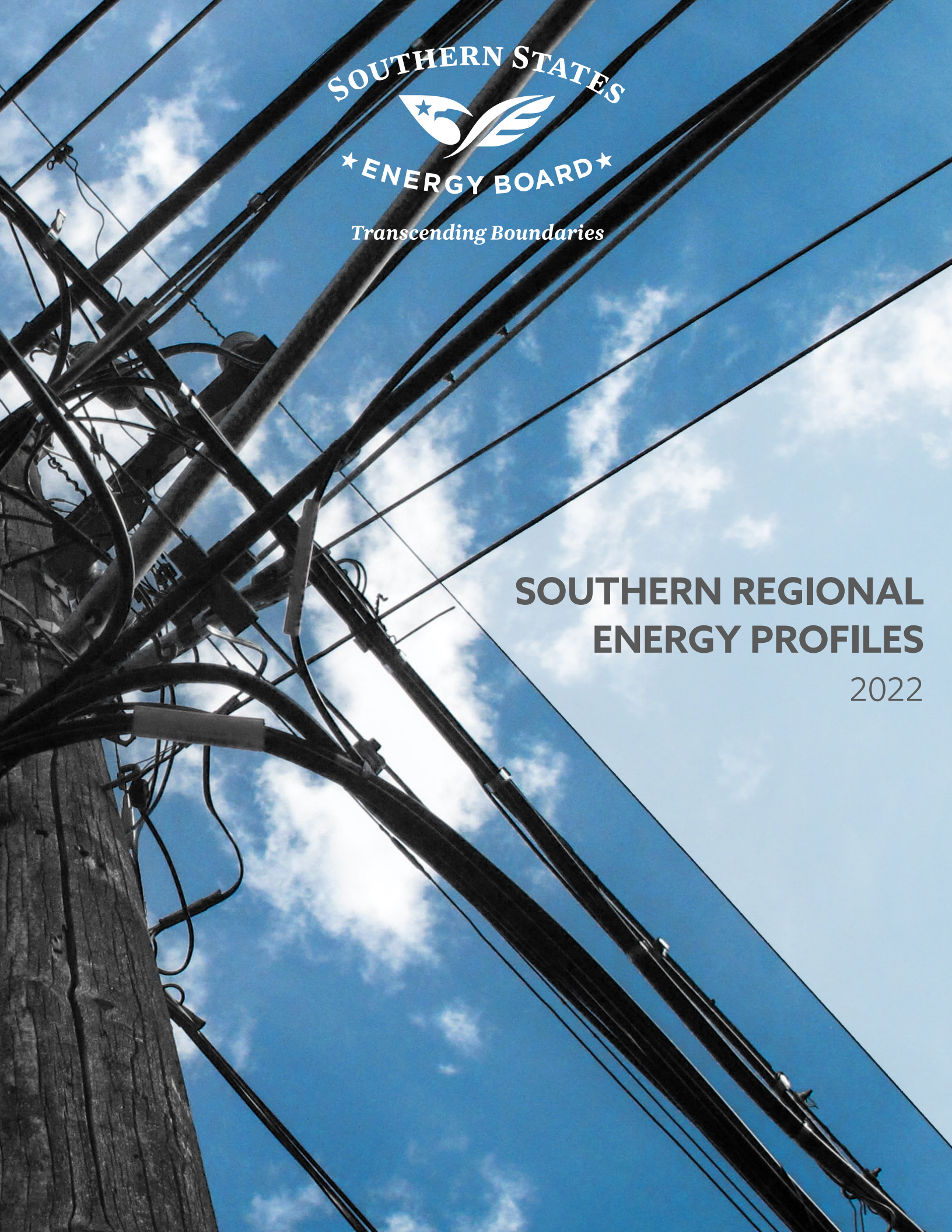


SOUTHERN REGIONAL ENERGY PROFILES

2022

MISSION STATEMENT

Through innovations in energy and environmental policies, programs, and technologies, the **Southern States Energy Board** enhances economic development and the quality of life in the South.

Contents

All information aggregated herein was sourced from EIA.gov

Introduction

The Southern States Energy Board (SSEB) is pleased to present this sixth edition of our Southern Regional Energy Profiles, which provides an overview of energy trends in the South and compares the region's energy profiles with the United States as a whole.

Our office has published this report for the past decade. In that time, the energy landscape has changed—sometimes drastically—for our members. This document is intended as a tool that can be used in presentations or documentation provided to constituents, civic groups, legislative committees, regulators, and industry stakeholders.

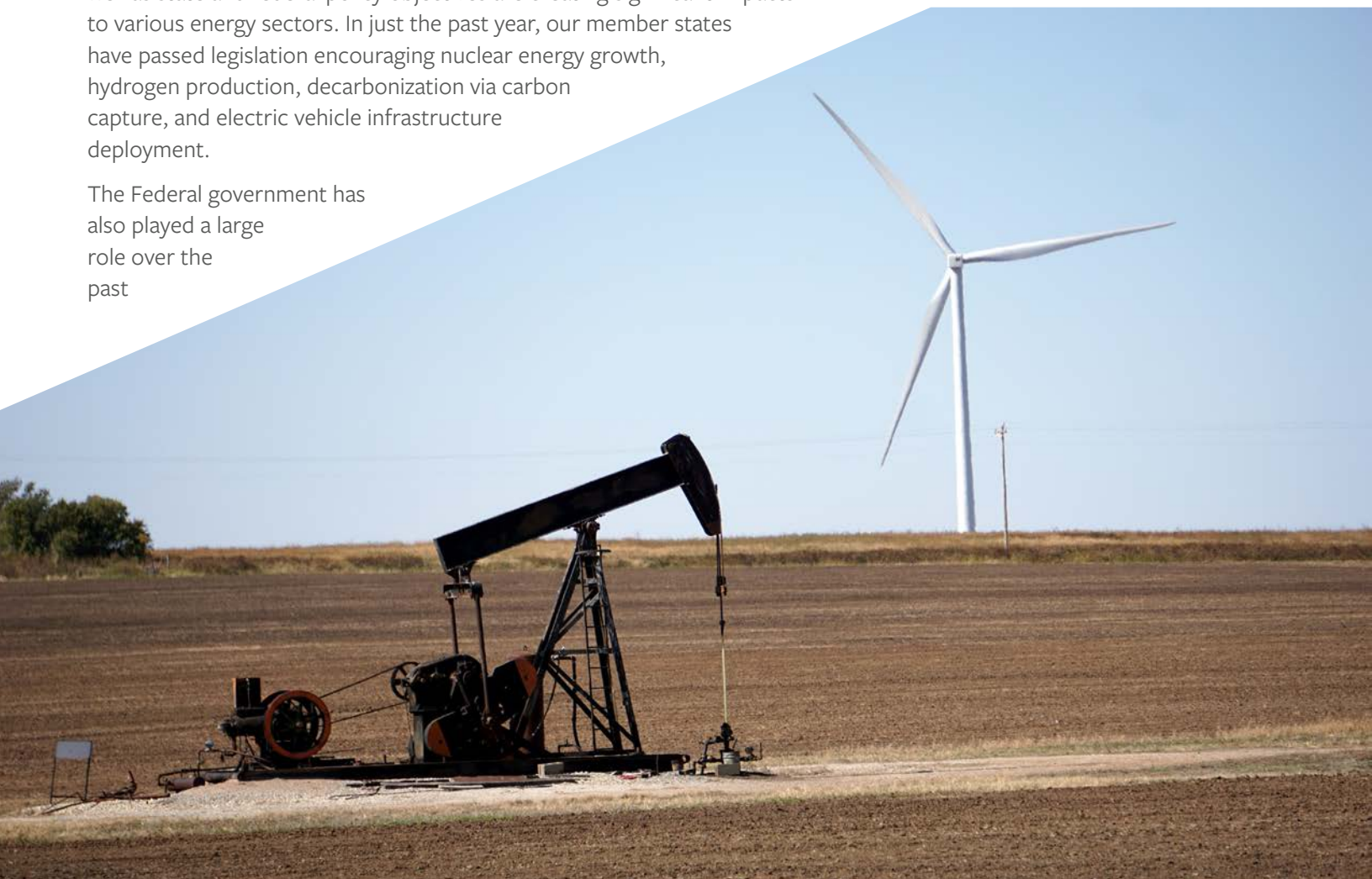
As with previous editions, this report serves as an informational resource and as a foundation for the discussion of energy programs, policies, and technologies that can enhance economic development and the quality of life in the region. Due to the nature of energy data aggregation, note that data points for Puerto Rico and the U.S. Virgin Islands is not comparable compared to other members within our region.

When we began producing this document a decade ago, we knew that the energy landscape in the South was entering a transitory period. What we did not anticipate was just how quickly things could change in a decade. Rising demand for energy meant new technology to meet that demand, so while demand increased--many states' energy consumption remained relatively flat over the past decade due to increased efficiency and resilient infrastructure.

Affordable, reliable energy is an integral part of the region's economy. Fortunately, given the diversity of resources and energy sources, our members display relative energy stability overall, even as certain trends have an impact on how energy is produced or used. For example, when the first edition of this report was published in 2012, coal accounted for 44 percent of the region's electricity generation. Today, coal-fueled generation accounts for just 16 percent of the region's electricity generation, with natural gas, wind, and solar filling the gap left by reduced coal-fueled generation.

Across our member states and territories, economic and technological forces as well as state and federal policy objectives are creating significant impacts to various energy sectors. In just the past year, our member states have passed legislation encouraging nuclear energy growth, hydrogen production, decarbonization via carbon capture, and electric vehicle infrastructure deployment.

The Federal government has also played a large role over the past



decade in orchestrating a range of public-private partnerships and research endeavors. The Bipartisan Infrastructure Law, passed in 2022, included $62 billion in funding for America's energy future. The measure capped off a decade of Department of Energy carbon management funding with another $6.5 billion spread over five years for certain carbon capture pilot ventures, such as direct air capture, and hydrogen hubs.

In 2020, the Covid-19 pandemic caused much volatility in the energy sector, especially with respect to petroleum prices.

Overall, energy consumption and associated emissions dropped in 2020. As pandemic difficulties began to assuage, a Russian war in Ukraine again disrupted energy imports/exports worldwide in 2022. Unfortunately, comprehensive and verified data for 2021-2022 does not yet exist, so a top-level analysis of the energy economy's tumultuous past couple years will come in a future edition of our Southern Regional Energy Profiles.

According to an EIA October 2021 report, global energy demand and energy-related carbon emissions will continue to rise through 2050, with oil remaining the largest energy source just ahead of renewables.

The electricity generation portfolio of the SSEB region is in a state of transition that matches the nation's trend toward lower carbon sources of electricity. In 2021, U.S. energy-related carbon dioxide (CO_2) emissions increased by 296 million metric tons (MMmt)—an increase of six percent compared to 2020 levels. At the fuel level, petroleum and coal accounted for the bulk of CO2 emissions increases from 2020 to 2021, rising by 181 MMmt, or nine percent, and 126 MMmt, or 14 percent, respectively.

Natural gas generation accounts for the majority of electricity production, followed by nuclear then coal. 2020 was the first year in which nuclear edged out coal in terms of net energy generation within our membership. Natural gas has shifted from 22 percent of generation in 2010 to 49 percent of generation regionally in 2020. Electricity generated from renewable energy resources increased by nearly 14 percent in the SSEB region from 2019 to 2020.

Solar power was the fastest growing renewable technology regionally, generating 32 terawatt-hours in 2020, up nearly 50 percent from 2019 levels. Despite solar's immense growth, wind remained the largest source of renewable energy in the area at seven percent of generation.

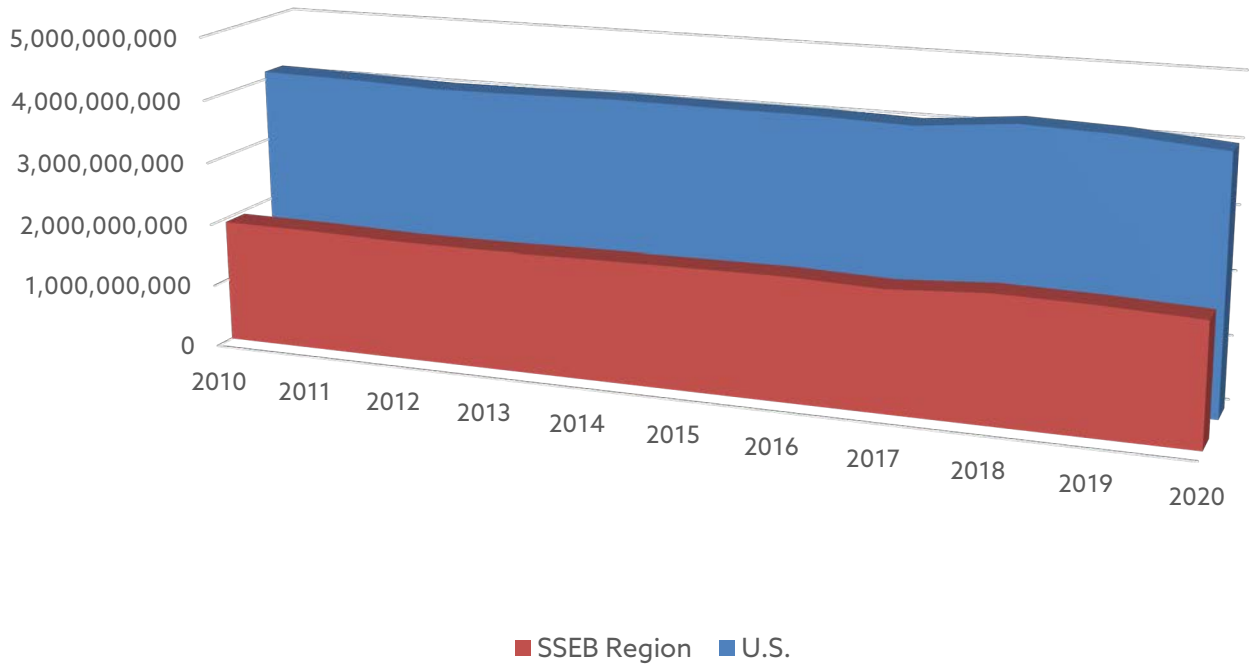
Before we dive into the data, we would like to recognize the public sources used in aggregating statistics for this report. The Energy Information Administration of the U.S. Department of Energy; U.S. Environmental Protection Agency; the Bureau of Labor Statistics; the Bureau of Economic Analysis; and the Census Bureau all contribute data to EIA, which is the main source of data in this document. The following pages will compare energy resources, consumption, and sources; electricity generation, consumption, and emissions of SSEB member states, the SSEB region, and the United States. We appreciate your interest, and we ask that you let us know if you have any questions regarding the 2022 edition of the Southern Regional Energy Profiles.

Our Region Compared to the U.S.

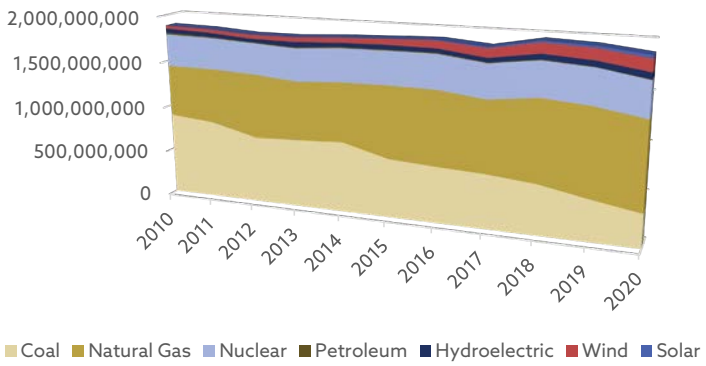
This section will examine the energy production and usage differences between our region as compared to the U.S. on average.

Overall, electricity generation has remained flat—this trend is occurring nationally, as well. Declining electricity generation reflects a number of factors, including increased energy efficiency, increased adoption of on-site energy resources such as roof-top solar, and shifting patterns in industrial usage. Solar power was the fastest growing source of electricity generation in the region.

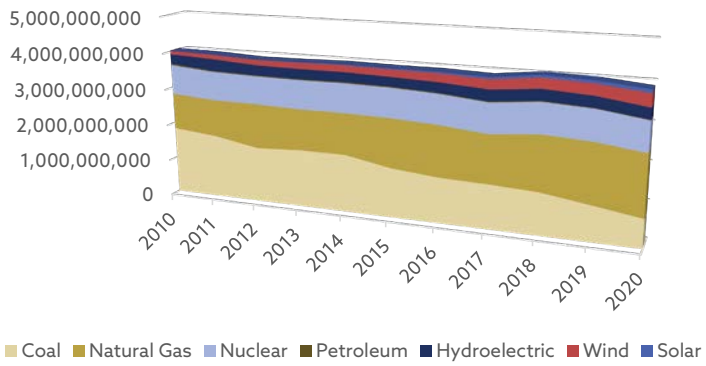
U.S. v. Regional Electric Generation in Megawatt-hours



Regional Electric Generation in MWh by Fuel



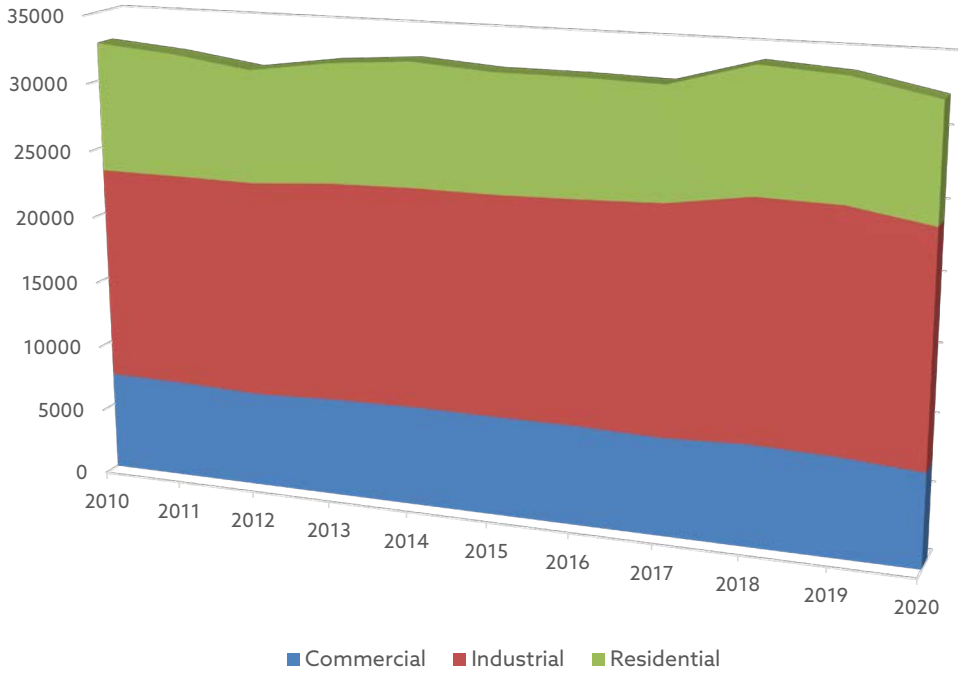
U.S. Electric Generation in MWh by Fuel



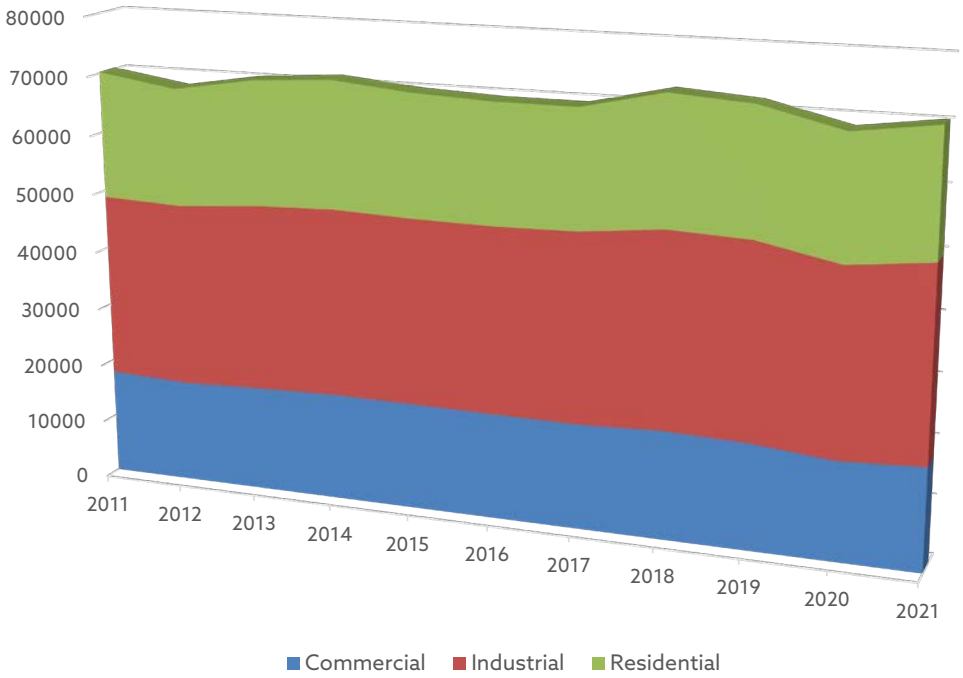
Consumption by Sector

In 2020, energy consumption declined by a record seven and a half percent in the United States, mostly as a result of pandemic effects and relatively warmer weather. Data from EIA shows that declines in energy consumption varied significantly by state. The states that had the largest declines tended to have significantly less energy used in transportation.

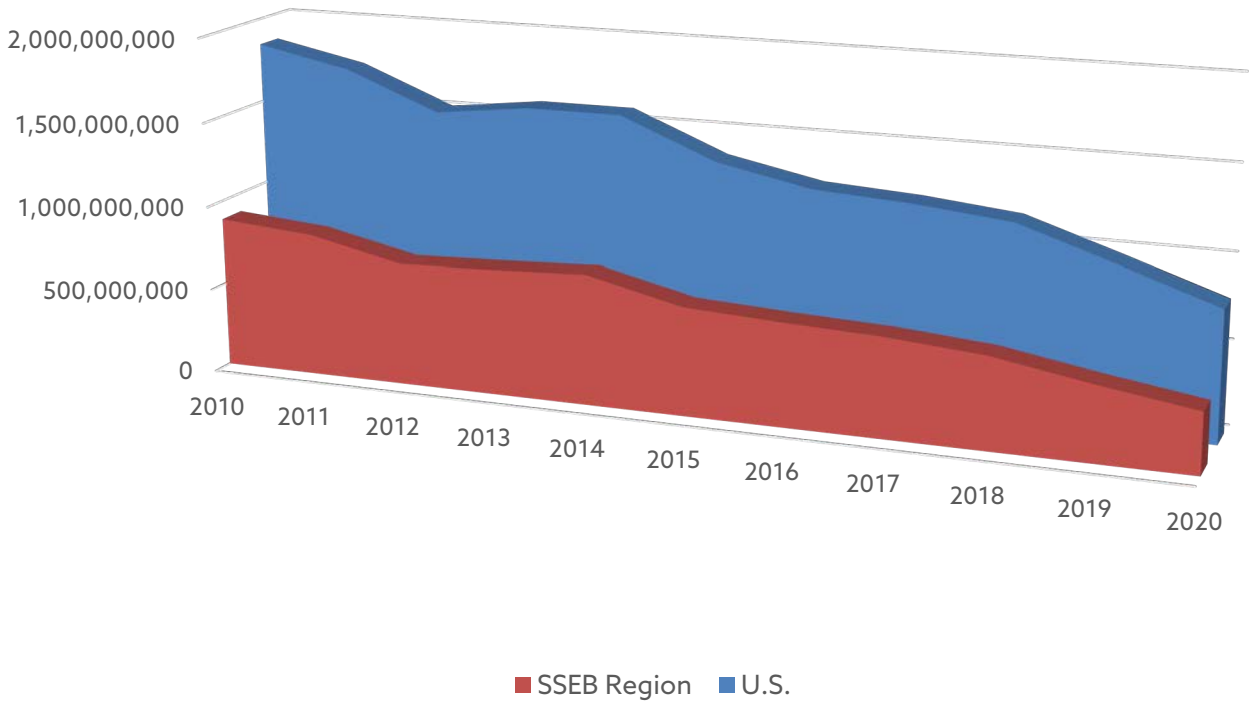
Total Regional Energy Consumed by Sector (Trillion Btu)



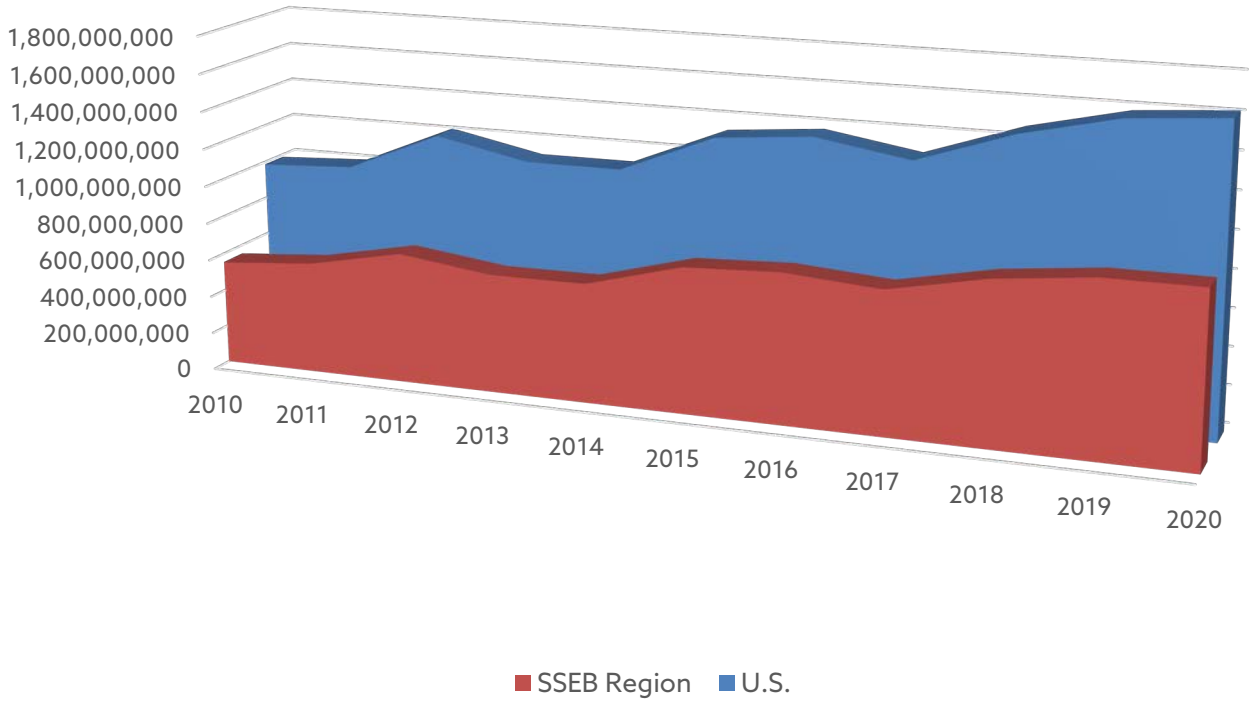
Total U.S. Energy Consumed by Sector (Trillion Btu)



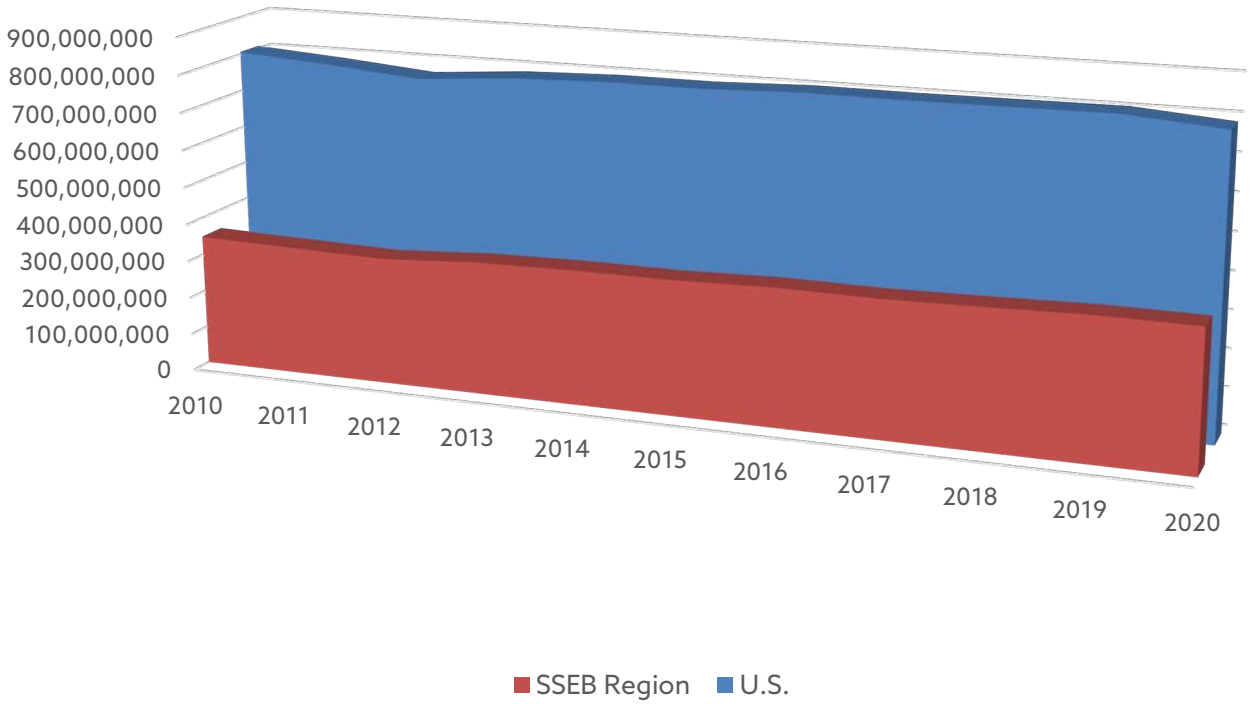
Coal — Regional v. U.S. Electric Generation in Megawatt-hours



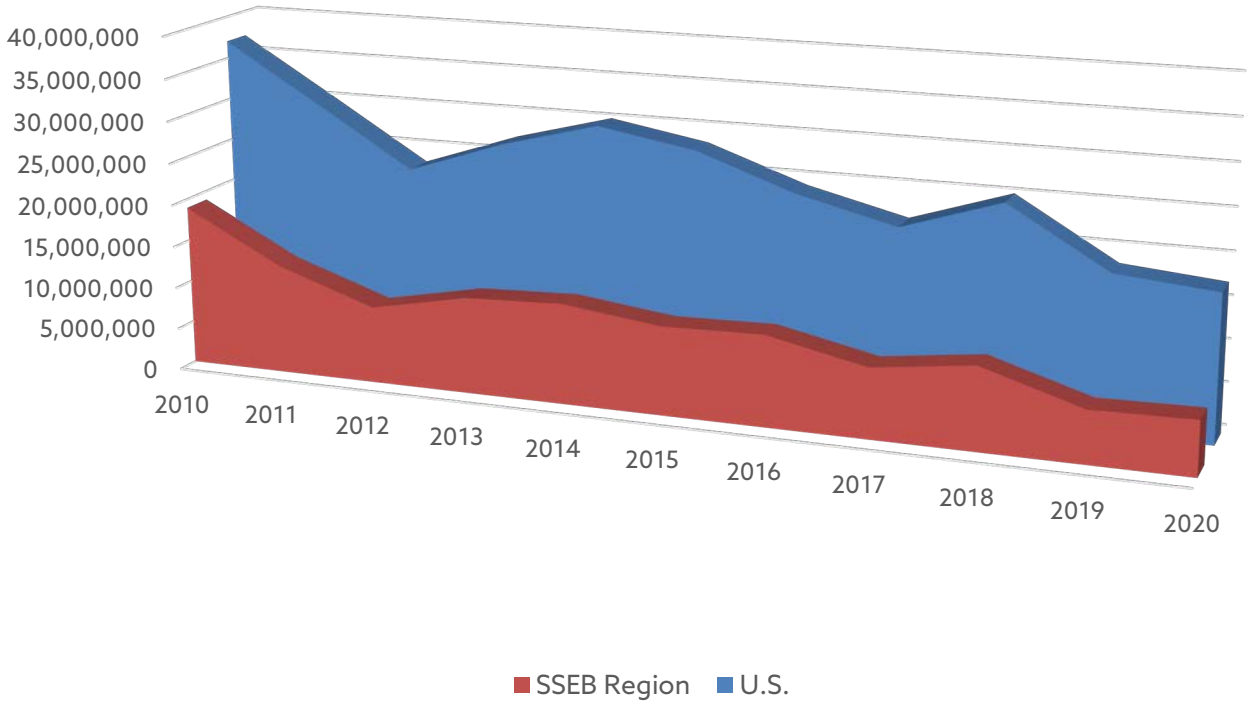
Natural Gas — Regional v. U.S. Electric Generation in Megawatt-hours



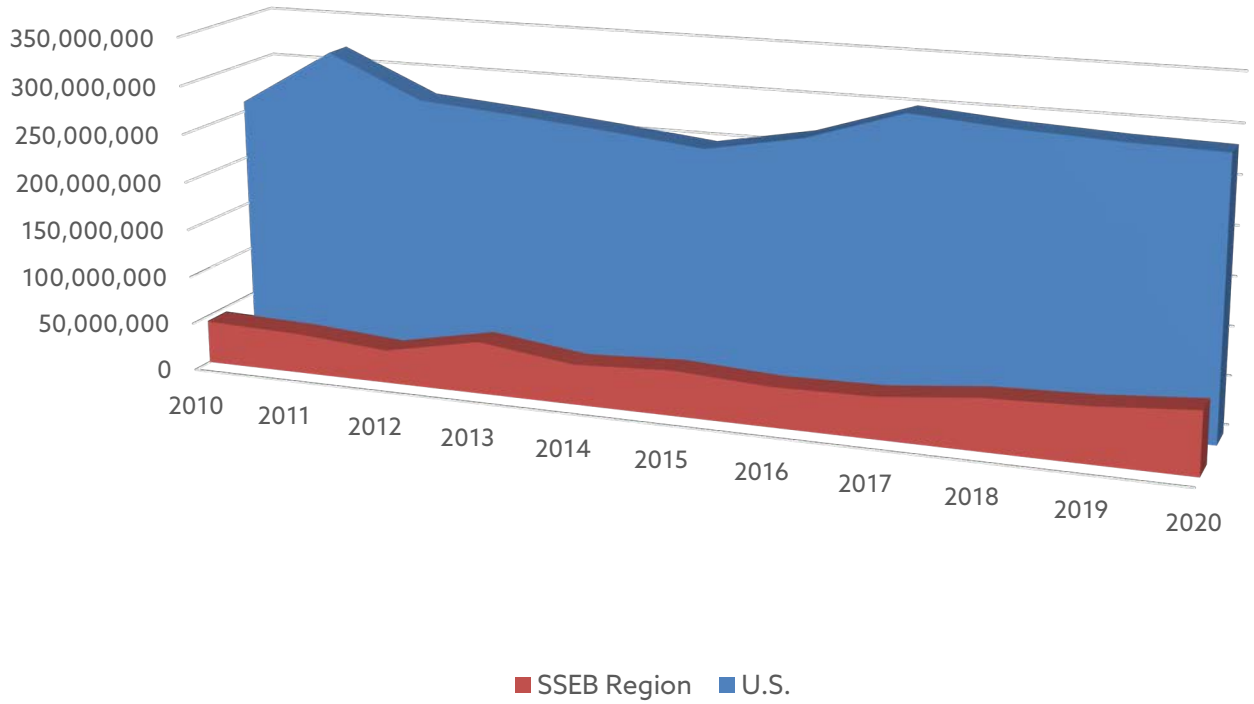
Nuclear — Regional v. U.S. Electric Generation in Megawatt-hours



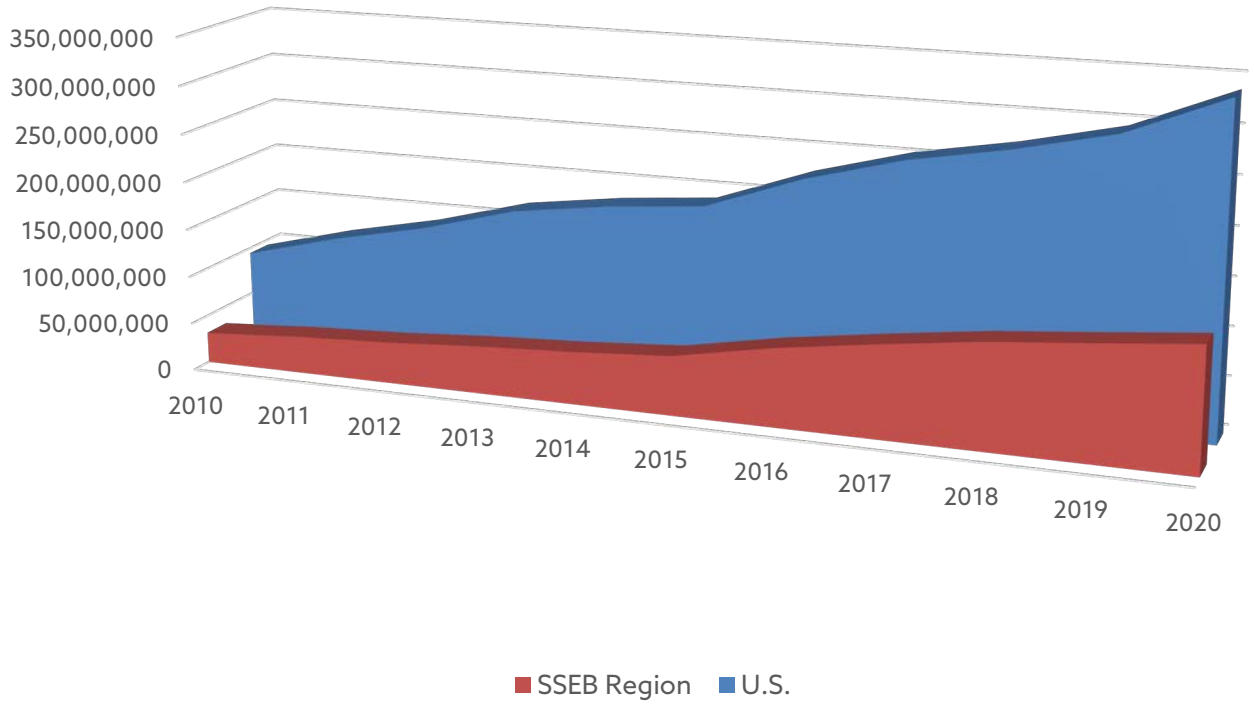
Petroleum — Regional v. U.S. Electric Generation in Megawatt-hours



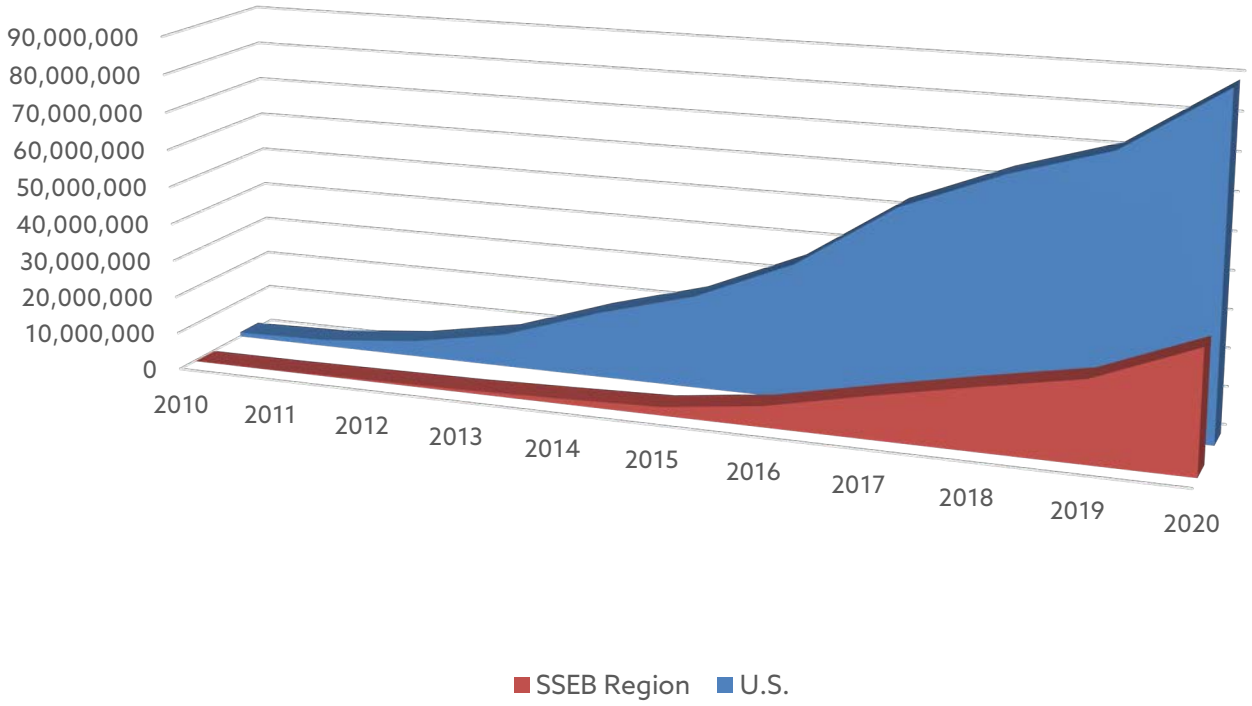
Hydroelectric — Regional v. U.S. Electric Generation in Megawatt-hours



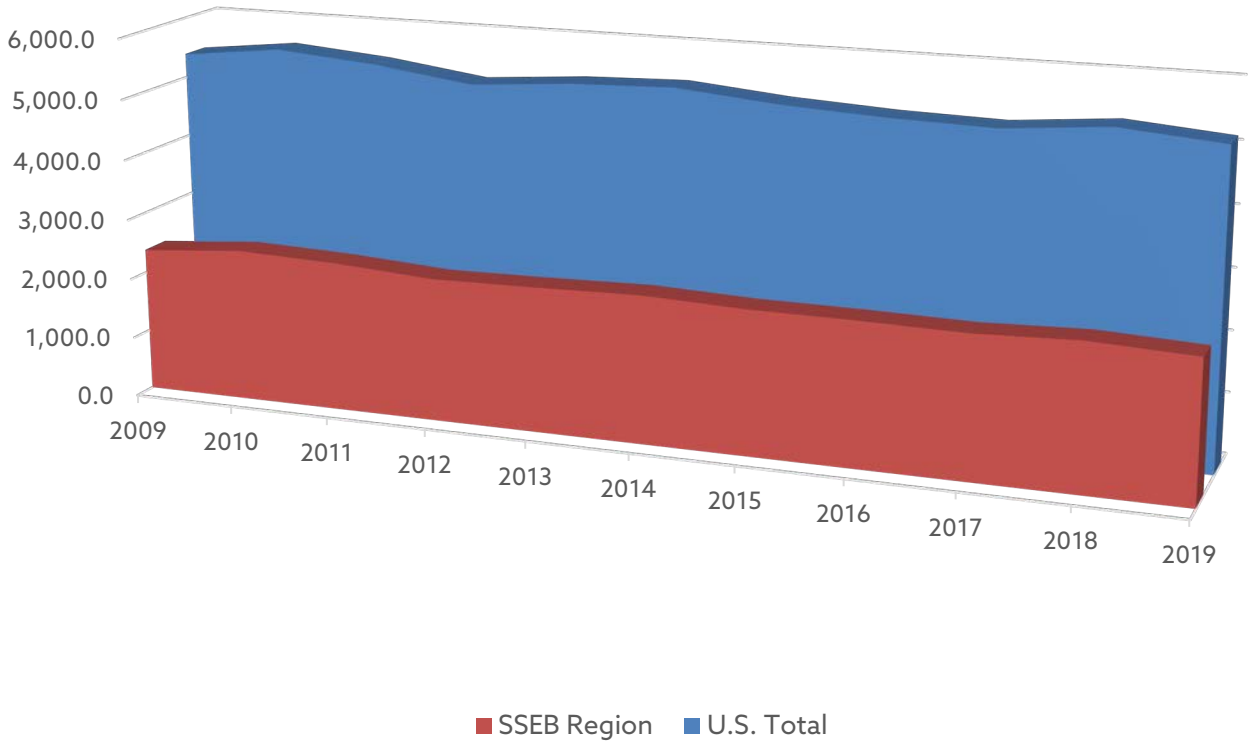
Wind — Regional v. U.S. Electric Generation in Megawatt-hours



Solar — Regional v. U.S. Electric Generation in Megawatt-hours

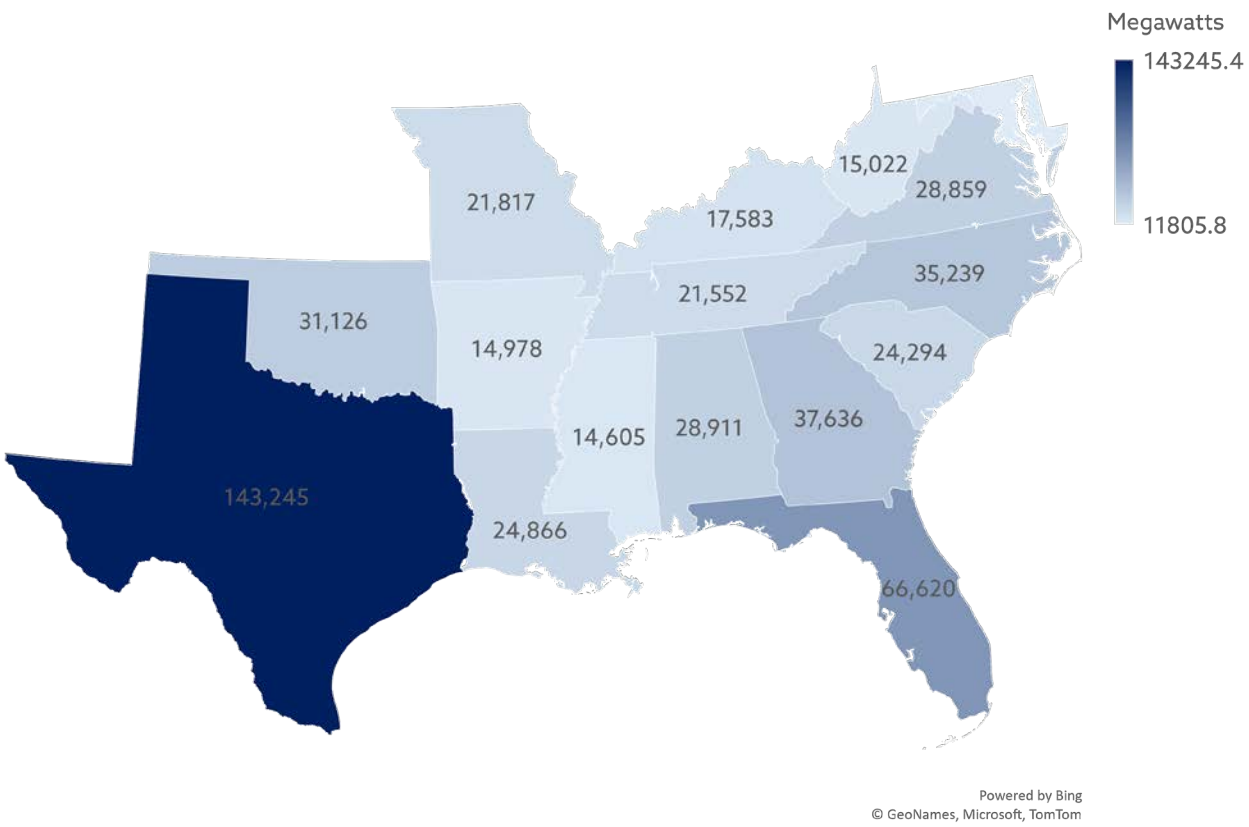


CO_2 Emissions by Year (in million metric tons)

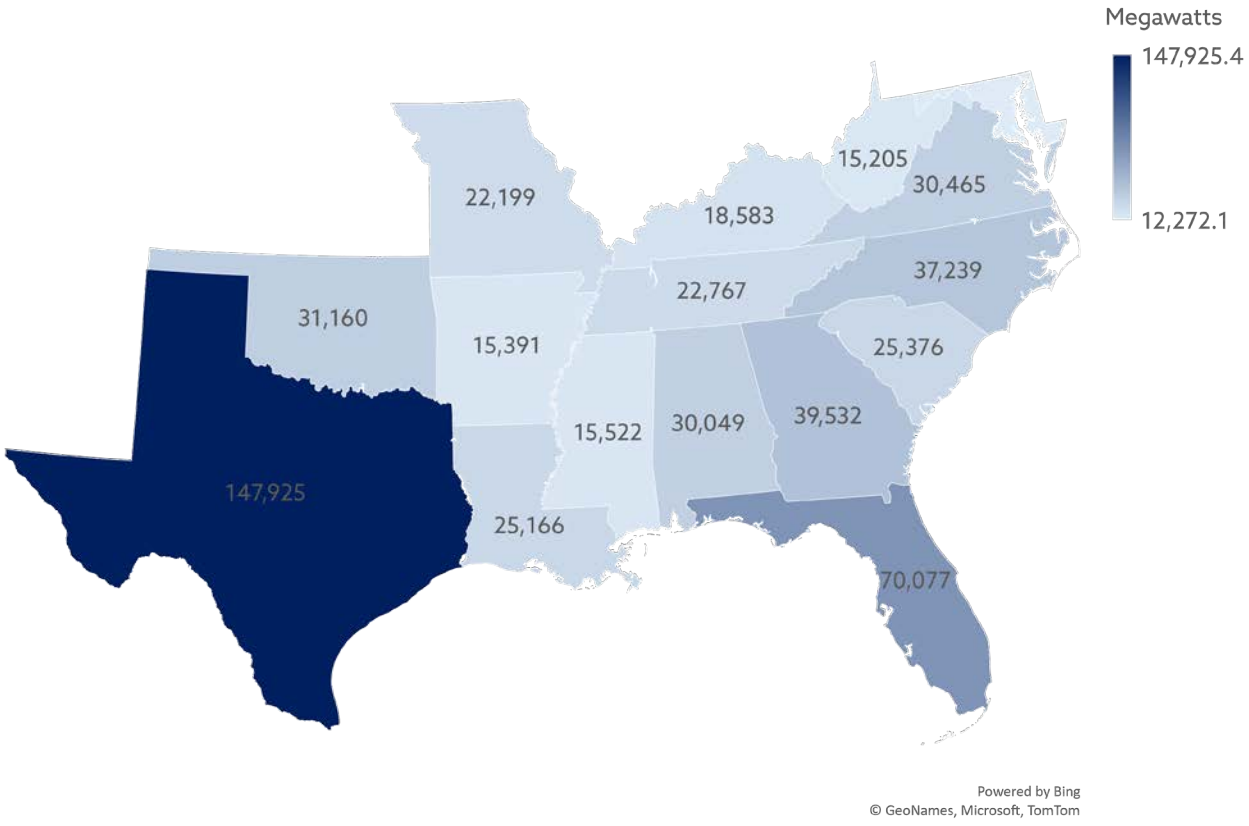


Regional Capacity Planning

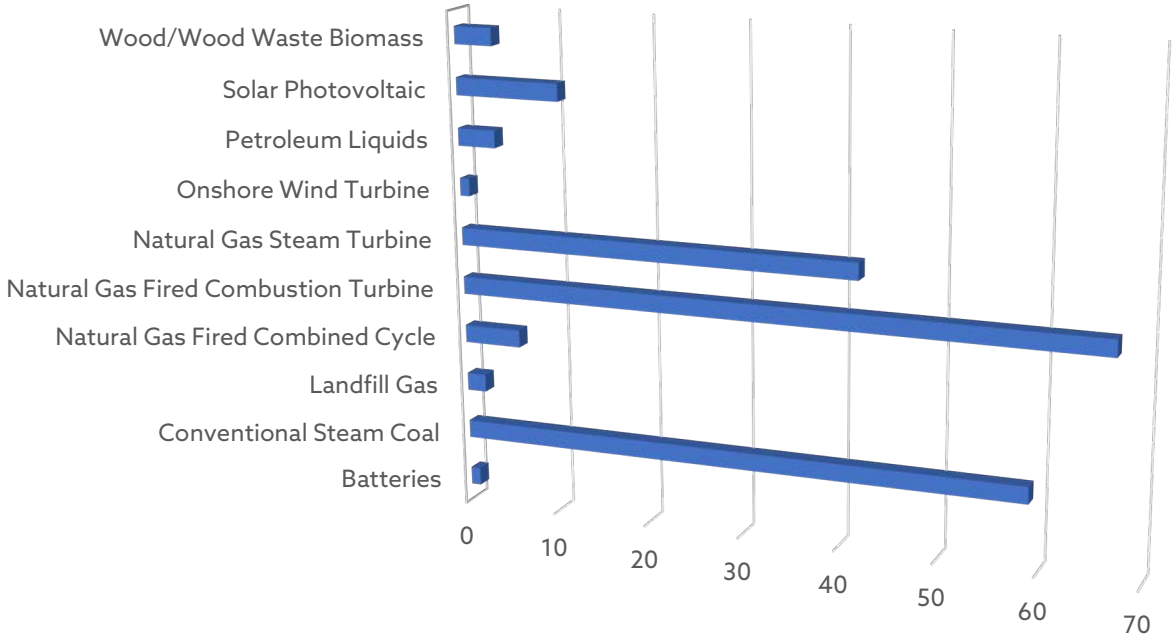
Net Summer Capacity by State, 2022



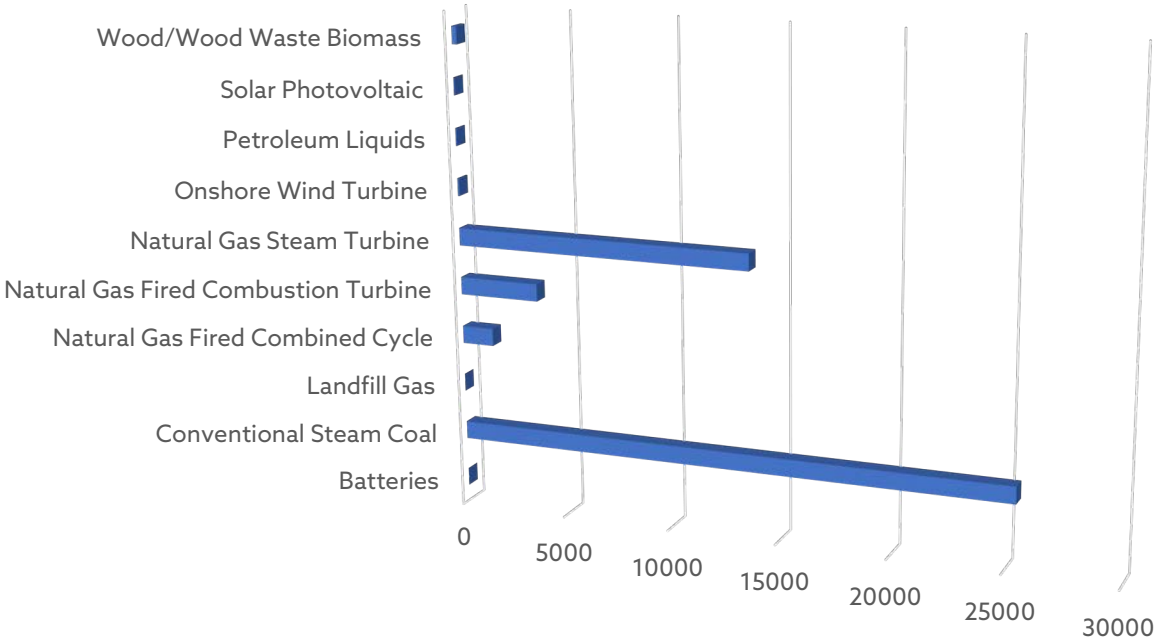
Net Winter Capacity by State, 2022



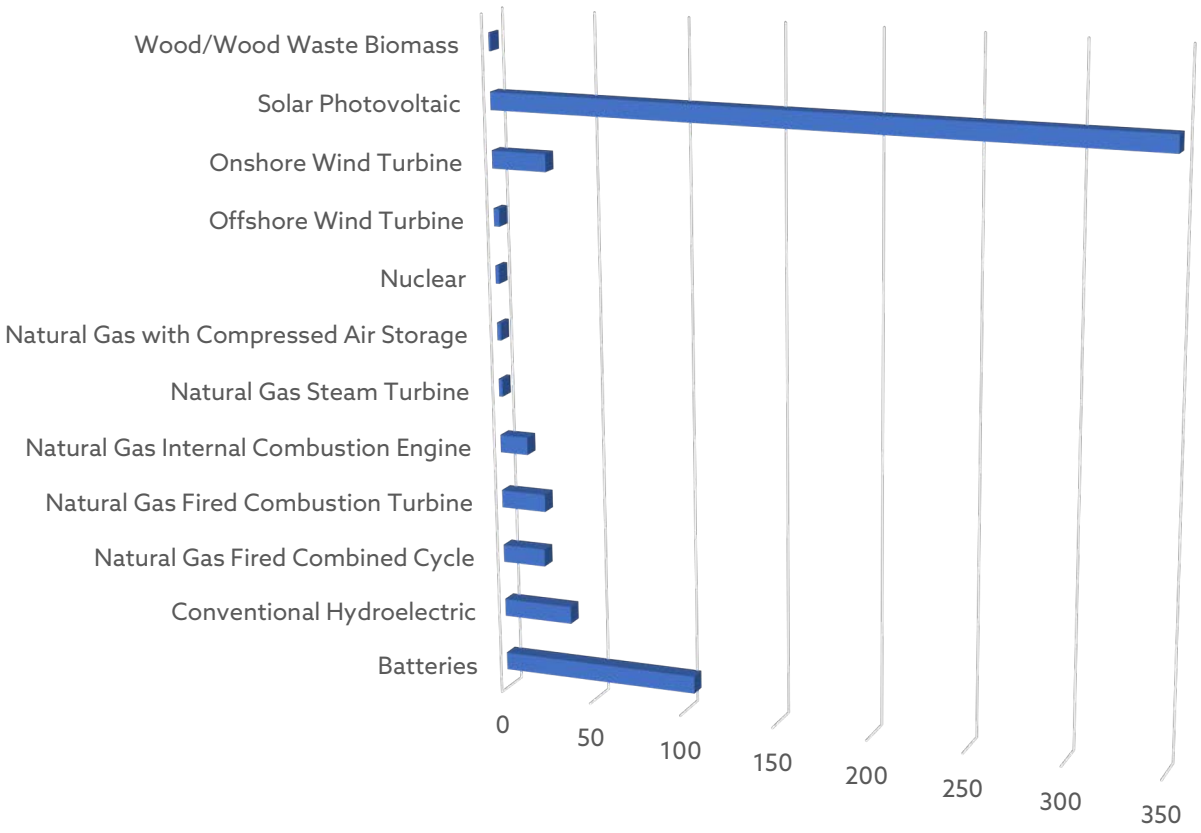
Planned Retirements by Technology Before 2061



Planned Retirements by Capacity (MW), 2023-2061



Planned Openings by Technology Before 2030



Planned Openings by Capacity (MW), 2023-2030

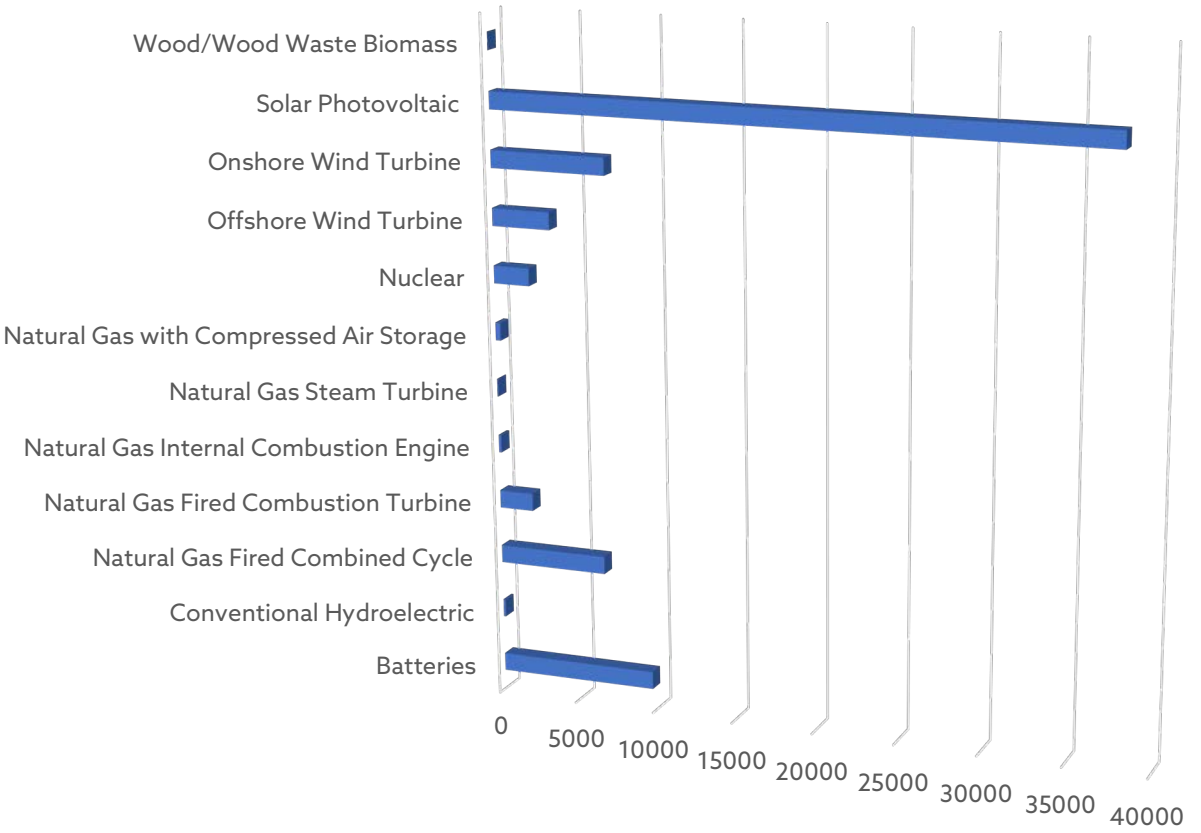
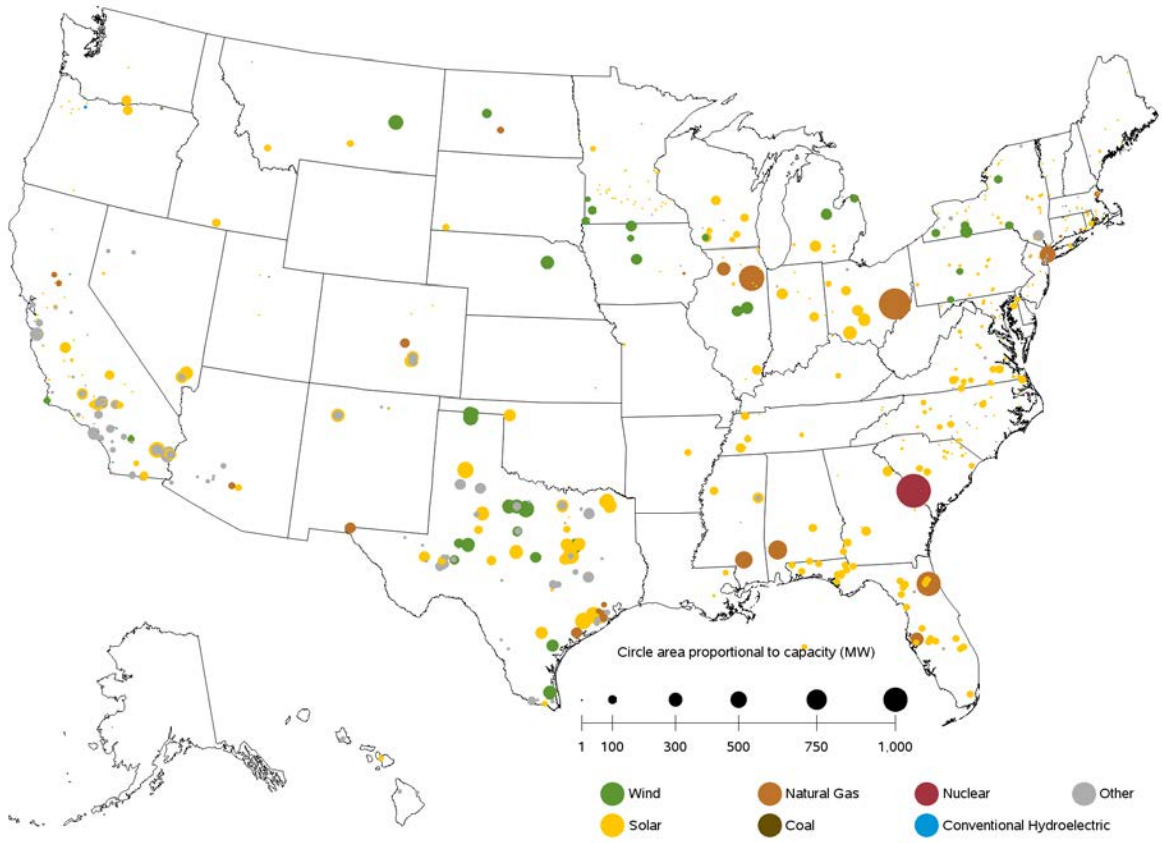
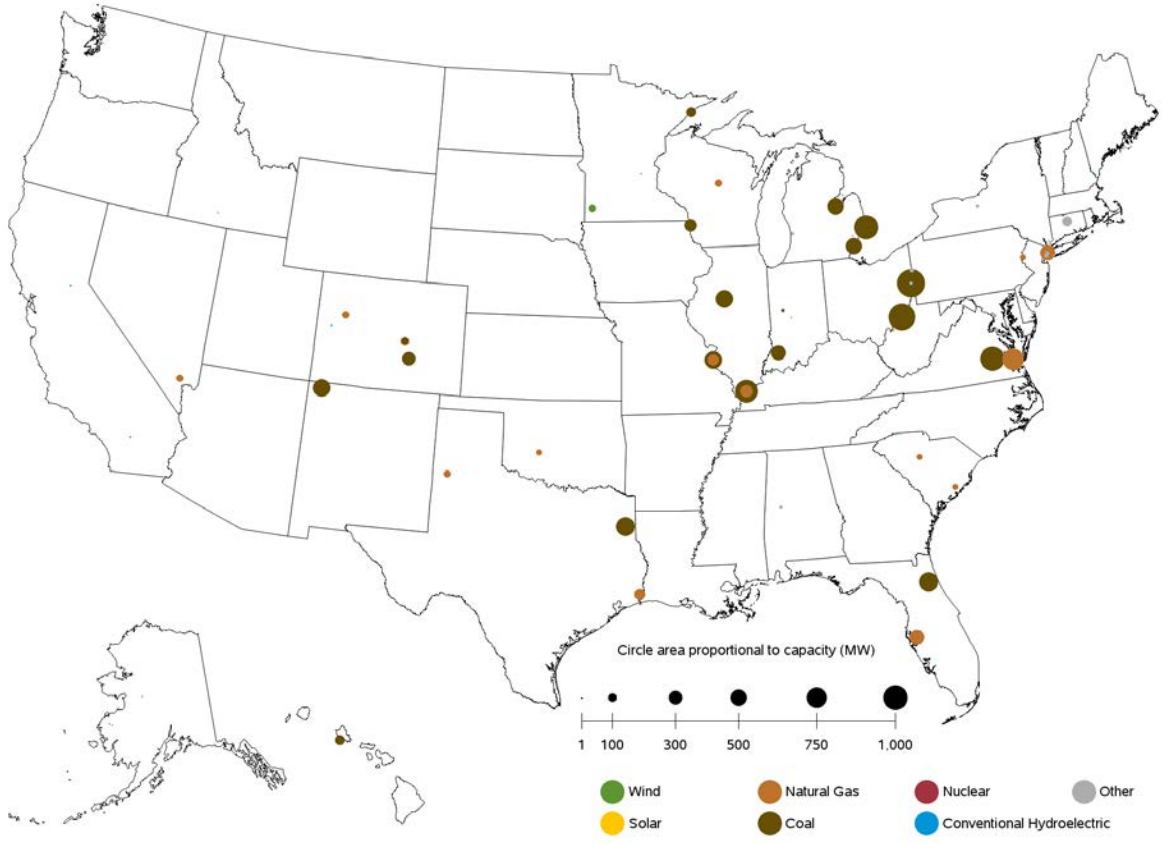


Figure 6.1.C. Utility-Scale Generating Units Planned to Come Online from August 2022 to July 2023



Sources: U.S. Energy Information Administration, Form EIA-860, 'Annual Electric Generator Report' and Form EIA-860M, 'Monthly Update to the Annual Electric Generator Report.'

Figure 6.1.D. Utility-Scale Generating Units Planned to Retire from August 2022 to July 2023



Sources: U.S. Energy Information Administration, Form EIA-860, 'Annual Electric Generator Report' and Form EIA-860M, 'Monthly Update to the Annual Electric Generator Report.'

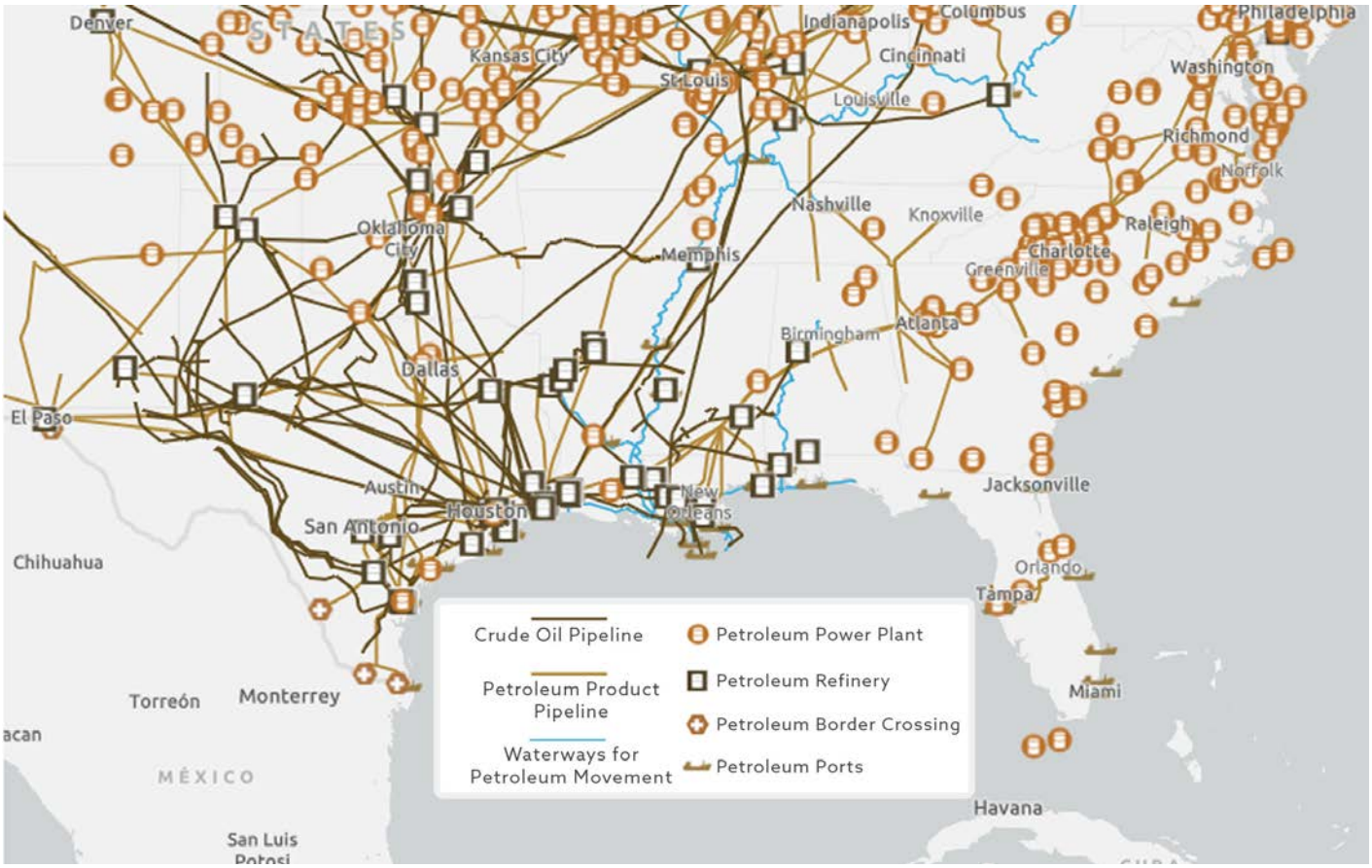
Pipelines

Petroleum

In 2021, pipeline companies completed 14 petroleum liquids pipelines projects in the United States, according to data from EIA. This total includes seven crude oil pipeline projects and seven hydrocarbon gas liquids pipeline projects.

Of the 14 completed projects, six projects were new pipelines, five projects were expansions of existing systems, two projects reversed the direction that the commodity flowed on the pipeline, and one project was a change in the commodity carried by the pipeline.

Over the past decade, our region and adjoining states have added 37,000 miles of petroleum gas pipeline accounting for an additional 32 million barrels per day of oil. Nationally, the last decade added about 65,000 miles of pipeline for an added capacity of 43 million barrels per day.

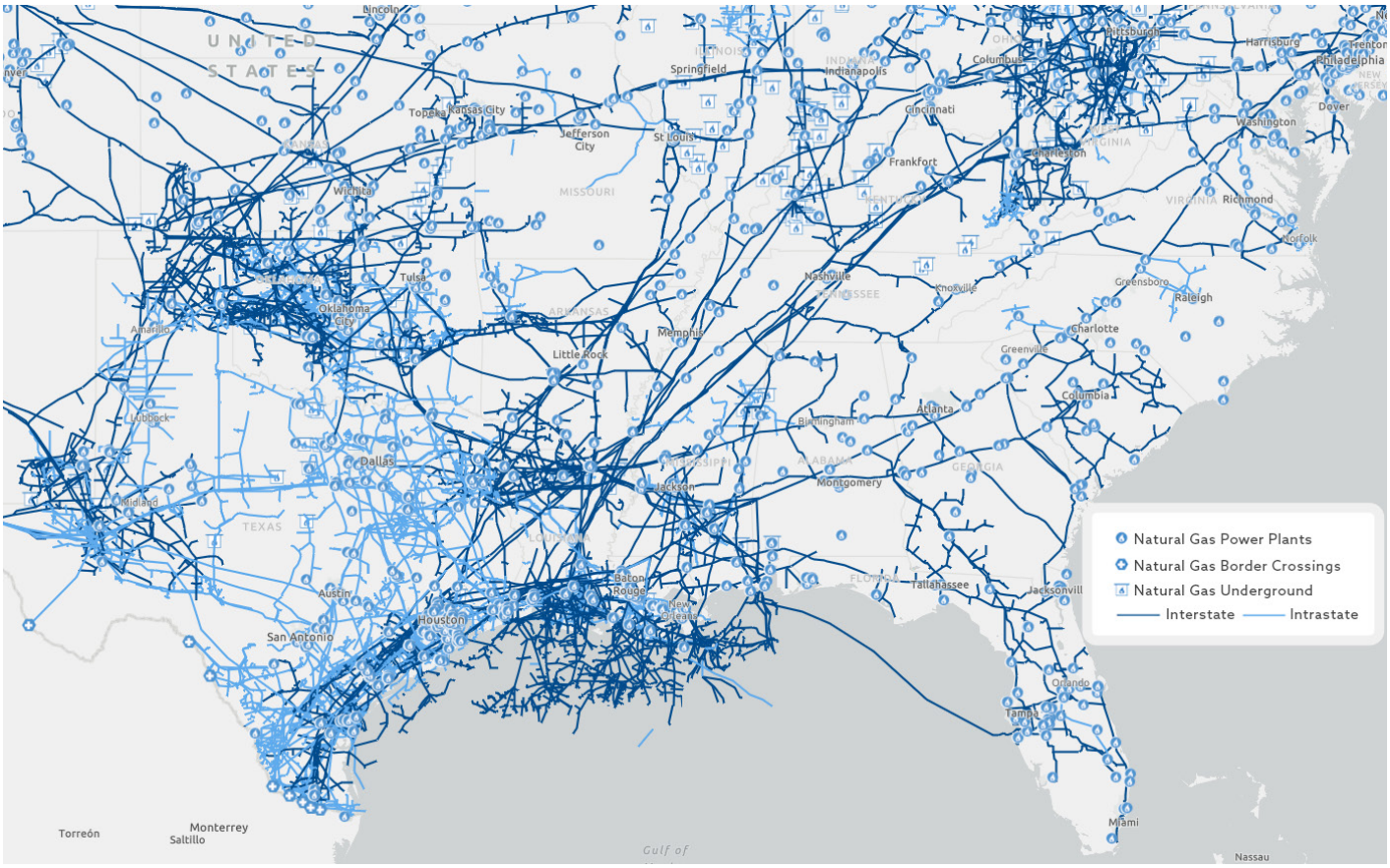


Natural Gas

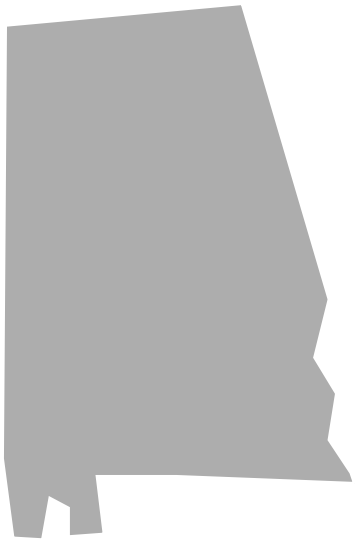
A total of 7.44 billion cubic feet per day (Bcf/d) of interstate natural gas pipeline capacity was added in the United States during 2021, according to data from EIA. This amount was the lowest amount of capacity added to interstate transmission since 2016.

More than two-thirds of the new interstate natural gas pipeline capacity, or 5.01 Bcf/d, was added to transport natural gas into and within Texas and the Gulf Coast markets, also known as the South Central region. Most of the additional capacity is intended to serve growing LNG export demand, primarily by better connecting other interstate pipelines with LNG export terminals.

Over the past decade, our region and adjoining states have added nearly 9,000 miles of natural gas pipeline accounting for more than two-thirds of the pipeline added nationally. Nationally, the last decade added about 12,000 miles of pipeline for an added capacity of 131,000 million cubic feet per day.



Alabama



Alabama has a wide variety of energy resources, with coal deposits, crude oil, and natural gas reserves. Located along the Gulf of Mexico, southern Alabama is a coastal plain with a humid, subtropical climate. The northern half of the state includes the southern edge of the Appalachian Mountains where sub-zero temperatures occur every few years and measurable snowfall is common.

Alabama's many rivers flow from the Appalachian mountains toward the Gulf of Mexico, and several dams along those rivers provide hydroelectric power. Forests cover more than two-thirds of Alabama, and the state boasts the third largest total timberland acreage among the Lower 48 states, after Georgia and Oregon, which gives Alabama vast biomass resources.

Alabama ranks among the top ten states with the highest total industrial sector energy use; its industrial sector accounts for slightly more than two-fifths of the state's total energy consumption. Alabama is among the top five states in the manufacture of cars and light trucks with a production capacity of about 1.3 million vehicles annually—vehicles are Alabama's number one export. It is the fourth-largest auto exporting state. The manufacture of automobiles and other transportation equipment, chemicals, food and beverages, paper, and wood products, as well as mining and oil and gas extraction, agriculture, and forestry, are major contributors to Alabama's economy. The transportation sector accounts for more than one-fourth of the state's total energy consumption.

> **"Alabama ranks sixth among the states in the production of electricity. Natural gas has fueled the largest share of electricity in Alabama since 2014 and accounted for 38 percent of the state's net generation in 2021. Seven of the ten largest power plants in Alabama by capacity and six of the largest by actual yearly electricity generation are fueled by natural gas.**

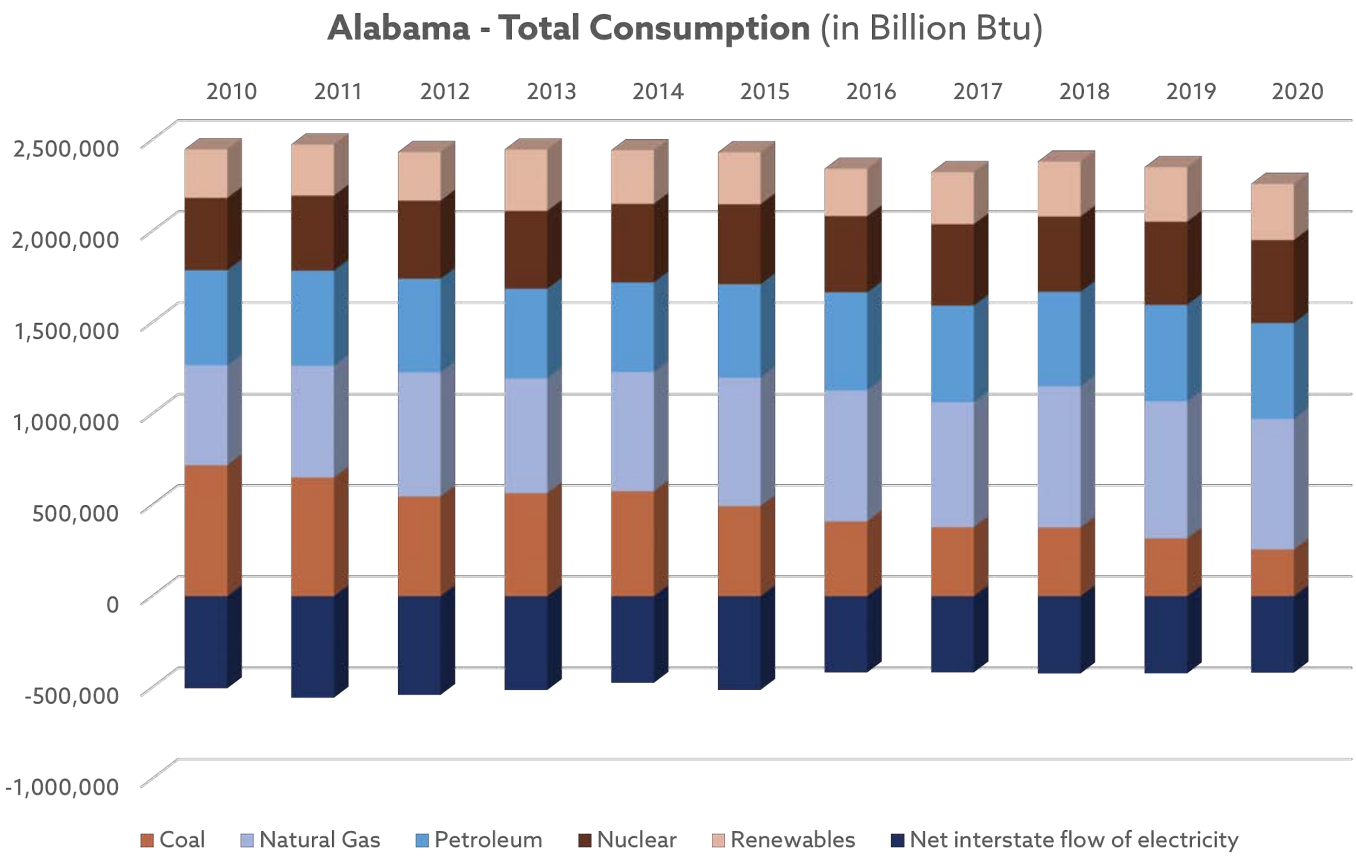
Alabama is the nation's fourth-largest producer of electricity from nuclear power. Its two nuclear power plants, totaling five reactors, produced 32 percent of the electricity generated in the state in 2021. The three reactors at the Tennessee Valley Authority's (TVA) Browns Ferry nuclear power plant in north Alabama have just under 3,800 megawatts of combined generating capacity, which is the second-largest among U.S. nuclear power plants after Arizona's Palo Verde nuclear power plant.

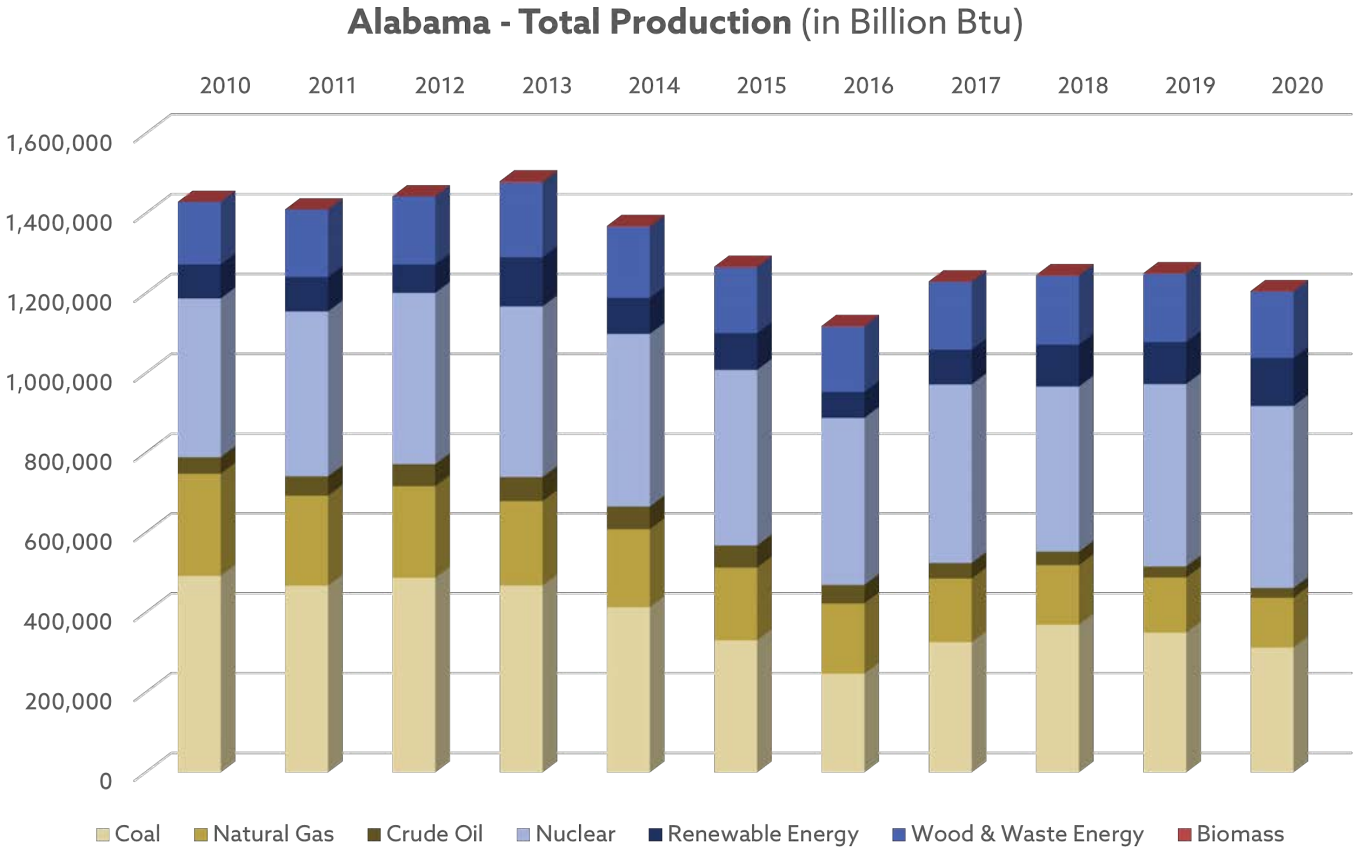
Historically, coal fueled the largest share of electric power generation in Alabama, but aging coal-fueled generating plants have shut down. About 4,200 megawatts of coal-fueled generating capacity in the state was retired from 2015 through 2021. Since 2010, the contribution of coal-fueled power plants to Alabama's net generation dropped by more than half, declining to 19 percent of the state's total generation in 2021.

Alabama is the sixth-largest U.S. hydroelectric power producer and third-largest east of the Rocky Mountains, after New York and Tennessee. Twenty-three hydroelectric dams on Alabama's rivers provided almost nine percent of the state's net generation in 2021.

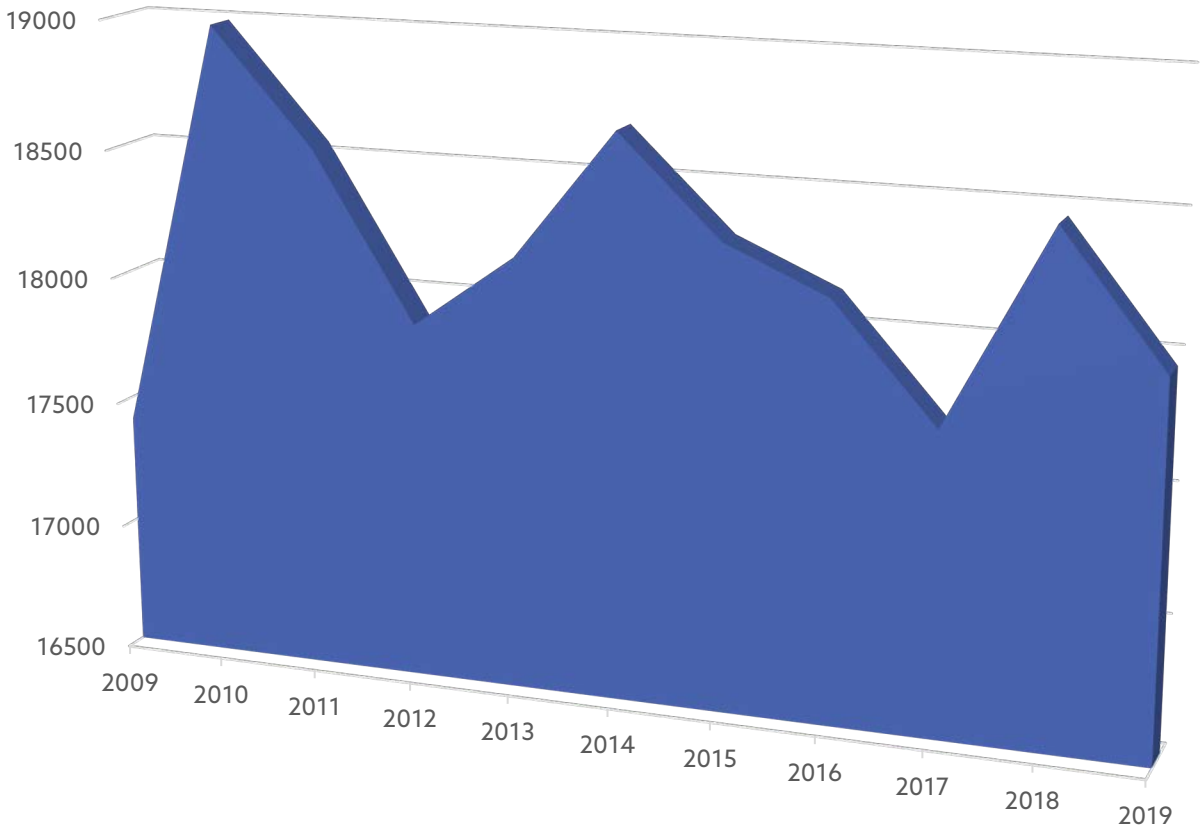
Alabama's electricity production exceeds its consumption, so about one-third of the electricity generated in the state is sent to neighboring states over the regional electric grid. Alabama's industrial sector and residential sector each account for slightly less than two-fifths of the electricity sold in the state. The commercial sector makes up one-fourth of the state's electricity sales.

Total electricity consumption per capita in Alabama is fifth-highest in the nation and per capita electricity use in the residential sector ranks third due in part to the high demand for air conditioning in the hot summers and the widespread use of electricity for heating in the winter. Almost seven out of ten Alabama households use electricity to generate heat.

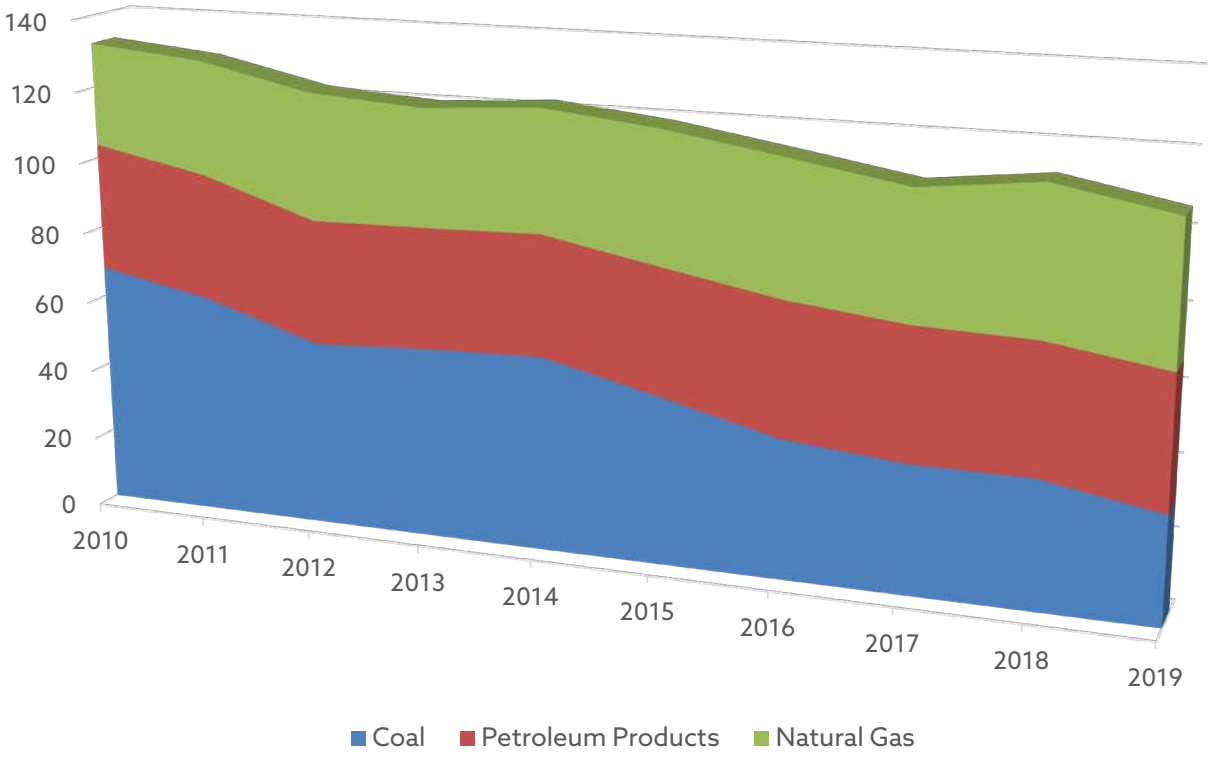

Alabama - Total Consumption (in Billion Btu)
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
-500,000
-1,000,000
Coal
Natural Gas
Petroleum
Nuclear
Renewables
Net interstate flow of electricity


Alabama - Total Production (in Billion Btu)
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Coal
Natural Gas
Crude Oil
Nuclear
Renewable Energy
Wood & Waste Energy
Biomass

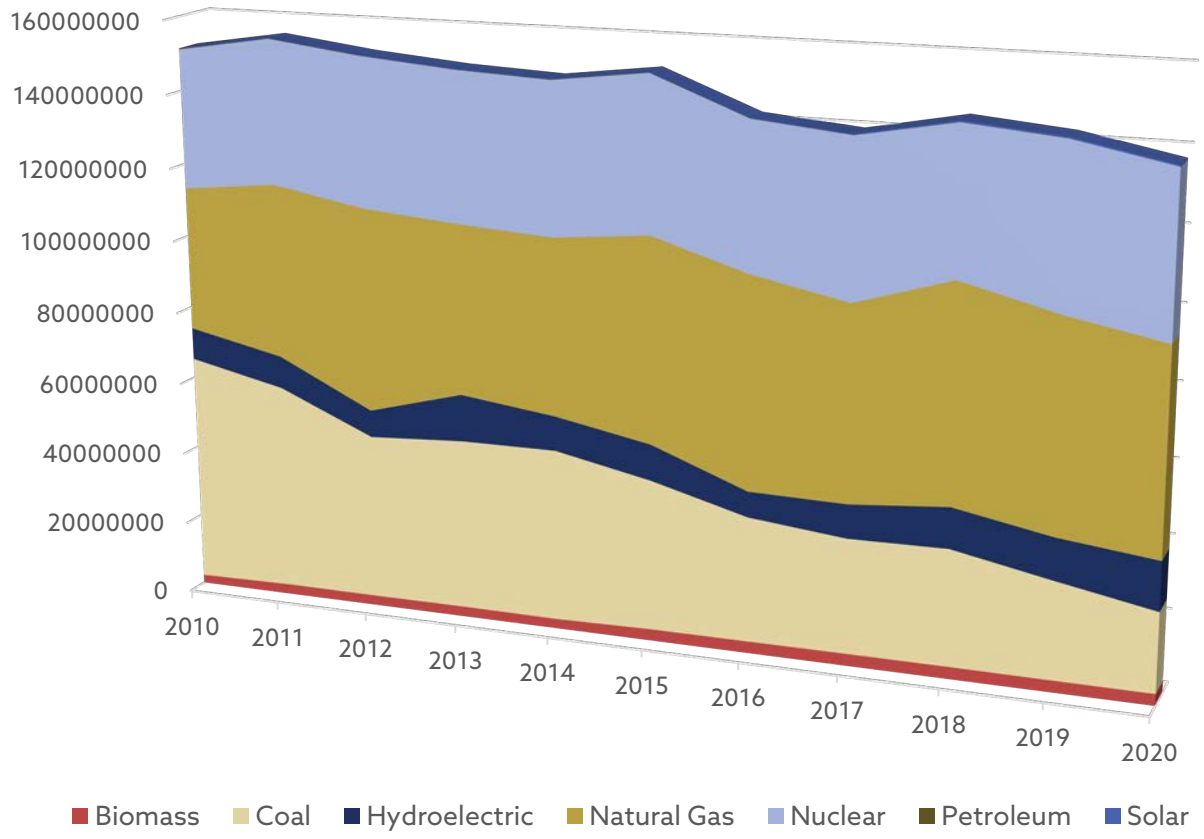
Electricity total consumption per capita (KWh), 2009-2019



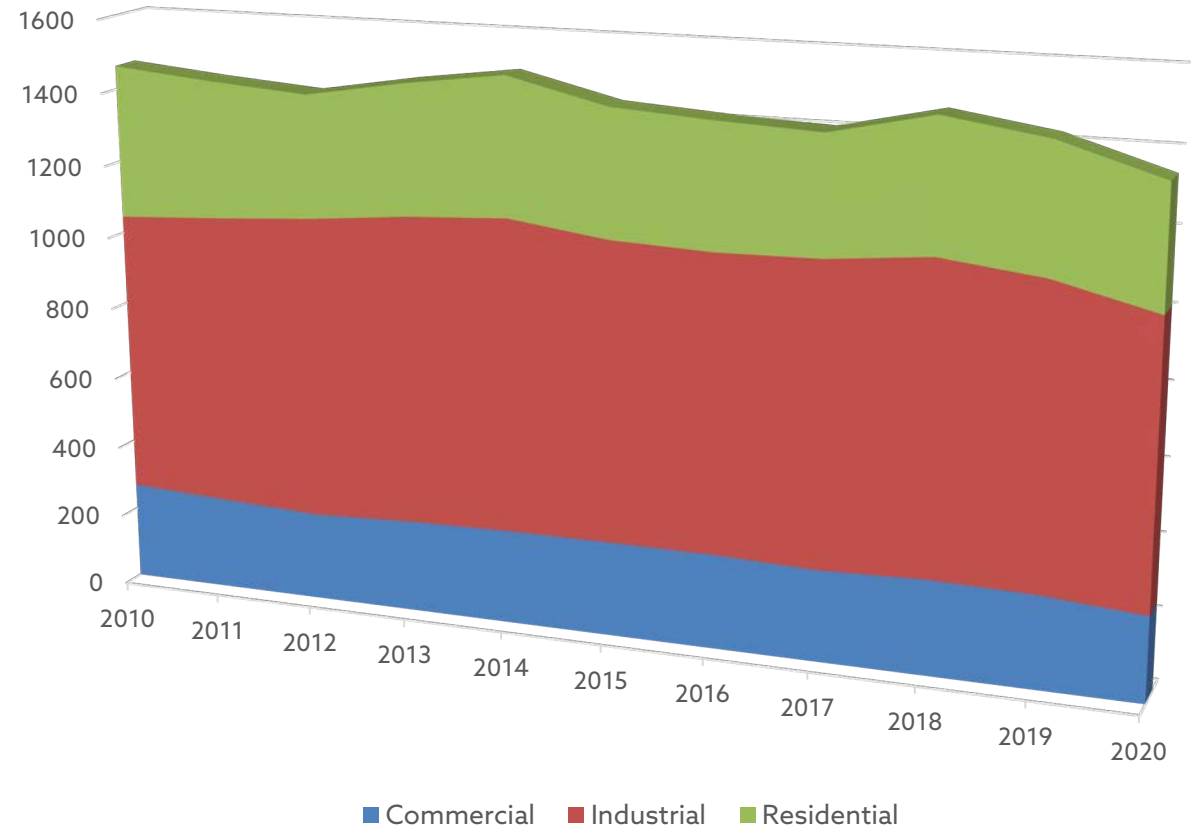
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Arkansas

Arkansas's varying geography holds natural resources that range from abundant natural gas, rivers, and forests to rare gems found in the Crater of the Diamonds State Park, home to the only active diamond mine in the United States. The Mississippi River flows along the state's eastern border, the northern edge of the Gulf Coastal Plain occupies southern Arkansas, while highlands cover the state's north and west.

The Arkansas River Valley separates the Ouachita Mountains from the Ozark Plateau in western Arkansas. Most of the state's natural gas production is from the Arkoma Basin, which underlies the Arkansas River Valley. Coal resources are found in the valley near the state's western border, and they can also be found in the eastern half of the state. To the south, the lowlands of the Gulf Coastal Plain contain the state's crude oil-producing area.

Arkansas utilizes hydropower from rivers that flow generally east and south from the state's highland regions toward the Mississippi River. The Mississippi River Valley and the upper reaches of its delta occupy the eastern third of Arkansas. That area, part of the Mississippi River Alluvial Plain, has rich soils that, along with the state's hot, humid summers and mild, slightly drier winters, provide excellent conditions for agriculture. Agricultural wastes and the forests that cover about half of the state supply Arkansas with significant biomass fuel.

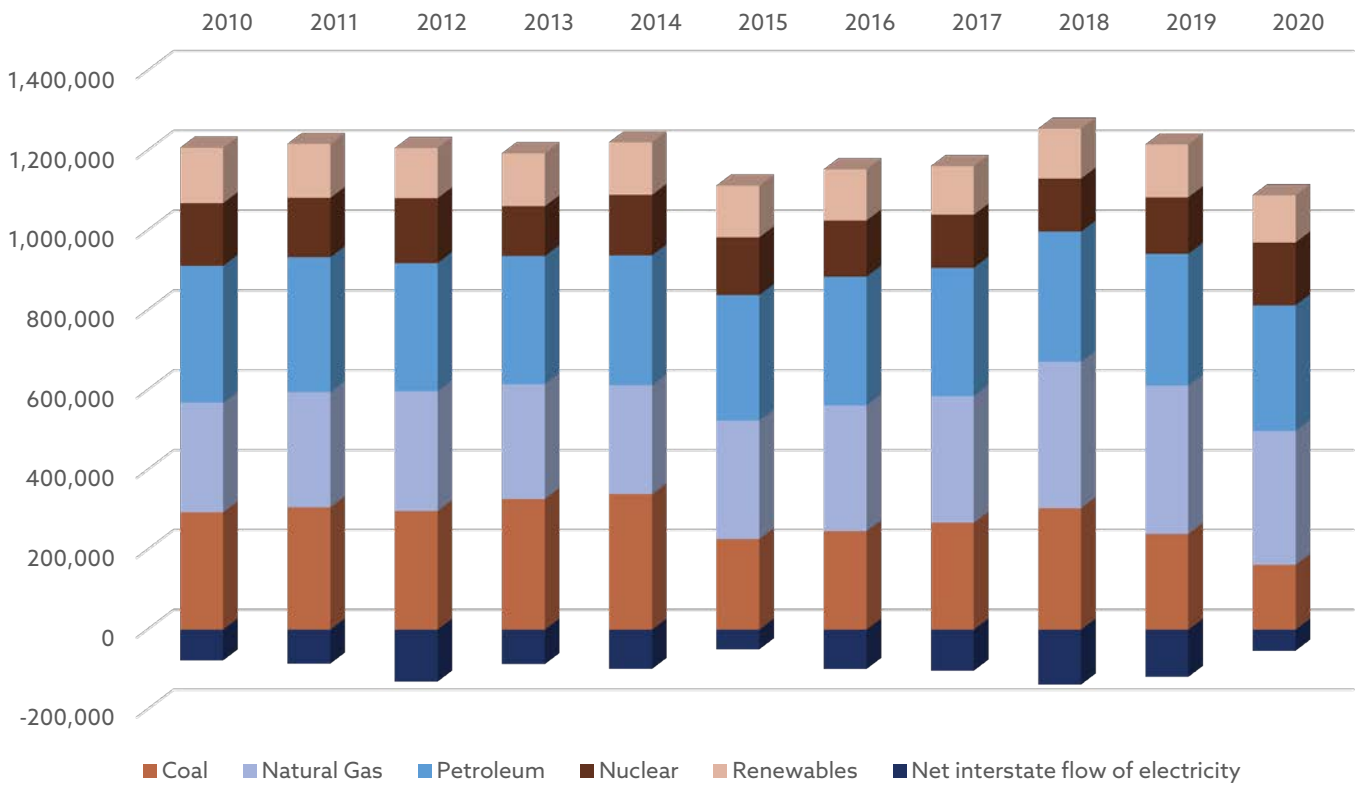
Arkansas consumes about 30 percent more energy than it produces, and its per capita energy consumption usually ranks among the top one-third of the states. The industrial sector, which includes agriculture, consumes the most energy of any end-use sector in Arkansas, accounting for almost two-fifths of the state total. Poultry, soybeans, and rice are the state's top three agricultural products in terms of cash farm receipts. Several energy-intensive manufacturing industries also are major contributors to Arkansas's GDP. They include: food, beverages, and tobacco; fabricated metal products; paper products; chemicals; plastics; and natural gas and crude oil extraction and mining. The transportation sector accounts for about one-fourth of the state's energy consumption, followed by the residential sector at one-fifth and the commercial sector at one-sixth.

> **"In 2021, coal reclaimed its spot as the leading fuel used to generate electricity in Arkansas and accounted for 35 percent of the state's total electricity net generation. Natural gas-fueled generation exceeded the state's coal-fueled generation in 2020 for the first time. However, higher natural gas prices made coal more competitive as a generating fuel. In 2021, natural gas accounted for 32 percent of the state's electricity generation.**

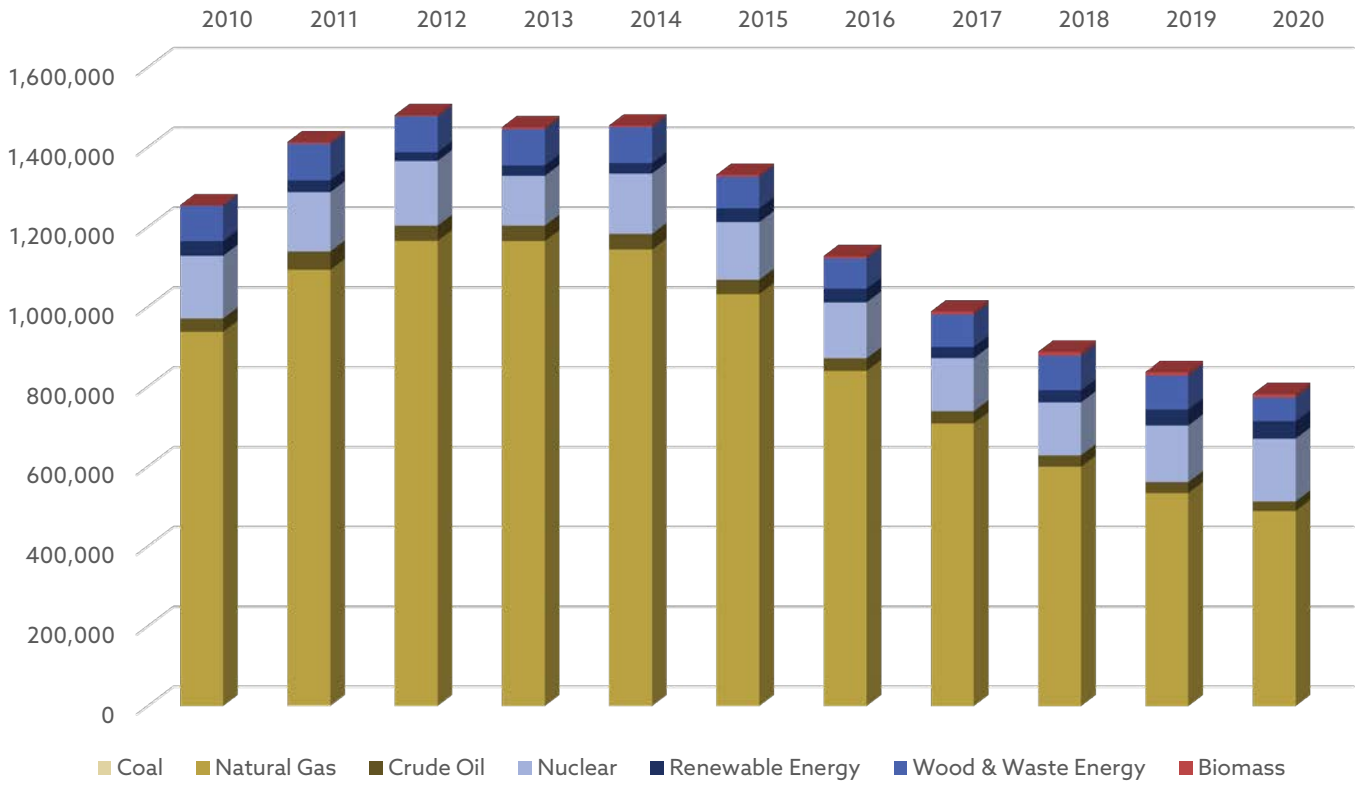
Natural gas fuels five of the ten largest power plants by capacity in Arkansas, including the 2,000-megawatt Union Power Station, which is the largest power plant in the state. Coal fuels four of Arkansas' ten largest power plants. The second-largest power plant is the state's lone nuclear power plant. Its two reactors provided about 22 percent of in-state net generation in 2021. The 1,800-megawatt nuclear power plant is located on Lake Dardanelle about 60 miles northwest of Little Rock. Almost all the rest of the state's electricity net generation came from hydroelectric power and biomass-fueled generating facilities.

Arkansas ranks among the top ten states in both total electricity sales per capita and residential electricity sales per capita. The residential sector accounts for the largest share of electricity use in Arkansas, with 39 percent of the state's total power sales. About half of the households in the state use electricity as their primary energy source for home heating, and nearly all the states with the highest residential electricity sales per capita, which includes Arkansas, are in the South where air conditioning use is most prevalent. Arkansas ranks among the ten states with the lowest average residential electricity retail prices. The industrial sector closely follows the residential sector with 38 percent of the state's electricity consumption, and the commercial sector accounts for 24 percent.

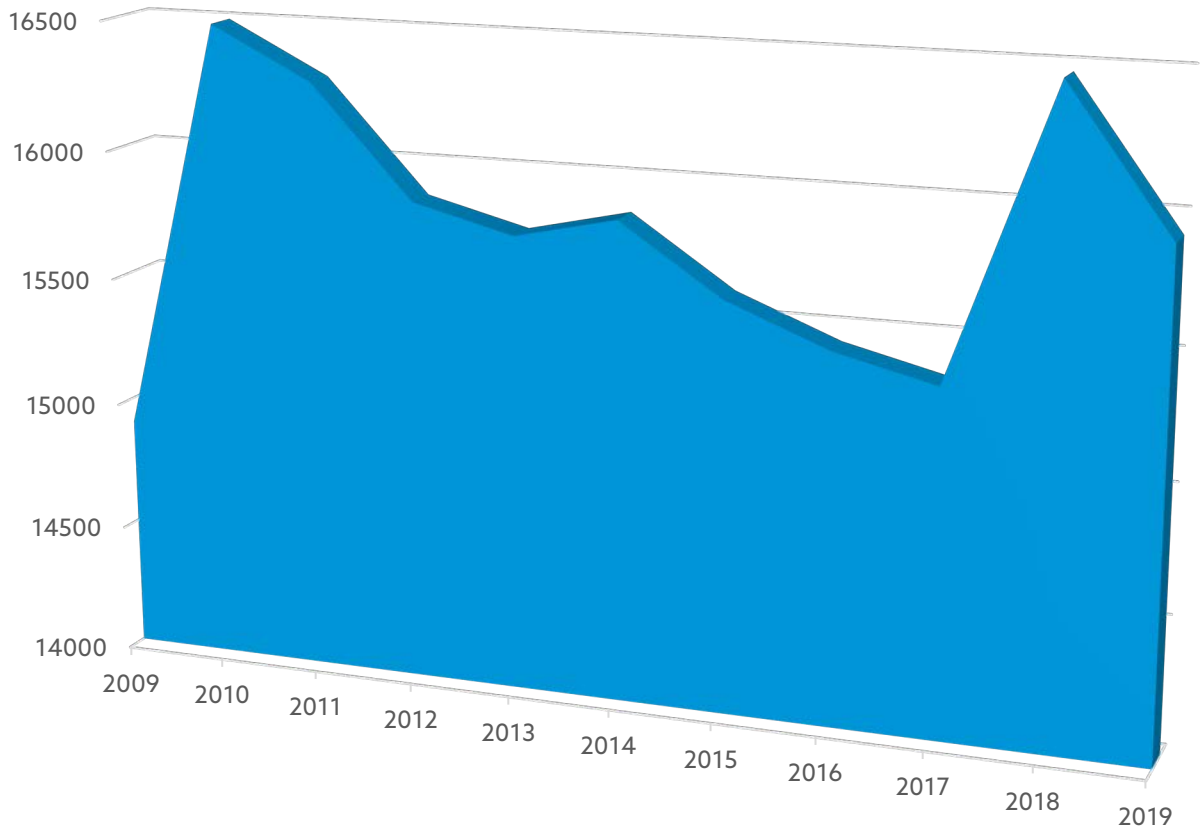
Arkansas - Total Consumption (in Billion Btu)



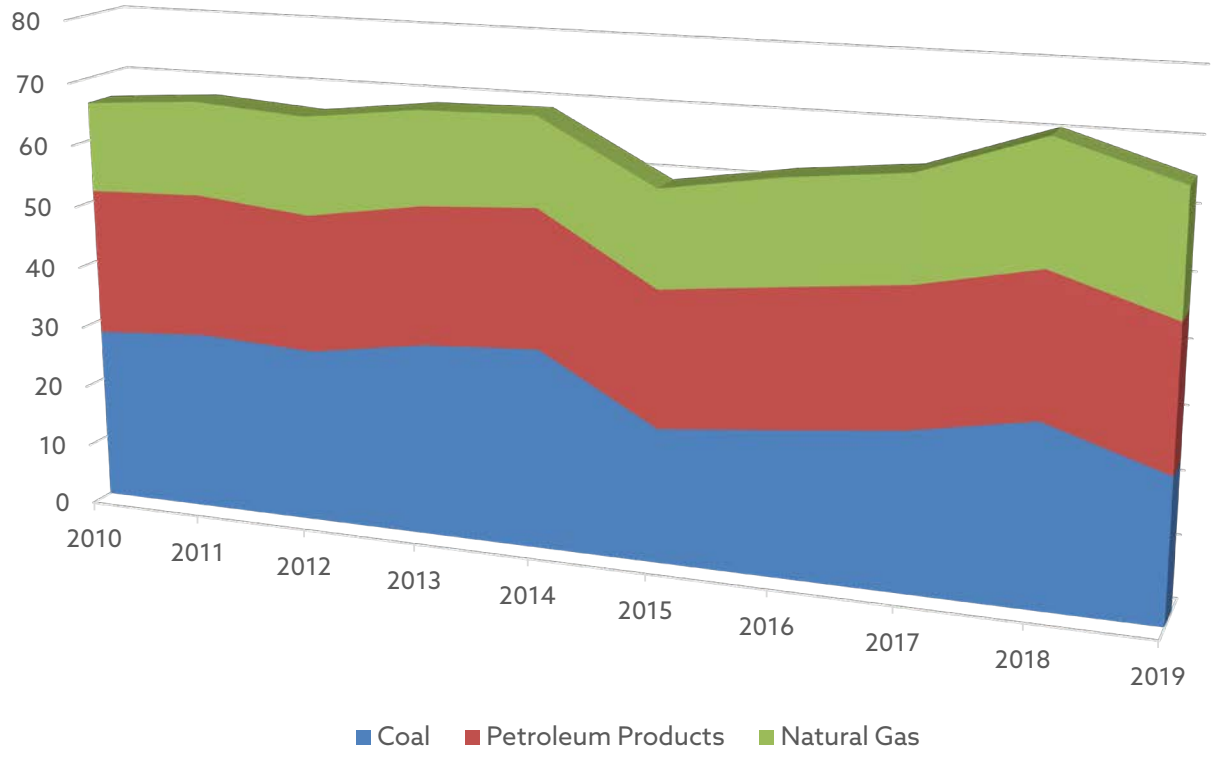
Arkansas - Total Production (in Billion Btu)



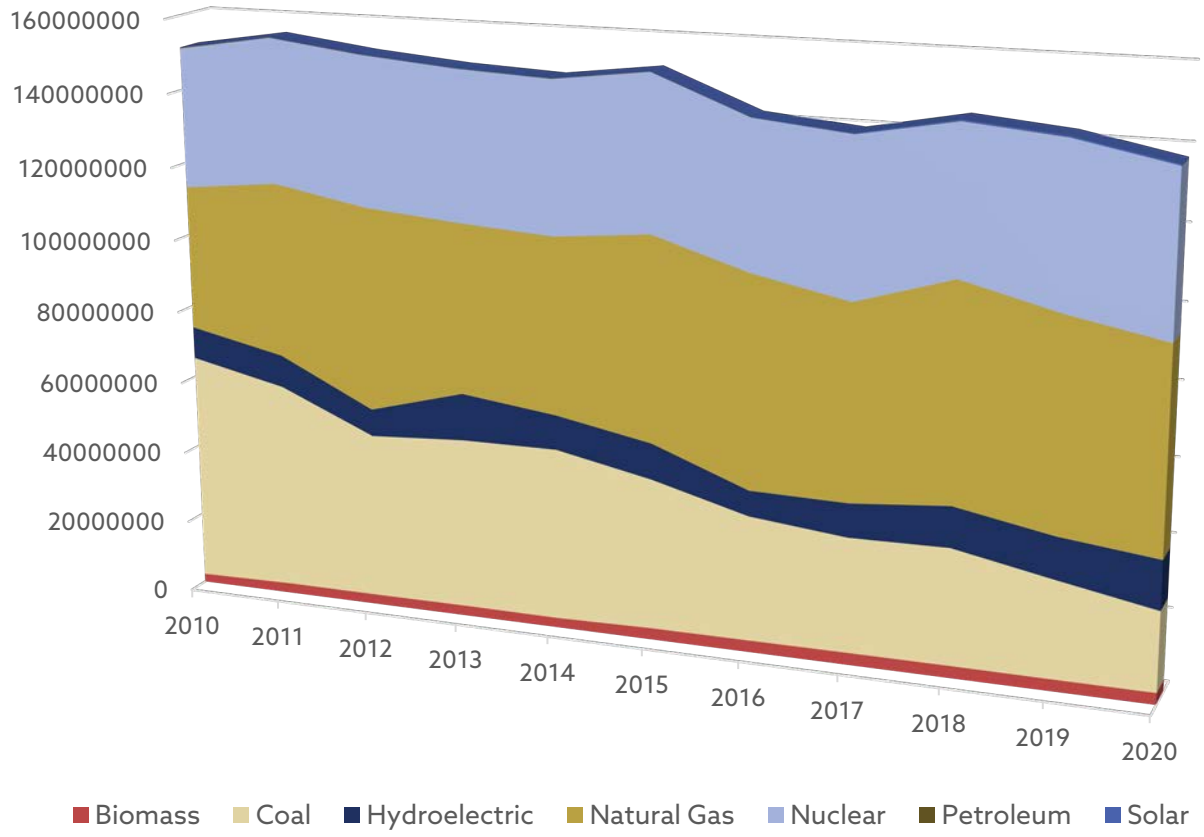
Electricity total consumption per capita (KWh), 2009-2019



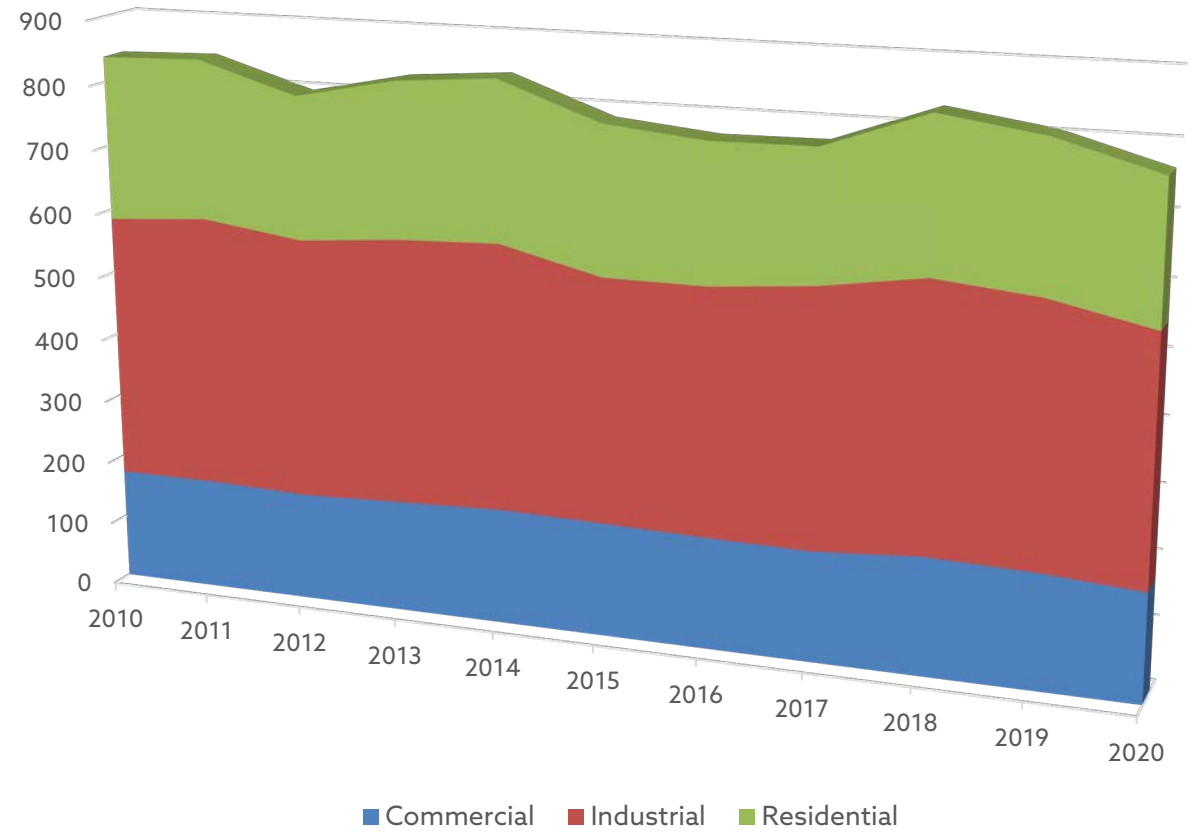
Historical CO_2 Emissions by Fuel Type, 2010-2019



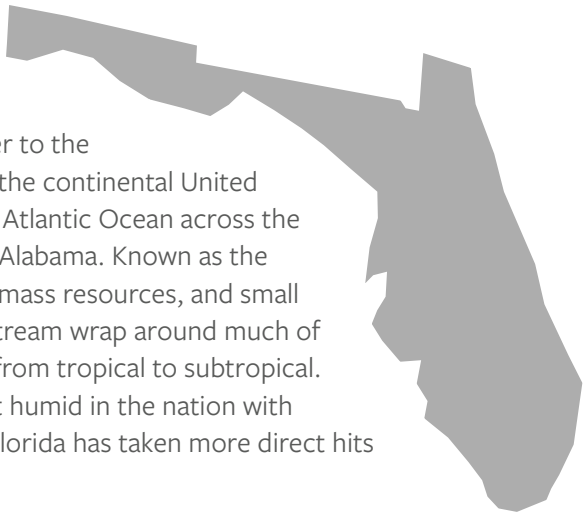
Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Florida



The Florida peninsula extends nearly 450 miles south of the Georgia border to the Florida Keys in the Gulf of Mexico and includes the southernmost point in the continental United States. The state's northern boundary stretches about 360 miles from the Atlantic Ocean across the Florida Panhandle to the Perdido River, the state's western boundary with Alabama. Known as the Sunshine State, Florida has significant solar energy potential, a bevy of biomass resources, and small amounts of oil and natural gas production. The warm waters of the Gulf Stream wrap around much of the state's marine coastline and moderate Florida's climate, which ranges from tropical to subtropical. The Gulf of Mexico and the Atlantic Ocean make the state one of the most humid in the nation with frequent summer thunderstorms and infrequent devastating hurricanes. Florida has taken more direct hits from tropical storms and hurricanes than any other state in the nation.

Until the 20th century, Florida was mostly rural and sparsely populated, but it has been one of the fastest growing states during the past century—in part because of the wide adoption of central air conditioning and because of the state's popularity as a tourist and retirement destination.

> **Florida is the third-largest electricity consumer in the nation, after Texas and California. However, the state does not produce enough electricity to meet its power needs, and demand is expected to increase as the state's population increases.**

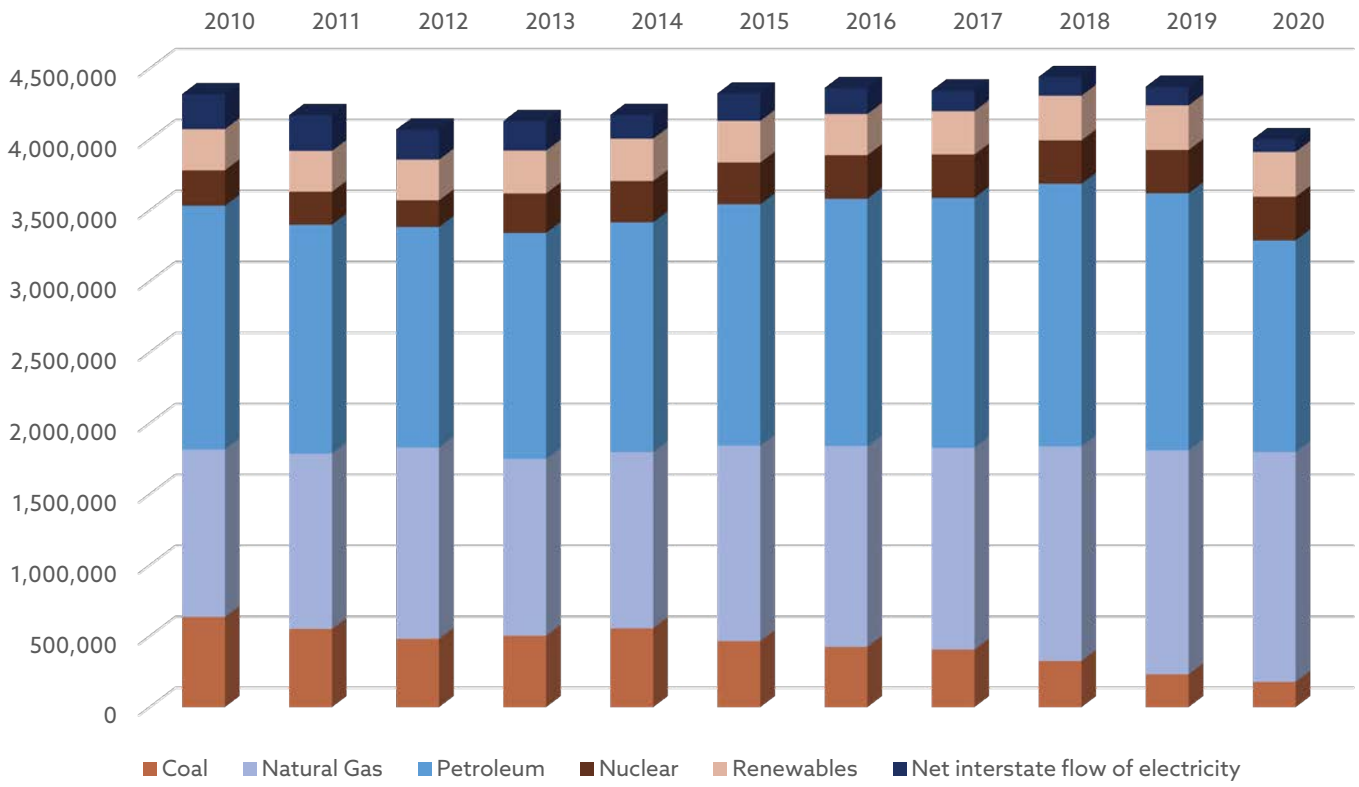
However, Florida ranks fourth-lowest in per capita energy consumption, in part because of its large population, moderate winter weather, and relatively low industrial sector energy use. The transportation sector, which includes the energy used by the automobiles, trains, planes, and ships that bring crowds of tourists to visit Florida's beaches and attractions, leads end-use energy consumption. It accounted for about two-fifths of the state's total energy use in 2019. Overall, Florida consumes almost eight times more energy than it produces.

Florida is the second-largest producer of electricity in the nation, second only to Texas. In 2020, natural gas fueled three-fourths of Florida's in-state net generation, and eight of the state's ten largest power plants by capacity and by generation are natural gas-fueled. Florida also leads the nation in generators capable of switching between natural gas and fuel oil. Although petroleum-fired power plants provided less than 0.1 percent of Florida's generation in 2020, petroleum liquids remain an important backup fuel source at many of the state's natural gas-fueled power plants. In 2020, almost two-thirds of the state's natural gas-fueled power plants could switch to petroleum fuels in the event of natural gas supply disruptions.

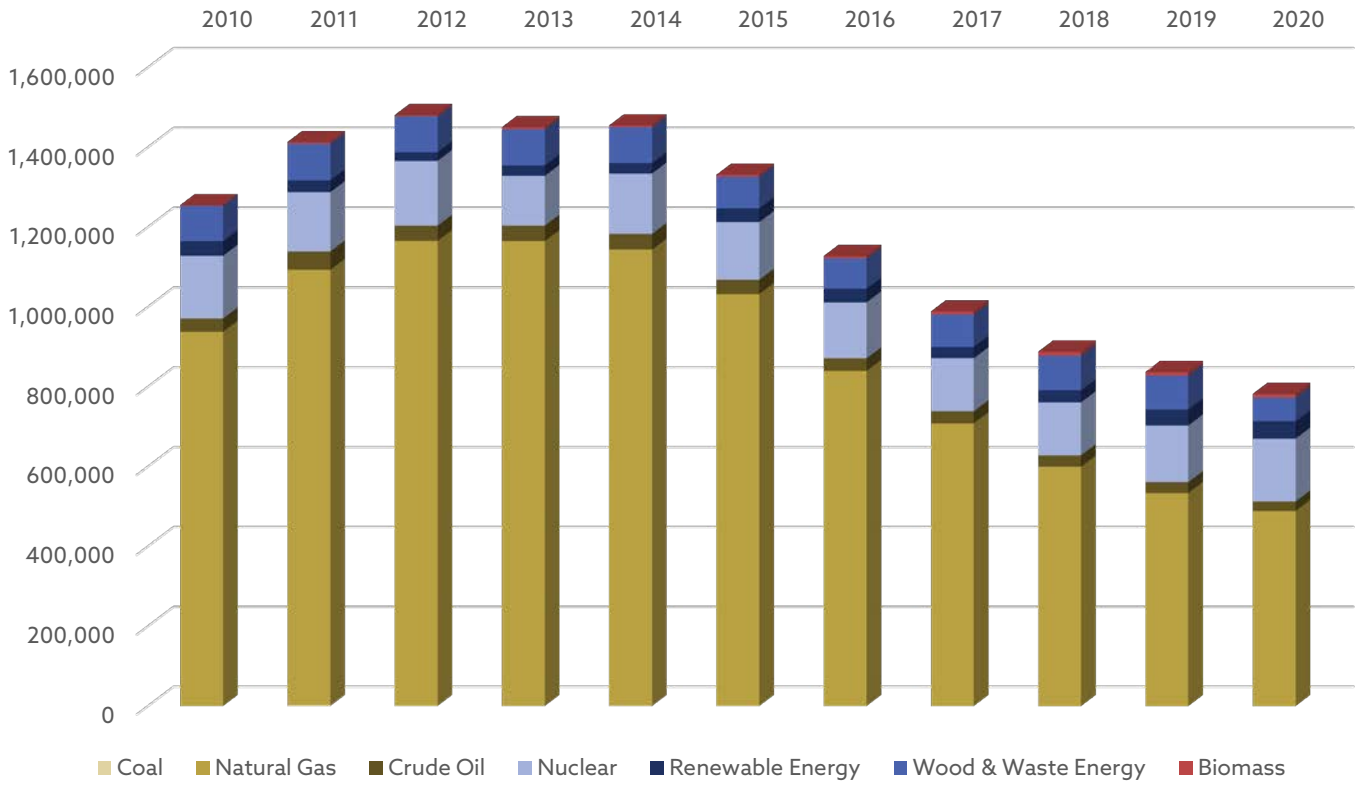
The second-largest source of generation in Florida is nuclear power. The state's two nuclear power stations are located on the Atlantic Coast. The plants typically provide more than one-tenth of the state's net generation. Two proposed additional nuclear reactors received licenses, but plans to construct those reactors are on hold because of increased construction costs and competition from other fuels. Coal-fueled power plants supplied about seven percent of Florida's net generation in 2020, down from 36 percent in 2001. Renewable resources, mainly solar energy and biomass, plus petroleum coke and generation at industrial plants that use multiple fuels, accounted for most of the remaining net generation in Florida. Almost all the state's recent and planned additions of generating capacity are natural gas-fueled or solar projects.

The residential sector, where more than nine in ten Florida households use electricity as their primary energy source for home heating and air conditioning, consumes more than half of the electricity used in Florida, the largest share of any state. The commercial sector accounts for about two-fifths of state consumption, and the industrial sector uses most of the rest. The transportation sector uses a very small amount of electricity. However, Florida is second only to California in the number of registered electric vehicles, and there are more than 2,300 publicly accessible electric vehicle charging stations in the state.

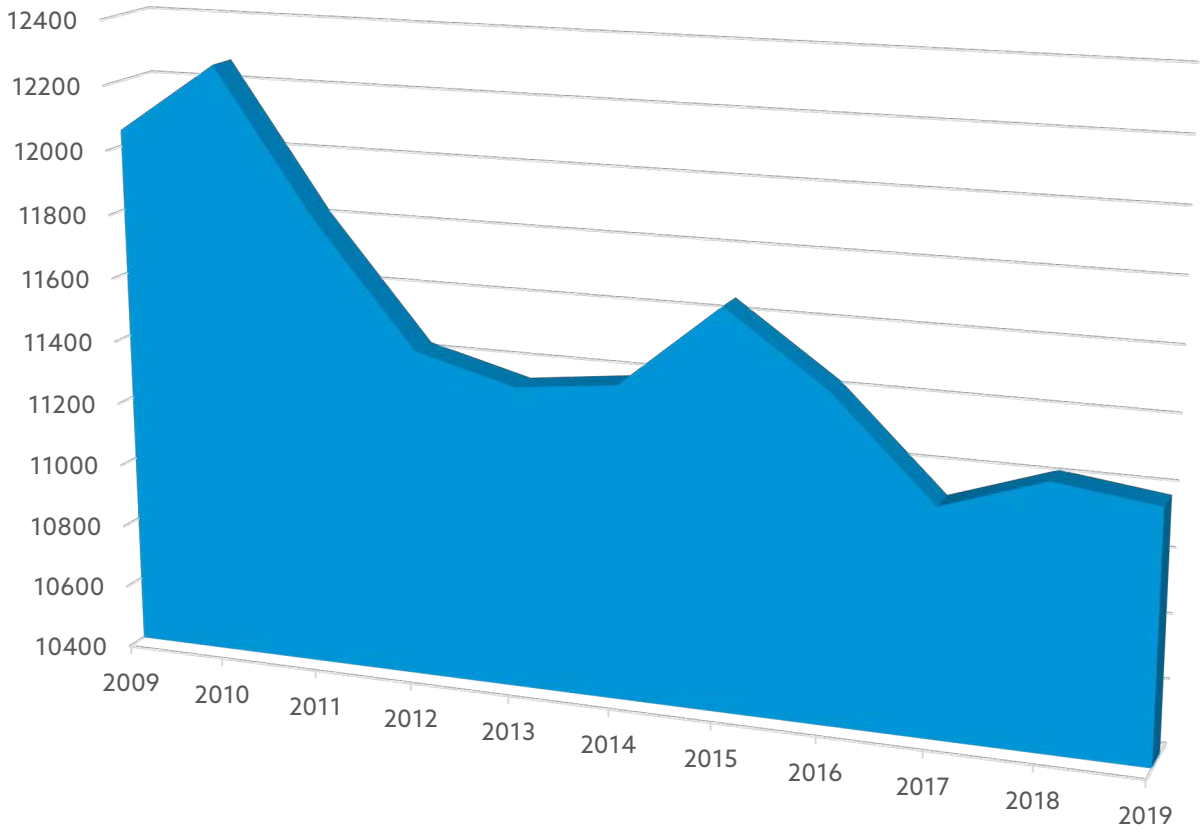
Florida - Total Consumption (in Billion Btu)



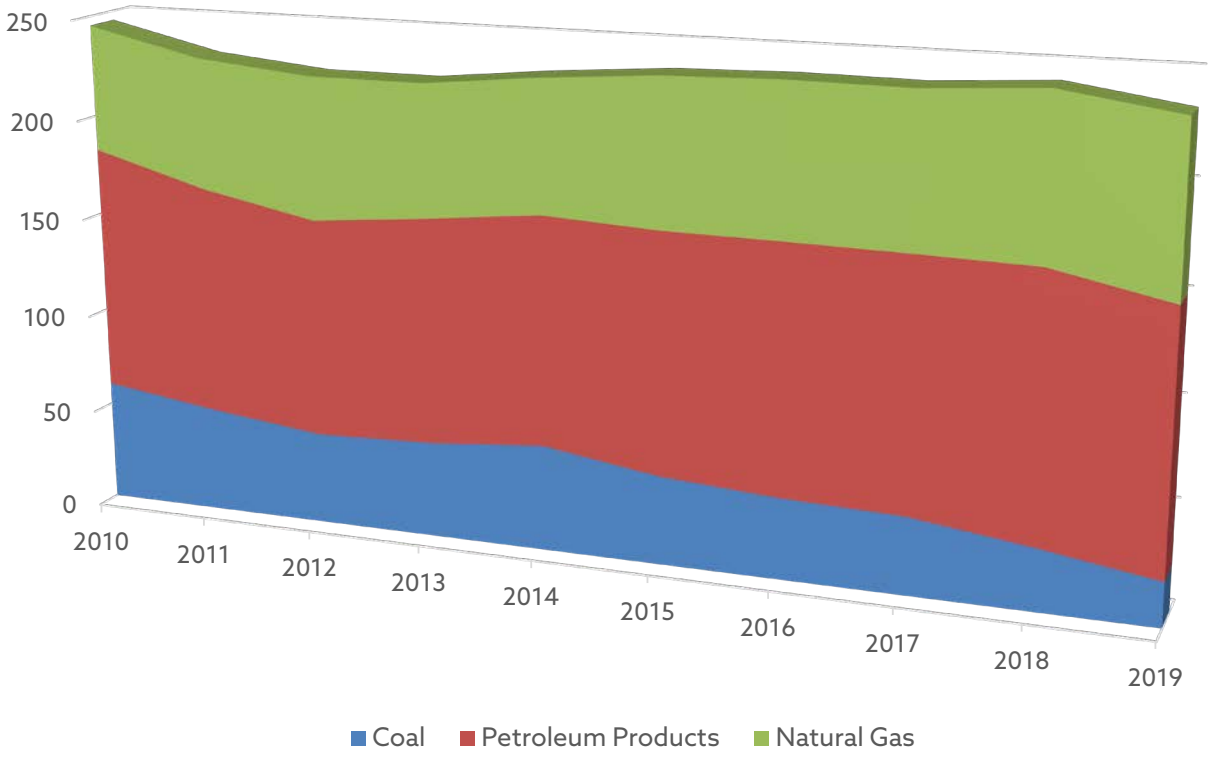
Florida - Total Production (in Billion Btu)



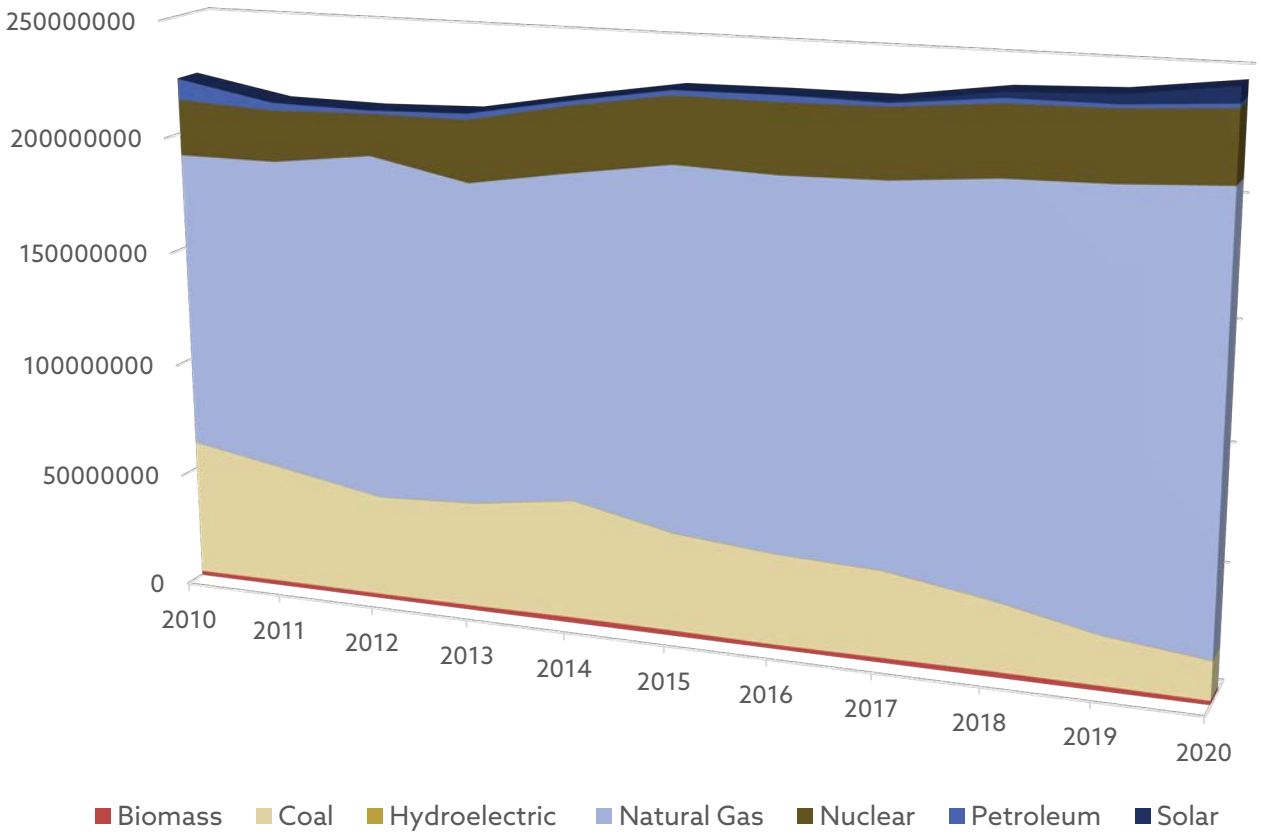
Electricity total consumption per capita (KWh), 2009-2019



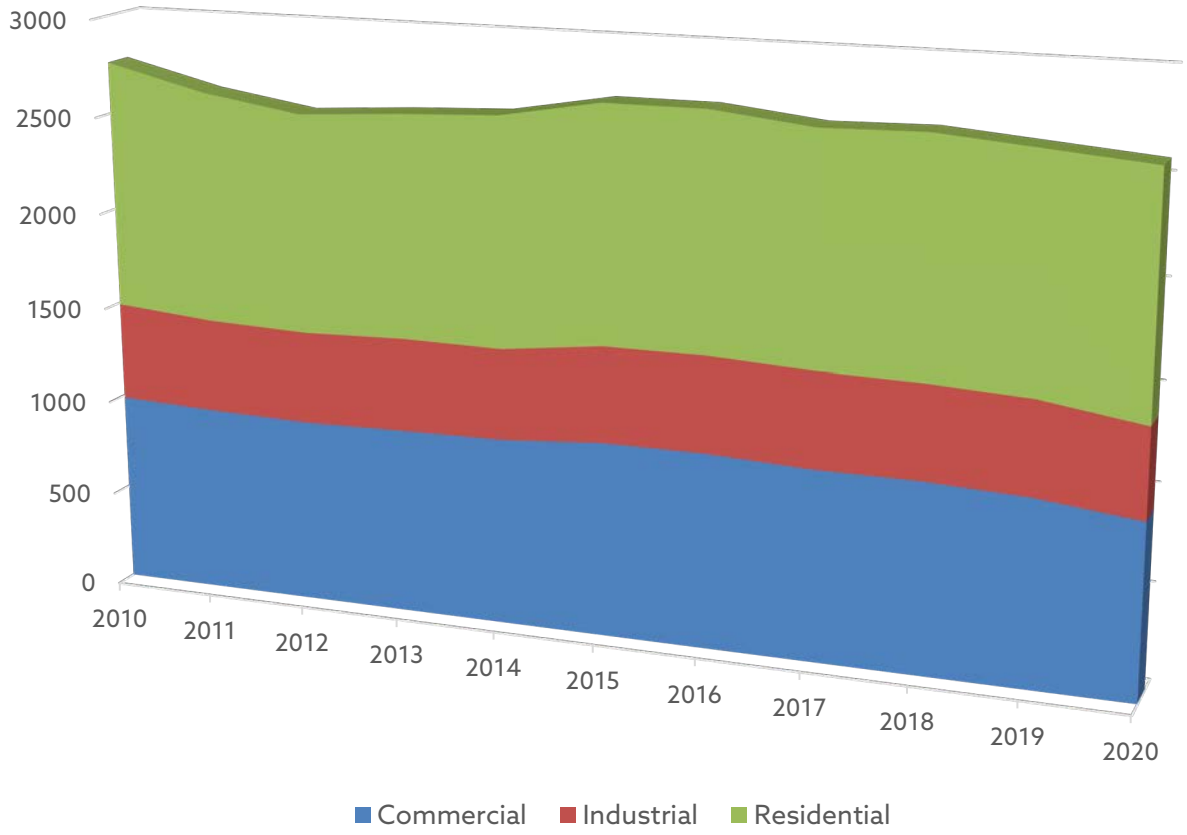
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Georgia

Georgia is located on the Atlantic coast at the southern end of the Blue Ridge Mountains in the Appalachians, and elevations in northwestern Georgia rise to almost 5,000 feet. The state has the largest land area of any state east of the Mississippi River. Despite its location near the Appalachian coalfields and oil and natural gas basins, Georgia does not have any significant fossil fuel resources.

Nuclear power supplies slightly more than half of the primary energy produced in Georgia, and the rest comes from renewable sources, specifically biomass, solar energy, and hydropower. Two-thirds of the state is forested and Georgia leads the nation in commercial timberland. The state has many wood processing mills, wood-fueled power plants, and wood pellet manufacturers.

The state is home to several large man-made lakes and reservoirs providing hydroelectric power, such as Lake Lanier and Lake Allatoona. Georgia's solar potential is among the highest in the Southeast, but the state has little viability for onshore wind energy projects. However, there are large areas with substantial wind energy resources in the Atlantic Ocean off Georgia's coast.

> **"Georgia ranks among the top ten states in the nation in total energy consumption, but because of its large population (eighth in the nation), the state's per capita energy consumption is lower than in three-fifths of all states. The transportation sector accounts for the largest share of Georgia's end-use energy consumption. Major interstates and Atlanta's Hartsfield-Jackson International Airport, known as the world's busiest passenger airport, helped make Georgia's transportation sector sixth in the nation in energy consumption in 2019.**

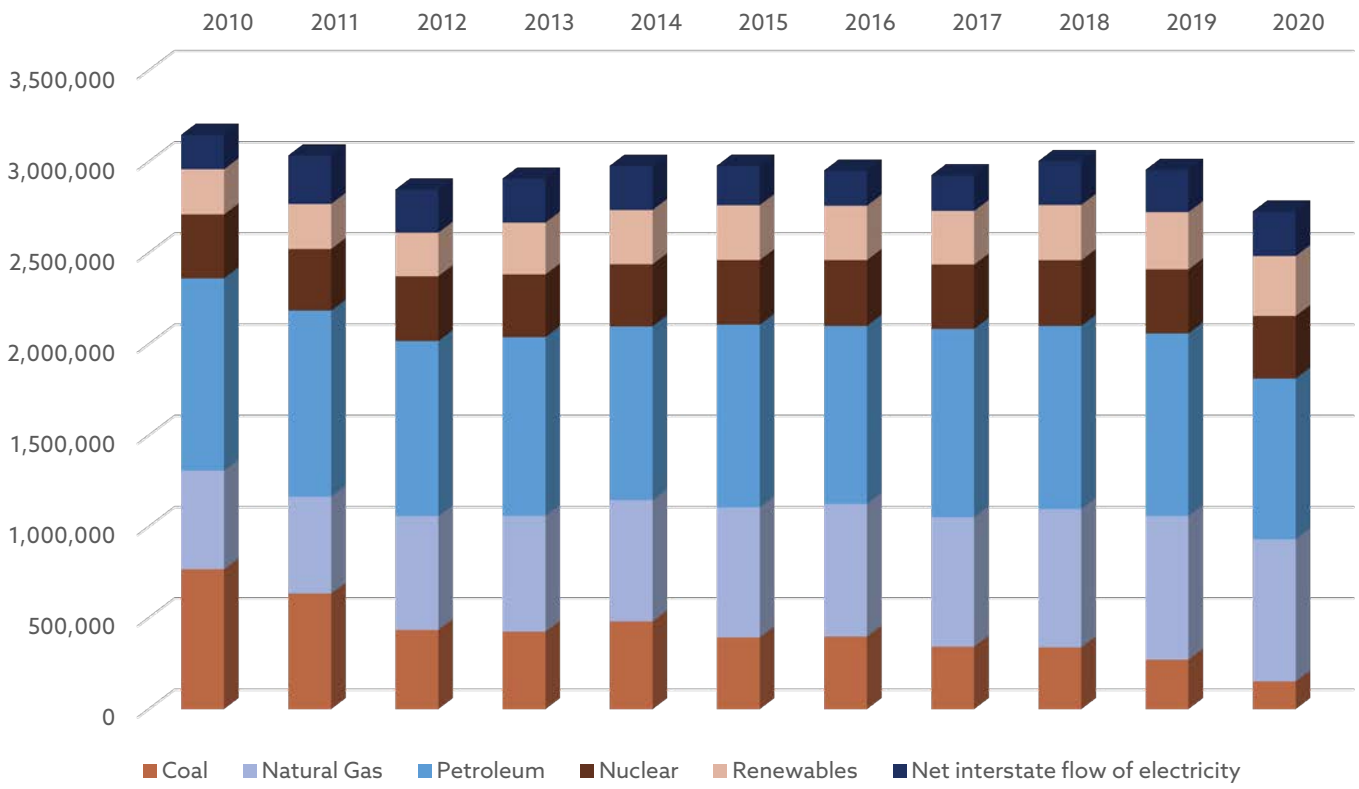
The industrial sector accounts for the second-largest share, followed closely by the residential sector. Georgia has several energy-intensive industries, including the manufacture of food, beverages, tobacco products, chemicals, and paper. With Georgia's warm and humid climate, air conditioning is widely used, and the residential sector's per capita energy consumption is above the national average.

Natural gas and nuclear power fuel more than three-fourths of Georgia's in-state electricity net generation. The share of generation fueled by natural gas has nearly tripled since 2010, and it now accounts for about half of the state's net generation. Georgia is among the top ten nuclear power-producing states in the nation. The state's two nuclear power plants, both located in eastern Georgia, provide about one-fourth of the state's net generation. Two new reactors under construction at the existing Vogtle nuclear plant in Waynesboro, Georgia, will nearly double the plant's generating capacity. The reactors currently are scheduled to begin operations in 2022 and 2023.

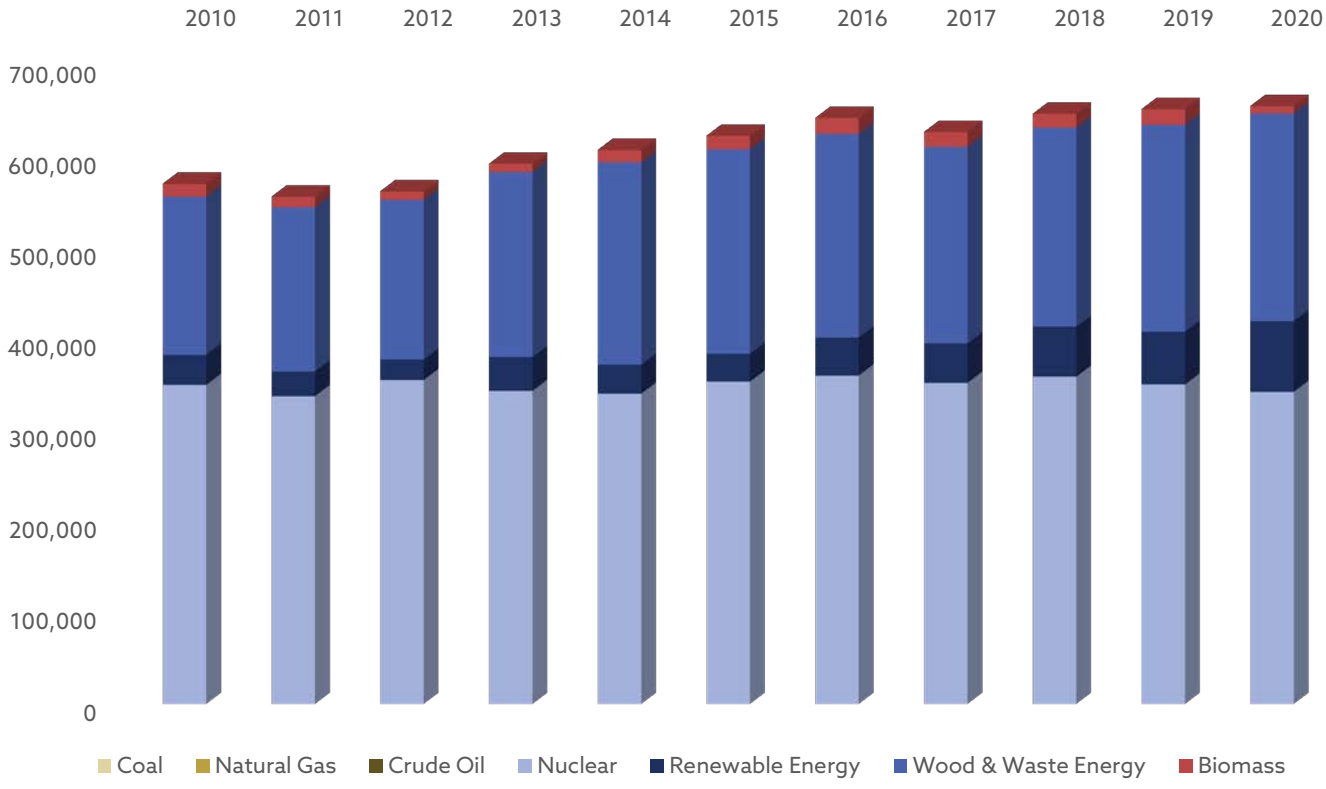
Renewable resources and coal provide almost all the rest of the state's net generation. Renewable resources, including biomass, hydroelectric power, and solar energy, provided about 12 percent of Georgia's in-state electricity net generation in 2020, surpassing coal for the first time on record. Coal-fueled power plants fueled more than half of generation in Georgia before 2010, but coal's use has declined steadily since then. Coal fueled about 12 percent of in-state generation in 2020. About 4,000 megawatts of Georgia's coal-fueled capacity retired during the past decade, and almost 2,500 megawatts of natural gas-fueled capacity came online within the same period.

Although Georgia is among the top ten electricity-producing states, the state typically uses more power than it generates. On average over the past decade, Georgia acquired about one-seventh of the electricity it consumed each year from neighboring states. In 2020, Georgia ranked 10th in the nation in number of registered electric vehicles, which resulted in the transportation sector accounting for a small amount of electricity retail sales.

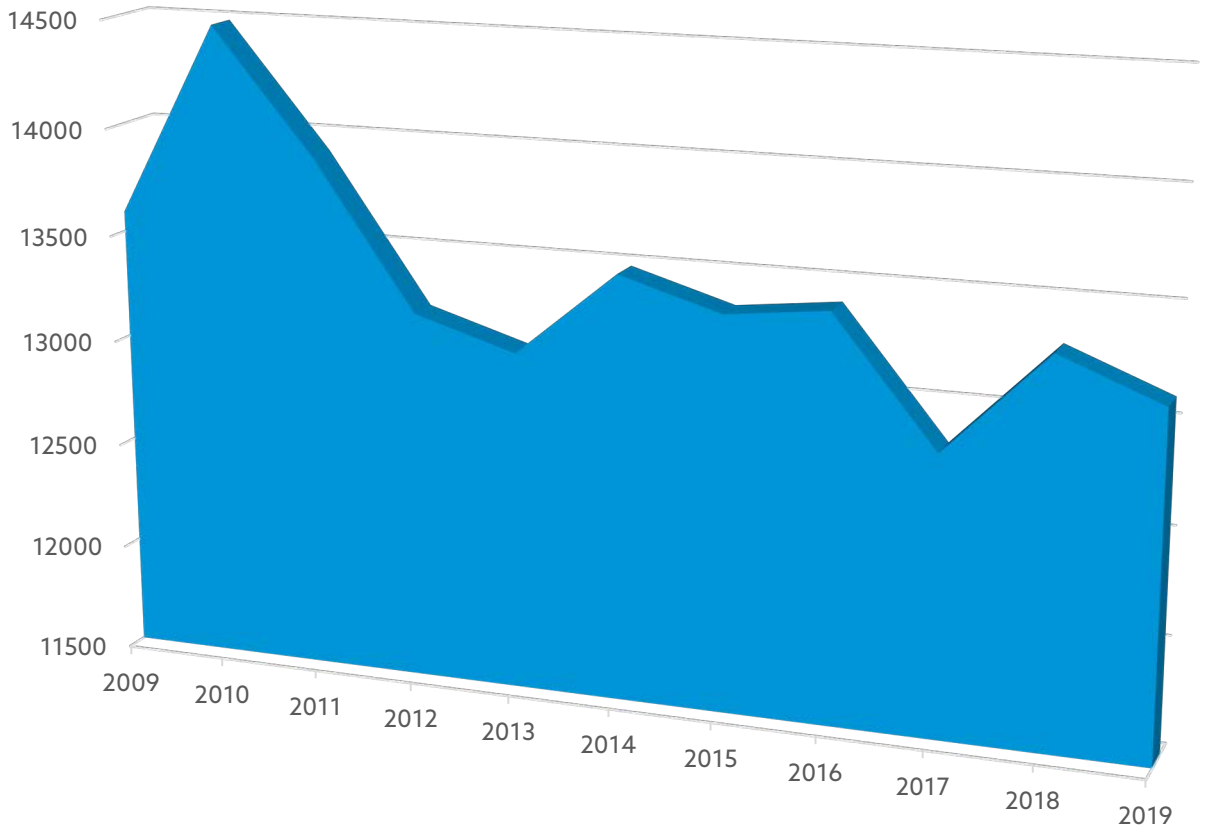
Georgia - Total Consumption (in Billion Btu)



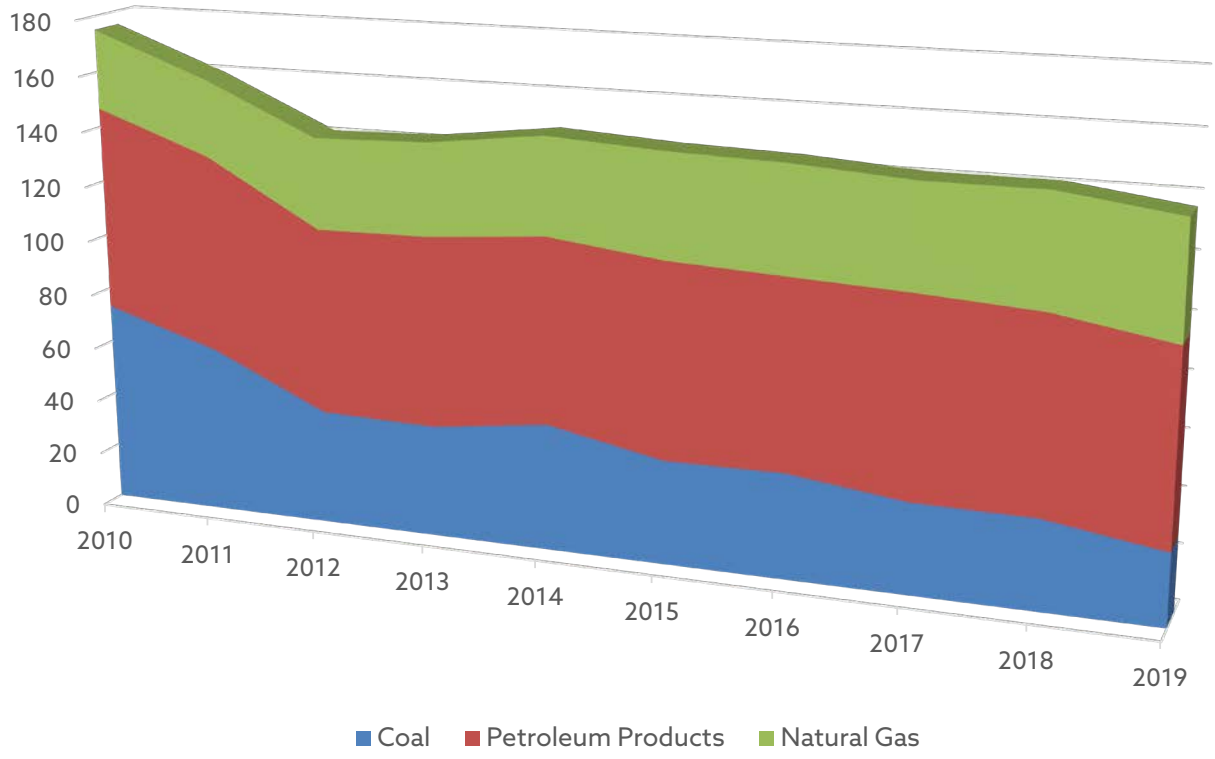
Georgia - Total Production (in Billion Btu)



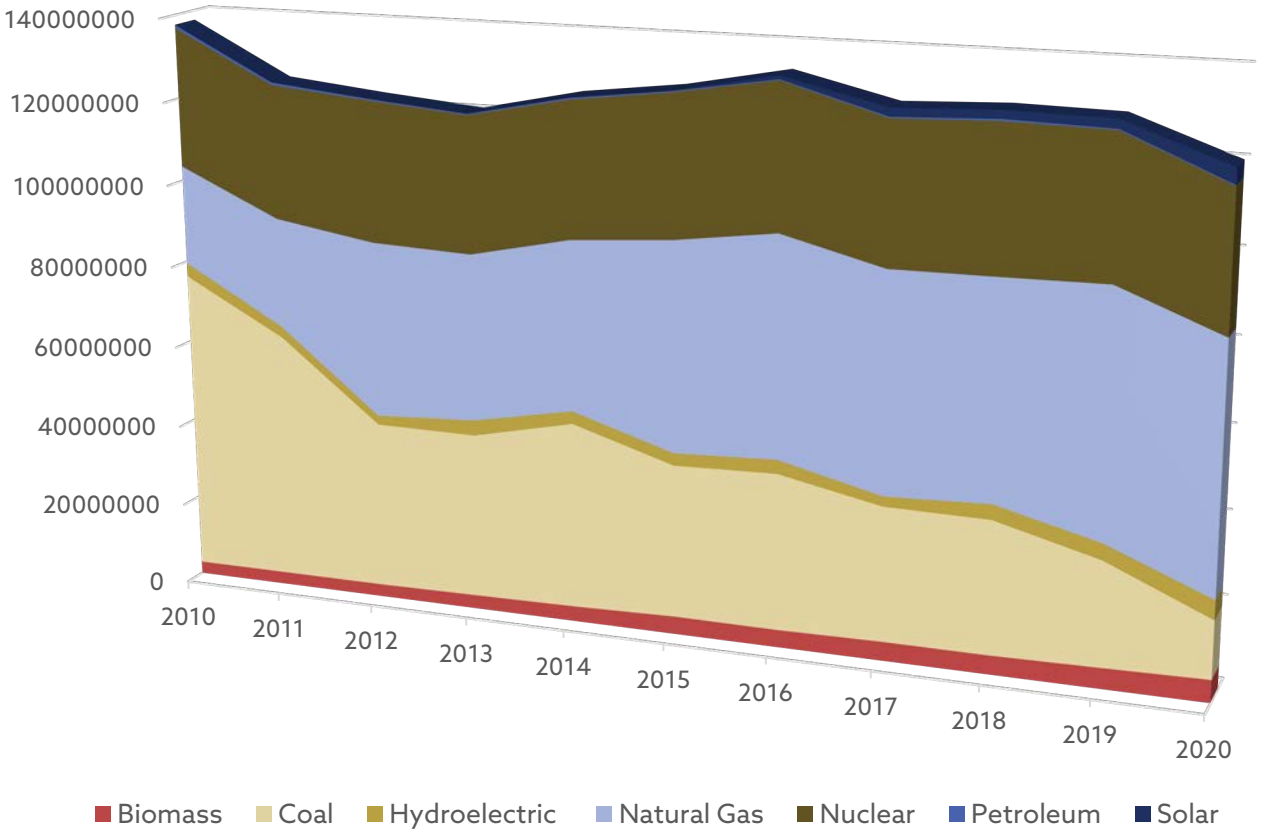
Electricity total consumption per capita (KWh), 2009-2019



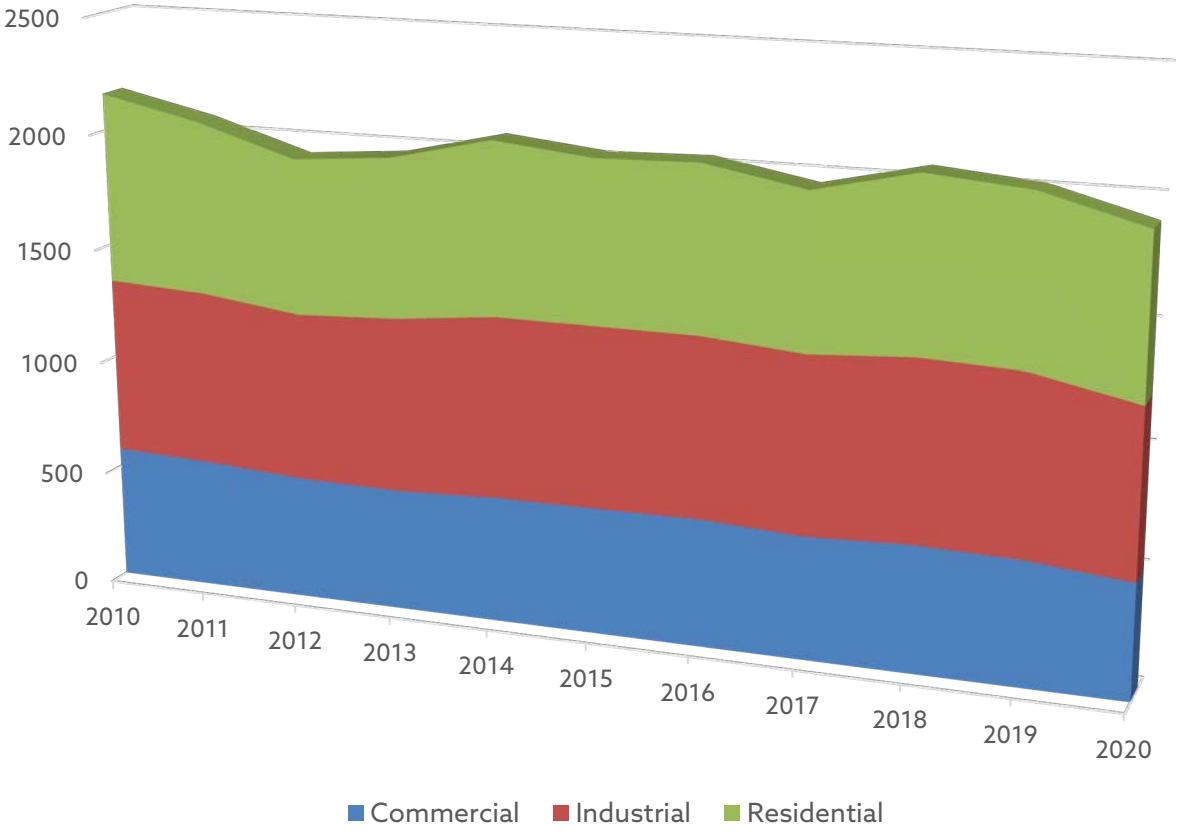
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Kentucky

Bordered on the north by the Ohio River, Kentucky stretches from the Appalachian Mountains in the east to the flood plain of the Mississippi River in the west. In between, the rolling hills of the state's fertile Bluegrass region extend southward from the Ohio River to the Pennyroyal region, which is famous for its thousands of caverns and springs, including Mammoth Cave National Park.

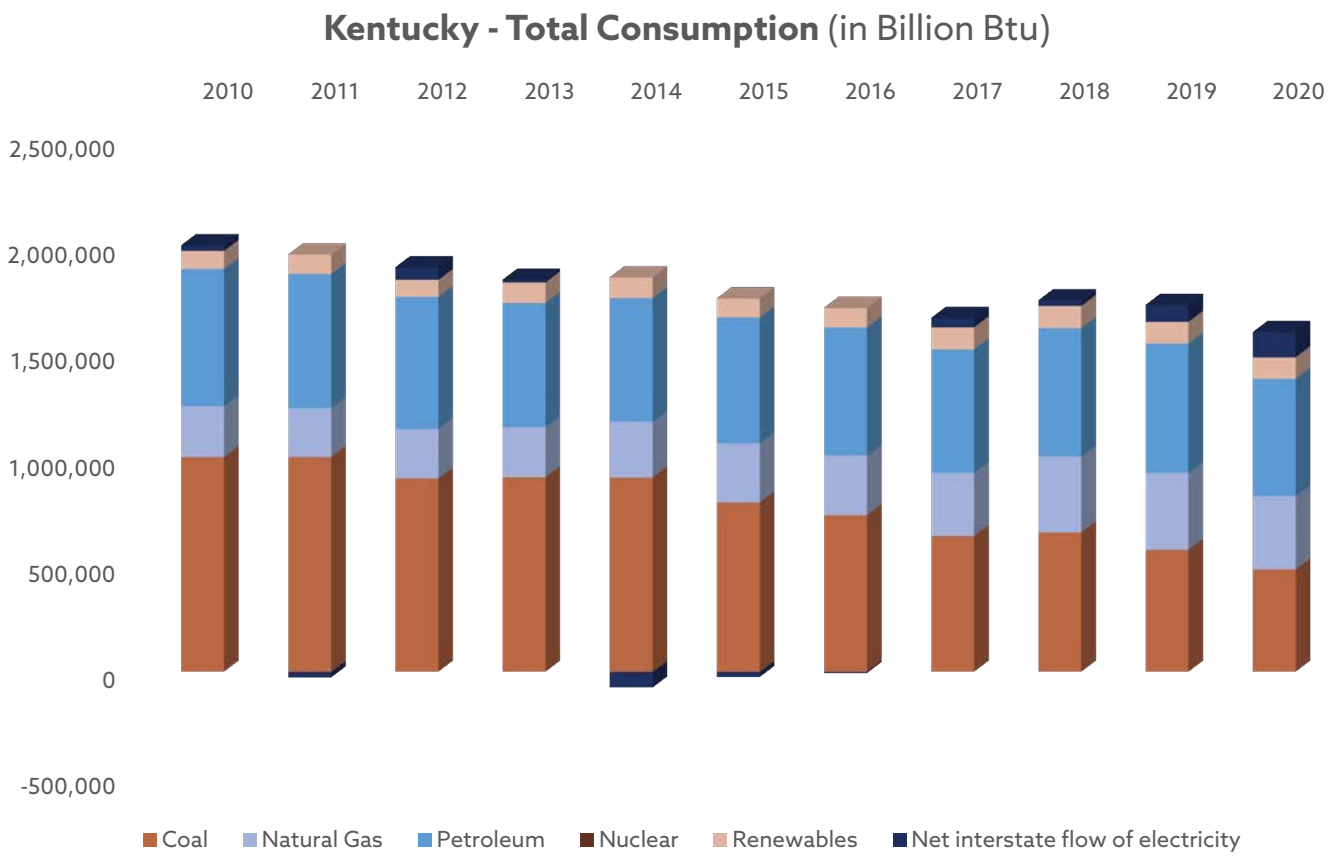
Major coal deposits are found both in the Central Appalachian Basin in the eastern part of the state and in the Illinois Basin in the northwest. The basins also contain crude oil and natural gas reserves. Dams on the Tennessee, Cumberland, Ohio, and Laurel rivers provide Kentucky with hydroelectric power. Although two-thirds of Kentucky's agricultural economy is livestock, primarily thoroughbred horses and beef cattle, the state's ample rainfall, temperate climate, and fertile soils provide ideal conditions for growing several crops, including tobacco, soybeans, corn, and wheat. Corn and beverage waste from Kentucky distilleries provide feedstock for the state's fuel ethanol production.

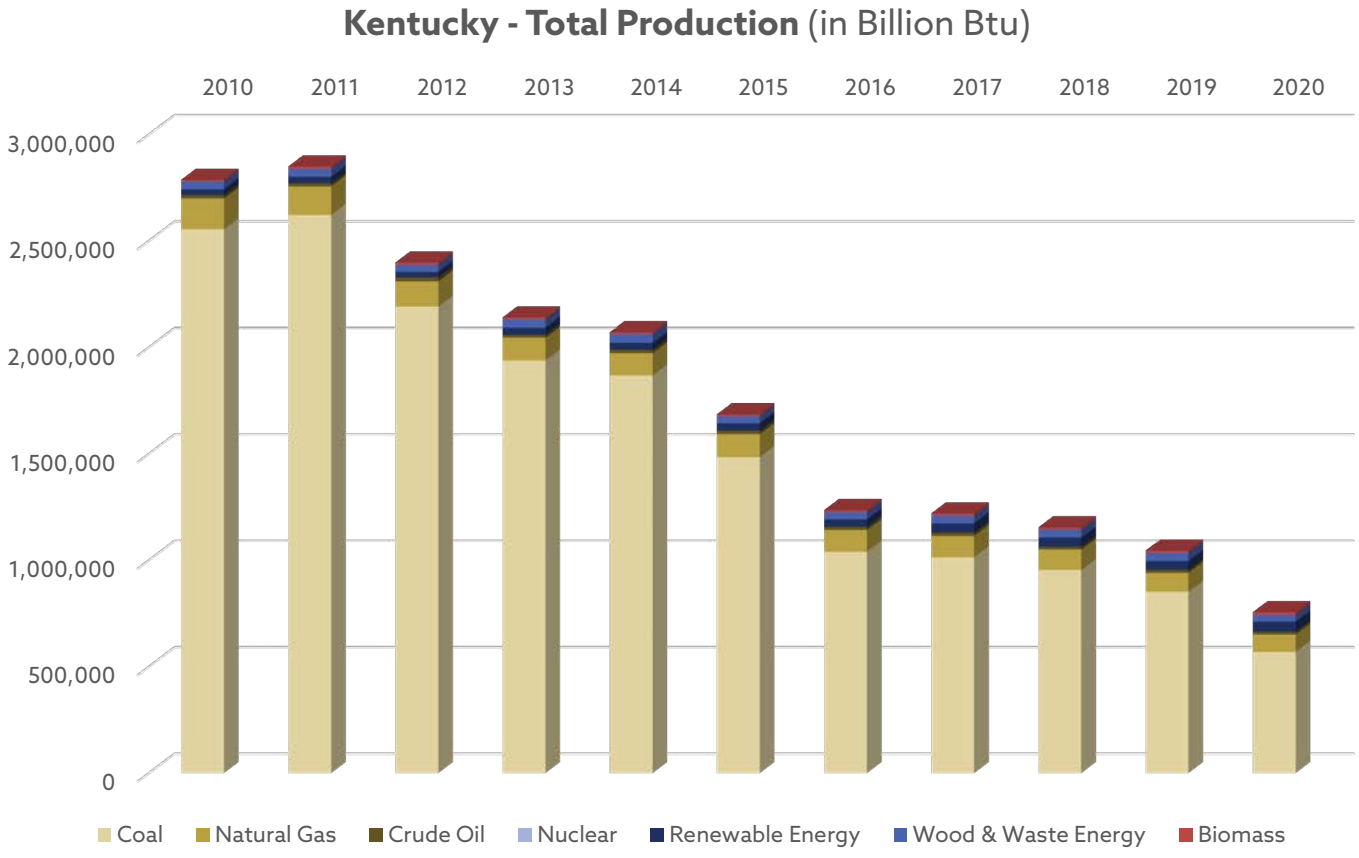
Kentucky has an energy-intensive economy, and ranks 11th among the states in the amount of energy used per dollar of GDP. The industrial sector is the state's largest energy consumer, accounting for about 35 percent of total end-use energy consumption. Kentucky's low electricity prices have helped attract manufacturing to the state. The manufacture of motor vehicles; food, beverages and tobacco products; primary and fabricated metal products; and chemicals are major contributors to the state's GDP, as are agriculture and forestry. Coal mining and petroleum refining are two of Kentucky's energy-intensive industries. The transportation sector constitutes about 29 percent of the state's energy consumption, followed by the residential sector at around 21 percent, and the commercial sector at about 15 percent of state energy use.

> **"In 2021, coal-fueled power plants supplied 71 percent of Kentucky's electricity generation, the fourth-largest share among the states after West Virginia, Missouri, and Wyoming. Historically, coal-fueled power plants produced more than 90 percent of Kentucky's net generation. However, as coal-fueled generating units became more costly, about 5,900 megawatts of coal-fueled generating capacity shut down over the past decade. Kentucky still remains among the top five states in the nation in coal-fueled generating capacity with about 9,400 megawatts at the beginning of 2022.**

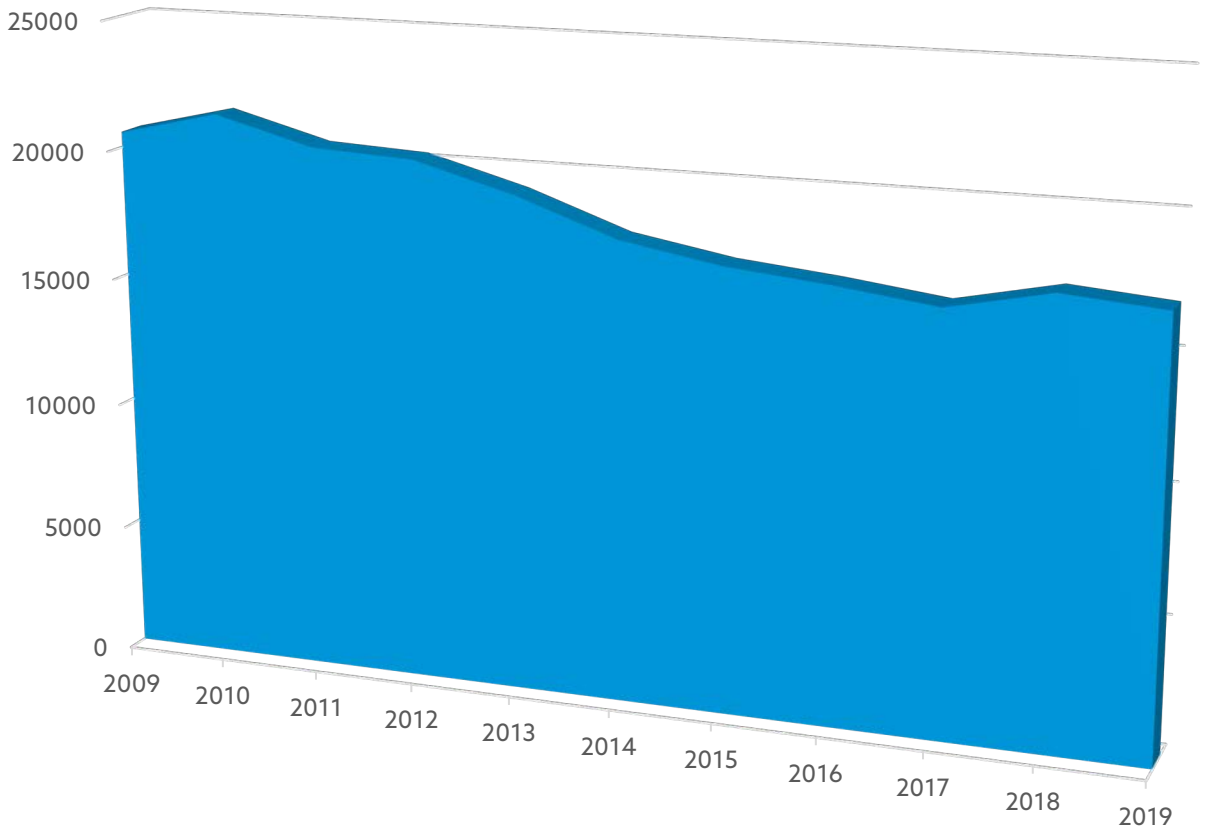
Kentucky plays a role in the benchmark prices for eastern U.S. coal that are determined in the Central Appalachian (CAPP) coal delivery zone located near where the Big Sandy River flows into the Ohio River. Kentucky meets Ohio and West Virginia at the rivers' confluence, and coal is delivered to the CAPP from mines in the three states, as well as Virginia and Tennessee. The coal arrives by rail or truck for transport on multi-car trains and barges to customers—including coal-fueled electricity generating plants, industrial plants, commercial and institutional facilities, and coking plants—throughout the country.

Natural gas provides an increasing amount of Kentucky's net generation. In 2021, natural gas-fueled power plants generated 21 percent of the state's electricity, double the share from five years earlier. The rest of Kentucky's electricity generation, less than one-tenth, came mostly from hydroelectric power plants, along with small contributions from biomass, solar energy, and petroleum-fired generation. In 2021, Kentucky had the 12th-lowest average electricity price of any state and the second-lowest price east of the Mississippi River. Slightly above half of Kentucky households use electricity as their primary heating source.

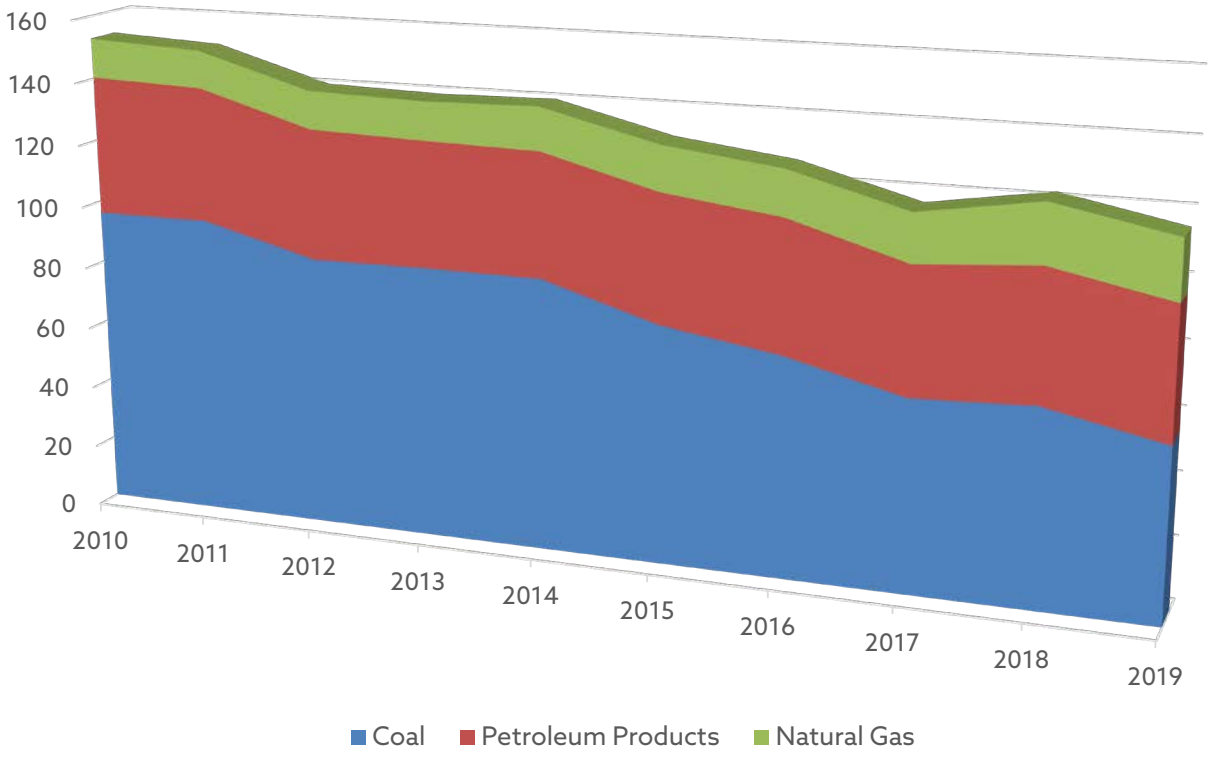

Kentucky - Total Consumption (in Billion Btu)
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
-500,000
Coal
Natural Gas
Petroleum
Nuclear
Renewables
Net interstate flow of electricity


Kentucky - Total Production (in Billion Btu)
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Coal
Natural Gas
Crude Oil
Nuclear
Renewable Energy
Wood & Waste Energy
Biomass

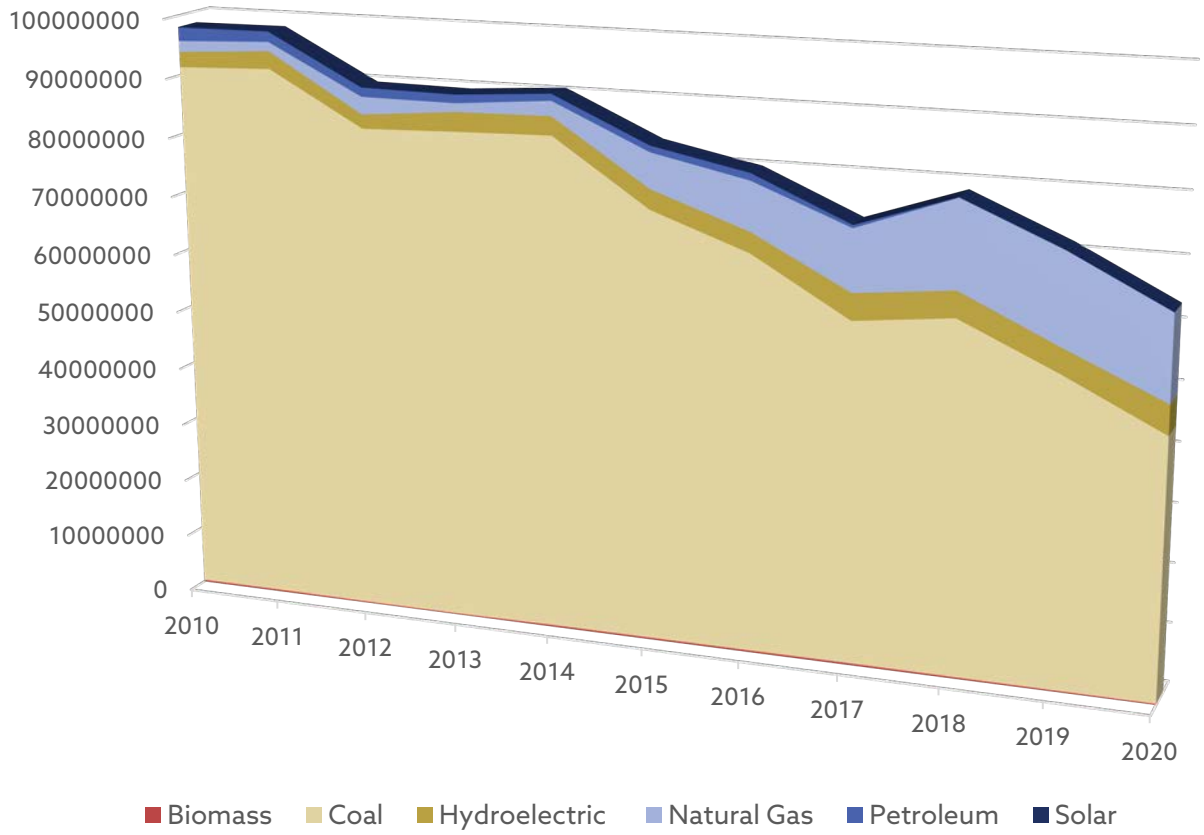
Electricity total consumption per capita (KWh), 2009-2019



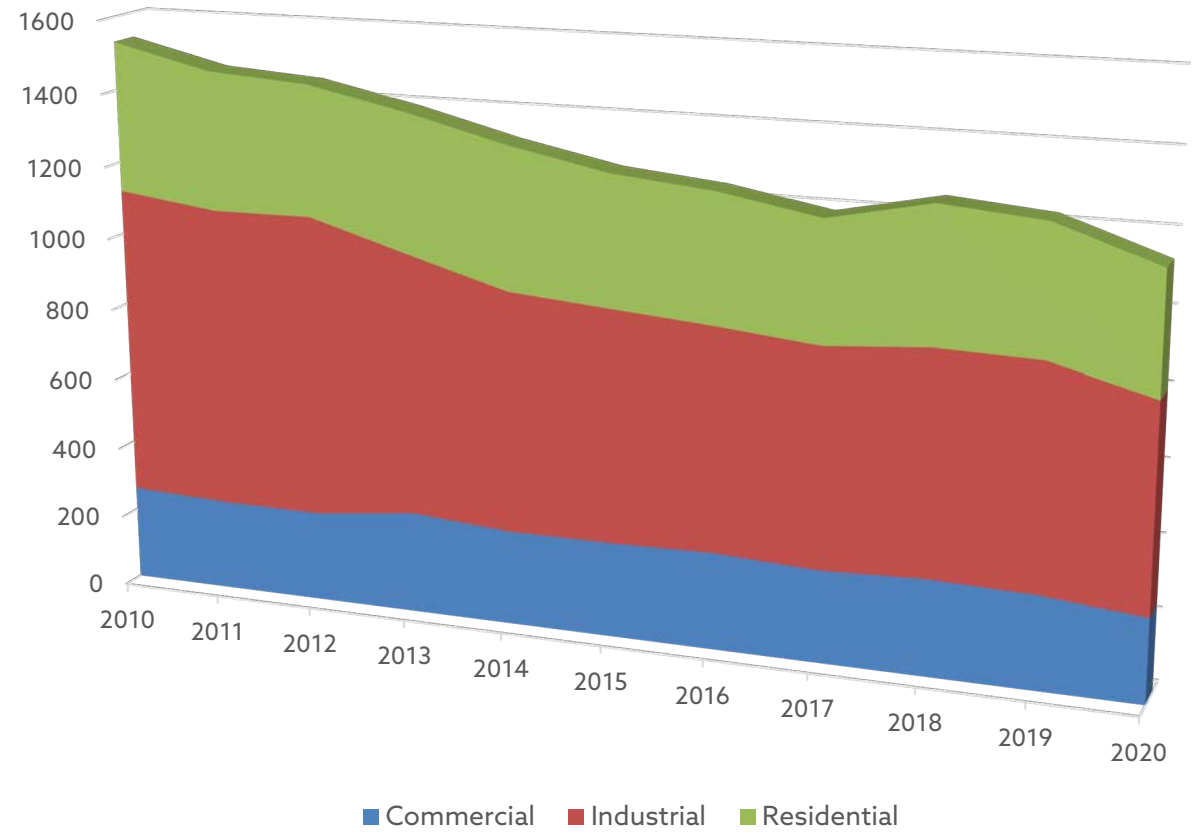
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Louisiana

Located at the mouth of the Mississippi River, Louisiana has abundant crude oil and natural gas reserves both onshore and offshore, buried beneath the thick sediments of the Mississippi Delta. Freshwater and saltwater wetlands cover about one-third of Louisiana, down from more than one-half of the state's area 200 years ago. The state rises gradually from the marshes, bayous, and estuaries along its extensive Gulf of Mexico coastline to the prairie in the state's north and west. On average, Louisiana rises only 100 feet above sea level.

In addition to crude oil and natural gas, Louisiana's energy resources include substantial biomass resources from agricultural byproducts, wood, and wood waste and minor deposits of coal. Louisiana has the highest annual rainfall of the lower 48 states averaging nearly five feet per year. Rich soils create a diverse agricultural economy that includes sugarcane, rice, and livestock, as well as forest products from upland pine and hardwood forests.

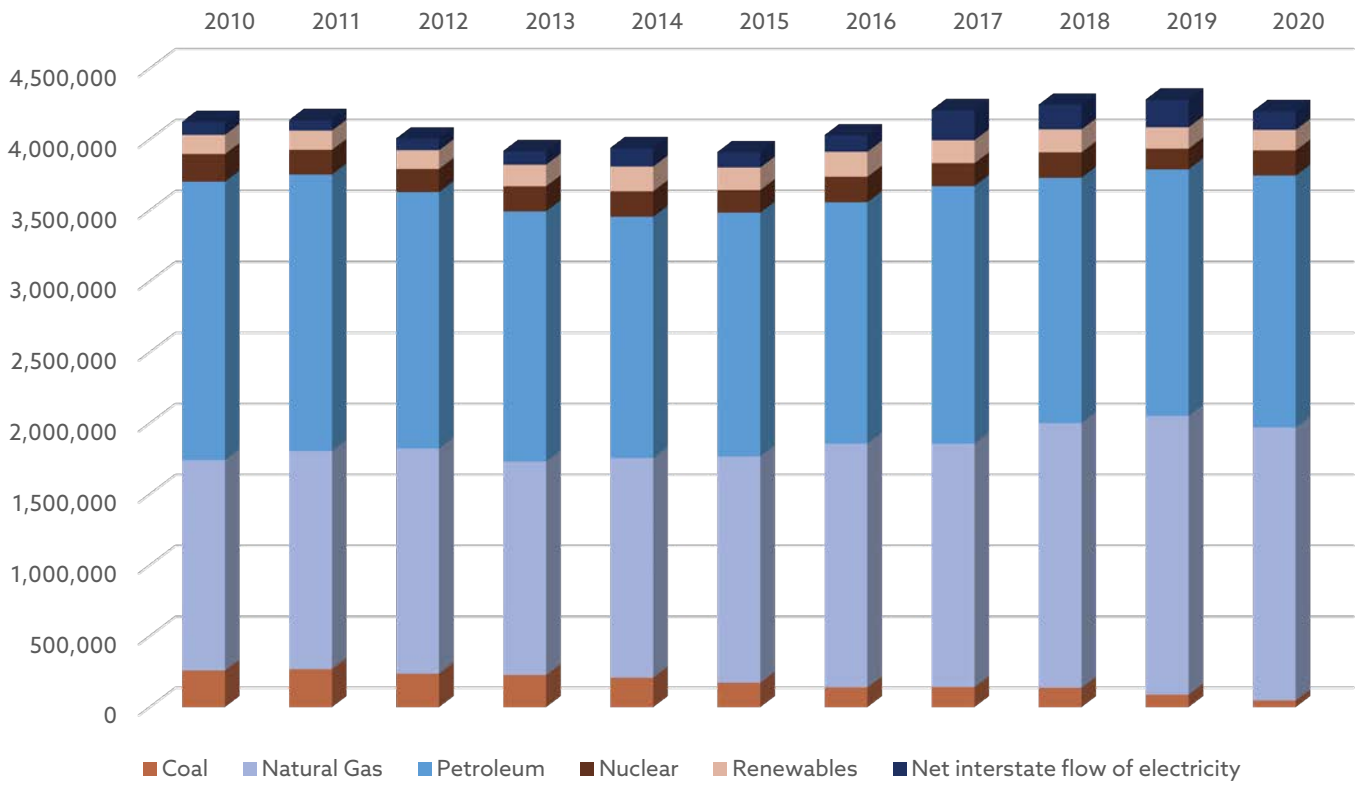
> **"Energy consumption in Louisiana's industrial sector is second only to Texan's demand. Louisiana's need for air conditioning is high during the hot, humid summer months, while its demand for heating is limited during the mild winter months. The state's residential sector total and per capita energy consumption are both near the middle of the states. Louisiana's total energy consumption ranks fourth among the states and its per capita energy consumption is the second highest, largely because of the energy-intensive chemical, petroleum, and natural gas industries in the state's industrial sector.**

In 2021, natural gas was the primary fuel used to generate electricity in Louisiana, accounting for 65 percent of the state's electricity net generation. Natural gas fuels seven of the ten largest power plants in Louisiana, based on generation. Nuclear electric power surpassed coal as the state's second-largest source of in-state electricity in 2015. Louisiana's two nuclear power plants, both located along the Mississippi River, accounted for about 18 percent of the state's net generation in 2021. The two nuclear plants are the second- and third-largest power plants in the state by actual generation.

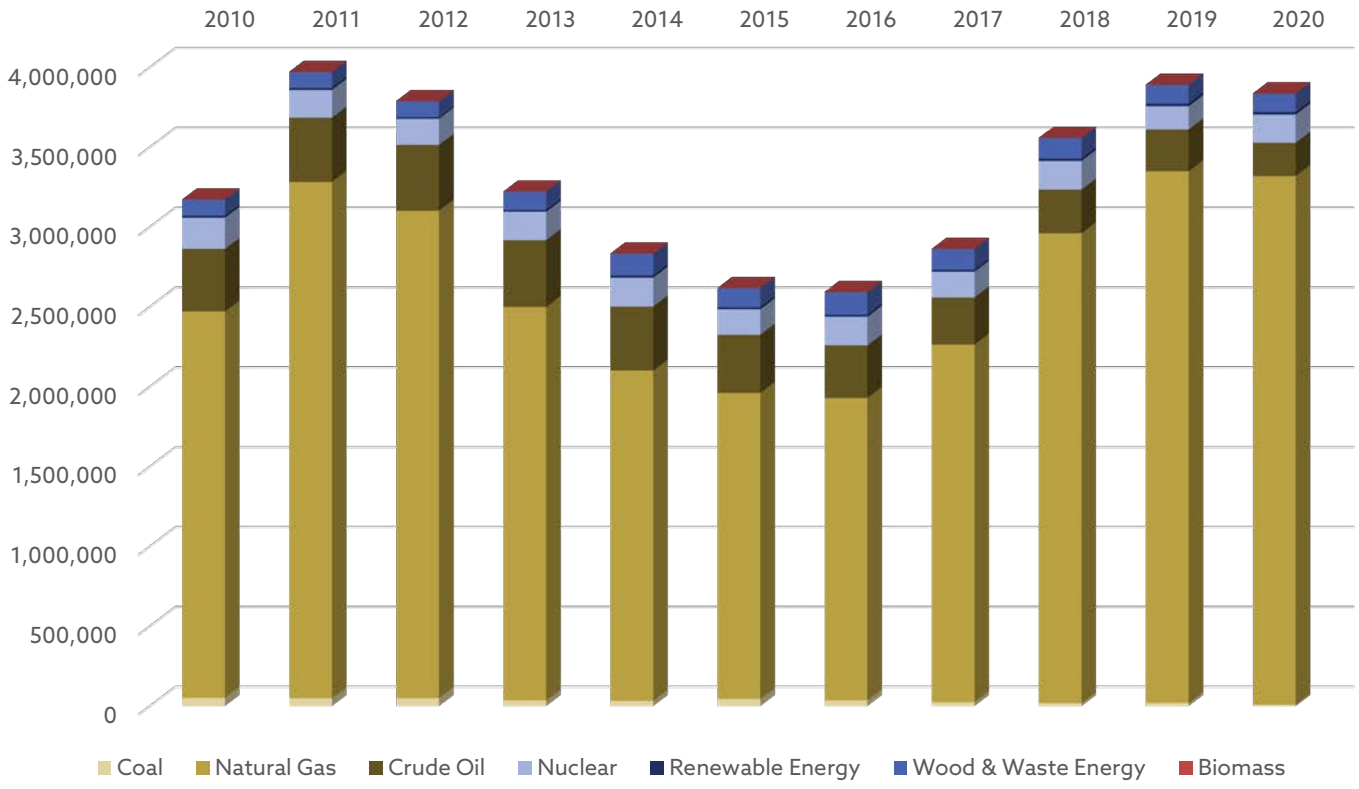
Coal was Louisiana's second-leading source for electricity generation for decades, but in 2021 coal fueled about eight percent of the state's generation. Louisiana has three coal-fueled power plants. Petroleum coke, which is a byproduct in crude oil refining, provided four percent of the state's generation. Louisiana generates more electricity from petroleum coke than any other state. Biomass, solar energy, and hydropower together accounted for just under four percent of Louisiana's total electricity generation.

Louisiana does not generate enough electricity to meet in-state demand and receives almost one-eighth of its power supplies from other states by way of the regional interstate grid. Louisiana ranks third among the states with the highest total electricity consumption on a per capita basis. In 2021, the industrial sector consumed the most electricity in the state, accounting for about 42 percent of the state total, followed by the residential sector at 33 percent and the commercial sector at 25 percent. Louisiana has the second-highest residential sector per capita electricity consumption in the nation. More than six in ten state households rely on electricity for home heating and almost all households have air conditioning.

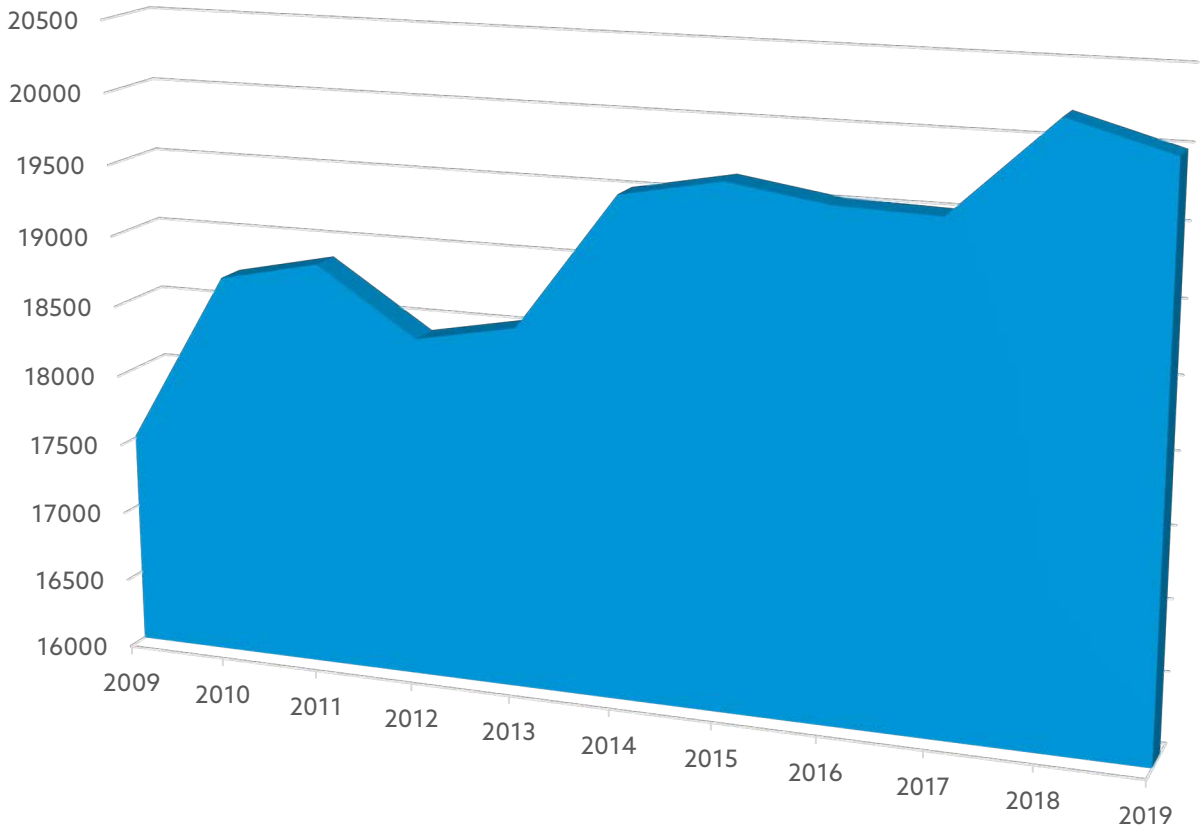
Louisiana - Total Consumption (in Billion Btu)



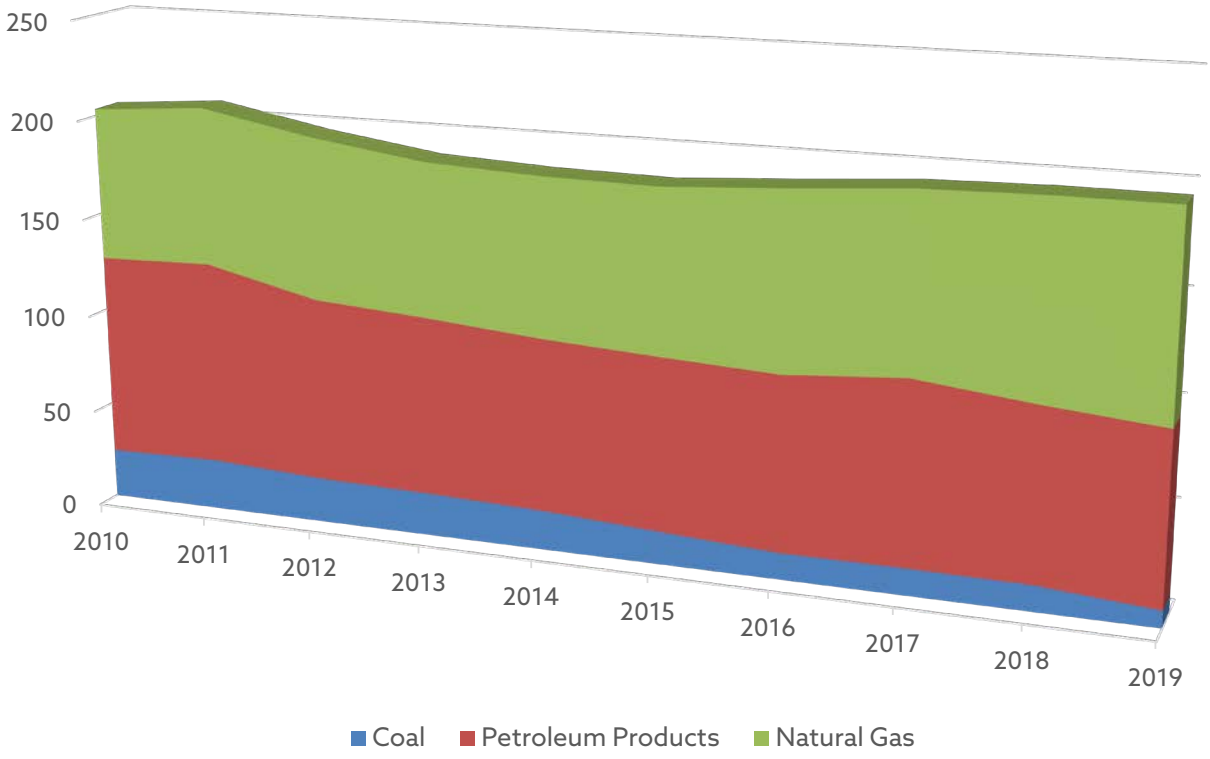
Louisiana - Total Production (in Billion Btu)



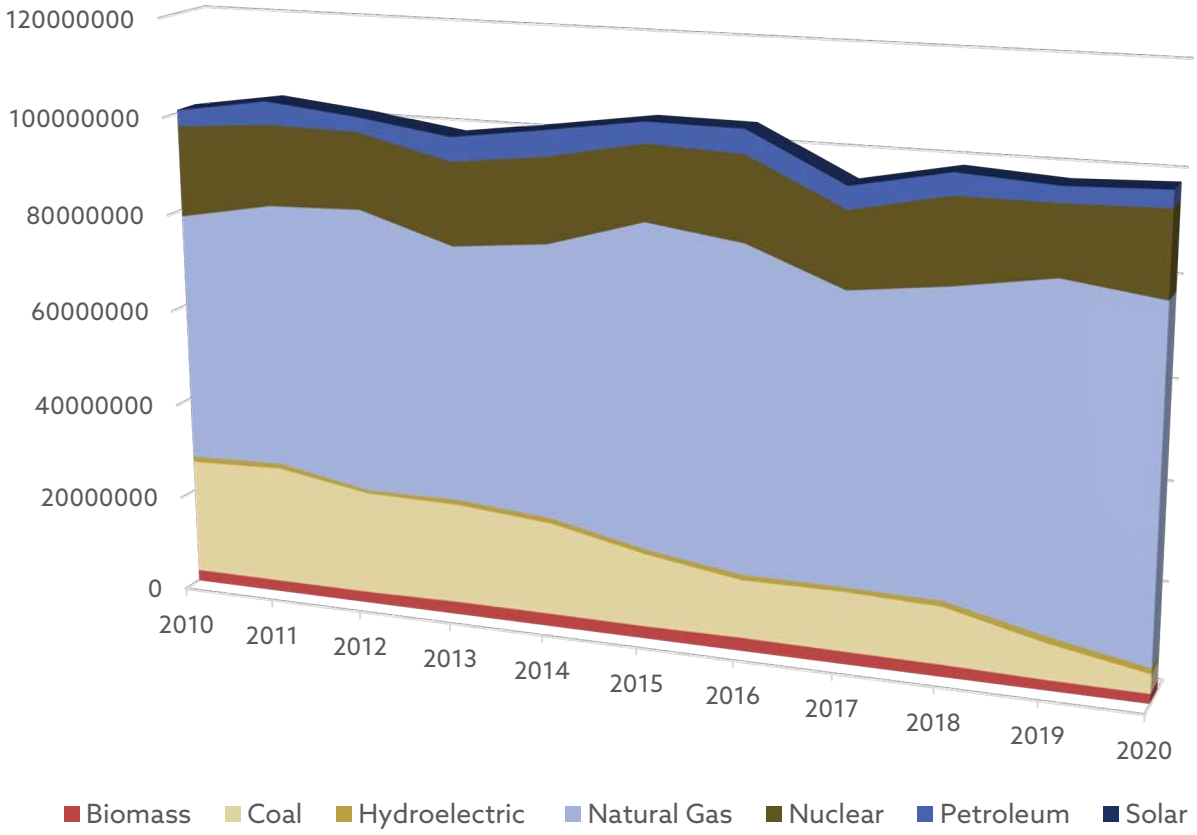
Electricity total consumption per capita (KWh), 2009-2019



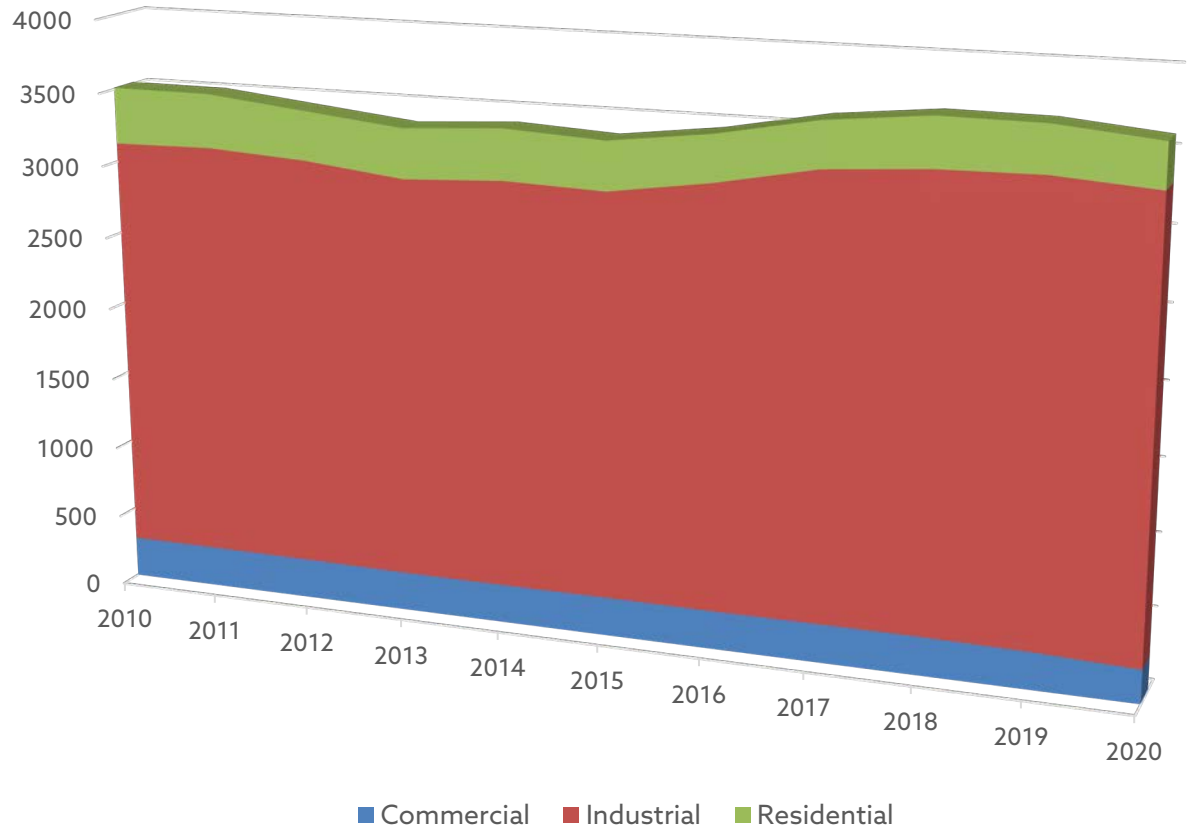
Historical CO_2 Emissions by Fuel Type, 2010-2019



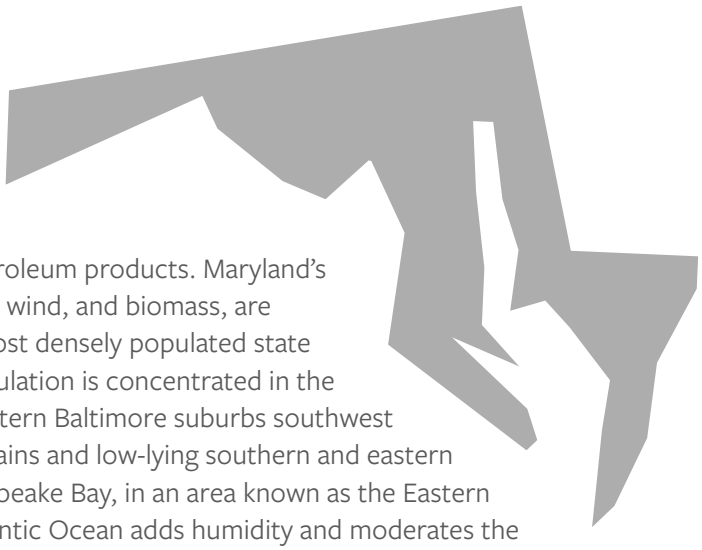
Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Maryland



Maryland wraps around the Chesapeake Bay and extends west into the Appalachian region, where the state's only fossil fuel reserves of coal and natural gas are found. Baltimore is the state's largest city and home to one of the 20 largest ports in the nation—it moves both coal and petroleum products. Maryland's renewable energy resources, which include hydropower, solar, wind, and biomass, are distributed widely across the state. Maryland is the seventh most densely populated state in the nation with 636 people per square mile. The state's population is concentrated in the center of the state in an area that stretches from the northeastern Baltimore suburbs southwest to the suburbs of Washington, DC. Maryland's western mountains and low-lying southern and eastern plains are largely rural and lightly populated. East of the Chesapeake Bay, in an area known as the Eastern Shore, the land is flat with many wetlands, and the nearby Atlantic Ocean adds humidity and moderates the weather year-round.

On the western side of the Bay, the land rises from the coastal plain through rolling foothills to the mountain ranges of the Appalachians. Precipitation is fairly evenly distributed throughout the year and across the state, but temperatures vary widely and annual snowfall levels increase during the winter as the land rises heading west. The state's coastal areas average less than four inches of snow annually, while western parts of the state average more than 100 inches.

Maryland consumes more than five times as much energy as it produces. The transportation sector accounts for slightly more than one-third of the state's energy consumption, while the commercial and residential sectors each consume about three-tenths of the energy used in the state. The industrial sector consumes less than one-tenth.

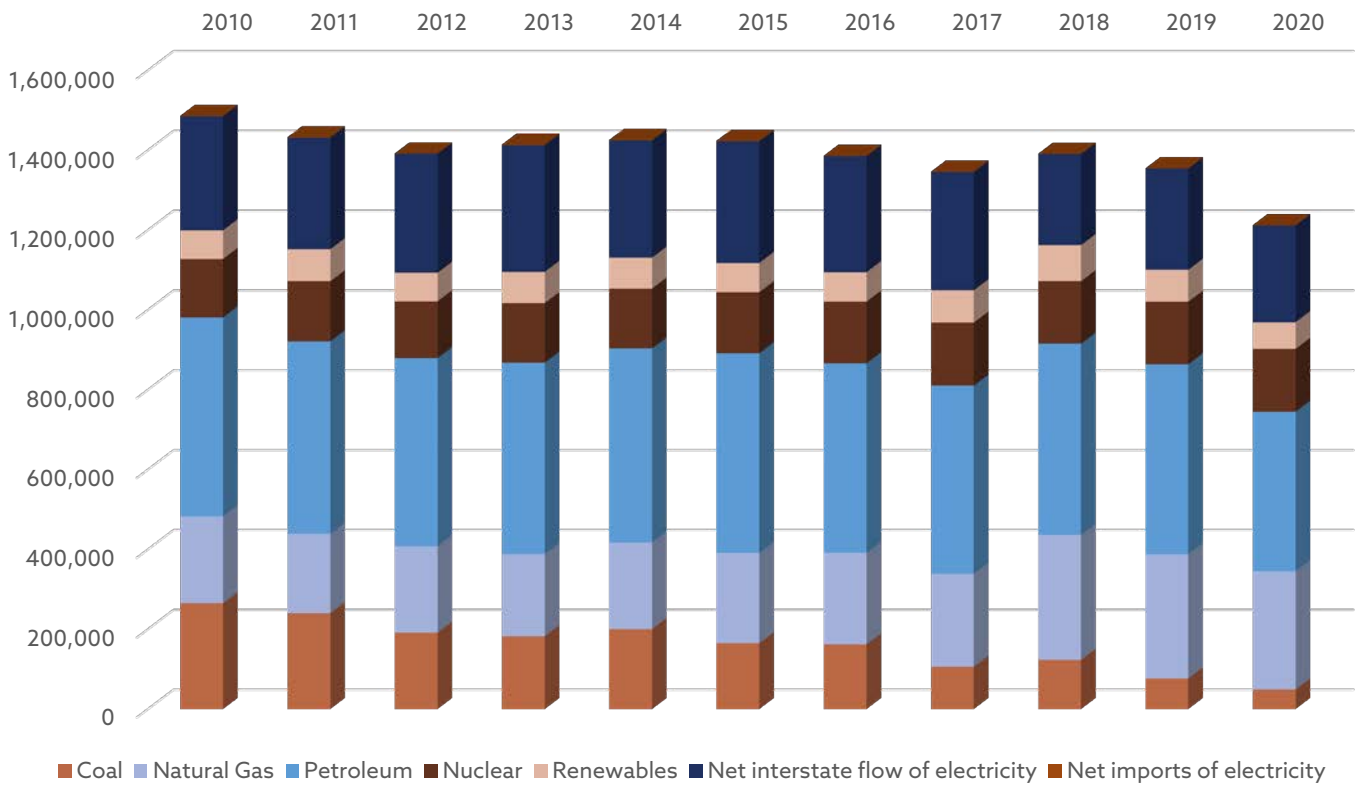
Maryland ranks among the ten states with the lowest per capita energy consumption. Maryland's economy is among the ten states that use the least amount of energy to produce one dollar of GDP. Major contributors to the state's GDP include government, finance, insurance, and real estate, professional and business services, education, healthcare, and manufacturing.

> **"In 2020, nuclear energy and natural gas provided 79 percent of Maryland's total in-state electricity net generation, with each supplying almost equal amounts of electricity. Maryland's only nuclear power plant—the two-reactor Calvert Cliffs power plant located on the western shore of the Chesapeake Bay—accounted for 41 percent of the state's total net generation.**

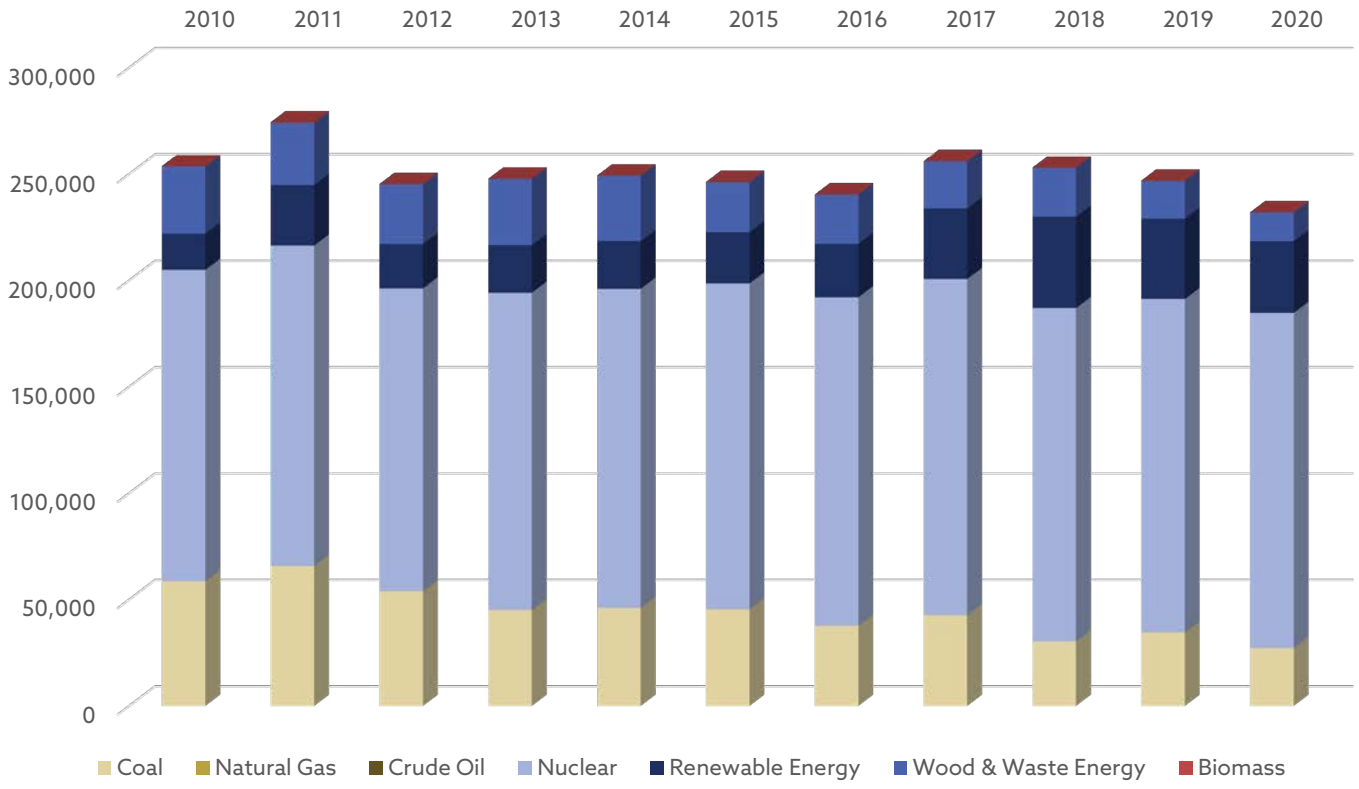
Natural gas-fueled generation has more than tripled since 2015 with nearly 2,700 megawatts of new natural gas-fueled generating capacity coming online. Natural gas accounted for 38 percent of in-state electricity in 2020. Coal-fueled generating plants historically supplied more than half the state's net generation, but coal's share has been below 50 percent since 2012 and fell to nine percent in 2020 as natural gas-fueled generation increased. As of mid-2021, all but two of the six generating units at Maryland's four remaining coal-fueled power plants were more than 35 years old. Two of those older units, with a combined 1,205 megawatts in generating capacity, are scheduled to shut down in 2022. Two other coal-fueled generating units in the state, with 670 megawatts of capacity, were retired in mid-2021. Hydropower, solar energy, and other renewable energy sources accounted for most of the state's remaining net generation. Since 2015, almost all the state's new generating capacity has been natural gas-fueled or solar-powered.

Maryland uses about 60 percent more electricity than it generates. The residential sector accounted for about 47 percent of Maryland's electricity use in 2020, followed closely by the commercial sector at 46 percent. The industrial sector accounted for six percent of the state's electricity consumption, and the transportation sector made up one percent. About four in ten Maryland households use electricity as their primary source of heating.

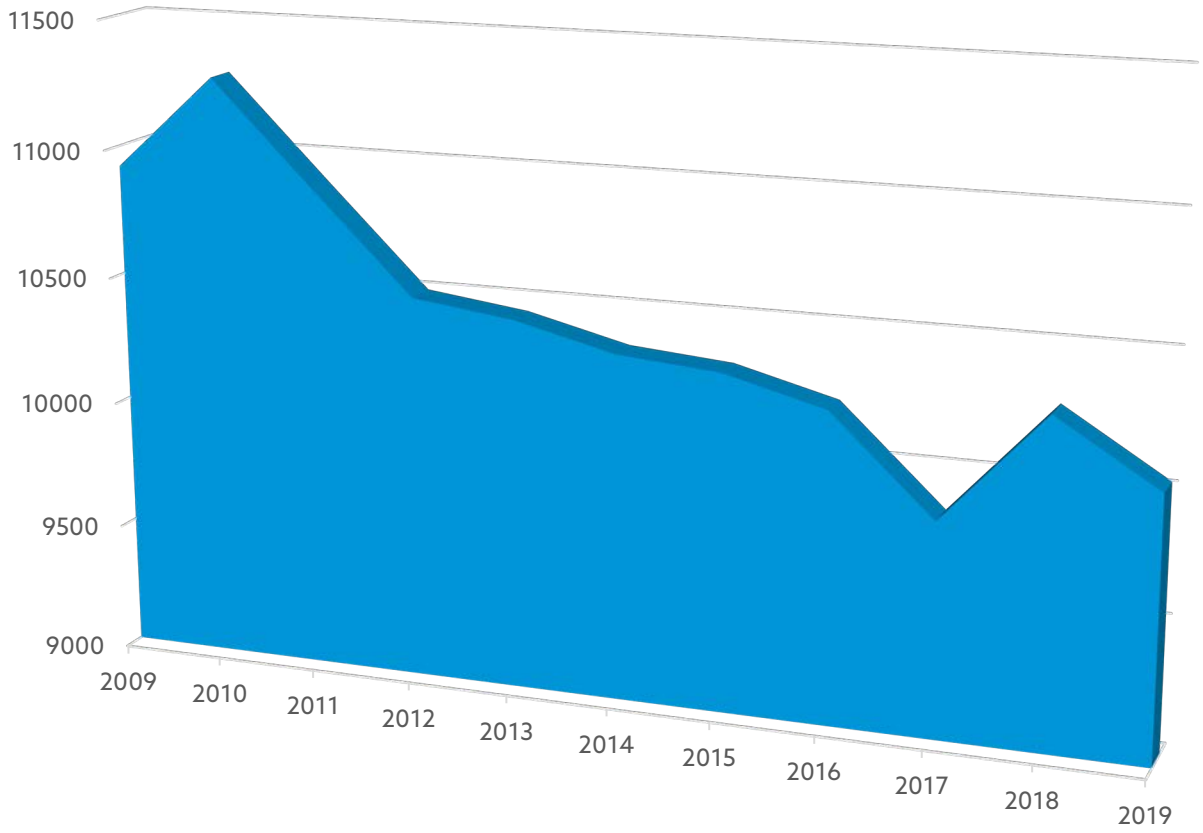
Maryland - Total Consumption (in Billion Btu)



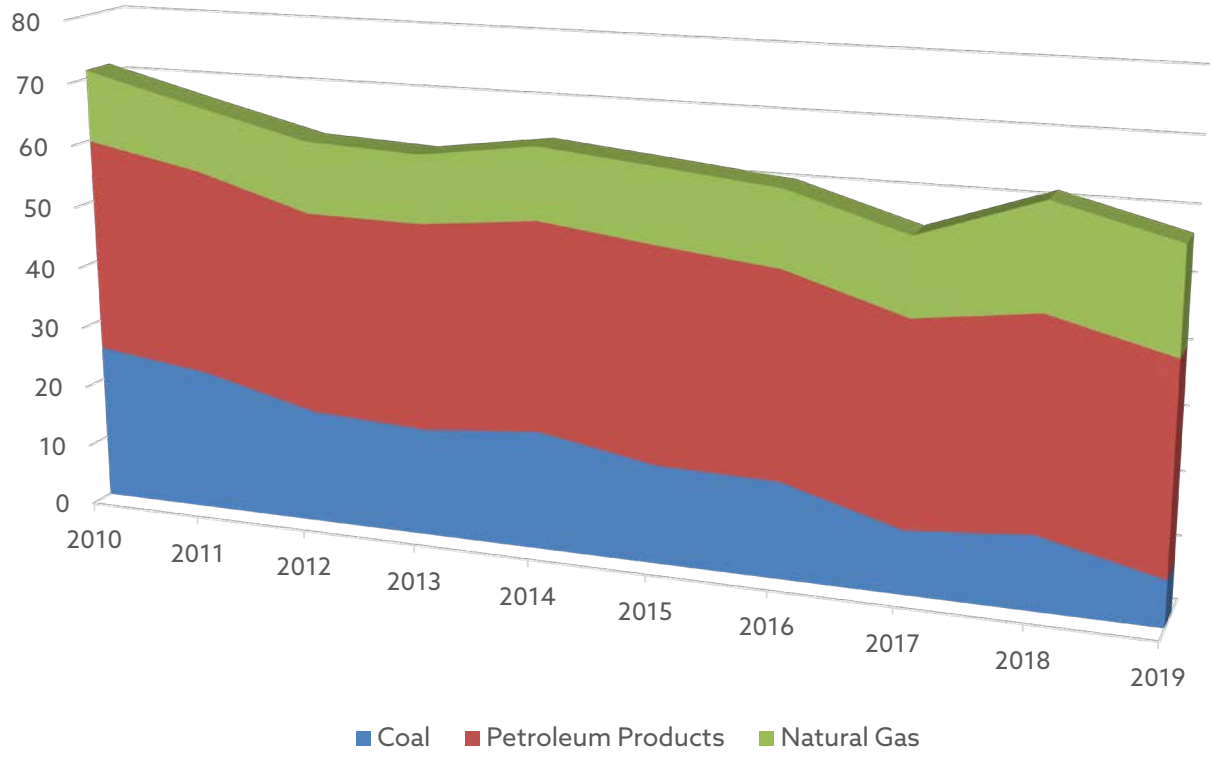
Maryland - Total Production (in Billion Btu)



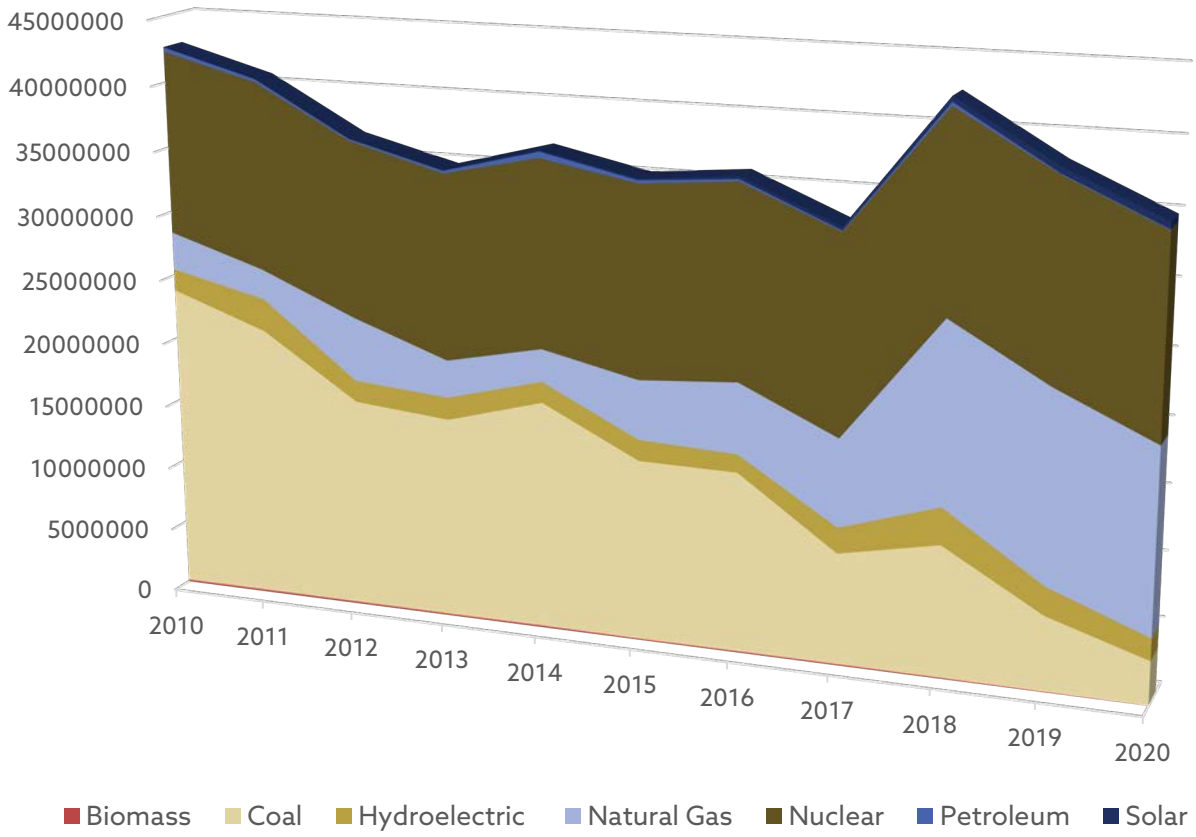
Electricity total consumption per capita (KWh), 2009-2019



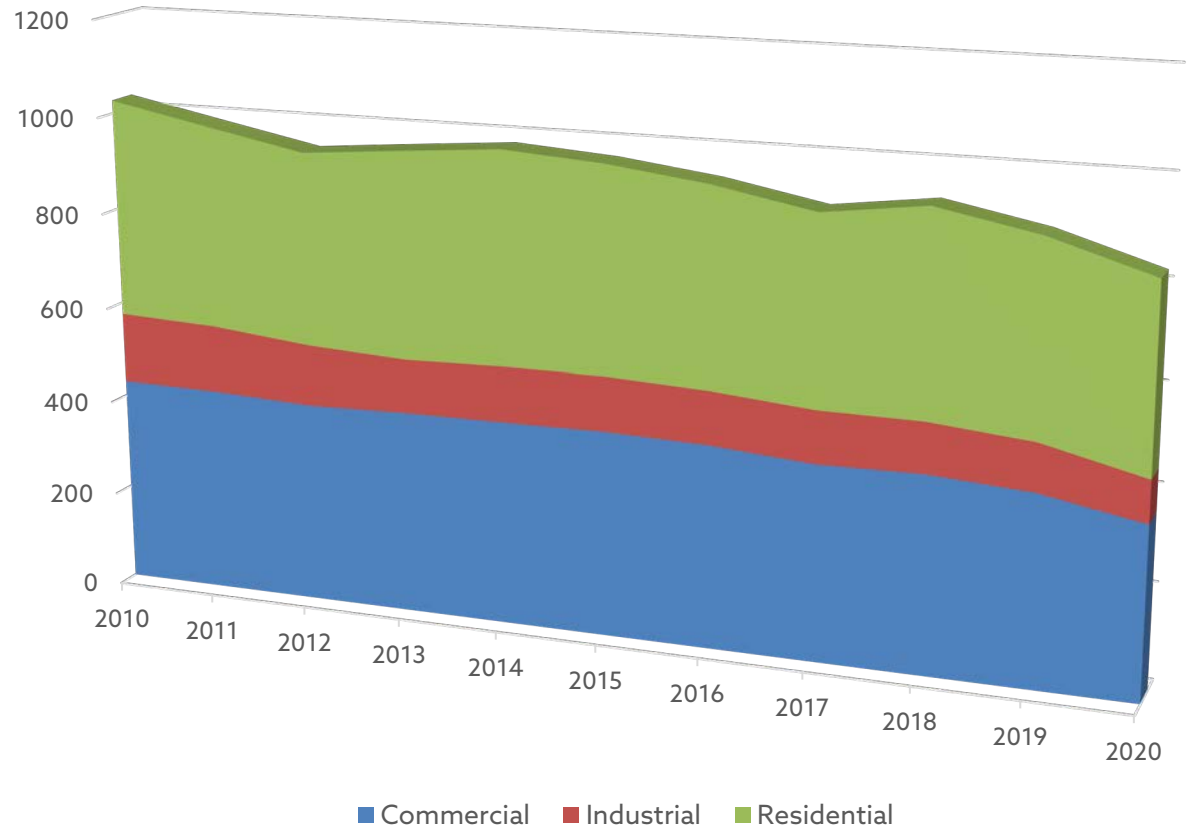
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Mississippi

Located on the nation's Gulf Coast and bordered on the west by the river that shares its name, Mississippi has substantial energy infrastructure. The state has many natural gas, crude oil, and refined product pipelines. Mississippi's larger ports—located on the Gulf of Mexico and the Mississippi River—handle coal, crude oil, petroleum coke, and refined petroleum products. Although it is not as rich in crude oil and natural gas resources as some of its neighboring states, Mississippi has the nation's largest nuclear power reactor and 10th-largest petroleum refinery, along with a large natural gas processing plant and a liquefied natural gas terminal located along the state's Gulf of Mexico coastline.

Mississippi has a humid subtropical climate with long, hot summers, mild winters, and abundant rainfall. Its rich soils, especially between the Mississippi River and the Yazoo River, provide fertile farmland where soybeans, cotton, and corn are the most valuable crops. Although agriculture played a central role in Mississippi's economy in the past, manufacturing now occupies the role of leading contributor in the state's gross domestic product. The manufacture of motor vehicles and other transportation equipment, chemicals, food, beverage, and tobacco products, paper products, as well as mining and crude oil and natural gas production, are substantial contributors to the state's economy.

Mississippi has an energy-intensive economy and ranks sixth among the states in the amount of energy used to produce one dollar of GDP. The industrial sector consumes the most energy in Mississippi at nearly two-fifths of the state total followed by the transportation sector at about one-third. The residential sector accounts for slightly less than one-fifth of state energy use and the commercial sector accounts for one-seventh.

The strong demand for electricity for cooling during summer and heating in winter, along with the state's energy-intensive industries, puts Mississippi among the top one-third of states in per capita energy consumption. Overall, Mississippi consumes almost four times more energy than it produces.

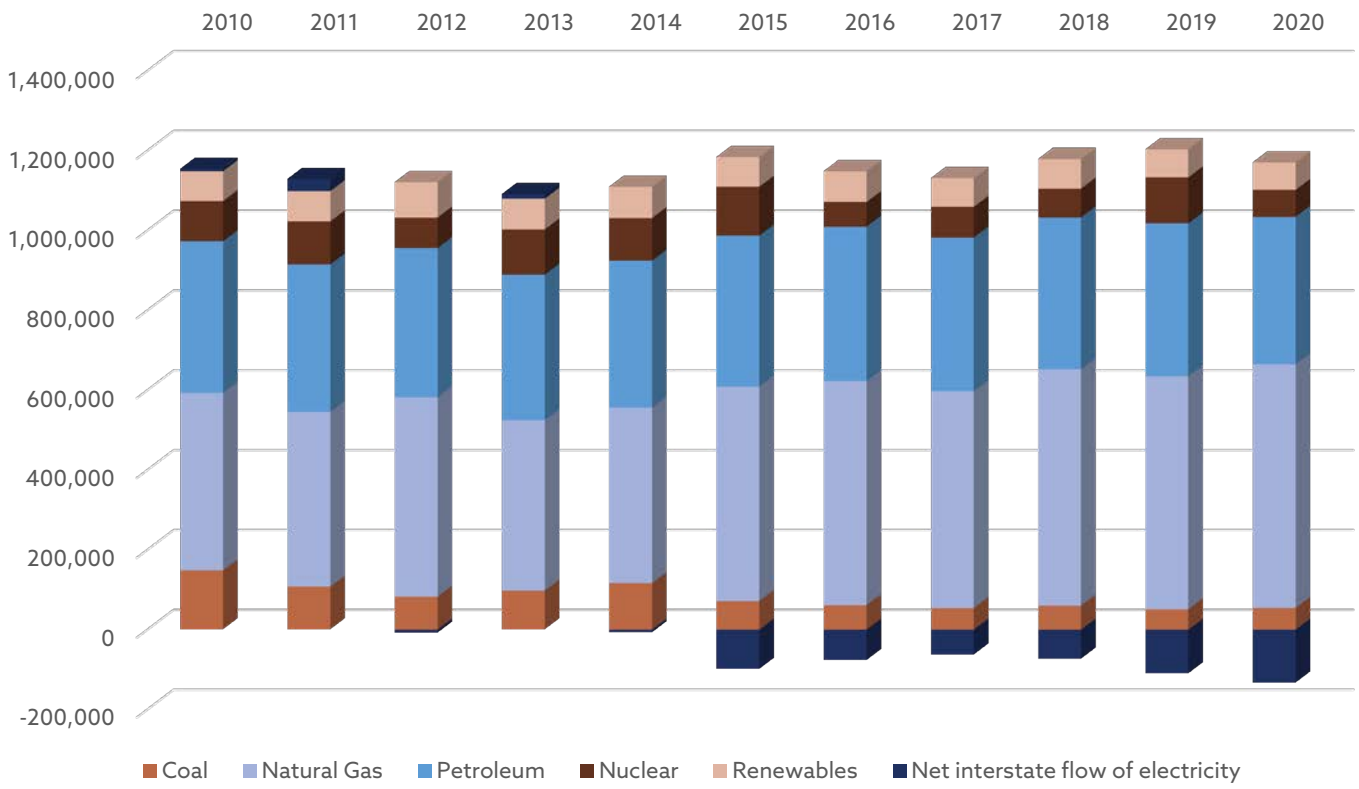
Natural gas accounted for 72 percent of Mississippi's in-state net generation in 2021 and fueled nine of the state's ten largest power plants.

> **"Nuclear power is the second-largest provider of in-state electricity and generated a record amount of electricity in 2021, accounting for 17 percent of Mississippi's generation. The Grand Gulf Nuclear Power Station is the largest single-reactor nuclear power plant by generating capacity in the nation and fifth largest in the world. Coal fueled eight percent of the state's net generation in 2021, down from about 19 percent a decade earlier. Biomass and solar energy primarily provide the rest of the state's net generation.**

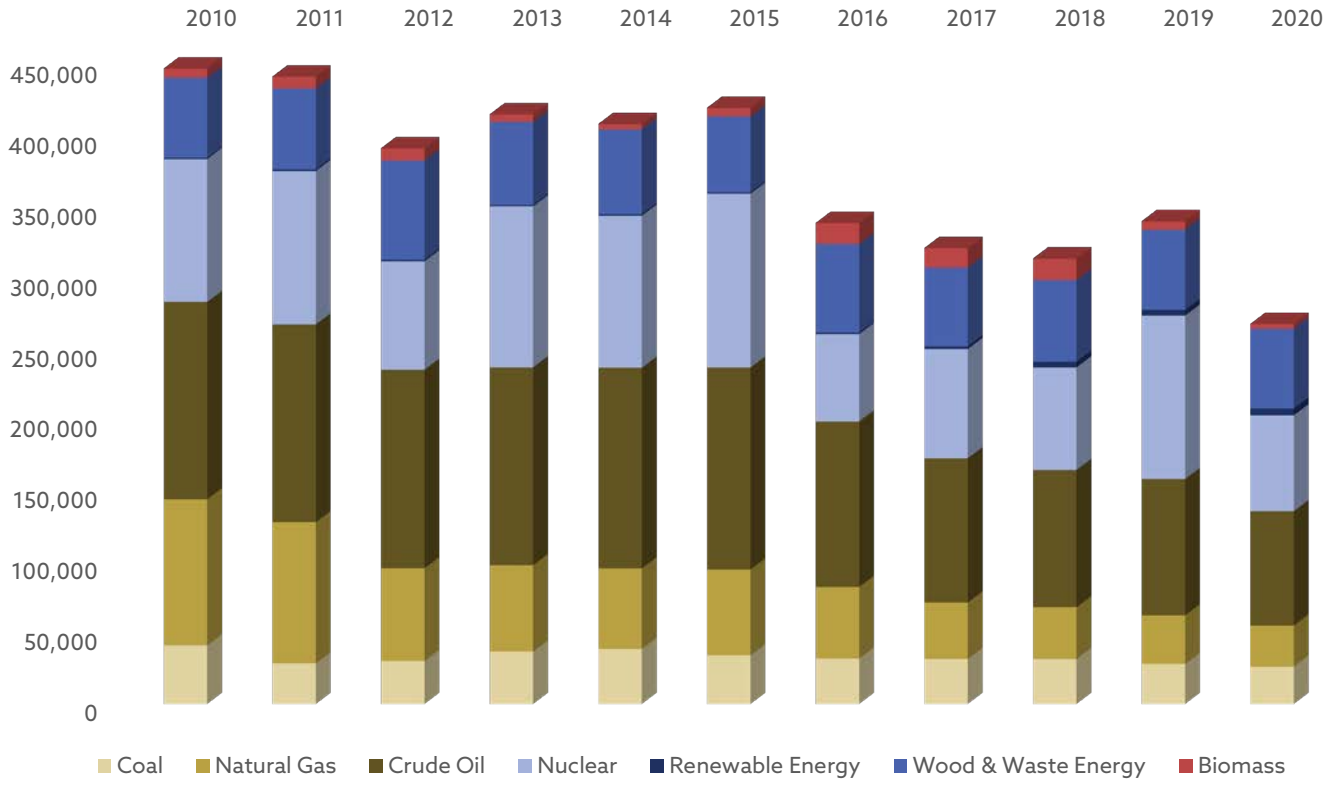
Mississippi generated a record amount of electricity in 2021. The state typically produces about one-fourth more electricity than it uses, and the surplus power is sent to other states over the regional grid. The residential sector is the largest power consumer in the state, accounting for two-fifths of the state's total electricity use, followed by the industrial sector at about one-third, and the commercial sector at slightly more than one-fourth.

Air-conditioning use during the state's hot summer months and the widespread use of electricity for home heating during the mild winter months drives demand for electricity from Mississippi's residential sector. About six out of ten of the state's households use electricity for home heating. Mississippi ranks among the top five states in residential sector electricity sales on a per capita basis.

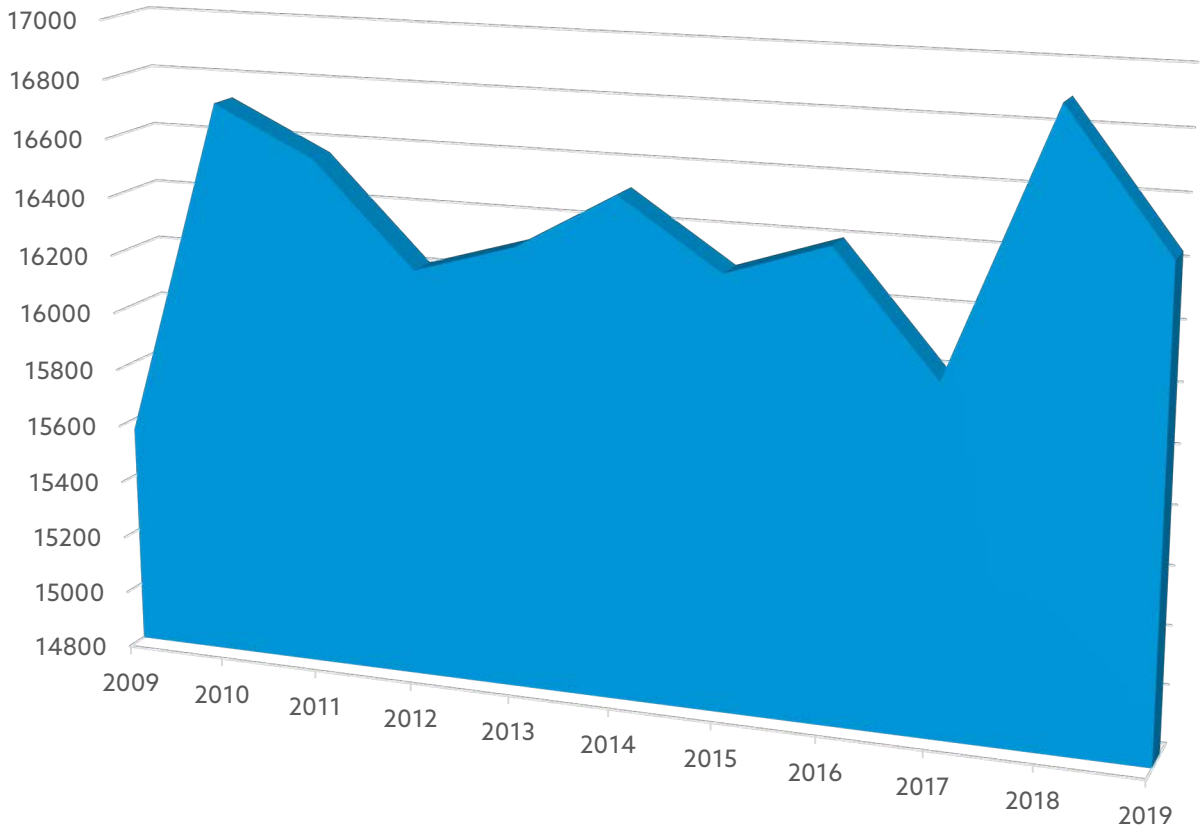
Mississippi - Total Consumption (in Billion Btu)



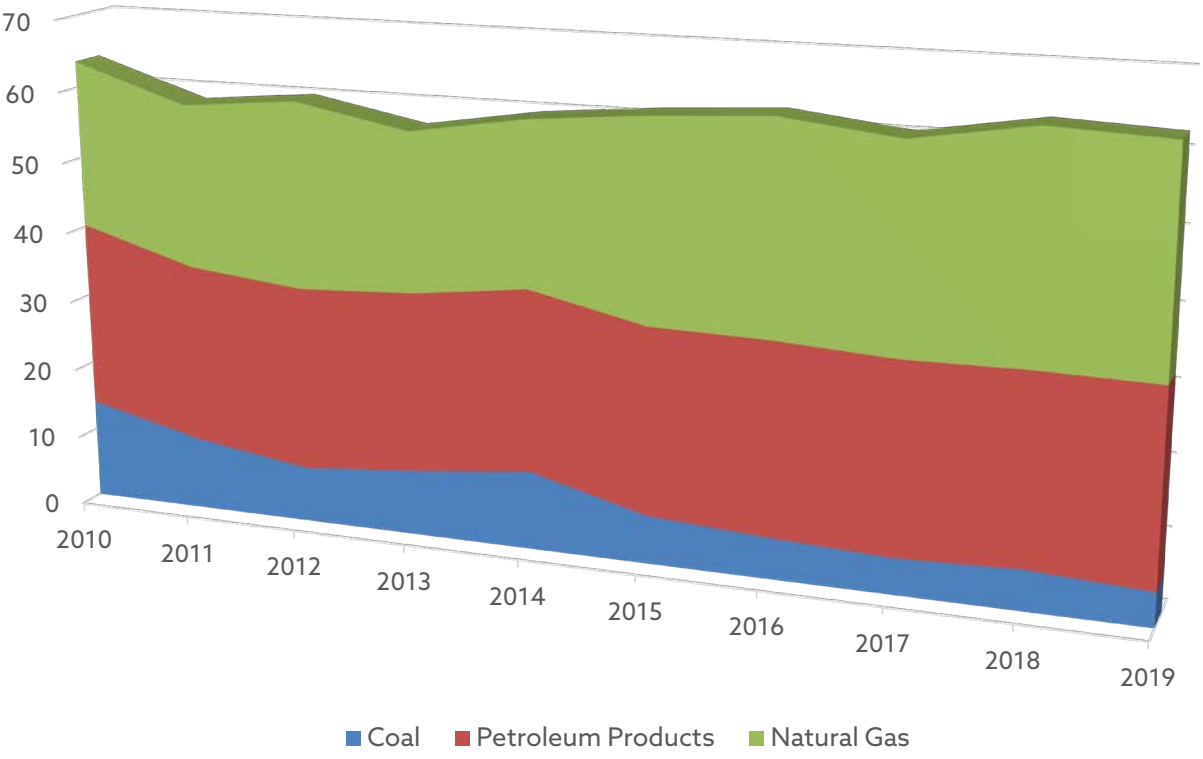
Mississippi - Total Production (in Billion Btu)



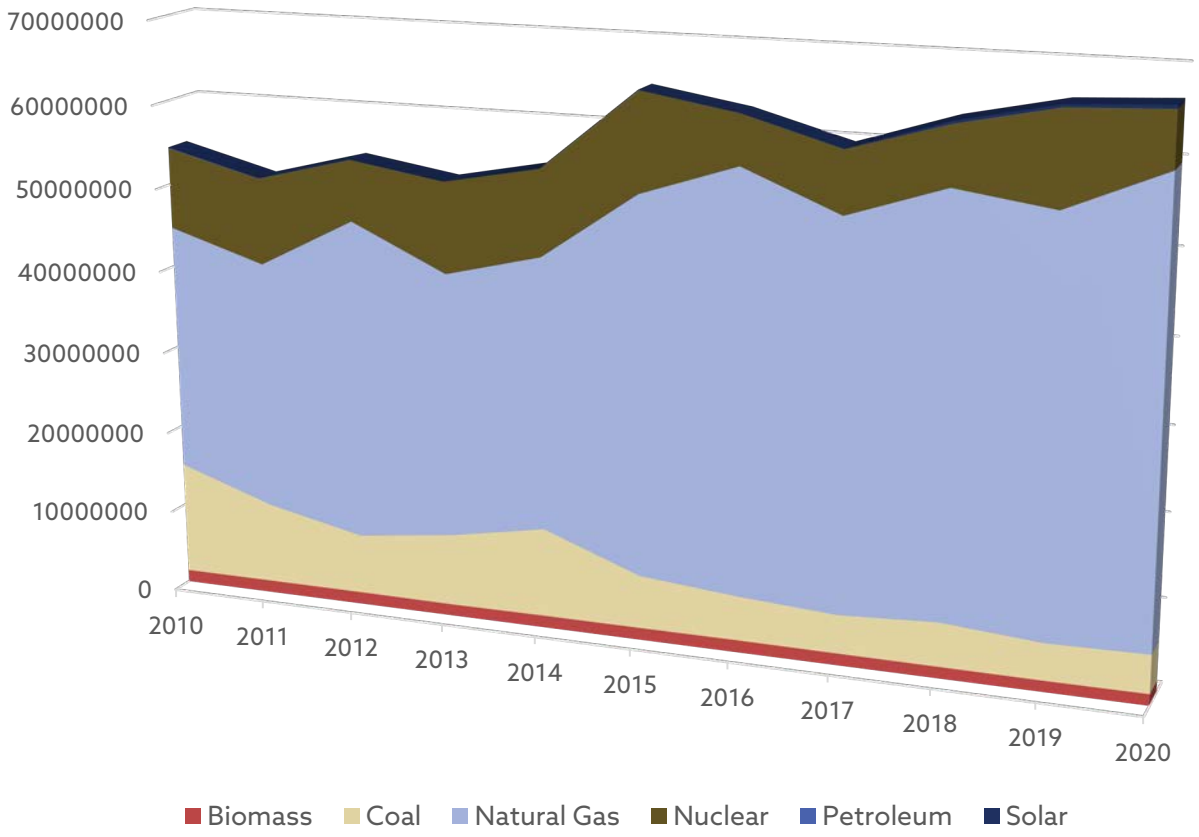
Electricity total consumption per capita (KWh), 2009-2019



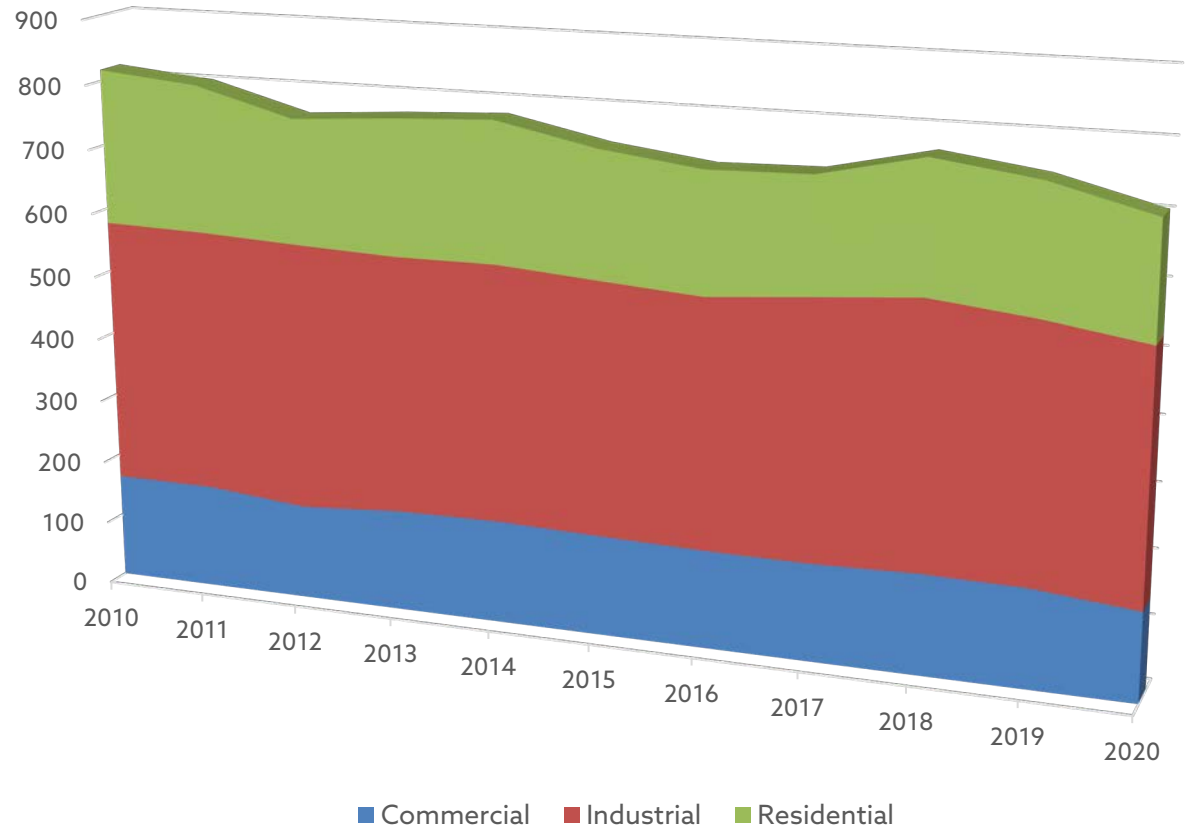
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Missouri

Missouri is a transportation hub for the United States at the junction of the nation's two longest rivers, the Missouri and the Mississippi. The state's infrastructure and location give shippers the ability to move raw materials and agricultural and manufactured products by rail, river, highway, and air to destinations across the country. Missouri has little fossil fuel production, but it does have fossil fuel resources, including coal deposits and petroleum-bearing tar sands and oil shales.

The rich soils of the plains, the rolling hills north of the Missouri River, and the southeastern lowlands form the state's fertile agricultural regions. Missouri's large corn and soybean crops are feedstocks for the state's biofuels industry. South of the Missouri River, the heavily forested Ozark Plateau has abundant biomass resource potential, and the open prairies of northern and western Missouri have the state's best wind resources. Three of the largest earthquakes in U.S. history were centered in southeastern Missouri. The potential for further tremors in that geologically active part of the state is taken into consideration in siting nuclear power plants throughout the Midwest.

Missouri has a moderate climate, and extended periods of very cold or very hot weather are uncommon. The state's total energy consumption per capita is close to the national average, but the state ranks sixth in the nation in per capita energy consumption in the residential sector. Missouri consumes almost eight times more energy than it produces. The transportation and residential sectors are the two largest energy consuming end-use sectors, and together they account for three-fifths of the state's total energy use. The commercial sector accounts for slightly more than one-fifths of Missouri's energy consumption. The industrial sector—which includes agriculture, construction, mining, and manufacturing—accounts for nearly one-sixth of the state's energy use.

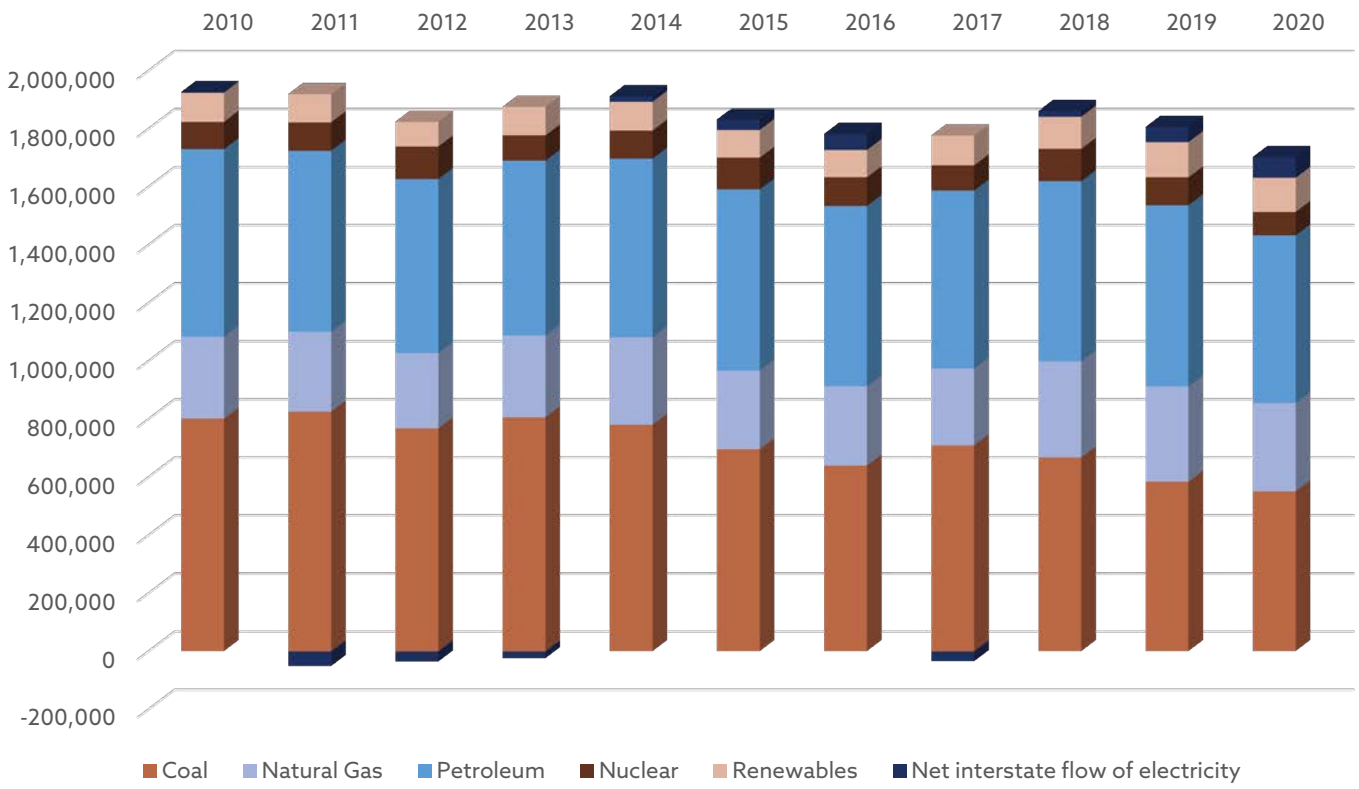
> **"In 2021, coal fueled 74 percent of Missouri's electricity net generation, and eight of the ten largest power plants in the state. Missouri ranks second, behind West Virginia, for the highest share of in-state electricity net generation from coal. However, coal's share of net generation declined slightly from a peak of 81 percent in 2010, as older coal-fueled plants retired, switched to natural gas, or replaced with renewable generation.**

In 2021, electricity net generation from natural gas and wind made up about nine percent each. Both natural gas and wind generation surpassed nuclear power for the first time in 2021. Callaway, Missouri's single nuclear power plant located west of St. Louis, accounted for about six percent of in-state generation, the lowest on record. Historically, Callaway generates about ten percent of the state's electricity, but declined in 2020 and 2021 because of multiple unplanned shutdowns for several months. Hydropower accounted for about two percent of total in-state generation, while solar, petroleum, and biomass accounted for the rest.

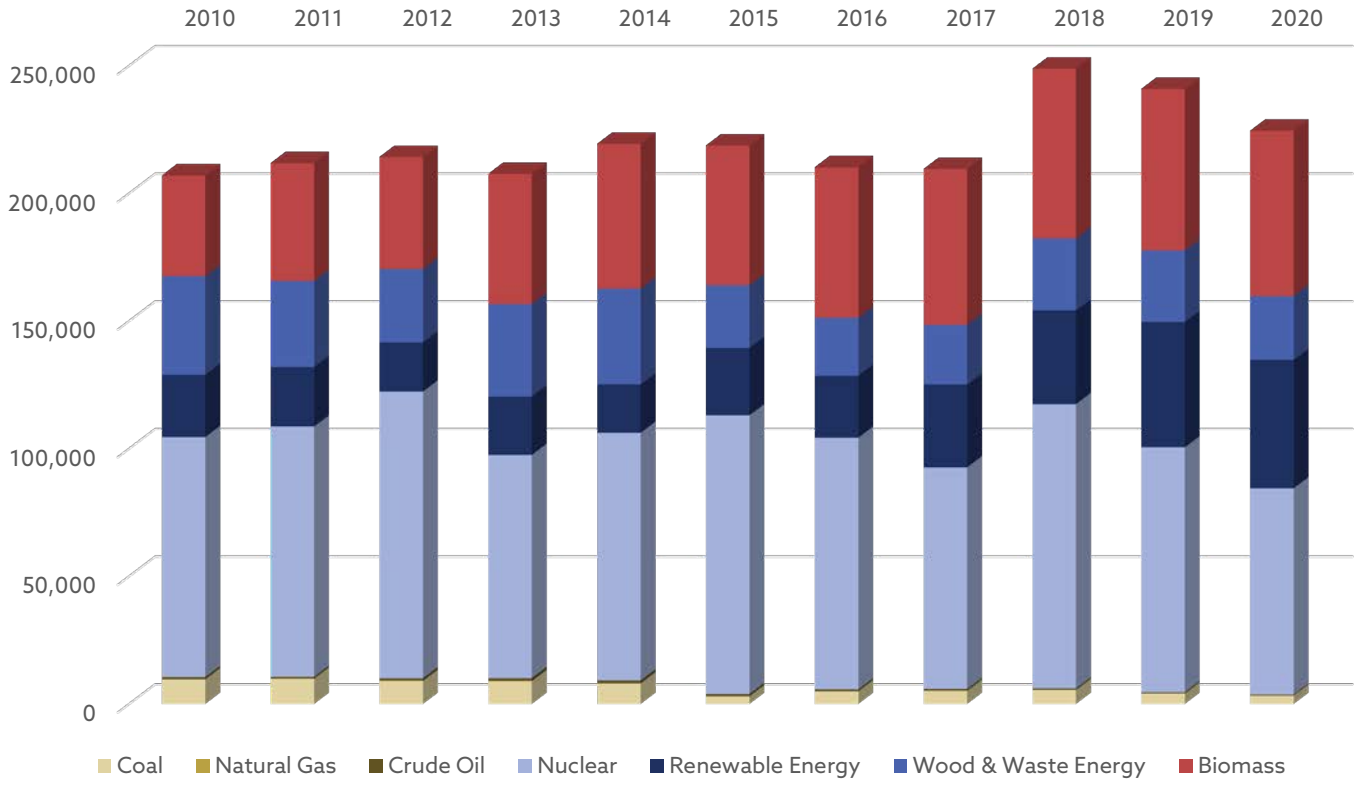
On an annual basis, Missouri typically uses more electricity than it generates and imports power from other states via the regional grid. Electric utilities provide almost all of the electricity generated in Missouri. Electric cooperatives serve the northeast corner and southeastern part of the state. However, most of the state's population is concentrated in urban areas—mainly St. Louis and Kansas City—and receives retail electric service from investor-owned utilities. The residential sector uses the most electricity in the state, accounting for almost half of total sales. The average electricity retail price in Missouri's residential sector is near the lowest one-tenth of the states. Nearly four out of ten Missouri households rely on electricity as their primary energy source for home heating.

Missouri currently has nearly 1,000 public charging stations for electric vehicles, with over 2,100 EVSE (Electric Vehicle Supply Equipment) ports (DC Fast and Level 2). The majority of charging stations are located in and around St. Louis and Kansas City. The Missouri Department of Natural Resources is planning to expand its charging station network through both public and private investments.

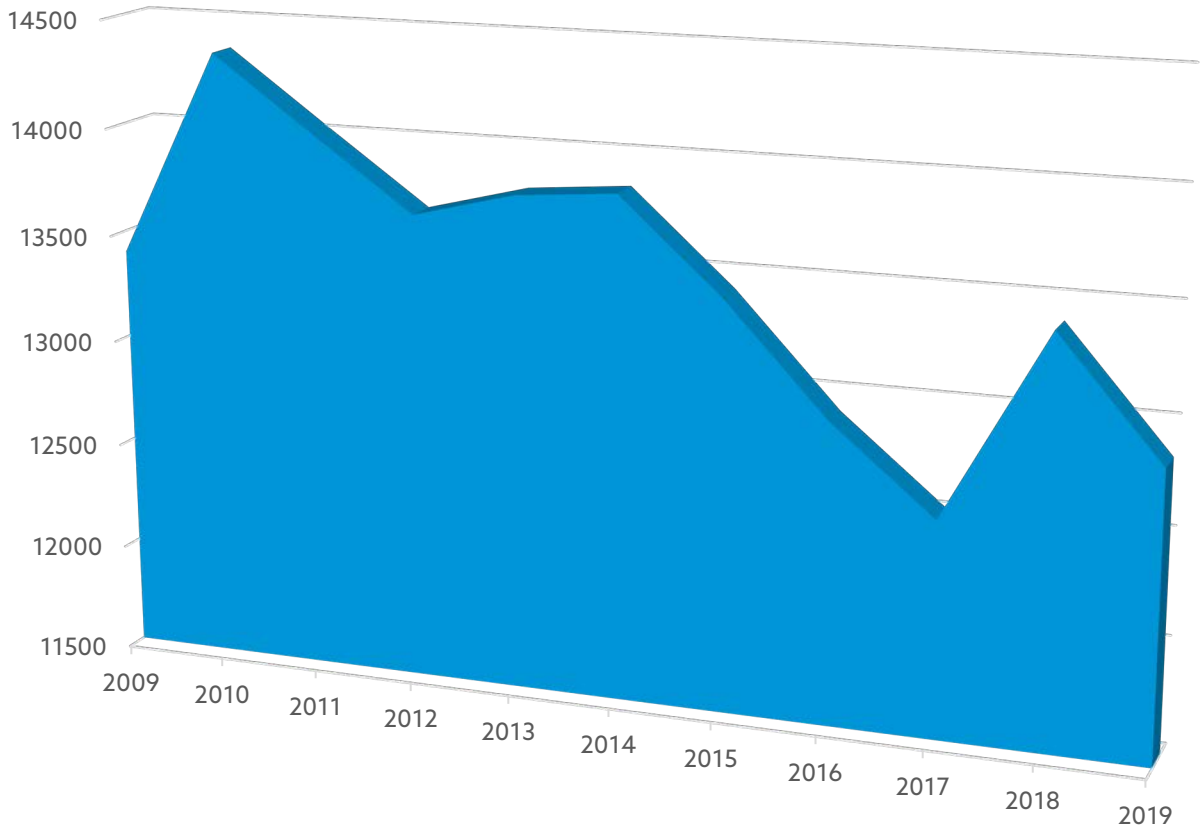
Missouri - Total Consumption (in Billion Btu)



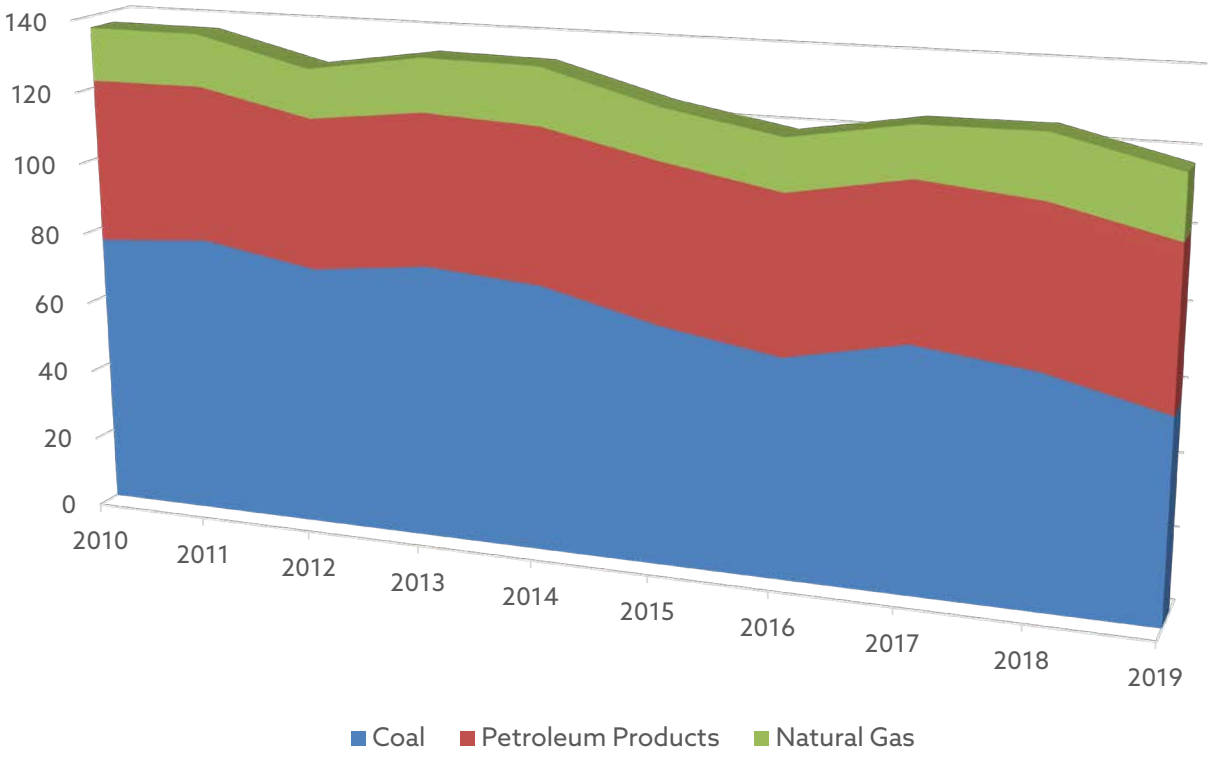
Missouri - Total Production (in Billion Btu)



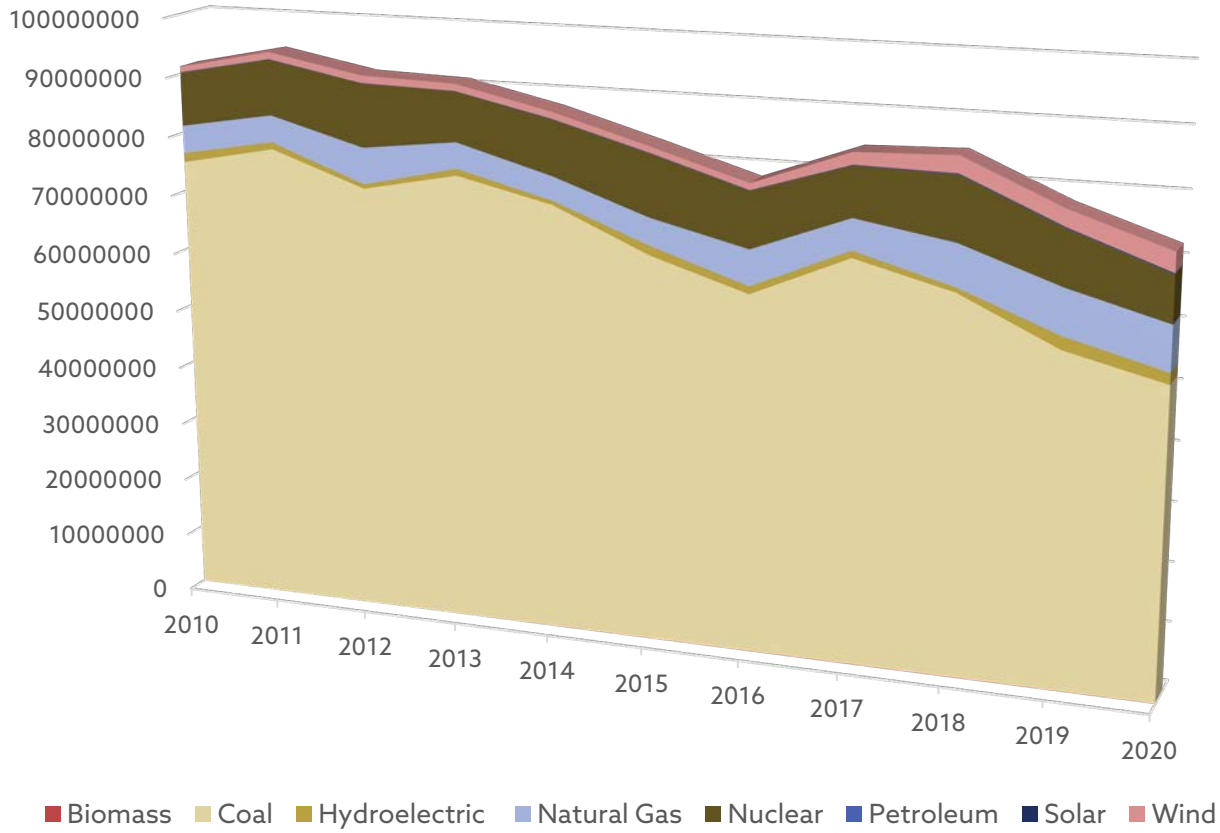
Electricity total consumption per capita (KWh), 2009-2019



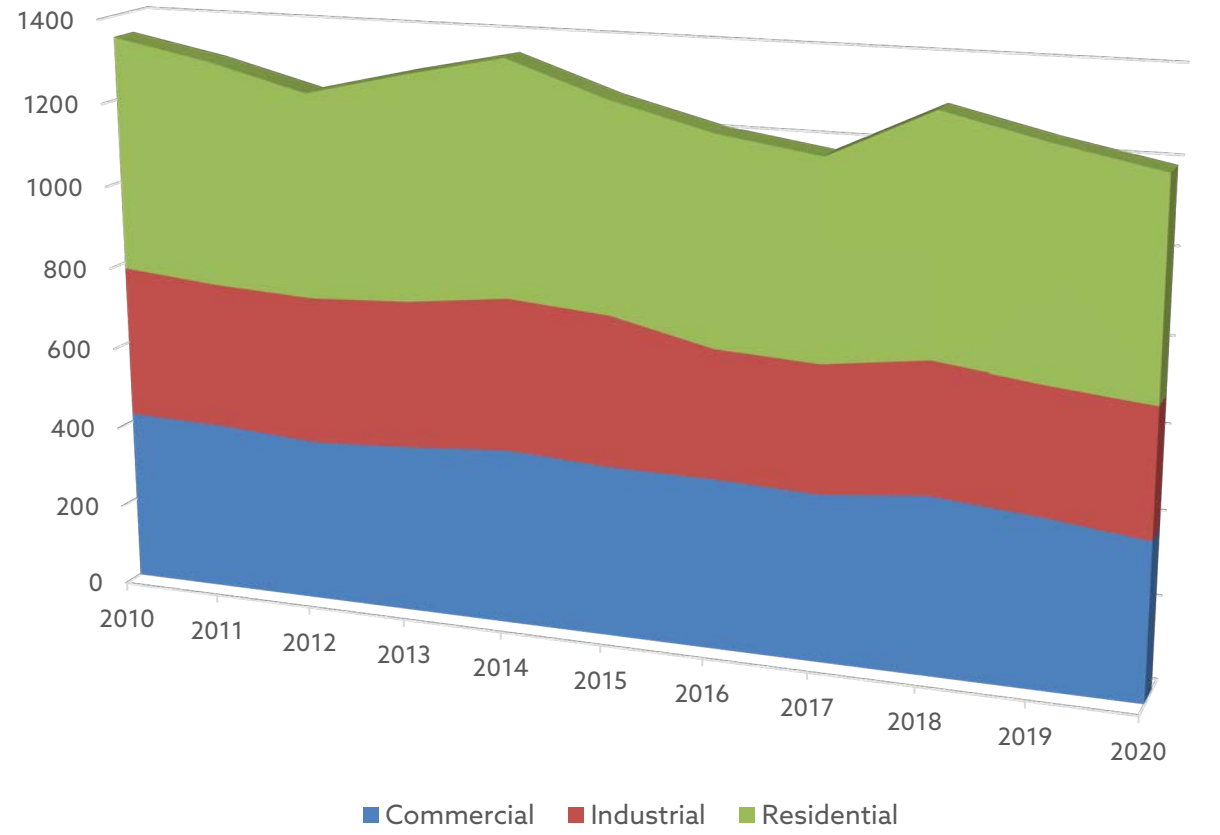
Historical CO_2 Emissions by Fuel Type, 2010-2019



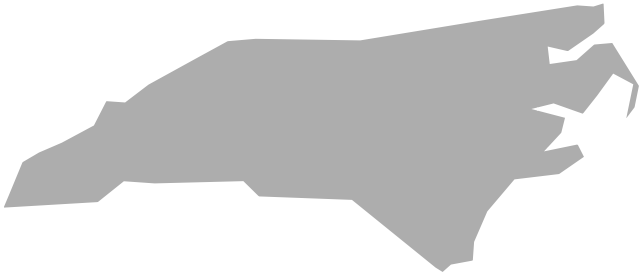
Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



North Carolina



North Carolina rises from its Atlantic Ocean coastline to the highest peak east of the Mississippi River—Mount Mitchell, which stands more than a mile above sea level at 6,684 feet. The state's terrain ranges from the barrier islands of the Outer Banks in the east, where North Carolina is brushed by the warm waters of the Gulf Stream, across the Coastal Plain and the Piedmont region to the heavily forested spine of the Appalachian Mountains in the west.

North Carolina has substantial renewable energy resources. Strong offshore winds along the state's coast could provide energy for electricity generation. North Carolina's solar resources help make the state a leader in solar power. The 18 million acres of woodlands that cover about three-fifths of the state provide a large biomass resource and employment for about 74,000 people who work in North Carolina's forestry and forest products industries. Rivers flow through the state providing hydroelectric power to many communities.

North Carolina consumes nearly four times more energy than it produces. Total energy consumption per capita in North Carolina is among the lowest one-third of the states. Residents, tourists, and truckers using motor gasoline and diesel fuel on the state's heavily traveled highway system and the jet fuel consumed at the busy Charlotte Douglas International Airport make the transportation sector North Carolina's largest end-use energy consuming sector, accounting for about three-tenths of the state's total energy consumption. The residential sector follows the transportation sector, accounting for about one-fourth of the state total. The commercial and industrial sectors each make up slightly more than one-fifth of the state's energy consumption.

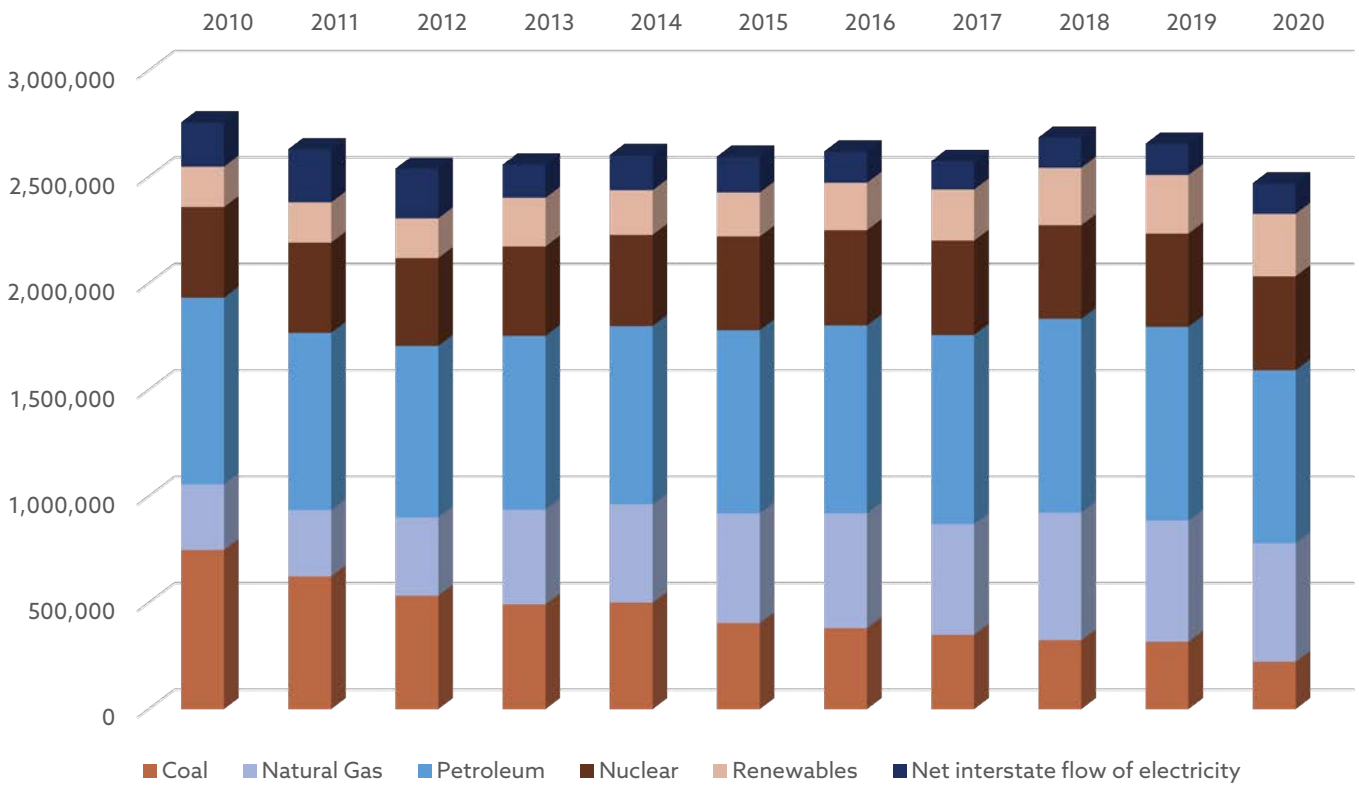
North Carolina has a large agricultural industry and is a top producer of poultry, hogs, tobacco, and sweet potatoes. The state's other key industries include: business and financial services; aerospace; auto and truck manufacturing; biotechnology and pharmaceuticals; food processing; furniture manufacturing; information technology; plastics and chemicals; and textiles. The energy-intensive food, beverage, and tobacco products industry; chemicals; and the computer and electronics products sector, together, account for more than half of the state's gross domestic product from manufacturing.

> **"North Carolina is among the nation's top five producers of electricity from nuclear power. In 2020, nuclear energy was the largest fuel source for electricity generation in the state and contributed a third of the state's net generation. Over the past decade, the contribution of natural gas-fueled generation has increased as electric utilities bring natural gas-fueled power plants online.**

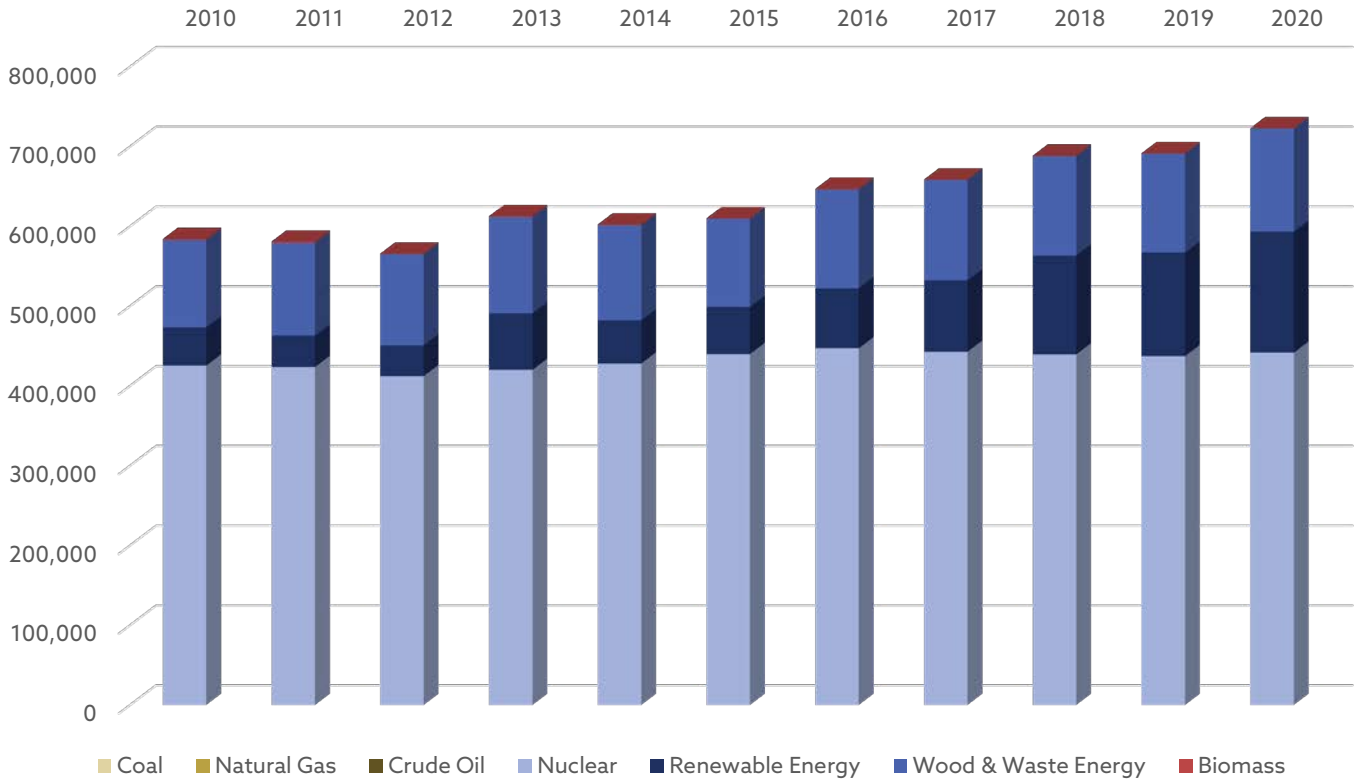
In 2020, natural gas provided slightly less generation than nuclear power, accounting for 33 percent of the state total. Natural gas-fueled generation exceeded coal-fueled generation for the first time in 2016. Before 2012, coal-fueled power plants provided more than half of the electricity generated in North Carolina, but 35 coal-fueled units with about 3,700 megawatts of generating capacity have been retired since 2010 and 35 natural gas-fueled units with about 5,300 megawatts of capacity were added. In 2020, the remaining coal-fueled power plants provided about 17 percent of the electricity generated in the state. Solar power, hydroelectric power, and biomass accounted for almost all the rest of North Carolina's electricity generation.

Even though North Carolina is among the top ten electricity-producing states in the nation, its consumers use about 12 percent more power than is generated in the state, and additional electricity is supplied from other states over the regional grid. The residential sector accounts for slightly less than half of the total electricity retail sales in North Carolina, the largest share among the end-use sectors. The commercial sector makes up about one-third of the state's electricity sales and the industrial sector accounts for about one-fifth.

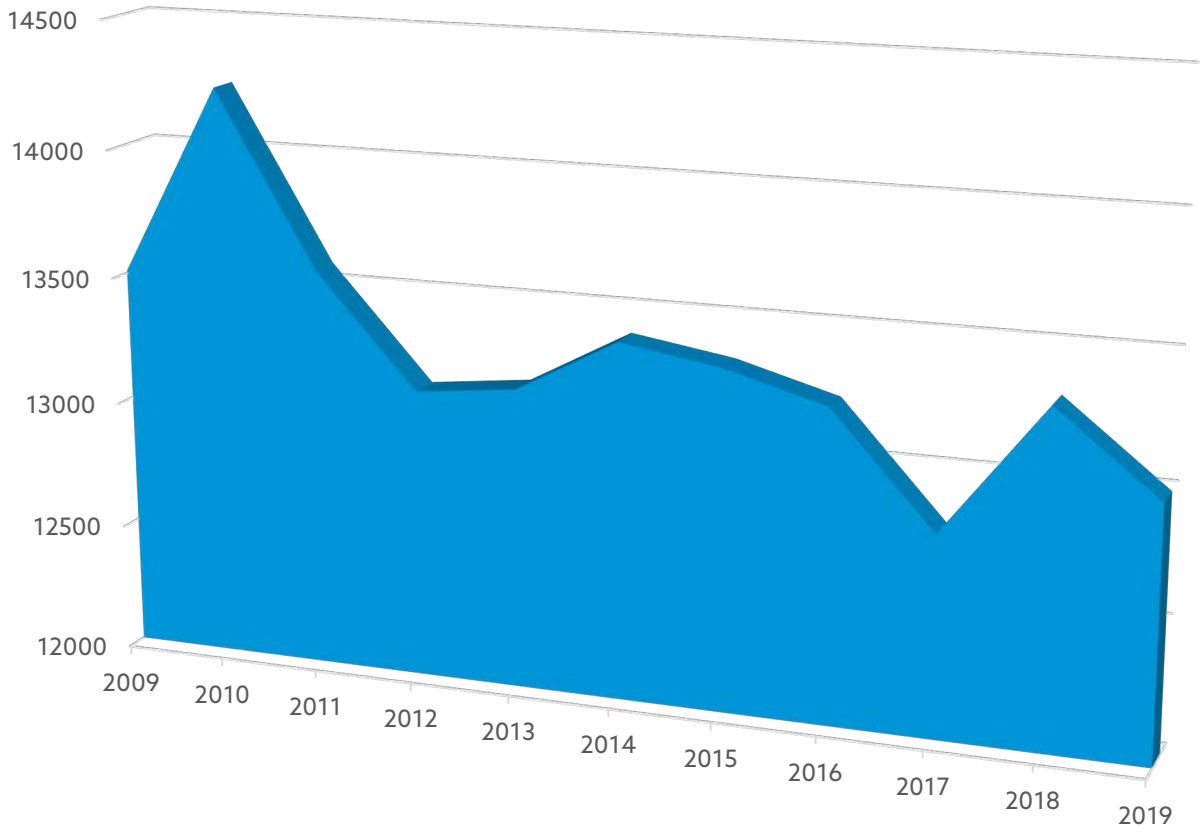
North Carolina - Total Consumption (in Billion Btu)



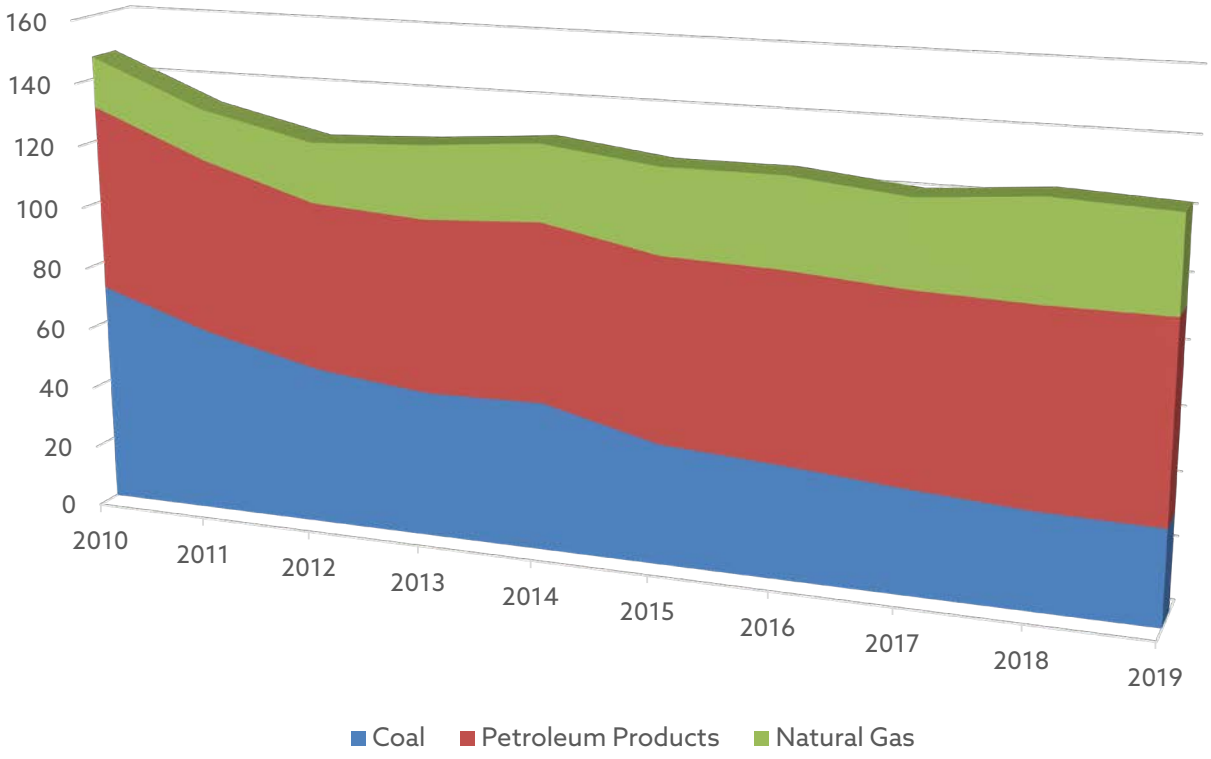
North Carolina - Total Production (in Billion Btu)



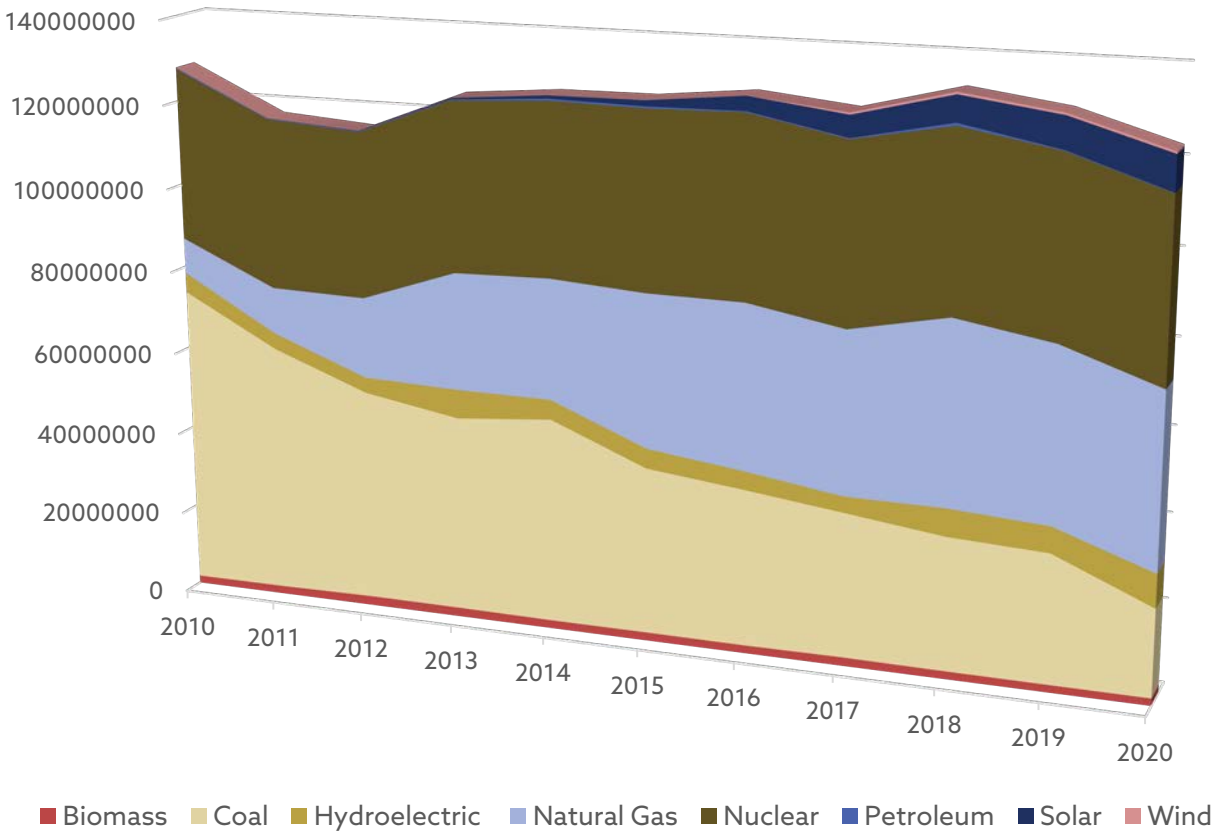
Electricity total consumption per capita (KWh), 2009-2019



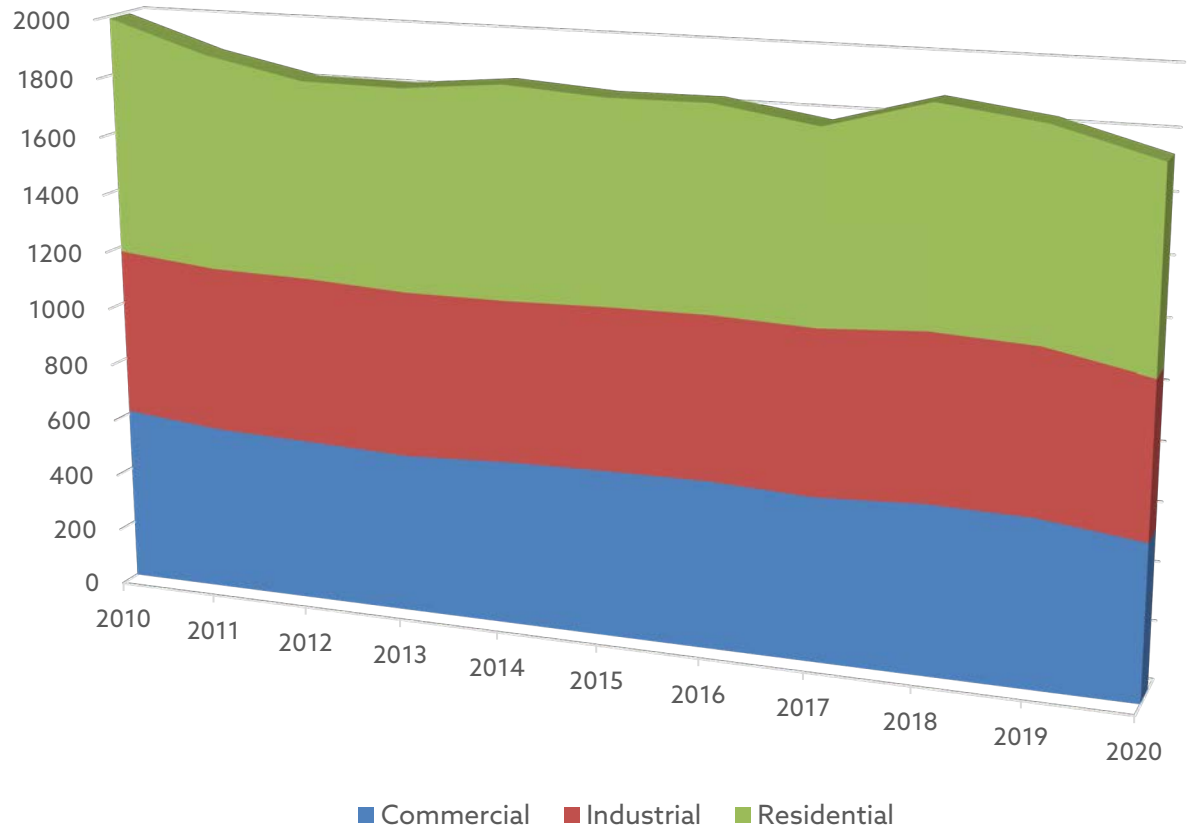
Historical CO_2 Emissions by Fuel Type, 2010-2019



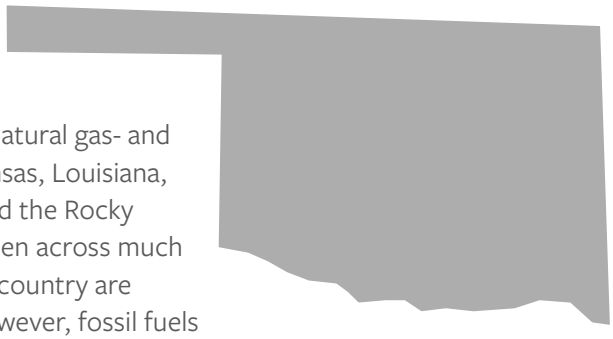
Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Oklahoma



Oklahoma is in the heart of the U.S. Mid-Continent oil region, a vast natural gas- and crude oil- producing area that also encompasses Kansas, Texas, Arkansas, Louisiana, and New Mexico, and is flanked by the Mississippi River to the east and the Rocky Mountain states to the west. Natural gas and crude oil wells can be seen across much of Oklahoma, and some of the largest natural gas and oil fields in the country are found in the state. Eastern Oklahoma is also a coal-mining region. However, fossil fuels are not the state's only energy resources. Although Oklahoma has mountains in the east and mesas in the west, it is a plains state with open prairie and fertile soils. Winds that blow across the open plains give the state significant wind energy potential, and wind provides a substantial and increasing share of Oklahoma's electricity generation. While solar potential in Oklahoma is widespread, the available solar energy resource increases across the state from east to west as sunny, arid conditions increase and precipitation decreases. Overall, the state ranks seventh in the nation in solar power potential. With several rivers and large reservoirs, the state also has hydropower resources.

Oklahoma is the 28th-most populated state in the nation, but it ranks 10th in energy use per capita. Oklahoma's industrial sector, which includes the energy-intensive crude oil and natural gas industries, accounts for about two-fifths of the state's total end-use sector energy consumption, and the transportation sector uses almost three-tenths. Oklahoma has long, hot summers and short, less-severe winters compared to more northern plains states. However, the state is known for its frequent tornadoes and sees an average of more than 50 each year. Despite the summer heat and the widespread use of air conditioning, the state's residential sector accounts for slightly less than one-fifth of the state's total end-use sector energy consumption, and the commercial sector consumes the rest.

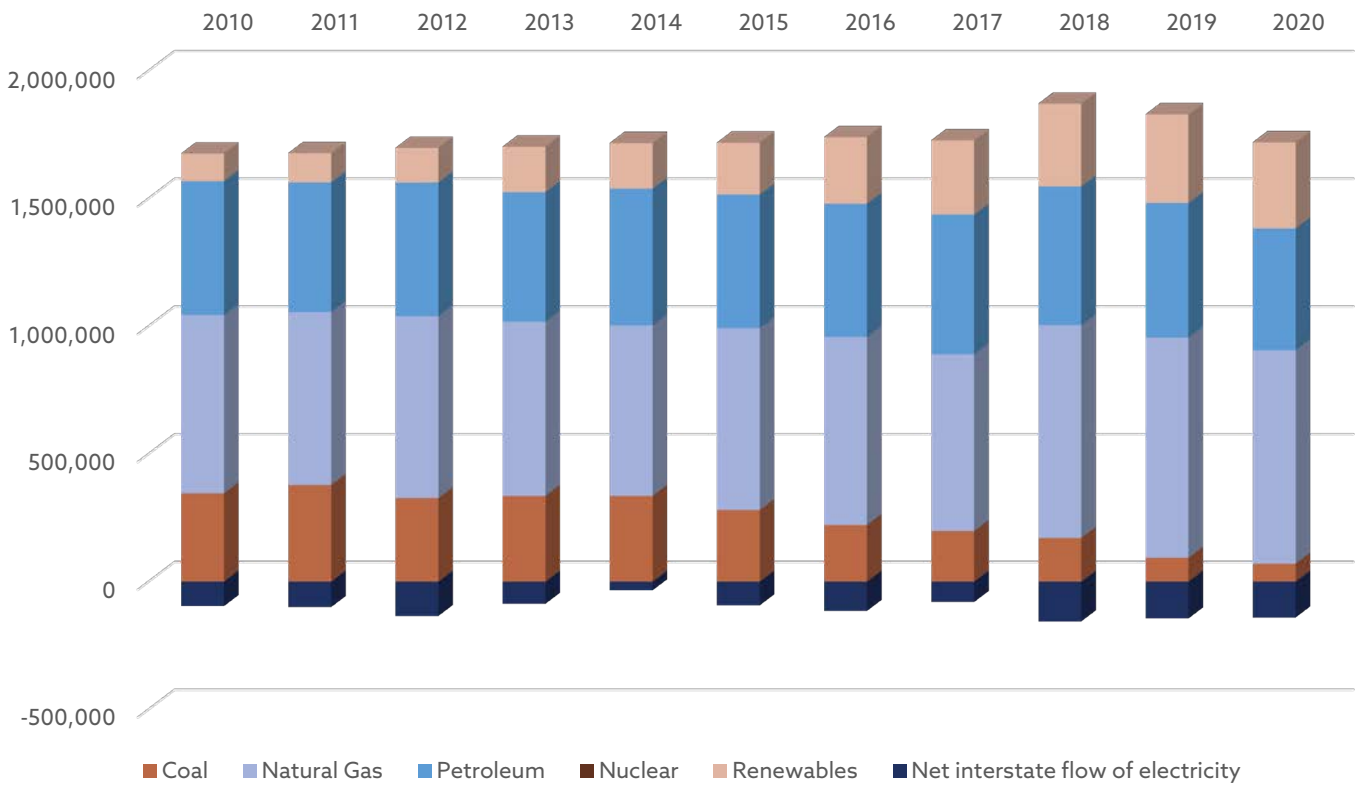
> **"In part because Oklahoma is a major crude oil- and natural gas-producing state, the state produces three times more energy than it consumes. As a result, much of the energy produced in Oklahoma, such as natural gas, petroleum, and electricity, is sent to other states.**

Wind and natural gas together account for more than four-fifths of Oklahoma's in-state utility-scale (one megawatt or greater) electricity net generation. In 2021, wind energy provided the largest share of Oklahoma's net generation for the first time and accounted for slightly more than 41 percent of in-state utility-scale net generation. Oklahoma ranks third, behind Texas and Iowa, in the amount of electricity generated from wind. In 2021, the state accounted for nine percent of the nation's total wind-powered electricity net generation; Oklahoma ranked third in the nation in electricity net generation from wind in 2021.

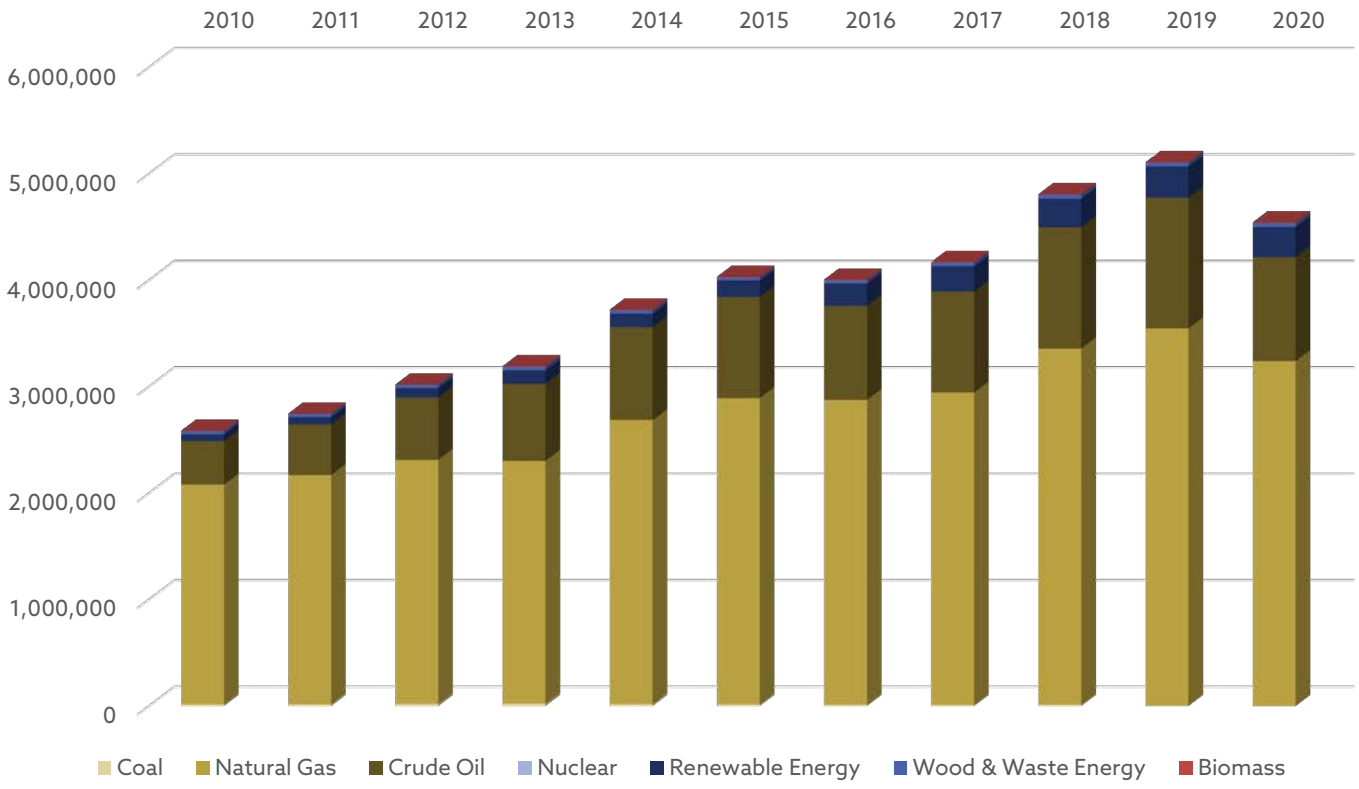
In 2021, natural gas fueled almost 41 percent of Oklahoma's electricity net generation, slightly less than wind, and dropped to the state's second-largest source of in-state generation for the first time since 2014. However, natural gas fueled more than half of in-state generation in 2019 and 2020, and eight of Oklahoma's ten largest power plants by capacity and nine of ten by generation are natural gas-fueled. Coal, which fueled 63 percent of in-state generation in 2001, saw its share decline to seven percent in 2020. Although Oklahoma's coal-fueled generation doubled to 14 percent in 2021, it was still less than before 2019. Almost all the rest of Oklahoma's net generation comes from renewable resources other than wind, primarily hydroelectric power. Oklahoma does not have any nuclear power plants.

The state's ten conventional hydroelectric generating plants, which have a combined capacity of 850 megawatts, supplied about three percent of Oklahoma's in-state net generation in 2021. The state also has one hydroelectric pumped storage power plant. That plant has about 260 megawatts of generating capacity. Pumped storage allows system operators to purchase inexpensive power during periods of low demand and use it to pump water from a lower reservoir to an upper reservoir. During periods of high electricity demand, the upper reservoir releases water that flows through turbines to the lower reservoir, generating electricity. A pumped storage facility uses more electricity than it generates, but it provides grid reliability and supplies power in periods when electricity demand is highest.

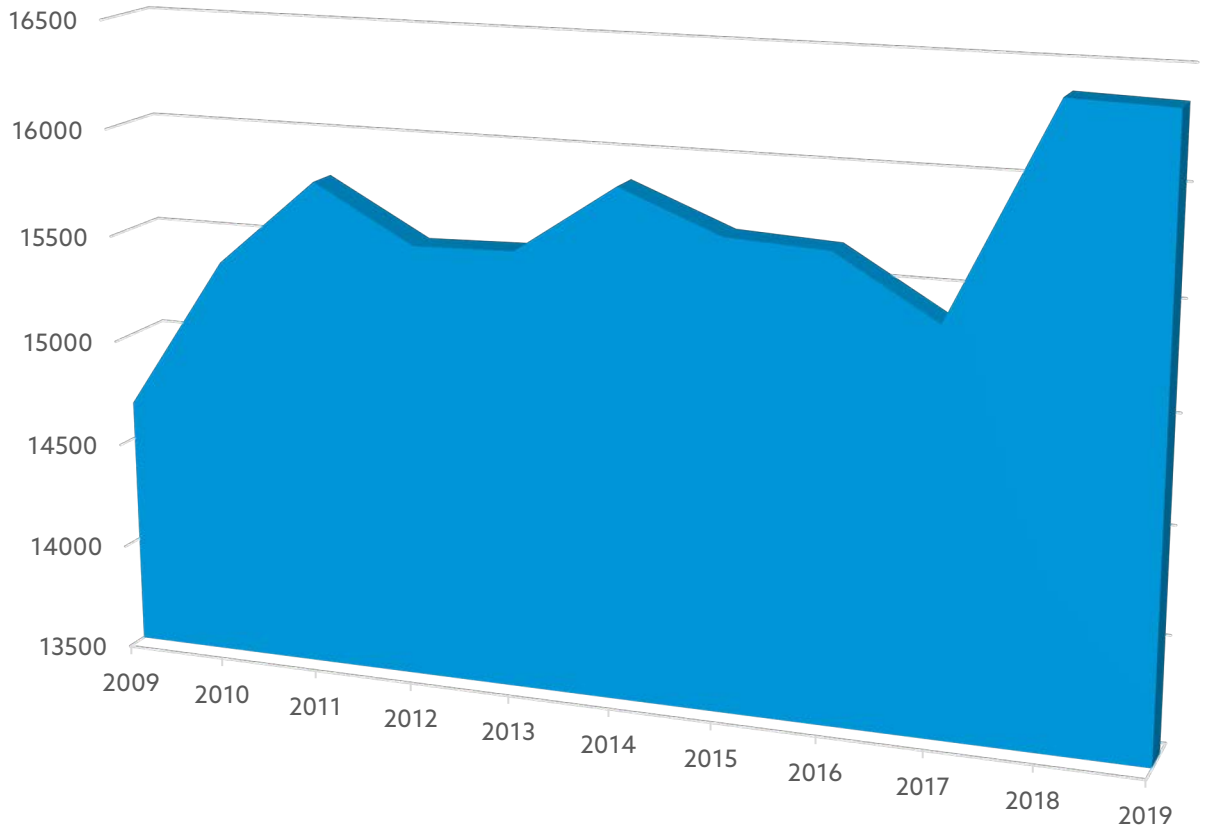
Oklahoma - Total Consumption (in Billion Btu)



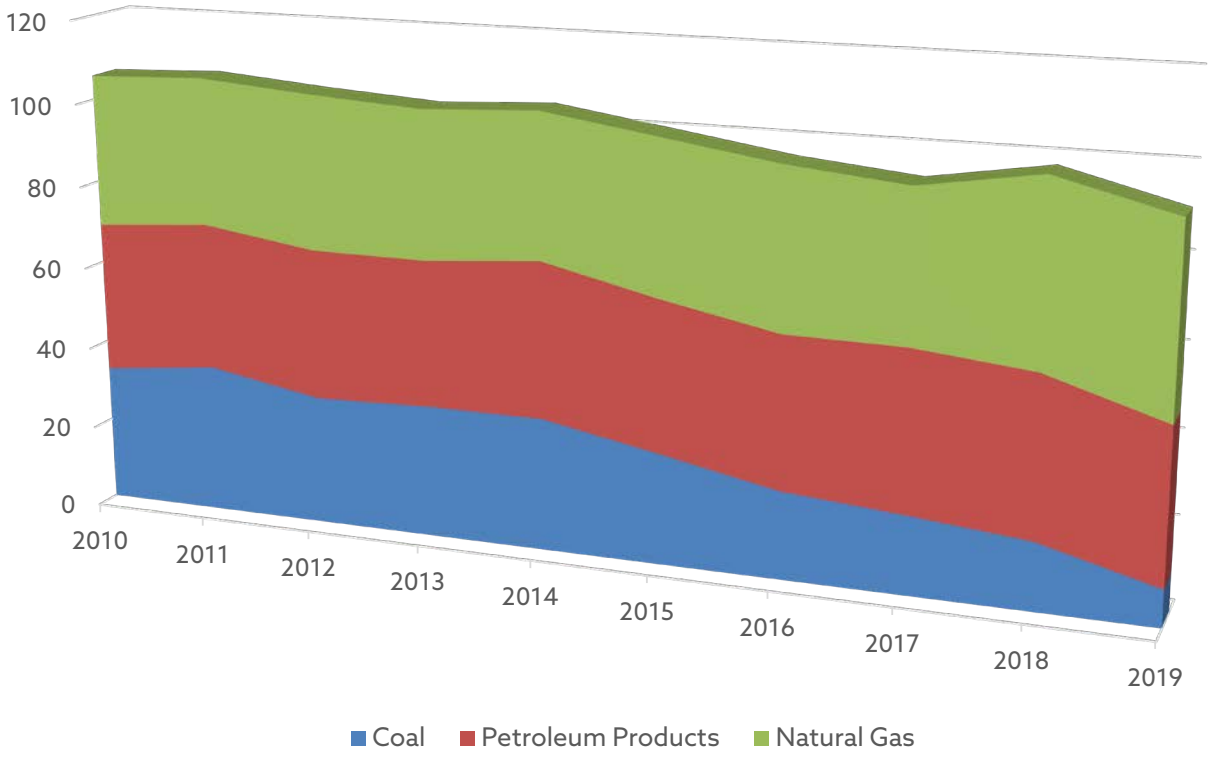
Oklahoma - Total Production (in Billion Btu)



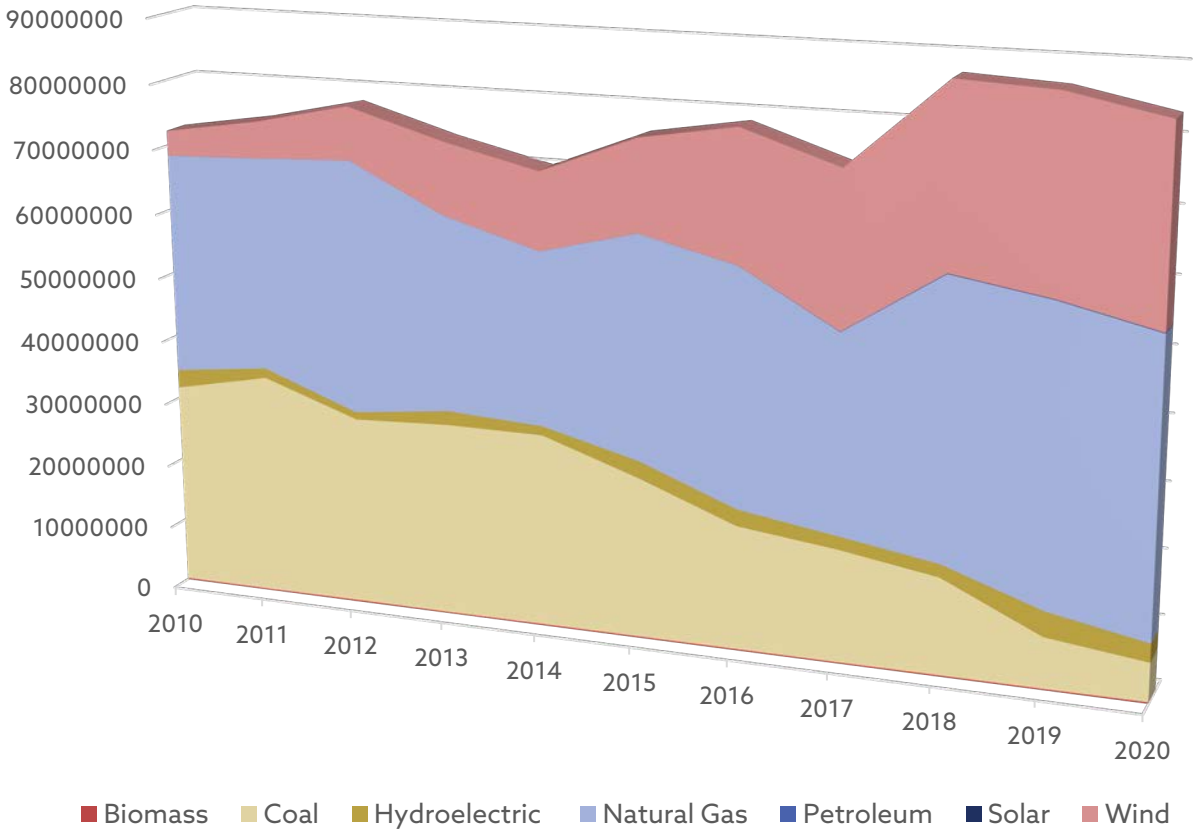
Electricity total consumption per capita (KWh), 2009-2019



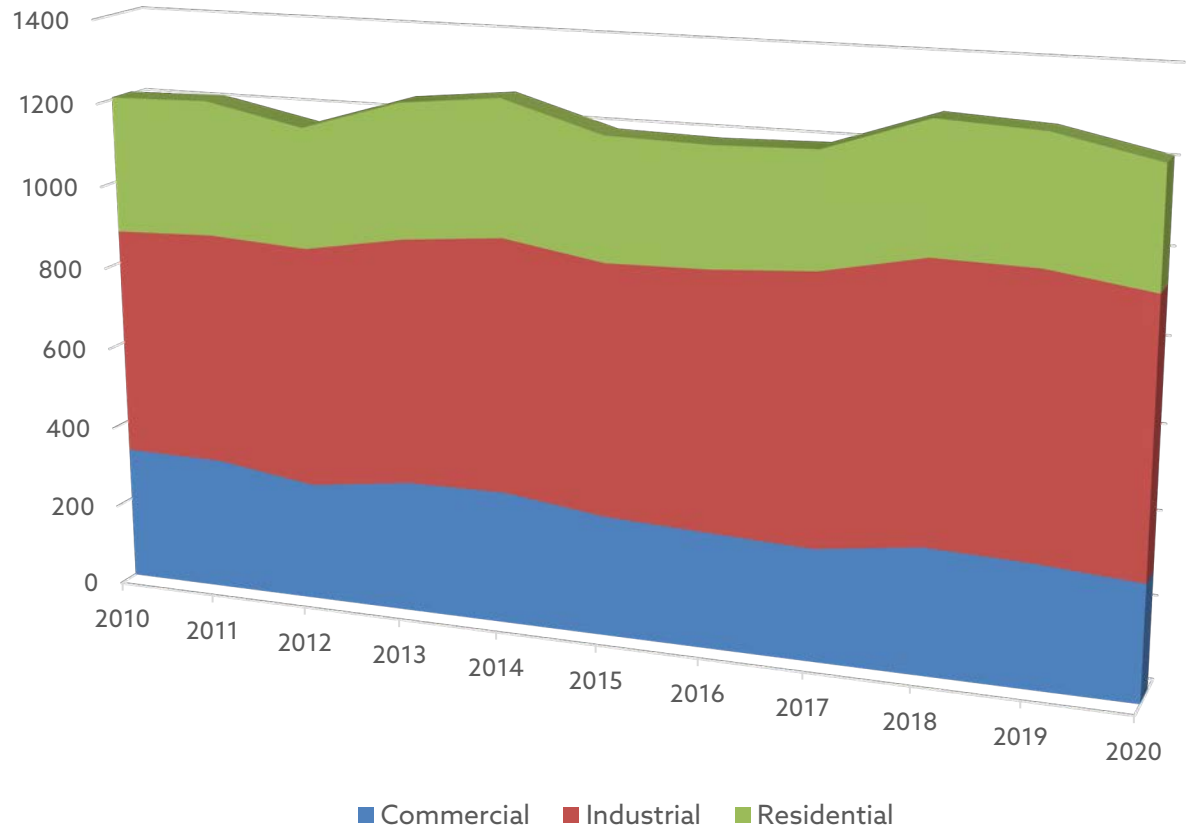
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Puerto Rico

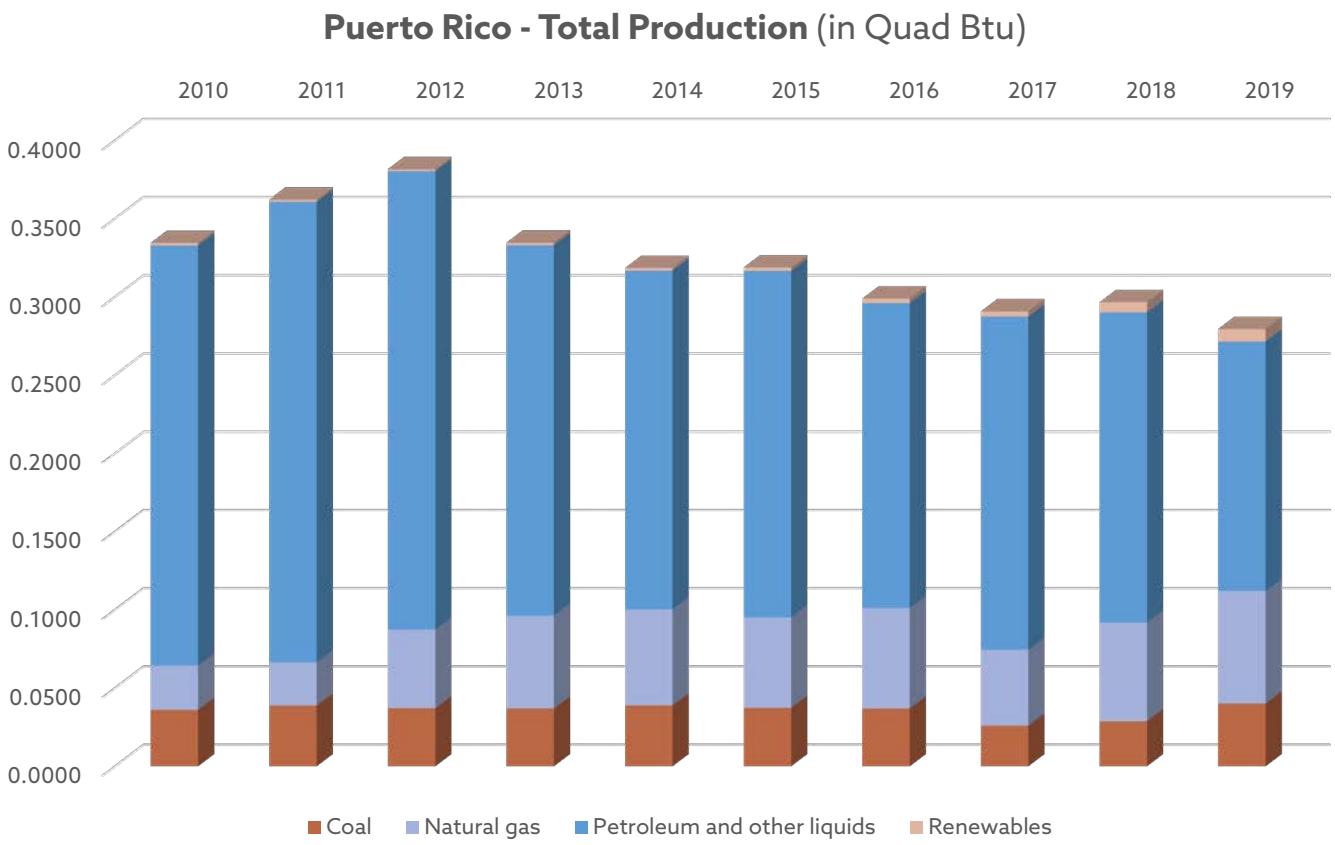
The Commonwealth of Puerto Rico consists of the easternmost islands of the Greater Antilles in the Caribbean Sea, southeast of Florida. Puerto Rico has no proved reserves or production of fossil fuels. The Commonwealth has some renewable resources in the form of solar, wind, hydropower, and biomass, but relies primarily on imported fossil fuels to meet its energy needs. Puerto Rico consumes about 27 times more energy than it produces. Petroleum accounts for about two-thirds of the Commonwealth's total energy use, while natural gas accounts for one-fifth, coal for about one-tenth, and renewables account for the rest. Puerto Rico's energy consumption per capita is about one-third of that in the 50 U.S. states.

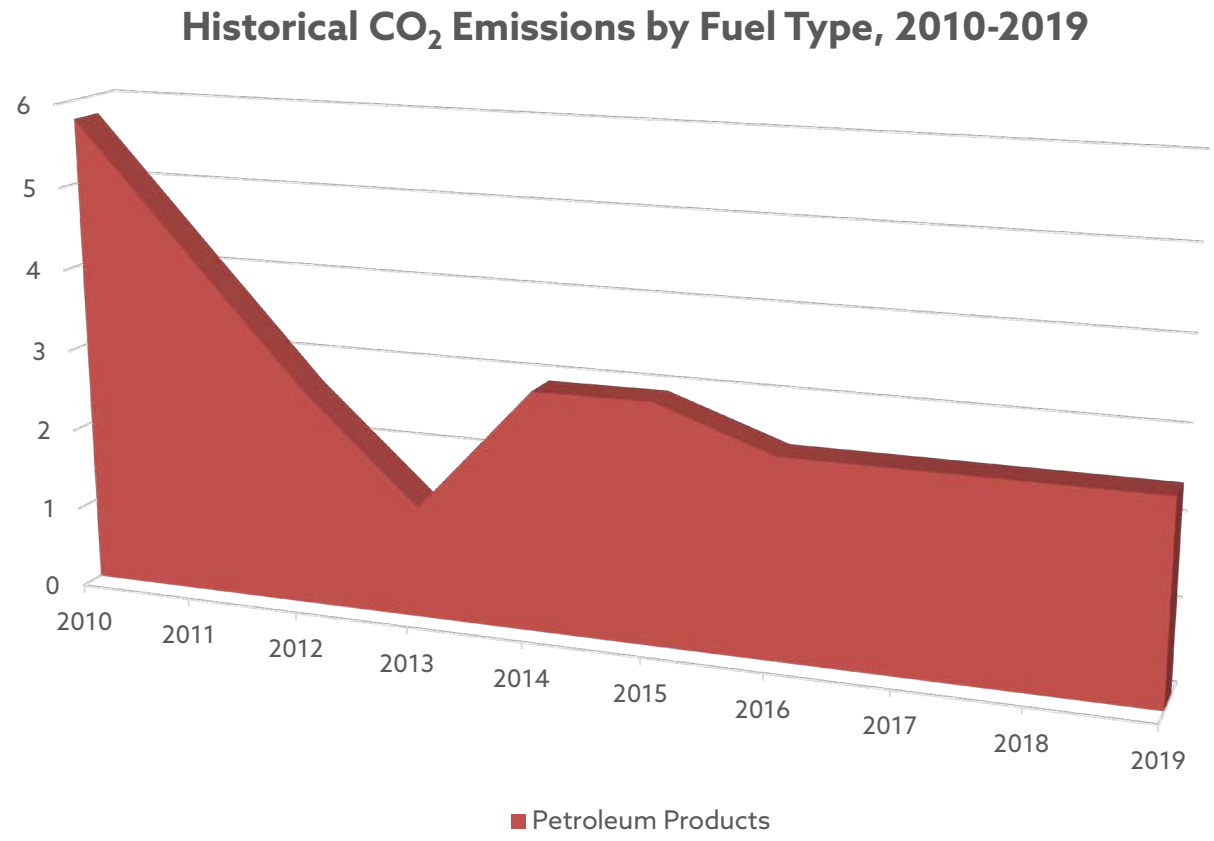
Puerto Rico has coastal plains, sandy beaches, and a forested and mountainous interior, with the highest peak exceeding 4,000 feet. The mountains in the interior separate the main island into two distinct climate regions, the north being relatively humid and the south semi-arid. But overall, the island's tropical marine climate has little seasonal variation, and rain occurs year round. Because of its tropical climate nearly nine out of ten Puerto Rican households have no heating system. The Caribbean hurricane season, which runs from June to November, sometimes brings destructive storms. In 2017, hurricanes Irma and Maria devastated much of the Commonwealth's electricity infrastructure and left many residents without power for months.

The Puerto Rico Electric Power Authority (PREPA, also known as Autoridad de Energía Eléctrica, or AEE) supplies Puerto Rico's electricity. PREPA is a government agency that owns the electricity transmission and distribution systems for the main island, Vieques, and Culebra, as well as about 86 percent (nearly 5,000 megawatts) of the installed electricity generating capacity. It serves more customers—about 1.5 million—than any other public electric utility in the United States. However, on a per customer basis, PREPA provides less than half as much power as similar U.S. mainland utilities. For fiscal year 2021 (July 2020 to June 2021), fossil fuel-fired power plants generated about 97 percent of Puerto Rico's electricity. Natural gas fueled about 44 percent, petroleum about 37 percent, and the island's one coal-fueled power plant about 17 percent. Renewables accounted for about three percent of the island's electricity generation.

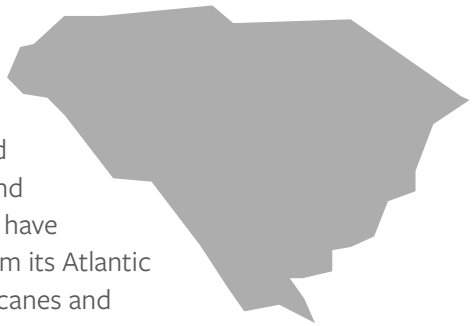
The commercial sector consumes nearly half of Puerto Rico's electricity sales, the residential sector accounts for two-fifths, and the industrial sector makes up about one-tenth. Puerto Rico's per capita electricity consumption is less than half that of the 50 states. PREPA's heavy reliance on petroleum means that Puerto Rican power prices fluctuate with international petroleum prices and vary monthly with fuel and purchased power costs. In 2020, Puerto Rico's average electricity price was higher than in all but two U.S. states, Hawaii and Alaska. Puerto Rico's electric power sector has suffered from decades of mismanagement and underinvestment and, most recently, natural disasters. In September 2017, Hurricanes Irma and Maria made landfall two weeks apart and destroyed much of Puerto Rico's electricity transmission and distribution infrastructure. Generating facilities were not as badly damaged as the electric grid. Still, PREPA's largest generating plants are in the south, while the largest population concentrations are in the north, making the system dependent on its 2,400 miles of transmission and 30,000 miles of distribution lines.

In early 2020, the 6.4 magnitude earthquake that hit Puerto Rico significantly damaged the island's two largest power plants, Costa Sur and EcoEléctrica. The earthquake caused widespread power outages and shifted Puerto Rico's electricity generation energy mix to a higher reliance on petroleum, as the two damaged power plants primarily used natural gas for electricity generation. After the hurricanes and earthquake, PREPA had to both re-build its electricity infrastructure and restructure its business, after operating in bankruptcy protection since 2017. In 2018, as part of the restructuring plan, the Puerto Rico legislature approved privatizing parts of PREPA. Under the plan, a private entity will manage, operate, and maintain PREPA's generation assets and electricity transmission and distribution system. In June 2020, PREPA chose the private entity LUMA Energy, a group of U.S. and Canadian companies, to operate its electricity transmission and distribution system.In June 2021, LUMA Energy began its role to reduce power interruptions, provide reliable electricity service to the island's residents and businesses, and upgrade the power grid. To assist in that effort, the Federal Emergency Management Agency (FEMA) provided more than $9.4 billion in funding to transform Puerto Rico's electrical system.


Puerto Rico - Total Production (in Quad Btu)
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
Coal
Natural gas
Petroleum and other liquids
Renewables


Historical CO_2 Emissions by Fuel Type, 2010-2019
6
5
4
3
2
1
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Petroleum Products

South Carolina



South Carolina is located on the U.S. East Coast halfway between New York City and Miami. The state does not have any economically recoverable fossil fuel reserves, and its primary energy production comes from its nuclear power plants. The state does have renewable energy resources as well. South Carolina's topography gradually rises from its Atlantic Ocean islands in the southeast to the Blue Ridge Mountains in the northwest. Hurricanes and tropical storms occasionally strike South Carolina or come close to its coastline, and they can damage the state's power plants, electric grid, and other energy infrastructure. South Carolina ranks seventh among states that have taken the most direct hits from these storms, according to meteorological records.

The coastal plain, which covers two-thirds of South Carolina, is known as the Low Country and extends westward across the swamps and flatlands of the outer coastal plain to the fertile low hills of South Carolina's inner coastal plain until it reaches the Fall Line, an area of waterfalls and rapids. The remaining one-third of the state, known as the Up Country, includes the forested hills of the Piedmont region and South Carolina's mountains. The state is crossed by many large rivers that flow from the Up Country to the ocean, and South Carolina's rivers and lakes provide considerable hydropower potential. With about three-fifths of South Carolina forested, the wood waste from the state's forests, lumber mills, and wood products industry yields significant amounts of biomass. Methane from landfills in more densely populated areas provides South Carolina with an additional biomass resource.

South Carolina consumes more than twice as much energy as it produces, and its energy consumption and energy production each rank around the midpoint of the states. The industrial sector is the largest end-use energy-consuming sector and accounts for about one-third of the state's total energy use. The state's manufacturing activities are a major contributor to South Carolina's GDP and include: motor vehicle assembly; chemicals; electrical equipment and computers; paper and wood products; plastics and rubber; machinery; and food products. The transportation sector is the second largest energy-consuming sector and accounts for about three-tenths of the state's energy use, primarily as motor gasoline.

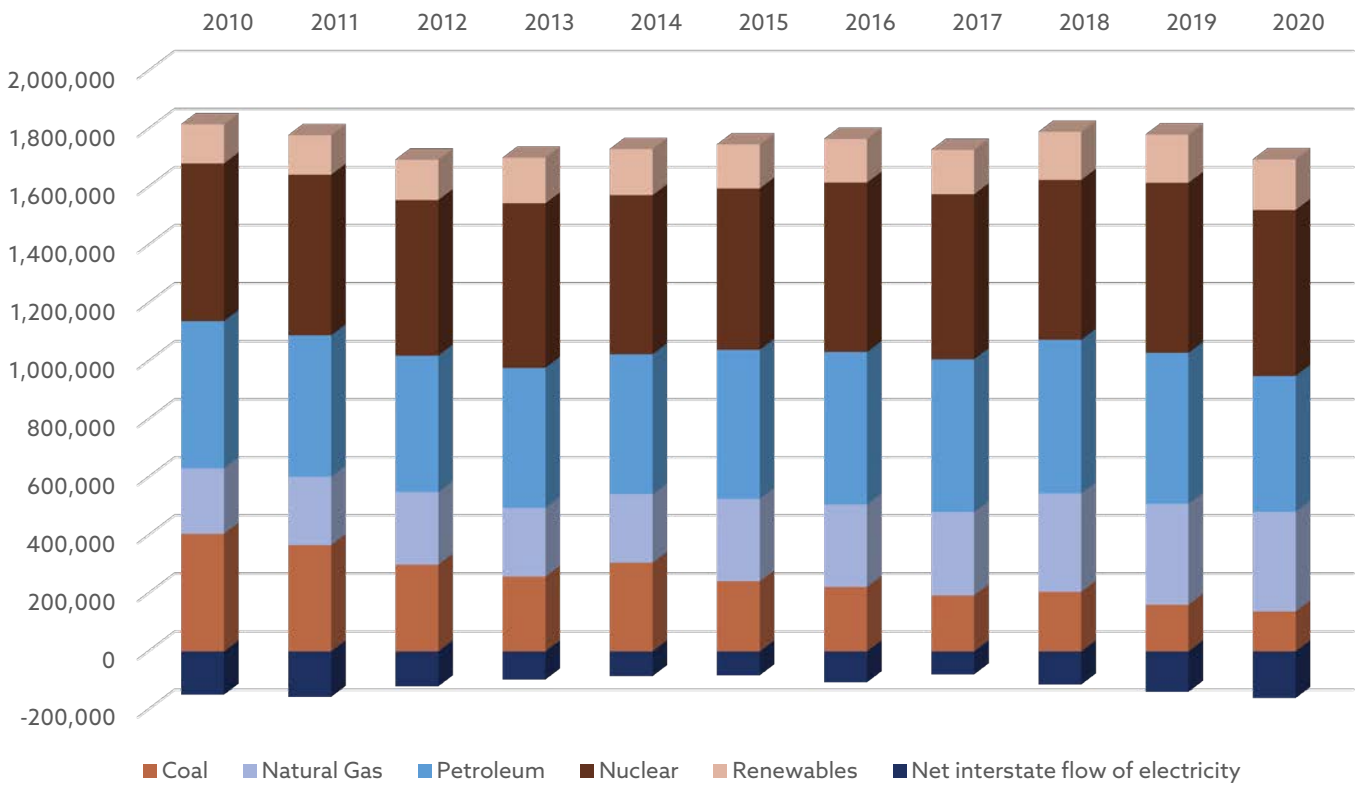
Nuclear energy is the leading source of electricity generation in South Carolina and produced 55 percent of total in-state electricity in 2020. South Carolina ranks third in the nation, after Illinois and Pennsylvania, in both nuclear power generating capacity and the amount of electricity generated by nuclear energy. There are seven operating reactors at four nuclear power plants in the state. South Carolina's three largest power plants in terms of actual annual electricity generation are the three-reactor Oconee nuclear facility, the two-reactor Catawba station and the single-reactor Summer plant. The one reactor at the Robinson generating station was the first nuclear power plant in the Southeast and the largest U.S. generating plant when it came online in 1971. Construction of two additional nuclear reactors at the Summer nuclear power station ceased in July 2017 and the expansion project was halted, due in part to higher-than-expected construction costs.

> **"Natural gas-fueled generation in South Carolina exceeded coal-fueled electricity for the first time in 2018 and accounted for 24 percent of the state's total generation 2020. The amount of electricity generated in the state from natural gas more than doubled between 2014 and 2020.**

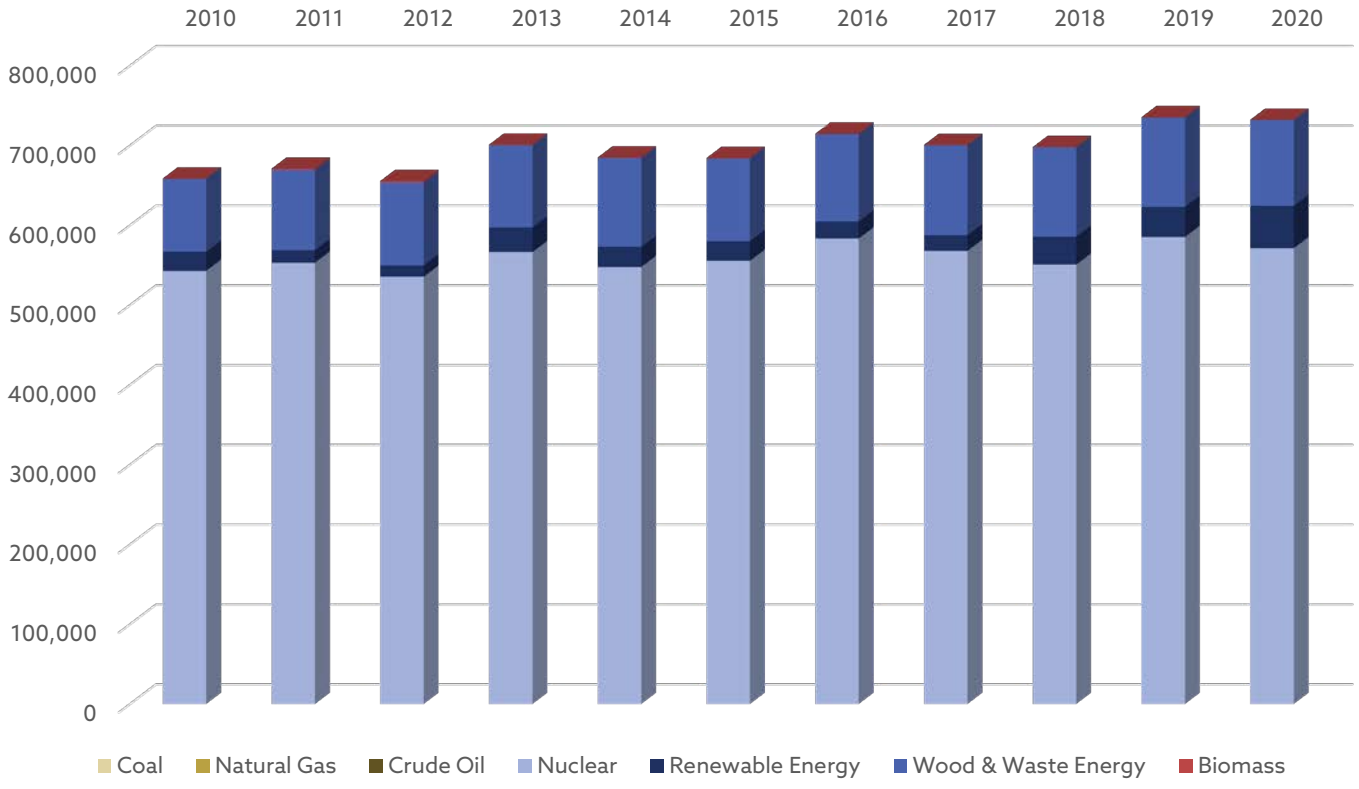
Natural gas fuels four of South Carolina's ten largest power plants by both capacity and generation. In 2020, the state's four coal-fueled power plants accounted for the 13 percent of total generation, less than half as much electricity as coal provided in 2014. The state's second-largest coal-fueled power plant, with 1,150 megawatts in generating capacity, is scheduled to close at the end of 2028. Almost all of the state's remaining electricity generation, about eight percent, was provided by renewable resources at hydropower facilities, solar panel generating systems, and biomass-fueled power plants that use wood waste or landfill gas.

South Carolina generates about 15 percent more electricity than it consumes and sends its surplus power across the regional grid to other states. South Carolina ranks among the top one-fourth of the states in per capita electricity retail sales, in part because of the high demand for air conditioning during the state's hot and humid summer months.

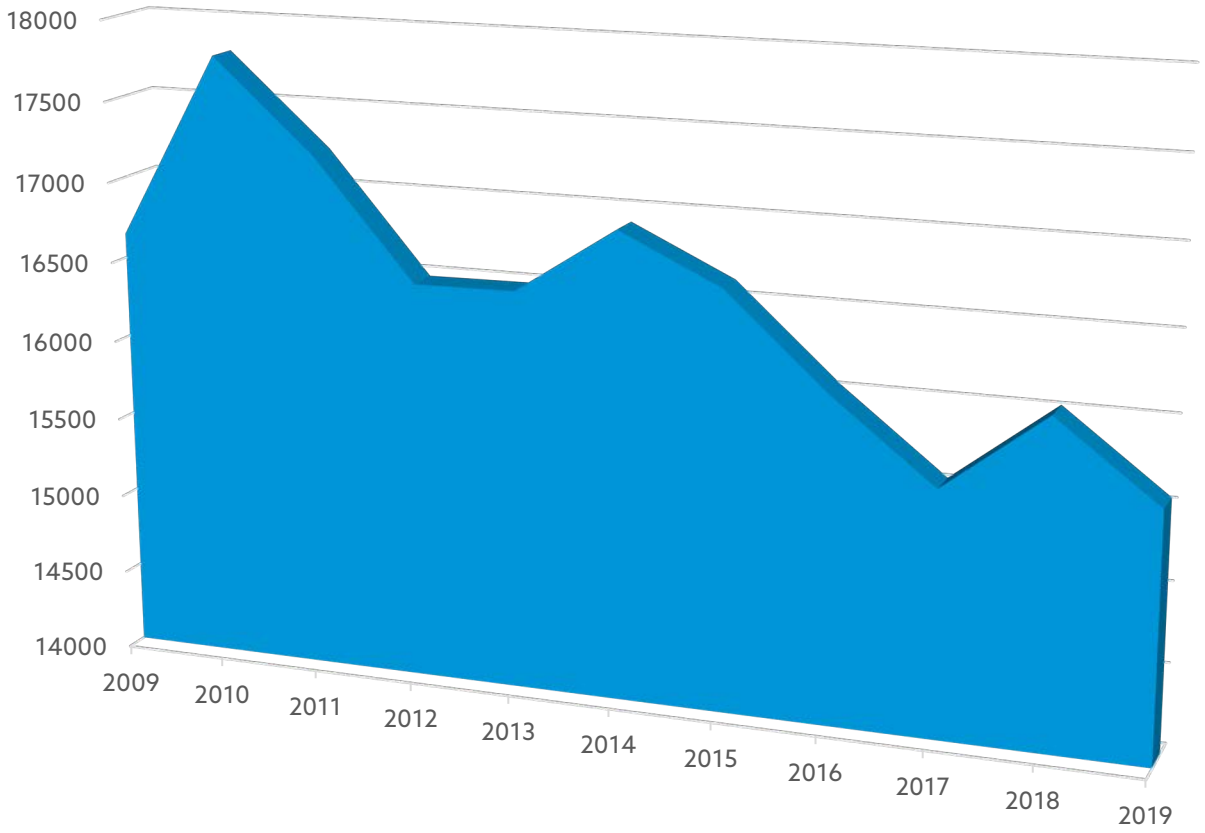
South Carolina - Total Consumption (in Billion Btu)



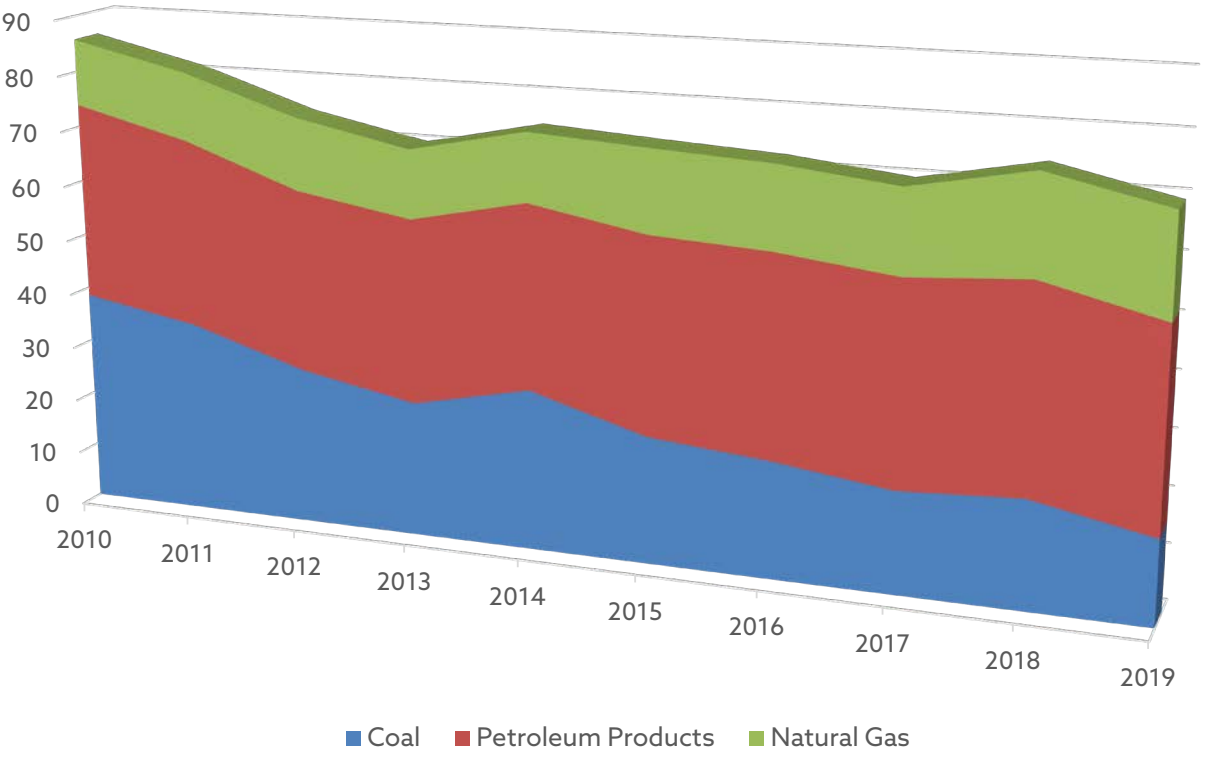
South Carolina - Total Production (in Billion Btu)



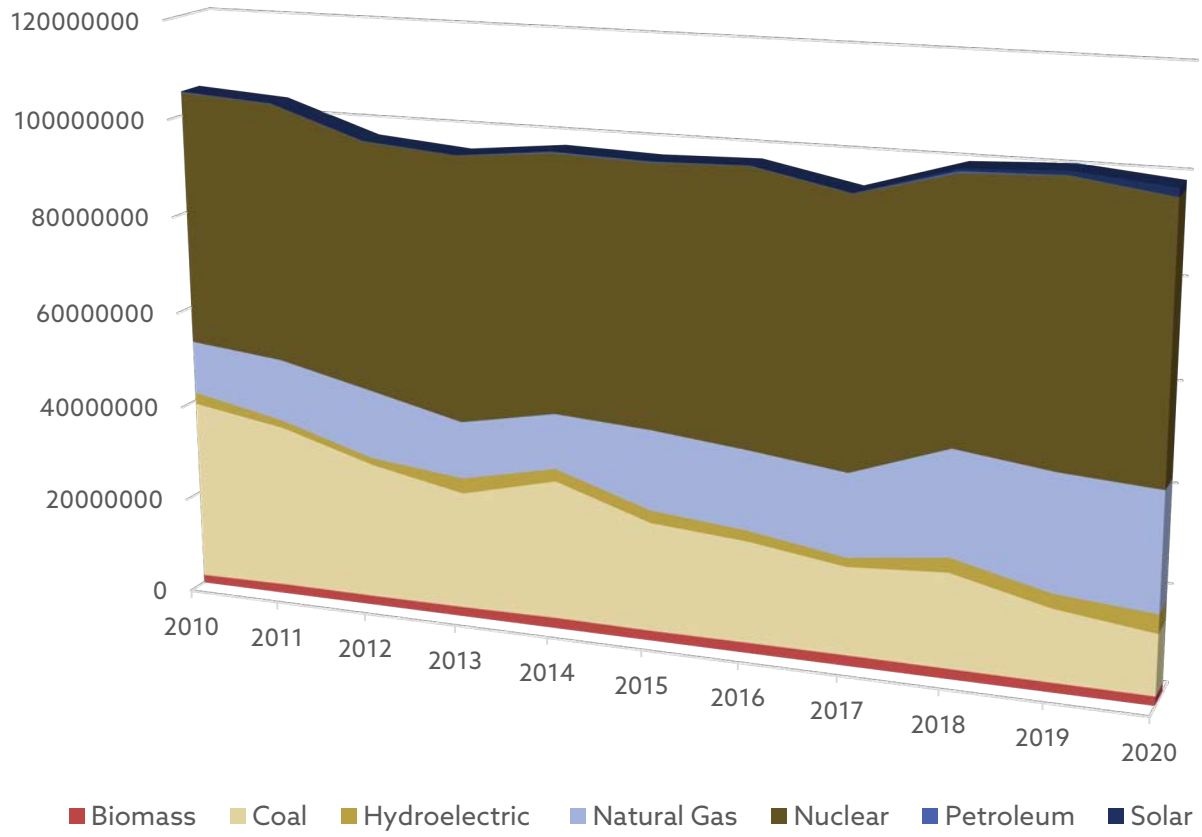
Electricity total consumption per capita (KWh), 2009-2019



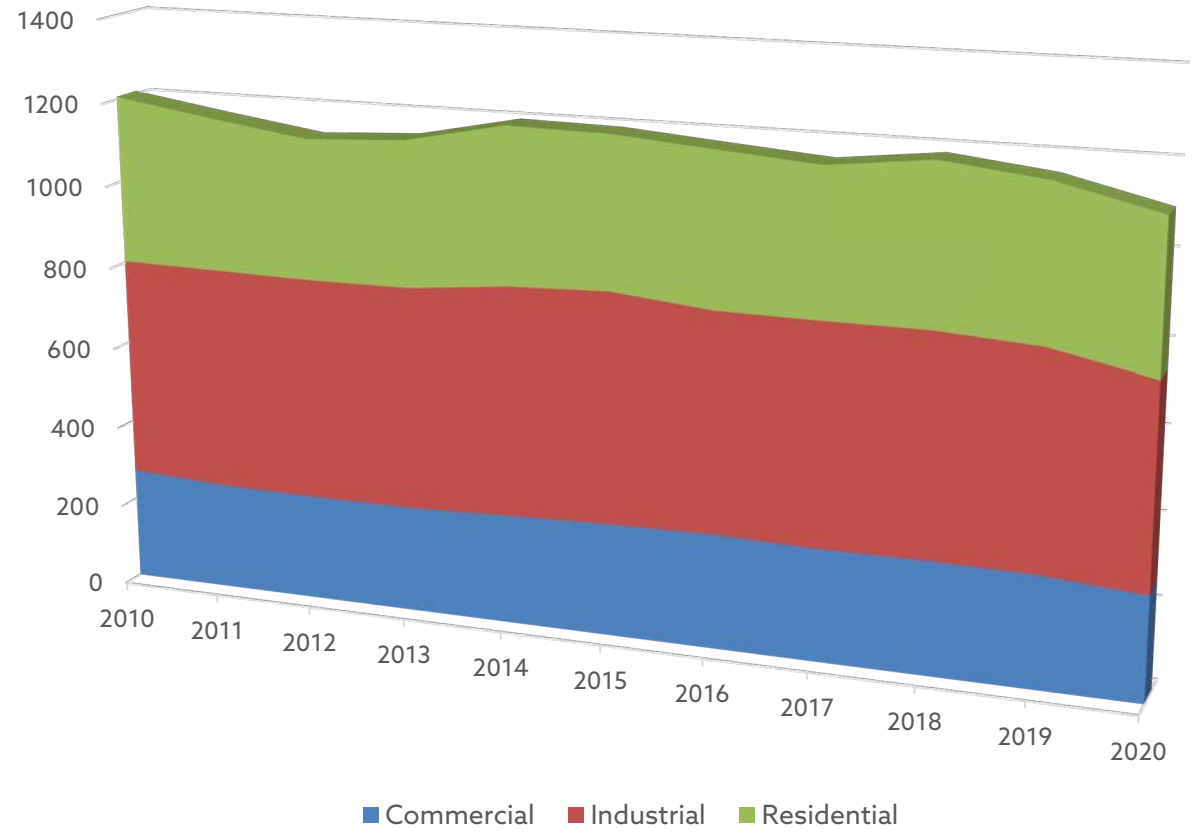
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Tennessee

Tennessee stretches almost 500 miles across from the state's eastern border with Virginia and North Carolina to its western border at the Mississippi River. Tennessee's westernmost city, Memphis, is one of the world's busiest hubs for barge, air, truck, and rail cargo traffic. Wide bends in the Tennessee River divide the state into three regions: the largely mountainous east, a central basin rimmed by highlands, and the low, rolling plains of western Tennessee. The eastern part of the state produces coal, natural gas, and crude oil, although those fossil energy reserves are modest. Both the Tennessee River and the Cumberland River, which flows in an arc from Kentucky across north-central Tennessee, have histories of destructive floods. In the 20th Century, a series of dams built by the Tennessee Valley Authority (TVA) to control those rivers brought hydroelectricity to the region. The federal TVA, the largest government-owned electricity provider by generating capacity in the nation, operates many hydroelectric, nuclear, natural gas-fueled, coal-fueled, and renewable-energy powered electricity generating facilities in the state. The TVA serves almost all of Tennessee's 95 counties and parts of six other states.

Tennessee consumes more than three times as much energy as it produces, and ranks among the top one-third of the states in total energy consumption and near the middle of the states in per capita energy use. The long travel distances across Tennessee, combined with the state's role as a logistics hub and popular tourism destination spot, contribute to the transportation sector accounting for three-tenths of the state's total energy consumption. Manufacturing is a leading component of the state's economy, and the industrial sector accounts for about one-fourth of the state's energy consumption. The industrial activities that make the largest contributions to Tennessee's GDP include the manufacture of food, beverages, and tobacco products; motor vehicles and automotive parts; chemicals; fabricated metal products; and electrical equipment.

Tennessee ranks near the middle of the states and is above the U.S. average in its energy consumption per dollar of GDP. Tennessee's climate is relatively mild, but it is greatly influenced by the state's topography. Much of the state experiences hot summers and mild winters. The residential sector, where both heating and air conditioning are widely used, accounts for slightly less than one-fourth of the state's end-use energy consumption. The commercial sector is responsible for about one-fifth of the state's energy use.

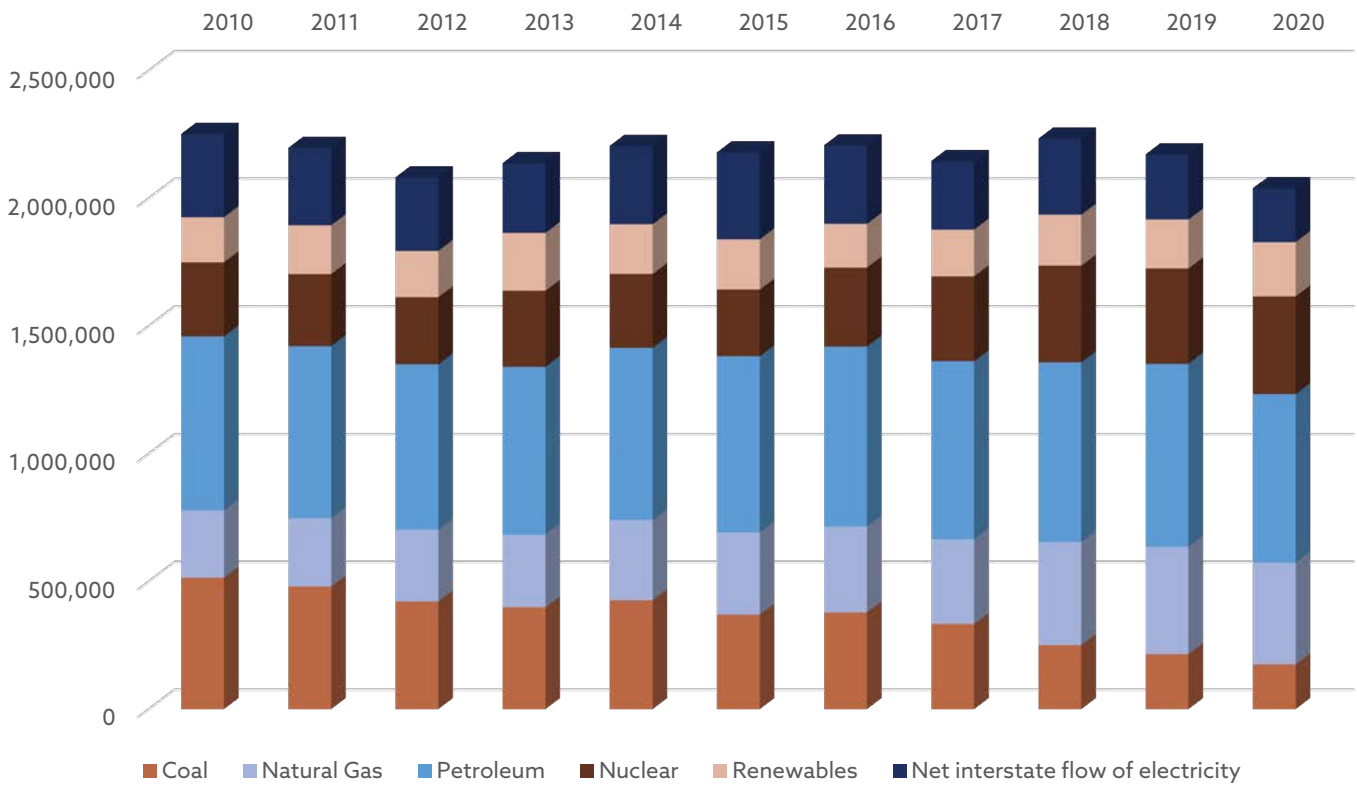
About three-fifths of Tennessee's utility-scale (one megawatt or larger) electricity generating facilities are owned and operated by TVA. TVA facilities in Tennessee include 19 hydroelectric dams, seven natural gas-fueled power plants, four coal-fueled power plants, two nuclear power plants, and one pumped-storage hydroelectric plant. In 2021, nuclear power provided 43 percent of the state's net generation. Natural gas-fueled generation exceeded coal-fueled electricity for the first time in 2020, but coal-fueled generation returned to the second spot in 2021 and accounted for 22 percent of the state's generation.

> **"Coal contributed more than half of the state's electricity generation as recently as 2011, but its share declined with the retirement of nearly 3,000 megawatts of coal-fueled generating capacity since then. Natural gas-fueled generation accounted for 18 percent of in-state electricity generation in 2021, down from 39 percent five years earlier.**

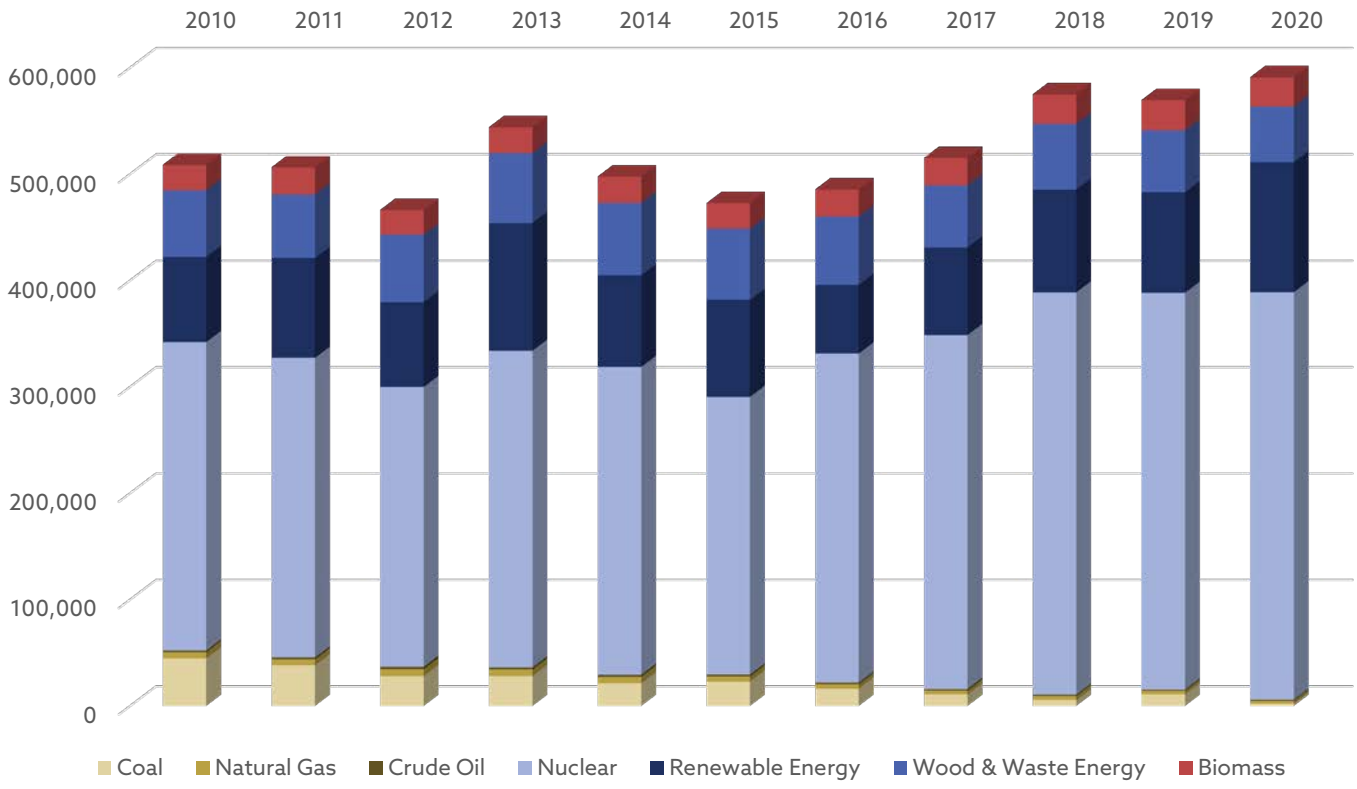
Hydroelectric power contributed 16 percent of the state's generation in 2021, and other renewables provided almost all the rest of Tennessee's net generation. The Watts Bar power plant has the nation's newest nuclear power reactors. Watts Bar Unit 1 began operating in 1996, and Watts Bar Unit 2 entered service in 2016—becoming the nation's first, and, so far only new nuclear reactor to come online in the 21st century. The TVA is pursuing a federal permit for a possible new nuclear power plant using small modular reactors at a site near Oak Ridge.

Despite its many TVA generating facilities, Tennessee is a net importer of electricity. Tennessee is among the top 15 states in both residential sector and total electricity sales. The average electricity price in Tennessee is below the national average, and the average price for the residential sector is among the lowest ten states.

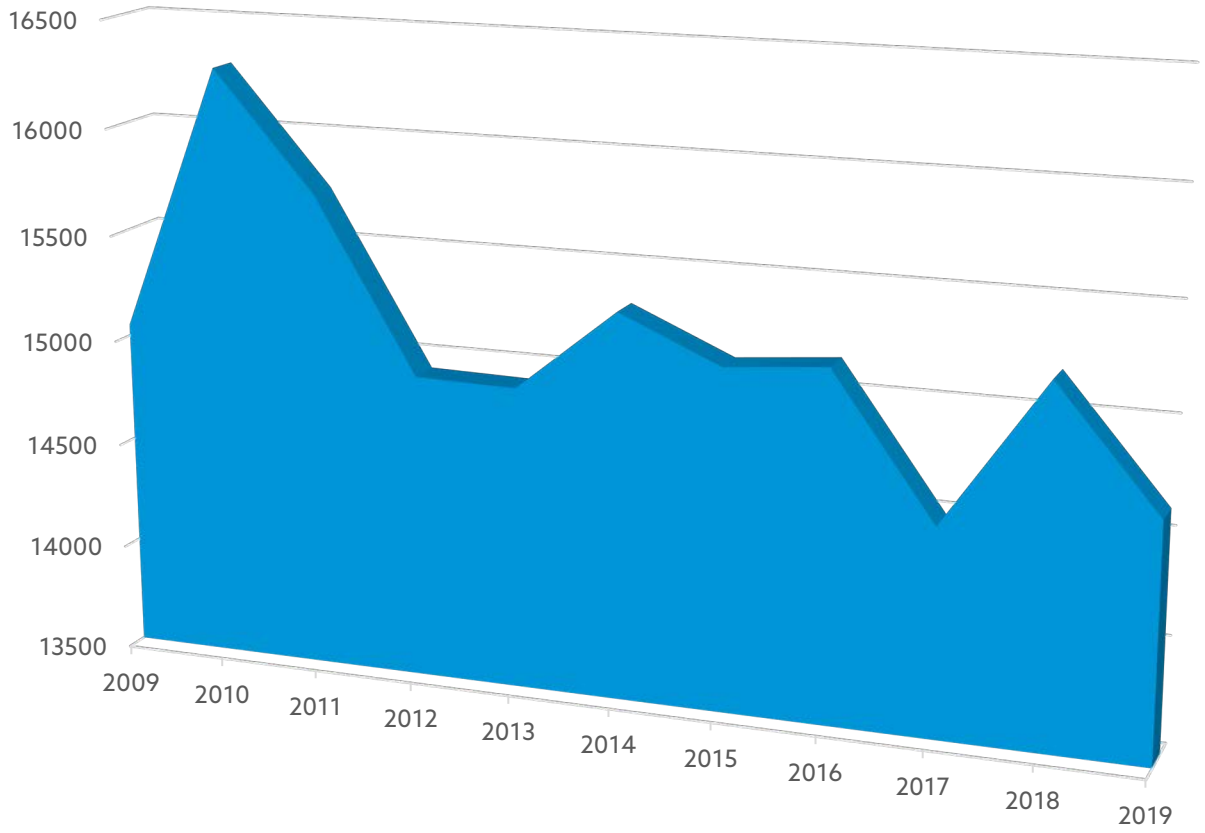
Tennessee - Total Consumption (in Billion Btu)



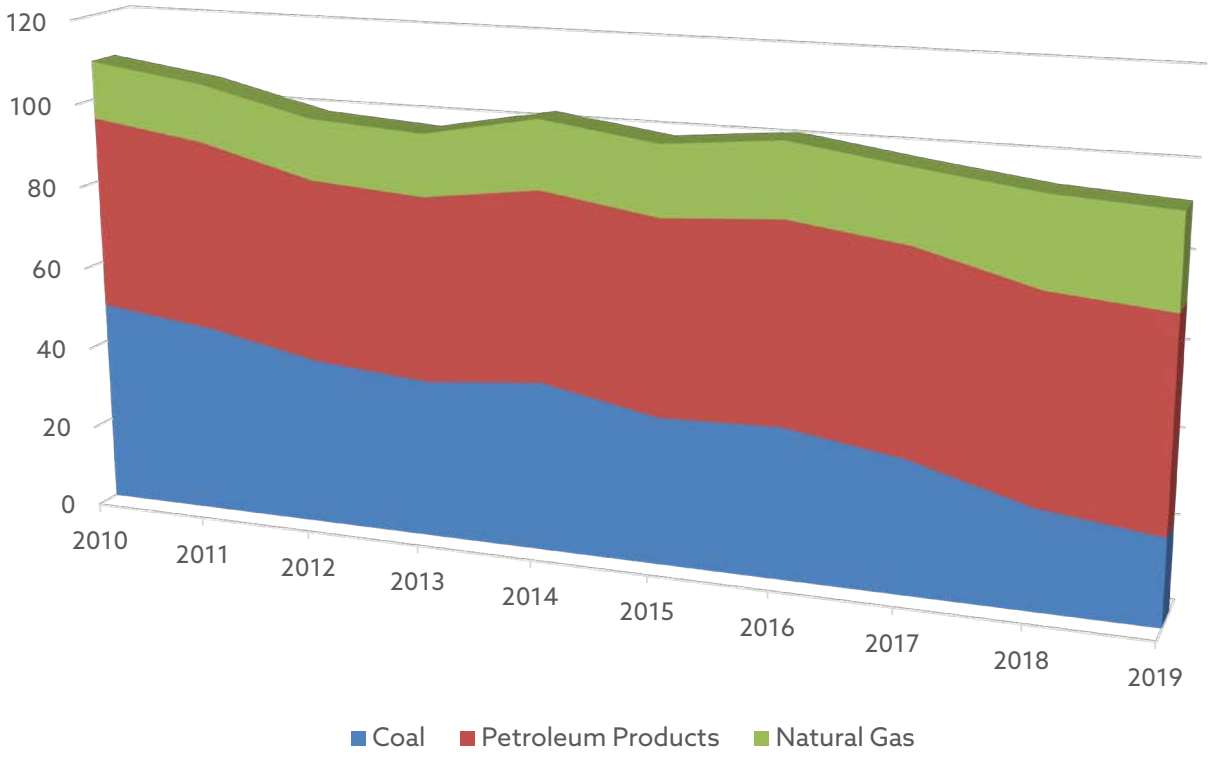
Tennessee - Total Production (in Billion Btu)



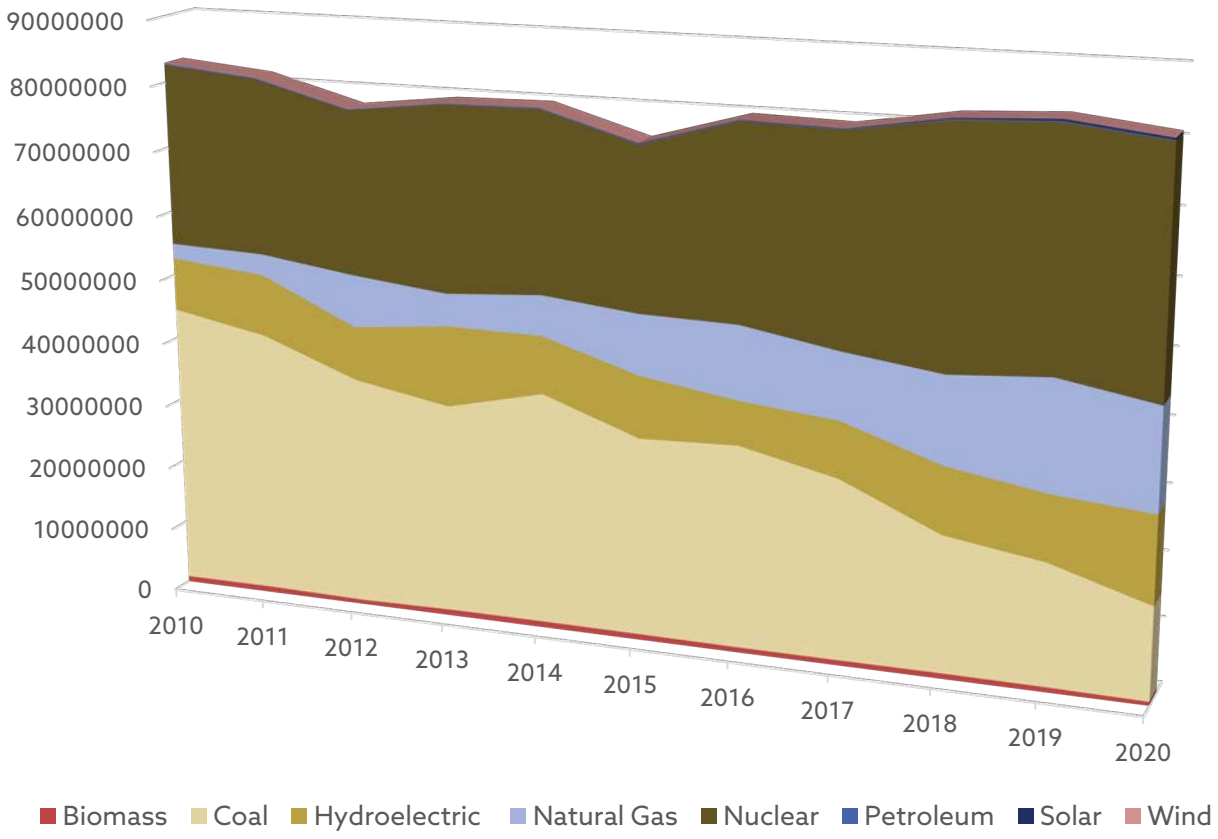
Electricity total consumption per capita (KWh), 2009-2019



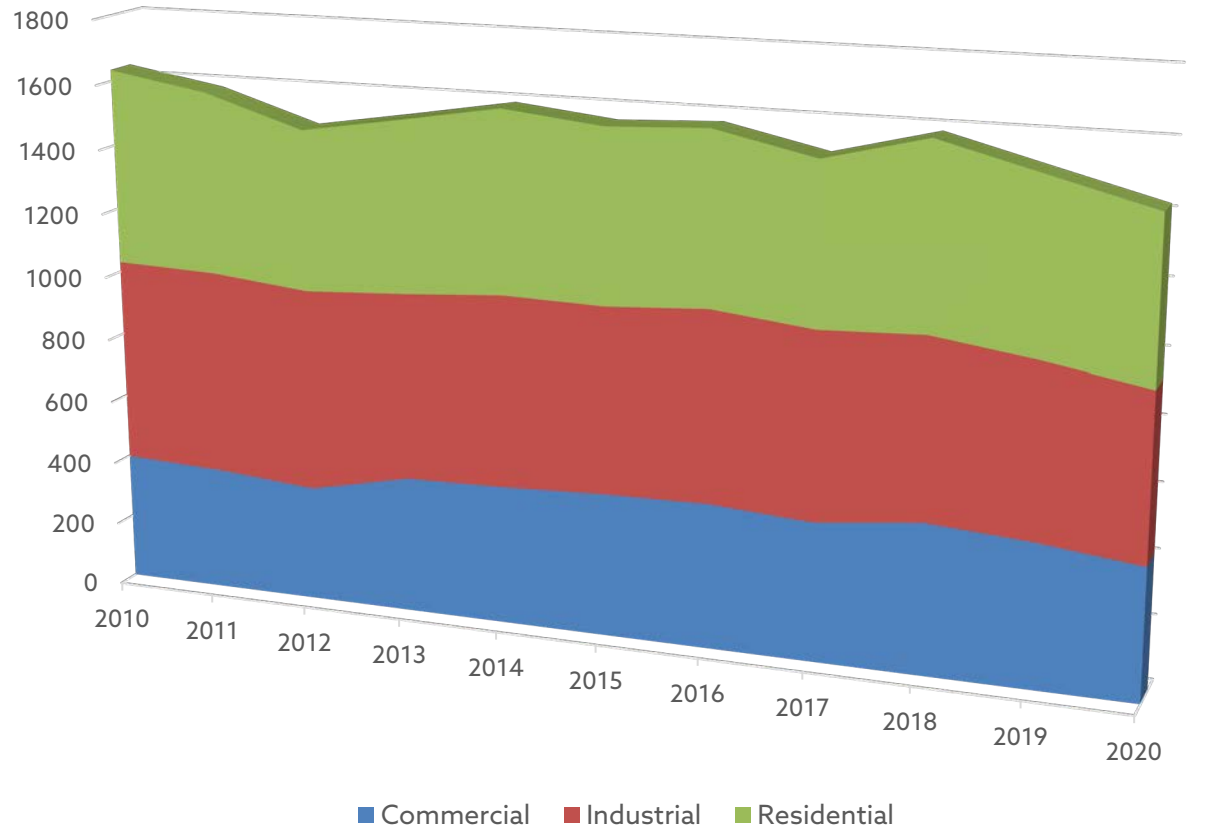
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



Texas

Texas is a large state with a wealth of energy resources. It leads the nation in energy production, providing nearly one-fourth of the country's domestically produced energy.

Second only to Alaska in total land area, Texas stretches about 800 miles at its widest points, east to west and north to south, and crude oil and natural gas fields are present across much of that expanse. Coal is found in bands that cut across the eastern Texas coastal plain and in other areas in the north-central and southwestern parts of the state.

Texas also has abundant renewable energy resources and is first in the nation in wind-generated electricity. With a significant number of sunny days across vast distances, Texas is also among the leading states in solar energy potential. Geothermal resources suitable for power generation are present in eastern and southern Texas. Uranium—the fuel for nuclear reactors—was mined from sandstone deposits in the Texas coastal plain as early as 1961, and significant resources remain. More recently, a project that will mine rare earth elements and other critical minerals is in development in southwest Texas. These minerals are used in many energy-related technologies.

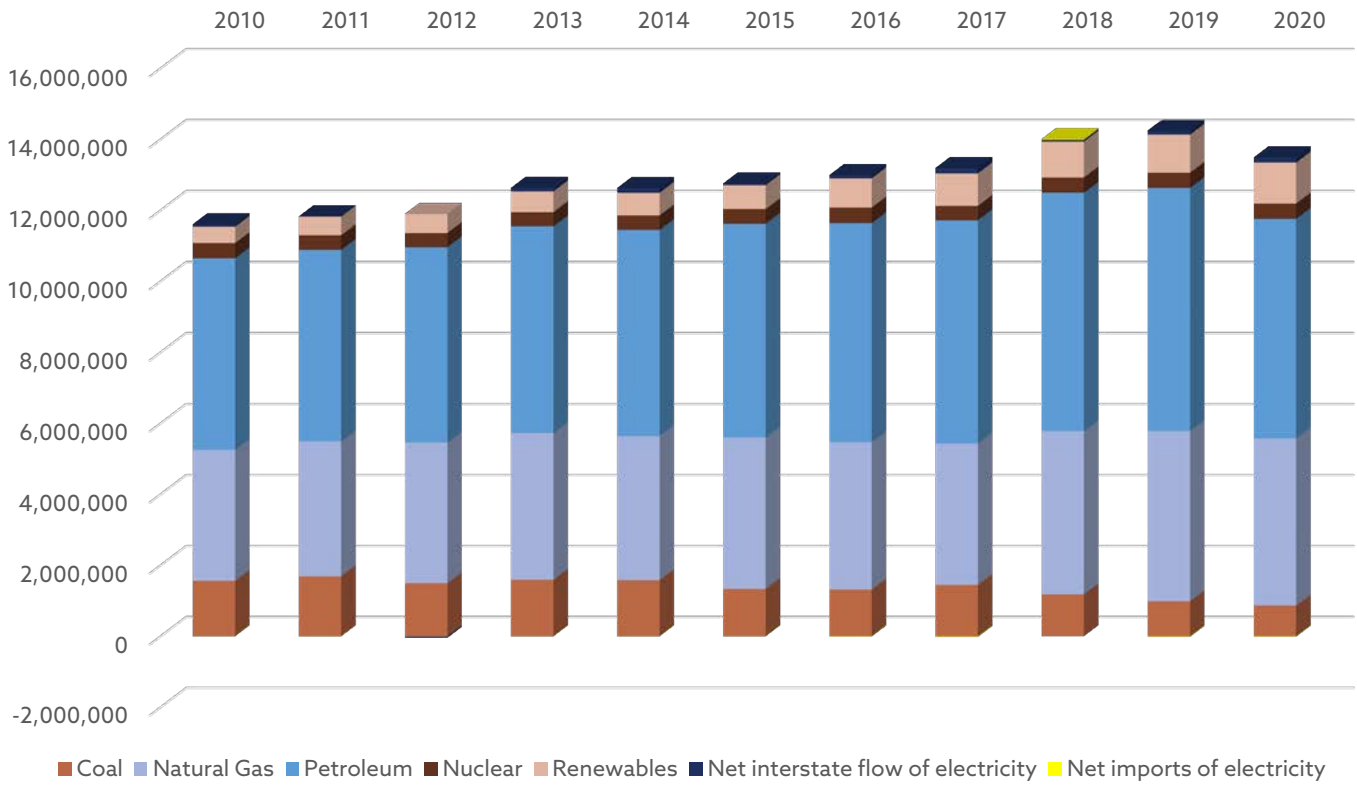
> **"Texas ranks second in the nation, after California, in both population and the size of its economy. Texas also accounts for about one-seventh of the nation's total energy consumption, more than any other state, and it is sixth among the states in per capita energy consumption. However, because Texas produces much more energy than it consumes, it is the nation's largest net energy supplier.**

The Texas climate varies significantly from east to west. Warm, moist air from the Gulf of Mexico sweeps westward across the state, losing moisture as it goes. The result is a climate that ranges from humid and subtropical along the coast, where much of the state's population resides, to semi-arid on the high plains of central and western Texas, and arid in the state's mountainous west. Frequent freezing temperatures occur in winter in the lightly populated high plains, and summer temperatures average above 90°F in the most densely populated parts of Texas where energy use for cooling is high. In part because of the state's large population, Texas leads the nation in total residential energy use, but it ranks among the lowest one-fifth of states in per capita residential energy consumption. The commercial sector accounts for almost as much energy consumption as the residential sector.

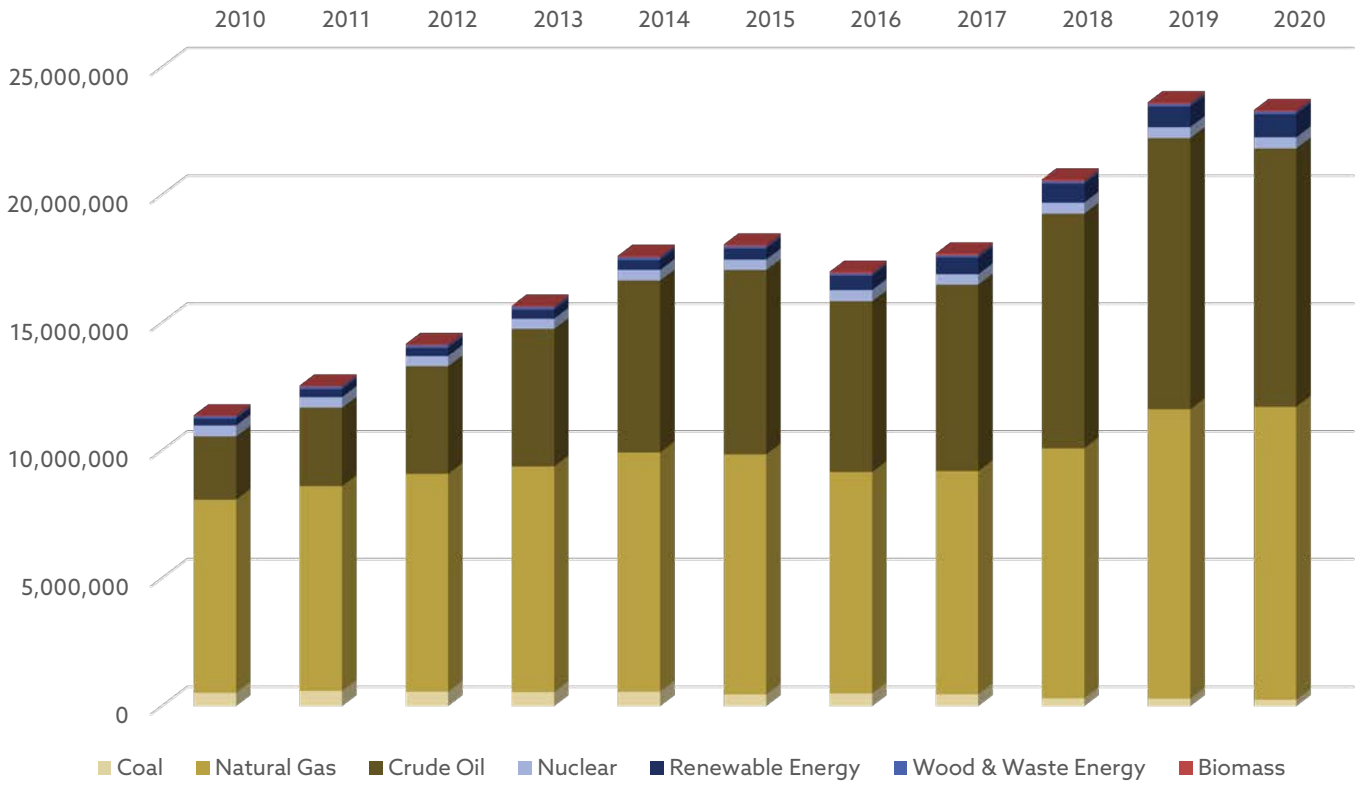
Texas produces more electricity than any other state, generating almost twice as much as the second-highest electricity-producing state, Florida. Natural gas-fueled power plants supplied about half the electricity generated in Texas in 2021. Natural gas fuels more electricity net generation in Texas than in any other state and accounts for 15 percent of all U.S. natural gas-fueled generation. Wind is the second-largest source of in-state generation in Texas. In 2021, wind supplied one-fifth of Texas' in-state utility-scale (one megawatt or larger) generation, providing more in-state power than coal for the second year in a row. Because of the increase in wind power and the retirement of almost 6,000 megawatts of coal-fueled generating capacity, coal-fueled power plants supplied 18 percent of state generation in 2021, down from a 36 percent share in 2011. The state's two operating nuclear power plants supplied eight percent of the state's electricity net generation in 2021. Most of the rest of the utility-scale generation in Texas is from renewable resources including solar, biomass, and hydroelectric power, as well as from other gases that are refinery byproducts.

The Electricity Reliability Council of Texas (ERCOT) operates the state's main power grid. The ERCOT grid operates completely within Texas and serves about 75 percent of the state's land area and 26 million customers. The ERCOT grid has few connections with the other interconnected power systems that serve the eastern and western contiguous United States. In February 2021, a major winter weather system, with extreme cold temperatures spread across much of the central United States, disrupted energy systems and caused serious health and safety issues, particularly in Texas. The cold weather increased energy demand and also affected energy supply, causing intense and widespread energy market disruptions. Notably, electricity deliveries were disrupted in the parts of Texas served by ERCOT because of the limited number of connections the ERCOT grid has with the nation's larger interconnected grids.

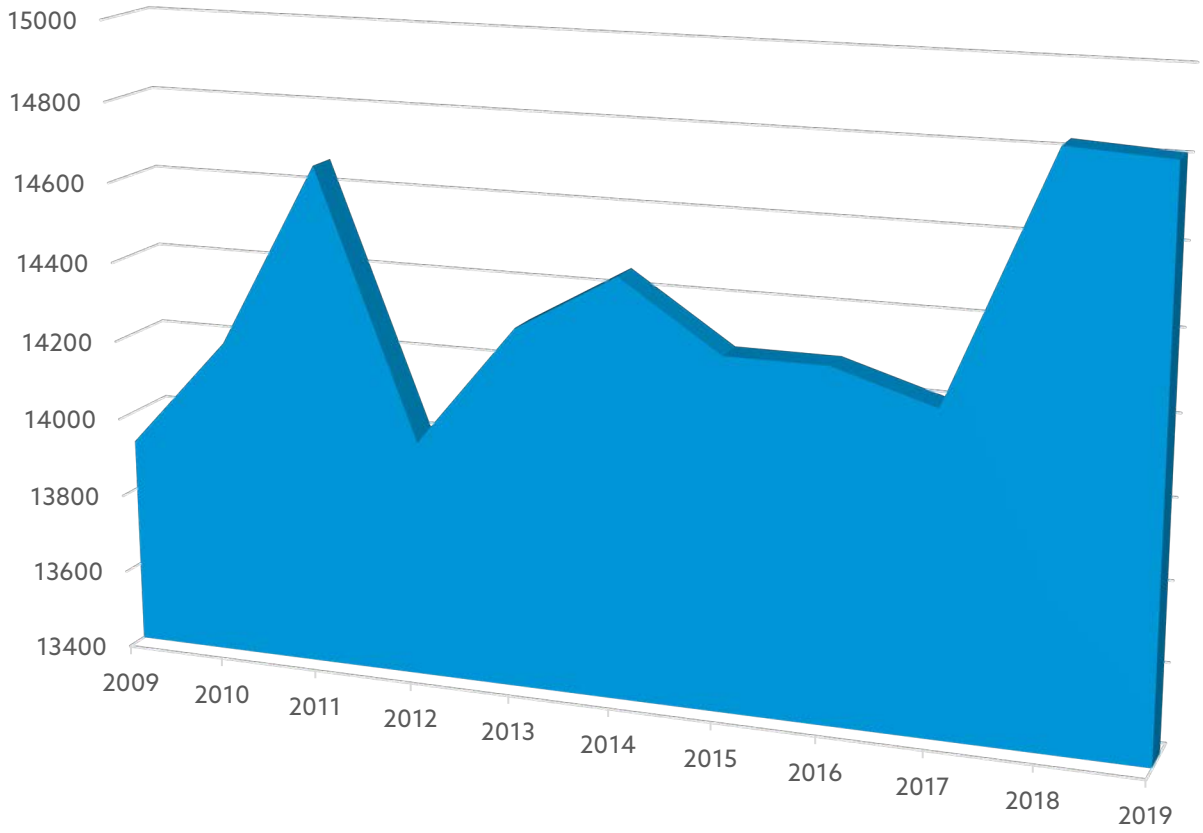
Texas - Total Consumption (in Billion Btu)



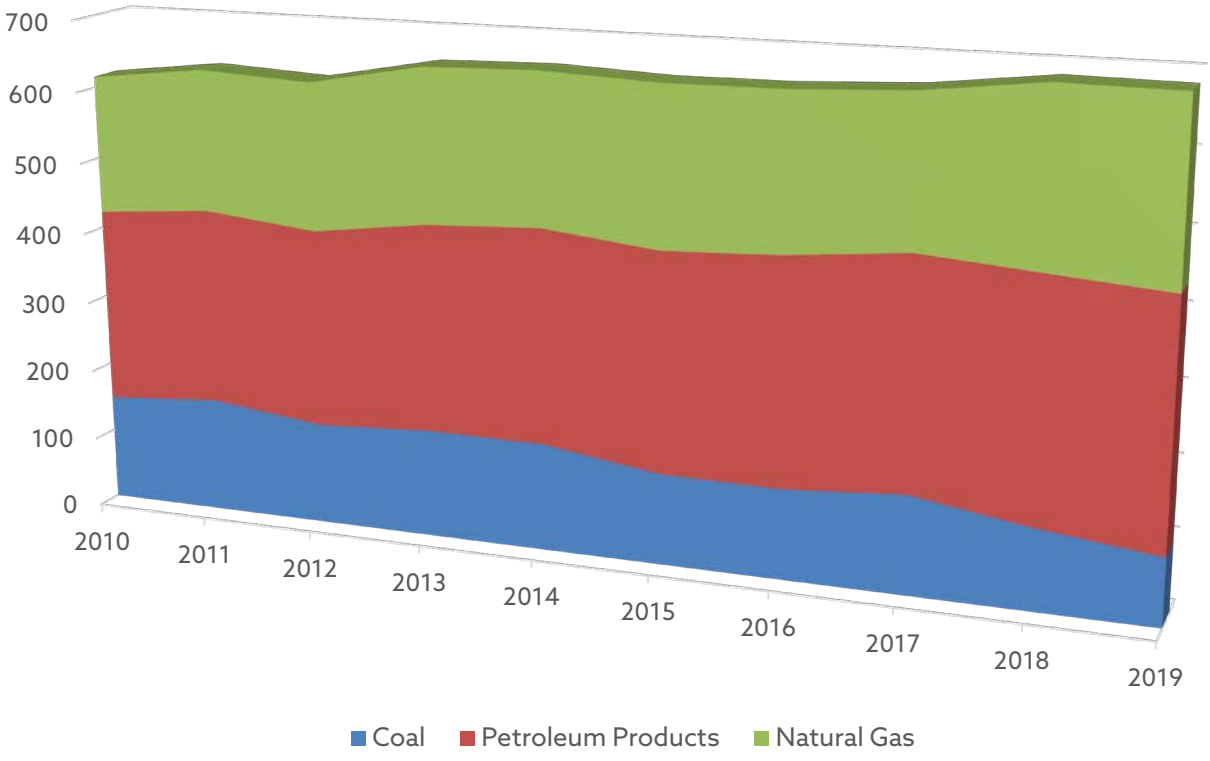
Texas - Total Production (in Billion Btu)



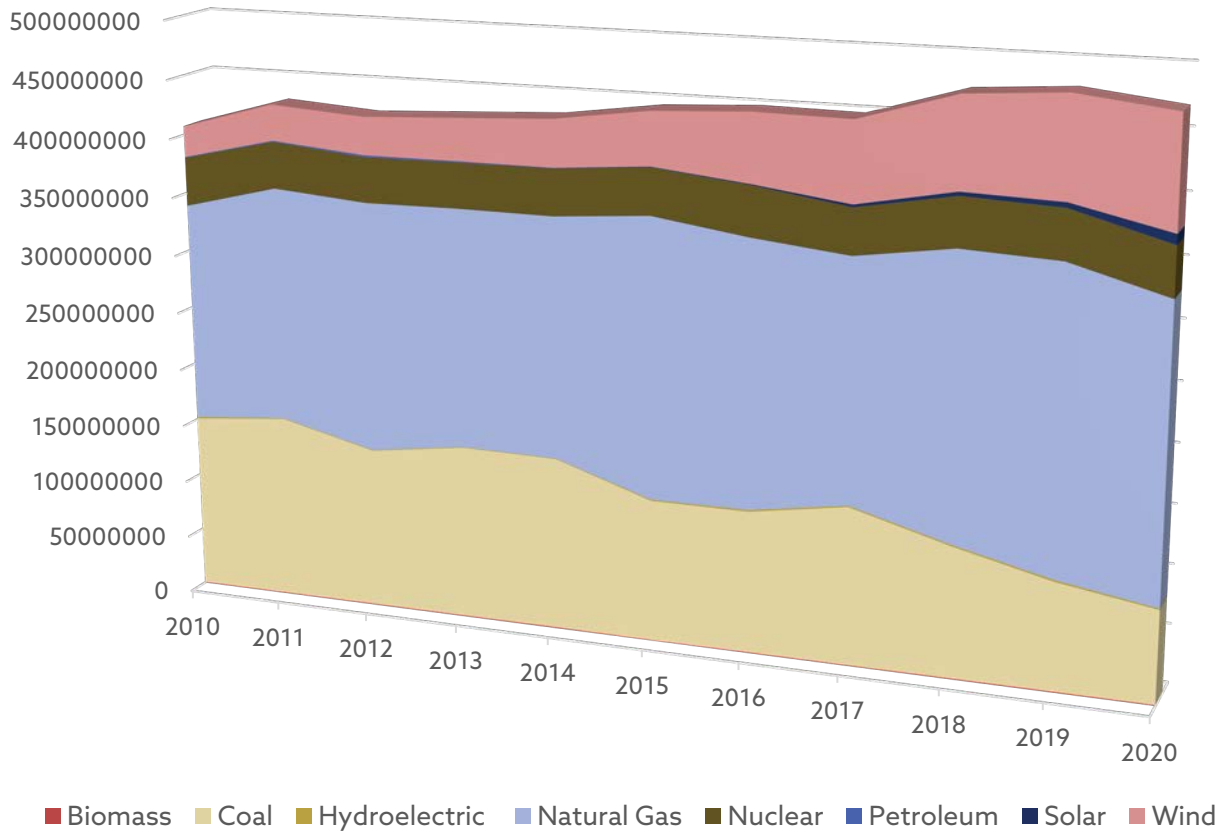
Electricity total consumption per capita (KWh), 2009-2019



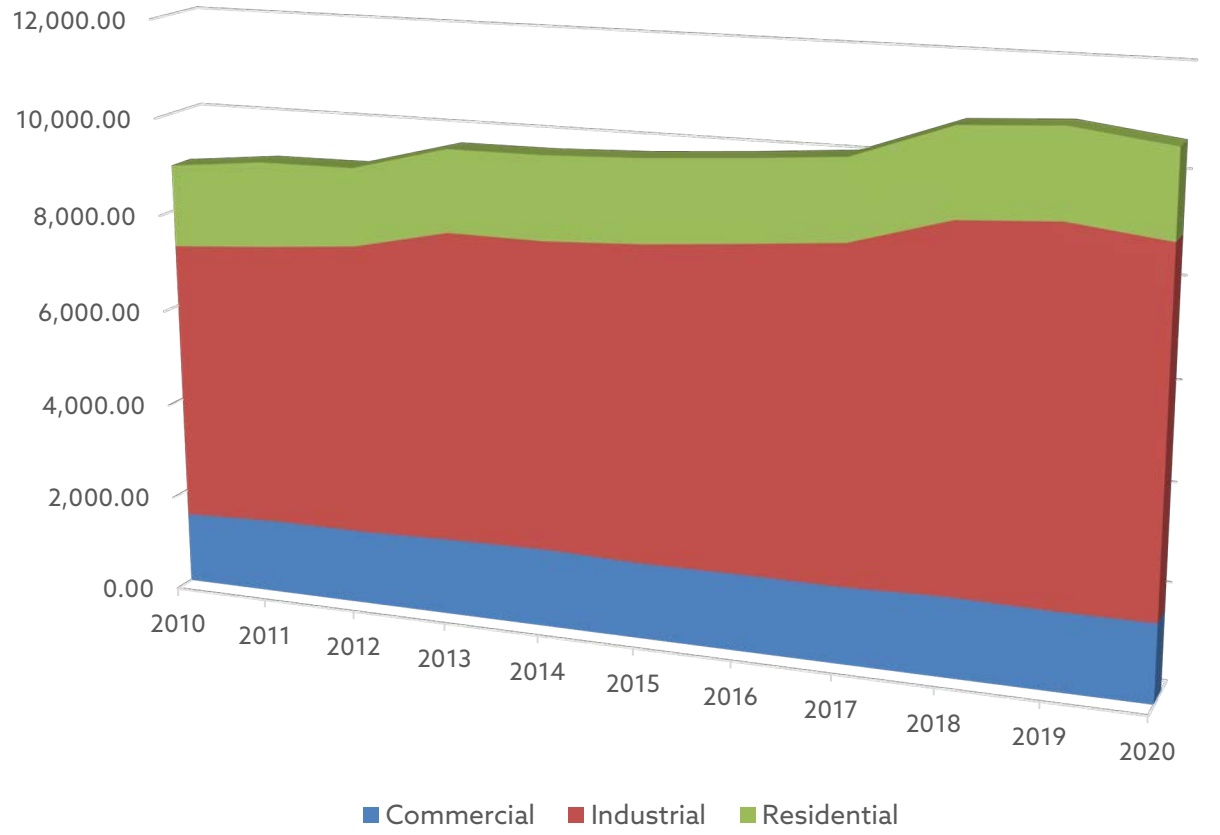
Historical CO_2 Emissions by Fuel Type, 2010-2019



Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



U.S. Virgin Islands

The U.S. Virgin Islands (USVI), part of the Leeward Islands of the Lesser Antilles, became a U.S. territory in 1917 and is located in the Caribbean Sea, about 1,100 miles southeast of Miami, Florida. The USVI has no fossil energy reserves, but does have some renewable resources, particularly solar energy. The USVI imports petroleum products to meet nearly all of its energy needs, including the fuels to operate vehicles and boats, to generate electricity, and to run the ocean water desalination plants that produce its public water supply.

Located between the Commonwealth of Puerto Rico to the west and the British Virgin Islands to the east, the USVI has a subtropical climate with easterly trade winds and little seasonal variation in its warm temperatures. The Caribbean hurricane season, which runs from June to November, sometimes brings destructive storms. On average, a hurricane passes near the USVI every three years, and one directly hits the islands about every eight years. In September 2017, the USVI was struck by two back-to-back storms, Hurricanes Irma and Maria, which were both category five hurricanes with sustained winds of more than 156 miles per hour. The hurricanes significantly damaged most of the USVI's electric distribution and transmission lines and also damaged several power generating facilities. The cost to rebuild from the destruction was an estimated $7.5 billion, which was about two times the value of the territory's annual Gross Domestic Product (GDP) at the time.

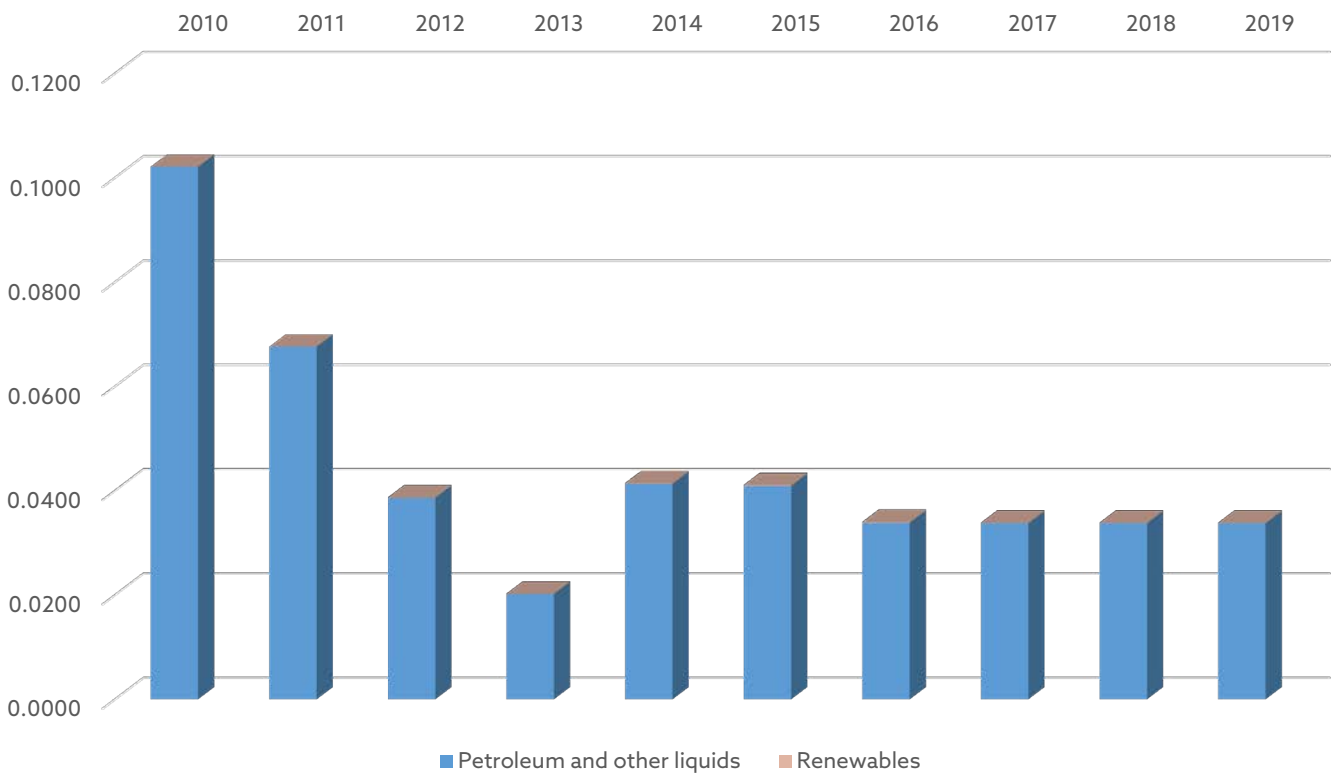
The USVI has two separate electricity grids, located on the two main islands, each with its own generating facilities, managed by the Water and Power Authority (WAPA), an independent governmental agency. Generating units include combustion and steam turbines powered with fuel oil or propane, as well as some solar power facilities owned by independent power producers (IPPs) and residents with rooftop solar panels. More than half of the USVI's petroleum-fueled generating units are more than 25 years old. WAPA is replacing some of its older generators with combinations of smaller units for more efficient balancing with renewable energy sources.

The St. Thomas electric system, with about 160 megawatts of generating capacity, supplies electricity to St. Thomas as well as both nearby islands St. John and Water by underwater cables. Separated from the St. Thomas system by 40 miles of ocean, the St. Croix system, with about 140 megawatts of capacity, supplies St. Croix Island. Seabed depth makes any potential electrical connection between the St. Thomas and St. Croix systems difficult. For both electric systems, the average power demand loads are less than half of their generating capacities, which allows them to maintain their own backup generation and reserves. During the back-to-back hurricanes in September 2017, 80 percent to 90 percent of the USVI's transmission and distribution systems were damaged or destroyed. To mitigate future disruption of the islands' grids, WAPA added backup generating units that include battery storage. The territory is also building underground electrical lines and installing composite electrical poles that can survive winds up to 200 miles per hour. As of October 2021, WAPA installed just over half of the planned 8,500 composite poles across the territory, and was on track to finish the project in early 2024.

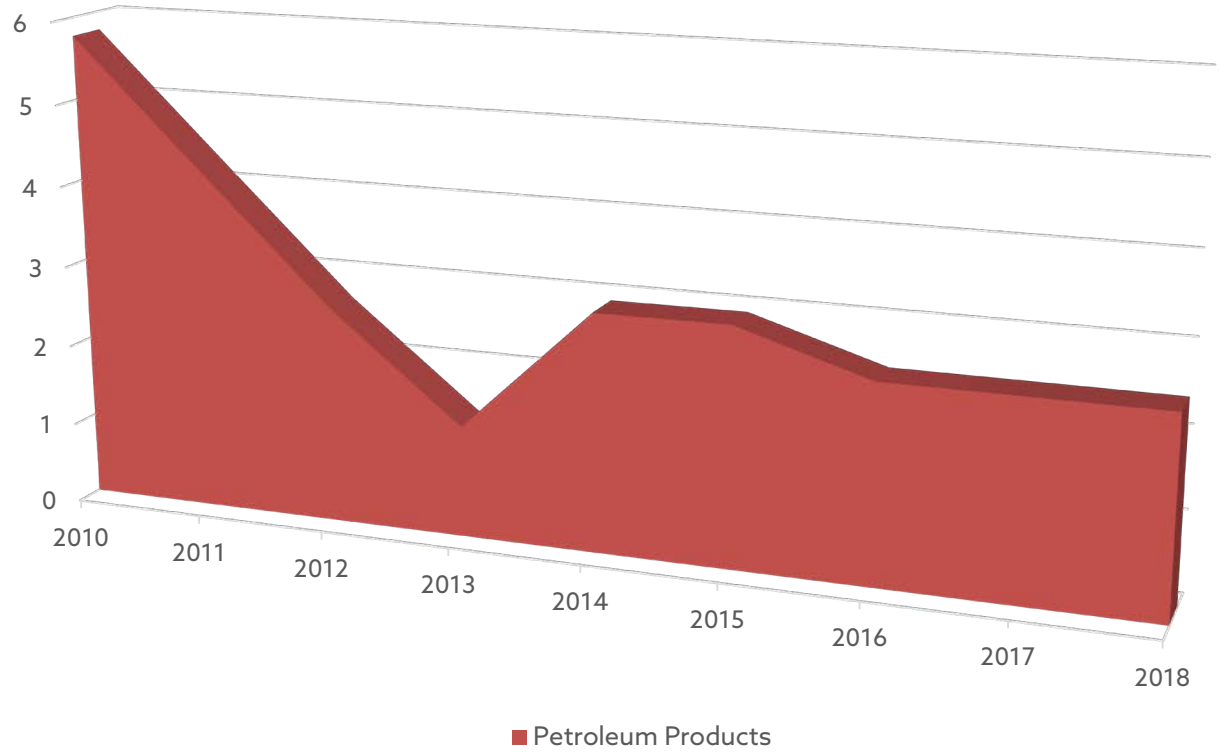
In 2020, the industrial sector consumed about 43 percent of the Virgin Islands' electricity, followed closely by the residential sector at 42 percent, and the commercial sector at 15 percent. Imported petroleum products fuel nearly all of the electricity generation on the islands. In 2020, propane generated about two-thirds of the islands' electricity, fuel oil about one-third, and solar power about two percent. The USVI has some of the highest electricity rates in the world, in part because of petroleum fuel surcharges. The islands' residential electricity price in mid-2021 was about 43 cents per kilowatt-hour (which included a fuel surcharge of 17 cents), more than three times higher than the U.S. residential average price of about 14 cents.

After petroleum prices increased in 2008, WAPA explored converting its generating facilities to operate on imported liquefied natural gas (LNG), but the utility opted to go with propane because it was less expensive to build the storage facilities and other infrastructure needed for propane compared for LNG. The turbine conversions for the project increase the fuel flexibility for WAPA's generators, and allow several of them to burn propane, fuel oil, or natural gas. Increased propane use is expected to cut carbon dioxide emissions at generating plants by 35 percent, help the USVI meet clean air standards, and reduce future fuel surcharges.

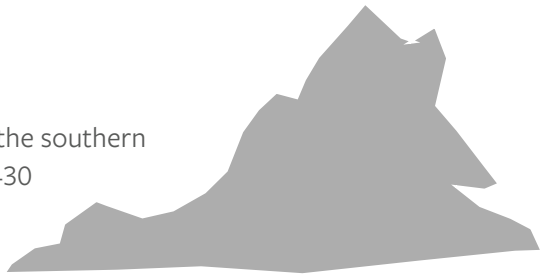
U.S. Virgin Islands - Total Production (in Quad Btu)



Historical CO_2 Emissions by Fuel Type, 2010-2019



Virginia



Virginia is located on the East Coast of the United States, midway between the southern tip of Florida and the northern coast of Maine. The state stretches almost 430 miles west to east and includes the southern tip of the Delmarva Peninsula on the eastern side of the Chesapeake Bay. The coastal plain that occupies eastern Virginia includes: the site of the first permanent English settlement in North America at Jamestown; several of the state's modern-day population centers; and the nation's largest coal export port at Hampton Roads. To the west, the flat coastal plain meets the rolling hills of the Piedmont region along a boundary known as the Fall Line, which is characterized by rapids and waterfalls. However, most of the state's hydroelectric power plants are further west, where the Piedmont rises into the Blue Ridge Mountains. The valleys and ridges that occupy the western part of the state are parallel to the spine of the Appalachian Mountains and, along with the Appalachian Plateau, contain most of the state's coal, the primary energy resource produced in Virginia. The Appalachian Plateau, which cuts across the southwestern corner of Virginia, holds almost all the state's crude oil and natural gas fields. About 16 million acres in Virginia are forested, and the state's widely distributed forests hold abundant biomass resources. Virginia has offshore and onshore wind energy potential as well.

Uranium, the source for nuclear fuel, was discovered in southern Virginia, but the state has banned uranium mining since the1980s. The state has the nation's third-largest state-maintained transportation network, including six major interstate highways. More than a dozen railroads operate on 3,500 miles of railway in the state.

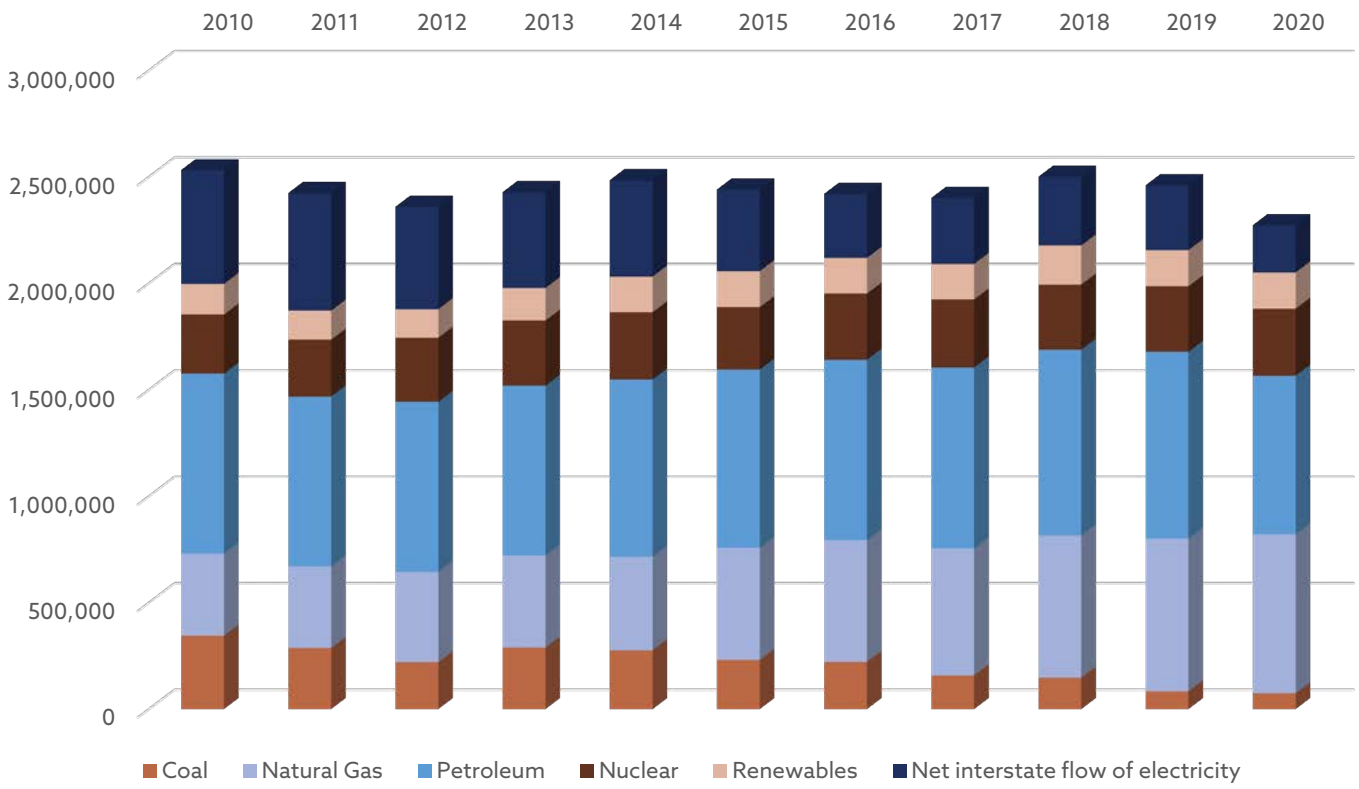
> **"Virginia also has several commercial airports, including two near Washington, DC, that are among the nation's busiest, and one of the nation's largest seaports, the Port of Virginia at Hampton Roads. As a result, the transportation sector accounts for the largest share of the state's total end-use energy consumption at about one-third.**

The commercial sector accounts for slightly more than one-fourth, the residential sector uses almost one-fourth, and the state's industrial sector consumes nearly one-fifth. Overall, Virginia consumes almost three times more energy than the state produces. Although Virginia is just below the top one-fourth of states in total energy consumption, the state's per capita use is well below the national average and is less than that of 30 other states.

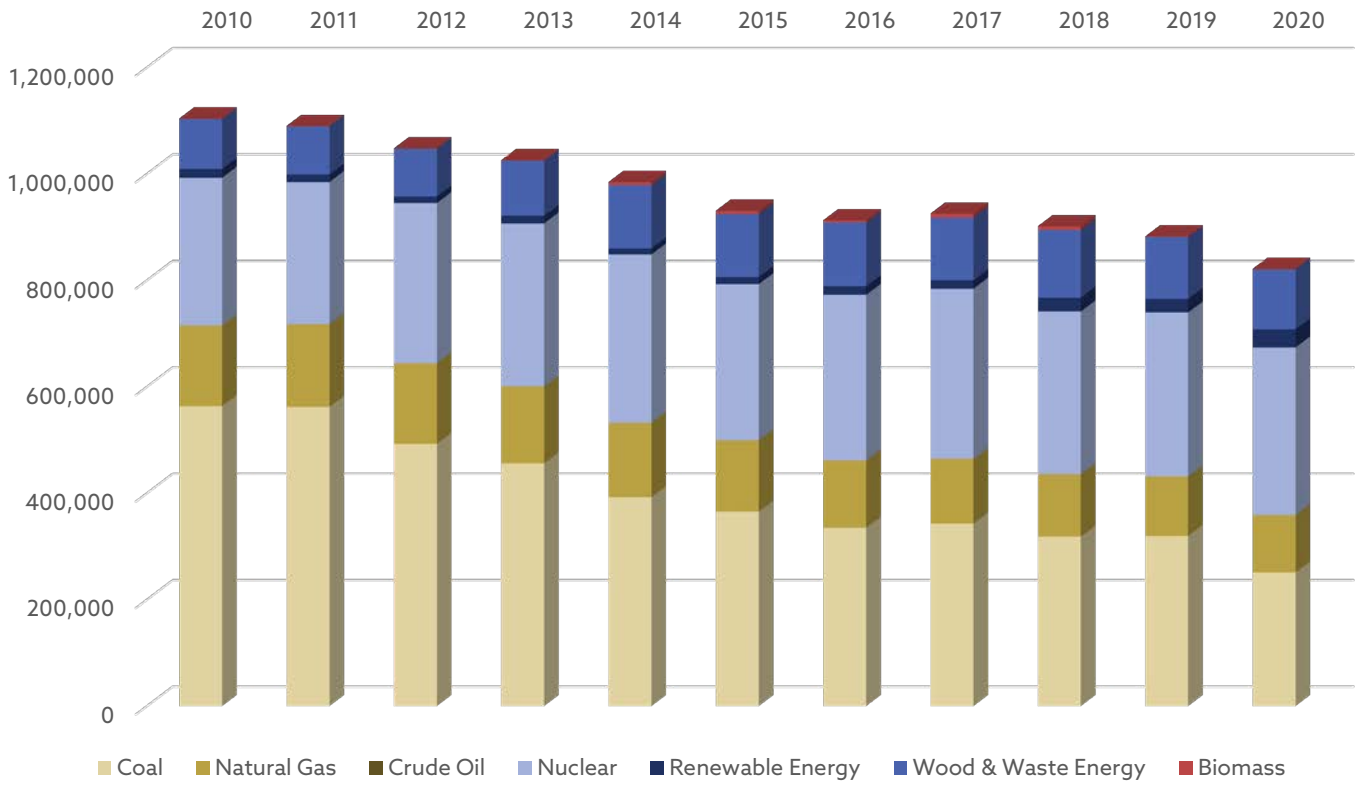
Natural gas and nuclear power accounted for 90 percent of Virginia's in-state electricity net generation in 2020. Natural gas fueled the largest share, about three-fifths, and the state's two nuclear power plants supplied about three-tenths. Renewable energy sources, including biomass, hydroelectric power, and solar, accounted for almost seven percent. Coal and, to a much lesser extent, petroleum together fueled less than four percent of in-state generation. Coal-fueled power plants supplied the largest share of the state's net generation until 2009, when coal's contribution fell below that of nuclear power. As coal-fueled generation decreased, natural gas-fueled generation increased. In 2012, natural gas fueled more of Virginia's generation than coal for the first time, and, in 2015, the contribution from natural gas-fueled generation surpassed that of nuclear power. In large part because of the continued decline in coal-fueled generation, in 2019, in-state electricity generation from renewable energy sources also exceeded coal's contribution for the first time.

Virginia's in-state electricity generation increased by 40 percent between 2010 and 2020. However, electricity consumption in the state is still greater than generation, and Virginia receives additional power from two regional grids. One grid, the PJM Interconnection, supplies most of the state. The PJM Interconnection is a regional transmission organization that coordinates the movement of electricity in all or parts of 13 Mid-Atlantic and Midwestern states plus the District of Columbia. The Tennessee Valley Authority provides electricity to local power companies in four counties in southwestern Virginia that are not in the PJM grid. In 2019, Virginia was the nation's 10th largest electricity consumer as measured by retail sales, but ranked 20th on a per capita basis. Electricity prices in Virginia fall below national averages. The commercial sector accounts for almost half of Virginia's electricity retail sales. The residential sector, where most households have air conditioning and more than half use electricity for home heating, accounts for about two-fifths of electricity sales. The industrial sector uses almost all the rest.

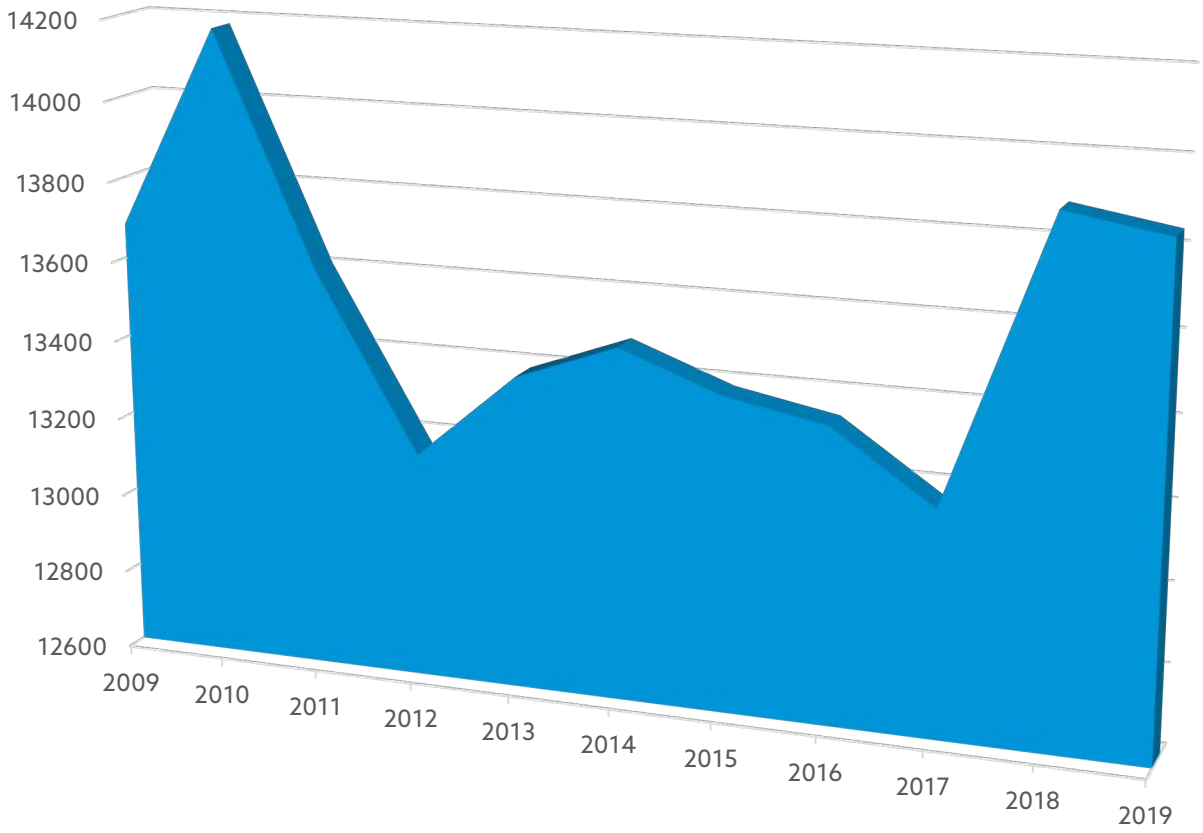
Virginia - Total Consumption (in Billion Btu)



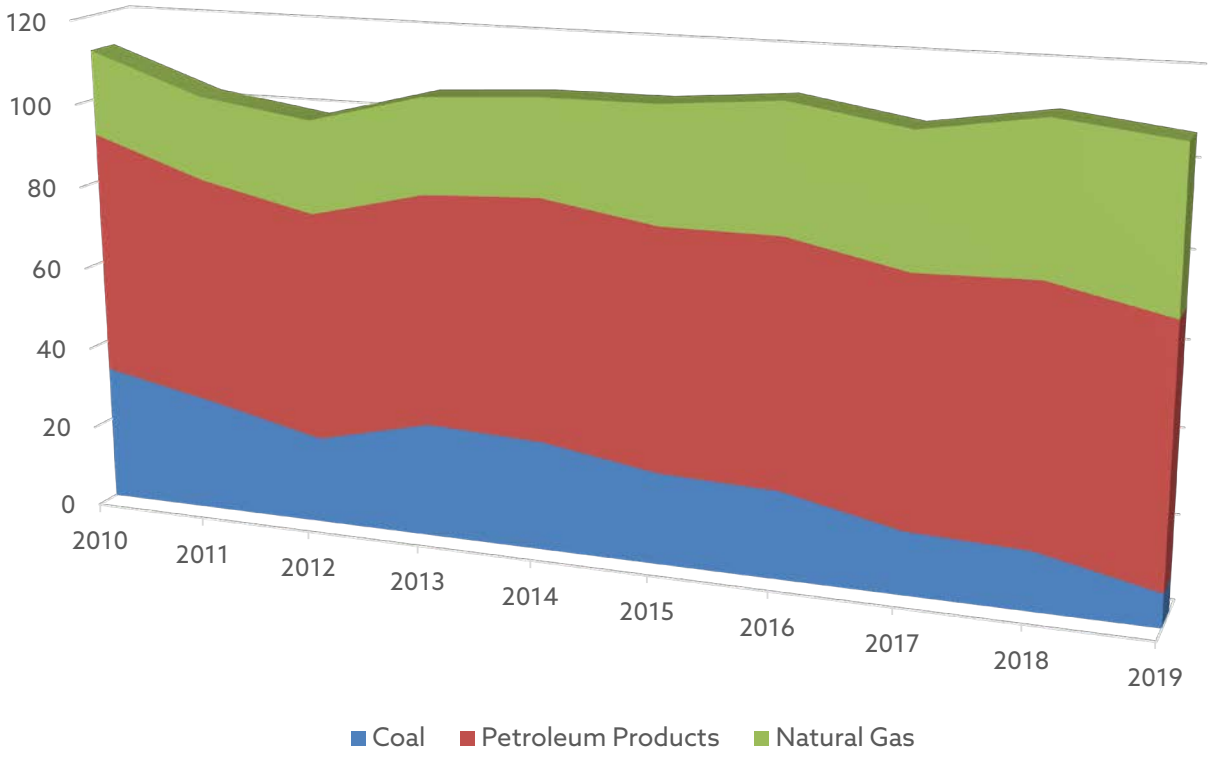
Virginia - Total Production (in Billion Btu)



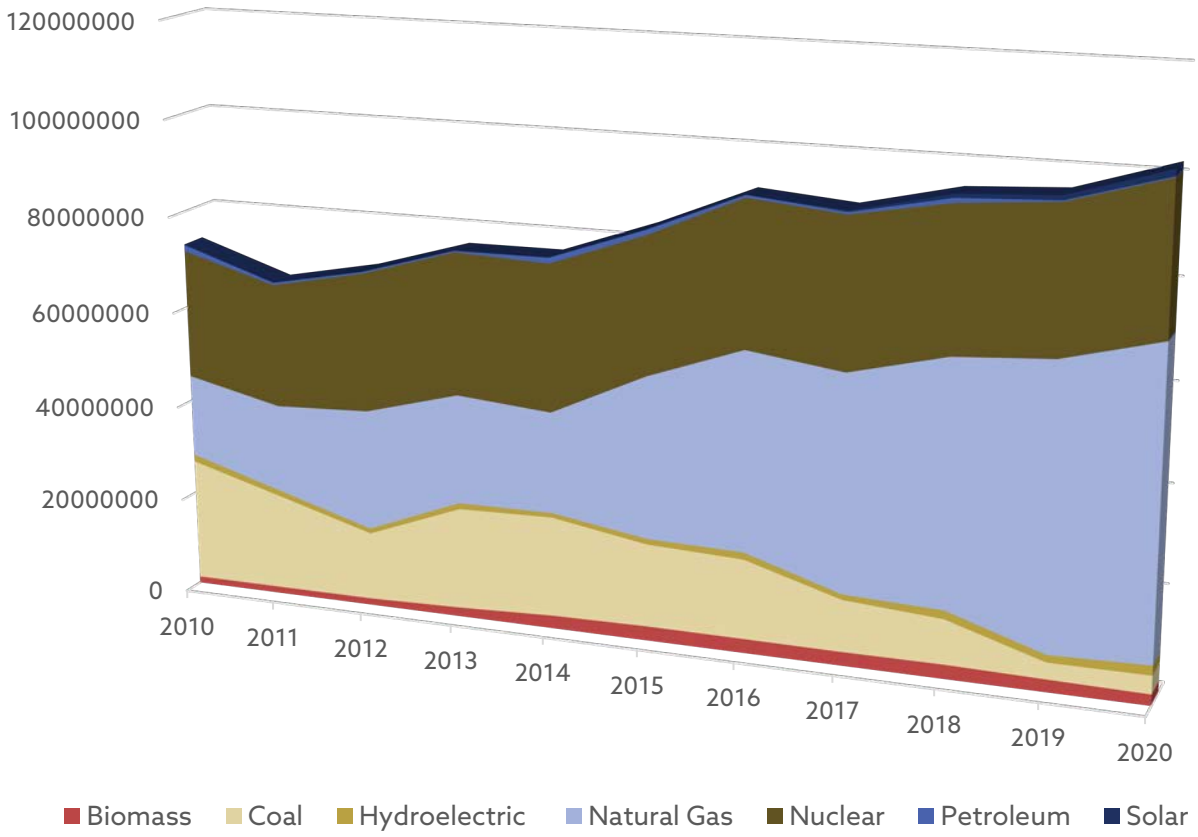
Electricity total consumption per capita (KWh), 2009-2019



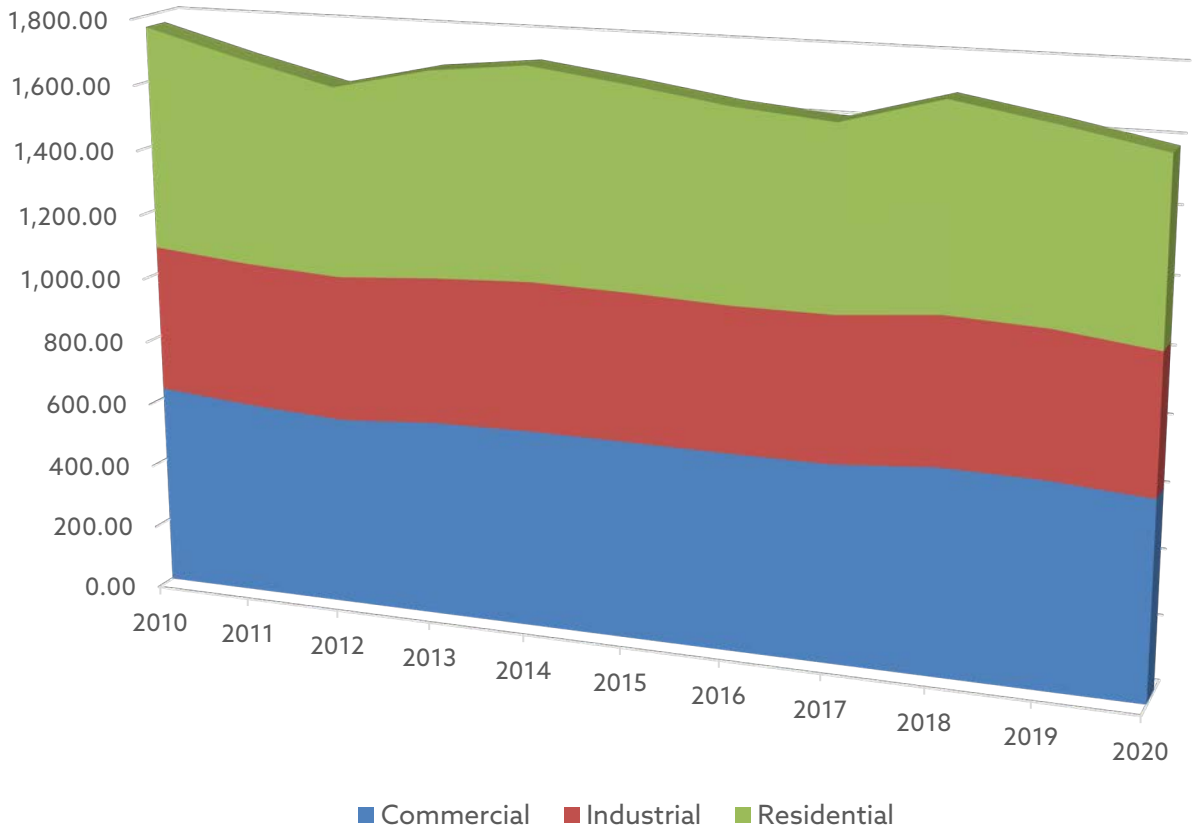
Historical CO_2 Emissions by Fuel Type, 2010-2019



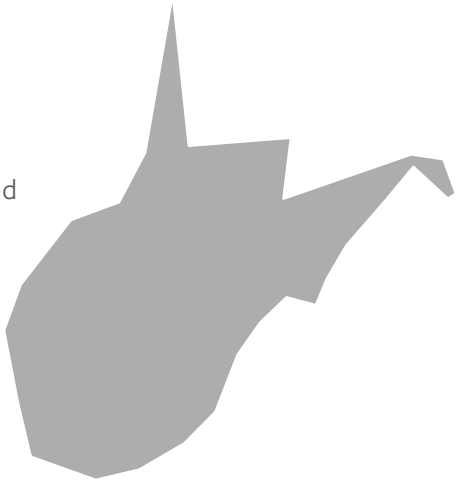
Electricity Generation by Fuel (MWh), 2010-2020



Total Energy Consumed by Sector (Trillion Btu), 2010-2020



West Virginia



West Virginia is the nation's fifth-largest energy producer, with plentiful fossil energy and renewable resources. Located in the center of the Appalachian Mountain region, West Virginia's boundaries follow the region's mountain ridges, valleys, and rivers, giving the state an unusual outline that includes two panhandles. Although it is one of the ten smallest states in total area, West Virginia stretches from the Ohio River, where the state's northern panhandle is wedged between Pennsylvania and Ohio, to a point almost 240 miles away on the state's southern border with Virginia. Most of West Virginia is part of the Appalachian Plateau region, where much of the state's natural gas, coal, and crude oil are found. Rivers that cross the Appalachian Plateau have plentiful hydroelectric power potential, while the narrow, wind-swept mountain ridges that run northeast to southwest in the Appalachian Valley and Ridge region of eastern West Virginia have the state's best wind resources. Almost four-fifths of the state is covered by forests, providing West Virginia with abundant biomass potential, as well.

West Virginia is a net energy supplier to other states and provides about five percent of the nation's total energy, almost half of it from coal production. However, because of increases in natural gas and natural gas liquids production from the Marcellus and Utica shales in northern West Virginia, natural gas surpassed coal for the first time in 2019 and became the largest contributor to the state's energy economy. West Virginia is also a significant consumer of energy and ranks among the top ten states on a per capita basis.

The industrial sector accounts for the largest share of end-use energy consumption in West Virginia, at 45 percent of the state's total. Mining, including coal, crude oil, and natural gas extraction, and chemical manufacturing are significant and energy intensive contributors to the state's economy. The transportation sector is the second-largest energy consuming sector, accounting for 22 percent of state energy use, and the residential sector consumes a total of 19 percent. The commercial sector accounts for the rest.

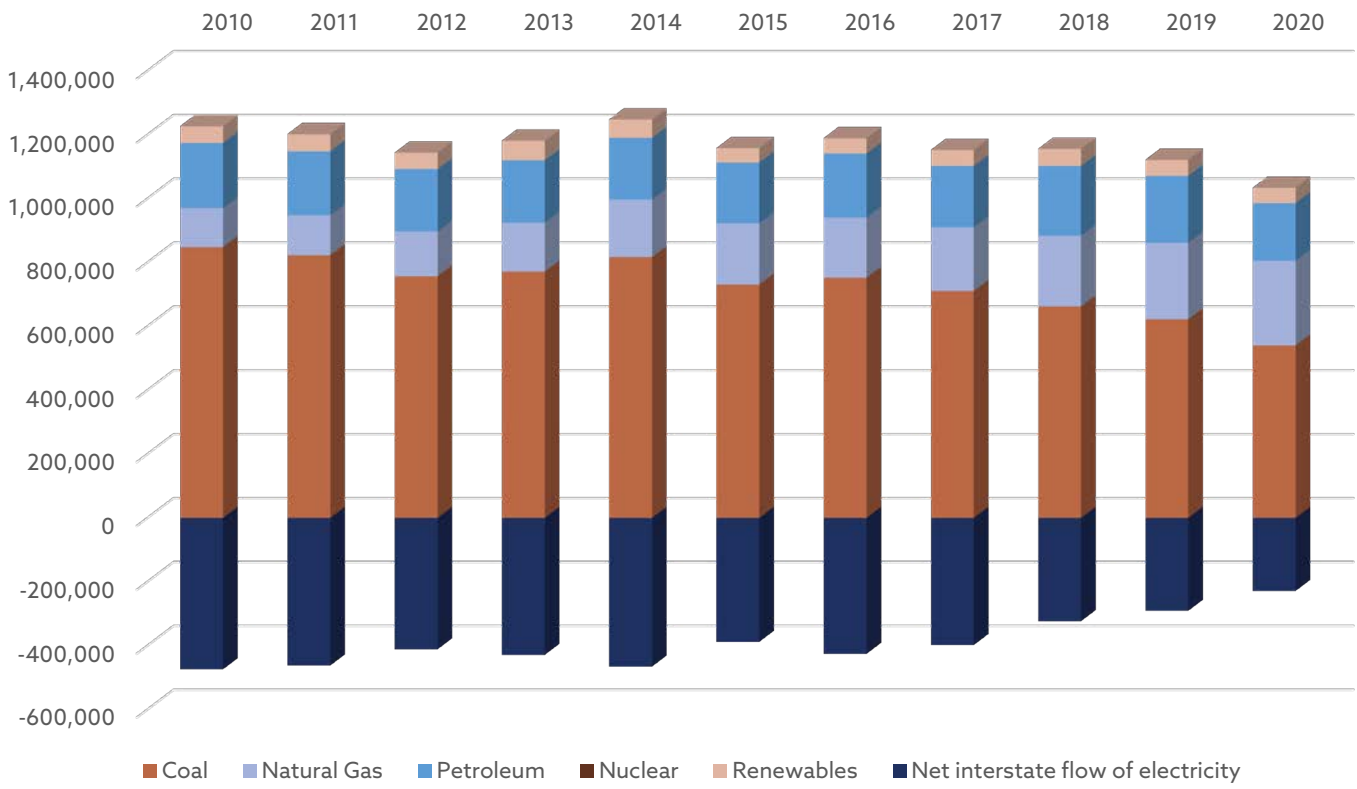
> **"Coal-fueled power plants account for almost all of West Virginia's electricity generation, and eight of the state's ten largest power plants, both by capacity and by generation, use coal. Although coal-fueled power plants with almost 2,800 megawatts of capacity retired during the past decade and another nearly 1,300 megawatts are scheduled for retirement in 2022, West Virginia still has more than 12,500 megawatts of coal-fueled capacity.**

In 2020, coal fueled almost nine-tenths of in-state generation. Natural gas, wind, and hydropower supplied almost all the rest. In 2020, natural gas fueled a record amount of electricity in West Virginia at about five percent of the state's net generation. Wind and hydropower each supplied about three percent in 2020. West Virginia does not produce electricity from nuclear power and is one of eight states east of the Mississippi River without an operating nuclear power plant. In 2022, the state overturned its long-standing ban on nuclear energy deployment within the state.

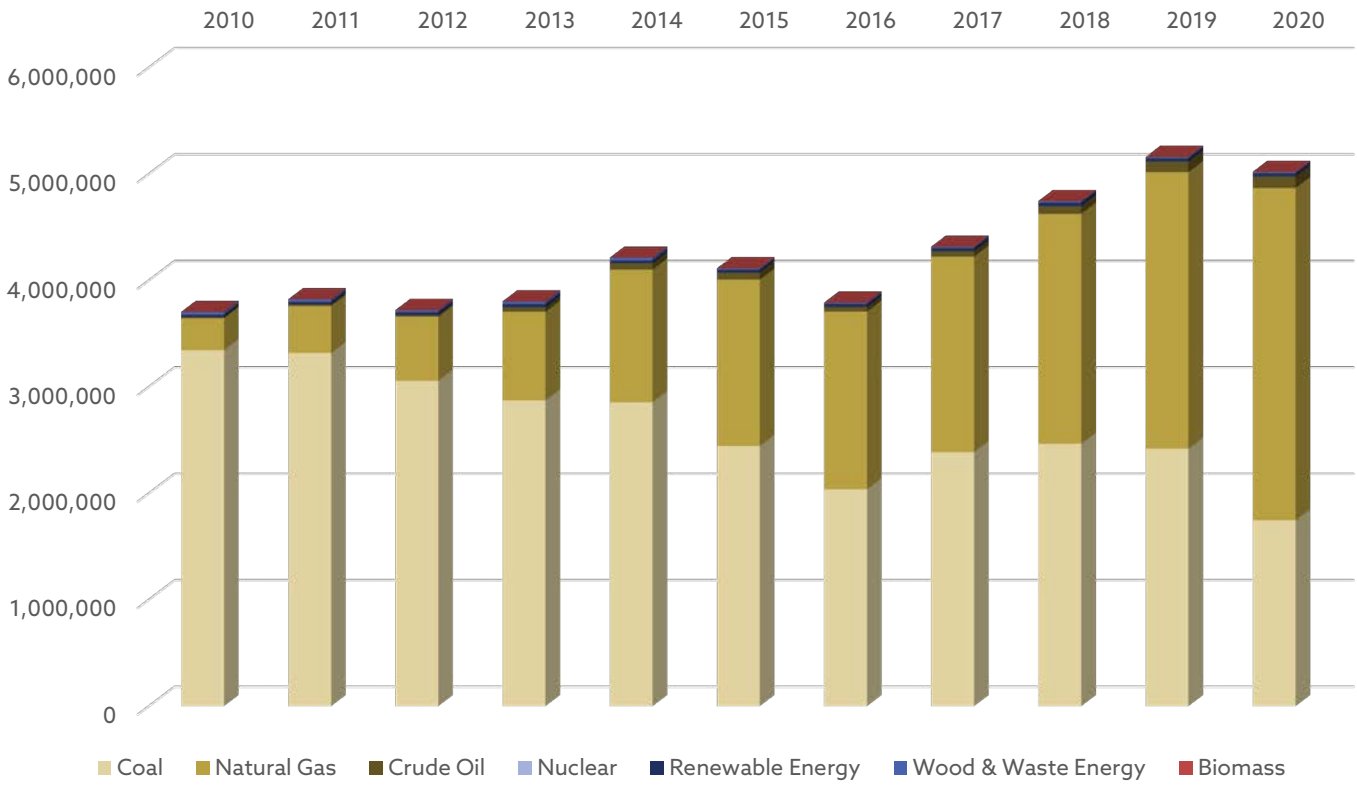
In 2020, West Virginia had the second-lowest average price for electricity, after Kentucky, among states east of the Mississippi River, and its total electricity retail sales were less than in about two-thirds of the states. However, West Virginia is among the nation's top five states in electricity use per capita. The state's industrial sector is the largest end-user and accounts for more than two-fifths of West Virginia's electricity consumption. More than half of the households in West Virginia use electricity as their primary source for home heating, and the state's residential sector accounts for one-third of electricity retail sales.

Overall, West Virginians typically use less than half of the electricity generated in the state. As a result, West Virginia is a net supplier of electricity to the regional grid and is among the top states in interstate transfers of electricity. In 2020, only seven other states sent more electricity out of state.

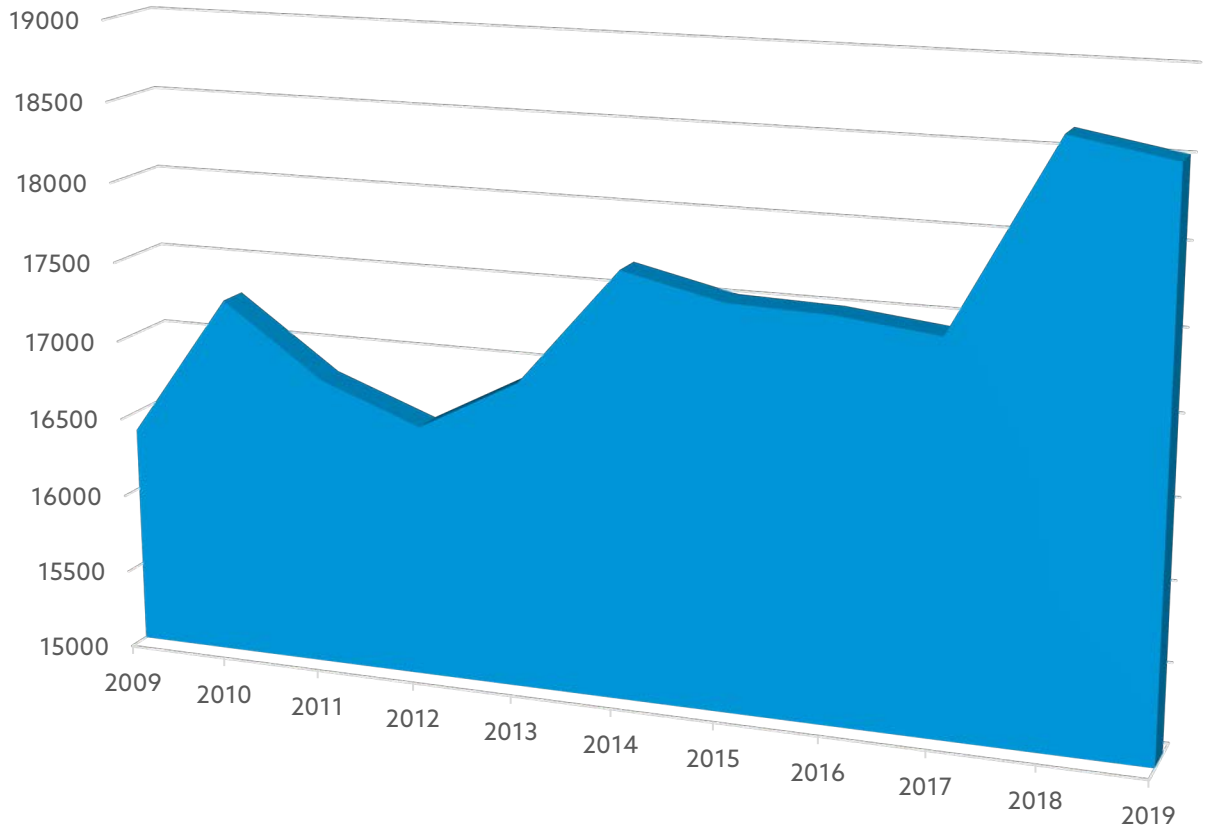
West Virginia - Total Consumption (in Billion Btu)



West Virginia - Total Production (in Billion Btu)



Electricity total consumption per capita (KWh), 2009-2019



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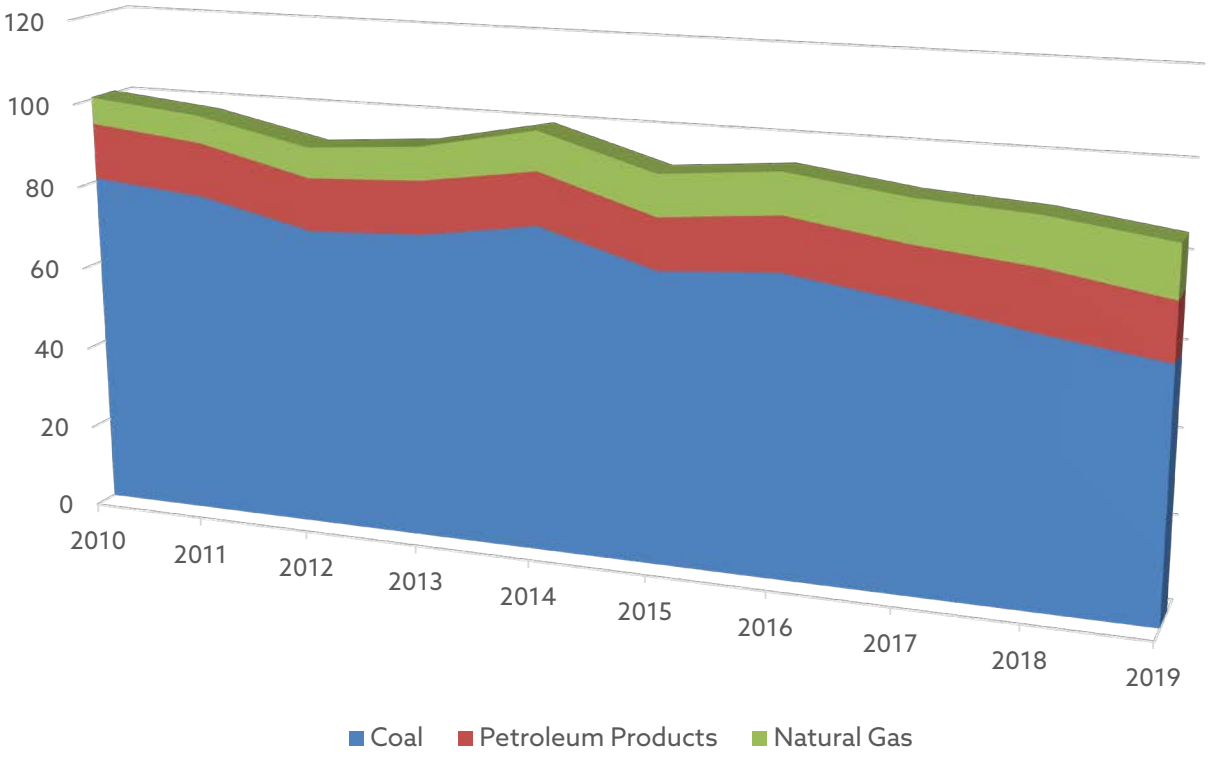
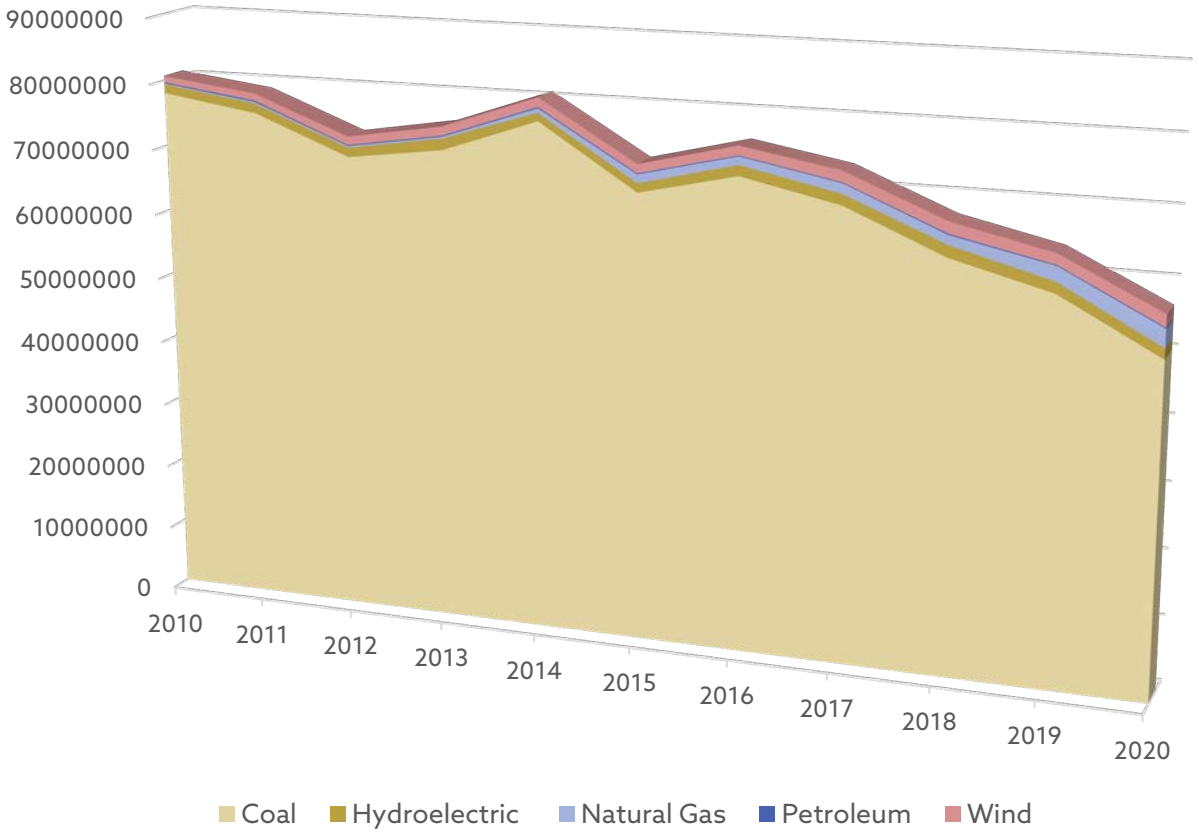


Electricity Generation by Fuel (MWh), 2010-2020



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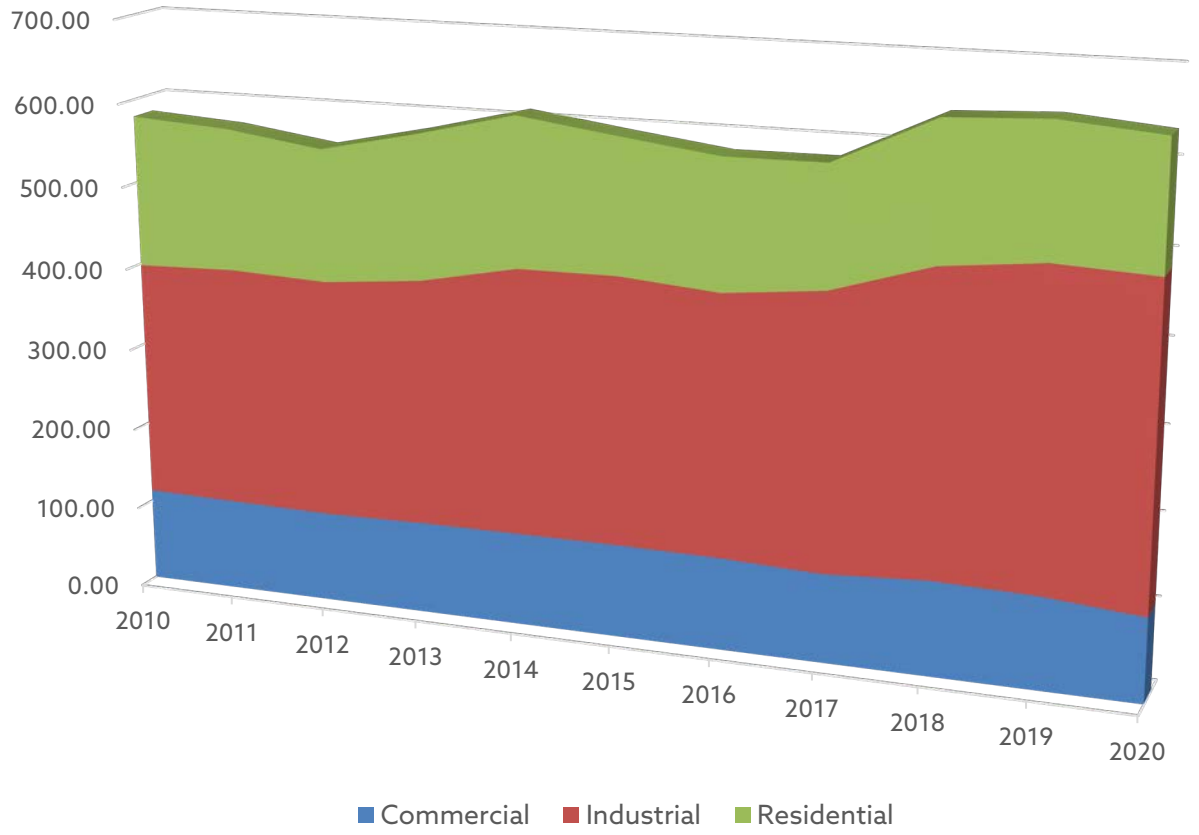

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Southern States Energy Board
6325 Amherst Court
Peachtree Corners, GA 30092
770.242.7712
www.sseb.org