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January 12, 2011

Ms. Renné C. Vance, Chief Clerk
North Carolina Utilities Commission
4325 Mail Service Center
Raleigh, NC 27699-4325

Re: **Docket No. E-7, Sub 906**

Dear Ms. Vance:

Enclosed for filing are an original and thirty copies of Duke Energy Carolinas, LLC's Residential Energy Management Systems Pilot Measurement, Verification, and Evaluation Report.

If you have any questions, please do not hesitate to contact me.

Sincerely,

Brian L. Franklin

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Enclosures

Copy: Parties of Record

Full Dist. MW

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Clerk's Office
N.C. Utilities Commission

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**DUKE ENERGY CAROLINAS, LLC, RESIDENTIAL ENERGY MANAGEMENT SYSTEMS PILOT
MEASUREMENT, VERIFICATION, AND EVALUATION REPORT**

DOCKET NO. E-7, SUB 906

In Docket No. E-7, Sub 906, the North Carolina Utilities Commission ("Commission") approved Duke Energy Carolinas LLC's ("Duke Energy Carolinas" or the "Company") proposal for a Residential Energy Management Systems Pilot ("Pilot") by Order dated March 10, 2009 ("Order"). In its Order, the Commission required the Company to file a report by December 31, 2010, containing the results of the Company's measurement, verification, and evaluation of the Pilot. The following information is provided in compliance with said Order. The Company subsequently filed to extend the Pilot, which was also approved by the Commission's Order dated June 22, 2010, and a supplemental report containing the results of the measurement, verification, and evaluation of the Pilot extension will be provided in 2011.

During 2009 and 2010, Duke Energy Carolinas installed home energy management systems in customers' homes in Charlotte, North Carolina that are served by the McAlpine Creek substation. The home energy management systems allow customers to control their HVAC thermostat, electric water heater, pool pumps, and various smaller loads in the home. Two types of equipment were installed in 2009 to test their technical functionality, home energy savings, and customer experience. With extension of the Pilot, the Company began installing a third type of equipment in 2010 to test its capabilities. Overall, the benefit of home energy management systems is reduction in energy and peak demand.

Technical Functionality

Each system was tested to confirm that the home energy management system performed as stated by the vendor. Tests were performed to verify that the home energy management system controlled the customer's HVAC thermostat as programmed. Customers had the ability to program their HVAC systems for home, away, vacation, and event modes. Testing was performed to verify that the home energy management system changed the thermostat temperature as programmed for the various modes.

During testing, several issues occurred with the performance of the systems. For example, several customers had a problem with the thermostats (e.g., the system would control the heat pump compressor but not the resistance heat, thermostat failure, connectivity issues). After determining root causes, steps were taken to handle these issues with the participating customers.

The systems installed were designed to provide the customer with detailed usage information; however, the Company was only able to provide the detailed data to customers using one of the types of equipment. This was due to technical issues in transferring the data from Duke Energy Carolinas to the vendor. During a Company survey, the customers testing this equipment pointed out that the detailed data was important to them and they wished they had received the detailed data.

During summer peak times, customers could choose what degree temperature rise they would allow in their home (1 to 5 degrees). Duke Energy Carolinas closely monitored the customer's temperature during these events to validate that the Company was within the customer's temperature preference. The Company had a 0.002% complaint rate for the temperature being too high.

Energy Savings

Normalized for weather, customers who participated in the pilot saw on average an 8% reduction (~\$9/month) in their bill. The largest energy reduction among participants was 34%, but there were participants whose energy usage increased over the year.

This pilot also tested for a reduction in peak usage. In 2009, there were 7 events lasting for 2 hours. The outside temperature for these events ranged from 75 to 95 degrees, with the majority of the events occurring in the temperature range of 90 degrees. The Company used these events to develop the forecasting approach to the execution and measurement of these events.

In 2010, Duke Energy Carolinas asked the customers to participate in 13 peak events. Five of the thirteen events lasted for 2 hours, four of the events lasted 4 hours, and the other four events lasted 6 hours. During these peak events, energy usage was reduced by 52% from the forecasted usage (temperature, dew point, and wind speeds were used to determine forecasted usage). The outside temperature during these events ranged from 79 to 96 degrees, with the majority of the events occurring in the temperature range of 94 degrees.

There were 5 additional events that focused on load leveling. During these two-hour events, the focus was to levelize the energy usage using the forecasted usage. The purpose of this test was to show that home energy management systems can be used to manage the timing of equipment usage in a way to levelize usage during peak hours.

Customer Experience

Customer experience was measured in several ways. During the pilot, 80% of the customers made at least one phone call to the Company's dedicated call group for assistance. The primary concern was with the operation of the HVAC thermostat.

During each event, the Company closely monitored the temperature in the home to maintain the setting the customer had chosen. On average, the temperature rise was 2 degrees, with the largest temperature change being 4.6 degrees. The Company's complaint rate for high temperature was 0.002%. Thus, showing peak reductions can be achieved while minimizing customer disturbance.

After the pilot was complete, the Company surveyed the customer to evaluate their experience with the equipment, peak events, and Duke Energy Carolinas service. Over 50% of the customers felt the internet portal for managing their equipment and viewing data was easy to use; however, they did not visit it frequently: 71% of the customers visited the portal less than once a week.

70.6% of the customers who answered the survey had no problems with any of the equipment installed. The most common issue that the customer experienced was with the thermostat operating different from what the customer had programmed (temperature would increase or decrease from the scheduled program).

67.9% of the customers felt this pilot helped them lower their energy usage and saved them money. Several commented that they like having more control over their usage. The Company also asked the customers if they made any significant changes to their home. The majority of the customers have changed to CFL bulbs, which will also reduce their energy usage.

The majority of participants (81.8%) were very satisfied with the frequency of the events. Slightly more than half (63.6%) of the customers were very satisfied with the duration, noticing a difference in their energy usage, yet feeling comfortable during an event. The majority of customers (85.2%) stated they were very likely to participate in another Duke Energy Carolinas pilot.

Several questions were focused on the experience with the Duke Energy Smart Energy Specialist. Only one customer surveyed was not highly satisfied with the Company's specialist.

Overall, there were significant learnings from the Pilot. Duke Energy Carolinas learned that customers do want to better manage their energy consumption and be able to see the effects on their bill. Customers, overall, wanted to participate in peak events. The technologies that the Company is testing have had some technical and customer interface challenges, which is an opportunity for the Company to continue to develop new technologies that will increase benefits to the customer financially and Duke Energy Carolinas operationally.