Georgia Department of Community Affairs

Assessment of North Georgia Communities for Potential Coal Impacts

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clarity from complexity

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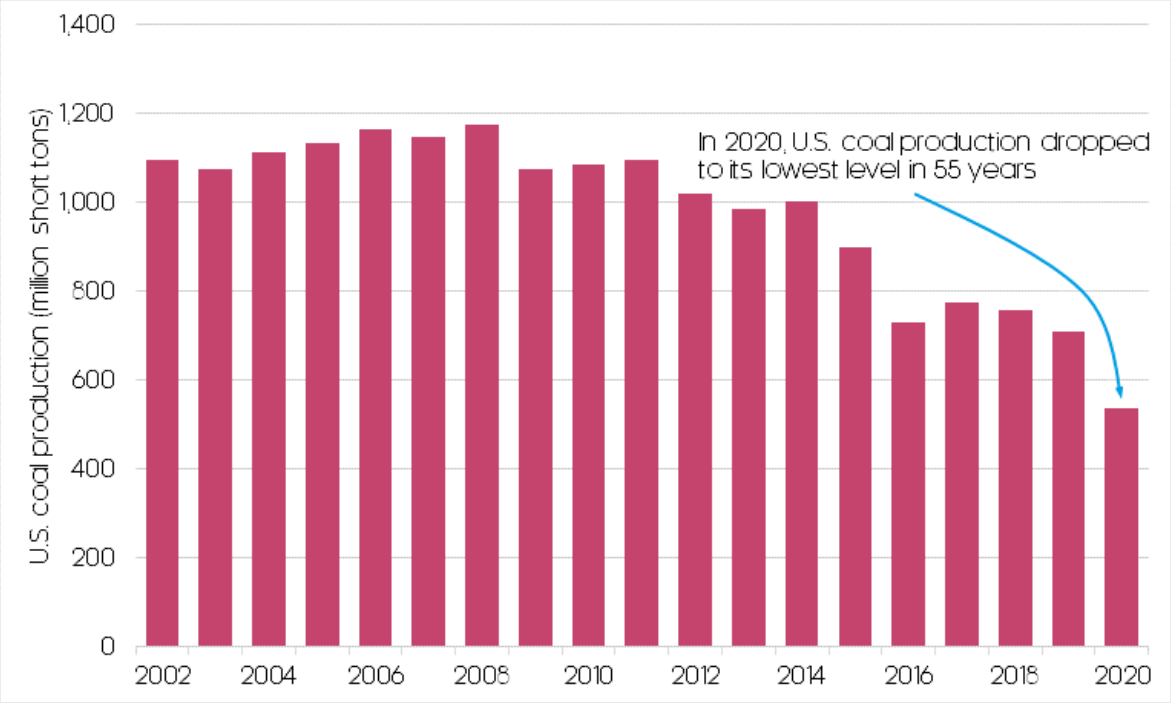
1 Introduction

1.1 Background

Recognizing the significant economic challenges facing parts of the U.S. due to the continued and accelerated decline of coal industry production and power generation, the federal government initiated the Partnerships for Opportunity and Workforce and Economic Revitalization (POWER) Initiative.[1]

Underpinning this work and the POWER program is the measurable decline in coal production and consumption in the United States. As shown in Figure 1.1, Figure 1.1 U.S. coal production has been steadily declining since its peak in 2008, dropping by about 54% overall to 2020.

Figure 1.1: U.S. coal production, 2002-2020



Source: Energy Information Administration

In fact, the 24% drop between 2019-20 was one of the steepest falls on record, and according to the Energy Information Administration (EIA), U.S. coal production is now at its lowest point since 1965.

This reflects the relatively recent transition away from coal derived electricity generation in the U.S. with a shift towards natural gas. In 2017, natural gas electricity generation exceeded coal for the first time ever, while generation from renewable sources has also increased over recent years.

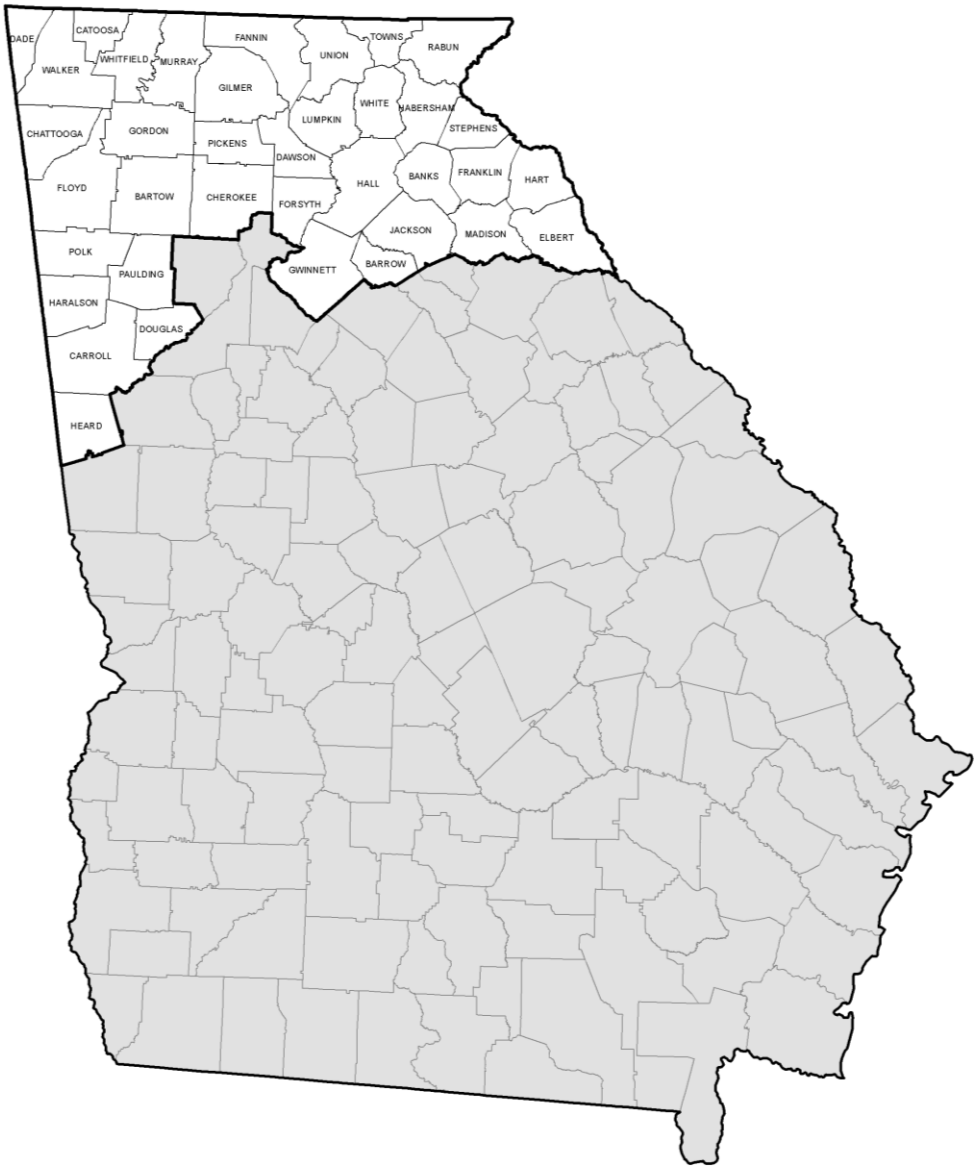
1.2 Purpose

Northern Georgia (see Figure 1.2) lies within the federally-designated definition of Appalachia and thus, parts of Georgia can apply for POWER funds through the Appalachian Regional Commission (ARC). This grant

[1] https://www.whitehouse.gov/the-press-office/2015/03/27/fact-sheet-partnerships-opportunity-and-workforce-and-economic-revitaliz

funding program was which were over $46 million in 2021 and expected to be at least as large (if not larger) in 2022 and beyond.[2]

Figure 1.2: Appalachian Regional Commission Counties in Georgia



Source: Appalachian Regional Commission

That said, Georgia does not have an active coal mining industry, so assessing "coal reliant communities" in the state is not as straight-forward as it might be for other states in the Appalachian region.

To assist Georgia and its communities in exploring and estimating potential communities (at the county-level) that might have experienced impacts due to the decline in the coal industry, Cambridge Econometrics (henceforth CE) have focused on analyzing:

- Coal-fired power plants – either current ones that may be planning to close or have already been shut down or converted to other uses;

[2] http://www.arc.gov/funding/POWER.asp

- Supply chain impacts – examining businesses in Georgia that are suppliers to coal-related companies and activities, and part of the sector's supply chain; and
- Transportation impacts – coal has traditionally been one of the largest (by tonnage) commodities moved by rail and barge but recent declines are impacting transportation service firms.

The following 37 counties constitute the federally-designated definition of Appalachia in Georgia: Banks, Barrow, Bartow, Carroll, Catoosa, Chattooga, Cherokee, Dade, Dawson, Douglas, Elbert, Fannin, Floyd, Forsyth, Franklin, Gilmer, Gordon, Gwinnett, Habersham, Hall, Haralson, Hart, Heard, Jackson, Lumpkin, Madison, Murray, Paulding, Pickens, Polk, Rabun, Stephens, Towns, Union, Walker, White, and Whitfield.

1.3 This Report

The remainder of this report is organized around the data findings, research and identification of possible coal impacts in northern Georgia centered on: 1) coal-fired power plants; 2) supply chain impacts; and 3) transportation impacts. The report concludes with a summary of findings of the most significant coal-related impacts in northern Georgia.

2 Potential Coal Impacts in Northern Georgia

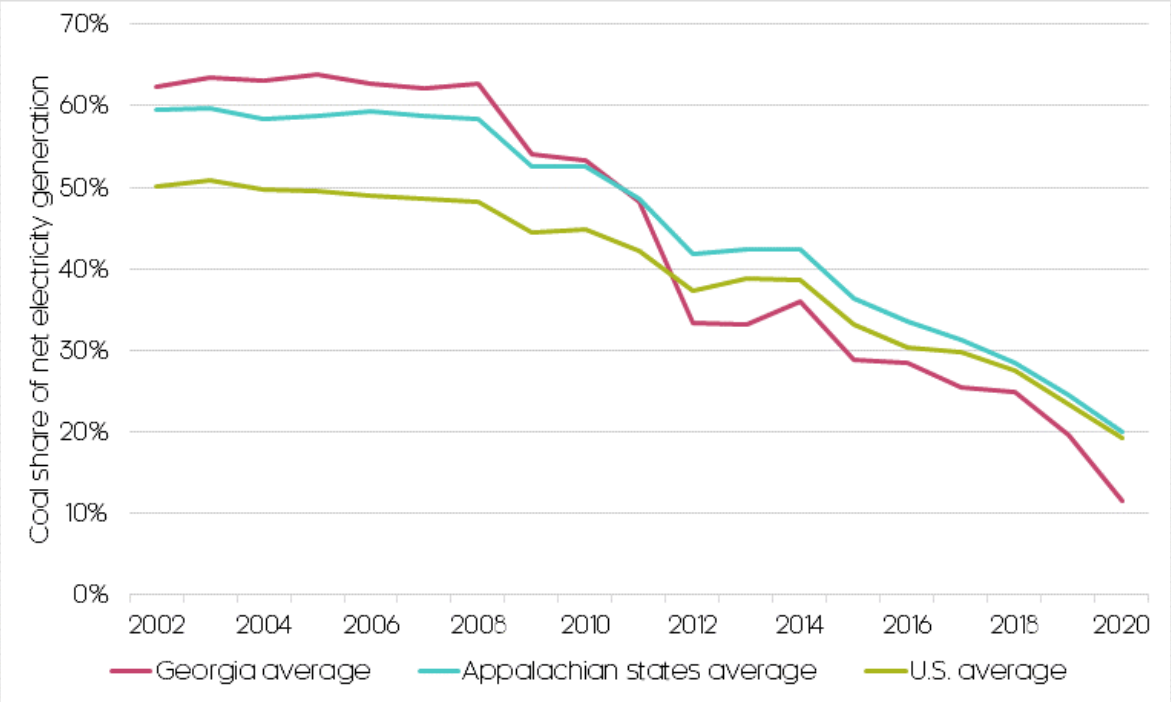
2.1 Introduction

This section of the report includes the assessment and detailed findings of coal-related economic impacts in Appalachian Georgia in terms of coal-fired power plants, suppliers and supply chains, transportation, and employment impacts.

2.2 Coal-Fired Power Plants in Northern Georgia

While Georgia lacks a coal mining industry – in contrast to several other Appalachian states – it has had a significant number of coal-fired power plants, including some of the largest ever operated in the U.S. Yet, Georgia has seen a more precipitous decline in electricity generation from coal as shown in Figure 2.1.

Figure 2.1: Coal share of net electricity generation, 2002-2020



Source: Energy Information Administration

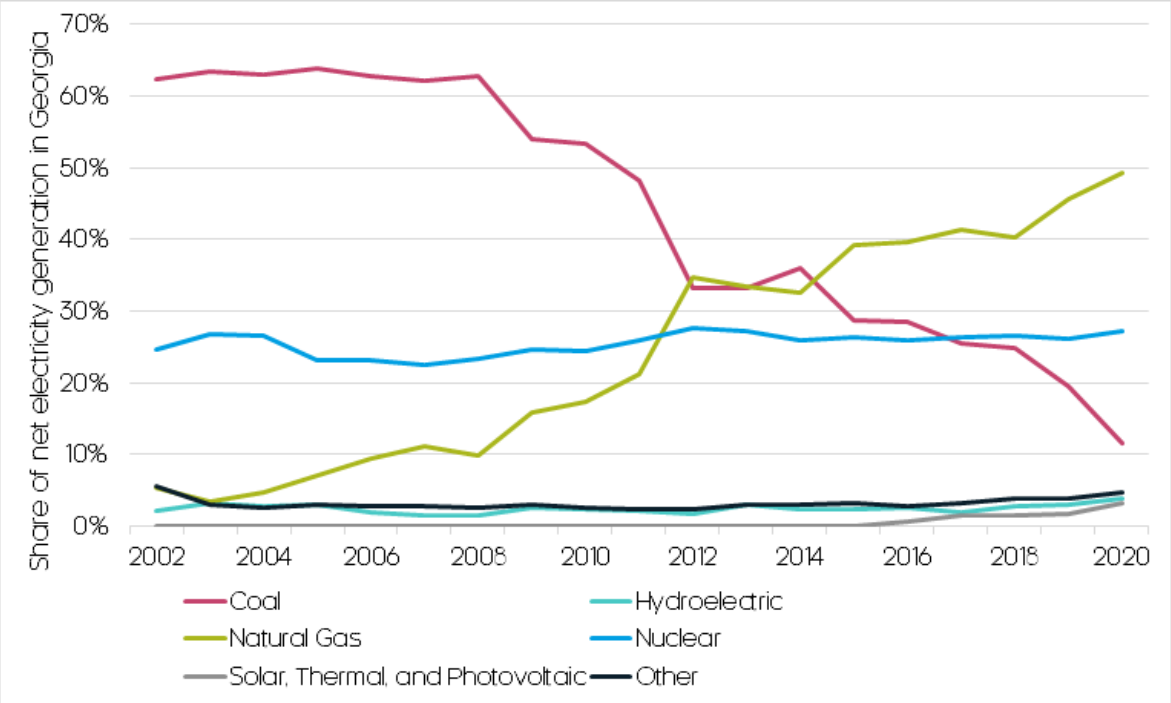
In only about a dozen years, Georgia has gone from having almost two-thirds of its electricity generated by coal in 2008, down to only 12% in 2020. In terms of electricity generation in thousands of net megawatt hours, coal-fired generation in Georgia was 13,914 units in 2020, down from almost 85,491 units in 2008, a decline of 84%.

At the U.S. level, this decline was not quite as steep, dropping from approximately 48% in 2008, to 19% in 2020. Also shown is the coal share of electricity in other Appalachian states, many of which have also transitioned away from above-average coal dependency – though this decline has not been as steep relative to Georgia's.

The decline in coal-fired electricity generation across the wider Appalachian region is relevant to northern Georgia as they are indicative of the overall decreases in coal shipments, many of which have traditionally traveled through the Class I CSX and Norfolk Southern rail corridors in the region.

A number of coal-fired power plants have been retired or converted to natural gas in Georgia over the past decade (region-specific retirements or planned retirements are profiled later in the report). As Figure 2.2 shows, the decline of coal-powered electricity generation has been accompanied by a transition to natural gas which increased from well under 10 percent of electricity generation in 2002 to about 50 percent in 2020. The share from nuclear has remained relatively constant, while that from renewables (notably solar), though small, has increased of late.

Figure 2.2: Net electricity generation in Georgia by source, 2002-2020



Source: Energy Information Administration

According to 2020 data from the EIA, presented in Table 2.1 below, there are three coal-fired power plants[3] still operational in northern Georgia; Plant Bowen in Bartow County, Plant Wansley in Heard County, and Inland Paperboard & Packaging Inc's facilities in Floyd County. The latter two maintain only limited facilities for coal, with Plant Bowen accounting for 96% of the region's coal-fired electricity generation.

Due to the retirement in 2019 of Plant Hammond in Floyd County, the conversion of Plant Wansley towards oil and natural gas, and the general decline in coal energy demand, coal-fired electricity generation (in terms of thousands of net megawatt hours) in northern Georgia has seen a major decline, from 39,697 units in 2005 to only 3,481 units in 2020, a decrease of 91 percent. Despite remaining operational, Plant Bowen accounted for more than half of this drop.

[3] Note: this excludes non-utility sources and disposition of electricity.

As a result, the demand for coal in the region has also fallen dramatically; in 2005, more than 17.5 million short tons of coal was consumed by power plants in northern Georgia. By 2020, this had more than halved to 8.2 million short tons. Given that the majority of this coal is delivered by freight rail, the transportation implications of this reduction in coal consumption is explored in greater depth later in this report as reductions in coal shipments appear to be accelerating a decline in overall freight rail service (Class 1 and shortline) as well as contributing towards the abandonment of rail lines.

According to a January 31, 2022 press release, Georgia Power will phase out all coal-fired power plants in Georgia by 2035, with only two units at Plant Bowen operating from 2028.[4] This means that the drastic reduction in coal-related economic activity (namely power generation and freight rail shipments) in Appalachian Georgia observed over the past decade will continue its downward trend in the coming years.

Employment and Fiscal Impacts of Coal Power Plant Retirements

The retirement of Plant Hammond and the planned reduction at Plant Bowen in 2028 constitute the most significant, measurable and direct economic and fiscal impacts in Appalachian Georgia. For example, Plant Hammond (Floyd County) is estimated to have employed approximately 200 local/regional workers, not including contractors and suppliers. Further details on this estimated total economic impact to the region is provided below. Similarly, Plant Bowen (Bartow County) is estimated to have had up to 340 direct workers and another 500 contract workers.

These jobs are at serious risk as Bowen is already operating at only 16 percent capacity and is scheduled to retire Units 1 and 2 entirely by 2028. In addition, local government officials from Bartow County estimate that there has already been a major decline in local sales tax due to the reduced activity and coal purchases. They estimate that utility-related local sales taxes were about $30 million per year in 2010 and represented 45 percent of tax revenue. With the reductions in activity, revenue has fallen down to about $7.5 million per year and represent only 10 percent of tax revenue – a decrease of approximately $22.5 million per year.

[4] https://www.georgiapower.com/company/news-center/press-releases.html

Table 2.1: 2020 status of coal-fired power plants in northern Georgia, relative to 2005

			2005		2020		*Difference, 2005-2020*	
Plant name	Plant operator	Current plant status	Net generation	Coal consumption	Net generation	Coal consumption	*Net generation*	*Coal consumption*
Plant Bowen	Georgia Power Co	Operational – the third- largest coal-fired power plant in the U.S. in terms of generation capacity. In November 2021, Georgia Power announced two of the plants four units would be "closing in the coming years".	22,329	9,832	3,327	7,940	*-19,002*	*-1,892*
Plant Wansley	Georgia Power Co	Operational – but with only limited facilities for coal. The majority of the plant's generation capacity is now provided by both oil and natural gas. In November 2021 Georgia Power announced additional closures "would occur" at the plant.	12,923	5,498	97	180	*-12,826*	*-5,318*
Plant Hammond	Georgia Power Co	Closed – the plant was officially decommissioned in 2019, having averaged only 12% capacity factor since 2012.	4,350	1,990	0	0	*-4,350*	*-1,990*
Inland Paperboard Packaging Rome	Inland Paperboard & Package Inc	Operational – a small-scale, mixed-use power plant, with facilities for biomass, oil, natural gas and coal.	94	229	57	39	*-37*	*-190*
		Northern Georgia total:	**39,697**	**17,549**	**3,481**	**8,160**	***-36,216***	***-9,390***

Source: Energy Information Administration, Georgia Power. Note: net generation measured as net megawatt hours. Coal consumption measured as gross short tons

2.3 Coal Supply Chain and Broader Economic Impacts

Like any major commodity production, the coal mining industry requires a wide range of equipment, materials, and specialty services. And reductions in the coal mining industry can have broader (less obvious) "multiplier" impacts as lower levels of mining revenue and labor income mean less demand for products and services. To examine these potential impacts in Georgia, we employed a mix of:

1) Data-driven analysis of the supplier industries to the coal industry, and their prevalence in northern Georgia;
2) Estimates of the total (multiplier) effects in northern Georgia of reductions in the coal industry, specifically in terms of the impact of coal-fired power plant closures; and
3) Research to identify and interview actual coal mining supplier companies in northern Georgia to determine their impacts

Analysis of Potential Coal Mining Supplier Industries

To try to identify and assess the presence of companies in northern Georgia that are suppliers to the coal mining industry, it's important to understand the detailed industry sectors that are most critical to coal mining production.

Table 2.2 ranks the top supplier industries based on the input value per $ 1 million of output (sales) in coal mining. In other words, this table quantifies how much input (intermediate goods or services) are needed by industry for coal mining production based on input-output data from U.S. Bureau of Economic Analysis.

Table 2.2: Key coal mining supplier industries (dollars per $1 million of output) in the U.S., 2012

Industry	Input per $million output
Coal mining	$81,918
Petroleum refineries	$54,973
Rail transportation	$32,578
Management of companies and enterprises	$31,796
Electric power generation, transmission, and distribution	$25,490
Fertilizer manufacturing	$16,934
Mining and oil and gas field machinery manufacturing	$16,251
Nonresidential maintenance and repair	$15,893
Other support activities for mining	$14,284
Commercial and industrial machinery and equipment rental and leasing	$13,592
Architectural, engineering, and related services	$13,216
Petroleum and petroleum products	$12,988
Other petroleum and coal products manufacturing	$12,638
Machinery, equipment, and supplies	$11,583
All other chemical product and preparation manufacturing	$10,762

Source: Bureau of Economic Analysis

As is fairly common, the largest input industry to coal mining is coal mining, which doesn't mean very much in Georgia since we already know that industry is not present in the state. Other key industries include petroleum refineries,

rail transportation (e.g., to ship coal to electric utilities), wholesale trade, specialty machinery for mining, and other mining and support services to mining.

While this is a useful starting point, most of these industries supply to many other industries beyond coal mining. This means that simply identifying and measuring the presence of these supplier industries in northern Georgia is not sufficient to understand the presence of regional coal suppliers.

For example, architectural, engineering and related services is an important input to coal mining but this sector supplies its services to a huge range of projects and industries, most of them unrelated to coal. On the other hand, other support activities for mining is more likely to be an input to coal mining, so the presence of this industry would be more telling.

In general, this challenge is what necessitates a more detailed identification of actual companies that supply to the coal mining industry (see below). As a next step, it is possible to estimate the number of employees from key supplier industries present in northern Georgia.

The data shown in Table 2.3 covers the entire 37-county northern Georgia region and was pulled from the Census Bureau's Quarterly Workforce Indicators (QWI) dataset, covering the financial year 2019-20 (and thus excludes pandemic-related impacts).

Table 2.3: Employment and establishments in coal mining supplier industries, 2019-20

Industry	Employees in northern Georgia, 2019-20	*Growth in employees in northern Georgia since 2010-11*
Support Activities for Mining	30	*10*
Electric Power Generation, Transmission and Distribution	1,890	*540*
Petroleum and Coal Products Manufacturing	110	*20*
Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	<10	*<10*
Agriculture, Construction, and Mining Machinery Manufacturing	2,520	*900*
Machinery, Equipment, and Supplies Merchant Wholesalers	9,930	*3,420*
Petroleum and Petroleum Products Merchant Wholesalers	600	*370*
Rail Transportation*	1,870	*<10*
Commercial and Industrial Machinery and Equipment Rental and Leasing	860	*480*
Architectural, Engineering, and Related Services	11,040	*3,490*
Management of Companies and Enterprises	16,400	*4,760*

Source: Census Bureau, Railroad Retirement Board. *Note: county-level rail transportation employees are not sufficiently covered by the QWI. Instead, Railroad Retirement Board data for 2012 and 2019 has been used. As a result, data for this sector is not directly comparable with others, given different sources and timeframes

In many cases, there might be additional establishments and employees not quantified here as they were not disclosed due to company confidentiality rules governing industry data. Of the industries and locations where data is

available, we can see the number of establishments and jobs for key supplier industries in northern Georgia.

In terms of employment, the largest potential coal supplier industries in the region are: 1) management of companies and enterprises; 2) architectural, engineering and related services; 3) machinery equipment and supplies merchant wholesalers; 4) agriculture, construction and mining machinery manufacturing (e.g., Fenner Dunlop); 5) electric power generation transmission and distribution (e.g., Georgia Power); and 6) rail transportation.

Despite the ongoing reduction of the coal mining industry, potential coal supplier industries in northern Georgia have experienced positive employment growth over the past decade. This is however likely due to growing demand from other markets and industries besides coal mining. There is limited or slower growth observable in more coal-reliant industries such as rail transportation, support activities for mining, and coal products manufacturing.

These findings align with dedicated research on the Appalachian coal industry supply chain undertaken by the ARC in 2018.[5] The study used input-output data to score each industry's dependency on the coal mining industry (resulting in a similar list of industries to Table 2.2 above). These industry dependency scores were then used to classify and rank the 423 Appalachian counties according to coal industry dependence, impact, and risk:

1. **Coal-dependence:** is defined by strong concentrations in industries that are central to the coal industry supply chain. A higher/lower score means a county has higher/lower coal dependency.
2. **Coal-impact:** is defined by observed declines in coal-dependent industries. A higher/lower score means a county has recently experienced higher/lower coal impacts.
3. **Coal-risk:** is defined by high coal-dependence but low accompanying coal mine productivity (and thus at high risk of closure). A higher/lower score means a county is at higher/lower risk of further mine closures.

Across the three dimensions, no Georgia county ranks in the top 20 highest scoring Appalachian counties, while the vast majority typically score below the Appalachian average. By interacting the county-level scores across the three dimensions, the study develops a 'Coal Industry Ecosystem (CIE) county typology' to categorize Appalachian counties into:

- **Depressed counties:** comprise counties that have high CIE-dependency and are the most distressed from changes in the coal-industry. These counties score highly across all dimensions (dependence, impact and risk).
- **Vulnerable counties:** have not yet faced the levels of economic hardship of other CIE-dependent counties but are vulnerable to continued coal-industry decline. These counties score highly for dependence and risk.
- **Hardship counties:** have experienced CIE-based declines, but because they have lost the majority of their CIE, their economies are

[5] http://www.arc.gov/wp-content/uploads/2018/01/CIE2-CountyLevelCIESupplyChainAnalysis-2.pdf

no longer CIE-dependent, so are not expected to incur further substantial CIE-based job loss. These counties score highly for impact.

For Appalachian Georgia, 23 of the 37 counties are categorized as depressed, vulnerable, or hardship. Fourteen are uncategorized, and according to the study, are those least affected by the coal industry. As Table 2.4 shows, Georgia has a comparatively low incidence of counties that are depressed, vulnerable, or hardship.

Table 2.4: Appalachian counties according to Coal Industry Ecosystem (CIE) typology

State	Depressed counties	Vulnerable counties	Hardship counties	Total depressed, vulnerable, or hardship	Proportion depressed, vulnerable, or hardship
Alabama	3	11	15	29	78%
Georgia	**4**	**5**	**14**	**23**	**62%**
Kentucky	17	15	12	44	81%
Maryland	1	1	0	2	67%
Mississippi	2	3	8	13	54%
North Carolina	4	2	14	20	65%
New York	0	3	8	11	79%
Ohio	8	12	8	28	88%
Pennsylvania	10	28	8	46	88%
South Carolina	0	3	2	5	71%
Tennessee	9	11	18	38	73%
Virginia	9	5	9	23	92%
West Virginia	16	25	7	48	87%
Appalachian total	***83***	***124***	***123***	***330***	***78%***

Source: Appalachian Regional Commission

Table 2.5 summarizes the typology results for the individual counties in Georgia. The majority of affected counties in Georgia sit within the hardship category, whereby the greatest coal industry related losses have already occurred. The presence of depressed and vulnerable counties in Georgia warrants special attention and concern, particularly if current coal industry trends continue.

Table 2.5: Georgia counties according to Coal Industry Ecosystem (CIE) typology

Depressed counties	Vulnerable counties	Hardship counties
Elbert County	Bartow County	Chattooga County
Franklin County	Forsyth County	Dade County
Heard County	Gwinnett County	Gilmer County
Pickens County	Jackson County	Gordon County
	Murray County	Habersham County
		Hall County
		Hart County
		Lumpkin County
		Madison County
		Polk County
		Rabun County
		Stephens County
		Towns County
		Whitfield County

Source: Appalachian Regional Commission

Economic Effects of Coal Industry Reductions

In addition to data-driven attempts at identifying firms supplying the coal industry in northern Georgia, it is possible to use input-output modeling to estimate the indirect, induced and total economic effects of changes in the coal industry on the region. Given that northern Georgia and the surrounding region lack a coal mining industry, these effects have been estimated for the local coal-fired power sector – a key end user of the Appalachian coal industry with coal-fired electricity generating plants the largest user of coal in Georgia.

Specifically, we have identified two scenarios to assess the wider economic effects of a reduction in local coal-fired generation: 1) models the effects of the recent closure of Plant Hammond in Floyd County; and 2) models the effects of the announced capacity reduction at Plant Bowen in Bartow County[6]. These scenarios have been used to estimate and articulate the direct, indirect and induced economic effects of coal-fired plant closures in northern Georgia.

Direct effects capture the jobs, wages, and business output (sales) of a coal power plant. **Indirect effects** refer to coal power plant suppliers, and track the input (or intermediate) purchases of goods and services that are required for coal electricity generation. **Induced effects** represent the economic impact of consumer spending when direct (coal power plants) and indirect (suppliers) industry workers and labor income change. Or said differently, when labor income is decreased due to a reduction in coal power plant workers and suppliers, that results in reductions in consumer spending.

Total effects represent the combination of direct, indirect and induced effects (often called total multiplier effects). In the case of northern Georgia, the direct effects relate to the activities of the Georgia Power run facilities at Plant Hammond and Plant Bowen. Simulating the indirect and inducted effects in the region requires customized analysis and interpretation. To approximate

[6] Georgia Power are yet to confirm which two of Plant Bowen's four units will be closed. Here, we have assumed the closure of its two oldest units, which account for 46% of its nameplate capacity.

these effects, a Regional Input-Output Modeling System (RIMS II) dataset[7] was obtained for the 37-county northern Georgia region.

An estimated output loss has been estimated for the individual plants based on publicly available data and announcements, which has then been entered into the RIMS II dataset, to calculate the broader indirect and induced economic effects. These output losses have been estimated by considering current and forecast data on the individual plant's capacity factor (using plant-level data from the U.S. Energy Information Administration) and the wholesale price of coal-fired electricity.

Table 2.6 and Table 2.8 present a summary of the estimated economic impacts in northern Georgia as a result of the recent closure of Plant Hammond and the planned reduction of capacity at Plant Bowen. It should be noted that both scenarios estimate the reduction of economic activity at these plants as a single year when in reality impacts will be felt over multiple years with likely 'winding down' and the potential for scaling/shifting of activity from these plants.

Table 2.6: Estimated economic effects in northern Georgia of the closure of Plant Hammond, relative to its 2012-2019 capacity factor

	Direct	Indirect	Induced	TOTAL
Jobs	40	48	50	**137**
Output ($million)	$39.2	$7.6	$7.1	**$53.9**
Earnings ($million)	$5.2	$2.1	$1.8	**$9.1**

Source: Cambridge Econometrics (using RIMS II multipliers)

For Plant Hammond, which had been averaging only 16% capacity factor since 2012, the estimated losses from the plants closure are comparatively small, but still notable. In terms of job impacts, the indirect effect (i.e. to suppliers) is relatively modest with almost 50 estimated job losses stemming from a reduction of approximately 40 jobs directly at Plant Hammond.

The induced effects based on lower consumer spending result in a similar loss of 50 jobs for an estimated total of almost 140 job losses in northern Georgia. The estimated $39 million drop in output from the closure of Plant Hammond could result in up to $8 million in lost sales for northern Georgia suppliers and another $7 million from induced effects for a total of almost $54 million.

Examining the impact to earnings (labor income for workers), the total impact in northern Georgia between direct, indirect and induced effects is estimated to be just under $9 million. This equates to approximately $66,000 per job lost, reflecting the above-average earnings in the electric power industry.

[7] RIMS II is a product of the U.S. Bureau of Economic Analysis and can be customized to any set of U.S. counties. It provides a detailed series of input-output "multipliers" for business output, employment and wages. For more information, see: https://apps.bea.gov/regional/rims/

Table 2.7: Estimated economic effects in northern Georgia of the closure of Plant Hammond, relative to its 2005 capacity factor

	Direct	Indirect	Induced	TOTAL
Jobs	200	239	249	**687**
Output ($million)	$196.2	$38.2	$35.5	**$269.9**
Earnings ($million)	$25.9	$10.5	$9.0	**$45.4**

Source: Cambridge Econometrics (using RIMS II multipliers)

However, with Plant Hammond recently being operated at a substantially reduced capacity factor since 2012, additional modelling has been undertaken to assess the longer-term economic effects Plant Hammond's closure, specifically relative to its capacity factor in 2005. These results are summarized in Table 2.7 above.

They show that, relative to 2005, the reduction in capacity factor and eventual closure of Plant Hammond resulted in approximately 200 direct jobs lost and an estimated total of 687 job losses, a $270 million drop in output, and $45 loss of wages across northern Georgia.

Table 2.8: Estimated economic effects in northern Georgia of the reduction in capacity at Plant Bowen

	Direct	Indirect	Induced	TOTAL
Jobs	178	213	222	**613**
Output ($million)	$175.2	$34.1	$31.7	**$241.0**
Earnings ($million)	$23.1	$9.4	$8.0	**$40.5**

Source: Cambridge Econometrics (using RIMS II multipliers). Note: Georgia Power are yet to confirm which two of Plant Bowen's four units will be closed. Here, we have assumed the closure of its two oldest units, which account for 46% of its nameplate capacity

Meanwhile, the planned reduction of Plant Bowen's operating capacity (with 2 or its 4 units expected to close in 2028) could result in an estimated 610 job losses across northern Georgia; almost 180 of these will be directly from the plant closure itself, while almost 240 further job losses will be attributable to indirect (supplier) and induced effects.

The estimated $175 million drop in output from the planned reductions at Plant Bowen could result in up to $34 million in lost sales for northern Georgia suppliers and another $32 million from induced effects for total losses of $241 million. Examining the impact to earnings (labor income for workers), the total impact in northern Georgia between direct, indirect and induced effects is estimated to be just over $40 million.

In reality, and as recent experiences show, it is likely any closure or reduction of a coal-fired power plant operating capacity would occur over time (a more gradual process than that hypothesized here), and it is likely that rather than a wholesale loss of activity, some existing activity and employees would shift to other plants or locations.

In other words, the impacts presented above likely represent an upper end interpretation. As a result, any future use of these estimates should carefully describe their assumptions about the magnitude and nature of coal-fired power plant closures and how that would adjust these estimates.

These estimates should also be reconciled with other related research and studies. For instance, a recent study commissioned by the ARC[8] found that the magnitude of the economic effects of coal-fired power plant shutdowns range dramatically, depending on the capacity of the plant and the size of the local economic market.

Under an extreme illustrative scenario, the study found the shutdown of a large coal-fired power plant in a small county can lead to a loss of around two-thirds of the county's wage and salary income. In contrast, for a mid-size plant shutdown in a mid-size county, the study found that the plant shutdown reduces wage and salary income by in the region of 5%.

Research on Individual Company Coal-related Impacts

As demonstrated in the sections above, quantitative analysis of secondary (published) data can help estimate the overall impacts of coal mining changes on the northern Georgia economy. But the analysis can feel a bit abstract at the industry-level and as described earlier, it is nearly impossible to identify actual coal industry suppliers and companies impacted by changes in the coal industry purely based on this data.

Consequently, considerable effort was allocated to try to identify individual companies that in some way are impacted by changes in the coal industry. This included the use of a survey with local and regional economic development leaders throughout Appalachian Georgia to identify potential coal-related impacts. This could include, most directly, firms that are actual suppliers of mining-related equipment, products or services that are used in coal production. It also could include businesses or development opportunities that are impacted more indirectly such as when reduced coal shipments by rail result in reduced freight rail service for the region (see Section 2.4 below).

The one major coal mining industry supplier that we identified is Fenner Dunlop (https://fennerdunlopamericas.com/) based in Lavonia, Georgia. Fenner Dunlop specializes in large-scale conveyor belts and related equipment for the energy, agriculture and infrastructure sectors. They employ approximately 150 workers in Appalachian Georgia, and Hart County economic development officials state that mining-related sales losses of their conveyor belts led to a loss of workforce positions. Company officials estimate that they have experienced a roughly 10-15 percent reduction in coal mining-related sales and have worked hard to diversify their markets due to the overall decline in mining activity.

2.4 Transportation Impacts – Reduced Freight Rail Service

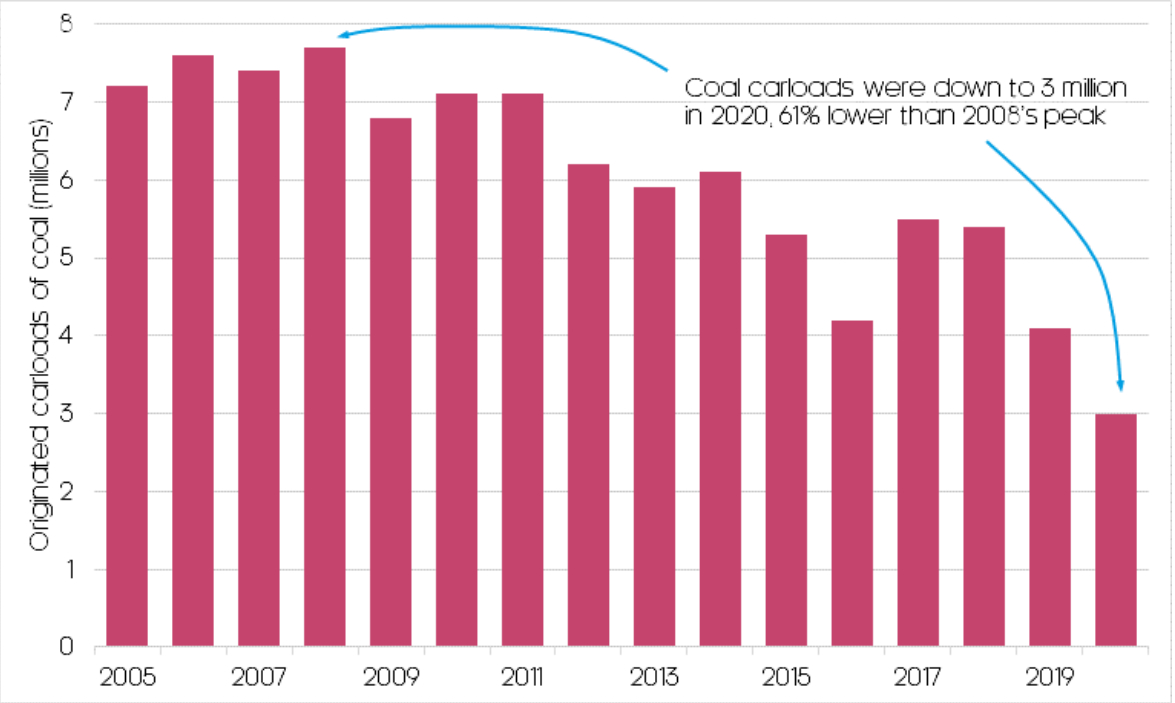
As noted earlier in the report, US coal mining production and consumption has fallen significantly in recent years, with production at its lowest level in 55 years. One of the direct implications is that rail carloads for coal are also down. Coal is the largest tonnage commodity shipped by rail in the U.S., and accounts for 23% of all rail traffic terminating in Georgia.

Using data from the American Association of Railroads (AAR), Figure 2.2 depicts this reduction in coal rail traffic across the U.S. According to the AAR, coal carloads have fallen 61% since their peak in 2008, a trend consistent with

[8] http://www.arc.gov/wp-content/uploads/2018/01/CIE4-ImpactsandRisksElectricPowerGeneration-2.pdf

the annual reduction in U.S. coal production shown in Energy Information Administration data (see Figure 1.1 above).

Figure 2.2: U.S. coal carloads, 2005-2020



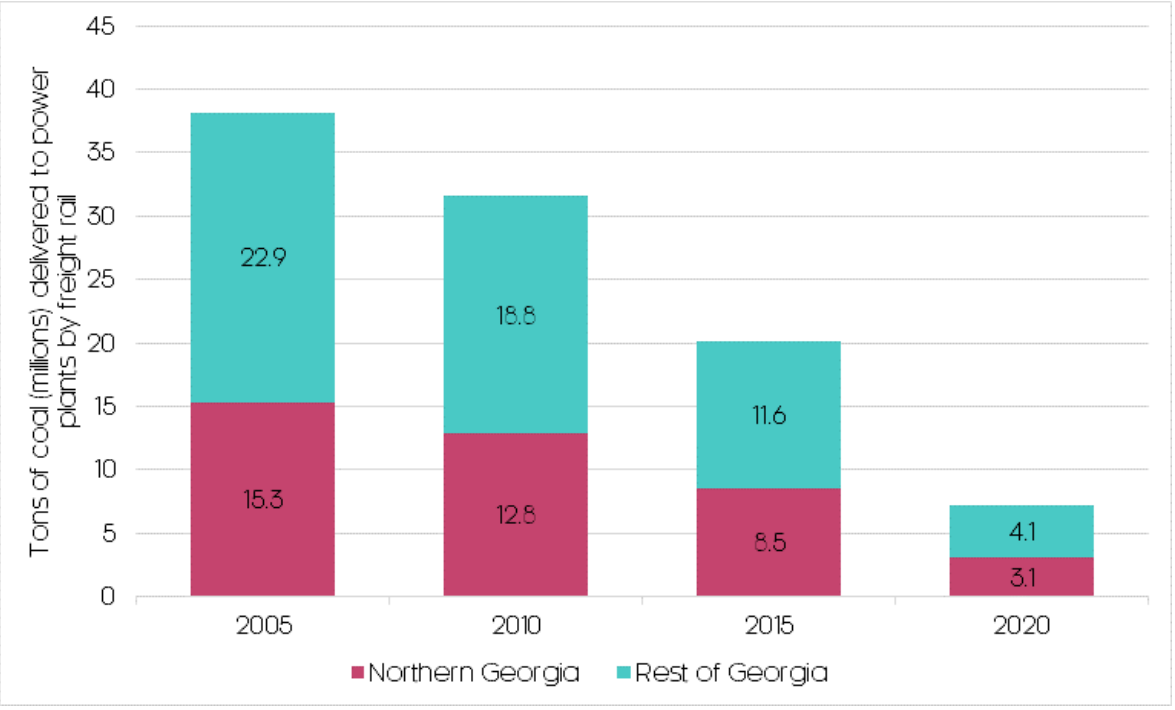
Source: American Association of Railroads

Data from 2017 Commodity Flow Survey found that, in revenue terms, Georgia receives more coal traffic than any other Appalachian state. The 1,009 rail miles per shipment was also amongst the highest average distances in the U.S., reflecting the greater distance coal travels to reach the state, and the wider supply chain dependencies and freight rail implications of coal arriving in Georgia.

Plant-level records obtained from the IEA, presented in Figure 2.3, show that coal-fired power plants in northern Georgia have on average accounted for more than two-fifths of all coal rail traffic terminating in Georgia. In 2020 alone, Plant Bowen directly received 3.1 million tons of coal from freight rail, the majority of which travelled from mines in Illinois, with more than two-thirds of that volume from just two mines - Galatia and MC#1.

The data also highlights how the steady retirement and conversion of coal-fired power plants in the region has led to a major reduction in associated coal rail traffic. For example, in 2005, power plants in northern Georgia took receipt of some 15.3 million tons of coal by rail. In 2020, this number was down to 3.1 million tons, a decrease of 80%. Over the same time period, total U.S. freight tons declined by just 17%.

Figure 2.3: Power plant coal receipts by rail in Georgia, 2005-2020

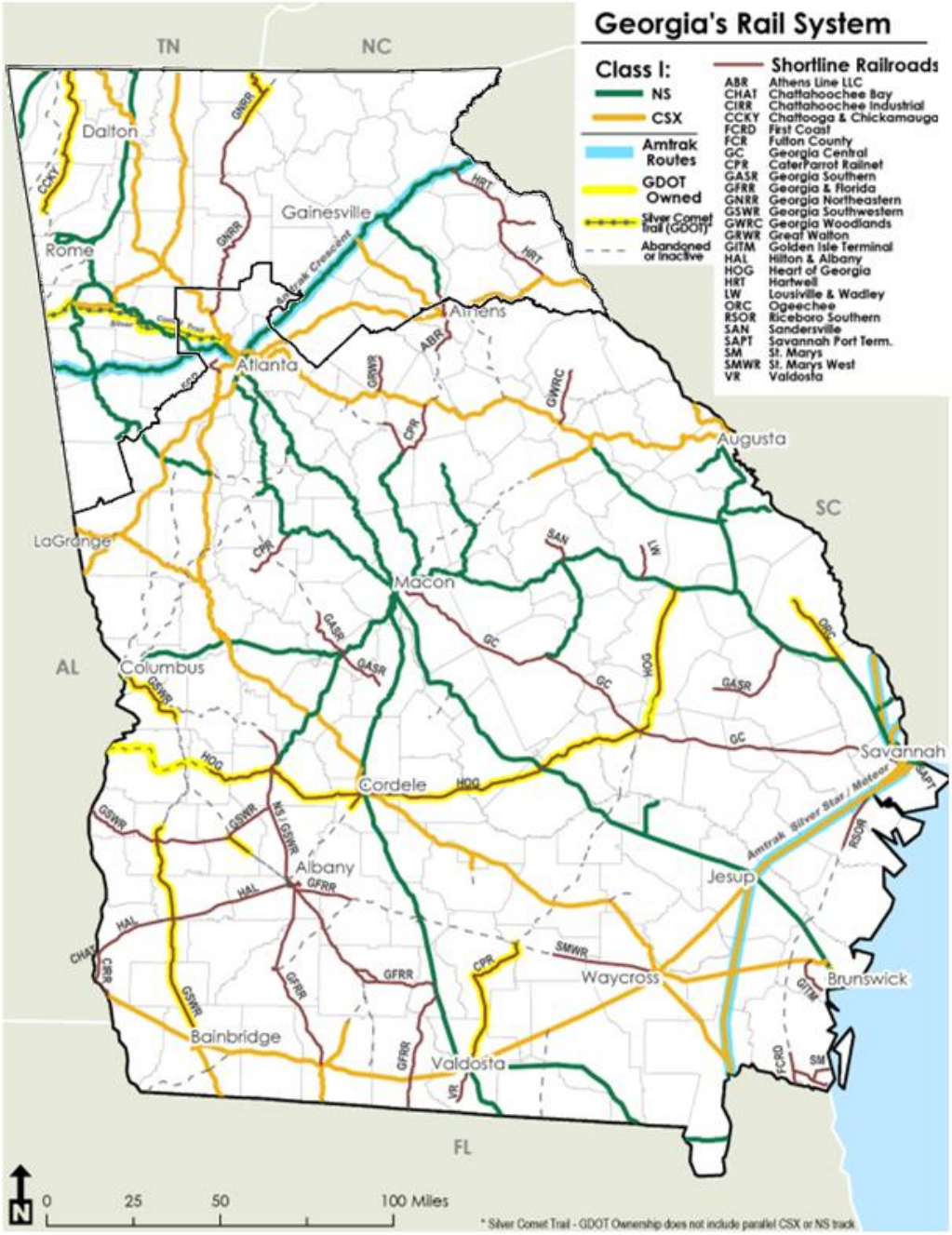


Source: Energy Information Administration

To examine the implications for northern Georgia, it's helpful to start with an understanding of some of the key freight rail corridors in the region, as presented in Figure 2.4. The two major Class I railroads present in the region are CSX and Norfolk Southern (NS), who together operate some 3,282 miles of track across Georgia, 70% of all track in the state.

Also relevant to the region are a number of short line railroads including Georgia Northeastern, Chattooga & Chickamauga, and Hartwell. Together, these short line railroads operate 208 miles of track in northern Georgia. Some of these operators have taken over rail lines formerly run by Class I operators in the region.

Figure 2.4: Georgia's rail system



Source: Georgia Department of Transportation

Coal-Related Impacts on Freight Rail Service and Volumes

The major reductions in coal consumption in Georgia and the broader Appalachian region are directly changing the volume and routing of freight rail service in northern Georgia with impacts for railroad companies, freight rail customers, rail routes and economic development. Based on multiple accounts from local/regional economic development officials in northern Georgia, there are a number of ways that the reduction in coal use is affecting the region, including:

- Officials in Bartow County report that there used to be about nine freight trains per day, primarily serving the coal power plant(s) with 900 train cars per day. That number has dwindled to less than one per day, indicative of how much less freight rail service exists in the region.

- At the University of Georgia in Athens, they converted a coal-fired boiler to an electro-boiler in 2015. They used to receive coal via rail directly to that university facility, but no longer.
- Reduced freight rail traffic volumes on the Great Walton Railroad corridor from Elberton to Toccoa.
- In Chattooga County, they are experiencing multiple impacts due to reduced freight rail volumes:
    - The Chattooga & Chickamauga (CCKY) railroad used to be an active freight rail corridor but is now almost exclusively a tourist railroad (which wasn't able to operated last year).
    - The county has suffered from abandoned rail lines and used to have freight rail connections to Norfolk Southern.
    - The lack of freight rail service options means that traditional industry and manufacturing companies in the county (and nearby) are forced to use trucking for all inbound and outbound shipments. Local officials discussed current and potential economic opportunities for flooring (nearby Dalton is a global leader in carpet manufacturing), logging, and poultry. But these, and other economic development opportunities, are limited due to a lack of freight rail.

3 Summary of Key Findings

Although Georgia does not possess a coal mining industry, this report and the data evidence generated by it find a number of significant areas of economic impact in Appalachian Georgia due to the decline in coal-related activity. As an overarching finding, the impacts to northern Georgia communities primarily stem from the dramatic decline in coal used in power generation. This is exemplified by:

- The major shift from coal to natural gas for electricity production;
- The retirement and planned retirements of major coal-fired power plants, including operating units in Appalachian Georgia, with Georgia Power announcing that it will phase out all coal power plants by 2035, with only two units operating at Plant Bowen after 2028;
- A staggering reduction in freight rail shipping volumes and the resultant impacts to freight rail service; and
- Ripple effects on economic development related to job losses, reduced economic indirect and induced activity from power plants, and counties at-risk from broader coal industry declines due to their industry mix.

More specifically, we find that:

- There has been a steady decline in US coal production over the past 15 years, and 2020 represented the lowest level of coal industry production in 55 years.
- As recently as 2002, the coal share of electricity generation in Georgia was over 60 percent, a higher share than the US or Appalachian averages. By 2020, the coal share in Georgia had fallen to about 11 percent, even lower than the US and Appalachian averages of closer to 20 percent. This is a clear indication of how dramatically coal use has fallen in Georgia over the past 20 years.
- Some of Georgia Power's largest coal-fired power plants are in Appalachia with recent and upcoming retirements – Plant Hammond in Floyd County was closed in 2019; Plant Bowen in Bartow County is retiring 2 of its 4 operating units; and Plant Wansley in Heard County is also expected to close.[9]
    - These closures, to go along with operating levels which are already well-below capacity, lead to job layoffs, less local tax revenue, reduced freight rail shipments and multiplier effects on the regional economy. For example, local officials state that Plant Hammond is estimated to have resulted in approximately 200 direct job losses not including contractors and other indirect and induced effects.
- A 2018 research study published by the Appalachian Regional Commission helped identify the supply chain impacts of reduced coal mining activity and categorized all counties in Appalachia by risk

[9] https://www.powermag.com/southern-will-close-more-than-half-of-coal-fleet/

factors, according to industry mix. For Appalachian Georgia, 23 of the 37 counties are categorized as depressed, vulnerable, or hardship. Fourteen are uncategorized, and according to the study, are those least affected by the coal industry.

  - Elbert, Franklin, Heard and Pickens counties were identified as 'depressed' as they comprise counties that have high coal industry-dependency and are the most distressed from changes in the coal-industry.

- Multiple research methods were used to try to identify specific coal mining supplier industries in Appalachian Georgia, including surveys of local and regional economic development officials. The one major coal mining industry supplier that we identified is Fenner Dunlop (FD) based in Lavonia, Georgia. FD specializes in large-scale conveyor belts for the energy, agriculture and infrastructure sectors. They employ approximately 150 workers in Appalachian Georgia with Hart County officials stating that there has been a loss of workforce positions. Company officials estimate that they have experienced a roughly 10-15 percent reduction in coal mining-related sales and have diversified their markets due to the overall decline in mining activity.
- The retirement and scaling back of operations at coal-fired power plants has had both direct and broader regional economic impacts for Appalachian Georgia, with more retirements and jobs at-risk in the coming years. For example, we estimate that the 2019 retirement of Plant Hammond (at one point employing about 200 workers) has led (over time) to an annual economic impact loss of approximately 685 jobs, $270 million in business output (sales), and $45 million less earnings by regional workers.
  - For Bartow County, they estimate that the gradual reduction in operations at Plant Bowen has led to a drop in local sales taxes from about $30 million per year down to $7.5 million per year.
- Freight rail coal shipments have fallen significantly nationwide, but have dropped even more precipitously in Appalachian Georgia. For example, in 2005, power plants in northern Georgia took receipt of some 15.3 million tons of coal by rail. In 2020, this number was down to 3.1 million tons, a decrease of 80%. Over the same time period, total U.S. freight tons declined by just 17%. This decrease has led to a reduction in overall freight rail service to the region and anecdotal evidence of increased freight rail costs (rates), which also impacts economic development opportunities in other key industrial sectors such as flooring materials, logging, agriculture and poultry.