

Florida State's Energy Emergency Response to the 2004 Hurricanes

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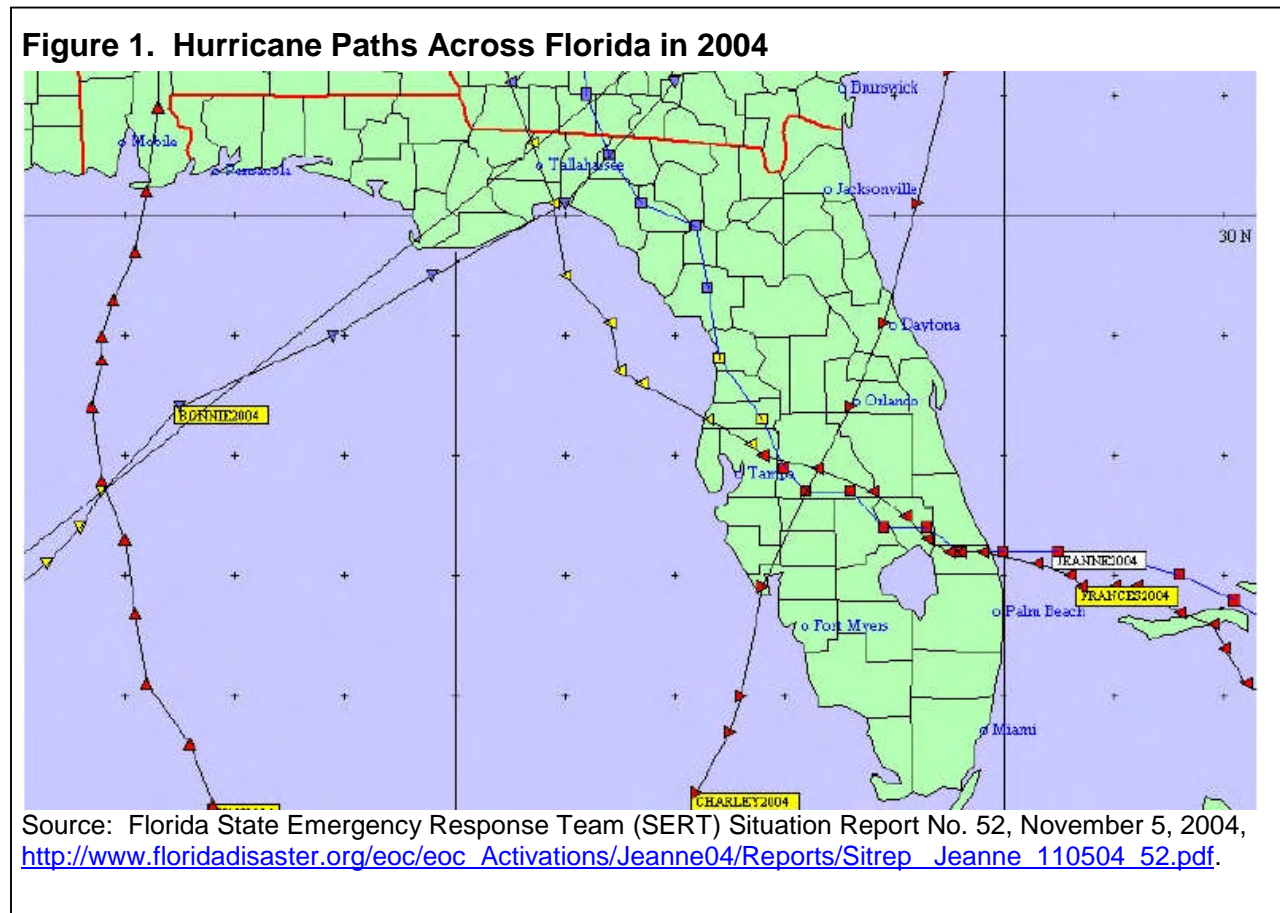
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Executive Summary

During the fall of 2004, four major hurricanes crossed the Florida peninsula creating wide swaths of destruction. Hurricane Charley made landfall on August 13, 2004 on the west coast above Fort Myers. Within three weeks, Hurricane Frances reached the east coast near Port St. Lucie on September 5, 2004. On September 16, 2004, Hurricane Ivan skirted the western panhandle, causing major damage to ports and terminals. Then Hurricane Jeanne followed the same path of Frances into the east coast and out the west above Tampa. These four hurricanes crisscrossed the state as shown in Figure 1.



This report summarizes the efforts made in Florida to prepare for and recover from successive hurricane damage to the state's energy infrastructure. The systems in place in Florida are compared against the "State Energy Assurance Guidelines" prepared by the National Association of State Energy Officials (NASEO)¹ and other planning and operational procedures. The analysis is based on telephone interviews with stakeholders, publicly-available Internet information, and materials gathered for

¹ National Association of State Energy Officials, "State Energy Assurance Guidelines" June 2004.

preparation of the Daily Situation Reports.² A number of agencies in Florida have issued lessons learned and organized training sessions on hurricane preparedness, but none of these address the lessons learned from impacts on energy supply and demand of the 2004 hurricane season.

While four hurricanes impacted many Southeastern and Mid-Atlantic states, from as far west as Texas and as far north as New Jersey, this report is focused on the impact on Florida. Not since the 1880s has the destructive power of four hurricanes struck a single state, and never in Florida's history has this occurred. The economic devastation resulting from the impact of these storms on homes and businesses across Florida is in the billions of dollars and 117 fatalities.

Through most of the state, extensive damage occurred to buildings, vehicles, personal property, agriculture, transportation, recreation, commerce and industry. Total insurance claims from the four 2004 hurricanes have been estimated in excess of \$20 billion, which is the amount of claims resulting from 1992 Hurricane Andrew (adjusted for inflation). The only U.S. disaster to exceed the hurricane claims of Floridians is the attack on the World Trade Center in 2001 with claims of approximately \$32 billion.³ Table 1 profiles the four hurricanes and compares key consequences in Florida – storm surge, evacuations, deaths, estimated damaged and insurance claims paid.

Table 1. Summary Profile of Florida's 2004 Hurricanes

Hurricane	Charley	Frances	Ivan	Jeanne
Landfall Date	8/13/04	9/5/04	9/16/04	9/25/04
Landfall Location	Cavo Costa (Captive I.), FL	Hutchinson I. (Pt. St. Lucie), FL	Gulf Shores, AL	Near Stuart, FL
Category	4	2	3	3
Windspeed at Landfall	145 mph	105 mph	130 mph	120 mph
Width of Hurricane Force Winds	60 miles	145 miles	105 miles	125 miles
Storm Surge	7 feet	8 feet	10-15 feet	10 feet
Florida Residents Evacuated	2.7 million	2.8 million	0.5 million	4.4 million
Florida Deaths	33	38	29	17
Estimated Damages in Florida*	\$7.5 billion	\$4.5 billion	\$4.1 billion	\$4.0 billion
Florida Claims Paid *	\$4.5 billion	\$2.3 billion	\$0.9 billion	\$0.9 billion

Note: * Damages and claims estimated as of November 4, 2004. Subsequent estimates may be larger. Sources: Angie Drobic Holan, Florida Hurricanes of 2004, Hurricane Biography, The Tampa Tribune, November 26, 2004, <http://news.tbo.com/news/MGBKWK7N02E.html>, "400,000 ordered to evacuate in Florida," CNN, August 13, 2004, <http://www.cnn.com/2004/WEATHER/08/12/storms/>, American Red Cross, <http://www.redcross.org/sponsors/df/h2004-stewardreport.html>, "Hurricane Season 2004 – Responding to Statewide Disasters, Florida Power and Light PDF, Slide 15, Florida State Emergency Response Team (SERT) Situation Report No. 52, November 5, 2004, http://www.floridadisaster.org/eoc/eoc_Activations/Jeanne04/Reports/Sitrep_Jeanne_110504_52.pdf

² Reports prepared by the Office of Electricity Delivery and Energy Reliability, formerly known as the Office of Energy Assurance.

³ *Insurance Journal*, Wells Publishing, Inc. 2004, Pasadena, CA. <http://www.insurancejournal.com/news/national/2004/10/01/46438.htm>.

The energy infrastructure of the state suffered extensive damage, compounded with each successive storm. However, the state was well prepared with a Comprehensive Emergency Management Plan and its Annex 12 specifically addressing Energy. The level of hurricane readiness in Florida is exceptional. State, county and local municipal governments all have developed guidelines for emergency preparedness and response. The statewide response of the petroleum marketers and distributors was less coordinated at the start of the hurricane season. Florida has neither a refinery nor a production basin, and the majority of distributors are independent. Natural gas distributors were ready but their preparedness was never tested because the storms did not substantially impact gas systems. The Florida Public Service Commission and dominant electric utilities have plans, mutual aid agreements with out-of-state partners, storm reserve balances, and operational procedures in place to effect recovery as quickly as possible.

Petroleum. Most of the petroleum products consumed in Florida are delivered by barge to three ports: Port Everglades and Jacksonville on the east coast and Tampa on the west coast. There is one short pipeline that brings gasoline and diesel fuels from Tampa to Orlando. The U.S. Coast Guard and private and/or city port operators had to repeatedly close ports and terminals in anticipation of the storms, during electricity outages, and after suffering damage to basic infrastructure. Petroleum supplies were delivered by truck and rail to compensate for port and terminal closures. The Florida petroleum industry obtained waivers from the U.S. Environmental Protection Agency to permit sales of higher RVP⁴ gasoline and high-sulfur diesel for on-road vehicles. They also obtained waivers to permit truckers to drive more hours each day to deliver product to storm-ravaged areas. Portable fuel sales points were created from tank wagon and transport trucks. Portable generation equipment was quickly moved from one critical area to another as needs changed.

Natural Gas. Delivery of natural gas was not as impacted by the successive hurricanes. Four interstate pipeline systems supply seven investor-owned local distribution companies and 27 municipally-owned systems serving Florida. One interstate line runs from Mobile Bay in Alabama to the Tampa area.⁵ According to press reports and a waiver request to the Federal Energy Regulatory Commission, the primary impacts were a few days of restrictions on line volumes during Hurricane Ivan.

Electricity. Every segment of Florida's electricity infrastructure was damaged during the storms. Thousands of transformers and poles, hundreds of miles of conductor lines, dozens of substations, and even a few power plants were damaged during each hurricane. The damaged infrastructure resulted in over 9.6 million peak outages (number of customers without power at the height of each storm, see Table 2). This number includes considerable double-counting since Hurricanes Frances and Jeanne

⁴ RVP is an abbreviation for "Reid vapor pressure," a common measure of gasoline volatility, as well as a generic term for gasoline volatility.

⁵ Florida Public Service Commission, *Natural Gas Utility Regulation in Florida*, pamphlet, no date.

followed the same paths across the state and three storm paths converged near Tampa and Tallahassee.

Table 2. Florida Electric Customer Impacts

Hurricane	Peak Outages	Days to Restoration
Charley	1,499,304	6-16
Frances	4,270,583	8-15
Ivan	437,703	17
Jeanne	3,444,400	5-16

Source: Calculated from Hurricane Situation Reports, August-October 2004.

Electric restoration was coordinated among investor-owned, cooperative and municipal utilities through representatives of the state Public Service Commission (PSC) serving at the State Emergency Operations Center. The PSC was able to help coordinate required assistance from the state Department of Transportation to reopen roads and allow out of state work crews (from 39 states and Canadian provinces) to enter after each storm and in waiving some work hour requirements. The restoration of electric power was accomplished after each storm with 85 to 90 percent of customers back on line in about ten days. This Report provides insight into the details of how this was accomplished.

Background

Florida is a state unlike any other. No point in Florida is further than 65 miles from the coast. Almost 78 percent of the state's population resides in 35 counties with coastlines on the Atlantic Ocean or the Gulf of Mexico. These counties comprise 1,350 miles of general coastline and 8,436 miles of tidal inlets, bays and waterways. Even though only 35 counties are officially "Coastal," all 67 counties can experience category 3 winds or greater. Florida has over 8.1 million people living in category 1 through 5 evacuation zones and in mobile homes. The magnitude of the hurricane problem in Florida requires a constant and concerted year round effort to address all of the issues associated with hurricane impacts, pre and post-landfall.

Storm surge is perhaps the most dangerous aspect of a hurricane. It is a phenomenon that occurs when the winds and forward motion associated with a hurricane piles water up in advance of the main storm as it moves toward shore. Storm surge heights, and associated waves, are dependent upon the width of the continental shelf and the depth of the ocean bottom. A narrow shelf, or one that drops steeply from the shoreline and subsequently produces deep water in close proximity to the shoreline, tends to produce a lower surge but higher and more powerful storm waves. This is the situation along most of the Atlantic Ocean side of the state. However, the Gulf Coast of Florida has a long gently sloping shelf and shallow water depths, and can expect a higher surge but smaller waves (up to 38 feet).

State Emergency Agency Coordination

The Florida Department of Community Affairs (DCA) has been designated by the Governor as the lead state coordinating agency for Emergency Management, State Planning and Housing and Community Development related issues. Its Division of Emergency Management plans for and responds to both natural and man-made disasters. These range from floods and hurricanes to incidents involving hazardous materials or nuclear power.⁶ The Division prepares and implements a statewide Comprehensive Emergency Management Plan (CEMP), and routinely conducts extensive exercises to test state and county emergency response capabilities. The Division is the state's liaison with federal and local agencies on emergencies of all kinds. Division staff members provide technical assistance to local governments as they prepare emergency plans and procedures. They also conduct emergency operations training for state and local governmental agencies.

After a disaster, the Division conducts damage assessment surveys and advises the Governor on whether to declare an emergency and seek federal relief funds. The Division maintains a primary Emergency Operations Center (EOC) in Tallahassee. The EOC serves as the communications and command center for reporting emergencies and coordinating state response activities. The Division also operates the State Warning Point, a state emergency communications center staffed 24 hours each day.

⁶ There are five nuclear power plants operating in Florida.

The Division's Bureau of Preparedness and Response provides oversight for the development of regional and statewide hurricane evacuation studies. In addition, information regarding evacuation routes, clearance times, shelter space and anticipated needs for effective response to hurricanes and other natural hazards is collected and disseminated. They also facilitate the planning efforts of the CEMP Emergency Support Functions (ESF), who staff and support the State EOC.

The Department of Environmental Protection (DEP) is the lead state agency for environmental regulation, resource management and stewardship. The Florida Energy Office is now fully integrated into the DEP.

Chapter 252, Florida Statutes (State Emergency Management Act) mandates the development of the CEMP.⁷ The Plan establishes a framework through which the State of Florida prepares for, responds to, recovers from, and mitigates the impacts of a wide variety of disasters that could adversely affect the health, safety and/or general welfare of the residents of the State. The CEMP provides guidance to State and local officials on procedures, organization, and responsibilities, as well as provides for an integrated and coordinated local, State and federal response.

This is an operations-based plan that addresses evacuation; sheltering; post-disaster response and recovery; deployment of resources; communications, and; warning systems. The Plan calls for annual exercises to determine the ability of State and local governments to respond to emergencies. The Plan also defines the responsibilities of State agencies and volunteer organizations.

The Plan describes the basic strategies, assumptions, operational goals and objectives, and mechanisms through which the State will mobilize resources and conduct activities to guide and support local emergency management efforts through preparedness, response, recovery, and mitigation. To facilitate effective operations, the Plan adopts a functional approach that groups the types of assistance to be provided into 17 Emergency Support Functions.

Emergency Support Function 12 – Energy

The State of Florida CEMP contains an Emergency Support Function 12 – Energy (ESF-12) patterned after the Federal National Response Plan.⁸ The primary agencies designated to manage an energy emergency in Florida are:

- Public Service Commission (PSC) for electricity and natural gas
- State Energy Office (SEO) for all other fuels

⁷ Florida Division of Emergency Management, State Emergency Response Team, *Comprehensive Emergency Management Plan 2004*, February 2004, <http://www.floridadisaster.org/documents/CEMP/floridaCEMP.htm>.

⁸ State of Florida, State Emergency Response Team, "ESF 12 Annex, Energy Contingency Plan," June 25, 2001 <http://www.floridadisaster.org/bpr/response/engineers/documents/ESF12Annex.PDF>.

SEO is fully integrated into the Department of Environmental Protection; it was previously part of Department of Community Affairs. SEO recently revised the annex and appendix related to energy emergencies; the new materials will be publicly available this summer.

The PSC is directed to "coordinate a response to electric and natural gas energy related requests with assistance from the ESF 12 support agencies and organizations as well as with assistance from other Emergency Support Functions". The Department [of Environmental Protection] "will coordinate a response to non-utility sector energy and transportation fuel related requests with assistance from the other ESF 12 support agencies and organizations as well as with assistance from other Emergency Support Functions."⁹

Other public and private agencies supporting the ESF 12 include:

- Nuclear Regulatory Commission
- Florida Department of Health
- Florida Petroleum Council
- Florida Reliability Coordinating Council
- Industry Trade Groups and Associations

ESF 12 sets forth seven phases of emergency operations: preparedness, detection, notification, activation, response, deactivation, and recovery. Roles and responsibilities, information requirements, and frequency and level of effort are all set forth in Florida's ESF 12 Annex. The NASEO State Energy Assurance Guidelines address four phases: monitor and alert, assess and decide action, actions and feedback, and review lessons learned. The NASEO Guidelines assumes that the state officials will have the time to evaluate the preparedness and overall performance after each emergency. However, the case of Florida's 2004 hurricanes shows how little time there is to take stock of what happened before another emergency overtakes prior efforts.

The NASEO Guidelines prescribe a scale for severity of each energy emergency. States are advised to consider four levels in their emergency plans: monitor and alert, mild shortage, moderate shortage, and severe shortage.

⁹ Comprehensive Emergency Management Plan 2002, Section II, E, Appendix XII, p. 6

Petroleum Supplies

Interdependencies in the Florida economy resulted in complex hurricane impacts. The loss of electric service made it impossible to pump fuel, supply water, and treat sewage while creating other problems. Service stations lost their ability to supply fuel sitting in their storage tanks. Loss of electricity and telephone lines meant that credit cards could not be used at fuel pumps. Retailers were forced to work with cash-only transactions or handwritten credit card purchases.

Petroleum distribution in Florida begins with delivery by barge from Texas, Louisiana, and East Coast refiners, including Amerada-Hess, BP-Amoco, Citgo, Chevron-Exxon, Conoco-Phillips, Exxon-Mobil, Shell and Sunoco. Refined products flow through ports to a network of approximately 200 wholesale-resellers (jobbers), who in turn serve some 5,600 retail sites. There are a total of 9,275 independent convenience stores and service stations in Florida. Within six weeks in 2004, four major hurricanes slammed into Florida, disrupting refined petroleum product delivery at every stage of this supply chain.

In the spring of 2004, the Florida Legislature passed House Bill 237 offering relief to motorists burdened with high motor gasoline costs. Beginning on August 1, 2004, and ending on August 30, motorists received an eight cents/gallon reduction in the state gasoline tax. Gasoline demand increased, and this tax holiday is credited with having run down stocks in the state at the time when Hurricane Charley hit.

Emergency Orders and Waivers

The Governor issued emergency executive orders at the start of each hurricane (see Table 3). Governor Bush specifically requested select agencies to provide maximum cooperation in moving fuel and helping return the fuel markets to normalcy. Certain counties also declared states of emergency (see Charlotte County in the table). In addition, petroleum distributors sought relief from the state Department of Environmental Protection's regulatory and proprietary requirements for obtaining and authorizations in impacted counties.

The local petroleum industry did, in fact, identify priority users in coordination with government, and agreed to supply them first. A list of priority users includes:

1. Emergency operations including the safety of employees and their families
2. Hospitals and emergency care
3. Police, fire and other emergency responders
4. Emergency centers and shelters
5. Blood donation
6. Power generators for various high priority operations
7. Emergency transport including ambulances
8. Nursing homes
9. Evacuation routes (service stations)

Table 3. Executive Orders Issued by the Governor

Issued	Description
8/10/04	Governor Bush signed Executive Order No. 04-182 declaring a state of emergency due to the impending Hurricanes Bonnie and Charley.
8/12/04	Board of County Commissioners of Charlotte County, by Resolution No. 2004-178 declares a state of local emergency.
9/1/04	Governor Bush signed Executive Order No. 04-192 declaring a state of emergency due to the impending Hurricane Frances.
9/5/04	Governor Bush signed Executive Order No. 2004-196 directing the FL DEP and FEMA to coordinate the state and county distribution of fuel supplies with fuel suppliers after the storm. Order was extended on 9/12/04.
9/10/04	Governor Bush signed Executive Order No. 04-196 declaring a state of emergency due to the impending Hurricane Ivan.
9/24/04	Governor Bush signed Executive Order No. 04-217 declaring a state of emergency for the State of Florida due to the impending Hurricane Jeanne.

Source: Governor's Office Home page, Executive Orders Search, <http://www.myflorida.com/myflorida/government/index.html>.

With each hurricane, the Florida DEP issued Emergency Final Orders. These Orders provided short-term (two-month) relief from specific emissions regulations that could potentially slow restoration and recovery efforts. By the time the fourth hurricane arrived, DEP issued a consolidated order. In recognition of the continued need for regulatory relief, the Consolidated Order was amended for a third time on February 14, 2005, with an expiration date of March 22, 2005 (see Table 4). The emergency authorization applies to governments, businesses and property owners across impacted counties that include Brevard, Escambia, Indian River, Lee, Martin, Okaloosa, Santa Rosa, St. Lucie, Volusia, and Walton.

Table 4. Emergency Final Orders Issued by the Florida DEP

Issued	Order Number and Description	Expired
8/20/04	Issued 04-1458 for Hurricane Charley, providing relief from the FL DEP regulatory and proprietary requirements in impacted counties.	11/18/04
9/5/04	Amended prior Order, issued as 04-1559 for Hurricane Frances	11/15/04
9/16/04	Amended prior Order for third time, issued as 04-1625 for Hurricane Ivan. Provided 60-day relief from regulatory requirements to minimize the environmental hazards and accelerate restoration in areas damaged.	11/15/04
9/26/04	Consolidated Order 04-1659 for Hurricane Jeanne and all prior storms	3/22/05

Source: FL DEP web site, "2004 Storms," http://www.dep.state.fl.us/beaches/#Hurricane_Recovery_Plan.

Florida officials wasted no time in obtaining waivers from a variety of agencies regulating fuel delivery (see Table 5). U.S. DOE worked with EPA to conduct assessments of the fuel situation in support of granting the waivers. Florida obtained waivers approving expansion of driver hours and easing highway weight limits. Other waivers were sought and quickly granted for using a higher Reid Vapor Pressure (RVP) than required for motor gasoline in designated counties, allowing out-of-state

companies to sell petroleum inside Florida and to lower the minimum level of product normally maintained in storage tanks. Waivers obtained during one storm were often extended into the next storm.

Table 5. Waivers Issued During Hurricane Season 2004

Issued	Description	Expired	Extended
8/20/04	EPA waiver on sale of 9.0 RVP gasoline in Hillsborough and Pinellas counties	8/27/04	8/30/04
9/2/04	EPA waiver on sale of 9.0 RVP gasoline statewide	9/7/04	9/15/04
9/2/04	EPA waiver on sale to on-road vehicles of high-sulfur off-road (red dyed) diesel statewide	9/7/04	10/5/04
9/1/04	FL DOT waivers on overweight and oversize vehicles and extension of truck driver hours	11/1/04	
9/10/04	EPA waiver on VOC emissions from gasoline/diesel truck loading at bulk terminals	9/24/04	

Sources: Communication with EPA and Letters from EPA to Alan Bedwell, Florida Department of Environmental Protection, and FPMA, *Petro Notes*, September 2004.

The storms created a shortage in on-road diesel fuel as distillate demand for emergency generators drained vehicular supply. The Petroleum Marketers and Convenience Store Association sought help from the EOC and U.S. DOE to obtain permission to use higher-sulfur (red-dyed), off-road diesel for on-highway trucks. EPA issued the first waiver on September 2, with three subsequent extensions.

As storms stopped barges from traveling the Gulf to terminals along Florida's coasts, fuels had to be trucked in by vehicles that do not normally deliver product to Florida. The Florida Petroleum Marketers and Convenience Store Association, Florida Petroleum Council and Florida Propane Gas Association coordinated with the DOE and SEO at the EOC to assist in obtaining truck and sales waivers. DOE coordinated with the Governor's Office the exemption on truck driver hours. DOE also worked closely with the American Trucking Association to obtain/coordinate trucks and drivers through Florida. Out-of-state trucks were not equipped with vapor recovery systems and, as a result, did not meet the VOC emission standards set forth in the New Source Performance Standards Subpart XX and the National Emission Standard for Hazardous Air Pollutants Subpart R. FL Department of Environmental Protection and the Florida Petroleum Council requested a waiver on September 3, 2004. EPA granted it on September 15, retroactive to September 10.

Port Closures

Each time a storm made landfall, ports in the path of the storm were closed to ship traffic. Most ports in Florida are controlled by the U.S. Coast Guard (USCG). Private and city-operated ports typically followed the hurricane preparation system in place at USCG ports. At 24 hours before the onset of gale force winds, all oceangoing vessels and barges over 500 gross tons are requested to put to sea. "The port is closed to incoming vessel movement. Ship-to-shore cargo operation is required to stop, except as necessary to ready for port departure. Inland tank barges must be emptied and secured,

and dredges and construction equipment must be secured and moved away from bridges.”¹⁰ After the hurricane has passed, some ports may operate with restrictions. This happens when buoy markers are lost to the storm and ships must navigate in daylight hours only. These circumstances complicate restoration time for the port.

The USCG Seventh District based in Jacksonville controls most of the Florida ports on both coasts:

- Jacksonville
- Port Canaveral
- Port Everglades
- Palm Beach
- Miami
- Tampa
- St. Petersburg

The USCG Eighth District controls the panhandle ports from its Mobile, Alabama headquarters:

- Pensacola
- Panama City
- Niceville

Table 6 summarizes the port closing that occurred in Florida during each hurricane.

Table 6. Florida Port Closings in 2004

Hurricane	USCG Port	Closed ^a	Reopened ^b
Charley	Tampa	8/12/04	8/12/04 (13 hours)
Frances	Canaveral	9/3/04	9/8/04
	Everglades ^c	9/3/04	9/5/04
	Jacksonville	9/3/04	9/8/04
	Tampa	9/3/04	9/5/04 (30 hours)
Ivan	Niceville	9/13/04	9/21/04
	Panama City	9/13/04	9/21/04
	Pensacola	9/14/04	9/24/04
Jeanne	Canaveral	9/24/04	9/29/04
	Jacksonville	9/25/04	9/28/04
	Miami	9/25/04	9/26/04
	Everglades ^c	9/25/04	9/26/04
	Palm Beach	9/25/04	9/28/04
	St. Petersburg	9/25/04	9/27/04
	Tampa	9/25/04	9/27/04

Notes: ^a DOE uses “closed” terminology to include the impact on product deliveries; USCG prefers to not call the port closed rather “ceased vessel movements” as the operative description.

^b Hours are shown for ports closed fewer than 36 hours.

^c Not all terminals were completely closed. Transmontaigne had sufficient inventories to maintain its North Pt. Everglades terminal open as the only source for emergency responders through both Frances and Jeanne.

Sources: Conversations with Captains of the Port (August-September 2004, April 2005) and Marine Safety Office (MSO) Marine Safety Information Bulletins from MSO Jacksonville and MSO Mobile.

¹⁰ U.S. Coast Guard, MSO Marine Safety Information Bulletins from MSO Jacksonville and MSO Mobile, www.uscg.mil.

Privately-owned terminals are co-located at all of the ports previously identified, plus Orlando (terminus of the Central Florida Pipeline). Petroleum terminal operators try to keep three-to-five days supply of gasoline and diesel fuels to weather port closings. However, damaged ports elsewhere, evacuations, and repair trucks combined to draw down supply at key terminals at a rate that compromised the ability of the operator to meet demand until the next barge reached dock. Following port closures, transport trucks were backed up at portside racks. The greatest problems occurred at Port Everglades where wait times for transport trucks exceeded six hours.

During the 2004 hurricanes, the SEO coordinated with companies to lower the minimum acceptable level for maintaining tank integrity and tank bottoms. Terminals usually leave 30 percent of the fuel in tanks as ballast to help protect against big storms. When supply gets very tight, operators consider emptying some tanks, sending fuel to other tanks and then filling the empties with water. However, this makes tanks with water unusable for a significant amount of time until the water can be drained and replaced with product. SEO personnel tracked seaborne barge locations of major suppliers, and shared information on estimated arrival times with jobbers and retailers. This permitted better planning and management.

The one large inland terminal at Orlando was impacted both by the port closing and by damage to communications devices along the pipeline. When USCG closed the Port of Tampa during Hurricanes Ivan and Jeanne, product moving along the Central Florida Pipeline to Taft Terminal in Orlando, was interrupted. This further reduced gasoline supplies available to evacuating residents and resulted in supplies being trucked in.

The extent of the Hurricane Ivan damage to terminals in Pensacola was significant, and both Transmontaigne and Mocar reported especially severe damage to their terminals. Independent terminal operator Mocar returned to business after three months closing. Transmontaigne, on the other hand, still remains closed and may never reopen this terminal. They lost the dock, loading arms, dockhouse, and pipeline connections. Many tanks floated off their bases and the truck loading rack was damaged, yet there were no catastrophic spills. Transmontaigne's damage assessment team originally estimated one-to-three months to reopen the terminal (rebuild the dock, dredge, and install new equipment). However, in June 2005, decisions on rebuilding the terminal still rested with insurance handlers. In the interim, Transmontaigne is supplying its customers with fuel from its Bainbridge, Georgia terminal.

Retail Operations

Normally, major oil companies, jobbers and spot market providers supply retail outlets under contract by formula based on use, time of year, special orders and supply conditions. Hurricanes changed these expectations and dealers could not communicate their needs due to repeated communication failures. Landline communications were down, cell phone towers were destroyed, internet connections failed when power and repairs were undone by repeated storms. Hand-held, wireless communications were often the only alternative.

In April 2003, the American Petroleum Institute published “Security Guidelines for the Petroleum Industry,” the second edition since 9/11.¹¹ The guidelines address planning and preparedness for any event likely to impact upstream and downstream operations. The same procedures set forth in this document are relevant to hurricane events.

Most large operators have emergency preparedness plans that automatically go into effect as storms approach. For example, ExxonMobil has an Emergency Support Group that managed its hurricane response from Coral Gables, FL. Redundant personnel in Virginia and Texas were able to step in immediately if communications with Florida failed. The Emergency Support Group was able to get supplies along the designated evacuation routes when ExxonMobil had to suspend its marketing operations in south and central Florida during the hurricanes.¹²

Gasoline demand skyrocketed as millions of Floridians prepared to evacuate for each storm. In the Florida Power & Light service area, over 7,000 repair trucks required 541,000 gallons of gasoline per day (or approximately 2.6 percent of daily statewide demand).

At various times immediately following a storm, there were media reports of price gouging, however, these reports were unsubstantiated. Similarly, reports of total outages were largely untrue. Gas stations along evacuation routes were low on unleaded regular, and sold higher-priced mid-grade and premium gasoline.

Emergency Generators

Auxiliary generation systems and portable generator sets were brought in from across the nation. Petroleum dealers and others drove out of state to obtain them and used portable generation to support fuel pumps and speed local delivery. Large scale generating facilities, housed in trailers and hauled on flat bed trucks, were set up wherever possible. Ultimately, there were insufficient portable generators to meet demand due to the repeated storms.

Storage tanks for auxiliary power generation were drained by repeated service during subsequent storms. Significant demand for auxiliary electric generators and fuel delivery interruptions caused a shortage of on-road diesel fuel, which was used instead of the higher-sulfur distillate fuel.

In the aftermath of Hurricane Ivan, Florida petroleum dealers estimated that the state required 100 thousand gallons of distillate per day for emergency generators. The SEO helped obtain one million gallons of diesel via rail from Texas and Louisiana. In addition, the SEO, together with on-site representatives from the U.S. DOE, worked with

¹¹ The guidelines are available from API free of charge at: http://api-ec.api.org/filelibrary/Security_Guidance2003.pdf.

¹² Thomas L. Torget, “Passing the test of Nature’s Fury,” The Lamp, March 2005, http://www.exxonmobil.com/Corporate/Newsroom/Publications/TheLamp_3_2005/story6.asp.

GSA to issue contracts procuring fuel from out-of-state vendors (Georgia, Alabama, and Mississippi).

In some cases, tanker trucks were routed directly to hospitals and other critical locations with emergency generators when supply could be moved. Some oil companies simply donated supply to local emergency responders. Ultimately, more distillate was obtained than needed and between 600 to 650 thousand gallons was returned to the Federal Emergency Management Agency (FEMA) after the storm season ended.

Tank Wagon Supply

In order to get around the lack of electricity for pumping fuel, jobbers and others scoured the state, and neighboring states, for "small" 1,500-to-4,000 gallon tank wagons ("tenders") that could be moved from site to site. These "tenders" were used primarily to fuel emergency responders. By the time the fourth storm hit the state, a tank wagon supply system had been ironed out that included importing supply in 9,000-gallon transports (and rail cars for diesel fuel) and then transferring it to tank wagons for retail sale directly from the truck to customer. In some cases, the large transport trucks were also turned into temporary filling stations.

Tank wagons were especially valuable in urban areas where tight maneuvering was required and where large carriers could not fit. Marketers took special care to insure safety. There were no problems with pumping fuel and only one truck was damaged in a traffic accident.

Hurricane Ivan shuttered a few refineries in Mississippi and Louisiana that fed the terminals in the Florida panhandle. Interstate 10 was closed, effectively stopping truck movements into hurricane-ravaged areas

Early in the storm cycle, fuel distribution was not well coordinated. Fuel accumulated in areas where it was not needed and moving it to new areas created logistical problems. With subsequent storms, the state petroleum supply industry was able to streamline the response, reduce wait times and move fuel quickly to where it was needed. There was unsubstantiated retail price gouging and a fair amount of fuel was given away to local and state first responders. By the end of the last storm, many petroleum providers in Florida had become experts in emergency petroleum fuel management.

Propane

In Florida, propane is used for cooking, warming pools and spas, water heating and mobile home space conditioning. Extensive loss of mobile homes and recreational vehicle facilities in the Port Charlotte and Punta Gorda areas reduced propane sales. Relatively little damage was sustained by propane infrastructure. One 30,000-gallon tank in Wauchula was damaged; the relief valves blew off and the propane escaped into the air harmlessly.

There were no shortages of propane at the onset of each storm and in-state storage was normal for the time of the year. There were localized problems obtaining authorization from law enforcement for restoration and movement.

Due to extensive power outages, many residents purchased portable propane stoves, cookers, and generators. Supply chains ran short of these 20-pound propane cylinders because a Florida law prevents dealers from maintaining large stocks of 20-pound propane bottles. The state propane industry began to address this issue with state officials as the storms ended.

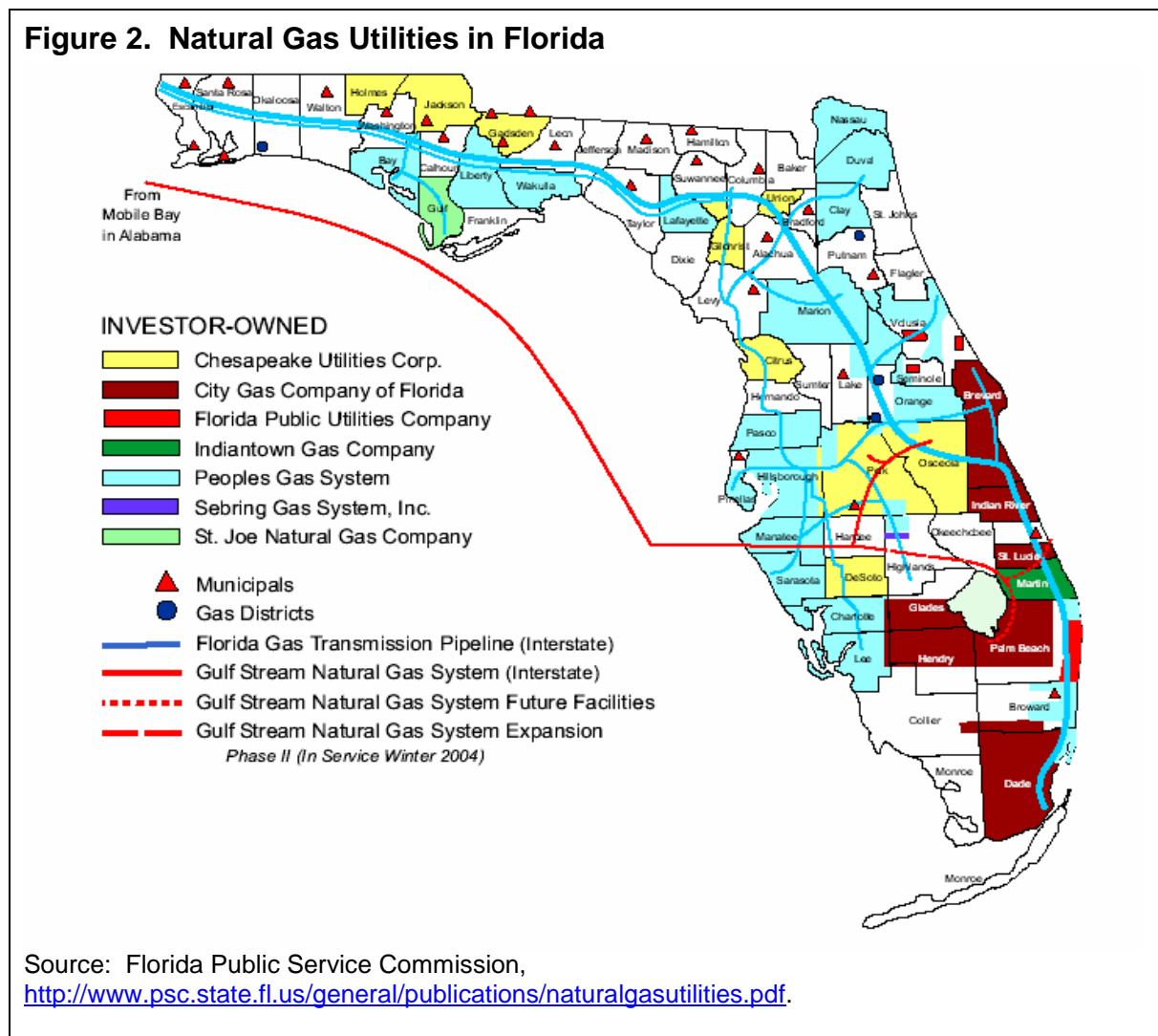
Post-Storm Petroleum Related Issues

Overall, private industry praised government for its responsiveness and success at temporarily removing regulatory barriers during the emergencies. Petroleum companies operate in an unregulated environment where data is closely held by competing entities. Some of the concerns in Florida revolved around the wisdom of shifting product back and forth to meet demand created by evacuating residents. Dealers and government officials have discussed the efficacy of some public calls for evacuation in light of the problems encountered supplying fuel along escape routes.

Natural Gas Availability

The natural gas delivery system in Florida was not significantly affected by the hurricanes. Most of the natural gas piped into the state is used for power generation. Much of the supply is delivered from Texas through a 5,000-mile pipeline known as the Florida Gas Transmission system, capable of delivering an average daily throughput of 2 billion cubic feet (see Figure 2). Over 50 gas-fired generation plants in Florida receive supplies from Florida Gas Transmission.¹³ Another 691-mile pipeline supplies Florida with one billion cubic feet per day of gas from the Gulf of Mexico. This 50/50 venture between Williams and Duke Energy, known as the Gulfstream Pipeline, was placed into service in May 2002.¹⁴

Figure 2. Natural Gas Utilities in Florida



¹³ Florida Gas Transmission, <http://www.crosscountryenergy.com/about/fgt.shtml>.

¹⁴ Gulfstream, <http://www.williams.com/productservices/gaspipelines/naturalgas.asp>.

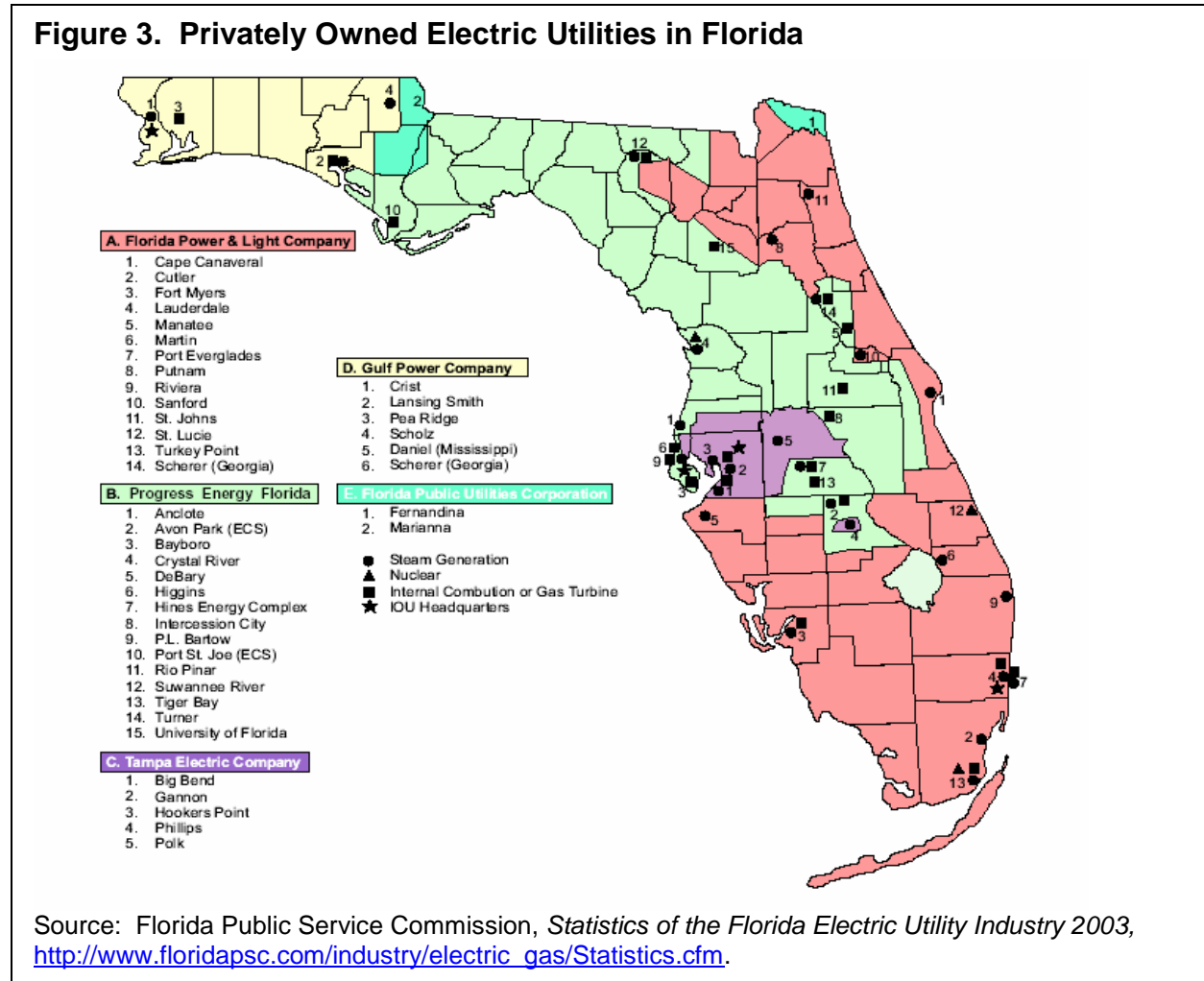
Natural gas companies post information on electronic bulletin boards when compressor stations are down or other situations affect operation. These two pipeline systems experienced some restrictions on throughput during Hurricane Ivan primarily because of reduced supply entering the system, not because of damage to the pipeline in Florida. For example, Gulfstream experienced 550 million cubic feet per day supply interruptions (half its capacity) on September 15, 2004.

While the gas delivery system was not adversely affected directly by the hurricanes, interdependencies with the electricity sector impacted gas transmission companies' ability to measure flow to customers. On October 18, 2004, Florida Gas Transmission filed a request with the Federal Energy Regulatory Commission (FERC) for limited waiver of the Alert Day provisions of its tariff [Docket No. RP05-29-000]. Section 13(D) of the tariff imposes penalties on deliver point operators when linepack imbalances occur on Alert Days. Florida Gas Transmission issued a number of Alert Days in September due to linepack imbalances, and approximately 80 percent of its market area had measurement or communications equipment failures due to power outages from the hurricanes. FERC granted the request for waiver in September on November 22, 2004.¹⁵

¹⁵ FERC, "Petition for Limited Waiver of Alert Day Tariff Provisions," November 22, 2004, <http://www.ferc.gov/whats-new/comm-meet/111804/G-5.pdf>.

Electricity

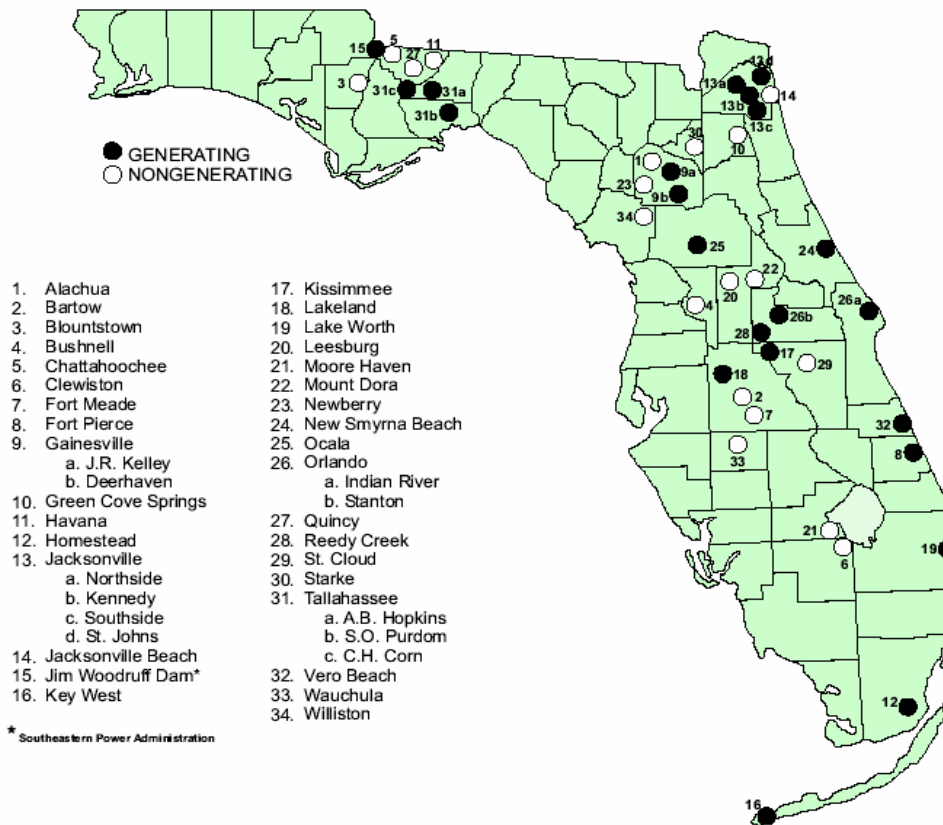
There are four investor-owned utilities serving most of the state (see Figure 3):



- Florida Power and Light (FPL) serves nearly 8 million people, or about half the state of Florida. Its service area comprises approximately 27,000 square miles in 35 of the state's 67 counties, encompassing the densely populated areas on the East and West coasts of Florida.
- Progress Energy is the second largest investor owned utility in the state. Headquartered in St. Petersburg, the company serves 1.5 million customers and maintains more than 43,600 miles of distribution and transmission lines in a territory exceeding 20,000 square miles in central and northern Florida.
- Gulf Power (a subsidiary of Southern Power) provides electricity to 0.4 million customers in ten counties and numerous communities in northwest Florida.
- Tampa Electric serves over 1.3 million in Hillsborough, Pasco, Pinellas and Polk counties, covering about 2,000 square miles.

Municipal utilities and cooperatives supply power to a significant portion of the state – 4.2 million customers (see Figures 4 and 5). There are 15 electric distribution cooperatives and two generation and transmission cooperatives serving over 1.4 million consumers in 57 of 67 Florida counties.¹⁶ The cooperatives primarily are located in the northern and western panhandle counties. There are 32 municipal electric (public power) utilities in the state, and they serve approximately 2.8 million Floridians, or 25 percent of Florida's population.¹⁷ These public power entities were particularly hard-hit by the continuous hammering of hurricanes.

Figure 4. Municipal Electric Utilities in Florida

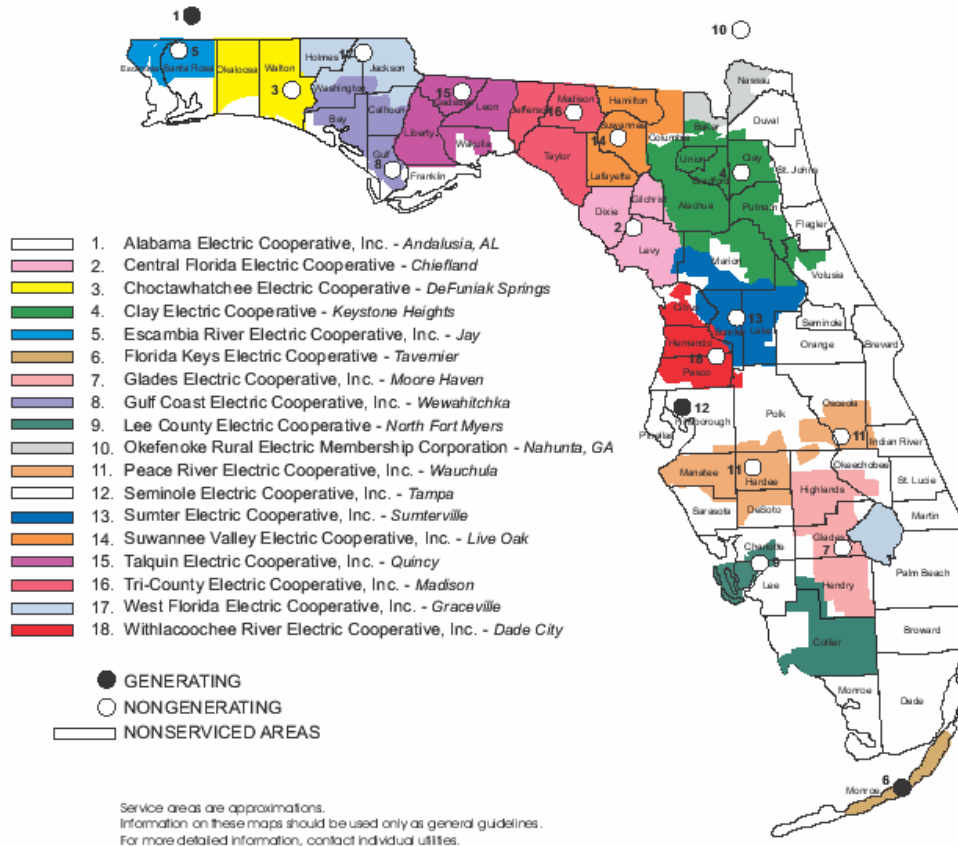


Source: Florida Public Service Commission, *Statistics of the Florida Electric Utility Industry 2003*, http://www.floridapsc.com/industry/electric_gas/Statistics.cfm.

¹⁶ Florida Electric Cooperatives Association web site, <http://www.feca.com/>.

¹⁷ Florida Municipal Electric Association web site, <http://www.publicpower.com/members.html>.

Figure 5. Rural Electric Cooperatives in Florida



Source: Florida Public Service Commission, *Statistics of the Florida Electric Utility Industry 2003*, http://www.floridapsc.com/industry/electric_gas/Statistics.cfm.

Preparedness and Restoration Guidelines

Generally, all Florida utilities have similar procedures. Prior to a storm, utilities assess the probable impact area and prepare. They check the status of internal repair resources and line up out-of-area assistance through mutual aid agreements. Communications and emergency procedures for utility employees are reviewed and updated while repair crews and equipment are pre-positioned in areas that are near, but not in, the predicted storm track.

Typical of other Florida utilities, FPL set up 13 staging sites from which equipment could be mobilized quickly. Crews live and work from sites that resembled a major semi-trailer or crew truck parking lot. Responders include utility personnel and outside contractors. Once the brunt of the storm is past, restoration begins. Restoration is coordinated closely with local emergency operation centers and where these cannot provide assistance, requests are passed up to the Emergency Operations Center.

Restoration Priorities

Electric infrastructure restoration is prioritized by relative customer impact: generation, transmission, substations, and distribution. Generation capacity, if damaged is repaired first along with long-distance high-tension transmission lines. The Florida hurricanes damaged long-distance transmission lines; Hurricane Ivan toppled several large towers in the panhandle. Once these primary parts of the system are restored, main lines to substations are repaired followed by main feeder lines to neighborhood transformers. From there, local distribution lines are restored.

Florida utilities also gave high priority, where feasible, to essential services customers similar to those identified by the petroleum industry. The general order of restoration followed by FPL (and supported by the Florida Public Service Commission, PSC) is:

- Hospitals
- Public service entities including
 - Emergency operations centers
 - Critical government facilities
 - Red Cross facilities
- Communications
 - Emergency responders including police and fire
 - Telecommunications
 - Media
- Water and sewage facilities
- Transportation infrastructure
- Gas supply utilities
- Electric company facilities
- Other essential entities
 - Schools
 - Nursing Homes
 - Critical Care Facilities
- Others as designed in coordination with government and the emergency operation centers.

Adding to Priority List

Utilities and the PSC have also sought to maintain consistency and order within their critical services priority lists. After the storms, some political leaders voiced concern about requiring certain types of facilities, such as nursing homes, be powered closer to primary feeder lines rather than neighborhood distribution lines. However, the sheer extent of damage, and limitations on available manpower, means that some order of priority is a necessity and relocating positions on lines does not alleviate the need for orderly restoration.

Power Alternatives

When restoring power to major users, most companies first ascertain whether power can be restored within 24 hours. If not, the customer is advised to use existing auxiliary,

or obtain portable, generation. The biggest problem with using portable generation, as noted above, was difficulty in obtaining fuel to power them. Many facilities, including health care and nursing homes, did not make sufficient preparation and had not tested emergency equipment nor arranged to purchase back up fuel.

Damage and Restoration

Since Hurricane Andrew, the Florida PSC requires each investor-owned utility to collect funds to cover storm-related operations and maintenance. For example, Progress Energy Florida collects \$6 million annually.¹⁸ By August 2004, each utility had amassed significant reserves, but they fell short of the total cumulative cost of service restoration and repair. The storms exacted an enormous toll on the transmission and distribution systems across Florida.

This is the first time these utilities have exceeded their storm reserve balance. Most utilities have filed petitions with the PSC for recovery of these costs and hearings are underway. An examination of three such dockets for Florida Power & Light, Progress Energy, and Tampa Electric revealed significant damage to infrastructure as shown in Table 7. Thousands of distribution poles and transformers had to be repaired or replaced. Transmission towers and miles of line suffered damage. Thousands of linemen and tree experts were brought in from other utilities to assist with the restoration effort. The cost of the restoration effort is astronomical.

Table 7. Cumulative Damage Estimates for Select Florida Utilities

Damages and Expenses	Florida Power & Light	Progress Energy	Tampa Electric
Fossil Power Plants	10	2	NA
Nuclear Power Plants	1	1	NA
Substations	63	83	NA
Conductor (miles)	2,000	1,400	12
Transformers	11,700	4,010	1,000
Poles	12,900	6,720	1,600
Outside Workers	16,700	11,100	4,600
Reserve Fund	\$356 million	\$46.9 million	\$42.2 million
Restoration Cost	\$710 million	\$366.3 million	\$73.4 million

Source: Dockets submitted to Florida PSC, November 2, 2004 (Progress), November 4, 2004 (FPL), and April 1, 2005 (Tampa).

Three of the storms crossed the Florida peninsula, ravaging the territories of FPL, Progress, Tampa Electric, and ten of the state’s cooperatives and a large number of municipal systems. The conditions surrounding each storm and its impact on electric utilities vary significantly. The next four tables (8-11) highlight customer outages and days to restoration for major utilities impacted.

¹⁸ “Progress Energy Florida files with FPSC to recover storm costs,” PSC News Release, November 2, 2004, <http://www.psc.state.fl.us/general/news/pressrelease.cfm?release=-2147483316>.

On August 13, 2004, the eye of Hurricane Charley made landfall at Punta Gorda in Charlotte County. At that time, Hurricane Charley was a category 4 hurricane on the Saffir-Simpson Hurricane Scale (rating hurricanes on a scale of 1 to 5 based on the destructive power of their winds), with winds of 145 miles per hour. Charley's strongest gusts were measured at 180 miles per hour at Punta Gorda. Hurricane force winds extended outward up to 25 miles from the center of the storm, and tropical force winds extended outward up to 85 miles from the storm's center. Hurricane Charley proceeded on a north to northeast path across Florida, traveling through much of the service territory of FPL and Progress, including densely populated areas around Orlando, before leaving the state.

Table 8. Hurricane Charley Electric Outages and Restoration

Utility	Landfall 8/13/04	Peak 8/14/04	Week Later 8/21/04	Restoration Complete ¹⁹	Days to Restoration
Florida Power & Light	648,000	874,000	66,300	8/29/04	16
Progress Energy	433,580	502,000	9,715	8/24/04	11
Tampa Electric	NA	78,000	0	8/19/04	6
Municipalities	150,000	22,500	NA	NA	
Cooperatives	200,000	22,804	NA	NA	
FLORIDA Impact		1,499,304	76,015		

Sources: Calculated from Utility Outage and Recovery Data as reported in Office of Energy Assurance Hurricane Charley Situation Reports.

On September 4, 2004, Hurricane Frances, a category 2 hurricane at the time it made landfall in Florida, reached the area between Fort Pierce and West Palm Beach with sustained winds of 105 miles per hour. The slow-moving hurricane knocked out power to six million customers, uprooted trees, ripped the roofs off of homes and businesses, flattened gas station canopies and slammed moored boats into one another. Hurricane Frances crossed over Florida and entered the Gulf of Mexico north of Tampa. Strong winds with gusts of near 100 miles per hour affected most utility service territories for almost a full day. The storm also dumped 6-12 inches of rain on the state.

Hurricane Ivan made landfall on the Alabama and Florida panhandle coastlines on September 16, 2004 as a strong Category 3 storm. It lashed the region with fierce winds, bringing coastal storm surges of 10 feet to 15 feet, and dropping torrential rain. It mostly impacted Gulf Power and cooperatives and municipalities in the northwest counties and panhandle. While the hurricane's impact on the state was limited geographically, the extent of the damage where it did hit was more complete. Hurricane Ivan was especially troublesome because it took out primary transmission lines in the panhandle. Sources of supply and the modes of delivery were impacted.

¹⁹ Less than one percent of customers remain without power

Table 9. Hurricane Frances Electric Outages and Restoration

Utility	Landfall 9/2/04	Peak 9/6/04	Week Later 9/9/04	Restoration Complete	Days to Restoration
Florida Power & Light	1,073,300	2,500,000	625,600	9/17/04	15
Progress Energy	25,000	832,898	155,892	9/13/04	11
Tampa Electric	NA	268,000	20,000	9/10/04	8
Municipalities	55,495	431,343	69,375	9/14/04	12
Cooperatives	NA	238,342	99,367	9/13/04	12
FLORIDA Impact		4,270,583	970,234		

Sources: Calculated from Utility Outage and Recovery Data as reported in Office of Energy Assurance Hurricane Frances Situation Reports.

Table 10. Hurricane Ivan Electric Outages and Restoration

Utility	Landfall 9/16/04	Peak 9/17/04	Week Later 9/23/04	Restoration Complete	Days to Restoration
Gulf Power	338,923	437,703	106,617	10/3/04	17
FLORIDA Impact		437,703	106,617		

Sources: Calculated from Utility Outage and Recovery Data as reported in Office of Energy Assurance Hurricane Ivan Situation Reports.

Hurricane Jeanne plowed into Florida on September 25, 2004 with blustering winds and torrential heavy rain. Nearly two million people were asked or ordered to evacuate low-lying areas, barrier islands and mobile homes in the storm's path. The hurricane washed out bridges and flooded roads as it tracked Hurricane Frances. Comparing Tables 9 and 11 provides insight into how utilities improved their restoration procedures. While both FPL and Progress had comparable numbers of customer outages, the days to restoration improved significantly from Hurricane Frances to Hurricane Jeanne.

Table 11. Hurricane Jeanne Electric Outages and Restoration

Utility	Landfall 9/26/04	Peak 9/27/04	Week Later 10/2/04	Restoration Complete	Days to Restoration
Florida Power & Light	938,800	1,737,400	97,800	10/5/04	9
Progress Energy	115,000	722,000	0	10/1/04	5
Tampa Electric	NA	285,000	14,565	10/3/04	7
Municipalities	NA	NA	33,300	10/12/04	16
Cooperatives	NA	700,000	5,110	10/8/04	12
FLORIDA Impact		3,444,400	150,775		

Sources: Calculated from Utility Outage and Recovery Data as reported in Office of Energy Assurance Hurricane Jeanne Situation Reports.

The utility petitions filed with PSC have not been all resolved. On February 22, 2005, a Florida state House panel approved a bill that would allow utility companies including

Florida Power & Light Co. to recoup their 2004 storm losses with bonds instead of a storm fee. If the bill becomes law, local customers could conceivably be paying less each month for hurricane expenses than the average of \$2.09 monthly over a three-year period that FPL has requested. On March 1, 2005, Florida PSC agreed to let Gulf Power Co. divide the costs of restoring electricity after Hurricane Ivan between itself and its customers on Florida's Panhandle. Gulf Power is one of three Florida investor-owned utilities that have asked the PSC to recover excessive storm costs from last year's hurricanes, and the first to come to an agreement on how that should be accomplished.

Lessons Learned

Extraordinary circumstances often encourage extraordinary responses. Managing the challenges to petroleum and electricity supply in Florida during the hurricanes of 2004 set a new standard for response and restoration.

Electric Restoration

Clearly, the restoration plans and training undertaken in the utility sector made it possible for investor-owned utilities, cooperative and municipal companies to pre-position equipment, move quickly to repair and restore, and return when subsequent storms

destroyed just-completed work. State and local government abetted electricity restoration by clearing roads, obtaining waivers and respecting the ability of companies to do their work and coordinating communications.

State restoration efforts centered on communications and coordination. An emergency event Storm Tracker System was used to inform public and private stakeholders regularly and it enabled all responders to have current information on power outage and related restoration efforts. Investor Owned Utility companies sent representatives to the EOC as well as affected local government emergency operation centers. Others were readily available by telephone or other communication systems to the emergency operation centers. Because the Governor's Office insisted that all possible measures be taken to achieve rapid restoration, many problems were solved at the local level by officials who felt empowered to make critical decisions and then report what they accomplished.

Petroleum Restoration

On the petroleum side, the EOC remained in constant touch with the state's major petroleum associations. The SEO worked closely with the Florida Petroleum Marketing Association, Florida Petroleum Council, and the Florida Propane Gas Association. Florida petroleum companies took the initiative in restoration by sharing generators, delivering fuel to needed areas, and finding alternatives to normal supply. The major role of the SEO was to coordinate, keep stakeholders informed, help find and expedite external supply, obtain government waivers and inform the public through the public information facilities of the EOC.

In the petroleum sector, suppliers adopted and used lists for priority customers in coordination with government and companies and customers accepted the results. Barriers to supply and coordination were removed. Petroleum suppliers were allowed to

What Worked Well

- Well-trained staff were ready for continuous hurricane demands
- Hurricane path prediction and analysis helped pre-position resources accurately
- Electric utility and independent contactor crews were shared effectively
- Restoration times improved for electric utilities with subsequent storms
- Interstate petroleum supply coordination improved with subsequent storms
- Coordinated requests for waivers on environmental impacts and trucker hours

innovate as needed and move product to customers. Government agencies helped locate new fuel supplies and equipment, obtained waivers, supported re-supply priorities and coordinated at all levels.

Communications and Coordination

The U.S. DOE supplemented the SEO's efforts with a rotating crew of officials from Washington, DC and field offices. The DOE effort was coordinated by the Office of Electricity Delivery and Energy Reliability (formerly the Office of Energy Assurance) which supplied half of the personnel. DOE personnel were in Florida at the EOC for the duration of all four storms and maintained ongoing communications with DOE and other units at headquarters, the Department of Homeland Security, and the White House Homeland Security Council as well as with the Corps of Engineers responders throughout the state.

What Needs Improvement

- Avoid tax holidays in/around hurricane season because of huge impact on gasoline demand.
- Improve allocation of portable generators to meet demand due to the repeated storms.
- Coordinate petroleum supply to isolated areas (port, highway cut-offs)

Information for the public was readily accessible. Updated announcements were provided via radio, television, newspaper, the Internet and telephone. Communications contained basic information about what to do to insure citizen safety, the status of fuel supply and restoration times for electric power and fuel delivery. During the height of the storms, the Governor held two press conferences each day. Utility companies provided their own public information in addition to that released by the Governor and state Emergency Management Center.

Discussions with responders to the 2004 hurricanes indicated that the emergency agencies operated as planned with intensive interagency coordination centered at the State Emergency Operations Center. There was coordination with local and Federal government agencies and private-sector emergency operation centers and offices. Private sector responders were also on site throughout the storms and restoration periods. Altogether, over 16,000 state employees were assigned to response and restoration duties during the storms.

The key to this success was the high level of responsibility accepted by both the public and private sectors. The Governor of Florida gave clear guidance requiring the highest level of coordination and cooperation. The federal government supplied needed expertise and assistance. The private sector provided its expertise and managed its human resources safely. There were some differences in expectations regarding the level of information required, a particular rule, or requests that seemed impossible to meet at the time. But, the important lesson learned is that in an atmosphere of cooperation and commitment to the work at hand, barriers were removed and doubts overcome.

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