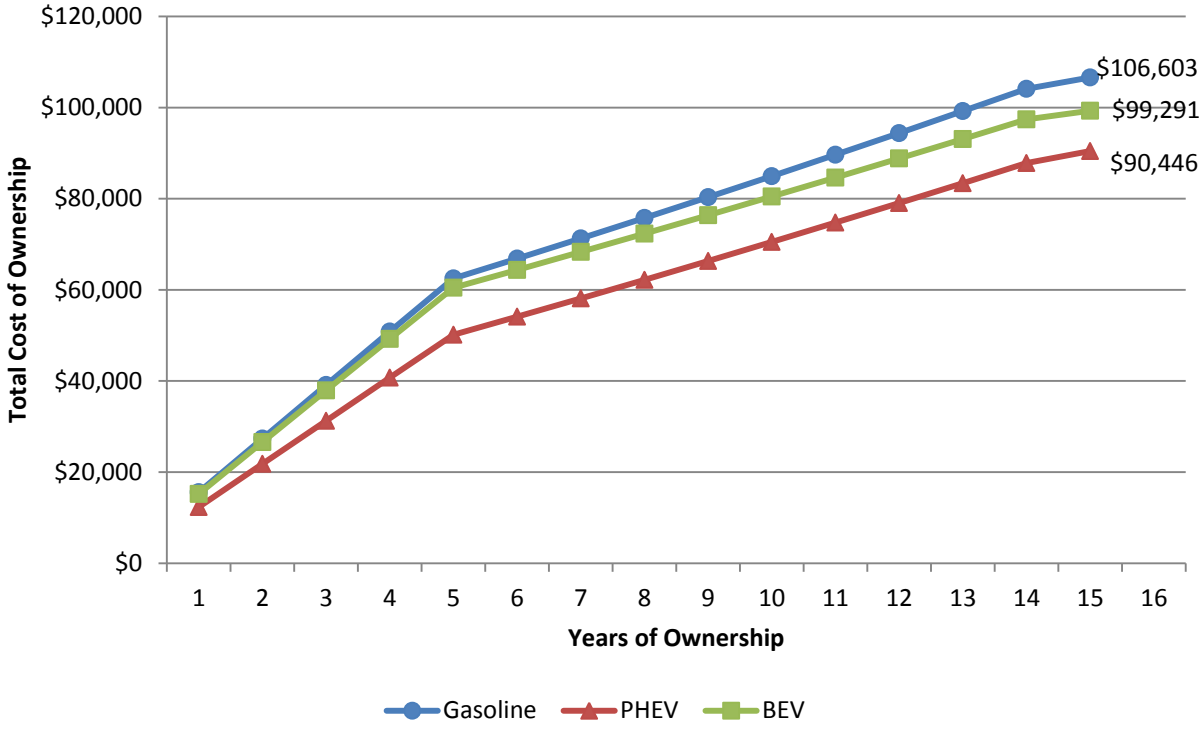


Source: U.S. Energy Information Administration

Total Cost of Ownership

The USDOE and Argonne National Labs have developed the Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool to allow fleet managers to compare the total cost of ownership of their traditionally fueled vehicles to potential new alternative fueled vehicles, including electric. Using this tool the total cost of ownership can be compared across vehicle fuel types for the state of New York. The AFLEET tool can be run with a default set of baseline assumptions or custom inputs can be used to model specific scenarios of vehicle cost, financing, fuel economy and a variety of other factors. The AFLEET tool was used to estimate potential total cost of ownership of a new PHEV purchase ($28,000) and BEV purchase ($37,500) compared to an ICE vehicle ($37,500) over a 15 year life cycle. The AFLEET model indicates that PHEV will have the lowest total cost of ownership due to its reduced purchase price and additional savings from fuel and maintenance costs. The BEV will have a higher total cost of ownership compared to the PHEV, but still lower than the gasoline vehicle. The gasoline vehicle will have the highest total cost of ownership of the three vehicle types. Figure 9 below illustrates the total cost of ownership comparison over the 15 year time period.

Figure 9 – Total Cost of Ownership Comparison



Average Commute Times

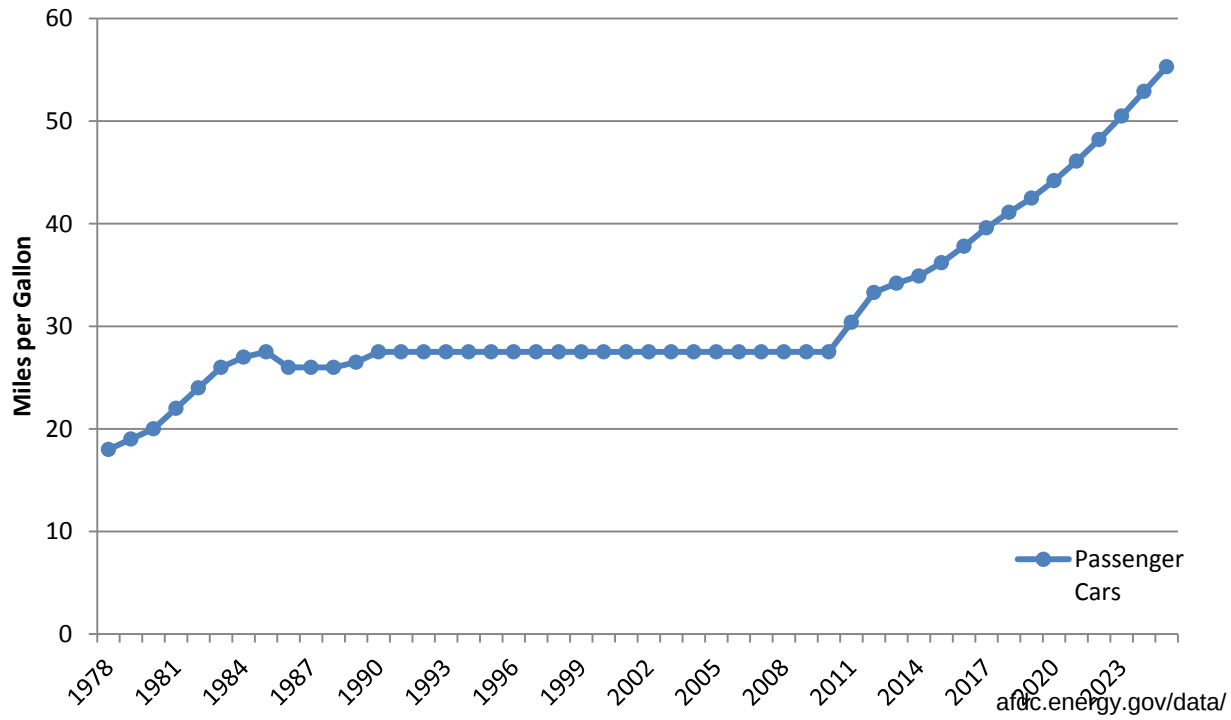
Although current fuel prices in the region are relatively low, average commute time and distance indicate that a large portion of the working population could adopt ZEVs capable of traveling a daily commute on all electric power. According to the Census American Community Survey (ACS) estimates for 2017, the average commute time in the Capital District is approximately 26 minutes for those traveling by car, truck, or van, and the average distance traveled in a daily commute to work is approximately 11 miles, one way, according to National Household Travel Survey (NHTS) data from 2009. Of course, many commuters travel much farther than 22 miles a day and often add in secondary trips to their commute resulting in a longer daily trip, however, of the available EVs on the market today, there are over 50 models with an all-electric range of 22 miles or greater that would allow the average Capital District commuter to complete a daily commute without the use of gasoline.

5.3 CAFÉ Standards

Corporate Average Fuel Economy (CAFÉ) standards were first introduced in 1975 through the Energy Policy and Conservation Act of 1975 with the goal of improving fuel economy for new vehicles in response to the 1973 oil embargo. Today, CAFÉ standards continue to improve energy independence but also influence the adoption of ZEVs across the country by requiring manufacturers to develop new technologies which will improve fuel economies including increased electrification of the fleet through hybrid vehicles, plug in hybrid electric vehicles, and battery electric vehicles.

Initial targets for average fuel economy of new car and light duty truck fleets beginning in model year (MY) 1978 aimed to double average fuel economy of the new car fleet to approximately 27.5 mpg by MY 1985. In 2007 standards were increased through the Energy Independence and Security Act of 2007 to set the combined average fuel economy of all new cars, light trucks and SUVs to approximately 35 mpg by MY 2020. In 2009, CAFÉ standards were increased once again through a joint agreement between the National Highway Traffic and Safety Administration (NHTSA) and Environmental Protection Agency (EPA). The new legislation increased the rate of average fuel economy increase and required the fleet wide average fuel economy to be approximately 35 mpg by 2016. In 2012 NHTSA extended the joint program with EPA and implemented standards for passenger cars and light trucks for model years 2017 through 2025, which would require a fleet-wide average fuel economy of approximately 55 miles per gallon (mpg) for vehicles with a model year 2025. The Safer Affordable Fuel Efficient (SAFE) Vehicles rule was proposed in 2017 that established new standards, freezing fuel economy requirements at the 2020 level through model year 2026. Because of this change, the projected overall industry average required fuel economy in model years 2021-2026 is 37.0 mpg compared to 46.7 mpg under the 2012 rule. The table below shows the progression of CAFÉ requirements from MY 1978 – 2025 and does not reflect the proposed SAFE rule standards for MY 2020-2026.

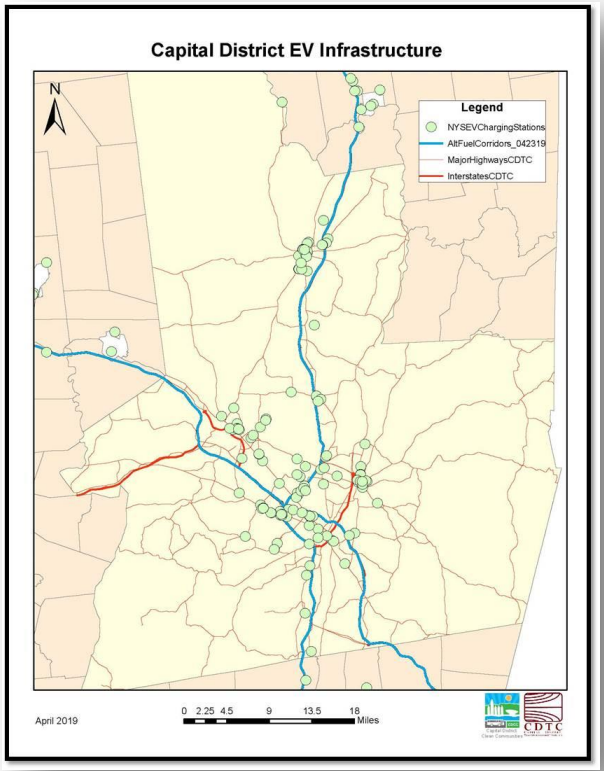
Figure 10 – Vehicle Fuel Efficiency (CAFÉ) Requirements 1978-2025



6 Alternative Fuel Corridors

Section 1413 of the Fixing America's Surface Transportation (FAST) Act, the current bill funding public infrastructure in the United States, requires the Secretary of Transportation to designate national alternative fuel corridors throughout the country. The goal is to develop a network of stations that will provide clean and domestically produced alternative fuels to commercial and passenger vehicles so they can travel reliably between cities and regions. Corridors can be designated for, hydrogen, propane, and natural gas fuel, and electric vehicle (EV) charging.

The FHWA's Alternative Fuels Clean Corridors program began in 2016 and is now in its fourth round of corridor designations. Currently, the State of New York has six designated Electric Vehicle, Alternative Fuel Corridors, two of which pass through the Capital District, I-87 and I-90. Since the designation of these corridors in 2016, FHWA criteria for an EV Alternative Fuel Corridor have changed.



Map 4 – Existing Alternative Fuel Corridors

Previously, for a corridor to be designated, public level 2 charging stations were required no more than 50 miles between stations and no greater than 5 miles off from the highway. Currently, for a corridor to be designated, public DC Fast Charging stations are required no greater than 50 miles between stations and no greater than 5-miles off from the highway to be considered "Corridor Ready". A corridor can be considered "Corridor Pending" if public DC Fast Charging exists more than 50 miles between stations.

Due to the changes in designation criteria, and the current opportunity for new corridor designations, CDCC staff evaluated several major Capital District Corridors for the potential to be designated as an EV or hydrogen alternative fuel corridor.

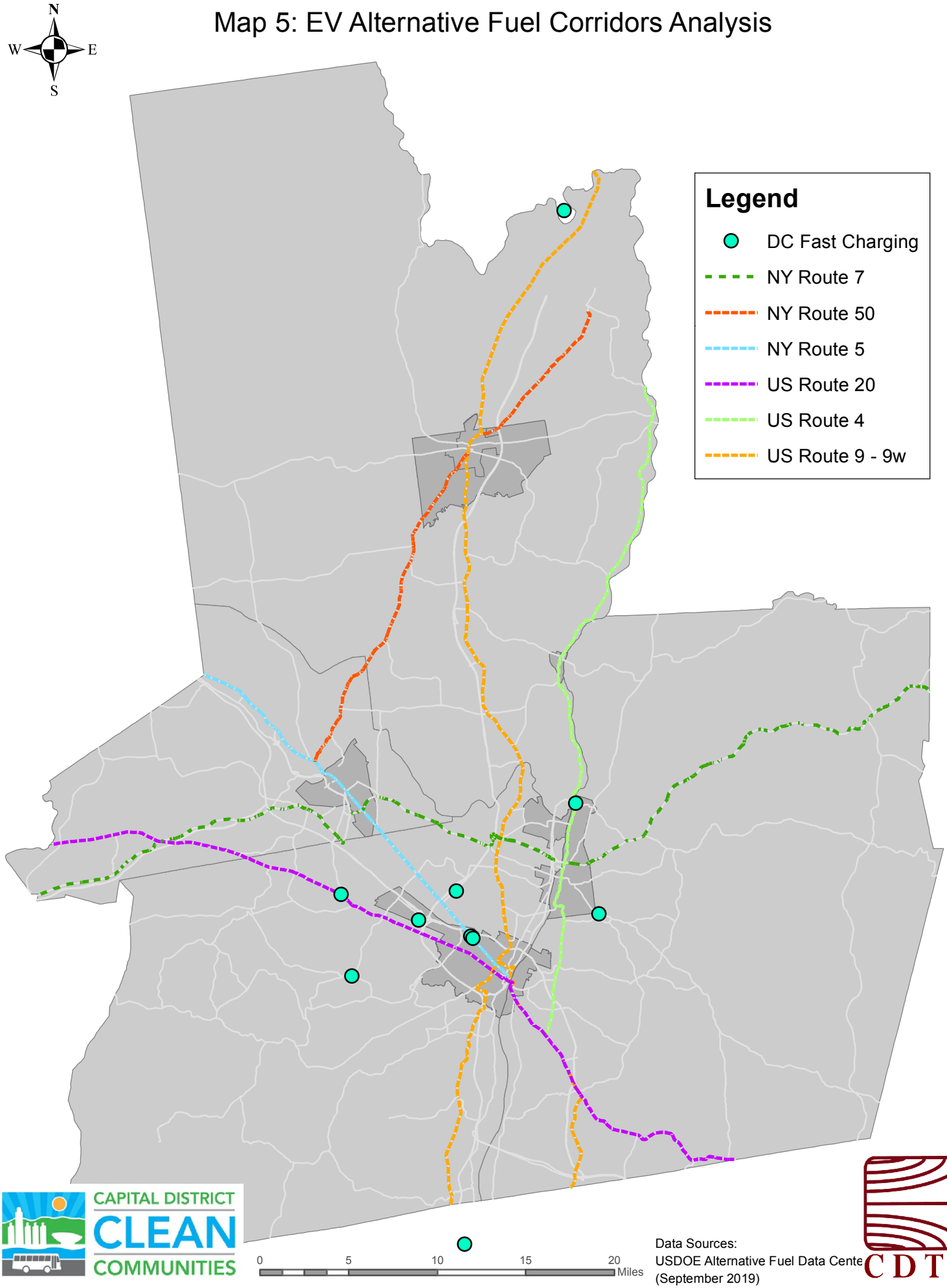
A desktop analysis comparing existing EVSE to major Capital District corridors was performed with the goal of identifying any corridors that could be potentially eligible for future designation. Given that I-87 and I-90 were previously identified and designated as EV Corridor Ready, the focus of the analysis was on non-Interstate routes. CDCC staff evaluated six non-interstate corridors in the region and overlaid the existing public DC fast charging infrastructure to perform a spatial comparison. Table 4 below shows the routes evaluated and the presence of DC fast Charging on each route evaluated.

Table 4 – Potentially Eligible EV Alternative Fuel Vehicle Corridors

Corridor Name	DC Fast within 5 miles of Corridor	Distance Between Eligible Stations (Miles)	AFV Corridor Eligible
US Route 9	7	45	Y
US Route 20	6	8	Y
NY Route 5	5	40	Y
NY Route 7	4	14	Y
NY Route 4	2	6	Y
NY Route 50	0	NA	N

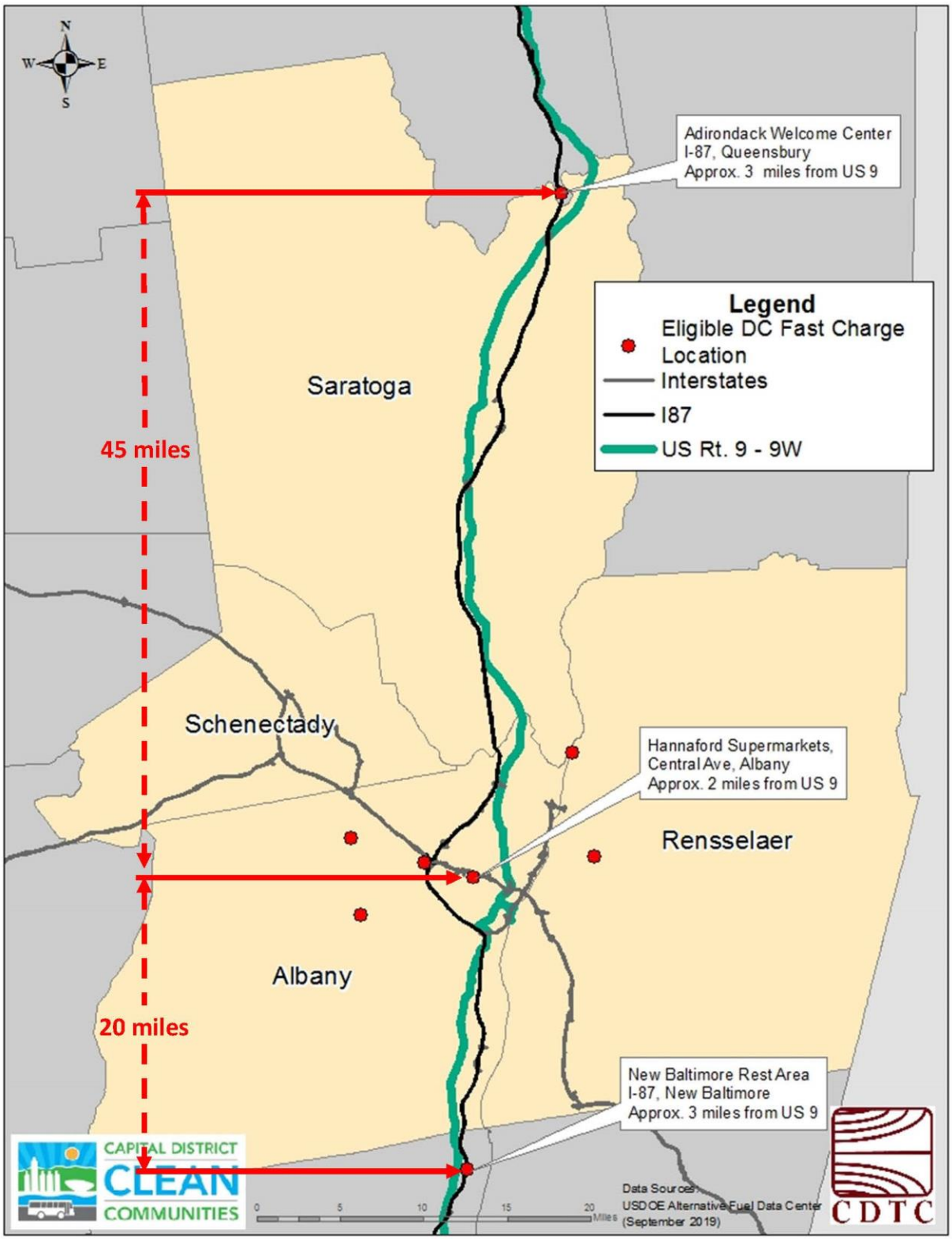
The analysis shows that of the routes evaluated, there are five corridors in the Capital District which fit the criteria needed to be designated as EV corridor ready. Although there are five total corridors that fit the criteria CDCC recommends only one for EV Alternative Fuel Corridor designation at this time, US Route 9 from New Baltimore to Glens Falls. This corridor is approximately 65 miles long and runs parallel to the already designated I-87 corridor. The US 9 corridor is served by three DC fast charging stations. Moving from north to south, the first station is located at the New Baltimore rest area on I-87 south, the second is located at Hannaford Supermarkets at 900 Central Avenue, Albany. This location is approximately 20 miles north of the New Baltimore location and 2 miles off from the US 9 corridor in the City of Albany. The third DC fast charge station is located at the Adirondack Welcome Center, on I-87 in Queensbury. This station is approximately 45 miles north of the Hannaford Supermarket location and 3 miles north of the Exit 17, US 9 / I-87 Interchange. This corridor provides EV drivers traveling north / south through the Capital District several charging options and the corridor ready designation would allow for consistent signage promoting EV travel throughout the region. Although the US 9 corridor is being recommended for designation at this time, CDCC recommends that all potentially eligible corridors are considered for corridor ready designation in the future and corridors that do not meet criteria are re-evaluated in the future as new EVSE is installed. CDCC staff has drafted a memo to NYSDOT requesting the corridor ready designation. A copy of this memo is included in Appendix C.

Map 5: EV Alternative Fuel Corridors Analysis



Data Sources:
USDOE Alternative Fuel Data Cente
(September 2019)

Map 6 –US Rt9-9W Corridor Map



7 Public Outreach

Public outreach was conducted throughout the plan update to gain a better understanding of the public perception of ZEVs in the Capital District. Public involvement activities included a Zero Emission Vehicle Working group to provide input and guidance on the ZEV plan, education and outreach at several local farmers markets, ride & drive events where attendees could experience driving an electric vehicle first hand, a presentation at a local government planning and zoning workshop, and distribution of a ZEV Survey to collect local resident's thoughts and opinions of ZEVs.

The survey had 72 total respondents to online and in person surveys. The results should not be taken as a representative sample of the entire Capital District population; nevertheless, the completed surveys provide valuable data and a glimpse of how some residents feel about the current and future conditions of ZEVs.

The following notes highlight some of the trends in survey responses.

- 40% of survey respondents currently owned or leased an EV
- 60% of survey respondents did not currently own or lease an EV
- 85% of survey respondents indicated that they were at least "somewhat familiar with EV technologies"
- 75% of survey respondents who did not own an EV already indicated that they were at "least somewhat familiar" with the technology
- Over 50% of survey respondents who did not currently own an EV indicated that they would consider purchasing an EV in the future
- Over 50% of survey respondents who did not currently own an EV indicated that "initial vehicle cost" is the primary reason why they do not currently own or lease an EV
- Almost 60% of respondents who owned an EV indicated that the main reason they chose to own an EV was for the positive environmental impacts

8 Barriers & Recommendations

Current conditions in the Capital District make it a great place to own a ZEV, however, there are still barriers limiting the adoption of ZEVs and actions that can be taken by the private and public sectors that will further improve conditions and continue to drive the adoption of ZEVs in the Capital District. The following sections outline these barriers and recommended strategies to help overcome them.

8.1 Barriers

Home Charger Installation

Residents who live in urban areas, multi-unit housing developments, or those who rent may find it more difficult to install and access EV charging at home. Urban areas often lack the necessary utilities to install on-street EV charging, and those who rent or live in multi-unit dwellings may not have the ability to install infrastructure on community owned property, leaving little opportunity for at home charging. However, as roads are reconstructed and streetscapes are redesigned, and new multi-unit dwellings are built EV infrastructure must be considered, and municipal EV readiness policies can guide new development to provide the infrastructure necessary for easier installation of home charging in urban and multi-unit settings.

Demand Charges

Demand charges are additional fees assessed to a customer based on their usage during peak hours of electricity demand. Demand charges are typically associated with DC fast charging which may draw a surge of power in a relatively short period of time. These charges can vary by utility but increased demand could result in high, unpredictable demand charges for the owners of DC fast charge stations and discourage some from installation all together. Demand charges are seen as a barrier to DC fast charger installation.

Electric Vehicle Pricing

Although the cost of EVs have gone down in recent years, many feel that the price of purchasing or leasing a new PHEV or BEV is still the primary barrier to owning an EV. Rebate and incentive programs for new EV leases and purchases help offset some of the additional costs and make them a more realistic option for many drivers.

8.2 Recommendations

The Capital District is in a good position for growth in EV deployment. As discussed, the numbers of EVs and EV charging stations have increased significantly since the 2016 Capital District EV Charging Station Plan. Steady financial and technical support from state, regional, and local governments have been key to developing an EV-Ready Capital District. This support should continue as resources are available. Additionally, the region must track and assess new vehicle technologies and how they fit into air quality, economic, and other environmental goals.

The Charge NY initiative has set a goal of increasing the number of EVs on the road to approximately 850,000 by 2025 and 2 million by 2030. Anticipated improvements in battery technology and charging will lead to larger numbers of EVs. As shown below, the region must continue to invest and promote infrastructure in order to support more vehicles.

Table 5 - EV Infrastructure Projections

	Albany-Schenectady		**Saratoga Springs**		**New York**	
	As of 2016	*10% EV Market Share*	*As of 2016*	*10% EV Market Share*	*As of 2016*	*10% EV Market Share*
Light-Duty Vehicles (as of 2016)	540,900	54,000	115,100	11,000	11,437,800	1,000,000
Workplace Level 2 Plugs	*	1,189	*	271	*	21,716
Public Level 2 Plugs	307	744	62	166	3,199	13,602
DCFC Plugs	39	90	0	27	496	1,801

*Wokplace charging includes private stations which are not tracked
Source: U.S. Department of Energy EVI-Pro-Lite Tool

Alternative Fuel Corridors

CDTC and CDCC must work with NYSDOT and municipalities within the I-90 and I87 corridors to maintain designation in FHWA's Alternative Fuel Corridor Program. As new corridors become eligible, CDTC and CDCC will assist NYSDOT in submitting designation proposals to FHWA. Developing a coordinated implementation or maintenance plan should be discussed and considered. US Route 9 should be proposed for designation in Round 4 (2019).

Additional Public Level 2 Charging

The amount of EVSE has increased in the Capital District since 2015, however, there are still gaps in charging infrastructure that can make it difficult to travel through the region on all electric power and prevent the adoption of ZEVs.

There are areas where an EV driver passing through the area would not have a feasible option to charge. Some municipalities and organizations in the Capital District have taken the initiative to install EV

charging stations which has made those locations very supportive of EV drivers. Continuing to expand the public charging network is needed to support existing and potential EV-owners, along with EV drivers that visit our region.

Five communities were identified as "key locations" for expanding the electric vehicle charging network as part of the original Capital District Electric Vehicle Charging Plan. These communities include the Cities of Albany, Saratoga Springs, Schenectady, Troy, and the Town of Colonie. They were ranked as the highest priority based on proximity to high volume roads, population and population shifts that occur as activity and employment centers, and existing electric vehicle infrastructure. These communities are still considered to be key locations for additional EV charging infrastructure.

Additional Public DC Fast Charging

Public level 2 charging in the region is becoming more prevalent, but the presence of public DC Fast charging is still lacking with only 11 public stations (41 outlets) in the region currently. DC fast chargers, are needed to further extend the use of EVs throughout the region and NYS as a whole. Strategically placing DC fast chargers in the Capital District along major routes could support transient EV drivers as well as local EV drivers.

The Capital District EV Charging Station Plan Working Group recommends that DC fast chargers are installed 25-50 miles from each other along major transportation routes. The following locations have been identified as preferred DC fast charge locations: Albany, Schenectady/Rotterdam, Chatham, Coxsackie, Malta/Saratoga Springs, Glens Falls, Cobleskill.

The planning of fast charging stations should be coordinated at a state level and attempt to align with regular routes for government or private fleets of EVs. Furthermore, the potential for EV Tourism should be explored in the Capital Region. Fast charging stations should also be located along Scenic Byways, beer or wine trails, or at popular natural area attractions.

Municipal EV Readiness Policy

Municipalities can prepare for EVs and the infrastructure that is used to charge them by incorporating EV readiness policy into their local rules and regulations. Several municipalities in the Capital District are already implementing these types of policies, but further adoption will encourage EV adoption help fill gaps in current EV charging infrastructure. See Appendix B for several documents that provide guidance implementing local EV readiness policy.

General Public Education and Outreach

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

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

Cost savings should be emphasized more than environmental benefits and promotional efforts should be directed towards key demographics of potential EV buyers rather than a broad audience. An audience to target would be residents drawn to the farmer's markets or other initiatives surrounding sustainability or embracing the natural environment (e.g. hiking).

Elected Officials Education and Outreach

Like many residents of the Capital District, most elected officials are not properly educated on EV technology or the benefits they can provide to our communities. General education on EVs through presentations and publications should be provided in coordination with their existing meetings and conferences. Key elements of this outreach to elected officials would be hands-on experiences where they have the chance to see and ideally drive EVs. It is also important to draw connections between EVs and other local initiatives such as smart cities initiatives, renewable electricity generation projects or even tourism.

Fuel Cell Technology

The next generation of alternative fuel and advanced vehicle technology that has not yet been deployed in any large numbers in the region is fuel cells. Hydrogen is an alternative fuel that can be produced from diverse domestic resources and is emissions-free. Since Hydrogen is stored in water (H2O) and other organic matter (i.e. methane, CH4), it is abundant in our environment. While the market is in its infancy as a transportation fuel, government and industry are working toward clean, economical, and safe hydrogen production and distribution for widespread use in fuel cell electric vehicles (FCEVs). Fuel cells are manufactured in the Capital District and have been piloted locally in a partnership between FedEx and PlugPower. As EVs become more ubiquitous, fuel cell technology will be essential for power back-up and peak demand shifting as vehicle charging strains the grid.3

[3] https://afdc.energy.gov/fuels/hydrogen_basics.html

Appendix A

NYS Drive Clean Rebate Eligible Models

Make and Model	All-Electric Range (miles)	Fuel Economy (MPGe)	Federal Tax Credit ($)	NY Rebate ($)	Vehicle Type
Audi e-tron	204	74	7500	500	Battery Electric Vehicle
Audi A3 e-tron	16	83	4502	500	Plug-In Hybrid Electric Vehicle
BMW 330e I Performance	14	71	4001	500	Plug-In Hybrid Electric Vehicle
BMW 530e (2018, 2019)	16	72	4668	500	Plug-In Hybrid Electric Vehicle
BMW 530e (2020)	20	69	5836	1100	Plug-In Hybrid Electric Vehicle
BMW 530e XDrive	18	65	5836	500	Plug-In Hybrid Electric Vehicle
BMW 740e XDrive	14	64	4668	500	Plug-In Hybrid Electric Vehicle
BMW i3 2016-18	81-114	112-124	7500	1700	Battery Electric Vehicle
BMW i3 2019	153	113	7500	2000	Battery Electric Vehicle
BMW i3 REx 2016-18	97	109-111	7500	1700	Plug-In Hybrid Electric Vehicle
BMW i3 REx 2019	126	100	7500	2000	Plug-In Hybrid Electric Vehicle
BMW i8	14	76	3793	500	Plug-In Hybrid Electric Vehicle
BMW X5 xDrive40e	14	56	4668	500	Plug-In Hybrid Electric Vehicle
Cadillac ELR	40	85	7500	500	Plug-In Hybrid Electric Vehicle
Cadillac ELR Sport	36	80	7500	500	Plug-In Hybrid Electric Vehicle
Chevrolet Bolt	238	119	3750	2000	Battery Electric Vehicle
Chevrolet Volt	53	106	3750	1700	Plug-In Hybrid Electric Vehicle
Chrysler Pacifica	32	82	7500	1100	Plug-In Hybrid Electric Vehicle
Ford C-MAX Energi - 2016	19	88	4007	500	Plug-In Hybrid Electric Vehicle
Ford C-MAX Energi - 2017	20	95	4007	1100	Plug-In Hybrid Electric Vehicle
Ford Focus Electric	115	105	7500	1700	Battery Electric Vehicle
Ford Fusion Energi	26	103	4609	1100	Plug-In Hybrid Electric Vehicle

Make and Model	All-Electric Range (miles)	Fuel Economy (MPGe)	Federal Tax Credit ($)	NY Rebate ($)	Vehicle Type
Honda Clarity Plug-in Hybrid	47	110	7500	1700	Plug-In Hybrid Electric Vehicle
Hyundai Kona Electric	258	120	7500	2000	Battery Electric Vehicle
Hyundai Ioniq Electric	124	136	7500	2000	Battery Electric Vehicle
Hyundai Ioniq Plug-in Hybrid	29	119	4543	1100	Plug-In Hybrid Electric Vehicle
Hyundai Sonata Plug-in Hybrid	28	99	4919	1100	Plug-In Hybrid Electric Vehicle
Jaguar I-PACE	234	76	7500	500	Battery Electric Vehicle
Kia Niro Electric	239	112	7500	2000	Battery Electric Vehicle
Kia Niro Plug-in Hybrid	26	105	4543	1100	Plug-In Hybrid Electric Vehicle
Kia Optima Plug-in Hybrid	29	103	4919	1100	Plug-In Hybrid Electric Vehicle
Kia Soul EV	111	108	7500	1700	Battery Electric Vehicle
Mercedes-Benz B250e	87	84	7500	1700	Battery Electric Vehicle
Mercedes-Benz GLE550e	8	43	4085	500	Plug-In Hybrid Electric Vehicle
Mercedes-Benz S550e	12	58	4043	500	Plug-In Hybrid Electric Vehicle
Mercedes-Benz C350e	8	51	3417	500	Plug-In Hybrid Electric Vehicle
Mercedes-Benz GLC 350e	9	56	4460	500	Plug-In Hybrid Electric Vehicle
MINI Cooper S E Countryman ALL4	12	65	4001	500	Plug-In Hybrid Electric Vehicle
Mitsubishi i-MiEV	59	112	7500	1700	Battery Electric Vehicle
Mitsubishi Outlander	22	74	5836	1100	Plug-In Hybrid Electric Vehicle
Nissan LEAF - 2016, 2017	107	112	7500	1700	Battery Electric Vehicle
Nissan LEAF - 2018, 2019	150	112	7500	2000	Battery Electric Vehicle
Porsche Cayenne S E-Hybrid	13	46	6712	500	Plug-In Hybrid Electric Vehicle
Porsche Panamera 4 E-Hybrid	16	46	6670	500	Plug-In Hybrid Electric Vehicle

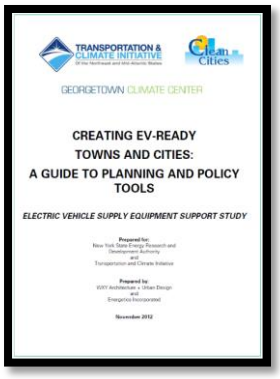
Make and Model	All-Electric Range (miles)	Fuel Economy (MPGe)	Federal Tax Credit ($)	NY Rebate ($)	Vehicle Type
Porsche Panamera S E-Hybrid	15	51	4752	500	Plug-In Hybrid Electric Vehicle
smart electric fortwo cabriolet	57	102	7500	1700	Battery Electric Vehicle
smart electric fortwo coupe	58	108	7500	1700	Battery Electric Vehicle
Subaru Crosstrek Hybrid	17	90	4502	500	Plug-In Hybrid Electric Vehicle
Tesla Model 3 Standard Range Plus	240	133	1875	2000	Battery Electric Vehicle
Tesla Model 3 Long Range	310	116	1875	2000	Battery Electric Vehicle
Tesla Model 3 Performance	310	116	1875	2000	Battery Electric Vehicle
Tesla Model S	285-370	104-111	1875	500	Battery Electric Vehicle
Tesla Model X	255-325	79-96	1875	500	Battery Electric Vehicle
Toyota Prius Prime	25	133	4502	1100	Plug-In Hybrid Electric Vehicle
Volkswagen e-Golf - 2016	83	116	7500	1700	Battery Electric Vehicle
Volkswagen e-Golf - 2017, 2018, 2019	125	119	7500	2000	Battery Electric Vehicle
Volvo XC90 T8	18	55	5002	500	Plug-In Hybrid Electric Vehicle
Volvo S60 T8	22	69	5002	1100	Plug-In Hybrid Electric Vehicle
Volvo S60 Polestar	22	69	5002	500	Plug-In Hybrid Electric Vehicle
Volvo V60 T8/Polestar	22	69	5002	500	Plug-In Hybrid Electric Vehicle
Volvo XC60 T8/Polestar	18	57	5002	500	Plug-In Hybrid Electric Vehicle
Volvo S90 T8	21	60	5002	500	Plug-In Hybrid Electric Vehicle

Appendix B

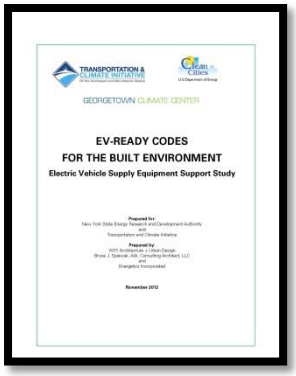
EV Community Readiness Guidance Documents

EV Community Readiness Guidance Documents

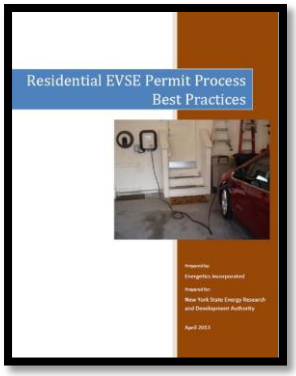
Creating EV-Ready Towns and Cities: A guide to planning and Policy Tools
https://www.transportationandclimate.org/creating-ev-ready-towns-and-cities-guide-planning-and-policy-tools



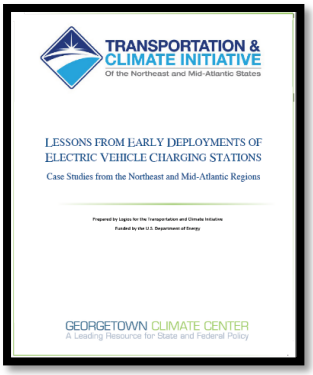
EV-Ready Codes for the Built Environment Electric Vehicle Supply Equipment Support Study
https://www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/EV-Ready-Codes-for-the-Built-Environment.pdf



Residential EVSE Permit Process Best Practices
https://www.nyserda.ny.gov/-/media/Files/Programs/ChargeNY/Permit-Process-Streamlining.pdf



Lessons from Early Deployments of Electric Vehicle Charging Stations Case Studies from the Northeast and Mid-Atlantic Regions
https://www.transportationandclimate.org/lessons-early-deployments-electric-vehicle-charging-stations



Appendix C

Alternative Fuel Corridors Designation Memo

CAPITAL DISTRICT TRANSPORTATION COMMITTEE

One Park Place, Main Floor · Albany, NY 12205-2676
www.cdtcmpo.org *e-mail:cdtc@cdtcmpo.org*
Phone: (518) 458-2161
Fax: (518) 729-5764

December 18, 2019

Ron Epstein
Assistant Commissioner of Policy & Planning Division
NYS Department of Transportation - Region 1
Office of Policy, Planning, & Performance
50 Wolf Road, Suite #1S50
Albany, New York 12232

Re: Designation of Alternative Fuel Corridors Round 4 – Request for Nominations

Dear Mr. Epstein,

Capital District Clean Communities coalition (CDCC) has recently completed a Zero Emission Vehicle Plan as part of work contracted through the United States Department of Energy (USDOE) Clean Cities program. The plan acts as an update to a previous Capital District Electric Vehicles Charging Station Plan released in March 2016 as part of the I-90 Corridor EV Charging Plan and provides an assessment of the Capital District's current support for electric vehicles and an analysis of corridors in the region eligible for designation in Round 4 of the FHWA Alterative Fuel Corridors program. This analysis helps CDCC meet the requirements of the Clean Cities contract.

CDCC performed a desktop analysis comparing existing Electric Vehicle Supply Equipment (EVSE) to several major corridors in the Capital District to identify any corridors that could be potentially eligible for future designation. Given that I-87 and I-90 were previously identified and designated as EV "Corridor Ready", the focus of the analysis was on non-Interstate routes located on the National Highway System (NHS). Existing eligible public DC fast charging infrastructure was overlaid on six non-interstate corridors in the region to perform a spatial comparison.

The analysis shows that there are portions of at least five corridors in the Capital District which fit the criteria needed to be designated as EV "Corridor Ready" (see table below).

Corridor Name	Eligible DC Fast within 5 miles of Corridor	Distance Between Eligible Stations (Miles)	AFV Corridor Eligible (Y/N)
US Route 9	7	45	Y
US Route 20	6	8	Y
NY Route 5	5	40	Y
NY Route 7	4	14	Y
NY Route 4	2	6	Y
NY Route 50	0	NA	N

As part of the Plan, CDCC recommends the US Route 9 corridor from New Baltimore to South Glens Falls be designated as EV "Corridor Ready". This corridor is approximately 65 miles long and runs parallel to the previously designated I-87 corridor. The corridor is served by three eligible DC fast charging stations at the Queensbury Rest Area (Adirondack Welcome Center), Hannaford Super Market (900 Central Avenue, Albany), and the Capital Region Welcome Center (New Baltimore Rest Area, I-87). This corridor provides EV drivers traveling north / south through the Capital District several charging options and the "Corridor Ready" designation would allow for consistent signage to promote EV travel within and through the Capital Region.

The Capital District Transportation Committee (CDTC) and CDCC support the nomination of the US 9 corridor, from New Baltimore to South Glens Falls, as a designated "Corridor Ready" EV Alternative Fuel Corridor. CDTC and CDCC requests NYSDOT submit a corridor nomination proposal to FHWA and would be happy to provide assistance in the development and submittal. Alternatively, CDTC and CDCC could develop and submit a nomination proposal as the lead agency, with NYSDOT approval. Corridor nominations are due by COB February 26, 2020.

Please contact Jacob Beeman (jbeeman@cdtcmpo.org) with any questions regarding this request.

Thank You,

Michael V. Franchini

Michael V. Franchini
Executive Director
Capital District Transportation Committee
Capital District Clean Communities Coalition

cc: Jacob Beeman, Capital District Transportation Committee
Jen Ceponis, Capital District Transportation Committee
Alan M. Warde, NYS Department of Transportation - Main Office

NEW YORK STATE OF OPPORTUNITY. | Department of Transportation

ANDREW M. CUOMO
Governor

MARIE THERESE DOMINGUEZ
Commissioner

RONALD L. EPSTEIN
Executive Deputy Commissioner
Chief Financial Officer

December 24, 2019

Michael V. Franchini, Executive Director
Capital District Transportation Committee
One Park Place, Main Floor
Albany, New York 12205-2676

Dear Mr. Franchini:

Thank you for your letter recommending the nomination of specific routes in the Capital Region under the Federal Highway Administration's Alternative Fuel Corridors initiative.

I would like to personally recognize the Capital District Transportation Committee and the Capital District Clean Communities Coalition for their efforts to help New York State achieve the benchmarks established in Climate Leadership and Community Protection Act. Through the implementation of new technologies, such as all-electric vehicles and supporting roadway infrastructure, New York State and the Capital Region will be positioned well to support a future with zero-emission vehicles. The New York State Department of Transportation (NYSDOT) is currently assessing the proposed nominations and will notify you of the determination in the near future.

Should you have any questions pertaining to the designation process, please feel free to contact myself at 518-457-6700 or you or your staff may contact Alan Warde at 518-457-5121.

Sincerely,

Ronald L. Epstein
Executive Deputy Commissioner/CFO

cc: L. Weiskopf, NYSDOT
J. Davis, NYSDOT
A. Warde, NYSDOT
J. Beeman, CDTC
J. Ceponis, CDTC

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JAN - 2 2020
CAPITAL DISTRICT
TRANSPORTATION COMMITTEE