REPORT

Town of Cary Electric Vehicle Charging Station Pilot Project Analysis

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Contributors

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Introduction

The purpose of this report is to evaluate the Town of Cary's electric vehicle charging station pilot project launched in August of 2012.

Table 1: PEV and Charging Station Counts	
PEVs in United States (Sept, 2014)	255,766
PEVs in NC (July, 2014)	3,260
PEVs in Wake County (July, 2014)	992
Number of Charging Stations Connectors in NC (publicly available- October, 2014)	514[1]

Cities, counties, workplaces, retailers and other entities are installing electric vehicle charging stations to serve the growing number of plug-in electric vehicles (PEVs) in the community. PEVs provide many benefits to a region including reducing emissions, diversification of

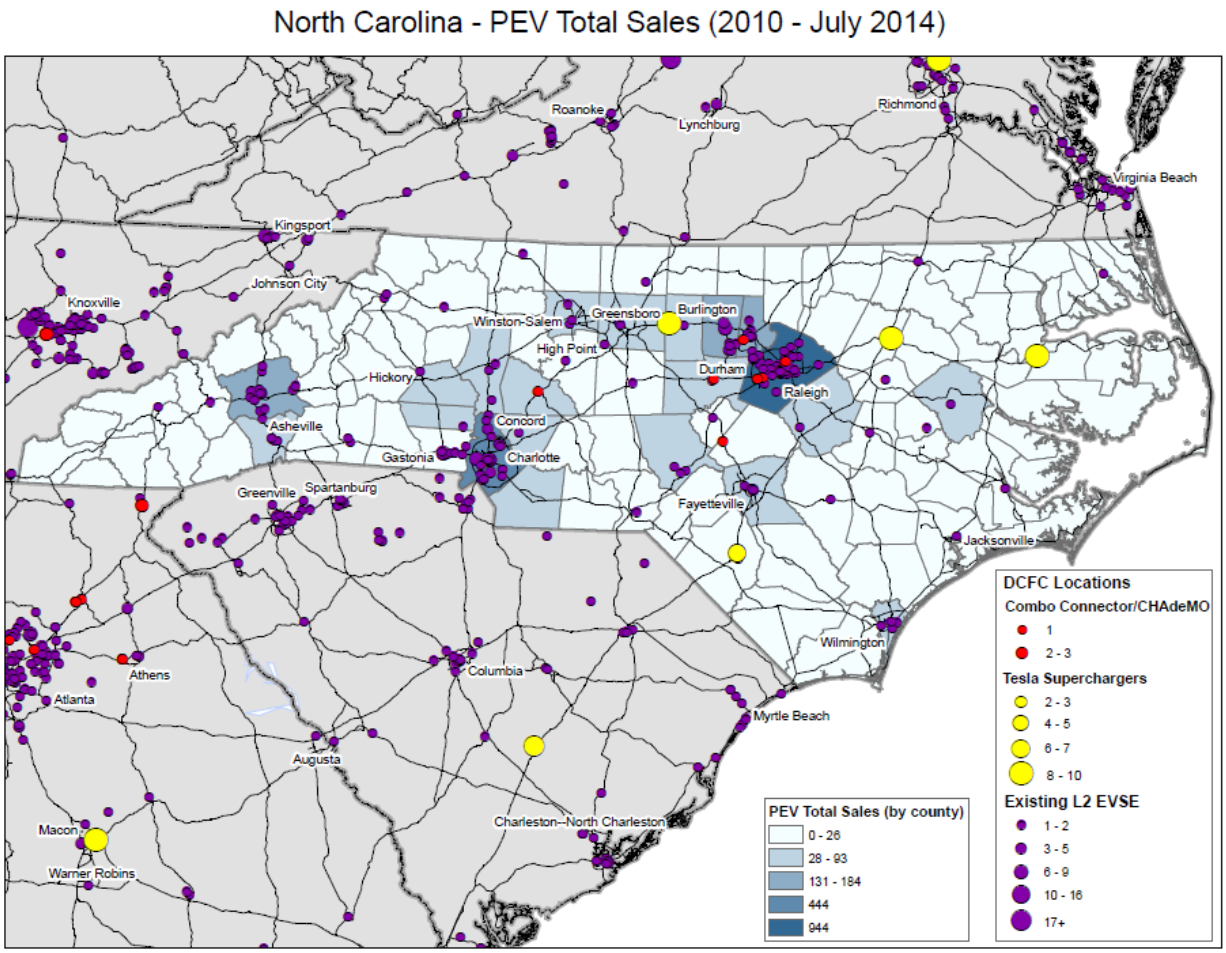

Figure 1: Source: Electric Power Research Institute

[1] Data from the Alternative Fuels Data Center www.afdc.energy.gov

fuel sources, and promotion of new technologies. PEVs include both plug-in hybrid electric vehicles, which use gasoline and electricity (such as the Chevy Volt) and all-electric vehicles, which only use electricity (such as the Nissan Leaf).

As of the end of September 2014, there were 255,766[2] plug-in electric vehicles on the roads in the United States. PEVs have been sold in North Carolina since late 2011, and in that time there have been just over 3,000[3] electric vehicles registered in the state.

Electric Vehicles, Charging Stations, and Driver Behavior

PEVs are typically plugged in overnight and charged at home, which means that most vehicles will start each day with a complete charge allowing the drivers to benefit from the battery's full range. All-electric vehicles' mileage ranges can vary between 60 to over 100 miles per charge (see Table 3), which is well within the average daily commute for most drivers in the Triangle (approximately 30 miles per day[4]).

Figure 2 illustrates what an average daily charging cycle may look like for a PEV driver, with the majority of the daily charging occurring at home and a lesser amount at the workplace and at public locations. If workplace charging is not available, then most electric vehicle drivers will charge at home and in public. Although the number of public charging stations will ultimately be much smaller compared to the number of home charging stations, public charging station infrastructure is a critical element to help support electric vehicles as they emerge into the marketplace as a new technology.

Figure 2: Daily PEV Charging Cycle

Charging patterns for plug-in hybrid electric vehicles do vary slightly from all-electric vehicles. These vehicles generally include an electric range of 20-40 miles. Like all-electric vehicles, plug-in hybrid electric vehicles will receive most of their charge at home each night. The drivers, however, may seek out public and workplace charging more than all-electric vehicle drivers in order to increase their electric range.

The Electric Power Research Institute (EPRI) has identified four main objectives for public charging infrastructure. These objectives are to:

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[2] Electric Drive Transportation Association
http://www.electricdrive.org/index.php?ht=d/sp/i/20952/pid/20952
[3] Data from Pike Research supplied by Duke Energy
[4] The Capital Area MPO, 2030 Long Range Transportation Plan

1. Add electric miles to plug-in hybrid electric vehicles
2. Build consumer acceptance (reducing "range anxiety")
3. Support electric vehicle ownership for occupants of multifamily dwellings
4. Enable longer trips for all electric vehicle drivers[5]

In addition to the reasons above, many entities find that promotion of electric vehicles through installation of public infrastructure can help show support for new technologies, meet sustainability goals, and address regional and community benefits.

Community Benefits for Electric Vehicle Promotion

Public electric vehicle charging stations have been installed in the public sector for a variety of reasons. One reason is that it is a mode of transport that provides air quality improvements. All-electric vehicles have no tailpipe emissions, and plug-in hybrid electric vehicles have reduced tailpipe emissions, both of which can have local air quality benefits. Air quality problems in the Triangle, seen by "ozone action days," are triggered by ground-level ozone which is a lung irritant. In our area, ground-level ozone formation is largely driven by the mobile sector. Additionally, a comparison of a Toyota Corolla to a Nissan Leaf shows a reduction in greenhouse gas emissions of approximately 50 percent (www.afdc.energy.gov/calc).

Another reason for installing electric vehicle charging stations is support of energy independence. PEVs are fueled with locally-generated electricity, not imported oil. Conventional transportation is wholly dependent on petroleum and results in the U.S. spending over one billion dollars per day on foreign oil. Electricity generation in the U.S. uses a diverse mix of domestic sources, and only one percent comes from oil. North Carolina's electricity generation is comprised of coal, nuclear, natural gas, and other sources such as hydroelectric dams and renewable sources. North Carolina's grid is increasingly becoming cleaner, and over the last few years the amount of electricity generated from coal fired power plants has decreased and other sources such as nuclear, natural gas, and renewables have increased. North Carolina's grid will continue to move towards cleaner forms of electricity with the EPA's proposed Clean Power Plan rule, which would require each state in the U.S. to develop plans to hit target emissions reduction goals by 2030.

Promotion of PEVs also helps to support new technologies and economic development associated with being a technology-friendly community. Some communities have seen charging stations as a destination amenity that could inspire visits to one locale over another, since most PEV drivers use online or mobile tools to plan trips. Electric vehicle

[5] EPRI, *Guidelines for Infrastructure Planning*, June 2014, http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000003002004096&Mode=download

charging can also be used as a recruitment tool for businesses. Workplace charging is increasing as a selling point for employers and employees who appreciate having charging stations easily accessible.

Table 2 shows the vehicle charge times for the level of a charging station. Using a 120-volt standard household outlet provides an average of three to five miles range per hour of charging. A 240-volt charging station increases the range to an average of 10 to 20 miles per hour of charging. Charging times vary between vehicles based on a variety of factors including the battery pack, the temperature of the battery, the vehicle model and other features.

As seen in Table 3, eleven all-electric or hybrid electric vehicles are currently available for sale in North Carolina. This table also shows the anticipated average miles each of these models can drive on a full charge. According to goelectricdrive.org, "vehicle charge time will depend on the battery size and the energy level remaining in the battery when it is plugged in."

Table 2: Levels of Charging Stations
Source: U.S. Department of Energy, "A Guide to the Lessons Learned from the Clean Cities Community Electric Vehicle Readiness Projects"
http://www.afdc.energy.gov/uploads/publication/guide_ev_projects.pdf

Charge Level	Voltage	Power Similar To	Charge Time for Vehicle
Level 1 AC	120 V	Toaster	3-5 miles of range per hour
Level 2 AC	240 V	Clothes Dryer	10-20 miles of range per hour
DC Fast Charger	480-600V	5-10 Central Air Conditioners	Full charge in 20- 30 minutes

Table 3: Types of Electric Vehicles Sold in North Carolina as of October, 2014

Source: Goelectricdrive.org, EV Virtual Showroom

Make – Model	Type	Year	Electric Range (miles)	Total Range (miles)
Ford Focus Electric 	All-electric	2013	76	76

Nissan Leaf 	All-electric	2013	83	83
Mitsubishi iMiEV 	All-electric	2012	62	62
Tesla Model S (40 kW-hr) 	All-electric	2013	208	208
Smart Electric Drive 	All-electric	2013	68	68
BMW i3 	All-electric	2014	80-100	80-100
BMW i8 	Electric hybrid	2014	22	310
Chevrolet Volt 	Electric hybrid	2014	38	380

Ford Fusion Energi SE 	Electric hybrid	2013	21	620
Ford C-Max Energi 	Electric hybrid	2014	21	620
Cadillac ELR 	Electric hybrid	2014	37	340

Most major automobile manufacturers are releasing one or more PEV models. Just two years ago, there were only two plug-in vehicle models sold in North Carolina (the Chevy Volt and Nissan Leaf). This number has increased to eleven as of 2014, and continues to grow. Estimates from the Electric Power Research Institute indicate that there will be over 700,000 PEVs on the roads in North Carolina by 2030. Chrysler also just announced a plug-in hybrid minivan to be released next year and Mitsubishi just announced their plug-in SUV.

Additionally, the federal government has invested resources to aid in the adoption of this new technology. In 2012, President Obama announced the EV-Everywhere Challenge at the Daimler Truck Factory in Mt. Holly, North Carolina. The goal of this initiative is to advance technology development so that electric vehicles will be more affordable and convenient than today's gas powered vehicles.

Town of Cary Pilot Project

In August 2012, the Town of Cary launched a two-year pilot project evaluating electric vehicle charging stations. Charging stations were installed at three locations including the Garmon Operations Center, the Herb Young Community Center and the Cary Arts Center. Table 4 provides information on the locations, types of stations, and other logistical information.

Table 4: Town of Cary Charging Stations				
Charging Station Location	**Number of Stations**	**Availability**	**Partner Providing Power During Pilot Project**	**Units Purchased with Funding From**
Garmon Operations Center 400 James Jackson Avenue Cary, NC 27513	1 Siemens Pedestal Community Level 2 Units	Available to the public during the day Reserved for Town's all-electric Nissan Leaf evenings and weekends	Siemens	DOE ARRA EECBG Grant Funds*
Town Hall Herb Young Community Center Parking Deck 101 Wilkinson Avenue Cary, NC 27513	2 Eaton Wall Mounted Pow-R-Station Level 2 Units	Citizens Town employees	Cary Chamber of Commerce	Duke Energy Progress DOE grant funding under the ARRA Smart Grid Investment Grant
Cary Arts Center 101 Dry Avenue Cary, NC 27511	2 GE WattStation™ PEV Chargers	Citizens	GE	DOE ARRA EECBG Grant Funds*

** DOE ARRA EECBG stands for Department of Energy, American Recovery and Reinvestment Act, Energy Efficiency and Conservation Block Grant*

Evaluation of Pilot Project

The Town of Cary worked with Advanced Energy to conduct an evaluation of the charging station pilot project. Advanced Energy is an energy engineering and planning firm based in Raleigh, NC. Advanced Energy was founded by the NC Public Utilities Commission in 1980 and provides economic, environmental, and societal benefits by creating market-based solutions for energy issues in North Carolina. Advanced Energy's work with the Town of Cary was conducted through its Public Benefits Program, which provides PEV readiness support to communities across the state.

Advanced Energy staff worked with the Town of Cary to determine evaluation criteria for the electric vehicle charging station pilot project. These criteria were selected based on the data needed by the Town of Cary. Advanced Energy also conducted research of common review criteria used for PEV deployment initiatives in other parts of the country.

The evaluation criteria for the charging station pilot project included:

1. Number of charging sessions (total and per month)

2. Length of charging sessions
3. Electricity consumed (total and average kWh per month and per session)

In addition to the evaluation criteria described above, other factors were taken into consideration including user rankings from PlugShare[6] (an online web application that allows users to locate, rank and comment on charging stations), ease of obtaining and reviewing data, and type of use (fleet, workplace, public, multi-use).

Advanced Energy pulled data from all three charging station locations and summarized the overall findings in Table 5. On average, it was found that the **stations are used between 20-40 times each month** and **each charging station location is dispensing around 188 kWh per month** (costing approximately $14.31 per[7] month).

Although the table below describes some of the summary data, it is recommended to use caution when comparing the stations because of different usage patterns for each site. For example, the station at the Garmon Operations Center has a dedicated fleet vehicle and is open for public charging during the day, while the stations at the Cary Art Center are used for both electric vehicles and short term non-electric vehicle parking. The stations at the Herb Young Community Center are open to the public and appear to be used by a mix of drivers, including some who are charging during the day while at work and others visiting a site downtown. A more detailed and individual analysis of each charging site is included in the following sections of this report.

Table 5: Town of Cary Charging Stations

	Garmon Operations Center (Siemens)	**Cary Art Center** (GE Watt Station)	**Herb Young Community Center** (Eaton)
Data Analysis Time Period:	Aug, 2012- Sept, 2014	Sept. 2013- Sept 2014	June 25- September 13, 2014
Usage	Fleet and Public	Public	Public and Workplace
Number of Units	1	2	2
Average kWh per Month	134.17 kWh	88.88 kWh	341.94 kWh

[6] http://www.recargo.com/plugshare
[7] Estimated electricity cost of $0.076 per kWh

Average Cost Per Month	$10.19	$6.75	$25.99
Estimated Total Energy Cost to Date	Public: $41.00 Town: $213.00	$162.00	$535.00
Average Charging Sessions per Month	20	23	36
Average Charge Time	1 hr, 50 min	1 hr, 13 min	2 hrs, 16 min
Average Energy per Charge	7.75 kWh	4.5 kWh	10.08 kWh

Comparison Cities in North Carolina

Charging Station Data from the City of Raleigh

The City of Raleigh has installed 23 charging stations at various city-owned locations including parking decks, recreational facilities and fleet locations. Raleigh provides online charging station monitoring through a web-based program called Periscope. This system allows for the City, as well as members of the public, to view usage data from the City's charging stations. Raleigh's data indicates an **average of 13 charging sessions per month** with an **average charge time of one hour and twenty minutes**. Much like the Town of Cary, the stations have various usage patterns depending on the location. Some stations are used significantly more than others due to location (reference Figure 3 below). Table 6 and Figure 3 further indicate the usage patterns from the City of Raleigh's stations.

Table 6: City of Raleigh Electric Vehicle Charging Stations *Data Source: www.raleighnc.gov*	
Time Period: August 2013- August 2014	
Number of Charging Stations	23
Average kWh per Month	1,372.75 kWh
Average Charging Sessions per Month	13
Average Charge Time	1 hr, 20 min
Average Energy Per Charge	4 kWh

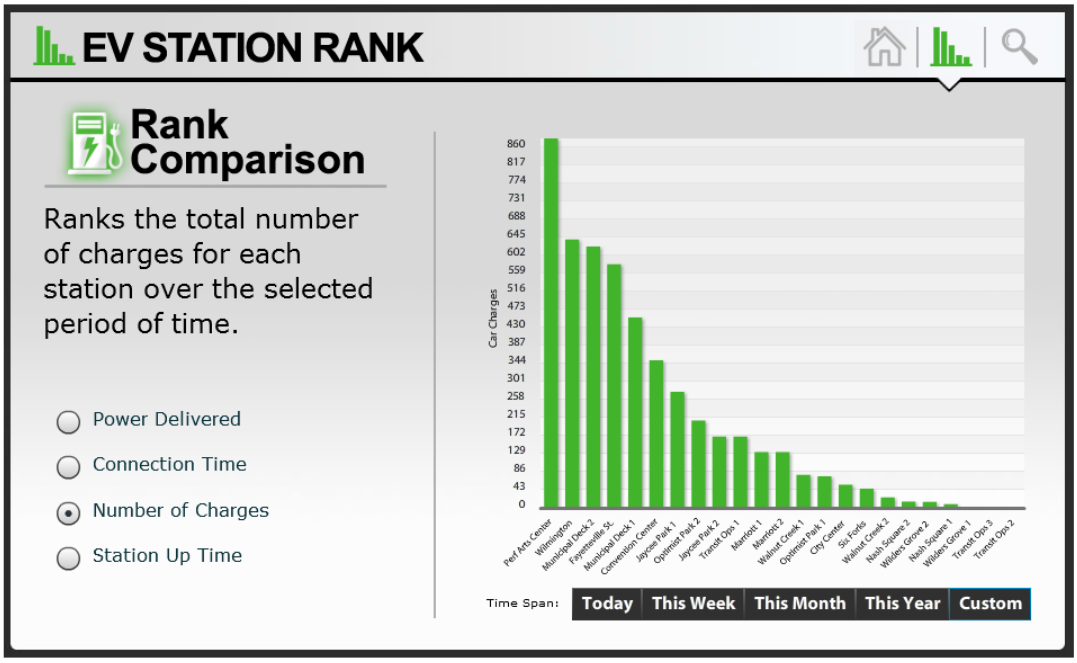


Figure 3: Data from Periscope on the City of Raleigh website www.raleighnc.gov
Data showing the number of charges for the City's charging stations from August 2013- August 2014

Charging Station Data from the City of Charlotte

The City of Charlotte has installed 23 charging stations with a total of 31 charging ports. These stations are provided at a variety of locations including city parking decks, park and ride locations, museums and other locations. The City of Charlotte staff provided summary data from their charging stations for use in this report (see Table 7). Charlotte's stations **average 15 charging sessions per month,** with an **average charge time of one hour and 46 minutes**.

Table 7: City of Charlotte Electric Vehicle Charging Stations *Data Source: City of Charlotte Sustainability Staff*	
Time Period: Jan 2014- September, 2014	
Number of Charging Stations	23
Number of Charging Ports	31
Average kWh per Month	91.99 kWh
Average Charging Sessions per Month	15
Average Charge Time	1 hr, 46 min
Average Energy Per Charge	6.2 kWh

PlugShare Scores: Town of Cary Charging Stations

In addition to the usage data, user feedback on the Town of Cary's charging stations was reviewed from the website PlugShare.com. PlugShare allows for users to rank charging stations and post comments. The table below provides an overview of the rankings for each location. The PlugShare scores are discussed in greater detail within the subsections for each station location in this report.

Table 8: PlugShare Scores *Source: www.plugshare.com*			
	Garmons Operations Center (Siemens)	**Cary Art Center** (GE Watt Station)	**Herb Young Community Center** (Eaton)
Score (1-10) with 10 being the best	4.9	8.4	10.0
Number of User Comments	5	26	11
Notes from Comments	• Questions about using card to access station • Notes about station being blocked by fleet vehicles	• Comments about QR code (not working) • Directions on station being confusing	• Comments on PlugShare providing directions for charging station within parking deck

Garmon Operations Center (Siemens)

The Garmon Operations Center charging station is manufactured by Siemens and is connected to the ChargePoint network. This station has a dedicated fleet vehicle that charges overnight. The station is available to the public from 8:30 AM to 4:30 PM.

Because this station serves multiple uses (fleet and public), the data was evaluated for usage during the public hours as well as for the dedicated fleet usage.

Electric Vehicle Charging Station at the Garmon Operations Center

Table 9: Garmon Operations Center Charging Station Data
Time Period: August 2012- August 2014

	Garmon Operations Center (Total)	**Public Charging**	**Fleet Charging**
Average kWh per Month	134 kWh	22 kWh	112 kWh
Average Cost per Month	$10.20	$1.67	$8.53
Total kWh	3,354	549	2,805
Average Charging Sessions per Month	20	3	17
Total Number of Charging Sessions	515	72	443
Average Charge Time	1 hr, 50 min	--	--
kWh consumed per average charging session	7.76	7.62	7.16

On average, there were approximately **20 charging sessions per month,** with an average of three charging sessions occurring per month that were public or non-fleet and 17 sessions that were the town fleet vehicle. Over the two year reporting period, a

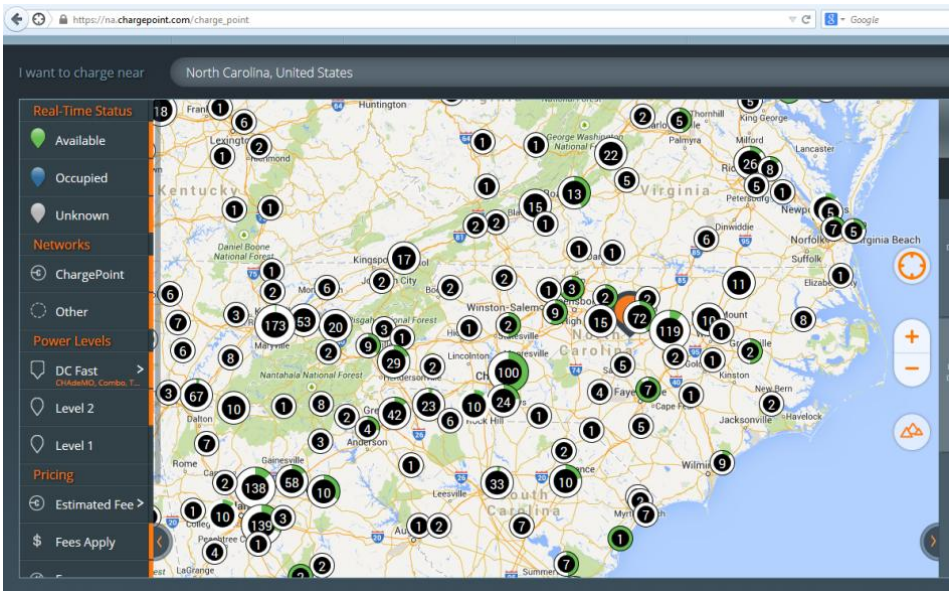
total of 3,354 kWh of electricity was consumed (approx. $254.93[8]), averaging around **134 kWh per month** (approx. $10.20). The average energy consumed was **7.76 kWh per session overall, 7.62 kWh per session for public charging sessions and 7.16 for fleet charging sessions**.

The station is experiencing an increase in usage with 213 total sessions from August 2012 to July 2013 and 271 total sessions from August 2013 to July 2014.

PlugShare Ranking: Garmon Operations Center

This station scored 4.9 out of 10 on the PlugShare website, with five user feedback posts. It should be noted that because there are only a few comments and user interactions, the likelihood of the score being impacted by only one or two users is much higher.

User comments for the Garmon Operation Center contain notes regarding the station being blocked by fleet vehicles and also confusion on whether payment was required.



Screenshot of ChargePoint website for North Carolina

This station is connected to the ChargePoint network, which is one of the most recognized and well-used electric vehicle charging networks (see www.chargepoint.com). A user typically needs an access card to initiate a charging session with any station connected to the ChargePoint network. If the user does not have a card, they can call the phone number provided on the station to activate the charge.

During the analysis of this station, it was discovered that the station availability was incorrectly noted on the Alternative Fuels Data Center station locator website and phone app. This tool, managed by the US Department of Energy, is commonly used by electric vehicle drivers to locate charging stations for public use. The AFDC tool incorrectly indicated that the station was available 24 hours per day for public use. This misinformation may have led to poor user experiences for certain PEV drivers.

[8] Based on an estimated $0.076 per kWh

Advanced Energy has notified the managers of the Alternative Fuels Data Center that this information is incorrect.

Cary Art Center (GE WattStation)

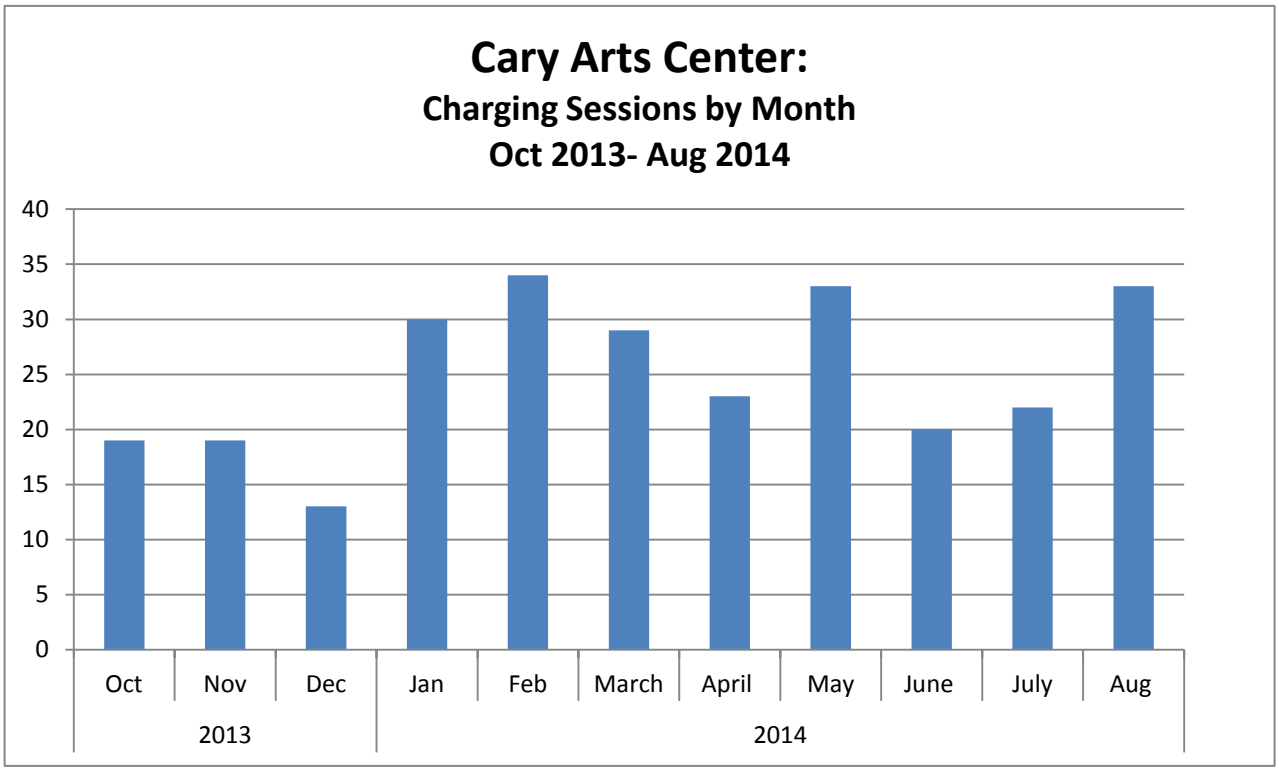
The Cary Art Center has two GE WattStation level two units which are available for public use. The usage pattern for these stations is different from the station at the Garmon Operations Center because they are located in a parking lot used by the public for various activities, and the Town does not have an assigned fleet vehicle. These are also shared-use parking spaces and allow for 15 minute parking for non-electric vehicles.

The data for the GE WattStation is accessed through GE's online website, "WattStation Connect". Data for this station can only be accessed for a one year period of time. For this report, the charging station data was analyzed for September 2013 through September 2014.

Data for the GE WattStation indicated an average of **23 charging sessions per month** (for both stations) and an average of **88.88 kWh consumed per month** (approx. $6.75). The average charge time was **one hour and 13 min** with an average of **4.5 kWh charge per session**.

Electric Vehicle Charging Station at the Cary Art Center

Table 10: Cary Arts Center Charging Stations *Time Period: Sept 2013- Sept 2014*	
Number of Units	2
Average kWh per Month	88.88 kWh
Average Cost per Month	$6.75
Total kWh	1,067 kWh
Average Charging Sessions per Month	23
Total Number of Charging Sessions	560
Average Charge Time	1 hr, 13 min
KWh Consumed per average Charging Session	4.5 kWh



PlugShare Ranking: Cary Arts Center

This station scored 8.4 out of 10 on the PlugShare website, with 26 user feedback posts. Most of the comments were positive posts about the convenience and accessibility of the charging stations. There were a few comments indicating the directions for use, located on the station, were confusing. Additionally, there were posts indicating the charging indicator lights were difficult to read.

A site visit was conducted for this report that confirmed the station operated well, however, the directions on the charging station are incorrect as the PlugShare users noted. The charging station instructs the user to scan a QR code to activate the session. Upon the site visit, it was noted the QR code was broken and not needed to activate the session.

Herb Young Community Center (Eaton)

The Herb Young Community Center parking deck includes two wall mounted Eaton units. These stations are available to the public 24 hours per day. Users of these stations include PEV drivers visiting the Herb Young Community Center in downtown Cary. These stations are also frequently used by downtown employees.

Town of Cary and Advanced Energy Staff Collecting Data from the Electric Vehicle Charging Station at the Herb Young Community Center

Data for these stations is collected on an SD card located inside each unit. Without an SD card, the units store a very limited amount of session data. Town of Cary staff and Advanced Energy accessed the units in June 2014 to collect the data stored on the internal units. SD cards were then inserted into the units and were accessed again in September 2014 to collect data. From an analysis of the data, it appears that the data was only captured for the front wall unit and limited information was collected on the second unit. Advanced Energy and Town of Cary made an assumption that the second unit was used one third of the time of the first unit. Staff will continue to monitor data collected as the SD cards will be able to hold up to 15 years' worth of data.

The data from the Eaton charging stations indicate an average of **27 charging sessions per month** for the front unit (closest to the Herb Young Community Center) and an average of **257.1 kWh consumed per month** for the unit. For this report, it was estimated that the second unit may receive one-third of the usage of the front unit, which brings the total cost of electricity to approximately **$19.54 per month**. The table below summarizes findings from data from June 25, 2014 – September 13, 2014.

Table 9: Eaton Charging Station Front (Closest to Herb Young Community Center)
Time Period: June 25, 2014- September 13, 2014

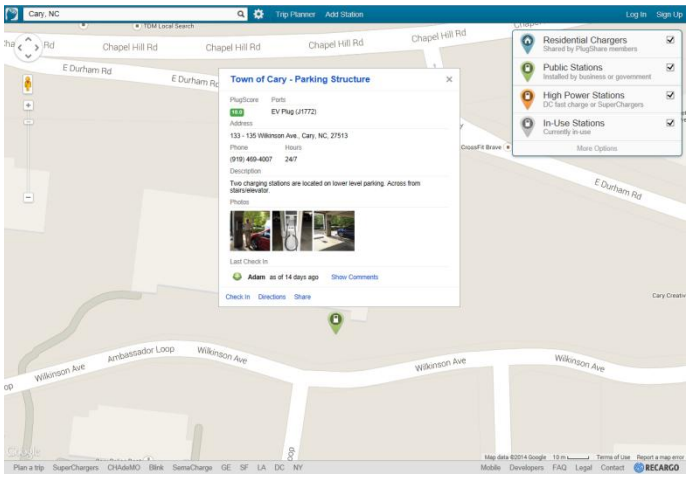
Number of Units	2 (data could only be pulled for one unit)
Average kWh per Month	257.1 kWh
Average Cost per Month, Unit 1	$19.54

Average Cost per Month for Both Units (estimating the second station receives one third the usage of the first)	$25.99
Total kWh	725.8 kWh
Average Charging Sessions per Month	27
Total Number of Charging Sessions	72
Average Charge Time	2 hr, 16 min
KWh Consumed per average Charging Session	10.08 kWh

PlugShare Ranking: Herb Young Community Center

The Herb Young Community Center stations ranked 10.0 out of 10.0 on the PlugShare website. There were a total of 11 comments on these stations. Comments provided were mostly positive and included notes on directions for how to find the stations in the parking deck to how often the stations are used.

Plugshare user post at Herb Young Community Center charging station



Screenshot of the Plugshare website with the Herb Young Community Center station displayed

Future Considerations

The analysis of the Town of Cary charging station pilot project found that the usage is similar to the charging stations in other locations in North Carolina such as the City of Raleigh and the City of Charlotte. It should be noted that the technology for charging stations and electric vehicles is still relatively new, and it is anticipated that as electric vehicle adoptions continue to increase, there will be improvements and changes to charging station technology and usage patterns from PEV drivers.

Below is a brief discussion of a few items for future considerations for the charging station project.

1. Usage Patterns Differ Between Stations:
It is recommended to use caution when comparing stations because each site has different usage patterns based on their locations.

- Garmon Operations Center: Fleet and Public
- Cary Arts Center: Public and Short Term Non-electric Vehicles
- Herb Young Community Center: Workplace and Public

As illustrated in figure 2 of this report, PEVs will receive most of the charging (approximately 80 percent) at home, with the remaining daily charging events occurring at the workplace and at public locations. The Garmon Operations Center, for example, serves a fleet vehicle, which means that much of the electricity dispensed will go towards providing the daily electricity needed to fuel that vehicle. The charging station the Herb Young Community Center is used for workplace charging as well as public (downtown visitor) charging. This leads to longer charge times than a typical charging station that is used primarily as a public charging station. For future evaluations, the variation in usage patterns should be recognized.

2. Ongoing Costs:
Reports from various charging station deployment initiatives throughout the country indicate that the cost of electricity is one of the least expensive items associated with maintaining a charging station. Some of the additional ongoing costs identified may include:

- Maintaining the parking spaces
- Cleaning
- Insurance
- Enforcement
- Data monitoring and network access fees

3. Assessing a Fee for use of the Charging Stations:
Because PEVs and charging stations are a relatively new technology, there is still uncertainty around assessing a fee for the use of a charging station. Findings from a

national PEV deployment initiative (The EV Project) have reported that when fees were enacted at previously free parking spaces, this led to:

- Decreased usage of the public charging stations
- An “all-you-can-eat” mentality resulting in increased session time and energy consumption
- Increased vehicle charging at home

For the time being, many charging stations hosted by public entities are being offered with no charge. For example, Raleigh and Charlotte are not currently charging for using charging station parking spots. It is recognized, however, that in the future the market will change and public charging stations will require the assessment of a fee. At this time, many locations are waiting to see how the market evolves before enacting usage fees.

There are also considerations for the legality of assessing a fee in North Carolina. General Statute Chapter 62 dictates that if an entity provides electricity for compensation then they are a public utility and must be regulated as such. Therefore, entities other than regulated utilities (such as Duke Energy Progress) are not permitted to resell electricity. However, there are several legal options for collecting payment for use. Some of these options include assessing an access fee, which cannot be based on the amount of electricity dispensed, or assessing a fixed rate for the use of the parking space.

In conclusion, the Town of Cary should be applauded for the positive impact it is making through the electric vehicle charging station project. The Town is a leader in the state for installing charging stations which shows a commitment to embracing new and innovative technologies. By analyzing the data from the pilot project, the Town is taking a very thoughtful and informed approach to deciding the next steps. The process used in this report will be beneficial for other cities and counties as they begin to analyze their charging station programs in the future.