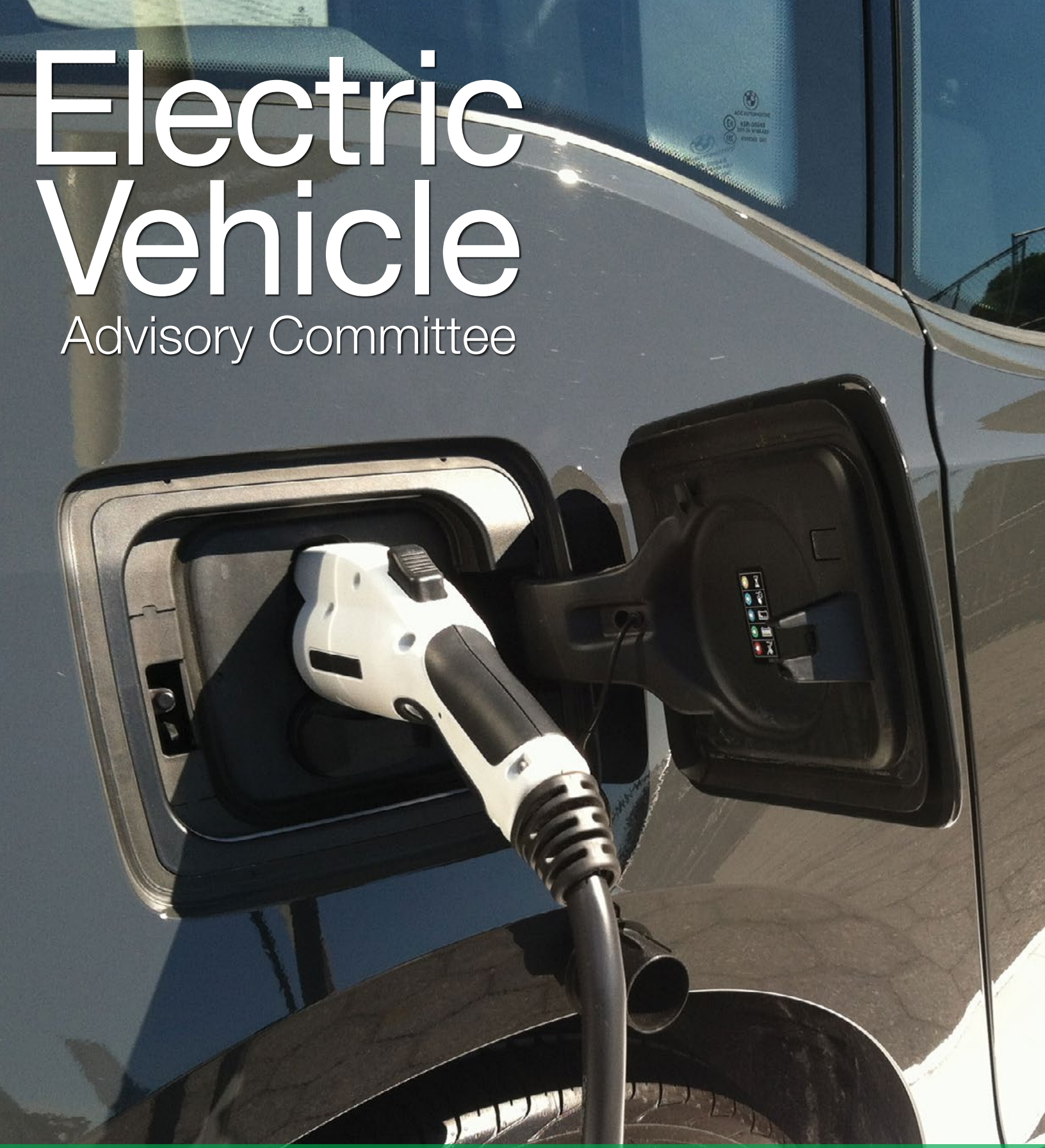
Electric Vehicle Advisory Committee



Report of Recommendations 2015

NEW YORK CITY DOT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OPTIMUS
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Executive Summary

The Electric Vehicle Advisory Committee (the Committee) was convened pursuant to Local Law 122 of 2013. The Committee is required to meet at least twice a year through 2019 with the goal to make recommendations on ways to promote the use of Electric Vehicles (EVs) among the general public. Pursuant to the Local Law the following Committee members are required: the Commissioners of the City's Department of Transportation (DOT),the Department of Environmental Protection (DEP) and the Department of Buildings (DOB) or their designees; the Director of the Mayor's Office of Sustainability or his or her designee; the Speaker of the City Council or his or her designee; each of the five borough presidents or their designees; and at least one representative from the EV industry and transportation and environmental advocates (currently Consolidated Edison, New York Power Authority (NYPA), National Resources Defense Council (NRDC), Green Parking Council and the Electric Drive Transportation Association).

EVs are becoming more common in New York City, but increased EV usage raises many complex questions. The Committee will work to find potential solutions to these questions and other issues related to increased EV usage. This first report addresses the current state of EV usage in New York City and recommends potential actions that the City and other members of the Committee can take to encourage the use of EV including:

- **EV ownership in New York City has been steadily increasing but remains relatively low and, accordingly, has the demand for additional charging solutions.**
- **The existing charging situation is mostly reliant on private parking facilities. New solutions may be needed in the future as electric vehicle populations continue to grow.**
- **Expanded publically available infrastructure could inspire purchaser confidence and stimulate additional market demand. This infrastructure does not necessarily require the City's involvement.**
- **Recently enacted Local law 130 of 2013 will provide some additional charging opportunities in private property in the near future.**

Prospective buyers admire a sedan in the Tesla showroom in Manhattan.

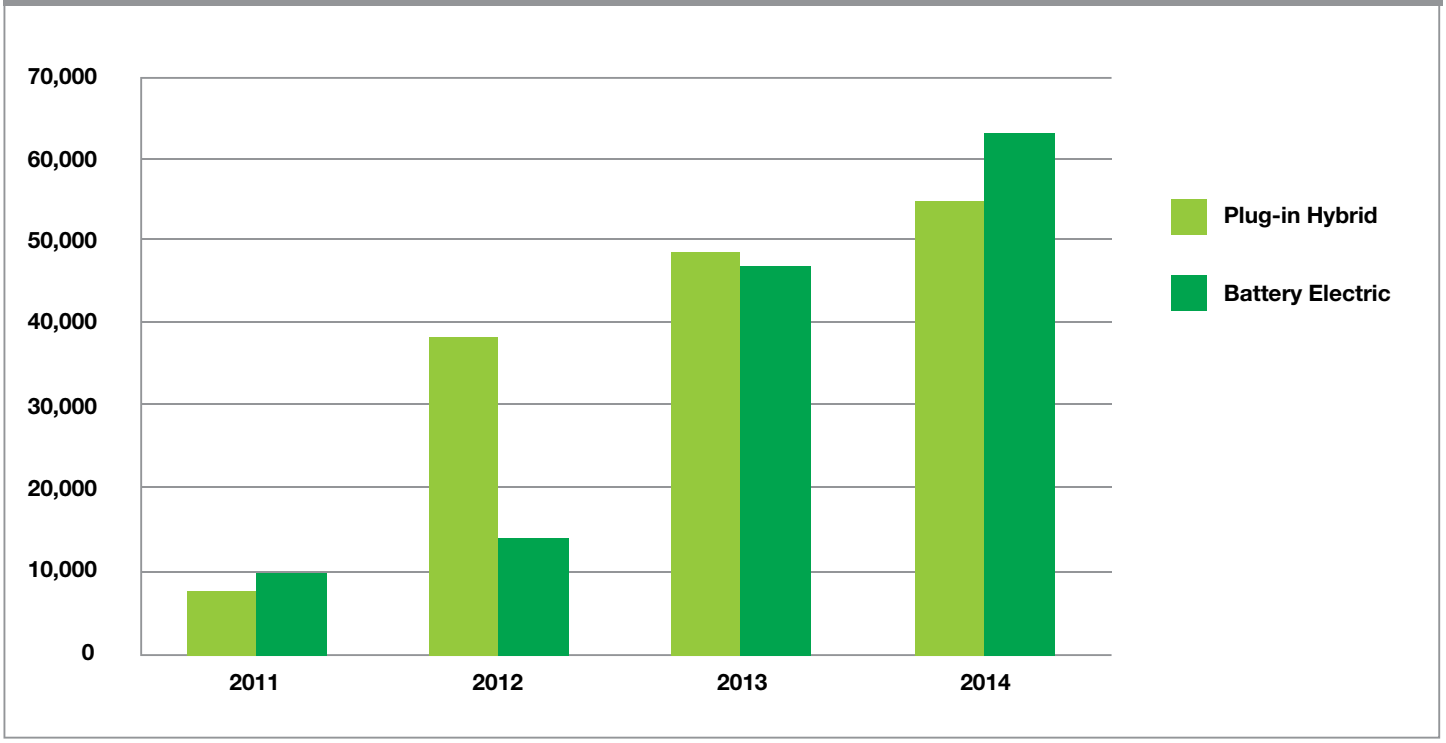
I. Current State of the EV Industry

National EV Sales

Since the current generation of EVs entered the market in 2011, the number of EV models has steadily increased and currently there are about 20 models of plug-in EVs available. As the name suggests, a plug-in EV requires that the vehicle be physically attached to an electrical source to charge its battery. There are hybrid plug-in EVs, which are powered by battery and gasoline, and pure battery powered plug-in EVs.

EV sales have grown dramatically since 2011. However, penetrating the American automotive market with a new technology has been a long, slow process. EV sales represent less than 1% of the total vehicle sales in 2014. According to the Electric Drive Transportation Association (EDTA), as of December 2014, there were a cumulative total of 286,000 plug-in EVs operating in the United States. This figure includes 2014 sales of 118,773 plug-in EVs in the United States (23% increase over 2013 sales). Hybrid plug-in EVs represent approximately 50% of the plug-in EVs sold today. Pure battery EVs were slower coming to market but have grown in sales.

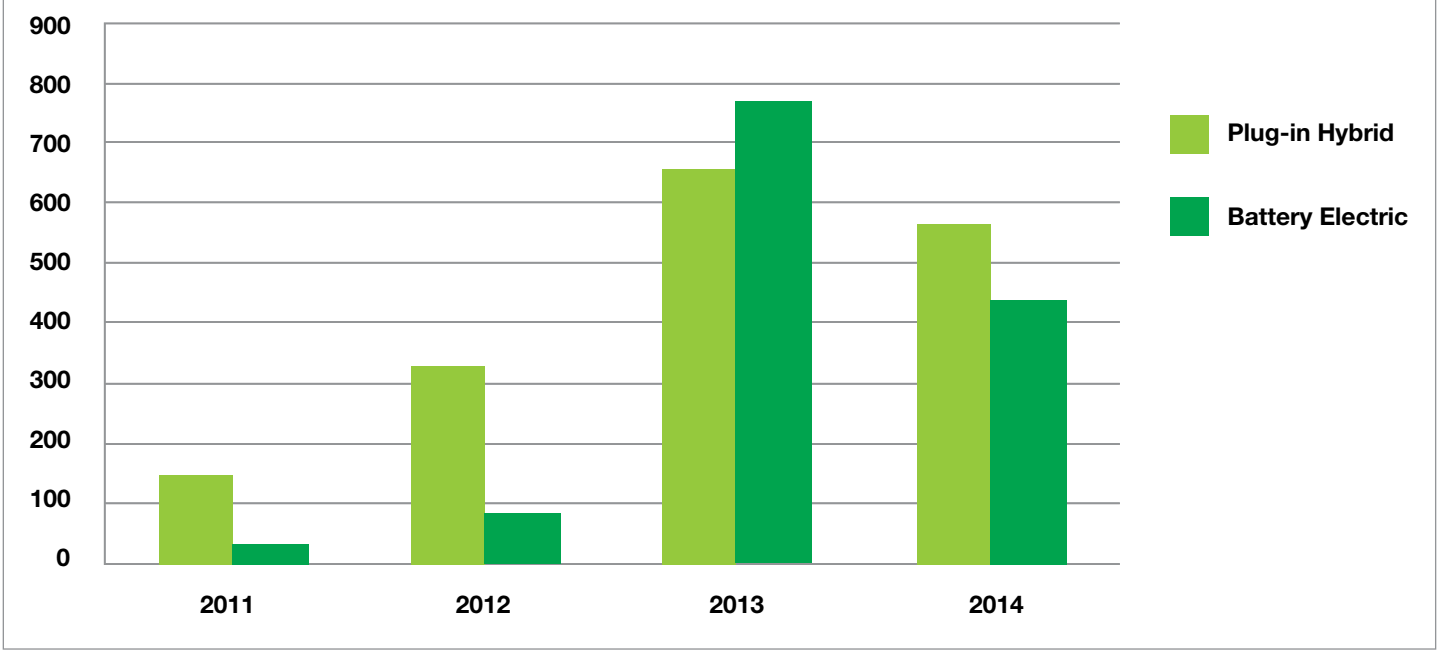
National Sales of Plug-in Vehicles by Model Year



Regional EV Sales

In 2014, 1,004 plug-in EVs were registered in New York City and Westchester County, of which 434 were pure battery EVs. There were 298,973 total vehicles sold in the region during that same period. Cumulatively, since 2011, there were over 3,000 EVs registered in New York City and Westchester.

Plug-in Vehicle Sales for NYC & Westchester County by Model Year

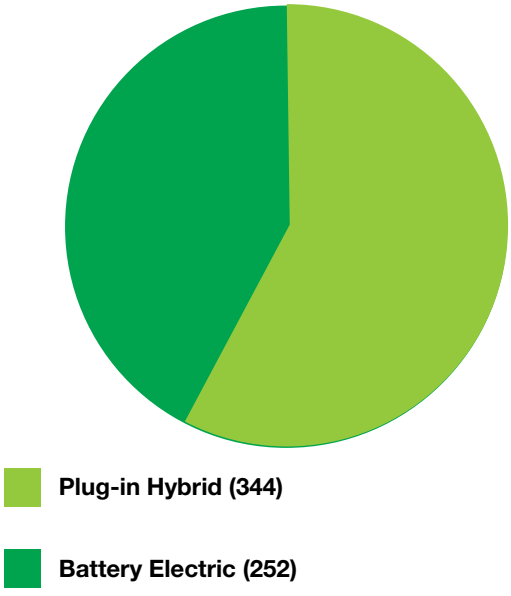


New Yorkers at the Shops at Columbus Circle examine an electric vehicle on display.

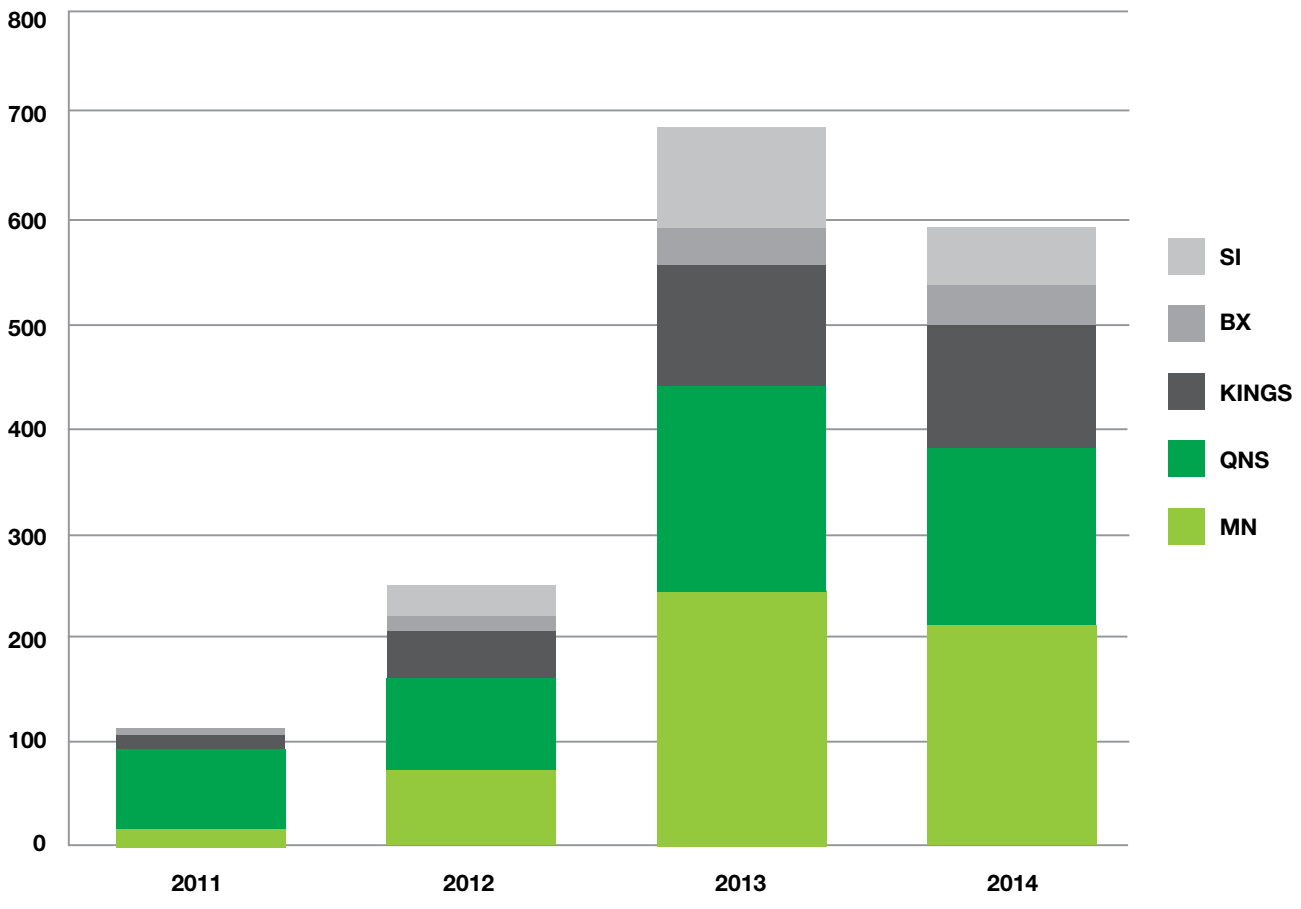
Local EV Sales

In New York City, 229,775 conventional vehicles were sold during in 2014. During that same period, 596 plug-in EVs were registered. About 1,600 Plug-in EV's were registered in New York City between 2011-2014; however, some of those vehicles are part of the New York City fleet acquisitions. New York City's fleet currently operates a total 510 plug-in EVs ranging from low speed to highway ready.

2014 Sales by Type— NYC



NYC Plug-in EV Registrations by Borough 2011- 2014



Multi-State ZEV MOU

In October 2013, New York State (NYS) joined 7 other states (California, Connecticut, Maryland, Massachusetts, Oregon, Rhode Island, and Vermont) in signing a Memorandum of Understanding (MOU) which, among other things, is aimed at reducing transportation-related air pollution, including the emission of greenhouse gas emissions. Specifically, the signatory states agreed to jointly develop infrastructure, policies, codes and standards to put 3.3 million Zero-Emission Vehicles (ZEVs) on the road by 2025. ZEVs include hybrid plug-in, battery electric and hydrogen-powered fuel cell EVs. These 8 states together comprise about a quarter of the nation's new car sales. Since the signing of the MOU, state regulators, the auto industry, infrastructure developers and other stakeholders have shared information and best practices to help move this groundbreaking effort forward.

Based on NYS's traditional market share, it is forecast that NYS will need approximately 820,000 ZEVs on the road by 2025. As of late 2014, there were about 8,000 ZEVs in NYS; therefore, a 100 fold increase will be required in the next decade. NYS created the Governor's ZEV Task Force to develop plans to increase the use of ZEVs within the government and to encourage the public to use them as well.

II. EV Charging Methods

EV charging is generally available in four major configurations:

Level 1 Chargers

The 110 Volt option is typically used at private homes and some workplace charging locations. Charge times are slower than the other charging options. They can provide up to 1.1 kWh of charge, which is ideal for hybrid plug-in EVs that have smaller batteries and can get a substantial charge in 8 hours or less. A typical use would be a vehicle parked for an 8 hour work day, which would receive about a 37% charge (30 miles) during that time. Level 1 is typically a cord set costing a few hundred dollars that plugs into a conventional outlet.

Level 2 Chargers

The 220 Volt option is currently the most commonly used charging application. It can provide between 3.3 and 6.6 kWh and can fully charge an EV battery in about 4 hours. The vast majority of the 200+ publicly available chargers in New York City are Level 2 chargers. Costs can range from a few hundred dollars up to $5,000 excluding installation. The difference in cost is based on being rated for outdoors versus indoors and containing intelligence to operate as part of a network.

A car charges with a Level 2 Charger.

DC Fast Chargers

The 480 Volt option is available to limited types of EVs. They provide between 25 and 50 kWh and can provide a typical sedan with an 80% charge in 20-30 minutes. The DC Fast Charger cost upwards of $20,000 excluding installation.

An example of a DC Fast Charger

Tesla Supercharger

This is a proprietary charger available only to Tesla vehicles (however, Tesla vehicles can also use other charging options as well). It provides a charge of approximately 120 kWh and can provide an 80% charge in 30 minutes.

The Tesla Supercharger charges vehicles in minutes.

III. Approaches to EV Charging

International Models

Cities around the world such as Oslo, Amsterdam, Paris, London and Berlin have developed different approaches to EV charging. Representatives from the cities of Amsterdam and Oslo advised the Committee that in their cities there was a top down national effort to bring EVs and EV chargers into their respective countries, which involved large incentives at the national and local levels. In Oslo, these incentives included: tax credits, access to priority bus lanes, waiver of the city congestion zone fee, and free parking and charging in the city. Amsterdam's incentives involved an expedited permit to park in the congested city along with tax incentives. Amsterdam initially developed its on-street charging network in response to individual resident purchases of EVs (a charger would be installed by the city within 1000 feet of each resident). Amsterdam also developed a generic plan of charging locations based on the probability of purchases in specific demographic neighborhoods.

In Paris, the Autolib' electric car share system has been a catalyst for the creation of a citywide network of parking and charging stations. In London, where the city has created a large on street charging program, utilization of said system has been very low. However, efforts are currently underway to develop an electric car share program, similar to the one in Paris, which will utilize the existing on street charging locations. Recent efforts to develop an on-street charging network are also underway in Berlin, where in 2015, the city awarded a contract to a consortium to develop the citywide network.

National Models

Citywide on-street charging networks are very limited in the United States. There are a few small programs being developed; most notably in Indianapolis, Indiana. Indianapolis is developing an electric car share program, BlueIndy, with the Bolloré Group (who currently operates Paris' electric car share program and is about to enter the car share market in London). A key requirement of BlueIndy's car share program is that it will have two on-street charge points for each car in the program.

The majority of public charging infrastructure in the United States is located off-street on private property such as shopping mall parking facilities, large box stores, coffee stops, and rest areas. Many of these charging locations, predominantly on the west coast, were funded through the United States Department of Energy's EV Project, which funded mostly Level 2 and some Level 3 chargers in 16 cities in nine states (Arizona, California, Georgia, Illinois, Oregon, Pennsylvania, Tennessee, Texas, and Washington) and the District of Columbia. Another federally funded public charging initiative is the West Coast Electric Highway Project, which facilitated the installation of 43 Level 3 chargers along Interstate 5 and other major roadways in the Pacific Northwest.

Utility investments in charging stations for EV's have been growing as well. For example, Kansas City Power and Light announced in 2014 that it would install 1000

charging stations. In addition, because the State of California Public Utilities Commission (PUC) recently rescinded a rule prohibiting utility ownership of charging networks, the three largest utilities in California submitted proposals to operate charging stations in the state that are under review by PUC. Their proposals, combined, would require utility investments in excess of $1.0 billion dollars to place an additional 60,000 charging spots in the State of California.

There are also privately funded initiatives for EV charging on a national scale. Most notably by NRG eVgo, a subsidiary of NRG Energy, Inc., which created the nation's first privately funded comprehensive network of home charging stations and fast charging stations. NRG eVgo offers different charging plans (monthly fees/usage rates) so that its users can charge their EVs both at home and away from home. It has a growing network of Level 2 and Level 3 chargers in off-street major retail locations in California, Georgia, Illinois, Maryland, Tennessee, Texas, Virginia and the District of Columbia.

EV Charging Options in New York City

Charging for plug-in EVs in New York City is currently occurring at residences and at private parking facilities. According to the National Renewable Energy Laboratory (NREL), there are 260 publically available charging sites in New York City; the vast majority of these are located in private parking facilities in Manhattan. In addition, the City has installed over 200 chargers at City facilities for charging its own fleet of EVs.

In 2013, DOT and NYPA entered into an agreement that allowed DOT to purchase 27 NYPA funded EV charging stations that were installed at various DOT owned parking garages and municipal lots in all five boroughs.

NYPA completed the installations at the locations shown in the chart at the bottom of this page.

Local Law 130/13

A recent local law (Local Law 130 of 2013) amended New York City's Building Code to require that the electrical systems of new privately owned parking garages and open parking lots (as well as those receiving electrical upgrades as part of an alteration) be capable of supporting EV charging in at least 20% of the parking spaces. The Committee will coordinate with DOB on how to provide updates on the impact of this local law on the number of EV charging stations throughout the City.

EV Chargers for Installation in Municipal Parking Facilities 2015

Location	Address	# of EV Chargers
Bay Ridge Municipal Parking	8501 Fifth Avenue, Brooklyn, NY 11209	3
Court Square Municipal Parking	45-40 Court Square, Long Island City, NY 11101	3
East 149th St. Municipal Parking	315 East 149th Street, Bronx, NY 104511	3
Jerome-Gun Hill Road Municipal Parking	3510 Jerome Ave Bronx, NY 10467	3
St. George Courthouse Garage	54 Central Avenue, Staten Island, NY 10301	3
Flushing #3 Municipal Parking Field	133 41st Avenue, Flushing NY 11354	3
Delancey and Essex Municipal Parking	107 Essex Street, NY, NY 10002	3
Queens Family Court Garage	150-07 Archer Avenue, Jamaica NY 11433	3
Jerome-190th Street Municipal Garage	2478 Jerome Ave. Bronx, NY 10468	3

IV. EV Charging Challenges for New York City

New York City is unique in that it has many privately owned public parking garages. By their nature, these facilities are capable of adapting to the changing market, including the demand for publically available EV charging. Expanding EV charging beyond the public parking garages is difficult in New York City due to existing regulatory and financial challenges.

One example of a regulatory challenge is the New York City Charter limit on the use of City owned public property for private and commercial activities. This may significantly affect the City's ability to establish a viable EV charging program.

There are also some significant financial barriers to the cost effective placement of EV chargers in and around New York City. The placement of high powered Level 3 chargers or clusters of Level 2 chargers may impose utility demand charges on the facility where they are located. If the chargers cause an increase in the peak usage, the facility may be subject to an additional monthly fee for such demand. The fee would be in addition to the charging cost (per kWh) and may be a discouraging factor in the decision to install the faster EV chargers.

There are some technical solutions that may be available to reduce the peak demand and avoid surcharges (ie demand charges). Facilities that have EV chargers can limit the number of chargers operating at any one time or can use battery storage to provide some of the charging. Batteries could be charged during low utilization time and then provide their power during the peak times. Another potential solution that is being evaluated in the New York City area by General Electric, Columbia University, Fed Ex and Con Edison is a smart EV charging system that looks at an entire building's power demand and arranges charging to occur at the times of lower overall demand. This type of system avoids the generation of very expensive demand charges.

To better assess these costs, a variable charge rate structure could be established, whereby users could be charged different rates depending on when they are utilizing the service. For example, fast charges at peak usage times would be more expensive than slower chargers at non-peak times.

A parking lot with Level 2 chargers is available to workers and travelers at the Albany Airport.
Photo courtesy of NY Power Authority

V. Committee Recommendations-2015 Work Plan

1 .Coordination with New York State EV Working Group.

As part of the multi-state MOU to support the increased use of ZEVs that will help improve air quality, Governor Cuomo established a working group to explore statewide initiatives to accelerate the sale of EVs in New York State. The Committee will closely coordinate efforts with the State's working group to ensure a consistent effort to promote the use of EVs in New York City and New York State.

2. Centralize Tracking of Citywide EV Infrastructure.

There are a number of private websites that identify charging locations in New York City, which are mostly located in privately owned parking facilities. However, currently there is no citywide database of such locations. The Committee will compile a database of locations for dissemination to the public by all members of the Committee, especially by Committee members in public service. This will be supplemented by with general information about EVs to promote their usage. A reliable database of EV charging locations will be an important step towards promoting EV use by the public.

3. Coordinate with DOB tracking of progress under Local 130/13.

As parking facilities add EV charging options to comply with the requirements of Local Law 130/13, the Committee will coordinate with DOB to track such new locations. Even if these locations do not include physical chargers at the onset, they will be designed so that EV chargers can be easily installed in the future. The Committee will look into how to best disseminate the information as new charging locations become available.

4. Liaise with Employers on the Workplace Charging Challenge

The US Department of Energy established a voluntary national effort called the Workplace Charging Challenge.

This program's mission is to get large employers to make EV charging available in their own parking facilities for workers. New York City is home to many large corporate headquarters and centers of employment that may provide employee parking. By acting as a liaison to the Workplace Charging Challenge, the Committee can reach out to employers and make them both aware of this initiative and encourage them to join.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