State of the Market:
Electric Vehicles in North Carolina

advanced energy
About Advanced Energy

◦ Independent, non-profit organization established in 1980, Headquartered in Raleigh, NC

◦ Mission: Create economic, environmental and societal benefits through innovative and market-based approaches to energy issues

◦ Provide training, consulting, testing and outreach
  • Transportation Initiatives
  • Building Sciences
  • Energy Efficiency
  • Renewable Energy
  • Motors and Drives
NC PEV Taskforce
Plug-in Electric Vehicles (PEVs)

- Use **ELECTRICITY** as primary fuel source
- Plug into an external electrical power supply to re-fuel
- Have an electric motor or combination of electric motor and gasoline engine (hybrid) that propels the vehicle

  - **Toyota Prius**
    - Hybrid Electric
  - **GM’s Chevy Volt**
    - Plug-In Hybrid
  - **Nissan Leaf**
    - All-Electric
Benefits to NC

PEVs provide:
- Cost savings
- High performance
- Healthier communities
- Economic development

Charging stations provide:
- Energy independence
- Power sustainability
- Marketing advantage
- Return on Investment
Available PEVs in North Carolina

**ALL ELECTRIC**
- BMW i3: 81 MILES
- FORD FOCUS: 76 MILES
- MITSUBISHI i-MIEV: 62 MILES
- NISSAN LEAF: 84 MILES
- SMART: 68 MILES
- TESLA MODEL S: 265 MILES

**PLUG-IN HYBRID**
- BMW i8: 15 MILES
- CADILLAC ELR: 37 MILES
- CHEVROLET VOLT: 38 MILES
- FORD C-MAX: 21 MILES
- FORD FUSION: 21 MILES
- PORSCHE PANAMERA: 16 MILES
PEV Charging Levels

**LEVEL 1**
Uses a standard 120-volt outlet
Provides 3 to 5 electric miles per hour of charge

**LEVEL 2**
Uses a 240-volt circuit
Provides 10 to 20 electric miles per hour of charge

**DC FAST CHARGE**
Ability to charge a battery to 80 percent capacity in 30 minutes or less
Where Are EV Drivers Charging?

Data from the EV Project indicates that 75 percent of Nissan LEAF and 80 percent of Chevy VOLT charging events occurred at residential locations.
My EV Driving Experience

- Driving Ford C-Max in April, 2015

- **Daily Charging Pattern:**
  - **7:30am** - car is pre-conditioned based on “go time”
  - **8:00am** - plug-in at work
  - **9:30am** - car text my phone when it’s done charging
  - **5:00pm** - plug-in at home (can set car to start charging to match time-of-use rates)

- **Public charging** - increasing number of public charging locations in downtowns and retail and recreational locations
Annual Vehicle Energy Costs: To and From Work

Gas Price: $2.10
Electricity Price: $0.11 kWh

Acura TSX: $475
Ford C-Max: $106
My EV Driving Experience

**My Achievements:** 13

**CO₂ Saved:** 12744 lbs
**Gallons Saved:** 157 gal

- Enough to fill 1 blimp(s)

**Efficiency**

**Miles Driven:** 4844 miles
- Last Trip: Tuesday, Nov 17th, Completed 4:45 pm
- Last Charge: Tuesday, Nov 17th, Completed 9:29 AM

> Trip & Charge Log
EVs and Charging Stations in the Southeast

- **NC**: EVs | Charging Stations
- **SC**: EVs | Charging Stations
- **TN**: EVs | Charging Stations
- **VA**: EVs | Charging Stations
North Carolina Electric Vehicles & Charging Stations: 2013

Electric Vehicle Registrations (2013)

Public Charging Stations (2013)

Electric Vehicle Data Source: National Renewable Energy Laboratory analysis, R.L. Polk, POLK_VIC DETAIL_2013, 2015 (data pulled by Triangle Clean Cities Coalition)
Charging Station Data Source: AFDC Alternative Fueling Station Locator Data, U.S. Department of Energy

Electric Vehicle Registrations (2014)

Public Charging Stations (2014-Current)

Charging Station Data Source: AFDC Alternative Fueling Station Locator Data, U.S. Department of Energy
NC PEV Taskforce Resources

Innovation is a journey, and we are a part of a movement. Technology is changing, and we are the game changers. We share. We motivate. We progress. We breathe. We drive. Now let’s connect...

Find a Charging Station
Charging stations are being installed across North Carolina. Many of these charging stations are Level 2, which provides 10 to 20 electric miles of range per hour. There are also DC Fast Charge stations being installed, which charge a vehicle’s battery to 80 percent capacity in 30 minutes or less.

Current Events
Plug-in NC: Webinar
November 6, 2015
**Workplace Charging**

**Operational Models**

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<thead>
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<td>18.15 minutes of range per hour</td>
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<td>Level 2</td>
<td>208 or 240V, 30A, 60A max</td>
<td>18.15 minutes of range per hour</td>
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<tr>
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<td>208 or 480V, 75, 50 kW</td>
<td>Rate change at 23.00 minute</td>
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These are multiple options for operating charging stations. The stations can be both fast and operated by a plug-in charging provider. They can also be charged at the workplace by employees. These options can be charged at the workplace, which can be more efficient for less travel time and less frustration.

**SCC**

SCC offers a variety of charging stations that can be installed at the workplace or at the charging station. The stations can be charged at the workplace, which can be more efficient for less travel time and less frustration.

**GAS**

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Multifamily

Apartments with Charging Stations in the Triangle:

• Adeline at White Oak - Garner
• Allister North Hills - Raleigh
• Amberton at Stonewater - Cary
• The Lincoln Apartments - Raleigh
• Link Apartments Glenwood South - Raleigh
• The Lux at Central Park - Chapel Hill
• Midtown Green Apartments - Raleigh
• 401 Oberlin - Raleigh
• Post Parkside at Wade - Raleigh
• Solis Crabtree – Raleigh
• Village Town Center - Raleigh
Charging Station Usage Study

Number of Responses: 61 Public EVCS Owners (52%)
Sites Covered: 136 (67%)
Stations Covered: 322 (68%)

Period: July 2015 to September 2015
Subject: Owners answered Qs broadly for all public stations and not by individual site

Public Sites (i.e. Addresses) covered by EVCS Owner Survey are shown in green
Part One of Study: Survey of Charging Station Management Experiences

What sources of funding have been used to install public charging stations owned or managed by your organization? (Select all funding sources used)

- Federal / State Government: 49%
- Local Government: 26%
- Utility: 20%
- Private: 45%
Have any of your public charging stations required repair or replacement?

- Never: 62%
- Once: 19%
- More than once: 19%
How do you monitor electricity usage for your public charging stations? (Select all methods used)

- Remotely through an online network: 32%
- On-board memory is downloaded from stations: 8%
- Station is metered: 30%
- We do not measure station usage: 36%
- We are unable to measure station usage: 11%
How have your public charging stations been publicized?

- Press Release: 51%
- Charging Station Network Map (e.g. ChargePoint): 49%
- On our Website: 47%
- Charging Station Phone App (e.g. Plugshare, AFDC): 41%
- Event (e.g. Ribbon cutting, Ride & Drive): 31%
- Other (please specify): 29%
- TV / Radio / Newspaper interview: 28%
Has your organization considered installing additional public charging stations? (Select all that apply)

- Yes, Level 2 (240V): 40%
- Yes, DC Fast Charger (480V): 22%
- Yes, Tesla Supercharger: 6%
- No: 48%
Part Two of Study: Data Analysis

Measured the frequency of charging station usage at public charging sites with four primary metrics:

- the amount of energy used,
- the frequency of charge events,
- the number of unique users at each site, and
- the cost of energy.
Average Weekly Charge Events by Venue

Comparison with EV Project Benchmarks by Venue
Average Quarterly kWh per Station

<table>
<thead>
<tr>
<th>Quarter</th>
<th>Quarterly kWh per Station</th>
<th>Number of Stations with Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012_Q2</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>2012_Q3</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td>2012_Q4</td>
<td>300</td>
<td>200</td>
</tr>
<tr>
<td>2013_Q1</td>
<td>400</td>
<td>300</td>
</tr>
<tr>
<td>2013_Q2</td>
<td>500</td>
<td>400</td>
</tr>
<tr>
<td>2013_Q3</td>
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<td>2013_Q4</td>
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<td>2014_Q1</td>
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</tr>
<tr>
<td>2015_Q1</td>
<td>1200</td>
<td>1100</td>
</tr>
<tr>
<td>2015_Q2</td>
<td>1300</td>
<td>1200</td>
</tr>
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2015_Q2, 494
Any station with a Walkscore above 60 or 70 provides a variety of destinations and activities that will attract EV drivers.

Charge events will also depend on the region, with higher averages in more mature markets such as the Triangle.
2016 Activities
Download the Plug-in NC application from the file pod in the top right or from pluginnc.com

Who can apply?
- Any location that has installed charging stations or added electric fleet vehicles
- Cities
- Counties
- Towns
- Businesses
- Schools
- Universities
- Stores
- Hotels
- Shopping Centers
- Tourist Destinations
- Multifamily Communities
For more information, visit www.pluginnc.com

For questions, contact Katie Drye – kdrye@advancedenergy.org or 919-857-9009

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