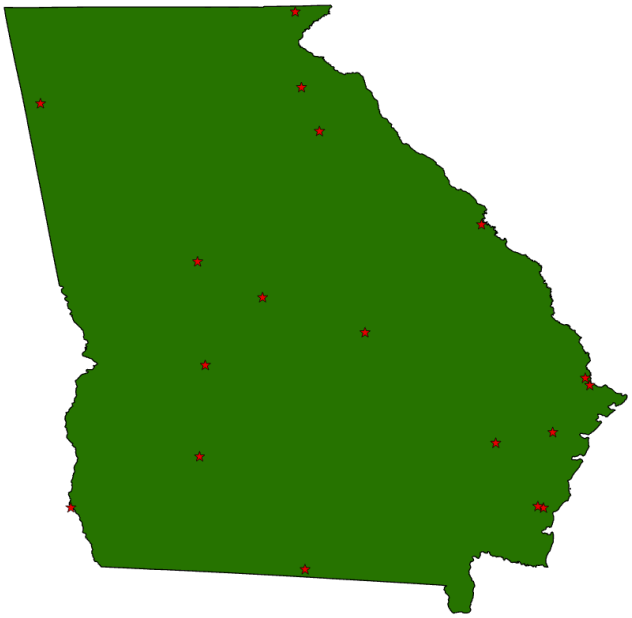
Economic Contributions of Wood-based Biomass Power Generation Industries in Georgia
2022 Version



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Executive Summary

Decarbonization of the electricity sector calls for a greater reliance on renewable energy sources including biomass for generating electricity. In 2024, approximately, 41% of the total electricity generated in Georgia came from natural gas, 34% from nuclear power, 13% from coal and the remaining 12% came from renewable energy sources including solar power, biomass, and hydropower. Of the total renewable energy generated, biomass accounted for about three-tenths with most of it coming from wood and wood-derived fuel (U.S. Energy Information Administration, 2023a). Georgia ranks first across the nation in the amount of electricity generated from biomass resources. Woody biomass is unique in that it is one of the few renewable energy sources that can provide 24/7 baseload power. Wood-based biomass for energy reduces greenhouse gas emissions over traditional fossil fuels, generates income and employment opportunities in rural forest-dependent communities, provides the market outlet for unwanted materials, reduces the amount of garbage ending up in landfill sites, and has positive effects on forests' health if done sustainably.

This report provides an overview of electric power generation industries in Georgia and estimates the economic contributions of wood-based biomass power generation industries on the state's economy. The analysis is part of a series of coordinated comparable reports produced for multiple Northeast Midwest U.S states along with California, Georgia and Virginia. Forest resource statistics used in the report were drawn from the U.S. Forest Service's Forest Inventory and Analysis (FIA) data, while economic modeling was conducted using the 2022 Impact Analysis for Planning (IMPLAN) data via the cloud-based platform.

To isolate the economic effects of wood-based biomass power generation specifically, the study applied IMPLAN's detailed impact analysis activity type which is analogous to its Analysis-by-Parts (ABP) technique. IMPLAN does not provide a dedicated sector for wood-based biomass power; instead, these activities are included under the broader "electric power generation using biomass" sector (Sector 45). This sector also encompasses electricity generation from other biomass sources, including agricultural byproducts, landfill gas, municipal solid waste, black liquor, and sludge waste. Using the detailed impact analysis activity

type, we developed a customized sector profile based on budgetary spending patterns and labor income specific to wood-based biomass power generation. Supplementary data for analysis were drawn from the Michigan Department of Natural Resources' 2022 and 2024 mail surveys of biomass power producers across a 20-state Northeast-Midwest region along with California, Georgia and Virginia as well as a review of recent literature on biomass energy in the United States.

The economic contribution estimates presented in this report are expressed in constant 2022 dollars. In 2022, Georgia generated approximately 5.5 million megawatt hours of electricity using wood and wood-derived fuel. This was about seventeen percent more than the amount generated from woody-biomass in 2017. The estimated cost of producing electricity from wood and wood-derived fuels per MWh was estimated to be $87 in 2022 (Obtained from the mail survey of biomass power facilities located in the twenty state Northeast Midwest region in 2024).

In Georgia, the wood-based biomass power generation industry directly employed 331 people and generated ~$475 million in direct output to the state's economy in 2022. Including ripple effects, the industry created a total of 4,328 jobs and contributed $1.0 billion in total output to the state's economy. In terms of tax contributions, the industry generated ~$72million at the state and local levels and ~$70 million at the federal level in 2022. The social accounting matrix multipliers for the industry output were found to be 2.2 which means that for every $1 million in output in the state's wood-based biopower industry, an additional $1.2 million in output was supported in the rest of the economy. In terms of output, the top three industries affected by the state's wood-based biomass power generation industry included the biomass power generation industry itself, the commercial logging industry, and the forestry, forest products, and timber tract production industry. In terms of employment, the industries most affected, aside from biomass power generating industry itself included commercial logging, support activities for agriculture and forestry, and commercial and industrial machinery and equipment repair and maintenance industry.

In comparison, the biomass power generation industry directly employed 304 individuals and generated $326 million (in 2022 dollars) in direct output in 2017. This represents an increase of 9% in direct employment and 46% in direct output between 2017 and 2022 in wood-based biomass power generation industry in Georgia. Similarly, total employment increased by 15% and output increased by 38% in 2022 compared to 2017.

Glossary

Biomass: Renewable organic material that comes from plants and animals. It contains stored chemical energy from the sun. Sources of biomass for energy include wood and wood processing wastes, agricultural crops and waste materials, biogenic materials in municipal solid waste, animal manure, and human sewage.

Woody Biomass: It encompasses biomass obtained from the trees and woody plants, including limbs, tops, needles, leaves, and other woody parts, grown in a forest, woodland, or rangeland environment, that are the by-products of forest management.

Biopower: Biopower technologies convert biomass fuels into heat and electricity. There are three main methods of releasing the energy stored in biomass to produce biopower: burning, bacterial decay, and conversion to gas/liquid fuel.

Net Electric Power Generation: Generation is a measure of electricity produced over time. Some portion of the electricity produced by the power plants is used internally to operate these plants. Net generation excludes electricity use for power plant operations.

Renewable Portfolio Standard (RPS): It is a regulatory requirement that electricity providers must supply a specified minimum share of their total electricity sales from eligible renewable energy sources.

Power Plant Capacity: It is the maximum level of electricity that a power plant can supply at a specific point in time under certain conditions.

Nameplate Capacity: Nameplate generator capacity is determined by the generator's manufacturer and indicates the maximum output of electricity a generator can produce without exceeding design thermal limits.

Kilowatt (kW): A standard unit for measuring electricity. 1 kW is equivalent to 1,000 Watts.

Kilowatt-hour (kWh): One kW of electricity generated or used for one hour.

Megawatt (MW): 1,000 kW

Megawatt hour (MWh): 1,000 kWh

Economic Contribution Terms

Direct effects/contributions: The economic activities (e.g., output, employment, labor income, and value-added) associated with an industry or sector in the study area. These can describe the current economic sectors or changes to those sectors.

Employment: The number of full- and part-time jobs associated with an industry plus self-employed individual.

Indirect effects/contributions: The impact of local industries purchasing goods and services from other industries, leading to others' outputs, employment, and labor income.

Induced effects/contributions: The impact of labor income (employee compensation and proprietor income) via goods and services purchased due to the direct and indirect spending by industries.

Labor income: The dollar total of employee compensation and proprietor income; the latter is associated with self-employed individuals.

Output: The dollar measure of production within an area; it is also viewed as sales.

Type I multiplier: These multipliers are derived by dividing the sum of direct and indirect effects by the direct effects.

Social Accounting Matrix (SAM) multipliers: These multipliers are derived by dividing the sum of direct, indirect, and induced effects by the direct effects. The social accounts include payments made between households, households, and government and more. These are available for output, employment, labor income, and value-added and are used to assess the effects of changes in industry activity (i.e., "ripple effects").

Total effects/contributions: The sum of direct, indirect, and induced effects.

Value-added (also known as gross state product, or GSP): The sum of labor income, other property income (e.g., rents and profits), and indirect business taxes (e.g., excise and sales taxes). It is the difference between an industry's total output and the cost of its intermediate inputs. The sum of value-added for all economic sectors within the state equals the total GSP.

Forest Inventory and Analysis Terms

Forestland: It is a land that has at least 10 percent canopy cover of trees of any size or has had at least 10 percent canopy cover of trees in the past that will be naturally or artificially regenerated. To qualify as forest land, an area must be at least 1 acre in size and have a minimum width of 120 feet to ensure continuity of forest conditions.

Merchantable net bole volume: It is the volume of sound wood in the merchantable bole (from the 1-foot stump to merchantable top), after deductions for rot, missing sections, or other defects.

Annual net growth: It is the average annual increase in net volume of live or growing-stock trees on forest land during the inventory period.

Annual removals: It is the average annual net volume of trees removed from forest land during the inventory period due to harvest, land-clearing, or other land-use changes.

Annual mortality: It is the average annual net volume of live trees that died from natural causes during the inventory period.

Introduction

Renewable energy plays an increasingly important role in the U.S. electricity sector, driven by concerns over greenhouse gas emissions from fossil fuels, energy security, and the potential for local and rural economic development. In 2023, the United States generated 4.18 trillion kilowatt-hours (kWh) of electricity, with approximately 60% produced from fossil fuels, 19% from nuclear energy, and 21% from renewable sources (U.S. Energy Information Administration [EIA], 2025a). Renewable electricity generation more than doubled over the past two decades, increasing from 357 billion kWh in 2000 to over 900 billion kWh in 2022 (EIA, 2025b). Despite this growth, the electricity sector remains a major contributor to national greenhouse gas emissions, accounting for roughly 25% of total U.S. emissions in 2022 (U.S. Environmental Protection Agency [EPA], 2025).

The expansion of renewable energy across the country has been strongly supported by state and local policies, including renewable portfolio standards (RPS) and voluntary renewable energy goals. These policies aim to increase the share of renewable energy in electricity generation, reduce emissions, and stimulate local investment. In addition, some states have adopted clean energy standards (CES), which often encompass RPS requirements while also including broader low-emission technologies (National Conference of State Legislatures, 2025). As of 2025, 28 states, along with the District of Columbia, have enacted RPS mandates (Lawrence Berkeley National Laboratory, 2025). Three additional states and one U.S. territory (Guam) have adopted voluntary renewable energy targets, further reinforcing the nationwide momentum toward cleaner energy systems (National Conference of State Legislatures 2025). Additionally, sixteen states have established a broader 100% CES in combination with RPS (Lawrence Berkeley National Laboratory, 2025). Figure 1 highlights the states with 100% CES commitments and the range of RPS targets currently in place.

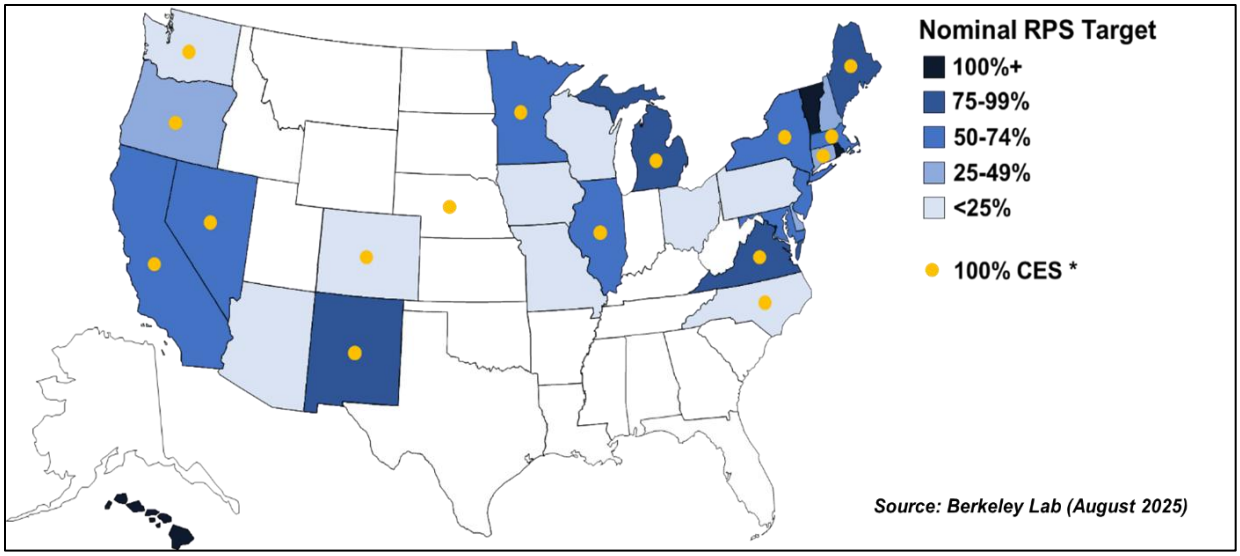

Figure1. Map of US depicting states with 100% Clean Energy Standards (CES) and associated Renewable Portfolio Standard targets (Source: Lawrence Berkeley National Laboratory, 2025).

Till date, Georgia has not implemented a binding RPS. The state relies on nonbinding goals and incentives to further renewable energy rather than formal mandates. In 2024, approximately 12% of the total electricity generated in Georgia came from renewable energy sources, mostly solar energy. Of the total renewable energy generated, biomass contributed about three-tenths with most of it coming from wood and wood-derived fuel (US EIA 2025c). Woody biomass offers unique benefits. It provides baseload power, reduces greenhouse gas emissions, supports rural economies, and creates a market for forest residues and byproducts from forest management, wildfire reduction, and wood product manufacturing (National renewable energy laboratory 2023, USDA Forests and Rangelands 2023, Gan and Smith 2007). Biomass power can also help offset the costs of forest restoration and hazardous fuel treatments (Page-Dumroese et al. 2022).

Despite its benefits, electricity generation from woody biomass in the U.S. has remained relatively stable over the past two decades, with a slight decline in recent years (Figure 2). In Georgia, however, the share of total electricity generated from woody biomass has increased over the years contributing 2.4% of the total electricity generated in 2000 to 4.6% in 2020. In 2023, woody biomass contributed about 3.6% of the total electricity produced in the state (US EIA 2025d). Nationwide, the number of power plants utilizing wood and wood-derived fuels

declined from 247 in 2017 to 219 in 2022, and further to 197 in 2024 (U.S. EIA 2025d). In Georgia, there were 18 biopower facilities utilizing wood and wood derived fuels in 2022 (Figure 3; U.S. EIA 2025d). Table 1 provides the names, locations, sector classifications, and full fuel portfolios of Georgia facilities using wood and wood-derived fuels in 2022.

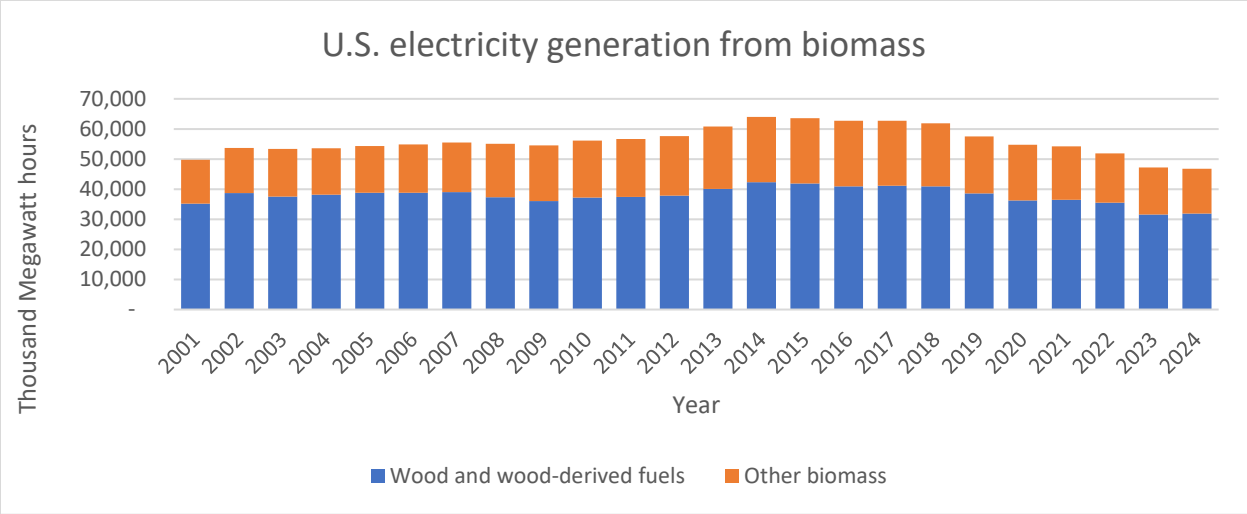

Figure 2. U.S. electricity generation from biomass, 2001 to 2024. (Source: U.S. Energy Information Administration 2025d).

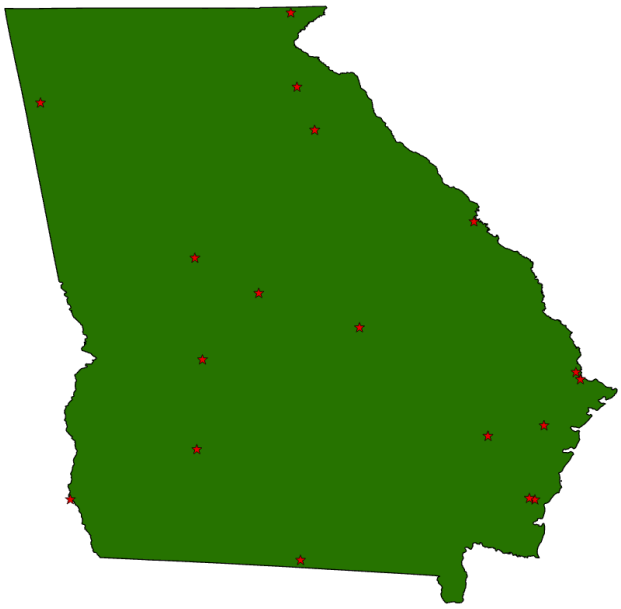

Figure 3. Map depicting locations of biomass power plants using wood and wood-derived fuels in Georgia in 2022. (Source: U.S. Energy Information Administration, 2025d).

Table 1: List of Georgia power generation facilities using wood-based fuels in 2022.

Plant Name	Street Address	City	County	Sector Name	Fuel Type Used*
Pinova Inc.	2801 Cook St	Brunswick	GLYNN	Industrial CHP	OBL,NG,WDS
Inland Paperboard Packaging Rome	238 Mays Bridge Rd	Rome	Floyd	Industrial CHP	NG,WDS,RFO,BLQ,OTH
Jesup Plant	4470 Savannah Highway	Jesup	Wayne	Industrial CHP	NG,WDS,RFO,BLQ
Brunswick Cellulose	W 9th Street	Brunswick	Glynn	Industrial CHP	NG,WDS,TDF,RFO,BLQ
Multitrade Rabun Gap, LLC	1585 York House Road	Rabun Gap	RABUN	IPP Non-CHP	WDS
International Paper Savanna Mill	West Lathrop	Savannah	Chatham	Industrial CHP	NG,WDS,BLQ
Flint River Operations	2449 Stagecoach Road	Oglethorpe	Macon	Industrial CHP	NG,DFO,WDS,BLQ
Port Wentworth Mill	1 Bonnybridge Road	Port Wentworth	Chatham	Industrial CHP	OBL,OBG,NG,WDS,BLQ
WestRock Southeast, LLC.	709 Papermill Road	Dublin	Laurens	Industrial CHP	NG,WDS,TDF,OBS
Georgia-Pacific Cedar Springs	GA Hwy 273 W	Cedar Springs	Early	Industrial CHP	NG,DFO,WDS,RFO,BIT,BLQ
Interstate Paper LLC Riceboro	2366 Interstate Paper Road	Riceboro	Liberty	Industrial CHP	NG,WDS,BLQ
Riverwood International Macon Mill	100 Graphic Packaging Intl Way	Macon	Bibb	Industrial CHP	SLW,WO,NG,WDS,BLQ
Piedmont Green Power	100 Legacy Park Drive	Barnesville	Lamar	IPP Non-CHP	OBL,WDS
PCA-Valdosta Mill	5495 Clyattville-Lake Park Roa	Valdosta	Lowndes	Industrial CHP	NG,WDS,RFO,BLQ
Albany Green Energy	508 Liberty Expressway SE	Albany	Dougherty	IPP CHP	NG,WDS
GRP Franklin Renewable Energy Facility	3465 Highway 198	Carnesville	Franklin	IPP Non-CHP	WDS
GRP Madison Renewable Energy Facility	268 Office Drive	Colbert	Madison	IPP Non-CHP	WDS
Clearwater Paper Corporation-Augusta	4278 Mike Padgett Highway	Augusta	Richmond	Industrial CHP	NG,WDS,BLQ

*Fuel Type Codes: OBL= Other Biomass Liquid; NG = Natural Gas; WDS = Wood and Wood-Derived Solids; BLQ = Black Liquor; OTH= Other/Unspecified Fuel; DFO = Distillate Fuel Oil; RFO = Residual Fuel Oil; OBG = Other Biomass Gas; OBS = Other Biomass Solids; BIT = Bituminous Coal; SLW = Sludge Waste; TDF = Tire-Derived Fuel.

Estimating the economic contributions of the wood-based biomass power generation industry is essential for highlighting its broader impacts on regional and state economies, and for supporting efforts to sustain and expand the industry. In 2022, the Michigan Department of Natural Resources (MI DNR) Forest Resources Division commissioned a research team from Michigan State University's Department of Forestry along with collaborators from North Carolina State University, Oklahoma State University, the University of Idaho, SUNY College of Environmental Science and Forestry, and Michigan Biopower to assess the economic contributions of this industry for calendar years 2017 and 2022.

As part of this project, the research team developed a 2022 regional report analyzing the economic contributions of the wood-based biomass power generation industry across a 20-state Northeast and Midwest regions. In addition to the regional analysis, individual state reports are prepared for the participating states which include California, Connecticut, Georgia, Illinois, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New York, Pennsylvania, Vermont, Virginia, and Wisconsin. These reports summarize the industry's economic contributions within each state.

This report presents the results for Georgia, focusing on the industry's economic role in the state's economy. The sections that follow provide an overview of Georgia's electric power generation industry, a brief description of the state's forest resources, an explanation of the methods used in this analysis, and a summary of the findings from the 2022 study.

Electric power generation in Georgia in 2022

In 2022, the electric power industry in Georgia produced a total of ~126 million Megawatt hours of electricity. Natural gas was the major source of electricity generated across the state followed by nuclear power and coal respectively (Figure 4). Out of the total electricity generated, approximately 4% or 5.5 million Megawatt hours were produced using wood and wood-derived fuel (Figure 4) (US EIA 2025d).

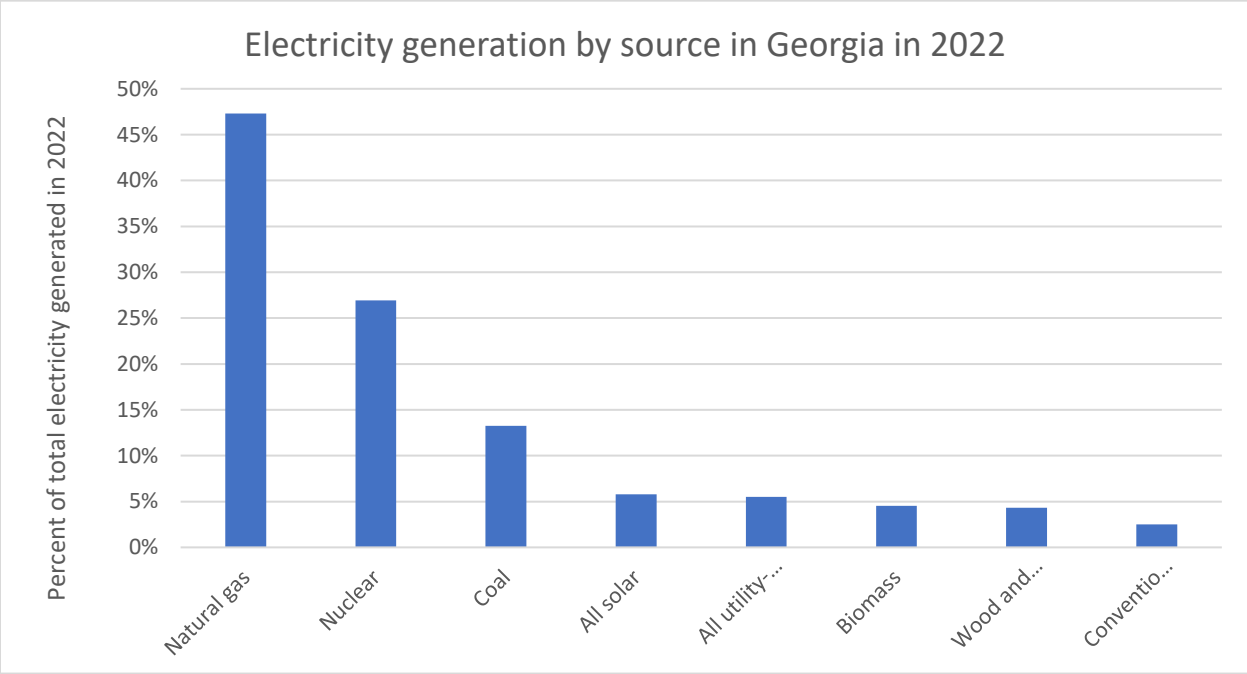

Figure 4. Percentage of total electricity generated in Georgia in 2022 by energy source (Source: U.S. Energy Information Administration 2025d).

Collectively the electric power generation, transmission, and distribution industry employed 17,799 people in 2022 which is equivalent to 0.26% of total jobs in the state the same year (IMPLAN 2022). The direct economic effects resulting from various power-generating industries within the state including biomass are listed in Table 2.

Table 2. The direct economic effects of power generating industries in Georgia based on 2022 IMPLAN data.

IMPLAN Sector Code (Electric Power Generation)	Energy Source	Employment	Labor Income (Millions of 2022 dollars)	Value-Added	Output
39	Hydroelectric	40	$7	$19	$34
40	Fossil fuel	221	$46	$186	$392
41	Nuclear	3,224	$827	$1,875	$3,492
42	Solar	84	$12	$32	$62
43	Wind	-	$-	$-	$-
44	Geothermal	-	$-	$-	$-
45	Biomass	51	$9	$31	$73
46	All other	63	$12	$2	$9
47	Electric power transmission and distribution	14,117	$2,541	$10,137	$22,228
	Total electric power generation, transmission, and distribution	17,799	$3,455	$12,283	$26,290
	Total All Sectors	**6,759,232**	**447,706**	**763,292**	**1,376,563**

Forest Resources of Georgia

Georgia is rich in forests. Forestlands cover approximately 64% of the total land area in Georgia (USDA Forest Service, Forest Inventory and Analysis 2025). Out of this, ~98% of the forestland can produce commercial timber and is identified as timberlands. Most of the forests in the state (88%) are under private ownership, followed by the federal government (4%), and the state and local government (4%) respectively (Figure 5). Loblolly/shortleaf pine and Oak/hickory are the major forest types in the state followed by Longleaf/slash pine and Oak/gum/cypress forest types (Table 3).

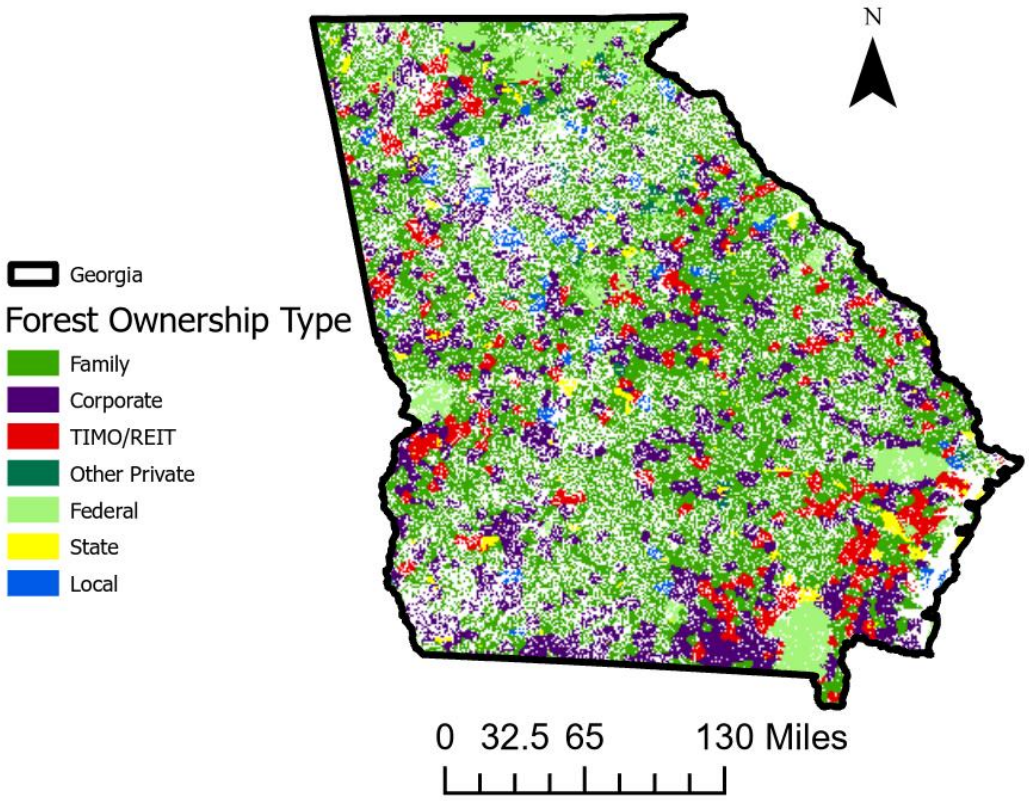

Figure 5. Forest ownership in Georgia (Data source: Sass et al. 2020).

Table 3. Forestland area in Georgia by forest type (Source: USDA Forest Service, Forest Inventory and Analysis 2025).

Forest Type Group	Acres	Percentage
Loblolly / shortleaf pine group	7,664,604	32%
Oak / hickory group	6,191,565	26%
Longleaf / slash pine group	3,253,932	13%
Oak / gum / cypress group	3,236,239	13%
Oak / pine group	2,741,962	11%
Elm / ash / cottonwood group	480,326	2%
Other	604,051	2%
Total	24,172,679	100%

The merchantable net bole volume of live trees in Georgia is estimated to be ~50 billion cubic feet (Table 4). The average annual net growth is 2,021 million cubic feet, annual removals are 1,402 million cubic feet, and annual mortality is 453 million cubic feet. Annual growth in the timberlands exceeded the removals by a ratio of 1.4, meaning that for each cubic foot of timber harvested in the region, about 1.4 cubic feet of timber grew in the timberlands. However, this ratio varies by ownership type. The growth to removals ratio in national forests is 8.8. In private forests, it is 1.5, 2.8 in the case of forests under state and local government, and 0.9 in forests under other federal ownership (Table 4). This suggests variation in management focus on timberlands owned by different forest ownership types. Across the state, the annual removals are close to 3% of the standing volume (Table 4).

Table 4. Characteristics of state growing stock in Georgia in 2025 (million cubic feet) (Source: USDA Forest Service, Forest Inventory and Analysis 2025).

Ownership	Net Volume	Annual Net Growth	Annual Removals	Annual Mortality	Growth/Removals
Total	49,706	2,021	1,402	453	1.4
National Forest	2,548	44	5	24	8.8
Other federal	1,481	31	35	13	0.9
State and local	2,373	70	25	24	2.8
Private	43,304	1,865	1,208	392	1.5

Methods

The analysis was conducted using impact analysis for planning (IMPLAN) software and 2022 IMPLAN data using the Analysis-by-Parts (ABP) technique accomplished through detailed industry impact analysis activity type in IMPLAN. The ABP technique was chosen because it allows the user to create a customized industry sector by using the information about that sector's budgetary spending pattern and labor income (Lucas 2022). So far IMPLAN does not have a separate sector to represent wood-based biomass power generation. Instead, it is incorporated as a part of the electric power generation using the biomass industry. This means that it includes power generation from all sources of biomass including agricultural byproducts, landfill gas, municipal solid waste, woody biomass, black liquor, and sludge waste. To separate the economic contributions associated with wood-based power generation from power generation using all forms of biomass, the analysis-by-parts (ABP) technique was used. The resulting economic contributions are measured in terms of full- and part-time employment, industry output, value-added, labor income, other property income, and business taxes.

The information about industry spending patterns for the biomass power generation industry using woody biomass was obtained from Dahal et al. (2020) and corroborated or supplemented (where applicable) with the information collected through the mail survey of biomass power generation plants located in the twenty state Northeast-Midwest region. In fall 2022 and 2024, Michigan Department of Natural Resources conducted a mail survey of 120 biomass power industries located in the 20-state Northeast-Midwest region along with California, Georgia, and Virginia to collect the financial and resources utilization data for the year 2017 and 2022 respectively. Overall, 11 responses were obtained in the 2022 survey (9.2% response rate), and five responses were obtained in the 2024 survey (4.2% response rate). The data obtained from these responses were used to inform and supplement the industry spending pattern for wood-based biomass power generation industries for regional and state level reports for participating states. The average operation and maintenance expenditure for the wood-based biomass power generation industry used for the economic contribution analysis is listed in Table 5.

The 2024 survey asked respondents to indicate the total amount of electricity produced in 2022 using wood and wood-derived fuel along with the total cost of production. This information was used to estimate the cost per megawatt hour of electricity produced. It was estimated to be $87/MWh on average when weighed by the size of production for respondents who responded to the survey. This cost falls within the range of levelized cost of electricity generation from biomass ($77.16 to $95.16) as listed by the US energy information administration in the Annual Energy Outlook (2023). Hence, we used $87/MWh of electricity production as the cost of generating biopower from woody biomass for our 2022 analysis. The details of the survey method along with the information collected are included in the twenty-state Northeast-Midwest biopower economic contribution analysis report.

The per unit cost of electricity produced using wood and wood-derived fuel was multiplied by the total electricity produced using wood and wood-derived fuel within a state to obtain the direct output from the wood-based biomass power-generating industry in that state. Information about the total electricity produced by the electric power generation industry using wood and wood-derived fuels in 2022 was obtained from US EIA (2025d).

In Georgia, ~5.5 million Megawatt hours of electricity were generated using wood and wood-derived fuel in 2022. At the rate of $87/MWh of electricity produced, this translated into a direct output of $475 million for the wood-based biomass power generation industry in the state. The direct output was then allocated into intermediate inputs and value-added following the percentage breakdown of output into its component parts for IMPLAN sector 45 (electricity generation using biopower industry) using 2022 IMPLAN data for Georgia. According to it, approximately 57.2% of the output of the biomass power generation industry was comprised of intermediate inputs and 42.8% was value-added. Value added was further broken down into employee compensation (10.3%), proprietor income (2.4%), other property type income (20.7%), and taxes on production and imports (9.4%) following IMPLAN sector 45's percentage breakdown for Georgia in 2022 IMPLAN data. To estimate employment, the industry's total output was divided by the output per worker value for IMPLAN sector 45 (from Georgia's 2022 dataset). Using this method, the wood-based biomass power generation industry supported an estimated 331 jobs in Georgia in 2022.

When estimating the economic contribution of the biomass power generation industry in IMPLAN using the ABP technique, the local purchase percentage (LPP) for all other items in the industry spending pattern except woody biomass, was set to default SAM value. For woody biomass, LPP was set to 100%. This is because all wood used by the biomass power generation industry is sourced locally as per the findings obtained from the mail survey (within 60 miles radius). Since it is not possible to precisely identify the location of production, transport, and purchase of other items included in the industry spending pattern for the wood-based biomass power generation industry, LPP was set to default SAM values for those items. Like Dahal et al. (2020), we estimated total taxes (including emission fee) to be 1.85% of total operation and maintenance cost, which amounted to $8.8 million. This was modeled separately, and the resulting indirect and induced effects obtained from tax contributions were added to the total economic contribution summary for the state.

Table 5. Percentage distribution of annual operation and maintenance expenditures for the wood-based biomass power generation industry. Percentages are based on Dahal et al. (2020) and supplemented with data collected from a mail survey of wood-based power generation facilities in the Northeast and Midwest United States.

IMPLAN Sector	Cost category (sector)	Percentage
16	Biomass	58.6%
20	Natural Gas	0.05%
39	Utilities	2.8%
49	Water	1.6%
60	Building expenses	0.4%
154	Oil and diesel	0.8%
162	Chemical	1.3%
167	Supplies (consumable, urea, ammonia)	1.9%
384	Office supplies and expenses	0.2%
408	Gasoline (retail)	0.1%
433	Communication	0.2%
444	Insurance	1.6%
453	Equipment rental	0.1%
457	Outside support services (water treatment, vendor services)	0.6%
462	Consulting fees	0.4%
470	Office administrative service	1.0%
474	Travel and entertainment	0.1%
476	Janitorial	0.3%
479	Ash freight and waste management	3.0%
512	Vehicle repair	0.1%
515	Maintenance	7.2%
50001	Employee compensation	15.6%
	Total taxes (including emission fee)	1.8%
	Total operation and maintenance cost	100.0%

Results

The results obtained from the economic contribution analysis indicated that in Georgia, the wood-based biomass power generation industry directly employed 331 individuals in 2022 with a labor income of $60 million, value-added of $203 million, and an output or sales of $474 million in 2022 US dollars (Table 6). Including ripple effects, the industry supported a total of 4,328 jobs with $294 million in labor income. The industry contributed a total of $536 million in value-added and $1.0 billion in total output to the economy of Georgia (Table 6). The top three industries affected in terms of output by wood-based biomass power generation industry in the state include the biomass power generation industry itself, commercial logging industry (IMPLAN sector 16), and forestry, forest products, and timber tract production industry (IMPLAN sector 15). In terms of employment, the industries that were most affected include commercial logging, support activities for agriculture and forestry and electric power generation using biomass industry.

SAM multipliers for employment, labor income, value-added, and output across the state were estimated to be 13.1, 4.9, 2.6, and 2.2 respectively. Output multiplier of 2.2 means that every $1 million in output in the region's wood-based biopower industry supported an additional $1.2 million in output to the rest of the economy. The relatively high employment multiplier compared to output, labor income, and value-added multipliers, reflect the biomass power industry's supply chain and spending patterns. It reflects the wood-based biomass power sector's dependence on labor-intensive upstream industries, especially commercial logging and forestry support services. These industries generate many jobs per dollar of spending, but with relatively modest wages and value added per worker. Additional induced effects in service industries such as hospitals, restaurants, and retail further increase job counts. Consequently, employment multipliers are substantially higher than output, labor income, or value-added multipliers. It should be noted that IMPLAN employment is jobs including part-time, seasonal workers and proprietors head count, hence sectors that add lots of part-time, low-hour service jobs tend to increase the employment count though labor income and output remain modest.

The industry also contributed close to $72 million in annual state and local taxes and ~$70 million in federal taxes in 2022 (Table 7).

Table 6. Economic contributions of wood-based biomass power generation industry in Georgia in 2022 US dollars using IMPLAN software and 2022 IMPLAN data.

	Economic Contributions of Wood-based Biomass Power Generation Industry				
States Included		**Employment (Jobs)**	**Labor Income**	**Value-added ($MM 2022)**	**Output**
Georgia	Direct	331	$60	$203	$475
	Indirect	2,813	$167	$205	$334
	Induced	1,184	$67	$128	$217
	Total Contribution	4,328	$294	$536	$1,026
	SAM Multiplier	13.1	4.9	2.6	2.2

Table 7. Total tax contributions of wood-based biomass power generation industry in Georgia in 2022 US dollars ($MM) using 2022 IMPLAN data.

Impact	Sub County General	Sub County Special Districts	County	State	Federal	Total
Direct	$4.02	$12.58	$9.95	$18.68	$18.60	$63.84
Indirect	$0.91	$2.87	$2.26	$8.51	$35.09	$49.65
Induced	$0.97	$3.03	$2.39	$6.15	$16.45	$28.99
Total	$5.91	$18.48	$14.61	$33.35	$70.14	$142.48

Table 8. The top five industries affected in terms of employment by wood-based biomass power generation industry in Georgia in 2022

		Impact			
	Industry affected (IMPLAN Sector)	**Direct**	**Indirect**	**Induced**	**Total**
1	Commercial logging (16)	0	1714	0	1714
2	Support activities for agriculture and forestry (19)	0	383	1	384
3	Electric power generation – Biomass (45)	331	0	0	331
4	Commercial and industrial machinery and equipment repair and maintenance (515)	0	183	3	186
5	All other crop farming (10)	0	114	1	115

Summary

This study assessed the economic contributions of wood-based biomass power generation industry in Georgia using IMPLAN, an input-output analysis software and 2022 IMPLAN data. It provides a snapshot of the economic effects of wood-based biomass power generation industry in terms of employment generated, value-added contributed and output produced using analysis by parts technique. The ABP technique was used to separate the economic contributions of wood-based biomass power generation from the contributions of biomass power generation in general, which also includes biomass sources other than wood and wood-derived fuel. The wood-based biomass power generation industry in Georgia was found to directly support 331 jobs and contribute $475 million in output to the state's economy. Including direct, indirect, and induced effects, the industry contributed a total of 4,328 jobs and $1.0 billion in output in Georgia.

Compared to 2017, direct employment in wood-based biomass power generation industry in Georgia increased by 9% (from 304 employees in 2017 to 331 employees in 2022) and direct output increased by 46% (from $326 million in 2017 to $475 million in 2022) in 2022 dollars. Similarly, total employment increased by 15% and output increased by 38% in 2022 compared to 2017.

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