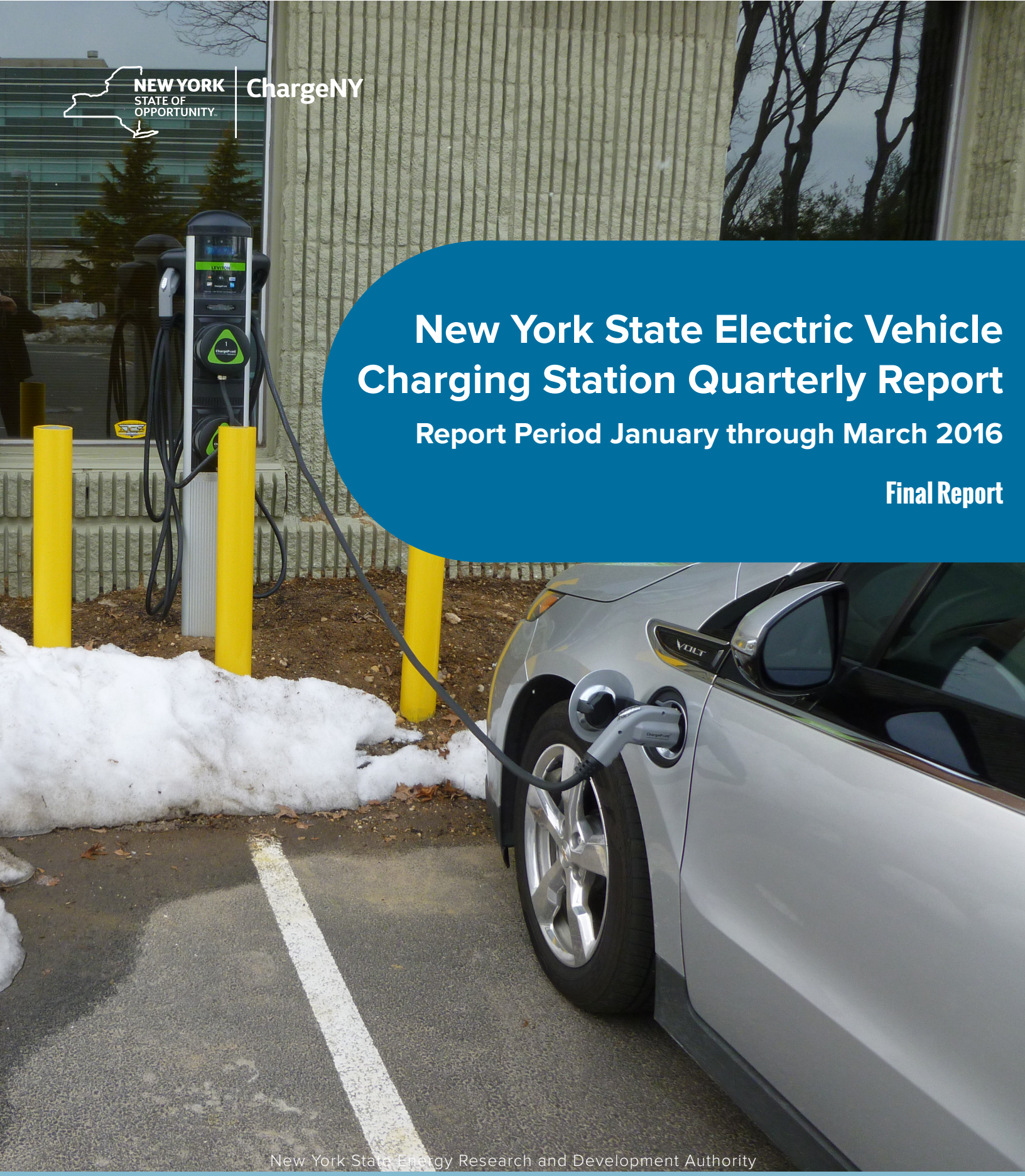

New York State Electric Vehicle Charging Station Quarterly Report

Report Period January through March 2016

Final Report

New York State Energy Research and Development Authority

May 2016

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NYSERDA provides resources, expertise, and objective information so New Yorkers can make confident, informed energy decisions.

Mission Statement:

Advance innovative energy solutions in ways that improve New York's economy and environment.

Vision Statement:

Serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives.

Cover Image: Energetics Incorporated

New York State
Electric Vehicle Charging Station Quarterly Report

Report Period January through March 2016

Final Report

Prepared for:

New York State Energy Research and Development Authority

Albany, NY

Adam Ruder
Project Manager

Prepared by:

Energetics Incorporated

Clinton, NY

and

Idaho National Laboratory

Boise, ID

May 2016

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1 Introduction

The New York State Energy Research and Development Authority (NYSERDA) made financial grant awards in 2012 and 2013 to more than a dozen organizations to install Level 2 electric vehicle (EV) charging stations (also referred to as electric vehicle supply equipment [EVSE]) across New York State. These installations support Governor Andrew M. Cuomo's ChargeNY initiative. The initiative set the goal of a statewide network of up to 3,000 public and workplace charging stations to support up to 40,000 plug-in vehicles on the road by 2018. Since the program's inception in 2013, New York State has supported the installation of almost 650 charging ports (bringing the statewide total to more than 1,300), revised regulations to clarify charging station ownership rules, and supported research and demonstration projects on new EV technologies and policies.

The NYSERDA-funded EVSE projects represent a wide range of business models and approaches for providing public charging infrastructure. One NYSERDA program goal is to learn how the stations are used, including which types of locations and business models are the most promising. By doing so, NYSERDA is paving the way for future private sector charging station investment. Charging station usage data and analysis are shared with the public through these quarterly data reports.

2 Charging Station Usage in New York

The NYSERDA Electric Vehicle Charging Infrastructure Report in Appendix A summarizes the usage of EVSE that were installed by the NYSERDA program. Only EVSE with at least one charging event during the past quarter were included in the analysis, which does not reflect the total number of charging stations installed to date through the NYSERDA program. The first page overview in Appendix A is most useful to electric utilities. Subsequent pages present usage statistics based on various station attributes, which are useful to current and future EVSE site owners. Data was collected for every charging port, which means that a charging station with two charging connections (a dual port station) was counted as two ports.

EVSE access types are defined as follows:

- Public EVSE are available to any EV driver.
- Limited EVSE are installed specifically for, but may not necessarily be restricted to, a select group (e.g., employees, apartment building tenants, or hotel guests).

EVs are likely connected to a charging station the entire time they are in EV dedicated parking spaces. However, the vehicles only draw power until the battery pack is finished charging. The Charging Demand plot on the first page of Appendix A shows the total electrical power used by all active NYSERDA-funded stations at different times of the day. This data indicates the total electrical grid impact from EVs charging at NYSERDA-funded public stations. It is important to note that this data does not reflect all EV charging in the State. Public charging stations that were not funded by the NYSERDA project and home charging were not included in this analysis.

The remaining five pages of data analysis in Appendix A include the same table and charts for various charging station subsets including: access type, required payment, land use type, region, and venue. Site owners who are considering installing charging stations can use this data and analysis to understand how sites similar to theirs are used and which attributes may lead to better utilization.

The data tables include summary results for charging events (total and average per week), energy consumed (total, average per week, and average per charging event), average time with a vehicle connected (percentage and hours), and average time with a vehicle drawing power (percentage and hours). The energy consumed is an indication of the electrical energy required from the host location. The average time a vehicle is connected is the duration drivers stay at the location as a consumer, client, or employee.

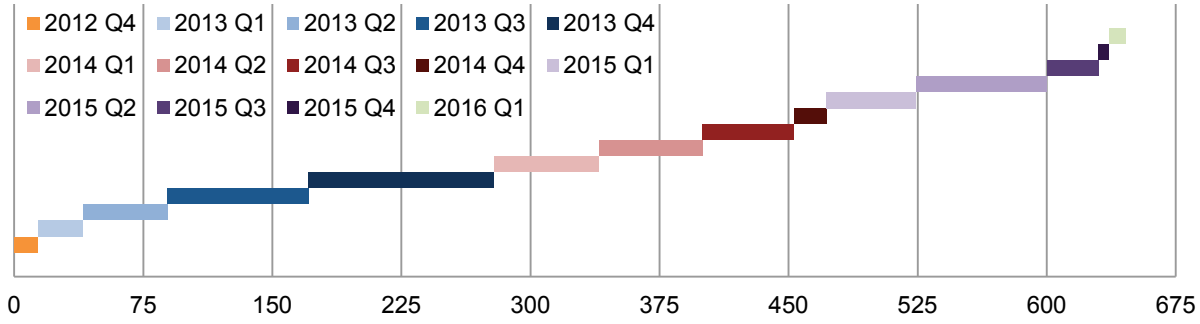
If the average time a vehicle draws power is significantly less than the average time a vehicle is connected, then the EV is occupying the station longer than necessary and should be moved to allow other EVs to charge. Site owners can use all of these metrics to help decide whether installing EVSE is a good investment (directly or indirectly). These results also provide insight into whether or not to charge EV drivers for using the station and the most appropriate fee structure to use (fees can be set by session, time, or energy consumed).

The three line charts on the last five pages of Appendix A display the differences in length of time a vehicle is connected, differences in length of time a vehicle is drawing power, and differences in energy consumed to show variations in charging behavior within the EVSE groups (e.g., a large portion of retail location charging events are very short, compared to a more uniform distribution of charge event durations for parking lots/garages in New York City). The final bar chart displays the range of charging events per port per week which shows the difference between the most and least utilized ports as compared to the average for those charging stations.

3 Data Comparisons to Previous Quarter

Figure 1 shows the quarterly growth of installed charging stations through NYSERDA's program. Between December 2012 and March 2016, the NYSERDA EV Charging Station Program funded the installation of 646 charging ports (456 stations at 282 unique locations). During the last quarter, 10 new charging ports were installed.

Figure 1. Growth in Installed EVSE Ports Supported by NYSERDA Funding



On average, an EV was connected to these charging stations 6.6 percent of the time in the past quarter, a 20 percent increase from the previous quarter. Figure 2 shows the change in average percent of time with a vehicle connected per charging port and average electricity dispensed per charging port per week (AC KWh) throughout the data monitoring period of the NYSERDA EV Charging Station Program.

Figure 2. Change in Station Occupancy and Electricity Dispensed

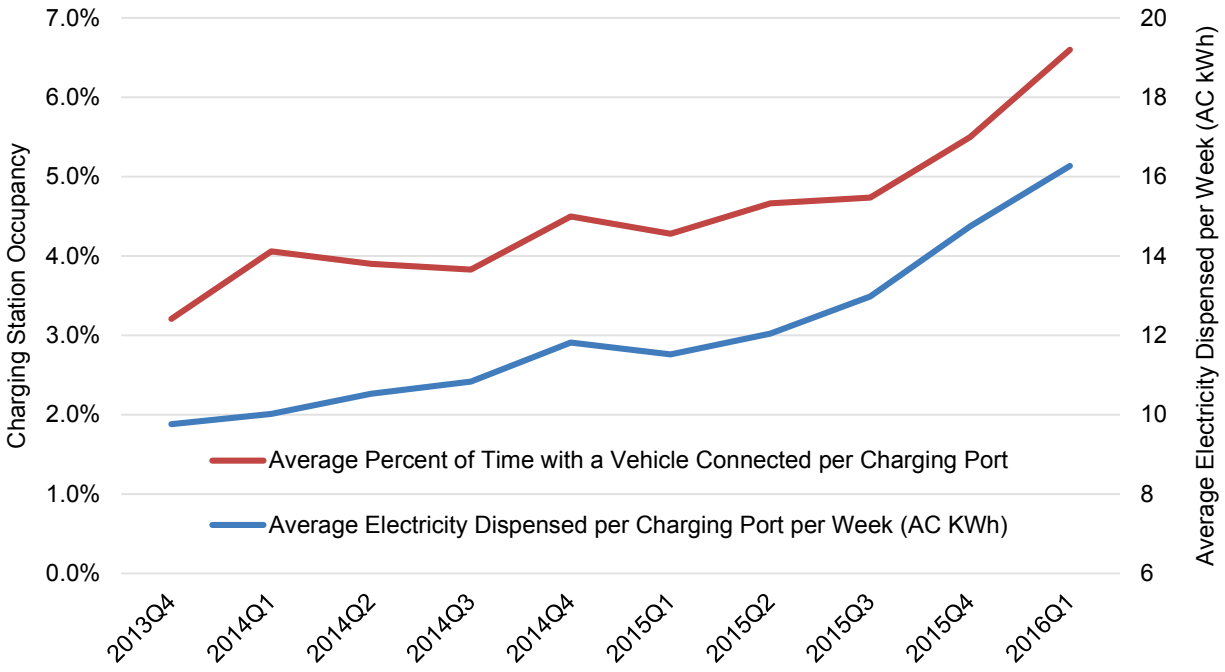


Table 1 and Table 2 show the data results by subset for the percentage of time with a vehicle connected for the average this quarter and change from last quarter (highest results are highlighted in green).

Table 1. Percentage of Time with a Vehicle Connected with Access Type, Payments and Land Use

Access Type	2016 Q1 Average	Change from 2015 Q4	Payment	2016 Q1 Average	Change from 2015 Q4	Land Use	2016 Q1 Average	Change from 2015 Q4
Limited	9.2%	30%	Free	7.0%	17%	Urban	8.5%	12%
Public	5.1%	9%	For Fee	3.5%	40%	Suburban	5.8%	26%
						Rural	3.6%	9%

Table 2. Percentage of Time with a Vehicle Connected by Region and Venue

Region	2016 Q1 Average	Change from 2015 Q4	Venue	2016 Q1 Average	Change from 2015 Q4
Long Island	12.1%	29%	Multi-Family	12.9%	79%
Finger Lakes	10.0%	28%	University/Medical	12.1%	19%
New York City	6.4%	2%	Parking (non-NYC)	8.2%	17%
Hudson Valley	6.4%	52%	Parking (NYC)	4.8%	-6%
Capital District	6.2%	17%	Workplace	4.7%	9%
Western NY	4.0%	3%	Transit	4.5%	55%
Central NY	2.5%	9%	Leisure Destination	3.2%	23%
North Country	2.2%	-4%	Retail Location	2.6%	8%
Southern Tier	2.2%		Hotel	1.5%	50%
Mohawk Valley	0.9%				

The charging ports are used more heavily during weekdays. Between 9 a.m. and 4 p.m. on weekdays, 12 percent of the charging ports on average are occupied; this peaked on one day during the quarter at 16 percent. During weekends, the charging port occupancy averages about five percent in the early afternoon and peaked at eight percent one day during the quarter.

Public and Limited access stations average a similar number of charging events started per charging port per week (2.3 and 2.2 respectively), but EVs stay connected almost twice as long to Limited access stations (7.0 hours per charge event for Limited access stations as compared to 3.7 for Public stations). While not as drastic of a difference, the average length of time with vehicle drawing power per charging event at Limited access stations is also longer (2.4 hours as compared to 2.0 hours for Public access). This results in a slightly higher average electricity consumed per charging event for the Limited access stations (8.4 AC kWh) than the Public stations (6.4 AC kWh per charge event).

When EVs charge at a station that has a fee, the EV will typically stay connected longer (6.5 hours per charge event vs. 4.8 hours per charging event for free stations) and draw more electricity per charging event (10.5 AC kWh per charging event vs. 6.9 AC kWh). However, free charging stations are used much more often (2.5 charging events started per charging port per week vs. 0.9 with “for-fee” stations), and therefore average a higher amount of electricity consumed per charging port per week (17.2 AC KWh for free stations vs. 9.4 AC KWh for “for-fee”).

Charging stations in a suburban setting have the lowest average length of time with a vehicle drawing power per charging event (1.8 hours) and the lowest average electricity consumed per charging event (5.7 AC kWh) when compared to charging stations in rural settings (average 2.2 hours drawing power and 7.9 AC kWh consumed per charging event) and urban settings (average 2.7 hours drawing power and 9.2 AC kWh consumed per charging event). However, suburban charging stations average the same number of charging events started per port per week as urban chargers (2.4), which is higher than rural chargers (1.5).

Charging stations in Long Island and the Finger Lakes Region (including Rochester) experience a much higher average percent of time with a vehicle connected per charging port (12.1 percent and 10.0 percent respectively) than all the other regions in the state (next closest is 6.4 percent in New York City and the Hudson Valley). Charging stations in New York City show the highest average length of time with vehicle connected per charging event (9.9 hours) and highest average electricity consumed per charging event (12.8 AC kWh); the next closest regions for both of these categories is at least 25 percent lower.

Charging stations at multi-family dwellings and parking lots or garages in New York City dispense considerably more electricity per charging event on average than other venues (20.3 AC kWh and 17.1 AC kWh respectively, with the next highest being 12.3 AC kWh for hotels). Retail location charging stations have the highest average number of charging events started per charging port per week (3.5), but also the shortest average length of time with vehicle connected per charging event (1.3 hours).

4 Analysis of EV Registrations in New York State

The following graphs show the results of EV registration data analysis as of March 31, 2016 from the NYS Department of Motor Vehicles over time, by model and by location.

Figure 3. Total Registered EVs in New York State

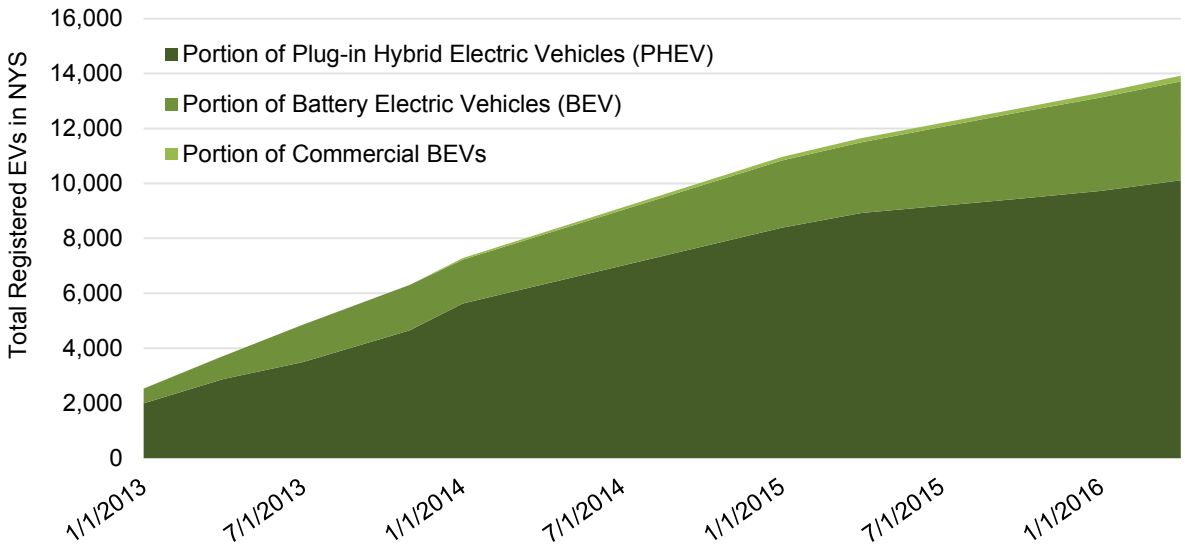


Figure 4. Battery Electric Vehicles in New York State

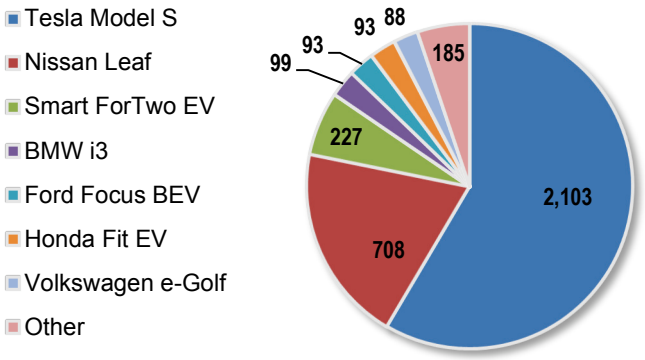
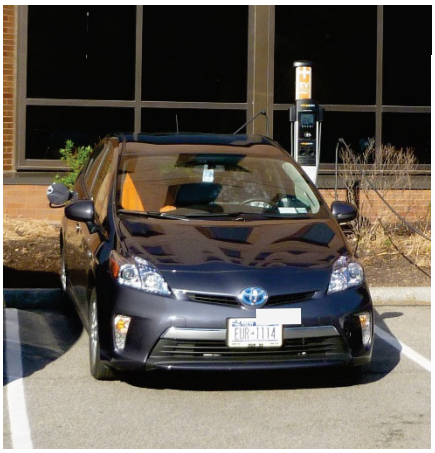


Figure 5. Plug-in Hybrid Electric Vehicles in New York State



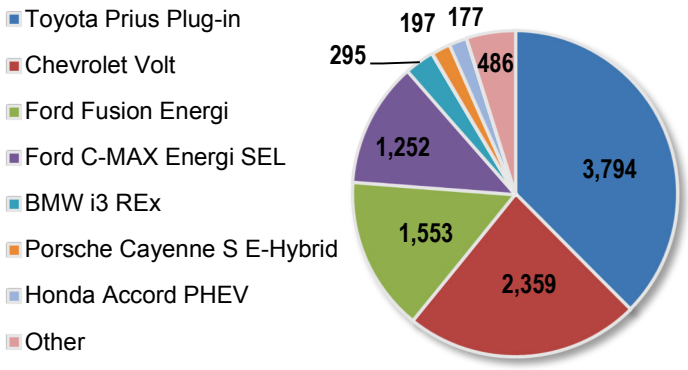
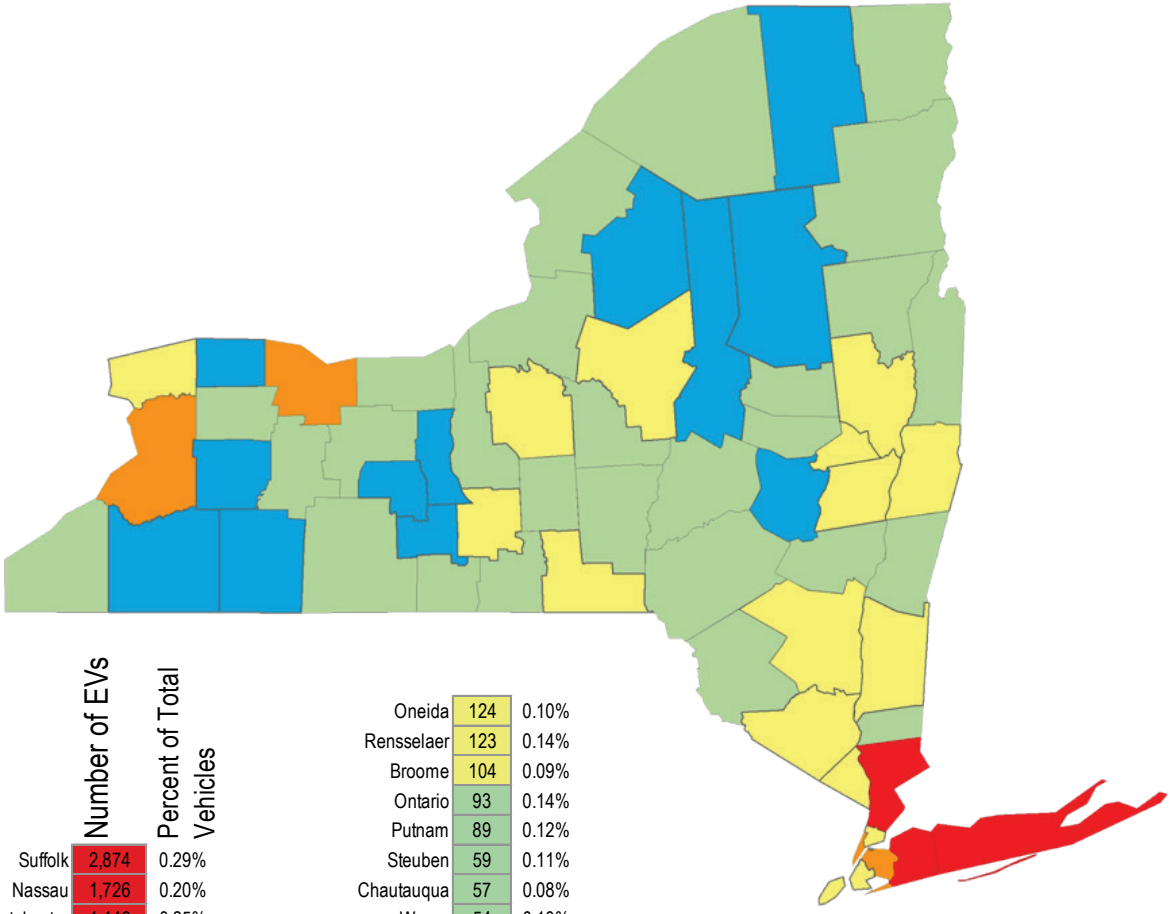


Figure 6. Number and Percentage of EVs Among All Registered Vehicles in Each New York State County



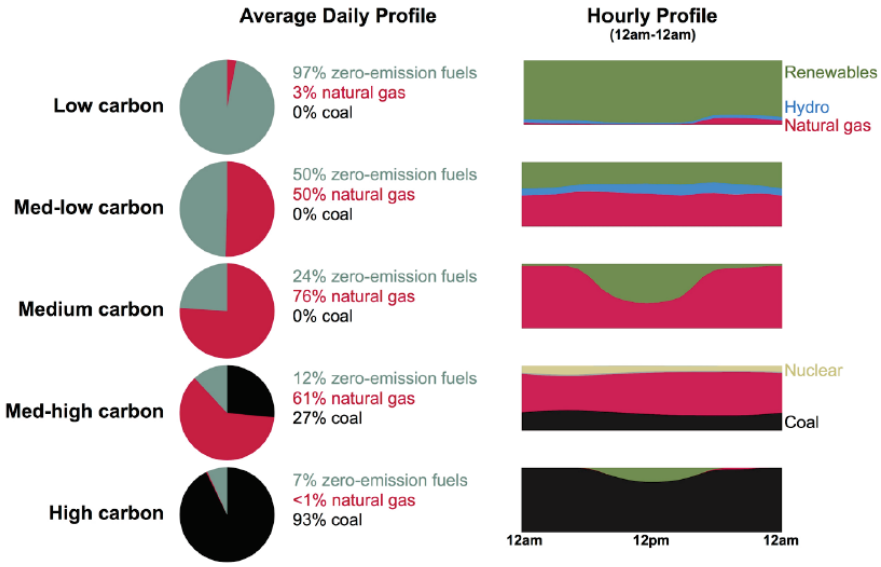
	Number of EVs	Percent of Total Vehicles
Suffolk	2,874	0.29%
Nassau	1,726	0.20%
Westchester	1,446	0.25%
Monroe	849	0.19%
Queens	779	0.11%
New York	693	0.32%
Erie	643	0.12%
Kings	372	0.09%
Onondaga	345	0.13%
Rockland	317	0.17%
Albany	287	0.17%
Saratoga	277	0.19%
Orange	260	0.12%
Dutchess	246	0.13%
Richmond	216	0.09%
Ulster	186	0.17%
Bronx	173	0.07%
Schenectady	152	0.16%
Tompkins	138	0.29%
Niagara	130	0.11%
Oneida	124	0.10%
Rensselaer	123	0.14%
Broome	104	0.09%
Ontario	93	0.14%
Putnam	89	0.12%
Steuben	59	0.11%
Chautauqua	57	0.08%
Wayne	54	0.10%
Clinton	52	0.12%
Columbia	51	0.13%
St Lawrence	47	0.09%
Chemung	46	0.10%
Oswego	44	0.07%
Madison	42	0.11%
Warren	41	0.10%
Sullivan	41	0.09%
Otsego	34	0.11%
Washington	33	0.10%
Greene	32	0.11%
Fulton	31	0.11%
Jefferson	31	0.06%
Delaware	29	0.11%
Chenango	29	0.10%
Cayuga	29	0.07%
Essex	26	0.13%
Montgomery	26	0.09%
Genesee	23	0.07%
Tioga	22	0.08%
Livingston	22	0.06%
Cortland	21	0.09%
Schoharie	20	0.11%
Schuyler	19	0.18%
Seneca	19	0.11%
Herkimer	19	0.06%
Allegany	18	0.08%
Franklin	17	0.07%
Yates	16	0.13%
Orleans	16	0.08%
Wyoming	12	0.06%
Cattaraugus	7	0.02%
Lewis	4	0.03%
Hamilton	1	0.03%

5 Comparison to Other Published Reports

A recent report from the National Renewable Energy Laboratory (NREL) titled Emissions Associated with Electric Vehicle Charging: Impact of Electricity Generation Mix, Charging Infrastructure Availability, and Vehicle Type[1] presents an analysis of anticipated emissions resulting from both battery electric and plug-in hybrid electric vehicles for four charging scenarios and five electricity grid profiles. The actual amount of emissions reduction electric vehicles provide is dependent on when and where drivers charge the vehicles. This analysis contributes to our understanding of the degree to which a particular electricity grid profile, the vehicle type, and charging patterns impact CO_2 emissions from light-duty, plug-in electric vehicles.

In their methodology NREL considers not only the emissions resulting from charging the PEVs, but also the emissions associated with the miles driven on gasoline. The emissions are calculated for a defined set of trips taken by multiple vehicle types, using anticipated 2025 vehicle efficiencies. The analysis suggests the following conclusions:

Figure 7. Modeled Grid Profiles Representing Varying Levels of Carbon Intensty

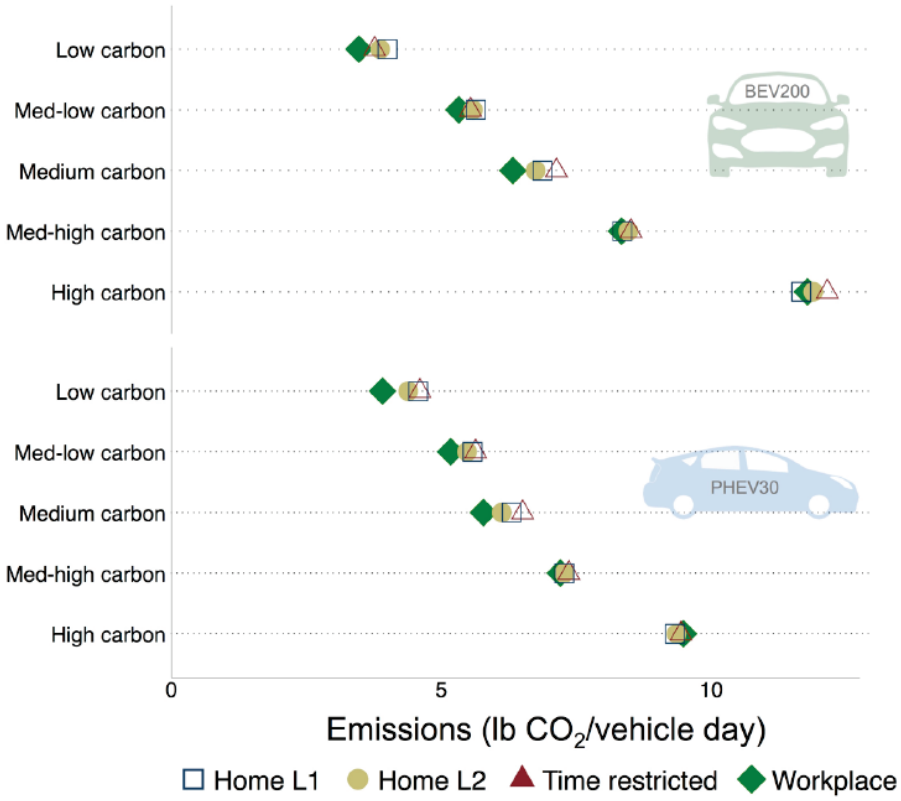


[1] McLaren, J., Miller, J, O'Shaughnessy, E., Wood, E., and E Shapiro, E. Emissions Associated with Electric Vehicle Charging: Impact of Electricity Generation Mix, Charging Infrastructure Availability, and Vehicle Type. National Renewable Energy Laboratory. April 2016. www.afdc.energy.gov/uploads/publication/ev_emissions_impact.pdf.

The carbon intensity of the electricity grid has a greater impact on the total emissions associated with PEVs than does the charging scenario.

- New York State currently has med-low carbon intensity of the electric grid with 50 percent generated by zero-emission fuels as defined by NREL (nuclear, hydro, and renewables) and much of the remainder from natural gas with very little from coal.

Figure 8. Total Emissions per Vehicle Day by Region, Vehicle Type and Scenario



PHEVs yield lower total emissions than BEVs (for which non-electric miles are driven in a conventional vehicle) in four of the five grid types (the low-carbon grid is the only case in which BEVs have lower total emissions).

- NYS PEV registrations show a mix of BEVs and PHEVs, with residents hopefully selecting the technology that best suits their needs and maximizes their electric miles.

Workplace charging results in the greatest percentage of electric miles for both BEVs and PHEVs and consistently results in lower total emissions across all charging scenarios.

- Many of the charging stations deployed in the NYSERDA program are in locations that are accessible for workplace charging and the majority of use is seen during weekdays from 9 a.m. to 4 p.m., which shows that PEV drivers are charging during their workday.

Time-restricted charging (at home during off-peak hours) results in the lowest number of electric miles and the highest level of emissions for most grids and vehicle types.

- Charging stations funded by the NYSERDA program have significantly increased the number of public stations available to PEV drivers beyond their home, allowing for a higher number of electric miles and lower levels of emissions.

A BEV using workplace charging on a low carbon grid provides the greatest emissions reductions as compared to driving a conventional vehicle.

- The ChargeNY Initiative is promoting workplace charging for EVs and encouraging drivers to select a PEV technology that can optimize the electric miles driven, while many other NYSERDA program are supporting renewables that lower the carbon intensity of the electrical grid.

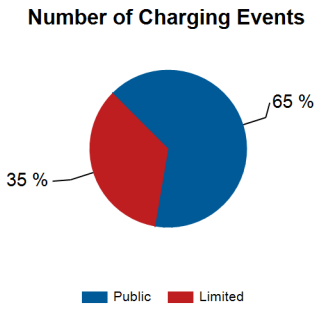
Appendix A: NYSERDA Electric Vehicle Charging Infrastructure Report

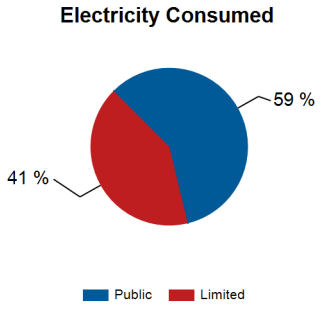
NYSERDA Electric Vehicle Charging Infrastructure Report

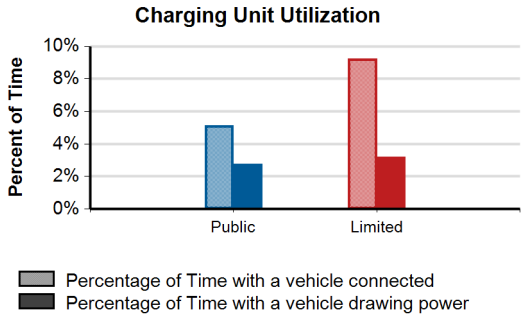
Report period: January 2016 through March 2016

New York State

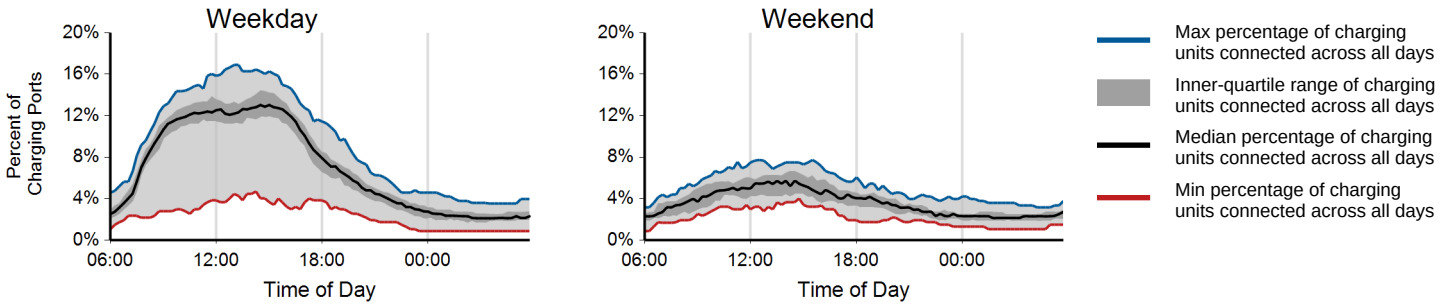
EVSE Usage - By Access Type	Public	Limited[3]	Total
Number of charging ports[1]	308	174	482
Number of charging events[2]	9,140	4,883	14,023
Electricity consumed (AC MWh)	58.30	41.01	99.31
Percent of time with a vehicle connected	5.1%	9.2%	6.6%
Percent of time with a vehicle drawing power	2.8%	3.2%	2.9%



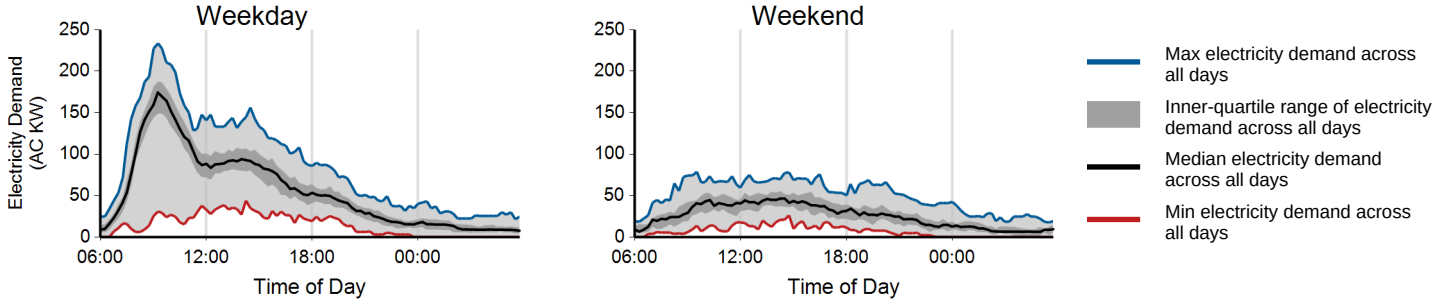




Charging Availability: Range of Percentage of All Charging Ports with a Vehicle Connected versus Time of Day[4]



Charging Demand: Range of Aggregate Electricity Demand versus Time of Day[4] for All Charging Ports



[1] Includes all EVSE ports in use during the reporting period and have reported data to INL.

[2] A charging event is defined as the period when a vehicle is connected to a charging unit, during which power is transferred.

[3] Limited Access EVSE are primarily for use by employees or tenants (including paying guests at hotels) and are placed where these EV drivers would normally park, but others (such as visitors or customers) may be able to plug in on a more limited basis.

[4] Weekends start at 6:00am on Saturday and end 6:00am Monday local time.

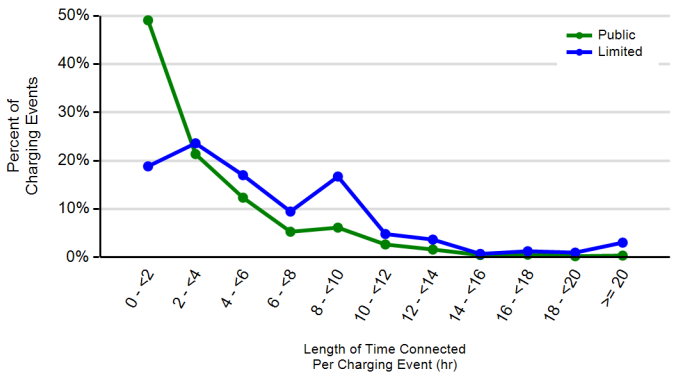
NYSERDA Electric Vehicle Charging Infrastructure Report

Report period: January 2016 through March 2016

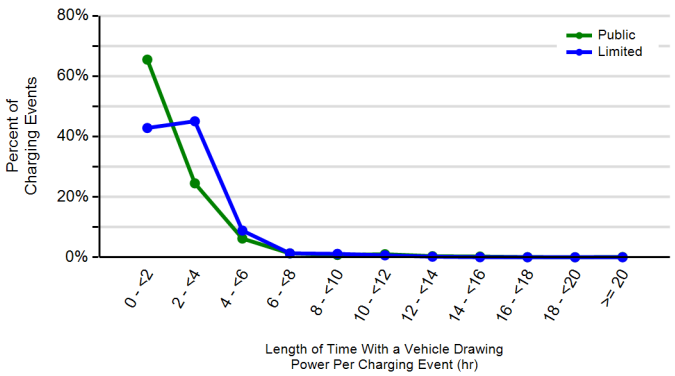
EVSE Usage - By Access Type

	Public	Limited[3]
Number of charging ports[1]	308	174
Number of charging events[2]	9,140	4,883
Charging energy consumed (AC MWh)	58.3	41.0
Average percent of time with a vehicle connected per charging port	5.1%	9.2%
Average percent of time with a vehicle drawing power per charging port	2.8%	3.2%
Average number of charging events started per charging port per week	2.3	2.2
Average electricity consumed per charging port per week (AC KWh)	14.9	18.7
Average length of time with vehicle connected per charging event (hr)	3.7	7.0
Average length of time with vehicle drawing power per charging event (hr)	2.0	2.4
Average electricity consumed per charging event (AC kWh)	6.4	8.4

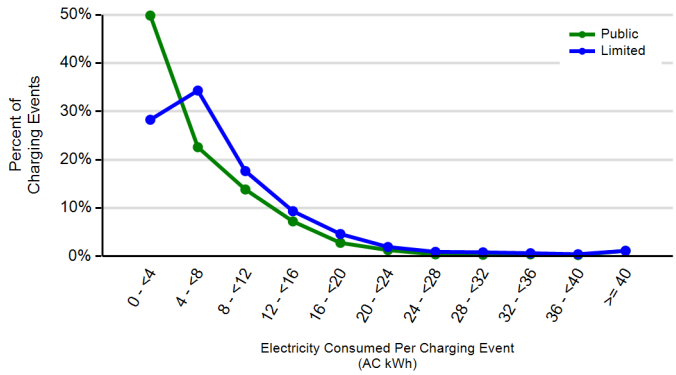
Distribution of Length of Time with a Vehicle Connected per Charging Event



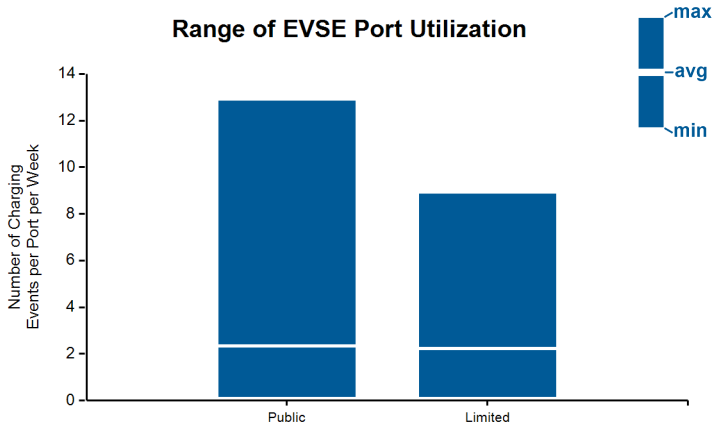
Distribution of Length of Time with a Vehicle Drawing Power per Charging Event



Distribution of AC Energy Consumed per Charging Event



Range of EVSE Port Utilization



[1] Includes all EVSE ports in use during the reporting period and have reported data to INL.

[2] A charging event is defined as the period when a vehicle is connected to a charging unit, during which power is transferred.

[3] Limited Access EVSE are primarily for use by employees or tenants (including paying guests at hotels) and are placed where these EV drivers would normally park, but others (such as visitors or customers) may be able to plug in on a more limited basis.

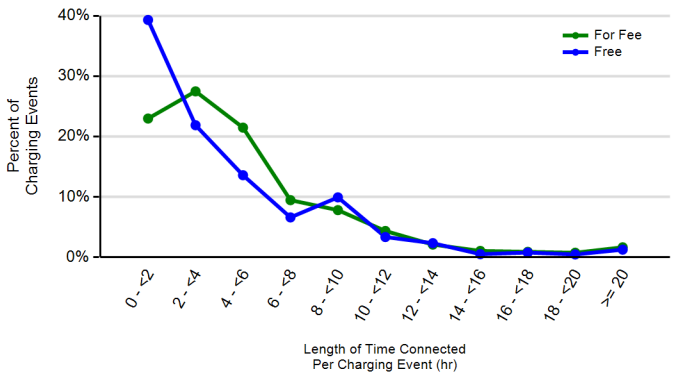
NYSERDA Electric Vehicle Charging Infrastructure Report

Report period: January 2016 through March 2016

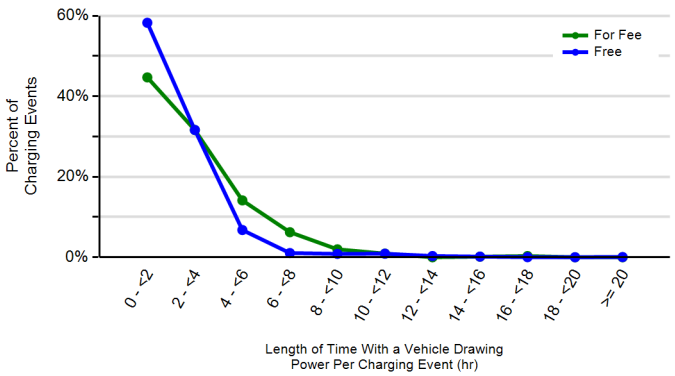
EVSE Usage - By Required Payment

	For Fee	Free
Number of charging ports[1]	58	424
Number of charging events[2]	666	13,357
Charging energy consumed (AC MWh)	7.0	92.3
Average percent of time with a vehicle connected per charging port	3.5%	7.0%
Average percent of time with a vehicle drawing power per charging port	1.5%	3.1%
Average number of charging events started per charging port per week	0.9	2.5
Average electricity consumed per charging port per week (AC KWh)	9.4	17.2
Average length of time with vehicle connected per charging event (hr)	6.5	4.8
Average length of time with vehicle drawing power per charging event (hr)	2.7	2.1
Average electricity consumed per charging event (AC kWh)	10.5	6.9

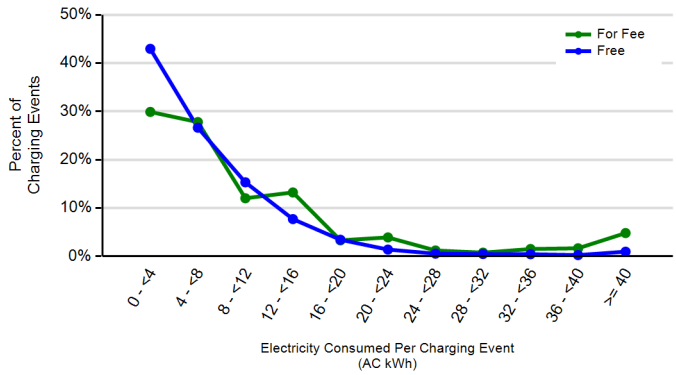
Distribution of Length of Time with a Vehicle Connected per Charging Event



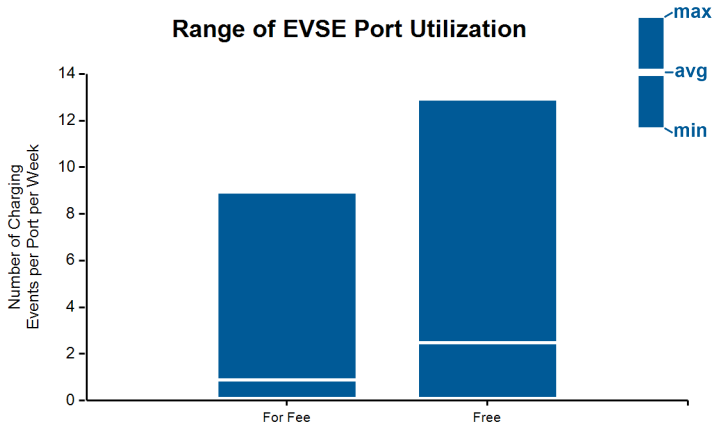
Distribution of Length of Time with a Vehicle Drawing Power per Charging Event



Distribution of AC Energy Consumed per Charging Event



Range of EVSE Port Utilization



[1] Includes all EVSE ports in use during the reporting period and have reported data to INL.

[2] A charging event is defined as the period when a vehicle is connected to a charging unit, during which power is transferred.

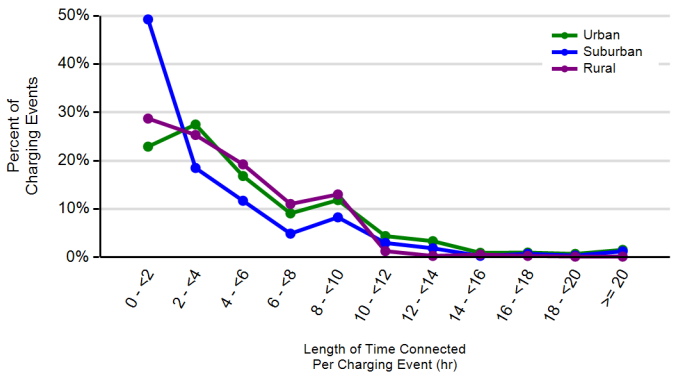
NYSERDA Electric Vehicle Charging Infrastructure Report

Report period: January 2016 through March 2016

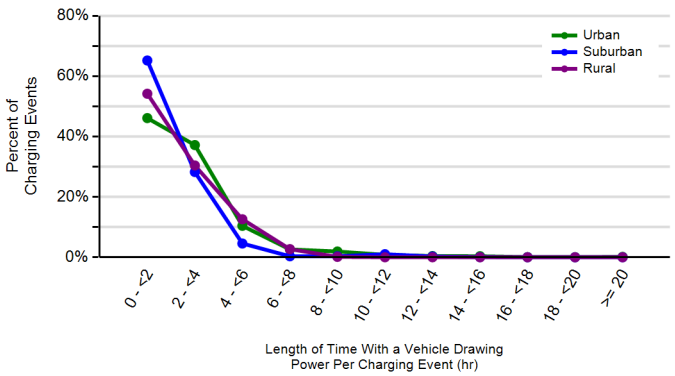
EVSE Usage - By Land Use Type

	Urban	Suburban	Rural
Number of charging ports[1]	171	273	38
Number of charging events[2]	5,153	8,163	707
Charging energy consumed (AC MWh)	47.5	46.3	5.6
Average percent of time with a vehicle connected per charging port	8.5%	5.8%	3.6%
Average percent of time with a vehicle drawing power per charging port	3.8%	2.5%	1.9%
Average number of charging events started per charging port per week	2.4	2.4	1.5
Average electricity consumed per charging port per week (AC KWh)	21.7	13.4	11.4
Average length of time with vehicle connected per charging event (hr)	6.1	4.1	4.2
Average length of time with vehicle drawing power per charging event (hr)	2.7	1.8	2.2
Average electricity consumed per charging event (AC kWh)	9.2	5.7	7.9

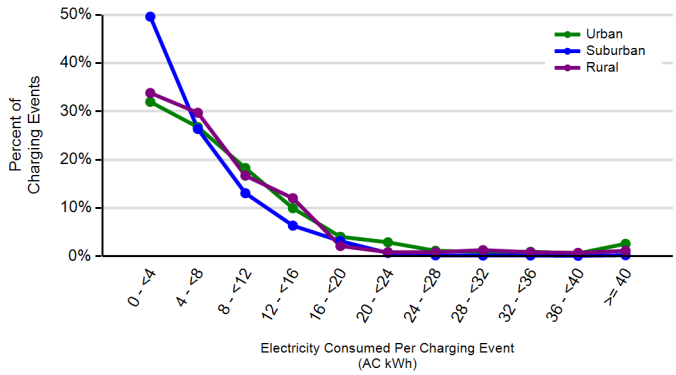
Distribution of Length of Time with a Vehicle Connected per Charging Event



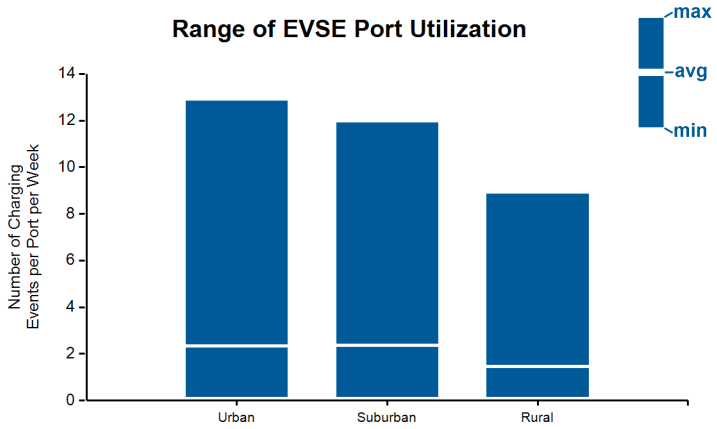
Distribution of Length of Time with a Vehicle Drawing Power per Charging Event



Distribution of AC Energy Consumed per Charging Event



Range of EVSE Port Utilization



[1] Includes all EVSE ports in use during the reporting period and have reported data to INL.

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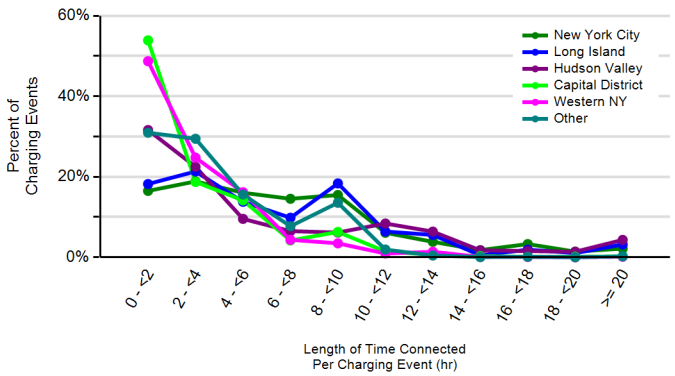
NYSERDA Electric Vehicle Charging Infrastructure Report

Report period: January 2016 through March 2016

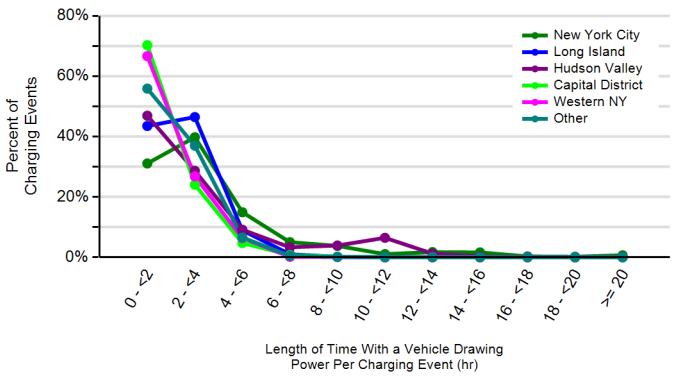
EVSE Usage - By Region

	New York City	Long Island	Hudson Valley	Capital District	Syracuse/Central NY	Rochester/Finger Lakes	Mohawk Valley	North Country	Western NY	Southern Tier
Number of charging ports[1]	77	60	91	101	19	42	10	23	48	11
Number of charging events[2]	1,067	2,017	1,740	4,768	293	2,009	77	484	1,386	182
Charging energy consumed (AC MWh)	13.6	16.0	17.8	25.1	1.8	12.9	0.5	2.5	7.8	1.3
Average percent of time with a vehicle connected per charging port	6.4%	12.1%	6.4%	6.2%	2.5%	10.0%	0.9%	2.2%	4.0%	2.2%
Average percent of time with a vehicle drawing power per charging port	2.5%	3.5%	2.9%	3.4%	1.3%	4.6%	0.7%	1.4%	2.4%	1.6%
Average number of charging events started per charging port per week	1.1	2.6	1.5	3.7	1.2	3.7	0.7	1.6	2.3	1.5
Average electricity consumed per charging port per week (AC KWh)	13.9	20.8	15.6	19.4	7.5	23.9	3.9	8.3	12.8	10.3
Average length of time with vehicle connected per charging event (hr)	9.9	7.8	7.0	2.8	3.5	4.5	2.3	2.2	2.9	2.5
Average length of time with vehicle drawing power per charging event (hr)	3.9	2.2	3.3	1.6	1.9	2.1	1.7	1.5	1.8	1.8
Average electricity consumed per charging event (AC kWh)	12.8	7.9	10.2	5.3	6.2	6.4	6.0	5.1	5.6	7.0

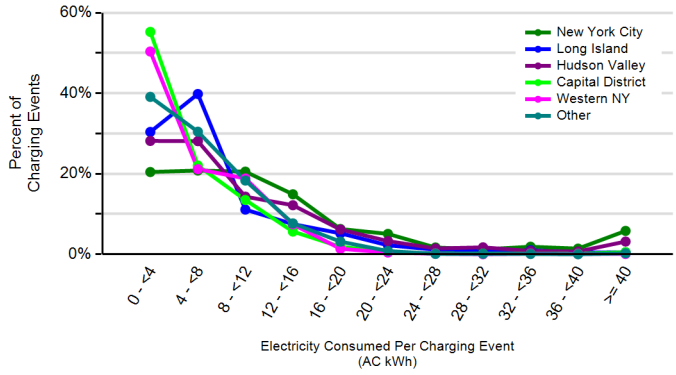
Distribution of Length of Time with a Vehicle Connected per Charging Event[4]



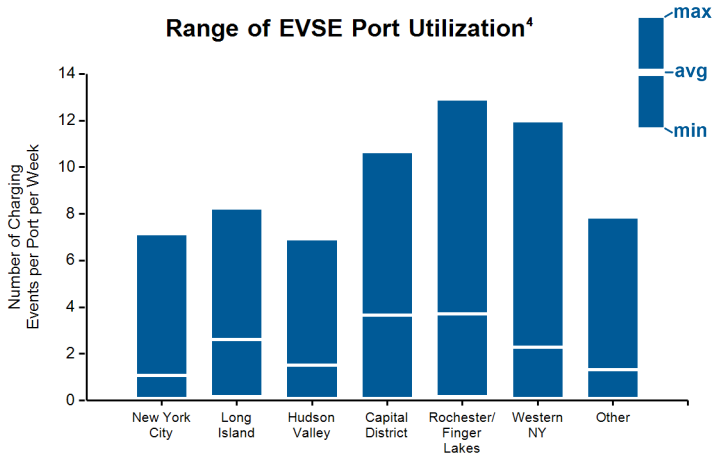
Distribution of Length of Time with a Vehicle Drawing Power per Charging Event[4]



Distribution of AC Energy Consumed per Charging Event[4]



Range of EVSE Port Utilization[4]



[1] Includes all EVSE ports in use during the reporting period and have reported data to INL.

[2] A charging event is defined as the period when a vehicle is connected to a charging unit, during which power is transferred.

[3] Regions with less than 10 EVSE ports are not individually represented, and are combined and reported as 'Other'.

[4] Only 5 or 6 regions with the most EVSE ports are individually represented, with the remaining regions combined and shown as 'Other'.

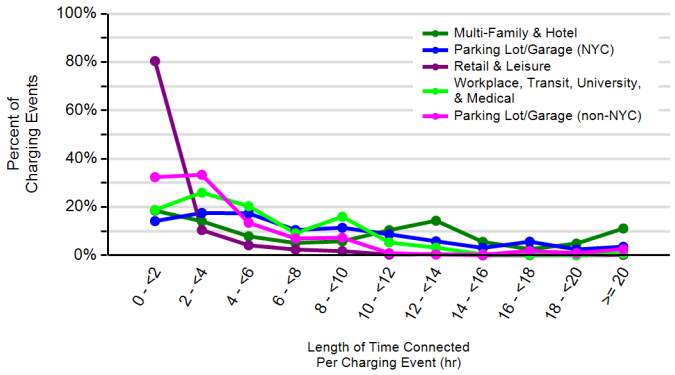
NYSERDA Electric Vehicle Charging Infrastructure Report

Report period: January 2016 through March 2016

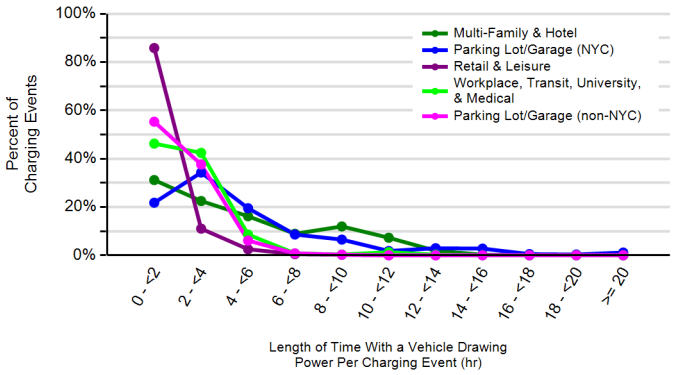
EVSE Usage - By Venue

	Parking Lot/Garage (non-NYC)	Parking Lot/Garage (NYC)	Retail Location	Workplace	Multi-Family	Hotel	University or Medical Campus	Leisure Destination	Transit Station
Number of charging ports[1]	72	61	83	64	15	24	111	20	32
Number of charging events[2]	2,551	622	3,693	1,418	288	145	4,585	289	432
Charging energy consumed (AC MWh)	16.7	10.6	12.7	10.4	5.8	1.8	34.8	2.5	4.0
Average percent of time with a vehicle connected per charging port	8.2%	4.8%	2.6%	4.7%	12.9%	1.5%	12.1%	3.2%	4.5%
Average percent of time with a vehicle drawing power per charging port	3.3%	2.4%	2.0%	2.4%	4.6%	0.9%	4.4%	1.5%	2.9%
Average number of charging events started per charging port per week	2.8	0.8	3.5	1.8	1.5	0.5	3.3	1.1	1.1
Average electricity consumed per charging port per week (AC KWh)	18.1	13.7	11.9	13.2	30.2	5.8	24.8	9.7	9.7
Average length of time with vehicle connected per charging event (hr)	5.0	10.1	1.3	4.3	14.5	5.4	6.3	4.8	7.1
Average length of time with vehicle drawing power per charging event (hr)	2.0	5.0	1.0	2.2	5.2	3.2	2.3	2.3	4.6
Average electricity consumed per charging event (AC kWh)	6.5	17.1	3.4	7.3	20.3	12.3	7.6	8.7	9.2

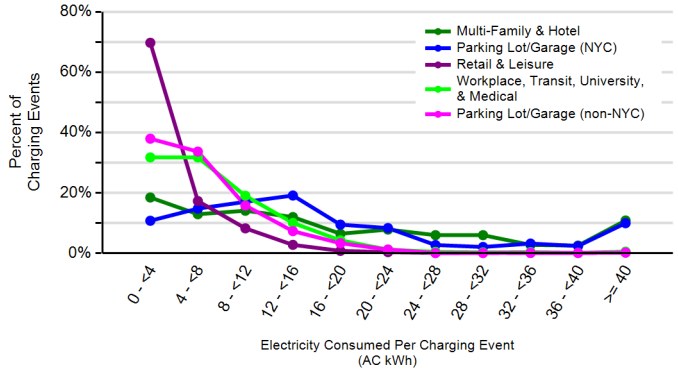
Distribution of Length of Time with a Vehicle Connected per Charging Event



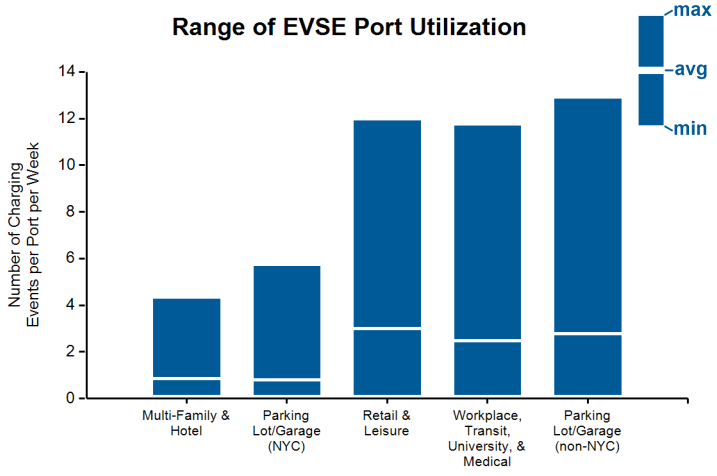
Distribution of Length of Time with a Vehicle Drawing Power per Charging Event



Distribution of AC Energy Consumed per Charging Event



Range of EVSE Port Utilization



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New York State Energy Research and Development Authority

17 Columbia Circle
Albany, NY 12203-6399

toll free: 866-NYSERDA
local: 518-862-1090
fax: 518-862-1091

info@nyserda.ny.gov
nyserda.ny.gov

State of New York
Andrew M. Cuomo, Governor

New York State Energy Research and Development Authority
Richard L. Kauffman, Chair | John B. Rhodes, President and CEO

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