

Georgia Environmental Finance Authority

Georgia Energy Report

2022



Contents

03

Introduction

04

Initiatives and Programs

24

Energy by Sector

25

Energy Consumption





Introduction

To the people of Georgia: We are proud to present the 2022 Georgia Energy Report.

The Georgia Environmental Finance Authority's (GEFA) Energy Resources Division, under the leadership of Kristofor Anderson, has compiled this report to provide a high-level overview of Georgia's energy sector.

The report is a valuable resource for policymakers and other stakeholders interested in Georgia's energy future. I hope you enjoy reading and learning about Georgia's energy programs, usage, resources, and related trends at a state and national level.

As energy demands increase due to Georgia's growing population and economy, energy efficiency and a diversified energy portfolio are more significant than ever. The 2022 Georgia Energy Report highlights the growth of energy efficiency and renewable energy, the future of energy, and changes in American energy policy and production. The report also summarizes GEFA programs that support Georgia's energy goals to conserve and improve energy resources. The report contains an overview of Georgia's energy data, including production and consumption statistics.

GEFA is responsible for funding more than 600 kilowatts (kW) of solar energy installations, providing scholarships for energy education and workforce development, updating building energy codes, weatherizing homes, and aiding in critical events throughout Georgia.

For Georgia,



Hunter Hill, Executive Director
Georgia Environmental Finance Authority

Energy Assurance

The state of Georgia and the Southeast region of the U.S. are susceptible to an array of natural disasters, such as ice storms, flooding, and hurricanes. Beyond natural disasters, cybersecurity attacks and global pandemics have also been added to the growing list. To prepare for and respond to energy shortages caused by these critical events, GEFA works with the Georgia Emergency Management Agency (GEMA) to lead Emergency Support Function #12 (ESF-12). GEFA utilizes the U.S. Department of Energy (DOE) funding to maintain a statewide Energy Security Plan and lead ESF-12 in workshops, exercises, and trainings to prepare for such events.

A key component of ESF-12 is to engage with private-sector partners, who own and operate the majority of Georgia's energy supply and infrastructure, to provide assistance and communication during critical events. Numerous critical events including severe weather formations such as Tropical Storm Zeta and Hurricane Michael have caused devastating destruction to the state.

These events can reduce fuel availability and disrupt electricity to millions of consumers, often cutting off electricity to critical facilities, including hospitals, nursing homes, 911 centers, water and wastewater treatment plants, and cellular communication towers. In Southwest Georgia, winds from Hurricane Michael reached speeds of 74 mph, knocking down many trees and powerlines. The hurricane resulted in roughly \$2.3 billion in agriculture and timber losses and left 1.7 million customers in the Southeast without electricity.¹

Acting as a liaison during such events, GEFA communicates with electrical utilities and leadership of local, state, and federal divisions to convey power outages, respond to resource requests, and provide event updates on outages and restoration times in effected areas. At times, GEFA staffs the State Operations Center around-the-clock until the emergency has settled. GEFA will continue to lead ESF-12 and work with other state agencies and the private sector to enhance the state's response capabilities.

¹ https://www.weather.gov/ffc/2018_hurricane_michael&lang=en



Fuel Storage Tank Program

The Fuel Storage Tank Program (FSTP) is the centralized management and monitoring office for fuel storage tanks owned by state agencies and institutions.

The FSTP was established in 1995 in response to federal construction and maintenance standards for underground storage tanks (USTs). The program expanded in 2004 to include oversight and maintenance of state-owned aboveground storage tanks (ASTs). The FSTP assists state agencies with running tank operations and ensuring fuel delivery companies are taking necessary safety measures to prevent leaks and spills. Currently, there are more than 600 active USTs and ASTs at more than 300 state-owned sites.

The Georgia Environmental Protection Division (EPD) enforces state and federal rules and regulations for USTs, while local fire marshals regulate ASTs.

EPD inspects USTs at state facilities every three years. Violations found during inspections can lead to hefty fines and, in severe cases, the closing of the facility. If a leak has occurred or clean up is needed, the FSTP will coordinate with EPD, the site, and contractors to ensure proper protocols are in place and clean up ensues in a timely manner.

The FSTP contracts with petroleum equipment and service companies to perform annual inspections, provide site maintenance when requested, and environmental cleanup of petroleum contamination when necessary. The FSTP also approves work scopes and manages invoices.



Weatherization

The Weatherization Assistance Program (WAP) utilizes a "whole house weatherization" approach. Through this approach, household energy audits are conducted to analyze the entirety of the building system, including exteriors, electrical systems, appliances, etc. This method requires advanced diagnostic skills, installation knowledge, and selection of appropriate cost-effective measures. Energy efficient upgrades through the program can include air and duct sealing, wall and attic insulation, heating and ventilation improvements, and hot water tank installations. From April 2021 to April 2022, 676 homes were weatherized throughout the state of Georgia.

Through the WAP annual funding, DOE allocated the Weatherization Readiness funds. These funds are designated to aid households that are at risk of deferral because they do not meet WAP guidelines. A deferral can happen if the inspector of the dwelling has found significant defects or hazards that cause WAP methods to be defective or require measures that are outside of the WAP scope. The funding is targeted to reduce the frequency of deferred homes within the program.

WAP will also receive funding from the Bipartisan Infrastructure Law (BIL). BIL funding will span over a five-year timeline, with a tentative issue date beginning at the end of 2022. Through BIL, Georgia will receive \$84 million in additional WAP funding to aid in efficient infrastructure investments and the reduction of energy costs for low-income households across the state.

WAP increases energy efficiency and decreases energy costs within low-income households. Lower-income households are typically less energy efficient, and many WAP participants are spending up to 30 percent of their income on energy costs. WAP provides free energy auditing and efficient solutions for single family, multifamily, and mobile units.

Conservation

The Clean Water State Revolving Fund (CWSRF) and the Drinking Water State Revolving Fund (DWSRF) are federally-funded programs that assist communities with the expensive and energy intensive services involved with drinking water and wastewater treatment.

GEFA has several loan programs for local governments to finance a wide range of energy production, energy conservation, and energy management projects at water and wastewater facilities and publicly-owned landfills. GEFA provides a 1 percent interest rate reduction on loans for energy efficient and conservation-focused projects. Many local governments and nonprofit organizations have taken advantage of these loans to save money and energy and to preserve the environment.

Energy production and conservation eligible projects can include landfill gas collection, inflow/infiltration detection projects, providing SCADA equipment, and the installation of energy efficient treatment equipment and processes. Eligible energy production or conservation projects may be funded as part of a larger infrastructure project or as a stand-alone project. GEFA will work with borrowers to identify which portion(s) of the project are eligible for the energy conservation designation.

Several counties, including DeKalb County and the city of Cuthbert have taken advantage of the 1 percent interest rate reduction. The loan was used by both communities to participate in a sewer rehabilitation project that addressed issues with water inflow and infiltration. These energy conservation projects lead to increased energy savings by reducing pumping needs and treatment costs at the sewer sites.

Energy Code Updates

Energy codes represent the minimum or baseline requirements for energy-efficient design and construction for residential and commercial buildings. Energy codes apply to:

01

BUILDING ENVELOPE WALLS, FLOORS, CEILINGS, DOORS, AND WINDOWS

02

HEATING, VENTILATING, AND COOLING SYSTEMS

03

LIGHTING SYSTEMS AND EQUIPMENT

04

WATER-HEATING SYSTEMS AND EQUIPMENT

Georgia Energy Code

Effective January 1, 2020, the Georgia Energy Code was updated to the 2015 International Energy Conservation Code (IECC) with the addition of several Georgia specific supplements and amendments. In Georgia, designers and builders in the commercial sector have the option to comply with either the IECC-2015 or ASHRAE 90.1-2013.

Building energy codes include standards to reduce energy consumption and carbon dioxide emissions.

The codes also aid in cost reductions by addressing efficiencies and improvements to the building envelope, mechanical systems, water heating, lighting, and electrical power. Georgia's 2020 energy code brings forward several state specific amendments and includes enhanced graphics that illustrate proper construction details for insulation installation, envelope and duct sealing, as well as a fileable Georgia Residential Energy Code Compliance Certificate.

In preparation for rollout of the new code in 2020, GEFA contracted with Southface Energy Institute to conduct statewide trainings and develop supplemental resources to assist building professionals across the industry. Southface organized more than 50 trainings in 21 counties across Georgia, reaching 1,775 registered building code officials, inspectors, builders, designers, contractors, and subcontractors.

Performance Contracting

GEFA manages the energy savings performance contracting program for the state.

In an energy performance contract, the energy services company (ESCO) guarantees the state will save an agreed-upon amount of money with the installation of energy- and water-efficient equipment and systems. Rather than appropriating the funds to pay for the work, the state uses a loan from a third-party financial institution. The guaranteed savings allow the agency to pay off the loan in a budget-neutral manner.

Agencies can enter into contracts of up to 20 years. Each year the ESCO performs measurement and verification (M&V) to ensure the project is achieving the guaranteed savings. Energy performance contracts are a proven, budget-neutral way for agencies to fund efficiency and operational improvements. As a result, the contracts are common in the public and private sectors.

Since the program began in 2010, the six state agencies listed below entered into eight energy performance contracts worth approximately \$88 million in construction costs:

- The Georgia Institute of Technology
- The University of Georgia
- Georgia World Congress Center Authority
- Georgia Department of Corrections (GDC)
- Georgia Department of Transportation
- North Georgia Mountains Authority

The eight performance contracts have finished construction and are generating significant savings. In fiscal year 2021, these eight performance contracts generated more than \$11 million in realized savings. GEFA will continue to work with state agencies to implement energy performance contracts as an important method for saving energy and money while improving facilities.

Building Operator Certification

The Building Operator Certification (BOC®) is a nationally-recognized, competency-based training and certification program for facility managers, building engineers, and maintenance technicians to improve energy efficiency within their buildings. GEFA and Gwinnett Technical College have partnered together to train more than 200 facility personnel from various local governments and state institutions including Bibb, Clayton, Effingham, Floyd, Fulton, and Gwinnett Counties; Atlanta Public Schools; Georgia State University; University of North Georgia; and Kennesaw State University. As well, students from several government sectors including the Georgia Bureau of Investigation, various county courts, and Georgia Department of Juvenile Justice have attended the course. This is in addition to the 650 students from public and private entities that have paid for training out-of-pocket. Upon BOC® certification, state buildings have reported an annual utility savings per building ranging from \$2,000 to \$10,000.

Through the partnership, GEFA provides a scholarship of \$1,599 to selected individuals to complete eight BOC® level one courses at Gwinnett Technical College.

The courses provide training and technical assistance for state building operators and facility managers on how to operate and maintain their facilities in an efficient manner. As scholarship recipients, students will provide utility data from one facility prior to completing the course and utility data after implementing what they learned. This data allows GEFA to track energy savings and report on the program's effectiveness.

Due to the success and interest within the program, level two courses have been added to the curriculum. Level two scholarship participants are required to submit a high-level project, encompassing facility utility data into an Energy Action Plan that they will present to their facility supervisors. As part of the course, the students must also provide mentorship to a level one student outside of their organization.

In total the program has improved 102 state buildings (13.3 million square feet) and saved a total of more than 6.5 million kilowatt-hours from 2012 to 2019.

STUDENT TESTIMONIAL

"I learned that to truly care for a building, you have to be a scientist, detective, communicator, and an advocate. The BOC teaches you how those skills blend to form a "building operator" making you more valuable to your organization and marketable in the future."

BAILEY GARNER
Gwinnett Technical College

Solar Resiliency Program

The GEFA Solar Resiliency Technical Assistance Program provided financial assistance to local governments to aid in energy resiliency by establishing solar and battery storage at critical facilities.

The program educated facility staff on technical solutions available to help them achieve the highest output and best use of their resources. Critical facilities can vary by community, but often include means of transportation, water, energy, and communications. Examples include public safety buildings, water and wastewater facilities, IT/data centers, healthcare/public health facilities, emergency management offices, government facilities, transportation systems, shelters, and schools.

Phase 1: Solar Resiliency Online Workshop

Phase 1 of the program aimed to educate local governments about solar and storage resiliency hubs for critical infrastructure. GEFA hosted an online workshop that helped define the specific solar/storage capacity needed at critical facilities. The workshop provided a training on regulatory issues, electrical engineering requirements and limitations, critical load design, and accommodation necessary to create a resiliency hub. GEFA provided information to local governments to increase knowledge and understanding of various solar/storage/backup generator technologies and products that can be implemented to increase resiliency. The online workshop also provided local governments with the opportunity to meet with project developers, solar installers, and other industry experts.

Phase 2: Feasibility Studies

Phase 2 of the program provided grant funding for feasibility studies at local government critical facilities to include solar and storage. Two feasibility studies were completed for each applicant selected by GEFA. Each study included the following information, at minimum:

- Proposed sites
- List of critical loads
- Discussion of any obvious impediments to solar plus battery storage solutions
- Proposed solar resiliency solution
- Suitable technology recommendations, based on existing conditions, size of critical load, etc.
- Economic analysis
- Description of how the proposed system will work during a 36-hour grid outage
- Summary and recommendation (including any recommendations for procurement and financing strategy)

Feasibility studies funded in the following communities

Town of Toombsboro	City of Forest Park
Marion County	City of Decatur
Dougherty County	City of South Fulton
Athens-Clarke County	City of Savannah
Jones County	

Phase 3: Funding for Solar Resiliency Installations

Phase 3 of the Solar Resiliency Technical Assistance Program was offered to government entities—cities, counties, K-12 schools, and state agencies to incentivize the installation of solar photovoltaic (PV) and backup batteries at critical facilities.

GEFA reimbursed selected applicants for up to 85 percent of the cost of backup battery and solar PV costs, up to a maximum of \$200,000.

Funding was evaluated using a competitive process. Applications were evaluated based on their positive impact to the community's critical facility resilience. Disadvantaged communities were given extra points in the scoring process based on the community's median income, population growth, and unemployment rate. Critical facilities can vary from community to community but are often a building considered to be a community hub. The applicant needed to include a clear description of the facility and state why it is critical to the community during an emergency.



Resiliency funding was awarded to the following communities

Community	Solar kW	GEFA Funding
City of Decatur	100 kW	\$200,000
Liberty County Schools	35 kW	\$127,500
Athens-Clarke County	52 kW	\$200,000
City of South Fulton	30 kW	\$99,000
Cobb County BOC	56.3 kW	\$150,000
City of College Park	89.6 kW	\$199,811
Savannah Chatham PSS	60 kW	\$187,500
Liberty County Schools (2)	40 kW	\$170,000
Habersham County	83.2 kW	\$175,815
City of Winterville	33 kW	\$105,000

Plant Vogtle

Construction efforts continue as Plant Vogtle's newest additions, units three and four, make advancements in nuclear technology. Approved in 2009, units three and four are the nation's only current nuclear construction projects.

Plant Vogtle is a jointly-owned project financed by four energy and utility companies, which includes Georgia Power (largest shareholder), Oglethorpe Power, Dalton Utilities, and the Municipal Electric Authority of Georgia.

The plant currently operates two 1,180 MW reactors, units one and two. New units three and four will be implementing new technology, two AP1000 reactors, a technology developed by Westinghouse. The new advanced safety system will provide the reactors with the capability to power down without external power or operator actions. The new reactors will produce about 1,117 MW each. The additions will be an important step towards reliable energy for the state, generating more than 17 million megawatt hour (MWh) of electricity, with the capability to power 500,000 homes and businesses with carbon free energy.²

During peak construction of units three and four, the project employed more than 6,000 people, noted as one of the largest job producing projects in Georgia.

When the project is completed, the plant will create approximately 800 permanent jobs to maintain operations.

Once fully operational, Plant Vogtle will become an integral part in Georgia's energy portfolio. Uranium, used to produce nuclear fuel, is a more price reliable option compared to volatile fuel sources such as crude oil. Nuclear energy sources make up approximately 20 percent of the nation's electricity. These continuous developments can promote an environmentally responsible fuel source, decrease our reliance on foreign oil markets, and increase reliable and affordable energy infrastructure.

According to recent updates, various pre-operational tests are being conducted. Unit three is expected to be in operation between December 2022 and March 2023 and unit four will begin operations in late 2023.³ The construction costs for the new units are estimated to be more than \$30 billion.⁴

² <https://www.energy.gov/ne/articles/5-things-you-should-know-about-plant-vogtle>

³ <https://www.ajc.com/news/business/georgias-plant-vogtle-nuclear-expansion-hit-with-new-delays-costs/IPLQ4TUKGJH3TBAQYL7MX5KU7I/>

⁴ <https://www.wrdw.com/2022/05/09/cost-new-units-vogtle-has-more-than-doubled-30b/>

Electric Vehicles

The state of Georgia is rapidly advancing as a top electric vehicle (EV) market, as Georgia car owners move towards more efficient modes of transportation.

Multiple large multi-billion-dollar EV manufacturers, battery producers, and recycling facilities are locating to Georgia. In 2021, EV sales in Georgia rose 29 percent, with more than 30,000 registered EVs on the road. Since 2020, investments in EV-related projects have totaled more than \$13 billion* and are expected to produce more than 18,000* new jobs in Georgia. Georgia has become an appealing location for manufacturers due to Gov. Kemp's legislative priorities, along with extensive infrastructure, prime location, and the business-oriented climate. These EV investments are positioning Georgia to be the south's "Detroit of EVs" as companies continue to locate to the Peach State.⁵

Gov. Kemp and state officials created the Electric Mobility and Innovation Alliance, which constitutes a statewide initiative between government, industries, electric utilities, and other relevant stakeholders to support the growing needs of electrification manufacturers and EV infrastructure.

⁵ <https://www.axios.com/local/atlanta/2022/06/28/electric-vehicle-popularity-georgia>

⁶ <https://www.georgia.org/EV>

⁷ <https://businessfacilities.com/2022/05/hyundai-will-build-first-fully-dedicated-ev-plant-in-georgia/>

⁸ <https://gov.georgia.gov/press-releases/2020-05-05/sk-innovation-begin-construction-second-georgia-battery-facility-july>

⁹ <http://capitol-beat.org/2022/07/sk-battery-america-stepping-up-to-hire-georgia-veterans/>

¹⁰ <https://www.georgia.org/blog/georgia-emerges-hub-sustainability>

¹¹ <https://gov.georgia.gov/press-releases/2022-08-18/gov-kemp-korean-lithium-ion-battery-recycler-sungeel-hitech-build-first>

* This is the combined total of estimated investments according to press reports from Hyundai, Rivian Inc., and SK Innovation.

* This is the combined total of estimated jobs according to press reports from Hyundai, Rivian Inc., and SK Innovation.





Rivian Inc. (Rivian), an EV producer, is expanding to Georgia, with a \$5 billion investment in the production of its electric adventure vehicle. The manufacturing facility will be located on a 2,000-acre megasite in Morgan and Walton Counties. The facility construction is expected to begin summer of 2022, with a goal for commercial production beginning in 2025. The new facility is expected to produce 400,000 vehicles annually and to employ more than 7,000 workers. The facility will also serve as a Rivian research center to support future ventures.⁶

The Hyundai Motor Company is building its first fully dedicated EV and battery manufacturing facility in Georgia. The facility will be located on a megasite in Bryan County and will be the first of its kind in the U.S. With Hyundai's initial investment of \$5.54 billion, the facility is expected to generate another \$1 billion in outside investments and create more than 8,000 new jobs. The facility is scheduled to begin construction in January 2023 and expected to be fully operational in 2025. The vehicle factory will be capable of producing an annual capacity of 300,000 units over a wide range of models.⁷

SK Innovation is a global leader in developing and manufacturing lithium-ion batteries for EVs. SK Innovation is building its second EV battery manufacturing facility in Jackson County, Georgia, a \$1.67 billion investment. When both facilities are in operation, SK Innovation will be capable of producing batteries for 310,000 EVs annually. Completion of the second facility is expected by 2023.⁸ The new facility will employ more than

2,600 new employees. In partnership with the Georgia National Guard, a portion of SK Innovation's employees will be Georgia veterans in support of the "Work for Warriors" Program.⁹

Ascend Elements is anticipated to invest \$43 million in opening a commercial scale lithium-ion battery recycling plant. The company will recycle critical battery materials at a 98 percent recovery rate, then supply the viable materials back to the supply chain for continuous battery manufacturing. Located in Covington, Georgia, this facility will be the largest of its kind in the U.S. and is set to be fully operational by the end of 2022.¹⁰

Other lithium-ion battery recyclers, such as SungEel Recycling Park Georgia LLC, are locating to Georgia. The Korea-based global company is investing \$37 million to open its first U.S. battery recycling facility. The facility will be in Stephens County and provide 100 new job opportunities.¹¹

As more EVs fill the roads, there is an increased need for charging infrastructure. There are more than 1,500 public charging stations located in the state, with 3,770 individual outlets.⁶ The new National Electric Vehicle Infrastructure (NEVI) funds, awarded to the Georgia Department of Transportation (GDOT), will go to increasing convenience and access to public charging infrastructure. The money will fund the creation of alternative fuel corridors (AFC) along frequently-traveled highways to reduce range anxiety and create a more connected EV network.

Coal

In recent years, coal generated power has decreased in significance as Georgia's energy portfolio becomes more diverse.

Georgia is not a coal producing state and relies on coal imports from out-of-state sources. Due to the reliance and shifts in energy markets to meet emission regulations, Georgia's consumption of coal has declined from roughly 35 million tons in 2010 to 8 million tons in 2020. In 2010, coal-fired power plants accounted for roughly half of the power generation in Georgia. Since the steady decrease in coal consumption, coal now fuels approximately 15 percent of in-state power. Since 2010, 4,000 megawatts (MW) of coal generation capacity have been retired in Georgia.¹²

Every three years, Georgia Power drafts the Integrated Resource Plan (IRP). This document outlines future energy strategies and implementation for the state and Southeast customers. Recently, the 2022 IRP was approved by the Georgia Public Service Commission (PSC). The approved IRP includes the retirement of several outdated coal power units, with the exception of two Bowen Steam Plant units, which will continue to operate until readdressed in the 2025 IRP. By 2028, the potential plan is to decommission all Georgia Power coal units, which generate roughly 3,500 MW of electricity.¹³ Plants scheduled to be decommissioned include Wansley units one and two by the end of 2022, Scherer unit three, and Gaston (Alabama) units one through four by 2028. To offset the energy loss, Georgia Power proposed to add an additional 2,300 MW from natural gas and supplement the rest through a mix of renewable sources.

Georgia Power has been successful in converting coal fired Plant McDonough-Atkins into three natural gas units.¹⁴

As the future of coal becomes a point of discussion, the topic of coal production waste, commonly known as coal ash, is important to address. Coal ash is a byproduct of burning coal. The ash is typically dispensed into landfills and holding ponds. Georgia Power announced its plans to repurpose the 9 million tons of coal ash located at Plant Bowen with the nation's largest beneficial use project. The \$9 billion project will excavate the ash at a pace of 600,000 tons per year. The ash will then be converted into concrete for constructing infrastructure, such as roads, bridges, and buildings across Georgia. This project is expected to begin in 2024.¹⁵

¹² <https://www.eia.gov/state/analysis.php?sid=GA>

¹³ <https://www.georgiapower.com/company/news-center/2022-articles/georgia-power-files-plan-preparing-for-future-energy-landscape-building-upon-solid-foundation-to-meet-needs-of-customers-and-state.html>

¹⁴ <https://www.georgiapower.com/company/energy-industry/generating-plants/mcdonough-atkinson.html>

¹⁵ <https://thecurrentga.org/2022/07/06/georgia-power-to-recycle-coal-ash-from-plant-bowen/>

Petroleum

In 2020, according to the U.S. Energy Information Administration (EIA), Georgia consumed an estimated 175 million barrels of petroleum.

Georgia is not a producer of oil or in possession of any petroleum reserves, making the state heavily reliant on out-of-state sources.

Most of the petroleum used in the Metro Atlanta area and Northern Georgia enters the state via two petroleum product pipelines located on the Gulf Coast. Petroleum products are also imported through liquid bulk terminals in Savannah, Georgia.

A large portion of the petroleum, almost 90 percent of the state's consumption, is used by the transportation sector, with more than half of that amount used as motor gasoline and the remainder as a distillate fuel oil or jet fuel.

Many Americans remained at home and worked remote due to the Covid-19 pandemic. This drastically decreased gasoline demand and resulted in low prices for consumers. As many consumers returned to work and travel increased, the oil markets struggled to keep up with the increase in demand and prices began to rise.

Recent global events, such as the conflict between Russia and Ukraine beginning in early 2022, majorly impacted the oil and gas markets in the U.S. and across the world. In March 2022, crude oil prices reached a high of \$139 per barrel compared to the \$76 price per barrel in January 2022.¹⁶ In response, President Biden signed an executive order banning oil, natural gas, and coal imports from Russia. Hoping to alleviate the repercussions of the order, a suspension of the federal gas tax was enacted. Gov. Kemp also suspended the state motor fuel tax through the fall of 2022.

¹⁶ <https://www.profolus.com/topics/why-are-oil-and-gas-prices-going-up-impact-of-russia-ukraine-war>

Electricity

In 2022, Georgia ranked seventh in a national ranking as a top 10 electricity generating state.¹⁷

Within Georgia, 44 percent of the state's retail electricity sales are consumed by the residential sector. Within the residential sector, roughly 40 percent of household electricity is used for heating and air conditioning. The commercial sector accounts for 33 percent of state electricity sales and the industrial sector consumes 23 percent of the electricity. The transportation sector only accounted for a very small portion of electricity usage.

According to the EIA, the majority of Georgia's in-state electricity is generated from natural gas and nuclear power. These two sources fuel more than 75 percent of Georgia's electricity needs. Natural gas is the largest electricity source. In 2022, natural gas accounted for almost half of the electricity generated. The two existing nuclear power plants provide 25 percent of the state's generated electricity. While the reliance on coal powered electricity is decreasing, coal burning plants still make up 15 percent of electricity generation. The remaining energy needs are supplemented with renewable sources such as solar, biomass, and hydroelectric. Liquid petroleum accounted for less than 1 percent of Georgia's electricity generation.

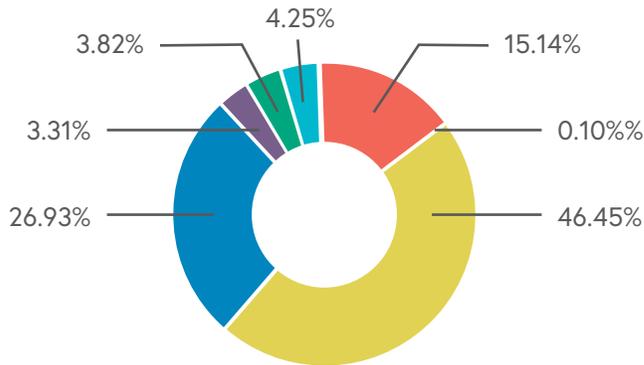
The fuel source used to generate electricity depends on a variety of factors, including demand, time of day, seasons, and weather. Electric providers must meet customer demand any time of the day despite storage challenges. Electricity generation is divided between three load categories: baseload (around-the-clock), intermediate load (mid-morning until the evening), and peak load, when demand is highest (afternoon to early evening).

The specific operating and cost characteristics determine which fuel type the load category will use to generate the electricity. Nuclear and coal generators tend to satisfy baseload electric needs due to their low variable cost and limited operation flexibility. Biomass and hydroelectric generation also assist in baseload needs. Intermediate load is often satisfied by gas and oil steam turbines, combined cycle gas turbines, and hydroelectric power. These fuels are best used due to their operational flexibility allowing them to ramp up and down as loads rise and fall. Peak load is usually satisfied by single cycle gas turbines, hydroelectric power, and wind and solar generating units.

The IRP emphasized Georgia Power's plan to invest in grid resilient infrastructure to ensure electricity needs can meet demand during extreme weather periods. The IRP describes the usage of Battery Energy Storage Systems (BESS), an energy storage solution that provides backup power to microgrids, grid support, and assists in load leveling. This is important for maintaining electricity reliability and accommodating the increase in renewable energy generation. The latest Georgia Power efforts include three new BESS facilities—the 65 MW Talbot County project, the 13 MW Fort Stewart project, and the Cherokee County McGrau Ford Battery Facility. Once complete, the Cherokee County McGrau Ford Battery Facility will be the largest BESS project and consist of a 265 MW lithium-ion battery interconnected at the McGrau Ford substation. This project will aid in goals of electricity resilience, allowing on-site storage to be used to power communities when needed.

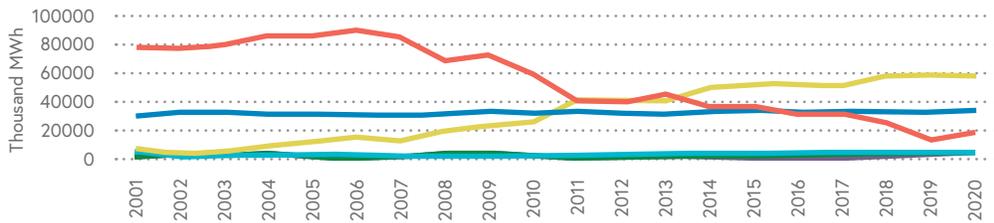
¹⁷ <https://www.eia.gov/state/?sid=GA>

Net Electricity Generated in 2021



- Coal
- Nuclear
- Wood & Wood Derived
- Petroleum Liquid
- Hydroelectric
- Solar
- Natural Gas

Electricity Generation by Fuel Source



- Coal
- Nuclear
- Wood & Wood Derived
- Petroleum Liquid
- Hydroelectric
- Solar
- Natural Gas

Solar

The state of Georgia is currently ranked seventh in a 2022 national solar energy ranking, with a previous ranking of fifth in 2021.

According to Solar Energy Industries Association (SEIA), 507,658 Georgia homes are powered by solar energy. This has resulted in creating 5,314 solar jobs for the state. This is a 19 percent increase in solar jobs from 2020 to 2021.

Georgia has continued to grow its solar presence, as companies capitalize on Georgia's business markets and improving solar economics. In 2019, Q Cells, a global solar cell manufacturing company built a new solar module assembly facility in Dalton, Georgia. The current facility produces 12,000 panels daily or 1.7 gigawatts (GW) of solar modules annually. Q Cells will be expanding its existing solar facility through a \$171 million investment deal with the state. The expansion will increase the production capacity to 3 GW of solar modules per year, equivalent to one-third of the current U.S. solar module production capacity.¹⁸ This project is planned to be completed in 2023.

Other large Georgia retailers have adopted the solar infrastructure evolution, including Anheuser-Busch, General Growth Properties, IKEA, and Porsche. IKEA has the largest rooftop solar array in the state, located at its distribution center in Savannah, Georgia.¹⁹ Porsche announced its solar powered micro-grid initiative at their Atlanta headquarters. The expected \$50 million project will cut 3.2 million pounds of annual carbon emissions.²⁰

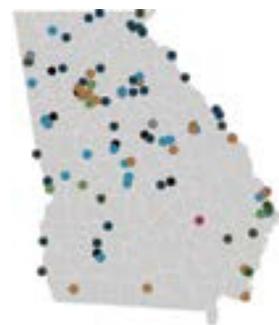
In the upcoming years, Georgia Power will continue to invest in solar energy. With the approval of the 2022 IRP, a total of 2.3 GW of solar energy will be installed between 2026-2029. This solar energy effort is the largest solar addition ever approved in a Georgia IRP cycle.

Oglethorpe Power Corporation has partnered with Green Power Electric Membership Corporation (EMC) to install 972 MW of solar energy across the state. This provides enough solar energy to power

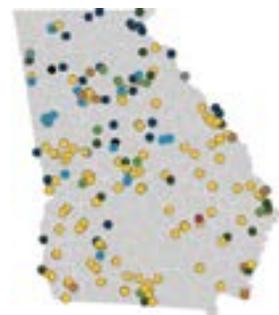
158,000 EMC households annually.

Green Power EMC has an additional 553 MW of solar energy under construction, with goals set to grow their solar capacity by 1,500 MW by 2024.²¹

Below is a graphic comparing solar power plants in the state from 2010 to 2021.



Georgia State Power Plant Location Map, 2010



Georgia State Power Plant Location Map, 2021

¹⁸ <https://electrek.co/2022/05/26/georgia-solar-panel-manufacturing/>

¹⁹ <https://seia.org/state-solar-policy/georgia-solar>

²⁰ <https://microgridknowledge.com/porsche-solar-microgrid/>

²¹ <https://greenpoweremc.com/solar>

Natural Gas

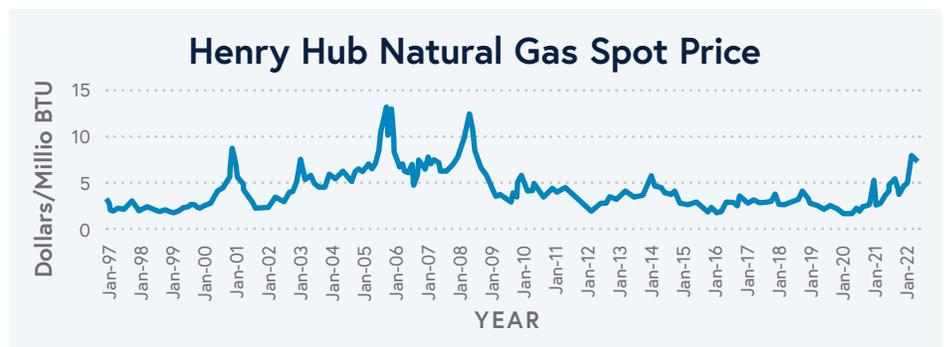
The natural gas market has dramatically shifted in the past two decades due to improvements in hydraulic fracking technology and the utilization of shale gas supply.

In 1997, roughly 4 percent of the natural gas consumed in Georgia was utilized for electric power generation. In 2020, more than half of the natural gas delivered to Georgia consumers was used for electricity generation, nearly tripling since 2010. In 2020, Georgians consumed a total of 759,276 million cubic feet (MMcf) of natural gas. Of that amount, 428,117 MMcf were consumed by the electric power sector. According to the EIA, in May 2022 alone, about 38,000 MMcf of natural gas was delivered to Georgia electric power consumers. Further shifts towards natural gas continue to occur as Georgia decreases reliance on coal burning sources. The recently approved IRP helps to facilitate this transition by approving Georgia Power's request to increase natural gas capacity by more than 2,000 MW through power purchasing agreements in the coming years.²²

Georgia receives a majority of its natural gas supply via interstate pipelines and has the capability to import supplies from various countries through the Elba Island Liquefied Natural Gas (LNG) Terminal located in Savannah, Georgia. Due to the increase in U.S. natural gas production, import volumes dropped from a high of 170 billion cubic feet (BSCF) to less than 3 BSCF in 2020.

To capitalize on the increase in natural gas production, Elba Island added a liquefaction facility. The facility enables exports of 350 MMcf per day of natural gas.

Commercial LNG export operations began in August 2020 and exported more than 36 BSCF. LNG continues to increase in importance globally. In early 2022, the U.S. became the largest LNG exporter. Russia remains a dominant figure in the natural gas market, as the second largest natural gas producer in 2020, outputting estimates of 22.5 trillion cubic feet (Tcf).²³ The U.S. has been able to excel in the LNG market due to numerous factors, including added LNG exporting capabilities, increased international prices, and increased global demand—specifically in Europe as they face conflict and compensate for decreased Russian exports.



²² https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2022/07_28/

²³ www.eia.gov/international/content/analysis/countries_long/russia/

Biomass

Due to Georgia's geography, biomass has become a viable renewable energy supply in the state.

Biomass is a form of energy generated by burning organic matter to generate steam, which is used to produce electricity.

Biomass is derived from wood pellets made from low-grade wood waste, but it can also be produced from agricultural or animal waste. Georgia is one of the largest timber producers in the country. Georgia's landscape has 24.6 million acres of forest, and 23.9 million of those acres are available for commercial usage.²⁴ Logging waste, such as wood chips, saw dust, and pellets, that would otherwise be released to landfills is now a viable source of energy. Biomass energy production often utilizes an already abundant renewable natural resource.

Technology advancements have allowed Georgia to capitalize on its disposable waste to produce biogas, an alternative source of electricity. Biogas is a gas released during the decomposition process of biomass.²⁵ Biogas is largely composed of methane gas along with small amounts of water vapor and other various gases. Biogas can be produced through the decomposition of municipal solid

waste in a landfill, called landfill gas, through water and sewage treatment processes, food waste, and agricultural waste. Georgia receives a large portion of its methane production through agricultural waste, specifically animal manure.²⁶

Biomass supplies roughly 40 percent of Georgia's in-state renewable electricity net generation.¹² In 2022, Georgia's net generation from biomass was 489,000 MWh, a 4 percent increase from 2021.²⁷ The state is a leader, ranking second nationwide, in biomass fuel manufacturing with more than 200 wood product manufacturing facilities, including six wood pellet manufacturing plants. Georgia is one of the nation's top wood pellet exporters with a combined production capacity of more than 1.8 million tons of pellets per year. The pellets are largely exported to Europe and used as an alternative fuel source for electricity generation.

²⁴ <https://gatrees.org/wp-content/uploads/2020/01/Sustainability-Report-for-Georgias-Forests-January-2019-WEB.pdf>

²⁵ <https://www.eia.gov/energyexplained/biomass/landfill-gas-and-biogas.php>

²⁶ https://americanbiogascouncil.org/wp-content/uploads/2019/02/ABCBiogasStateProfile_GA.pdf

²⁷ https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_1_15_a

Pipelines in Georgia

To meet demand, Georgia relies on imported refined petroleum products through two interstate pipelines—Colonial Pipeline and Plantation Pipeline.

The Colonial Pipeline is a main source of fuel transportation on the East Coast. Spanning 5,500 miles, the pipeline carries more than 2.5 million barrels of fuel per day from Texas to New Jersey. The company today is owned by five different entities and is responsible for supplying almost half of the entire East Coast with fuel.

The pipeline faced a halt in product movement during a five-day full closure in the spring of 2021. The closure was a precautionary measure due to a cybersecurity attack. The cyberattack caused gasoline shortages throughout the Southeast and cost the company more than \$5 million in ransom and losses.²⁸

The Plantation Pipeline, stretching 3,100 miles, competes with Colonial Pipeline for the Southeast petroleum market. The pipeline supplies gasoline, diesel, and jet fuel products from the Gulf Coast to Georgia, North Carolina, South

Carolina, and Virginia markets, transporting 700,000 barrels of fuel and oil per day. The pipeline is a co-ownership between Kinder Morgan and ExxonMobil.

Providing transportation fuels and other refined petroleum products involves the supply of crude oil through the global oil market and the capacity to refine crude oil. Oil refineries are found throughout the U.S., but the largest refining capacity is located along the Gulf Coast in Louisiana, Mississippi, and Texas. Georgia relies almost entirely on the refining capacities from the Gulf Coast. A small amount of petroleum product is imported through the port of Savannah.

Natural gas supply arrives in Georgia largely through four interstate pipelines: The Southern Gas (SNG) Pipeline, the Transco Pipeline, the East Tennessee Natural Gas (ENTG) Pipeline, and the Elba Express Pipeline.

The SNG pipeline, owned by Kinder Morgan, stretches almost 7,000 miles, extending from Gulf Coast locations to the Southeast. The SNG is the major supplier of natural gas to the Atlanta Gas Light (AGL) Company. The Transco Pipeline, owned by Williams Companies, spans 10,500 miles, supplying natural gas from Texas through the East Coast to New York. The ENTG Pipeline, owned by Spectra Energy Partners, provides a small supply of natural gas to North Georgia. Lastly, the Elba Express Pipeline, is a bi-directional pipeline that connects the Elba Island LNG terminal with the Transco pipeline in Hart County, Georgia, and the SNG pipeline in Jefferson County, Georgia.

Although Georgia lacks underground storage for natural gas, AGL operates three LNG storage facilities. The three storage facilities are located in Riverdale, Macon, and Cherokee County, Georgia. Plans have been made to expand the Cherokee County facility, doubling the facility size, making this location now the largest LNG facility of the three.²⁹

²⁸ <https://www.bloomberg.com/news/articles/2021-05-13/colonial-pipeline-paid-hackers-nearly-5-million-in-ransom>

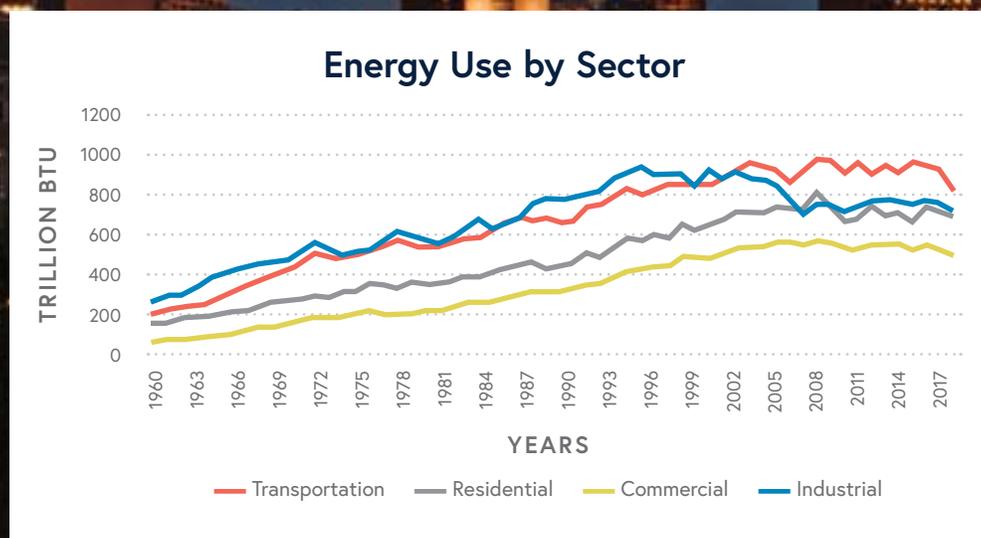
²⁹ <https://www.atlantagaslight.com/company/press-room/atlanta-gas-light-announces-lng-expansion.html>

Energy by Sector

There are four main energy sectors that all energy consumers fall under: **industrial – residential – commercial – transportation**

The transportation sector is the largest energy consuming sector in Georgia. In 2020, transportation consumed approximately 30 percent of the state's energy supply. This consumption trend can be explained by a variety of factors, including changes in commuting patterns, major highways leading through Georgia, and Hartsfield-Jackson Atlanta International Airport being considered the busiest

passenger airport in the country. The industrial sector consumed 26 percent of the state's energy, while the residential sector used 25.3 percent and the commercial sector used 18.3 percent. Combined, all sectors consumed an estimated 2,727,500 billion British thermal units (BTU) of energy in 2020.



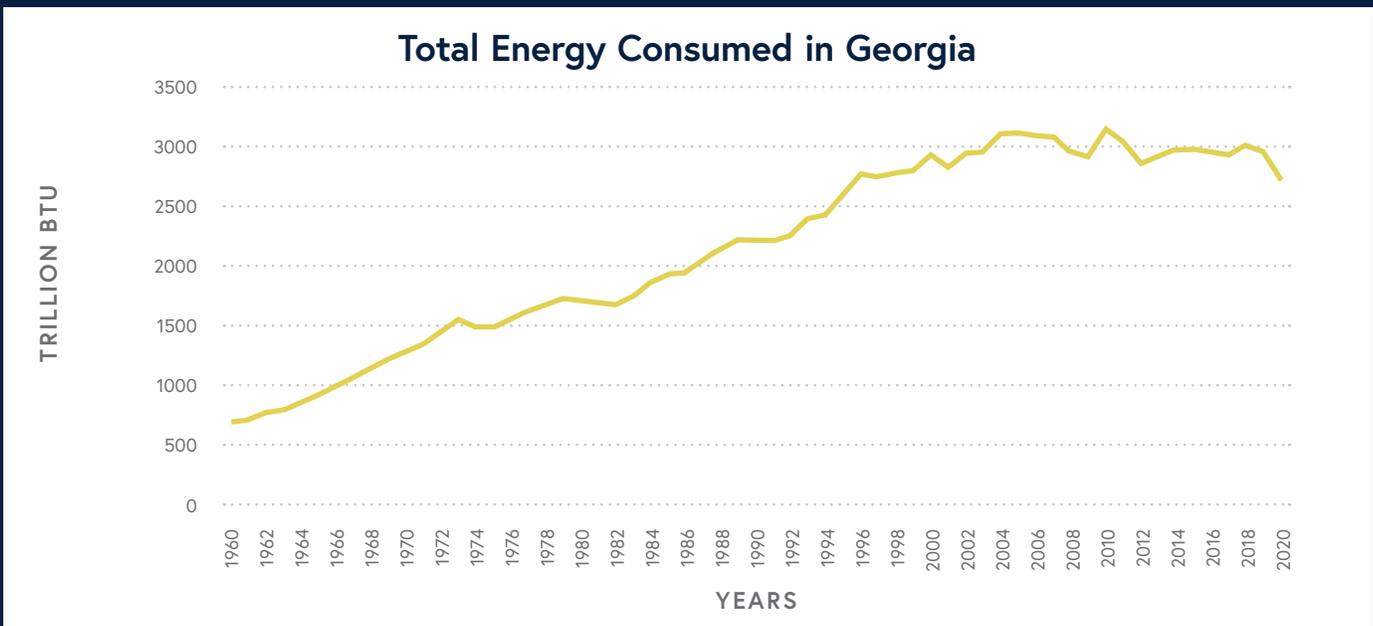
Energy Consumption

Since 1997, estimated total energy consumed per capita has continued to decrease despite increasing populations and economic growth.

In Georgia, the number of BTUs consumed per person have dropped 31 percent from 1996 to 2020. This decrease is an indicator of Georgia's progression towards energy efficiency. Many factors can be attributed to the decrease in energy consumption per capita, including technology improvements in transportation and utility equipment, stronger energy codes for residential and commercial buildings, and increased awareness of environmental issues. Another indicator of the state's increased efficiency is the BTUs consumed per dollar of Gross Domestic Product (GDP). In 2020, Georgia's economy used 39 percent less energy per dollar of GDP than in 1997.

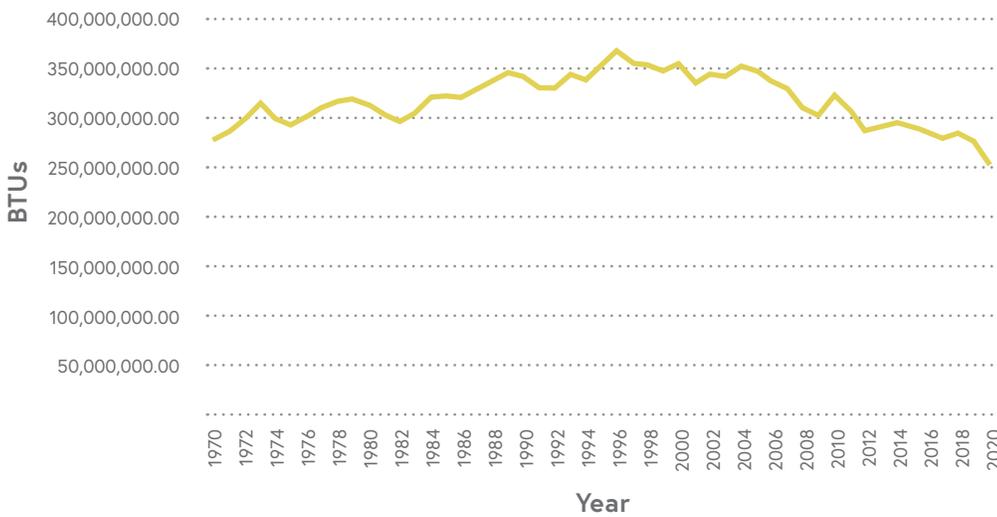
According to the IRP, a motion has been passed to increase the annual energy efficiency savings goal by 15 percent over the next three years. This target is in addition to the already required 15 percent increase in the 2019 IRP. Customer savings are expected to exceed half a billion dollars.

In Georgia, petroleum is the largest consumed energy source, accounting for almost half of the state's total energy usage. Electricity is the state's second largest consumed energy source, then natural gas, followed by renewable energy sources, and then coal.

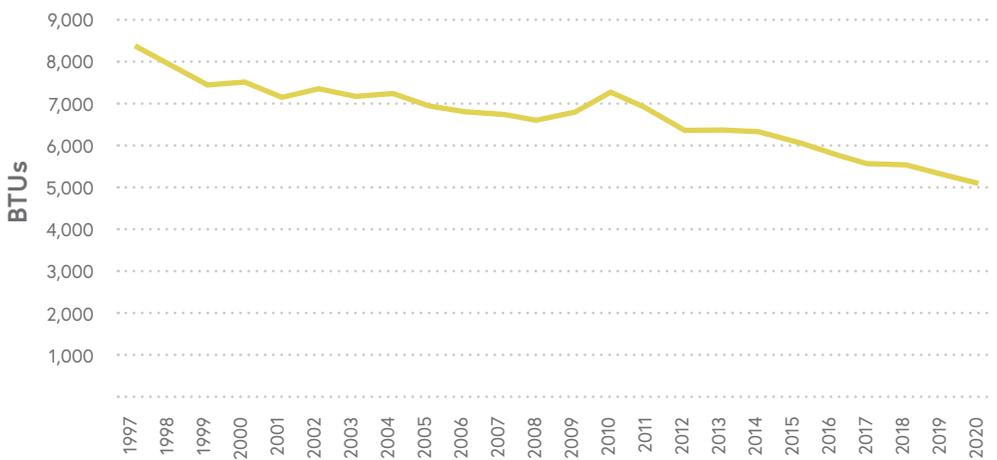


Energy Consumption (cont.)

Energy Consumption per Capita



Economic Energy, Intensity, BTU per Dollar of GDP



Jobs in Energy



The Covid-19 pandemic universally disrupted the job market, causing a large decrease in employment nationally across all sectors within the energy industry. From 2019 to 2020, the energy and motor vehicle sector's net employment decreased by nearly 10 percent resulting in a loss of nearly 840,000 jobs nationwide.³⁰

Throughout the pandemic, some energy markets were inversely impacted and instead increased in national employment rates due to continuous investments. Electric industries increased in employment rates and battery storage employment grew by 1.3 percent. In 2020, the electric vehicle employment rate grew by 7.8 percent, totaling 6,100 jobs. Employment within the hybrid vehicle market also increased by 6,300 jobs, growing 5.5 percent.³⁰

Despite the pandemic, Georgia continued to grow and bring large industries, including the previously discussed Rivian, Hyundai, and SK Innovation facilities to the state. The EV plants are expected to bring more than 18,000* new jobs, skyrocketing the electric mobility market in Georgia.

The Georgia Department of Labor conducted an analysis to study Long-term Employment Projections to 2028. According to their projections, transportation and utilities employment will grow by 18 percent in the following years.

As many states further incorporate energy efficient and renewable sources into their energy portfolios, the energy job market continues to grow. The fastest growing jobs across the country include solar panel installation and wind turbine technicians.³¹

In 2021, the Georgia job market employed approximately 113,692 energy workers, representing 4.4 percent of total state employment. According to the 2022 U.S. Energy and Employment Report, of these energy jobs, "17,129 are in electric power generation; 8,007 in fuels; 35,262 in transmission, distribution, and storage; and 53,294 in energy efficiency."³² Energy jobs have grown by 3.3 percent or approximately 6,280 jobs from 2020 to 2021. Since 2020, there has been an increase in employment in the following markets: electric power generation and energy efficiency.

Within Georgia the electric power generation sector alone employed more than 17,000 workers, adding 900 new jobs from 2020 to 2021. The largest power generation industry was the solar electric generation sector, employing 7,300 Georgians. The nuclear generation industry employs the second largest number of employees, with approximately 2,500 workers and growing with the Plant Vogtle additions.³²

Within the fossil fuel sector, the oil and petroleum industry employed the largest amount of people, providing roughly 4,000 jobs. The Georgia fuel sector decreased in employment, with oil industry jobs declining by more than 1 percent. The transmission, distribution, and storage sector, which employs 35,000 workers, also decreased within the past year.³²

³⁰ <https://www.energy.gov/sites/default/files/2021-07/USEER%202021%20Executive%20Summary.pdf>

³¹ https://cleanchoiceenergy.com/news/renewable_energy_jobs_for_coal_miners_and_oil_workers

³² https://www.energy.gov/sites/default/files/2022-06/USEER%202022%20State%20Report_0.pdf

Georgia Environmental Finance Authority

Georgia Energy Report

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