



EXECUTIVE SUMMARY

Tompkins County

Plug-in Electric Vehicle Infrastructure Plan

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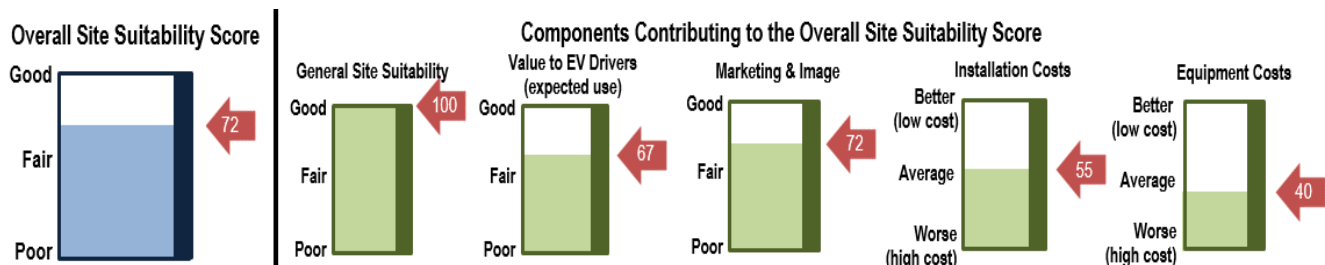
Project Background

Electric vehicle (EV) use in Tompkins County is expanding; however, widespread adoption has not yet occurred despite their advanced engineering, lower fuel costs, and environmental benefits. The transportation sector is responsible for 35% of all greenhouse gas (GHG) emissions in Tompkins County. EVs have the potential to significantly reduce GHG emissions while creating green jobs. Over the past year, an EV Infrastructure Plan for Tompkins County was coordinated by the Ithaca-Tompkins County Transportation Council and supported by several other key organizations in the area to prepare for and encourage EV adoption. The [Tompkins County Electric Vehicle Network](#) was established on social media to be a channel for feedback and insight from the broad community on this topic. The goal of this project is to guide the expansion of EV infrastructure in the County through the development and sharing of several reports and tools.



Existing Conditions and Best Practices summarized the current conditions for EV use in Tompkins County, and best practices in the establishment of a charging station networks.

An EV charging station **Site Suitability Criteria Tool** (“Tool”) was developed to help compare the viability for installing AC Level 2 EV charging stations at various locations in Tompkins County. The Tool’s ratings are based on best practices and analysis of prior EV charging station installations. Potential EV charging station hosts answered questions on the site location, parking characteristics, and electrical capacity.



EV Charging Station Site Suitability identified a set of optimal locations for EV charging stations in Tompkins County using the ranking of the best sites based on the scores of the Site Suitability Criteria Tool.

Preliminary Engineering and Cost Analysis for EV Charging Stations documented the recommended strategy for installing new EV charging stations at seven different locations in Tompkins County. These locations include a range of site characteristics that should help other locations estimate the costs to install a charging station based on similarities.

Charging Station Implementation Strategies summarizes opportunities to expand the EV charging station network. It outlines approaches to help finance EV charging stations, along with an implementation strategy for Tompkins County to increase EV charging infrastructure and EV use.

The primary results and findings from this project are summarized on the following pages. Visit the Clean Communities of Central New York website, <http://www.tompkinscountyny.gov/itctc/projects#EV>, to access and read the full reports.

Electric Vehicles

EVs that charge their battery by plugging into an outlet are more energy efficient, have no tailpipe emissions, and cost 50-70% less to operate per mile.

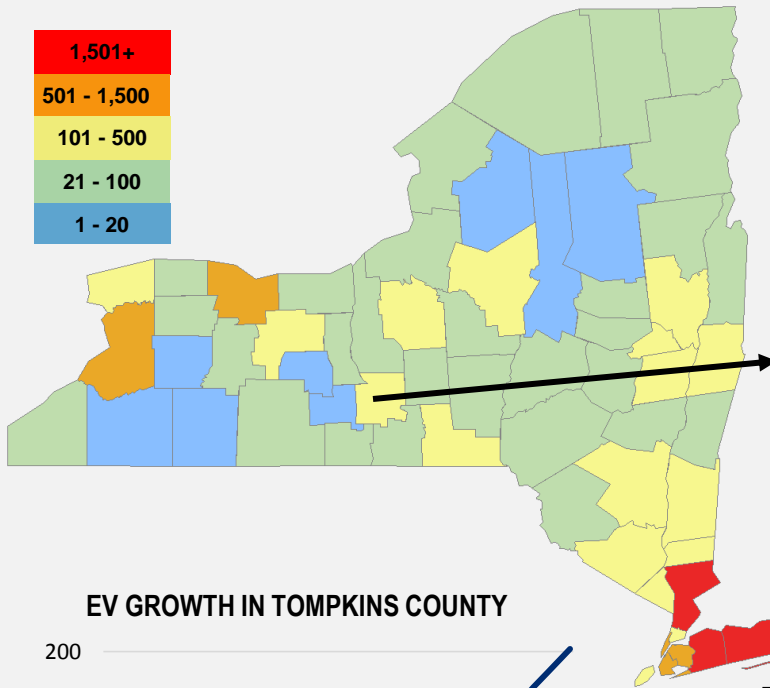
Plug-in Hybrid Electric Vehicles (PHEV) have a battery-powered electric motor to drive 15-80 miles then use an internal combustion engine powered by another fuel such as gas or diesel.

Battery Electric Vehicles (BEV) only have an electric motor, but with a larger battery pack that provides a range of 60-250 miles. These require no petroleum fuel or oil changes.

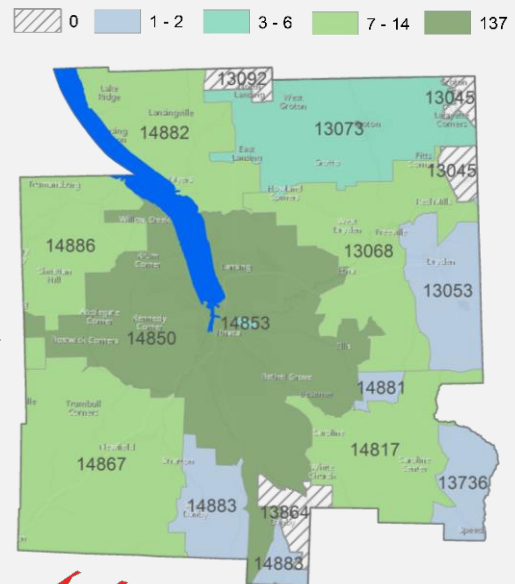
There were 202 EVs registered in Tompkins County as of March 31, 2017, which represents 0.42% of all registered vehicles (second highest in the entire state). Total PHEVs outnumber BEVs by more than a 2:1 margin.



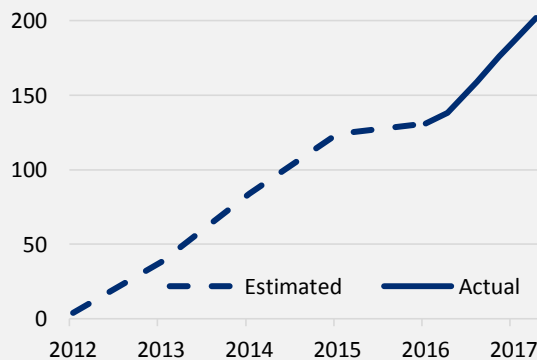
REGISTERED EVS IN NEW YORK STATE



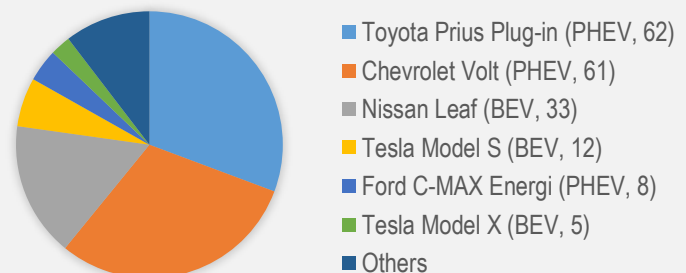
REGISTERED EVS IN TOMPKINS COUNTY



EV GROWTH IN TOMPKINS COUNTY



EV MODELS IN TOMPKINS COUNTY



Charging Stations

EVs replenish their batteries with charging stations at home, work, or public locations. BEVs only use electric power, so drivers plan ahead to find charging stations if an extended range is needed. PHEVs can use the combustion engine once the batteries are depleted, however, it costs less to drive on electricity so drivers look for charging opportunities.

Charging stations are classified by their rate of charge and 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. Networked stations add capability to track usage, accept payments, and share real-time status, among other features.

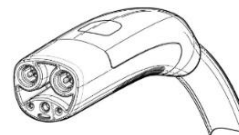


SAE J1772 is used for most AC Level 1 and 2 charging

SAE Combo is used for some DC fast charging



CHAdeMO is used for some DC fast charging



Tesla specific connector

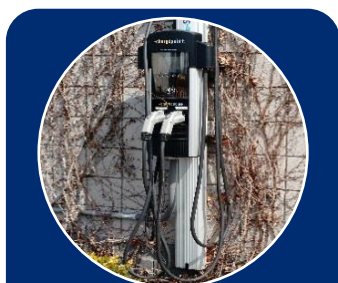
Standard Connectors for Charging



Diane's Automotive

DC Fast Charger

- 480V input power
- Very fast charging, 40-80 miles in 20 min.
- Used for longer distance travel along major highways
- Installed Cost \$40,000 - \$80,000



Maguire Volkswagen

AC Level 2

- More features offered
- 240V input power
- Faster charging, 10-20 miles per hour
- Common for public parking settings
- Installed Cost \$2,000 - \$30,000



NYPA (White Plains)

AC Level 1

- LED status indicator
- 120V input power
- Slow charging, 4-6 miles per hour
- Best in garages for weather protection
- Installed Cost \$1,000 - \$3,000



Cornell Business Park

GFCI Outlet

- Must use own cord
- 120V input power
- Very slow charging, 2-4 miles per hour
- Occasional use only, will wear over time
- Installed Cost \$500 - \$1,000

Charging stations are installed throughout Tompkins County include a wide variety of location types.

Public Access Stations

- Diane's Automotive:** Two DC ports, fee
- Ithaca Yards:** Two AC Level 2 ports
- Taitem Engineering:** Two AC Level 2 ports, fee
- Cayuga Medical Center:** Two AC Level 2 ports
- BJ's Wholesale Club:** Two AC Level 2 ports
- Sciencenter:** One AC Level 2 port
- Cornell Hoy Garage:** Two AC Level 2 ports
- William Henry Miller Inn:** One Tesla port
- The Lama Plaza:** 1 public Tesla port
- La Tourelle:** One AC Level 2, one Tesla port

- Maguire VW/Toyota:** Two AC Level 2 ports
- Honda of Ithaca:** One AC Level 2 port
- Maguire Nissan:** One AC Level 2 port, one 120V outlet
- Weaver Wind Energy:** Two 240V outlets
- Cornell Business Park:** Six 120V outlets

Restricted Access to certain users or time of day

- Cornell Forest Home Garage:** Two AC Level 2 ports
- Three Hills Properties:** One AC Level 2, one 240V outlet
- Emma's Acres:** One AC Level 2, one 240V outlet
- Brookton Hollow Bed & Breakfast:** One 120V outlet

Expanding Tompkins County's Charging Network

EV drivers often seek out charging locations as they go about their everyday routines at, for example, restaurants, stores, and entertainment venues. Offering charging can help businesses attract new clientele or keep customers for longer durations. Tompkins County has many accommodations, outdoor attractions, and events that draw tourists who might be driving an EV.

Site selection for new EV charging stations in Tompkins County were based on survey input and responses to the *Site Suitability Criteria Tool*. Potential sites that would most likely be used by EV drivers and had characteristics that attributed to lower installation costs were prioritized.

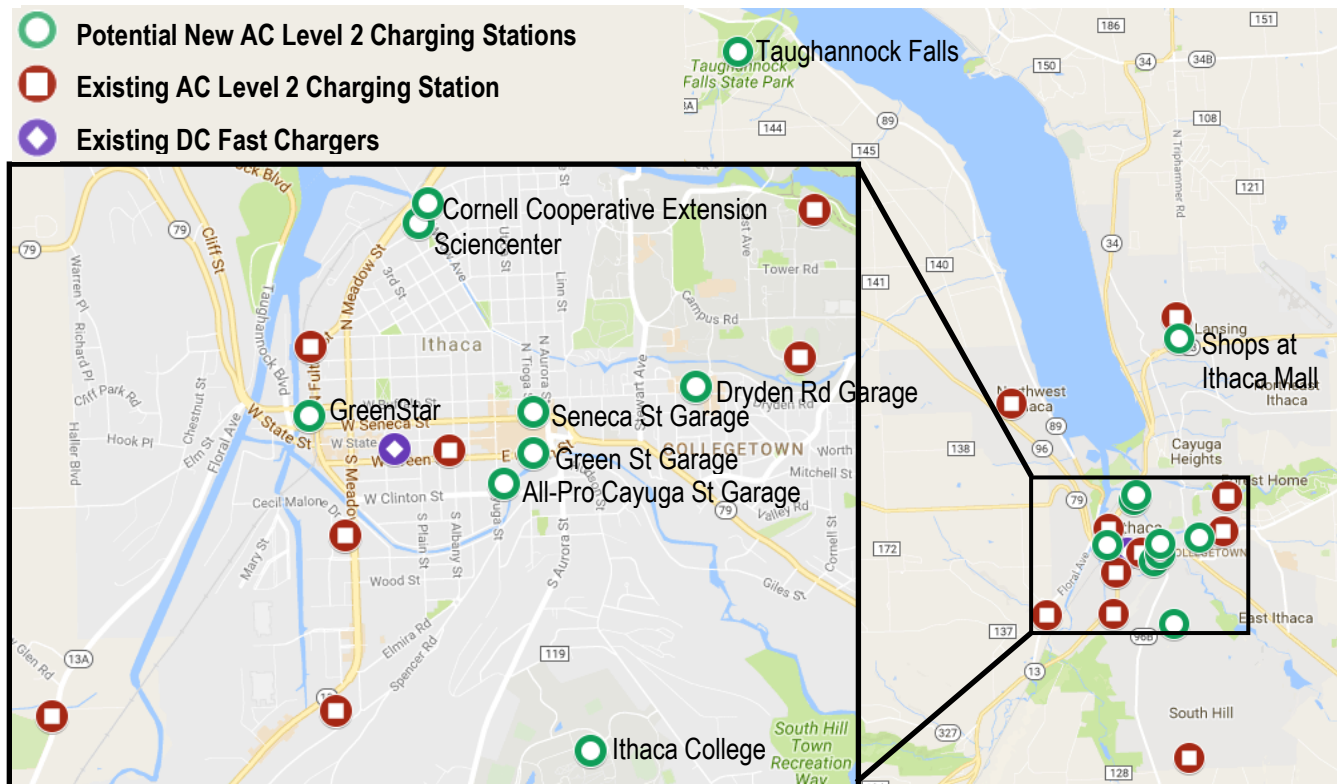
The ten most suitable sites for new charging station installations are shown geographically on the map below along with the existing EV charging stations. These locations represent a range of site characteristics that should help other locations design a site plan and estimate the costs to install a charging station based on their similarities.



Tesla charger at William Henry Miller Inn mounted on an existing structure to minimize installation costs



The Sciencenter is a potential site for an EV charging station because it draws many visitors and aligns with their purpose.



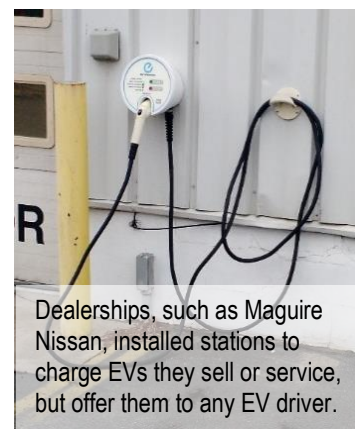
Installation Best Practices

A preliminary engineering and cost analysis for installing EV charging stations in Tompkins County determined the total costs range from \$11,000 to \$21,000. The stations analyzed for this study were dual-port, AC Level 2, and networked. Components contributing to the total installation costs include:

- **Station hardware** – \$6,500 for a wall-mounted unit that can be attached to an existing structure or \$7,500 for a pedestal unit that would be mounted on a concrete footer.
- **Network activation** – \$1,000 for a certified installer to configure the station.
- **Protection from vehicles** – \$350 per tire stop could be used in a garage where snow plowing is not needed, otherwise \$1,000 for a single bollard or \$1,500 for two bollards is recommended since most station repairs are due to vehicle damage.
- **Signage** – \$500 for signs at the station or pavement markings to clearly designate the parking station for EV charging.
- **Installation** – ranged from \$2,000 to \$12,500 for the selected Tompkins County locations with lower costs for wall-mounted installations and higher costs for sites with longer electrical runs between the electrical panel and station, trenching under or through pavement, or when electrical panel upgrades are required.



BJ's station has 2 bollards for protection and signs.



Dealerships, such as Maguire Nissan, installed stations to charge EVs they sell or service, but offer them to any EV driver.

Operational and maintenance costs for EV charging stations include:

- **Networking** – around \$600 per year for a dual-port station. Networked stations can set a fee for use per energy dispensed or time charging to recoup operational costs, but many offer it for free to draw customers.
- **Maintenance** – \$1,000 or less over 10 years for replacement parts. Properly protected and cared for charging station (ensuring the cords are coiled, occasionally wiping it clean, and clearing any snow or debris that might accumulate) have minimal maintenance.
- **Electricity** – \$250 annually¹ is the average for a public dual-port station in New York State.

To enjoy the benefits EVs can bring 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 by pursuing these best practices:

- Add EV charging language to the municipal code
- Support EV infrastructure deployments
- Establish regulations for EV charging use
- Require EV charging stations or preparations through code
- Standardized EV signage
- Adopt a vehicle fleet efficiency or EV procurement program
- Set goals for EV deployment
- Simplify the permit process for EV charging stations
- Train municipal staff and inspectors on EV charging stations



Signage for EV charging stations

¹ The average charge event at public charging stations in New York State dispenses about \$1.00 of electricity to an EV (~7.7 kWh at \$0.13 per kWh) and has 2.5 charge events per week per port, which results in yearly electricity costs around \$250 for a dual-port station.

Incentives and Funding Opportunities

An initial cost of \$11,000 to \$21,000 for an EV charging station is a significant investment, but it can provide many benefits to a site host such as;

- additional business from EV drivers,
- an outward sign of the host site's sustainability commitment, and
- attracting or retaining highly educated and tech savvy employees.

While there are many reasons to install charging stations, a host site must figure out how to finance this investment. Being selective on station location can minimize costs, but taking advantage of incentives and grants can be very useful in reducing the initial investment. New York State is very supportive of expanding EV technology and is offering attractive opportunities to install charging stations.

New York State Alternative Fuel Vehicle Recharging Tax Credit provides an [income tax credit](#) for 50% of the cost, up to \$5,000, for the purchase and installation of commercial and workplace EV charging stations until end of 2017.

NYPA Public Sector Charging Station Program

offers Level 2 EV charging stations manufactured by EV-Box to NYPA energy customers, as well as any state or local government entity, through a pre-negotiated contract with EV Connect to install and manage approximately 300 stations.

Energetics Incorporated Targeted EV Charging Station Deployments provide coordination support and discounted costs to install ChargePoint EV charging stations as part of a broad EV market development project that carries out recommendations from EV Charging Station Plans in the 5 regional along the I-90 corridor, and an EV tourism initiative for the Lower Hudson Valley and Catskill regions. There is also some installations as part of two EV Deployment Communities – one in Rochester and a second that is currently being selected.

EV Connect EV Charging Station Financing Project has established low-cost financing and leasing opportunities for EV-Box charging stations with a focus on public and non-profit entities.

Zero Emission Vehicle Infrastructure Rebate Program for Municipalities, administered by the New York State Department of Conservation, awarded grants for EV charging stations up \$8,000 per port, and for DC Fast Charge infrastructure up to \$32,000 per pedestal. The applicant is responsible for a 20% local match (of the rebate amount) and any additional costs above the stated limits. The 2016 Request for Applications concluded on March 31, 2017, but additional funding is expected to be secured for continuing this program for another year.

The dual-port AC Level 2 station at Cayuga Medical Center was partially funded through a NYSERDA grant and placed by the main entrance where it is highly visible.



Implementation Strategy

Successful EV deployments occur in phases that gradually increase charging stations and support these installations through education, outreach, and incentives for vehicle purchases. In the first deployment phase, EVs start to appear in the community through purchases by early adopters and charging stations are installed at their residence. During this initial deployment phase the first public charging stations are also installed and several barriers are resolved in regards to the administrative (permitting) and technical (trained electricians) process which makes it much easier for future charging station installations.



Tompkins County has successfully progressed through this first deployment phase and should market EV use beyond the early adopter. All local organizations and businesses should be determining if an EV charging station installation could be beneficial. Increasing the public AC Level 2 charging station sites with universal connectors, from the 10 currently in Tompkins County, to 15 or 20 would greatly expand the charging opportunities for EV drivers and satisfy their charging needs as they come into the county for business or pleasure.

It is time to encourage every new car buyer to consider an EV. In addition to the expanded offerings by manufacturers that are making EVs more attractive to customers, there is a Federal tax credit up to \$7,500 and New York State has a [Drive Clean Rebate](#) that could reduce the purchase price of an EV by up to \$2,000 more. A broad-based consumer education program should be pursued that will take advantage of existing networks to create significant EV recognition, interest, and demand. A multi-faceted initiative that expands the charging station network to support EV use, provides outreach to educate consumers about their options, and leverages the rebates and tax credits for vehicle purchases would have the most success at increasing EV ownership.

Eventually, in the third deployment phase, EVs become such a normal part of everyone's lives that they are no longer special to discuss or hold events for. All new houses will eventually run a 220V line to the garage for EV charging and factor the charging demand into the potential electrical load. Any new development, parking lot modification, or significant electrical work will also run conduit, install stations, or factor in excess capacity to accommodate charging stations. This vision for the future won't happen overnight, but continued community support for EV adoption will create opportunities for Tompkins County to leverage grant funding in support of advanced transportation technologies that reduces the amount of imported petroleum fuel and GHG emissions.

EV CHARGING STATION DEPLOYMENT AND EV ACCELERATOR PROJECT UPDATE

The success of this EV infrastructure planning project and commitments of support from Tompkins County stakeholders has enabled Energetics Incorporated to secure funding from NYSERDA that will help fund 11 new charging stations and an outreach campaign that will be launched in 2018 to promote EVs and raise awareness about this technology.