

A large, lattice-structured electrical transmission tower stands prominently in the center of the image. The tower is silhouetted against a bright, hazy sky that transitions from a pale blue at the top to a warm orange and yellow near the horizon, suggesting a sunset or sunrise. The tower's complex structure of cross-bracing and vertical supports is clearly visible. In the lower foreground, there are dark, out-of-focus silhouettes of trees and foliage, adding depth to the scene.

# **REPORT ON TRANSMISSION SYSTEM RELIABILITY AND RESPONSE TO EMERGENCY CONTINGENCY CONDITIONS IN THE STATE OF FLORIDA**

**SUBMITTED TO THE GOVERNOR AND LEGISLATURE TO FULFILL  
THE REQUIREMENTS OF SENATE BILL 888**

**FLORIDA PUBLIC SERVICE COMMISSION  
MARCH 2007**

1.	EXECUTIVE SUMMARY .....	1
	Legislation.....	1
	Overview.....	1
	Findings.....	2
2.	INTRODUCTION .....	3
3.	FLORIDA’S TRANSMISSION SYSTEM .....	4
	Basics of Power Flow .....	4
	Description of Florida’s Existing Transmission System .....	5
	Role of National and Regional Reliability Councils.....	8
	Reliability Criteria .....	9
	Mitigation Strategies.....	10
	Security Coordinator.....	10
4.	STATE AND FEDERAL REGULATION.....	11
	Commission Authority.....	11
	Ten-Year Site Plan.....	11
	Power Plant Siting Act.....	11
	Transmission Line Siting Act .....	12
	Federal Authority .....	13
	Open Access Transmission Tariff.....	13
5.	RESULTS OF UTILITY EXPANSION PLANS .....	15
	Generation.....	15
	Transmission .....	16
6.	RESULTS OF COORDINATED TRANSMISSION PLAN .....	18
	Coordinated Transmission Planning Process.....	18
	Short-Range Studies.....	20
	Florida Central Coordinated Study .....	20
	Long-Range Studies.....	22
	Taylor Energy Center.....	22
	North Florida (Tallahassee) .....	22
	Transmission Siting Issues.....	23
	Third 500 kV Line at Florida-Southern Interface .....	24
	Lake Tarpon - Kathleen .....	25
	Other Examples.....	25
7.	INFRASTRUCTURE HARDENING ISSUES .....	26
	Service Reliability Impacts.....	27
	Commission Actions in 2006.....	29
	Future Commission Actions .....	31
8.	CONCLUSIONS.....	32
	Transmission System Reliability .....	32
	Electric System Hardening .....	32

# 1. EXECUTIVE SUMMARY

## ***Legislation***

Chapter 2006-230, Section 19(1), at 2615, Laws of Florida<sup>1</sup>, passed by the 2006 Florida Legislature, states:

The Florida Public Service Commission shall direct a study of the electric transmission grid in the state. The study shall look at electric system reliability to examine the efficiency and reliability of power transfer and emergency contingency conditions. In addition, the study shall examine the hardening of infrastructure to address issues arising from the 2004 and 2005 hurricane seasons. A report of the results of the study shall be provided to the Governor, the President of the Senate, and the Speaker of the House of Representatives by March 1, 2007.

## ***Overview***

The Florida Public Service Commission has broad authority over the adequacy and reliability of the state's electric grid. In exercising its authority, the Commission takes action in a variety of forums:

- Review of Ten-Year Site Plans;
- Coordination of generation and transmission planning to ensure that adequate facilities are constructed; and
- Determination of need for generation and transmission facilities.

The Commission's Ten-Year Site Plan process, conducted pursuant to the requirements of Section 186.801, Florida Statutes, has historically addressed a wide range of issues pertaining to generation and transmission planning in the state. In 2006, the Commission placed additional emphasis on its review of transmission system planning, adequacy, and reliability. The Commission uses this process to collect data from individual utilities and from the Florida Reliability Coordinating Council (FRCC).<sup>2</sup>

At the direction of the Commission, Peninsular Florida's utilities complete an annual ten-year long-range transmission study. The 2006-2015 Long Range Transmission Reliability Study is a steady-state assessment of Peninsular Florida's transmission system to ensure that it remains stable under normal and emergency conditions. Annual transmission planning studies normally begin in June of each year and are completed by March of the following year.

The widespread hurricane damage in Florida in 2004 and 2005 provided strong evidence of the vulnerability of the state's electrical system to the effects of hurricanes. In 2006, the Commission initiated a multi-faceted approach to address storm preparation, including increased pole inspections, enhanced vegetation management, and revisions to overhead and underground

---

<sup>1</sup> This law was the result of Senate Bill 888.

<sup>2</sup> The FRCC is one of eight regional electric reliability councils that comprise the North American Electric Reliability Council (NERC). Discussed in Section 3.

construction standards. When making its decisions, the Commission carefully balanced the need for developing a robust transmission and distribution system with the need to prevent excessive rate impacts to utility customers.

## ***Findings***

Overall, the results of the 2006-2015 Long Range Transmission Reliability Study indicate that Peninsular Florida's transmission system is adequate to provide reliable service to retail customers. The Commission found that the planning methods and criteria used in the study are based on sound utility practices and procedures. In order to maintain a reliable transmission system that will reliably serve the state's increasing need for electricity, Peninsular Florida's utilities plan to add an additional 1,109 miles of transmission lines to the system, at a cost of approximately \$1.7 billion, over the next five years.

The short-range analysis shows that the use of mitigation strategies, such as generation re-dispatch, should successfully alleviate all contingency conditions appearing in the first five years. Extensive use of operational strategies will be required for contingencies occurring on transmission lines connecting generating capacity in Polk County to load centers near Orlando. Utilities in the region have committed to spend approximately \$277 million for additional transmission facilities needed during the 2008-2011 period.

The long-range study reveals developing transmission needs associated with increasing power flows in north Florida, near Tallahassee, and with the proposed construction of the Taylor Energy Center, an 800 MW coal-fired generating unit in Taylor County. The addition of the Taylor Energy Center and associated transmission facilities, although not expected to enter service until 2012, would likely improve power flows in the region.

The progress made by the Commission to establish a storm hardened electric system in Florida will continue in 2007. Comprehensive storm hardening plans will be submitted in March 2007 for review and approval by the Commission. Each plan will be evaluated for its impact on system reliability and, subsequently, customer electric rates. Collaborative research on the merits of placing electric facilities underground will continue through 2007 and 2008.

In addition to these actions, the Commission will make specific recommendations for enhancing the reliability of Florida's electric transmission and distribution system. These recommendations will be contained in a separate report, due by July 1, 2007, required pursuant to Chapter 2006-230, Section 19(2), at 2615, Laws of Florida.<sup>3</sup>

---

<sup>3</sup> This law was the result of Senate Bill 888.

## 2. INTRODUCTION

This report provides an assessment of the Florida transmission grid in terms of its current and planned utilization, efficiency, and reliability. In 2006, through the Ten-Year Site Plan review process, the Commission placed additional emphasis on its review of transmission system planning, adequacy, and reliability. The Commission uses this process to collect data from individual utilities and from the Florida Reliability Coordinating Council (FRCC). The major sources of information derived from the Ten-Year Site Plan review process and used in this report are as follows:

- The 2006 Regional Load and Resource Plan, filed with the Commission in June 2006, contains aggregate data on demand and energy, capacity and reserves, and proposed new generating unit and transmission line additions for Peninsular Florida<sup>4</sup> as well as statewide.
- The 2006 Reliability Assessment, filed with the Commission in September 2006, is an aggregate study of generating unit availability, forced outage rates, load forecast methodologies, and gas pipeline availability. Generating units and associated transmission facilities identified in this assessment form the basis for future expansion of the bulk power electric system in Florida.
- The 2006-2015 Long Range Transmission Reliability Study, filed with the Commission in September 2006, assesses the adequacy of Peninsular Florida's bulk power and transmission system. The study includes both short-term (1-5 years) detailed analysis and long-term (6-10 years) evaluation of developing trends that would require transmission additions or other corrective action.
- The Florida Central Coordinated Study, filed with the Commission in September 2006, is a regional transmission study that identifies and addresses transmission constraints in Central Florida.

In addition, data was obtained through interrogatory and production of documents requests by the Commission staff. The Commission held a public workshop in Tallahassee in September 2006, at which utilities were required to report on certain areas of critical concern involving the state's transmission system. In December 2006, the Commission issued its Review of 2006 Ten-Year Site Plans for Florida's Electric Utilities.

Section 3 of this report provides background information on Florida's transmission system, while Section 4 describes state and federal regulatory authority over transmission facilities. Section 5 discusses the results of the utilities' generation and transmission expansion plans. Section 6 provides a description of the coordinated transmission planning process and results of specific studies. Section 7 contains a summary of Commission activities in response to issues arising from the 2004 and 2005 hurricane seasons. Section 8 provides a summary conclusion of the Commission's findings with regard to transmission system reliability and actions taken with regard to electric system hardening issues.

---

<sup>4</sup> Peninsular Florida utilities, located east of the Apalachicola River, comprise the FRCC region.

### 3. FLORIDA'S TRANSMISSION SYSTEM

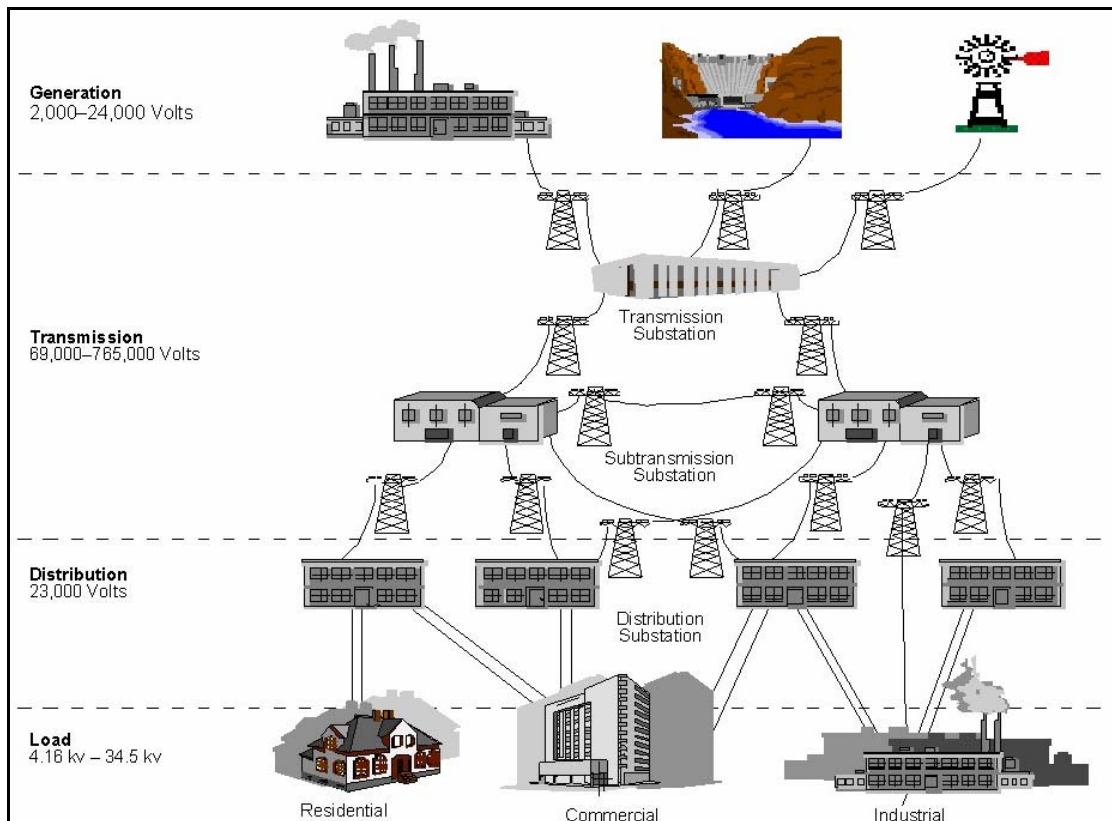
Electricity is an integral part of our daily lives. It is indispensable to industry, businesses, and homes. Electricity cannot be stored in large quantities on the power system; therefore, utilities must generate and deliver electricity exactly when it is needed. Disruption of electricity service is not only an inconvenience, but could cause financial and economic loss, compromise health and safety, and adversely affect other industries such as telecommunications, water and wastewater, and transportation.

#### ***Basics of Power Flow***

An electric power system delivers electricity in a form known as alternating current (AC). AC is a type of electrical current in which the direction of the flow of electrons switches back and forth. The current that flows in a flashlight, on the other hand, is direct current (DC), which flows only in one direction. AC is used in power systems because it can be transmitted and distributed economically over long distances. In North America, the standard for alternating current is 60 complete cycles per second. Such electricity is said to have a frequency of 60 hertz.

An electric power delivery system consists of three basic components: generating power plants, transmission lines and facilities, and distribution lines and facilities. Figure 1 shows the components of a typical electric power delivery system and how they operate together.

**Figure 1: Components of a Typical Electric Power Delivery System**



The simplest type of generator consists of a rotating magnet, known as a rotor, which turns inside stationary coils of copper wire, known as a stator. By rotating through the magnetic field, the rotor generates a flow of electric current through the copper coils of the stator. Generating plants use some form of fuel to produce mechanical energy to turn the rotor. Most electricity comes from burning fossil fuels such as coal, natural gas, or oil in a boiler to convert water into steam. In a nuclear plant, the controlled splitting of uranium atoms releases heat energy, a process known as nuclear fission. The heat is used to boil the surrounding water, producing steam. Under high pressure, the steam turns the blades of a turbine that is connected to a generator, producing electricity. In a hydroelectric plant, moving water provides the energy to turn the turbine blades. Once electric power is produced, the voltage is "stepped up" by a transformer at the generator so that the power can be transmitted efficiently and economically over long distances on the transmission system.

Transmission lines connect the power plants to each other and to the distribution system. Transmission lines support the electric power delivery system in two ways. First, the transmission system forms the link between power plants and the distribution system, which ultimately delivers the electricity to the customer. Second, transmission lines interconnect the electric power delivery systems of neighboring electric utilities. These interconnections result in increased reliability and economic efficiency by allowing utilities to buy and sell power from and to each other. Today, all electric utilities in the continental United States are interconnected to at least one other electric utility. As a result, the operation of an interconnected electric system must be carefully coordinated among all electric utilities.

At the distribution system level, the voltage is "stepped down" by a transformer at a substation for distribution to local neighborhoods and business districts. There is usually a final reduction in voltage by a distribution transformer at the service drops of residential and commercial customers.

Managing the flow of electricity throughout the electric power delivery system is the function of control centers. Control centers are located at strategic locations on the power grid from which the electric utility monitors and controls generation, transmission, and distribution systems. Real-time information is gathered to manage flows of electrical energy to wholesale and end-use customers in an efficient and reliable manner within and through utility systems. In managing electricity flows, operators must ensure that the system's frequency does not deviate from 60 Hertz by more than 0.2 Hertz.

The interconnected electric power system is designed to deliver power safely and reliably wherever it is needed, every second of every day. The system can be viewed as one large electric machine where hundreds of generator shafts are spinning in unison to produce electricity at the correct voltage level and frequency to satisfy the electrical needs of industrial, commercial and residential customers.

### ***Description of Florida's Existing Transmission System***

Typically, the transmission system is defined as the part of the power delivery system rated above 69,000 volts [69 kilovolts (kV)]. In Florida, the transmission system consists of lines rated at 69 kV, 115 kV, 138 kV, 230 kV, and 500 kV. The distribution system comprises all lines at voltages lower than 69 kV.

The coordinated electric transmission system in Peninsular Florida currently has approximately 15,700 miles of transmission lines. Of this total, approximately 990 miles of transmission lines have been added since 2001. A map of the state's transmission system is shown in Figure 2 on the next page.

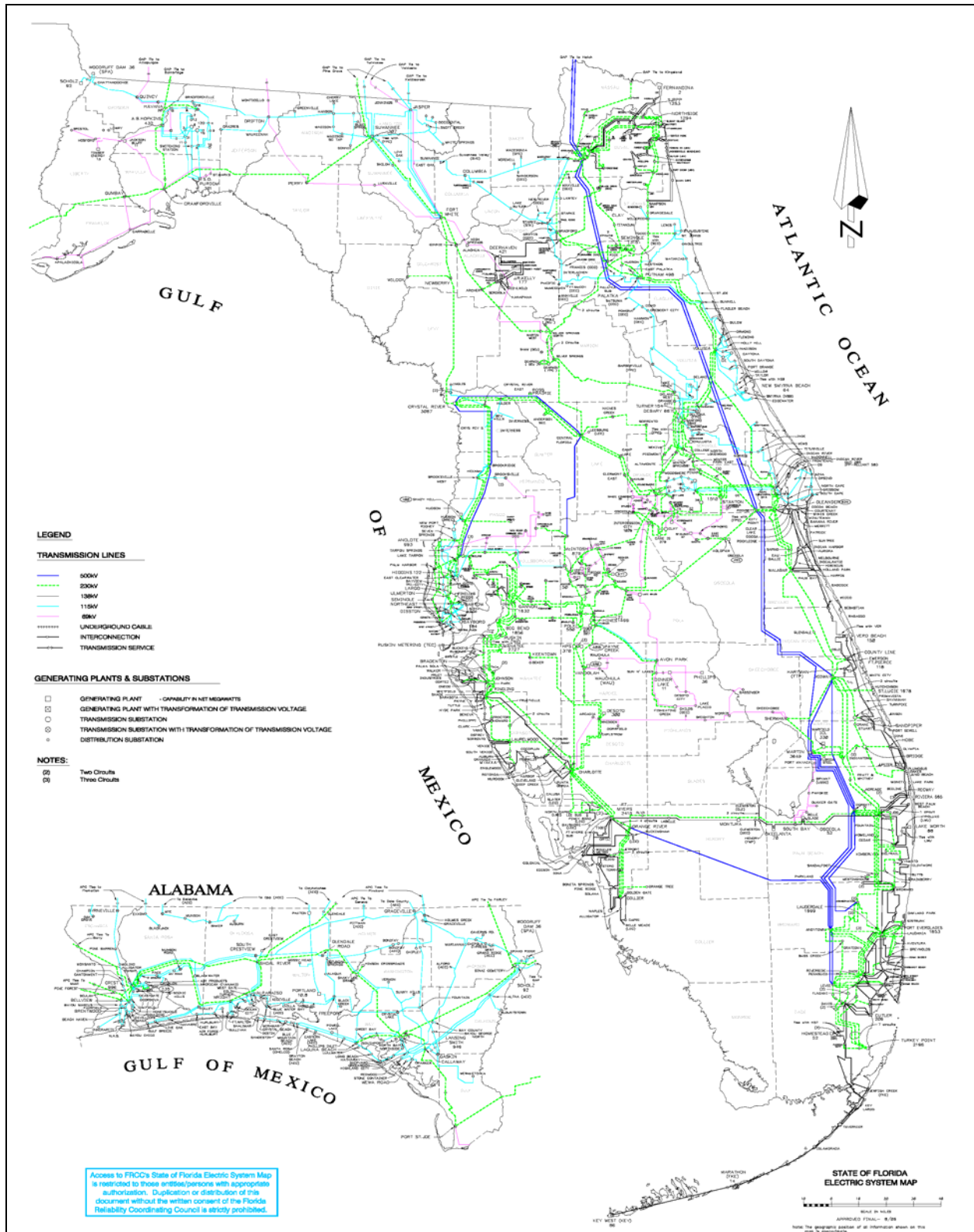
Prior to 1980, Peninsular Florida's transmission interconnections to the rest of the nation were limited, consisting of only a few 69 kV, 115 kV, and 230 kV ties at the Florida-Georgia state line. These limited ties allowed Peninsular Florida's utilities to import a maximum of only 400 MW of capacity into the region. Practically speaking, Peninsular Florida was an "electrical island," a region susceptible to disturbances and outages when large generating units such as nuclear units experienced forced, unplanned outages. These outages often caused Peninsular Florida's loads to exceed generation available in the region, which in turn increased the flow of electricity over the limited Florida-Southern interface. As a result, line overloads frequently caused Peninsular Florida to disconnect from the rest of the nation, further aggravating imbalances in the state and increasing the magnitude of customer blackouts.

In response to reliability concerns caused by limitations at the Florida-Southern interface, the Commission worked with Peninsular Florida's utilities to evaluate the feasibility and cost of strengthening transmission interties between the regions. From these evaluations, FPL and JEA agreed to construct two parallel 500 kV transmission lines connecting the Southern Company to Peninsular Florida and extending along Florida's east coast to Miami. Completed in 1982, the new 500 kV lines increased Peninsular Florida's maximum import capability to its present level of 3,600 MW. In addition to strengthening the Florida-Southern interface, which reduced the incidence of electrical separation, the 500 kV transmission line improvements allowed Florida's utilities to import significant amounts of lower cost energy than could be generated instate.





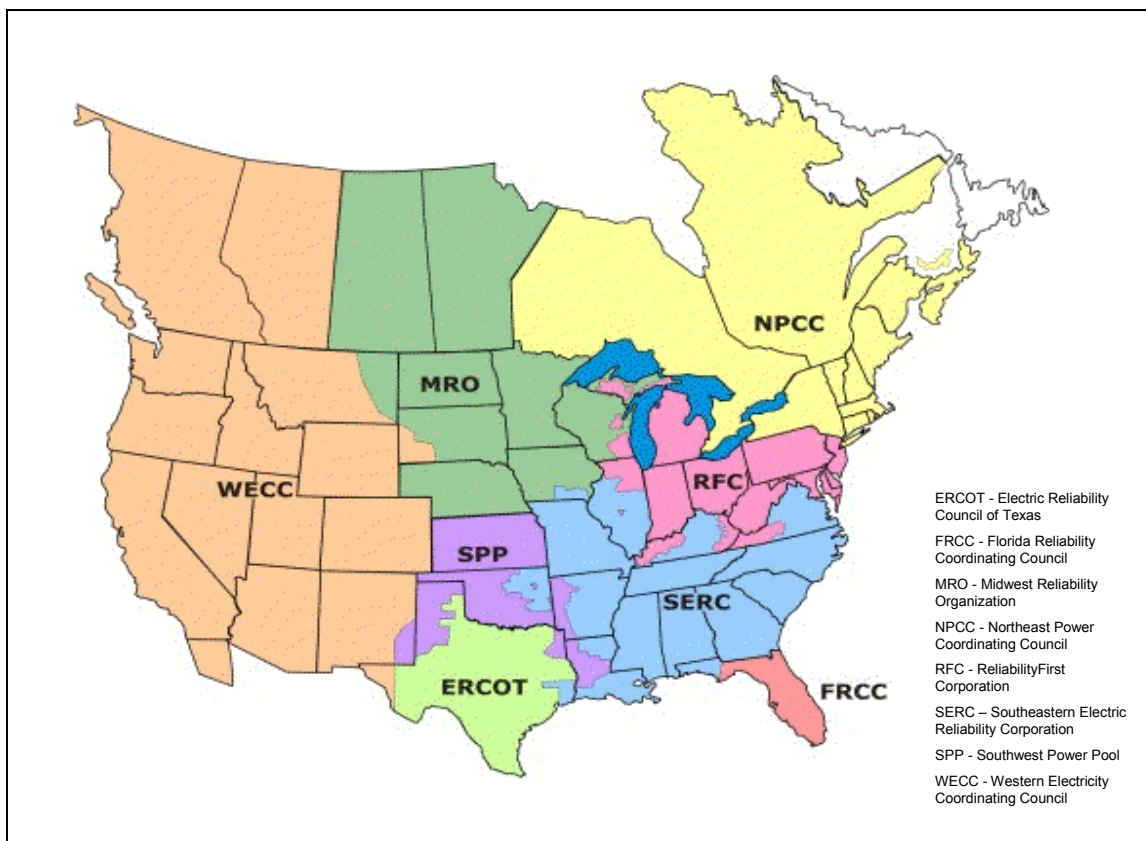
**Figure 2: State of Florida - Electric Transmission Map**



## ***Role of National and Regional Reliability Councils***

Nationwide, electric utilities plan their bulk power systems to comply with reliability standards set by the North American Electric Reliability Council (NERC). NERC is comprised of eight regional electric reliability councils as shown in Figure 3. NERC and the regional reliability councils ensure that the bulk electric system in North America is reliable, adequate and secure.

**Figure 3: Reliability Regions of the North American Electric Reliability Council**



Since its formation in 1968, NERC has operated successfully as a self-regulatory organization, and the electric industry voluntarily complied with NERC reliability standards. However, increased competition in the electric industry rendered the voluntary compliance system insufficient. In response, Congress required the Federal Energy Regulatory Commission (FERC) to develop a new mandatory system of reliability standards and compliance. The Energy Policy Act of 2005 authorized the creation of a national electric reliability organization (ERO) with the statutory authority granted by the FERC to enforce compliance with reliability standards among all market participants. NERC received certification as the ERO in July 2006.

NERC works with all stakeholder segments of the electric industry to develop standards for the reliable planning and operation of the bulk power systems. In Florida, the majority of the bulk power system is located in Peninsular Florida. The Florida Reliability Coordinating Council (FRCC) is responsible for ensuring that Peninsular Florida's electric utilities meet

federal reliability standards<sup>5</sup>. The FRCC is comprised primarily of electric utilities, although some power marketers and independent power producers are also members. The FRCC is governed by a board of directors consisting of top-level executives from the members. Utility personnel serve on numerous technical committees, whose role is to carry out the planning, engineering, and operating aspects of electric system reliability in Peninsular Florida. Specifically, the FRCC's Planning Committee and Operating Committee produce the studies relied on, in part, by the Commission in its regulatory oversight role.

NERC will work through the regional reliability councils to carry out some of its responsibilities as the ERO. Through approval by the NERC and the FERC, the FRCC will be designated as a Regional Entity with enforcement authority pursuant to Section 215 of the Federal Power Act. By June 2007, the FRCC should receive this approval, including the authority to impose financial penalties for failure to comply with reliability standards. The FRCC has already implemented a compliance program that will monitor and enforce regional and national reliability standards. The program relies on self-assessment, periodic reporting, and on-site audits to ensure conformity. In administering the compliance program, the FRCC works closely with all owners, operators, and users of the state's bulk electric system.

The Commission does not have direct jurisdiction over the FRCC, but does have jurisdiction over the FRCC's utility members. However, the Commission has an indirect, cooperative relationship with the FRCC, attending meetings, participating in planning activities, and maintaining an open dialog with the FRCC on reliability matters affecting the state. Through this cooperative relationship, the Commission exercises its authority to ensure the adequacy of Florida's electric grid.

## **Reliability Criteria**

When planning and operating a power system, utilities perform many sophisticated computer analyses to model the system under a variety of situations and load levels. A power system should always operate in such a way that no credible contingency, or outage of a generating unit or transmission line, could trigger system instabilities that affect neighboring utilities. The criteria for planning and operating an electric system are as follows:

- Under a single-contingency criterion, a utility's transmission system experiences no overloads or instability following an outage of the single most crucial element (generator, transmission line, or transformer). During a single-contingency outage, no loss of firm load should occur. At a minimum, Florida's electric utilities generally plan their bulk power systems to withstand a single-contingency outage.
- Under a multiple-contingency criterion, a utility's transmission system must withstand the simultaneous failure of two or more elements. A utility may experience a controlled loss of firm load during a multiple-contingency outage, but no cascading outages, or outages that extend into neighboring utility systems, occur. After a multiple-contingency outage, all elements of the bulk power system must be able to operate within their emergency ratings for the duration of the outage.

---

<sup>5</sup> Gulf Power Company, which serves the Florida panhandle west of the Apalachicola River, operates under the Southeastern Electric Reliability Council (SERC).

---

## **Mitigation Strategies**

As a way to mitigate contingency overloads on a power system, utilities have several operational strategies at their disposal to avoid blackouts. These strategies are consistent with corrective actions that are permitted under NERC Reliability Standards. Typical mitigation strategies that can be used are as follows:

- Generation re-dispatch: the re-dispatch of one or more generating units out of economic order to, due to their location or size, help maintain electric system stability.
- Sectionalizing: the planned removal of a transmission line from service, such as when a higher voltage line in the same corridor suffers a contingency outage. Sectionalizing allows power to be re-distributed across the entire electric system rather than solely on the one remaining transmission line.
- Planned load shedding: the intentional coordinated shedding of customer load on part of a utility's electric system to maintain stability on the rest of the system.
- Reactive device control and transformer tap adjustments: the switching of power system equipment into or out of service to control voltage on the electric system.

Operational strategies are essential to the safe and reliable operation of a transmission system under contingencies. However, it is not appropriate for utilities to rely on such actions long-term where additional transmission capacity can be constructed in a cost-effective manner.

## **Security Coordinator**

The FRCC is responsible for ensuring that all operational reliability criteria comply with federal and regional reliability standards. However, the FRCC does not have direct control of power flows on the electric system. The FRCC has contracted with Florida Power & Light Company (FPL) to act as the Security Coordinator for Peninsular Florida. The Security Coordinator monitors system conditions in real-time using remote telemetry units at substations and other points in the electric system. The Security Coordinator gathers data on power flows, voltages, and the status of various switching and relaying equipment in the FRCC region. Based on this real-time information, the Security Coordinator has the authority to direct the termination of transactions, direct operating entities to implement operating reserves, set interface limits to other regions, order interruption of firm load, and take other actions deemed necessary to relieve load from critical circuits. Communication between the Security Coordinator and other operating entities is accomplished through multiple means, including a dedicated hot line to all operating entities.

The Commission monitors the FRCC's role as the Security Coordinator through several means. The Commission staff attends meetings of the FRCC's Operating Committee, reviews and comments on reports published by the Security Coordinator, and maintains an open dialog with the FRCC on matters affecting the real-time operation of Peninsular Florida's coordinated electric system.

## **4. STATE AND FEDERAL REGULATION**

### ***Commission Authority***

The Commission has broad-based authority over the adequacy and reliability of Florida's electric system pursuant to Chapter 366, Florida Statutes. Parts of Section 366.04, Florida Statutes, known as the "Grid Bill," give the Commission jurisdiction over the "planning, development, and maintenance of a coordinated electric power grid throughout Florida to assure an adequate and reliable source of energy for operational and emergency purposes in Florida."

In addition to the Commission's Grid Bill authority, other state statutes guide how Florida's electric utilities plan and operate the coordinated electric system.

### **Ten-Year Site Plan**

Section 186.801, Florida Statutes, requires that all major generating electric utilities in Florida submit a Ten-Year Site Plan to the Commission for review. Section 377.703(e), Florida Statutes, requires the Commission to analyze and provide natural gas and electricity forecasts to the Florida Department of Environmental Protection (DEP).

To fulfill the requirements of Sections 186.801 and 377.703(e), Florida Statutes, the Commission adopted Rules 25-22.070 through 25-22.072, Florida Administrative Code. Electric utilities must file an annual Ten-Year Site Plan by April 1. Each utility's Ten-Year Site Plan contains projections of the utility's electric power needs, fuel requirements, and the general location of proposed power plant sites and major transmission facilities. In accordance with the statute, the Commission performs a preliminary study of each Ten-Year Site Plan and must determine whether it is "suitable" or "unsuitable." The Commission receives comments from state, regional, and local planning agencies on issues of concern raised by the Ten-Year Site Plans. In December 2006, the Commission issued its Review of 2006 Ten-Year Site Plans for Florida's Electric Utilities, which was forwarded to the DEP for use in subsequent power plant siting proceedings.

### **Power Plant Siting Act**

The Power Plant Siting Act (PPSA), Sections 403.501 - 403.518, Florida Statutes, provides clear time lines and regulatory requirements for utilities seeking to build new power plants and their directly associated facilities, including transmission lines, in the state. The PPSA applies to proposed steam electric or solar power plants which are 75 MW or larger. The plants can be gas-fired combined-cycle units, nuclear units, or units fueled by more conventional means. The DEP coordinates a multi-agency review of proposed generating units under the PPSA.

As part of the PPSA process, utilities must first receive a Determination of Need from the Commission. Pursuant to Section 403.519(3), Florida Statutes, the Commission has the following statutory responsibility for determining the need for proposed generating units, other than nuclear units, which are subject to PPSA requirements:

In making its determination, the commission shall take into account the need for electric system reliability and integrity, the need for adequate electricity at a reasonable cost, the need for fuel diversity and supply reliability, and whether the proposed plant is the most cost-effective

alternative available. The commission shall also expressly consider the conservation measures taken by or reasonably available to the applicant or its members which might mitigate the need for the proposed plant and other matters within its jurisdiction which it deems relevant.

Nuclear generating units have similar, though slightly different, requirements under Section 403.519(4), Florida Statutes. Under this statute, the Commission has following statutory responsibility:

In making its determination to either grant or deny the petition, the commission shall consider the need for electric system reliability and integrity, including fuel diversity, the need for base-load generating capacity, and the need for adequate electricity at a reasonable cost.

From receipt of a utility's petition, the Commission has 90 days to hold a hearing and 135 days to issue a final order granting a Determination of Need. The final order is submitted to the DEP, which coordinates a multi-agency review of the proposed generating unit. As part of its review, the DEP evaluates the proposed plant's impact on land use, air quality, water quality and consumption, and all other environmental impacts of the proposed plant. The PPSA certification process takes as long as 430 days to complete.

Certification includes a power plant's directly associated facilities, which are necessary to connect the plant to the existing transmission grid. These facilities may include transmission lines to interconnect to the nearest substation. In other cases, significant additions to the transmission system must be made. Other directly associated facilities include natural gas pipelines supplying the plant's fuel, rail lines for coal delivery to the site, or roads.

The Governor and Cabinet, acting as the Power Plant Siting Board, grant final approval to a proposed power plant. The statutory framework for siting power plants gives some level of certainty to the process and is important in promoting timely infrastructure decisions.

### **Transmission Line Siting Act**

The Transmission Line Siting Act (TLSA), Sections 403.52 - 403.5365, Florida Statutes, provides clear time lines and regulatory requirements for utilities seeking to build new transmission lines in the state. The TLSA applies to proposed transmission lines in new corridors that are rated at 230 kV or higher, cross a county line, and are at least fifteen miles in length. Proposed lines in an existing corridor are exempt from TLSA requirements. The DEP coordinates a multi-agency review of proposed transmission lines under the PPSA.

As part of the TLSA process, utilities must first receive a Determination of Need from the Commission. Pursuant to Section 403.537(1)(c), Florida Statutes, the Commission has the following statutory responsibility for determining the need for proposed transmission facilities subject to TLSA requirements:

In the determination of need, the commission shall take into account the need for electric system reliability and integrity, the need for abundant, low-cost electrical energy to assure the economic well-being of the residents of this state, the appropriate starting and ending point of the line, and other matters within its jurisdiction deemed relevant to the determination of need. The appropriate starting and ending points of the

electric transmission line must be verified by the commission in its determination of need.

From the receipt of a utility's petition, the Commission has 45 days to hold a hearing and 60 days to issue a final order granting a Determination of Need. The final order is submitted to the DEP, which coordinates a multi-agency review of proposed transmission lines subject to the TLSA. As part of its review, the DEP determines the actual route of the proposed line between the starting and ending points, and evaluates all land use and environmental impacts of the proposed route. The Governor and Cabinet, acting as the Transmission Line Siting Board, grant final approval to a proposed transmission line. The TLSA certification process takes between 319 and 409 days to complete, depending on whether an alternate corridor for the line is proposed. The statutory framework for siting transmission facilities gives some level of certainty to the process and is important in promoting timely infrastructure decisions.

### ***Federal Authority***

In addition to state regulation, Florida's transmission system is also subject to regulatory oversight of the Federal Energy Regulatory Commission (FERC). FERC has jurisdiction over wholesale electric rates and the interstate transmission of electricity. The Commission regularly monitors activities at the FERC and participates in FERC docketed matters and ratemaking proceedings that affect Florida's transmission system.

### **Open Access Transmission Tariff**

When Congress passed the Energy Policy Act of 1992, the FERC required electric utilities to provide fair and open access to their transmission systems for independent power producers (IPPs). The FERC issued two landmark orders to promote competition and open access to the transmission system. FERC Order No. 888, issued in April 1996, specified the terms under which transmission owners must provide access to their systems for IPPs and other transmission users who desire to sell electricity on a wholesale basis. Among the requirements of Order No. 888 was that all utilities file an open-access transmission tariff with the FERC. A companion order, FERC Order No. 889, required utilities to provide an internet-based open access same-time information system (OASIS). OASIS provides information in real-time to transmission users about the utilities' available transmission capacity.

Each individual transmission-providing utility is responsible for managing its transmission tariffs. However, the FERC has required that utilities separate the transmission planning function from the daily operations of the electric system. This separation was done to ensure that the management of the OASIS system, including calculating available transmission and scheduling transmission, be done without preference to any individual utility. Florida's transmission-owning utilities have contracted with Siemens to operate an electronic webpage, known as FLOASIS, to identify available transmission and associated tariffs. The actual scheduling of transmission requests are done by transmission-owning utilities using links from the FLOASIS web page to the individual utility transmission centers.

After issuing Order Nos. 888 and 889, the FERC issued Order No. 2000 in December 1999, which required that each public utility that owns, operates, or controls transmission facilities make certain filings with respect to forming and participating in a regional transmission organization (RTO). Order No. 2000 also codified certain minimum characteristics and functions that a transmission entity must satisfy in order to be considered an RTO. The order

required all transmission owners not yet part of a FERC-approved RTO to file plans for forming or joining an RTO, or to provide reasons why participation was not warranted. The FERC's initial goal was to have all transmission owners in the country operating under an RTO by December 2001, and the FERC expected that the RTO would conduct transmission planning and operate the OASIS systems.

In response, Florida's three peninsular investor-owned utilities (IOUs), Florida Power & Light Company (FPL), Florida Power Corporation (FPC), and Tampa Electric Company (TECO) filed a joint petition with the FERC in October 2000, proposing the establishment of GridFlorida, an independent transmission company covering Peninsular Florida. The FERC issued an order provisionally granting RTO status to GridFlorida in March 2001. Subsequently, in May 2001, the three utilities decided to "suspend RTO development activities" until the matters initiated in separate prudence reviews by the Commission with respect to GridFlorida were resolved.

In June 2001, FPL, FPC -- now known as Progress Energy Florida (PEF) -- and TECO filed petitions asking the Commission to determine the prudence of the formation of, and their participation in, GridFlorida. In December 2001, the Commission found that the GridFlorida companies were prudent in proactively forming GridFlorida. However, in making its finding, the Commission ordered that transmission assets not be divested, but, rather, that an independent system operator (ISO) structure be used.

In response to the Commission's direction, the three utilities contracted with ICF Consulting<sup>6</sup> to perform a study to assess the costs and benefits to Peninsular Florida consumers of implementing the GridFlorida ISO. The Final ICF report concluded that the RTO as proposed was not cost-effective, with costs projected to exceed benefits by between \$285 million and \$704 million over a three-year operating period. In May 2006, the Commission found that in light of the extensive information on the potential costs and benefits of forming the proposed GridFlorida RTO, continuing the development of the GridFlorida RTO was no longer prudent nor in the public interest.

Although the Commission closed its investigation into forming the GridFlorida RTO, the underlying reasons for examining the feasibility of an RTO remain a valid concern for the state. One of the benefits attributed to the formation of an RTO is centralized, coordinated transmission planning. The Commission ordered Peninsular Florida's utilities to implement a coordinated transmission planning process, discussed in Section 6 of this report. Another area under preliminary investigation is a new cost-based spot energy market. Florida established a cost-based broker system for electricity sales in 1978 but abandoned the system in the mid-1990s. Reestablishing a cost-based spot market would create a mechanism that could match potential sellers of electric energy with potential buyers. A potential buyer reviews the energy sale prices on the spot market and determines which economic decision is better: to generate its own energy or to purchase energy from another utility. A final area of investigation includes the development of mechanisms and treatment of transmission congestion. Transmission congestion occurs in two forms: a lack of transmission capacity that limits commercial transactions and thus creates economic inefficiencies, and a lack of transmission capacity that leads to violations of reliability standards. Both types can be remedied by the construction of new transmission lines.

---

<sup>6</sup> ICF Consulting Resources, LLC, Fairfax, VA.



## 5. RESULTS OF UTILITY EXPANSION PLANS

### Generation

Over the past three years, the Commission has granted a Determination of Need for seven generating units, including directly associated facilities, whose combined capacity exceeds 5,700 MW. At present, five of these facilities have received certification under the Power Plant Siting Act (PPSA) by Florida's Governor and Cabinet. Table 1 lists all proposed generating units in the Ten-Year Site Plans that meet the criteria for requiring certification under the PPSA. Solid fuel units are shown in ***BOLD ITALIC CAPS***.

**Table 1: Proposed Generating Units Requiring Certification**

Utility	Generating Unit - Name & Type	Winter Capacity (MW)	Dates		
			Need Approved	PPSA Certified	In-Service
FPL	Turkey Point CC Unit 5	1181	6/2004	2/2005	6/2007
PEF	Hines CC Unit 4	517	11/2004	6/2005	12/2007
FMPA	Treasure Coast Energy Center CC Unit 1	318	7/2005	5/2006	6/2008
FPL	West County Energy Center CC Unit 1	1335	6/2006	12/2006	6/2009
FPL	West County Energy Center CC Unit 2	1335	6/2006	12/2006	6/2010
<b><i>OUC</i></b>	<b><i>STANTON IGCC UNIT B</i></b>	<b><i>283</i></b>	<b><i>6/2006</i></b>		<b><i>6/2010</i></b>
<b><i>SEC</i></b>	<b><i>SEMINOLE PC UNIT 3</i></b>	<b><i>750</i></b>	<b><i>7/2006</i></b>		<b><i>5/2012</i></b>
PEF	Unsite CC Unit 1	550			6/2011
<b><i>FMPA/JEA/TAL</i></b>	<b><i>TAYLOR ENERGY CENTER PC UNIT</i></b>	<b><i>819</i></b>			<b><i>6/2012</i></b>
<b><i>FPL</i></b>	<b><i>UNSITED PC UNIT 1</i></b>	<b><i>855</i></b>			<b><i>6/2012</i></b>
<b><i>TECO</i></b>	<b><i>UNSITED IGCC UNIT 1</i></b>	<b><i>630</i></b>			<b><i>1/2013</i></b>
<b><i>FPL</i></b>	<b><i>UNSITED PC UNIT 2</i></b>	<b><i>855</i></b>			<b><i>6/2013</i></b>
<b><i>GRU</i></b>	<b><i>DEERHAVEN UNIT 3 CFB</i></b>	<b><i>220</i></b>			<b><i>6/2013</i></b>
<b><i>PEF</i></b>	<b><i>UNSITED PC UNIT 1</i></b>	<b><i>750</i></b>			<b><i>6/2013</i></b>
<b><i>JEA</i></b>	<b><i>UNSITED PC UNIT 1</i></b>	<b><i>250</i></b>			<b><i>12/2013</i></b>
FMPA	Unsite CC Unit 4	318			6/2014
GULF	Unsite CC Unit A	620			6/2014
<b><i>PEF</i></b>	<b><i>UNSITED PC UNIT 2</i></b>	<b><i>750</i></b>			<b><i>6/2014</i></b>
FPL	Unsite CC Unit 5	610			6/2015
PEF	Unsite CC Unit 2	550			6/2015
TOTAL REQUIRING CERTIFICATION		13496			

## Transmission

Over the past three years, the Commission has granted a Determination of Need for two transmission lines in the state. One of these lines, FPL's 230 kV St. Johns - Pringle line, has received certification under the Transmission Line Siting Act (TLSA) by Florida's Governor and Cabinet. The other line, FPL's 230 kV Manatee - Bob White, is awaiting certification. Table 2 lists all recent and proposed transmission lines that meet the criteria for TLSA certification.

**Table 2: Proposed Transmission Lines Requiring Certification**

Line Owner	Transmission Line	Line Length (Miles)	Nominal Voltage (kV)	Dates		
				Need Approved	TLSA Certified	In-Service
FPL	St. Johns - Pringle	26	230	5/2005	4/2006	12/2008
FPL	Manatee - Bob White	30	230	8/2006		12/2011
FPL	Eve - Sweatt	25	230			6/2012

As shown in Table 3, the coordinated electric system in Peninsular Florida consists of approximately 15,700 miles of transmission lines. Of this total, approximately 990 miles of transmission lines have been added since 2002. Over the next five years, Peninsular Florida's utilities plan to add an additional 1,109 miles of transmission lines to the system.

**Table 3: Circuit Miles of Transmission Lines in the FRCC Region**

Year	Circuit Miles					
	500 kV	230 kV	138 kV	115 kV	69 kV	Total
2002	1351	5420	2208	1984	3761	14724
2003	1351	5545	2286	2117	3859	15158
2004	1351	5558	2286	2171	3868	15234
2005	1351	5630	2286	2213	4014	15494
2006	1351	5761	2306	2247	4049	15714
% growth (2001-06)	0.00%	6.29%	4.44%	13.26%	7.66%	6.72%
2007	1351	5866	2314	2288	4124	15943
2008	1351	6025	2351	2326	4174	16227
2009	1351	6097	2399	2355	4239	16441
2010	1381	6207	2413	2388	4285	16675
2011	1381	6303	2430	2398	4312	16823
% growth (2007-11)	2.22%	7.45%	5.01%	4.81%	4.56%	5.52%

Transmission system additions require a considerable amount of investment for land acquisition, permitting, and construction. As shown in Table 4, Peninsular Florida’s utilities have spent nearly \$526 million on new transmission system facilities since 2001. Over the next five years, utilities expect to spend nearly \$1.7 billion on transmission additions.

**Table 4: Annual Transmission Line Investment in the FRCC Region**

Year	Annual Investment (\$ million)					Total
	500 kV	230 kV	138 kV	115 kV	69 kV	
2002	0.0	17.2	2.5	6.5	12.3	38.5
2003	0.0	37.2	12.7	4.0	19.5	73.4
2004	0.0	65.1	11.1	1.5	19.7	97.4
2005	0.0	58.7	8.4	51.1	21.7	139.9
2006	0.0	66.1	33.0	40.5	37.2	176.8
Subtotal - actual	0.0	244.3	67.7	103.6	110.4	526.0
2007	0.3	130.6	24.6	60.9	60.1	276.5
2008	0.3	289.4	33.9	37.0	50.7	411.3
2009	6.0	169.3	27.5	38.3	66.2	307.3
2010	24.0	258.2	29.0	38.0	46.9	396.1
2011	43.9	180.8	21.1	16.6	39.3	301.7
Subtotal - projected	74.5	1028.3	136.1	190.8	263.2	1692.9

## 6. RESULTS OF COORDINATED TRANSMISSION PLAN

While generating units supply the energy needs of all Floridians, the transmission system is the backbone that delivers the energy to end users. Utilities must coordinate their individual generation and transmission plans to make certain that needed capacity can be moved from power plant sites to load centers throughout the state. This section will examine the results of transmission planning studies conducted to examine the reliability of the transmission system, as well as a discussion of future transmission siting issues.

### ***Coordinated Transmission Planning Process***

Peninsular Florida's utilities complete an annual ten-year long-range transmission study that is coordinated through the Commission and the FRCC. The study is a steady-state assessment of Peninsular Florida's transmission system to ensure that it remains stable, within thermal and voltage ratings, under normal, single-contingency, and multiple-contingency conditions. The process begins with the consolidation of the long-term transmission plans of all Peninsular Florida transmission owners into a common database, which is shared with all users of the power system. All transmission facilities rated at 69 kV and above are included in the database. The first five years of the study period are a detailed analysis of these independently developed transmission plans, while the second five years of the study period are a generalized, long-term assessment due to the many uncertainties that occur in the latter years of the planning horizon. Annual transmission planning studies normally begin in June of each year and are completed by March of the following year.

Sensitivity studies are also performed to test the robustness of Peninsular Florida's transmission system under various conditions. Examples of sensitivities studied are as follows:

- Weather extremes for summer and winter periods;
- Different load levels (e.g., 100%, 80%, 60%, 40%) and/or seasons of the year;
- Various generation dispatches that will test or stress the transmission system;
- Reactive supply and demand assessment (generator reactive limits, power factor); and,
- Other scenarios or system conditions, such as stability analysis.

While these sensitivity studies will not necessarily call for the construction of transmission facilities identified in the studies, they will provide insight into how robust the planned transmission system is expected to be.

The 2006-2015 Long Range Transmission Reliability Study was completed in June 2006 and filed with the Commission in September 2006. The long-range transmission study consists of two stages. The short-term, which covers the first five years of the planning horizon, is analyzed in detail with specific remedies sought for any thermal or voltage violations. The long-term, which covers the remaining five years of the planning horizon, is reviewed to identify any developing trends that would require future attention.

The short-range analysis of normal, single-contingency, and multiple-contingency conditions in Peninsular Florida show that the use of mitigation strategies, such as generation re-dispatch, should successfully alleviate all contingency thermal and voltage overloads appearing in the first five years. However, for contingencies occurring on transmission lines connecting

generating capacity in Polk County to load centers near Orlando, utilities in the region expect to require extensive use of operational strategies. The long-range study reveals developing transmission needs associated with excessive power flows in north Florida, near Tallahassee, and with the proposed construction of the Taylor Energy Center, an 800 MW coal-fired generating unit in Taylor County. The addition of the Taylor Energy Center and associated transmission facilities, although not expected to enter service until 2012, would likely improve power flows in the region. A detailed discussion of these developing transmission needs occurs in the following sections on short-range and long-range transmission studies.

Overall, the results of the 2006-2015 Long Range Transmission Reliability Study indicate that Peninsular Florida's transmission system is adequate to provide reliable service to retail customers. The planning methods and criteria utilized by the FRCC are based on sound utility practices and procedures. In order to maintain a transmission system that will reliably serve the state's increasing need for electricity, Peninsular Florida's utilities plan to add an additional 1,109 miles of transmission lines to the system, at a cost of approximately \$1.7 billion, over the next five years.



## Florida Central Coordinated Study

In late 2005, the Commission directed Peninsular Florida’s utilities, through the FRCC, to complete a major planning assessment known as the Florida Central Coordinated Study. The assessment identified an immediate need for additional transmission transfer capability along the Interstate 4 corridor, to move electricity generated in the Polk county region south of Lakeland to load centers in the Greater Orlando area. The region is shown in Figure 4. The need for additional transmission transfer capability, which cannot be met until 2008 at the earliest, is further exacerbated in 2011 when additional generating capability in the Polk County area is scheduled to enter service.

The Florida Central Coordinated Study identified approximately \$277 million in transmission projects that would address future needs in the region. Eight of these projects are expected to be needed before 2008 but may not be completed until 2009 or later. Permitting activities, as well as construction activities in active transmission corridors, are expected to cause all projects to be completed by 2011. Therefore, the region's utilities anticipate continuing the use of operational strategies such as uneconomic dispatch, voltage reduction, and line switching to mitigate contingency overloads. Operational strategies are essential to the safe and reliable operation of a transmission system under contingencies. However, it is not appropriate for utilities to rely on such actions long-term where additional transmission capacity can be constructed in a cost-effective manner.

FPL, the Florida Municipal Power Agency (FMPA), the Kissimmee Utility Authority (KUA), OUC, PEF, and TECO are responsible for the transmission projects identified by the Florida Central Coordinated Study. These projects are listed in Table 5. The proposed Lake Agnes - Gifford line is the only project expected to require certification under the TLISA.

**Table 5: Florida Central Coordinated Study – Needed Transmission Projects**

Line Owner	Transmission Line	Project Type	Line Length (Miles)	Needed In-Service	Planned In-Service	Estimated Cost (\$M)
PEF	West Lake Wales - Dundee #2	New	13.2	Before 2008	6/2009	28.5
PEF	Dundee - Intercession City #2	New	25.9	Before 2008	6/2010	54.1
PEF	West Lake Wales - Dundee #1	Rebuild	9.7	Before 2008	6/2011	20.5
PEF	Dundee - Intercession City #1	Rebuild	20.3	Before 2008	6/2011	40.5
PEF	Avalon - Gifford	New	7.0	Before 2008	6/2008	33.0
FPL	Vandollah - Charlotte	Terminal	--	12/2008	12/2008	0.1
FPL	Poinsett - Holopaw	Terminal	--	12/2008	12/2008	0.1
TECO/PEF	LAKE AGNES - GIFFORD <sup>7</sup>	NEW	32.4	BEFORE 2008	6/2011	67.5
OUC	McIntosh - Lake Agnes	Reconductor	9.4	Before 2008	6/2011	6.1
FMPA/KUA	Cane Island - CI North Tap	Reconductor	6.0	6/2011	6/2010	3.0
OUC	CI North Tap - Taft	Reconductor	11.2	6/2011	6/2010	7.3
OUC/TECO	Lake Agnes - Osceola	Reconductor	21.5	Before 2008	6/2008	14.0
OUC/TECO	Osceola - CI North Tap	Reconductor	4.1	6/2011	6/2009	2.7
TOTAL COST						277.4

The Florida Central Coordinated Study also brought to light two areas that the Commission believes Florida's utilities should pursue to improve the coordinated transmission planning process. First, utilities should develop a methodology for allocating the costs of new transmission projects that affect more than one utility. Under the current arrangement, utilities

<sup>7</sup> The Lake Agnes - Gifford line will require certification under the TLISA. A Determination of Need Filing is expected by spring 2007.

pay for new transmission projects in their service territory regardless of whether a neighboring utility's actions cause that need. Second, Peninsular Florida's utilities should establish a uniform process for queuing transmission service requests. At the September 7, 2006 Ten-Year Site Plan workshop, the Commission directed the FRCC to address these areas of concern. In addition to these actions, the FRCC has adopted procedures to maintain an up-to-date transmission system database to ensure that utilities use the most current data when making planning decisions. The Commission staff will continue to actively participate in FRCC meetings to ensure that these directives are carried out. If necessary, the Commission will initiate formal proceedings to ensure that Florida's electric utilities coordinate their planning efforts to ensure the reliability of the state's electric grid.

## ***Long-Range Studies***

### **Taylor Energy Center**

Four municipal utilities have announced a plan to jointly own, construct, and operate the Taylor Energy Center, an 800 MW coal-fired generating unit in Taylor County. The Commission held a determination of need hearing for the proposed plant, including associated transmission facilities, in December 2007. The Commission is scheduled to make its final decision on the proposed plant on February 13, 2007.

The Taylor Energy Center would be the largest generating unit in Northwest Florida, a region without substantial transmission infrastructure currently in place. As a result, the Taylor Energy Center could cause a considerable impact on power flows in the region. A preliminary feasibility study, performed by the four municipal utility owners, as well as FPL and PEF, was completed in October 2006. The feasibility study indicated that the Taylor Energy Center should not have any adverse affect on the regional transmission system.

Also completed in October 2006 was a system impact study, a coordinated, detailed analysis of several potential transmission alternatives to connect the Taylor Energy Center to the transmission system. The system impact study identified four alternatives for connecting the Taylor Energy Center to the regional grid, each of which included two new 230 kV transmission lines, approximately 6.5 miles in length, connecting to PEF's Perry substation. The four alternatives, including necessary network improvements, have an estimated cost ranging between \$86 and \$112 million. The system impact study also determined that the Taylor Energy Center would not pose significant impacts to the regional grid or to the Florida-Southern interface.

One final study, currently underway, is the facilities study. This evaluation will identify the final interconnection plan, including the required transmission facilities and final cost estimate. The final transmission projects will enter the annual FRCC transmission planning process and will be used to complete the North Florida Transmission Study discussed below.

### **North Florida (Tallahassee)**

Continued growth in north Florida, combined with a lack of generating units and transmission facilities east of Tallahassee, has resulted in increasing power flows across Tallahassee's system. The power flows from Southern Company resources in Georgia, across Tallahassee's service area, to PEF and Seminole to the south and east. The inadvertent power flows have caused local system imbalances that, in turn, adversely affect Tallahassee's ability to serve its own load in an economic manner.



As a result, Tallahassee, PEF, and Seminole began the North Florida Transmission Study in 2005 to assess the reliability of the transmission system in the region. For any identified transmission system additions, cost allocation could be an issue, as there might be uncertainty over which utility causes any system imbalances. The addition of the Taylor Energy Center and associated transmission facilities, although not expected to enter service until 2012, would likely improve power flows in the region. For this reason, Tallahassee, PEF, and Seminole have postponed the North Florida Transmission Study pending completion of the facilities study for the Taylor Energy Center. Once the North Florida Transmission Study is completed, the recommended alternatives will enter the annual FRCC transmission planning process.

### ***Transmission Siting Issues***

For proposed lines subject to the requirements of the Transmission Line Siting Act (TLISA), certification of the line corridor has some locational risk due to the final site chosen for the line. Acquisition of right-of-way has schedule and execution risks, primarily due to the increased number of landowners and land parcels involved. The majority of right-of-way acquisition cases are disputed, resulting in eminent domain cases handled in circuit court venues. The permitting process has significant schedule risks, due to multiple environmental and regulatory jurisdictions involved in the approval process.

Transmission lines have historically required less time to site and construct than generating units. In the past decade, as many as four years were required for permit approval and construction of a combined cycle generating unit, thus driving the time schedule for electric system additions.

However, the siting of new transmission lines has become increasingly difficult nationwide. A number of obstacles have been encountered in the process of regulatory review and approval: the complicated state regulatory review process, the involvement of several local government agencies, the courts, and the participation of competing interest groups in the siting process.

One example of the difficulty utilities face when siting new transmission lines is that many people oppose projects that might adversely affect them -- the "not in my back yard" (NIMBY) effect -- even when there is considerable public benefit. Another problem is the increased competition for available land on which to build transmission lines, causing right-of-way costs to rise substantially as property values increase. Further, the regulatory review process can be complicated by the participation of numerous parties with competing interests. Projects that cross a state line pose additional difficulties, since the utility must seek approval from different regulatory review agencies that may have diverse requirements and time schedules.

Table 7 shows the approximate timelines required for the siting, certification, and construction of high-voltage transmission lines. Certain activities involved with building transmission lines, carry the most risk of schedule or execution delays. These activities are shown in **BOLD CAPS**.

**Table 6: Transmission Line Planning Timelines**

Activity	Approximate Project Scope (months)					
	230kV No TLSA 25-50 miles	230kV TLSA Req'd. 25-50 miles	230kV TLSA Req'd. 75+ miles	500kV No TLSA 25-50 miles	500kV TLSA Req'd. 25-50 miles	500kV TLSA Req'd. 75+ miles
Establish Project Scope / Schedule	Start	Start	Start	Start	Start	Start
FPSC Need Determination (TLSA)		7	7		7	7
Outreach, Route Evaluation, & Selection	6	6	9	6	6	9
Prepare & File Application (TLSA)		2	3		2	3
<b>CORRIDOR CERTIFICATION (TLSA)</b>		<b>15</b>	<b>18</b>		<b>15</b>	<b>18</b>
Route Survey / Environmental Assessment	6-9	6-9	9-12	6-9	6-9	12-18
Preliminary Design	3	3	6	3	3	6
<b>RIGHT-OF-WAY ACQUISITION &amp; EMINENT DOMAIN</b>	<b>15</b>	<b>15</b>	<b>18-21</b>	<b>18</b>	<b>18</b>	<b>21-24</b>
<b>PERMITTING (ADMINISTRATIVE &amp; ENVIRONMENTAL)</b>	<b>6-9</b>	<b>6-9</b>	<b>9-12</b>	<b>9-12</b>	<b>9-12</b>	<b>12-18</b>
Material Acquisition	6	6	9	9	9	12
Right-of-Way Preparation	6	9	12	9	12	15
Line Construction	12-15	12-15	18	15-18	15-18	24
Place In-Service / Operation	Finish	Finish	Finish	Finish	Finish	Finish
Overall Duration <sup>8</sup>	42-48	60	72 +	54-60	72	96 +

In the recent past, the construction of several new transmission projects in Florida was either delayed or cancelled altogether. The following are some examples of the difficulty of siting and constructing new transmission projects in Florida.

### Third 500 kV Line at Florida-Southern Interface

In the early 1990s, FPL and PEF performed studies to determine the cost-effectiveness of constructing a third 500 kV transmission line to increase the import capability of the Florida-Southern interface. The additional line was not needed for reliability purposes; rather, the utilities were exploring the potential for additional economy energy purchases from Southern. The proposed line was to enter service by 2002 and would have increased the import capacity at

<sup>8</sup> Some activities can run concurrently. The overall durations are a representative project total.

the Florida-Southern interface by approximately 1300 MW. PEF planned to own 850 MW of the increased interface capacity, with FPL owning the remaining 450 MW.

However, utilities had become hesitant to make economic investments in transmission system improvements and expansion. Uncertainty existed over whether FERC wholesale pricing policies would enable utilities to recover the cost of such investments. Furthermore, by 1993, FPL had decided not to pursue its portion of the new line. Because of both FERC's unknown pricing policies and the questionable cost-effectiveness of the proposed line, PEF decided to abandon further consideration of the third 500 kV line. In comments to the FERC in 1993, PEF stated, "expenditure of resources and assumption of risk is extremely difficult to justify unless there are clear cost recovery guidelines."

As part of its oversight of the transmission planning processes of individual utilities and the state as a whole, the Commission will continue to examine the feasibility of expanding Florida's transmission capacity where cost-effective. The examinations will be conducted in coordination with the FRCC through the Commission's Ten-Year Site Plan process.

### **Lake Tarpon - Kathleen**

In 1984, the Commission granted PEF a Determination of Need for a proposed 500 kV transmission line connecting the Lake Tarpon and Kathleen substations. The project originated in order to bolster PEF's transmission system south of the Crystal River plant site. At the time the Lake Tarpon-Kathleen line was approved by the Commission, the estimated cost was \$30.5 million, and the line was expected to enter service by December 1987.

During the TLSA process at the DEP, PEF experienced increased costs and delays due to various legal challenges concerning the appropriateness of the corridor for the transmission line. By 1994, the cost to complete the project had increased to over \$85 million. PEF cancelled the project, determining that the proposed line was no longer viable since less costly alternatives were available to ensure system reliability. As an alternate to the cancelled line, PEF has implemented a fast automatic load shedding system, reactivated the 115 kV Higgins-Griffin transmission line, and can dispatch generating units out of economic order.

### **Other Examples**

The third 500 kV line and the Lake Tarpon - Kathleen line cancellations are just two examples of difficulties in permitting and constructing new transmission lines in the state. In addition, lesser examples of siting difficulties have occurred in the state.

PEF's Atwater - Liberty 115 kV transmission line, a 20-mile line located in Gadsden and Liberty Counties, took nearly four years for permitting and construction. PEF needed the line based on the loads of a wholesale cooperative utility customer. Despite being placed in an existing railway corridor, the line met community and local government opposition. In part due to eminent domain proceedings, PEF acquired the land for the line. The Atwater - Liberty line entered service in late 2006, a year behind schedule.

## 7. INFRASTRUCTURE HARDENING ISSUES

Chapter 2006-230, Section 19(1), at 2615, Laws of Florida, requires that the Commission examine the hardening of infrastructure to address transmission issues arising from the 2004 and 2005 hurricane seasons. The widespread hurricane damage in Florida in 2004 and 2005 provided strong evidence of the vulnerability of the state's electrical system to the effects of hurricanes. However, the eight hurricanes that directly affected Florida in 2004 and 2005 did not cause significant damage to the majority of the state's transmission facilities. Most of the electrical system damage resulting from the 2004 and 2005 hurricanes was sustained by distribution facilities.

The only significant transmission event addressed by the Commission was associated with the wind impacts of Hurricane Wilma in 2005, which caused the failure of 30 transmission towers on two FPL transmission lines: the Conservation - Corbett 500 kV and the Alva - Corbett 230 kV lines. As part of its proceeding on storm cost recovery, the Commission determined that transmission tower failures on these lines were the result of loose or missing bolts at key locations on the lines. FPL spent \$12 million to repair the failed structures. FPL had originally booked the costs as capital items to its rate base. However, FPL was aware of the existence of loose bolts, and the Commission found that FPL failed to apply its own revised construction standards for the tower bolts prior to the 2005 storm season. As a result, the Commission reduced FPL's rate base by \$12 million.<sup>9</sup> FPL has now implemented revised construction standards to ensure proper maintenance of the transmission towers.

---

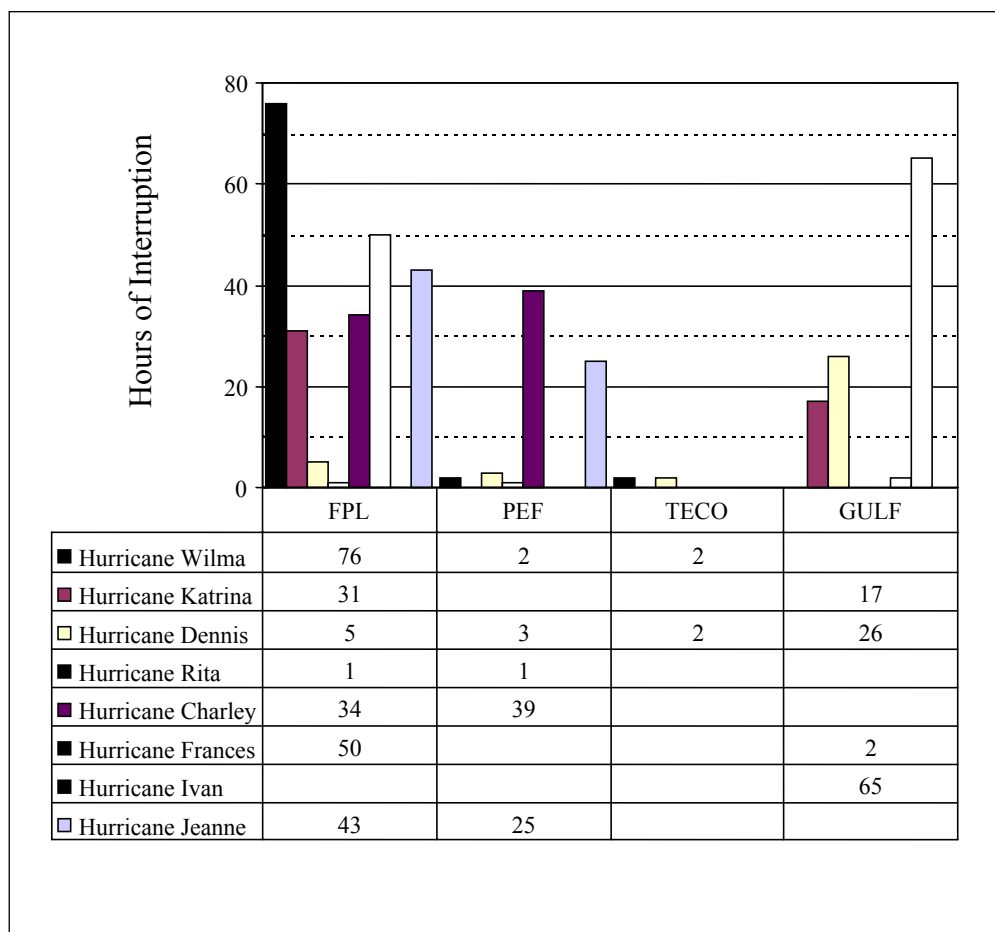
<sup>9</sup> Order No. PSC-06-0464-FOF-EI, Docket No. 060038-EI, issued May 30, 2006.

---

## Service Reliability Impacts

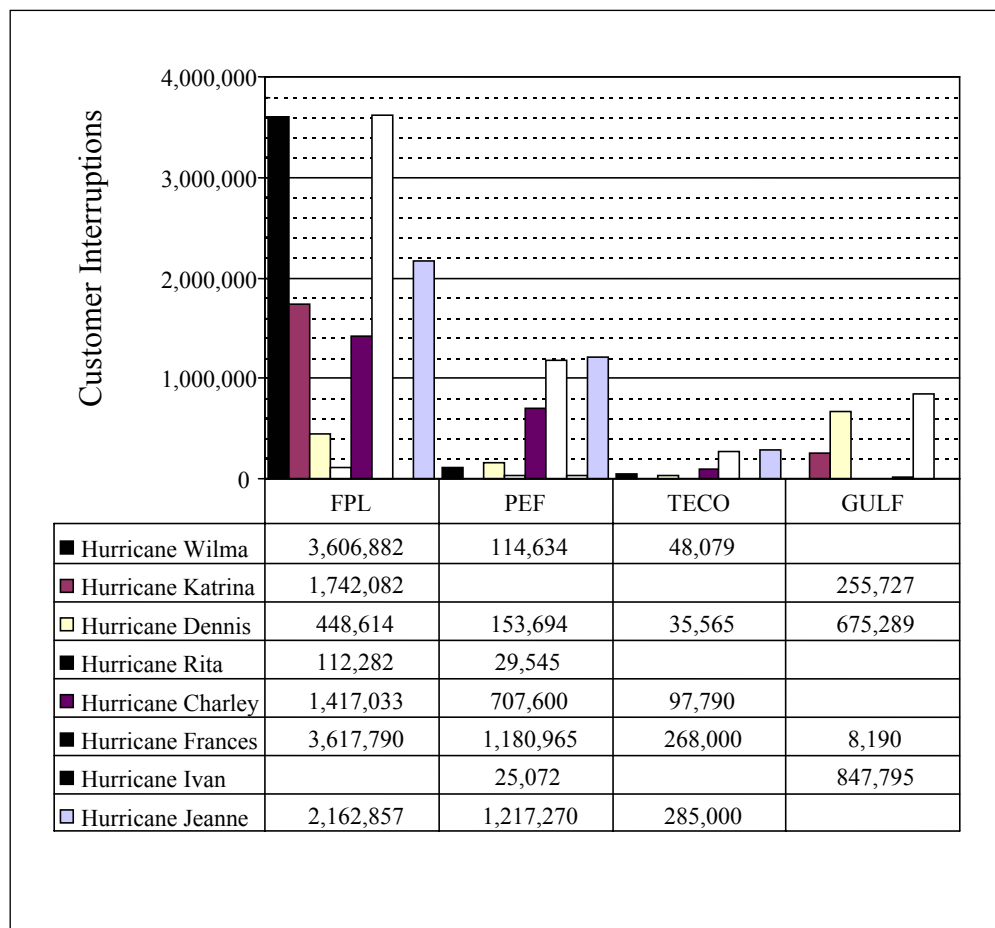
The widespread hurricane damage in Florida in 2004 and 2005 resulted in lengthy sustained electric service interruptions for millions of utility customers. Table 7 illustrates the average number of hours required to restore electric service to IOU customers after each hurricane that hit Florida in 2004 and 2005. The storms resulted in average restoration times ranging from one hour to 76 hours. However, for some storms, service restoration to all customers took as long as eighteen days.

**Table 7: Restoration Times - 2004 and 2005 Hurricane Seasons**



The number of customer interruptions resulting from the 2004 and 2005 hurricane seasons varied considerably depending on the storm. Table 8 shows the number of customer interruptions for the IOUs that resulted from each storm during the 2004 and 2005 hurricane seasons. The largest amount of customer interruptions from these storms was experienced by FPL due to Hurricanes Wilma and Francis, with over 3.6 million FPL customers losing electric service during these two storms. It is clear that no portion of the state is immune to widespread and lengthy electric service interruptions associated with the powerful storms that may strike the state during hurricane season.

**Table 8: Number of Customer Interruptions - 2004 and 2005 Hurricane Seasons**



The primary lesson learned from studying the 2004-2005 hurricane impacts is that a high level of storm preparation in Florida is essential, no matter whether recent hurricane seasons have been mild or severe. An additional lesson learned is that the goal of achieving a storm-hardened system will require a wide range of hardening activities that may take years to complete.

## ***Commission Actions in 2006***

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 in 2006 to address storm preparation, including facility storm hardening. 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 prevent excessive rate impacts to utility customers.

Mandatory Wood Pole Inspections - To assure the storm-readiness of electric utility distribution poles in an era of increased storm activity, the Commission approved an eight-year mandatory wood pole inspection program for all electric IOUs and local exchange telephone companies. The Commission also required wood pole inspection reports to be filed annually on March 1. To assure suitable implementation of these requirements, the Commission required electric IOUs to file wood pole inspection plans by April 1, 2006.<sup>10</sup>

Storm Preparation Initiatives - After conducting a Commission workshop on storm hardening involving electric utilities, government officials, and technical experts, the Commission required IOUs to file storm preparation plans that included specific storm hardening initiatives. The required storm hardening initiatives included the following items:

- a three-year vegetation management cycle or equivalent program;
- transmission hardening;
- a six-year cycle for transmission inspections;
- a geographic information system for data gathering;
- post-storm data collection for both overhead and underground structures;
- increased coordination with local governments;
- collaborative research with universities on the effects of hurricanes on transmission and distribution structures; and
- a natural disaster preparedness and recovery program.

The IOUs filed their storm preparation plans with the Commission June 1, 2006. Updates of these plans are due to be filed with the Commission by March 1, 2007.

Pre-hurricane Season Briefing - On June 5, 2006, the Commission conducted a hurricane preparation briefing with presentations by all electric utilities. In the future, annual briefings will take place at the beginning of each storm season.

Storm Hardening Rulemaking for Investor-Owned Utilities - In determining that the IOUs should take steps to strengthen the electric distribution and transmission infrastructure in

---

<sup>10</sup> These requirements were codified in Order No. PSC-06-0144-PAA-EI, Docket No. 060078-EI, and in Order No. PSC-06-0168-PAA-TL, Docket No. 060077-TP.

---

Florida in a cost-effective manner, the Commission initiated rule development to achieve this objective. On December 5, 2006, the Commission made the following decisions:

- Require utilities to file storm hardening plans every three years, to be approved by the Commission. These plans must identify the deployment strategies for response to extreme weather conditions, including extreme wind, flooding, and storm surges;
- Require utilities to locate distribution facilities in a manner that promotes service maintenance and storm restoration; and
- Provide cost incentives to encourage underground electric service installations and conversions of overhead service to underground.

The Commission adopted Rules 25-6.034, 25-6.0345, 25-6.078, and 25-6.115, Florida Administrative Code, which became effective on February 5, 2007.

Storm Hardening Rulemaking for Municipal and Cooperative Utilities - The Commission conducted a separate rulemaking proceeding to address storm hardening for municipal and cooperative utilities. The Commission adopted Rule 25-6.0343, Florida Administrative Code, which became effective on December 12, 2006. Per the rule, the utilities must annually report the following:

- The extent to which their standards, policies, practices, and procedures are designed to address the impacts of extreme weather events;
- The results of their pole inspections; and
- The programs and results of their vegetation management programs.

Revision of Distribution Reliability Rules - On June 6, 2006, the Commission approved rule revisions that required annual distribution reliability reports filed by the IOUs to include reliability data with and without the impacts of storm-related interruptions. Including such data will allow the Commission to isolate the reliability data associated with storms. The Commission adopted revisions to Rules 25-6.044 and 25-6.0455, Florida Administrative Code, which became effective on August 17, 2006.

On October 30, 2006, the Commission staff and parties identified the elements of a comprehensive reliability report to be filed by all IOUs on March 1 of each year, including the distribution reliability report, updated storm preparation initiatives, and wood pole inspection reports. Specific performance measurements were identified for each storm hardening initiative.



## ***Future Commission Actions***

The Commission will take a number of additional actions in 2007 to continue its efforts to ensure that Florida's electric facilities are resistant to storm-related damage. These actions are described below:

Assessment of Comprehensive Reliability Reports - Each IOU is required to file comprehensive reliability reports by March 1, 2007. The Commission will review these comprehensive reliability reports and issue a mid-year staff report.

2007 Storm Preparation Briefing - The Commission will hold its annual briefing on June 4, 2007 to gauge the utilities' level of preparation for the 2007 storm season.

Proceeding to Consider Storm Hardening Plans - Storm hardening plans are to be filed by each electric IOU no later than May 7, 2007. The reports will contain a deployment strategy to respond to extreme weather conditions, including extreme wind, flooding, and storm surges. The Commission will hold a hearing to determine the adequacy of the storm hardening plans.

Tariffs to Promote Underground Service Construction - In 2006, the Commission received a tariff proposal by FPL that would provide underground incentives for local government overhead-to-underground conversion projects. The tariff was suspended because the Commission was in the process of amending Rule 25-6.115, Florida Administrative Code, pertaining to charges for overhead-to-underground facility conversions. The revised rule became effective on February 5, 2007. With rulemaking now complete, the Commission will consider FPL's tariff proposal in 2007.

In addition to these actions, the Commission will make specific recommendations for enhancing the reliability of Florida's electric transmission and distribution system. These recommendations will be contained in a separate report, due by July 1, 2007, required pursuant to Chapter 2006-230, Section 19(2), at 2615, Laws of Florida<sup>11</sup>.

---

<sup>11</sup> This law was the result of Senate Bill 888.

## 8. CONCLUSIONS

Florida's coordinated transmission system is the backbone that delivers electricity from power plants to end users throughout the state. The Commission has reviewed a substantial amount of data from the state's electric utilities. Additionally, the Commission has directed and evaluated several electric system studies performed by the individual utilities and jointly through the FRCC. As a result of its evaluation, the Commission makes the following conclusions.

### ***Transmission System Reliability***

Studies of the Peninsular Florida transmission system indicate that the system is adequate to provide reliable service to retail customers. The planning methods and criteria utilized by the state's utilities, as well as the FRCC, are based on sound utility practices and procedures. To maintain the reliability of the power system, Peninsular Florida's utilities plan to add an additional 1,109 miles of transmission lines to the system, at a cost of approximately \$1.7 billion, over the next five years.

One area of the state in which the Commission focused its attention was central Florida. Without the addition of new transmission facilities in this region, there might not be sufficient transmission capability to connect all available generating units in Polk County to growing demand in the Greater Orlando area. In response to these needs, the region's utilities expect to add a substantial amount of transmission facilities. Utilities in the region have identified approximately \$277 million in transmission projects that would address future needs in the region. Although some of these projects are needed before 2008, completion of all needed transmission facilities is not expected until between 2009 and 2011. Utilities in the region anticipate using operational strategies such as uneconomic dispatch, voltage reduction, and line switching to mitigate overloads. The Florida Central Coordinated Study brought to light two additional areas in which Florida's utilities can improve the coordinated transmission planning process: (1) development of a cost allocation methodology for new transmission projects, and (2) establishment of a uniform process for queuing transmission service requests made to utilities.

At the Commission's direction, Peninsular Florida's utilities, through the FRCC, have begun the process of addressing these areas of concern. In addition, procedures have been put into place to ensure that an up-to-date transmission system database is maintained, thus ensuring that utilities use the most current data when making planning decisions. The Commission staff will continue to actively participate in FRCC meetings to ensure that these directives are carried out. If necessary, the Commission will initiate formal proceedings to ensure that Florida's electric utilities coordinate their planning efforts to ensure the reliability of the state's electric grid.

### ***Electric System Hardening***

The primary lesson learned from the 2004 and 2005 hurricane seasons is that storm preparation in Florida is essential, regardless of the severity of the storm. Additionally, the goal of achieving a storm-hardened system will require a wide range of hardening activities that may take years to complete. To address the vulnerabilities of the state's electric distribution and transmission system to powerful storms, the Commission initiated a multi-faceted approach in

2006 to address storm preparation, including increased pole inspections, enhanced vegetation management, and revisions to overhead and underground construction standards.

The progress made by the Commission to establish a storm hardened electric system in Florida will continue in 2007. Comprehensive storm hardening plans will be submitted in March 2007 for review and approval by the Commission. Each plan will be evaluated for its impact on system reliability and, subsequently, customer electric rates. Collaborative research on the merits of placing electric facilities underground will continue through 2007 and 2008.

Chapter 2006-230, Section 19(2), at 2615, Laws of Florida, requires the Commission to make specific recommendations for enhancing the reliability of Florida's electric transmission and distribution systems in a separate report to the Governor, the President of the Senate, and the Speaker of the House of Representatives. The Commission intends for this second report, due by July 1, 2007, to discuss in detail the issues related to storm hardening the state's electric power system.