

## 7. ELECTRIC UTILITIES

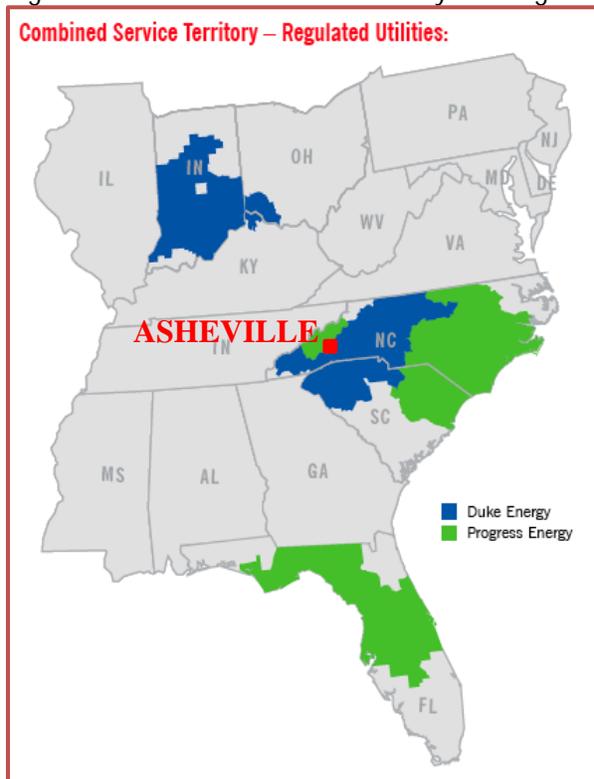
### 7.1 Introduction to Electric Utilities

The NC electric utilities have undertaken many initiatives to better understand and prepare for the adoption of electric vehicles. Part of the task is not only understanding the impact of electric vehicle adoption to the grid but helping the electric rate payers learn about best practices for vehicle usage. A highlighted in this chapter, the electric utilities in the state are highly engaged in PEV preparedness. Some notable trends include active engagement with collaborative efforts and rate payers, research-based studies, and contributions and recognition on a national scale.

#### *Providers*

In July 2012 Duke Energy completed its merger with Progress Energy to become the largest regulated utility in the U.S., with approximately 7 million customers across six states.

Figure 7.1 Combined Service Territory for Progress Energy and Duke Energy



#### Duke Energy Carolinas

Duke Energy Carolinas owns nuclear, coal-fired, natural gas and hydroelectric generation. That diverse fuel mix provides approximately 19,500 megawatts of owned electric capacity to approximately 2.4 million customers in a 24,000-square-mile service area of North Carolina and South Carolina. Duke Energy serves territory in the Asheville region that includes parts of Henderson County and Transylvania County. Duke Energy now also serves former Progress Energy

territory in the Asheville region that includes parts of Buncombe County, Haywood County, and Madison County.

### Progress Energy Carolinas

Progress Energy Carolinas, a subsidiary of Duke Energy, provides electricity and related services to nearly 1.5 million customers in North Carolina and South Carolina. The company is headquartered in Raleigh, N.C., and maintains a diverse generation fleet of more than 12,200 megawatts in owned capacity. PEC serves a territory encompassing more than 34,000 square miles, including the cities of Raleigh, Wilmington and Asheville in North Carolina and Florence and Sumter in South Carolina. Progress Energy Carolinas serves territory in the Asheville region that includes parts of Buncombe County, Haywood County, and Madison County.

### Electric Cooperatives

The North Carolina Electric Membership Corporation consists of the state's 26 electric cooperatives which provide energy and related services in 93 of North Carolina's 100 counties. Each of the 26 cooperatives is member-owned, not-for-profit and overseen by a board of directors elected by the membership. In the Asheville region, these include:

- Haywood EMC in Haywood County
- French Broad EMC in Madison County

<http://ncemcs.com/co-ops/coops.htm>

### ElectriCities

NC Public power is a municipally-owned and operated electric service comprised of more than 70 communities in North Carolina collectively known as NC Public Power. In the Asheville region, participating communities include:

- Town of Waynesville

## **7.2 Utility PEV Readiness Matrix**

Utilities in North Carolina area involved in various activities to prepare their services and customers for plug-in electric vehicle adoption. The matrix below captures the various readiness efforts of the utilities.

The North Carolina Electric Cooperatives and ElectriCities were not included in the matrix because their memberships are comprised of many individual member utilities making it difficult to represent the various policies and programs on PEV readiness. Both the Electric Cooperatives and the ElectriCities are actively engaged in the preparing for PEV adoption and they have each submitted a comprehensive list of their readiness activities which are outlined in section 8.3 following the matrix.

## UTILITY PEV READINESS MATRIX

PEV Policies	Duke Energy Carolinas	Progress Energy Carolinas
<b>General Policies and Plans for Accommodating the Deployment of PEVs:</b>	Duke Energy has a comprehensive internal readiness plan which includes a Power Delivery Notification and circuit evaluation process, a customer service plan and internal communication plan. Duke Energy has also launched several customer and fleet pilots to evaluate various charging technologies, charging behaviors of PEV drivers and impacts to the grid.	Progress Energy Carolinas has a comprehensive internal readiness plan which includes grid impact scenario analyses, a utility notification arrangement with automakers, updated customer service guides as well as website information related to PEVs, and an internal communication and education plan. Progress Energy Carolinas has also launched several customer and fleet research projects to evaluate various charging technologies, charging behaviors of PEV drivers and impacts to the grid.
<b>PEV Charging Policies and Plans for Rate Structures or Provisions:</b>	Duke Energy is evaluating the potential of utilizing a whole house TOU rate that would appeal to our PEV driving customers.	Progress Energy Carolinas is gathering a baseline of plug-in vehicle charging behavior from its load research project to better understand consumer charging behavior. Data from this project will allow the utility to better understand how vehicle charging may overlap with peak demand times, if additional rate structures may provide value in shifting peak energy usage, and how they may be best designed. Progress Energy Carolinas currently offers a whole house time-of-use rate which may be utilized by customers with PEVs.
<b>Policies and Plans for Billing Protocols for Charging of PEVs:</b>	Duke Energy has not developed any special policies/plans for billing protocols for charging PEVs. The utility is using its various PEV pilots to help it determine what additional policies and protocols will be needed as PEV adoption grows in the Duke Energy territories.	Progress Energy Carolinas has not developed any special policies/plans for billing protocols for charging PEVs. The utility is using its various PEV research programs to help it determine what additional policies and protocols will be needed as PEV adoption grows in the Progress Energy Carolinas territory.
<b>Policies and Plans for Analysis of Potential PEV Impact to Grid:</b>	Duke Energy has established a Power Delivery notification and circuit evaluation process through which circuits are evaluated as new PEV customers are added to the system. The utility has also completed a grid impact analysis to provide insight into the types of effects that PEV charging could have on various circuits and how much tolerance local grid infrastructure has to support PEV charging before major infrastructure upgrades are needed.	Progress Energy Carolinas has established a notification arrangement with several major automakers and is evaluating the best solutions moving forward with greater adoption rates of plug-in vehicles. The utility has also completed grid impact scenario analysis across generation, transmission, and distribution to assess the potential impacts related to plug-in vehicles including an in-depth model analysis of a representative circuit outside Raleigh, NC. Under the expected penetration rates of PEVs and with modest charge rates, the grid impact is expected to be negligible in the near term. Local and isolated transformer upgrades may be necessary in some cases, although the number and exact location will vary depending on specific loading, vehicle density, and equipment ratings. These models and assessment studies are continually updated as new information becomes available related to PEV adoption rates, charging levels, and

<p><b>Policies and Plans to Minimize the Effects of Charging on Peak Loads:</b></p>	<p>Duke Energy currently has a demand response program offered to retail and commercial customers to mitigate energy consumption during peak times. Although the utility does not currently have any policies to minimize the effects of on-peak charging, Duke Energy has implemented a number of PEV pilots to evaluate the impacts of on-peak charging and plans to test demand response offerings as part of its pilot activities.</p>	<p>charging behaviors.</p> <p>Progress Energy Carolinas currently offers a whole house time-of-use rate for residential customers and demand response programs offered to retail and commercial customers to mitigate energy consumption during peak times. Although the utility does not currently have any policies to minimize the effects of on-peak charging for electric vehicles, Progress Energy Carolinas has implemented a charging station load research project to evaluate the impacts of PEV charging and plans to test demand response offerings as part of its research activities. Independent of rate structures, Progress Energy Carolinas actively communicates and encourages utilizing the built-in capability of PEVs to charge off peak when it meets the needs of the drivers.</p>
<p><b>Policies and Plans for Making Widespread Utility and Grid Upgrades:</b></p>	<p>Duke Energy has a number of elements in its Power Delivery Strategic Plan to support widespread utility and grid upgrades. These items include redesign studies of underground systems, continued implementation of its 3 year capital plan, policies/procedures to identify reliability needs of public infrastructure, and implementation of facilities rating tools and procedures. Additionally, Duke Energy is investing several million dollars in new metering and distribution management technology to modernize its grid.</p>	<p>Progress Energy Carolinas is actively engaged in research and demonstration projects in order to better understand the potential impact of widespread adoption of electric vehicles on the grid and how future policies may be adjusted. Near term, the impact is expected to be minimal and readily managed utilizing the existing line extension and service upgrade policies that would apply to other new load sources. Progress Energy Carolinas is also working with stakeholders to improve the utility notification process and continues to educate and encourage customers on the preferred times to charge to lessen any potential grid infrastructure concerns.</p>

### 7.3 Public Utilities PEV Readiness Programs and Activities

In addition to the preparations listed above in the matrix, North Carolina electric utilities are each involved in a variety of studies, programs, and other initiatives designed to help prepare both the utilities and the residents in NC for plug-in electric vehicles. This section contains the readiness activities undertaken by all utility partners including the North Carolina Electric Cooperatives and ElectriCities.

#### *Duke Energy Carolinas*

The information contained in this document pertains to Legacy Duke Energy Carolinas and should not be interpreted or presented as information from the combined company. Legacy Progress Energy Carolinas information is not included nor represented in this section. Duke Energy Carolinas is currently participating in pilots to collect data that will enable us to learn about grid impacts, better understand customer charging behavior, and potentially develop PEV-related products that will appeal to PEV owning customers. Two of these pilot programs are based in North Carolina.

### GM Chevy Volt EV Field Test

The purpose of the General Motors (GM) Volt Deployment Project is to evaluate the technical performance, system impacts, and user preferences associated with electric vehicle charging during normal usage of extended range electric vehicles (EREV). Technical attributes to be tested include impacts on distribution-level power delivery equipment, power quality impacts, and interoperability with customer-sited energy management systems. To achieve these objectives, Duke Energy purchased 16 Chevy Volts. Ten of these Volts were issued to Duke Energy employees with diverse commuter profiles and in some cases previously installed home energy management equipment and the other six vehicles were distributed as part of fleet pool vehicles. In addition, charging stations and necessary monitoring equipment were installed as needed to support EREV usage and collect data in accordance with the test plan. The results of the project will be primarily technical aspects of EREV usage. These results will be made available to other business units to help project the impacts of future electric vehicle adoption.

### Charge Carolinas Project

This is an EV infrastructure pilot designed for Duke Energy to learn about residential customer charging behavior and test residential offers. This project involves 150 Duke Energy residential customers and 150 Duke Energy owned intelligent charging stations in North and South Carolina. A total of 121 customer participants are located throughout Duke Energy's North Carolina service territory as follows:

Figure 7.2 Charge Carolina Participants

Region	Participants
Greater Asheville	5
Greater Charlotte	51
Piedmont Triad	18
Research Triangle n	41
Other NC locations	6

In addition to these pilots, Duke Energy has collaborated with Advanced Energy since 2010 to assist with PEV community readiness efforts and partially fund the development and delivery of PEV related training courses, throughout the State.

### Fleet Vehicles

Duke Energy is also greening its vehicle fleet with PEVs and plans to buy more. In 2009, Duke Energy made a commitment at the Clinton Global Initiative that by 2020, all new vehicle purchases will be electric vehicles. This represents an investment of hundreds of millions of dollars and has the potential to significantly reduce fleet costs and greenhouse emissions over the next 10 years.

### The Envision Center

In partnership with Advanced Energy, Duke Energy opened the Envision Center on the Centennial Campus of North Carolina State University, Raleigh, NC in 2009. The Envision Center is an interactive demonstration facility where visitors can discover how new energy technologies are

transforming today's power delivery system into tomorrow's smart grid. It features modernized power equipment, a "smart" home complete with solar panels, a plug-in hybrid electric vehicle, an advanced meter display and a power delivery center with real-time monitoring capabilities.

### *Progress Energy Carolinas*

The information contained in this document pertains solely to legacy Progress Energy and its operating utility Progress Energy Carolinas in the state of North Carolina. Legacy Duke Energy and the Duke Energy Carolinas operating utility information is not represented in this section. Progress Energy Carolinas is actively engaged in a range of activities related to the research and demonstration of plug-in electric vehicles (PEVs) and related charging infrastructure. The information gathered from this work will enable us to learn about grid impacts, better understand customer charging behavior and needs, and potentially develop PEV-related products that will appeal to PEV customers.

#### GM Chevy Volt demonstration

Progress Energy Carolinas is a utility partner in a grant awarded to General Motors under the American Recovery and Reinvestment Act. The automaker is utilizing the funding to help develop, demonstrate and deploy its Chevy Volt extended-range electric vehicle. Progress Energy is participating by demonstrating 12 early production Chevrolet Volts, five of which are deployed in the North Carolina territory. This expands our existing partnership and our knowledge of the technology. The vehicles join a national GM demonstration fleet of Volts with enhanced data logging capability to better understand vehicle performance and charging behavior. In addition, Progress Energy Carolinas will be completing a technology evaluation of demand response via OnStar, as well as facilitating additional research on DC fast charging and large-scale PEV charge management.

#### Plugged-In Carolinas project

This is an EV charging infrastructure research project designed for Progress Energy Carolinas to learn about residential and public access electric vehicle charging infrastructure and charging behavior. This project is targeting the deployment of approximately 150 residential and 50 commercial, publically accessible smart charging stations with Progress Energy Carolinas customers in North and South Carolina. Data collected from the stations will help us to evaluate charging needs outside the home, impact on the grid and the costs and issues associated with installing public access charging stations. These insights will help us as we continue to prepare for the large-scale adoption of plug-in vehicles.

#### Plug-in vehicle community readiness planning

Progress Energy Carolinas has collaborated with Advanced Energy since 2009 to assist with plug-in vehicle community readiness efforts and to partially fund the development and delivery of PEV-related training courses throughout the state.

#### Plug-in vehicle fleet

Progress Energy, through its Carolinas and Florida operating utilities, has deployed one of the largest plug-in vehicle fleets in the country. Specific to North Carolina, the company operates seven Chevrolet Volts, one Nissan LEAF, one prototype Ford Escape plug-in hybrid, several Toyota Plug-in Prius vehicles, and has demonstrated the Southeast's first plug-in hybrid bucket truck. The company also has working relationships with General Motors, Nissan, Ford and others to better understand vehicle technology and facilitate the integration of PEVs into the nation's electric grid.

### Advanced Transportation Energy Center

Progress Energy Carolinas and NC State University announced in April 2008 the creation of the Advanced Transportation Energy Center. This innovative research center will focus on developing a lighter, cheaper and more-efficient battery and advanced charging systems for PEVs.

### PLUG-IN 2011 Conference

Progress Energy Carolinas hosted and co-organized a national conference on plug-in vehicles in Raleigh, N.C., in July 2011 – the first time this major industry conference was held outside California. The conference was an outstanding success, including achieving a new record for public night attendance.

### Education and Outreach

Progress Energy Carolinas is a sponsor and board member of the Sustainable Transportation Education Program (STEP) at the North Carolina Solar Center. This program engages middle and high school students in learning about the transition toward electric transportation.

## *North Carolina's Electric Cooperatives*

### Support of PEV Development:

The cooperatives within North Carolina, as well as the North Carolina Statewide Association, have actively participated in the promotion of the PEV market. Individually, many cooperatives have purchased electric vehicles and “wrapped” these cars in PEV promotional attire and featured them at their Annual Member meetings. Collectively, we financially support a Raleigh based organization called Advanced Energy. Dedicated research dollars are provided to assist AE’s PEV market research based initiatives, as well as develop collateral materials for our communities, coops, and their members. NCAEC also has membership with EDTA. Educational PEV support articles and editorials have been featured in our award winning publication “Carolina Country”. In addition, we have provided timely national and North Carolina specific consumer market research on PEVs to this market readiness effort. And lastly, we even have a dedicated solar power charging station for our fleet PEV.

### Policies/Rates/Infrastructure Support:

Not for profit electric cooperatives, by their very nature, are organizations run by their owners, the members. As the PEV market matures in each individual cooperative’s territory, the cooperatives are nimble to support the needs of the membership accordingly. No one size fits all policy will work in this diverse environment, ranging from deeply rural, to metropolitan bedroom community. As wholesale power purchasers, coops will work closely with their supplier and markets to manage and leverage distribution and energy costs as PEV demand grows.

## *ElectriCities*

*(Information provided by ElectriCities)*

- 2007 – Joined Plug-In Partners, a national grassroots initiative to demonstrate to automakers that a market for flexible-fuel Plug-in Hybrid Electric Vehicles (PHEV) exists today.

- 2008 – With help from an American Public Power Association grant, purchased a Toyota Prius and had it converted to a plug-in hybrid. The objective of the grant was to promote plug-in hybrids among the membership and to measure the miles per gallon performance
  - In a one year project period covering 2008-2009, the NC Public Power plug in hybrid car made 46 visits to cities and ElectriCities sponsored events. Below are some specific bullet points of the cars reach:
    - 46 total visits to member cities or to ElectriCities sponsored events
    - 38 unique city visits
    - 4 cities used the car twice
    - 4 ElectriCities events where the car was displayed
    - 513,521 people attended events where the car was on display
    - There were 9 events covered by local media.
- The car averaged the following range of gas mileage in charge depleting/charge sustaining mode:

Figure 7.3 PHEV Fuel Economy

Fuel Economy Range	Percent of total miles
40-60 mpg	42%
60-80	44%
80-100	10%
100-120	4%

- 2010 to present: serve as an advisor/matchmaker to member cities on issues such as charging stations and electric vehicle availability
- 2012: organized a technical session on electric vehicles at the ElectriCities Annual Meeting including a Ride & Drive event for members.

## 8. IMPLEMENTATION

### 8.1 Plan Implementation and Monitoring

The Land-of-Sky Clean Vehicles Coalition (CVC) will monitor implementation of the plan, and continue to work with local stakeholders to support implementation of the plan's strategies.

The strategies in the previous sections will be carried out through both direct and indirect routes. The CVC will collaborate with the statewide NC PEV Taskforce to directly implement applicable strategies as a part of their larger mission to reduce petroleum usage in the region.

The second more indirect route is one that will be carried out by any local governments that replicate this plan for their own jurisdictions. Endorsement of this plan will be requested from the Land-of-Sky Regional Council, with templates provided for endorsement by member governments across the Land-of-Sky transportation planning area. The Land-of-Sky Regional Council is made up of elected officials representing cities and counties across the Asheville region and their support of this plan should encourage the member governments to use this plan as a model for creating their own.

### 8.2 Amending & Updating the Plan

The NC PEV Taskforce, Advanced Energy and the CVC will continue to get periodic data updates on the number of PEVs in the Asheville region from the NC Department of Motor Vehicles (NC DMV), and will collaborate to amend the plan with this new data. The CVC plans to review the progress that has been made in this region by our combined stakeholders on the recommended actions on a three year basis, with the first review to be held in 2015. At that time, these organizations will also amend or modify the plan's recommendations as appropriate in light of new data and changes in the regional context as well as to align with other related regional planning initiatives.

Through its participation in this planning process the CVC will be better prepared to target effective outreach to key audiences within the PEV community in the Asheville region. The CVC will further align its work plan to contribute to the PEV outreach efforts and will track the ongoing efforts of CVC member organizations. The CVC will maintain periodic communication with CVC members and other community-level stakeholders through EV Committee meetings and outreach events as they occur. The CVC will also continue to produce PEV case studies and success stories as part of their normal coalition activities

### 8.3 Continued Support and Funding

The CVC will continue to engage with US Department of Energy (USDOE) Clean Cities program staff, the State Energy Office of North Carolina (NC SEO) and the NC Department of Environment and Natural Resources (NC DENR) to stay apprised of federal and state funding opportunities that will assist with implementation of the Asheville Area PEV Plan. Will CVC will also look for opportunities to partner with fellow Clean Cities Coalitions and other NC PEV Taskforce members to develop competitive grant proposals that assist PEV plan implementation.

The EV and EVSE industry partners involved in the PEV planning process may also be interested in supporting implementation actions that match their interests in the PEV market in the Asheville region. These businesses and other private and public organizations will be able to hear about new federal grant opportunities and informational resources by becoming an official CVC member.

The utilities will also be a possible source of support for the implementation of Asheville Area PEV Plan as they have a large stake in the region's PEV Readiness.

Once funding is secured, it will be important to ensure that budgetary decision makers and staff involved with purchasing are made aware of the expenses involved with PEV readiness in order to reduce obstacles in the approval of expenditures.