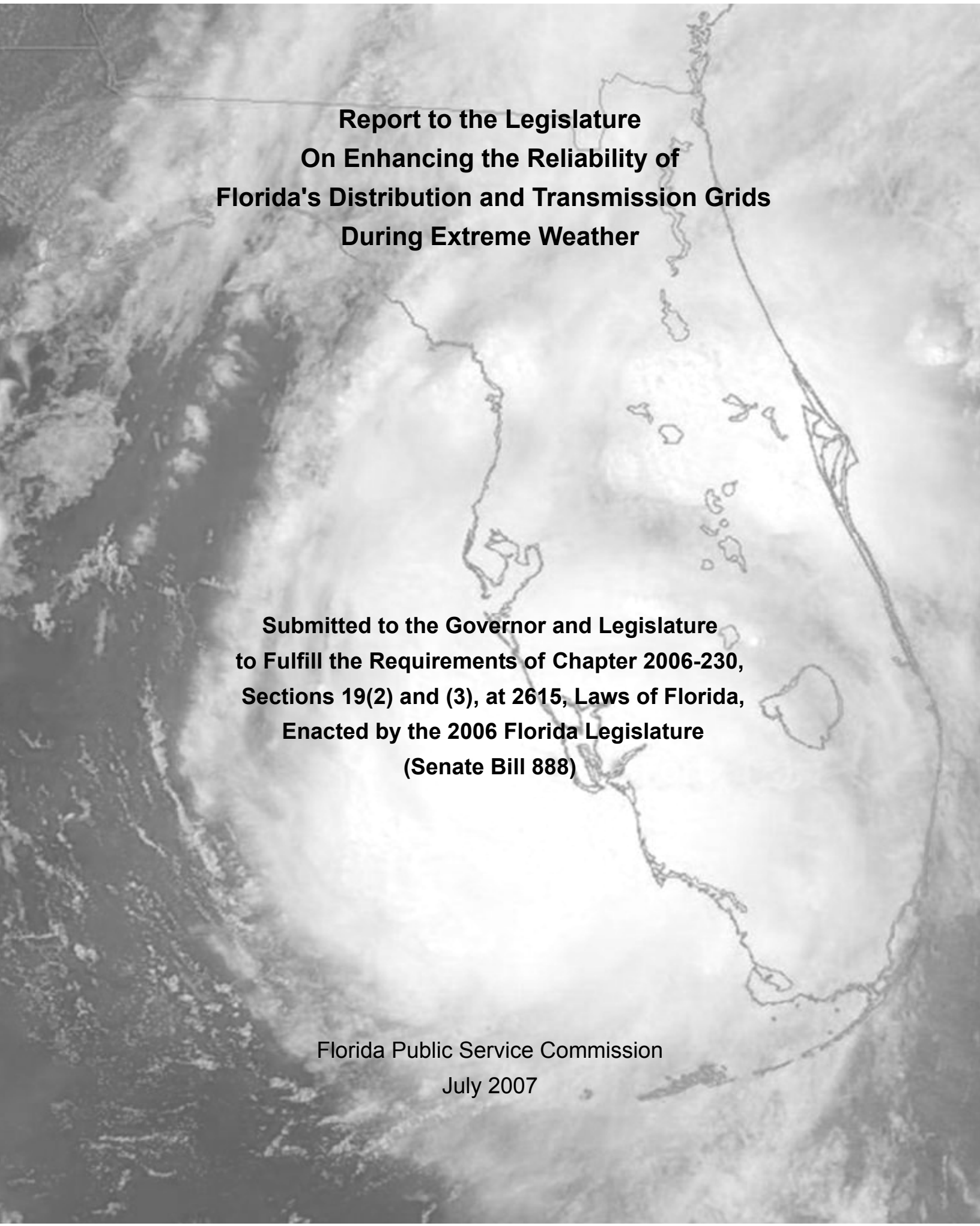

# Report to the Legislature
# On Enhancing the Reliability of
# Florida's Distribution and Transmission Grids
# During Extreme Weather

**Submitted to the Governor and Legislature**
**to Fulfill the Requirements of Chapter 2006-230,**
**Sections 19(2) and (3), at 2615, Laws of Florida,**
**Enacted by the 2006 Florida Legislature**
**(Senate Bill 888)**

Florida Public Service Commission

July 2007

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# TERMS AND ACRONYMS

| | |
|---|---|
| CIAC | Contribution-In-Aid-of-Construction |
| EOC | Florida's Emergency Operation Center |
| F.A.C. | Florida Administrative Code |
| FPL | Florida Power & Light Company |
| FPUC | Florida Public Utilities Company |
| GIS | Geographic information system |
| GPC | Gulf Power Company |
| IOUs | The five investor-owned electric utilities: FPL, PEF, TECO, GPC, and FPUC |
| PEF | Progress Energy Florida, Inc. |
| PURC | Public Utility Research Center located in the Warrington College of Business at the University of Florida |
| TECO | Tampa Electric Company |

# EXECUTIVE SUMMARY

## *Legislation*

Chapter 2006-230, Sections 19(2) and (3), at 2615, Laws of Florida, enacted by the 2006 Florida Legislature, states:

> (2) The commission shall conduct a review to determine what should be done to enhance the reliability of Florida's transmission and distribution grids during extreme weather events, including the strengthening of distribution and transmission facilities. Considerations may include:
>
> > (a) Recommendations for promoting and encouraging underground electric distribution for new service or construction provided by public utilities.
> >
> > (b) Recommendations for promoting and encouraging the conversion of existing overhead distribution facilities to underground facilities, including any recommended incentives to local governments for local-government-sponsored conversions.
> >
> > (c) Recommendations as to whether incentives for local-government-sponsored conversions should include participation by a public utility in the conversion costs as an investment in the reliability of the grid in total, with such investment recognized as a new plant in service for regulatory purposes.
> >
> > (d) Recommendations for promoting and encouraging the use of road rights-of-way for the location of underground facilities in any local-government-sponsored conversion project, provided the customers of the public utility do not incur increased liability and future relocation costs.
>
> (3) The commission shall submit its review and recommendations to the Governor, the President of the Senate, and the Speaker of the House of Representatives by July 1, 2007.

## *Overview*

The Florida Public Service Commission has broad authority over the adequacy and reliability of the state's electric transmission and distribution grids. In exercising its authority, the Commission has taken action in a variety of forms:

- Rules on construction standards for electric transmission and distribution facilities.
- Rules on safe construction of electric transmission and distribution facilities.
- Rules pertaining to customer charges for underground facilities.
- Prudence reviews of hurricane restoration costs.
- Annual review of transmission and distribution service reliability.

The Commission's authority over investor-owned electric utilities (IOUs) is comprehensive and includes setting rates and all cost-recovery matters. While the Commission does not have authority to set rates for municipal electric utilities and rural electric cooperative utilities, the Commission has authority over all electric utilities to:

- Prescribe uniform systems and classifications of accounts.
- Evaluate rate structure to ensure no undue discrimination between customer classes.[1]
- Require electric power conservation and reliability within a coordinated grid for operational as well as emergency purposes.
- Safety of new electrical utility facility construction using the National Electrical Safety Code of 2007 as the minimum standard.
- Approve territorial agreements between and among rural electric cooperatives, municipal electric utilities, and other electric utilities under its jurisdiction.
- Resolve any territorial dispute involving service areas between and among rural electric cooperatives, municipal electric utilities, and other electric utilities under its jurisdiction.
- Require reports as deemed necessary.

The Commission first initiated rules on standards of construction for electric transmission and distribution facilities in 1969. These initial standards of construction were simply a broad statement promoting continuity and uniformity in the quality of service. In 1987, pursuant to Section 366.04(6), Florida Statutes, the Commission adopted rules establishing safety standards for new transmission and distribution facilities. In 1992, the Commission established rules governing utility calculations of Contribution-in-Aid-of-Construction (CIAC) charges for the conversion of existing overhead electric distribution facilities to underground. In 1993, the Commission required utilities to file annual service reliability reports. Subsequent to Hurricane

[1] Rate structure refers to the classification system used in justifying different rates and, more specifically, to the rate relationship between various customer classes, as well as the rate relationship between members of a customer class. See Rule 25-9.051(7), Florida Administrative Code. https://www.flrules.org/gateway/RuleNo.asp?ID=25-9.051

Andrew in 1992, the Commission implemented measures providing for self-insurance of transmission and distribution facilities because cost-effective commercial insurance offerings were no longer available.

In 2006, the Commission initiated a multi-faceted response to the widespread hurricane damage experienced in Florida in 2004 and 2005. On January 23, 2006, the Commission held a workshop to explore lessons learned by all electric utilities during the 2004 and 2005 hurricane seasons. Workshop presenters included:

Charles A. Falcone, Commissioner, Town of Jupiter Island
Anne Castro, Mayor, City of Dania Beach
Dr. Kurtis R. Gurley, University of Florida
Robert Scheffel Wright, Town of Palm Beach
Dr. Richard E. Brown, KEMA
Mary Wolter Glass & Dr. Martin Skeer, New Stratagem Consulting
Roy Jazowski & Mark Hammer, HOMAC Corporation
Charles E. Fisher, James Lee Witt Associates, LLC.
Composite Technology
Dr. Alexander Domijan, Jr., University of South Florida
William H. Mayer, P.E., Edison Electric Institute
Florida Power & Light Company
Progress Energy Florida
Tampa Electric Company
Gulf Power Company
Florida Public Utilities Company
Lakeland Electric

Copies of each presentation are available at the Commission's website on storm hardening activities.[2] During the workshop, discussion covered actual utility experiences, damages to electric utility facilities, and suggestions on ways to mitigate future storm damages and customer outages. Review of the information provided in this workshop helped frame the Commission's multi-faceted approach to hardening the electric infrastructure.

## *Commission Recommendations and Actions*

Studying the 2004-2005 hurricane impacts led to three overarching recommendations. The first, and perhaps the most critical, recommendation is for Florida to maintain a high level of storm preparation, no matter whether recent hurricane seasons have been mild or severe. Second, strengthening Florida's electric infrastructure to better withstand the impacts of severe weather events should include a wide range of hardening activities that will take years to complete. Finally, regarding conversions of existing overhead electric facilities to underground, there is a need to establish additional comprehensive planning tools to enable the Commission and utilities

[2] http://www.psc.state.fl.us/utilities/electricgas/eiproject/

to identify and implement those instances and circumstances where undergrounding is appropriate as a means of storm hardening. These planning tools should also take into consideration the needs of local communities. Such planning tools will aid utility and community planners in making better informed decisions and avoid costly mistakes. Throughout its storm hardening program, the Commission has been careful to balance the need to strengthen the state's electric infrastructure to minimize storm damage, reduce outages, and reduce restoration time while mitigating excessive cost increases to electric customers.

At this time, as part of its multi-faceted response, the Commission has initiated the following actions:

- Annual hurricane preparedness briefings (page 17).
- A formal electric utility pole inspection program (page 17).
- Annual assessment of comprehensive reliability reports by the electric utilities (page 18).
- Ten additional storm-hardening initiatives that include Florida specific research (page 19).
- University research on the measurement and effects of storm wind speeds on electric utility infrastructure (page 24).
- University research on best practices for vegetation management (page 24).
- Rules governing IOU storm restoration costs (page 26).
- Rulemaking regarding overhead and underground storm hardening construction standards (page 27).
- Rulemaking to expand the calculation of Contribution-in-Aid-of-Construction (CIAC) for new underground facilities and conversion of existing overhead facilities to underground to reflect the cost impacts of storm hardening and storm restoration (page 30).
- Tariffs promoting underground electric distribution facilities (page 30).
- University research to develop cost benefit methodologies to identify areas and circumstances to facilitate the conversion of overhead distribution facilities to underground facilities (page 34).

As discussed in greater detail in this report, the Commission will continue to pursue the above storm hardening activities. Achieving a transmission and distribution system capable of better withstanding hurricanes will take time and require financial resources. Additionally, storm hardening must be actively monitored to ensure cost-effective achievement of the goals. The Commission's rulemaking activities are completed. There are, however, a number of ongoing storm hardening activities initiated by the Commission that will continue over the next several years. Information to be gained from these activities is pivotal in determining how to further enhance the reliability of Florida's transmission and distribution grids and will serve as a basis for recommendations to the Governor and the Legislature. As an addendum to this report, the Commission plans to summarize Commission actions completed between May 1, 2007, and December 15, 2007. The addendum will be made available to the Governor and Legislature by

February 1, 2008. Additionally, the Commission will provide a complete update to this report by July 1, 2008, with recommendations for any needed legislative action.

# INTRODUCTION

Reliable electric service is the cornerstone of Florida's economy. Citizens and businesses rely on an adequate reliable supply of electricity. As such, utilities need to be able to rapidly recover from the destruction caused by hurricanes. Strengthening Florida's electric transmission and distribution grids to better withstand the effects of these extreme weather events helps to reduce power outages and the time and cost incurred to restore electric service.

This report describes Commission actions, both present and future, directed at mitigating storm-caused power outages and the costs incurred to restore electric service. This report consists of four sections.

Section 1: Addresses the 2004/2005 hurricane damage, costs incurred to restore electric service, and reliability impacts on transmission and distribution facilities.

Section 2: Addresses Commission actions implementing electric infrastructure storm hardening.

Section 3: Addresses Commission actions implementing undergrounding initiatives.

Section 4: Addresses the Commission's planned activities which includes future updates to this report.

# SECTION 1. STORM IMPACTS ON DISTRIBUTION AND TRANSMISSION IN FLORIDA

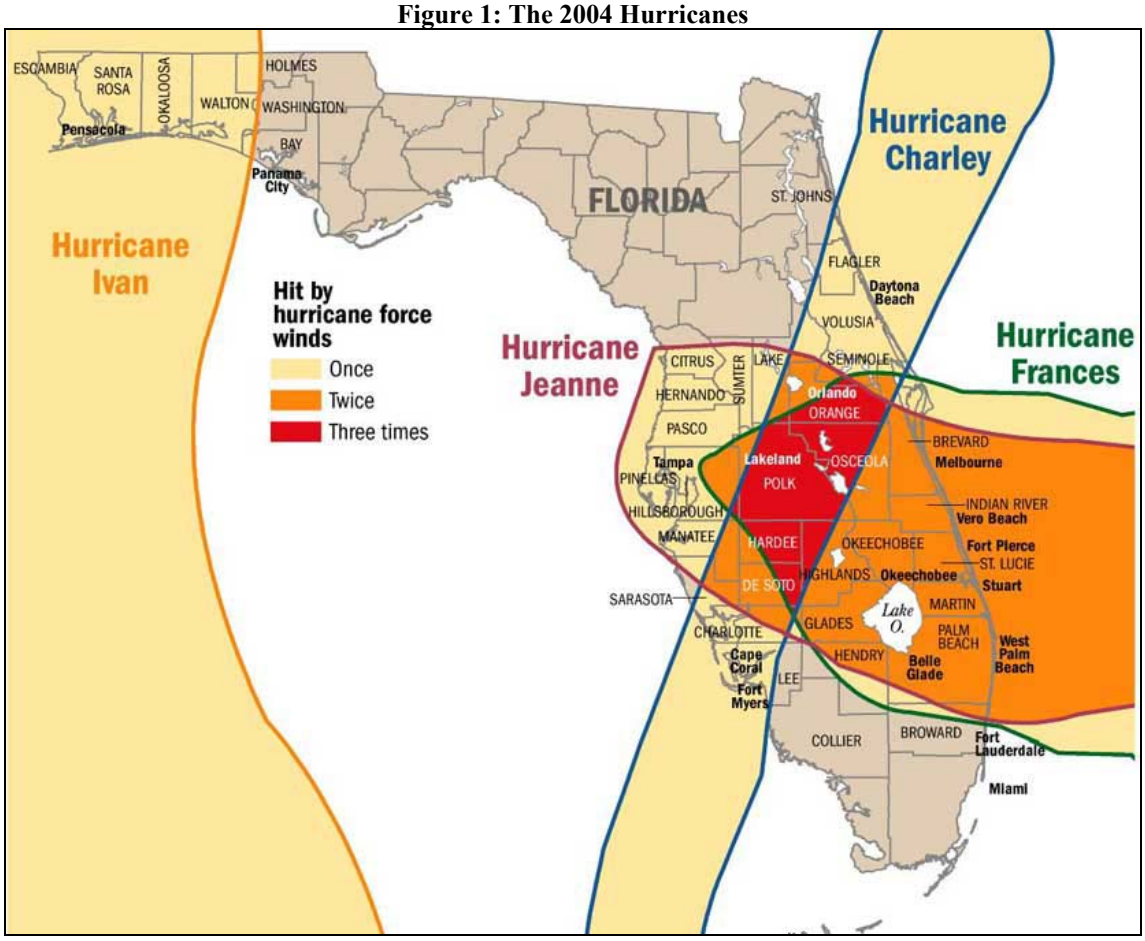
## *The 2004-2005 Hurricane Seasons*

The widespread hurricane damage experienced in Florida in 2004 and 2005 provided strong evidence of the vulnerability of the state's electrical system to the effects of hurricanes.

The 2004 Hurricane Season

The 2004 hurricane season was one of the most destructive storm seasons in Florida's history. During the six-week period from August 13 through September 25, an unprecedented onslaught of four major hurricanes devastated the State. The paths of Hurricanes Charley, Frances, and Jeanne overlapped in the central part of the State. Hurricane Ivan affected the northwestern panhandle.

**Figure 1: The 2004 Hurricanes**




Source: http://img.coxnewsweb.com/C/05/92/61/image_961925.jpg

Hurricane Charley made landfall on the Gulf coast of Florida near Ft. Myers on August 13, 2004, as a Category 4 hurricane with sustained winds of 145 miles per hour. The storm swept through the State in a southwest to northeast direction and exited around Daytona Beach. In geographical terms, Charley was the narrowest of the four storms, with hurricane force winds spanning 60 miles and tropical storm force winds spanning 170 miles at the time of landfall.

Three weeks after Hurricane Charley made landfall on the southwestern coast of Florida, Hurricane Frances hit the southeastern part of the State just north of West Palm Beach with sustained winds of 105 miles per hour. Hurricane Frances, a Category 2 storm, was a much wider storm than Hurricane Charley, with hurricane force winds and tropical storm force winds spanning 150 miles and 400 miles, respectively, at the time of landfall.

On September 16, Hurricane Ivan, a very powerful Category 3 hurricane, made landfall at Gulf Shores, Alabama, severely impacting the northwestern part of the Florida Panhandle. At landfall, wind speeds were near 130 miles per hour with hurricane force winds extended outward 105 miles and tropical storm force winds extended outward 580 miles.

On September 25, Hurricane Jeanne, Florida's fourth hurricane within a six-week period, made landfall near the same place on the southeast coast that Hurricane Frances hit three weeks earlier. Hurricane Jeanne was a Category 3 storm with winds up to 120 miles per hour. Hurricane Jeanne was also a wide storm, just as Hurricane Frances was, with hurricane force winds spanning about 140 miles and tropical storm force winds spanning approximately 410 miles.

Both overhead and underground electric infrastructure is adversely affected by hurricane strength winds and flooding. Massive damage to homes and other private facilities also occur.

The impact of these four hurricanes to the State of Florida was significant. The Florida EOC estimated one in every five homes was impacted to some degree. As shown in Table 1, millions of Floridians were displaced while restoration efforts were underway.

Selected indicators of the extensive effects of these four hurricanes on Florida are summarized in Table 1. The hurricanes not only caused millions of customers to be without power but also caused billions of dollars in property damages to homes and businesses throughout Florida.

**Table 1: Statewide Impact of the 2004 Hurricanes - Selected Indicators**

| | Charley | Frances | Ivan | Jeanne |
|---|---|---|---|---|
| Category of Hurricane | 4 | 2 | 3 | 3 |
| Sustained Winds over FL | 145 m.p.h. | 105 m.p.h. | 130 m.p.h. | 120 m.p.h. |
| Number of Evacuees | 2.7 million | 1.8 million | 0.5 million | 4.4 million |
| Number of Meals | 2.2 million | 0.3 million | 1.3 million | 1.3 million |
| Insured Damages * | $6.8 billion | $4.1 billion | $3.8 billion | $2.8 billion |
| Number of Utility Restoration Personnel ** | 19,860 | 21,172 | 6,430 | 27,320 |
| Customer Power Outages | 1,800,000 | 4,500,000 | 400,000 | 3,500,000 |

Source: Florida Division of Emergency Management, Hurricane Impact Report, A Summary, November 2004.

- Specific comparisons between storm events based on the category of hurricane are difficult because of the diverse characteristics of storm width, wind speed, rainfall, the degree of urban development in the impacted areas, and residual effects of prior storms. For example, Hurricane Frances, a wide Category 2 hurricane, caused more customer power outages and required more utility restoration personnel than Hurricane Charley, a narrow Category 4 hurricane. However, Hurricane Charley, the more intense storm resulted in larger insured damages than Hurricane Frances. Hurricane Ivan and Hurricane Jeanne, both Category 3 hurricanes, resulted in substantially different levels of evacuees, utility restoration personnel, and power outages. One reason is because Hurricane Jeanne impacted much of the Florida Peninsula while Hurricane Ivan impacted a smaller area with less urban development.

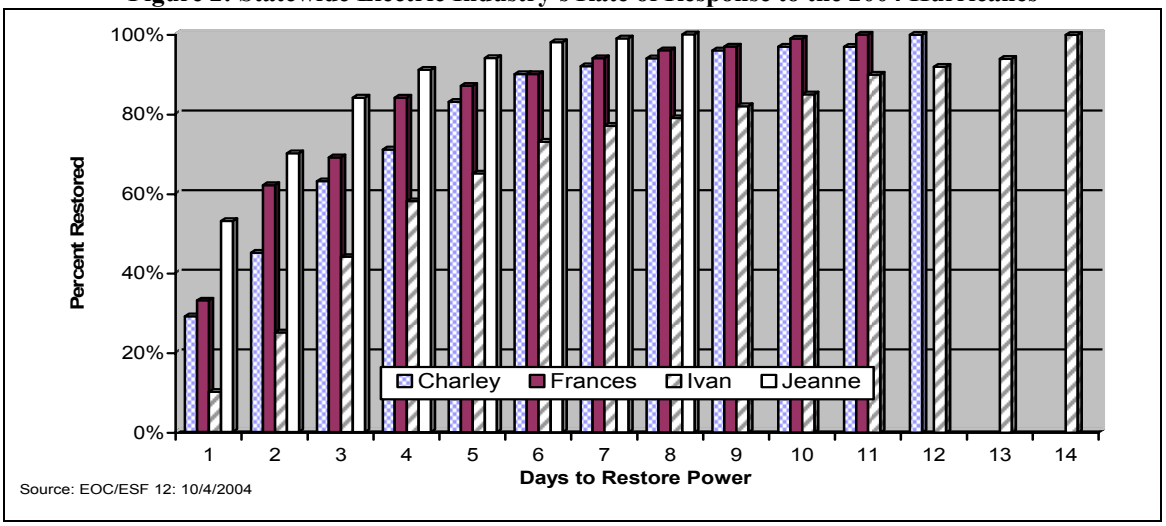
* Insured damages include all insured property damages from the general public, such as homes and businesses, as well as electric utility claims for insured facilities such as power plants and office buildings. Insured damages do not include damage to investor-owned electric utility transmission and distribution facilities.

** Includes volunteers from non-Florida utilities from as far away as California and Canada.

For most of the electric customers able to take service, restoration was completed within eight to 14 days, depending on the storm.[3] Figure 2 on the following page, provides a composite customer restoration rate for all of Florida's investor-owned, municipal, and cooperative electric utilities for the period in which any electric utility was in a state of emergency response. During 2004, the electric industry experienced a total of 45 emergency response days based on the total number of days shown in Figure 2 for each storm. During the emergency response period, crews from 38 states and Canada helped rebuild Florida's hurricane-damaged electric facilities.

[3] In some instances, extensively damaged homes and businesses could not be safely reenergized.

**Figure 2: Statewide Electric Industry's Rate of Response to the 2004 Hurricanes**




The 2005 Hurricane Season

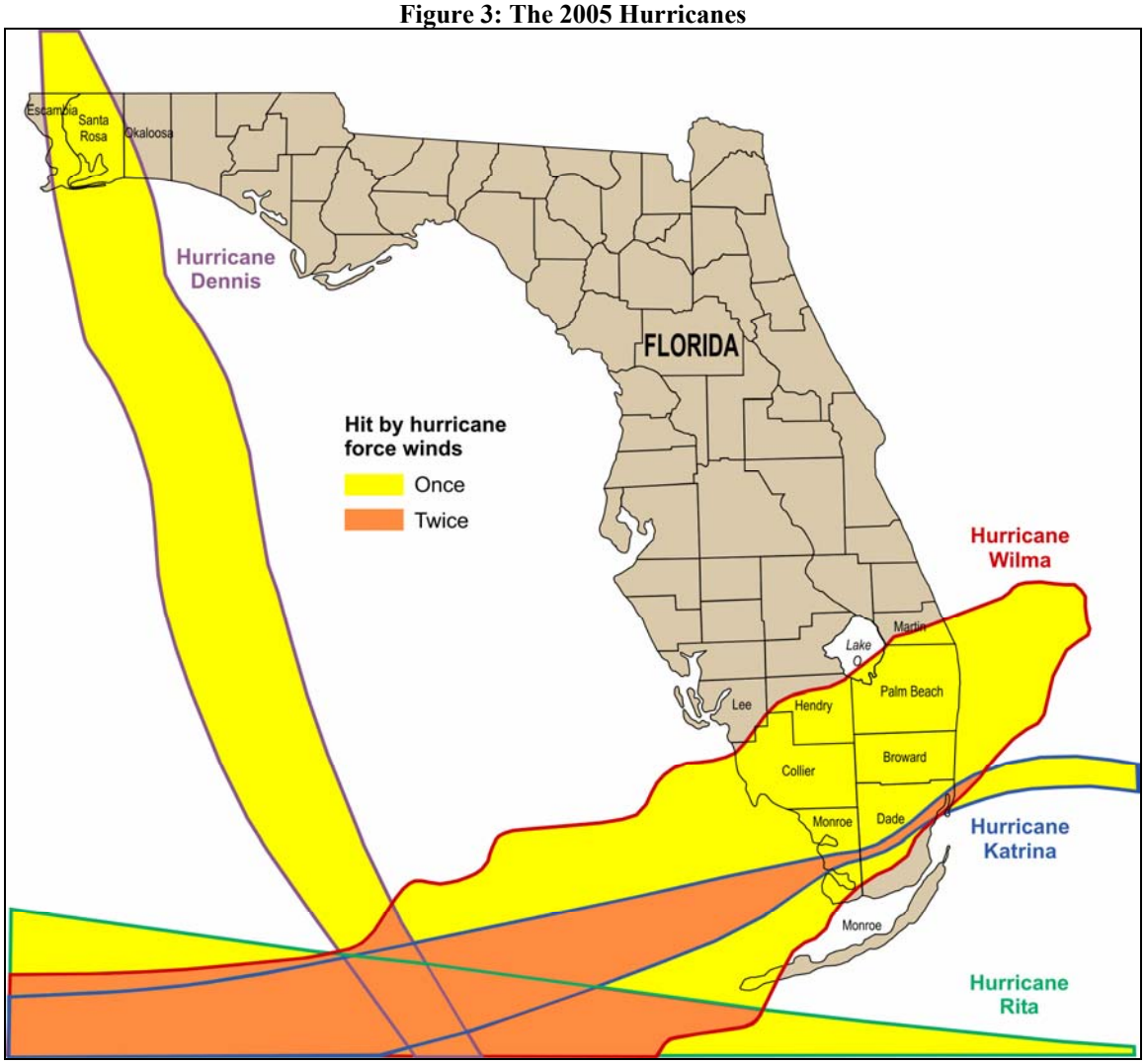
The 2005 hurricane season was one of the most active on record resulting in 26 named storms, seven of which strengthened into major hurricanes. Four hurricanes impacted Florida.

The lower Keys received about 18 hours of tropical storm conditions as the eye of Hurricane Dennis passed about 100 miles to the west of Key West on July 8-9, 2005. On July 10, Hurricane Dennis, a Category 3 storm, became the fifth hurricane to strike Florida within an 11 month period when it made landfall on Santa Rosa Island in Florida's panhandle with sustained winds of 120 miles per hour. Hurricane Dennis caused significant storm surge and wind damage, as it followed nearly the same similar path as Hurricane Ivan ten months earlier.

Hurricane Katrina was only a Category 1 storm with sustained wind speeds near 80 miles per hour when it struck the Dade-Broward County coastal border on August 25, 2005. Hurricane Katrina caused over 15 inches of rainfall over portions of South Florida and approximately ten hours of tropical storm conditions in the lower Keys as the storm moved westward and into the Gulf of Mexico. Once in the Gulf of Mexico, Hurricane Katrina strengthened to a Category 5 storm and began a gradual turn toward the Mississippi River Delta. Prior to landfall, Hurricane Katrina lost some of its strength before devastating parts of Mississippi and Louisiana as a Category 3 storm with wind, rain, and a storm surge. The recorded sustained wind speeds at landfall were 127 miles per hour. Rainfall was locally intense with levels between eight and 17 inches. The storm surge of 24-28 feet was estimated along the western Mississippi coast across a path of about 20 miles, tapering to a height of 17-22 feet along the eastern Mississippi coast. Surges in Louisiana ranged from ten to 19 feet. Alabama's coast experienced surges of 10-15 feet.[4]

[4] "Hurricane Katrina, A Climatological Perspective," Updated August 2006 http://www.ncdc.noaa.gov/oa/reports/tech-report-200501z.pdf

**Figure 3: The 2005 Hurricanes**




Source: Commission staff using National Oceanic & Atmospheric Administration Internet data.

The eye of Hurricane Rita remained about 50 miles to the south of Key West as it strengthened into a Category 2 storm on September 20, 2005. Tropical storm conditions persisted for more than 12 hours, producing gusty squalls, heavy rain, and a storm surge that impacted primarily the Keys and the southernmost tip of the mainland. The maximum sustained wind speed recorded at Key West was 62 miles per hour.

On October 24, 2005, Hurricane Wilma, a Category 3 storm with sustained winds of 125 miles per hour, made landfall near Cape Romano in southern Collier County. Hurricane Wilma exited the state about five hours later near Jupiter Inlet as a Category 2 storm with sustained wind speeds of 105 miles per hour. Hurricane Wilma produced a large swath of hurricane force winds across South Florida over the entire stretch of the Florida Keys and throughout the major metropolitan areas of Dade, Broward, Palm Beach, and Martin Counties. In Key West, the resultant storm surge inundated approximately 60 percent of the City of Key West. The highest storm surge of over 13 feet was recorded in unpopulated areas of Monroe County along the southern tip of the mainland.

Table 2 is a summary of selected statistics showing the extensive effects that these four hurricanes had on Florida from a statewide perspective.

**Table 2: Statewide Impact of 2005 Hurricanes on Florida – Selected Indicators**

| | Dennis | Katrina | Rita | Wilma |
|---|---|---|---|---|
| Category of Hurricane | 3 | 2 | 2 | 3 |
| Sustained Winds over FL | 120 m.p.h. | 80 m.p.h. | 62 m.p.h. | 125 m.p.h. |
| Number of Evacuees | 1,222,073 | 856,830 | 411,000 | 2,800,000 |
| Number of Meals | 158,000 | 80,000 | 0 | 3,900,000 |
| Insured Damages * | $640 million | $468 million | $23 million | $6,100 million |
| Number of Utility Restoration Personnel ** | 5,353 | 14,820 | 546 | 19,121 |
| Customer Power Outages | 500,000 | 1,200,000 | 24,800 | 3,551,167 |

Source: Florida Division of Emergency Management, Draft Hurricane Impact Report, March 19, 2007

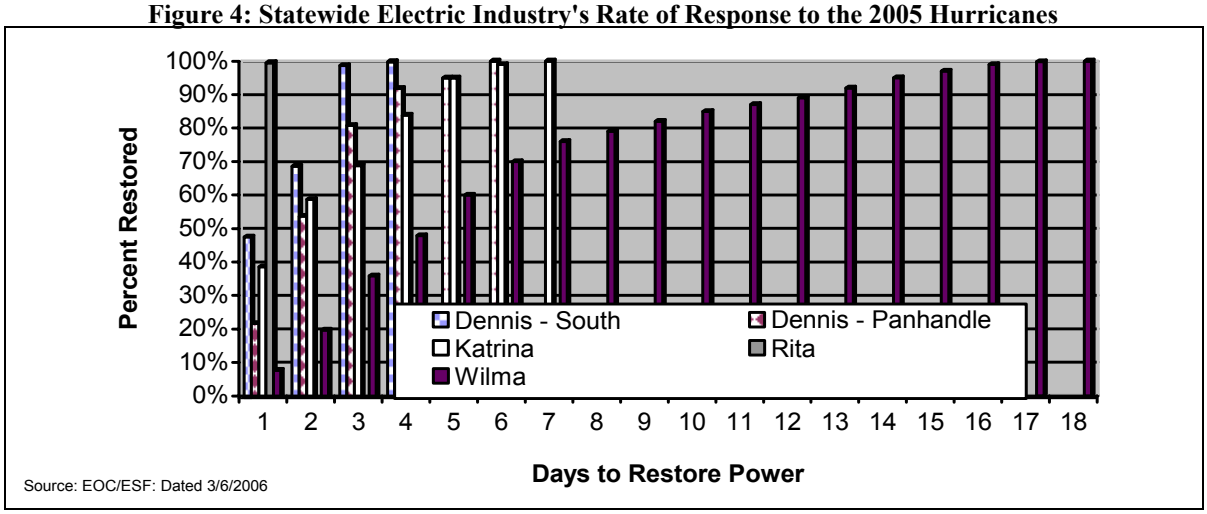
- Specific comparisons between storm events based on the category of hurricane are difficult because of the diverse characteristics of storm width, wind speed, rainfall, and the degree of urban development in the impacted areas. For example, Hurricane Katrina, a narrow Category 2 hurricane that crossed the urban southern tip of Florida, caused more customer power outages and required more utility restoration personnel than Hurricane Dennis, a Category 3 hurricane which crossed through the lesser developed areas of Florida. Hurricane Wilma, with wind speeds similar to Hurricane Dennis, was much wider than Hurricane Dennis and impacted more urbanized areas than Hurricane Dennis resulting in a larger number of evacuees, meals, insured damages, utility restoration personnel, and customer outages than those caused by Hurricane Dennis.

* Insured damages include all insured property damages from the general public, such as homes and businesses, as well as electric utility claims for insured facilities such as power plants and office buildings. Insured damages do not include damage to investor-owned electric utility transmission and distribution facilities.

** Includes volunteers from non-Florida utilities for Hurricanes Katrina and Wilma.

Restoration of electric service to most customers able to take service was completed within one to 18 days. Figure 3 on the following page, provides a composite customer restoration rate for all of Florida's investor-owned, municipal, and cooperative electric utilities for the period in which any electric utility was in a state of emergency response. During 2005, the electric industry experienced a total of 36 emergency response days based on the total number of days shown in Figure 4 for each storm.

**Figure 4: Statewide Electric Industry's Rate of Response to the 2005 Hurricanes**




## *The IOU's 2004-2005 Hurricane-Damaged Electric Facilities*

Factors contributing to hurricane-damaged electric facilities include coastal development and utility standards. The U.S. Department of Commerce reports the following:

> United States has a significant hurricane problem as the coastal population continues to rapidly increase. More than one in six Americans now live in a county abutting the eastern Atlantic or Gulf of Mexico coast. In fact, the coastal population is expected to double between 1995 and 2010.[5]

Florida is primarily a coastal state, and installation of electric facilities follows growth. This coastal growth results in Florida having substantial hurricane exposure to all of its electric transmission and distribution facilities.

Tables 3 and 4, on the following page, show each IOU's hurricane damage restoration costs for 2004 and 2005. These hurricane damage restoration costs include the cost of new electrical facilities damaged by the storms, the costs incurred to bring non-Florida electric crews in to help with reconstruction, and deductibles for insured power plants and buildings that were damaged during the storms.

[5] Hurricanes, A Preparedness Guide, U.S. Department of Commerce, August 2001. http://www.nws.noaa.gov/om/brochures/hurr.pdf

**Table 3: 2004 Hurricane Damage Restoration Costs**
**Impact on Florida's Investor-Owned Electric Utilities**
**(Dollars in Millions)**

| | Charley | Frances | Ivan | Jeanne | Total |
|---|---|---|---|---|---|
| FPL | $ 209 | $267 | $ 0 | $234 | $ 710 |
| PEF | $ 146 | $129 | $ 6 | $ 86 | $ 367 |
| TECO | $ 14 | $ 23 | $ 0 | $ 28 | $ 65 |
| GPC | $ 0 | $ 0 | $ 134 | $ 0 | $ 134 |
| FPUC | $ .03 | $ .1 | $ .1 | $ .2 | $ .4 |
| Total | $ 369 | $419 | $ 140 | $349 | $1,276 |

Sources: Docket No. 041291-EI for FPL; Docket No. 041272-EI for PEF; and answers to staff data requests for TECO, GPC, and FPUC.

**Table 4: 2005 Hurricane Damage Restoration Cost**
**Impact on Florida's Investor-Owned Electric Utilities**
**(Dollars in Millions)**

| | Dennis | Katrina | Rita | Wilma | Total |
|---|---|---|---|---|---|
| FPL | $10 | $162 | $12 | $695 | $880 |
| PEF | $ 7 | $ 0 | $ 0 | $ 0 | $ 7 |
| TECO | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| GPC | $59 | $ 4 | $ 0 | $ 0 | $ 63 |
| FPUC | $ 0 | $ 0 | $ 0 | $ 0 | $ 0 |
| Total | $76 | $166 | $12 | $695 | $949 |

Sources: Docket Nos. 060038-EI, 041272-EI, and 060154-EI.

Most of the electrical system damages and restoration times resulting from the 2004 and 2005 hurricanes can be attributed to distribution facilities because:

(i) transmission facilities have been designed to withstand more extreme weather than distribution facilities;

(ii) vegetation clearances for transmission facilities are greater than for distribution facilities; and

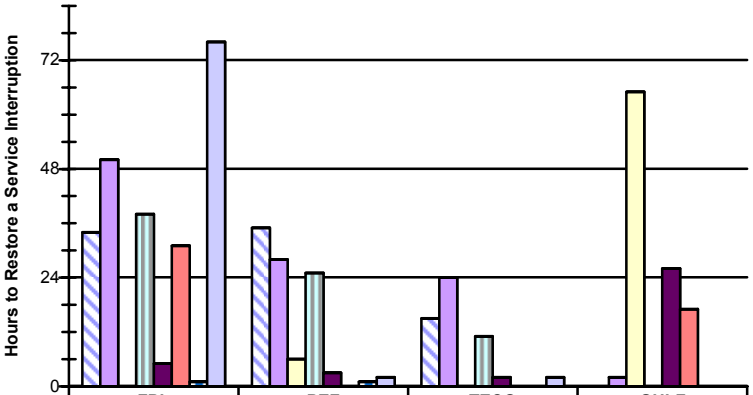
(iii) there are fewer miles of transmission facilities than there are of distribution facilities.

As detailed in Sections 2 and 3 of this report, the Commission recently established new storm hardening requirements for the electric utilities. Prospectively, as the Commission's storm hardening initiatives are implemented, electric reliability should improve.

## *2004-2005 Hurricane Service Reliability Impacts*

The widespread hurricane damage resulted in lengthy sustained electric service interruptions for millions of utility customers. No portion of the State was immune to electric service interruptions associated with these powerful storms.[6]

**Figure 5: Average Time to Restore Power**




| | FPL | PEF | TECO | GULF |
|---|---|---|---|---|
| '04 Charley | 34 | 35 | 15 | |
| '04 Frances | 50 | 28 | 24 | 2 |
| '04 Ivan | | 6 | | 65 |
| '04 Jeanne | 38 | 25 | 11 | |
| '05 Dennis | 5 | 3 | 2 | 26 |
| '05 Katrina | 31 | | | 17 |
| '05 Rita | 1 | 1 | | |
| '05 Wilma | 76 | 2 | 2 | |

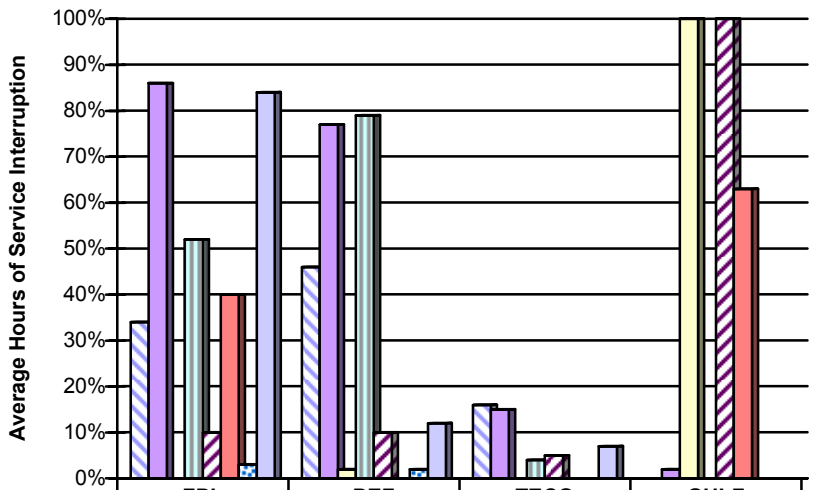
Source: Commission Staff Data Requests of March 14, 2005 and April 7, 2006

Figure 5 above illustrates the average number of hours required by each major IOU to restore electric service after each storm. Electric service restoration times for any given customer varied by storm from one hour to 18 days. In 2004, the longest average restoration time occurred in Gulf Power Company's (GPC) service area due to Hurricane Ivan. In 2005, the longest average restoration time occurred in FPL's service area due to Hurricane Wilma.

The number of customers who lost electric service during each of the storms varied considerably. Figure 6 on the next page shows the number of customers who experienced service interruptions during each hurricane of 2004 and 2005 as a percentage of total customers served. FPL recorded the largest number of customer interruptions from Hurricanes Frances and Wilma with over 3.6 million customers losing electric service due to each storm.

[6] Florida Public Utilities Company is not shown in Figures 5 and 6 because the utility did not have the ability to record the data.

**Figure 6: Percent of Customers Without Power**




| | FPL | PEF | TECO | GULF |
|---|---|---|---|---|
| '04 Charley | 34% | 46% | 16% | |
| '04 Frances | 86% | 77% | 15% | 2% |
| '04 Ivan | | 2% | | 214% * |
| '04 Jeanne | 52% | 79% | 4% | |
| '05 Dennis | 10% | 10% | 5% | 165% * |
| '05 Katrina | 40% | | | 63% |
| '05 Rita | 3% | 2% | | |
| '05 Wilma | 84% | 12% | 7% | |

Source: Commission Staff Data Requests of March 14, 2005 and April 7, 2006

*** Multiple power outages and service restoration events caused customer outage rates to exceed 100 percent.**

Some customers experienced multiple power outages and service restoration events due to the diverse storm characteristics. A good example of multiple power outage events to the same customer is seen in GPC's data for Hurricanes Ivan and Dennis in Figure 6. GPC, which serves approximately 400,000 customers, reported over 800,000 interruptions due to Hurricane Ivan and over 600,000 interruptions due to Hurricane Dennis.

# SECTION 2. ELECTRIC INFRASTRUCTURE STORM HARDENING INITIATIVES AND ISSUES

## *Commission Actions in 2006-2007*

In order to address the vulnerabilities of the state's electric distribution and transmission system to powerful storms, the Commission initiated a multi-faceted approach to address storm preparation. One area pursued by the Commission was "storm hardening." Storm hardening entails upgraded design and construction practices, as well as maintenance practices, so that electric facilities are better able to withstand extreme weather such as high wind speeds and flooding. As discussed in detail below, the Commission made significant progress in 2006 to establish the regulatory groundwork for a storm-hardened electric system in Florida. The Commission's multi-faceted approach for storm preparation includes several events and actions directed at providing a higher level of preparedness and hardening of the electric infrastructure throughout the state for future storm events. For each action, the Commission carefully balanced the need for developing a robust transmission and distribution system with the need to mitigate excessive rate impacts to utility customers.

## Annual Pre-Hurricane Season Hurricane Preparedness Briefing

At the February 27, 2006, Internal Affairs, the Commission decided to require all Florida electric utilities, including municipal utilities and rural electric cooperative utilities, to provide a Hurricane Preparedness Briefing at the Commission's June 5, 2006, Internal Affairs. The briefing allowed the Commission to gauge the storm-readiness of each utility prior to the 2006 hurricane season. The Commission anticipates holding a Hurricane Preparedness Briefing annually, prior to each summer season. The 2007 Hurricane Preparedness Briefing is scheduled for May 23, 2007.

## Inspections and Replacements of Wooden Poles (Docket Nos. 060078-EI & 060077-TP)

To assure the storm-readiness of electric utility distribution poles in an era of increased storm activity, the Commission required an eight-year mandatory wooden pole inspection program for all investor-owned electric utilities and local exchange telephone companies.[7] Each company is required to file, by March 1, annual inspection reports that contain the following informational sections:

[7] Order No. PSC-06-0144-PAA-EI, issued February 27, 2006, in Docket No. 060078-EI. http://www.floridapsc.com/library/filings/06/01671-06/01671-06.pdf and Order No. PSC-06-0168-PAA-TL, issued March 1, 2006, in Docket No. 060077-TP http://www.floridapsc.com/library/filings/06/01762-06/01762-06.pdf.

- A review of the methods the company used to determine National Electrical Safety Code compliance for strength and structural integrity of the wood poles included in the previous year's annual inspections, taking into account pole loadings where required.

- An explanation of the inspected poles, selection criteria, including, among other things, geographic location and the rationale for including each such selection criterion.

- Summary data and results of the company's previous year's transmission and distribution wood pole inspections, addressing the strength, structural integrity, and loading requirements of the National Electrical Safety Code.

- The cause(s) of each pole failure for poles failing inspection, to the extent that such cause(s) can be discerned in the inspection. Also, the specific actions the company has taken or will take to correct each pole failure.

## Annual Distribution Service Reliability Reports by the IOUs (Docket Nos. 060243-EI and 060512-EU)

Annually, by March 1, all IOUs are required to file Distribution Service Reliability Reports pursuant to Rule 25-6.0455, Florida Administrative Code (F.A.C.). On July 31, 2006, the Commission adopted rules that changed the existing reporting requirements for the IOUs to include reliability data for extreme weather events such as hurricanes.[8] Prior reporting requirements allowed for the exclusion of reliability data that is typically related to power outage events that are viewed as outside the utility's ability to prevent. Thus, absent the rule change, the IOUs' reports provided no insight into storm-related impacts on reliable electric service in Florida. The rule changes specifically require IOUs to retain records and data supporting their annual reports.

Effective August 17, 2006, the IOUs are required to report both adjusted and unadjusted reliability performance data. The adjusted reliability performance data typically excludes statistics for those power outage events that are viewed as outside the utility's ability to prevent. The unadjusted reliability performance data includes all power outage statistics, even hurricane events. By including power outage statistics for extreme weather events, the Annual Distribution Service Reliability Reports will provide a complete representation of a utility's overall reliability performance. IOUs are now also required to retain data supporting their reliability performance for a minimum of 10 years. The 10-year period is to ensure that the records of previous facility inspections will be available.

The Commission determined that the most effective method to monitor each utility's ongoing storm hardening initiatives is in conjunction with the Commission's annual review of distribution reliability performance. The storm hardening initiatives are primarily distribution activities.[9] On

[8] Order No. PSC-06-0645-FOF-EI, Notice of Adoptions of Rule 25-6.0455, F.A.C. in Docket No. 060243-EI. http://www.floridapsc.com/library/filings/06/06774-06/06774-06.pdf

[9] Order No. PSC-06-0781-PAA-EI, issued September 19, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/08605-06/08605-06.pdf

October 30, 2006, the Commission held an informal workshop addressing all reports pertaining to a utility's reliability performance, including pole inspection data, storm hardening data, metrics for each storm hardening initiative, and the Annual Distribution Service Reliability Reports. The Commission's expectation was that the March 1 reports should be comprehensive self-critical reports on service reliability.[10] On March 1, 2007, the IOUs collectively filed reports totaling over 3,300 pages, a marked increase over the 2006 filings which totaled 29 pages.[11]

The IOUs' March 1, 2007, reports are currently under review. The Commission typically addresses its review of the reliability reports at an Internal Affairs conference in the third or fourth quarter of the year. For example, in December 2006, the Commission published its review of the IOUs' reliability performance during calendar year 2005.[12]

## Ten Additional Storm Preparedness Initiatives (Docket No. 060198-EI)

On April 4, 2006, the Commission voted to require the IOUs to file plans and implementation costs for the following ten ongoing storm preparedness initiatives on or before June 1, 2006. After its review, the Commission required each IOU to implement programs for each of the following initiatives.[13]

- A Three-Year Vegetation Management Cycle for Distribution Circuits.
- An Audit of Joint-Use Attachment Agreements.
- A Six-Year Transmission Structure Inspection Program.
- Hardening of Existing Transmission Structures.
- A Transmission and Distribution Geographic Information System.
- Post-Storm Data Collection and Forensic Analysis.
- Collection of Detailed Outage Data Differentiating Between the Reliability Performance of Overhead and Underground Systems.
- Increased Utility Coordination with Local Governments.
- Collaborative Research on Effects of Hurricane Winds and Storm Surge.
- A Natural Disaster Preparedness and Recovery Program.

[10] http://www.psc.state.fl.us/utilities/electricgas/eiproject/
[11] Document No. 02092-07, recorded in Docket No. 070000-OT. http://www.floridapsc.com/library/filings/07/02092-07/02092-07.pdf, and Document No. 02582-06, recorded in Docket No. 060000-OT. http://www.floridapsc.com/library/filings/06/02582-06/02582-06.pdf
[12] http://www.psc.state.fl.us/utilities/electricgas/docs/reliabilityreport-2005.pdf
[13] Document No. 03042-06, Vote Sheet, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/03042-06/03042-06.pdf and PSC-06-0781-PAA-EI, issued September 19, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/08605-06/08605-06.pdf

The list of ten initiatives is not intended to encompass all reasonable ongoing storm preparedness initiatives. Rather, the Commission views these initiatives as the starting point of an ongoing process. Utilities and interested persons are encouraged to identify additional initiatives and to suggest alternative plans so long as the same objectives are achieved in a cost-effective manner.

The ten ongoing storm preparedness initiatives are briefly discussed below. Discussion of the initiatives implementing a geographical information system, post-storm data collection and forensic analysis, and detailed outage data are consolidated because effective implementation of any one of these three initiatives is dependent on effective implementation of the other two initiatives. The IOUs are required to provide periodic updates and status reports of their ongoing storm hardening initiatives in their comprehensive Annual Distribution Service Reliability Reports which are filed by March 1.

Vegetation Management

In Order No. PSC-06-0351-PAA-EI, the Commission found that "the vegetation management practices of the IOUs do not provide adequate assurance that tree clearances for overhead distribution facilities are being maintained in a manner that is likely to reduce vegetation related storm damage. We believe that utilities should develop more stringent distribution vegetation management programs."[14]

Consequently, each IOU was required to provide a plan, an implementation timeline, and a calculation of rate impacts for a three-year trim cycle on all distribution circuits. The Commission allowed utilities to propose an alternative plan if the alternative was shown to be equivalent or better in terms of cost and reliability in preparing for future storms.

All five IOUs proposed a three-year trim cycle program for the primary distribution circuits. Alternatives to a three-year trim cycle program for the lateral distribution circuits were proposed by Progress Energy Florida, Inc. (PEF), GPC, and FPL. The Commission ultimately determined that plans from Tampa Electric Company (TECO), Florida Public Utilities Company (FPUC), PEF, GPC, and FPL were found reasonable for initial implementation and subject to annual review.[15,16]

Primary & Lateral Circuits: Distribution circuits consist of primary circuits and lateral circuits. Primary circuits are those that begin at substations and lead outward with the capability of serving thousands of customers. Primary circuits are typically located along or near major roads throughout each community. Primary circuits, like urban commercial traffic routes, are designed for heavy loads. Lateral circuits begin at the primary circuits and provide service to tens or hundreds of customers. Lateral circuits are commonly associated with residential areas and often are located in back lots between the homes. A lateral circuit typically serves a smaller portion of the customers compared to primary circuits just like residential roads are designed for lighter traffic compared to urban commercial traffic routes.

[14] Order No. PSC-06-0351-PAA-EI, issued April 25, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/03645-06/03645-06.pdf

[15] PSC-06-0781-PAA-EI, issued September 19, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/08605-06/08605-06.pdf

[16] PSC-06-0947-PAA-EI, issued November 13, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/10395-06/10395-06.pdf

The City of North Miami filed a protest asserting that FPL should be required to implement a three-year trim cycle for lateral circuits within the boundary of North Miami, and a hearing was held on March 5, 2007. On May 8, 2007, the Commission voted to require FPL to continue to implement its proposed system-wide vegetation management program. FPL was also required to address rapid tree growth within the City of North Miami using mid-cycle trimming, hot-spot trimming, and the Right-Tree-Right-Place program. Thirty days after the Commission's order on this item becomes final, and by March 1 of years 2008 through 2010, FPL is required to file a report with the Commission and the City of North Miami which includes (i) an information package containing historical and projected vegetation management activity and related reliability performance, both for the City and system-wide, (ii) an explanation of how FPL's proposed changes to its vegetation management program will impact the City and the storm resilience of the electrical system serving the City of North Miami, and (iii) documentation summarizing FPL's actions to improve communications with the City of North Miami.

Audits of Joint-Use Facilities

In April 2006, the Commission found that Florida's utilities had not provided adequate assurance that their practices and procedures governing joint-use facilities serve to mitigate storm damages and customer outages. Consequently, each IOU was required to establish a plan, an implementation timeline, and a calculation of rate impacts to audit joint-use agreements that include pole strength assessments.[17] Each IOU's plan for performing pole strength assessments includes the stress impacts of all pole attachments as an integral part of its eight-year pole inspection program.[18] The IOUs' plans were found to be consistent with the Commission's intent; nevertheless, the Commission required that each utility reevaluate its plan annually to assess the need for any adjustment.

Six-Year Transmission Structure Inspection Program

Each IOU was required to establish a plan, an implementation timeline, and a calculation of rate impacts to fully inspect all transmission towers and other transmission line supporting equipment on a six-year cycle.[4] Each utility's plan was reviewed and found to be consistent with the Commission's intent based on the available information.

Hardening of Existing Transmission Structures

The Commission's initiative for hardening existing transmission facilities is closely coupled with inspection of facilities and forensic investigation of failed facilities. In April 2006, the Commission concluded that the electric utilities had neither shown the extent of utility efforts in this area nor the criteria used to select which transmission structures are upgraded or replaced. Each IOU was then required to establish a plan, an implementation timeline, and a calculation of rate impacts to upgrade and replace existing transmission structures. These plans were reviewed and found to be consistent with the Commission's intent based on the information currently available.

[17] Order No. PSC-06-0351-PAA-EI, issued April 25, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/03645-06/03645-06.pdf

[18] Order No. PSC-06-0781-PAA-EI, issued September 19, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/08605-06/08605-06.pdf

As discussed below, utility forensic data is limited but is being expanded consistent with other Commission initiatives. Over time, as each utility collects and reviews its storm performance data, they will be better able to address the adequacy of their efforts to prepare their transmission facilities for future storms.

Geographical Information Systems, Post-Storm Critical Reviews, and Detailed Outage Data

Based on observations during 2004 and 2005, and the information provided pursuant to a January 23, 2006, workshop, the Commission determined that IOUs needed to place a higher priority on implementing programs that provided more detailed information on the performance of facilities in the field, both before and after storms.

In Order No. PSC-06-0351-PAA-EI, the Commission concluded that the electric utilities should develop a transmission and distribution geographic information system (GIS) adequate to provide assurance that sufficiently detailed data is collected to conduct forensic reviews and assess performance of overhead and underground systems. GIS data is necessary to determine whether appropriate maintenance has been performed at the locations impacted by the storm and to evaluate the storm hardening options. The same data regarding overhead and underground system performance is also needed to adequately inform customers and communities that are considering options associated with underground electric facilities.

A key element in mitigating storm-caused outages is having a natural disaster preparedness and recovery plan. A formal disaster plan provides an effective means to document lessons learned, improve disaster recovery training, conduct pre-storm staging activities, plan post-storm recovery, and collect data for forensic reviews and performance assessments.

Consequently, by June 1, 2006, each IOU was required to provide a plan, timeline for implementation, costs, and rate impacts to implement plans to develop a GIS program, collect post-storm data on competing technologies, perform forensic analysis, assess the reliability of overhead and underground systems on an ongoing basis, and develop a natural disaster preparedness and recovery program. The utilities were charged to develop plans that are efficient and cost-effective.

The IOUs' filed plans called for post-storm surveys and data collection in addition to enhancements of existing GIS programs. The Commission found that plans filed by the IOUs met the Commission's objectives.

Increased Coordination with Local Governments

A key element in providing quality electric service is knowing the needs and desires of the customers. While the IOUs have various public outreach programs, the January 23, 2006, workshop highlighted the need for better communication between the IOUs and the cities and counties they serve. Utilities work with local governments when storms threaten and immediately after the storm passes. Nevertheless, the Commission concluded that each utility should increase efforts to actively work with local communities year-round to identify and address issues of common concern.[19]

[19] Order No. PSC-06-0351-PAA-EI, issued April 25, 2006, in Docket No. 060198-EI,

This point was raised at the January, 23, 2006, workshop by Mayor Anne Castro of the City of Dania Beach who suggested that a more integrated partnership between local governments and utilities could assist utilities in better serving customers. Mayor Castro explained:

> We want to be the eyes and ears for FPL. We have offered . . . [to] . . . train our public service people, our public safety people, especially after a hurricane or even on an ongoing basis during the year, as to what to look for in their infrastructure. If they could teach us what to look for as far as poles being bad or wires being bad or fuses hanging or loose ends hanging, our folks, as they routinely do this through code enforcement, through the fire department, through the police department, are happy to go out there and take a look. Even our citizens on patrol . . . turn in half of the code violations anyway . . . they can report all that, they can create a list. . . .

Mayor Castro's comments demonstrate the precise type of cooperative spirit that can help utilities target their resources to meet local needs and priorities.

Precedent for this level of cooperation with local governments already exists. The Department of Community Affairs provides hazard mitigation planning guidance to local governments. Several of the proposals listed in the mitigation guidelines are easily adaptable and equally applicable to utility/government relationships. For example, the guidelines require local governments to provide a multi-hazard map of the community.

The mitigation guidelines also cite the need for land use patterns and discussion on development trends provided by the future land use and coastal elements of the local comprehensive plans. The section on mitigation techniques notes the importance of identifying areas subject to repetitive damage from disasters. It cites the need to develop plans to protect critical functions and structures. In other words, electric utilities need to develop plans to provide service to critical functions and structures. All of these functions are best performed in conjunction with the local governments most familiar with local needs and tolerances. Dialog with local communities would naturally include various overlapping interests, such as undergrounding and tree trimming matters. This type of information can only assist the utility in designing and operating its system in the most cost efficient manner.

The Commission also cautioned that plans are only as good as their implementation and follow-through procedures. Even an ambitious plan can be inadequate if not timely implemented with adequate resources to achieve the desired results. The Commission will monitor each IOU's coordination with local governments through review of the utility's rapport with local governments.

Collaborative Storm Hardening Research by Utilities and Universities

During the January 23, 2006, workshop, the electric utilities appeared to be unaware of work being done by universities to study the effects of hurricane winds and storm surge within Florida.

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http://www.floridapsc.com/library/filings/06/03645-06/03645-06.pdf and
Order No. PSC-06-0781-PAA-EI, issued September 19, 2006, in Docket No. 060198-EI.
http://www.floridapsc.com/library/filings/06/08605-06/08605-06.pdf

Each utility was engaged in independent efforts to gather its own data with little, if any, coordination of resources and information with other utilities.

The Commission found that Florida would be better served by consolidating utility resources through a centrally coordinated research and development effort with universities and research organizations. Coordinating efforts would further the development of storm resilient electric utility infrastructure and technologies to reduce storm restoration costs and outages to customers.[20]

For the program to be effective, utilities must participate in funding. Therefore, the Commission's order required each IOU to establish a plan that increases collaborative research, establishes continuing collaboration, identifies objectives, promotes cost sharing, and funds necessary work. The IOUs were also required to solicit participation from the municipal electric utilities and rural electric cooperative utilities in addition to the available educational and research organizations. The Commission-ordered statewide collaborative research effort with participation by all electric utilities appears to be unique to Florida.

The IOUs response was to establish a non-profit, member financed, organization to coordinate all research efforts. On June 9, 2006, a workshop was held at the Public Utility Research Center (PURC), located in the Warrington College of Business at the University of Florida, to discuss collaborative research efforts. On July 19, 2006, the Commission was provided a copy of a Memorandum of Understanding that established the administrative requirements for Florida's electric utility collaborative research effort.

The research programs address three areas: hurricane wind effects, vegetation management, and undergrounding of electric utility infrastructure.

Hurricane Wind Effects: The wind research project is a long-term effort that will collect data on hurricane force wind impacts on electric facilities through actual events and experimentation. The wind information is needed to fill a gap in the current utility knowledge base. Absent the research effort, each utility would have very little objective wind data which is essential for effective forensic assessments. The knowledge developed through wind research will enable future utility planners to evaluate storm hardening alternatives before implementation, thereby avoiding a potentially costly trial-by-error approach. No end date for the wind research program has been set. By year-end 2007, an interim report will be filed with the Commission for its review.

Vegetation Management: The vegetation management research project is directed at improving vegetation management practices so that outages are reduced, post-storm restoration efforts are reduced, and overall vegetation management costs are reduced.

An industry workshop addressing best practices in vegetation management was held on March 5-6, 2007, in Orlando. The workshop was attended by 30 electric utilities. A report summarizing

[20] Order No. PSC-06-0351-PAA-EI, issued April 25, 2007, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/03645-06/03645-06.pdf

results from the best practice workshop was completed April 17, 2007.[21] The top five best practices ranked by number of votes received are:

- State law (referenced the law in California) giving utility right to trim/remove (26 votes).
- Adequate financial resources to maintain vegetation management cycles (13 votes).
- City partnership to work with homeowner associations/city foresters(10 votes).
- Using herbicides to control growth on vegetation and in ground (8 votes).
- Directional pruning (7 votes).

Additionally, the workshop addressed areas where utilities believed improvements could be made. The top five areas for improvement in vegetation management programs ranked by the number of votes received are:

- Better education of customers and public (22 votes).
- State laws to support tree removals (18 votes).
- Maintenance of some circuits from station to the end of the line (3 votes).
- Access (3 votes).
- Chemical applications (3 votes).

The report on the best vegetation management practices does not discuss any future plans for additional review. The report notes a suggested role for the Commission in providing regular public service announcement campaigns.

Undergrounding of Electric Utility Infrastructure: The undergrounding research project is a shorter term research effort with a final report due March 30, 2008. The research program is structured in three phases: Phase 1 is a meta-analysis of existing research, reports, and case studies; Phase 2 consists of Florida specific case studies of actual projects in which overhead facilities have been converted to underground; and Phase 3 is the development and testing of a methodology to identify and evaluate the costs and benefits of underground specific facilities in Florida. Phase 1 was completed on February 28, 2007. The target dates for completing Phase 2 and 3 are August 6, 2007, and March 30, 2008, respectively. Reports will be filed with the Commission for its review as each phase of the undergrounding research program is completed. A more detailed discussion of the underground research project is presented in Section 3 in the subsection titled "Overhead-Undgrounding Cost Methodology."

A Natural Disaster Preparedness and Recovery Program

A key element in minimizing storm-caused outages is having a natural disaster preparedness and recovery plan. A formal disaster plan provides an effective means to document lessons learned, and to improve disaster recovery training, pre-storm staging activities, post-storm recovery, facility performance data, and forensic analysis. As such, each company's formal disaster preparedness and recovery plan are "living documents" and subject to constant revision as new

[21] "Report on the Workshop for Best Practices in Vegetation Management," April 17, 2007. http://bear.cba.ufl.edu/centers/purc/energy/documents/VegetationManagementWorkshopReport.pdf

lessons are learned. Each IOU is required to maintain a current copy of its formal disaster preparedness and recovery plan with the Commission.

## Rules Governing IOU Storm Restoration Costs (Docket No. 070011-EI)

Prior to Hurricane Andrew in 1992, the IOUs were able to purchase commercial insurance for their transmission and distribution facilities at reasonable and affordable prices. Accruals were made to a property insurance reserve to cover items such as insurance deductible amounts. Due to the level of damage caused by Hurricane Andrew, however, the price of commercial insurance for Florida IOU transmission and distribution facilities became cost prohibitive and uneconomical. As a result, the Commission authorized Florida IOUs to begin operating under a self-insurance program for their transmission and distribution facilities.

Until the 2004 hurricane season, each of the IOU's self-insurance programs was adequate to cover the costs incurred for storm damage restoration. However, the combined effects of the damages caused by the storms during the 2004 and 2005 hurricane seasons far exceeded the amounts that had been accumulated in four of the five IOU's property damage reserves. In the various dockets concerning the recovery of the storm restoration costs, each IOU employed a different methodology to determine the amount of storm damage restoration costs that should be charged to the property damage reserve. Through its orders, the Commission established a basic policy that only incremental costs should be charged to the storm damage reserve.

In an effort to promote consistency in the accounting for storm restoration costs, the Commission initiated rulemaking in 2006. On February 21, 2007, a rule development workshop was held, and draft rule language was discussed. All of the investor owned electric utilities, the Office of Public Counsel and the Florida Industrial Power Users Group participated in this workshop.

On April 10, 2007, the Commission proposed amendments to Rule 25-6.0143, F.A.C., dealing with the appropriate charges to the storm damage reserve. This rule will help ensure that only "incremental" costs are charged to the storm reserve and "normal costs" are charged to the normal operating accounts. This is necessary to ensure that consumers only pay once for reasonable and prudent costs associated with storm restoration. For instance, an electric distribution repairman's salary is considered a normal operating cost chargeable to base rates. If this salary amount were charged to the storm damage reserve during storm restoration, it would have the potential of resulting in double recovery from customers because this salary amount is already being recovered through base rates and should not be recovered again through a storm surcharge. However, the overtime pay of the electric distribution repairman associated with storm restoration would be considered an incremental cost chargeable to the storm reserve.

This accounting rule also clarifies which "incremental" costs can be charged to the storm damage reserve and which costs cannot. For instance, image enhancing advertising costs incurred during storm restoration cannot be charged to the storm reserve. This rule will reduce the time and cost associated with formal storm recovery proceedings since some of the more contentious issues are now addressed.

In addition to the storm accounting rulemaking, the Commission plans to evaluate both the appropriateness and accounting treatment of "captive" or "cooperative" type of insurance coverage for electric transmission and distribution facilities.[22] Since electric utilities began Commission authorized self-insurance programs in the aftermath of Hurricane Andrew in 1992, the Commission has encouraged utilities to seek cost-effective insurance including group or cooperative types of insurance programs. These would include multiple utilities with the intent to spread risk and reduce premiums. At an informational workshop, on May 9, 2007, the utilities made a presentation on their efforts to explore various storm damage insurance options. The main topic was the possibility of establishing an industry mutual insurance group.

## Wind and Flood Resistance of New Electric Facilities (Docket Nos. 060173-EU, 060512-EU)

On February 27, 2006, during an Internal Affairs conference, the Commission directed its staff to initiate rulemaking to adopt distribution construction standards that are more stringent than the minimum safety requirements of the National Electrical Safety Code.[23] In response to that decision, Docket No. 060173-EU was established on March 1, 2006, to address rules applicable to IOUs. After several initial rulemaking workshops, Docket No. 060512-EU was established July 26, 2006, to separately address the same subject matter for municipal electric utilities and cooperative electric utilities.

The Commission's efforts to adopt storm hardening construction standards ultimately included three rulemaking workshops, two rule hearings, two Agenda Conferences, and a rule challenge at the Division of Administrative Hearings. Throughout the rulemaking process, third-party attachers to electric utility poles, such as telephone and cable companies, expressed apprehension that the IOUs would use Commission rules as a means of shifting the costs of storm hardening to the non-electric companies attached to the poles. The Commission directed the IOUs to meet with the telephone and cable companies to try to resolve the expressed concerns. However, the parties reported that they were unable to reach consensus.

Cable Industry Rule Challenge: On July 28, 2006, Florida Cable Telecommunications Association (FCTA) filed a Petition for Administrative Determination of the Invalidity of Proposed Rules with the Division of Administrative Hearings (DOAH Case No. 06-2733-RP). FCTA challenged proposed rules that applied to IOUs as well as those that applied to municipal electric utilities and cooperative electric utilities. On November 14, 2006, FCTA withdrew its challenge to proposed new Rule 25-6.0343, F.A.C., the rule applicable to municipal and cooperative electric utilities. On December 22, 2006, the rule challenge case was closed because FCTA withdrew its petition.

Notwithstanding the lack of consensus within the industries, on October 4, 2006, the Commission voted to adopt new rules applicable to municipal electric utilities and cooperative electric utilities. On December 5, 2006, the Commission voted to adopt rules applicable to

[22] A captive is a closely held insurance company whose insurance business is primarily supplied by and controlled by its owners. This could include multiple affiliated and non-affiliated utilities.

[23] Order No. PSC-06-0351-PAA-EI, issued April 25, 2006, in Docket No. 060198-EI. http://www.floridapsc.com/library/filings/06/03645-06/03645-06.pdf

IOUs. The adopted rules promote cost-effective strengthening of electric infrastructure in Florida to better withstand extreme weather events and reduce restoration costs and outage times. A summary of the rules follows.

Rule 25-6.034 Standard of Construction

The rule requires IOUs to employ accepted engineering practices and comply, at a minimum, with the applicable edition of the National Electrical Safety Code.

Rule 25-6.0341 Location of the Utility's Electric Distribution Facilities

IOUs, to the extent feasible and cost-effective, are required to place new and replacement distribution facilities in locations that facilitate safe and efficient access for installation and maintenance of its facilities. In general, such locations are expected to be adjacent to public roads and normally in front of the customer's premises rather than along back lot-lines among the fences and vegetation that typically boarder the customer's property. Consequently, the rule requires maximum use of easements and road rights-of-way. IOUs are required to notify and attempt in good faith to accommodate concerns raised by third-party attachers and joint users. To the extent practical, IOUs are required to coordinate the construction of their facilities with affected third-party attachers. Finally, in the event of a dispute, resolution may be sought from the Commission.

Rule 25-6.0342 Electric Infrastructure Storm Hardening

Each IOU is required to file a comprehensive storm hardening plan for review and approval by the Commission. The IOU storm hardening plans would initially be filed within three months of the effective date of the rule (May 7, 2007), then every three years thereafter. Upon petition or on its on motion, the Commission will review and approve changes to the storm hardening plans more frequently than every three years if needed.

The IOU storm hardening plans are explicitly required to address all the key elements associated with facility hardening including:

- Compliance, at a minimum, with the National Electrical Safety Code.
- The applicability of extreme wind loading standards for new and replacement distribution facilities.
- Mitigation of damage to underground facilities and supporting overhead facilities due to flooding and storm surges.
- Safe and efficient access for the installation and maintenance of new and replacement distribution facilities.

The IOU storm hardening plans must also include a detailed explanation of the company's deployment strategy. Each plan must contain a description of the facilities affected and the technical design specifications, standards, and construction methodologies to be used. The communities and areas within the utility's service area affected by the plan must be identified. Critical infrastructure must be defined.

To gain Commission approval of storm hardening plans, each IOU must demonstrate that its plan is prudent, practical, and cost-effective to all affected parties, including third-party attachers. Each storm hardening plan must identify the extent to which collocation facilities are affected. Attachment Standards and Procedures governing the safety, reliability, pole loading capacity, and engineering standards and procedures for third-party attachments must be included. Each plan must contain an estimate of the costs and benefits to the IOU such as reductions in storm restoration costs and outages. Further, each plan must provide an estimate of the costs and benefits to third-party attachers, with such information to be provided to the IOU by the affected third-party attachers.

The Commission found that requiring the IOUs to submit storm hardening plans for Commission approval will meet the Commission's objectives of enhancing reliability and reducing restoration costs and outage times. At the same time, the concerns over potential undue cost incurrence by or cost shifting to third-party attachers will be fully addressed by the Commission.

Rule 25-6.0343 Municipal Electric Utility and Rural Electric Cooperative Reporting Requirements

The rule requires municipals and cooperative electric utilities to report annually, by March 1, the extent to which their construction standards, policies, practices, and procedures are designed to storm-harden their transmission and distribution facilities.

The reporting requirements of their standards, policies, practices, and procedures include:

- Compliance with the National Electrical Safety Code.
- Consideration of extreme wind load, flooding and storm surge.
- Placement of facilities.
- Pole attachments.
- Pole inspections.
- Vegetation management programs.

These are the same topics that the Commission has pursued with the IOUs. As part of the alternative rule negotiations, the municipals and cooperatives agreed to share overall distribution reliability data with the Commission so that the impacts of storm hardening on overall system reliability can be validated and evaluated.[24]

Rule 25-6.0345 Safety Standards for Construction of New Transmission and Distribution Facilities

The Commission adopted the 2007 National Electrical Safety Code as the applicable minimum safety standards for transmission and distribution electrical facilities constructed on or after February 1, 2007.

[24] Rule Hearing Transcript, Document No. 09372-06, October 4, 2006, in Docket No. 060512-EU. http://www.floridapsc.com/library/filings/06/09372-06/09372-06.pdf

# SECTION 3. UNDERGROUNDING INITIATIVES AND ISSUES

## *Commission Actions in 2006-2007*

In its review of infrastructure hardening, the Commission recognized that, in some situations, conversion to underground could be preferable to overhead electric distribution facilities. On February 27, 2006, the Commission voted to initiate rulemaking to change policies applicable to customer Contribution-in-Aid-of-Construction (CIAC) and policies on construction standards to include storm hardening. Docket Nos. 060172-EU and 060173-EU were established in response to that decision. This chapter describes the Commission's changes to policies which could be inhibiting the cost-effective installation of underground utilities.

Another Commission effort to promote conversion to underground electric distribution facilities involves the development of a comprehensive planning tool that addresses the interests of all affected parties including electric utilities, other utilities, community planners, and individual customers. This chapter describes a research program that is developing a comprehensive planning tool.

At each juncture, the Commission has been careful to consider increased storm resilience, reduced storm restoration costs, reduced storm restoration time, and overall possible cost increases to all of the IOUs' customers.

## Policy Changes on Calculating the Contribution-In-Aid-Of-Construction (CIAC) for Underground Distribution Facilities (Docket Nos. 060172-EU and 060173-EU)

It is generally recognized that construction of underground electric distribution systems is more expensive than a comparable overhead system. Thus, when underground facilities are requested, the customer is responsible for the difference between the cost of the underground project and the cost of a comparable overhead project. This cost difference, or Contribution-In-Aid-of-Construction (CIAC), is often cited as a barrier to installation of underground because the amount is often large and because the customer is required to pay the total cost difference upfront, before construction begins.

In Docket Nos. 060172-EU and 060173-EU, the Commission approached the issue of reducing the CIAC from several directions simultaneously. First, new rules require utilities to compare hardened overhead to hardened underground facilities to ensure comparable costs. Second, utilities were required to include the cost differentials in long-term operating costs and benefits, including the costs and benefits of storm restoration in the CIAC. Third, the Commission provided for sharing some portion of the costs of undergrounding a specific location with all ratepayers, if that project provided quantifiable benefits to the utility's customers outside of the immediate area. Finally, the Commission continues to endorse alternative CIAC collection procedures that spread the CIAC amount over a time period rather than requiring full upfront

payment. The new Commission policies are generally expected to reduce the CIAC amount for underground distribution facilities in many instances.

The new Commission policies became effective February 7, 2007.[25] The four major IOUs filed storm hardening plans in May 2007. Florida Public Utilities Company requested a rule waiver because it anticipates filing for a general rate increase in 2007. After Commission review and subject to Commission approval, each utility will implement the storm hardening plans through subsequent tariff filings. As discussed in Section 2, the electric utilities made storm hardening filings in May 2007 that are still under review. Tariff filings implementing the Commission approved storm hardening plans for each utility are also required. In April, both FPL and GPC filed updated rates for construction of new underground facilities.[26] Commission review of these filings is ongoing and will be coordinated with the review of the hardening plans to ensure consistency in approach and calculations.

Cost Comparison of Storm Hardened Underground and Overhead Facilities

In most cases, the initial construction and installation of underground electric distribution facilities costs more than building comparable overhead facilities. This high cost is due to the increased complexity of underground systems and other factors such as more expensive hardware and labor. Consequently, the CIAC amount is dominated by the upfront differential in construction costs of underground compared to overhead distribution facilities.

Effective February 7, 2007, new Commission policies require each IOU to develop new storm hardened construction standards for both underground and overhead electric distribution facilities. Storm hardened construction standards will more appropriately identify costs as well as conditions favorable to underground facilities. Updates to construction standards addressing storm hardening will increase the cost of construction for both overhead and underground systems. However, costs to implement extreme wind standards for overhead systems may generally exceed the costs to address flood and resultant water intrusion issues associated with underground systems. Thus, consideration of storm hardening construction standards may reduce the otherwise applicable CIAC for undergrounding and make conversion to underground facilities more affordable.

Long-Term Operating Cost Differences Between Underground and Overhead Facilities

Historically, the calculation of the CIAC amount did not include long-term utility costs and benefits associated with underground distribution systems. Experience during the 2004 and 2005 storm seasons indicated that areas with underground service experienced fewer outages. While utilities were aware in general terms of these benefits, they had not maintained accounting data sufficient to quantify the differences between overhead and underground systems.

In Docket No. 060172-EI, the Commission adopted rule changes to recognize these potential savings by requiring utilities to include the long-term costs for normal day-to-day operations and

[25] Order No. PSC-07-0043-FOF-EU, Notice of Adoption of Rules, issued January 16, 2007, in Docket Nos. 060172-EU and 060173-EU, http://www.floridapsc.com/library/filings/07/00378-07/00378-07.pdf

[26] Docket 070231-EI, Petition for approval of 2007 revisions to underground residential and commercial distribution tariff, by Florida Power & Light Company. http://www.psc.state.fl.us/dockets/cms/docketDetails.aspx?docket=070231
Docket 070242-EI, Request for revisions to underground residential differential, by Gulf Power Company. http://www.psc.state.fl.us/dockets/cms/docketDetails.aspx?docket=070242

also storm restoration costs in all CIAC calculations. Prospectively, utilities will implement the necessary accounting measures to accurately record long-term operating costs differences between overhead and underground systems.

An Alternative to Upfront CIAC Payment

As noted above, one of the primary concerns with any CIAC amount is the requirement to pay an often significant amount upfront before the construction begins. To address the "sticker shock" often associated with projects that convert existing overhead distribution facilities to underground, the Commission approved tariffs for PEF and FPL that allow payment of the CIAC over a period of time.

An Alternative to Upfront CIAC Payment for PEF's Customers

Effective November 5, 2002, the Commission approved a Local Governmental Underground Cost Recovery tariff requested by PEF. This tariff allows local governments to pay for the conversion upfront and then recoup their conversion costs from affected customers through a charge on those customers' electric bills. Under the tariff, the governmental entity may finance the cost of the conversion on its own, or it may request that PEF finance the project. Utility financing is typically more expensive because a utility's debt costs are typically higher than that available to a government entity. Nevertheless, utility financing is an opportunity for governments who may not wish to, or may be precluded from, incurring additional debt.

Based on a formula stated in the tariff, PEF establishes a monthly underground assessment fee for each customer in the designated area. The formula is designed to recover the cost of the conversion project over a period not to exceed 20 years. The underground assessment fee is expressed as a percentage of the customer's bill. The underground assessment fee is a charge for electric service just like the other monthly rates are. Thus, failure to pay the underground assessment may result in disconnection of service.

PEF had a similar option approved in 1994, after numerous requests by municipalities for alternatives to a one-time payment for conversion of overhead facilities. Under the 1994 tariff, PEF stated that it prepared 11 detailed cost estimates for cities. However, in December 1997 PEF withdrew the tariff. PEF cited three reasons for the closure of the offering: (i) lack of interest; (ii) programming costs; and (iii) the potential for retail wheeling. (Retail wheeling allows retail customers to select their generation supplier much as customers select their long distance telephone company.) In renewing the offer in 2002, PEF cited increased interest by cities in the conversion of overhead facilities. To date, no governmental entity has applied for this option although PEF reports that one city is seriously considering it.

An Alternative to Upfront CIAC Payment for FPL's Customers

FPL instituted a tariff similar to PEF's Local Governmental Underground Cost Recovery tariff in August 2003. Like PEF, FPL establishes a Governmental Undergrounding Fee pursuant to a formula, which is applied to the bills of customers residing in the designated area. Unlike PEF, FPL requires the governmental entity to finance the conversion and does not offer the option for the utility to finance the construction. FPL also has no customers currently taking service under this tariff.

Cost-Sharing

Under prior rules, an IOU had the ability to waive collection of some or all of any CIAC. The full CIAC amount, however, had to be recorded on the company's books as if the entire CIAC had been collected from the customer. This meant the utility's stockholders absorbed the cost of any CIAC not collected from the customer. This procedure was adopted to protect the general body of ratepayers from subsidizing localized construction from which they received little or no benefit and ensured non-discriminatory treatment of customers.

Throughout the various rule workshops and in written comments, parties argued that some localized construction projects may provide benefits to the general body of ratepayers and that those benefits should be recognized. One method of recognizing those benefits is to reduce the amount of an otherwise applicable CIAC to the customer and still allow the utility to record the full CIAC amount as if the entire CIAC had been collected from the customer.

However, doing this accounting treatment results in the utility recording a corresponding larger amount in investments because the direct customer payment is smaller. Larger investment costs typically result in higher future rates for all customers to address the increased investment costs. If, however, benefits to all other customers can be quantified, then it is fair to ask all customers to share in the cost necessary to achieve those benefits. The Commission's new rules allowing for cost-sharing also require that the Commission determine that quantifiable benefits to the general body of ratepayers exist and that those benefits are commensurate with the waived charge. Such benefits would have to be in addition to operational savings and storm restoration savings which are already included in the initial CIAC calculation.

At this time, the rule sets no limitation on the nature of the additional cost benefits that could be subject to cost-sharing. Based on a recent study by municipalities, it appears there is interest in evaluation of many factors and costs. A report prepared for the Municipal Underground Utilities Consortium, an organization of various municipal governments interested in converting their existing overhead facilities to underground construction "support[s] a substantial study of the cost-effectiveness of undergrounding electric distribution facilities considered on a life-cycle basis….[to address] not only the initial installation costs of [underground] vs. [overhead] facilities, but also the differences in operating and maintenance costs…"[27] The report also purported to include "qualitative" benefits such as improved health and safety during and after storms, life safety, aesthetics, reliability, economic development, environmental benefits and general community enhancements.

An example of both the broadened definition of CIAC components and cost sharing is seen in a pilot tariff filed by FPL. The pilot tariff approved by the PSC on April 24, 2007, provides a flat 25 percent discount from the otherwise applicable CIAC based on FPL's estimated average storm restoration cost savings. The pilot tariff is limited to municipal governments and contains a restriction on the size of the project necessary to qualify for the discount. Under the proposal,

[27] "Cost-Effectiveness of Undergrounding Electric Distribution Facilities in Florida" prepared by PowerServices, Inc., for the Municipal Underground Utilities Consortium, November 2006, http://www.floridapsc.com/library/filings/06/10429-06/10429-06.pdf

the full amount of the investment would be recorded by FPL, and the difference between what the municipality customer pays and the full cost would become the responsibility of the general body of ratepayers in a rate case. The pilot tariff only addresses the initial construction and storm restoration cost components of the CIAC. Customers are free to negotiate on any other cost component as they are today. The tariff is a pilot offering effective for contracts signed between April 4, 2006, and October 6, 2008. Additional information is expected to be filed in that time frame which will allow the PSC to better determine if the amount of the credit is appropriate. FPL is required to file an extension of the current tariff, or for any modification, two months prior to the expiration of the tariff.

## Overhead-Undergrounding Cost Methodology

A piece-meal approach to underground electric distribution issues is not the most effective means of addressing the needs of utilities and communities. As part of its storm-hardening initiatives, the Commission directed all electric utilities to begin collaborative research projects focused on finding better solutions for Florida. One of these research projects includes the development and testing of a methodology to identify and evaluate the costs and benefits of undergrounding specific facilities in Florida.

The development and testing of a methodology that identifies and evaluates underground facilities is a significant research program that is fully supported by all of Florida's electric utilities, including investor-owned, municipal, and cooperative electric utilities. The PURC facilitates this effort by providing focus and coordination. While the research initiative includes other topics, such as wind effects and vegetation management, this section will only address the research program associated with underground electric distribution facilities.

PURC coordinated the soliciting of competitive bids from consulting firms for the underground research program. The project was awarded to InfraSource Technologies. The underground research program is structured in three phases. Upon completion of each phase, a summary report is filed with the Commission for its review. Collectively, these work-products will comprise a comprehensive planning tool addressing the needs of utilities as well as communities.

Phase 1: Meta-Analysis

A meta-analysis is a technique for compiling, summarizing, and reviewing previous quantitative research. In the first phase of the underground research program a meta-analysis was performed on existing research, reports, and case studies addressing conversion from overhead electric systems to underground systems. A summary report of the findings was completed on February 28, 2007. [28] The meta-analysis was presented to the Commission at its Internal Affairs meeting on May 7, 2007.

InfraSource, the independent consulting firm which was awarded the research project, reviewed all pertinent studies on undergrounding including academic, utility, municipality, and state

[28] "Underground Assessment Phase 1 Final Report" by InfraSource for PURC, February 28, 2007, http://bear.cba.ufl.edu/centers/purc/energy/documents/Undergrounding_AssessmentPH1.pdf

sponsored efforts. Based on this review, InfraSource concluded that not only is undergrounding expensive, but also that the qualitative benefits often used to justify the cost of conversions to underground are often nebulous and difficult to quantify. InfraSource also concluded that there are benefits to undergrounding facilities, such as reduced tree-trimming expense, lower damage and restoration costs, fewer outages during normal weather, and perceived improved aesthetics. However, a shortcoming found in the studies was the tendency to exclude the negative factors associated with underground projections, such as, environmental damage from trenching, utility hazards from digging into cables, longer outages and more customers affected per outage, reduced flexibility in system expansion, possibly higher operating and maintenance expense, and stranded cost for the utility. Unanswered in the studies reviewed was the optimal method of financing such construction.

InfraSource noted that there have been many municipal studies to investigate undergrounding and that no study recommends broad-based undergrounding, but several recommend targeted undgrounding to achieve specific community goals. Without consideration of aesthetics, no study reviewed concludes that wholesale conversion of overhead electric distribution lines to underground can be fully cost justified.

In conclusion, InfraSource noted that no state has required extensive undergrounding of distribution facilities and that undergrounding is rarely justified on a straight cost benefit analysis. Virtually no academic or industry data is available addressing storm reliability modeling of the electric distribution system. Existing research on mitigating the impacts of major storms on electric distribution systems is not sufficient for use in a detailed study. Conversion of overhead facilities to underground facilities is rarely 100 percent justified on the basis of costs and quantifiable benefits.

Phase 2: Case Studies

Phase 2 of the research program consists of documenting actual conversion to underground projects in Florida, or applicable to Florida. The Phase 2 final report is due August 6, 2007. Case studies of actual underground installations will expedite collection of real-world data that is both current and meaningful to all. Actual underground installation projects in various regions of the state will be selected to represent coastal versus inland, city versus rural, technology differences and other key parameters to enable a broad-based assessment of Florida. The costs and benefits reviewed will include retrofit costs, reliability effects, any direct benefits to the utility and customers, and indirect social benefits resulting from the underground project.

Additional benefits to be reviewed in the Phase 2 report include avoided economic and business losses, reduced operating and maintenance expense (such as vegetation management), and enhanced property value. Particular attention will be given to the drivers of each undergrounding project, common factors, and challenges unique to each case study.

Phase 3: Development and Testing of a Cost/Benefit Methodology

The final report of this research effort is scheduled for completion March 30, 2008. Information and observations gleaned from the prior two phases will be relied on to develop and test a methodology to identify and evaluate the costs and benefits of undergrounding specific facilities in Florida. The outcome will be a detailed manual and a prototype computer model for

estimating costs and benefits to all interested parties. The methodology will account for, but not be limited to, location-specific conditions, known properties of materials and methods used in undergrounding applications, lifecycle costs, public (social) and private costs of outages, reliability improvements, and conditions in Florida. Other considerations include diversity with respect to funding sources, such as grants and economic development initiatives.

Special attention will be given to the distribution of costs and benefits across customer, utilities, and other stakeholders. Efforts will be made to seek information from telecommunications and cable television companies regarding their impacts for purpose of inclusion in the methodology. Some benefits may be conceptually valid but infeasible to quantify with hard data, especially in a general statewide effort. For example, the loss of power after a hurricane may result in a loss of business if that business cannot otherwise operate. How much money is actually lost is likely to be subjective and a local matter, so testing the cost/benefit methodology after it is developed is necessary.

## Conclusion

As discussed above, the Commission has initiated rulemaking to establish a methodology for determining the effects of storm-related costs on the decision to employ the undergrounding of electric distribution facilities as a storm-hardening measure. Coupled with collaborative research and the enhanced collection of overhead and underground facility performance data by electric utilities before and after severe storms, the Commission will be better able to determine and pursue more specific actions to promote and encourage the undergrounding of existing and new distribution, where prudent, to strengthen electric distribution systems and reduce outages and restoration costs resulting from severe weather. These efforts will enable the Commission to identify areas where statutory changes may be needed and will form the basis for recommendations to the Legislature.

# SECTION 4. CONCLUSIONS

## *Recommendations*

As stated in the Overview on pages 3 and 4, studying the 2004-2005 hurricane impacts led to three overarching recommendations. First, and perhaps the most critical recommendation, is for Florida to maintain a high level of storm preparation no matter whether recent hurricane seasons have been mild or severe. Second, strengthening Florida's electric infrastructure to better withstand the impacts of severe weather events should include a wide range of hardening activities that will take years to complete. Finally, regarding conversions of existing overhead electric facilities to underground, there is a need to establish additional comprehensive planning tools to enable the Commission and utilities to identify and implement those instances and circumstances where undergrounding is appropriate as a means of storm hardening. These planning tools should take into consideration the needs of local communities. Such planning tools will aid utility and community planners to make better informed decisions and avoid costly mistakes. Throughout its storm hardening program, the Commission has been careful to balance the need to strengthen the state's electric infrastructure to minimize storm damage, reduce outages, and reduce restoration time while mitigating excessive cost increases to electric customers.

## *Ongoing Commission Actions*

As the currently implemented hardening measures discussed throughout this report progress, more detailed information on their effectiveness and related costs will become available. For example, as the collaborative university research described in this report is completed, more definitive data and information will be developed on (1) the impacts of wind speed on above-ground electric infrastructure, and (2) how to identify areas and circumstances when electric distribution lines should be placed underground. With more complete and detailed information, the Commission will be able to formulate and pursue additional actions or revise current approaches to storm hardening and identify areas where specific legislative actions are required.

As described in the body of this report, work continues at the Commission to enhance the reliability of Florida's distribution and transmission grids during extreme weather events. These ongoing activities include:

Annual Electric Industry Briefing on Hurricane Preparedness (page 17)

On May 23, 2007, the Commission will conduct a public workshop during which each Florida electric utility will report on its Hurricane Preparedness Plans for the 2007 storm season.

Annual Assessment of Comprehensive Reliability Reports (page 18)

On March 1, 2007, pursuant to Rule 25-6.0455, each investor-owned utility filed a Distribution Service Reliability Report providing detailed information of its distribution system reliability. Each utility's Distribution Reliability Report includes performance data for storm-related outages and non-storm-related outages for a ten-year period through 2006. Also, on a voluntary basis, Florida's municipal electric utilities and rural electric utilities have provided similar reliability data to the Commission. This outage data will be reviewed by the Commission to determine areas where improvements can be made.

Proceeding to Implement Storm Hardening Standards (page 27)

The Commission has adopted new rules requiring each IOU to file a comprehensive storm hardening plan for review and approval by the Commission. The initial storm hardening plans were filed on May 7, 2007, and will be updated every three years. The plans address a wide range of utility storm hardening activities including (1) compliance, at a minimum, with the National Electric Safety Code, (2) the applicability of extreme wind loading standards for new and replacement distribution facilities, (3) mitigation of damage to underground facilities and supporting overhead facilities due to flooding and storm surge, and (4) safe and efficient access for the installation and maintenance of new and replacement distribution facilities. The IOU storm hardening plans include input from telecommunications and cable companies whose facilities collocate on electric distribution poles. The Commission's review of the IOU storm hardening plans will take place through public workshops, hearings, and agenda conferences during 2007.

Tariffs to Promote Underground Electric Distribution Facilities (page 30)

The Commission has adopted new rules requiring each IOU to file tariffs that reflect the costs and benefits of storm hardening in the calculation of Contribution-in-Aid-of-Construction (CIAC) charged for new underground distribution and conversions of existing overhead facilities to underground. Also, as part of its additional storm preparedness initiatives in Docket No. 060198-EU, the Commission required each IOU to enhance the collection of (1) detailed outage data differentiating between the reliability performance of its overhead and underground systems, and (2) after a severe storm, post-storm performance data including forensic analysis of any damage incurred. Finally, the Commission directed all electric utilities to participate in collaborative university research to develop and test methodologies to identify and evaluate the cost and benefits of underground distribution facilities. The results of Phase 1 of this research, an analysis of all previous quantitative research currently available, was reported to the Commission on May 7, 2007. Results from Phase 2, actual case studies of overhead-to-underground conversions in Florida, are due August 6, 2007. Phase 3, the development and testing of a cost/benefit methodology, is scheduled for completion by March 30, 2008.

Continued Research (pages 24, 34)

In addition to the research into the cost-effectiveness of underground distribution mentioned above, the Commission also directed Florida's electric utilities to participate in collaborative university research in the areas of (1) hurricane wind effects, and (2) vegetation management.

The wind research project is a long-term effort to collect data on hurricane force wind impacts on electric facilities. Electric utilities will fund the installation of equipment in key areas of the state to measure actual wind speeds during hurricane and severe storm events. This data will be used to evaluate the effectiveness of storm hardening of structures affected by extreme winds. By year-end 2007, an interim report on the wind research project will be filed with the Commission for its review.

The vegetation management research project is directed at improving vegetation management practices so that outages are reduced, post-storm restoration efforts are reduced, and overall vegetation management costs are minimized. An initial report summarizing the results from a best practices workshop was completed on April 17, 2007. As discussed below, the Commission will continue its review in the area of vegetation management as part of its review of utility hardening plans and report its findings and recommendations to the Governor and Legislature in subsequent updates to this report.

## *Future Commission Reports*

In order to keep the Governor and Legislature informed of its progress, the Commission will provide an addendum to this report by February 1, 2008, describing Commission actions completed between May 1, 2007, and December 15, 2007. Additionally, the Commission will provide a complete update to this report by July 1, 2008, which will include recommendations for any needed legislative action.