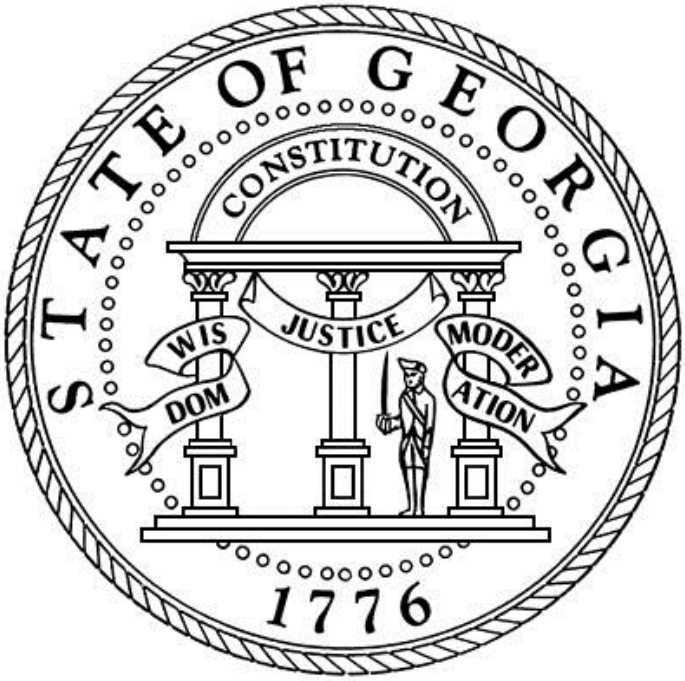
Georgia
Energy Assurance Plan

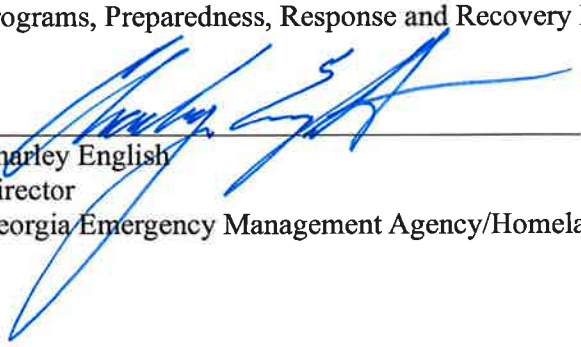


2011

January 2013

The Georgia Energy Assurance Plan was prepared by the Georgia Emergency Management Agency / Homeland Security in conjunction with the Georgia Environmental Finance Authority to develop, implement and maintain a viable capability to mitigate disruptions to energy within the State of Georgia. The Georgia Energy Assurance Plan complies with applicable internal agency policy, local and state regulations, and supports recommendations provided by the Federal Emergency Management Agency. The Georgia Energy Assurance Plan has been distributed internally within the Georgia Emergency Management Agency and with external agencies that may be affected by its implementation.

For more information on the Georgia Energy Assurance Plan, please contact the GEMA/HS Programs, Preparedness, Response and Recovery Directorate- Planning Unit at 404-635-7200.



1-28-13
Date

Charley English
Director
Georgia Emergency Management Agency/Homeland Security

PART 1: INTRODUCTION AND STATE ENERGY PROFILE & OPERATIONAL ELEMENTS

PART 2: ENERGY CONTINGENCY PLANS

State Energy Profile
and
Operational Elements

Introduction

In 2009, the Georgia Environmental Finance Authority (GEFA) received the "Enhancing State Government Energy Assurance Capabilities and Planning for Smart Grid Resiliency" grant, through the American Recovery and Reinvestment Act (ARRA). The purpose of the grant is for states to improve emergency preparedness plans, enhance the state's ability to respond to energy emergencies, and ensure grid resiliency on a regional basis. In order to best accomplish the goals and deliverables associated with the grant, GEFA partnered with the Georgia Emergency Management Agency (GEMA). The Energy Assurance Plan is one of the main deliverables required by the grant.

The energy assurance grant arrived at an opportune time for the state of Georgia. After hurricanes caused fuel shortages in metro Atlanta in 2005 and 2008, Georgia was eager to develop and exercise a more robust energy emergency plan. As a result of the funding, GEFA and GEMA were able to directly engage a large and diverse array of energy stakeholders in Georgia, including other government agencies and private sector energy providers. Beyond the plan that follows, GEFA and GEMA developed and executed a robust state-level energy emergency exercise, participated in both regional and national level exercises with the U.S. Department of Energy (DOE), and developed a geographic information system (GIS) and emergency management software-based supply disruption tracking system and energy infrastructure analysis and awareness tool.

A state government cannot properly plan for and respond to an energy emergency unless it has a solid understanding of its energy markets, energy interdependencies, energy regulatory environment, and threat environment. This plan includes a thorough analysis of those key items. Additionally, the plan examines options that are available to the state to respond to and mitigate an energy shortage. Lastly, the plan discusses how emerging technologies and issues in renewable energy generation, the smart grid, and cybersecurity can impact the state's energy reliability and security.

Georgia's energy sector, government structure, and threat environment are not static; therefore, the relevance of certain sections of this plan may change with time. It is the goal of the state to update this plan as needed and to ensure that Georgia's Emergency Support Function (ESF) 12 team remains engaged and educated on the topics contained in this plan. Please direct any questions or concerns regarding this plan to the Energy Resources Division at GEFA. GEFA can be reached at 404-584-1000.

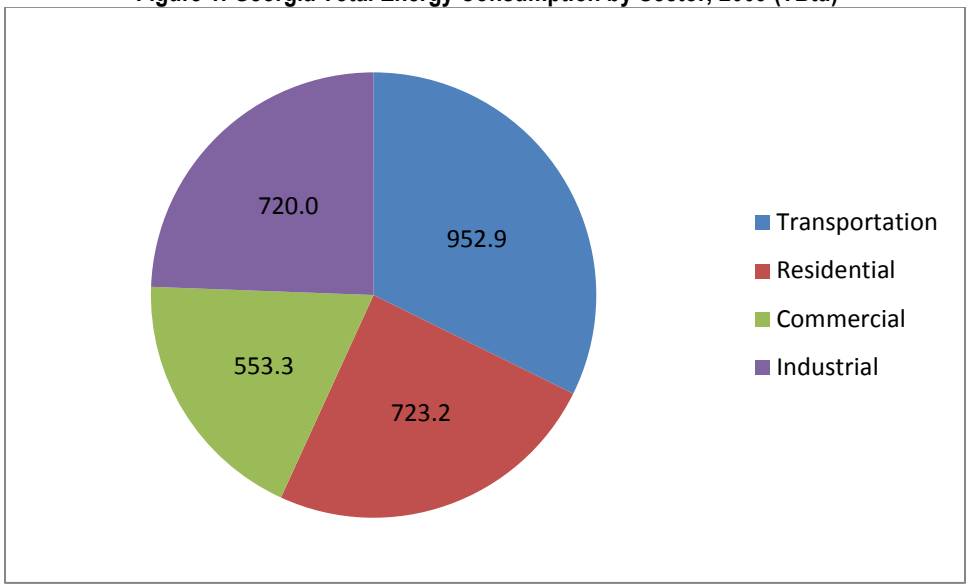
State Energy Profile

Energy Consumption and Demand

Between 1980 and 2009, the state's total energy consumption grew 70.1% from 1,734 Trillion British Thermal Units (TBtu) to 2,949.4 TBtu.[1] This rate of growth corresponds with the state's rate of population growth, 79.9%, over the same period.[2] As demand for energy in Georgia continues to grow, the state must ensure a reliable provision of energy resources, including electricity, petroleum products, and natural gas.

Since 2005, the transportation sector has been the largest consumer of energy in Georgia, consuming more than 952 TBtu of energy in 2009. The residential sector consumed over 723 TBtu of energy, followed by 720 TBtu in the industrial sector and approximately 553 TBtu in the commercial sector. The industrial sector's energy consumption began decreasing in 2001 and generally decreased through 2009.[3] [4]

Figure 1. Georgia Total Energy Consumption by Sector, 2009 (TBtu)



Electricity

The demand for electricity in Georgia, as indicated by megawatts hours (MWh) of electricity consumed in the state, grew by 63% between 1990 and 2009. In 2009, retail sales of electricity in Georgia totaled 130,765,505 MWh.[5]

[1] "2012 Georgia Energy Report", Georgia Environmental Finance Authority.
[2] "ACS Demographic and Housing Estimates: 2006-2008 – Georgia: 2008 Total Population Estimate" and "1980 Decennial Census – Georgia". U.S. Census Bureau.
[3] The electric power sector in Georgia is the number one consumer of energy; however, the energy consumed by the electric power sector in Georgia is not included in the state's total energy consumption in the graph above. This is because energy consumed by the electric power sector includes energy used for the generation and delivery of electricity to the point of use plus the energy consumed by the electric power sector itself. This loss during generation and transmission is referred to as "electric system losses."

[4] "State Energy Data System - Georgia." U.S. Energy Information Administration, Information Statistics and Analysis. http://www.eia.gov/state/seds/hf.jsp?incfile=sep_use/tx/use_tx_GA.html&mstate=Georgia
[5] "State Energy Data System 2008 - Georgia: Table R2. Energy Consumption by Source and Total Consumption per Capita, Ranked by State, 2008." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released November 18, 2010. http://www.eia.gov/state/state_energy_rankings.cfm?keyid=60&orderid=1

During this time period, over 15,000 additional MW of generating capacity were added to Georgia's electrical generation mix; this represents almost half of Georgia's current generating capacity. Despite the increasing demand for electricity, electrical infrastructure and facilities, including plants, substations, transmission and distribution lines, have performed very reliably. Unlike the other parts of the United States, Georgia has not experienced any substantial or prolonged periods of electricity outages due to demand exceeding production capacity. This is in part because Georgia continues to expand its power generation capacity, so that demand is met even during peak period usage.

Petroleum

In 2009, Georgia consumed 191.1 million barrels of refined petroleum products.[6] The transportation sector accounts for approximately 90% of this consumption, making the transportation sector the largest consumer of energy in Georgia. Studies indicate that the demand for petroleum for transportation will continue to rise. Consumption of refined petroleum products rose by 57% between 1983 and 2009, an average annual growth rate of 2.2%.[7] During this same period, the state's population increased by 51%, indicating a net increase in the use of petroleum products.

Natural Gas

In 2009, Georgia consumed 455 billion cubic feet of natural gas. Demand for natural gas is growing; between 1997 and 2009, natural gas consumption has increased by 25%.[8] Natural gas is increasingly being utilized as a fuel for electricity generation. In 1997, only 4.7% of natural gas was used for production of electricity; by 2009, this percentage rose to 31.3%.[9]

Since 2000, utilities and independent power providers in the state have almost exclusively built generators powered by natural gas. As power generation facilities are built to meet demand for electricity, the demand for natural gas will likely be driven up as well. [10]

Energy Production

Georgia uses a variety of energy resources, including petroleum, natural gas, coal, electricity, and renewables. Electricity is generated by a variety of fuels, including coal, natural gas, nuclear, petroleum, and renewables such as hydropower, wood and woodwaste, and other biomass. The following section first focuses on electricity generation by these different fuel sources. The next section discusses the range of other fuel sources used in Georgia.

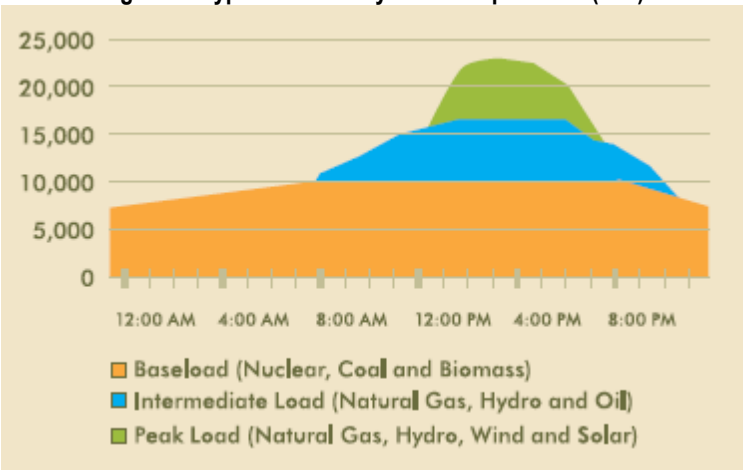
[6] Prices, Sales Volume & Stocks by State – Georgia." U.S. Energy Information Administration, Information Statistics and Analysis. Petroleum Navigator. Data released August 6, 2010. http://www.eia.gov/dnav/pet/pet_sum_mkt_dcu_SGA_a.htm
[7] "Prime Supplier Sales Volume – Georgia." U.S. Energy Information Administration, Information Statistics and Analysis. Petroleum Navigator. Data released August 6, 2010. http://www.eia.gov/dnav/pet/pet_sum_mkt_dcu_SGA_a.htm
[8] "Annual Natural Gas Delivered to Consumers in Georgia (including Vehicle Fuel)." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released January 28, 2011. http://www.eia.doe.gov/dnav/ng/hist/n3060ga2A.htm
[9] "Annual Georgia Natural Gas Deliveries to Electric Power Consumers." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released on January 28, 2011. http://www.eia.doe.gov/dnav/ng/hist/n3045ga2A.htm
[10] State Energy Strategy for Georgia. Georgia Environmental Facilities Authority. December 14, 2006.

Electricity

The bulk of Georgia's electricity is provided by coal, natural gas, nuclear, and hydroelectric plants. According to the U.S. Department of Energy's Energy Information Administration (EIA), in 2010, Georgia ranked 8th in the nation in net generation at 137,576,941 MWh.[11]

The type of fuel used to generate electricity depends on many factors, including demand, the time of day, the season, and the weather. Because electricity is not easily stored, electric providers must be ready to meet the electricity demands of customers at all times. Electricity is typically divided into three categories: baseload (generation run 24 hours a day), intermediate (usually run from mid-morning until the evening), and peak load (run when demand is highest – usually in the afternoon and early evening).

Figure 2. Hypothetical Daily Load Shape Curve (MW)



Source: 2009 State Energy Strategy Update, GEFA

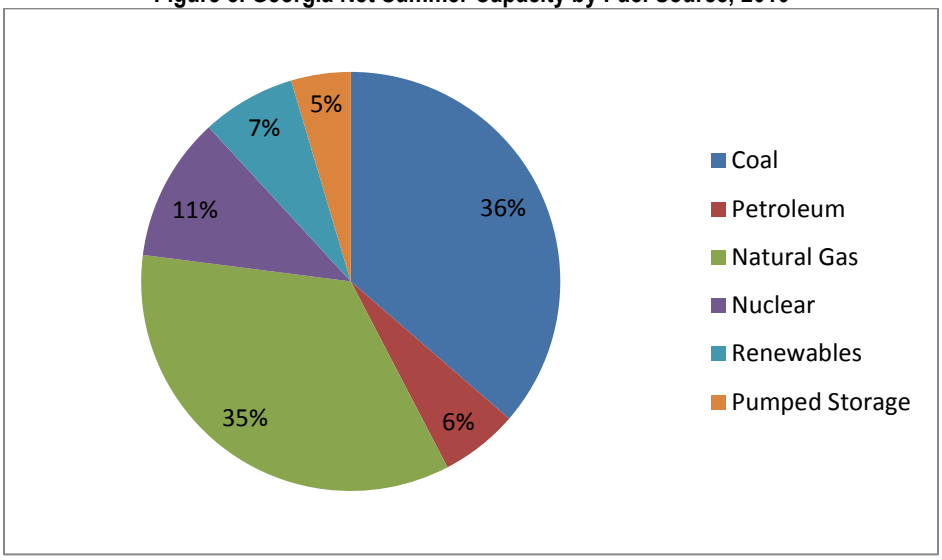
Each type of fuel used to generate electricity has specific operating and cost characteristics that determine during which load category the fuel will be used to generate electricity. Baseload demand is usually satisfied by nuclear and coal generators, due to their low variable costs and limited operational flexibility (i.e., it takes some time for the generators to warm up); biomass; and some hydro generation, which also has low variable costs. Intermediate loads are often satisfied by gas and oil steam turbines, combined-cycle gas turbines, and hydro power. These are used because their operational flexibility allows them to be ramped up and down as loads rise and fall during the day, and because their variable costs are lower than other options. Peak loads are usually satisfied by single-cycle gas turbines, hydro power, pumped hydro, wind, and solar generating units.[12]

[11] "Georgia Electricity Profile 2010: Table 1. 2010 Summary Statistics." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released January 30, 2012.

[12] State Energy Strategy for Georgia. Georgia Environmental Facilities Authority. December 14, 2006.

In 2010, Georgia had a total net summer capacity of 36,636 MW. Between 2000 and 2010, Georgia's net summer generating capacity increased 32 percent.[13][14] The majority of the capacity additions during that time were natural gas additions.

Figure 3. Georgia Net Summer Capacity by Fuel Source, 2010



In 2010, coal and natural gas fueled generators made up the majority of Georgia's net summer generating capacity (36% and 35%, respectively), followed by nuclear units (11%), units using renewables (hydroelectric and other renewable resources) (7%), petroleum units (6%), and pumped storage (excluding conventional hydroelectric) (5%). The majority of Georgia's electricity is generated by coal and natural gas, followed by nuclear. Coal and nuclear units are typically used as baseload plants, which run continuously. Georgia Power has installed a number of natural gas-fueled combined cycle units at plants across the state. These units offer a clean and efficient means of producing electricity and have the benefit of a quick start-up time to meet peak demand. Natural gas is also becoming more prominent as a base fuel due to low natural gas prices.[15]

Georgia Power Company ("Georgia Power"), a subsidiary of Southern Company, owns or co-owns most of the state's power generating facilities, including power plants and hydroelectric dams. Georgia Power, along with the Georgia Transmission Company (GTC), Municipal Electric Authority of Georgia (MEAG), and City of Dalton, co-own the Integrated Transmission System, a network of over 16,000 miles of transmission voltage lines.

Petroleum

[13] "Georgia Electricity Profile 2010: Table 4. Electric Power Net Capacity by Primary Energy Source and Industry Sector, 2000 and 2004 Through 2010 (Megawatts)." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released January 30, 2012.

[14] Capacity is the maximum electric power output of a generating unit and net summer capability is the maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to a system load, as demonstrated by a multi-hour test, adjusted to ambient weather conditions for summer peak demand (from June 1 through September 30). Summer capacity is different from nameplate capacity – nameplate capacity is the maximum rated output of a generator under specific conditions designated by the manufacturer. Generator nameplate capacity is usually indicated in units of kilovolt-amperes (kVA) and in kilowatts (kW) on a nameplate physically attached to the generator. Georgia's nameplate capacity in 2006 was 39,758 MW. Due to Georgia's high air conditioning use, electricity demand peaks during the summer months so net summer capacity is usually used as the measure for Georgia's peak load needs.

[15] "Georgia Electricity Profile 2010: Table 4. Electric Power Net Capacity by Primary Energy Source and Industry Sector, 2000 and 2004 Through 2010 (Megawatts)." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released January 30, 2012.

The petroleum industry in Georgia includes major companies that import fuel as well as wholesale and retail distributors, including service stations and distributors of fuel oil and propane.

Because Georgia does not have its own petroleum resources, all of the state's petroleum products are imported.[16] Approximately 85% of the state's petroleum products enter the state via Colonial and Plantation interstate pipelines. The Colonial pipeline network supplies the majority of pipeline petroleum products in Georgia. The entire system stretches from Texas to New Jersey, providing refined petroleum products to Louisiana, Mississippi, Alabama, Georgia, Tennessee, South Carolina, North Carolina, Virginia, Maryland, Delaware, and New Jersey. The Plantation pipeline transports product from refineries in Mississippi and Louisiana and delivers to eight states through a network of 3,100 miles of pipeline. In addition to Georgia, Plantation pipeline serves Louisiana, Mississippi, Alabama, Tennessee, South Carolina, North Carolina, and Virginia. The remaining 15% of Georgia's petroleum products are imported by tanker and offloaded at ports in Brunswick and Savannah. From here, the products are received at terminals and trucked to distribution points. The petroleum product terminals that serve Georgia are located in Doraville (the largest); Athens; Bainbridge; Griffin; Macon; Rome; and Jacksonville, Florida. Propane is supplied via the Dixie Pipeline, which originates at the Gulf Coast.

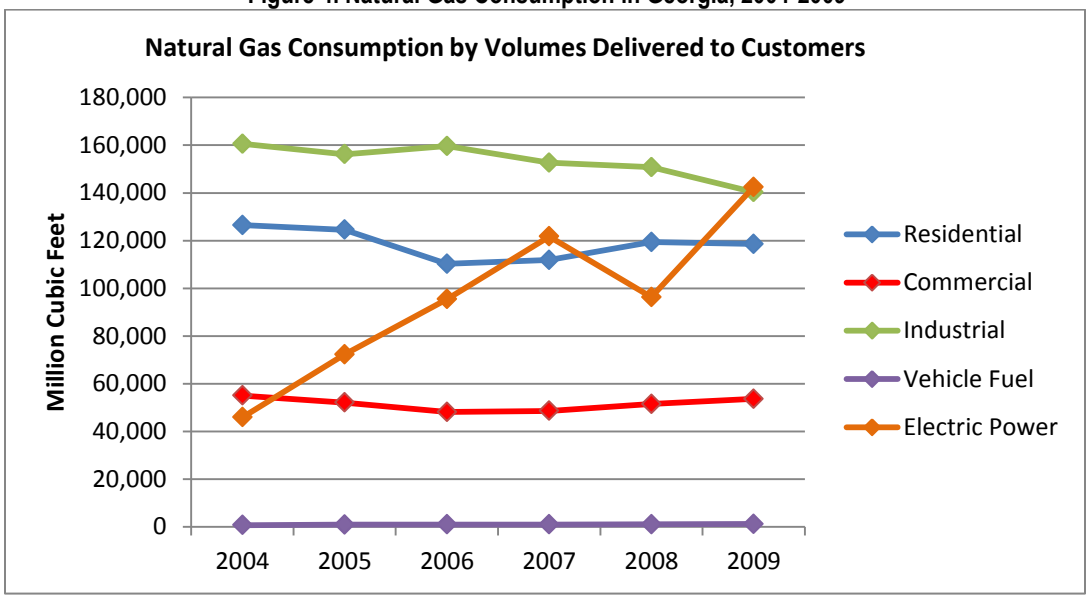
Within Georgia, the petroleum business is dominated by wholesale (jobbers) and retail dealers who receive refined product from national oil companies based on a monthly allocation. The allocation is determined by the number of customers served as well as weather, types of consumers (residential, commercial, industrial) and historical consumption patterns. During normal delivery conditions, jobbers and the retail outlets they serve receive as much product as they can sell, or *over* 100% of allocation. Thus, the 100% allocation level does not reflect actual demand. If supply becomes scarce, major suppliers will reduce the allocation. A reduction to 100% of allocation is an early warning sign. The unit price of petroleum product can be expected to rise as the allocation percentage falls. Less than 100% allocation will lead to even higher prices and, if continued long enough, the possibility of serious shortage.[17]

Natural Gas

Natural gas is a heavily used fuel in Georgia. In 2011, 530,154 million cubic feet (MMcf) of natural gas was consumed within the state. Nearly one-half (49%) of all Georgia households use natural gas as their main energy source for home heating.[18] Historically, the industrial and residential sectors have been the largest consumers of natural gas in Georgia. In 2009, however, for the first time, electric power generation surpassed the industrial and residential sectors as the primary natural gas consumer in the state. In 2011, electric power consumption accounted for 196,151 MMcF; the industrial sector consumed 143,551 MMcF; and the residential sector consumed 114,046 MMcF.[19] This is shown in Figure 4.

[16] Georgia's one operable petroleum refinery, the Citgo Asphalt Refinery near Savannah, has a capacity of 28,000 barrels per calendar day (B/CD) but has produced no product since 2005.
[17] Georgia Energy Emergency Plan. Georgia Environmental Facilities Authority. 2007 Revision.
[18] "Georgia: 2000 – Summary Social, Economic, and Housing Characteristics." 2000 Census of Population and Housing, U.S. Census Bureau. April 2003. http://www.census.gov/prod/cen2000/phc-2-12.pdf
[19] "Natural Gas Consumption by State." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released April 12, 2012. http://www.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_SGA_a.htm

Figure 4. Natural Gas Consumption in Georgia, 2004-2009



Georgia produces no natural gas and has no proven reserves of natural gas; consequently, the state relies on imports to meet all of its natural gas demands. Georgia is one of more than 20 states in the U.S. that is dependent on the interstate pipeline network for its natural gas supply.

Natural gas imports into Georgia arrive via three interstate pipelines and a liquefied natural gas (LNG) import terminal near Savannah. Three companies, Williams Partners, L.P., El Paso Natural Gas and Spectra Energy Partners, own the interstate pipelines that deliver natural gas to Georgia. Williams Partners owns the Transco Pipeline, a 10,500-mile natural gas pipeline system that extends from south Texas to New York City. El Paso Natural Gas operates the Southern Natural Gas (SNG) pipeline, which serves as Atlanta Gas Light's major supplier. The SNG pipeline capacity is 3.7 billion cubic feet (Bcf) per day. SNG's pipeline delivers gas at 165 delivery points in Georgia, including 131 local distribution companies or municipal gas utility delivery points, 22 direct industrial customers, and 12 power generation facilities. As a whole, the SNG system consists of approximately 7,600 miles of pipeline extending from the Gulf Coast to Texas, Louisiana, and seven additional states. El Paso Corporation also owns the Elba Express pipeline. This pipeline receives supplies from the Elba Island LNG facility in Savannah and runs northwest along the Georgia's eastern border, interconnecting with pipelines and customers on the route. The Elba Express opened in March 2010 and is approximately 190 miles long. An additional compressor station to increase capacity is anticipated for construction in the near future. Spectra Energy Partners owns the East Tennessee (ENTG) Pipeline. This system begins in Tennessee and extends approximately 1,353 miles to an area just south of Roanoke, Virginia. The ENTG pipeline has a small branch into Georgia, connecting to the SN pipeline.

In addition to the SNG and Elba Express pipelines, El Paso Corporation owns and operates the Elba Island LNG Terminal near Savannah. This facility receives import of LNG from around the world for transport throughout the southeast and eastern U.S. A 45-acre cargo slip allows two LNG tankers to offload LNG cargo simultaneously. Elba Island has five double-walled tanks with a combined capacity of 11.5 billion cubic feet to store the imported LNG. In addition, the terminal has regasification facilities with a peak send-out capacity of more than 1.75 Bcf per day. New methods of extracting natural gas in the US have dramatically increased supply and thereby lowered the price of natural gas over the past few years. In 2012, El Paso applied for a license with the US DOE to allow for the export of up to 0.5 Bcf of natural gas per day from the Elba Island facility.

Atlanta Gas Light Company (AGL) is the largest gas distribution utility in the southeast U.S. and serves approximately 1.55 million residential, industrial and commercial customers in 237 communities in Georgia. Even though Georgia has no underground natural gas storage, AGL owns and operates three LNG peak-shaving facilities in Georgia. AGL's Riverdale LNG plant has a storage capacity of 2,560 Bcf and is connected to two interstate pipelines for supply. The Riverdale plant is also connected to the AGL beltline pipeline system for distribution of natural gas into the Atlanta market and has a peak send-out of 400 Bcf per day. AGL's Cherokee LNG plant, located in Ball Ground, has a storage capacity of approximately 2,020 Bcf. The plant receives natural gas from three pipelines and has a peak send-out of 400 Bcf per day. Like the Riverdale plant, the Cherokee plant also serves the Atlanta market. AGL's Macon LNG plant has a storage capacity of almost 1,502 Bcf and has a peak send-out of 150 Bcf per day. However, the plant's pipeline system can only accommodate a delivery of 70 Bcf per day. AGL completed a new pipeline in November 2009 to supply 83,722 dekatherms a day of new capacity to the state. The Magnolia pipeline delivers enough natural gas to fuel 250,000 Georgia homes. The pipeline connects the Elba Island LNG facility directly to AGL's Brunswick and Macon service territories and establishes new deliverability to Atlanta.

Approximately 227,000 Georgia customers are served by 76 municipally owned gas companies. Municipal gas companies own, operate, and maintain their own facilities and have both firm (uninterruptible) and interruptible customers. They purchase their gas from pipelines associated with the non-profit Municipal Gas Authority of Georgia, an interstate system covering Alabama, Georgia, and Florida.

Coal

More than 95% of the coal in Georgia is used to generate electricity. Thus, the demand for coal is largely driven by the electric power sector. Most of Georgia's coal imports are domestic; in 2006, 96% of the coal used to generate electricity originated in the United States. Most of this coal came from either Kentucky or Wyoming (39% and 35%, respectively). Demand for Wyoming's subbituminous coal is growing; this coal is lower in ash and sulfur than the coal mined from the Appalachian area, and more readily complies with EPA regulations than the Appalachian coal.

Rising concerns over the air pollution produced by coal has contributed to its declining use as a primary energy source in electric generation. In 2000, coal accounted for 49.5% of electric energy production; this declined to 36.1% in favor of cleaner fuels.[20] Coal remains a cost-effective and efficient fuel source for electricity production, especially for baseload demand. Since 1991, therefore, Georgia utilities have invested more than one billion dollars in environmental controls for coal-burning plants. One of these controls is the use of flue gas desulfurization units, or "coal scrubbers." These devices use a limestone-water mixture to capture sulfur from the emitted gases, preventing it from entering the air. Since 1991, such environmental controls have reduced sulfur dioxide emissions by 42% and nitrogen oxide emissions by 50%. By 2016, the Georgia Environmental Protection Division (EPD) estimates that sulfur dioxide will be further reduced by 88% and nitrogen oxide by an additional 54% from today's emission levels.[21]

[20] "Georgia Electricity Profile 2010: Table 4. Electric Power Net Capacity by Primary Energy Source and Industry Sector, 2000 and 2004 Through 2010 (Megawatts)." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released January 30, 2012.
[21] Georgia Power Presentation to State Energy Assurance Stakeholders. Fall 2010.

Renewable Energy

In Georgia, renewable energy is used primarily for electricity production and transportation fuels. Renewable sources of energy, such as biomass, ethanol, hydro, solar, and wind, play an increasingly important role in Georgia's energy industry and currently account for almost 7% of total energy consumption in Georgia.[22]

In 2010, more than 6.5 million MWh of electricity in Georgia were generated using renewable fuels. The majority of the electricity generated from renewable sources was produced from conventional hydroelectric power (3.3 million MWh), followed by wood and wood waste (3 million MWh).[23]

A more thorough discussion on new trends in renewable energy and the potential for use in electricity generation can be found in *Part 4: Renewables for Energy Assurance*.

[22] Renewable energy is energy obtained from sources that are essentially inexhaustible. Renewable sources of energy include conventional hydroelectric power, geothermal, solar, wind, and biomass. Conventional hydroelectric power is generated from flowing water that is not created by hydroelectric pumped storage. Hydroelectric pumped storage is "hydroelectric power that is generated during peak load periods by using water previously pumped into an elevated storage reservoir during off-peak periods when excess generating capacity is available to do so. When additional generating capacity is needed, the water can be released from the reservoir through a conduit to turbine generators located in an electric power plant at a lower level." Hydroelectric pumped storage is usually to meet peak demand times. Biomass energy is produced from non-fossilized materials derived from plants. Biomass includes wood and wood-derived fuels, biomass waste, and biofuels. Wood biomass is "wood and products derived from wood that are used as fuel, including round wood (cord wood), limb wood, wood chips, bark, sawdust, forest residues, charcoal, paper pellets, railroad ties, utility poles, black liquor, red liquor, sludge wood, spent sulfite liquor, and other wood-based solids and liquids." Black liquor is produced when a byproduct of the paper production process, alkaline spent liquor, is removed for the digesters in the process of chemically pulping wood. After evaporation, the residual "black" liquor can be burned as a fuel. Biomass waste includes municipal solid waste from biogenic sources, landfill gas, sludge waste, agricultural crop byproducts, straw, and other biomass solids, liquids and gases but excluding wood and wood-derived fuels, biofuels feedstock, biodiesel, and fuel ethanol. Biofuels include alcohol fuels, such as ethanol and "biodiesel," a fuel made from grain oils and animal fats.

[23] "Georgia Renewable Electricity Profile 2010: Table 1. Summary Renewable Electric Power Industry Statistics (2010)." U.S. Energy Information Administration, Independent Statistics and Analysis. Data released March 8, 2012. http://www.eia.gov/renewable/state/georgia/

Energy Assurance Stakeholders

Ensuring a consistent supply of energy relies on the collaboration of numerous federal, state, and local agencies; private energy providers; and non-profit energy-related associations. Each of these entities works within its legal authority and specialization to maintain the production and distribution of energy resources critical to the state.

Georgia Emergency Management Agency - Role in Energy Assurance

The Georgia Emergency Management Agency (GEMA) is the lead state agency for the unified coordination of planning and response to events that require multi-agency support. Its mission is to provide a comprehensive and aggressive all-hazards approach to homeland security initiatives, mitigation, preparedness, response, recovery and special events in order to protect life and property and prevent and/or reduce negative impacts of terrorism and natural disasters in Georgia. GEMA is partnering with GEFA on Georgia's energy assurance initiative and is leading the energy assurance exercises as part of the planning effort.

The *Georgia Emergency Operations Plan (GEOP)* incorporates the Emergency Support Functions (ESFs) used in the nation's emergency disaster management system. Paralleling the Federal Response Plan, Georgia assigns Emergency Support Function #12 (ESF 12) as the energy sector. Within this protocol, the basic elements of energy emergency preparedness and action are established. *Emergency Support Function #12 Annex – Ener*gy explains the roles and responsibilities of the appropriate state agencies during an energy emergency. This document is presented in a following section.

Primary and Support Agencies

GEMA's *Emergency Support Function (ESF) 12 – Energy Annex* establishes the public and private agencies that are best suited to respond to energy emergencies in the state. The following section identifies these agencies and explains their roles in energy assurance.

Primary Agencies

There are three primary state agencies that are involved in energy assurance on a day-to-day basis – these are the Georgia Environmental Finance Authority (GEFA), Georgia Department of Agriculture (GDA), and the Georgia Public Service Commission (PSC). As the state's emergency management agency, GEMA also has a key role during situations that impact the provision of energy in the state.

Georgia Environmental Finance Authority

The Georgia Environmental Finance Authority (GEFA) serves as the state's energy office through its Division of Energy Resources. The Division promotes energy efficiency, renewable energy, and energy assistance programs, among other initiatives. GEFA manages the Energy Assurance program in Georgia and has been tasked with overseeing the development of the Energy Assurance Plan, supply disruption tracking system, and other energy assurance initiatives for the state.

Within ESF #12, GEFA is designated as the primary agency to coordinate with key partners to mitigate fuel disruptions in emergency situations. During the 2005 and 2008 hurricane seasons, petroleum refinery operations in the Gulf of Mexico were disrupted, and Georgia experienced moderate fuel shortages. GEFA was the primary agency that coordinated with state and federal authorities, as well as petroleum producers and transporters, to

mitigate the shortage and assist in the restoration of a sufficient supply of fuel to the state. It is important to note, however, that GEFA does not own or regulate any energy infrastructure or supply in Georgia.

Georgia Department of Agriculture

The primary involvement of the Georgia Department of Agriculture (GDA) in energy assurance stems from the department's authority over weights and measures, including fuel. Authority of petroleum fuels and weights was transferred to GDA from the Georgia Department of Revenue in 1960. The Division of Field Regulatory Inspection administers field inspections, the state fuel oil and weights laboratories, and a warehouse division. GDA tests and certifies commercial weighing and measuring equipment for motor gasoline, propane, and wholesale petroleum. During the 2008 fuel shortage, the Department of Agriculture assisted in the acquisition of fuel type waivers from the U.S. Environmental Protection Agency, allowing a greater volume of fuel to be available for use in Georgia.

Georgia Public Service Commission

The mission of the Georgia Public Service Commission (Georgia PSC) is "to exercise its authority and influence to ensure that customers receive safe, reliable and reasonably priced telecommunications, electric and natural gas services from financially viable and technically competent companies. The regulatory side of the Commission's activities is most prevalent in relation to investor owned natural gas and electric utilities. The Commission has the authority to set rates, require long-range energy plans and projections, provide for the safety of natural gas pipelines and protect underground utility systems from damage."[24] The Georgia PSC has a central emergency preparedness role in ESF #12 if there are disruptions to electricity; however, it has limited jurisdiction regarding the state's electric and gas companies. Table 1 depicts the limits of Georgia PSC authority over the various types of electric and gas energy providers and associated entities in Georgia.

[24] 2003 Annual Report. Georgia Public Service Commission.

Table 1. Limits of Georgia PSC's Regulatory Authority

Energy Provider	Scope of Regulatory Authority
Investor-owned electric utilities (Georgia Power)	Full regulatory authority
Electric Membership Cooperatives	Limited regulatory: - Territorial matters - Approval authority regarding applications for financing
Municipal Electric Utilities	Limited regulatory authority: - Territorial matters - Requires utilities to file rate information
Investor-owned gas utility (Atmos Energy)	Full regulatory authority
Atlanta Gas Light (distributes natural gas for many of the state's certified gas companies)	Regulates charges for pipelines and distribution; does not regulate delivery company rates
Municipal gas companies	Safety authority only
Intrastate gas transmission lines (2)	Safety authority only
Energy Provider Activities	**Scope of Regulatory Authority**
Expansion of gas company lines to new territory	PSC must issue certificate of public convenience and necessity
Gas price billing	Regulates billing practices; does not regulate rates
Universal Service Fund	Provides low-income assistance

Source: "What is the Commission's Role and Responsibility?" Georgia Public Service Commission. January 2002.

Although the utilities under its jurisdiction are not required to file plans and procedures for the restoration of electric service, the Georgia PSC may receive this information as needed for determination of appropriate costs to be recovered from ratepayers for the restoration of service. In the event of an emergency, these entities expect the affected utility to restore power rapidly within safety and restoration sequence protocols and to report on the projected completion of repairs and progress towards completion. Georgia PSC's primary role in an energy emergency is to provide ongoing communications and coordination as needed to facilitate repair and restoration. The agency also maintains proactive oversight over safety issues in a continuous effort to assure the integrity of both electric and gas distribution systems. As a practical matter, electric utilities must adhere to the National Electrical Safety Code, which is enforced by local government jurisdictions in Georgia. The Georgia PSC works closely with federal authorities to enforce federal Department of Transportation pipeline safety regulations.[25]

Support Agencies

Georgia Department of Defense

The Georgia Department of Defense (GADOD) serves as law enforcement as well as civil defense during periods of emergency. In additional to personnel, the GADOD may also contribute communications equipment, fueling equipment, and electric generators.

Georgia Department of Natural Resources

In fuel shortages or fuel-related emergencies, the Georgia Department of Natural Resources' (GADNR)Environmental Protection Division (EPD) may coordinate with the U.S. Environmental Protection Agency (U.S. EPA) to permit the use of lower-volatility fuel for the state, thereby expanding the state's available fuel supply. In other energy emergencies, GADNR may contribute communications equipment and personnel.

Georgia Department of Public Safety

[25] Georgia Energy Emergency Plan. Georgia Environmental Facilities Authority, Division of Energy Resources. 2007.

The state's Department of Public Safety is crucial for maintaining order during any type of energy emergency. During a fuel shortage or power restoration, officers from the Georgia State Patrol may accompany carriers and crews to ensure they can securely carry out operations.

Georgia Department of Transportation

In an energy emergency, the Georgia Department of Transportation (GDOT) may contribute, as needed, architectural and engineering services, construction equipment, fuel equipment, electric generators, personnel or vehicles. GDOT may work with power utilities to clear debris from roads prior to power restoration. During a fuel shortage, GDOT may temporarily relax bridge weight restrictions to allow fuel tankers to reach areas where fuel is most needed.

Georgia Forestry Commission

The Georgia Forestry Commission (GFC) works with electric utilities to coordinate the clearing of vegetation from roads. During an energy shortage, the Georgia Forestry Commission may be able to facilitate the provision of wood as alternative bio-fuel source.

ESF #12 includes additional support agencies comprised of private utilities and energy-related associations. These are Atlanta Gas Light Company, Georgia Association of Convenience Stores, Georgia Electric Membership Corporation, Georgia Oilmen's Association, Georgia Petroleum Council, Georgia Power Company ("Georgia Power"), Georgia Propane Gas Association, Georgia Transmission Company, and the Municipal Gas Authority of Georgia. These organizations, along with other private stakeholders, are discussed in the following section.

Private Partners

Electricity

The following stakeholders play a crucial role in the provision and distribution of electricity for the state of Georgia.

Georgia Power Company

Georgia Power Company, a subsidiary of Southern Company, is an investor-owned utility that supplies power to 155 of 159 Georgia counties. Georgia Power operates 14 generating plants and 20 hydroelectric dams across the state. It co-owns and operates over 16,000 miles of electric transmission and distribution lines. During an electrical outage, Georgia Power is responsible for restoration of service within its service area.

Georgia Electric Membership Corporation (Georgia EMC)

Georgia Electric Membership Corporation is a trade association that represents Georgia's 42 EMCs, as well Oglethorpe Power Company, Georgia Transmission Company, and Georgia Systems Operation Corporation. As Georgia EMC oversees multiple electric providers, it is a crucial partner in coordinating restoration of power during an electric outage.

Oglethorpe Power Corporation

Oglethorpe Power Corporation ("Oglethorpe Power") is a power supply cooperative that supplies power to 39 of Georgia's EMCs. It co-owns several plants and facilities with Georgia Power and the Municipal Electrical Authority of Georgia. In 1997, Oglethorpe Power was divided into three separate, but interrelated, cooperatives. Oglethorpe

Power Corporation oversees electric generation; the Georgia Transmission Company owns and operates substations and transmission lines; and the Georgia System Operations Corporation controls and monitors the system.

Georgia Transmission Company

The Georgia Transmission Company (GTC) is a non-profit association that oversees 39 of Georgia's EMCs. GTC plans, builds, and maintains transmission infrastructure, including lines and substations, throughout the state in an effort to ensure reliable electric service to Georgia EMCs. These facilities are jointly maintained and operated by GTC and Georgia Power, as well as the Municipal Electrical Authority of Georgia (MEAG Power) and Dalton Utilities. Georgia Power is the system operator for the state of Georgia and performs any repair or maintenance required on the state's transmission lines.

Georgia Systems Operation Corporation

Georgia Systems Operation Corporation is an independent, not-for-profit association that ensures the reliability of the electric system "by controlling and monitoring electric generation, transmission and distribution assets owned by Oglethorpe Power Corporation, Georgia Transmission Corporation, the Member Systems and other customers." This group would be closely consulted with during an electric outage affecting any of its service areas.

Municipal Electrical Authority of Georgia

The Municipal Electrical Authority of Georgia (MEAG Power) is a public power entity whose membership consists of municipalities that supply electricity for their citizens. MEAG Power currently serves 49 communities across the state. During a power outage, the association assists in the restoration of electric service for its member communities.

Petroleum

The following stakeholders are involved in the production and distribution of petroleum products supplied to Georgia, including gasoline, diesel fuel, and other distillate products.

Colonial Oil Industries

Colonial Oil Industries operates a storage and distribution facility at the Port of Savannah. Imported petroleum products are received via ship and distributed by truck throughout the state.

Colonial Pipeline Company, Inc.

Colonial Pipeline Company, Inc. (not affiliated with Colonial Oil Industries) operates an interstate network of petroleum pipelines that travel through Georgia, providing petroleum products at several distribution points. The pipelines distribute refined petroleum products produced at refineries in Texas, Louisiana, Mississippi, and Alabama. The entire interstate network spans more than 5,500 miles of pipeline. Colonial Pipeline supplies the majority of the state's petroleum products.

Plantation Pipeline Company

The Plantation Pipeline Company also operates an interstate pipeline network that transports petroleum from Louisiana to Georgia and beyond. The company operates multiple pumping and distribution stations across the northern and central portions of the state. The entire interstate pipeline network totals approximately 3,100 miles.

Georgia Oilmen's Association

The Georgia Oilmen's Association (GOA) is a state trade organization that represents distributors and marketers of petroleum products. Its membership includes producers, refiners, manufacturers, wholesalers, transport carriers, convenience stores, and other entities involved in the petroleum industry. Because it represents stakeholders from all facets of the petroleum industry, the GOA is an important partner during a shortage of petroleum products.

Georgia Petroleum Council

The Georgia Petroleum Council (GPC) is a state chapter of the American Petroleum Institute, a research and advocacy group representing the petroleum industry. GPC has been a crucial partner in mitigating statewide fuel shortages.

Georgia Association of Convenience Stores

The Georgia Association of Convenience Stores (GACS) provides numerous services to convenience store members across the state, including employee training, legal assistance, credit card processing, and other activities related to convenience store operations. As sellers of petroleum products, including gasoline, diesel, and propane, GACS members are directly connected with the "end users," making the association a key partner during a petroleum shortage.

Enterprise Product Partners (Dixie Pipeline)

Enterprise Product Partners operates several pipelines throughout the United States that transport natural gas, propane, and other similar products. The Dixie Pipeline transports propane from refineries and fractionators in Texas, Louisiana, and Mississippi to Southeast states, including Georgia. As Georgia's primary source of propane, the state would work closely with Enterprise Product Partners in case of an imminent or existing propane shortage.

Georgia Propane Gas Association

The Georgia Propane Gas Association is a trade and membership organization for propane gas marketers across Georgia. The organization focuses on industry safety and standards for propane as well as marketing propane as a source of fuel. If a propane shortage were imminent, the Georgia Propane Gas Association would be a key point of contact to reach partners in the propane industry, and help restore propane supply for the state.

Natural Gas

The following stakeholders are involved in the import and distribution of natural gas and liquefied natural gas in Georgia.

Atlanta Gas Light Company

Atlanta Gas Light Company (AGL) is the largest distributor of natural gas in the southeast. Originally, AGL was the sole natural gas marketer for Georgia. In 1997, however, Georgia deregulated the natural gas industry, and AGL was forced to relinquish its marketing authority and become a "pipes only" company. AGL is still responsible for ensuring gas delivery for the state by contracting for firm transmission and storage capacity with interstate pipelines. The rights to use these contracts are "released" to marketing companies, which then use them to ship gas to their customers in Georgia. AGL's primary responsibility is now the operation and maintenance of natural gas systems and

infrastructure in the state of Georgia, including pipes, storage facilities, and meters. AGL also directly manages storage and transportation services needed to meet the shifts in customer loads associated with weather forecast variances. If there is a significant disruption in natural gas within the state, the state would partner with AGL to restore natural gas service expeditiously, with first priority given to critical services and special needs populations.

Atmos Energy Corporation

Atmos Energy Corporation is a natural gas utility that distributes and markets natural gas. Like AGL, it is an investor-owned utility. When Georgia's natural gas industry deregulated, however, Atmos Energy Corporation did not elect to open its territory, and it continues to operate as an investor-owned local distribution company, fully regulated by the PSC. Atmos Energy serves areas within the cities of Columbus and Gainesville; customers in this territory must purchase their natural gas from Atmos Energy.

Municipal Gas Authority of Georgia

The Municipal Gas Authority of Georgia (MGAG) represents 72 municipal gas distributors across the state of Georgia in addition to additional distributors in Florida, Alabama, Pennsylvania, and Tennessee. MGAG provides a variety of services, including regulatory assistance, supply and capacity planning, budget assistance, project financing, and employee training. MGAG also provides capacity management services to member utilities and, in the event of a flow limit imposed by one of its pipelines, assures that firm gas supply to member utilities is seamless.[26] Municipal gas utilities were exempt from the deregulation of Georgia's natural gas industry; customers who reside within municipalities that provide natural gas services must purchase their natural gas from their municipality.[27]

El Paso Corporation / Southern Natural Gas Company

Southern Natural Gas Company, a subsidiary of El Paso Corporation, operates the Elba Island Terminal at Elba Island off the Georgia coast. The terminal receives and stores imports of liquefied natural gas (LNG), primarily from Trinidad and Tobago. Although the terminal is the smallest of its kind in the United States, it distributes the second-largest volume of LNG. El Paso Corporation also owns the Southern Natural Gas and Elba Express pipelines.

Williams Partners, L.P. (Transco Pipeline)

Williams Partners, L.P. owns the Transco Pipeline, a 10,000-mile network that delivers natural gas across the United States. The pipeline runs in a direct path across central Georgia to South Carolina.

Spectra Energy Partners (East Tennessee Pipeline)

Spectra Energy Partners owns the East Tennessee Pipeline network. A small portion of the pipeline branches into Georgia from Tennessee, connecting to the SNG pipeline.

[26] "Beacons of Service – Municipal Gas Authority of Georgia, Annual Report 2009." Municipal Gas Authority of Georgia. http://www.gasauthority.com/Images/Users/3/09AR.pdf

[27] "Georgia Environmental Finance Authority: Georgia's Energy Markets." http://www.gefa.org/Index.aspx?page=328 Accessed September 15, 2010.

Federal Partners

There are several federal partners whose assistance may be sought during an energy emergency. Many of these departments, such as the U.S. Department of Energy, Federal Emergency Management Agency, and U.S. Department of Agriculture, have statewide equivalents wherein initial contact would be made. Following portions of the *Georgia Energy Assurance Plan* discuss how these and other federal partners have unique roles and legal authorities that can assist in the recovery of state energy resources.

Legal Authorities

Energy Emergency Authority

Legal authority for managing energy emergencies in Georgia is contained in several sections of the Georgia Annotated Code. Section 38.3-51 provides broad powers to enforce laws, seize property temporarily and sell, lend, give or distribute such property among the state's citizens; however, these powers are specifically limited to a declared energy emergency. The specific definition of an energy emergency is contained in Section 38-3-3. The definitions in this section provide overall guidance for emergency management; they stress preparedness, mitigation and restoration. Article 3 in this Section defines an energy emergency as:

A condition of danger to the health, safety, welfare or economic well-being of the citizens of this state arising out of a present or threatened shortage of usable energy resources; also any condition of substantial danger to the health, safety, or welfare of the citizens of this state resulting from the operation of any electrical power-generating facility, the transport of any energy resource by any means whatsoever, or the production, use or disposal of any source material, special nuclear material, or by– product, as defined by the Atomic Energy Act of 1954, 68 Stat. 919, 42 U.S.C. 2011, et seq.; also any nuclear incident, as defined by the Atomic Energy Act of 195C4, occurring within or outside this state, substantially affecting the health, safety or welfare of the citizens of this state.

The Section further defines the types of energy envisioned. These include "without limitation," oil, gasoline, other petroleum products, natural and synthetic gas, electricity and all other sources except wood.

Georgia Emergency Management Agency

The *Georgia Emergency Operations Plan (GEOP)*, developed by the Georgia Emergency Management Agency, is a comprehensive state emergency operations plan intended to ensure mitigation and preparedness, appropriate response, and timely recovery from natural and manmade hazards that may affect residents of Georgia. The GEOP is based on the authority of the state government for emergency management and contains specific Emergency Support Functions (ESFs). Standard operating procedures for accomplishment of these functions are the responsibility of the primary state agency or organization in coordination with other supporting agencies and organizations.

An emergency or disaster can easily impact energy service to the state. Severe weather may damage the power grid and disrupt electrical service for thousands of citizens. A hurricane bearing down on the Gulf Coast would necessitate the shut-down of several petroleum refineries, stymying the distribution of vehicle fuel to Georgia. Regardless of the exact cause of the emergency, it is crucial to have a coordinated response of the appropriate state, local, and federal agencies, along with private and non-profit partners, to restore energy supply to the state. This coordination effort is addressed in the GEOP's *Emergency Support Function #12 (ESF #12) - Energy Annex.*

Georgia Environmental Finance Authority

The role of the Georgia Environmental Finance Authority in energy emergencies is detailed in *Georgia General Assembly § 50 – 23 – 32.* The Division of Energy Resources (DER), located within GEFA, is authorized to *"prepare and present to the government for approval a standby emergency plan setting forth actions to be taken in the event of an impending serious shortage of energy or a threat to public health, safety, or welfare."*

This bill authorizes GEFA, as the state energy office, to participate in the following activities to assist in ensuring a reliable supply of energy for the state of Georgia:

1) Consult with other departments, agencies, or officials of this state or political subdivisions thereof and appropriate private and professional organizations in matters related to energy;
2) Enter into agreements to carry out energy related research and planning jointly with other states or the federal government where appropriate;
3) Inform, educate, and provide materials to other agencies, political subdivisions, and the public on energy related matters, with particular emphasis on energy consumption trends and their social, environmental, and economic impacts; conservation and energy efficiency; and alternative energy technologies;
4) Monitor and assess the relationship and impact of international, federal, and regional energy policies on the state's energy policies and programs;
5) Collect and analyze data relating to past, present, and future consumption levels for all sources of energy, and make recommendations on actions to encourage energy conservation and management;
6) Prepare and present to the government for approval a standby emergency plan setting forth actions to be taken in the event of an impending serious shortage of energy or a threat to public health, safety, or welfare;
7) Design and implement a program to encourage energy conservation and efficiency, to include public, commercial, industrial, governmental, and residential areas;
8) Maintain awareness of all energy related research, with particular emphasis on alternative energy resources
9) Design and implement programs to assist local governing authorities and other entities in implementing alternative energy projects. [28]

Office of the Governor

If an energy emergency disrupts a substantial portion of the state's energy resources, the Governor may declare a State of Emergency. The declaration may include a price gouging statute, prohibiting retailers from increasing the price of goods or services greater than the cost to the retailer, plus average markup percentage, from 10 days before the emergency declaration. In the declaration, the Governor must specify the specific goods and services (e.g., plywood, gasoline) that the price gouging statute applies to.

ESF #12 Supporting Agencies

Supporting agencies within ESF #12, including the Georgia Public Service Commission, Georgia Environmental Protection Division, Georgia Department of Transportation, Georgia Department of Agriculture, and others have specific legal authorities to mitigate energy disruptions. These roles are outlined in a preceding section.

Threat Environment

Georgia's vastly contrasting climates, from the saltwater marshes in the southeast to the mountains in the north, as well as its proximity to other states considered as risk states, make it susceptible to a wide range of natural, manmade and technological hazards. An analysis of the threat environment allows emergency managers to prioritize planning requirements in a verifiable order and apply human and financial resources appropriately during the preparedness phase of the emergency management process.

This portion of the State Energy Assurance Plan details several potential hazards that have affected the State or that the State may be susceptible to. The first section highlights specific natural hazards that Georgia has experienced or is likely to face. The second section discusses Georgia's cyber hazards, and the impact the cyber vulnerabilities could potentially have on energy delivery. The last section focuses on these hazards' effects upon the State's primary energy resources (electricity, petroleum, and natural gas), and the expediency and efficiency of restoration based on current plans and procedures. This information should be used to prioritize planning and preparedness activities for all agencies listed in this plan. Portions of this section are adapted from the Hazard Analysis from the *Georgia Emergency Operations Plan (August 2010),* the *Georgia Fuel Emergency Plan (2009)* and the *Georgia Energy Emergency Plan (2007)*.

Natural Hazards

Georgia faces a number of natural hazards, including floods, hurricanes, tornadoes, wild fires, winter storms, drought, and earthquakes. These natural disasters are highly likely to impact the energy infrastructure in local neighborhoods, cities, regions, or the entire state.

Tropical Systems and Hurricanes

Tropical systems can impact the entire state of Georgia depending on a storm's track and its forward motion. Even the weakest of systems can produce tornadoes and major flooding. Georgia is vulnerable to tropical systems coming from both the Gulf of Mexico and the Atlantic coast. Hurricanes bring the greatest threats to Georgia's six coastal counties and immediate adjacent seven inland risk counties. The threats from a major hurricane include storm surge, high winds, flooding, and tornadoes. Although coastal Georgia has not experienced a landfall from a major hurricane (category 3 or stronger) since 1900, many major tropical systems have impacted the state. Tropical storms may cause serious damage to lines, poles, equipment, and trees. Debris cleaning plus transmission and distribution line replacement can require many days to complete. Furthermore, gasoline stations without electricity will be unable to provide gas for first responders, such as fire, police, and ambulance services.

The State of Georgia has historically provided assistance and services to residents of neighboring states evacuating coastal areas for major hurricanes. In moderate size evacuations, the majority of these citizens obtain shelter and feeding support from the private sector via hotels, motels and restaurants. In most cases, these citizens will stay within Georgia for less than a week before returning home. In some instances, because of the catastrophic impact of the event or the volume of the evacuating population, the private sector cannot support these individuals, and local and state government must coordinate operations to provide basic support to large numbers of citizens from other states. In 1999, the threat of Hurricane Floyd caused an estimated 1.7 million residents of Florida and South Carolina to evacuate to Georgia; in addition, over 250,000 Coastal Georgia residents moved inland. In 2005,

Hurricane Katrina prompted an estimated 100,000 residents of Louisiana and Mississippi to evacuate to Georgia. Approximately 10,000 of these citizens were transported by federal response agencies. Georgia may also receive citizens evacuating or repatriating from a foreign country. In 2006, Georgia was a host to several thousand Americans being evacuated from Lebanon when armed conflicts broke out between Lebanese and Israeli forces. Vehicle gasoline shortages are the most common impact of intra- and interstate evacuations on energy resources. This most often occurs during hurricane-related evacuations, when the state's fuel supply may be impacted by an increased demand for fuel along evacuation routes, or is in short supply due to shut-down of refineries in anticipation of the storm.

Tornadoes

Georgia usually ranks in the top 15 states in relation to the number of tornadoes reported each year. Between 1950 and 1994, Georgia reported 888 tornadoes, ranking the state 13th in the U.S. with an average of 20 tornadoes per year. Although tornadoes have been reported in every month, most occur in the March to May timeframe. There are also a greater number of tornadoes reported in the fall from October to November caused by late Fall cold fronts. Although Georgia rarely experiences the most devastating EF-4 and EF-5 tornadoes experienced in the Midwest, some have occurred in the past. On May 11, 2008, Georgia experienced twenty (20) tornadoes in one day, ranging from EF-0 to EF-4 in intensity. Two months earlier, an EF-2 tornado struck downtown Atlanta, killing one resident and causing millions of dollars in damage. The disaster occurred while several large events were going on with thousands of people in attendance. In 2011, Georgia and four other Southeast states experienced a "Super Outbreak" of intensely destructive tornados. A total of 15 tornadoes touched down in Georgia on April 27 and 28, 2011, including an EF-4 and five EF-3 twisters resulting in dozens of injuries and 15 deaths. Tornadoes of any intensity are likely to damage energy infrastructure. Because of the exposure of the power grid, electricity infrastructure, such as power lines and substations, will almost certainly be damaged if in the path of a tornado. Depending on the intensity of the tornado, other facilities, such as natural gas storage and above-ground pipelines, may be damaged as well.

Floods

Georgia's greatest natural disaster in modern history occurred when freshwater flooding from Tropical Storm Alberto passed over the state in 1994. Some areas received more than 20 inches of rain from Alberto. An estimated 1,700 roads and 600 bridges were forced out of service, and several towns were largely under water. Over 40,000 people were evacuated due to the rising waters, and about 12,000 homes and businesses were destroyed or severely damaged by the flooding. Thirty people were killed; many of these were vehicle-related. Fifty-five counties in Georgia were declared disaster areas, and approximately 11,500 Georgians applied for federal disaster assistance. In fall 2009, Georgia experienced severe flooding over a ten-day period that resulted in 46 counties being declared Presidential Disaster areas. Currently, the state is still recovering from devastating floods that impacted over 21 counties in north, central and western parts of the state. This event may conclude as the most costly natural disaster in state history. During a severe flood, the power supply would likely be impacted; substations and other facilities may be under water, and intense floods can down power lines. Natural gas and petroleum operations rely heavily on electricity, so these resources may be impacted as well. Flooding also has the potential to damage underground pipes that distribute natural gas and petroleum products.

Wildfires

Wildfires in Georgia are impacted by long-term drought conditions. A wildfire threat can increase after a hard freeze, when tender vegetation dies and becomes additional fuel for fires. Wildfire risks also increase in the fall when the combination of low humidity, freezes, and freshly fallen leaves provide the greatest amount of fire material. Wildfires can become disastrous when they threaten and damage residential and business areas. Some wildfire events necessitate major evacuations to protect citizens. Careless burning of debris such as leaves and household garbage, farm machine usage, and lightning strikes causes most wildfires in Georgia. In 2007, Georgia experienced its worst wildfire in recorded history. The fire, which started at the Georgia Bay Complex, burned 441,705 acres statewide and destroyed 9 homes. An additional 21,000 acres burned within a 21-county Governor-declared emergency area. The Georgia Forestry Commission and more than 3,300 people from 44 states worked to control the wildfires. In the spring of 2011 lightning sparked another wildfire in the same area of the state. The Honey Prairie Fire burned over 300,000 acres but was mostly confined to the Okefenokee National Wildlife Refuge. Later that spring, two more large fires broke out on private land in southeast Georgia burning over 40,000 acres, occasionally closing roads, and briefly forcing 250 people to evacuate. Wildfires, like other natural threats, adversely impact energy equipment and infrastructure in impacted areas.

Winter Storms

Although winter weather is a greater probability in North Georgia's higher elevations, snow and ice storms have threatened south and central Georgia as well. Ice storms pose some of the greatest risks of long-term damage to the state. A major ice storm, caused by a long period of freezing rain, may cause ice to accumulate on power lines and trees. Ice as thick as a quarter of an inch may cause power lines to snap. Ice accumulation on branches may bring down trees, as well as the power lines beneath them. In January 2011, the state experienced a significant winter storm event during which several counties across the north and central witnessed several inches of snowfall and ice. This event made travel extremely hazardous resulted in the closing of several school districts, government offices, and businesses. In addition, ice accumulation disrupted electric service to several hundred customers, particularly in east-central Georgia.

Drought

Long-term lack of rainfall can cause major concerns for Georgia's agricultural industry and water supply. When dry conditions persist for more than one to two years, soil moisture levels decrease dramatically and impact agriculture, trees, and drinking water reservoirs. Severe droughts have the potential to impact hydroelectric dams across the state, reducing the efficiency of power generation. Long-term droughts also increase the threat of wildfires in Georgia.

Earthquakes

Earthquakes in Georgia are rare, particularly when compared to the long history of damaging earthquakes elsewhere in the United States, such as those associated with California's active San Andreas Fault zone. While there are no active fault lines within Georgia, the state falls within a number of seismic zones, or areas where there is an increased risk of seismic activity. These include the Madrid Seismic Zone, Eastern Tennessee Seismic Zone, Central Georgia Seismic Zone, and Charleston Seismic Zone. Intraplate earthquakes, which are highly unpredictable, are also a possibility. Damages from the great eastern United States earthquakes are largely forgotten because the last great earthquake was over 100 years ago. Although large earthquakes are now less

frequent, some seismologists argue that earthquakes cause damage over much larger areas in the eastern United States than earthquakes of similar size in the western United States. Hence, in Georgia, as in most of the eastern United States, calculations of seismic hazard indicate that large distant earthquakes are likely to cause as much damage in Georgia as earthquakes of any size with epicenters within the state. No area is immune from the earthquake threat, but northern Georgia has experienced the most earthquakes in recent history. Earthquakes large enough to cause damage would be felt in most, if not all, of Georgia's counties. Thus, if a damaging earthquake occurs anywhere in the state, it will affect an expansive area throughout the state. Earthquakes, similar to other natural disasters, are highly likely to damage energy infrastructure, including power lines and facilities and underground pipelines for natural gas and petroleum.

Energy Source Vulnerability

Electricity

Electricity is fundamental for almost any stationary fuel use. Without electricity, heating oil and natural gas, while abundant, cannot be pumped. Petroleum pipelines also require a substantial amount of electricity to operate and transport product. In Georgia, electricity is the principal source of all energy needs in the commercial and residential sectors. These two sectors are especially vulnerable when electric service is interrupted.

Electric service restoration varies according to geography and the amount of damage to facilities. In general, the number of users per line mile in urban areas is dense, so restoration often occurs quickly. Outages in rural areas affect fewer customers, but full restoration can take longer due to the distance between customers and proximity of wires to trees.

Regional power loss is another risk faced by states. The electric grid is a unique energy asset in that each state's electric grid is inextricably tied to other states, despite the utility that owns the transmission and distribution lines. The northeast United States has experienced blackouts and brownouts due to the cascading effects of outages in neighboring states. While Georgia has not experienced a large-scale outage due to difficulties on neighboring states' lines, the state's power grid is still linked to Alabama, Florida, Tennessee, North Carolina and South Carolina. For Georgia, the balance of fuel generation and load forecast is managed daily by Southern Company. Any unanticipated increase in load in one area, however, has the potential to affect power supply in Georgia.

Electricity can be generated by a variety of fuels. The vulnerability of these fuel sources is directly correlated to the reliability of electricity generation. These vulnerabilities are discussed further in *Part 2: Energy Contingency Plans.*

Petroleum

Georgia uses more petroleum than any other type of energy, primarily for motor vehicle gasoline. Therefore, an extended petroleum shortage could have severe impacts on transportation and mobility, and cascade to affect several areas of the economy. Some shortages, such as those that arise from ice storms or temporary interruptions to pipeline flow, are quickly mitigated. The only visible effects may be a temporary increase in price or in demand, resulting in sporadic gasoline outages. Because a significant percentage of the state's petroleum supply is imported internationally, including from the Organization of Petroleum Exporting Countries (OPEC), Georgia is vulnerable to the effects of international events, such as war or economic competition, which may cause more long-term disruptions to petroleum supply.

Regional and national American oil markets also affect petroleum delivery. Two significant changes in these markets during the last twenty years are especially important. The first is the growth of open pricing. Oil pricing is no longer dominated by a cabal of senior oil company executives and state regulators. The New York Mercantile Exchange, along with the advent of personal computers and the Internet, has made it possible for any buyer or seller to instantly assess the price of petroleum. The second change began in the 1990s and is still developing. Out-of-state suppliers reduced their dependence on regional and local storage to meet peak seasonal demand. This is referred to as "just-in-time delivery."

Petroleum marketers reduce regional and local storage for two reasons. First, storage is expensive. Petroleum companies also argue that the cost of storage has increased with new environmental regulations. Second, stored product competes with new product. Generally, oil products are purchased for storage before they are needed (pre-season). When seasonal national and regional supplies are tight, petroleum products become more expensive. Stored product, purchased at a pre-season price, provides a lower cost alternative. Hence, cutting storage reduces a form of competition.

Petroleum companies prefer to adjust product shipped through pipelines as demand varies. The economy of just-in-time delivery benefits producers and helps to maintain the balance between supply and demand. On the other hand, if supplies are curtailed, the cushion of comfort (and moderated prices) provided by storage is diminished. From the consumer's perspective, this means that prices will rise more rapidly when demand is high than they did just before just-in-time delivery was introduced. Petroleum companies argue that prices will also fall rapidly when demand recedes. This is explained by petroleum market theory that higher prices encourage greater production that, in turn, leads to more supply and lower prices.

Long-term petroleum product storage in the United States is relatively stable; however, EIA data indicates a slight downward trend since 1995. Each year, for the past several years, EIA has indicated that seasonal U.S. stocks tend fall close to, or below, what the agency refers to as the Lower Operating Inventory level of 270 million barrels (excluding the Strategic Petroleum Reserve). These trends vary according to the world economy. Prosperity, peace and economic growth in less developed countries place pressure on the availability of petroleum for the United States. OPEC is also a factor. OPEC does try to maintain a relatively stable price range in order to reduce market volatility, but this is more an art than a science and is subject to area politics.

From Georgia's perspective, rapidly increasing prices cause public concern. Georgia has a *Fair Business Practices Act (1975)* that prohibits price gouging during a declared state of emergency. In the event of such a declaration for the state, the Georgia Petroleum Council (GPC) would be in contact with GEMA, the state's Office of Consumer Affairs, and the major oil suppliers to make sure that the Act is enforced fairly. GEMA may contact the pricing and sales offices of the major oil companies, but GPC also reinforces this with calls to oil company public affairs offices to make certain that the information is absorbed quickly.

Short of an emergency declaration, some prices are likely to increase during an actual or anticipated shortage. Public concern may require explanations or responses from government. If supply is curtailed for any length of time, higher prices related to the lack of local storage can exacerbate the shortage. This creates problems for everyone, since petroleum use is universal. The same concern of a curtailed supply creating a shortage also affects propane.

Pipeline or refinery problems can also tighten petroleum supply statewide. In turn, higher prices for fuel reduce the amount of money available for purchasing other goods and services. High transportation costs are eventually passed on to consumers through higher prices for goods and services.[29]

Natural Gas

Industrial and residential users are the largest consumers of natural gas for energy in Georgia. Increasingly, natural gas has been used for electric generation, increasing its demand. Thus, when electricity demand peaks, natural gas prices often peak as well. In order to meet peak demand, natural gas is stored during the off-season and drawn down in the winter. Recent expansions in pipeline capacity, such as with the Elba Express pipeline, complement existing storage and allow natural gas producers to increase production. If there becomes greater reliance on pipelines versus storage increases, the same issues that affect just-in-time delivery for petroleum would affect natural gas.

Proper management of load by natural gas providers reduces the risk of outages. Any potential outages that occur would be felt most significantly by the residential sector as well as commercial businesses, as industrial customers usually have the ability to tap into secondary energy sources. For example, a natural gas shortage in the winter of 1978 caused commercial businesses to close and State of Georgia government to temporarily shut down. Since that time, there has not been a significant natural gas outage in Georgia.

[29] Georgia Energy Emergency Plan. Georgia Environmental Facilities Authority. 2007 Revision.

Energy Disruptions and Consequences

A prolonged energy outage would have a substantial impact on the state's economy and citizens' daily lives. Electricity is the primary source of energy for homes, businesses, and institutions across the state. Furthermore, a disruption in electric service would disrupt other forms of energy production. Electricity is needed to push product through petroleum pipelines and to operate gasoline pumps. Electricity is also a primary source of power for many natural gas facilities and pipelines.

Historically, Georgia has not experienced major, extended electricity outages. Other areas of the country have experienced brownouts or blackouts when energy demand has exceeded supply at peak load periods. The reliability of electric service in Georgia can be attributed to a variety of factors, including the state's regulated electric market, vertically integrated utility structure and integrated transmission system. These are discussed further in the next section, *Energy Contingency Plans*.

A period of natural gas shortage in the late 1970's led to the deregulation of the natural gas market; since that time, Georgia has not experienced an extended or substantial disruption of natural gas services.

Georgia is most vulnerable to interruptions in the supply of petroleum products, including gasoline, diesel fuel, kerosene, and other refined products. This vulnerability was witnessed in 2005 and 2008. In 2005, Hurricanes Katrina and Rita hit the Gulf Coast back-to-back, in August and September, respectively. Oil refineries shut down in anticipation of the storms, and electric service in a portion of the Gulf Coast region was interrupted. At the peak of the crisis, on September 25, 20 refineries with a capacity of 4.9 million barrels per day were shut down. The lack of refinery production, as well as electric power to help transport the refined product down the pipelines, led to fuel shortages in several Southeast states, including Georgia. In 2008, Hurricanes Gustav and Ike hit the Gulf Coast within two weeks of each other. Again, refinery production and pipeline operation, along with electrical service, were shut down, and Georgia experienced a moderate fuel shortage. The following sections detail the 2005 and 2008 fuel shortage events, including the impacts and the subsequent response of the government and private sector.

2005 Hurricane Season

The 2005 hurricane season was the most active on record in the United States. There were 27 named storms, 15 of which were hurricanes. Of these, 7 hurricanes were classified as major (reached Category 3 to 5 status). Hurricane Katrina, which struck on August 29, 2005 near New Orleans, Louisiana, caused over $100 billion in damage and led to the death of over 1,000 people. Shortly thereafter, on September 23, 2005, Hurricane Rita struck shore between Sabine Pass, Texas and Johnsons Bayou, Louisiana, as a Category 3 storm. The little time between the two storms did not allow sufficient time for the nation's power grid to recover and energy resources to be restored. High winds and heavy rains damaged the electrical transmission and distribution infrastructure, creating major power outages, particularly in high-density coastal communities with above-ground lines. Hurricane Katrina knocked power service out to over 2.7 million customers in four states. Two weeks after Hurricane Katrina, 40% of customers in Louisiana, one of the hardest hit states, remained out of power. Parts of New Orleans were submerged for weeks, and Entergy New Orleans, the area's investor-owned utility, was not able to restore power for months.

The loss of electrical service affected areas far beyond the storm's impact. Damage to oil production platforms shut-in oil production, and refineries faced flooding and loss of electric power. This stymied the transport of petroleum products via pipeline to several states, including Georgia. Prior to Hurricane Katrina's landfall, oil production in the Gulf of Mexico was approximately 1.5 million barrels per day (MMBD). Before the storm entered the Gulf, personnel

on oil platforms were evacuated, and crude oil production was halted. After the storm passed, several platforms were sunk, and much of the crude oil production was lost. Even when production was restored at repaired facilities, about 52% of production remained shut-in. Likewise, 11 refineries in Louisiana and Mississippi were shut down in anticipation of Hurricane Katrina, and an additional 16 refineries in Texas and Louisiana stopped operations prior to Hurricane Rita. This halted refining activities totaling 6.5 MMBD. After the storms passed, over 1 MMBD remained offline for more than four weeks, and several refineries operated at reduced rates for several more weeks. Furthermore, there was damage incurred to underground petroleum pipelines. These factors led to a significant reduction in petroleum product supply and impeded pipeline transport, causing fuel shortages in Georgia and nationwide. Refiners requested 24.5 million barrels of oil from the Strategic Petroleum Reserve to produce petroleum products. All 48 states in the continental U.S. received fuel waivers to allow lower volatility and less specialized fuels to be used across the country.

2008 Hurricane Season

Hurricane Gustav made landfall in Louisiana on September 1, 2008. Twelve days later, on September 13, Hurricane Ike struck Galveston, Texas. Similar to the 2005 season, power outages were extensive, though shorter in duration. At the peak of the outage, 1.3 million customers in Louisiana, Mississippi, and Arkansas lacked power service. Severe flooding by Hurricane Gustav raised water levels on the Mississippi River, shutting down locks and impacting waterborne delivery of fuel to power plants, and access to the river for plant cooling.

In advance of Hurricane Gustav, 100% of Gulf oil platforms shut down production; most of the platforms remained inactive in anticipation of Hurricane Ike, which struck shortly after. The 2008 Gulf hurricanes damaged and sunk oil platforms, though fewer platforms were affected than in 2005. Refineries in Louisiana shut-in 2.7 MMBD of capacity in anticipation of Hurricane Gustav. Hurricane Ike halted 4 MMBD of refining capacity, primarily in Texas. The refineries had restored activities by 10 days after landfall, but the shut-in of oil production and reduction of refining capacity had cascading effects, causing fuel shortages in southeastern states.

GEFA was aware of the impending hurricane and the shut-down of platforms and refineries in advance of the storms. In anticipation of a potential fuel shortage, GEFA first contacted state agencies and critical services so that they could prepare accordingly. The Governor and state agencies were advised to refill fuel tanks as soon as possible. GEFA also consulted with the Georgia Department of Agriculture and the Governor's Office to discuss fuel supply needs.

Numerous state agencies played a critical role during the fuel shortage. The Georgia Environmental Protection Division (EPD) and Georgia Department of Agriculture (GDA) coordinated the issuance of fuel waivers for the state. Standards regarding Reid Vapor Pressure (RVP), sulfur content, and volatility were waived at varying extents, allowing a greater volume of fuel to enter the state. At the request of the Governor, the Georgia Department of Transportation (GDOT) relaxed weight restrictions on specific state-owned roads to allow large tankers to make deliveries of fuel in areas with the greatest need. This was critical to replenishing the state's fuel supply; the distribution of fuel relied more heavily on road transportation, as the pipelines were operating at very low volumes due to damage and short fuel supply near the Gulf Coast.

The fuel situation was largely mitigated by coordination not only among state government, but also with the private sector. The state consulted with the Georgia Association of Convenience Stores, the Georgia's Oilmen's Association, Colonial Oil Industries and other partners to assess the state's fuel supply and address local shortages. GEFA coordinated with jobbers to determine the available supply of diesel fuel, and helped them obtain additional supply for the benefit of South Georgia farmers and loggers. GEFA and EPD maintained daily contact with terminals,

wholesalers, and pipeline companies, and received daily status reports from USDI-Minerals Management Service and ESF #12 partners.

In a time of crisis for Georgia, the state also looked to the federal government for assistance. During the shortage, the Secretary of Energy authorized the release of a total of 5.7 million barrels of oil from the Strategic Petroleum Reserve. The federal government, the U.S. Environmental Protection Agency in particular, was also instrumental in approving the fuel waivers for the state.

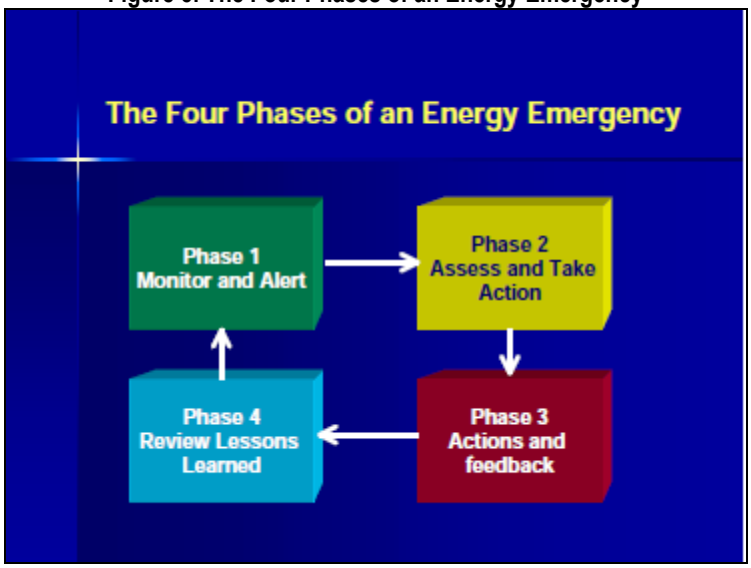
Public information played a vital role throughout the entire process. The state wanted to keep citizens informed and educated about the fuel supply situation, but it was critical that media coverage of the situation not induce panic buying of fuel and exacerbate the shortage. The Governor declared a State of Emergency on September 12, invoking the state price gouging statute. This prohibited retailers of particular goods and services, including gas stations, from artificially raising prices to take advantage of customers in need of fuel. The Governor's Office also issued press releases encouraging fuel conservation and efficiency tips for the public. On September 26, the Atlanta Journal-Constitution featured an op-ed piece by GEFA Director Chris Clark and EPD Director Carol Couch that explained the causes of the fuel shortage and ensured citizens that the state was taking action to mitigate the situation. This was in response to an opinion piece published days earlier blaming Georgia's fuel shortage on inaction by the government. Clark did several additional interviews with the Atlanta Journal-Constitution, WSB Radio, and WSB, Fox 5, and 11 Alive TV stations.

State of Georgia Emergency Response and Coordination

Four Phases of an Energy Emergency

The response to an energy shortage, emergency, or any other sudden event is divided into four phases: monitoring, assessment, response measures, and review. Monitoring takes place continuously, but during an outage, shortage, or other crisis, it takes place at increasingly shorter intervals. At the onset of any problem, energy emergency response personnel need to assess the situation and identify which parts of the energy supply are involved and what consumption sectors are affected. Assessment is critical for determining which response measures, if any, are to be taken by various stakeholders, both within the government and the private sector. Finally, once the response effort is complete, officials should review the actions taken and determine whether any improvements to the response procedures can be made.

Figure 5. The Four Phases of an Energy Emergency



Source: State Energy Assurance Guidelines. National Association of State Energy Officials (NASEO). December 2009.

Levels of Energy Shortages

During an energy emergency, state officials must determine the appropriate actions based on the type of energy disruption and severity of impact. The following series of tables identifies four levels of energy outages, the triggers that signal their onset, and the probable impacts observed.

Shortage Level 1 – Monitor and Alert. *No discernible shortage in Georgia. Possible shortages elsewhere.*

Conditions (one or more may apply)	Probable Impacts Observed
Severe cold weather in any region affecting Georgia may cause local supply problems.	Prices of heating fuels (natural gas, electricity, heating oil, and propane) may rise due to increased demand. Effects on pipeline operations may cause natural gas and petroleum prices to rise.
Reports of shortages in other parts of the United States, or reports of natural or political difficulties in oil-producing countries, may affect petroleum and petroleum product prices on the New York Mercantile Exchange (NYMEX).	Jobbers (state and local fuel companies) may report temporary supply difficulties.
Local prices may move up rapidly in response to spot market prices.	Some gasoline stations, if queried (especially during the summer driving season), will report greater than normal buying as motorists attempt to secure the current lowest price.

Shortage Level 2 – Mild Shortage. *5 to 10% reductions in petroleum supply for a week or more. 5 to 10% reduction in natural gas nominations on interstate pipelines for up to 2 weeks. Localized storm damage causes short-term electric transmission/distribution loss.*

Conditions (in addition to previous phase; one or more may apply)	Probable Impacts Observed	Media/Public Reaction
The U.S. Department of Energy, American Petroleum Institute (API), or other sources report a decrease in the availability of a product (e.g., petroleum from the Middle East, South America, and other domestic refineries).	Some jobbers report supply and delivery problems or related issues (such as long queues at fuel loading racks). Deliveries extend into evenings and weekends to keep up with demand.	National news reflects events indicating that particular energy supplies will be delivered short of expected amounts. Petroleum retailers speak in terms of "being put on allocation" lower than (or equal to, because in normal circumstances they draw above 100%) their contract amount. Stories about energy may be featured in the media.
Spot prices increase rapidly. National and regional oil companies (prime suppliers) put more dealers on "allocation."	Dealers are uncertain about product delivery and question information received from prime suppliers.	Media may feature reports about high prices. If spot shortages occur, media will inquire.
Natural gas supplies available to Atlanta Gas Light for delivery to state gas marketing firms are lower than normal.	Gas distribution companies may temporarily curtail interruptible contract customers.	No media reaction is likely.
Severe demand outside the state may be seen as challenging electric supply for Georgia customers. A local generating plant has to be shut down temporarily. Electric lines may be out of service.	Electric utilities consider load management steps.	Some news reports likely.
Regional prices rise due to temporary imbalances between supply and demand. Causes may include refinery outages, transportation problems or sudden increases due to tertiary (consumer level) storage and higher spot market prices.	Government assistance in removing retail driver hour limitations may be sought.	Some news reports, mainly feature stories, likely.
Gasoline, heating oil, and propane dealers, if queried, will report concern about continuity of supply.	Dealers complain to associations.	Some news reports possible. Dealers may complain to GEFA and other agencies.
Dealers report increased pressure on their ability to deliver fuel.	Some customers call dealers to top off home storage tanks.	Some news stories, mainly feature stories, possible. Public inquiries received by agencies.

Shortage Level 3 – Moderate Shortage. *10 to 15% reductions in petroleum products for three weeks or more, 10 to 15% reduction in natural gas supply nominations on interstate pipelines plus inside City Gate (the point at which gas moves from the pipeline to local distribution lines), curtailments by local gas distribution companies for two weeks or more. Severe storm damage to electric transmission / distribution infrastructure.*

Conditions (in addition to previous phase; one or more may apply)	Probable Impacts Observed	Media/Public Reaction
Petroleum product imports to the state drop 5% from the previous year or other base period. Allocations for a growing number of petroleum retailers are reduced.	Jobbers report difficulty in obtaining or delivering enough supply to satisfy customers. Queuing at wholesale loading racks keeps drivers in line for several hours or more.	News reports about shortage appear on regional and national broadcasts. Federal and State officials are interviewed.
Local weather or storms in other regions result in problems that lead to temporary curtailment in Georgia.	Some transportation companies add a "fuel charge" to their usual price.	The U.S. DOE, or other federal agencies, and energy companies may publicly confirm shortage.
Product prices are rising steadily. Prices for key fuels rise at a rate of 10% or more per week.	Some retail dealers have difficulty meeting contract obligations.	Energy shortage in affected area is highlighted on national news.
Natural gas supplies fall below state demand for firm customers. Inadequate storage is projected.	In winter, many industrial and commercial interruptible gas customers are curtailed, but this does not mean a natural gas shortage. However, demand increased for heating oil and propane.	News media begin to air or publish shortage stories regularly. Public asks for temperature controls for business and industry.
Demand from other countries draws product away from the U.S.	Supplies diminish as demand for oil products increases. Prices increase significantly.	News media begin to use the words, "energy crisis."
Interstate generation capacity is severely strained by wide area severe weather (cold, heat and storm).	Utilities curtail load, leading to brownouts and the threat of blackouts.	Media coverage likely. Public tolerates mild inconvenience. Economic impact felt. Officials ask for explanations.
Growing numbers of low-income customers have difficulty paying for fuel.	Requests for federal Low-Income Heating Program (LIHEAP) assistance increase, and State agencies receive calls from individual households for help.	News media begin to cover energy problems several times a week. Low-income advocates demand help. Volunteer programs accelerate.

Shortage Level 4 – Severe Shortage. *20 to 30% and upwards reduction in petroleum product and/or natural gas for more than two weeks. Natural gas nominations fall severely due to weather, interstate pipeline failure, or production problems. Electricity outages extend for several weeks.*

Conditions (in addition to previous phase; one or more may apply)	Probable Impacts Observed	Media/Public Reaction
Regional and state fuel disruption is brought on by hurricane-scale storms; extended, widespread, winter cold; or embargo or terrorist acts.	In peak driving seasons, gasoline stations curtail operating hours and motorists form lines to purchase available fuel regardless of price.	Government may be criticized for not acting quickly enough.
Prices do not level off, but continue to rise.	During winter months, non-contract customers have serious difficulty locating heating oil even if they can afford it.	Fuel issues are reported regularly by the media; rumors are abundant.
Local product storage is extremely low or exhausted.	Petroleum fuel hoarding is observed.	Regulated energy company officials are called upon to explain the shortage.
Dealers receive less than 75% of their normal allocation and have difficulty maintaining contract delivery.	Suppliers sharply reduce allocations to dealers, and dealers cannot manage customer inquiries.	Some consumption is reduced as users turn to alternatives or go without.
Shortages are regional and possibly broader.	Government agencies are called on to provide relief.	The public is willing to tolerate intervention such as odd/even gasoline purchase days and will respond to calls for voluntary conservation such as carpooling or reliance on mass transit.
Firm gas contract supplies fall below 80% of normal.	Industrial customers face ongoing higher fuel cost. Commercial customers are asked to curtail hours. Some residential customers are displaced from homes in cold weather.	Economic impact noted. Media attention likely. Public may demand mandatory temperature control measures for commercial and government facilities. Energy company officials questioned by public authorities.
Long-term power problems due to fuel prices or lack of fuel, weather or infrastructure failure.	Rolling brownouts and blackouts occur.	Media attention constant. Economic impact noted.
Low-income families require significant assistance to obtain fuel.	Economic dislocation occurs.	The danger to vulnerable citizens is featured in the media.

Additionally, conditions may deteriorate to "beyond severe." Probable causes may include war, concerted petroleum embargo, widespread natural disasters, or other calamities that can initiate a long-term reduction in fuel availability. At this crisis level, retail sectors suffer noticeable decline in revenue. Initial volatile public reaction, such as hoarding and complaints to energy company officials, become almost routine as consumers adjust, however unwilling, to fuel deprivation. Health and safety issues are especially evident for vulnerable populations, extending from the poor to middle class. Price and/or consumption reductions do not readily influence supply. Severe economic dislocation occurs.

Strong government intervention is needed to protect the most vulnerable members of society. This sort of intervention goes well beyond allocation and other measures and may require further legislative action. The public is likely to tolerate severe government intervention to ration supplies and provide alternatives.

From a media perspective, major coverage is likely to diminish as the crisis becomes "old news." Feature stories dominate media reports rather than headline news.[30]

Coordinated State Response – ESF #12

Once it has been determined that an energy emergency is imminent or exists, the state will partner with private energy stakeholders to mitigate the energy crisis. This is most effectively accomplished through the framework and relationships established through ESF #12.

The primary tasks of energy response personnel within ESF #12 are:

- Planning and coordinating preparedness, response, recovery, and mitigation activities pertaining to the electrical, natural gas, petroleum, and LPG infrastructures.
- Conducting regular ESF #12 meetings and/or conference calls.
- Supporting and participating in planning meetings and exercises that pertain to ESF #12.
- Maintaining ongoing contact with ESF #12 primary and support agencies.
- Ensuring that ESF #12 Primary and Support Emergency Coordinators maintain operational readiness by taking requisite GEMA SOC training courses.
- Acting as a liaison between ESF #12 and external entities.
- Directing requests for assistance to the appropriate ESF #12 primary agencies.
- Directing unmet requests for assistance to ESF #5 – Emergency Management.
- Providing information on the status, threats/impacts, or restoration of agricultural or natural resources.
- Providing updates on the status of ESF #12 mission assignments to ESF #5 – Emergency Management, the Planning Section Chief, and other entities external to ESF #12.
- Generating, in a timely manner, information to be used in briefings, situation reports, and incident action plans.

Within ESF #12, three primary agencies coordinate emergency or disaster operations pertaining to Georgia's energy sector: the Georgia Department of Agriculture, the Georgia Environmental Finance Authority and the Georgia Public Service Commission (PSC). Within the SOC, the ESF Coordinator (GEFA) will serve as the principal point of contact for operations associated with ESF #12. The scope, scale, and magnitude of the threat / incident will dictate which primary agencies will assign personnel to the SOC and the relevant support agencies that will be requested for support.

The scope of operations for ESF #12 includes two principal functions: the restoration of service for the electrical infrastructure and the restoration of fuel service including natural gas, petroleum, and liquefied petroleum gas (LPG) infrastructures. ESF #12 oversees damage assessments to and restoration of electrical and fuel services and ensures the provision of temporary sources of electrical power following an emergency or disaster.

ESF #12 (PSC) assumes responsibility for operations pertaining to the electrical infrastructure. The scope of a response for threats or impacts to the electrical infrastructure includes: coordinating with critical infrastructure owners and operators (CI/OO) on the assessment and restoration of electrical generation facilities, transmission and distribution service; and the provision of temporary electrical service for forward disaster response support sites (base camps, staging areas, etc.), and critical facilities.

[30] Georgia Emergency Operations Plan, Incident Annex 5: Georgia Fuel Emergency Plan. Georgia Emergency Management Agency. August 15, 2009.

ESF #12 (GDA and GEFA) assumes responsibility for operations pertaining to the fuel infrastructure. The scope of a response for threats or impacts to the fuel infrastructure includes: coordinating with CI/OO on the assessment and restoration of the commercial transportation fuel infrastructure, production and storage facilities, and pipelines; the provision of fuel to support forward disaster response sites (base camps, staging areas, temporary fuel points, etc.); and the provision of bulk fuel to support disaster response operations.

In general, support of emergency or disaster operations pertaining to the energy infrastructure, ESF #12:

- (GDA, GEFA, and PSC) shall designate Primary and Alternate Emergency Coordinators. The designees shall represent the agencies in an emergency or disaster and provide operational support in the State Operations Center when requested.
- Promotes disaster resiliency and readiness by developing and maintaining Standard Operating Procedures (SOP)/Standard Operating Guidelines (SOG), facilitating regular planning meetings, and by conducting/participating in regular drills/exercises.
- Utilizes the National Incident Management System Incident Command System (NIMS-ICS) structure during operations and will organize, train, and equip specialists to operate within the NIMS/ICS.
- Acts as the state-level focal point for the collection, validation, and dissemination of information pertaining to the status of the critical energy infrastructure to local, state, federal, private sector partners, and non-governmental organizations (NGO) during potential threats or impacts and disseminates information to the public in conjunction with ESF #15 – External Affairs.
- Maintains situational awareness and provides ESF #5 – Emergency Management, ESF #15 – External Affairs, and the Planning Section with regular updates and information to support briefings, situation reports, and incident action plans.
- Coordinates the acquisition and provision of resources for the restoration of critical energy infrastructure in conjunction with ESF #5 – Emergency Management through mutual aid, the Emergency Management Assistance Compact (EMAC), federal ESF #12 partners as identified in the National Response Framework (NRF), and through other assistance compacts from non-impacted CI/OO.
- Coordinates the acquisition and provision of electrical service and fuel to support disaster response efforts in conjunction with ESF #7 – Logistics Support.
- Coordinates and regularly updates public information with ESF #15 – External Affairs and, if established, the Joint Information Center (JIC).
- Maintains financial records on personnel, supplies, and other resources utilized and provides regular reports to the Finance Chief and support staff.

Electrical Infrastructure

The PSC assumes primary oversight of emergency or disaster operations pertaining to the electrical infrastructure. In support of this essential function, ESF #12:

- Ensures electrical CI/OO maintain equitable provision and/or restoration of services to the public.
- Reserves the authority to assess the severity of an emergency or disaster on the electrical infrastructure and determine and prioritize restoration efforts.
- Coordinates with CI/OO to determine the number of citizens without electrical service and regularly reports findings to the Incident Command Staff and the Planning Section, when a portion of the electrical infrastructure is debilitated.

- Procures generators to support the provision of temporary emergency electrical service for forward disaster response sites and critical facilities, in conjunction with ESF #7 – Resource Support.
- Coordinates with CI/OO to pre-stage electrical service restoration resources in safe proximity to areas that may be impacted by hazardous conditions to minimize response time during threats for which there is advance notice.

Fuel Infrastructure

The GEFA and GDA jointly assume primary oversight of emergency or disaster operations pertaining to the fuel infrastructure. In support of this essential function, ESF #12:

- Maintains directories of commercial and industrial petroleum and LPG fuel storage handling and distribution facilities within the state.
- Establishes contacts based on location, distribution territory, and operating capacity.
- Develops mutual aid agreements with the private petroleum and LPG fuel industries.
- Establishes the Unified Planning Group and initiates the Georgia Fuel Emergency Plan during a potential or realized decrease in Georgia's transportation fuel supply.
- Coordinates the pre-staging of fuel and resources in safe proximity to areas that may be impacted by hazardous conditions to minimize response time during threats for which there is advance notice.
- Locates petroleum and alternative fuel sources and helps to establish distribution priorities.
- Assists in the procurement of bulk fuel supplies to support both aviation- and ground-based transportation operations during a disaster response.
- Coordinates fuel for temporary fuel points that will support responders within impacted areas during an emergency or disaster.
- Assists energy suppliers in obtaining product (coordinating with fuel regulatory agencies regarding restrictions), equipment, specialized personnel and transportation to repair or restore the fuel infrastructure.[31]

Emergency Communications

Information Acquisition and Dissemination

As mentioned in the previous section, during an energy emergency, ESF #12 partners are responsible for collecting, validating, and disseminating information on critical energy infrastructure and operations. During an energy-related emergency, ESF #12 agencies will provide this information to GEMA and other ESF partners, who will then coordinate the response activities. As the state energy office, GEFA maintains knowledge and information on overall state energy infrastructure, historical data, and trends. If an energy shortage develops over a period of time, GEFA will be able to gather additional facts and, if appropriate, provide information to GEMA to prepare the public accordingly. The following section explains how information is acquired during an energy-related emergency.

Direct Source

Private sector partners serve as the most valuable source of information for data related to their own operations. For example, in case of a widespread power outage, Georgia Power, Georgia EMC, and MEAG representatives are the primary source of information regarding the geographic coverage of the outage, its anticipated duration, and

[31] Georgia Emergency Operations Plan – ESF 12 Annex. Georgia Emergency Management Agency. May 2012.

resources available to restore power. Similarly, during a fuel shortage, the state consults with jobbers and petroleum pipeline companies to determine when the fuel supply would be replenished for the state. Some utilities, particularly electric providers, regularly play a role in ESF #12 during disasters. Other providers whose operations are not often affected on a wide scale, such as natural gas utilities, are included in ESF #12 discussions if their systems or operations are impacted.

Data Sources

GEFA may examine energy data to identify trends that may preclude energy shortages. There is a vast amount of data regarding energy facilities, generation, consumption, and prices available from a variety of organizations, including the following:

- U.S. Department of Energy's Energy Information Administration (EIA)
- National Energy Technology Laboratory - Energy Analysis Publications
- North American Electric Reliability Corporation - Reliability Assessment
- Southeast Electric Reliability Corporation
- Jobs and Economic Development Impact Models
- Federal Energy Regulatory Commission (Southeast Electric Power Market)
- Georgia PSC Docket Search
- Nuclear Regulatory Commission
- Pipeline Integrity Mapping Application
- U.S Department of Energy's Office of Electricity Delivery and Energy Reliability
- National Association of State Energy Officials - Fuels Outlook

GODAWGS

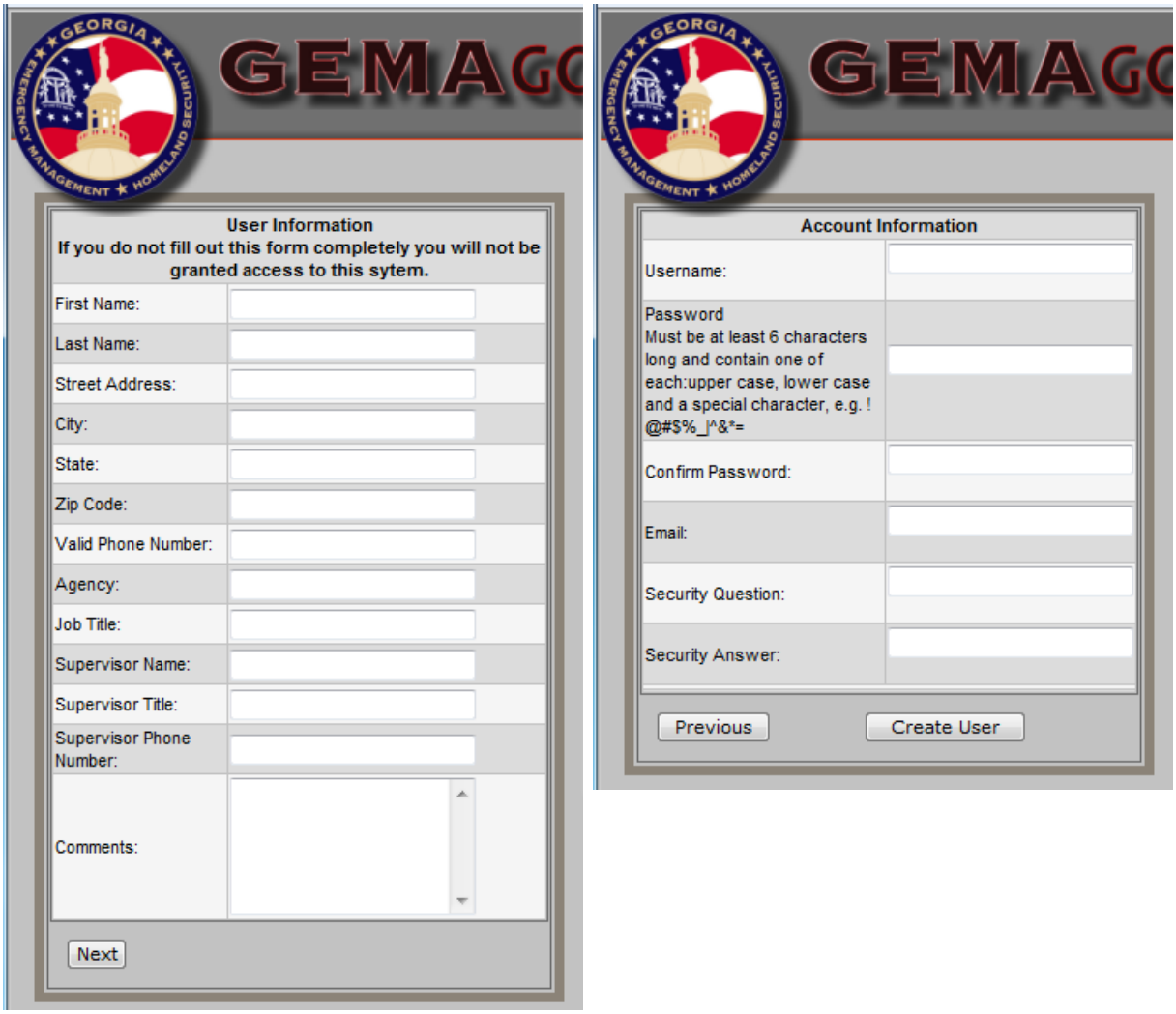
The Georgia Online Disaster Awareness Geospatial System (GODAWGS) is a geographic information system (GIS)-based visualization tool to enhance emergency response in Georgia. GODAWGS integrates a variety of GIS data from public and private data sources for comprehensive visualization and analysis of an incident and its impacts. GIS viewers offer some major advantages to decision makers responding to emergency situations. A visual picture greatly increases understanding and situational awareness when compared to mentally integrating data in charts and text. Secondly, the GIS Viewer can combine information from multiple map layers to show the relationship of many factors. Finally, since the Viewer is web based, it can be consulted by responders in multiple locations without waiting for maps to be delivered. The extensive data within GODAWGS allows for increased situational awareness, helping responders more efficiently and effectively coordinate response and recovery efforts.

GODAWGS is a secure application. Users are restricted to personnel that have a responsibility during emergency crisis situations, and must request and receive permission to access the map. Included in the user list are GEMA operations personnel, GEMA planners, members of all of the ESFs (Emergency Support Functions), the Georgia State Patrol, the Department of Corrections, County School Safety Officers, the Department of Public Health, Hospital Safety Officers, and representatives of the American Red Cross.

A potential user must request permission by using an internet browser to navigate to https://godawgs.gema.ga.gov/GEMA2/Auth/Login.aspx and selecting the "Create a New User" link. The request form requires personal contact information, including a government email address. For verification purposes the user also submits his supervisor's name and phone number. Figure 6 illustrates the application form.

After the user's credentials are verified by GEMA, the user is placed in a functional role and uses his password to log-in to that role's view. This system allows GEMA to track and control usage as necessary. Most users in the response community are given a power role. However, proprietary layers or sensitive energy layers can only be seen using an ESF 12 role. If needed during an Emergency Activation, pertinent energy layers can be assigned to the State Operations Center (SOC) role, so that other groups in the SOC can have access to that information.

Figure 6. On-line form for requesting access to GODAWGS



During an energy emergency event, GODAWGS may be employed in a variety of ways, including in the following sample scenarios:

- Weather conditions, such as an approaching hurricane or ice storm, can be monitored in real-time, allowing for better preparedness.

- As ESF #12 partners communicate areas of widespread power outages, state personnel can open pre-designated shelters if necessary and track shelter capacities in real-time.
- Following a widespread natural gas outage, emergency personnel can pinpoint areas of vulnerable populations (such as the elderly or those in special care homes) to help the utilities prioritize restoration of service.
- If petroleum pipeline deliveries are disrupted, and fuel must be transported by tanker, GDOT may grant temporary bridge weight restriction waivers so that tankers can access areas with critical fuel needs. This data can be entered in GODAWGS, and emergency management personnel can quickly inform drivers which bridges are suitable for transport.

Table 2 displays many of the data layers available in GODAWGS. Some of this data is proprietary and has restricted access; this data can be viewed and accessed only by the data owner, as well as approved GEMA administration. ESF 12 will access these layers during a crisis event though a special Event Role with a login that remains active through the duration of the event. The Event Role is pre-established and a password will be assigned and distributed to the ESF 12 team at activation.

Table 2. List of selected GODAWGS layers

Energy	*Transportation*	*Health and Human Services*
Pipeline	Airports	Hospitals
Interconnects	Runways	Child Support Service Offices
Meters	Bridges	Emergency Shelters
Oil Pumping Stations	Helipads	Emergency Management Services' Regional Offices
Oil Interconnects	Railroads	Public Health Districts
Gas Storage Facilities	Roads	Public Health District Offices
Refineries	Hurricane Evacuation Routes	Division of Family and Children Services Areas
Electrical Transmission Lines	Traffic Cameras	Woman/Infant/Child Clinics
Substations	*Weather*	Adolescent Health & Youth Development Centers
Power Generation Facilities	Radar	Office of Regulatory Services Facilities
Nuclear Plant Emergency Planning Zones	Warnings	*Other*
Compressors - Gas and Oil	Current and Forecast Precipitation	Incidents
Gas Processing Plants	Wave Heights	Chemical Spill Analysis
Hubs	Current Storm Systems	Wildfires
LNG Terminals	Storm Reports	Nuclear Power Safety Layers
Terminals	Flood Gauges	Earthquakes
Tank Farms	Storm Surge Inundation by Categories of Hurricane	Demographics
Ethanol Plants	Hurricane Evacuation Routes	Federal Lands
Wind Farms	Gas Stations within 5 miles of Hurricane Evacuation Routes	U.S. National Grid
Biodiesel Fuel Plants	HAZUS Predictions of Hurricane Damage	Hydrology and Water Bodies

The base map of GODAWGS and examples of non-proprietary energy related layers are shown in Figures 7 - 9.

Figure 7. GODAWGS Base Map showing the approach of Hurricane Irene with coastal watches and warnings feeding from the National Weather Service

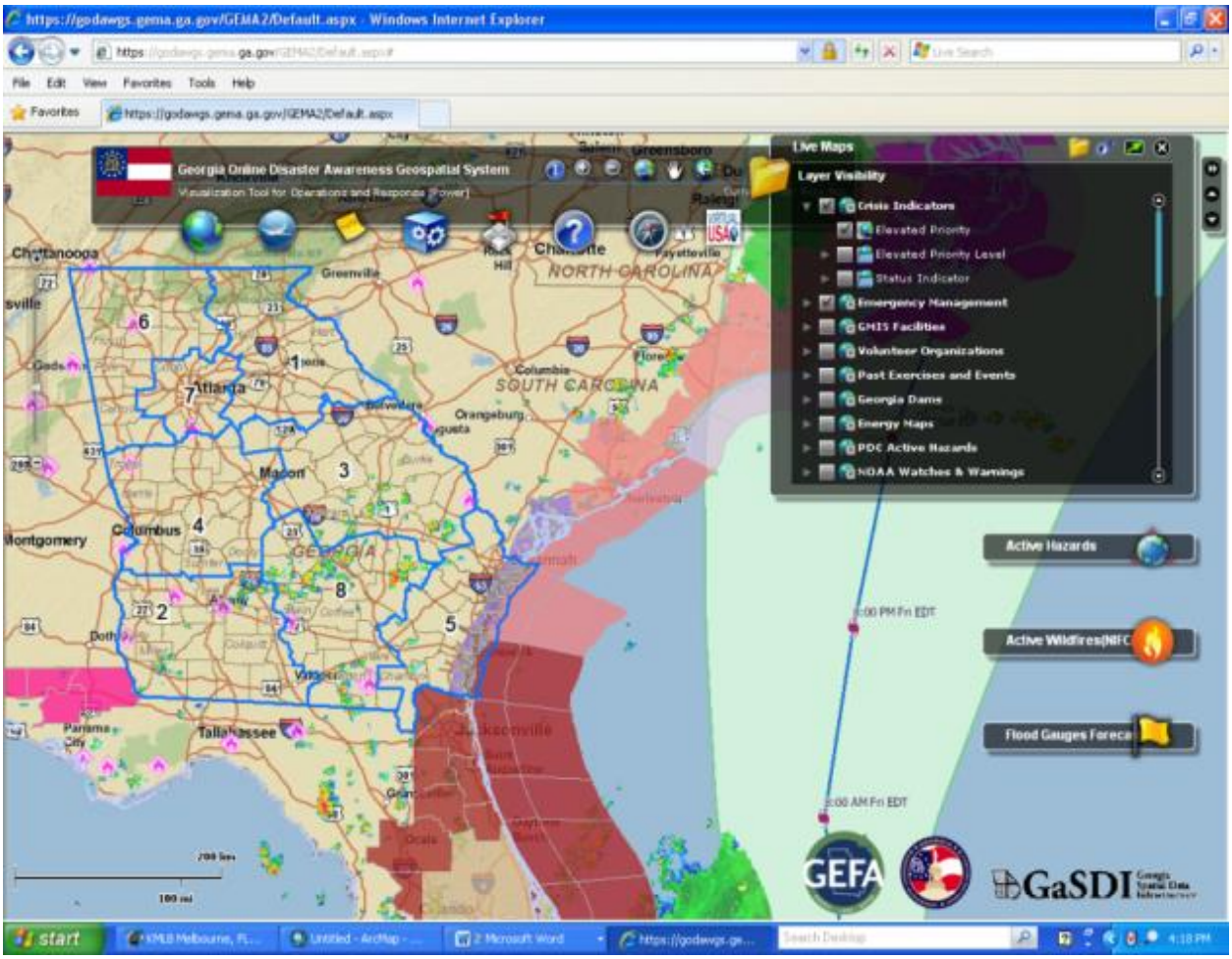


Figure 8. Evacuation Zones, Evacuation Routes, Traffic Control Points, and Points of Interest - Radiological Emergency Preparedness for Vogtle Electric Generating Plant

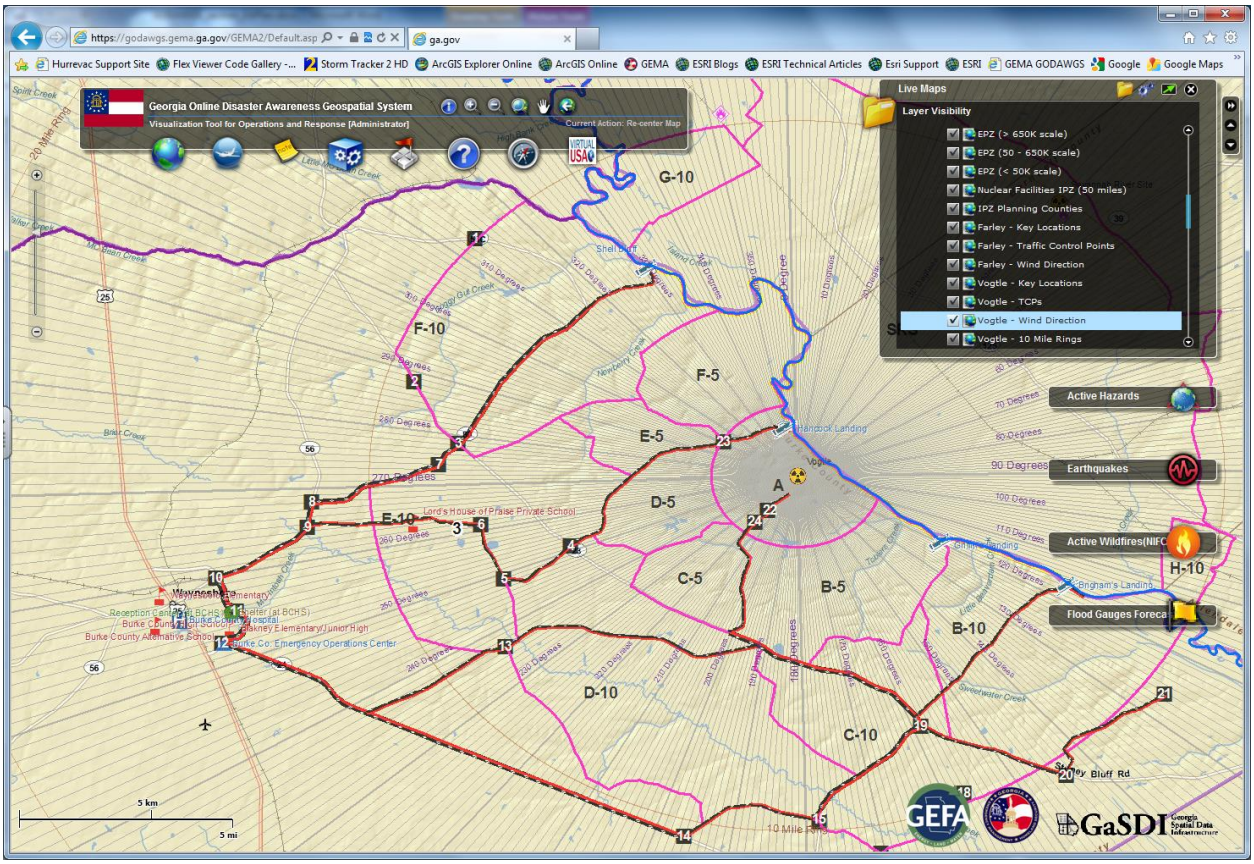


Figure 9. Screenshot showing facilities in the South Georgia town of Blackshear that have generators in preparation for power outages

GEMA recently implemented WebEOC to enhance data capture from field reporting partners. GEMA is currently working to integrate WebEOC with GODAWGS. GODAWGS will become the mapping interface to represent their data inputs. Some of the WebEOC boards that GODAWGS will pull information from are as follows: Facility Emergency Power Database, Road Closures, Shelters, Points of Distribution (PODs), Disaster Recovery Centers, etc.

Energy partners such as the Georgia EMC have agreed to share their outage tracking information when they have their process worked out. This will be a dynamic feed providing automatic updates. We are working with the other energy providers to form a similar partnership.

GEMA has also partnered with the Georgia DOT to provide dynamic updates to GODAWGS from their Storm Center Application. Some layers include Passable Lanes, Roadways Cleared and Treated Areas. This information is vital to state responders in crisis situations where roads have to be cleared in order to restore power.

The primary objective of GODAWGS is to improve preparedness and support energy emergencies by:

- Spatially representing energy infrastructure within their geography. This improves the ability of responders to quickly identify and assess the vulnerability of key energy assets.
- Providing an overall view of the current energy infrastructure and its relationship to other key infrastructure, such as hospitals, schools, farms, etc.
- Tracking energy disruptions at the state level using modeling and analysis. This is achieved through its interoperability with other systems such as WebEOC, which improves information sharing, collaboration, and reporting.

GODAWGS is a valuable situational awareness tool providing a Common Operating Picture to senior state leaders and Emergency Support Functions partners (ESFs) operating in or in support of the State Operations Center. Information that might take days to obtain is readily available and can be overlaid with other relevant data. Instant access to data is a hallmark of GODAWGS, allowing GEMA and its partners to better protect Georgia's citizens.

Energy Emergency Contacts

During a potential, impending, or actual energy disruption, it is critical to remain in contact with authorities and energy industry representatives who can provide timely, accurate information regarding energy supply and delivery. Throughout the development of the Statewide Energy Assurance Plan, GEFA and GEMA have sought to engage these partners in the planning process and build good working relationships with the energy industry. These contacts, listed in Table 3, will be updated periodically as needed.

Table 3. Energy Emergency Contacts

	Partner	Representative	Email	Address
Petroleum	Georgia Oilmen's Association	Roger Lane	rlane@gaoilassoc.com	1775 Spectrum Dr, Ste 100, Lawrenceville, GA 30043
	Georgia Petroleum Council	Ric Cobb	cobbr@api.org	50 Hurt Plaza SE, Ste 70, Atlanta, GA 30303
	GA Association of Convenience Stores	Jim Tudor	jtudor@aol.com	168 North Johnston St, Ste 209, Dallas, GA 30132
	Colonial Pipeline Company	Sam Whitehead	swhitehe@colpipe.com	1185 Sanctuary Pkwy #100, Alpharetta, GA 30009
Natural Gas	Atlanta Gas Light Company	Patrick Flynn	pflynn@aglresources.com	10 Peachtree Pl NE, Atlanta, GA 30309
Electricity	Georgia Power Company	Randy Dees	brdees@southernco.com	241 Ralph McGill Blvd NE, Atlanta, GA 30308
	Georgia EMC	Keith Brooks	keith.brooks@georgiaemc.com	2100 E. Exchange Pl, Ste 510, Tucker, GA 30084

Energy Emergency Assurance Coordinators System

The U.S. Department of Energy Office of Electricity Delivery and Energy Reliability (OE) maintains a password-protected Energy Emergency Assurance Coordinators (EEAC) website. This system allows authorized state energy emergency coordinators to access valuable energy security information, including daily news summaries, emergency situation reports, lessons learned from other states, links to outage and curtailment information, and contact information for colleagues in other jurisdictions. The EEAC is a cooperative effort among the National Association of State Energy Officials (NASEO), National Association of Regulatory Utility Commissioners (NARUC), National Conference of State Legislatures (NCSL), National Governors Association - Center for Best Practices, Public Technology Institute, and OE's Infrastructure Security and Energy Restoration (ISER) Division. It establishes a secure cooperative communications environment for state and local government personnel with access to information on energy supply, demand, pricing, and infrastructure. EEACs are most often representatives from state energy offices, public utility organizations, state legislators, emergency management agencies, homeland security offices, local governments, and governors' offices.

Representatives from GEMA and GEFA are designated as energy emergency assurance coordinators. In the event of an energy supply disruption or emergency, the OE relies upon the EEAC contacts to provide an up-to-date assessment of energy markets in the effected states. During these emergency situations, as well as other non-emergency situations in which the list may be used, the EEAC serves as the link between the state, industry, and OE.

In an energy emergency, OE may need to disclose sensitive and privileged information. In these situations, it is the coordinators' responsibility to follow the state's protocol for disclosure of information. In non-emergency or less sensitive emergency or disruption situations, communications can be sent directly to the OE via email, and an EEAC can use the listservs to send information to different regions. In addition, coordinators may utilize the bulletin board to share information and best practices across the states.[32]

Interoperability

Interoperability addresses the need for communications technologies to be compatible across different jurisdictions and agencies. As an emergency situation progresses, it often becomes more complex and requires the assistance of additional agencies, different levels of governments (e.g., the federal government), or neighboring jurisdictions or states. These different groups must be able to communicate seamlessly for a coordinated response. GEMA's *2010 Emergency Communications Plan* addresses the need for interoperable communications during a disaster. The Plan is based on the National Incident Management System (NIMS) and sets forth communications requirements and strategies for the following activities or operations: command and control, evacuation, sheltering, search and rescue, commodities, medical, and debris removal. The Plan is implemented during all disasters, including situations that impact the provision of energy.

Public Information Program

Energy shortages necessitate public explanations. Most small electric outages and natural gas line breaks are not reported in the media. Any event, however, can come to the media's attention, depending on how many customers are affected and the time it takes to restore energy. A medium- or large-scale event will concern the public, and people will turn to the media for answers. Media, in turn, will begin its investigation with company and state officials.

[32] State Energy Assurance Guidelines. National Association of State Energy Officials (NASEO). December 2009.

Energy companies and the government have long wrestled with the challenge of providing accurate and sufficient energy emergency information without causing panic. Most citizens are well-prepared for and fairly tolerant of temporary outages or shortages. The degree of tolerance is directly correlated with the access of timely information. Over the years, energy companies and governments have learned the value of being forthright with the public when discussing emergency situations. A lack of such candor can sour public opinion and hinder cooperation.

During a serious emergency, GEMA is staffed by state, volunteer, and public sector relief organizations. Crisis information is managed through the State Operation Center by the GEMA Public Affairs office. GEMA Public Affairs establishes a Joint Information Center (JIC) to ensure the consistency of the messages sent to the public. The JIC handles all media inquiries, coordinates requests for interviews, and issues press releases with the Office of the Governor. During the fuel shortages of 2005 and 2008, GEMA Public Affairs issued requests for the public not to hoard gas and to limit fuel purchases to 10 gallons per vehicle.[33]

[33] Georgia Energy Emergency Plan. Georgia Environmental Facilities Authority, Division of Energy Resources. 2007.

Energy Contingency Plans

Electricity

As mentioned in the *State Energy Profile*, most of Georgia's electricity is generated by coal, natural gas, nuclear, and hydroelectricity. In 2010, Georgia ranked 8th in the nation in net generation at 137,576,941 MWh.[34] In 2008, total per capita electricity consumption was 310.94 million Btu, ranking Georgia 29th in the nation.[35]

Most of the state's generating facilities are summarized in Table 4.

Table 4. Georgia Electric Generation Plants

Facility	Capacity (kW)	Fuel Source	Ownership
Barnett Shoals	2,800	Hydro	Georgia Power
Bartletts Ferry	173,000	Hydro	Georgia Power
Boulevard	59,100	Oil, Gas	Georgia Power
Bowen	3,160,000	Coal	Georgia Power
Bowen, Combustion Turbines	39,400	Oil	Georgia Power
Branch	1,539,700	Coal	Georgia Power
Burton	6,120	Hydro	Georgia Power
Estatoah	240	Hydro	Georgia Power
Flint River	5,400	Hydro	Georgia Power
Goat Rock	38,600	Hydro	Georgia Power
Hammond	800,000	Coal	Georgia Power
Hatch	899,612	Nuclear	Georgia Power, Oglethorpe Power Corp, MEAG, Dalton
Intercession City	47,667	Oil	Georgia Power
Kraft	281,136	Coal	Georgia Power
Kraft, Combustion Turbines	22,000	Oil, Gas	Georgia Power
Langdale	1,040	Hydro	Georgia Power
Lloyd Shoals	14,400	Hydro	Georgia Power

[34] "State Energy Data System 2008 - Georgia: Table 1.6.A. Net Generation by State by Sector, August 2010 and 2009." U.S. Energy Information Administration, Information Statistics and Analysis. Data released November 18, 2010. http://www.eia.gov/state/state_energy_rankings.cfm?keyid=33&orderid=1

[35] "State Energy Data System 2008 - Georgia: Table R2. Energy Consumption by Source and Total Consumption per Capita, Ranked by State, 2008." U.S. Energy Information Administration, Information Statistics and Analysis. Data released November 18, 2010. http://www.eia.gov/state/state_energy_rankings.cfm?keyid=60&orderid=1

Facility	Capacity (kW)	Fuel Source	Ownership
McDonough	490,000	Coal	Georgia Power
McDonough, Combustion Turbines	78,800	Oil, Gas	Georgia Power
McIntosh	163,117	Coal	Georgia Power
McIntosh, Combustion Turbines	640,000	Oil, Gas	Georgia Power
McIntosh, Combined Cycle	1,318,920	Oil, Gas	Georgia Power
McManus	115,000	Oil	Georgia Power
McManus, Combustion Turbines	481,700	Oil	Georgia Power
Mitchell	125,000	Coal	Georgia Power
Mitchell, Combustion Turbines	118,200	Oil	Georgia Power
Morgan Falls	16,800	Hydro	Georgia Power
Nacoochee	4,800	Hydro	Georgia Power
North Highlands	29,600	Hydro	Georgia Power
Oliver Dam	60,000	Hydro	Georgia Power
Riverview	480	Hydro	Georgia Power
Robins	158,400	Oil, Gas	Georgia Power
Rocky Mountain	215,256	Hydro	OPC, Georgia Power
Scherer	750,924	Coal	Georgia Power, Florida Power & Light, Oglethorpe Power Corp, MEAG, Gulf Power, Jacksonville Electric Authority, Dalton
Sinclair Dam	45,000	Hydro	Georgia Power
Tallulah Falls	72,000	Hydro	Georgia Power
Terrora	16,000	Hydro	Georgia Power
Tugalo	45,000	Hydro	Georgia Power
Vogtle	1,060,240	Nuclear	Georgia Power, Oglethorpe Power Corp, MEAG, Dalton
Wallace Dam	321,300	Hydro	Georgia Power
Wansley	925,550	Coal	Georgia Power, Oglethorpe Power

Facility	Capacity (kW)	Fuel Source	Ownership
			Corp, MEAG, Dalton
Wansley, Combustion Turbines	26,322	Oil	Georgia Power
Wilson	354,100	Oil	Georgia Power
Yates	1,250,000	Coal	Georgia Power
Yonah	22,500	Hydro	Georgia Power

Source: Georgia Power Company

Over half of the capacity, or 59%, is from coal power. For this reason, the state must ensure that a sufficient supply of coal is available to operate power plants. Coal-powered plants in Georgia typically have a 30 to 60 day stockpile of coal on site. Still, the availability of the coal supply is dependent on several other factors, such as the reliability of delivery via the railroad and consistent mining operations. Georgia Power purchases three different types of coal; Powder River Basin (PRB) coal from southeast Montana and northeast Wyoming, Appalachian coal, and Columbian coal (via the Port of Savannah). In the past, the U.S. has been plagued with shortages in available coal supply. In the early 2000's, China embarked on an extensive development campaign. The demand for coking coal to produce steel exceeded Asia's supply, and China sought coking coal from the foreign sources. Several U.S. coal production companies that were under contract to mine steam coal for utilities were enticed by the high price being commanded for coking coal, and declared bankruptcy, re-organized, and profited from new contracts with China. Faced with a shortage of coal supply, Georgia Power had to buy coal from alternate sources at a premium price.

Neither oil nor gas for power generation is stockpiled; oil and natural gas powered plants rely on "just-in-time delivery" for a steady source of fuel for operations. Oil and natural gas are transported to plants via underground pipeline. These fuel supplies have the potential to be disrupted due to an impact at the refinery or import facility, or due to power outages along the pipeline.[36]

Hydroelectric facilities are vulnerable to reduced operations in drought conditions. In 2007, in the midst of a statewide drought, Georgia Power experienced a 51% loss in hydroelectric power generation. Southern Company supplemented by purchasing additional coal and oil for power generation at other plants.[37] In this way, the mix of fuels used for electric generation provides a measure of security for reliable service. If one source of fuel becomes limited in supply, then the state relies more heavily on alternative generating units. In addition, coal-powered plants have been converted to dual fuel plants that regularly operate with both coal and natural gas. Other coal plants have the ability to operate with oil as a secondary fuel source if the coal supply is disrupted.

Southern Nuclear, which operates Southern Company's nuclear facilities, has received approval from the North American Electrical Reliability Corporation (NERC) to construct two additional nuclear reactors at Plant Vogtle in east Georgia. The units are currently under construction and should be operational by 2017.[38]

[36] Georgia Power Presentation to State Energy Assurance Stakeholders. Fall 2010.
[37] Rubner, Justin. "Drought hits hydropower." Atlanta Business Chronicle. November 19, 2007. http://www.bizjournals.com/atlanta/stories/2007/11/19/story2.html
[38] Georgia Power Presentation to State Energy Assurance Stakeholders. Fall 2010.

Reliability

Historic Disruptions

The North American Electrical Reliability Corporation (NERC) was formed as a response to a significant blackout in the northeast U.S. in 1965. NERC is a non-profit association that "develops and enforces reliability standards; assesses adequacy annually via a 10-year forecast and winter and summer forecasts; monitors the bulk power system; and educates, trains, and certifies industry personnel."[39] Originally a non-profit association, the Energy Policy Act of 2007 gave the agency regulatory authority, requiring utilities to comply with NERC standards regarding operations and reliability. SERC, or the Southeast Reliability Corporation, is a regional entity of NERC whose jurisdiction includes Georgia, Alabama, Mississippi, Tennessee, North Carolina, South Carolina, and portions of Kentucky, Virginia, Louisiana, Arkansas, Missouri, and Illinois.

SERC is required to report "major disturbances and unusual occurrences" regarding the electric grid to the U.S. Department of Energy. Such reports are mandatory when a utility, "due to any equipment failure/system operational action or event, (1) initiates a system voltage reduction of 3 percent or more, (2) disconnects circuits supplying over 100 megawatts of firm customer load, (3) issues an appeal to the public for a voluntary reduction in the use of electricity, or (4) has existing or anticipated fuel supply emergency situations requiring abnormal use of a particular fuel with the potential to reduce supply or stocks if needed to maintain reliable electric service. A report is also mandatory in regard to any actual or suspected act of sabotage or terrorism directed at the bulk power system."[40] Table 5 summarizes major disturbances and unusual occurrences reported for the bulk power system in Georgia from 2004 through November 2010. Several of these disturbances affected other states as well; as such, the number of customers affected may include customers in neighboring states, and the loss in megawatts may span multiple states.

[39] "NERC: About NERC." North American Electrical Reliability Corporation. http://www.nerc.com/page.php?cid=1 Accessed November 17, 2010.
[40] "Electric Power Monthly." U.S. Department of Energy, Office of Coal, Nuclear, Electric and Alternate Fuels, Energy Information Administration. March 2000.

Table 5. Major Disturbances and Unusual Occurrences for Georgia's Bulk Power System, January 2004 – November 2010

Date	Utility	Type of Disturbance	Loss (MW)	Number of Customers Affected
1/26/04	Southern Company	Ice Storm	< 150	30,689
2/26/04	Southern Company	Severe Storm	10	47,165
6/23/04	Southern Company	Thunderstorms	50	50,595
7/25/04	Southern Company	Severe Storms	61	61,004
9/06/04	Southern Company	Hurricane Frances	3,000	99,000
9/07/04	Georgia System Operations	Hurricane Frances	2,200	150,000
9/15/04	Southern Company	Hurricane Ivan	916	916,316
9/27/04	Southern Company	Hurricane Jeanne	854	85,455
11/24/04	Southern Company	Strong Thunderstorms	100	83,450
2/26/08	Southern Company	Thunderstorms	484	145,380
3/15/08	Southern Company	Major Storm	200	157,744
5/11/08	Southern Company	Severe Thunderstorms	100	80,539
8/02/08	Southern Company	Severe Thunderstorms	400	131,115
8/24/08	Southern Company	Tropical Storm Fay	110	87,390
4/10/09	Southern Company	Severe Thunderstorms	162	56,679
6/12/09	Southern Company	Severe Thunderstorm	290	102,000

Source: DOE Emergency Operations Center, Form EIA-417R, "Electric Power System Emergency Report", 2004 – November 2010

It should be noted that the "type of disturbance" in Georgia is confined to inclement weather events. Other possible causes of disruption to the power grid include complete electrical system failure; electric system separation associate with islanding; inadequate electric resources to serve load; actual or suspected attack; transmission equipment; loss of part or all of a high voltage substation or switchyard; operator actions; or fuel supply deficiency. Utilities in several other states had records of these non-weather related events affecting power supply during this time period.

If an electric utility becomes overwhelmed during repair and restoration services, such as after a major storm event, Georgia's electric utilities provide mutual aid to each other as well as with neighboring states' utilities. Through the Southeast Electric Exchange, Georgia Power maintains mutual aid agreements to receive repair assistance in heavily damaged areas. Georgia's Electric Membership Cooperatives (EMCs) have operated successfully with unwritten understandings for assistance among members, while the municipal utilities have a system-wide mutual aid agreement that facilitates restoration first and sorts out cost-sharing later. Both EMCs and municipals coordinate

restoration on their systems with the assistance of their respective coordinating corporations, the Georgia Electric Membership Corporation and the Municipal Electric Authority of Georgia.

In 2009, the frequency of Georgia Power outages averaged 1.3 outages per customer. These interruptions to service lasted an average of 122 minutes.[41]

Regulated Market

Unlike many states, Georgia's electricity market is not deregulated. Georgia Power, a subsidiary of Southern Company, operates as a vertically integrated company; the utility is involved in all aspect of power service, including construction of infrastructure, transmission and distribution of electricity, and the sale of power to customers. This allows the utility to balance fuel supply with electric demand, ensuring reliable service. There is some evidence that, in other states, the deregulation of electricity has adversely affected reliability of service. Some energy industry experts believe that a deregulated market can facilitate price manipulation of wholesale power, destabilizing the cost and provision of electricity. Governor Gray Davis of California investigated this possibility during the 2000 and 2001 blackouts across California.[42]

Integrated Transmission System

Georgia has a unique Integrated Transmission System jointly operated by the state's principal investor owned utility, its two public power entities and one of the state's municipal utilities. Participation is dictated by the amount of power each member draws from the system -- Georgia Power, MEAG, Georgia Transmission Corporation and Dalton Utilities. Georgia Transmission Corporation, like Oglethorpe Power, is owned by 39 electric membership cooperatives.

This integrated system provides operational economies by allowing participants to share approximately 16,000 miles of the state's electric transmission lines, substations and other infrastructure even though the parts are owned and maintained by individual participants. The system supports joint load growth planning and can also provide seamless in-state back-up capability.[43]

The Integrated Transmission System provides added security for the state. This system is built upon joint planning efforts to meet load growth and rapid access to back-up equipment and work-around for power outages. The system also focuses statewide attention on component company reliability under the oversight of several state and federal regulatory agencies in addition to applicable local governing authorities.

Integrated Resource Plan

Georgia law (O.C.G.A. § 46-3A-1) requires that Georgia Power submit an Integrated Resource Plan (IRP) to the Georgia PSC every three years. The IRP shows how Georgia Power plans to provide electricity to its customers over the next 20 years. The IRP includes Georgia Power's projections for its customers' demand and details how Georgia Power intends to meet those demands through plant load, efficiency standards, and conservation measures. The IRP Act gives the Georgia PSC the authority to review, modify, reject, or approve a plan for meeting future energy demands prior to any commitment to construct a facility, contract for purchase power, or implement a demand-side resource. The IRP process dictates that Georgia Power develop the resources that prove the most cost-effective in

[41] Georgia Power Presentation to State Energy Assurance Stakeholders. December 17, 2010.
[42] "The California Crisis: California Timeline." Frontline, Public Broadcasting Service. http://www.pbs.org/wgbh/pages/frontline/shows/blackout/california/timeline.html Accessed February 14, 2011.
[43] Georgia Energy Emergency Plan. Georgia Environmental Facilities Authority. May 2007.

meeting Georgia's energy needs. In requiring Georgia Power to evaluate demand side management programs (DSM) as a resource for meeting their forecasted loads, the IRP compels Georgia Power to also use energy efficiency as a cost-effective way to meet future demand instead of only building new power plants to meet future needs. Georgia utilities currently offer demand response tariffs (real-time pricing, time-of use, and interruptible tariffs), weatherization assistance for low-income customers, direct load control programs, energy efficiency consumer awareness programs, ENERGY STAR awareness programs, energy audits, renewable energy programs, and other energy efficiency or demand-side programs.[44]

Georgia Power's IRP has several inputs, including an economic forecast, based on projected demographics, employment rates, and income; a fuel forecast, summarizing the projected costs of various fuels for power generation; historic generation reliability; existing capacity resources; and the cost of new power generation for different fuel types as well as plant infrastructure. The outputs of the IRP analyses are a load forecast, or projection of electricity consumption; reserve margin, the electricity that will be made available beyond the forecasted load; a retirement study, which outlines which units will be shut down for more efficient operations; a demand side plan that includes measures Georgia Power will take to reduce demand for electricity; generation needs; an optimal mix study for fuel sources; an environmental compliance plan for future power generation operations; and a transmission plan to complement generation output plans. The particular outputs that concern reliability of electricity generation are the load forecast and reserve margin. The load forecast represents the amount of electricity that a utility anticipates must be generated in order to meet customer demand. The reserve margin refers to the electricity that will be produced beyond the load forecast. A reserve margin is included in a utility's power generation plans for the following reasons:

1. The load forecast assumes average weather conditions, and does not take into account days with inclement or unusual conditions, such as exceedingly hot days.
2. The reserve margin accounts for potential fluctuations in the economic environment that the load forecast uses in its projections. For example, a robust economy may lead to increased electricity consumption.

Georgia Power has an overall reserve margin of 15%. In IRP years one through three (from the date of IRP adoption), the margin is 13.5%, as there is greater confidence in the load forecast projection in the short-term. The following years have a reserve margin of 15%. With the exception of Florida, Georgia's reserve margins are typically equal or greater than those of other states. This is a contributing factor to the historic reliability of Georgia's electric grid. If the reserve cannot meet excess demand, then Georgia Power has agreements in place to quickly purchase power from other electric utilities.

As with any forecasting study, there will always be uncertainties in the IRP process. For the most recently adopted IRP, the particular uncertainties include the nation's short-term economic outlook; long-term projection of fuel costs; rulemaking by the U.S. EPA, which could potentially change the types of fuels used; potential carbon control legislation; and future potential for a renewable energy standard. A diversified resource plan that incorporates a variety of fuel types and environmental controls helps to address these uncertainties.[45]

Bulk Power Coordination

Many states in the U.S. belong to an independent system operator (ISO) or regional transmission organization (RTO). These groups are designed to operate the electric grid, administer the wholesale power market, and plan for the reliability of the system. Georgia does not fall within the jurisdiction of either an RTO or an ISO. Georgia Power's

[44] State Energy Strategy for Georgia. Georgia Environmental Facilities Authority. December 14, 2006.
[45] Georgia Power Presentation to State Energy Assurance Stakeholders. Fall 2010.

parent company, Southern Company, has a service area that extends through most of the southeast U.S. Because of its extensive territory and the need for coordinated planning, Southern Company performs many of the functions of an RTO/ISO. The Power Coordination Center, headquartered in Birmingham, Alabama, performs a variety of tasks related to the reliability of the grid, including the following:

- Unit Commitment – determines which units and other power-supply resources across the territory should be generating power and at which times, in order to meet projected integrated system demand on a daily basis.
- Economic Dispatch – determines the desired loading of the generating resources connected to the integrated system.
- Common Interchange – implements the interchange of power with non-associated companies that are connected with the Southern Company system.
- Bulk Power Transmission Security – assesses the security of the transmission system and concurs on actions required to ensure the system's integrity under first-contingency conditions.
- Maintenance –Outage Coordination – coordinates the unit system requirements of the operating companies to minimize the cost to the system.
- Record Keeping – maintains specified operating data and records.[46]

MEAG Power performs similar functions within its Bulk Power Operations department. This unit is responsible for balancing resources and loads on the bulk power system and meeting scheduling requirements with Southern Company. Load forecasting personnel in the Bulk Power Operations department are also responsible for procuring alternate fuels, such as natural gas, as needed and addressing system emergencies.[47] Similarly, each Georgia EMC provides an annual load forecast to its power suppliers so that resources can be allocated to meet anticipated energy needs.[48]

Monitoring Methodology

The U.S. Energy Information Administration publishes weekly, monthly, and periodic reports on the bulk power industry, including "Energy Assurance Daily, ""Electric Power Flash," "Electric Power Monthly," "Electric Power Annual," "Wholesale Market Data," "Cost and Quality of Fuels," "Electric Sales and Revenue," These reports, available on the Internet, summarize price, facility information, market trends, and news on electric power. GEFA, as part of its role within ESF #12, monitors this data to observe any trends that may affect the supply and delivery of electricity in Georgia.

During major disruptions in power (spatially and/or in duration), GEMA consults with representatives from Georgia Power, Georgia EMC, or MEAG Power partners, as appropriate, within the ESF #12 framework. Public outage data, such as that currently available from numerous EMCs, may be incorporated as feeds into GODAWGS. This will allow emergency management personnel to analyze the effect of power outages in affected areas and prioritize response and recovery activities to address vulnerable populations and critical services.

Restoration of Service

If Georgia Power experiences a major outage in its service territory, it will activate its Storm Center. The Storm Center coordinates the logistics of electric service restoration, including dispatching crews, clearing downed trees,

[46] "Georgia's Electric Industry." Georgia Public Service Commission. http://www.psc.state.ga.us/electricindust/structure.htm Accessed February 14, 2011.
[47] "Niche Player: MEAG Power's Bulk Power Operations." MEAG Power Current, Vol. 4, Issue 1. January 2011.
[48] Richardson, Hugh. "Manager's Comments." Middle Georgia EMC Member Newsletter. February 2003. http://www.mgemc.com/news_letters/2003%20Issues/feb_03/1.html

hiring contractors, supporting telecommunications, coordinating efforts with GEMA, and communicating with the media. The Storm Center works closely with the Transmission Control Center to monitor outages and prioritize the repair of damaged equipment.

As part of ESF #12, Georgia Power, Georgia EMC, and MEAG Power, as appropriate, work closely with GEMA to communicate outages and provide estimates of restoration time. GEMA communicates to electric utilities the areas where power restoration is most critical. In general, in the event of a major outage, service restoration priority is as follows:

1. To mitigate unsafe conditions;
2. Critical facilities, such as hospitals and other emergency operations;
3. Restorations that will serve the most customers in the shortest period of time;
4. Places to restore the community to its normal functions (e.g., grocery stores, home repair stores).

Demand Management

In a severe or prolonged electric power shortage, the Office of the Governor may initiate a public information program for Georgians to reduce energy consumption. The Governor may also choose to close state offices to reduce energy demand. Georgia is committed to energy conservation as a statewide policy. The Energy Challenge, administered by GEFA, encourages Georgians to track energy usage and conserve energy. As part of this initiative, former Governor Perdue committed all state agencies to reduce energy consumption in facilities by 15% below 2007 consumption levels, by 2020.

Petroleum

Georgia is highly reliant upon petroleum as a transportation fuel, as 99% of motor vehicles are powered by petroleum products. Motor gasoline in Georgia comprises 66% of petroleum use; distillate, diesel, and other fuels are made from the remaining petroleum supply.[49] The petroleum industry in Georgia includes major companies that import fuel and wholesale and retail distributors, including service stations and distributors of fuel oil and propane.

As previously discussed in the *State Energy Profile*, most petroleum product enters Georgia through the Colonial and Plantation pipelines. Georgia also receives a portion of its petroleum products imported by tanker and offloaded at ports in Brunswick and Savannah. From here, the products are received at terminals and trucked to distribution points across the state.[50]

Monitoring Methodology

The U.S. Energy Information Administration publishes weekly, monthly, and periodic reports on the petroleum industry, including "Energy Assurance Daily," "This Week in Petroleum," "Weekly Retail Gasoline Prices," "Weekly Highway Diesel Prices," "EIA Petroleum Data News," "Petroleum Supply Monthly," "International Petroleum Monthly," and "Petroleum Analysis Products." These reports, available on the Internet, summarize price, storage information, market trends, and news on petroleum products. GEFA, as part of its role within ESF #12, monitors this data to observe any trends that may affect the supply and delivery of petroleum in Georgia.

The petroleum industry is perhaps the most complexly structured energy market in Georgia. Unlike the electricity and natural gas industries, the petroleum industry is not subject to state PSC regulations; therefore, historically, there has been less oversight of petroleum industry activities. The petroleum market also has several "layers" of players associated with the production, transport, and delivery of fuel. Furthermore, Georgia does not produce any petroleum products; rather, it relies on refineries found outside of the state or on imports of petroleum product via coastal ports. Likewise, the pipelines that transport petroleum product originate in other states. The complex nature of the petroleum market makes it all the more crucial for state officials to maintain good working relationships and effective communications with the petroleum industry representatives. Specifically, ESF #12 and petroleum industry representatives have agreed to engage in the following communications during fuel disruptions.

- ESF #12 will communicate fuel priorities (e.g., emergency responders and major evacuation routes) to petroleum industry representatives.
- ESF #12 will coordinate the request of regulatory allowances, such as driver hour and fuel waivers, from the appropriate state and federal agencies.
- ESF #12 and petroleum industry representatives will provide state officials with guidance and recommendations for fuel conservation.
- ESF #12 will request that petroleum industry representatives summarize activities undertaken to increase fuel supplies and reserves, as well as anticipated impacts or interruptions to supply (including those associated with tanker ship routes, supply terminals, refineries, receiving port terminals, and so forth).

[49] "Energy Use in Georgia: Overview and Trends – 1984-2004." Georgia Environmental Facilities Authority. March 19, 2007.
[50] Georgia's one operable petroleum refinery, the Citgo Asphalt Refinery near Savannah, has a capacity of 28,000 barrels per calendar day (B/CD) but has produced no product since 2005.

- ESF #12 will request that petroleum industry representatives summarize information regarding anticipated outage duration, curtailment priorities, anticipated restoration schedules, and other similar data.[51]

Supply Management

During a fuel shortage, there are a variety of measures that may be used to manage available petroleum supply and help mitigate the shortages. Ideally, these measures should be employed well in advance of a fuel shortage, when officials first anticipate an impending supply issue. These measures are discussed in the following section.

Priority Energy Users

When a fuel shortage is anticipated, it is critical to ensure that priority users have sufficient supply. To this end, all state agencies, particularly public service agencies, should top off their fuel tanks. This should ideally be done before news of an impending fuel shortage reaches the media and potentially induces panic buying.

In general, the hierarchy of priority users in the state is as follows: (1) first responders; (2) agricultural users; (3) schools. As fuel becomes in short supply, GEFA shall work with ESF #12 partners, including private fuel providers, to ensure that these users are prioritized for receiving fuel. During this process, it is critical to have positive working relationships between the state and fuel providers, so that state officials can direct available fuel to these critical needs. The particular users prioritized for receipt of fuel may change according the need of the situation and the type of fuel in short supply. For example, if the fuel shortage is accompanied by electricity outages, then diesel fuel may be a critical need to run back-up generators. During the 2005 and 2008 hurricane seasons, GEFA successfully coordinated with private partners in the fuel industry to ensure the provision of fuel for priority users.

Driver Hour Waivers

The US Department of Transportation's Federal Motor Carrier Safety Administration (FMCSA) has established hours-of-service regulations that regulate the number of hours that commercial motor vehicles may be operated by a single driver. The intent of these regulations is to prevent fatigued drivers from operating commercial vehicles, ensuring the safety of both the driver as well as other travelers on the road.

As mentioned in *Energy Disruptions and Consequences*, Georgia experienced fuel shortages during the active 2005 and 2008 hurricane seasons. On September 14, 2005, FMCSA, in cooperation with the Department of Energy, issued driver hour waivers for motor carriers hauling fuel and other emergency relief supplies. The waiver was issued for southern and eastern states, including Georgia, and extended nationwide through October 26, 2005. During the 2008 hurricane season, FMCSA issued a regional emergency declaration for Alabama, Georgia, Louisiana, Mississippi, North Carolina, and South Carolina. This triggered temporary suspension of driver hour regulations for trucks carrying fuel. The driver hour waivers were in place through October 15, 2008.[52]

The driver hour waivers were issued on the basis of Federal Motor Carrier Safety Regulations (FMCSRs) (390.23), which provides relief from compliance with many established safety regulations when an emergency is declared. According to 49 CFR 390.5, an *"Emergency means any… storm (e.g., thunderstorm, snowstorm, ice storm…) earthquake… explosion, blackout, or other occurrence, natural or manmade, that interrupts the delivery of essential services… or supplies (such as food and fuel) or otherwise immediately threatens human life or public welfare…."* In

[51] Georgia Emergency Operations Plan. Georgia Emergency Management Agency. August 15, 2009.
[52] "Comparing the Impacts of the 2005 and 2008 Hurricanes on U.S. Energy Infrastructure." Infrastructure Security and Energy Restoration, Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy. February 2009.

these circumstances, the FMCSA Field Administrator may declare emergencies if there is a regional crises which justifies such regulator relief.

The following procedure for utilizing driver hour waivers in Georgia are based on *FMCSR 390.23* and recommended by the Federal Motor Carrier Safety Administration (FMCSA) in the event of a potential serious shortage of deliverable fuels.

1. State energy officials learn that a supply problem may be developing. This information may come from numerous sources, including requests from suppliers for driver hour waivers; EIA data and information gathered by GEFA; the occurrence of very cold weather for an extended period; major winter storms that may impede highway travel; ice conditions that may affect barge traffic on rivers supplying key terminals, and so forth.
2. State energy officials contact other state energy officials in the southeast region to determine if they are anticipating similar fuel supply issues.
3. If Georgia and neighboring states determine that a regional driver hour waiver is necessary to ensure reliable fuel supply, each state shall prepare information supporting the need for such a waiver.
4. If individual suppliers have requested the waivers, they must provide detailed information supporting their request.
5. State energy officials prepare an analysis of the fuel supply situation, drawing upon contacts with the fuel industry, as well as independent sources of information such as the Energy Information Administration and National Weather Service.
6. Determine the amount of time for which the waiver shall be in place (i.e., 5 days, 10 days, etc.). The time requested should not exceed the time necessary for supply problems to be resolved.
7. Georgia and neighboring states request a regional waiver as well as supporting justification. This request should ideally be sent by the Governor's Office, with the support of the agencies such as GEFA, GEMA, DMVS, PSC, and GDOT. The request shall be sent to the appropriate FMCSA Field Administrator, as well as the State Director of the FMCSA.

While this procedure does not guarantee that a driver hour waiver will be granted, the extent to which the states provide detailed analysis of the fuel supply, as well as justifications for requesting the waiver, will affect the likelihood that a waiver will be granted.

Georgia shall also consider the following information to determine whether driver hour waivers are needed for the state.

<u>Weather</u>

1. Is snow or ice sufficiently severe that full recovery of highways and primary roads will take more than two days?
2. Is snow or ice sufficiently severe that full recovery of secondary and rural roads will take two to four days?
3. Is cold sufficiently severe that fuel use by significant numbers of households will outstrip the ability of local retailers (operating under normal hours of service limitations) to replenish critically-low home fuel tanks?
4. Is cold sufficiently severe that fuel transporters (operated by jobbers or retailers under normal hours of service limitations) are unable to replenish the supplies of retail outlets in the face of increased consumer demand?
5. Have the Heating Degree Days substantially exceeded normal for a prolonged period?

6. Which counties have been declared under a state of emergency of any sort?

Supply Shortage and Infrastructure Damage

1. Are terminal lines or product shortages the result of product allocations by a single supplier within the region?
2. What is the status of the state and regional inventory, and how does it compare to last year, the recent average for the month, or the high and lows for the month?
3. Has a pipeline, refinery, or terminal been damaged?
4. Has a damaged pipeline, refinery, or terminal dispensed reduced quantities of Product? Has distribution actually stopped?
5. How long is a damaged pipeline, refinery, or terminal expected to be at reduced capacity or shut down?
6. What is the geographic range of product distribution from the pipeline, refinery, or terminal?
7. Are terminals within the region out of a given product, and if so, for how long?
8. Are terminal outages limited to one or two terminals within the region?
9. Are alternative suppliers available within the region?
10. Can transporters reach alternative suppliers within normal hours of service limitations?
11. Are there other mitigating factors that will lessen the threat to the public (e.g., mild weather, alternative product availability)?

Transportation

1. Have jobbers and/or retailers pressed all qualified drivers into service?
2. Have all qualified drivers exhausted their hours of availability under normal hours of service limitations, or are they anticipated to do so?
3. Have all available trucks been placed into service?
4. Have third party carriers been contacted and found to be unavailable?
5. Are there excessive waits or lines at fuel terminals?
6. Are there excessive waits or lines at fuel terminals during all hours, including at night?
7. Do trucks at fuel terminals have waits exceeding four hours to load supplies? If so, during which hours of the day and/or night have wait lines been observed?
8. Are excessive waits at terminals isolated to one or two specific terminals within the region?
9. What other actions has the industry taken to avoid the need to grant driver hour waivers?

During this analysis, the following points should also be taken into consideration:

A. Fuel truck drivers require special training and certification, and there is usually a limitation on the ability to employ extra drivers during emergencies. However, retailers and jobbers should make efforts to hire all available drivers and to place into service all available trucks during emergencies or shortages.
B. Long waits at terminals during the day do not demonstrate a shortage of product or a need for driver hour waivers if those lines disappear at night.
C. Lines at one terminal and the absence of lines at another may indicate competitive activity rather than product shortages or transportation disruptions. Waivers should not be granted where terminal lines are the result of economic decisions.

Regional Effect

A. Which states have been directly affected by severe weather (cold, ice, or snow)?
B. How many states are served by terminals that are out of product or at which there are long lines?
C. How many states are served by pipelines that are out of service or that have restricted supplies?
D. How do affected states obtain fuel supplies; is travel outside the state vital to obtaining product?
E. Has severe weather affected a state that significant numbers of transporters from another state need to travel through to obtain supplies?

During this analysis, the following points should also be taken into consideration:

A. The states requesting driver hour waivers should have uniformity in hours of service requirements. If several states are similarly affected, they should receive (or be denied) the same relief.
B. Consideration should be given to the fact that states with cold-related emergencies (heightened demand) may draw supplies from a state that is less affected by the same problem; drivers serving an emergency in one state will still need to cross state lines to obtain product.
C. Consideration should be given to where drivers will need to go to obtain alternative supplies in the event of severe shortage or extreme demand.[53]

Environmental Waivers for Fuel Specification

If a significant reduction in fuel supply is anticipated, the U.S. EPA, in coordination with the U.S. Department of Energy, may temporarily waive fuel or fuel additive requirements. Under the Clean Air Act, during particular seasons in particular parts of the country, cleaner-burning fuels are required in order to mitigate adverse air quality impacts. For example, in Atlanta, during the high ozone season (June 1 – September 15), gasoline must have a lower volatility in order to control the emission of volatile organic compounds (VOCs), which contribute to ozone pollution. If a fuel supply emergency is imminent, however, the EPA and DOE may issue a fuel waiver, allowing additional gasoline or diesel supply to become available to the state.[54]

The Clean Air Act specifies situations for which fuel waivers may be issued. The criteria and conditions for fuels waivers are outlined in the *Clean Air Act, Section 211(c)(4)(C)*:

(ii) The Administrator may temporarily waive a control or prohibition respecting the use of a fuel or fuel additive ... if, after consultation with, and concurrence by, the Secretary of Energy, the Administrator determines that--

> *(I) extreme and unusual fuel or fuel additive supply circumstances exist in a State or region of the Nation which prevent the distribution of an adequate supply of the fuel or fuel additive to consumers;*
>
> *(II) such extreme and unusual fuel and fuel additive supply circumstances are the result of a natural disaster, an Act of God, a pipeline or refinery equipment failure, or another event that could not reasonably have been foreseen or prevented and not the lack of prudent planning on the part of the suppliers of the fuel or fuel additive to such State or region; and*

[53] "Procedures for States to Request Regional Driver Hours Waivers for the Federal Motor Carrier Safety Administration (FMCSA) in the Event of a Potential Serious Shortage of Deliverable Fuels." The Energy Data and Security Committee, National Association of State Energy Officials (NASEO). September 6, 2002.
[54] "Frequent Questions about Fuel Waivers." Cleanup Enforcement, U.S. Environmental Protection Agency. http://www.epa.gov/compliance/resources/faqs/civil/fuelwaiver.html Accessed August 25, 2010.

> *(III) it is in the public interest to grant the waiver (for example, when a waiver is necessary to meet projected temporary shortfalls in the supply of the fuel or fuel additive in a State or region of the Nation which cannot otherwise be compensated for).*

(iii) If the Administrator makes the determinations required under clause (ii), such a temporary extreme and unusual fuel and fuel additive supply circumstances waiver shall be permitted only if--

> *(I) the waiver applies to the smallest geographic area necessary to address the extreme and unusual fuel and fuel additive supply circumstances;*
>
> *(II) the waiver is effective for a period of 20 calendar days or, if the Administrator determines that a shorter waiver period is adequate, for the shortest practicable time period necessary to permit the correction of the extreme and unusual fuel and fuel additive supply circumstances and to mitigate impact on air quality;*
>
> *(III) the waiver permits a transitional period, the exact duration of which shall be determined by the Administrator (but which shall be for the shortest practicable period), after the termination of the temporary waiver to permit wholesalers and retailers to blend down their wholesale and retail inventory;*
>
> *(IV) the waiver applies to all persons in the motor fuel distribution system; and*
>
> *(V) the Administrator has given public notice to all parties in the motor fuel distribution system, and local and State regulators, in the State or region to be covered by the waiver.*

The EPA issued fuel waivers during both the 2005 and 2008 hurricane seasons. In 2005, several states, including Georgia, received fuel waivers for both gasoline and diesel fuel. In addition, a waiver was issued for the entire country covering a period of two weeks after Katrina's landfall to allow early use of higher volatility winter-time gasoline as well as on-highway diesel fuel with over 500 ppm sulfur content. In 2008, the fuel waivers issued were less widespread, primarily limited to the Gulf Coast and southeastern states. With the exception of Texas, fuel waivers were granted for gasoline only.[55]

During hurricane season, ESF #12 and GEMA's State Operations Center coordinate closely on the monitoring of both the Gulf and Atlantic Basins. NOAA's National Hurricane Center website, which provides official information and guidance on active and developing storms, is utilized to assess the threat of tropical cyclones to fuel infrastructure concentrated along the Gulf Coast. If a tropical cyclone is forecasted to impact the Gulf Coast, the Georgia Environmental Protection Division (EPD) initiates coordination activities in preparation for potential fuel disruptions. During regularly scheduled conference calls, which increase in frequency as the storm nears, ESF #12 partners verify roles, responsibilities, and tasks as outlined in the ESF #12 Annex in the Georgia Emergency Operations Plan. ESF #12 also begins monitoring reports issued by the US DOE and the Bureau of Safety and Environmental Enforcement's Hurricane Response Team to assess the operating status of energy infrastructure in the Gulf region. If ESF #12 determines that the approaching storm is slowing or stopping the operation of drilling platforms, oil refineries, and other fuel infrastructure in the Gulf region, and/or if the storm is anticipated to cause significant damage to the fuel infrastructure in the region, the EPD will begin to draft fuel waiver requests for potential submission to the EPA Air Enforcement Division. ESF #12 will also contact the EPA to communicate concerns about fuel disruptions; early coordination with the EPA will expedite the issuance of a fuel waiver if necessary.

[55] "Comparing the Impacts of the 2005 and 2008 Hurricanes on U.S. Energy Infrastructure." Infrastructure Security and Energy Restoration, Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy. February 2009.

Once the storm makes landfall, the EPD, in coordination with GEFA, contacts fuel suppliers and transporters in the impacted areas. Refinery representatives receive inquiries on how long impacted refineries are anticipated to be shut down or operating at reduced capacity, and which non-Georgia specified fuels might be available for potential use. Fuel suppliers are asked how much fuel terminals have on hand, whether fuel shipments are being delayed, and whether or not suppliers have had to place customers on allocations. Pipeline companies receive inquiries on the location of Georgia specified fuels in the pipelines. Based on this information, if a fuel supply issue is anticipated, ESF #12 will communicate this information to GEMA, and GEMA will recommend that the Governor's Office formally request a fuel waiver from the EPA. The request should describe how the fuel waiver criteria in the Clean Air Act have been met. In addition, the waiver request should address:

- *"The nature of the Act of God or other event that caused the shortage;*
- *An explanation of why the shortage was not foreseeable and could not have been prevented by prudent planning on the part of the suppliers of the fuel;*
- *The type of fuel for which a shortage exists;*
- *The geographic area that is affected;*
- *The effect of the shortage on fuel supplies, such as the number of gasoline stations that are, or are expected to be, out of fuel;*
- *The expected duration of the shortage; and*
- *The specific nature of the waiver being requested, including the duration, the geographic area, and the alternative fuel that would be allowed."*[56]

Gas Station Supply

Depending on the particular situation, it may be necessary to prioritize the gas stations that receive fuel. For instance, if a hurricane is projected to strike the Georgia coast, state officials should assist stations as needed to ensure that there is ample fuel along evacuation routes. At this time, it is critical to have established positive working relationships with jobbers, terminals, and wholesale fuel suppliers to ensure an efficient and coordinated response.

Strategic Petroleum Reserve

If petroleum is in short supply, private fuel companies, including terminals, refiners, and pipeline companies, have the option of requesting supplies from the Strategic Petroleum Reserve (SPR). The SPR was established after the 1973-1974 oil embargo, which drastically reduced critical petroleum supplies in the United States. The SPR is intended to provide a source of petroleum during significant disruptions to fuel supplies and serve as a national defense fuel reserve.

During the 2005 hurricane season, when fuel provision was severely disrupted, President George W. Bush issued a Finding of a Severe Energy Supply Interruption as defined in Section *161(d) of the Energy Policy and Conservation Act (EPCA), 42 U.S.C. 6 241(d)*. President Bush authorized and directed the Secretary of Energy to drawdown and sell crude oil from the SPR. 30 million barrels were made available for sale; the offers were submitted by a total of seven companies, and a total of 11 million barrels were sold. An additional 9.8 million barrels were exchanged as an emergency loan. During the 2008 hurricane season, two exchanges from the SPR were made to several refineries, including Marathon, Placid, ConocoPhillips, Citgo, and AlonUSA. Under the terms of the exchange, the companies

[56] "Frequent Questions about Fuel Waivers." Cleanup Enforcement, U.S. Environmental Protection Agency. http://www.epa.gov/compliance/resources/faqs/civil/fuelwaiver.html Accessed August 25, 2010.

ultimately returned a volume of petroleum to the SPR exceeding the additional drawdown, thereby adding additional oil to the reserve.[57]

One drawback to utilizing the SPR is that it contains only crude oil, not petroleum products; therefore, there must be functioning refineries that can process the crude oil into motor vehicle gasoline, diesel, and other products. For certain situations, such as additional oil needed for overseas defense operations or to alleviate pipeline blockages, this factor may not come into play. However, during hurricanes or other natural disasters, refineries may be damaged or temporarily offline, inhibiting their ability to produce petroleum products altogether.

Demand Management

During fuel shortages, there are numerous demand management tools that the state can utilize to reduce the demand upon existing fuel supply. Examples include:

- Georgia Department of Education may close schools in affected areas, reserving available diesel fuel for emergency response or critical services.
- Georgia Department of Public Safety may request temporary speed limit reductions on state roads and highways to facilitate fuel conservation.
- Georgia may temporarily close state offices not critical to life-safety operations.[58]

The following section highlights tools that the public can voluntarily undertake to reduce petroleum demand.

Telecommuting

Telecommuting is a viable alternative for employees whose duties would allow them to perform the same tasks at home, or a remote location close to their home, rather than from the office, utilizing common resources such as computers and telephones. Telecommuting often eliminates or drastically reduces vehicle miles traveled, thereby reducing fuel use. The Clean Air Campaign, a non-profit group that encourages commute alternatives in Georgia, offers commuters and employers resources to begin telecommuting programs. During a fuel shortage, the Clean Air Campaign would be a critical partner in encouraging commute alternatives to reduce fuel consumption.

Ridesharing

Ridesharing is an alternative that allows people in multiple single-occupancy vehicles to ride together to employment or other destinations. This reduces the number of vehicles on the road, thereby saving on fuel. Ridesharing is already used in many areas of the country, most notably in urban areas with high traffic congestion. The Clean Air Campaign encourages commuters to participate in ridesharing by facilitating carpool and vanpool formation, and offering financial incentives for people to rideshare. Several large employers, such as IBM, have worked with the Clean Air Campaign to establish ridesharing programs.

Mass Transit

Increasing the use of mass transit, such as buses and trains, is another method to reduce vehicle fuel consumption. In the Atlanta area, within DeKalb and Fulton Counties, the Metropolitan Atlanta Rapid Transit Authority (MARTA)

[57] "Releasing Crude Oil from the Strategic Petroleum Reserve." SPR Drawdowns, U.S. Petroleum Reserves, Fossil Energy, U.S. Department of Energy. http://www.fe.doe.gov/programs/reserves/spr/spr-drawdown.html Accessed August 26, 2010.

[58] Georgia Emergency Operations Plan, Incident Annex 5: Georgia Fuel Emergency Plan. Georgia Emergency Management Agency. August 15, 2009.

operates rail as well as an extensive network of bus routes. The Georgia Regional Transportation Authority provides an express bus service between metro Atlanta suburbs and employment destinations. Cobb and Gwinnett Counties also offer bus services for both intra- and inter-county travel. Chatham County also offers an expansive bus route network. Several other smaller counties and municipalities offer bus service as well.[59]

During the 2008 fuel shortage in Georgia, MARTA estimated an increase of 15% in ridership.[60]

During a fuel shortage, external affairs at GEMA may coordinate with local media outlets, along with the Clean Air Campaign and mass transit providers, to encourage the public to take alternative transportation during a fuel shortage. This may be accomplished through press releases, interviews, local newspaper and television coverage, as well as social media.

Improved Vehicle Maintenance

Proper maintenance of personal vehicles can significantly enhance fuel efficiency. Keeping the engine tuned, ensuring tires are properly inflated, and using the recommended grade of motor oil can improve fuel efficiency by 1 to 4%. Fixing more serious vehicle issues may improve fuel economy by as much as 40%.[61] Proper vehicle maintenance is an easy, relatively low-cost way for drivers to improve fuel economy, thereby reducing overall gasoline consumption.

[59] "Georgia Transit Links." American Public Transit Association. http://www.apta.com/resources/links/unitedstates/Pages/GeorgiaTransitLinks.aspx Accessed August 27, 2010.
[60] Pickard, Mark. "Moving out of Single Occupancy Vehicles." September 30, 2008. http://www.11alive.com/rss/rss_story.aspx?storyid=121813 Accessed August 27, 2010.
[61] "Keeping Your Car in Shape." http://www.fueleconomy.gov/feg/maintain.shtml Accessed August 30, 2010.

Natural Gas

As mentioned in the *State Energy Profile*, Georgia relies heavily on natural gas for its energy needs. On the residential and commercial scales, natural gas is a common source of fuel for cooking and heating. Natural gas is also the primary energy source in the state's industrial sector and supplies a significant amount of fuel to the state's electric generators.

Georgia receives natural gas via four pipelines (Southern Natural Gas, Elba Express, Transco, and East Tennessee pipelines) and Elba Island, the LNG import terminal near Savannah. The Southern Natural Gas pipeline is the major supplier of natural gas to Atlanta Gas Light Company at 3.7 Bcf per day. AGL owns and operates three LNG peak-shaving facilities in Riverdale, Ball Ground and Macon.

Power generation is the fastest growing use of natural gas in Georgia. Georgia Power is in the process of replacing three coal-fired units at Plant McDonough with natural gas-powered units. These units are expected to be on-line in 2012.

Regulation

Several regulations govern the transportation of natural gas in the state. The Federal Energy Regulatory Commission (FERC) has oversight over the interstate transportation of natural gas products via pipeline. This agency regulates several activities of the natural gas transportation market, including the construction of interstate pipelines, environmental issues, and the rates charged by the pipeline companies.

The U.S. Department of Transportation's Office of Pipeline Safety has programs and procedures to ensure for the safety of natural gas pipelines as well as citizens. The office's primary activities include inspection of the pipelines and training and educating the public on safe pipeline practices. The *Pipeline Inspection, Protection, Enforcement, and Safety (PIPES) Act of 2006* strengthens the authority of the U.S. DOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) to ensure the integrity of the pipeline network. The *PIPES Act* focuses primarily on mitigation and prevention programs and provides incentives to states that proactively protect their pipelines. The Act provides for increased funding, up to 80%, for states that annually certify and participate in a pipeline or hazardous materials safety program. Georgia's 811 Program, "Call Before You Dig," (discussed in the following section) satisfies the requirements of the *PIPES Act*.

Since 1997, the Office of Pipeline Safety has emphasized its Integrity Management Program, which directs safety-enhancing resources towards "high-risk" areas of the pipeline. This includes high population areas, environmentally sensitive sites, or areas of the network adjacent to navigable waters. The Integrity Management Program facilitates continuous monitoring of the pipelines, along with ongoing risk assessments, and mitigation for high-risk areas. [62]

Safety and Security

The most common cause of natural gas pipeline incidents is unauthorized excavating. Between 2000 and 2009, pipeline incidents resulted in 158 injuries, 38 fatalities, and $196 million in property damage across the United States.[63] Georgia's Utilities Protection Center operates a call center on behalf of all underground utilities. By law, homeowners or contractors are required to contact the call center (by dialing "811") before digging on property, and

[62] Parfomak, Paul W. "Pipeline Security: An Overview of Federal Activities and Current Policy Issues." February 5, 2004.
[63] "Pipeline incidents are deadly reminders to make the One-Call." U.S. Department of Transportation, Fast Lane Blog. http://fastlane.dot.gov/2010/06/pipeline-incidents-are-deadly-reminders-to-make-the-onecall.html Accessed November 5, 2010.

the utility companies have two business days to come to the property and mark their lines. It is estimated that Georgia's one-call center has saved hundreds of millions of dollars in costly repairs, as well as many lives.[64]

The most significant natural gas pipeline explosion in recent U.S. history occurred in San Bruno, California on September 9, 2010. A 30 inch pipeline owned by Pacific Gas and Electric Company ruptured, causing a massive explosion in a residential neighborhood. The explosion leveled almost 40 homes and damaged scores more, and eight people were killed. Ongoing investigations into the cause of the pipeline revealed that the pipeline may have been operating at a higher pressure than the maximum allowed, due to incorrect records regarding the composition of the pipe material. The National Transportation Safety Board has urged PHMSA to request that operators across the country check the accuracy of pipeline material composition and maximum allowable operating pressures.[65]

In 1998, Georgia deregulated its natural gas market, allowing consumers to purchase natural gas from a variety of marketers within their service area. Due to the confluence of multiple natural gas marketers within service areas once served by one provider, in 2008, the Georgia PSC began requiring counties with more than one service provider to submit safety plans. These plans contain the providers' negotiated boundary lines corresponding to service areas, with the goal of ensuring safety and preventing the co-mingling of gas services.

Since the terrorist attacks of September 11, 2001, natural gas companies, along with other critical infrastructure providers, have bolstered security and enhanced emergency planning capabilities. The American Gas Association reports that during the past decade, pipeline companies have engaged in activities such as tightening security procedures, altering transportation routes, adding surveillance equipment, and more closely guarding the release of infrastructure location on the internet. The Association of Oil Pipelines reports that 95% of companies had developed new security plans and implemented recommendations by February 2003.[66]

Reliability

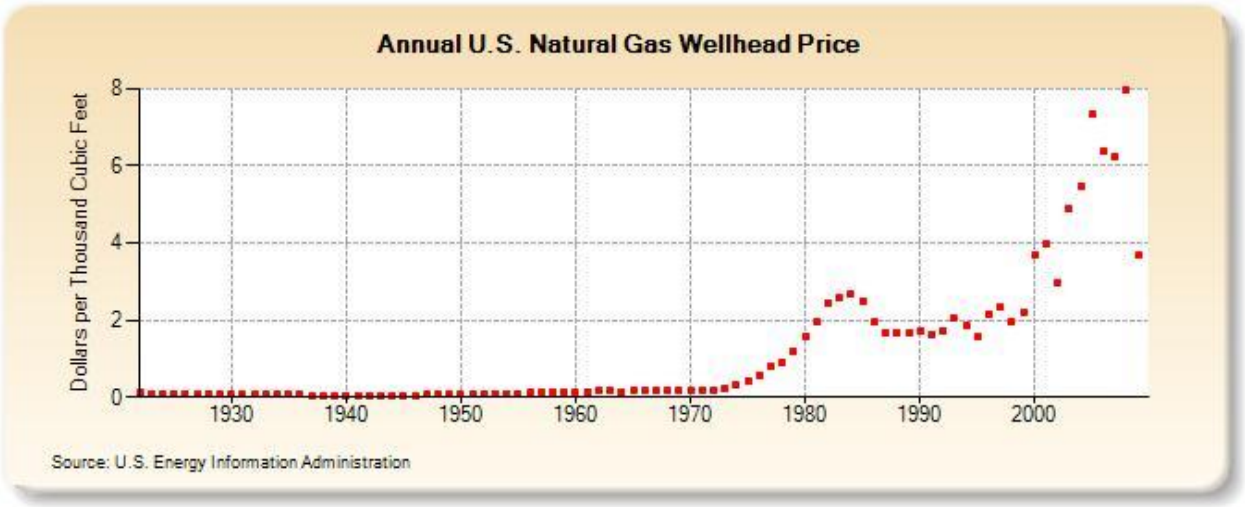
Most often, natural gas pipeline disruptions are caused by scheduled or unscheduled maintenance, temporary decreases in market demand, or weather-related limitations to operations.[67] In the U.S., shut-in of gas production most often occurs in advance of hurricanes, and production may be limited for days or weeks after landfall, depending on the severity of the storm. Georgia, however, receives a percentage of its natural gas through the Elba Island LNG facility. The facility imports, rather than produces, natural gas. Furthermore, historically, there have been far fewer hurricanes and or tropical storms off the Georgia coast than in the Gulf of Mexico, so that the LNG facility is at a lower risk of disruption to due storm events.

As mentioned in the *State Energy Profile*, the majority of natural gas in Georgia is used for heating, cooking, and water heating. Historically, natural gas demand, and thereby prices, have peaked annually in the winter months, when natural gas is utilized for home heating. In recent years, however, natural gas has become the fastest growing source of fuel for power generation. This has caused natural gas use to peak in the summer as well, when there is an increased electric load due to home air conditioning. Due to increased regulations associated with off-shore drilling, much of the off-shore natural gas production in the Gulf of Mexico has been reduced. Instead, natural gas is increasingly being extracted from shale deposits, which are located in several areas throughout the country. Shale

[64] Chestnutt, Megan. "Safe Digging Month Recognized by Georgia Governor." http://www.uncc2.org/web/news/pdf/news_05-05-09_cga_newsletter.pdf Accessed November 5, 2010.
[65] "Natural Gas Weekly Update." U.S. Department of Energy, Energy Information Administration. For the week ending January 5, 2011.
[66] Parfomak, Paul W. "Pipeline Security: An Overview of Federal Activities and Current Policy Issues." February 5, 2004.
[67] "About U.S. Natural Gas Pipelines- - Transporting Natural Gas. Natural Gas Pipeline Capacity and Utilization." U.S. Energy Information Administration, Information Statistics and Analysis. http://www.eia.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/usage.html Accessed November 24, 2010.

gas wells typically have a longer functional life than conventional wells. Furthermore, they are protected from the impact of hurricanes that shut-in production at conventional production sites. The discovery of natural gas extraction from shale has led to an increase in the overall supply of natural gas, and the country has had lower than average natural gas prices for the past couple of years.[68] This is shown in Figure 10; prices peak in 2008, then drop sharply by 2009.

Figure 10. Annual U.S. Natural Gas Wellhead Price



In Georgia, the last major disruption to natural gas supply was in the 1970s, coinciding with a nationwide imbalance of supply and demand.

Monitoring Methodology

The U.S. Energy Information Administration publishes weekly, monthly, and periodic reports on the natural gas industry, including "Energy Assurance Daily," "Natural Gas Weekly Update," "Natural Gas Monthly," "Natural Gas Analysis Products," "Natural Gas Restructuring/Residential Choice Program," and "Natural Gas Weekly Storage Report." These reports, available on the Internet, summarize price, storage information, market trends, and news on natural gas. GEFA, as part of its role within ESF #12, monitors this data to observe any trends that may affect the supply and delivery of natural gas in Georgia.

During a potential, impending, or actual disruption in natural gas delivery, the state will also contact appropriate officials in the natural gas industry to understand the severity and extent of the disruption, learn of the industry's response activities, and coordinate mitigation measures among natural gas suppliers, deliverers, marketers, and the state. These contacts are listed in *Emergency Communications*.

Supply and Demand Management

Southern Natural Gas Company

Southern Natural Gas Company (SNG) performs a rolling three-day forecast of actual supply compared to forecasted demand. If forecasted demand exceeds the scheduled supply delivery and storage withdrawal capability (1.2 Bcf/day), then natural gas is considered to be in short supply. This most often occurs when customers who are

[68] Discussion with Elba Island Facility representatives. Fall 2010.

shipping gas do not match their supply to demand, or the pipeline system does not have the capacity to serve both firm and interruptible customers. In these cases, SNG would issue an Operational Flow Order (OFO). OFOs are issued during high demand to protect holders of firm transportation contracts, ensuring that SNG can deliver the firm customers with their contracted volumes, at the contracted pressures and contracted delivery points. The OFO provides tiered penalties to incentivize providers to either ship additional product or reduce demand.

There are different types of OFOs that address supply and demand imbalances. In Georgia, the most commonly issued OFOS are Type 3 and Type 6, initiated when cold weather drives up demand for natural gas. A Type 3 OFO is issued when demand exceeds segment capacity. A Type 6 OFO is issued when demand exceeds SNG's withdrawal capacity. Types 3 and 6 OFOs may be issued in conjunction with one another to address short-term imbalances. On rare occasions, SNG has initiated curtailment proceedings using a Type 1 OFO, or Force Majeure. A Type 1 OFO is issued when pipeline equipment is out of service and SNG cannot uphold its contractual obligations to deliver natural gas.

If SNG determines that gas delivery must be curtailed, customer deliveries are curtailed according to the type of transportation contract held with SNG. Primary firm customers have priority over all other deliveries. After primary firm customers, the order of priority (from greatest to least priority), is alternate firm in the path, alternate firm outside the path, and interruptible transportation.

SNG's Gas Tariff dictates how the company allocates capacity to priority users. SNG cannot deviate from tariff protocols unless it receives a waiver from FERC. SNG's standards on capacity allocation follow policies of FERC and the North American Energy Standards Board (NAESB).

State Response

GEFA's State Energy Strategy has established policy objectives and associated implementation strategies for natural gas usage in the state. These policies center on efficient use of the existing natural gas supply and exploring the possibilities for increasing natural gas capacity in the state. The policy objectives and implementation strategies are presented in Table 6.

Table 6. Natural Gas Policies and Implementation Measures (State Energy Strategy)

Policy Objective: Promote Natural Gas End-Use Efficiency and Consumption Reduction Strategies
Implementation Strategy: Support Increased Residential and Commercial Energy Efficiency to Put Downward Pressure on Natural Gas Costs This has been accomplished through the Federal tax incentives for LEED and Energy Star certification; the State of Georgia's goal to reduce energy consumption in government buildings; encouraging the use of energy saving performance contracting (ESPC); the State's adoption of an energy code for residential and commercial buildings; offering tax incentives and rebates for the purchase of energy efficient appliances; establishing minimum energy performance criteria for appliances purchased by state government; encouraging utilities to adopt a voluntary energy efficiency target; and altering Georgia PSC regulation to encourage more demand-side management programs. **Implementation Strategy: Promote Fuel Flexibility in Georgia Industries by Removing Barriers to Industrial Fuel Switching and Fuel Back-Up Programs** The Georgia Environmental Protection Division has discussed streamlining the process for the State to review permits for flex-fuel programs and considered legislative changes to this effect.
Policy Objective: Enhance Natural Gas Production and Infrastructure to Minimize Vulnerability to Supply Disruptions
In 2006, an expansion of the Elba Island Terminal increased the terminal's delivery capacity from 446 million MMcf to 806 million MMcf per day. In 2010, the newly-constructed Elba Express pipeline began operations, providing increased natural gas service to Georgia via a 190-mile pipeline. In 2009 Atlanta Gas Light received approval from the PSC to begin a multi-year system upgrade to improve the utility's ability to provide service on peak demand days. The initiative, called the Georgia Strategic Infrastructure Development and Enhancement Program (STRIDE), includes programs aimed at extending distribution facilities to areas of the state where natural gas is unavailable. As a part of STRIDE, AGL added a large diameter pipeline in Cobb County to increase supply and availability to industrial and residential customers. Similar projects in Spalding, Butts and Henry Counties are on schedule for completion in 2012. The STRIDE program also includes AGL's Pipeline Replacement Program, which will improve the safety and reliability of the natural gas infrastructure by replacing aging, unprotected, and corroded pipes with state-of-the-art plastic and steel pipes. **Implementation Strategy: Evaluate Best Methods to Encourage Investment in the Natural Gas Infrastructure** In 2007, the Georgia Public Service Commission coordinated with local distribution companies, municipal gas utilities, pipeline companies and natural gas marketers to study contractual and physical natural gas supply and capacity within Georgia.

Source: State Energy Strategy, Georgia Environmental Finance Authority (2005) and 2012 Georgia Energy Report, Georgia Environmental Finance Authority

Renewables for Energy Assurance

Renewables for Energy Assurance

With a greater emphasis on preserving the natural environment, renewable energy has been the focus of recent trends and research activities. The following sections highlight public and private renewable energy initiatives in the state and the opportunities and challenges of increasingly integrating renewables into the state's energy profile.

Bioenergy

There are three types of primary bioenergy in Georgia: biodiesel, ethanol from agricultural crops, and cellulosic ethanol. Biodiesel is a biodegradable, non-toxic alternative fuel produced from natural renewable sources such as new and used vegetable oils and animal fats. It is produced from a variety of feedstocks, including soybean oil, peanut oil, sunflower seed oil, canola oil, chicken fat and waste grease. Biodiesel factories in Georgia include:

- *Soymet/Peach State Labs*, Rome, Georgia
- Georgia Alternative Fuels, Dublin, Georgia
- *Bulldog Biodiesel*, Ellenwood, Georgia
- *Inland Oil/Seminole Biodiesel*, Bainbridge, Georgia
- *Alterra Bioenergy of Middle Georgia*, Gordon, Georgia
- Down to Earth Energy, Monroe, Georgia

Ethanol is a clean-burning, high-octane fuel that is produced from renewable sources. In its most basic form, ethanol is grain alcohol produced from plant material. Ethanol can be blended with gasoline to create E85, a blend of 85 percent ethanol and 15 percent gasoline. Vehicles that run on E85, referred to as "Flexible Fuel Vehicles" (FFVs), are offered by several vehicle manufacturers. Standard gasoline engines burn E10, which contains only 10 percent ethanol. Ethanol is produced from corn, sugar cane, sugar beets, and sweet potatoes. Ethanol factories in Georgia include First United Ethanol in Camilla, Georgia.

Cellulosic ethanol can be produced from a variety of non-food products that contain cellulose. Great environmental benefits are realized when cellulosic ethanol is used in place of gasoline. Additionally, Georgia citizens will realize economic benefit by using ethanol from wood and agricultural residues instead of imported gasoline. Georgia has almost 20 million dry tons of timber harvesting residues and unmerchantable timber available annually, and Georgia timberland owners are growing more wood each year than is being removed from the forests. This tremendous renewable resource of growing timber ensures a long-term and continuous supply. Cellulose ethanol is produced from switchgrass, wood, hay, plants, and waste materials. The development of cellulosic ethanol is in the early stages, and currently, production on a mass scale is cost-prohibitive. Georgia is continuing to research ways to produce cellulosic ethanol in a cost effective manner. Having local produced sources of alternative fuel, including biodiesel and ethanol, ensures that the state can operate its critical functions during an outage of conventional fuels such as diesel and gasoline.

The Center of Innovation for Energy (COI-E), works closely to attract businesses interested in producing or selling renewable energy or alternative fuels in Georgia. Utilizing a broad network of biomass and energy industry representatives, as well as state and local government leaders, the COI-E provides prospective businesses with valuable information and useful contacts to help them get started.

Green Energy (Georgia Power)

Georgia Power's Green Energy Program provides an avenue for customers to invest in renewable energy. Georgia Power produces a limited amount of energy from renewable resources, including landfill gas, solar energy and biomass. Residential customers can direct their power purchase towards renewable energy by purchasing it in 100 kW blocks per year. Business customers may purchase green energy, in a minimum amount based on the customer's historic usage.[69]

Waste-to-Energy Program (City of Roswell)

The City of Roswell, a recipient of a local energy assurance planning (LEAP) grant, is developing a waste-to-energy program. The Public Works and Environmental Department is spearheading an effort to integrate biodiesel fuel into the city's vehicle fleet. Under the program, business and residences would drop off waste oil at the city's Recycling Center. Here, specialized processing equipment would convert the waste oil to biodiesel. This use of alternative fuel will enable the City's critical functions, such as fire and police, to remain operational in case of a future petroleum shortage.

Challenges and Opportunities of Using Renewable Energy Sources

Hydroelectric Power

Water powered the state's first major power generating facilities. In the 1920s, private entrepreneurs and municipalities were building dams across the state, particularly in North Georgia, to harness and distribute electric power to local customers. A devastating drought hit Georgia in the 1920s, reducing the efficiency of hydroelectric plants. In 1930, Georgia Power constructed the state's first coal-powered plant in Cobb County, representing a move away from hydroelectric power. Electricity generation at dams is heavily dependent on the local climate. Recent drought conditions throughout the state have contributed to a decrease in use of hydropower. In 2010, only 1.2% of net electricity generation in Georgia was from hydropower. Between 2005 and 2008, net generation by conventional hydropower decreased by 88%, from 4,032,000 MWh to 2,145,00 MWh.[70] The drought has also brought to the forefront a debate as to whether utilities should use the state's limited water resources for power generation or for water consumption by residents, businesses and industry.

Hydroelectric facilities have a low cost of operation compared to other generation facilities. Construction of new facilities, however, would prove challenging. Dams and their associated bodies of water can encompass tens of thousands of acres; this magnitude of undeveloped acreage would be difficult to find and expensive to purchase. In addition, damming a river and flooding land for a reservoir would require extensive environmental permits, and potentially displace homes and businesses.

Biomass

Georgia's most promising source of renewable energy is renewable wood biomass. The state has 24 million acres of timberland, providing a local, cost-effective, and reliable source of energy. Although biomass is a renewable source of fuel, there are some environmental objections to its use. Some argue that biomass releases about the same amount of carbon dioxide as the burning of an equivalent volume of fossil fuels. Also, there have been objections to

[69] Georgia Power Presentation to State Energy Assurance Stakeholders. Fall 2010.
[70] "Summary Renewable Electric Power Industry Statistics (2008)." U.S. Energy Information Administration, State Renewable Electricity Profiles 2008. http://www.eia.gov/cneaf/solar.renewables/page/state_profiles/georgia.pdf

the massive harvesting of trees that would be required to support woody biomass operations. Others counter that biomass is ultimately carbon neutral, and if the wood is not being utilized as biomass, it would otherwise be discarded and rot, wasting its potential for energy generation.

Wind

Wind power has also been a consideration as a renewable energy source for the state. The major challenge of harnessing wind power is that even in particularly windy areas, winds are variable over a 24 hour period. During low winds, there must be a back-up source of power for energy assurance. For this reason, existing technology best supports using wind power for intermediate and peak loads, rather than baseload, generation. In this scenario, wind power could be utilized to reduce the net load on traditional generators. There is also a challenge in integrating wind power with the electric grid, however, low natural gas prices may allow utility-scale wind farms to be built alongside natural gas generators which can quickly be ramped up and down as needed.

Research by the National Renewables Energy Laboratory shows that there is relatively low wind potential across Georgia compared to the remainder of the United States. There is moderate offshore wind potential, however. Georgia has jurisdiction over coastal waters to a distance of three nautical miles from the shoreline. Federal waters extend from this point to two-hundred miles outward, referred to as the economic exclusive boundary. In the offshore areas of South Carolina, Georgia and Florida, referred to as the "South Atlantic Bight," the continental shelf widens, forming a large area of shallow water farther from the shore. This effectively produces offshore wind at lower speeds than the north Atlantic coast. The mild climate and shallow waters, however, act as a moderating force for weather activity in the area, sheltering the southeast coast from hurricanes and tropical storms. This would help mitigate the impact of tropical storms on wind turbines in this area. Figure 11 shows offshore wind potential in "installed capacity" (MW).

Figure 11. Georgia Offshore Wind Potential

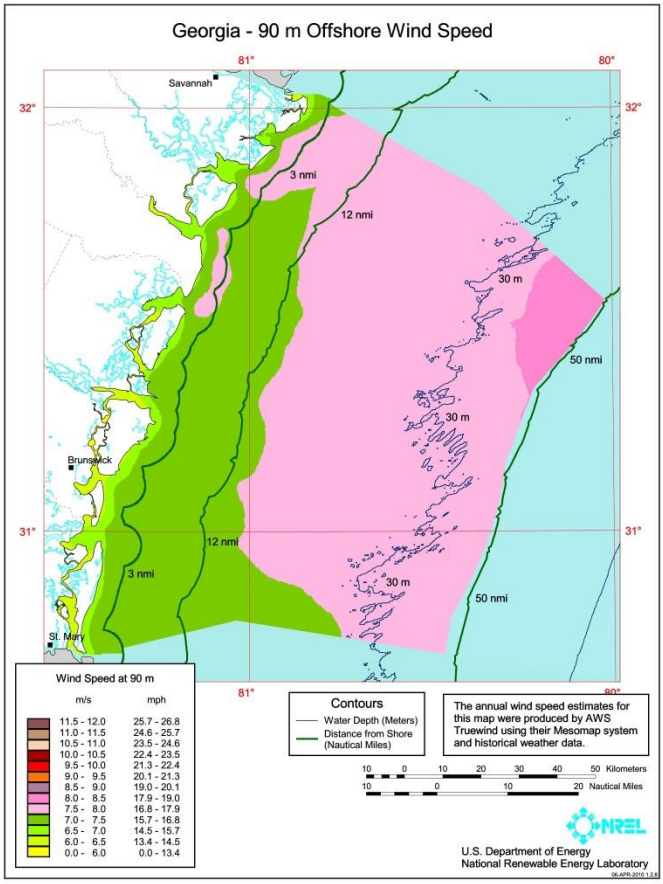


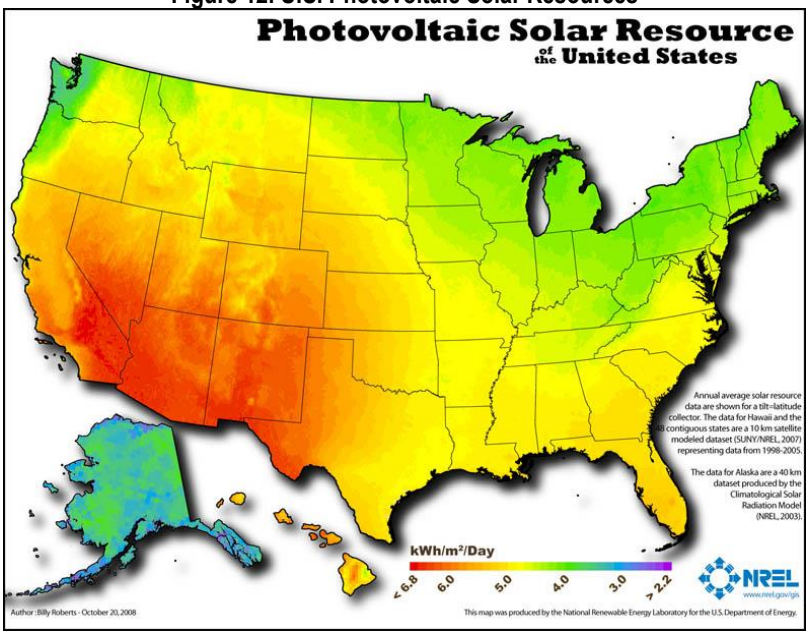
Figure 11 shows that within 50 nautical miles of the coast, there are approximately 60.4 GW of estimated wind potential; however, much of this area cannot be developed due to environmental sensitivities or other competing uses. The winds are stronger in federal waters, at a distance of 30 to 100 kilometers from the coast, giving offshore wind generation greater potential in this area. The approval and installation of offshore wind generation facilities would require permissions from and coordination among multiple state, federal, and local agencies.

The Southern Company, with the assistance of the Georgia Institute of Technology's Strategic Energy Institute, initiated the Southern Wind Project. An initial study assessed the viability of wind generation off the Georgia coast, with three to five turbines with a generation capacity of 10 MW, or enough to power 2,500 homes. The study concluded that wind turbine installation is most viable at least five miles offshore, where winds are a sustained 16 to 17 miles per hour. At this distance from the shore, however, there is greater risk of hurricane or tropical storm damage, and the cost to transmit power to shore becomes cost prohibitive. Southern Company has committed to continue the study, and has applied for permits to place meteorological towers off the coast near Savannah and Tybee Island to collect further wind data.

Solar Power

According to the NREL, Georgia possesses an average of 5 peak solar hours per day. While the western US has a greater number of hours due to less cloud cover, typically, and lower annual rainfall, Georgia still ranks 10th among states for solar power potential.

Figure 12. U.S. Photovoltaic Solar Resources



In October 2010, the Georgia PSC approved Georgia Power's request for a new tariff that would almost double the amount of solar energy the company purchases through the Green Energy Program. An additional 1.5 MW of solar capacity will be available for purchase from customers at 17 cents per kWh, for generating facilities designed to produce under 100 kW. Georgia Power also plans to request proposals for an additional 1 MW of solar capacity with a price of 15 cents per kWh or less. Under the Green Energy Program, Georgia Power customers may purchase 100-kWh blocks of renewable energy with a 50 percent solar component.[71] Additionally, at the request of the PSC, Georgia Power is in the process of procuring another 50 MW of solar at avoided cost.

Southern Company has initiated two solar photovoltaic demonstration projects at the headquarters of Georgia Power and Alabama Power. At these sites, the performance and reliability of different photovoltaic technologies will be monitored and assessed. These demonstration projects will help the company assess the viability of different photovoltaic technologies for potential future use.

[71] "Georgia Power to Expand Solar Energy Capacity." Transmission & Distribution World. October 6, 2010.

Smart Grid and Cybersecurity

Smart Grid and Cybersecurity

This portion of the *Georgia Energy Assurance Plan* discusses the advent of the smart grid and its implications for energy assurance and cybersecurity. While smart grid technologies have enormous potential to enhance energy assurance, it also enhances vulnerabilities of existing threats to cybersecurity. The following sections provide an overview of the smart grid and smart grid applications in Georgia, as well as developments in cybersecurity policy across the nation and within Georgia.

Smart Grid

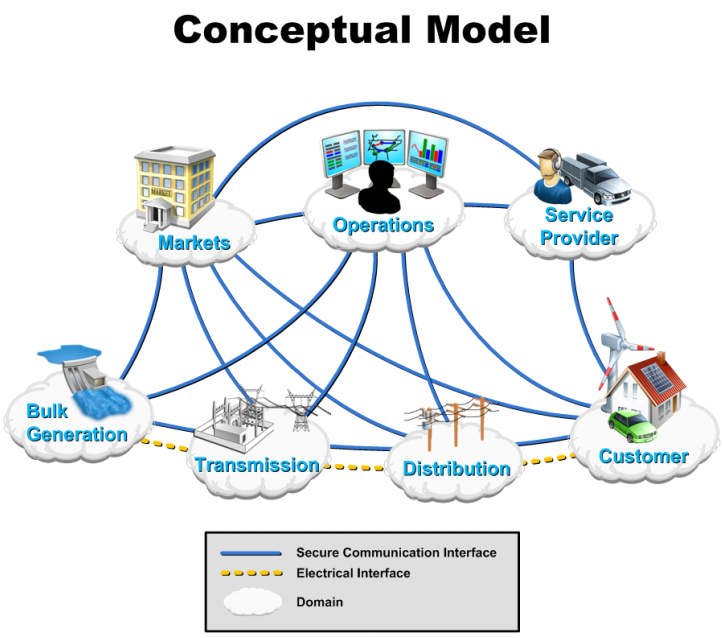
The "smart grid" refers to the modernization of electricity infrastructure to maintain a reliable and secure system that can meet the demands of future demand. The concept of the smart grid is characterized by a two-way flow of electricity and data to create an automated, widely-distributed electricity network. The smart grid will also involve the interconnection of many elements of the power grid, including the high, medium, and low voltage networks; transmission lines; energy storage; meters; and consumer-level controls and devices. The smart grid, which will evolve over several years, will eventually collect and analyze user data to deliver real-time information, thereby instantly matching electricity demand with available supply from a variety of sources.

The smart grid has enormous potential for enhancing energy assurance. Among the benefits of the Smart Grid are enhanced power reliability and quality through the use of automated controls, thereby reducing the frequency of outages; greater security of the system, due to continual monitoring to detect vulnerabilities; greater energy efficiency, reducing energy losses on transmission and distribution systems; emissions reduction, facilitated by the integration of alternative, cleaner fuel sources on the grid; and financial benefits for customers, who will have the ability to access usage information and make consumption choices based on known costs.[72]

Figure 13 shows a conceptual model of the smart grid. This model consists of seven different domains, each of which has unique technological applications.[73]

[72] Smart Grid and Cyber Security for Energy Assurance. National Association of State Energy Officials. December 2010.
[73] Report to NIST on the Smart Grid Interoperability Standards Roadmap. *(Contract No. SB1341-09-CN-0031—Deliverable 10), Post Comment Period Version Document,* Palo Alto, CA: June 17, 2009. Electric Power Research Institute.

Figure 13. Conceptual Model of the Smart Grid



State Smart Grid Guidance

The Georgia Public Service Commission (Georgia PSC) received the State Electricity Regulatory Assistance Grant for the Smart Grid. This grant is designed to help the Georgia PSC better manage dockets and other regulatory actions, including but not limited to, the utilities' use of the Smart Grid Investment Grants.

Smart Grid Activities in Georgia

Southern Company

Southern Company, parent of Georgia Power, considers deployment of smart grid technologies as an investment in reliability. The utility uses supervisory control and data acquisition systems, or SCADA systems, in over 90% of substations across its service territory. There are also numerous intelligent electronic devices (IEDs) embedded throughout Southern Company's infrastructure. These microprocessors control the operations of a variety of equipment, such as transformers and circuit breakers. Transmission and distribution operations are also controlled by features such as SCADA-controlled line devices and automated fault isolation and restoration schemes. In addition, Southern Company employs remote fault, harmonic, and waveform data retrieval. For several years, Georgia Power has made real-time pricing available to large customers (primarily, commercial, industrial and institutional).

Georgia Power has committed approximately $102 million dollars to investments in smart grid technology. The program is funded through the Southern Company's receipt of a Smart Grid Investment Grant, as well as matching funds from Georgia Power. Some of these projects represent enhancements of smart grid technology already in place. Table 7 summarizes Georgia Power's planned smart grid projects.

Table 7. Georgia Power Smart Grid Projects

Project Category	Investment ($ millions)
Distributed Energy Efficiency Program (DEEP)	$35
SCADA/IDMS/Fault Locating	$17
Distribution Automation	$24
Transmission Line Automation	$3
Smart Substations	$21
Total	**$102**

Source: Georgia Power Company

The distributed energy efficiency program aims to reduce energy loss at the distribution system. Georgia Power is participating in the EPRI Green Circuits initiative, a pilot project to analyze energy savings as a result of enhancements to distribution technology. In addition, the Company has already begun monitoring capacitors remotely. Georgia Power is also developing power flow optimization systems to observe load flow in real-time. The utility has achieved a 250 MW expansion of its Conservation Voltage Reduction program. Under this program, voltage is lowered to the minimum level required to maintain a reliable level of service. By effectively lowering demand, Southern Company avoids paying higher costs for electricity on the spot market or having to build new generation to meet the higher demand.

The Integrated Distribution Management System (IDMS) optimizes system performance by integrating distribution functions into a single interface, maximizing capital efficiencies and enhancing succession planning. IDMS protects the validation of schemes; enhances visualization of data; automates switch management; provides for contingency analyses; and allows for automated fault location. A major part of this effort involves the deployment of advanced metering infrastructure (AMI). AMI, or smart meters, allow for two-way communication between customers and the utility. The meters will communicate outage information with the SCADA system in real-time, reducing customer call volumes and helping crews to address outages more efficiently and in a timelier manner. Georgia Power anticipates that in the future, the smart meters will allow for more customers to utilize time-of-use and demand-response pricing.

Distribution automation consists of investment in smart distribution system technology to isolate and quickly repair anomalies that could shut power off to the entire network. Remote fault indicators allow Georgia Power to have instant information regarding faults on the electric system, reducing the need for manual fault tracking. SCADA towers will allow communications to directly integrate with Georgia Power's SCADA system. A self-healing network refers to the ability of the power system to employ smart technologies to anticipate, detect, and respond to anomalies to prevent or reduce the effect of disruptions to service. Smart reclosers are used in lieu of the conventional practice of manually closing switches in distribution operations.

Georgia Power plans to automate the transmission system by deploying a series of automated switches for 115kV and 46 kV transmission lines. These switches can detect and isolate faults along the transmission lines, reducing the magnitude of potential outages.

Substations upgrades will allow for enhanced equipment monitoring to improve maintenance or reduce equipment failures. Specific upgrades to make substations "smarter" include transformer, bushing, and battery monitors, as well as relay modernization.[74]

[74] Georgia Power Presentation to State Energy Assurance Stakeholders. Fall 2010.

Georgia Systems Operation Corporation

Georgia Systems Operation Corporation has received approximately $6.5 million in ARRA funding to allow for instantaneous and automatic communication regarding disruptions or changes in flow on the grid, and for digital controls to manage and modify electricity demand. [75]

Cobb Electric Membership Corporation

Cobb Electric Membership Corporation (Cobb EMC), headquartered in Marietta, Georgia, has received $20 million in ARRA funding for smart grid investments. Cobb EMC plans to deploy smart meters for its entire customer base, totaling approximately 90,000 smart meters. In addition, the utility will invest in enhanced communication infrastructure and load control switches, using state-of-the-art interoperable systems, servers, and data management technologies.[76]

Tri State Electric Membership Corporation

Tri State Electric Membership Corporation, based in Blue Ridge, Georgia, received approximately $1.1 million in ARRA funding to deploy over 15,000 smart meters, allowing consumers to take advantage of dynamic pricing options. In addition, the EMC plans to expand line monitoring for improved outage detection. [77]

Municipal Electric Authority of Georgia

The Municipal Electric Authority of Georgia received approximately $12.2 million in ARRA funding to install information technology and smart grid technologies on substations, routers, and network terminal units. These upgrades are expected to reduce peak demand and system maintenance costs. [78]

[75] "Georgia Systems Operation Corporation Smart Grid Project." SmartGrid.gov http://www.smartgrid.gov/project/georgia-system-operations-corporation-inc-smart-grid-project Accessed January 4, 2011.
[76] "Cobb Electric Membership Corporation Smart Grid Project." SmartGrid.gov http://www.smartgrid.gov/project/cobb-electric-membership-corporation-smart-grid-project Accessed January 4, 2011.
[77] "Tri State Electric Membership Corporation Smart Grid Project." SmartGrid.gov http://www.smartgrid.gov/project/tri-state-electric-membership-corporation-smart-grid-project Accessed January 4, 2011.
[78] "Municipal Electric Authority of Georgia Smart Grid Project." SmartGrid.gov http://www.smartgrid.gov/project/municipal-electric-authority-georgia-smart-grid-project Accessed January 4, 2011.

Cybersecurity

As energy systems become more technologically advanced, so do the efforts of those seeking to deliberately attack energy infrastructure and facilities. Traditionally, most people associate terrorism with explosive devices; while the threat of such attacks remains, terrorism has become more subtle and technologically advanced over the past several years. "Cybersecurity" has become a major issue for energy providers and for the state. The smart grid adds an additional layer of vulnerability to energy systems. As energy operations become increasingly reliant on automated functions and advanced communications, there is greater vulnerability to cyber-attacks.

Current Standards

Electricity and the Smart Grid

On the national level, the National Electric Reliability Corporation (NERC) and the Federal Energy Regulatory Commission (FERC) are involved in cybersecurity guidance and policies. Within NERC's *Critical Infrastructure Protection Standards*, the "Critical Cyber Asset Identification" section outlines the need to identify and document "Critical Cyber Assets" associated with the "Critical Assets" that support the reliable operation of the bulk electric system. The U.S. Energy Independence and Security Act of 2007 (EISA 2007) defines the Federal Energy Regulatory Commission's (FERC) role in the smart grid as follows:

"At any time after the Institute's work has led to sufficient consensus in the Commission's judgment, the Commission shall institute a rulemaking proceeding to adopt such standards and protocols as may be necessary to insure smart-grid functionality and interoperability in interstate transmission of electric power, and regional and wholesale electricity markets."[79]

Pipeline Network

EISA 2007 appoints the National Institute for Standards and Technology (NIST) to coordinate the development of protocols and standards to address interoperability of smart grid components. NIST is undertaking this task through the Smart Grid Interoperability Standards Project (SGIP). Through this project, NIST aims to facilitate the integration of a variety of smart grid components; two-way communication among integrated smart grid elements; and effective cooperation among the public and private sectors. NIST has formed a number of forums and working groups to facilitate the collaborative process. These groups include governing boards, standing committees, working groups, priority action plan teams, and domain expert working groups. To date, NIST's Smart Grid project has accomplished the following:

- Launched a consensus-based organization to coordinate the development of standards (Smart Grid Interoperability Panel, established November 2009)
- Created a collaborative ("wiki") web site for the exchange of information among SGIP members and other technical experts (NIST Smart Grid Collaboration Site, launched November 2009)
- Developed and published a framework and roadmap to guide the development of interoperable standards (*NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0*, published January 2010)
- Organized and hosted, in cooperation with the White House Office of Science and Technology Policy, an online forum to gather public input on questions pertaining to the consumer interface to the evolving Smart

[79] Ray Palmer Smart Grid Update to FERC A-3: (Docket No. AD10-15-000) July 15, 2010

Grid, including issues surrounding data ownership, access, and privacy. (Consumer Interface Forum, launched February 2010)
- Developed and published guidelines for Smart Grid cyber security (*Guidelines for Smart Grid Cyber Security, NISTIR 7628*, published August 2010)
- Established the Smart Grid Advisory Committee to advise NIST Director Patrick Gallagher on the direction of NIST's Smart Grid-related programs and activities (convened September 2010)
- Identified five foundational sets of standards for Smart Grid interoperability as ready for consideration by federal and state regulators (Letter to Federal Energy Regulatory Commission, sent October 2010)

Next steps include developing plug-in electric vehicle standards, releasing version 2.0 of the Interoperability Framework, and publishing the Framework for Testing and Certification.[80]

Standards in Development

The Advanced Security Acceleration Project for the Smart Grid (ASAP-SG) is a public-private collaboration among the Department of Energy, Electric Power Research Institute, and several leading North American utility companies. ASAP-SG's goal is to develop standardized security requirements for the Smart Grid; these are being captured in the framework of three unique security profiles. The *Security Profile for Advanced Metering Infrastructure ("AMI Security Profile")* provides guidance on how to implement security on meter data management systems. This profile has been ratified by the UCA International Users Group, a not-for-profit organization that promotes interoperability and integration of utilities through standard-based technology. The S*ecurity Profile for Third Party Data Access ("3PDA Security Profile")* has also been ratified. This profile outlines the security requirements for utilities, vendors, and individuals regarding the ownership and handling of sensitive data. The final profile, *Security Profile for Distribution Management ("DM Security Profile")* addresses automated distribution management functionality. This profile is in the review process for ratification.

The National Electric Sector Cyber Security Organization (NESCO) and National Electric Sector Cyber Security Organization Resources (NESCOR) are also collaborating to improve cyber security practices and policies in the electric sector. The specific role of NESCO is to work with federal agencies to identity best cybersecurity practices, improve cybersecurity in the electric sector, and develop a tool to disseminate threat and vulnerability information. NESCOR will assist NESCO in collecting best practices in cybersecurity, examining requirements and standards from NIST, Department of Homeland Security, NERC, and the Utility Communications Architecture (UCA). It will also develop cybersecurity testing methodologies and facilitate testing at Electric Power Research Institute (EPRI) labs and other sites. In addition, NESCOR will help NESCO identify mitigation strategies to address vulnerabilities.[81]

State's Role in Cybersecurity

The Georgia Information Sharing and Analysis Center (GISAC), which is housed within GEMA, is working with the Georgia Technology Authority (GTA) to establish a cyber-fusion center. The center, which will be managed by GTA, will monitor network activity on Georgia's network backbone, analyzing for suspicious activity and reporting out to appropriate state and federal partners. The cyber fusion center will also produce threat assessments, alert bulletins, and statistical reports based on its monitoring activities. Reports to local agencies and law enforcement authorities will be routed through GISAC. The cyber fusion center will have access to the resources of the United States

[80] NIST and the Smart Grid. http://www.nist.gov/smartgrid/nistandsmartgrid.cfm Accessed December 7, 2010.
[81] Recover Act Selections for Smart Grid Investment Grant Awards – by State." http://www.energy.gov/recovery/smartgrid_maps/SGIGSelections_State.pdf Accessed December 9, 2010.

Computer Emergency Readiness Team (US-CERT), the Multi-State Information Sharing and Analysis Center (MISAC), and the State Information Security Officers (ISOs).

Recipients of the Smart Grid Investment Grants are required to address how cybersecurity will be addressed in their projects, including equipment used and applying cybersecurity procedures and practices. As referenced previously, in Georgia, these recipients include Georgia Power, Cobb EMC, Municipal Electric Authority of Georgia, and Tri-State EMC.

Critical Infrastructure and Key Resources for Energy

Critical Infrastructure and Key Resources for Energy

This portion of the *Georgia Energy Assurance Plan* addresses key energy systems and networks that are within or are connected to the state. These assets are critical for the provision of electricity, natural gas, and petroleum for Georgia. The Department of Homeland Security's *Strategy for the Physical Protection of Critical Infrastructure and Key Assets* mandates that states develop a program to identify critical infrastructure, assess risk, prioritize key assets, implement protective programs, and gauge the effectiveness of risk reduction strategies. To address this mandate, the Georgia Vulnerability Working Group (GVWG) has developed the *Georgia Critical Infrastructure Protection Strategy*.

Within the Protection Strategy, the Georgia Critical Infrastructure Protection Policy commits the state of Georgia to enhancing the protection of our state's critical infrastructure and key resources from acts of terror that could:

1) Cause catastrophic health effects or mass casualties comparable to those from the use of a weapon of mass effect.
2) Undermine or impair state and local governments' ability to maintain order, perform essential missions, or ensure public safety.
3) Damage the private sector's ability to ensure the orderly functioning of the economy and delivery of essential services.
4) Have a negative impact on the economy through the cascading disruption of other critical infrastructure and key resources.
5) Undermine public morale and confidence in our state's economic and political institutions.

The guiding principles of the policy are to:

1) Ensure public health, safety, and confidence as well as the delivery of essential services.
2) Establish responsibility and accountability for critical infrastructure protection.
3) Encourage partnerships among all levels of government, industry, and private citizens.
4) Facilitate meaningful information sharing among all partners both public and private.
5) Protect sensitive information from public disclosure.

In the energy sector, the following resources are considered as critical infrastructure and key assets for Georgia.

Electricity

a. All power plants
b. Power plants and their associated substations that provide significant transmission capacity or distribution service to high priority critical infrastructure and key resources

Oil and Natural Gas

a. Petroleum Terminals with capacity greater than 1 million barrels
b. Petroleum Storage sites with capacity greater than 500,000 barrels
c. All Liquefied Petroleum Gas (LPG) Terminals
d. Sites that provide electricity to businesses and consumers in such quantities that the remaining suppliers cannot make up any significant lost volume

Pipeline

a. Natural gas pipeline compression stations that serve Urban Area Security Initiative (UASI) jurisdictions
b. Gasoline, diesel fuel, and aviation fuel pipelines that serve commercial airports, mass transit depots, governmental motor pools, and significant transportation and infrastructure sites

Dams

a. Dams, navigation locks, levees, and flood control systems that provide water supply, power generation, navigable waterways, and/or flood protection; and whose partial or total failure could potentially cause significant loss of lives, economic impact exceeding $1 Billion, population at risk over 10,000 people (seasonal or permanent), or significant impact over multiple sectors in terms of damage or disruption of service

Nuclear Power

b. All nuclear power plants

Georgia has employed the Automated Critical Asset Management System (ACAMS), a product of the Department of Homeland Security, to develop a database of critical assets; assess and prioritize vulnerabilities; implement a reporting scheme to provide information on the threat environment and address local, state, and national-level concerns; generate buffer zone protection plans; produce pre-incident operational plans for local police and first responders; make CIKR data readily available for responders in the field; and integrate GIS into data collection and analysis.[82]

NERC also has several Critical Infrastructure Protection (CIP) standards for electric utilities. These standards address sabotage reporting, incident reporting and response planning, critical cyber asset identification and security, security management controls, personnel and training, electronic security perimeters, and recovery plans for critical cyber assets.[83]

Georgia is actively engaged in the protection of its critical infrastructure and key resources and demonstrates this commitment through the GVWG, ACAMS, and relationships with energy service providers, the federal government, and other organizations involved in the protection of critical infrastructure.

[82] A Strategy for Protecting Georgia's Critical Infrastructure. Critical Infrastructure Protection Unit, Terrorism Emergency Response and Preparedness Division, Georgia Emergency Management Agency/Homeland Security. February 2010.
[83] "Reliability Standards." North American Electric Reliability Corporation. http://www.nerc.com/page.php?cid=2%7C20 Accessed December 20, 2010.

Conclusion

Conclusion

Georgia's energy markets, regulatory structure, and threat environment are unique from any other state in the country. This plan represents Georgia's most thorough effort to date to prepare for a significant energy emergency. The energy assurance plan thoroughly discusses Georgia's energy statistics, energy markets, interdependencies, regulatory structure, threat environment, and mitigation and response tools. Additionally, the plan highlights the role of renewables, smart grid, and cybersecurity in providing energy reliability to citizens and businesses across the state. The plan should be considered the best single source of information for state officials during any energy emergency. Thanks to the all-hazards planning approach, the Energy Assurance Plan is designed to support efforts during any type of energy emergency, whether natural or man-made.

Thanks to funding provided by the ARRA, Georgia now has a thorough and exercised Energy Assurance Plan, an advanced GIS analysis and tracking tool, and a more engaged and knowledgeable ESF 12 team. While the energy assurance grant funding concludes in 2012, Georgia's energy picture, regulatory environment, and threat environment don't cease to adapt and change. Therefore, it is important to note that certain aspects of this plan may not be applicable at all times. It is the intent of GEFA to update this plan periodically as needed and to keep stakeholders aware of any changes. Thus, this plan should be considered a living document.

Please direct any future comments or concerns to the Energy Resources Division of GEFA. The Energy Resources Division can be reached at 404-584-1000.