2009 State Energy Strategy Update

Georgia Environmental Facilities Authority
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Over the past 30 years, Georgia experienced tremendous growth in population, economic activity, and energy demand. Georgia's energy sector has been an important factor in the state's prosperity and our ability to provide safe and reliable energy must be sustained to support our high quality of life. However, the hurricanes of 2005 and 2008 highlighted our dependence on out-of-state, fossil fuel energy resources and our need to ensure Georgia's energy supply. In early 2006, I directed the Georgia Environmental Facilities Authority (GEFA) to develop a state energy strategy for Georgia. Since its release in December 2006, the ***State Energy Strategy*** has provided an energy roadmap with options that balance economic growth and environmental concerns.

The recent energy price increases and volatility underscore the importance of an energy plan for the state and the interconnection between energy, the economy, and our natural resources. Georgia's abundant natural resources and thriving economy contribute to the state's high quality of life and each one of us has a valuable role to play in ensuring that they continue to do so.

One of the ways the state can help is by leading by example. That's why I've charged all state agencies to reduce energy consumption per square foot in state facilities 15 percent below FY2007 levels by 2020. To further ensure that our state's natural resources are protected for future generations to use and to enjoy, I also challenge Georgia's citizens, businesses, and local governments to match the state's effort. Meeting this goal will reduce our dependence on traditional energy sources, support the local economy, and improve the environment. Georgia has made great strides in other policies set forth by the ***State Energy Strategy*** such as the clean energy property tax credit, our one stop shop for renewable and bioenergy-related businesses, various energy-related public-private partnerships and initiatives, and numerous other activities and programs.

How we respond today to the challenges meeting our state will shape the Georgia of tomorrow. The management of our resources, both short-term and long-term, is vital to the lives of all our state's citizens.

Sincerely,

Sonny Perdue

Governor Sonny Perdue

The 2009 *State Energy Strategy* Update

contains a state energy profile, an inventory of the actions Georgia has taken to implement the ***State Energy Strategy,*** and an updated list of recommended next steps. Since the Governor's Energy Policy Council presented the ***State Energy Strategy*** to Governor Perdue in December 2006, the state has made much progress in implementing its policies and strategies. For example, the *Governor's Energy Challenge* is a realization of one of the commitments made in the ***State Energy Strategy.*** The Governor's commitment to reduce energy consumption in state facilities by 15 percent by 2020 will save the state more than 1.6 trillion Btus of energy by 2020 (which is the equivalent of powering approximately 34,000 Georgia households for a year) and save state taxpayers more than $12 million annually.

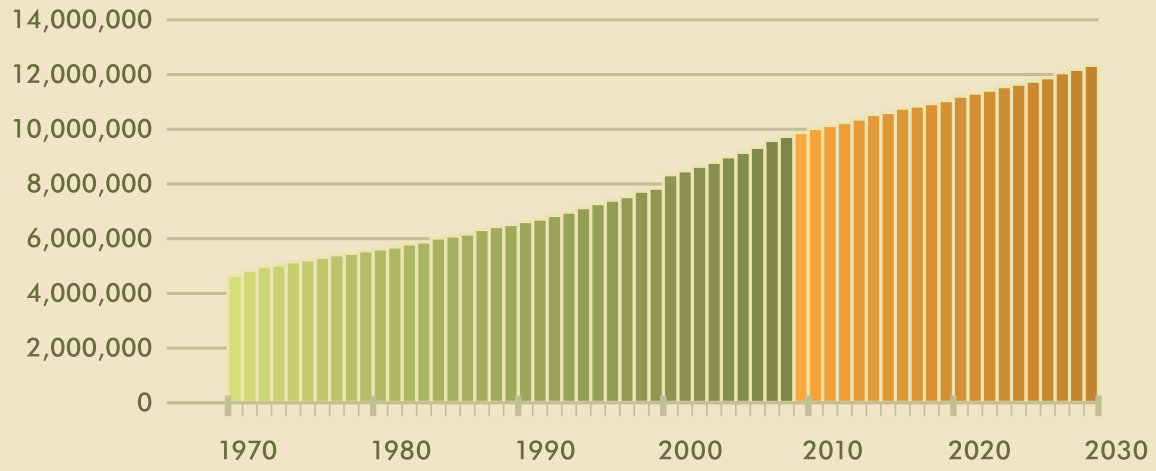
Georgia is planning ahead and taking the necessary steps to balance today's needs with tomorrow's obligations by fostering the wise use and conservation of our state's natural resources. While the state is making great progress in energy conservation, government alone is not the answer. If every home in Georgia replaced one incandescent light bulb with an ENERGY STAR qualified CFL, it would save enough energy to light more than 67,300 homes for a year. As citizens of Georgia, it is our actions - the many individual and seemingly unrelated steps - that lead to a big impact rather than one "silver bullet."

Georgia's access to affordable and reliable energy is an important factor in the state's prosperity and economic development. Planning for our future energy needs today supports Georgia's high quality of life and environmental integrity for tomorrow.

Georgia is one of the fastest growing states in the nation and the ninth most populous state, with slightly more than three percent of the nation's population. From 1970 to 2007, Georgia's population increased 108 percent, climbing from 4,587,930 to 9,544,750. As shown by the graph below, the U.S. Census Bureau projects that Georgia's population will grow to ten million by 2015 and to 12 million by 2030.

Given the state's tremendous growth, we must prepare now to meet Georgia's future energy needs. The state's total energy consumption expanded 63 percent from 1985 to 2005 (the most recent year for which all state-level energy data is available), from approximately 1,944,646 billion British thermal units (Btus) in 1985 to 3,172,990 billion Btus in 2005.[1,2]

Georgia Population, 1970 to 2007 and Population Projections, 2008 to 2030

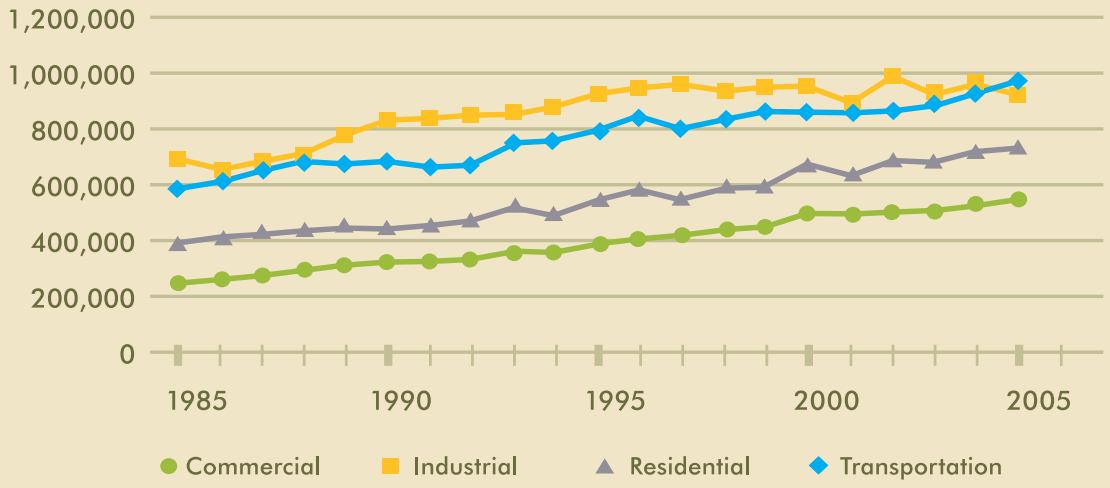


Data Source: U.S. Census Bureau

[1] Whenever possible, we have attempted to use the most recent data available. For comparison across fuels and sectors, 2005 data, the most recent year for all state-level data, is used. Data that is more recent is frequently used in the individual fuel and sector sections.

[2] Throughout the document, when comparing different fuels, British thermal units (Btu) will be used as the common unit of measurement. However, whenever possible, the most recognized unit of measurement is used for individual fuels, i.e. cubic feet for natural gas, gallons for petroleum, etc.

Georgia Total Energy Consumption by Sector, 1985 to 2005 (Billion Btus)



Data Source: Energy Information Administration

In 2005, the transportation sector was the largest energy consumer in the state, consuming more than 969,074 billion Btus, followed by the industrial sector (925,184 billion Btus), the residential sector (726,988 billion Btus), and the commercial sector (551,745 billion Btus).[3] It is especially notable that the transportation sector was the largest energy-consuming sector, making 2005 the first year that the industrial sector did not rank first in energy consumption. From 2000 to 2005, the industrial sector's energy consumption actually decreased by three percent. This small decline from 2000 to 2005 is mostly a result of efficiency improvements and structural changes in the U.S. economy.

[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. In 2005, Georgia's electric power sector consumed more than 1,303,638 billion Btus of primary energy in order to provide 451,290 billion Btus of electricity for sale. More than 991,235 billion Btus of energy (76 percent of the total energy consumed by the electric power sector) were used for the generation and delivery of electricity to the point of use (the end user). This loss during generation and transmission is referred to as "electrical system losses."

Exploration of the Outer Continental Shelf

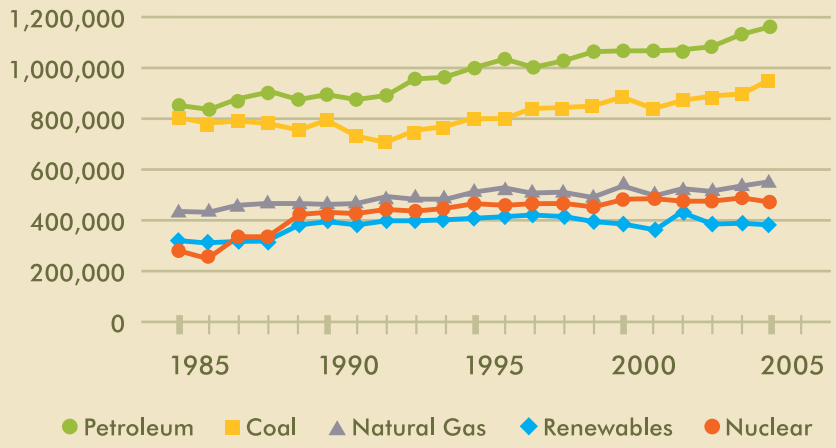
To increase the supply of fossil fuels, including oil and natural gas, Georgia supports prudent exploration and drilling on the Outer Continental Shelf (OCS). The U.S. Department of Interior's Minerals Management Service (MMS) estimates technically recoverable resources currently off-limits in the lower 48 OCS total approximately 17.84 billion barrels of crude oil and 76.47 trillion cubic feet of natural gas. In 2007, the U.S. consumed 7.5 billion barrels of crude oil and petroleum products and 23 trillion cubic feet of natural gas. Using these figures, if the U.S. relied solely on the OCS for oil and natural gas, the OCS would provide the U.S. with slightly more than a two-year supply of oil and approximately a three-year supply of natural gas. The largest estimate for the oil and natural gas in the OCS is 59 billion barrels of oil and 288 trillion cubic feet of natural gas. Again, using 2007 U.S. total petroleum and natural gas consumption, the OCS would provide an estimated seven-year supply of oil and a nine-year supply of natural gas.

There has been no development or production of OCS gas along the U.S. East Coast and currently no active leases remain. Forty-six exploratory wells and five stratigraphic test wells drilled in the Atlantic OCS between 1978 and 1984 yielded no commercial finds. Natural gas was discovered during drilling in the mid-Atlantic, but it was not economically viable at the time. No exploratory wells have been drilled anywhere on the Atlantic OCS since 1984. Since this time, there have been advances in exploration and production technologies and a myriad of new drilling methods have been introduced. Recently, off the coast of Canada, some major gas fields have been discovered and developed. The same gas play(s) may extend south into the North Atlantic and other Atlantic planning areas.

Petroleum

In 2007, Georgia used 7,198,858,500 gallons of petroleum products (which is equivalent to 10,903 Olympic-sized swimming pools), including 4,739,452,000 gallons of motor gasoline (equivalent to 7,178 Olympic-sized swimming pools).[4] All of the state's petroleum products are imported because Georgia does not have any petroleum resources.[5] Georgia receives petroleum products via ports in Savannah and Brunswick and through the Colonial and Plantation pipelines, which run northeast through the state from Texas and Louisiana. The Dixie pipeline, also originating in the Gulf Coast region, supplies the state's propane needs.[6]

Georgia Total Energy Consumption by Fuel, 1985 to 2005 (Billion Btus)



Data Source: Energy Information Administration

[4] Assuming that an Olympic-sized swimming pool holds approximately 660,253 gallons of water.

[5] 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.

[6] Georgia's total petroleum products consumption is equivalent to 919,397,071 million Btus, 592,770,032 million Btus of which is motor gasoline.

Natural Gas

Natural gas is the third most used fuel in Georgia. Georgians consumed 419,908 million cubic feet (MMcf) of natural gas in 2006, mainly for heating, cooking, and water heating.[7] Nearly one-half (46 percent) of all Georgia households use natural gas as their main energy source for home heating. The residential and industrial sectors are Georgia's largest consumers of natural gas.[8] However, in 2006, 23 percent of the natural gas consumed in the state was used by the electric power sector to generate electricity (95,407 MMcf). Georgia produces no natural gas and has no proven reserves of natural gas; consequently, Georgia relies on imports to meet all of its natural gas demands. Georgia is one of 20+ states in the U.S. that are dependent on the interstate pipeline network for their natural gas supply.

Georgia is home to the Elba Island Terminal, which is one of five operational liquefied natural gas (LNG) terminals in the United States.

The Elba Island Terminal receives and stores shipments of LNG, the majority of which originate in Trinidad and Tobago (104 billion cubic feet [Bcf], 71 percent of total international imports in 2006). The Elba Island Terminal is owned by El Paso Corporation and is the smallest of the conterminous U.S. terminals. However, in 2006, the terminal imported the second largest amount of LNG out of the five current operating terminals. In 2006, 147 Bcf of liquefied natural gas was imported into Georgia via the Elba Island Terminal. The terminal has a total storage capacity of 7.3 Bcf and a total peak send-out capacity of more than 1.2 Bcf per day. Currently, Southern LNG and El Paso are planning a $1.1 billion expansion to increase the terminal's total storage capacity to 12 Bcf by 2012. After the expansion, Elba's total peak send-out capacity will be 2.1 Bcf per day and its current baseload capacity of 161 Bcf per year will be expanded to 292 Bcf per year.

[7] Which is equivalent to 432,925 billion Btus of natural gas.

[8] In 2006, Georgia's residential natural gas consumption was 110,245 MMcf, the industrial sector consumed 159,024 MMcf, the electric power sector consumed 95,407 MMcf, the commercial sector consumed 48,137 MMcf, pipeline and distribution consumed 6,092 MMcf, and vehicle fuel consumed 1,003 MMcf of natural gas.

[9] The municipal utilities were exempted from the legislation.

[10] United Cities Gas (now Atmos Energy) did not "elect" to open its territory and continues to operate as an investor-owned local distribution company, fully regulated by the PSC.

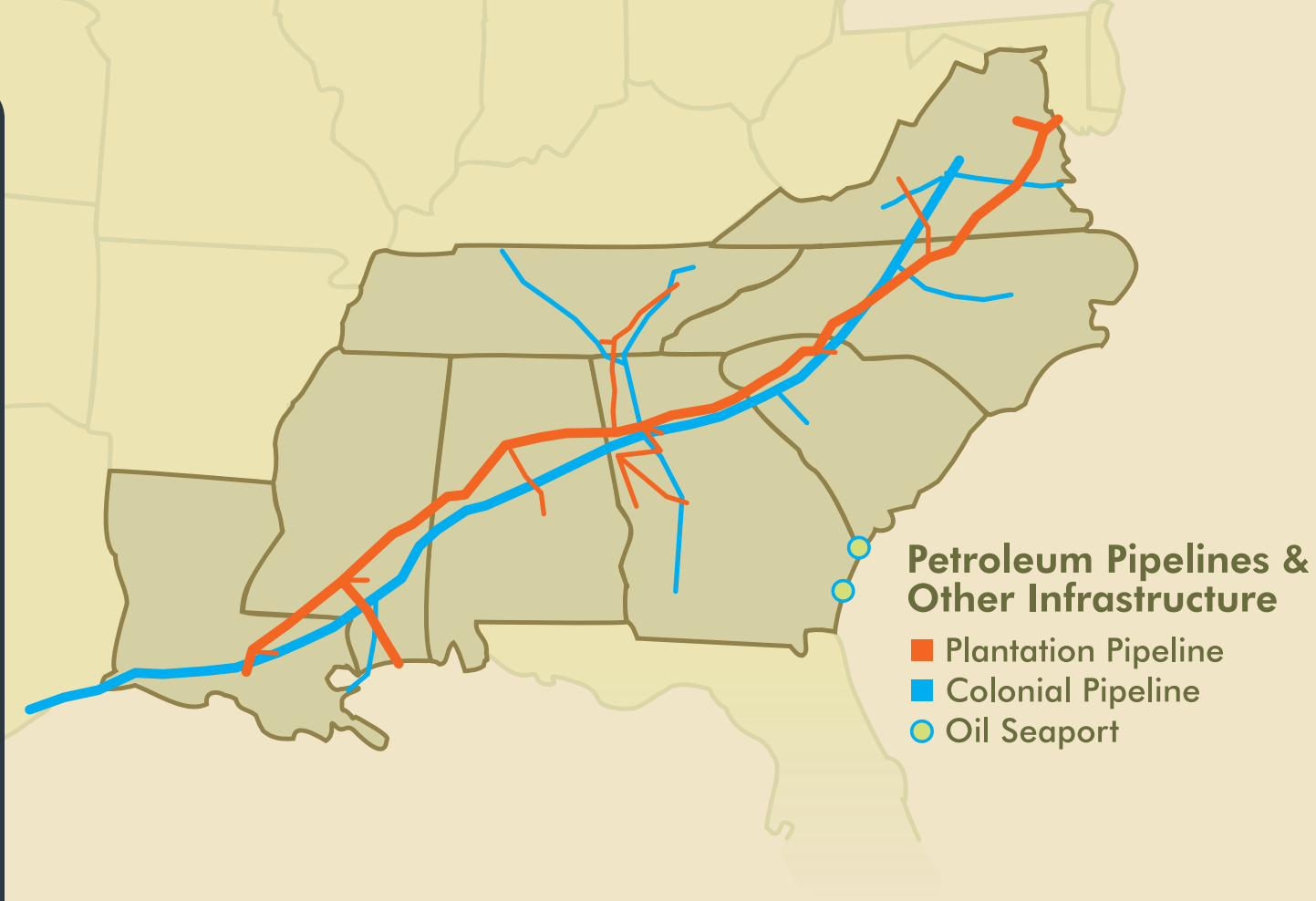
Natural Gas Deregulation in Georgia

Prior to 1998, all retail and commercial natural gas consumers in Georgia purchased their gas from one of the two investor-owned natural gas distribution companies in the state (Atlanta Gas Light Company and United Cities Gas – now Atmos Energy), or from their local municipal gas company. The Georgia Public Service Commission (PSC) regulated and set rates for the two investor-owned utilities, while the local municipal governments set rates for their municipal gas systems. However, in 1997, the Georgia General Assembly passed The Natural Gas Competition and Deregulation Act (SB 215) (O.C.G.A. § 46-4-150 through 166).

The Act allowed the existing investor-owned natural gas distribution companies in the state to relinquish their gas merchant functions and operate as a "pipes only" utility (electing distribution company) and for marketers to enter the market and take over the retail function of selling natural gas to end-use customers.[9] In October 1999, Atlanta Gas Light Company (AGL) completed the conversion process, relinquishing all merchant functions and becoming an electing distribution company.[10] However, AGL is still responsible for ensuring gas delivery for Georgia 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 also directly manages storage and transportation services needed to meet the shifts in customer loads.

Three types of natural gas companies currently serve retail customers in Georgia. Customers living within the AGL service territory (the deregulated area of the state) choose their marketer from the list of PSC-certified natural gas marketers. Customers living within the service territory of Atmos Energy must receive natural gas service from Atmos. Likewise, the natural gas customers living within the service territory of one of the 84 municipal natural gas utilities must take their natural gas service from that municipal utility.

Today, 12 natural gas marketers are certified in Georgia. Marketers charge market-based prices, but rates for AGL's distribution service are still regulated by the PSC (and make up a percentage of each customer bill issued by the natural gas marketers).

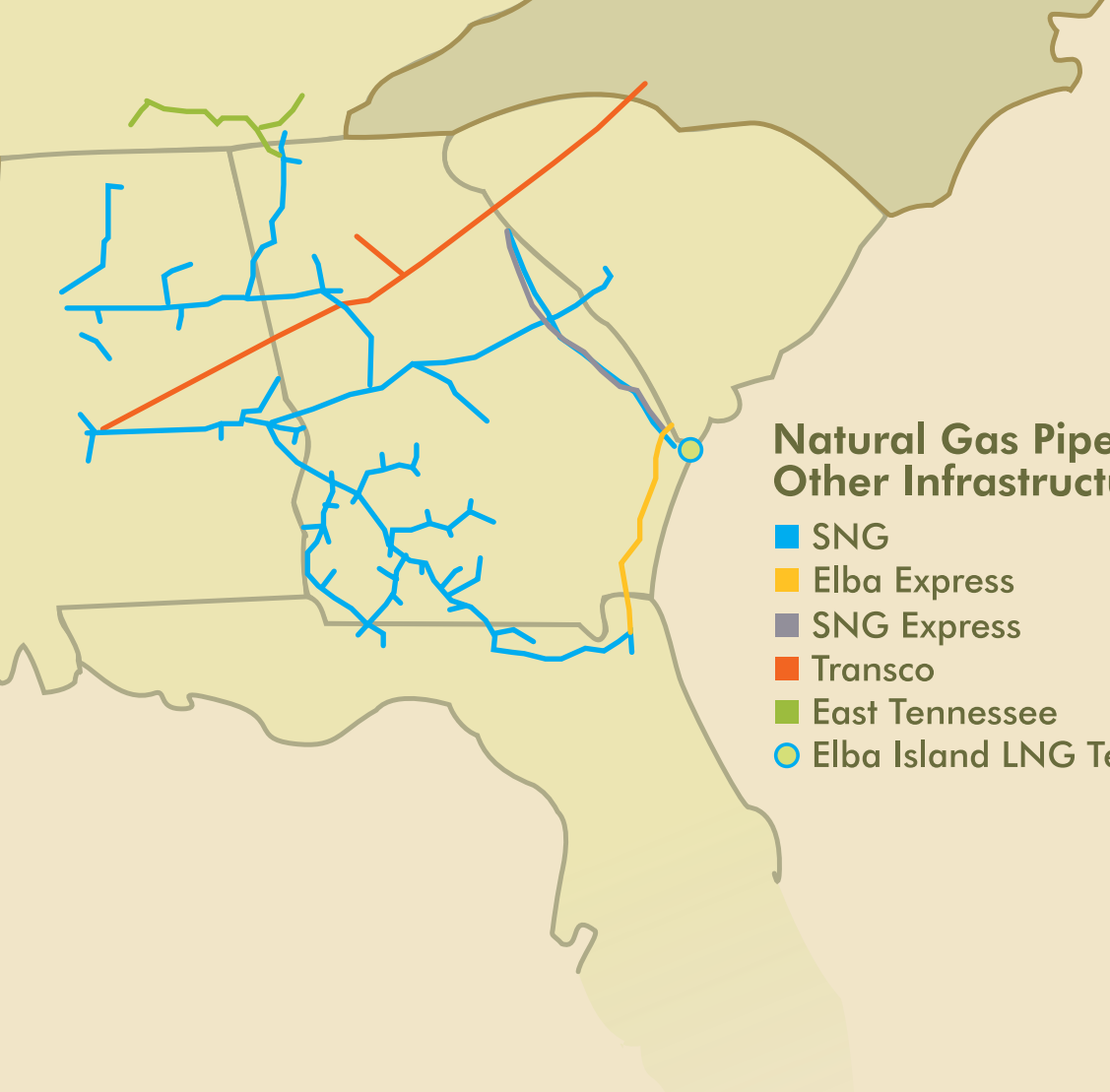


Where Does Georgia's Petroleum & Natural Gas Come From?

Georgia is completely reliant on imports of refined petroleum products to meet its demand. Most refined petroleum product imports come into the state via two interstate pipelines: Colonial pipeline and Plantation pipeline. The Colonial pipeline system spans from Texas to Delaware, providing refined petroleum products to Louisiana, Mississippi, Alabama, Georgia, Tennessee, South Carolina, North Carolina, Virginia, Maryland, and Delaware. The Plantation pipeline system receives petroleum products from nine refineries in Mississippi and Louisiana and delivers those products to 130 shipper terminals in eight states through a network of 3,100 miles of pipeline. The states served by the Plantation pipeline include Louisiana, Mississippi, Alabama, Georgia, Tennessee, South Carolina, North Carolina, and Virginia.

The supply of transportation fuels and other refined petroleum products involves not only the supply of crude oil though the global oil market, but also the capacity to refine crude oil into fuels. While refineries are spread throughout the United States, the greatest concentration of refining capacity is located along the Gulf Coast in Texas, Louisiana, and Mississippi. Georgia relies almost entirely on the refining capacity in the Gulf Coast region.

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 noted above, the state receives the bulk of the oil products it consumes via the interstate Colonial and Plantation pipelines. In addition, propane is received via the Dixie pipeline. Some product is also imported by tanker and offloaded at ports in Brunswick and Savannah. Petroleum products delivered to Georgia are usually received at terminals and trucked to local distribution points. The petroleum product terminals serving Georgia are located in Athens; Bainbridge; Griffin; Jacksonville, Florida; Macon; Doraville (the largest); and Rome.



Natural gas imports into Georgia arrive via three interstate pipelines and a liquefied natural gas (LNG) import terminal (Elba Island Terminal) at Elba Island, near Savannah. Three companies operate the interstate pipelines that deliver natural gas to Georgia – Transcontinental Gas Pipeline Corporation (Transco), East Tennessee Natural Gas Company (ETNG), and Southern Natural Gas Company (SNG). The Transco system is the second largest natural gas pipeline system in the nation, and consists of 10,500 miles of pipeline extending from south Texas to the city of New York. The ETNG pipeline system is 1,353 miles long, begins in Tennessee, and extends to an area just south of Roanoke, Virginia. The SNG pipeline system is made up of approximately 7,600 miles of pipeline extending from Gulf Coast locations in Texas and Louisiana to seven southeastern states. SNG is the major supplier of natural gas to Atlanta Gas Light Company. The SNG pipeline capacity is 3.6 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.

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.

Coal Scrubbers

As part of Georgia utilities' efforts to meet tighter federal emission standards, Georgia Power recently installed a second scrubber at Plant Bowen and the first of two scrubbers at Plant Wansley in Heard County. The scrubbers will reduce sulfur dioxide (SO_2) emissions from the coal power plants and in the case of Plant Wansley's scrubbers, will reduce SO_2 emissions by more than 95 percent.

Since 1991, Georgia utilities have invested more than one billion dollars in environmental controls, and reduced SO_2 emissions by 42 percent and nitrogen oxide (NO_x) emissions by 50 percent. By 2016, Georgia EPD estimates that Georgia utilities will reduce their total SO_2 emissions by an additional 88 percent and their total NO_x emissions by an additional 54 percent from today's emission levels.

What Are Coal Scrubbers?
Most modern power plants are required to have special devices installed that clean the sulfur from the coal's combustion gases before the gases go up the smokestack. The technical name for these devices is "flue gas desulfurization units," but most people just call them "scrubbers" — because they "scrub" the sulfur out of the smoke released by coal-burning boilers.

How do scrubbers work?
Most scrubbers use limestone to absorb sulfur gases.

Limestone is mixed with water and either sprayed into the coal combustion gases (called "flue gases") or the flue gases are directed through a tank of the limestone and water mixture. The limestone captures the sulfur and "pulls" it out of the gases. The limestone and sulfur combine with each other to form either a wet paste, or in some newer scrubbers, a dry powder. In either case, the sulfur is trapped and prevented from escaping into the air.

Coal Scrubber Information Source:
http://fossil.energy.gov/education/energylessons/coal/coal_cct2.html

Coal

Coal demand is driven by the electric power sector; more than 95 percent of the coal used in Georgia is used to generate electricity. In 2006, the majority of electricity in Georgia was produced by coal (63 percent).

Most of Georgia's imports of coal were from domestic sources in 2006: 96 percent of the coal consumed by Georgia's electric utilities originated in the United States. In 2006, the majority of domestic coal delivered to electric utility plants in Georgia originated in either Kentucky or Wyoming (39 and 35 percents respectively). Demand for Wyoming coal is growing because the coal is subbituminous, which is lower in ash and sulfur than coal mined from the Appalachian area of the United States and consequently meets EPA compliance regulations much more readily than coal from Appalachia.

Plant Bowen, shown here, is located in Euharlee, Georgia.

Renewable Energy

In Georgia, renewable energy is used mainly 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 seven percent of total energy consumption in Georgia.[11]

In 2006, more than six million megawatt hours (6,011,830 MWh) of electricity in Georgia were generated using renewable fuels. The majority of the electricity generated from renewable sources was produced from wood and wood waste (3,381,260 MWh), followed by conventional hydroelectric power (2,568,837 MWh).

[11] 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 used as a demand supply management tool. 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.

Electricity from Biomass

Georgia, with its abundant biomass resources, is well positioned to become a leader in the nation's biofuel "revolution." The state's 24 million acres of timberland provide a local and cost-effective resource that can be used to power our economy while helping the environment. Even now, there are plans to begin providing power to Georgians using our state's biomass resources.

In August of 2008, Georgia Power announced plans to convert coal-fired Plant Mitchell to renewable wood biomass. Once converted, Plant Mitchell, originally a 288 megawatt (MW) coal-fired and combustion turbine facility, will be capable of producing 96 MW of renewable energy - or enough electricity to power approximately 60,000 homes. The converted Plant Mitchell will have lower emissions, and will be one of the largest wood biomass plants in the nation.

In September of 2008, Oglethorpe Power Corporation (OPC), the nation's largest power supply cooperative, announced plans to build up to three 100 MW biomass electric generating facilities in Georgia. The power plants will utilize woody biomass and provide power to OPC's 38 member cooperatives, which supply electricity to nearly half of Georgia's population. The first two biomass power plants are scheduled to be built and placed into operation in 2014 and 2015. Capital investment in the biomass plants ranges from $400-500 million per facility, with each providing approximately 40 good-paying, full-time jobs. Each plant will also require an annual investment of more than $30 million for fuel stock alone and will create a need for potentially hundreds of new jobs in the state's forestry industry.

The power plants will be steam-electric generation stations using conventional fluidized bed boiler/steam turbine technology. Fuel for the plants will consist of a woody biomass mixture, including processed roundwood (e.g. chipped pulpwood), primary manufacturing residue (e.g. wood waste from sawmills), and harvest residue (e.g. wood remaining in forests after clearing). The plants will be designed to allow for the co-firing of other types of biomass, such as pecan hulls and peanut shells.

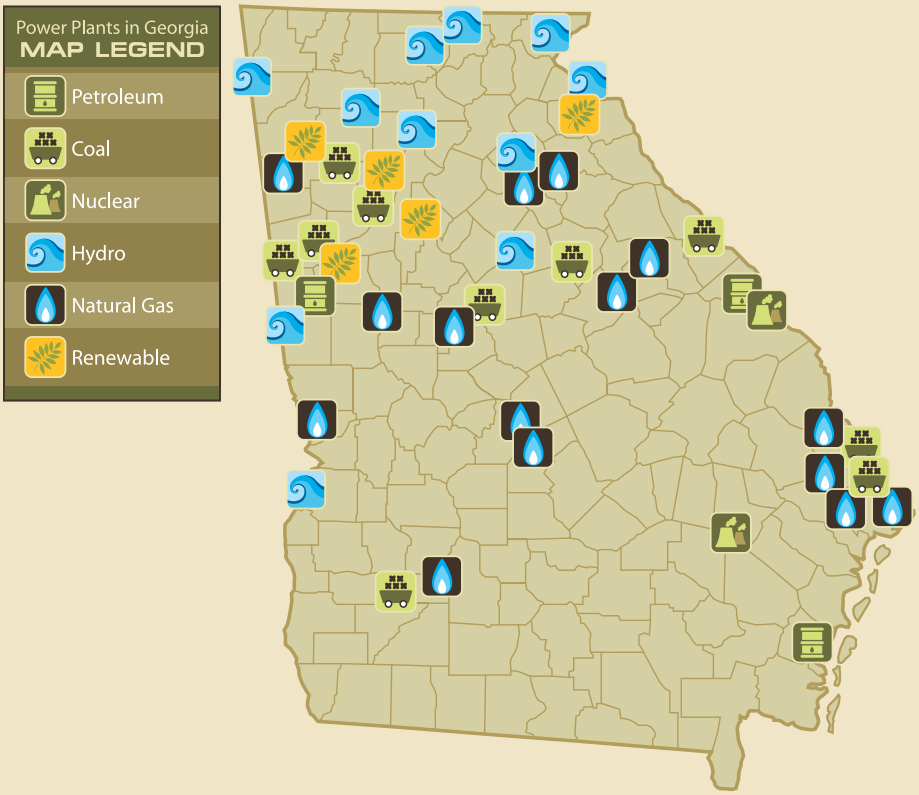
Integrated Resource Plan (IRP)

Georgia law (O.C.G.A. § 46-3A-1) requires that every three years Georgia Power submit an Integrated Resource Plan (IRP) to the Public Service Commission (PSC). 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 but also details how Georgia Power intends to meet those demands through power plants, efficiency, and conservation.

The IRP Act gives the 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 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 Power and all of the utilities in Georgia 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.

Electricity

As of 2006, Georgia had 72 operating power plants with 291 power generators with a total generation capacity of 39,758 MW. Coal generated electricity has the largest amount of capacity in the state followed by natural gas. The map below shows the locations of major power plants in Georgia.



The type of fuel used to generate electricity depends on many factors, including demand, the time of day, the season, and the weather. Electricity cannot be stored and so electric providers must be ready to meet the electricity demands of their customers at all times of the day. As shown by the first graph on page 11, electricity generation is usually divided into three categories: baseload (generation run 24 hours of the 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).

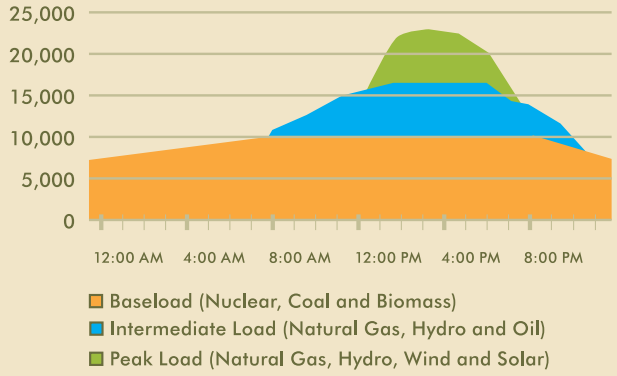
Each type of fuel used to generate electricity has specific operating and cost characteristics that determine during which load category the fuel will be used to generate electricity. Baseload demand is usually satisfied by nuclear and coal generators (due to their low variable costs and limited operational flexibility – i.e. it takes awhile for the generators to warm up), biomass, and some hydro generation (due to 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.

In 2006, Georgia had a total net summer capacity of 36,499 MW. From 2001 to 2006, Georgia's net summer generating capacity increased 24 percent.[12] The majority of the capacity additions during that time were natural gas additions (96 percent of summer capacity additions).

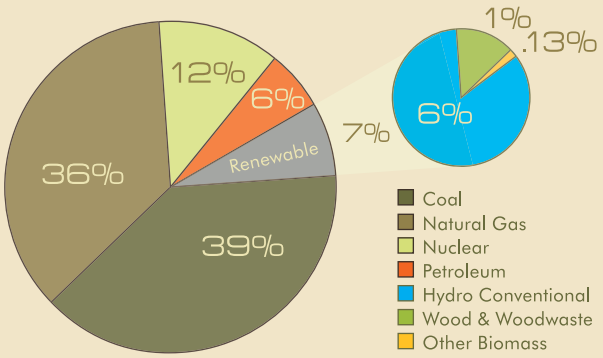
In 2006, coal and natural gas fueled generators made up the majority of Georgia's net summer generating capacity (39 and 36 percents respectively), followed by nuclear units (12 percent), units using renewable sources (seven percent), and petroleum units (six percent). Other biomass includes landfill gas; municipal solid waste; agriculture byproducts/ crops; sludge waste; and other biomass solids, liquids, and gases.

However, as shown by the graph to the right, the majority of Georgia's electricity is generated using coal or nuclear fuel. This is because coal and nuclear units are usually used as baseload plants – which run continuously.

Hypothetical Daily Load Shape Curve (MW)

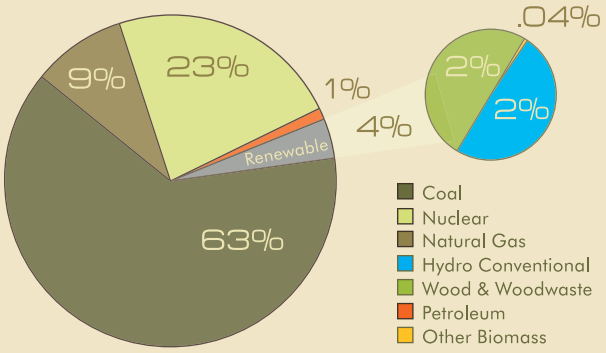


Georgia Net Summer Capacity by Fuel Source, 2006 (MW)



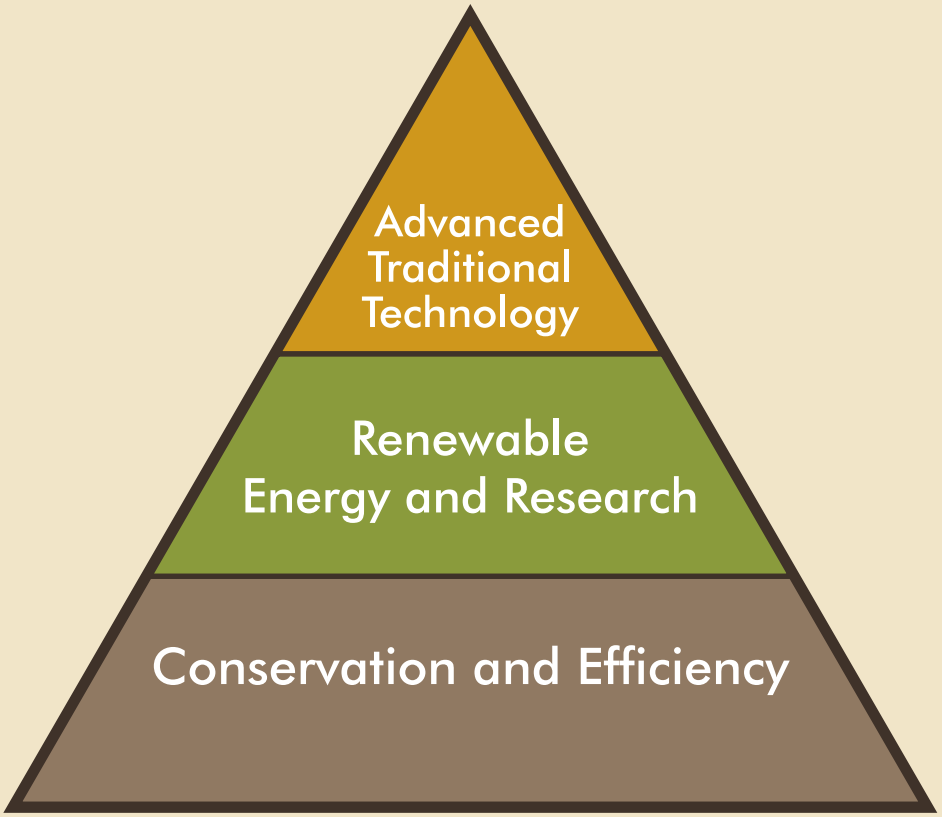
Data Source: Energy Information Administration

Georgia Net Electricity Generation by Fuel Source, 2006 (MW)



Data Source: Energy Information Administration

[12] 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.



State Energy Strategy Update

In February 2006, Governor Sonny Perdue directed the Georgia Environmental Facilities Authority (GEFA) to lead an inclusive, statewide stakeholder process to develop a comprehensive state energy strategy for Georgia. In December 2006, the Governor's Energy Policy Council submitted the first comprehensive ***State Energy Strategy for Georgia*** to Governor Perdue. The resulting strategy provides a menu of policy options for the state to consider. Given the rapidly changing world of energy supply and demand, it is important that the state review the implementation of the ***Strategy*** regularly and update the analysis and policy objectives to reflect changing energy trends.

The ***State Energy Strategy*** recommendations prioritized the existing options available to meet the state's energy needs, using increased energy efficiency and conservation as a base. The second priority is the use of renewable resources, and the third priority advocates advanced coal, gas, and nuclear technologies. Georgia's ***State Energy Strategy*** recognizes the need for a combination of all resources with the assumption that no single resource can or will be sufficient. Relying on efficiency, conservation, and renewable energy first, supplemented with advanced clean technologies, including nuclear and advanced coal technology as needed, will ensure our ability to meet our future energy needs in an environmentally responsible and economic way.

Conservation and Efficiency

A study completed in 2005 found that Georgia has the ability to satisfy at least six percent of its energy needs through conservation and efficiency, measures that cost less than producing an equivalent amount of energy. Since then, rising energy prices have likely increased the amount of energy efficiency that has become cost effective. By reducing our energy use through conservation and efficiency, Georgians can cut Georgia's energy consumption.

Steps Taken

- *Governor's Energy Challenge*
  Broad public awareness campaign, publicity program, state energy reduction goals, formal energy education curricula, and demonstration projects.
  Please see sidebar on page 14 for more information.

- Clean Energy Property Tax Credit
  Includes incentives for buildings that achieve significant (30 percent) reductions beyond the required energy code or install efficient lighting systems or geothermal heat pumps.
  Please go to www.gefa.org for more information.

- Energy Efficiency and Sustainable Construction Act of 2008
  Directs the Department of Community Affairs to create voluntary state facilities construction policies and procedures that recommend building standards that optimize energy performance, conserve energy, and utilize local and renewable energy sources, and that encourage obtaining ENERGY STAR designation.

- *Conserve Georgia*
  Georgia's statewide energy, land, and water conservation marketing and outreach campaign. By marketing Georgia's conservation programs together, *Conserve Georgia* helps reinforce the linkage between energy, land, and water and the importance of incorporating energy, land, water, and environmental strategies into any statewide planning effort.
  Please go to www.conservegeorgia.org for more information.

- The State Utilities Program (SUP)
  Saves approximately $5 million annually through the coordinated review and purchase of electricity and natural gas for state facilities.

- The Work Away Initiative
  A management option that allows selected employees to telework from home or other remote locations for one or more days per week. Under this program, more than 30,000 state employees now telework, saving almost five million commute miles each month. The program also includes compressed workweeks and other work schedule alternatives.

- Telecommuting Tax Credit
  Georgia recently created the nation's first telecommuting tax credit. Under the law, qualified employers may receive a tax credit for up to $20,000 for planning, consulting, training, and/or raw labor costs associated with starting or expanding a telework program and an additional tax credit of $1,200 per new teleworker in 2009. Eligible expenses include equipment (computers, telecommunications, data entry, and data processing), software, and maintenance.

- Idle Reduction Strategy
  The Georgia Environmental Protection Division (EPD) is working with stakeholders to reduce unnecessary diesel emissions associated with heavy-duty vehicle idling. Georgia is also supporting a pilot project to test the performance of idle reduction technologies for the trucking industry.

Governor's Energy Challenge

One of the main programs that arose from the ***State Energy Strategy*** is the *Governor's Energy Challenge,* a program operated by the Georgia Environmental Facilities Authority (GEFA) to educate Georgians about energy conservation and efficiency and to assist them in making wise energy choices.

The *Governor's Energy Challenge* combines a variety of elements from the ***State Energy Strategy*** into a comprehensive program to advance energy efficiency and conservation and clean energy in Georgia. A main component of the *Governor's Energy Challenge* is a commitment by state government to reduce energy use by 15 percent in state facilities by 2020. The reduction will save state taxpayers an average of $12 million annually.

In conjunction with the state's energy reduction goals, Governor Perdue challenged individuals, businesses, local governments, and others to reduce their energy consumption by 15 percent as well. To help the public match the Governor's reduction goals, a public education campaign and a corresponding website were created to provide information, tools, and incentives to help individuals, businesses, and local governments achieve their energy reduction goals.

The *Challenge* includes a focus on grades K-12 by promoting the integration of energy curricula through such programs as the nationally recognized program Wind for Schools, Green Power EMCs' Sun Power for Schools, Lights for Learning, and other similar programs.

Please go to www.gefa.org for more information.

- **Efficient and Alternative State Fleet**
  Governor Perdue issued an executive order requiring the purchase of efficient and alternative fuel vehicles for the state fleet when cost effective. Currently, the state fleet has more than 750 alternative-fuel vehicles.

- **Energy Performance Contracting**
  The State Facilities Energy Council is aggressively exploring the opportunity to utilize performance contracting to reduce energy use. These efforts will help reduce the state's energy bill that approaches $200 million annually.

- **Sales Tax Holiday**
  Georgia's ENERGY STAR and WaterSense sales tax holiday incentivizes the purchase of energy efficient appliances and household fixtures to encourage greater household energy conservation. Each year, Georgia has a four-day period where the state does not charge sales tax on the sale of appliances with a federally approved ENERGY STAR low energy-use rating. This year water efficient products were added to the list of items eligible for the tax holiday.

- **Weatherization Program**
  Works with low-income households to reduce energy costs by providing free home energy efficiency testing and solutions for low-income individuals and families. In FY2008, this program weatherized 2,509 homes, benefitting 4,114 low-income and elderly clients.

- **Energy and Environmental Task Force**
  Provides a quarterly education forum for state personnel working on energy and/or environmental issues to enhance their understanding of recent state and national developments and to promote sustainable practices in Georgia.

- **Georgia Tech Enterprise Innovation Institute's Energy and Environmental Management Center (EEMC)**
  Provides energy management, waste minimization, and productivity assessment to business and industry through a variety of services. Please go to www.innovate.gatech.edu for more information.

- **State Energy Program (SEP)**
  Provides funding, program guidance, and administration for activities promoting energy efficiency and renewable energy. Programs and activities include energy code training, EarthCraft House, Building America, and the Greenprints conference and tradeshow. Please go to www.gefa.org for more information.

- **University of Georgia's Cooperative Extension Service**
  Helps transform Georgia's agricultural population and businesses into more efficient energy consumers through a number of programs identifying efficiencies in poultry house operation, crop irrigation, animal production systems, peanut curing, and buildings. Please go to www.tifton.uga.edu/eng for more information.

- **University of Georgia's Engineering Outreach Service**
  Enables industries, communities, and agencies to improve their profitability, sustainability, and competitiveness by providing technical assistance, education, and practical solutions such as energy audits, biofuel feedstock analysis, and CO_2 footprinting. Please go to http://outreach.engineering.uga.edu for more information.

Renewable Energy & Research

Georgia boasts an abundance of renewable natural resources such as pine trees and agricultural products, along with waste streams from agriculture and industrial processes that are available as feedstocks for an expanding renewable energy industry. According to a recent Forbes.com article entitled "America's Best Places for Alternative Energy," Georgia ranks third in the nation for potential biomass energy as measured by the amount of biomass available in the state. The article stated, "Georgia has more acres of privately owned forest than any other state in the country. Roughly 50 million tons of the state's own timber end up in the state's wood-products manufacturing plants every year, according to the Georgia Forestry Commission. Ironically, the state's wood products industry returns nearly half of it in the form of primary mill wood debris every year, according to a study by General Bioenergy." In addition to our abundant biomass resources, Georgia also has the potential to meet some of the state's energy demands using solar, wind, and tidal resources.

Steps Taken

- **Energy Innovation Center**
  Acts as a facilitator between the academic, government, and private sectors to encourage the growth of Georgia's renewable energy and biofuels industry.
  Please see sidebar on page 16 for more information.

- **Bioenergy Corridor**
  Georgia is America's "Bioenergy Corridor" and with more than $600 million alternative energy-related projects active in Georgia, the state is emerging as a prominent leader in the bioenergy revolution. Over the next ten years, the bioenergy industry is projected to contribute nearly $5 billion to the state economy.
  Please go to http://energy.georgiainnovation.org/bioenergy_corridor for more information.

- **Public-Private Partnerships**
  The state's research institutions, including the Georgia Institute of Technology, the University of Georgia, and the Herty Advanced Materials Development Center, are providing R&D in support of cellulosic ethanol and other renewable energy alternatives. Both the Georgia Institute of Technology and the University of Georgia have received funds from the Department of Energy (DOE) as two of the partners in the BioEnergy Science Center (BESC), whose purpose is to develop cost-effective and sustainable means of producing biofuels from plants. Please go to http://bioenergycenter.org for more information.

- **Industry Recruitment and Commercialization**
  In the last two years, a dozen new ethanol and biodiesel facilities broke ground in Georgia, investing more than $460 million in our state's bioenergy industry and pledging to process more than 215 million gallons of biofuel every year in Georgia.

- **Bioenergy One Stop Shop**
  Brings together representatives of local, state, and federal government to meet with bioenergy companies to address questions about doing business in Georgia. The streamlined process accelerates business startup by helping companies cut through bureaucracies and permitting processes. Please see sidebar on page 16 for more information.

Energy Innovation Center (EIC)

In April 2008, Governor Perdue established the Energy Innovation Center (EIC) to integrate Georgia's research, business, and government resources to attract and grow clean energy businesses in Georgia and to promote the state's natural and economic resources. Based in Atlanta and headquartered at GEFA, EIC teams with the state's other Centers of Innovation and the Department of Economic Development to support strategic industries and to create a pro-growth, innovative business environment. EIC coordinates efforts among academic, research, and development organizations; the private sector; and other state agencies to advance the development of renewable energy, biofuels, and other clean energy fuels by utilizing Georgia-based resources. To date, EIC has assisted with the establishment of 16 biofuel production facilities in the state. The One Stop Shop is one of EIC's programs that are designed to provide strong leadership and guidance for the bioenergy industry. EIC and the One Stop Shop meet with clean energy businesses once every month to assist and expedite the establishment of clean energy businesses and projects in Georgia. Already EIC has met with and assisted more than 80 prospective companies.

Please go to http://energy.georgiainnovation.org for more information.

- **Streamlined Review and Permitting for Renewable Energy Facilities**
  Governor Perdue signed an executive order speeding up the permitting and regulatory processes for all proposed renewable energy facilities in Georgia.

- **Georgia Research Alliance**
  With the guidance of an advisory group of energy industry executives, government leaders, and university scientists, each of the Georgia Research Alliance core programs – GRA Eminent Scholars, Centers of Research Excellence, and Commercialization – are playing a role in supporting research and development in renewable energy. In 2006, the Commission for a New Georgia recommended that GRA increase its pool of GRA Eminent Scholars engaged in research relevant to renewable energy. As a result, endowed chairs were established at the University of Georgia and the Georgia Institute of Technology and scholars were recruited, bringing to ten the number of GRA Eminent Scholars with an interest in research related to renewable energy. **Please go to www.gra.org for more information.**

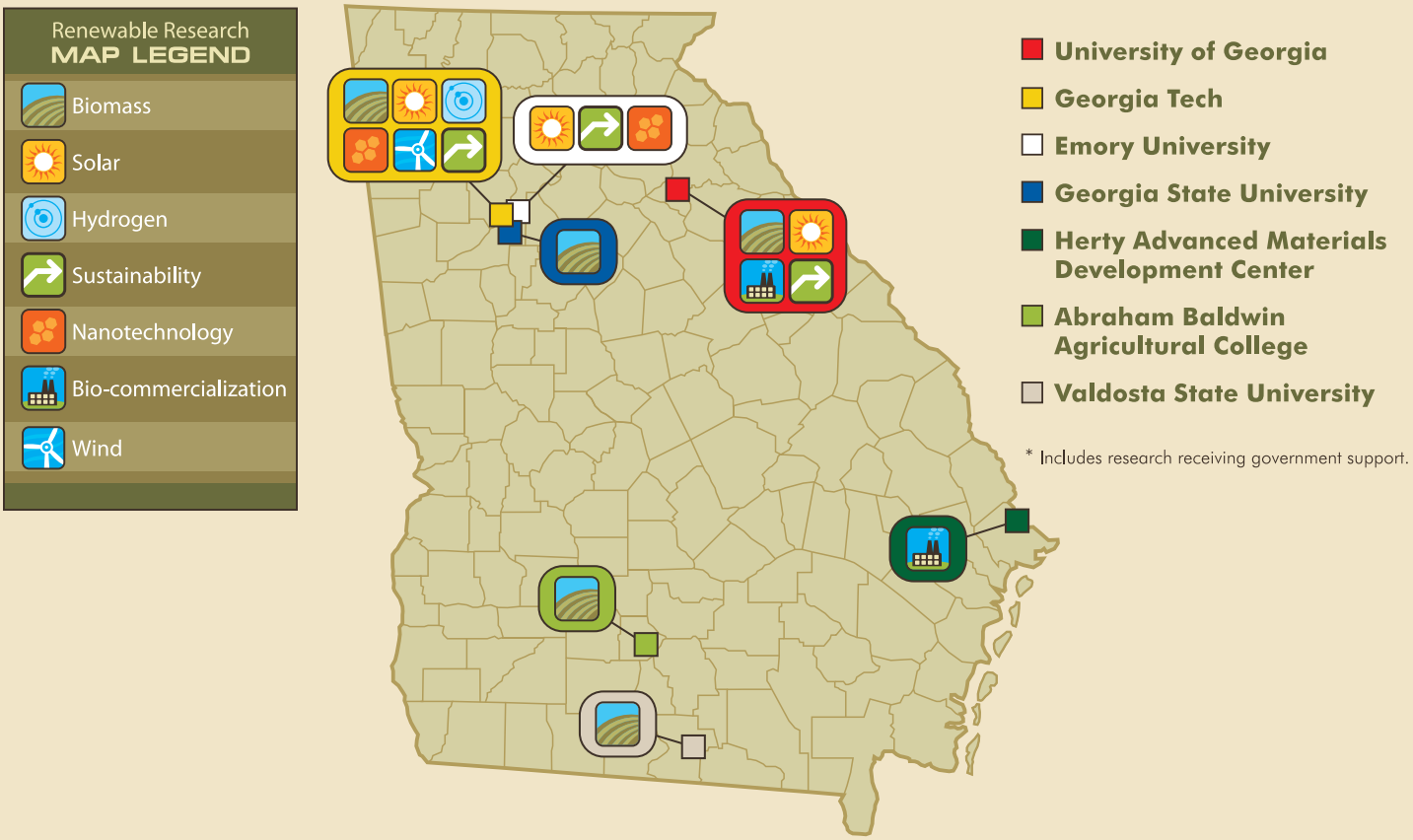
- **University of Georgia's Biofuels, Biopower and Biomaterials Initiative (B3I)**
  Combines the University's expertise in agriculture, forestry, environmental science, and engineering with its strengths in carbohydrate science, genetics, and microbiology to research bioenergy production and to support an economic and sustainable bioenergy future. **Please see http://bioenergy.uga.edu for more information.**

- **Promote Alternative and Clean Energy Sources**
  Georgia's Clean Energy Property Tax Credit reduces the costs for a variety of renewable energy technologies including solar, wind, and biomass. The income tax credit offsets up to 35 percent of the cost of the purchase and installation of technologies for solar, wind, and biomass energy producing facilities. Between July 1, 2008, and December 31, 2012, $2.5 million in tax credits will be available each calendar year.

- **Wind Resources**
  Georgia state agencies are working with stakeholders to facilitate exploration of Georgia's offshore wind resources. Georgia Tech and Southern Company have partnered to explore the feasibility of a wind farm off of Georgia's coast.

- **E85 Infrastructure Grant Program**
  In 2008, to increase the availability of E85 fuel to consumers, Georgia's E85 Infrastructure Grant Program funded 21 E85 fueling pumps at retail gas stations throughout the state. A second round of grants has been issued to support the installation of more pumps within the state's main transportation corridors. **Please go to www.gefa.org for more information.**

Georgia's Renewable Energy Research*



* Includes research receiving government support.

- **Alternative Energy Demonstration Projects in Schools**
  To provide students and instructors with hands-on experience with solar technologies in a variety of courses, GEFA supported the installation of solar panels at Georgia Southern University. The solar electric system will be used as a teaching aid in engineering courses.

- **Promote Curriculum on Energy**
  In partnership with Green Power EMC and the Georgia Wind Working Group, GEFA provided assistance with a grant proposal to install wind turbines at two schools in North Georgia. The wind turbines will be part of a curriculum on renewable energy and introduce students and the surrounding community to this clean, renewable energy resource.

- **Greenhouse Gas Inventory**
  Georgia's Environmental Protection Division (EPD) is currently in the process of completing an update to Georgia's greenhouse gas inventory.

- **Greenhouse Gas Registry**
  EPD is also representing Georgia in the Climate Registry, an organization developing standardized means of measuring and reporting greenhouse gas reductions.

- **Carbon Sequestration Registry**
  The Georgia Forestry Commission developed a carbon sequestration registry to enable landowners to report carbon sequestration projects taking place in Georgia and to facilitate their participation in any regional, national, or international carbon markets that emerge in the future.

Advanced Traditional Technology

In the coming years, Georgia's demand for electricity will continue to grow and energy efficiency, conservation, and renewable fuel sources can help meet Georgia's growing demand but will not be sufficient to meet all of Georgia's electricity needs. In addition, Georgia recognizes that renewable resources and the technologies for their use on a large-scale basis will require investment, research, and adequate time for such technology to become viable and subsequently supports additional advanced fossil fuel and nuclear technologies to meet Georgia's generation needs when necessary.

Advanced fossil fuel and nuclear technologies provide higher levels of generation efficiency, power reliability, and improved environmental performance than standard coal and nuclear technologies. Greater efficiency in centralized power generation is possible using advanced fossil fuel technology such as integrated gasification combined cycle and super-critical coal-fired steam power. Super critical coal-fired plants operate using higher steam temperatures and pressures than normal coal plants and can achieve greater thermal efficiencies compared to standard coal combustion technology. Nuclear generated electricity can meet the state's growing baseload needs without the emissions concerns of traditional coal plants.

Steps Taken

- **Support Production of Electricity from Nuclear Generation**
  To supply reliable and emission free electricity, Georgia supports the construction of two new nuclear reactors at Plant Vogtle. The two Westinghouse AP 1000 reactors will provide 2,234 MW of baseload capacity to Georgia Power and municipal utilities. The partnership, referred to as the Southern Nuclear Operating Company, Inc. is made up of Georgia Power (46 percent), Oglethorpe Power (30 percent), the Municipal Electric Authority of Georgia (MEAG Power) (23 percent), and Dalton Utilities (two percent).
- **Support Greater Exploration of the Outer Continental Shelf (OCS)**
  To increase the supply of fossil fuels, including oil and natural gas, Georgia supports prudent exploration and drilling of the OCS.
- **Public-Private Partnerships**
  The state's research institutions are providing research and development in support of advanced fossil fuel and nuclear technologies. In July 2008, the Georgia Tech Research Corporation received a $1,620,479 grant from DOE to develop a novel class of solvents, called "reversible ionic liquids," to capture CO_2 from coal-fired power plant flue gas. The Georgia Tech Research Corporation also has received DOE funding for two other advanced coal technologies research programs.

Going Forward

To support our growing economy and population, Georgia must make certain that our energy infrastructure and supply remain adequate and reliable while protecting our environment for future generations. The updating, upgrading, and expanding of our electricity infrastructure will ensure that our electricity grid and energy infrastructure are sufficient to provide for our state's energy needs and that renewable resources can be successfully integrated with our electricity infrastructure.

Growth and prosperity demand new electrical generation capacity, including electricity derived from nuclear, advanced coal technology, biomass and other renewable energy sources. Electricity from biomass can meet some of our baseload needs; however, current biomass technology cannot meet all of our baseload electricity demand. One single source is not the answer, Georgia needs to take a multi-pronged approach. There is no "silver bullet," rather a "silver buckshot" approach is necessary to meet Georgia's future energy demand.

As Georgia continues implementing the ***State Energy Strategy,*** other steps should be considered to further Georgia's energy future. These steps include:

- Regularly update the ***State Energy Strategy.***
- Develop a statewide energy demand forecast.
- Continue to support state tax incentives for renewable energy and energy efficiency.
- Continue to promote sustainable building policies for state facilities.
- Provide technical assistance to businesses and local governments on energy efficiency and conservation.
- Adopt best practice approach to energy management.
- Support the upgrading of the electricity transmission system and grid and the electricity infrastructure of Georgia.
- Support continued expansion of alternative fuel retail infrastructure, including but not limited to E85, biodiesel, compressed natural gas, and hydrogen.
- Develop energy-savings performance contracting legislation for state buildings.
- Support state and local government efforts to enforce and strengthen building codes to maximize energy efficiency savings.
- Educate the public about the important role of building codes in energy efficiency and conservation.

- Support research into clean coal and advanced clean coal technologies (i.e., integrated gasification combined cycle, or IGCC, and carbon sequestration).
- Support the use of advanced coal technologies to meet Georgia's growing baseload needs.
- Develop a report offering recommendations for using and developing renewable resources to meet Georgia's energy needs while managing the cost and risks to Georgia customers.
- Encourage achievement of voluntary energy efficiency targets for electric and natural gas utilities.
- Consider alternative utility strategies that allow utilities to recover investments in energy efficiency.
- Study the impact of potential federal climate change legislation.
- Continue to promote energy efficiency and conservation education.
- Support continued cost effective energy efficiency programs.
- Continue to support energy efficiency appliance standards.
- Support commercial-scale development of state produced biomass energy resources.
- Conduct an assessment of alternative fuel delivery infrastructure needs.
- Evaluate the Georgia bi-directional metering law to support renewable energy development.
- Continue to encourage the development of distributed biomass-to-energy (electricity plants) in Georgia.
- Promote development of the solar energy market in Georgia.
- Increase the adoption of efficient vehicles and vehicle technologies.
- Continue support and funding of public transit systems.
- Continue to support public-private partnerships to coordinate research and development efforts of universities and industries.
- Continue to support the Energy Innovation Center.
- Provide the resources necessary to achieve state energy goals.
- Continue to improve the quality and availability of Georgia energy data products.
- Continue to support greater exploration of the Outer Continental Shelf.
- Support the construction of petroleum and natural gas pipelines.
- Encourage private sector efforts in renewable and energy efficiency.
- Recruit companies that use waste materials from other industries as feedstock.
- Encourage a low-carbon economy and use it as an engine for growth, competitive advantage, and jobs.

Research, commercialization, and recruitment of renewable and clean energy technologies are vital to Georgia's economic future. Georgia has the resources to become the leader in biomass energy and the state's tax, economic, energy, and industry recruitment policies should reflect, support, and encourage the renewable energy industry. Georgia will continue to support the development of the state's renewable energy sector while encouraging the development, use of, and investment in traditional energy sources such as nuclear, advanced coal technologies, and natural gas. By partnering not only with the private sector but across state agencies, Georgia can build a secure energy future.

For further information on the Georgia's ***State Energy Strategy,*** please contact GEFA's division of energy resources at 404.584.1000 or visit us on the web at **www.gefa.org.**