



2014
GEORGIA
ENERGY
REPORT





2014 GEORGIA ENERGY REPORT

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Photo courtesy of Colonial Pipeline Company



EXECUTIVE SUMMARY

THE ENERGY SECTOR IS RAPIDLY CHANGING IN GEORGIA AND ACROSS THE GLOBE.

Patterns in energy production and consumption are shifting as competition for limited resources grow, environmental concerns mount, and new technologies emerge. Since the last Georgia Energy Report was released in 2012, there have been significant changes within Georgia's energy sector, and progress has been made on many of the state's energy programs and goals. **In 2013, the state executed its first guaranteed energy savings performance contract (GESPC) at Phillips State Prison in Buford, Ga. The State Energy Program (SEP) completed projects that will save the state an estimated 250 million kWh per year, enough energy to power more than 16,000 homes for a year. In 2013, the Weatherization Assistance Program weatherized 3,814 homes.** These are just a few of the accomplishments that the Georgia Environmental Finance Authority (GEFA) has led over the past two years.

In addition to projects led by GEFA, many other organizations and institutions within Georgia, including private sector companies, regulatory bodies, and nonprofit organizations, have led positive improvements in the energy sector. Outside the state's borders, developments such as dramatic increases in natural gas and renewable technologies are changing how Georgia produces and uses energy.

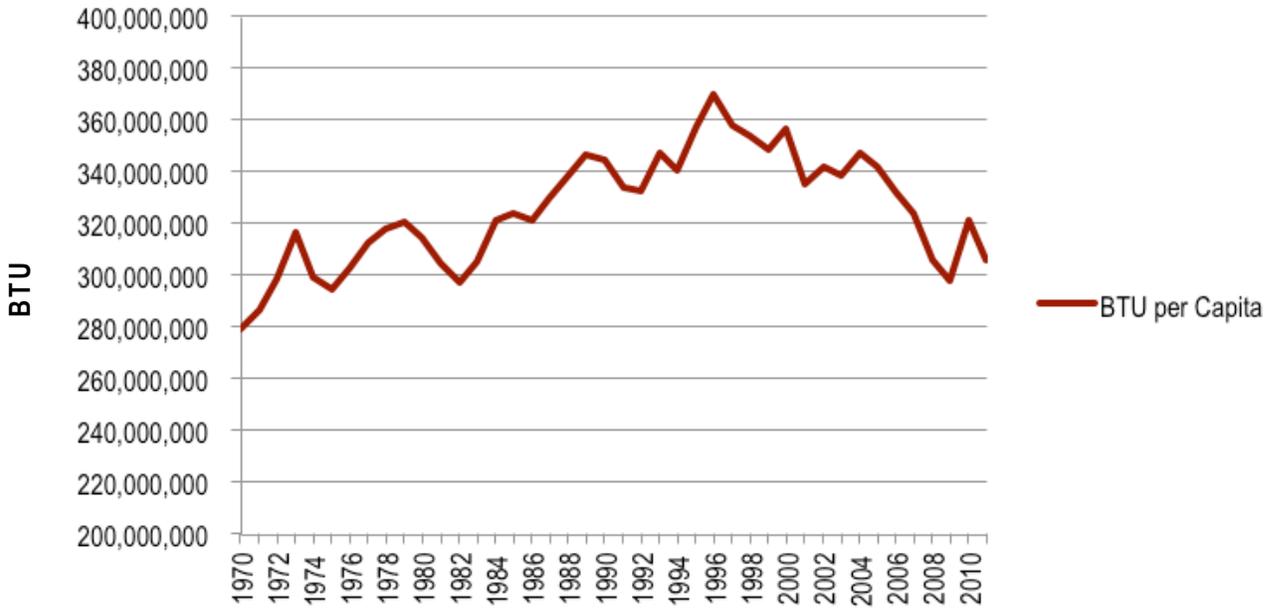
GEFA continues to take a leadership role in energy conservation and management in the state by implementing and managing innovative and productive energy programs that span a wide range of sectors and communities. These initiatives, as well as important energy trends, will be highlighted in the 2014 Georgia Energy Report.



The total amount of primary energy consumed in Georgia has grown nearly every year, as expected based on population and economic growth. However, the amount of energy consumed per capita has steadily declined since reaching a peak of 369 million British thermal units (Btus) per person in 1996. The 2014 Georgia Energy Report includes U.S. Energy Information Administration (EIA)¹ data through 2011 (in some limited cases, 2012), generally the most recent year the data is available. In 2011, 305 million Btus per person was consumed in Georgia. The decrease in per capita energy consumption is the result of a number of important factors, including the rising cost of energy, efficiency gains from technology improvements, behavior modifications thanks to increased awareness of sustainability issues, and the recession that started in 2008. Georgia's economy is also more energy efficient. From 1997 to 2011, Georgia's economic energy intensity, or Btu per dollar of real GDP, decreased by 16 percent.

¹ UNLESS OTHERWISE NOTED, THE ENERGY DATA CITED IN THIS DOCUMENT COMES FROM THE U.S. ENERGY INFORMATION ADMINISTRATION (EIA), THE INDEPENDENT STATISTICAL AND ANALYTICAL AGENCY OF THE U.S. DEPARTMENT OF ENERGY. THE EIA IS CONSIDERED ONE OF THE MOST RELIABLE SOURCES OF ENERGY INFORMATION AROUND THE GLOBE.

ENERGY CONSUMPTION PER PERSON

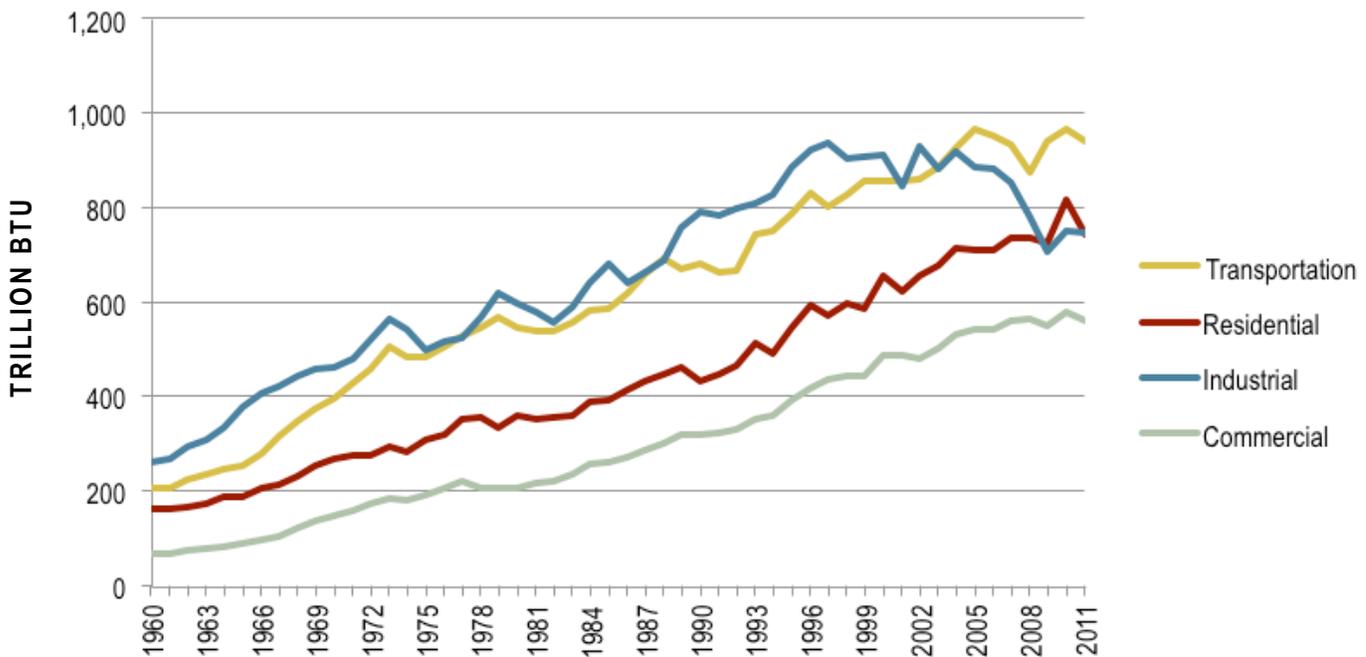


ECONOMIC ENERGY INTENSITY



Not counting the electric power sector², the transportation sector is the largest energy consumer in the state. In 2004, the transportation sector passed the industrial sector as the largest consumer. In 2011, the transportation sector consumed 944 trillion Btus of energy, followed by 747.7 trillion Btus in the industrial sector, 745.9 trillion Btus in the residential sector, and 564.4 trillion Btus in the commercial sector. Transportation, residential, and commercial energy use have grown consistently over past decades, along with Georgia's population and economy. However, a noteworthy trend shown in the chart below is the sharp decline in industrial energy consumption over the past decade. There are likely numerous reasons for this decline, including efficiency gains, global competition in the manufacturing sector, and the recessions that began in 2001 and 2008.

ENERGY USE BY SECTOR



² 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 ABOVE GRAPH. 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.

GEORGIA, ESPECIALLY METRO ATLANTA, IS A MAJOR CONSUMER OF PETROLEUM AND IS 100 PERCENT DEPENDENT UPON OIL AND PETROLEUM PRODUCTS DRILLED AND REFINED IN OTHER STATES AND COUNTRIES. THE MAJORITY OF PETROLEUM FOR METRO ATLANTA AND NORTH GEORGIA ENTERS THE STATE VIA TWO PIPELINES FROM THE GULF COAST. PETROLEUM ALSO COMES IN THROUGH THE PORTS OF SAVANNAH, GA. AND BRUNSWICK, GA. DUE TO RELIANCE ON PIPELINES, GEORGIA IS PARTICULARLY VULNERABLE TO SUPPLY INTERRUPTIONS FROM WEATHER AND HUMAN INTERFERENCE. IN 2011, GEORGIA CONSUMED APPROXIMATELY 7.9 BILLION GALLONS OF PETROLEUM PRODUCTS, OF WHICH APPROXIMATELY 4.6 BILLION GALLONS WERE MOTOR GASOLINE. MOTOR GASOLINE CONSUMPTION IN GEORGIA PEAKED IN 2005, AND HAS DROPPED BY NEARLY 500 MILLION GALLONS IN 2011.

PETROLEUM

THE AMOUNT OF COAL CONSUMED IN GEORGIA DECREASED IN RECENT YEARS; HOWEVER, IT IS STILL A MAJOR SOURCE OF ENERGY FOR ELECTRIC POWER GENERATION IN THE STATE. IN 2011, GEORGIA CONSUMED 1,168,000 SHORT TONS OF COAL, WHICH IS EQUIVALENT TO ABOUT 11,680 RAIL CARS OF COAL. THE VAST MAJORITY OF THIS COAL WAS CONSUMED IN THE ELECTRIC GENERATION SECTOR.

COAL

LIKE PETROLEUM, GEORGIA IMPORTS ALL OF ITS COAL. GEORGIA'S COAL SUPPLY LARGELY COMES FROM KENTUCKY AND WYOMING. IN 2011, WYOMING WAS THE LEADING SUPPLIER OF COAL TO GEORGIA. NEARLY ALL COAL ARRIVES IN GEORGIA VIA RAILROAD. DEMAND FOR SUBBITUMINOUS WYOMING COAL HAS INCREASED BECAUSE THE DELIVERED COST IS TYPICALLY LOWER THAN THAT OF BITUMINOUS COAL FROM KENTUCKY. SUBBITUMINOUS WYOMING COAL IS ALSO LOWER IN ASH AND SULFUR, WHICH HELPS IT MEET SOME U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA) REQUIREMENTS. HOWEVER, IT IS IMPORTANT TO NOTE THAT WYOMING COAL IS LESS ENERGY DENSE THAN COAL FROM KENTUCKY, WHICH REQUIRES BURNING MORE TO PRODUCE THE SAME AMOUNT OF ENERGY. THIS MEANS POTENTIAL FUTURE ENVIRONMENTAL REGULATIONS COULD CHANGE THE MIX REQUIRED BY UTILITIES IN GEORGIA.

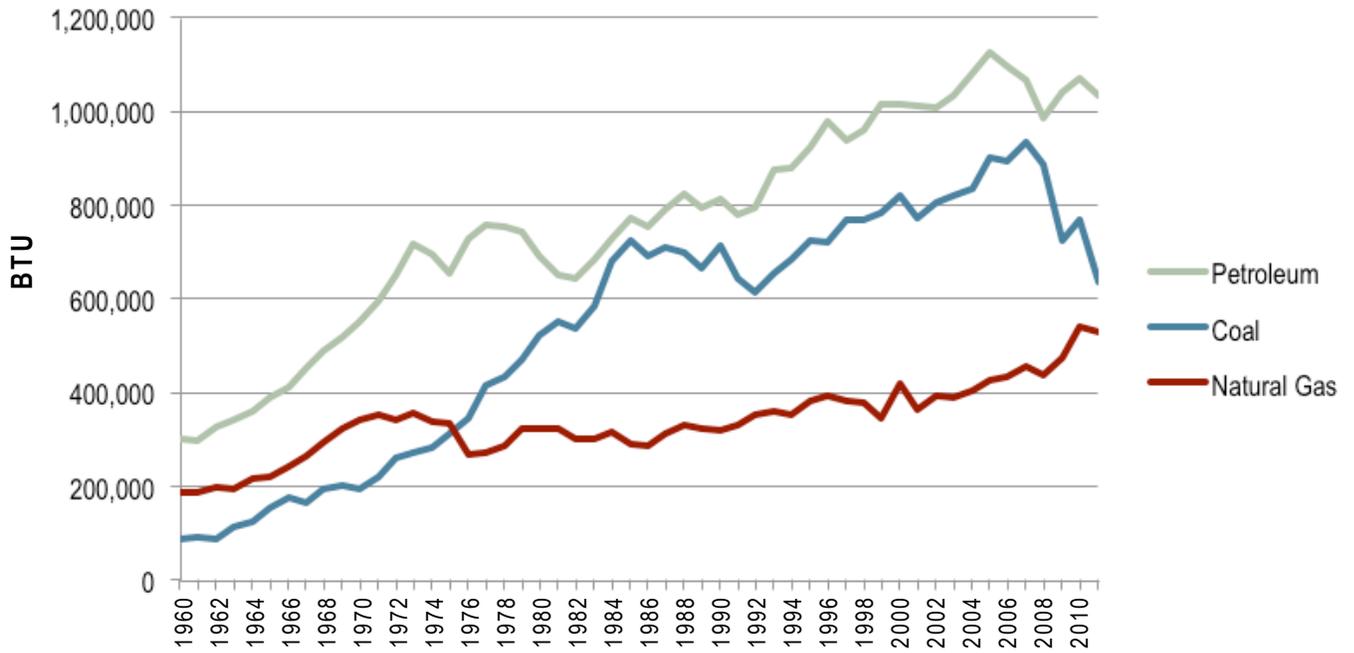
THE NATURAL GAS MARKET HAS CHANGED DRAMATICALLY IN RECENT YEARS IN THE U.S. THANKS TO TECHNOLOGICAL IMPROVEMENTS, INCLUDING HYDRAULIC FRACTURING, THAT HAVE ALLOWED SUBSTANTIAL GAS RECOVERY FROM SHALE FORMATIONS, THE U.S. HAS BEEN ABLE TO PRODUCE SIGNIFICANTLY MORE NATURAL GAS. THIS HAS RESULTED IN LOWER NATURAL GAS PRICES IN GEORGIA. IN 2012, THE U.S. PRODUCED AN AVERAGE OF 69.2 BILLION CUBIC FEET PER DAY (BCF/D) AND CONSUMED AN AVERAGE OF 69.6 BCF/D, THEREFORE PRODUCING NEARLY ALL OF THE NATURAL GAS CONSUMED IN THE COUNTRY. BECAUSE NATURAL GAS IS NOT AS EASILY OR AFFORDABLY IMPORTED OR EXPORTED AS PETROLEUM PRODUCTS, THE U.S. READILY BENEFITS FROM THE INCREASING SUPPLY.

NATURAL GAS

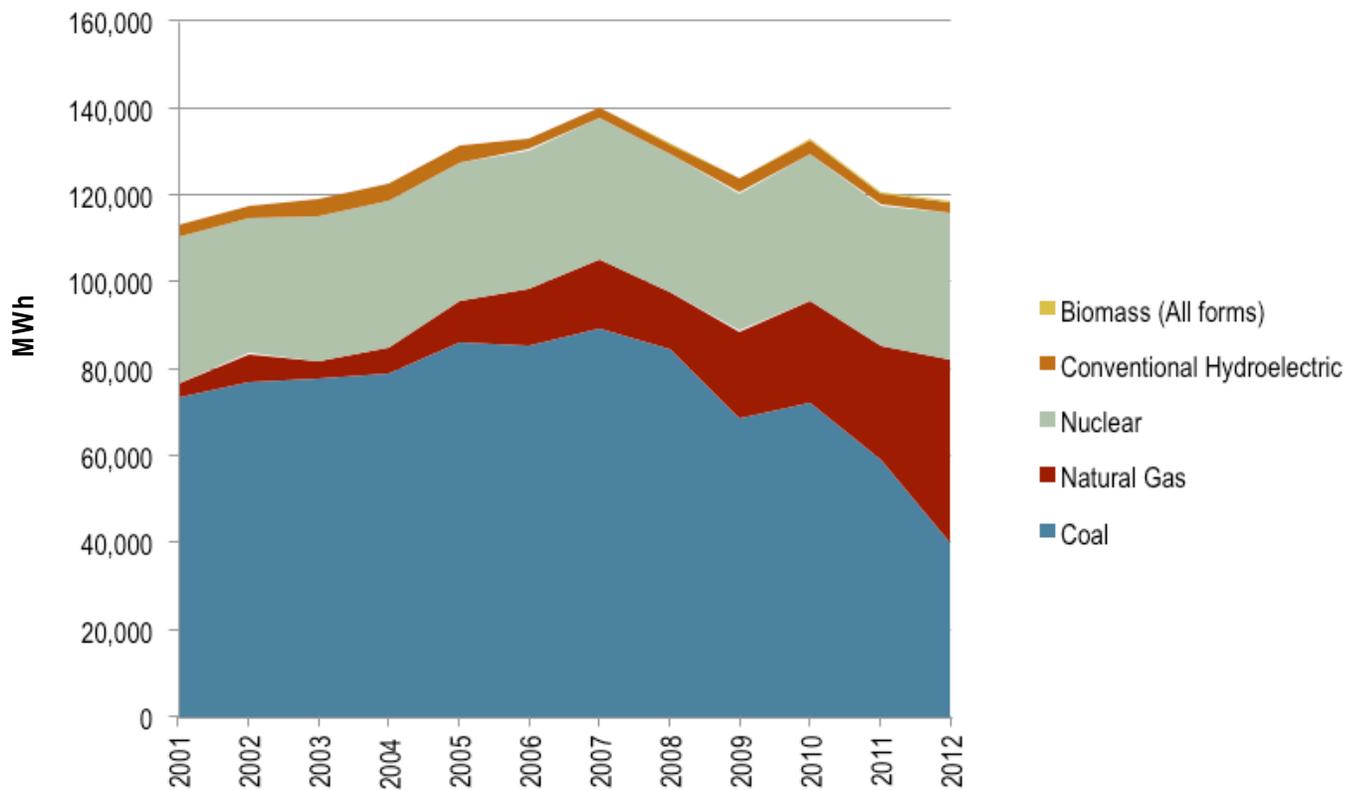
IN 2011, GEORGIA USED 522,874 MILLION CUBIC FEET (MMCF) OF NATURAL GAS. APPROXIMATELY 37.5 PERCENT OF THE TOTAL AMOUNT OF NATURAL GAS CONSUMED IN GEORGIA IN 2011 WAS CONSUMED BY THE ELECTRIC POWER GENERATION SECTOR, WHICH REPRESENTS DRAMATIC GROWTH. IN 1997, JUST 4.6 PERCENT OF THE NATURAL GAS CONSUMED IN GEORGIA WAS UTILIZED BY THE ELECTRIC POWER GENERATION SECTOR.

SIMILAR TO PETROLEUM, GEORGIA HAS NO PROVEN RESERVES OF NATURAL GAS AND IS DEPENDENT UPON INTERSTATE PIPELINES FOR NATURAL GAS DELIVERY. GEORGIA ALSO HAS ACCESS TO LIQUEFIED NATURAL GAS (LNG) IMPORTS THROUGH THE ELBA ISLAND TERMINAL NEAR SAVANNAH, GA.

FOSSIL FUEL CONSUMPTION

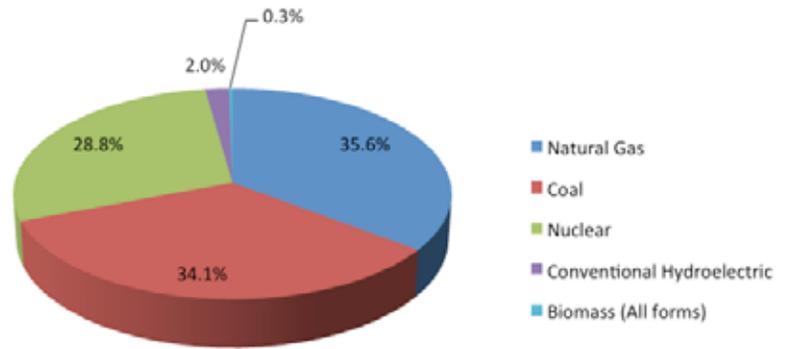


ELECTRICITY GENERATION

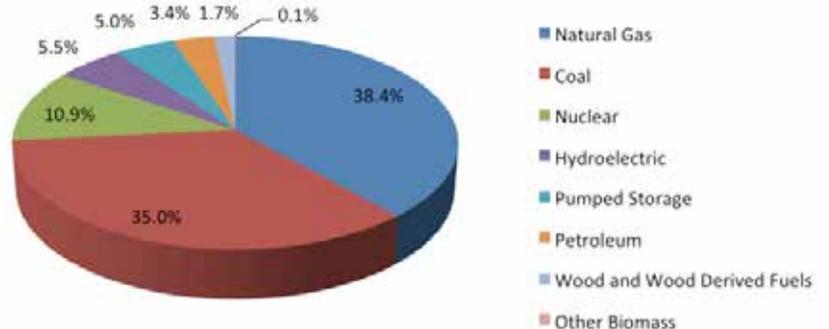


One of the most significant developments in Georgia's electricity market over the past few years is the growing importance of natural gas to the state's electric generation mix. In 2012, 35.6 percent of Georgia's electricity was generated by natural gas. In 2001, just 3 percent of Georgia's electricity was generated by natural gas. Natural gas has become a significant player in the market because dramatically increasing supplies in the U.S. have lowered the price significantly and also because pollution regulations have pressured utilities into switching from coal to natural gas. While less electricity is generated from coal than in the past, it still remains a large and important source of electricity for the state. In 2012, 34 percent of the state's electricity was generated by coal. Approximately 29 percent was generated by nuclear in 2012, with the remainder of the generation made up of hydroelectric, biomass, and other renewables.

ELECTRIC GENERATION BY FUEL TYPE 2012



ELECTRIC CAPACITY 2011



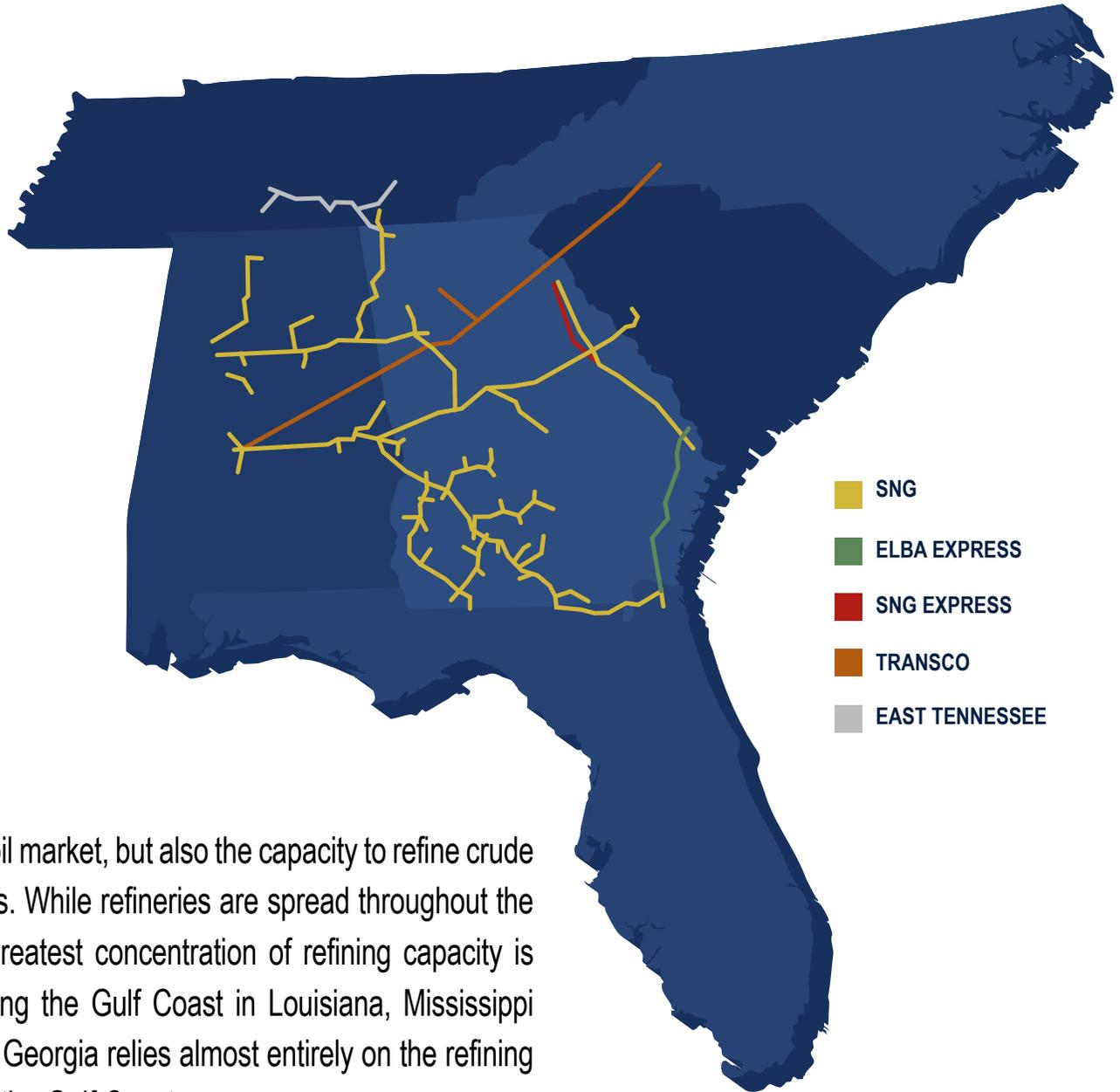
The type of fuel used to generate electricity depends on many factors, including demand, the time of day, the season and the weather. Electric providers must be ready to meet the electricity demands of their customers at all times of the day, despite storage challenges. Electricity generation is usually divided into three categories: baseload (generation run 24 hours per 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 which load category it is used for. Baseload demand is usually satisfied by nuclear and coal generators (due to low variable costs and limited operational flexibility – i.e., it takes time for the generators to warm up), biomass, and some hydroelectric generation (due to low variable costs). Intermediate loads are often satisfied by gas and oil steam turbines, combined cycle gas turbines, and hydroelectric power. These are used because the operational flexibility allows them to be ramped up and down as loads rise and fall during the day, and because variable costs are lower than other options. Peak loads are usually satisfied by single-cycle gas turbines, hydroelectric power, pumped hydroelectric power, and wind- and solar-generating units.

Georgia relies on imported refined petroleum products to meet its demand. Most refined petroleum imports come into the state via two interstate pipelines: Colonial Pipeline and Plantation Pipeline. The Colonial Pipeline system spans 3,500 miles with 5,100 miles of pipe (some of the right away contains more than one line) from Texas to New Jersey, providing refined petroleum products to Alabama, Delaware, Georgia, Louisiana, Maryland, Mississippi, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia. 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 3,100 mile network of pipeline. The states served by the Plantation Pipeline include Alabama, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. The supply of transportation fuels and other refined petroleum products involve not only the supply of crude oil through

PETROLEUM PIPELINES





the global oil market, but also the capacity to refine crude oil into fuels. While refineries are spread throughout the U.S., the greatest concentration of refining capacity is located along the Gulf Coast in Louisiana, Mississippi and Texas. Georgia relies almost entirely on the refining capacity in the Gulf Coast.

The petroleum industry in Georgia includes major companies that import fuel, as well as wholesale and retail distributors, including service stations and fuel oil and propane distributors. While the bulk of the oil products Georgia consumes come to the state via the interstate Colonial and Plantation Pipelines, 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 Albany, Americus, Athens, Bainbridge, Doraville (the largest), Griffin, Macon and Rome. Product terminals are also located in Chattanooga, Tenn. and Jacksonville, Fla.

NATURAL GAS PIPELINES

Natural gas imports into Georgia arrive via three interstate pipelines and an LNG import terminal (Elba Island Terminal) at Elba Island, near Savannah, Ga. Three companies operate the interstate pipelines that deliver natural gas to Georgia – Williams Companies Inc. (which owns the Transco Pipeline), East Tennessee Natural Gas Company (ETNG, owned by Spectra Energy) and Southern Natural Gas Company (SNG, owned by El Paso Pipeline Partners, a subsidiary of Kinder Morgan). The Transco pipeline is the second largest natural gas pipeline system in the nation, and consists of 10,500 miles of pipeline extending from south Texas to New York City. The ETNG pipeline system is 1,353 miles long, begins in Tennessee, and extends to an area just south of Roanoke, Va. 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 (AGL) Company, with a pipeline capacity of 3.6 billion cubic feet (Bcf) per day. SNG's pipeline distributes gas to 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 largest facility is the Riverdale LNG plant, which 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, Ga., has approximately 2,020 Bcf in a storage capacity. 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, Ga., 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. In December 2013, the PSC approved the second part of AGL's Strategic Infrastructure Development and Enhancement (STRIDE) program. The first phase of the program improved capacity and pressure in Atlanta and Riverdale and in Cherokee, Cobb, North Fulton, and Forsyth Counties. The second phase will install new pipelines and other facilities to improve capacity and pressure in Coweta, Fayette, Gwinnett, Hall, Forsyth and Dawson Counties. The STRIDE program extension approved in December 2013 will increase customer bills by \$0.48 per month beginning in January 2015, an additional \$0.48 per month in January 2016, and \$0.47 per month in January 2017.



Photo courtesy of Colonial Pipeline Company



AMERICAN RECOVERY AND REINVESTMENT ACT RESULTS



GEFA received \$82,495,000 in funding for the SEP under the American Recovery and Reinvestment Act of 2009 (ARRA). These funds were distributed into a variety of newly-created programs designed to expand energy-efficiency and renewable energy. Funds were distributed through competitive funding opportunities focused on energy savings, return on investment, geographical diversity and educational opportunities. In addition to the SEP funding, GEFA administered nearly \$125 million in funds for the Weatherization Assistance Program. SEP program expenses and estimated energy savings are shown below:

<u>PROGRAM</u>	<u>AMOUNT ALLOCATED</u>	<u>ANNUAL KWH SAVINGS</u>
CLEAN ENERGY PROPERTY REBATE PROGRAM	\$4,495,000	4,748,947
COMMERCIAL ENERGY-EFFICIENCY	2,000,000	4,588,291
ENERGY CODES UPDATE AND COMPLIANCE	936,364	N/A
GREEN COMMUNITIES FUND	341,400	N/A
INDUSTRIAL ENERGY-EFFICIENCY	2,000,000	135,993,286
PROGRAM MANAGEMENT SUPPLEMENT	1,722,236	N/A
RESIDENTIAL ENERGY-EFFICIENCY	2,000,000	4,053,327
RENEWABLE ENERGY	4,000,000	1,775,483
STATE ENERGY STAR APPLIANCE REBATE	787,877	2,640,062
STATE FACILITIES RETROFIT PROGRAM	64,212,123	95,611,837
TOTAL	\$82,495,000	249,411,233

THE GEORGIA AGRICULTURAL IRRIGATION MOTOR (AIM) PROGRAM

GEFA PROVIDED FUNDING FROM ARRA OF 2009 TO THE PINE COUNTRY RESOURCE CONSERVATION AND DEVELOPMENT COUNCIL INC., THROUGH A CONTRACT WITH DODGE COUNTY, TO LAUNCH A REBATE PROGRAM TO HELP FARMERS WITH THE COSTS OF REPLACING INEFFICIENT DIESEL IRRIGATION ENGINES WITH MORE ENERGY-EFFICIENT ELECTRIC IRRIGATION MOTORS. FARMERS IN BLECKLEY, DODGE AND TWIGGS COUNTIES HAD THE OPPORTUNITY TO APPLY FOR REBATES UP TO \$15,000. GIVEN THE SUCCESS OF THE ARRA PROGRAM, GEFA LAUNCHED ITS OWN IRRIGATION MOTOR REPLACEMENT PROGRAM, THE GEORGIA AGRICULTURAL IRRIGATION MOTOR (AIM) PROGRAM. THE GEORGIA AIM PROGRAM PROVIDED FARMERS WITH REBATES TO REPLACE DIESEL ENGINES WITH ELECTRIC MOTORS.

ELIGIBLE ELECTRIC IRRIGATION MOTOR CONVERSION PROJECTS HAD TO TAKE PLACE IN THE STATE OF GEORGIA, AND REPLACE A DIESEL ENGINE AT LEAST 10 YEARS OLD AND IN SERVICE. THE REBATES COVERED 25 PERCENT OF ELIGIBLE PROJECT COSTS UP TO \$10,000, INCLUDING EXPENSES ASSOCIATED WITH CONNECTING THE ELECTRIC MOTOR TO THE POWER METER, THREE-PHASE CONVERTERS AND VARIABLE FREQUENCY DRIVES.

THE FIRST ROUND OF THE PROGRAM AWARDED 34 FARMERS THROUGHOUT THE STATE WITH REBATES TOTALING \$154,309. THE NEW INSTALLATIONS WERE PROJECTED TO SAVE 30,167 MMBTUS OF ENERGY ANNUALLY, AND REDUCE ANNUAL DIESEL FUEL CONSUMPTION BY 217,029 GALLONS. THE SECOND ROUND OF THE GEORGIA AIM PROGRAM LAUNCHED IN DECEMBER 2013, AND WILL LAST UNTIL THE AVAILABLE \$146,000 IS FULLY ALLOTTED.

THE GEORGIA AIM PROGRAM WAS AN INCENTIVE PROGRAM DESIGNED TO HELP GEORGIA FARMERS BECOME MORE ENERGY-EFFICIENT, SAVE MONEY ON FUEL COSTS, AND REDUCE EMISSIONS, AS WELL AS PROMOTE JOB GROWTH.

SEP PROGRAM DESCRIPTIONS:

CLEAN ENERGY PROPERTY REBATE PROGRAM (4,748,947 IN ANNUAL KWH SAVINGS):

The program provided a rebate of 35 percent off the total project costs, up to a maximum of \$500,000 for solar photovoltaics (PV) and \$100,000 for eligible lighting retrofits. These rebates were provided on a first-come, first-served basis to applicants under contract with GEFA. The program funded 19 solar PV systems with a total installed capacity of 2,090 kW, and three lighting retrofits covering 1,239,307 square feet with total estimated annual energy savings/generation of 4,748,947 kWh.

RENEWABLE ENERGY GRANTS (1,775,483 IN ANNUAL KWH SAVINGS):

The Renewable Energy Grants Program funded market transformation activities in renewable energy, including wind, solar PV, and solar hot-water heating. Georgia received \$4 million for this program and the grants were awarded on a competitive basis. A total of five grants were awarded, which included 34 solar PV installations, 13 solar hot water projects and one wind installation.

STATE ENERGY STAR APPLIANCE REBATE PROGRAM (2,640,062 IN ANNUAL KWH SAVINGS):

Georgia's ENERGY STAR Appliance Rebate program ran from February 2012 until funds were exhausted in August 2012. In November 2012, GEFA launched Phase II of the rebate program with a transfer of \$787,877 from the State Facilities Retrofit Program. GEFA offered rebates for all ENERGY STAR appliances listed in the U.S. Department of Energy's (DOE) original funding opportunity. Rebate values ranged between \$25 and \$199. High-efficiency clothes washers, refrigerators and furnaces were among the most frequently purchased appliances. The program incentivized the purchase of \$9,004,003 in ENERGY STAR appliances with projected annual energy savings of 2,640,062 kWh.

STATE FACILITIES RETROFIT (95,202,055 IN ANNUAL KWH SAVINGS):

The State Facilities Retrofit Program spent \$62,142,265 to implement 101 energy conservation measures (ECMs) in 1,683 buildings owned by the state of Georgia. These projects will achieve annual energy costs savings of \$9,826,221. The projects will result in annual electricity savings of 95,202,055 kWh and annual fossil fuel savings of 397,159 MBTU. Savings are documented by individual project measurement and verification plans. The projects included a wide range of facility types and the ECM's consisted of mechanical, lighting, controls, commissioning, and building envelope projects.

In February 2006, former Governor Perdue directed GEFA to lead an inclusive, statewide stakeholder process to develop the first comprehensive State Energy Strategy for Georgia (SES). In December 2006, the Governor's Energy Policy Council submitted the SES to Governor Perdue, which provided 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 SES regularly and ensure that the state's energy programs are in-line with the goals of the SES.

The SES 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 SES recognizes the need for a combination of all resources with the assumption that no single resource can or will be sufficient to meet our future energy needs in an environmentally responsible and economical way.



CONSERVATION AND EFFICIENCY

PHILLIPS STATE PRISON

IN AUGUST 2013, THE GEORGIA DEPARTMENT OF CORRECTIONS CONTRACTED WITH JOHNSON CONTROLS TO IMPLEMENT ENERGY AND WATER CONSERVATION MEASURES AT PHILLIPS STATE PRISON IN BUFORD, GA. THE MEASURES WERE IDENTIFIED DURING THE INVESTMENT GRADE ENERGY AUDIT CONDUCTED EARLIER IN THE YEAR. AN INVESTMENT GRADE ENERGY AUDIT IS A COMPREHENSIVE ANALYSIS TOOL THAT DETERMINES THE PRACTICALITY OF IMPLEMENTING ENERGY AND WATER CONSERVATION MEASURES AT A FACILITY, AS WELL AS THE FINANCIAL FEASIBILITY OF ENTERING INTO AN ENERGY PERFORMANCE CONTRACT. THIS PROJECT IS THE FIRST ENERGY PERFORMANCE CONTRACT AT A STATE AGENCY.

PHILLIPS STATE PRISON IN GWINNETT COUNTY WAS CONSTRUCTED IN 1988, AND HOUSES MORE THAN 900 INMATES. THE AUDIT RECOMMENDED 11 ENERGY AND WATER CONSERVATION MEASURES FOR PHILLIPS STATE PRISON, INCLUDING ELECTRONIC CONTROLS TO REDUCE WATER CONSUMPTION AND MONITOR USE; NEW HEATING AND DOMESTIC HOT WATER BOILERS; A NEW CHILLER AND OTHER IMPROVEMENTS TO THE HVAC SYSTEMS SUCH AS A NEW BUILDING AUTOMATION SYSTEM; IMPROVED INTERIOR LIGHTING; NEW ICE MACHINES IN THE KITCHENS TO REPLACE EXISTING EQUIPMENT; AND UPDATES TO THE LAUNDRY SYSTEMS.

THE DEPARTMENT OF CORRECTIONS AND JOHNSON CONTROLS ARE EXPECTING SUBSTANTIAL ENERGY AND WATER SAVINGS. THE ENERGY CONSERVATION MEASURES ARE PROJECTED TO ANNUALLY SAVE 621,129 KWH OF ELECTRICITY AND 149,411 THERMS OF NATURAL GAS. ELECTRICITY CONSUMPTION WILL BE REDUCED BY 15.5 PERCENT AND NATURAL GAS USE WILL BE REDUCED BY 43.4 PERCENT. THE TOTAL AMOUNT OF ENERGY THAT WILL BE SAVED (KWH OF ELECTRICITY AND BTU OF NATURAL GAS) IS EQUAL TO THE AMOUNT OF ENERGY THAT 190 TYPICAL GEORGIA HOMES USE IN A YEAR. THE WATER CONSERVATION MEASURES ARE PROJECTED TO SAVE THE FACILITY 27,945,000 GALLONS OF WATER ANNUALLY (A 38.7 PERCENT REDUCTION), WHICH IS ENOUGH WATER TO FILL APPROXIMATELY 42 OLYMPIC-SIZE SWIMMING POOLS. GUARANTEED SAVINGS ARE ESTIMATED TO BE \$445,579 IN THE FIRST YEAR. OVER THE 15-YEAR TERM OF THE CONTRACT, THE GUARANTEED SAVINGS WILL EXCEED \$7.3 MILLION. THE TOTAL PROJECT COST IS \$4.5 MILLION.

Increasing conservation and efficiency is the simplest and most cost-effective way for Georgia to meet its future energy needs while preserving our environment and resources. The SES's goal of conservation and efficiency first helps drive GEFA's program decisions. As a result of this, more funding from ARRA was spent on efficiency than other technologies. Since the last Georgia Energy Report in 2012, GEFA has continued to implement existing efficiency programs as well as create new programs. Initiatives by GEFA and the state of Georgia include:

GEORGIA ENERGY CHALLENGE (GEC): Public awareness campaign that includes state energy reduction goals, formal energy education curricula, residential and commercial energy modeling and demonstration projects. The GEC includes the state's goal to reduce state facility energy consumption 15 percent by 2020, compared to a 2007 baseline.

CLEAN ENERGY PROPERTY TAX CREDIT (CEPTC): Includes incentives for buildings that achieve significant (30 percent) reductions beyond the required energy code or install efficient lighting systems or geothermal heat pumps. The CEPTC expires at the end of 2014.

ENERGY CODES: Georgia adopted the 2009 International Energy Conservation Code, making the state a leader in using energy codes to encourage efficiency and conservation, as well as training home builders.

THE STATE UTILITIES PROGRAM (SUP): Supports state facility managers and administrators in developing energy procurement and management strategies that control the state's energy costs, reduce the state's energy consumption and improve the state's overall environmental performance. State facilities received \$65 million through ARRA and the SEP for energy-efficiency retrofits.

GUARANTEED ENERGY SAVINGS PERFORMANCE CONTRACTING (GESPC): Georgia's first guaranteed energy savings performance contract was signed in July 2013 for a \$4.5 million project at Phillips State Prison in Buford, Ga. In August 2013, GEFA received applications for more than \$80 million worth of GESPCs. In a GESPC, the energy services company (ESCO) guarantees that the state will save an agreed upon amount of money with the installation of modern, energy and water-efficient equipment and systems. Rather than having to appropriate all the funds in one year, the state uses the guaranteed savings to repay the ESCO for its work over a period of years.

WEATHERIZATION ASSISTANCE PROGRAM (WAP): Works with low-income households to reduce energy costs by providing free home energy efficiency testing and solutions for low-income individuals and families. From program years 2010 through 2013, WAP weatherized 20,106 homes, which amounts to an annual savings of 613,234 MMBtu.

STATE ENERGY PROGRAM (SEP): Implements a variety of energy efficiency and renewable energy projects. The SEP is funded by the DOE and is managed by GEFA. Current SEP initiatives include the Agricultural Irrigation Motor Program and the K-12 Technical Assistance Program (TAPs). SEP received more than \$82 million in funding through ARRA.

BUILDING OPERATOR CERTIFICATION: Twenty-one K-12 building operators throughout Georgia received \$31,479 in scholarships to complete Building Operator Certification training.

GEFA WATER RESOURCES DIVISION CONSERVATION LOANS: GEFA recently started providing low-interest loans from the Georgia Fund, the Drinking Water State Revolving Fund (DWSRF), and the Clean Water State Revolving Fund (CWSRF) for energy efficiency and renewable energy projects at landfills, drinking water treatment plants, and wastewater plants. The loans are available for local governments across Georgia and will help offset one of the most expensive and energy intensive services that many local governments provide.

Since the 2012 Georgia Energy Report, there have been significant movements towards more distributed and utility scale solar in the state. The combination of Georgia's solar resources and the steep decline in the price of solar PV has made solar energy development more attractive. In 2012, the Public Service Commission (PSC) approved Georgia Power's plan to add 210 MW of solar electricity to the grid through its Advanced Solar Initiative (ASI) program. In 2013, Georgia Power agreed to add another 525 MW of solar.

The past few years have seen a number of innovative landfill gas and wastewater gas projects in the state. With the help of ARRA funds administered through GEFA, Hickory Ridge Landfill in DeKalb County was able to build a landfill gas capture system and implement 1 MW of thin-film solar on the landfill's cap. GEFA's Water Resources Division (WRD) funded a methane capture project at Atlanta's R.M. Clayton Water Reclamation Center. The captured methane powers generators that are then used to help power the plant's operations. The recovery system is designed to produce 11 million kWh of renewable electricity per year, or approximately 16 percent of the electricity consumption of the plant, and is estimated to save as much as \$1.2 million per year in energy cost savings. In DeKalb County, the Seminole Road Landfill captures landfill gas to convert to electricity, but the project also converts gas to LNG for the county's trucks and has the ability to put excess gas back into a natural gas utility pipeline. Innovative projects such as these show how sustainable energy projects can be implemented in ways that make sound business sense and benefit the environment.

Traditionally, Georgia is not seen as wind energy state; however, there are a couple of projects that show there is a future for wind energy in Georgia. The U.S. Bureau of Ocean Energy Management (BOEM) is in the process of reviewing Southern Company's application for a meteorological tower and buoy off the coast of Georgia to collect wind data. This represents one of the first steps in evaluating the area for potential offshore wind development. Land-based wind has not been developed at a utility scale in Georgia; however, utilities in the region are proposing and procuring wind power purchase agreements to bring wind in from states such as Oklahoma. The cost of wind energy has decreased to a point that it can be transmitted over long distances and still be cost effective.



Photo courtesy of Republic Services

STEPS TAKEN:

THE GEORGIA CENTER OF INNOVATION FOR ENERGY:

Acts as a facilitator between the academic, government and the private sector to encourage the growth of Georgia's renewable energy and biofuels industry. Its "One-Stop-Shop" brings together representatives of the local, state and federal government to meet with energy companies to address questions about doing business in Georgia. The streamlined process accelerates business startup by helping companies cut through bureaucracies and permitting processes.

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 research and development in support of bioenergy and other renewable energy alternatives. Examples of this include the Georgia Institute of Technology's University Center of Excellence for Photovoltaics and the University of Georgia's Bioenergy Systems Research Institute.

PROMOTE ALTERNATIVE AND CLEAN ENERGY SOURCES:

GEFA is implementing an innovative program to use low-interest loans to help support renewable energy projects at local government wastewater, drinking water, and landfill sites across the state. Projects can be funded by the Georgia Fund, the DWSRF and the CWSRF.

STUDYING AND PROMOTING WIND RESOURCES:

A number of organizations in Georgia, including the Georgia Institute of Technology, Southern Company, GEFA, the Department of Natural Resources, and groups such as the Georgia Wind Working Group (GWWG), are working to evaluate wind resources in the state and to educate stakeholders on the development and permitting process.

ADVANCED TRADITIONAL TECHNOLOGY

K-12 BUILDING OPERATOR CERTIFICATION® SCHOLARSHIP

K-12 BUILDING OPERATOR CERTIFICATION® SCHOLARSHIP PROGRAM HELPS GEORGIA SCHOOLS SAVE ENERGY AND MONEY. THE GEORGIA ENVIRONMENTAL FINANCE AUTHORITY (GEFA) PROVIDED 40 SCHOLARSHIPS IN 2012 AND 2013 FOR GEORGIA'S K-12 BUILDING AND MAINTENANCE PERSONNEL TO ATTEND BUILDING OPERATOR CERTIFICATION® (BOC) TRAINING OFFERED BY GWINNETT TECHNICAL COLLEGE. THE BOC IS A NATIONALLY-ACCREDITED PROGRAM THAT PROMOTES ENERGY EFFICIENCY BY TRAINING FACILITIES PERSONNEL IN MAKING HEATING, VENTILATION, AND AIR CONDITIONING (HVAC), ELECTRIC AND LIGHTING SYSTEMS MORE ENERGY EFFICIENT. GWINNETT TECHNICAL COLLEGE'S BOC PROGRAM WAS RECENTLY NAMED A 2012 ENERGY STAR AWARD FOR EXCELLENCE WINNER FOR ITS OUTSTANDING CONTRIBUTIONS IN CONSUMER EDUCATION TO PROMOTE ENERGY-EFFICIENT TOOLS. THE COURSES OFFERED THROUGH THE BOC SEEK TO MEET THE DEMAND FOR EFFICIENCY PRACTICES AND FOCUSES ON UNDERSTANDING THE INTEGRATED NATURE OF FACILITY SYSTEMS.

THE BOC LEVEL ONE COURSE IS INTENDED FOR FACILITY PERSONNEL WITH TWO OR MORE YEARS OF BUILDING OPERATION AND MAINTENANCE EXPERIENCE WHO WISH TO INCREASE THEIR KNOWLEDGE OF THE TOTAL BUILDING SYSTEM. TRAINING CONSISTS OF EIGHT DAYS OF CLASSROOM INSTRUCTION, PROJECT ASSIGNMENTS COMPLETED AT THE PARTICIPANT'S FACILITY, AND IN-CLASS EXAMS ADMINISTERED AT THE END OF EACH DAY OF TRAINING.

THE GEFA SCHOLARSHIP PAID FOR THE LEVEL ONE BOC COURSE. THE LEVEL ONE COURSE WAS EXCLUSIVELY OFFERED TO K-12 OPERATORS TO ENCOURAGE PEER-TO-PEER EXCHANGE AND TO SHARE BEST PRACTICES. IN ADDITION TO THE STANDARD TRAINING, EACH PARTICIPANT DEVELOPED A SCHOOL-SPECIFIC ENERGY ACTION PLAN AND TRACKED THEIR SCHOOL'S ENERGY USAGE. ENERGY SAVINGS DATA PROVIDED SHOWS AN AVERAGE ENERGY SAVINGS OF \$8,322 PER SCHOOL PER PARTICIPANT PER YEAR.

Conservation, efficiency, and renewables are going to be a critical part of meeting Georgia's future energy needs, but a significant need will still exist for energy from traditional sources such as natural gas, coal, and nuclear. Across the U.S. and in Georgia, coal plants are being retired due to age and inefficiency, but also pollution concerns. New regulations are requiring coal plants to be updated with pollution control technology and it is not always economical to spend the money on certain older units.

New generation from fossil fuels will largely be made up of modern combined cycle natural gas turbines and nuclear plants. Natural gas prices in the U.S. are low and natural gas combustion produces significantly less pollution and carbon dioxide (CO₂) than coal power plants. A striking example of the switch to natural gas in Georgia is the transformation of Plant McDonough-Atkinson, in metro Atlanta, from coal powered to three combined cycle natural gas turbines in 2012. According to Georgia Power, the fuel switch at Plant McDonough-Atkinson will result in 95 percent reduction in nitrogen oxide emissions, 99 percent reduction in sulfur dioxide emissions, 100 percent reduction in mercury emissions, and 50 percent reduction in CO₂.

In addition to movement towards more natural gas fired plants, nuclear is growing in Georgia with Plant Vogtle adding two new reactors. Plant Vogtle, jointly owned by Georgia Power, Oglethorpe Power, MEAG Power and Dalton Utilities, is adding two Westinghouse AP 1000 1,100 MW reactors. Plant Vogtle Units 3 and 4 are set to open in 2017 and 2018, respectively, which will likely make them the first nuclear reactors completed in the U.S. since the 1980s.

Producing electricity more cleanly and efficiently is just one part of Georgia's advancing electricity technology. Delivering electricity more efficiently and reliably is another key component. Utilities across the state are rolling out increasing amounts of smart grid infrastructure, which improves both efficiency and reliability of the electric grid. From advanced meters at the customer level to advanced communications and computer systems at the distribution and transmission level, smart grid technology is helping to enable increased distributed generation, greater efficiency, lower operating costs for utilities, and quicker response and restoration times when portions of the grid lose power.

Photo courtesy of Georgia Power Company



Metro Atlanta became the number one market in the nation for Nissan's Leaf in August 2013. Electric vehicle (EV) ownership in Georgia is surging, with more than 5,000 EVs cruising Georgia's roads, streets and highways, according to Clean Cities Georgia. While electric vehicles are not new, there are a number of factors influencing sales growth in Georgia and across the nation.

EVs have traditionally been expensive to purchase. Thanks to declining technology costs and tax incentives, the cost to purchase an EV is lower than ever, with prices as low as \$30,000 before incentives. Georgia has the Zero Emission Vehicle (ZEV) tax credit, which provides 20 percent or up to \$5,000 in tax credits towards the purchase of a new EV. The federal government also has a tax credit program, the Qualified Plug-In Electric Drive Motor Vehicle Tax Credit, which provides up to \$7,500 towards a new EV. In addition to tax incentives to support the purchase of new EVs, Georgia Power has adopted a Plug-in Electric Vehicle (PEV) rate that encourages charging at low rates between 11:00 p.m. and 7:00 a.m. Georgia Power estimates that charging during this time frame is the cost equivalent of \$0.55 per gallon of gasoline.

One of the biggest challenges to widespread EV adoption is "range anxiety," a term coined to describe people's fears of being stranded due to a dead battery and no place to charge. EV range has never been better, with numerous EVs on the market being able to easily exceed 75 miles on a single charge, and some high-end models even being able to exceed 200 miles on a single charge. In recent years, many businesses and places of employment have installed electric charging stations, and there are plans to extend charging stations along high-volume interstate routes. According to the Federal Highway Administration, the average American drives about 36 miles per day. With many Americans driving long distances each day, attractive tax incentives at the state and federal level, and cheaper prices for such vehicles, EV ownership is increasing.





Georgia Environmental Finance Authority
233 Peachtree Street NE | Harris Tower, Suite 900
Atlanta, Georgia 30303 www.gefa.org
404.584.1000 (Main) 404.584.1069 (Fax)

