

PTI 2012-2013 SOLUTIONS AWARDS

City of Raleigh

Population C: 350,000-749,999

Category: Sustainability

Title: City of Raleigh Electric Vehicle Infrastructure



Installation of EV charging stations



Data/Images from Periscope Monitoring System



Solar Electric Vehicle Charging Station



Level II EV charging station on Hargett Street

ABSTRACT:

In 2009, Rocky Mountain Institute selected the City of Raleigh as one of three cities nationwide, and the only city on the east coast, to participate in the Project Get Ready initiative designed to help prepare for the national roll-out of plug-in and electric vehicles (PEVs) and the accompanying new PEV technology. (http://www.rmi.org/project_get_ready). Since then, Raleigh has served as a test lab, addressing and solving challenges that may have stalled the adoption of the emerging electric vehicle transportation. Raleigh's efforts included developing the City's fleet, developing the technology-based infrastructure for electric vehicle charging stations and operational expertise, along with removing and reducing barriers to electric vehicle adoption.

The result of Raleigh's efforts is the successful installation of 30 electric vehicle (EV) charging stations; 18 public charging stations and 12 fleet charging stations. The public EV infrastructure is designed to allow consumers to "top off" the EV battery, not provide full charging – which is typically done at home. The City also worked with Progress Energy to install the area's first solar powered EV charging station. The most recent project in our infrastructure effort is the installation of inductive, or wireless, charging stations in partnership with Evatran.

Raleigh uses a software system, [Periscope](#), to monitor the use of the EV charging stations. Periscope monitors the Level 2 electric vehicle charging stations/charging points and measures daily, weekly and

monthly totals of delivered kilowatt hours; CO₂ offset; number of charges; number of online charging stations; and average charge time.

<http://periscope.raleighnc.gov/externalViewlet?user=ev&viewletType=evStation&viewletId=evStation1311253443654>

STATEMENT OF THE PROBLEM:

As one of three cities selected nationwide to participate in Project Get Ready, an initiative of Rocky Mountain Institute to help prepare the nation for the roll out of plug-in and electric vehicles and EV technology, the City of Raleigh was charged with identifying and leading the effort to overcome perceived barriers related to technology, consumer demand, infrastructure and incentives.

A large part of that responsibility was to lead the effort to install the electric vehicle service equipment that comprises the EV infrastructure. Installation of public charging stations is an important part of the adoption process, as it helps assure the public who are considering purchasing a PEV that there are public charging options available to support the new technology.

The City also needed to develop self-monitoring, analysis and reporting technology (SMART) communications system to monitor use of the new technology.

RESPONSE:

The City of Raleigh developed model policies and procedures to remove and reduce barriers to the installation of EV charging stations and, thereby further the adoption of PEV technology not only in Raleigh, but also for other interested municipalities by:

- Addressing building codes, electrical codes, and city ordinances related to signage, parking, fees for charging, permitting and inspections processes and ADA compliance.
- Identifying the role(s) of city government regarding ownership, operation and maintenance of public Electric Vehicle Service Equipment (EVSE).
- Increasing the number of PEVs in Raleigh's municipal fleet by requiring that PEVs be considered for all new fleet purchase in order to reduce fuel costs and achieve favorable total cost of ownership (TCO).
- Installing public EVSEs and supporting business and other publically accessible charging stations
- Ensuring that all Level II public charging stations used the standardized J1772 electrical connectors developed by the Society of Automotive Engineers. This equipment has been adopted as the universal standard by all major car manufacturers developing electric vehicles.
- Working with Progress Energy to install the area's first solar powered EV charging station used for research and development. The solar station integrates three newer technologies: electric vehicles; harvesting solar power to charge EVs; smart data collection and communication.
- Saving taxpayer dollars through use of PEVs since in many cities the cost of fuel represents 50 percent or more of the total fleet budget. Furthermore, electricity prices are generally significantly more stable than petroleum prices, reducing budgeting uncertainty.

City of Raleigh provided leadership, shared information and built partnerships related to EV infrastructure by:

- Developing best practices related to electric transportation innovation and shared that information with other municipalities.
- Promoting the benefits of EVs to residents and businesses and sharing relevant information to create an informed community

- Partnering with Advanced Energy, Progress Energy, North Carolina State University, Rocky Mountain Institute to advance the broad acceptances of PEVs.
- Training all necessary safety and service providers including first responders, electrical inspectors, local contractors and installers and PEV dealerships.
- Establishing data collection and communication systems relevant to tracking usage.
- Maintaining strong partnerships with local utilities and technical advisors to share new information and identify any emerging issues that may require action

The City of Raleigh was also the first city in the world to use the energy monitoring system, Periscope, for tracking use of electric vehicle charging stations. Periscope measures daily, weekly and monthly totals of delivered kWh hours; CO₂ offset; number of charges; number of online charging stations; and average charge time. This information is available to the public online:

<http://periscope.raleighnc.gov/external/Viewlet?user=ev&viewletType=evStation&viewletId=evStation1311253443654>

RESULTS:

The City of Raleigh installed 30 electric vehicle (EV) charging stations; 18 public charging stations and 12 fleet charging stations. The approximate cost of \$303,272 was financed through grants created by the American Recovery and Reinvestment Act (ARRA): \$250,000 from Alternative Fleet Advancement Vehicle Technology, including a City match of \$125,000; \$30,000 from the Energy Efficiency & Conservation Block Grant; and \$23,272 from Clean Fuels Technology.

The 18 public charging stations have a total of 31 plugs/charging ports; Ten are Level 1, which take 10-to-12 hours to fully charge a vehicle; 21 are Level 2 stations which take 5 to 6 hours to fully charge. Sixteen of the Level 2 stations are also up-fitted with Level 1 outlets. The public EV infrastructure is designed to allow consumers to “top off” the EV battery, not provide full charging – which is typically done at home. The public charging stations are pay-to-park, free-to-charge.

The Periscope monitoring data system used by the City of Raleigh to track usage of the EV charging stations shows from December 1, 2010 to March 19, 2013, total number of charges was 6,699 and energy delivered totaled 24,181 kWh. Drivers offset 12.52 tons of CO₂ – saving the equivalent of 1,273 gallons of gasoline.

In developing a robust EV infrastructure, the City has also improved local air quality, reduced dependence on foreign oil and helped fulfill the President’s as well as the Raleigh Mayor and City Council’s goal of reducing fossil fuel consumption and greenhouse gas emissions in city operations.

Raleigh’s EV infrastructure accomplishments have garnered widespread attention. In May 2012, the City was listed among international metropolises such as Barcelona, Berlin and Shanghai, as well as American municipalities of Los Angeles, New York and Portland, Ore, as a leader in PEV readiness in the international report, “Electric Vehicle EV City Casebook: A Look at the Global EV Movement,” published by the Center for Climate and Energy Solutions (C2ES).

http://www.rmi.org/project_get_ready#downloaddevcasebook

Economic strength is one of the key principals of Raleigh’s sustainability program, and developing the EV infrastructure resulted in several opportunities for economic development:

- Fostered the switch from gasoline to electricity due to the potential to keep more money in the local economy
- Provided PEV charging infrastructure to aid in jobs creation and attracting and retaining startup and growth industries
- Advanced “smart” communication data technology

- Enabled additional innovations and technology advances in a number of business sectors
- Strengthened Raleigh's position as a national hub for smart grid research and development.
- Provided support to world-class technology firms and universities
- Fostered a manufacturing sector around PEV charging station equipment
- Attracted national conferences and conventions to Raleigh with a focus on technology-based business and industry, including *Plug-In 2011*, EPRI's (Electric Powered Research Institute) first conference held on the east coast

Another result of Raleigh's successful EV infrastructure is the invitation and subsequent partnership with Evatran to join the Apollo Program, a nationwide initiative aimed at encouraging the adoption of electric vehicles through the use of wireless charging technology. Raleigh will install 2 plugless chargers for use with City fleet with the results reported to Evatran using smart technology to advance this innovative technology.

KEY PARTICIPANTS:

City of Raleigh partnered with numerous local agencies to achieve the successes realized in developing the EV infrastructure: other City departments; Progress Energy Carolinas; Advanced Energy; Rocky Mountain Institute; Schneider Electric; NC State University; local Nissan Motor Corp. dealerships; Clean Fuel Advancement Technology (CFAT); Alternative Fuel and Advanced Vehicle Technology; Periscope; Evatran

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LINKS:

Project Get Ready - http://www.rmi.org/project_get_ready

Periscope Monitoring
<http://periscope.raleighnc.gov/externalViewlet?user=ev&viewletType=evStation&viewletId=evStation1311253443654>

EV City Casebook - http://www.rmi.org/project_get_ready#downloaddevcasebook

City of Raleigh EV Infrastructure Wrap-up -
<http://www.raleighnc.gov/environment/content/AdminServSustain/Articles/ElectricVehicles.html>

City of Raleigh partnership with Evatran -
<http://www.raleighnc.gov/home/news/content/CorNews/Articles/ChargingSystems.html>

City of Raleigh EV Charging Infrastructure Video - <http://www.youtube.com/watch?v=PxBqs-tDC2w&list=PL57D56DD45213607F&index=12>

EPRI Conference in Raleigh, NC -
<http://www.youtube.com/watch?v=2w5r8prDM5o&list=PL57D56DD45213607F&index=7>