



# State of North Carolina Utilities Commission

COMMISSIONERS  
JO ANNE SANFORD, Chair  
J. RICHARD CONDER  
ROBERT V. OWENS, JR.

4325 Mail Service Center  
Raleigh, N. C. 27699-4325

COMMISSIONERS  
SAM J. ERVIN, IV  
LORINZO L. JOYNER  
JAMES Y. KERR, II  
MICHAEL (MIKE) S. WILKINS

## **NORTH CAROLINA UTILITIES COMMISSION AND THE PUBLIC STAFF**

**TO THE**

### **NORTH CAROLINA NATURAL DISASTER PREPAREDNESS TASK FORCE**

### **RESPONSE OF ELECTRIC UTILITIES TO THE DECEMBER 2002 ICE STORM**

#### **EXECUTIVE SUMMARY**

**SEPTEMBER 5, 2003**

The Utilities Commission and the Public Staff today sent a jointly prepared Report on the December 2002 Ice Storm (the "Report") to Governor Easley's North Carolina Natural Disaster Preparedness Task Force. Following the unprecedented December 2002 Ice Storm, Governor Easley formed the Task Force and charged it with reviewing storm response and recovery efforts of state agencies and private companies. In conjunction with the work of the Task Force, the Utilities Commission and the Public Staff, which represents consumers before the Utilities Commission, have undertaken an independent review to assess how well utility providers responded to the ice storm, from the pre-planning stage through restoration of service to customers.

As part of the independent review, the Utilities Commission held six public meetings in the most heavily affected areas of the state to allow public comment regarding the utility outages related to the ice storm. In addition, the utility providers were sent extensive data requests concerning their forecasting, response planning, damage assessment, mobilization, repair activity, and customer service before and during the ice storm, as well as their general operation and maintenance practices and overall emergency preparedness. These data requests were followed by additional data requests and interviews regarding these matters. This Report presents the results of this independent review, and includes lessons learned and changes made by Duke Power ("Duke"), Progress Energy Carolinas ("Progress Energy"), and Dominion North Carolina Power ("Dominion") (collectively, the "Utilities"), and additional recommendations for changes made by the Commission and the Public Staff.

## Impact of the Storm

The ice storm began on December 4, 2002, and continued into the afternoon of December 5. Two days prior to the storm, initial weather forecasts called for  $\frac{1}{4}$  inch ice accumulations over a large part of the state. As the storm approached, weather forecasts changed to predict  $\frac{1}{4}$  to  $\frac{3}{8}$  inch accumulations with possible accumulations of up to  $\frac{1}{2}$  inch in central North Carolina. By the end of the storm on the afternoon of December 5, accumulations were more than double the expected buildup in most of central North Carolina. Only the extreme eastern and western portions of the state were spared the  $\frac{1}{4}$  to 1 inch of ice that covered almost all of the state.

Much of the state's heaviest accumulation fell within Duke's service territory, but Progress Energy's service territory was also hit hard. The impacted areas within the territories of Duke and Progress Energy included the most populous areas of the state. Dominion North Carolina's service territory (the northeastern region of North Carolina) is less populated and experienced less ice accumulation than other regions of the state.

The ice storm began in the Southern Region of Duke's service territory, moved through the Central Region, and finally impacted the Northern Region, which includes Orange and Durham Counties. The peak number of Duke's North Carolina customers without service at one time as a result of the storm occurred on December 5 and was 1,042,034 customers out of a total of 1,675,361 (62%). While the ice storm affected all of Duke's service territory, only certain portions of Progress Energy's territory were severely impacted. The peak number of Progress Energy's North Carolina customers without service at one time was 460,400 out of a total of 1,136,000 (40.5%). The primary impact was in the company's Northern Region (including the cities of Raleigh, Cary, and Henderson), where approximately 392,000 customers were without power at the peak of the storm.

Dominion experienced significantly less overall damage to its electrical system than did Duke and Progress Energy. The peak number of Dominion's North Carolina customers without service at one time as a result of the storm was 22,010 out 112,523 (19.56%).

North Carolina Electric Membership Corporation consists of 27 member cooperatives serving about 45% of the state's land mass and 860,000 customers. The member systems suffered 185,000 outages across North Carolina.

ElectriCities is an organization representing 72 cities across North Carolina that operate municipal electric systems serving 500,000 customers. Its member systems suffered 177,833 outages across North Carolina.

Most of the damage to the Utilities' systems was caused by widespread and pervasive damage to their distribution systems, i.e., the lines poles, transformers, fuses and insulators that are needed to distribute power to businesses and neighborhoods. Distribution systems are typically located in forested neighborhoods, and are subject to

damage from falling limbs and trees. Transmission systems, which are large voltage lines that move power between localities, are typically located in cleared areas, and suffered almost no damage. Typically, the vast majority of outages associated with ¼ inch or less of ice accumulation are widely scattered and are usually caused by evergreen tree limbs and leaning evergreen trees. But once accumulation reaches the ½ inch level, the number of outages climbs rapidly due to breaking limbs and trees. Ice accumulation of ¾ inch to 1 inch or more causes much more structural damage to trees, including breaking tree limbs and damage to hardwood treetops. The severity of this ice storm is demonstrated by the fact that Progress Energy had up to ¾ inch of ice accumulation in large portions of its service area, and up to 1 inch in northern areas, while Duke experienced from ¾ to 1 inch of ice buildup in all of its impacted service areas.

### Restoration Efforts

Restoration efforts began immediately, even before the storm ceased, although working conditions were especially dangerous as limbs, trees, and power lines continued to fall. Working with county and municipal public work forces, repair crews had to clear fallen trees from roadways before they could gain access to fallen power lines. The extremely cold weather for several days following the storm also impeded the work of tree and repair crews.

The Utilities' restoration priorities were to address safety-related situations, emergency services, and critical infrastructure needs and then to restore service to the largest number of customers in the shortest period of time. During the restoration period the Utilities implemented procedures learned from previous outages to maximize the crews' time on the job, including busing crews from work staging centers to hotels, feeding crews at staging centers early in the morning and late in the evenings, delivering lunch meals to crews at jobsites, refueling line trucks and equipment at night, and preparing work packages and materials overnight so that crews would be ready to move out immediately after breakfast.

To restore power, Duke utilized a total of more than 11,000 personnel, including company employees who were reassigned from normal duties to restoration efforts, employees of contractors, and off-system resources from 18 states. Likewise, Progress Energy utilized a combination of employees reassigned from normal duties, normal field employees, contract employees and off-system resources from 19 states. By December 7, the total work force was more than 5,000 people.

Duke restored customers at an average rate of 152,777 per day, compared to 81,250 customers per day for the 1996 Ice Storm. Progress Energy restored customers at an average rate of 70,083 per day compared to a rate of 15,250 per day for the 1996 Ice Storm, and 34,620 for the 2000 Snowstorm.

Communications with interested parties - customers, government officials, and the news media - are of vital importance to an electric utility when a major storm results in widespread power outages. This storm, being so intense and widespread, caused a

great deal of stress on the Utilities communications systems. For instance, Progress Energy answered approximately 650,000 outage calls between December 4 and 11. Almost half of the total call volume, 318,000 calls, was taken within the first full day of the storm event, in contrast to Progress Energy's normal daily call volume of approximately 15,000 calls. To answer call volumes of this magnitude, the Utilities relied heavily on automation, particularly during the early stages of the storm.

### Key Findings

The independent review by the Utilities Commission and the Public Staff resulted in the following key findings:

1. The severity of the ice storm, as measured by the number of customer outages, was unprecedented on a statewide basis, unprecedented for Duke as a system, and almost unprecedented for Progress Energy.
2. The great majority of outages during the ice storm were caused by tree trunks or limbs falling onto distribution lines. Because the storm occurred early in the season, when there was still foliage on many hardwood trees, the number of trees and limbs that fell due to ice buildup was greater than it would have been if the storm had occurred later in the winter.
3. The costs of power restoration were approximately \$87 million for Duke and approximately \$39 million for Progress Energy, and will be recovered by the Utilities through current rates rather than through increased rates.
4. Some government officials in Durham and Durham County were concerned that they did not receive sufficient information from Duke during the ice storm and the subsequent power restoration process. Since the storm, the Utilities have made extensive efforts to improve their communications with government officials during outage periods.
5. The Utilities' efforts to deal with the high volume of telephone calls they received were adequate; improvements were identified and have been made. Duke initially experienced difficulties with its automated outage reporting system, but the difficulties were quickly corrected.
6. As a result of the ice storm, Duke and Progress Energy identified a need for improved communications with their Spanish-speaking customers, and both utilities have made very commendable efforts to communicate more effectively in Spanish.
7. The Utilities' Internet sites were useful to some customers in the restoration process.
8. Power was restored at a faster rate following this storm than it was after severe ice storms in prior years.
9. The Utilities have appropriate procedures in place for making advance plans for severe weather events and obtaining restoration assistance from other utilities. Their plans were disrupted to some extent in this case because the storm unexpectedly increased in intensity and breadth as it moved through the state.
10. Assertions have been made that improvements in the design and maintenance of the Utilities' electric distribution systems would make less vulnerable to major

- storms. While there may be isolated areas or pockets that need improvement, the investigation did not indicate that significant outages during the ice storm were attributable to the design or age of the distribution systems or to pre-existing conditions on the systems.
11. Adequate right-of-way maintenance and tree trimming are essential in order to minimize the number and severity of outages during major storms. Clearly there is a direct correlation between the proximity of trees to utility lines and the integrity of the lines. Several municipalities have adopted ordinances limiting tree trimming by utilities. Such ordinances are designed to enhance the environment and aesthetics of a city, but if improperly formulated, implemented or enforced, they can compromise utility infrastructure and reliability when storms occur. Therefore, a proper balance must be struck between aesthetic benefits to the community and the risk of substantial societal costs associated with the types of major storms to which North Carolina is vulnerable. All municipalities and all utilities should carefully examine their tree-trimming ordinances and their interpretation as well as enforcement of those ordinances to determine whether improvements can be made to minimize the risk of damage to utility distribution systems during storms.
  12. Increasing the use of alternate feeds, as proposed by some customers, would not be of significant benefit in reducing outages during storms of the magnitude of the ice storm. Similarly, greater use of distributed generation would be of limited benefit in reducing weather-related outages.
  13. Assertions have been made that Duke assigned fewer restoration workers to the Durham area than to other parts of its service territory that incurred similar damage from the ice storm. The investigation indicates that the ice buildup in Durham peaked later than in other areas and was greater than Duke anticipated; the storm was more severe and widespread than predicted. This was reflected in the number of damage evaluation and restoration personnel there on the first day of the storm. However, by the second day of the storm, the number of personnel in Durham was comparable to that in other affected areas in its service territory.
  14. This investigation found no discrimination among geographical areas by any of the Utilities in their storm restoration efforts. There were fewer restoration workers per outage in Durham than in other parts of Duke's system during the first day of storm restoration due to several factors, including the fact that the ice storm began in Duke's Southern Region and the first available off-system resources were deployed there.
  15. The Utilities' restoration priorities were to address safety-related situations, emergency services, and critical infrastructure needs and then to restore service to the largest number of customers in the shortest period of time.
  16. During the ice storm there were widespread rumors that Duke's crews were working considerably fewer hours per day than Progress Energy's crews; however, the Public Staff's investigation indicates that these rumors had little or no basis in fact. Duke and Progress Energy worked their crews approximately the same number of hours per day, and these working hours were appropriate in light of the emergency conditions, the need for rapid power restoration, and the anticipated duration of the recovery effort.

17. There is no reason to believe that the restoration of service to customers was delayed because of employee layoffs by the Utilities, or closure of some local offices, during the period prior to the ice storm.
18. Predicting restoration times for customers is a very difficult and unreliable process, and customers tend to be very frustrated when they find themselves still without power at the predicted restoration time. Consequently, the Utilities Commission and Public Staff do not recommend increasing the use of power restoration estimates, or distributing maps showing estimated restoration times, as some customers have proposed.
19. At the time their power lines were damaged by the storm, or at the time their power was restored, a small percentage of customers suffered property damage because of open neutral conditions. The Utilities should use due diligence to correct any open neutral conditions which exist prior to power restoration in a given area.
20. The Utilities' line workers and field personnel deserve special recognition for their extraordinary work during the restoration effort.

### Recommendations and Implemented Changes

The Commission and the Public Staff have made five recommendations for change that will improve the Utilities' prevention and restoration practices. In addition, the Utilities have identified lessons learned from the storm and are implementing changes as well. The Commission and the Public Staff have reviewed these changes and endorse them.

### Recommendations for Change: Utilities

1. The Commission and Public Staff recommend that Duke take whatever steps are necessary to ensure that elected officials in all areas of its service territory have direct access to information regarding storm preparedness and restoration.
2. In planning for future storms, the Utilities should make every effort to ensure that the number of telephone lines available to customers at their outage-reporting numbers – as well as internal system parameters such as maximum queue size – is sufficient to meet the demands imposed by a major storm. The number of customers is steadily increasing, and the Utilities cannot appropriately assume that the December 2002 Ice Storm is the worst storm they will ever face; thus, even a telephone system adequate to meet the requirements of the December 2002 Ice Storm may not be sufficient for future planning purposes.
3. The Utilities should continue their policy of providing increased assistance to customers with medical needs. As storms approach, the Utilities should contact medical alert customers, or their caretakers, at the earliest time the impact and extent of a major storm become known to the Utilities and encourage them to make alternative shelter arrangements. The Utilities should continue to evaluate each storm on its merits, seek customer feedback, and determine the most effective means of contacting medical alert customers.

4. The Utilities should give further attention to right-of-way maintenance enhancements to determine whether changes can be made to improve system reliability.
5. The Utilities should make an effort to detect and eliminate open neutral conditions whenever practicable during the power restoration process. In particular, the Utilities should inspect primary lines for open neutral conditions as power is restored.

#### Recommendation for Change: Municipalities

Although the Commission and Public Staff have no jurisdiction over municipalities, they nevertheless recommend that all municipalities reexamine their tree-trimming ordinances, in consultation with utility providers, to make sure that the need to protect trees and foliage is properly balanced against the need for citizens to receive reliable electricity. This reexamination should focus on the municipalities' ordinances and the interpretation as well as enforcement of those ordinances.

#### Changes Implemented by the Utilities

1. The Utilities have made plans to designate specific employees to serve as liaisons with particular counties and emergency operations centers in future storms.
2. Duke is developing a new outage database, which enable it to determine the number outages and the number of customer calls received by county, city, and ZIP code. Duke also plans to communicate with key emergency personnel before the winter and summer storm seasons, and it intends to work with county officials to identify critical facilities that are remote from substations or main feeder lines and thus are especially vulnerable to lengthy outages.
3. Progress Energy has made plans to enhance its media communications in adverse weather periods by positioning additional media spokespersons in affected areas, proactively generating news updates on the restoration process, and adding local radio outlets and towers to its restoration priority lists.
4. Duke increased the Maximum Queue Size parameter for the Voice Response Unit (VRU) at its outage-reporting number from 255 to 2048 during the December 2002 Ice Storm, so that callers would not be directed back into the VRU while waiting to talk to a live operator.
5. Progress Energy has enhanced the VRU at its outage-reporting number so as to provide the following information to callers: (1) areas most impacted by the storm; (2) a schedule for providing restoration estimates, even while damage assessment is under way; (3) number of customer outages and number of repair crews working in the field; (4) areas for which no restoration estimates are available; (5) an option for customers with meter damage requiring an inspection before system connection can occur; and (6) a full Spanish outage-reporting menu.
6. Progress Energy plans to distribute glow-in-the dark magnets with outage-reporting numbers.

7. During the December 2002 Ice Storm Duke added messages to its VRU for Spanish-speaking customers; established a unique toll-free number for these customers, thus enabling them to hear the same storm informational messages that English-speaking customers heard; promoted the new toll-free number on radio stations targeted to Spanish-speaking customers; used Duke employee volunteers who speak Spanish to staff the line after regular Spanish-speaking specialists completed their 12-hour shifts; and utilized two Spanish-speaking Duke employees to provide translations, information, and interviews to major Latino news outlets.
8. Duke has requested PR Newswire to translate its storm restoration news releases into Spanish and distribute them to Spanish-language media outlets. In addition, Duke is designing and building a fully automated Spanish Outage Reporting application, enabling Spanish-speaking customers to report their outages through a special toll-free number.
9. Progress Energy has made enhancements to its automated outage reporting system, enabling Spanish-speaking customers to have the exact outage reporting functionality that is provided to English-speaking callers. In addition, Progress Energy has identified nearly 50 Spanish-language media outlets in its service area, and news releases have been translated into Spanish and distributed directly to these media outlets.
10. Duke and Progress Energy have adopted a policy of making calls to customers on their medical needs lists shortly after a major storm and informing these customers of the location of nearby shelters, telephone numbers where help can be obtained, the importance of making appropriate outage plans, the progress of service restoration efforts, and other information relevant to the customer's situation.
11. Duke has begun working with the city of Durham to relieve some of the restrictions imposed by the city's tree-trimming ordinance.
12. Duke has modified the text of its recorded and automatically dialed telephone messages to customers concerning power restoration, in order to avoid customer misunderstanding.

### Conclusions

The Report concludes that the Utilities were adequately prepared for the December 2002 Ice Storm, and that the Utilities' restoration efforts were diligent, effective, and well managed on the whole. Given the extraordinary scope and intensity of the storm, the Utilities' performance, though not flawless, was commendable. The Utilities have made changes in their outage prevention and restoration programs, which the Commission and the Public Staff endorse, and additional changes recommended by the Commission and the Public Staff will further improve these practices.

Finally, the Report concludes: "the Utilities' line workers and field personnel deserve special recognition for their part in the restoration effort. These men and women spent long hours performing dangerous tasks under difficult conditions in order

to restore power to hundreds of thousands of North Carolinians. They can be proud of their achievements and assured of the public's gratitude.”