# An Economic Analysis of Appalachian Power Industry Ecosystems

## County-level PIE Supply Chain Analysis

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# An Economic Analysis of Appalachian Power Industry Ecosystems

## Executive Summary

The transition in the U.S. power generation industry marked by a shift from fossil fuels to renewables has implications that differ from industry to industry and from region to region. These differences in industry implications arise because of the nature of the power industry ecosystem (PIE), in which each industry occupies its unique position in the power industry supply chain. There are industries that provide goods and services directly to the power industry and those that supply the power industry indirectly via provision of goods and services to the first-level suppliers and to their suppliers throughout subsequent supply chain levels and linkages. Likewise, each region has a unique mix of industries and so, as collections of industries, regional economies also vary in terms of their positions and roles in the PIE, and in terms of the strength of their linkages to the power industry. In turn, these critical differences give rise to impacts of power generating industry transitions that can vary substantially from county to county, region to region, and state to state.

Implicit in this analysis is the assumption that the supply chain representation in currently available interindustry data is dominated by fossil fuels and that as fossil fuel technology is replaced by renewables, industries in the current power industry supply chain will be at greater risk of decline than other industries. This is an appropriate assumption for an Appalachian Region that also has been dominated by fossil fuel power generation, especially coal-fired power plants. As these power plants close, the demand for Appalachian coal and its supply chain – embedded in the PIE – also will continue to decline.

In this report, we describe an effort to provide for the Appalachian Region a clearer picture of the implications for the PIE of power generating technology transitions and the geographical variations in PIE impacts. We develop and implement three measures that reveal meaningful characteristics of the PIE at the county level in terms of industry and place-based PIE dependence, changes in PIE-dependent employment, and susceptibility to impacts from a continued energy sector transition. We then use these three measures—Dependence, Impact, and Risk—to form a typology that we apply to identify and focus on counties in three identifiable categories: Hardship counties, Vulnerable counties, and Depressed counties.

The 106 *Hardship* counties rank below the median of all counties on the Dependence and Risk dimensions, and above the median on the Impact dimension. These counties have experienced high levels of negative impacts, but because they have lost most of their PIE-dependent industry jobs, their risk of further substantial decline is reduced. The 104 *Vulnerable* counties rank below the median score on the Impact dimension, but above median scores on the Dependence and Risk dimensions. These counties did not exhibit negative consequences of PIE transitions between 2005 and 2018, but because they are PIE-dependent and at risk of further power industry shifts away from fossil fuel technologies, they form a group of counties with higher potential for future job loss. The 76 *Depressed* counties score above median on all three dimensions. They suffered PIE-dependent job losses between 2005 and 2018, they continue to host PIE-dependent industries, and they are at risk of further future power decline job-loss.

Finally, we narrow focus to the five Depressed counties that rank in the top 20 on all three PIE dimensions. These are Grant, Mason, and Pleasants Counties in West Virginia; Oconee County, South Carolina; and Gallia County, Ohio. There is some variation in 2014-2018 unemployment rates in these counties, ranging from a low of 3.8 percent in Grant County, WV to a high of 8.3 percent in Pleasants County, WV. On average in these counties, the power industry alone accounts for just over 5% of total county employment, and their wages account for almost 12.7% of county totals. More than 7% of Grant County, WV employees are in the power industry, accounting for almost 17.5% of county wages. Counties in the Depressed category might warrant close monitoring if current power industry trends continue.

# Overview and Summary

Roughly one third of coal-fired power generation capacity was retired or replaced by another fuel source between 2011 and 2020, and another 25GW (~13%) reduction is planned by 2025.[1] The transition from fossil fuels to cleaner energy sources spurred on by technological and market forces coupled with heightened environmental concerns has reduced the economic viability of fossil-fueled power plants, especially coal-fired power generating facilities that historically have been the dominant suppliers of electricity in Appalachia. This has, in turn, diminished the demand for coal and other industries linked to the power industry ecosystem (PIE). As the technology transition continues, there are direct impacts from reductions in local employment and income and ripples through the industry supply chain that extend to a wide range of industry sectors and occupations. Still more jobs are imperiled as suppliers face declines in demand and the fiscal health of communities is weakened. Supporting workers might necessitate investments in formal education and training requiring time and resources. Environmental concerns, declining natural gas and renewables prices, and aging capital stock all have affected coal-fired power generation in the region. When coal-based capacity is replaced by natural gas and renewables, the demand for the region's coal, long a foundation of so many Appalachian communities, is further depressed. The shifting structure and spatial location of power generating capacity creates additional impacts on the economic and tax bases. As the economic base suffers, state and local governments also will see their capacity to fund education, health, and other public services weaken.

This project is designed to augment an earlier analysis of the Appalachian coal industry ecosystem (CIE). The CIE analysis placed the coal industry at the consuming end of the supply chain and provided county-specific metrics of CIE dependence, impact, and risk. To capture the direct and indirect impacts of the power industry technology transition, this analysis moves the consuming (downstream) end of the supply chain one step closer to final demand and use. Like the CIE, the PIE is characterized by the relationship and interdependence among the power generating and other industries – including coal – in its supply chain. This analysis is intended to deepen understanding of the PIE and its supply-chain interdependencies and supporting infrastructures.

This report presents the results of the supply-chain analysis of county-based PIEs and provides a unique characterization of power-impacted counties by defining and measuring three related dimensions, namely PIE dependence, impact, and risk. Risk in the CIE analyses was defined as a function of coal mine viability, whereas in this report, capacity utilization data are used as a proxy for risk, because the power plants that operate at lower capacity utilization levels are those that are least economically viable generally and therefore at greater risk of continued decline.

[1] https://www.eia.gov/todayinenergy/detail.php?id=44976

# Introduction

Given the trends in U.S. electric power generating technology and the shift away from fossil fuels, Appalachia's heavily coal-dependent fossil-fuel power sector faces continued declines. A deeper understanding of the ways in which these declines vary spatially, and which regions have been and might be expected to be most strongly impacted by continuing trends can assist in planning and in the development of economic policies and programs. There has been a growing focus on coal-impacted counties by federal agencies, in part due to direct funding and assistance programs for places that have been most heavily affected. This led us to define and assess three important dimensions of CIEs:  Dependence, Impact, and Risk.

As a supplement to the results of the CIE analysis, this document provides a parallel treatment of Power Industry Ecosystem (PIE) dimensions. PIE-dependence (hereafter simply Dependence) is defined by strong concentrations in industries that are central to the power generation industry supply chain. PIE impact (Impact) is defined by observed declines in PIE-dependent industries. Noting the correlation between capacity utilization and economic viability of power plants, we define a PIE risk index (Risk) by combining Region-wide and county-based Dependence with power plant capacity utilization factors, where counties in regions with higher Dependence and lower capacity utilization factors scores are at greatest risk of further negative impacts.

Depicting the production characteristics of the power industry ecosystem (PIE) requires an approach that recognizes the role of production supply chains. Like other industries, the Electric power generation, transmission, and distribution industry (or simply, the power industry) relies on many other industries for the materials and supplies it consumes in its production process. In turn, these supplying industries also require inputs from other industries to produce the supplies used by the power industry. Second-order suppliers require inputs from third-order suppliers, and so on. Together, these direct and indirect industry connections create a web of interindustry linkages that make up the power industry's supply chain.

Implicit in this analysis is the assumption that the supply chain representation in currently available interindustry data is dominated by fossil fuels and that as fossil fuel technology is replaced by renewables, industries in the existing power industry supply chain will be at greater risk of decline than other industries. These are appropriate assumptions for an Appalachian Region that also has been dominated by fossil fuel power generation, especially coal-fired power plants. According to the U.S. Energy Information Administration, for example, fossil fuels account for nearly 97% of all Appalachian net power generation (59% coal and 38% gas) in the Appalachian Region, and "Coal-fired electric power plants accounted for 91% of West Virginia's electricity net generation in 2019."[2] As these facilities age, decline, and close, the demand for Appalachian coal and its supply chain – embedded in the PIE – also will continue to decline.

[2] https://www.eia.gov/state/?sid=WV

# Analysis

To characterize Appalachian counties relative to the PIE, we develop and implement a set of tools that targets key supply chain industries and county level supply chain impacts. Our methods use national input-output data and county-level employment by industry data, both from the U.S. Bureau of Labor Statistics (BLS),[3] and energy data come from the U.S. Energy Information Administration (EIA) and the U.S. Department of Labor, Mine Safety and Health Administration (MSHA).

Each of the next three subsections describes one of the PIE dimensions used to characterize Appalachian counties, including conceptual underpinnings and discussions of results presented graphically and numerically in tabular format. Next, we present a typology of Appalachian counties formed from the three separate dimensions. The typology's eight classes provide an effective summary of the extent to which Appalachian counties have been affected by power industry declines. All underlying mathematical formulations are included as Appendix I.

## PIE Dependence

The overall objective in developing a county-based measure of PIE dependence is to quantify the extent to which a county's economy is dependent on the power industry and its supply chain. Counties that have relatively large and diverse economies would be expected to be able to adapt to changes in the PIE more readily than those whose economic activities are tied strongly, either directly or indirectly, to the power industry. In terms of economic resilience to power industry downturns, then, high Dependence scores are considered to be a negative.

### *PIE Industry Scores*

To estimate county PIE dependence requires that we develop a way to measure each industry's direct and indirect dependence on the power industry. We can then combine this metric with county distributions of employment by industry to determine the shares of each industry's employment that are PIE-oriented. The ratio of the sum of all industries' PIE-oriented employment to county total employment then provides a direct measure of county PIE-dependence.

The first step in implementation is to define the PIE to include the power industry and its supply chain-linked industries. The power itself obviously occupies the central PIE position in the supply chain. Upstream supplier industries and downstream purchasers can be connected directly by sales to and purchases from the power industry, or by supply chain links to and from the power industry's suppliers and purchasers, then to their supply chain-linked industries, and so on, as shown in Figure 1. In this report, we focus our analyses on power industry purchases (i.e.,

[3] The U.S. Bureau of Labor Statistics Census of Employment and Wages (BLS CEW) data are enhanced and extended by the Implan Group, a well-established commercial provider of regional economic data. Published BLS CEW data omit data values that are subject to disclosure rules. Implan imputes and provides consistent estimates for missing data at the county level.
The BLS input-output data are aggregated to

upstream, backward linkages). This implies that in the short or medium term, household and industrial electricity consumers are more likely to purchase from other providers to the grid than they are to reduce their activity levels or relocate, and long run economic development implications are excluded from consideration. The linkages to upstream industries are more direct and regular and their fortunes are tied more directly to the power industry in that they are more likely to observe declining demand for their products as less power is produced than are downstream industries.

Direct and indirect upstream purchase requirements all can be identified straightforwardly using technical requirements coefficients from national input-output (IO) accounts. The national accounts identify total input requirements, but not their geographical sources. Some supply chain transactions will be sourced within a county where the power generation occurs, some will be sourced elsewhere in Appalachia, and some will be outside of the Appalachian Region.

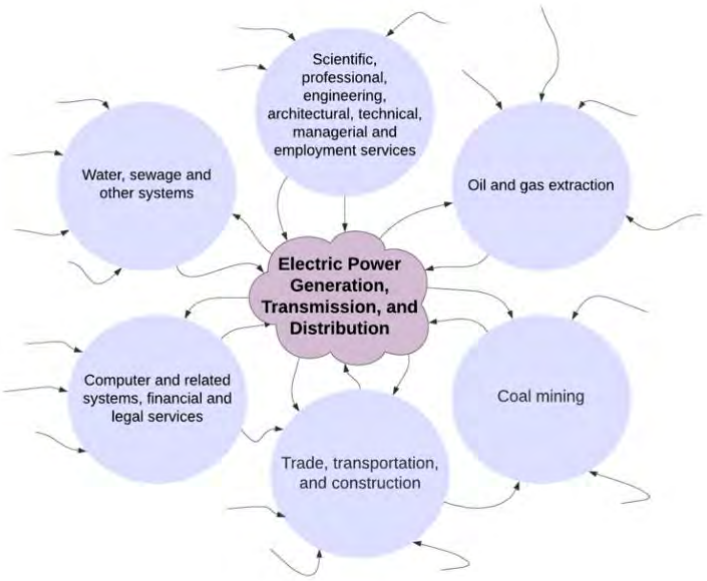



*Figure 1. Power Industry Supply Chain*

We can estimate the extent to which industries in the Region are PIE-oriented by comparing their observed employment levels and corresponding output estimates to the levels of supply needed to satisfy the direct and indirect demand attributable to power industry operation in the Appalachian Region. For this purpose, we use information from the BLS national input-output accounts to define the technical relationships among industries and average output per employee by industry to identify the shares of output from other industries that would be needed to support the Appalachian Region's power industry. If an industry in the Appalachian Region produces less output than is needed to support Appalachian power production, then we assign its entire output to the PIE, implying that the remaining demand will be supplied by other regions. If an industry produces more than enough output to satisfy demands directly and indirectly associated with power generation, then the PIE-dependent share is the ratio of the amount needed by the Appalachian power industry to the amount produced. These PIE-dependent shares of Appalachian Regional employment associated with the PIE, multiplied by 100, are industry PIE Scores.

The top 2018 PIE Score industries are shown in Table 1 along with corresponding employment levels, and all PIE Industry Scores are listed in Appendix II.[4] The value for *Electric power generation, transmission and distribution* (our power industry) has the maximum value of 100 in both years indicating that 100% of its employment is PIE power-dependent, as would be expected. The other industries' shares decline to a minimum value of zero as increasingly smaller portions of their activity levels throughout the Region can be attributed to the PIE.[5]

Region-wide industry-specific PIE Scores might well be conservative (low) estimates for many counties because they reflect the ability of the entire Region to satisfy all-Region PIE demands. The scores imply that industries throughout the entire regional economy supply the entire Appalachian power industry, irrespective of the geographical location of PIE demand and that output from these industries goes first to the power industry supply chain – the PIE – and then to other industries only after all the PIE demands have been met. To provide more localized detail, parallel computations at the county level contribute to the Risk Score developed below.

*Table 1. Top PIE Scores and Employment*

| | Score | | Employment | |
|---|---|---|---|---|
| Industry | 2005 | 2018 | 2005 | 2018 |
| Electric power generation, transmission and distribution | 100.00 | 100.00 | 53,077 | 47,870 |
| Oil and gas extraction | 61.80 | 14.21 | 4,984 | 7,889 |
| Pipeline transportation | 2.92 | 13.44 | 28,137 | 4,300 |
| Scenic and sightseeing transportation and support activities for | 5.00 | 13.22 | 63,855 | 34,424 |
| Water, sewage and other systems | 14.80 | 11.11 | 21,846 | 21,968 |
| Employment services | 3.63 | 7.02 | 190,456 | 210,536 |
| Other professional, scientific, and technical services | 8.78 | 6.27 | 32,807 | 41,977 |
| Petroleum and coal products manufacturing | 7.16 | 5.31 | 9,363 | 8,644 |
| Water transportation | 2.90 | 4.95 | 1,773 | 1,333 |
| Air transportation | 2.97 | 3.97 | 16,055 | 6,486 |
| Data processing, hosting, and related services | 3.86 | 3.70 | 13,105 | 11,434 |
| Coal mining | 4.99 | 3.69 | 47,140 | 29,239 |

[4] Some PIE Scores can be quite large, but because they correspond to industries with very low employment values, these high scores will have minimal impact on county Dependence Scores.

[5] Our power industry includes transmission and distribution because the published data do not provide employment, output, or wages data for electric power generation, alone. Because the BLS CEW database excludes employees covered by the railroad unemployment insurance system, this sector is excluded from the results, though it is included when determining direct and indirect technical requirements. Beyond the undercounting of Rail Transportation employees, there is no significant impact on any of the calculations in the report. Although industry sector *102 Scenic and sightseeing transportation and support activities for transportation* might at first seem odd as a link in the PIE supply chain, its inclusion is due much less to the scenic and sightseeing subsector than it is to support activities for transportation, which can include loading, unloading, and break-of-bulk processing. Readers interested in diving deeper into industry sector composition should consult Appendix II for our sectoring scheme, which aggregates a small number of industries, and the BLS website for additional detail.

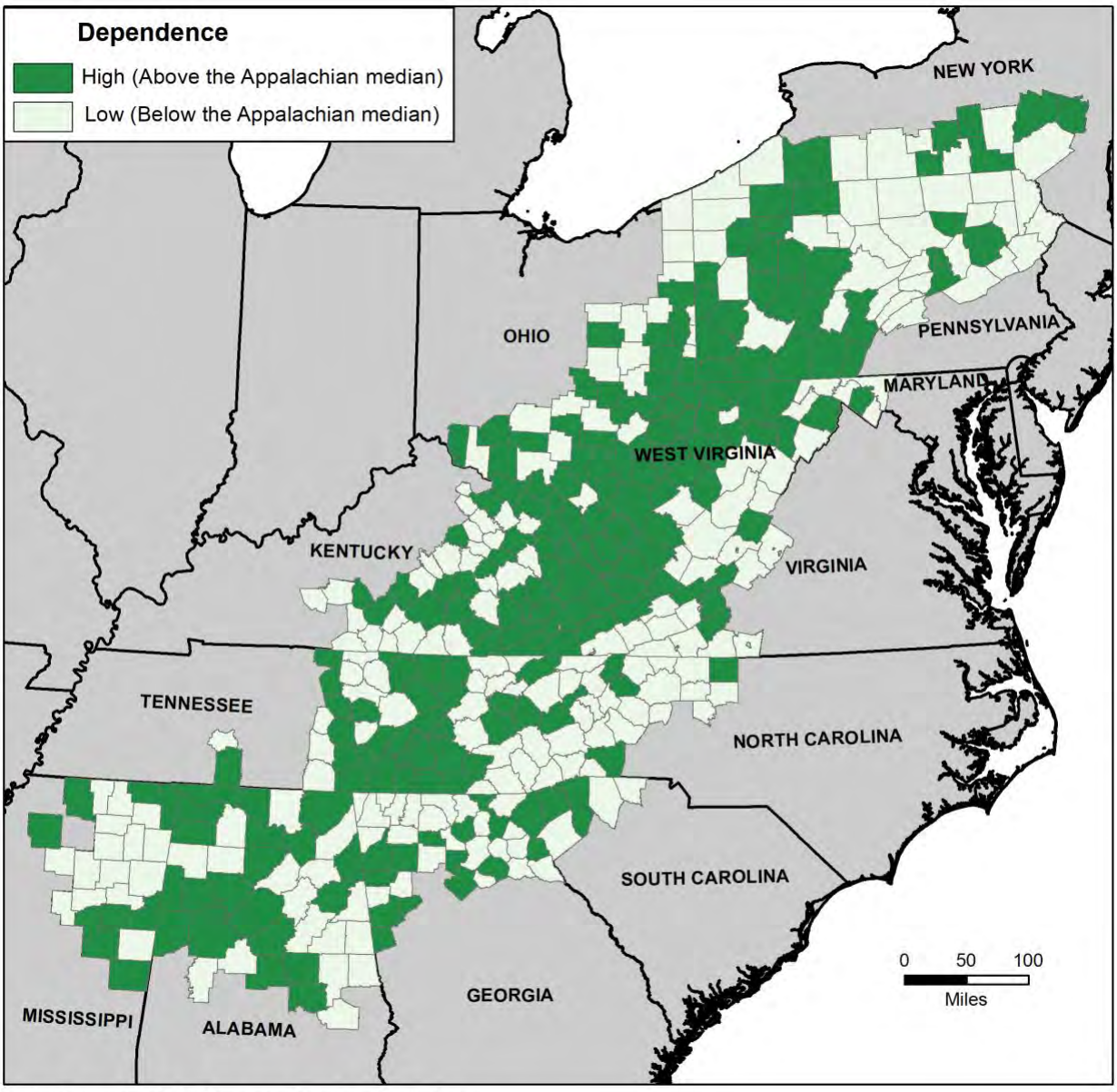
### *PIE County Dependence Scores*

PIE Scores are then applied to county industrial employment levels to derive an estimate of the number of power industry supply chain-oriented employees in each industry in each county. The sum of these power-dependent county employees over all industries divided by total county employment is the Dependence Score for that county. Note that Dependence Scores, like all ratio-based measures, will change when either the numerator changes, the denominator changes, or both. Dependence Scores can increase when the numerator (PIE employment) increases and the denominator (total county employment) remains constant, or when the numerator remains constant but the denominator decreases. Likewise, Dependence Score decreases can be a result of declining PIE employment or growth in total employment, and when there are changes to numerator and denominator, the direction of the Dependence Score change will depend on the magnitudes of both changes.

For an initial, broad-brush view of the distribution of Dependent Appalachian counties, Figures 2 and 3 present a two-way classification of counties distinguishing those with greater than median Dependence values from the rest. The maximum Dependence score for 2005, expressed as a percentage, was 9.35% (Grant County, WV), with 121 counties exceeding the 1.55% mean for all counties. By 2018, the maximum value had risen to 9.81% (Rhea County Tennessee), and 119 of the counties had values greater than the 2018 all-county mean of 1.35%.

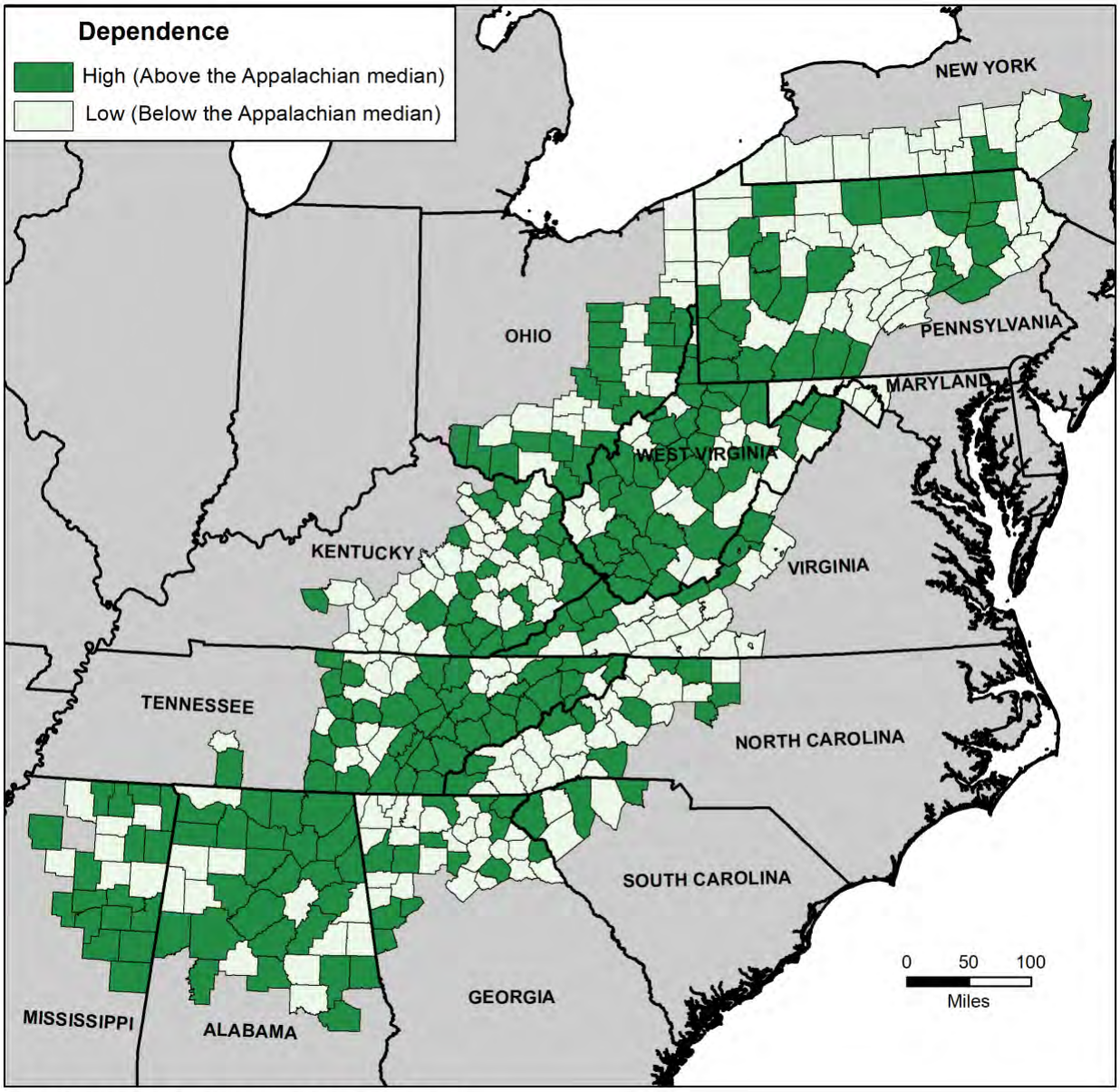
A more detailed view of Dependent counties is shown in Figures 4 and 5, which display county Dependence by quintile for 2005 and 2018. Bear in mind that there is far less variation in the lower four quintile intervals than in the highest quintile interval, and even within the highest quintile interval, the distribution remains skewed, where 73 of the 84 Dependence scores are less than half of the 9.35 percent maximum value.

*Figure 2. Two Category Map of 2005 County PIE Dependence*



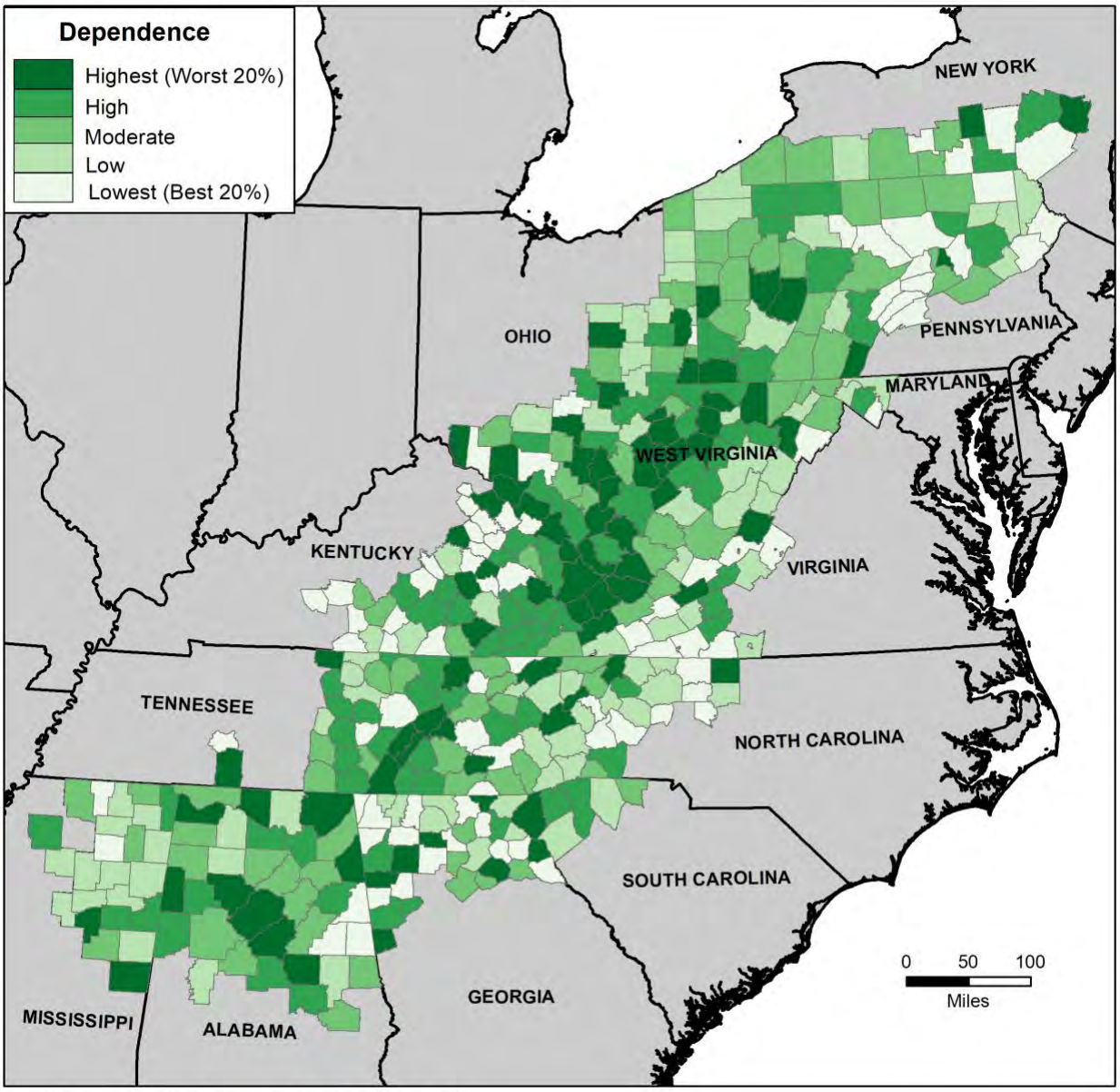

Data Source: U.S. Bureau of Labor Statistics

*Figure 3. Two-category Map of 2018 County PIE Dependence*



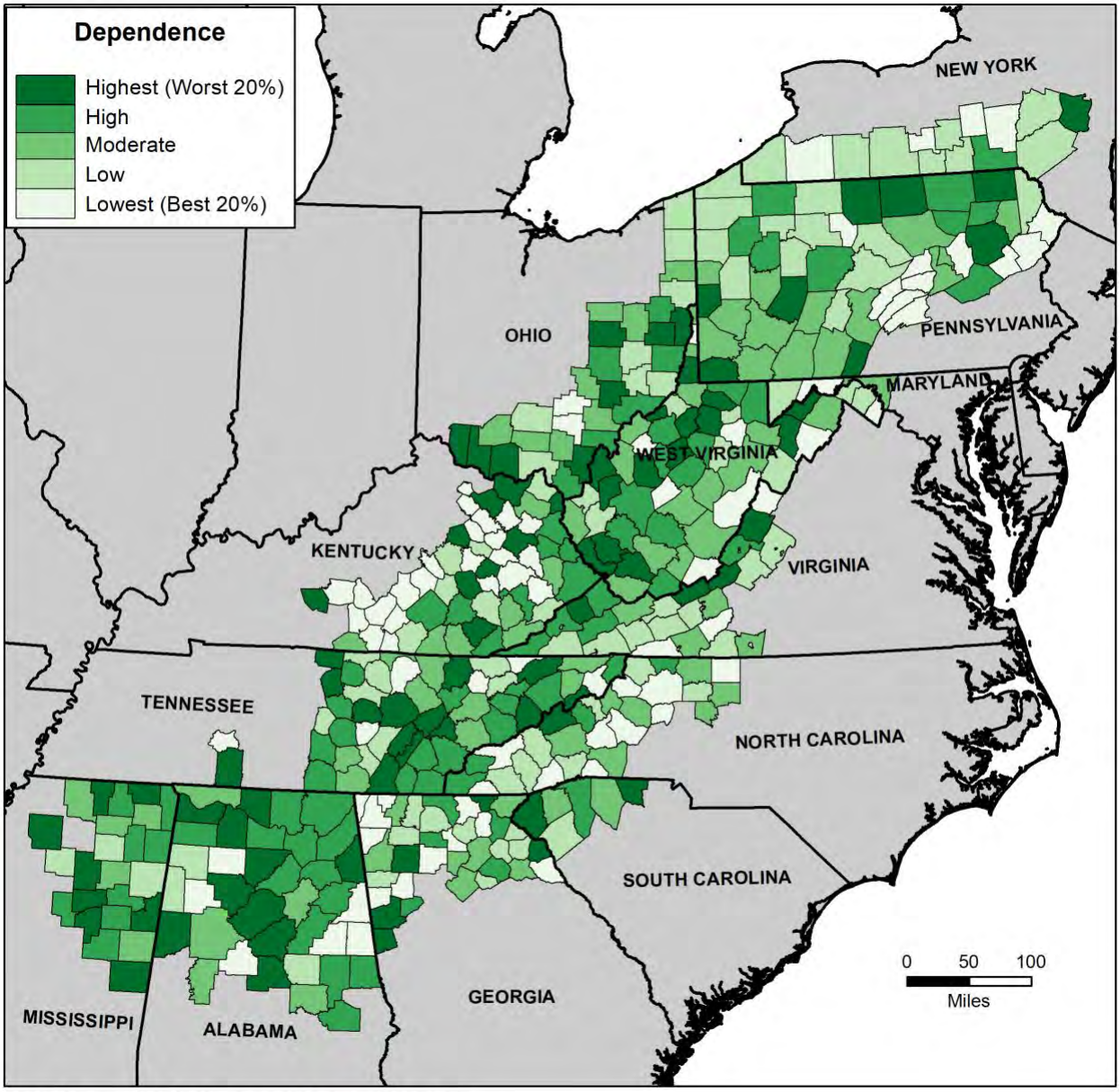

Data Source: U.S. Bureau of Labor Statistics

*Figure 4. Quintile Map of 2005 County PIE Dependence*




Data Source: U.S. Bureau of Labor Statistics

*Figure 5. Quintile Map of 2018 County PIE Dependence*




Data Source: U.S. Bureau of Labor Statistics

The complete listing of Dependence Scores by county appears in Appendix III, and associated ranks are listed in Appendix IV. Table 2 lists the 12 counties that had the highest 10 scores in either 2005 or 2018, along with their corresponding scores and ranks in each year. The rank ordering of the counties shows some variation, but the county composition of both lists is largely the same. As noted above, there are several ways in which Dependence Scores can change. County Dependence Scores can decline due to reductions in PIE employment *or* increases in non-PIE employment. Conversely, Dependence Scores can increase due to increases in PIE employment or decreases in non-PIE employment. Of course, offsetting changes can leave a county's Dependence Score unchanged.

*Table 2: Highest PIE Dependence Counties, 2005 and 2018*

| County Names | 2005 Rank | 2005 Dependence Score | 2018 Rank | 2018 Dependence Score |
|---|---|---|---|---|
| Grant County, West Virginia | 1 | 9.35 | 2 | 7.78 |
| Pleasants County, West Virginia | 2 | 8.72 | 5 | 6.33 |
| Oconee County, South Carolina | 3 | 8.36 | 6 | 6.16 |
| Mason County, West Virginia | 4 | 7.94 | 3 | 7.5 |
| Gallia County, Ohio | 5 | 6.55 | 9 | 5.19 |
| Rhea County, Tennessee | 6 | 6.38 | 1 | 9.81 |
| Limestone County, Alabama | 7 | 6.31 | 4 | 6.59 |
| Bath County, Virginia | 8 | 5.84 | 10 | 4.92 |
| Lawrence County, Kentucky | 9 | 5.6 | 129 | 1.33 |
| Calhoun County, West Virginia | 10 | 4.87 | 123 | 1.34 |
| Heard County, Georgia | 20 | 3.92 | 8 | 5.26 |
| Choctaw County, Mississippi | 32 | 3.09 | 7 | 5.66 |

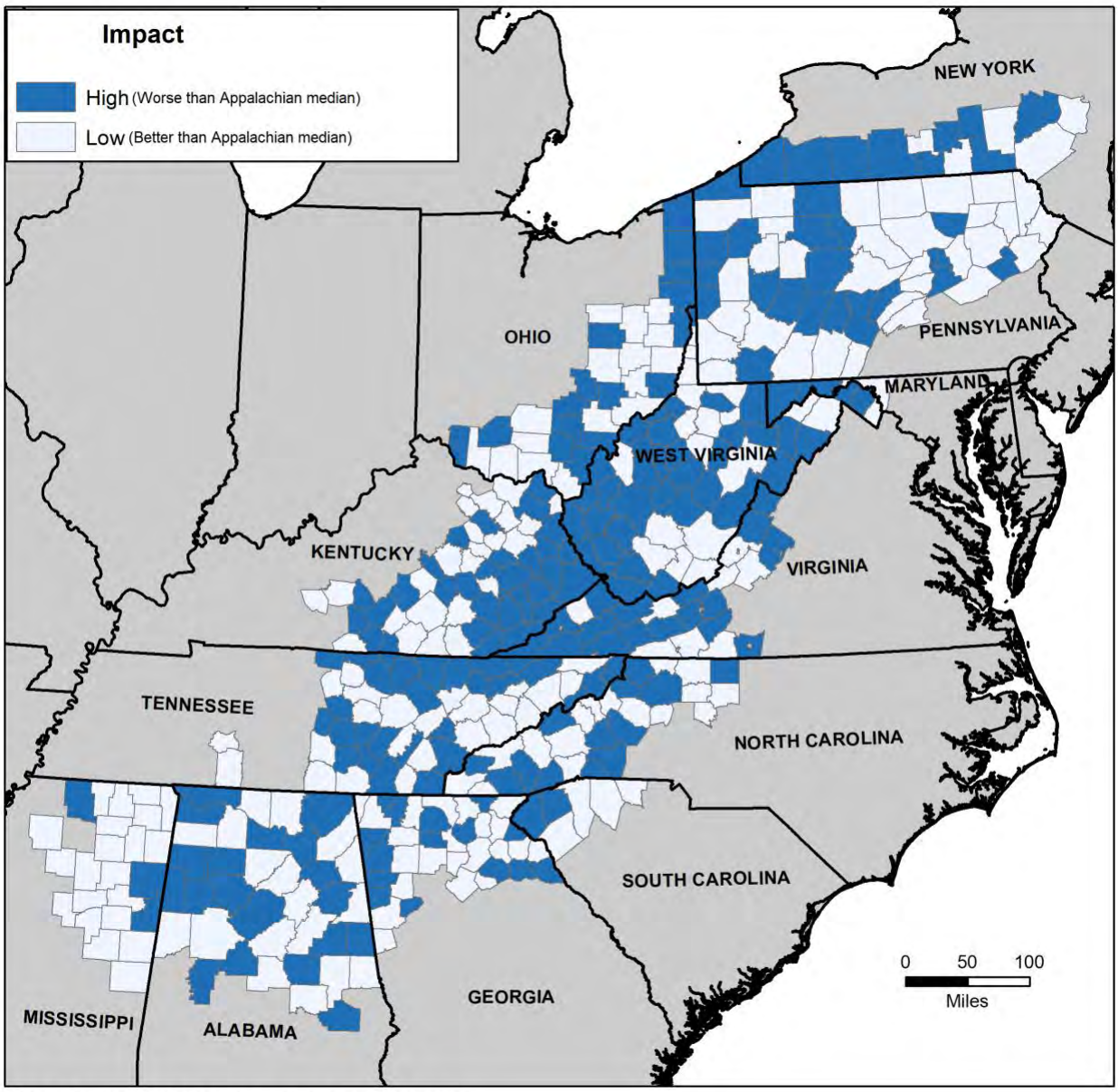
## PIE Impact

Our county-level PIE Impact Scores are formed by combining the industry-based PIE Scores with employment *change* by industry, expressing the sum of the employment change-weighted PIE Scores as a share of total employment. The rationale for this approach is that if observed job loss occurs in power-oriented industries, then this negative economic impact and accompanying economic distress is the share of that employment loss that is associated with the power industry. Employment change is defined as 2018 employment less 2005 employment.[6] Employment loss yields negative values, so larger negative values correspond to greater negative Impact. Perhaps somewhat surprisingly, roughly 36.6% of counties gained in PIE related employment, which supports the observation that the reliance on the power generation industry and its supply chain as a source of employment has not been uniformly negative across Appalachia. The Impact Score was between 0 percent and 1 percent in 139 Appalachian counties, and another 231 counties had Impact Scores between zero and -1 indicating relatively insubstantial change, less than one percent, in PIE employment in these 370 counties.

[6] Of course, employment in PIE industries could be changing for other reasons, but the implied assumption of causality is used because of a lack of mechanism by which to identify other causes.

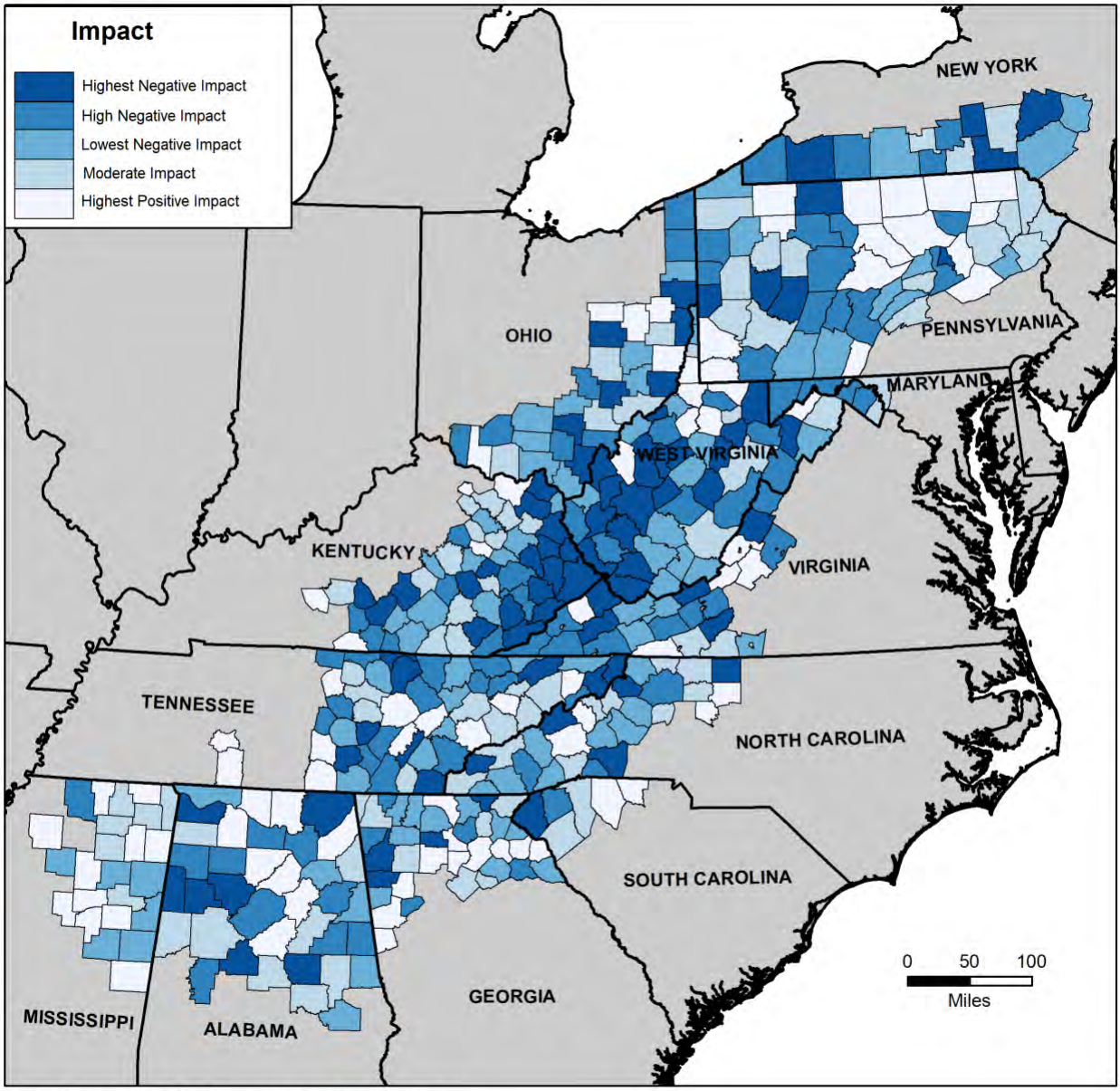
The largest negative Impact Score reveals a 4.02% PIE employment decline in Lawrence County, KY. The second largest negative value was -3.10 in Pleasants County, WV. The values in the High Positive Impact category range from 0.002 to 14.030 and the values in the High Negative Impact category range from -.004 to -4.0196, leaving a range from -.004 to 0.002 for the three intermediate category values. All Impact Scores are included in Appendix II. Figures 6 and 7 show Appalachian county Impact in two-category and quintile representation formats, paralleling the Dependence figures above. Counties with the largest negative Impact Scores are shown in Table 3. Seven of the 20 most negatively impacted counties appear in the list of most Dependent counties in Table 2. These seven county names appear in bold in Table 3.

*Figure 6. Two-category Map of County PIE Impact*




Data Source: U.S. Bureau of Labor Statistics

*Figure 7. Quintile Map of County PIE Impact*




Data Source: U.S. Bureau of Labor Statistics

Table 3: Highest *PIE Impact counties*

| Rank | County Names | Impact Score |
|---|---|---|
| 1 | **Lawrence County, Kentucky** | -4.02 |
| 2 | **Pleasants County, West Virginia** | -3.10 |
| 3 | **Calhoun County, West Virginia** | -2.78 |
| 4 | **Grant County, West Virginia** | -2.68 |
| 5 | Montour County, Pennsylvania | -2.68 |
| 6 | Jackson County, Alabama | -2.63 |
| 7 | Clay County, West Virginia | -2.45 |
| 8 | Knott County, Kentucky | -2.29 |
| 9 | Meigs County, Tennessee | -2.13 |
| 10 | **Gallia County, Ohio** | -2.01 |
| 11 | Vinton County, Ohio | -1.96 |
| 12 | Boone County, West Virginia | -1.94 |
| 13 | Lee County, Kentucky | -1.93 |
| 14 | **Oconee County, South Carolina** | -1.91 |
| 15 | Graham County, North Carolina | -1.84 |
| 16 | **Mason County, West Virginia** | -1.80 |
| 17 | Russell County, Virginia | -1.73 |
| 18 | Giles County, Virginia | -1.72 |
| 19 | Stokes County, North Carolina | -1.65 |
| 20 | Coshocton County, Ohio | -1.59 |

Note: Bold counties also appear on list of Dependent counties

## PIE Risk

Our objective for this third dimension of PIE counties is to quantify the degree to which Appalachian Region counties are at risk of experiencing additional economic hardship should the decline in the power industry continue. We base our risk metric on the observation that power plants that are most efficient and cost-effective tend to operate at higher capacity than those that operate smaller shares of potential capacity, or capacity factors.[7] Consistent with established economic principles, the least efficient power plants will be least profitable and, therefore, at greatest risk of decline and eventual closure.[8] Counties that have no power plants but that do have employment concentrations in PIE industries are also at risk via supply chain linkages. This overall risk is directly correlated with the Dependence Scores. Counties that are host to operating power industry facility face direct risks of declining power industry operation and localized supply-chain linkages that are tied to localized power industry support activity. Counties that are in proximity to other counties that are home to power plants are generally more susceptible to "spillover" supply chain impacts than are those whose neighbors lack power facilities. To quantify these spillover impacts, we calculate a spillover risk measure by averaging the capacity factor-based own-county risk measure.

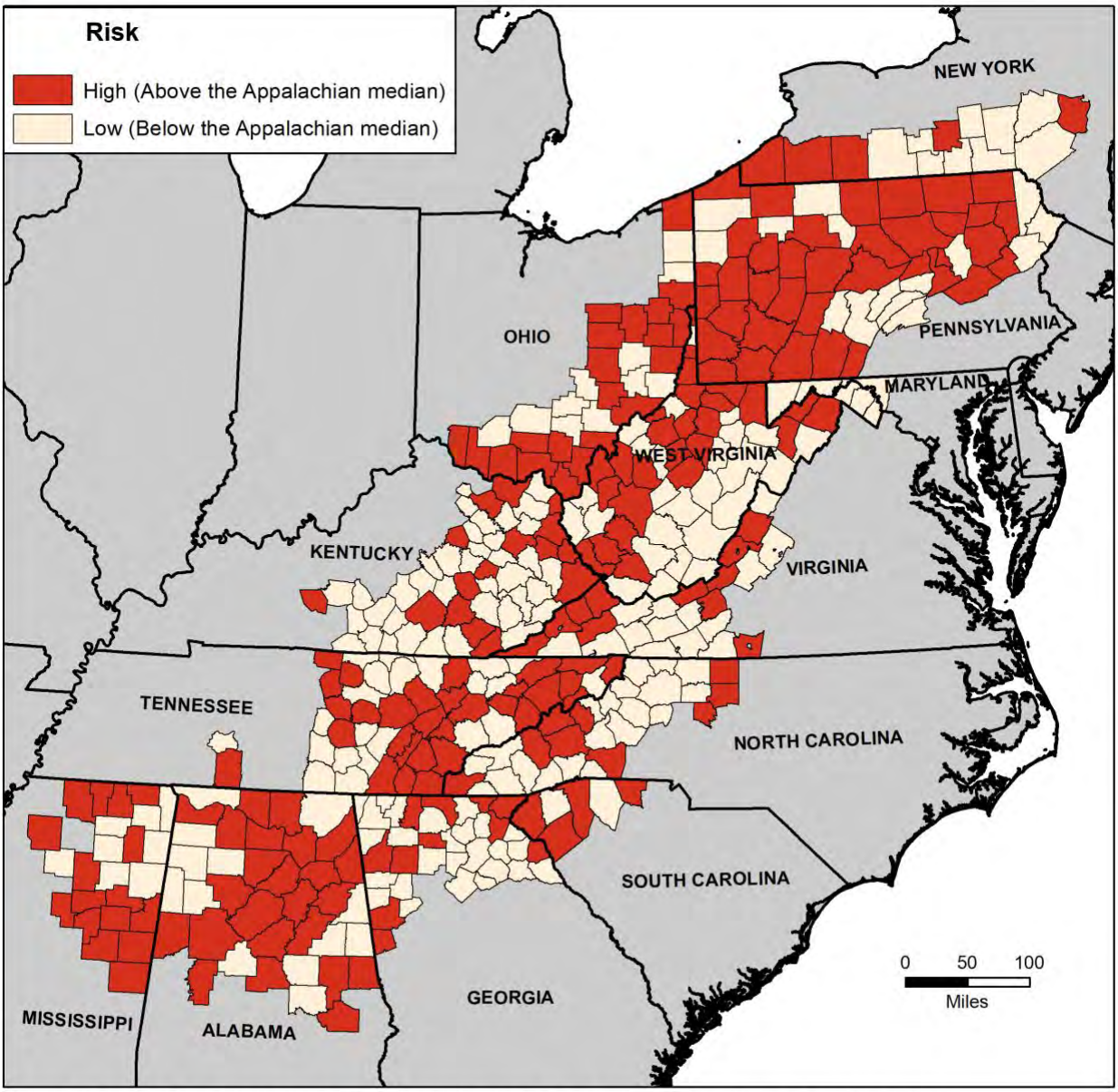
Lastly, the Dependence scores reflect the entire Appalachian Region's ability to supply the entire Regional PIE, but to the extent that the county's configuration and distribution of industries differs from the Region-wide averages, we can add this more localized dominance relationship by generating county-specific PIE industry scores from localized rather than Region-wide production levels and industry distributions, and we then use these localized scores to generate a localized dependence score for each county.

The final Risk Score is the original, Region-wide Dependence Score combined with these three new variables. The formula for doing so is $PRS = PDS(1 + Q_r)(1 + Q_s)(1 + B_r)$, where $PRS$ and $PDS$ are PIE Risk and Region-Wide Dependence Scores, $Q_r$ is own-county capacity-based risk measure, $Q_s$ is the spillover risk measure and $B$ is the county-specific dependence score derived from localized industry scores. More formal mathematical expressions for all measures are included in Appendix I.

[7] The EIA defines the capacity factor as "The ratio of the electrical energy produced by a generating unit for the period of time considered to the electrical energy that could have been produced at continuous full power operation during the same period." https://www.eia.gov/tools/glossary/index.php?id=C

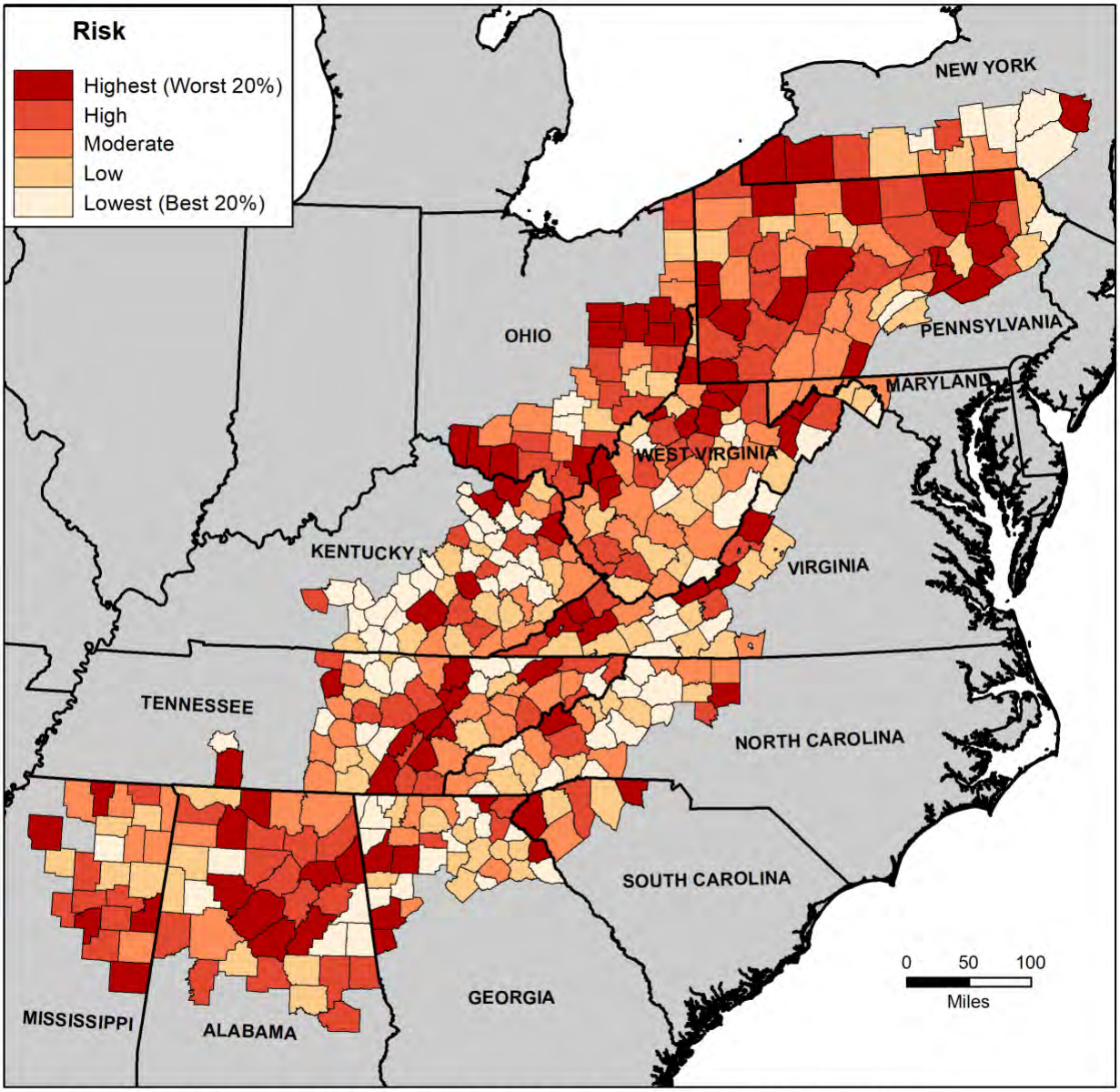
[8] There are, of course, other reasons why power plant can be uncompetitive, such as poor management practices, but these factors lie beyond our ability to measure.

*Figure 8. Two-category Map of County PIE Risk*




Data Sources: U.S. Bureau of Labor Statistics and U.S. Energy Information Administration

*Figure 9. Quintile Map of County PIE Risk*




Data Sources: U.S. Bureau of Labor Statistics and U.S. Energy Information Administration

Six of the 20 most impacted counties appear in the lists in Tables 2 and 3. These six county names appear in bold in Table 4. Because Dependence is a component of Risk, these two measures are more strongly related than other PIE-dimension pairs.

*Table 4: Highest PIE Risk Counties and Associated Values*

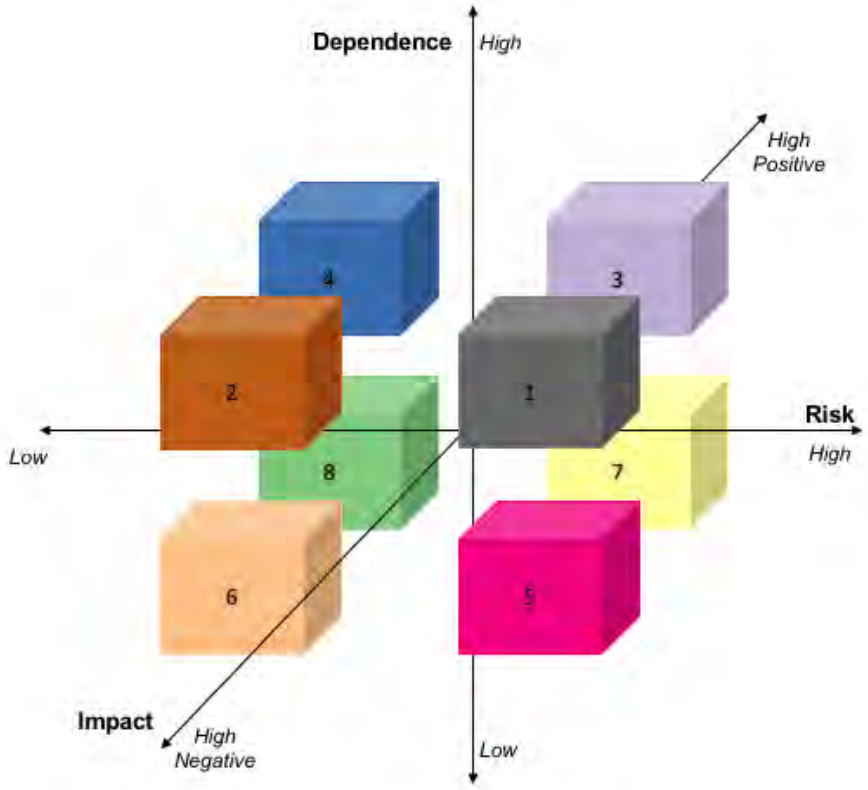
| County | 2018 Dependence Rank | Impact Rank | 2018 Risk Rank |
|---|---|---|---|
| **Grant County, West Virginia** | 2 | 4 | 2 |
| **Mason County, West Virginia** | 3 | 16 | 1 |
| **Pleasants County, West Virginia** | 5 | 2 | 3 |
| **Oconee County, South Carolina** | 6 | 14 | 15 |
| **Gallia County, Ohio** | 9 | 10 | 5 |
| Jefferson County, Ohio | 13 | 71 | 11 |
| Marion County, West Virginia | 19 | 86 | 16 |
| **Coshocton County, Ohio** | 24 | 20 | 14 |
| Bath County, Virginia | 10 | 30 | 23 |
| Jackson County, Kentucky | 11 | 45 | 25 |
| Indiana County, Pennsylvania | 22 | 36 | 12 |
| Beaver County, Pennsylvania | 23 | 43 | 10 |
| Lee County, Kentucky | 43 | 13 | 96 |
| Giles County, Virginia | 65 | 18 | 44 |
| Meigs County, Tennessee | 67 | 9 | 86 |
| Boone County, West Virginia | 97 | 12 | 179 |
| Russell County, Virginia | 125 | 17 | 54 |
| Lawrence County, Kentucky | 129 | 1 | 66 |
| Montour County, Pennsylvania | 181 | 5 | 41 |

Note: Bold counties also appear in the list of most Dependent and Impacted counties.

## PIE County Typology

To combine the information from the three dimensions and create a more comprehensive perspective on the Appalachian Region PIE, we developed a typology using an eight-way classification scheme. We assign counties to classes using combinations of the three High–Low groups on each dimension. Counties in Class 1 have High scores on all dimensions, counties in Class 8 have Low scores on all dimensions, and those in Classes 2–7 have varying combinations of High and Low category scores on the three dimensions. The resulting typology is depicted graphically in figure 11 and in tabular form in Table 5, along with the number of counties in each Class.

*Figure 10. PIE County Typology*




For ease of visual comparison, counties in Classes 1 through 8 can be seen in the panels of Figure 11, and the overall distribution of counties by Class is shown in Figure 13. Full-page versions of the eight individual Class maps in Figure 11 are provided in Appendix V. Classes 1, 3, 6, and 8 are the most heavily populated, as would be expected given the commonality between Dependence and Risk. We adopt the typology category terminology in the Appalachian CIE analysis, Class 1 counties compose the *Depressed* category. They are heavily PIE dependent, have high (negative) impact relative to other Appalachian counties, and are at continuing risk from hosting or proximity to power industry facilities. Class 3 *Vulnerable* counties have not yet suffered substantial PIE-related economic hardship but are vulnerable to continued coal-industry decline. The Class 6 *Hardship* counties have experienced PIE-based declines, but because they have lost the majority of their PIE employment, their economies are no longer PIE-dependent, so are not expected to incur further substantial PIE-based job loss. Counties in Class 8 are the least affected by the power industry fortunes.

Table 5: *Typology Score* Combinations

| Class | Dependence | Impact | Risk | Counties in Class |
|---|---|---|---|---|
| 1 | High | High | High | 76 |
| 2 | High | High | Low | 13 |
| 3 | High | Low | High | 104 |
| 4 | Low | High | High | 15 |
| 5 | High | Low | Low | 17 |
| 6 | Low | High | Low | 106 |
| 7 | Low | Low | High | 15 |
| 8 | Low | Low | Low | 74 |

Three spatial patterns are most evident from these maps. First, the Class 1 Depressed counties are generally bordered by other counties in the Appalachian Region and are distributed along a line from Alabama in the southwest to Pennsylvania in the northeast. Sixteen of these are West Virginia counties; thirteen are in Tennessee; Alabama, Kentucky, and Pennsylvania each have nine Class 1 counties; Ohio has seven; and the rest have three or less. Maryland and New York are home to no Class 1 counties.

Second, although they are widely distributed, as expected for the second largest class, the Class 3 Vulnerable counties dominate in Mississippi and, along with Class 1 counties, also dominate in Alabama. Likewise, Tennessee's Appalachian counties are mostly in Classes 1 and 3.
Third, the Hardship counties in Class 6, which is the largest class, also are present in all Appalachian states, but slightly more prevalent in the Central Appalachian states.

*Figure 11. Maps of PIE Typology Classes1-8 Isolated*

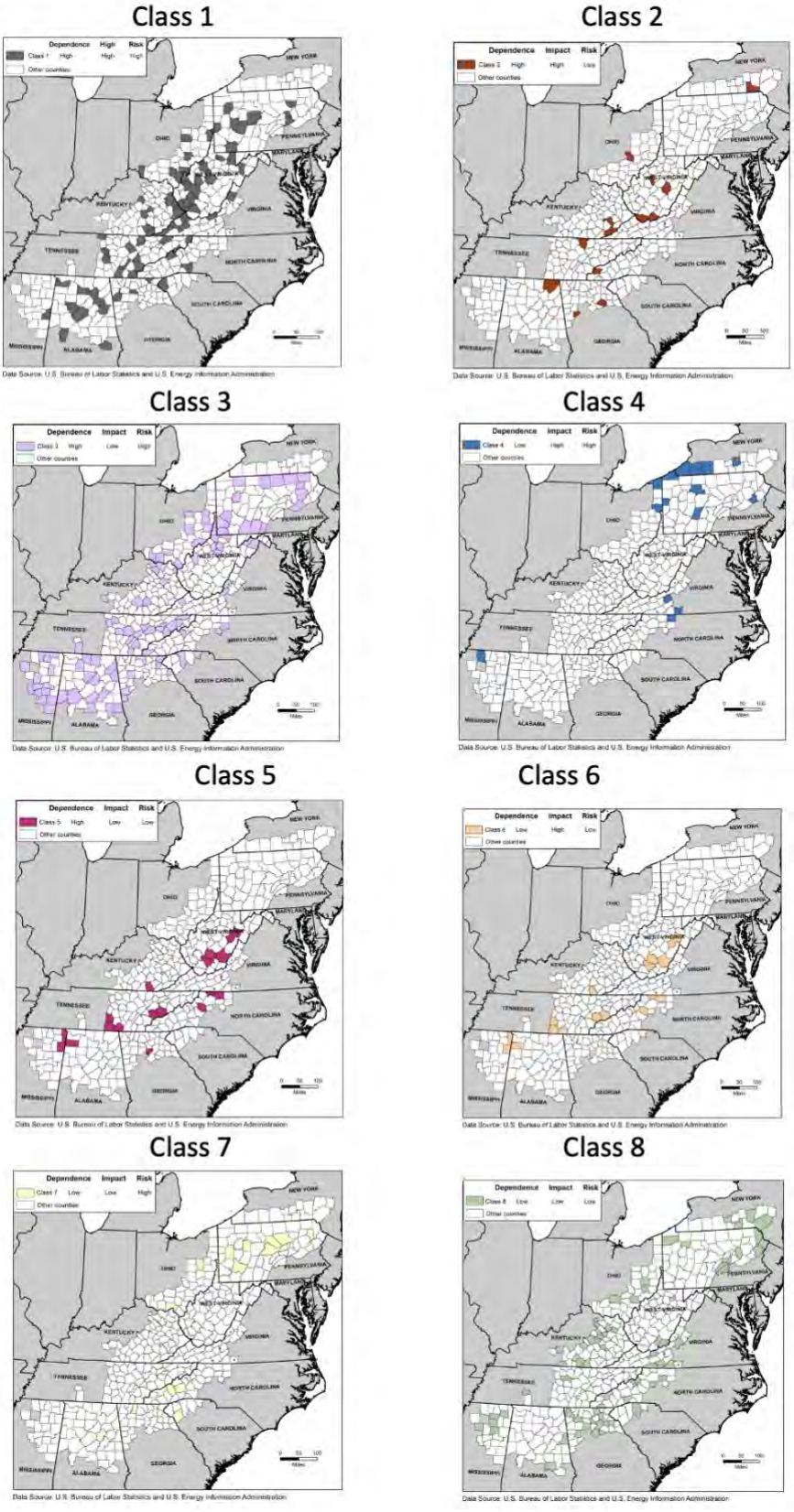
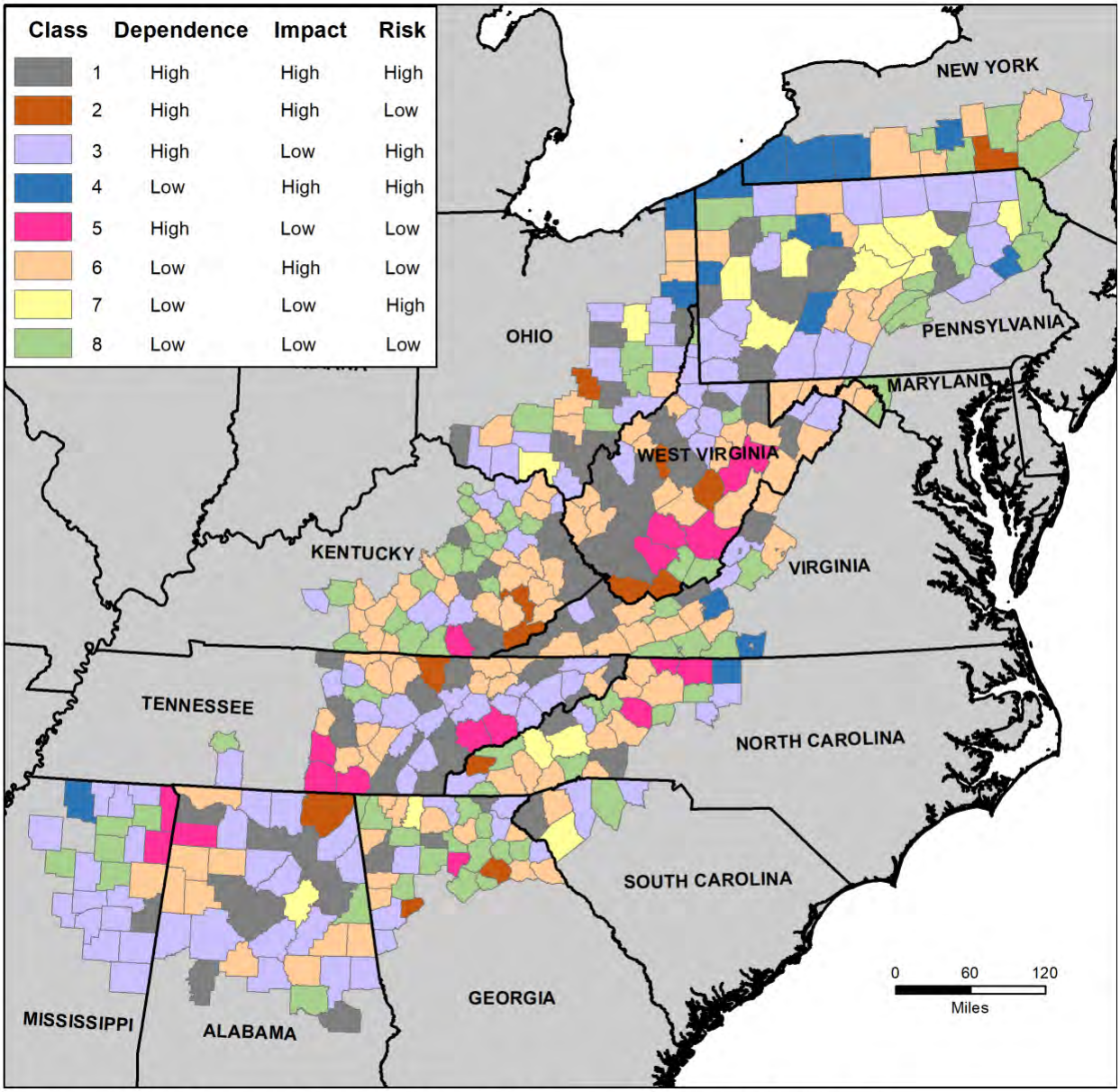


*Figure 12. Map of PIE Typology, all Classes*




Data Source: U.S. Bureau of Labor Statistics and U.S. Energy Information Administration

# PIE-Distressed Counties

This section focuses on counties in Class 1 whose scores on all dimensions distinguish them from the others. We identify two sets of such counties. The first set is composed of the 19 counties within Class 1 that also hold a top-20 ranking in at least one of the three PIE dimensions and is shown in Table 6 along with their dependence, impact, and risk rankings. The group of counties shaded dark blue have no ranking lower than 20 on any of the PIE dimensions. The group in light blue has only one ranking lower than the top-20 ranking, and the third group has only one top-20 ranking. As can be seen in Figure 15, three of these counties are located gin the Ohio River Valley.

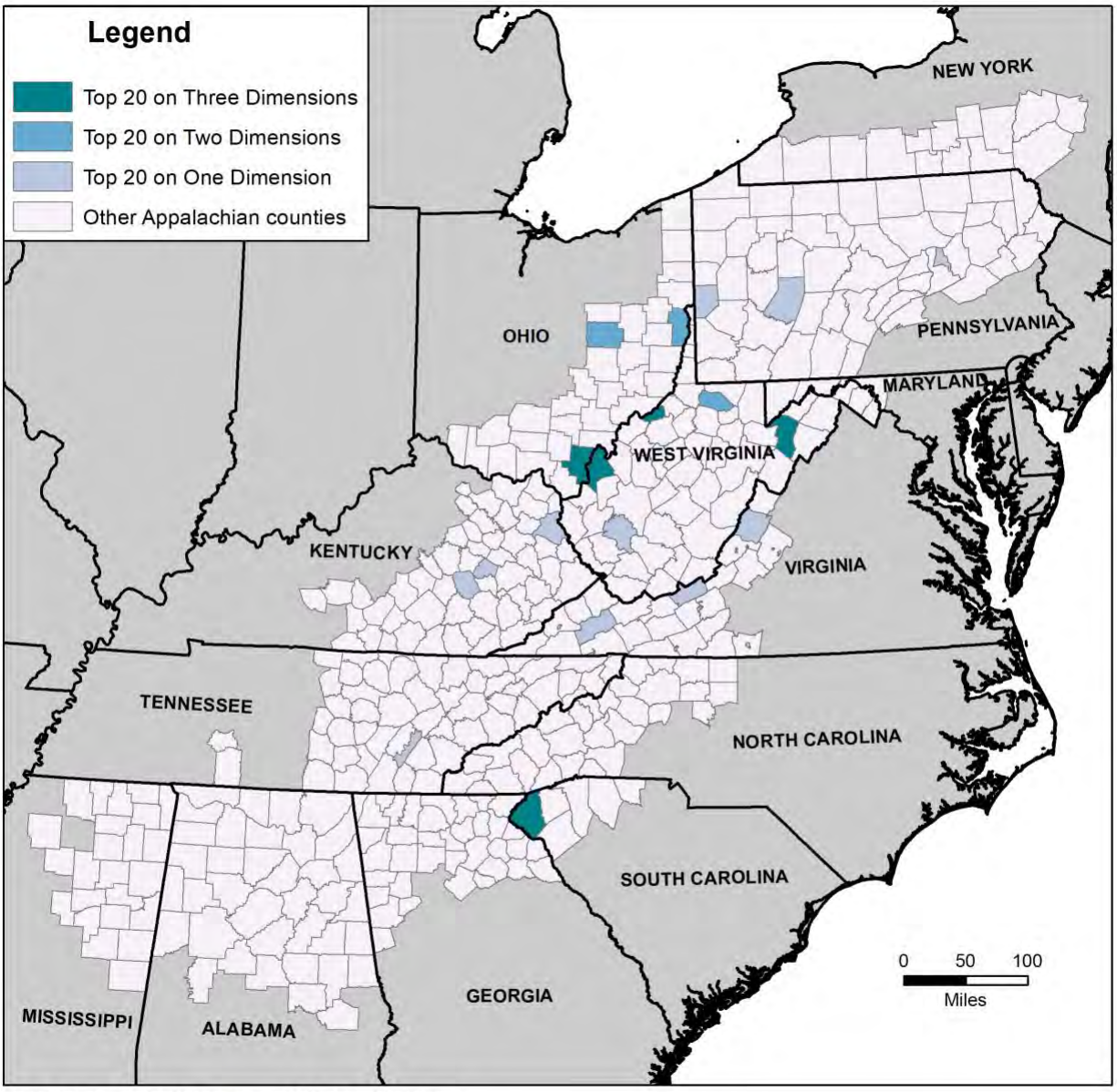
*Table 6. PIE Class 1 Counties with One or More Top-20 Rankings*

| County | 2018 Dependence Rank | Impact Rank | 2018 Risk Rank |
|---|---|---|---|
| **Grant County, West Virginia** | 2 | 4 | 2 |
| **Mason County, West Virginia** | 3 | 16 | 1 |
| **Pleasants County, West Virginia** | 5 | 2 | 3 |
| **Oconee County, South Carolina** | 6 | 14 | 15 |
| **Gallia County, Ohio** | 9 | 10 | 5 |
| Jefferson County, Ohio | 13 | 71 | 11 |
| Marion County, West Virginia | 19 | 86 | 16 |
| **Coshocton County, Ohio** | 24 | 20 | 14 |
| Bath County, Virginia | 10 | 30 | 23 |
| Jackson County, Kentucky | 11 | 45 | 25 |
| Indiana County, Pennsylvania | 22 | 36 | 12 |
| Beaver County, Pennsylvania | 23 | 43 | 10 |
| Lee County, Kentucky | 43 | 13 | 96 |
| Giles County, Virginia | 65 | 18 | 44 |
| Meigs County, Tennessee | 67 | 9 | 86 |
| Boone County, West Virginia | 97 | 12 | 179 |
| Russell County, Virginia | 125 | 17 | 54 |
| Lawrence County, Kentucky | 129 | 1 | 66 |
| Montour County, Pennsylvania | 181 | 5 | 41 |

There are five Class 1 counties that rank in the top 20 on all three PIE dimensions. These are Grant, Mason, and Pleasants Counties in West Virginia; Oconee County, South Carolina; and Gallia County, Ohio. There is some variation in 2014-2018 unemployment rates in these counties, ranging from a low of 3.8 percent in Grant County, WV to a high of 8.3 percent in Pleasants County, WV. On average in these counties, the power industry alone accounts for just over 5% of total county employment, and their wages account for almost 12.7% of county totals. More than 7% of Grant County, WV employees are in the power industry and account for almost 17.5% of county wages. Counties in this category might warrant close monitoring as current power industry trends continue.

The second set of counties includes those that ranked in the top 20 in Risk, Impact, and Dependence in either 2005 or 2018. These are the six counties that appear in bold in table 4. The 2005 and 2018 employment and wages data for these counties, along with 2018 power industry data, are shown in Table 7 below. These counties also are among those shown in dark blue in Figure 15, along with Coshocton County, OH, which is the medium blue county near the geographical center of the state.

*Figure 13. Top PIE Class 1 Counties*




Data Source: U.S. Bureau of Labor Statistics

*Table 7. Top PIE-Distressed Appalachian Counties - All Scores*

| County | Total 2005 Employment | 2005 Wages ($M) | Total 2018 Employment | 2018 Wages ($M) | 2018 Power Industry Employment | 2018 Power Industry Wages ($M) |
|---|---|---|---|---|---|---|
| Mason County, West Virginia | 6,602 | 217.10 | 5,365 | 239.69 | 373 | 31.34 |
| Grant County, West Virginia | 3,915 | 122.46 | 3,305 | 133.24 | 237 | 23.25 |
| Pleasants County, West Virginia | 3,122 | 116.81 | 2,692 | 136.74 | 144 | 17.27 |
| Gallia County, Ohio | 13,005 | 415.92 | 11,142 | 433.96 | 522 | 54.58 |
| Coshocton County, Ohio | 12,834 | 411.04 | 10,161 | 395.19 | 249 | 24.88 |
| Oconee County, South Carolina | 23,390 | 777.68 | 24,212 | 1,144.64 | 1,319 | 163.17 |

# Summary

Through a comprehensive, quantitative, supply chain-based assessment of Appalachian Region counties, we identified industry and county characteristics related to the Power industry Ecosystem (PIE). Industry measures were developed to identify their relative positions in the power industry supply chain, and these measures were weighted by employment and by employment change to construct county-based measures of PIE Dependence and PIE Impacts scores. We also developed a risk score that measures each county's susceptibility to continued power industry declines. This risk measure is built upon the Region-wide PIE industry self-sufficiency Dependence Score along with an additional locally based PIE industry self-sufficiency measure and an independent dimension that varies with the inverse of power plant capacity utilization.

Dependence, Impact, and Risk were assessed independently and sequentially and then used in the construction of an eight-class county typology. The typology was used to identify four dominant county classes. Class 1 Depressed counties are the most highly distressed, with High Dependence, High Negative Impact, and High Risk Scores. They have already suffered negative PIE-related economic impacts and are susceptible to future power-industry declines. Class 3 Vulnerable counties have not yet faced levels of economic hardship comparable to those in Class 1, but they remain vulnerable to continued power-industry decline. Class 6 Hardship counties have experienced PIE-based decline, but because their economies are no longer heavily PIE-dependent, they are not subject to increased PIE-driven hardship in future, though many continue to suffer the consequences of recent power-industry decline. Counties in Class 8 are not strongly tied to the PIE and have been and are expected to continue to be the least affected by the power industry fortunes.

The typology and the three county-level PIE Scores can be used as a lens for identifying the Appalachian counties whose economic distress might be most directly attributed to the PIE. These counties are strong candidates for further and deeper analysis to identify policies and programs that might be implemented to dampen future negative impacts and alleviate some of the economic distress that can and will continue to be attributable to the technology transition underway in the power generating industry.

# References

Jackson, Randall W. 2018. "An Economic Analysis of the Appalachian Coal Industry Ecosystem: Summary Report." Appalachian Coal Industry Ecosystem. https://researchrepository.wvu.edu/arc_acie/8

Jackson, Randall and Járósi, Péter, "County-level CIE Supply Chain Analysis" (2018). Appalachian Coal Industry Ecosystem. https://researchrepository.wvu.edu/arc_acie/4

U.S. Department of Labor, Bureau of Labor Statistics. Census of Employment and Wages. http://www.bls.gov/home.htm

U.S. Energy Information Administration. https://www.eia.gov/

# Appendices

## Appendix I. Dependence, Impact, and Risk Formulae

### Variable Definitions

The variables used in the derivations are defined as follows:

| | |
|---|---|
| $a_{ij} \in A$ | direct technical coefficients |
| $b_{ij} \in B = (I - A)^{-1}$ | total requirements coefficients |
| $e_i \in E$ | employment by industry |
| $x_i \in X$ | output by industry |
| $\pi_i \in \pi$ | industry output dollars per worker |
| subscripts or superscripts $p$ and $pp$ | denote power industry and power plant, respectively |
| subscript or superscript $R$ | denotes a region-specific variable |
| subscripts $r, u$ | denote county $r$, county $u$, respectively |
| $\lambda_i \in \lambda$ | denotes employment by industry in support of regional power production |
| $Q_s$ | spillover risk for county $s$ |
| $M_r$ | the employment-weighted average of county-level PIE scores |
| $B_r$ | Localized dependence score |
| $s_i \in S$ | the share of employment potentially directed to the power industry supply chain |
| $s_{i,t}^{R(v)}$ | denotes share $s_i$ as the function of ARC Region variable $v$ ($v = e$ denotes employment, $v = w$ denotes wages) in year $t$ |
| $\mu_{i,r}$ | similar to shares $s_i$, denote county-level scores of power dependence by industry in county $r$ |
| $e_{i,r,t}$ | employment by industry in county $r$, in year $t$ |
| $w_{i,r,t}$ | wages by industry in county $r$, in year $t$ |
| $h_{i,r,t}$ | number of power-dependent jobs by industry in county $r$, in year $t$ |
| $\pi_r$ | productivity of power industry in county $r$ |
| $q_r$ | Inverse capacity factor with values scaled to a (0, 1) interval |

| | |
|---|---|
| $\leftrightarrow$ overbar | denotes a standardized variable |
| $\Lambda_u$ | location quotient of the power industry in county $u$ |
| $H_D, H_I, H_R$ | sets of counties with high dependence, impact, and risk scores, respectively |
| $L_D, L_I, L_R$ | sets of counties with low dependence, impact, and risk scores, respectively |
| $C_1, \ldots, C_8$ | sets of counties by the eight categories |

## Industry PIE Scores

The objective in developing industry PIE Scores is to define, for the entire Region, the industry specific total employment requirements for the production of a specified level of regional output, $\lambda$, in this case, for the power industry. In the absence of superior data, we assume that productivities, in terms of output per employee, are spatially invariant. Given this objective, then, and using the variables defined above, we define the following:

$$\pi_i = \frac{x_i}{e_i} \tag{1}$$

$$\pi_i^{-1} b_{ip} x_p^R = \lambda_i^R \in \lambda \tag{2}$$

### *Estimating the industry PIE Scores*

The variable $\lambda$ now represents the industry-specific employment levels required to satisfy power industry supply chain needs. By comparing these "sufficiency" output levels to the observed regional industrial employment levels, we can estimate the share of observed regional output by industry that is potentially supporting power industry production. If a regional industry has less than the number employees needed to meet supply chain requirements, then the share of employment potentially directed to the power industry supply chain, $s_i \in S$, will be 1.0, otherwise the value of $s_i$ will be the ratio of sufficiency to observed. This is shown formally in (3), below.

$$s_i = \begin{cases} 1.0 & \lambda_i \geq e_i^R \\ \dfrac{\lambda_i}{e_i^R} & \lambda_i < e_i^R \end{cases} \tag{3}$$

Note that in this document, we rely on output to employment conversions using a fixed relationship between the two for each industry. It would be equally feasible to substitute wages for employment in these steps as a means of estimating industry supply chain sufficiency. Depending on the problem domain context, one variable might be preferred to the other on theoretical grounds.

## Dependence Scores

Dependence Scores can be calculated for employment or for wages. For completeness, we provide the formulae for both in this document. For the employment-based measure, power industry ecosystem (PIE) Dependency Scores (*PDS*) were calculated by the following formula:

$$CDS_{r,t}^{(e)} = \frac{\sum_i e_{i,r,t} s_{i,t}^{R(e)}}{\sum_i e_{i,r,t}} = \frac{\sum_i h_{i,r,t}}{\sum_i e_{i,r,t}} \quad (4)$$

Where $s_{i,t}^{R(e)}$ is the function of Appalachian Region employment $e_{i,t}^{R}$ whose formulation is the focus of the previous section:

$$s_{i,t}^{R(e)} = f_e\left(e_{i,t}^{R}\right) \quad (5)$$

The values of variable $e_{i,t}^{R}$ in equation (5) are the employment numbers by industry for the entire Appalachian Region, calculated as the sum of all counties' employment for each industry:

$$e_{i,t}^{R} = \sum_r e_{i,r,t} \quad (6)$$

Where $r$ denotes the Appalachian Region county index
We can define $h_{i,r,t}$ as the number of power-dependent jobs in each industry, and $H_{r,t}$ as the total power-dependent employment in county $r$ using the following formulas:

$$h_{i,r,t} = e_{i,r,t} s_{i,t}^{R(e)} \quad (7)$$

$$H_{r,t} = \sum_i h_{i,r,t} \quad (8)$$

The county level dependency scores can be interpreted as the weighted average of the $s_{i,t}$ industry dependency scores, where the weights are the number of employees $e_{i,r,t}$ in each industry within county $r$.
The derivation for Dependency Scores based on wages is similar. The wages-based index is given by:

$$PDS_{r,t}^{(w)} = \frac{\sum_i w_{i,r,t} s_{i,t}^{R(w)}}{\sum_i w_{i,r,t}} \quad (9)$$

Where $s_{i,t}^{R(w)}$ is a similar power-supporting wages-share $w_{i,t}^{R}$ of Appalachian Region totals.

$$s_{i,t}^{R(w)} = f_w\left(w_{i,t}^{R}\right) \quad (10)$$

$$w_{i,t}^{R} = \sum_r w_{i,r,t} \quad (11)$$

For year 2005:

$$PDS_{r,t_{2005}}^{(e)} = \frac{\sum_i e_{i,r,t_{2005}} s_{i,t_{2005}}^{R(e)}}{\sum_i e_{i,r,t_{2005}}} \quad (12)$$

$$PDS_{r,t_{2005}}^{(w)} = \frac{\sum_i w_{i,r,t_{2005}} s_{i,t_{2005}}^{R(w)}}{\sum_i w_{i,r,t_{2005}}} \quad (13)$$

For year 2018:

$$PDS_{r,t_{2018}}^{(e)} = \frac{\sum_i e_{i,r,t_{2018}} s_{i,t_{2018}}^{R(e)}}{\sum_i e_{i,r,t_{2018}}} \quad (14)$$

$$PDS_{r,t_{2018}}^{(w)} = \frac{\sum_i w_{i,r,t_{2018}} s_{i,t_{2018}}^{R(w)}}{\sum_i w_{i,r,t_{2018}}} \quad (15)$$

## Impact Scores

The Power Impact Score (*PIS*) has no time index because it was calculated using the differences between 2018 and 2005 using 2005 as the reference year. The products of the differences and the shares are summed, and then divided by the total 2005 employment. Equations (16) and (17) define the employment-based and wage-based Impact Scores.

$$CIS_r^{(e)} = \frac{\sum_i \left(e_{i,r,t_{2018}} - e_{i,r,t_{2005}}\right) s_{i,t_{2005}}^{R(e)}}{\sum_i e_{i,r,t_{2005}}} \quad (16)$$

$$CIS_r^{(w)} = \frac{\sum_i \left(w_{i,r,t_{2018}} - w_{i,r,t_{2005}}\right) s_{i,t_{2005}}^{R(w)}}{\sum_i w_{i,r,t_{2005}}} \quad (17)$$

## Risk Scores

Our goal in developing a Risk Score is to develop a metric that quantifies PIE risk for employment and income loss by county. Our PIE Risk Score equation takes the following form:

$$PRS = PDS(1 + Q_r)(1 + Q_s)(1 + B_r) \quad (18)$$

Where $Q_r$ is a factor that reflects risk as a function of own-county capacity factor, $Q_s$ is a factor that reflects risk as a function of capacity factor in neighboring counties, and $B_r$ captures local supply chain dependency in a form similar to the computation that was based on Region-wide supply-chain considerations.

### *Own-county and spillover capacity-based risk*

High efficiency power plants tend to utilize greater shares of available capacity than those that are less efficient. Less efficient power plants are less cost effective and therefore tend to use less of their available capacity than their more efficient counterparts. Power plant capacity utilization (capacity factor) data along with nameplate data are available from the Mine Safety and Health

Administration - MSHA.[9] We use power plant capacity factors weighted by capacity as a proxy for power plant risk. Those with lower capacity factors are at greater risk, as can be seen in the calculation of county level inverse capacity factor, $q_r$, below.

First, we calculate the county level weighted average capacity factor from the power plant capacity factors for all power plants in the corresponding county. We use nameplate capacity (NP) as the relevant capacity factor weights. The Energy Information Administration defines generator nameplate capacity (Installed) as "The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer."[10] Index *pp* denotes power plants.

$$\overline{CF_r} = \frac{\sum_{pp \in r} NP_{pp} \cdot CF_{pp}}{\sum_{pp \in r} NP_{pp}} \tag{19}$$

Secondly, we apply a linear function in order to transform the minimum value to one, the maximum value to zero, and the other values between them to (0,1) interval, linearly.

$$q_r = \frac{\max_r(\overline{CF_r}) - \overline{CF_r}}{\max_r(\overline{CF_r}) - \min_r(\overline{CF_r})} \tag{20}$$

Define the location quotient of the power generation industry in county $u$ using the CEW data of employment as shown in equation (21), where $\sum_r$ is aggregating by counties and $\sum_i$ is aggregating by industries (index $p$ denotes power industry):

$$\Lambda_u = \min\left[1, \frac{\frac{e_{p,u}}{\sum_r e_{p,r}}}{\frac{\sum_i e_{i,u}}{\sum_r \sum_i e_{i,r}}}\right] \tag{21}$$

The own-county risk, $Q_r$, is derived from the inverse capacity factor and the location quotient:

$$Q_r = q_r \Lambda_r \tag{22}$$

To reflect the likelihood that counties can be impacted by power industry changes in neighboring counties, we assign to spillover risk the simple average of the neighboring counties' own-county ($q_r$) risk scores, using the following formula:

$$q_s = \frac{\sum_{r \in N_r} q_r}{n_r} \tag{23}$$

where $r \in N_r$ denotes each county's set of neighboring counties and $n_r$ is the number of counties that share borders with county $r$.

[9] https://arlweb.msha.gov/OpenGovernmentData/OGIMSHA.asp
[10] https://www.eia.gov/tools/glossary/index.php?id=G#gen_nameplate

Standardize $q_s$ into the [0,1] interval.[11]

$$\overleftrightarrow{q_s} = \frac{q_s - \min_r(q_s)}{\max_r(q_s) - \min_r(q_s)} \tag{24}$$

The final step of calculating $Q_s$ is similar to calculating $Q_r$ according to the following formula:

$$Q_s = \overleftrightarrow{q_s}\Lambda_r \tag{25}$$

### *Risk due to localized backward linkages*

Whereas the Dependence Score has been defined with respect to power generation supply chain self-sufficiency at the level of the Appalachian Region, a more localized dependence metric can be developed to measure county PIE dependence on electricity produced in each county.
To implement a supply chain algorithm at the county level, we can calculate estimated electricity output using power generation employment at county level and the average power generation productivity (output/employment) at the national level.

$$\hat{x}_{p,r} = \pi_p \cdot e_{p,r} \tag{26}$$

As in the ARC Region-wide supply chain analysis, we can create variable $\lambda_{i,r}$, which represents the industry specific employment levels required to satisfy the county level power industry needs. In equation (27), the notation $x_{i\to p,r}$ represents the output level required in industry $i$ to satisfy the power industry needs.

$$\lambda_{i,r} = \frac{1}{\pi_i^{US}} b_{ip}\hat{x}_{p,r} = \frac{e_i^{US}}{x_i^{US}} x_{i\to p,r} = e_{i\to p,r} \tag{27}$$

In equation (27), $e_{i\to p,r}$ and $\lambda_{i,r}$ are equal. The notation $e_{i\to p}$ illustrates the employment level required in industry $i$ to satisfy the power industry needs. Again, as in the computation of Appalachian Region-wide shares $s_i^R$ we define the county level shares $\mu_{i,r}$ (Note: $\mu = 1\ if\ \lambda \geq e$):

$$\mu_{i,r} = \frac{\lambda_{i,r}}{e_{i,r}} = \frac{e_{i\to p.r}}{e_{i,r}} \tag{28}$$

Unlike the $s_i^R$ , the industry $\mu_{i,r}$ scores are different in each county. The county level aggregated score $M_r$ can be defined as the employment-weighted average of these industry scores, where the summations exclude the power industry:

$$M_r = \frac{\sum_{i\neq p} e_{i,r}\mu_{i,r}}{\sum_{i\neq p} e_{i,r}} \tag{29}$$

---

[11] Since $q_r$ is *per definitionem* standardized, see equation (20), $q_r$ does not need to be standardized again because $\overleftrightarrow{q_r}$ would be equal to $q_r$.

Finally, we can calculate the supply chain linkages factor as a product of the average industry scores $M_r$ and the inverse capacity factor $q_r$ of the county.

$$B_r = q_r M_r \tag{30}$$

## Defining categories by median

Combining the three coal scores (PDS = Coal Dependency Score, PIS = Power Impact Score, CRS = Power Risk Score), we can create eight categories of the counties. Denote $CDS_m$ the median of the Power Dependency Scores, $CIS_m$ the median of the Power Impact Scores, $CRS_m$ the median of the Power Risk Scores. The set of the counties were defined as the following:

$$H_D = \{r : PDS_r \geq PDS_m\}$$
$$H_I = \{r : PIS_r \leq PIS_m\}$$
$$H_R = \{r : PRS_r \geq PRS_m\}$$
$$L_D = \{r : PDS_r < PDS_m\}$$
$$L_I = \{r : PIS_r > PIS_m\}$$
$$L_R = \{r : PRS_r < PRS_m\}$$

The variations of the six sets above produce $(2^3 = 8)$ eight categories $C_1, \dots, C_8$ of the counties:

$$C_1 = H_D \cap H_I \cap H_R$$
$$C_2 = H_D \cap H_I \cap L_R$$
$$C_3 = H_D \cap L_I \cap H_R$$
$$C_4 = L_D \cap H_I \cap H_R$$
$$C_5 = H_D \cap L_I \cap L_R$$
$$C_6 = L_D \cap H_I \cap L_R$$
$$C_7 = L_D \cap L_I \cap H_R$$
$$C_8 = L_D \cap L_I \cap L_R$$

# Appendix II. PIE Scores, All Industries

| Industry | Industry Name | 2005 PIE Score | 2005 Employment | 2018 PIE Score | 2018 Employment |
|---|---|---|---|---|---|
| 1 | Crop production | 0.70 | 13,777 | 0.92 | 12,559 |
| 2 | Animal production | 0.34 | 8,846 | 0.25 | 11,166 |
| 3 | Forestry and Logging | 0.88 | 7,850 | 0.87 | 5,828 |
| 4 | Fishing, hunting and trapping | 2.92 | 138 | 1.11 | 250 |
| 5 | Support activities for agriculture and forestry | 2.29 | 4,903 | 2.34 | 5,276 |
| 6 | Oil and gas extraction | 61.80 | 4,984 | 14.21 | 7,889 |
| 7 | Coal mining | 4.99 | 47,140 | 3.69 | 29,239 |
| 8 | Metal ore mining | 6.28 | 475 | 2.37 | 1,235 |
| 9 | Nonmetallic mineral mining and quarrying | 0.83 | 18,285 | 1.52 | 10,008 |
| 10 | Support activities for mining | 3.15 | 14,278 | 0.85 | 22,296 |
| 11 | Electric power generation, transmission and distribution | 100.00 | 53,077 | 100.00 | 47,870 |
| 12 | Natural gas distribution | 1.39 | 7,914 | 0.87 | 8,209 |
| 13 | Water, sewage and other systems | 14.80 | 21,846 | 11.11 | 21,968 |
| 14 | Construction | 0.73 | 474,924 | 0.83 | 442,325 |
| 15 | Animal food manufacturing | 0.14 | 4,906 | 0.44 | 5,430 |
| 16 | Grain and oilseed milling | 0.71 | 1,952 | 0.81 | 1,779 |
| 17 | Sugar and confectionery product manufacturing | 0.07 | 6,249 | 0.07 | 7,004 |
| 18 | Fruit and vegetable preserving and specialty food manufacturing | 0.13 | 12,501 | 0.16 | 10,409 |
| 19 | Dairy product manufacturing | 0.22 | 9,368 | 0.17 | 9,841 |
| 20 | Animal slaughtering and processing | 0.10 | 63,808 | 0.08 | 59,739 |
| 21 | Seafood product preparation and packaging | 1.05 | 1,217 | 2.97 | 325 |
| 22 | Bakeries and tortilla manufacturing | 0.09 | 25,483 | 0.05 | 23,098 |
| 23 | Other food manufacturing | 0.22 | 8,120 | 0.18 | 11,569 |
| 24 | Beverage manufacturing | 0.09 | 14,566 | 0.11 | 18,891 |
| 25 | Tobacco manufacturing | 0.01 | 7,628 | 0.07 | 2,085 |
| 26 | Textile mills and textile product mills | 0.10 | 129,605 | 0.11 | 75,677 |
| 27 | Apparel, leather and allied product manufacturing | 0.18 | 35,160 | 0.51 | 11,948 |
| 28 | Sawmills and wood preservation | 0.50 | 21,687 | 0.51 | 16,980 |
| 29 | Veneer, plywood, and engineered wood product manufacturing | 0.53 | 13,722 | 0.62 | 8,336 |
| 30 | Other wood product manufacturing, including wood tv, radio and sewing machine cabinet manufacturing | 0.28 | 57,698 | 0.30 | 40,275 |
| 31 | Pulp, paper, and paperboard mills | 0.69 | 14,029 | 0.64 | 9,520 |

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|---|---|---|---|---|---|
| 32 | Converted paper product manufacturing | 0.56 | 33,423 | 0.57 | 30,484 |
| 33 | Printing and related support activities | 1.34 | 43,549 | 0.94 | 28,456 |
| 34 | Petroleum and coal products manufacturing | 7.16 | 9,363 | 5.31 | 8,644 |
| 35 | Basic chemical manufacturing | 0.96 | 25,208 | 1.32 | 19,293 |
| 36 | Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing | 0.34 | 18,782 | 0.30 | 15,874 |
| 37 | Pesticide, fertilizer, and other agricultural chemical manufacturing | 1.55 | 2,070 | 2.45 | 1,309 |
| 38 | Pharmaceutical and medicine manufacturing | 0.34 | 13,842 | 0.09 | 16,474 |
| 39 | Paint, coating, and adhesive manufacturing | 0.62 | 5,868 | 0.52 | 5,710 |
| 40 | Soap, cleaning compound, and toilet preparation manufacturing | 0.44 | 6,407 | 0.15 | 8,496 |
| 41 | Other chemical product and preparation manufacturing | 1.78 | 8,133 | 1.19 | 8,134 |
| 42 | Plastics product manufacturing | 0.35 | 77,252 | 0.32 | 78,976 |
| 43 | Rubber product manufacturing | 0.39 | 26,973 | 0.30 | 27,575 |
| 44 | Clay product and refractory manufacturing | 0.28 | 15,012 | 0.32 | 8,367 |
| 45 | Glass and glass product manufacturing | 0.19 | 16,658 | 0.26 | 12,174 |
| 46 | Cement and concrete product manufacturing | 1.00 | 20,511 | 0.86 | 17,576 |
| 47 | Lime, gypsum and other nonmetallic mineral product manufacturing | 0.75 | 9,490 | 0.74 | 9,592 |
| 48 | Iron and steel mills and ferroalloy manufacturing | 0.63 | 21,746 | 0.60 | 17,877 |
| 49 | Steel product manufacturing from purchased steel | 1.08 | 11,776 | 1.08 | 9,725 |
| 50 | Alumina and aluminum production and processing | 0.47 | 13,410 | 0.75 | 10,955 |
| 51 | Nonferrous metal (except aluminum) production and processing | 0.51 | 16,293 | 0.83 | 9,641 |
| 52 | Foundries | 0.81 | 19,460 | 0.70 | 14,841 |
| 53 | Forging and stamping | 0.47 | 15,620 | 0.55 | 15,886 |
| 54 | Cutlery and handtool manufacturing | 0.95 | 6,038 | 0.76 | 3,460 |
| 55 | Architectural and structural metals manufacturing | 0.83 | 42,736 | 0.74 | 40,419 |
| 56 | Boiler, tank, and shipping container manufacturing | 0.40 | 11,542 | 0.65 | 9,920 |
| 57 | Hardware manufacturing | 0.73 | 3,683 | 0.80 | 2,381 |
| 58 | Spring and wire product manufacturing | 1.87 | 6,621 | 1.49 | 4,314 |
| 59 | Machine shops; turned product; and screw, nut, and bolt manufacturing | 0.92 | 32,124 | 1.04 | 33,187 |
| 60 | Coating, engraving, heat treating, and allied activities | 1.05 | 11,205 | 1.34 | 10,901 |

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|---|---|---|---|---|---|
| 61 | Other fabricated metal product manufacturing | 1.23 | 27,645 | 0.93 | 26,063 |
| 62 | Agriculture, construction, and mining machinery manufacturing | 1.75 | 16,628 | 0.74 | 17,941 |
| 63 | Industrial machinery manufacturing | 0.29 | 11,572 | 0.22 | 9,407 |
| 64 | Commercial and service industry machinery manufacturing, including digital camera manufacturing | 0.79 | 6,259 | 1.56 | 4,349 |
| 65 | Ventilation, heating, air-conditioning, and commercial refrigeration equipment manufacturing | 0.54 | 14,384 | 0.62 | 9,956 |
| 66 | Metalworking machinery manufacturing | 1.44 | 22,878 | 0.73 | 16,801 |
| 67 | Engine, turbine, and power transmission equipment manufacturing | 1.53 | 12,424 | 2.16 | 11,712 |
| 68 | Other general purpose machinery manufacturing | 0.85 | 27,903 | 0.40 | 27,707 |
| 69 | Computer and peripheral equipment manufacturing, excluding digital camera manufacturing | 0.78 | 7,857 | 1.69 | 5,643 |
| 70 | Communications equipment manufacturing | 0.52 | 8,133 | 0.92 | 5,738 |
| 71 | Audio and video equipment manufacturing | 0.10 | 3,218 | 0.77 | 531 |
| 72 | Semiconductor and other electronic component manufacturing | 0.99 | 21,034 | 1.40 | 15,701 |
| 73 | Navigational, measuring, electromedical, and control instruments manufacturing | 0.38 | 22,652 | 0.35 | 20,683 |
| 74 | Manufacturing and reproducing magnetic and optical media | 0.76 | 6,035 | 1.44 | 1,524 |
| 75 | Electric lighting equipment manufacturing | 0.81 | 5,691 | 1.17 | 3,331 |
| 76 | Household appliance manufacturing | 0.11 | 10,323 | 0.15 | 9,354 |
| 77 | Electrical equipment manufacturing | 0.58 | 16,827 | 0.56 | 17,786 |
| 78 | Other electrical equipment and component manufacturing | 0.42 | 18,340 | 0.51 | 16,911 |
| 79 | Motor vehicle manufacturing | 0.01 | 26,691 | 0.00 | 36,422 |
| 80 | Motor vehicle body and trailer manufacturing | 0.08 | 14,867 | 0.01 | 18,022 |
| 81 | Motor vehicle parts manufacturing | 0.38 | 82,024 | 0.25 | 94,688 |
| 82 | Aerospace product and parts manufacturing | 0.70 | 16,235 | 0.48 | 17,834 |
| 83 | Railroad rolling stock manufacturing | 0.27 | 10,801 | 0.26 | 8,774 |
| 84 | Ship and boat building | 0.38 | 9,198 | 1.46 | 4,667 |
| 85 | Other transportation equipment manufacturing | 0.20 | 1,405 | 0.06 | 2,910 |
| 86 | Household and institutional furniture and kitchen cabinet manufacturing, excluding wood tv, radio and sewing maching cabinet manufacturing | 0.10 | 83,006 | 0.12 | 45,153 |

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|---|---|---|---|---|---|
| 87 | Office furniture (including fixtures) manufacturing | 0.18 | 13,214 | 0.23 | 11,501 |
| 88 | Other furniture related product manufacturing | 0.06 | 5,021 | 0.02 | 3,870 |
| 89 | Medical equipment and supplies manufacturing | 0.14 | 21,162 | 0.14 | 17,383 |
| 90 | Other miscellaneous manufacturing | 0.38 | 24,660 | 0.38 | 19,015 |
| 91 | Wholesale trade | 1.39 | 349,063 | 1.03 | 324,884 |
| 92 | Motor vehicle and parts dealers | 0.27 | 160,235 | 0.15 | 163,286 |
| 93 | Food and beverage stores | 0.11 | 226,916 | 0.06 | 222,894 |
| 94 | General Merchandise stores | 0.10 | 273,268 | 0.10 | 264,765 |
| 95 | All other retail | 0.46 | 624,576 | 0.42 | 558,722 |
| 96 | Air transportation | 2.97 | 16,055 | 3.97 | 6,486 |
| 97 | Rail transportation | NA | NA | NA | NA |
| 98 | Water transportation | 2.90 | 1,773 | 4.95 | 1,333 |
| 99 | Truck transportation | 0.69 | 143,624 | 1.53 | 134,792 |
| 100 | Transit and ground passenger transportation | 0.64 | 55,817 | 0.96 | 44,285 |
| 101 | Pipeline transportation | 2.92 | 28,137 | 13.44 | 4,300 |
| 102 | Scenic and sightseeing transportation and support activities for transportation | 5.00 | 63,855 | 13.22 | 34,424 |
| 103 | Couriers and messengers | 0.67 | 59,936 | 1.15 | 36,011 |
| 104 | Warehousing and storage | 1.13 | 84,721 | 1.23 | 86,559 |
| 105 | Newspaper, periodical, book, and directory publishers | 1.24 | 38,688 | 0.75 | 18,701 |
| 106 | Software publishers | 0.83 | 6,772 | 0.55 | 9,519 |
| 107 | Motion picture, video, and sound recording industries | 0.86 | 10,717 | 0.89 | 10,692 |
| 108 | Radio and television broadcasting | 1.54 | 16,722 | 1.17 | 13,127 |
| 109 | Cable and other subscription programming | 1.66 | 3,823 | 2.08 | 1,419 |
| 110 | Wired telecommunications carriers | 1.10 | 47,071 | 0.93 | 31,937 |
| 111 | Wireless telecommunications carriers (except satellite) | 0.96 | 12,261 | 0.57 | 8,471 |
| 112 | Satellite, telecommunications resellers, and all other telecommunications | 5.07 | 5,901 | 3.35 | 2,481 |
| 113 | Data processing, hosting, and related services | 3.86 | 13,105 | 3.70 | 11,434 |
| 114 | Other information services | 1.93 | 12,236 | 2.13 | 13,240 |
| 115 | Monetary authorities, credit intermediation, and related activities | 2.17 | 191,655 | 1.23 | 175,460 |
| 116 | Securities, commodity contracts, fund, trusts and other financial investments and vehicles and related activities | 3.92 | 19,490 | 1.52 | 22,494 |
| 117 | Insurance carriers | 0.76 | 66,351 | 0.68 | 53,832 |
| 118 | Agencies, brokerages, and other insurance related activities | 1.04 | 52,007 | 1.12 | 58,470 |

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|---|---|---|---|---|---|
| 119 | Real estate and Owner-occupied Dwellings | 0.68 | 68,345 | 0.54 | 69,777 |
| 120 | Automotive equipment rental and leasing | 2.40 | 9,049 | 0.78 | 12,130 |
| 121 | Consumer goods rental and general rental centers | 0.58 | 25,237 | 0.68 | 13,135 |
| 122 | Commercial and industrial machinery and equipment rental and leasing | 5.41 | 4,466 | 1.70 | 9,041 |
| 123 | Lessors of nonfinancial intangible assets (except copyrighted works) | 5.22 | 951 | 2.27 | 719 |
| 124 | Legal services | 3.92 | 61,252 | 2.72 | 55,414 |
| 125 | Accounting, tax preparation, bookkeeping, and payroll services | 3.36 | 44,687 | 2.35 | 46,311 |
| 126 | Architectural, engineering, and related services | 1.78 | 86,817 | 1.14 | 95,628 |
| 127 | Specialized design services | 2.53 | 6,710 | 1.81 | 7,185 |
| 128 | Computer systems design and related services | 2.32 | 46,214 | 1.77 | 71,799 |
| 129 | Management, scientific, and technical consulting services | 2.16 | 37,561 | 1.81 | 49,250 |
| 130 | Scientific research and development services | 0.81 | 23,269 | 0.13 | 26,457 |
| 131 | Advertising and related services | 3.59 | 16,106 | 2.62 | 15,105 |
| 132 | Other professional, scientific, and technical services | 8.78 | 32,807 | 6.27 | 41,977 |
| 133 | Management of companies and enterprises | 2.45 | 87,229 | 1.45 | 132,275 |
| 134 | Office administrative services | 1.40 | 18,614 | 1.89 | 19,604 |
| 135 | Facilities support services | 1.69 | 5,129 | 1.35 | 9,346 |
| 136 | Employment services | 3.63 | 190,456 | 7.02 | 210,536 |
| 137 | Business support services | 2.45 | 59,139 | 1.79 | 66,876 |
| 138 | Travel arrangement and reservation services | 2.67 | 9,463 | 2.27 | 7,024 |
| 139 | Investigation and security services | 2.40 | 37,926 | 2.11 | 42,041 |
| 140 | Services to buildings and dwellings | 1.41 | 101,402 | 1.01 | 125,692 |
| 141 | Other support services | 3.01 | 16,083 | 1.83 | 18,212 |
| 142 | Waste management and remediation services | 2.54 | 25,754 | 2.02 | 33,494 |
| 143 | Elementary and secondary schools | 0.03 | 615,304 | 0.01 | 590,261 |
| 144 | Junior colleges, colleges, universities, and professional schools | 0.33 | 207,638 | 0.25 | 252,582 |
| 145 | Other educational services | 0.13 | 33,516 | 0.23 | 35,239 |
| 146 | Offices of physicians | 0.01 | 163,952 | 0.00 | 201,250 |
| 147 | Offices of dentists | 0.02 | 51,720 | 0.01 | 59,846 |
| 148 | Offices of other health practitioners | 0.05 | 45,584 | 0.03 | 67,306 |
| 149 | Outpatient care centers | 0.04 | 47,189 | 0.01 | 71,262 |
| 150 | Medical and diagnostic laboratories | 0.05 | 10,297 | 0.08 | 14,423 |
| 151 | Home health care services | 0.09 | 53,212 | 0.03 | 81,595 |

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|---|---|---|---|---|---|
| 152 | Other ambulatory health care services | 0.04 | 26,547 | 0.05 | 32,827 |
| 153 | Hospitals | 0.01 | 441,832 | 0.01 | 472,902 |
| 154 | Nursing and residential care facilities | 0.02 | 281,402 | 0.01 | 300,346 |
| 155 | Individual and family services | 0.00 | 93,280 | 0.00 | 154,651 |
| 156 | Community and vocational rehabilitation services | 0.00 | 42,684 | 0.02 | 38,553 |
| 157 | Child day care services | 0.04 | 56,268 | 0.03 | 59,817 |
| 158 | Performing arts companies | 0.91 | 4,769 | 0.59 | 5,135 |
| 159 | Spectator sports | 1.13 | 6,287 | 1.01 | 5,589 |
| 160 | Promoters of events, and agents and managers | 1.02 | 4,367 | 0.65 | 8,194 |
| 161 | Independent artists, writers, and performers | 2.67 | 1,299 | 1.84 | 1,406 |
| 162 | Museums, historical sites, and similar institutions | 0.10 | 12,166 | 0.10 | 14,730 |
| 163 | Amusement parks and arcades | 0.39 | 6,095 | 0.22 | 7,792 |
| 164 | Gambling industries (except casino hotels) | 0.10 | 6,974 | 0.01 | 12,738 |
| 165 | Other amusement and recreation industries | 0.48 | 75,640 | 0.14 | 82,107 |
| 166 | Accommodation | 1.38 | 91,620 | 0.74 | 110,539 |
| 167 | Food services and drinking places | 0.68 | 691,809 | 0.39 | 832,480 |
| 168 | Automotive repair and maintenance | 0.50 | 59,879 | 0.32 | 60,442 |
| 169 | Electronic and precision equipment repair and maintenance | 2.07 | 6,438 | 0.90 | 6,349 |
| 170 | Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance | 1.53 | 17,026 | 0.77 | 17,822 |
| 171 | Personal and household goods repair and maintenance | 1.25 | 4,703 | 0.94 | 3,566 |
| 172 | Personal care services | 0.00 | 36,110 | 0.00 | 38,650 |
| 173 | Death care services | 0.00 | 16,392 | 0.03 | 16,287 |
| 174 | Drycleaning and laundry services | 0.52 | 22,385 | 0.57 | 17,145 |
| 175 | Other personal services | 0.31 | 9,854 | 0.22 | 13,109 |
| 176 | Religious organizations | 0.01 | 10,455 | 0.02 | 12,249 |
| 177 | Grantmaking and giving services and social advocacy organizations | 0.07 | 21,479 | 0.01 | 21,148 |
| 178 | Civic, social, professional, and similar organizations | 1.13 | 56,412 | 0.38 | 48,104 |
| 179 | Private households | 0.00 | 14,086 | 0.00 | 16,061 |
| 180 | Postal Service | 1.65 | 59,304 | 1.01 | 47,171 |
| 181 | Government and unclassified | 1.00 | 465,186 | 0.92 | 476,794 |

Data Sources: Bureau of Labor Statistics and Bureau of Economic Analysis

# Appendix III. All Dependence, Impact, and Risk Scores

| FIPS | County Names | 2018 Region-Wide Dependence | 2018 Local Dependence | Impact Score | Own-County Risk | 2018 Total Risk | Class |
|---|---|---|---|---|---|---|---|
| 1007 | Bibb County, Alabama | 0.7 | 0.0 | -0.4 | 0.0 | 1.0 | 6 |
| 1009 | Blount County, Alabama | 1.4 | 0.0 | 0.3 | 0.0 | 2.0 | 3 |
| 1015 | Calhoun County, Alabama | 1.3 | 0.0 | -0.2 | 0.0 | 1.8 | 1 |
| 1017 | Chambers County, Alabama | 1.4 | 0.0 | -0.1 | 0.0 | 1.9 | 3 |
| 1019 | Cherokee County, Alabama | 2.5 | 0.0 | 0.1 | 0.0 | 3.3 | 3 |
| 1021 | Chilton County, Alabama | 1.6 | 0.0 | 0.1 | 0.0 | 2.0 | 3 |
| 1027 | Clay County, Alabama | 0.5 | 0.0 | -0.2 | 0.0 | 0.7 | 6 |
| 1029 | Cleburne County, Alabama | 0.7 | 0.0 | -0.1 | 0.0 | 0.8 | 8 |
| 1033 | Colbert County, Alabama | 1.6 | 0.0 | -1.3 | 0.0 | 1.6 | 1 |
| 1037 | Coosa County, Alabama | 0.8 | 0.0 | -1.4 | 0.0 | 1.1 | 6 |
| 1043 | Cullman County, Alabama | 1.7 | 0.0 | 0.6 | 0.0 | 2.2 | 3 |
| 1049 | DeKalb County, Alabama | 1.5 | 0.0 | 0.2 | 0.0 | 1.7 | 3 |
| 1051 | Elmore County, Alabama | 1.0 | 0.0 | 0.0 | 0.0 | 1.2 | 8 |
| 1055 | Etowah County, Alabama | 1.2 | 0.3 | -0.1 | 93.0 | 2.4 | 1 |
| 1057 | Fayette County, Alabama | 0.6 | 0.0 | -0.9 | 0.0 | 0.7 | 6 |
| 1059 | Franklin County, Alabama | 1.2 | 0.0 | 0.0 | 0.0 | 1.2 | 5 |
| 1065 | Hale County, Alabama | 1.1 | 0.4 | -0.2 | 68.8 | 1.9 | 1 |
| 1071 | Jackson County, Alabama | 1.2 | 0.0 | -2.6 | 0.0 | 1.2 | 2 |
| 1073 | Jefferson County, Alabama | 2.1 | 1.0 | -0.2 | 54.0 | 4.1 | 1 |
| 1075 | Lamar County, Alabama | 0.9 | 0.0 | -1.2 | 0.0 | 1.1 | 6 |
| 1077 | Lauderdale County, Alabama | 1.1 | 0.0 | -0.1 | 0.0 | 1.1 | 6 |
| 1079 | Lawrence County, Alabama | 3.0 | 0.0 | 1.1 | 0.0 | 3.3 | 3 |
| 1083 | Limestone County, Alabama | 6.6 | 0.0 | 1.1 | 0.0 | 7.9 | 3 |
| 1087 | Macon County, Alabama | 1.2 | 0.0 | -0.1 | 0.0 | 1.7 | 1 |
| 1089 | Madison County, Alabama | 1.2 | 0.0 | 0.5 | 0.0 | 1.4 | 3 |
| 1093 | Marion County, Alabama | 0.9 | 0.0 | -0.3 | 0.0 | 1.0 | 6 |
| 1095 | Marshall County, Alabama | 1.2 | 0.0 | -0.2 | 0.0 | 1.5 | 1 |
| 1103 | Morgan County, Alabama | 1.3 | 0.4 | -0.3 | 66.7 | 2.1 | 1 |
| 1107 | Pickens County, Alabama | 1.8 | 0.0 | 0.1 | 0.0 | 2.1 | 3 |
| 1111 | Randolph County, Alabama | 0.5 | 0.0 | -0.3 | 0.0 | 0.7 | 6 |
| 1115 | St. Clair County, Alabama | 1.0 | 0.0 | 0.3 | 0.0 | 1.6 | 7 |
| 1117 | Shelby County, Alabama | 2.9 | 2.4 | 1.3 | 79.0 | 6.6 | 3 |
| 1121 | Talladega County, Alabama | 1.5 | 0.7 | 0.1 | 75.1 | 3.0 | 3 |
| 1123 | Tallapoosa County, Alabama | 1.3 | 0.2 | 0.1 | 59.6 | 2.1 | 3 |

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|---|---|---|---|---|---|---|
| 1125 Tuscaloosa County, Alabama | 1.1 | 0.0 | 0.0 | 0.0 | 1.5 | 3 |
| 1127 Walker County, Alabama | 2.2 | 1.3 | -0.7 | 64.5 | 4.1 | 1 |
| 1133 Winston County, Alabama | 0.5 | 0.0 | -0.4 | 0.0 | 0.6 | 6 |
| 13011 Banks County, Georgia | 0.9 | 0.0 | 0.4 | 0.0 | 0.9 | 8 |
| 13013 Barrow County, Georgia | 0.8 | 0.0 | 0.1 | 0.0 | 0.8 | 8 |
| 13015 Bartow County, Georgia | 1.8 | 1.2 | 0.0 | 71.9 | 3.8 | 3 |
| 13045 Carroll County, Georgia | 2.1 | 0.0 | 1.2 | 0.0 | 2.4 | 3 |
| 13047 Catoosa County, Georgia | 0.6 | 0.0 | -0.3 | 0.0 | 0.6 | 6 |
| 13055 Chattooga County, Georgia | 0.6 | 0.0 | -0.3 | 0.0 | 0.7 | 6 |
| 13057 Cherokee County, Georgia | 0.7 | 0.0 | 0.3 | 0.0 | 0.8 | 8 |
| 13083 Dade County, Georgia | 0.6 | 0.0 | 0.0 | 0.0 | 0.6 | 8 |
| 13085 Dawson County, Georgia | 0.6 | 0.0 | 0.3 | 0.0 | 0.6 | 8 |
| 13097 Douglas County, Georgia | 1.3 | 0.0 | -0.2 | 0.0 | 1.3 | 2 |
| 13105 Elbert County, Georgia | 0.6 | 0.0 | -0.1 | 0.0 | 0.7 | 6 |
| 13111 Fannin County, Georgia | 1.3 | 0.0 | 0.4 | 0.0 | 1.5 | 3 |
| 13115 Floyd County, Georgia | 1.2 | 0.8 | -0.5 | 99.2 | 2.7 | 1 |
| 13117 Forsyth County, Georgia | 1.1 | 0.0 | 0.7 | 0.0 | 1.1 | 5 |
| 13119 Franklin County, Georgia | 0.9 | 0.0 | 0.3 | 0.0 | 0.9 | 8 |
| 13123 Gilmer County, Georgia | 0.9 | 0.0 | -0.1 | 0.0 | 1.1 | 6 |
| 13129 Gordon County, Georgia | 0.9 | 0.0 | -0.1 | 0.0 | 1.3 | 8 |
| 13135 Gwinnett County, Georgia | 1.1 | 0.0 | 0.0 | 0.0 | 1.1 | 8 |
| 13137 Habersham County, Georgia | 1.5 | 0.0 | -0.1 | 0.0 | 1.7 | 3 |
| 13139 Hall County, Georgia | 1.0 | 0.0 | 0.3 | 0.0 | 1.0 | 8 |
| 13143 Haralson County, Georgia | 0.6 | 0.0 | -0.1 | 0.0 | 0.6 | 6 |
| 13147 Hart County, Georgia | 2.7 | 0.0 | 0.4 | 0.0 | 3.0 | 3 |
| 13149 Heard County, Georgia | 5.3 | 2.5 | 0.4 | 72.3 | 9.3 | 3 |
| 13157 Jackson County, Georgia | 1.3 | 0.0 | -0.1 | 0.0 | 1.3 | 2 |
| 13187 Lumpkin County, Georgia | 0.9 | 0.0 | -0.2 | 0.0 | 0.9 | 6 |
| 13195 Madison County, Georgia | 1.1 | 0.0 | -0.2 | 0.0 | 1.1 | 6 |
| 13213 Murray County, Georgia | 0.8 | 0.0 | -0.1 | 71.7 | 1.4 | 7 |
| 13223 Paulding County, Georgia | 0.6 | 0.0 | 0.3 | 0.0 | 0.7 | 8 |
| 13227 Pickens County, Georgia | 1.5 | 0.0 | -0.7 | 0.0 | 1.8 | 1 |
| 13233 Polk County, Georgia | 0.9 | 0.0 | -1.6 | 0.0 | 1.2 | 6 |
| 13241 Rabun County, Georgia | 1.1 | 0.4 | 0.0 | 62.9 | 1.8 | 3 |
| 13257 Stephens County, Georgia | 0.8 | 0.0 | -0.1 | 0.0 | 0.8 | 6 |
| 13281 Towns County, Georgia | 3.3 | 0.0 | -1.2 | 0.0 | 3.8 | 1 |
| 13291 Union County, Georgia | 0.5 | 0.0 | 0.0 | 0.0 | 0.5 | 8 |
| 13295 Walker County, Georgia | 0.5 | 0.0 | 0.0 | 0.0 | 0.6 | 8 |

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|---|---|---|---|---|---|---|
| 13311 White County, Georgia | 0.7 | 0.0 | 0.2 | 0.0 | 0.7 | 8 |
| 13313 Whitfield County, Georgia | 1.0 | 0.0 | -0.1 | 0.0 | 1.1 | 6 |
| 21001 Adair County, Kentucky | 0.6 | 0.0 | -0.6 | 0.0 | 0.6 | 6 |
| 21011 Bath County, Kentucky | 0.6 | 0.0 | -0.1 | 0.0 | 0.6 | 6 |
| 21013 Bell County, Kentucky | 1.5 | 0.0 | -0.2 | 0.0 | 1.5 | 1 |
| 21019 Boyd County, Kentucky | 1.6 | 0.0 | 0.0 | 0.0 | 2.1 | 3 |
| 21025 Breathitt County, Kentucky | 0.6 | 0.0 | -0.2 | 0.0 | 0.6 | 6 |
| 21043 Carter County, Kentucky | 1.1 | 0.0 | -1.3 | 0.0 | 1.2 | 6 |
| 21045 Casey County, Kentucky | 0.6 | 0.0 | -1.0 | 0.0 | 0.8 | 6 |
| 21049 Clark County, Kentucky | 1.6 | 0.0 | -0.2 | 0.0 | 1.6 | 1 |
| 21051 Clay County, Kentucky | 0.9 | 0.0 | -0.1 | 0.0 | 0.9 | 6 |
| 21053 Clinton County, Kentucky | 0.5 | 0.0 | -0.3 | 0.0 | 0.5 | 6 |
| 21057 Cumberland County, Kentucky | 0.6 | 0.0 | -0.2 | 0.0 | 0.6 | 6 |
| 21061 Edmonson County, Kentucky | 1.6 | 0.0 | 1.1 | 0.0 | 1.6 | 3 |
| 21063 Elliott County, Kentucky | 0.6 | 0.0 | 0.1 | 0.0 | 0.7 | 8 |
| 21065 Estill County, Kentucky | 0.6 | 0.0 | 0.0 | 0.0 | 0.6 | 8 |
| 21069 Fleming County, Kentucky | 2.4 | 0.0 | 0.0 | 0.0 | 2.4 | 3 |
| 21071 Floyd County, Kentucky | 1.0 | 0.0 | -0.6 | 0.0 | 1.0 | 6 |
| 21079 Garrard County, Kentucky | 0.7 | 0.0 | -0.1 | 0.0 | 0.7 | 6 |
| 21087 Green County, Kentucky | 0.6 | 0.0 | -0.6 | 0.0 | 0.6 | 6 |
| 21089 Greenup County, Kentucky | 0.9 | 0.0 | -0.6 | 0.0 | 1.1 | 6 |
| 21095 Harlan County, Kentucky | 1.2 | 0.0 | -0.5 | 0.0 | 1.3 | 2 |
| 21099 Hart County, Kentucky | 0.4 | 0.0 | 0.0 | 0.0 | 0.4 | 8 |
| 21109 Jackson County, Kentucky | 4.7 | 0.0 | -0.8 | 0.0 | 4.7 | 1 |
| 21115 Johnson County, Kentucky | 1.4 | 0.0 | -0.7 | 0.0 | 1.7 | 1 |
| 21119 Knott County, Kentucky | 0.5 | 0.0 | -2.3 | 0.0 | 0.5 | 6 |
| 21121 Knox County, Kentucky | 1.6 | 0.0 | -0.5 | 0.0 | 1.6 | 1 |
| 21125 Laurel County, Kentucky | 1.3 | 0.0 | 0.1 | 0.0 | 1.5 | 3 |
| 21127 Lawrence County, Kentucky | 1.3 | 0.9 | -4.0 | 85.7 | 2.5 | 1 |
| 21129 Lee County, Kentucky | 2.1 | 0.0 | -1.9 | 0.0 | 2.1 | 1 |
| 21131 Leslie County, Kentucky | 1.0 | 0.0 | -0.7 | 0.0 | 1.0 | 6 |
| 21133 Letcher County, Kentucky | 0.9 | 0.0 | -1.1 | 0.0 | 1.1 | 6 |
| 21135 Lewis County, Kentucky | 3.0 | 0.0 | 0.2 | 0.0 | 3.8 | 3 |
| 21137 Lincoln County, Kentucky | 0.7 | 0.0 | 0.0 | 0.0 | 0.9 | 8 |
| 21147 McCreary County, Kentucky | 1.0 | 0.0 | 0.1 | 0.0 | 1.2 | 8 |
| 21151 Madison County, Kentucky | 0.9 | 0.0 | 0.2 | 0.0 | 0.9 | 8 |
| 21153 Magoffin County, Kentucky | 0.7 | 0.0 | -0.6 | 0.0 | 0.7 | 6 |
| 21159 Martin County, Kentucky | 1.2 | 0.0 | -0.4 | 0.0 | 1.4 | 1 |

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| 21165 Menifee County, Kentucky | 0.6 | 0.0 | 0.0 | 0.0 | 0.6 | 8 |
| 21169 Metcalfe County, Kentucky | 0.7 | 0.0 | -0.2 | 0.0 | 0.7 | 6 |
| 21171 Monroe County, Kentucky | 1.0 | 0.0 | 0.2 | 0.0 | 1.0 | 8 |
| 21173 Montgomery County, Kentucky | 0.7 | 0.0 | 0.0 | 0.0 | 0.7 | 8 |
| 21175 Morgan County, Kentucky | 1.6 | 0.0 | 0.0 | 0.0 | 1.9 | 3 |
| 21181 Nicholas County, Kentucky | 0.8 | 0.0 | 0.1 | 0.0 | 0.8 | 8 |
| 21189 Owsley County, Kentucky | 0.5 | 0.0 | 0.1 | 0.0 | 0.5 | 8 |
| 21193 Perry County, Kentucky | 1.2 | 0.0 | -0.4 | 0.0 | 1.2 | 2 |
| 21195 Pike County, Kentucky | 1.3 | 0.0 | -0.6 | 0.0 | 1.4 | 1 |
| 21197 Powell County, Kentucky | 0.9 | 0.0 | 0.3 | 0.0 | 0.9 | 8 |
| 21199 Pulaski County, Kentucky | 1.5 | 1.1 | 0.0 | 91.5 | 2.9 | 3 |
| 21201 Robertson County, Kentucky | 0.6 | 0.0 | 0.2 | 0.0 | 0.6 | 8 |
| 21203 Rockcastle County, Kentucky | 0.8 | 0.0 | -0.3 | 0.0 | 1.0 | 6 |
| 21205 Rowan County, Kentucky | 0.6 | 0.0 | 0.0 | 0.0 | 0.6 | 8 |
| 21207 Russell County, Kentucky | 0.6 | 0.0 | -0.1 | 0.0 | 0.7 | 8 |
| 21231 Wayne County, Kentucky | 0.9 | 0.0 | -0.1 | 0.0 | 1.1 | 8 |
| 21235 Whitley County, Kentucky | 1.1 | 0.0 | 0.1 | 0.0 | 1.1 | 5 |
| 21237 Wolfe County, Kentucky | 0.6 | 0.0 | -0.1 | 0.0 | 0.6 | 6 |
| 24001 Allegany County, Maryland | 0.7 | 0.2 | -0.3 | 60.8 | 1.2 | 6 |
| 24023 Garrett County, Maryland | 0.9 | 0.0 | -0.3 | 0.0 | 1.2 | 6 |
| 24043 Washington County, Maryland | 1.0 | 0.0 | 0.1 | 0.0 | 1.2 | 8 |
| 28003 Alcorn County, Mississippi | 2.0 | 0.0 | 0.5 | 0.0 | 2.0 | 3 |
| 28009 Benton County, Mississippi | 3.7 | 1.0 | 2.1 | 57.8 | 5.9 | 3 |
| 28013 Calhoun County, Mississippi | 1.7 | 0.0 | 0.4 | 0.0 | 1.7 | 3 |
| 28017 Chickasaw County, Mississippi | 1.0 | 0.0 | -0.1 | 0.0 | 1.0 | 8 |
| 28019 Choctaw County, Mississippi | 5.7 | 2.6 | 3.1 | 60.6 | 9.3 | 3 |
| 28025 Clay County, Mississippi | 1.5 | 0.0 | 0.0 | 0.0 | 1.8 | 3 |
| 28057 Itawamba County, Mississippi | 1.3 | 0.0 | 0.3 | 0.0 | 1.3 | 5 |
| 28069 Kemper County, Mississippi | 4.7 | 2.7 | 3.0 | 90.7 | 9.1 | 3 |
| 28081 Lee County, Mississippi | 1.4 | 0.0 | 0.2 | 0.0 | 1.4 | 3 |
| 28087 Lowndes County, Mississippi | 1.6 | 0.7 | -0.1 | 64.6 | 2.7 | 1 |
| 28093 Marshall County, Mississippi | 1.1 | 0.0 | -0.2 | 0.0 | 1.4 | 4 |
| 28095 Monroe County, Mississippi | 0.9 | 0.0 | -0.1 | 0.0 | 1.0 | 6 |
| 28097 Montgomery County, Mississippi | 1.3 | 0.0 | 0.2 | 0.0 | 1.8 | 3 |
| 28103 Noxubee County, Mississippi | 1.1 | 0.0 | 0.0 | 0.0 | 1.5 | 3 |
| 28105 Oktibbeha County, Mississippi | 1.3 | 0.0 | 0.2 | 0.0 | 1.6 | 3 |
| 28107 Panola County, Mississippi | 2.3 | 1.3 | 0.2 | 71.5 | 3.9 | 3 |
| 28115 Pontotoc County, Mississippi | 0.9 | 0.0 | 0.1 | 0.0 | 0.9 | 8 |

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| 28117 Prentiss County, Mississippi | 1.0 | 0.0 | 0.1 | 0.0 | 1.0 | 8 |
| 28139 Tippah County, Mississippi | 1.2 | 0.0 | 0.0 | 0.0 | 1.4 | 3 |
| 28141 Tishomingo County, Mississippi | 1.4 | 0.0 | 0.1 | 0.0 | 1.4 | 5 |
| 28145 Union County, Mississippi | 1.0 | 0.0 | 0.0 | 0.0 | 1.1 | 8 |
| 28155 Webster County, Mississippi | 1.8 | 0.0 | 0.6 | 0.0 | 2.0 | 3 |
| 28159 Winston County, Mississippi | 1.3 | 0.0 | -0.1 | 0.0 | 1.8 | 3 |
| 28161 Yalobusha County, Mississippi | 0.8 | 0.0 | -0.1 | 0.0 | 1.2 | 8 |
| 36003 Allegany County, New York | 0.8 | 0.3 | -0.3 | 99.5 | 1.9 | 4 |
| 36007 Broome County, New York | 1.3 | 0.0 | -0.6 | 0.0 | 1.3 | 2 |
| 36009 Cattaraugus County, New York | 0.8 | 0.3 | -0.4 | 91.4 | 2.3 | 4 |
| 36013 Chautauqua County, New York | 0.9 | 0.4 | -0.2 | 100.0 | 3.2 | 4 |
| 36015 Chemung County, New York | 0.9 | 0.0 | -0.4 | 0.0 | 1.2 | 6 |
| 36017 Chenango County, New York | 0.7 | 0.0 | 0.1 | 0.0 | 0.7 | 8 |
| 36023 Cortland County, New York | 0.7 | 0.0 | -1.3 | 0.0 | 0.9 | 6 |
| 36025 Delaware County, New York | 0.8 | 0.0 | -0.1 | 0.0 | 0.8 | 8 |
| 36077 Otsego County, New York | 0.8 | 0.0 | -0.6 | 0.0 | 0.8 | 6 |
| 36095 Schoharie County, New York | 3.5 | 0.0 | 0.0 | 0.0 | 3.5 | 3 |
| 36097 Schuyler County, New York | 0.6 | 0.0 | 0.1 | 0.0 | 0.8 | 8 |
| 36101 Steuben County, New York | 0.9 | 0.0 | -0.2 | 0.0 | 1.1 | 6 |
| 36107 Tioga County, New York | 0.8 | 0.0 | 0.1 | 0.0 | 1.0 | 8 |
| 36109 Tompkins County, New York | 0.8 | 0.4 | -0.3 | 95.1 | 1.6 | 4 |
| 37003 Alexander County, North Carolina | 0.7 | 0.0 | 0.0 | 0.0 | 0.7 | 8 |
| 37005 Alleghany County, North Carolina | 1.3 | 0.0 | 0.0 | 0.0 | 1.3 | 5 |
| 37009 Ashe County, North Carolina | 0.8 | 0.0 | -0.1 | 0.0 | 0.8 | 6 |
| 37011 Avery County, North Carolina | 1.0 | 0.0 | 0.0 | 0.0 | 1.0 | 8 |
| 37021 Buncombe County, North Carolina | 1.0 | 0.3 | 0.2 | 79.1 | 1.9 | 7 |
| 37023 Burke County, North Carolina | 0.7 | 0.0 | -0.1 | 0.0 | 0.7 | 6 |
| 37027 Caldwell County, North Carolina | 1.1 | 0.0 | 0.0 | 0.0 | 1.1 | 5 |
| 37039 Cherokee County, North Carolina | 1.4 | 0.0 | 0.0 | 0.0 | 1.4 | 3 |
| 37043 Clay County, North Carolina | 0.5 | 0.0 | 0.0 | 0.0 | 0.6 | 8 |
| 37059 Davie County, North Carolina | 1.1 | 0.0 | 0.3 | 0.0 | 1.6 | 3 |
| 37067 Forsyth County, North Carolina | 1.2 | 0.3 | 0.2 | 72.0 | 2.5 | 3 |
| 37075 Graham County, North Carolina | 1.3 | 0.0 | -1.8 | 0.0 | 1.3 | 2 |
| 37087 Haywood County, North Carolina | 0.8 | 0.2 | -0.1 | 59.0 | 1.4 | 7 |
| 37089 Henderson County, North Carolina | 0.9 | 0.0 | 0.1 | 0.0 | 1.2 | 8 |
| 37099 Jackson County, North Carolina | 0.8 | 0.0 | -0.2 | 0.0 | 1.0 | 6 |
| 37111 McDowell County, North Carolina | 0.7 | 0.0 | -0.1 | 0.0 | 0.8 | 6 |
| 37113 Macon County, North Carolina | 0.9 | 0.0 | -0.1 | 0.0 | 1.0 | 6 |

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| 37115 Madison County, North Carolina | 1.9 | 0.0 | -0.7 | 0.0 | 2.4 | 1 |
| 37121 Mitchell County, North Carolina | 0.9 | 0.0 | 0.1 | 0.0 | 0.9 | 8 |
| 37149 Polk County, North Carolina | 0.7 | 0.0 | -0.3 | 0.0 | 0.7 | 6 |
| 37161 Rutherford County, North Carolina | 1.1 | 0.0 | -0.5 | 0.0 | 1.4 | 1 |
| 37169 Stokes County, North Carolina | 0.7 | 0.0 | -1.6 | 76.5 | 1.4 | 4 |
| 37171 Surry County, North Carolina | 1.1 | 0.0 | 0.0 | 0.0 | 1.3 | 5 |
| 37173 Swain County, North Carolina | 0.5 | 0.0 | 0.2 | 0.0 | 0.6 | 8 |
| 37175 Transylvania County, North Carolina | 0.6 | 0.0 | -0.1 | 0.0 | 0.7 | 6 |
| 37189 Watauga County, North Carolina | 0.7 | 0.0 | -0.9 | 0.0 | 0.7 | 6 |
| 37193 Wilkes County, North Carolina | 0.7 | 0.0 | -0.2 | 0.0 | 0.7 | 6 |
| 37197 Yadkin County, North Carolina | 0.8 | 0.0 | 0.1 | 0.0 | 1.0 | 8 |
| 37199 Yancey County, North Carolina | 1.2 | 0.0 | 0.5 | 0.0 | 1.4 | 3 |
| 39001 Adams County, Ohio | 2.8 | 2.2 | 0.1 | 75.9 | 5.8 | 3 |
| 39007 Ashtabula County, Ohio | 0.9 | 0.2 | -0.2 | 44.4 | 1.8 | 4 |
| 39009 Athens County, Ohio | 1.0 | 0.0 | 0.1 | 0.0 | 1.1 | 8 |
| 39013 Belmont County, Ohio | 1.3 | 0.0 | 0.3 | 0.0 | 1.6 | 3 |
| 39015 Brown County, Ohio | 3.8 | 0.0 | 3.0 | 0.0 | 5.9 | 3 |
| 39019 Carroll County, Ohio | 1.3 | 0.3 | 0.7 | 51.3 | 3.0 | 3 |
| 39025 Clermont County, Ohio | 1.6 | 0.4 | -0.3 | 56.6 | 2.5 | 1 |
| 39029 Columbiana County, Ohio | 0.8 | 0.0 | -0.5 | 0.0 | 1.4 | 4 |
| 39031 Coshocton County, Ohio | 3.0 | 2.4 | -1.6 | 83.5 | 7.8 | 1 |
| 39053 Gallia County, Ohio | 5.2 | 2.9 | -2.0 | 58.3 | 10.5 | 1 |
| 39059 Guernsey County, Ohio | 0.8 | 0.0 | 0.0 | 0.0 | 1.2 | 8 |
| 39067 Harrison County, Ohio | 1.6 | 0.0 | 0.1 | 0.0 | 2.4 | 3 |
| 39071 Highland County, Ohio | 1.0 | 0.0 | -0.3 | 0.0 | 1.3 | 6 |
| 39073 Hocking County, Ohio | 0.6 | 0.0 | -0.1 | 0.0 | 0.6 | 6 |
| 39075 Holmes County, Ohio | 1.2 | 0.0 | 0.2 | 0.0 | 2.4 | 3 |
| 39079 Jackson County, Ohio | 1.1 | 0.0 | -0.2 | 0.0 | 1.5 | 1 |
| 39081 Jefferson County, Ohio | 4.2 | 4.1 | -0.5 | 76.2 | 8.3 | 1 |
| 39087 Lawrence County, Ohio | 1.3 | 0.3 | 0.0 | 52.1 | 2.3 | 3 |
| 39099 Mahoning County, Ohio | 1.0 | 0.0 | -0.1 | 0.0 | 1.3 | 6 |
| 39105 Meigs County, Ohio | 1.4 | 0.0 | -0.2 | 0.0 | 1.8 | 1 |
| 39111 Monroe County, Ohio | 0.9 | 0.0 | -0.7 | 0.0 | 1.1 | 6 |
| 39115 Morgan County, Ohio | 1.7 | 0.0 | -0.5 | 0.0 | 2.1 | 1 |
| 39119 Muskingum County, Ohio | 1.2 | 0.4 | 0.2 | 44.2 | 2.1 | 3 |
| 39121 Noble County, Ohio | 0.8 | 0.0 | 0.0 | 0.0 | 1.0 | 8 |
| 39127 Perry County, Ohio | 1.1 | 0.0 | -0.2 | 0.0 | 1.2 | 2 |
| 39131 Pike County, Ohio | 1.2 | 0.0 | 0.0 | 0.0 | 1.6 | 3 |

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| 39141 Ross County, Ohio | 0.9 | 0.1 | 0.0 | 25.6 | 1.2 | 8 |
| 39145 Scioto County, Ohio | 0.8 | 0.3 | -0.1 | 61.3 | 1.6 | 7 |
| 39155 Trumbull County, Ohio | 0.9 | 0.0 | -0.2 | 0.0 | 1.1 | 6 |
| 39157 Tuscarawas County, Ohio | 1.0 | 0.3 | 0.3 | 85.1 | 2.6 | 7 |
| 39163 Vinton County, Ohio | 0.8 | 0.0 | -2.0 | 0.0 | 0.9 | 6 |
| 39167 Washington County, Ohio | 1.3 | 0.5 | 0.1 | 49.9 | 2.2 | 3 |
| 42003 Allegheny County, Pennsylvania | 1.1 | 0.2 | 0.0 | 75.1 | 2.5 | 3 |
| 42005 Armstrong County, Pennsylvania | 1.1 | 0.2 | -0.8 | 48.2 | 2.2 | 1 |
| 42007 Beaver County, Pennsylvania | 3.2 | 3.3 | -0.8 | 94.6 | 8.5 | 1 |
| 42009 Bedford County, Pennsylvania | 1.1 | 0.0 | -0.1 | 0.0 | 1.4 | 3 |
| 42013 Blair County, Pennsylvania | 0.9 | 0.0 | -0.2 | 0.0 | 1.3 | 6 |
| 42015 Bradford County, Pennsylvania | 1.3 | 0.4 | 0.4 | 52.9 | 2.4 | 3 |
| 42019 Butler County, Pennsylvania | 0.9 | 0.0 | 0.1 | 0.0 | 1.5 | 7 |
| 42021 Cambria County, Pennsylvania | 1.0 | 0.3 | -0.3 | 49.2 | 2.0 | 4 |
| 42023 Cameron County, Pennsylvania | 0.7 | 0.0 | -0.2 | 0.0 | 1.0 | 6 |
| 42025 Carbon County, Pennsylvania | 0.7 | 0.1 | -0.2 | 90.1 | 1.8 | 4 |
| 42027 Centre County, Pennsylvania | 0.8 | 0.1 | 0.2 | 72.0 | 1.9 | 7 |
| 42031 Clarion County, Pennsylvania | 1.2 | 0.0 | 0.0 | 0.0 | 1.6 | 3 |
| 42033 Clearfield County, Pennsylvania | 1.4 | 0.8 | -0.2 | 96.8 | 3.9 | 1 |
| 42035 Clinton County, Pennsylvania | 0.9 | 0.0 | 0.3 | 0.0 | 1.4 | 7 |
| 42037 Columbia County, Pennsylvania | 0.7 | 0.0 | 0.2 | 0.0 | 1.2 | 8 |
| 42039 Crawford County, Pennsylvania | 0.9 | 0.0 | 0.0 | 0.0 | 1.3 | 8 |
| 42047 Elk County, Pennsylvania | 0.8 | 0.1 | -0.2 | 61.7 | 1.5 | 4 |
| 42049 Erie County, Pennsylvania | 0.8 | 0.2 | -0.1 | 89.0 | 2.2 | 4 |
| 42051 Fayette County, Pennsylvania | 1.1 | 0.3 | -0.3 | 49.6 | 1.8 | 1 |
| 42053 Forest County, Pennsylvania | 0.9 | 0.0 | 0.3 | 0.0 | 1.1 | 8 |
| 42057 Fulton County, Pennsylvania | 2.1 | 0.0 | 0.3 | 0.0 | 2.4 | 3 |
| 42059 Greene County, Pennsylvania | 2.1 | 0.0 | 0.6 | 0.0 | 3.0 | 3 |
| 42061 Huntingdon County, Pennsylvania | 1.0 | 0.0 | -0.2 | 0.0 | 1.2 | 6 |
| 42063 Indiana County, Pennsylvania | 3.2 | 2.1 | -1.0 | 68.0 | 7.9 | 1 |
| 42065 Jefferson County, Pennsylvania | 0.9 | 0.0 | 0.0 | 0.0 | 1.4 | 7 |
| 42067 Juniata County, Pennsylvania | 0.5 | 0.0 | -0.1 | 0.0 | 0.6 | 8 |
| 42069 Lackawanna County, Pennsylvania | 1.1 | 0.1 | 0.1 | 25.2 | 1.7 | 7 |
| 42073 Lawrence County, Pennsylvania | 1.1 | 0.6 | -0.2 | 93.1 | 2.5 | 4 |
| 42079 Luzerne County, Pennsylvania | 1.8 | 0.5 | 0.1 | 33.4 | 3.4 | 3 |
| 42081 Lycoming County, Pennsylvania | 1.0 | 0.2 | 0.5 | 50.6 | 2.0 | 7 |
| 42083 McKean County, Pennsylvania | 0.9 | 0.0 | -0.5 | 0.0 | 1.3 | 6 |
| 42085 Mercer County, Pennsylvania | 0.8 | 0.0 | -0.3 | 0.0 | 1.0 | 6 |

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| 42087 Mifflin County, Pennsylvania | 0.7 | 0.0 | -0.1 | 0.0 | 1.0 | 6 |
| 42089 Monroe County, Pennsylvania | 0.7 | 0.0 | 0.0 | 0.0 | 1.0 | 8 |
| 42093 Montour County, Pennsylvania | 1.2 | 0.7 | -2.7 | 90.9 | 3.2 | 1 |
| 42097 Northumberland County, PA | 1.2 | 0.3 | -0.2 | 56.7 | 2.6 | 1 |
| 42099 Perry County, Pennsylvania | 0.7 | 0.0 | 0.1 | 0.0 | 1.0 | 8 |
| 42103 Pike County, Pennsylvania | 0.6 | 0.0 | 0.1 | 0.0 | 0.6 | 8 |
| 42105 Potter County, Pennsylvania | 2.9 | 0.0 | 1.0 | 0.0 | 3.6 | 3 |
| 42107 Schuylkill County, Pennsylvania | 1.3 | 0.4 | 0.2 | 53.8 | 3.0 | 3 |
| 42109 Snyder County, Pennsylvania | 0.6 | 0.1 | 0.1 | 46.6 | 1.2 | 8 |
| 42111 Somerset County, Pennsylvania | 1.1 | 0.0 | -0.1 | 0.0 | 1.5 | 3 |
| 42113 Sullivan County, Pennsylvania | 1.5 | 0.0 | -0.2 | 0.0 | 2.3 | 1 |
| 42115 Susquehanna County, Pennsylvania | 1.8 | 0.0 | 2.3 | 0.0 | 2.4 | 3 |
| 42117 Tioga County, Pennsylvania | 1.8 | 0.0 | 0.9 | 0.0 | 2.2 | 3 |
| 42119 Union County, Pennsylvania | 0.7 | 0.0 | -0.1 | 49.8 | 1.6 | 7 |
| 42121 Venango County, Pennsylvania | 1.2 | 0.4 | -0.2 | 66.2 | 2.1 | 1 |
| 42123 Warren County, Pennsylvania | 1.5 | 0.0 | 0.2 | 0.0 | 2.4 | 3 |
| 42125 Washington County, Pennsylvania | 1.2 | 0.0 | 0.7 | 0.0 | 1.6 | 3 |
| 42127 Wayne County, Pennsylvania | 0.9 | 0.0 | 0.1 | 0.0 | 1.0 | 8 |
| 42129 Westmoreland County, Pennsylvania | 1.0 | 0.0 | 0.1 | 0.0 | 1.6 | 7 |
| 42131 Wyoming County, Pennsylvania | 1.3 | 0.2 | 0.8 | 91.3 | 3.1 | 3 |
| 45007 Anderson County, South Carolina | 0.9 | 0.3 | 0.1 | 56.2 | 1.5 | 7 |
| 45021 Cherokee County, South Carolina | 1.6 | 0.3 | 0.2 | 57.5 | 2.5 | 3 |
| 45045 Greenville County, South Carolina | 1.4 | 0.0 | 0.2 | 0.0 | 1.6 | 3 |
| 45073 Oconee County, South Carolina | 6.2 | 0.0 | -1.9 | 0.0 | 7.0 | 1 |
| 45077 Pickens County, South Carolina | 1.0 | 0.0 | -0.4 | 0.0 | 1.1 | 6 |
| 45083 Spartanburg County, South Carolina | 1.0 | 0.0 | 0.3 | 0.0 | 1.2 | 8 |
| 47001 Anderson County, Tennessee | 1.5 | 0.9 | -0.1 | 91.7 | 3.4 | 3 |
| 47007 Bledsoe County, Tennessee | 0.8 | 0.0 | -0.3 | 0.0 | 0.8 | 6 |
| 47009 Blount County, Tennessee | 1.1 | 0.0 | 0.4 | 0.0 | 1.1 | 5 |
| 47011 Bradley County, Tennessee | 1.4 | 0.0 | 0.0 | 0.0 | 1.7 | 3 |
| 47013 Campbell County, Tennessee | 2.1 | 0.0 | -0.1 | 0.0 | 2.5 | 1 |
| 47015 Cannon County, Tennessee | 0.8 | 0.0 | -0.3 | 0.0 | 0.8 | 6 |
| 47019 Carter County, Tennessee | 0.6 | 0.0 | -0.4 | 0.0 | 0.7 | 6 |
| 47025 Claiborne County, Tennessee | 0.9 | 0.0 | -0.3 | 0.0 | 0.9 | 6 |
| 47027 Clay County, Tennessee | 0.8 | 0.0 | -0.3 | 0.0 | 0.8 | 6 |
| 47029 Cocke County, Tennessee | 1.9 | 0.0 | 0.1 | 0.0 | 2.2 | 3 |
| 47031 Coffee County, Tennessee | 1.3 | 0.0 | 0.2 | 0.0 | 1.3 | 5 |
| 47035 Cumberland County, Tennessee | 1.6 | 0.0 | 0.4 | 0.0 | 1.8 | 3 |

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| 47041 DeKalb County, Tennessee | 1.4 | 0.0 | -0.3 | 0.0 | 1.4 | 1 |
| 47049 Fentress County, Tennessee | 0.7 | 0.0 | -0.5 | 0.0 | 0.7 | 6 |
| 47051 Franklin County, Tennessee | 1.2 | 0.0 | 0.2 | 0.0 | 1.2 | 5 |
| 47057 Grainger County, Tennessee | 0.8 | 0.0 | -0.2 | 0.0 | 0.9 | 6 |
| 47059 Greene County, Tennessee | 1.2 | 0.0 | 0.0 | 0.0 | 1.4 | 3 |
| 47061 Grundy County, Tennessee | 1.0 | 0.0 | -0.7 | 0.0 | 1.0 | 6 |
| 47063 Hamblen County, Tennessee | 1.2 | 0.0 | 0.0 | 0.0 | 1.4 | 3 |
| 47065 Hamilton County, Tennessee | 2.5 | 0.0 | -0.2 | 0.0 | 2.5 | 1 |
| 47067 Hancock County, Tennessee | 0.5 | 0.0 | -0.2 | 0.0 | 0.6 | 6 |
| 47073 Hawkins County, Tennessee | 1.6 | 0.6 | -1.1 | 62.4 | 2.9 | 1 |
| 47087 Jackson County, Tennessee | 1.5 | 0.0 | 0.1 | 0.0 | 1.5 | 3 |
| 47089 Jefferson County, Tennessee | 1.5 | 0.0 | 0.5 | 0.0 | 1.5 | 3 |
| 47091 Johnson County, Tennessee | 1.5 | 0.0 | -0.7 | 0.0 | 1.6 | 1 |
| 47093 Knox County, Tennessee | 1.2 | 0.0 | 0.2 | 0.0 | 1.5 | 3 |
| 47099 Lawrence County, Tennessee | 3.0 | 0.0 | 0.4 | 0.0 | 3.0 | 3 |
| 47101 Lewis County, Tennessee | 0.7 | 0.0 | 0.2 | 0.0 | 0.7 | 8 |
| 47105 Loudon County, Tennessee | 2.0 | 0.0 | -0.1 | 0.0 | 2.8 | 1 |
| 47107 McMinn County, Tennessee | 1.5 | 0.7 | -0.1 | 64.6 | 3.0 | 3 |
| 47111 Macon County, Tennessee | 1.6 | 0.0 | -0.4 | 0.0 | 1.6 | 1 |
| 47115 Marion County, Tennessee | 1.2 | 0.0 | -0.1 | 0.0 | 1.2 | 5 |
| 47121 Meigs County, Tennessee | 1.7 | 0.0 | -2.1 | 0.0 | 2.3 | 1 |
| 47123 Monroe County, Tennessee | 1.3 | 0.0 | -0.2 | 0.0 | 1.4 | 1 |
| 47129 Morgan County, Tennessee | 1.1 | 0.0 | -0.3 | 0.0 | 1.5 | 1 |
| 47133 Overton County, Tennessee | 0.8 | 0.0 | -0.1 | 0.0 | 0.8 | 6 |
| 47137 Pickett County, Tennessee | 1.0 | 0.0 | -0.9 | 0.0 | 1.0 | 6 |
| 47139 Polk County, Tennessee | 1.4 | 0.0 | -0.4 | 0.0 | 1.8 | 1 |
| 47141 Putnam County, Tennessee | 0.9 | 0.0 | 0.0 | 0.0 | 0.9 | 8 |
| 47143 Rhea County, Tennessee | 9.8 | 0.0 | 2.9 | 0.0 | 11.8 | 3 |
| 47145 Roane County, Tennessee | 3.9 | 3.6 | 0.4 | 87.4 | 9.4 | 3 |
| 47151 Scott County, Tennessee | 1.1 | 0.0 | -0.4 | 0.0 | 1.3 | 2 |
| 47153 Sequatchie County, Tennessee | 0.9 | 0.0 | -0.2 | 0.0 | 0.9 | 6 |
| 47155 Sevier County, Tennessee | 1.2 | 0.0 | 0.0 | 0.0 | 1.4 | 5 |
| 47159 Smith County, Tennessee | 2.9 | 0.0 | 1.6 | 0.0 | 2.9 | 3 |
| 47163 Sullivan County, Tennessee | 1.1 | 0.2 | 0.0 | 57.7 | 2.0 | 3 |
| 47171 Unicoi County, Tennessee | 2.2 | 0.0 | -0.4 | 0.0 | 2.2 | 1 |
| 47173 Union County, Tennessee | 0.7 | 0.0 | -0.3 | 0.0 | 0.8 | 6 |
| 47175 Van Buren County, Tennessee | 0.7 | 0.0 | -0.5 | 0.0 | 0.7 | 6 |
| 47177 Warren County, Tennessee | 1.5 | 0.0 | -0.1 | 0.0 | 1.5 | 1 |

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|---|---|---|---|---|---|---|
| 47179 Washington County, Tennessee | 1.1 | 0.0 | 0.3 | 0.0 | 1.5 | 3 |
| 47185 White County, Tennessee | 1.6 | 0.0 | 0.0 | 0.0 | 1.6 | 3 |
| 51005 Alleghany County, Virginia | 1.2 | 0.3 | 0.2 | 54.9 | 1.8 | 3 |
| 51017 Bath County, Virginia | 4.9 | 0.0 | -1.1 | 0.0 | 5.6 | 1 |
| 51021 Bland County, Virginia | 0.8 | 0.0 | 0.0 | 0.0 | 0.9 | 8 |
| 51023 Botetourt County, Virginia | 0.9 | 0.0 | 0.2 | 0.0 | 1.1 | 8 |
| 51027 Buchanan County, Virginia | 1.5 | 0.0 | -0.8 | 0.0 | 1.7 | 1 |
| 51035 Carroll County, Virginia | 1.0 | 0.0 | 0.0 | 0.0 | 1.0 | 8 |
| 51045 Craig County, Virginia | 3.8 | 0.0 | 0.3 | 0.0 | 5.6 | 3 |
| 51051 Dickenson County, Virginia | 2.5 | 0.0 | 5.7 | 0.0 | 3.7 | 3 |
| 51063 Floyd County, Virginia | 0.6 | 0.0 | -0.8 | 0.0 | 0.7 | 6 |
| 51071 Giles County, Virginia | 1.7 | 0.6 | -1.7 | 56.0 | 3.1 | 1 |
| 51077 Grayson County, Virginia | 0.7 | 0.0 | 0.2 | 0.0 | 0.7 | 8 |
| 51089 Henry County, Virginia | 1.0 | 0.0 | -0.2 | 0.0 | 1.5 | 4 |
| 51091 Highland County, Virginia | 0.7 | 0.0 | -0.3 | 0.0 | 0.7 | 6 |
| 51105 Lee County, Virginia | 1.4 | 0.0 | -0.3 | 0.0 | 1.6 | 1 |
| 51121 Montgomery County, Virginia | 1.0 | 0.3 | -0.3 | 81.7 | 2.2 | 4 |
| 51141 Patrick County, Virginia | 0.8 | 0.0 | 0.1 | 0.0 | 1.0 | 8 |
| 51155 Pulaski County, Virginia | 0.8 | 0.0 | -0.2 | 0.0 | 1.1 | 6 |
| 51163 Rockbridge County, Virginia | 0.8 | 0.0 | -0.2 | 0.0 | 0.9 | 6 |
| 51167 Russell County, Virginia | 1.3 | 0.8 | -1.7 | 94.7 | 2.9 | 1 |
| 51169 Scott County, Virginia | 0.8 | 0.0 | -0.4 | 0.0 | 1.2 | 6 |
| 51173 Smyth County, Virginia | 0.8 | 0.0 | -0.1 | 0.0 | 1.0 | 6 |
| 51185 Tazewell County, Virginia | 1.0 | 0.0 | -0.1 | 0.0 | 1.2 | 6 |
| 51191 Washington County, Virginia | 0.8 | 0.0 | -0.3 | 0.0 | 1.1 | 6 |
| 51195 Wise County, Virginia | 1.4 | 0.7 | -0.2 | 67.0 | 2.8 | 1 |
| 51197 Wythe County, Virginia | 0.8 | 0.0 | -0.3 | 0.0 | 0.8 | 6 |
| 54001 Barbour County, West Virginia | 0.7 | 0.0 | -0.4 | 0.0 | 0.7 | 6 |
| 54003 Berkeley County, West Virginia | 1.0 | 0.0 | -0.2 | 0.0 | 1.0 | 6 |
| 54005 Boone County, West Virginia | 1.5 | 0.0 | -1.9 | 0.0 | 1.5 | 1 |
| 54007 Braxton County, West Virginia | 1.5 | 0.0 | -0.1 | 0.0 | 1.5 | 1 |
| 54009 Brooke County, West Virginia | 0.7 | 0.0 | -0.1 | 0.0 | 0.9 | 8 |
| 54011 Cabell County, West Virginia | 0.9 | 0.0 | -0.2 | 0.0 | 1.3 | 6 |
| 54013 Calhoun County, West Virginia | 1.3 | 0.0 | -2.8 | 0.0 | 1.3 | 2 |
| 54015 Clay County, West Virginia | 0.6 | 0.0 | -2.4 | 0.0 | 0.6 | 6 |
| 54017 Doddridge County, West Virginia | 3.9 | 0.0 | 14.0 | 0.0 | 4.3 | 3 |
| 54019 Fayette County, West Virginia | 1.2 | 0.0 | 0.0 | 0.0 | 1.2 | 5 |
| 54021 Gilmer County, West Virginia | 2.0 | 0.0 | -1.2 | 0.0 | 2.0 | 1 |

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| 54023 Grant County, West Virginia | 7.8 | 5.7 | -2.7 | 78.2 | 14.7 | 1 |
| 54025 Greenbrier County, West Virginia | 1.1 | 0.0 | 0.1 | 0.0 | 1.2 | 5 |
| 54027 Hampshire County, West Virginia | 1.2 | 0.0 | 0.0 | 0.0 | 1.6 | 3 |
| 54029 Hancock County, West Virginia | 1.1 | 0.0 | -0.1 | 0.0 | 1.5 | 1 |
| 54031 Hardy County, West Virginia | 0.5 | 0.0 | -0.1 | 0.0 | 0.6 | 6 |
| 54033 Harrison County, West Virginia | 1.9 | 0.7 | 0.6 | 52.2 | 3.1 | 3 |
| 54035 Jackson County, West Virginia | 1.1 | 0.0 | 0.3 | 0.0 | 1.4 | 3 |
| 54037 Jefferson County, West Virginia | 0.7 | 0.0 | 0.1 | 0.0 | 0.7 | 8 |
| 54039 Kanawha County, West Virginia | 1.4 | 0.0 | -0.4 | 0.0 | 1.5 | 1 |
| 54041 Lewis County, West Virginia | 1.4 | 0.0 | 0.0 | 0.0 | 1.6 | 3 |
| 54043 Lincoln County, West Virginia | 0.9 | 0.0 | -0.4 | 0.0 | 1.0 | 6 |
| 54045 Logan County, West Virginia | 1.6 | 0.0 | -0.3 | 0.0 | 1.6 | 1 |
| 54047 McDowell County, West Virginia | 1.2 | 0.0 | -0.7 | 0.0 | 1.2 | 2 |
| 54049 Marion County, West Virginia | 3.6 | 1.8 | -0.4 | 43.6 | 7.0 | 1 |
| 54051 Marshall County, West Virginia | 2.9 | 1.5 | 0.9 | 77.4 | 5.2 | 3 |
| 54053 Mason County, West Virginia | 7.5 | 4.8 | -1.8 | 70.5 | 17.5 | 1 |
| 54055 Mercer County, West Virginia | 1.2 | 0.0 | -0.2 | 0.0 | 1.3 | 2 |
| 54057 Mineral County, West Virginia | 1.7 | 0.0 | 0.9 | 0.0 | 2.3 | 3 |
| 54059 Mingo County, West Virginia | 1.9 | 0.0 | -0.8 | 0.0 | 1.9 | 1 |
| 54061 Monongalia County, West Virginia | 1.3 | 0.6 | 0.7 | 55.6 | 2.4 | 3 |
| 54063 Monroe County, West Virginia | 0.6 | 0.0 | -0.1 | 0.0 | 0.8 | 8 |
| 54065 Morgan County, West Virginia | 0.9 | 0.0 | -0.2 | 0.0 | 1.1 | 6 |
| 54067 Nicholas County, West Virginia | 1.0 | 0.0 | -0.2 | 0.0 | 1.0 | 6 |
| 54069 Ohio County, West Virginia | 1.1 | 0.0 | 0.1 | 0.0 | 1.5 | 3 |
| 54071 Pendleton County, West Virginia | 0.9 | 0.0 | -0.2 | 0.0 | 1.1 | 6 |
| 54073 Pleasants County, West Virginia | 6.3 | 3.2 | -3.1 | 62.4 | 12.2 | 1 |
| 54075 Pocahontas County, West Virginia | 0.6 | 0.0 | -0.3 | 0.0 | 0.6 | 6 |
| 54077 Preston County, West Virginia | 1.2 | 0.0 | -1.1 | 0.0 | 1.6 | 1 |
| 54079 Putnam County, West Virginia | 2.8 | 2.0 | -0.6 | 69.9 | 5.7 | 1 |
| 54081 Raleigh County, West Virginia | 1.1 | 0.0 | 0.0 | 0.0 | 1.1 | 5 |
| 54083 Randolph County, West Virginia | 1.2 | 0.0 | 0.0 | 0.0 | 1.3 | 5 |
| 54085 Ritchie County, West Virginia | 1.4 | 0.0 | -0.4 | 0.0 | 1.6 | 1 |
| 54087 Roane County, West Virginia | 1.5 | 0.0 | -1.0 | 0.0 | 1.5 | 1 |
| 54089 Summers County, West Virginia | 1.0 | 0.0 | -0.1 | 0.0 | 1.1 | 8 |
| 54091 Taylor County, West Virginia | 0.9 | 0.0 | 0.1 | 0.0 | 1.2 | 8 |
| 54093 Tucker County, West Virginia | 1.0 | 0.0 | -0.2 | 0.0 | 1.3 | 6 |
| 54095 Tyler County, West Virginia | 0.9 | 0.0 | -0.1 | 0.0 | 1.1 | 6 |
| 54097 Upshur County, West Virginia | 0.8 | 0.0 | -0.8 | 0.0 | 0.9 | 6 |

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| 54099 Wayne County, West Virginia | 1.0 | 0.0 | -0.4 | 0.0 | 1.2 | 6 |
| 54101 Webster County, West Virginia | 1.1 | 0.0 | -0.9 | 0.0 | 1.1 | 2 |
| 54103 Wetzel County, West Virginia | 1.1 | 0.0 | 0.6 | 0.0 | 1.5 | 3 |
| 54105 Wirt County, West Virginia | 0.6 | 0.0 | -1.6 | 0.0 | 0.6 | 6 |
| 54107 Wood County, West Virginia | 1.0 | 0.0 | -0.1 | 0.0 | 1.1 | 6 |
| 54109 Wyoming County, West Virginia | 1.8 | 0.0 | -1.1 | 0.0 | 1.8 | 1 |

Data Sources: Bureau of Labor Statistics, Bureau of Economic Analysis and Mine Safety and Health Administration

# Appendix IV. Dependence, Impact, and Risk Rankings

| FIPS | County Names | Class | Global Dependence Rank | Impact Rank | Total Risk Rank |
|---|---|---|---|---|---|
| 1007 | Bibb County, Alabama | 6 | 366 | 84 | 311 |
| 1009 | Blount County, Alabama | 3 | 111 | 372 | 106 |
| 1015 | Calhoun County, Alabama | 1 | 142 | 141 | 130 |
| 1017 | Chambers County, Alabama | 3 | 115 | 226 | 115 |
| 1019 | Cherokee County, Alabama | 3 | 37 | 297 | 40 |
| 1021 | Chilton County, Alabama | 3 | 76 | 327 | 107 |
| 1027 | Clay County, Alabama | 6 | 412 | 136 | 379 |
| 1029 | Cleburne County, Alabama | 8 | 347 | 214 | 350 |
| 1033 | Colbert County, Alabama | 1 | 68 | 24 | 140 |
| 1037 | Coosa County, Alabama | 6 | 322 | 23 | 267 |
| 1043 | Cullman County, Alabama | 3 | 62 | 396 | 91 |
| 1049 | DeKalb County, Alabama | 3 | 94 | 352 | 135 |
| 1051 | Elmore County, Alabama | 8 | 238 | 267 | 257 |
| 1055 | Etowah County, Alabama | 1 | 155 | 193 | 80 |
| 1057 | Fayette County, Alabama | 6 | 401 | 41 | 386 |
| 1059 | Franklin County, Alabama | 5 | 153 | 264 | 237 |
| 1065 | Hale County, Alabama | 1 | 194 | 134 | 114 |
| 1071 | Jackson County, Alabama | 2 | 167 | 6 | 252 |
| 1073 | Jefferson County, Alabama | 1 | 47 | 146 | 27 |
| 1075 | Lamar County, Alabama | 6 | 259 | 28 | 284 |
| 1077 | Lauderdale County, Alabama | 6 | 217 | 207 | 293 |
| 1079 | Lawrence County, Alabama | 3 | 25 | 409 | 39 |
| 1083 | Limestone County, Alabama | 3 | 4 | 407 | 13 |
| 1087 | Macon County, Alabama | 1 | 150 | 205 | 138 |
| 1089 | Madison County, Alabama | 3 | 148 | 389 | 191 |
| 1093 | Marion County, Alabama | 6 | 288 | 97 | 307 |
| 1095 | Marshall County, Alabama | 1 | 161 | 153 | 168 |
| 1103 | Morgan County, Alabama | 1 | 139 | 111 | 98 |
| 1107 | Pickens County, Alabama | 3 | 56 | 330 | 100 |
| 1111 | Randolph County, Alabama | 6 | 408 | 109 | 375 |
| 1115 | St. Clair County, Alabama | 7 | 243 | 364 | 158 |
| 1117 | Shelby County, Alabama | 3 | 30 | 411 | 17 |
| 1121 | Talladega County, Alabama | 3 | 101 | 315 | 50 |
| 1123 | Tallapoosa County, Alabama | 3 | 126 | 311 | 95 |
| 1125 | Tuscaloosa County, Alabama | 3 | 207 | 282 | 180 |

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|---|---|---|---|---|---|
| 1127 | Walker County, Alabama | 1 | 40 | 54 | 28 |
| 1133 | Winston County, Alabama | 6 | 407 | 89 | 395 |
| 13011 | Banks County, Georgia | 8 | 265 | 384 | 327 |
| 13013 | Barrow County, Georgia | 8 | 301 | 290 | 343 |
| 13015 | Bartow County, Georgia | 3 | 57 | 256 | 31 |
| 13045 | Carroll County, Georgia | 3 | 42 | 410 | 71 |
| 13047 | Catoosa County, Georgia | 6 | 389 | 120 | 400 |
| 13055 | Chattooga County, Georgia | 6 | 400 | 108 | 364 |
| 13057 | Cherokee County, Georgia | 8 | 350 | 370 | 344 |
| 13083 | Dade County, Georgia | 8 | 390 | 260 | 401 |
| 13085 | Dawson County, Georgia | 8 | 398 | 371 | 408 |
| 13097 | Douglas County, Georgia | 2 | 122 | 151 | 214 |
| 13105 | Elbert County, Georgia | 6 | 392 | 190 | 363 |
| 13111 | Fannin County, Georgia | 3 | 131 | 386 | 188 |
| 13115 | Floyd County, Georgia | 1 | 177 | 72 | 60 |
| 13117 | Forsyth County, Georgia | 5 | 191 | 399 | 272 |
| 13119 | Franklin County, Georgia | 8 | 255 | 360 | 324 |
| 13123 | Gilmer County, Georgia | 6 | 270 | 178 | 283 |
| 13129 | Gordon County, Georgia | 8 | 268 | 224 | 231 |
| 13135 | Gwinnett County, Georgia | 8 | 213 | 261 | 290 |
| 13137 | Habersham County, Georgia | 3 | 93 | 232 | 139 |
| 13139 | Hall County, Georgia | 8 | 220 | 373 | 295 |
| 13143 | Haralson County, Georgia | 6 | 377 | 204 | 391 |
| 13147 | Hart County, Georgia | 3 | 34 | 379 | 47 |
| 13149 | Heard County, Georgia | 3 | 8 | 383 | 8 |
| 13157 | Jackson County, Georgia | 2 | 121 | 185 | 213 |
| 13187 | Lumpkin County, Georgia | 6 | 258 | 162 | 326 |
| 13195 | Madison County, Georgia | 6 | 212 | 145 | 289 |
| 13213 | Murray County, Georgia | 7 | 316 | 228 | 200 |
| 13223 | Paulding County, Georgia | 8 | 394 | 363 | 369 |
| 13227 | Pickens County, Georgia | 1 | 89 | 53 | 129 |
| 13233 | Polk County, Georgia | 6 | 297 | 22 | 261 |
| 13241 | Rabun County, Georgia | 3 | 199 | 262 | 124 |
| 13257 | Stephens County, Georgia | 6 | 311 | 188 | 348 |
| 13281 | Towns County, Georgia | 1 | 21 | 29 | 32 |
| 13291 | Union County, Georgia | 8 | 410 | 248 | 416 |
| 13295 | Walker County, Georgia | 8 | 415 | 269 | 414 |
| 13311 | White County, Georgia | 8 | 371 | 336 | 387 |
| 13313 | Whitfield County, Georgia | 6 | 247 | 181 | 274 |
| 21001 | Adair County, Kentucky | 6 | 387 | 64 | 398 |

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| 21011 | Bath County, Kentucky | 6 | 399 | 197 | 409 |
| 21013 | Bell County, Kentucky | 1 | 99 | 133 | 182 |
| 21019 | Boyd County, Kentucky | 3 | 77 | 240 | 97 |
| 21025 | Breathitt County, Kentucky | 6 | 375 | 137 | 390 |
| 21043 | Carter County, Kentucky | 6 | 216 | 25 | 236 |
| 21045 | Casey County, Kentucky | 6 | 395 | 37 | 358 |
| 21049 | Clark County, Kentucky | 1 | 69 | 157 | 141 |
| 21051 | Clay County, Kentucky | 6 | 285 | 187 | 333 |
| 21053 | Clinton County, Kentucky | 6 | 413 | 118 | 418 |
| 21057 | Cumberland County, Kentucky | 6 | 382 | 139 | 396 |
| 21061 | Edmonson County, Kentucky | 3 | 78 | 408 | 152 |
| 21063 | Elliott County, Kentucky | 8 | 396 | 293 | 362 |
| 21065 | Estill County, Kentucky | 8 | 383 | 241 | 397 |
| 21069 | Fleming County, Kentucky | 3 | 38 | 265 | 77 |
| 21071 | Floyd County, Kentucky | 6 | 230 | 58 | 297 |
| 21079 | Garrard County, Kentucky | 6 | 351 | 191 | 370 |
| 21087 | Green County, Kentucky | 6 | 391 | 63 | 402 |
| 21089 | Greenup County, Kentucky | 6 | 298 | 66 | 281 |
| 21095 | Harlan County, Kentucky | 2 | 170 | 68 | 218 |
| 21099 | Hart County, Kentucky | 8 | 420 | 255 | 420 |
| 21109 | Jackson County, Kentucky | 1 | 11 | 45 | 25 |
| 21115 | Johnson County, Kentucky | 1 | 112 | 55 | 137 |
| 21119 | Knott County, Kentucky | 6 | 418 | 8 | 419 |
| 21121 | Knox County, Kentucky | 1 | 83 | 76 | 162 |
| 21125 | Laurel County, Kentucky | 3 | 124 | 299 | 166 |
| 21127 | Lawrence County, Kentucky | 1 | 129 | 1 | 66 |
| 21129 | Lee County, Kentucky | 1 | 43 | 13 | 96 |
| 21131 | Leslie County, Kentucky | 6 | 244 | 50 | 312 |
| 21133 | Letcher County, Kentucky | 6 | 269 | 33 | 288 |
| 21135 | Lewis County, Kentucky | 3 | 27 | 351 | 33 |
| 21137 | Lincoln County, Kentucky | 8 | 356 | 278 | 340 |
| 21147 | McCreary County, Kentucky | 8 | 227 | 316 | 242 |
| 21151 | Madison County, Kentucky | 8 | 272 | 334 | 329 |
| 21153 | Magoffin County, Kentucky | 6 | 374 | 59 | 389 |
| 21159 | Martin County, Kentucky | 1 | 152 | 77 | 193 |
| 21165 | Menifee County, Kentucky | 8 | 378 | 286 | 392 |
| 21169 | Metcalfe County, Kentucky | 6 | 358 | 166 | 376 |
| 21171 | Monroe County, Kentucky | 8 | 248 | 345 | 318 |
| 21173 | Montgomery County, Kentucky | 8 | 354 | 274 | 373 |
| 21175 | Morgan County, Kentucky | 3 | 72 | 251 | 116 |

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|---|---|---|---|---|---|
| 21181 | Nicholas County, Kentucky | 8 | 337 | 305 | 360 |
| 21189 | Owsley County, Kentucky | 8 | 411 | 292 | 417 |
| 21193 | Perry County, Kentucky | 2 | 163 | 93 | 246 |
| 21195 | Pike County, Kentucky | 1 | 143 | 62 | 203 |
| 21197 | Powell County, Kentucky | 8 | 281 | 361 | 331 |
| 21199 | Pulaski County, Kentucky | 3 | 96 | 234 | 55 |
| 21201 | Robertson County, Kentucky | 8 | 380 | 341 | 393 |
| 21203 | Rockcastle County, Kentucky | 6 | 318 | 99 | 319 |
| 21205 | Rowan County, Kentucky | 8 | 406 | 283 | 415 |
| 21207 | Russell County, Kentucky | 8 | 384 | 220 | 366 |
| 21231 | Wayne County, Kentucky | 8 | 263 | 211 | 280 |
| 21235 | Whitley County, Kentucky | 5 | 189 | 298 | 271 |
| 21237 | Wolfe County, Kentucky | 6 | 381 | 183 | 394 |
| 24001 | Allegany County, Maryland | 6 | 341 | 105 | 247 |
| 24023 | Garrett County, Maryland | 6 | 280 | 119 | 234 |
| 24043 | Washington County, Maryland | 8 | 225 | 306 | 251 |
| 28003 | Alcorn County, Mississippi | 3 | 50 | 390 | 105 |
| 28009 | Benton County, Mississippi | 3 | 18 | 413 | 18 |
| 28013 | Calhoun County, Mississippi | 3 | 66 | 380 | 136 |
| 28017 | Chickasaw County, Mississippi | 8 | 241 | 229 | 308 |
| 28019 | Choctaw County, Mississippi | 3 | 7 | 418 | 7 |
| 28025 | Clay County, Mississippi | 3 | 85 | 263 | 128 |
| 28057 | Itawamba County, Mississippi | 5 | 134 | 365 | 227 |
| 28069 | Kemper County, Mississippi | 3 | 12 | 416 | 9 |
| 28081 | Lee County, Mississippi | 3 | 116 | 346 | 207 |
| 28087 | Lowndes County, Mississippi | 1 | 71 | 203 | 59 |
| 28093 | Marshall County, Mississippi | 4 | 214 | 163 | 195 |
| 28095 | Monroe County, Mississippi | 6 | 277 | 179 | 299 |
| 28097 | Montgomery County, Mississippi | 3 | 120 | 350 | 119 |
| 28103 | Noxubee County, Mississippi | 3 | 188 | 246 | 169 |
| 28105 | Oktibbeha County, Mississippi | 3 | 133 | 354 | 148 |
| 28107 | Panola County, Mississippi | 3 | 39 | 347 | 29 |
| 28115 | Pontotoc County, Mississippi | 8 | 292 | 320 | 337 |
| 28117 | Prentiss County, Mississippi | 8 | 228 | 323 | 296 |
| 28139 | Tippah County, Mississippi | 3 | 165 | 268 | 199 |
| 28141 | Tishomingo County, Mississippi | 5 | 119 | 309 | 211 |
| 28145 | Union County, Mississippi | 8 | 226 | 288 | 263 |
| 28155 | Webster County, Mississippi | 3 | 60 | 397 | 109 |
| 28159 | Winston County, Mississippi | 3 | 144 | 216 | 120 |
| 28161 | Yalobusha County, Mississippi | 8 | 308 | 213 | 258 |

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|---|---|---|---|---|---|
| 36003 | Allegany County, New York | 4 | 333 | 124 | 111 |
| 36007 | Broome County, New York | 2 | 130 | 65 | 222 |
| 36009 | Cattaraugus County, New York | 4 | 338 | 83 | 83 |
| 36013 | Chautauqua County, New York | 4 | 274 | 129 | 42 |
| 36015 | Chemung County, New York | 6 | 261 | 88 | 243 |
| 36017 | Chenango County, New York | 8 | 373 | 289 | 388 |
| 36023 | Cortland County, New York | 6 | 359 | 26 | 339 |
| 36025 | Delaware County, New York | 8 | 332 | 225 | 357 |
| 36077 | Otsego County, New York | 6 | 323 | 61 | 352 |
| 36095 | Schoharie County, New York | 3 | 20 | 250 | 36 |
| 36097 | Schuyler County, New York | 8 | 403 | 296 | 356 |
| 36101 | Steuben County, New York | 6 | 276 | 170 | 268 |
| 36107 | Tioga County, New York | 8 | 327 | 319 | 304 |
| 36109 | Tompkins County, New York | 4 | 320 | 115 | 159 |
| 37003 | Alexander County, North Carolina | 8 | 365 | 276 | 382 |
| 37005 | Alleghany County, North Carolina | 5 | 145 | 281 | 232 |
| 37009 | Ashe County, North Carolina | 6 | 307 | 184 | 347 |
| 37011 | Avery County, North Carolina | 8 | 233 | 279 | 302 |
| 37021 | Buncombe County, North Carolina | 7 | 250 | 340 | 112 |
| 37023 | Burke County, North Carolina | 6 | 370 | 199 | 385 |
| 37027 | Caldwell County, North Carolina | 5 | 197 | 252 | 276 |
| 37039 | Cherokee County, North Carolina | 3 | 114 | 272 | 198 |
| 37043 | Clay County, North Carolina | 8 | 416 | 242 | 413 |
| 37059 | Davie County, North Carolina | 3 | 195 | 368 | 154 |
| 37067 | Forsyth County, North Carolina | 3 | 171 | 356 | 67 |
| 37075 | Graham County, North Carolina | 2 | 141 | 15 | 230 |
| 37087 | Haywood County, North Carolina | 7 | 328 | 222 | 208 |
| 37089 | Henderson County, North Carolina | 8 | 267 | 326 | 255 |
| 37099 | Jackson County, North Carolina | 6 | 310 | 150 | 298 |
| 37111 | McDowell County, North Carolina | 6 | 352 | 180 | 349 |
| 37113 | Macon County, North Carolina | 6 | 275 | 209 | 300 |
| 37115 | Madison County, North Carolina | 1 | 52 | 52 | 75 |
| 37121 | Mitchell County, North Carolina | 8 | 257 | 301 | 325 |
| 37149 | Polk County, North Carolina | 6 | 368 | 107 | 383 |
| 37161 | Rutherford County, North Carolina | 1 | 192 | 75 | 205 |
| 37169 | Stokes County, North Carolina | 4 | 360 | 19 | 190 |
| 37171 | Surry County, North Carolina | 5 | 201 | 285 | 215 |
| 37173 | Swain County, North Carolina | 8 | 409 | 333 | 404 |
| 37175 | Transylvania County, North Carolina | 6 | 379 | 201 | 371 |
| 37189 | Watauga County, North Carolina | 6 | 361 | 40 | 377 |

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|---|---|---|---|---|---|
| 37193 | Wilkes County, North Carolina | 6 | 362 | 143 | 378 |
| 37197 | Yadkin County, North Carolina | 8 | 315 | 314 | 309 |
| 37199 | Yancey County, North Carolina | 3 | 158 | 388 | 192 |
| 39001 | Adams County, Ohio | 3 | 33 | 312 | 20 |
| 39007 | Ashtabula County, Ohio | 4 | 279 | 130 | 127 |
| 39009 | Athens County, Ohio | 8 | 229 | 313 | 275 |
| 39013 | Belmont County, Ohio | 3 | 138 | 369 | 147 |
| 39015 | Brown County, Ohio | 3 | 16 | 417 | 19 |
| 39019 | Carroll County, Ohio | 3 | 127 | 400 | 49 |
| 39025 | Clermont County, Ohio | 1 | 82 | 116 | 70 |
| 39029 | Columbiana County, Ohio | 4 | 302 | 73 | 209 |
| 39031 | Coshocton County, Ohio | 1 | 24 | 20 | 14 |
| 39053 | Gallia County, Ohio | 1 | 9 | 10 | 5 |
| 39059 | Guernsey County, Ohio | 8 | 300 | 237 | 244 |
| 39067 | Harrison County, Ohio | 3 | 73 | 317 | 76 |
| 39071 | Highland County, Ohio | 6 | 237 | 102 | 223 |
| 39073 | Hocking County, Ohio | 6 | 404 | 192 | 405 |
| 39075 | Holmes County, Ohio | 3 | 169 | 358 | 81 |
| 39079 | Jackson County, Ohio | 1 | 202 | 140 | 171 |
| 39081 | Jefferson County, Ohio | 1 | 13 | 71 | 11 |
| 39087 | Lawrence County, Ohio | 3 | 146 | 249 | 85 |
| 39099 | Mahoning County, Ohio | 6 | 239 | 189 | 229 |
| 39105 | Meigs County, Ohio | 1 | 105 | 158 | 125 |
| 39111 | Monroe County, Ohio | 6 | 295 | 57 | 282 |
| 39115 | Morgan County, Ohio | 1 | 63 | 70 | 99 |
| 39119 | Muskingum County, Ohio | 3 | 157 | 331 | 101 |
| 39121 | Noble County, Ohio | 8 | 312 | 238 | 314 |
| 39127 | Perry County, Ohio | 2 | 208 | 156 | 240 |
| 39131 | Pike County, Ohio | 3 | 180 | 236 | 149 |
| 39141 | Ross County, Ohio | 8 | 256 | 243 | 250 |
| 39145 | Scioto County, Ohio | 7 | 329 | 230 | 160 |
| 39155 | Trumbull County, Ohio | 6 | 254 | 127 | 286 |
| 39157 | Tuscarawas County, Ohio | 7 | 219 | 362 | 62 |
| 39163 | Vinton County, Ohio | 6 | 339 | 11 | 338 |
| 39167 | Washington County, Ohio | 3 | 128 | 328 | 88 |
| 42003 | Allegheny County, Pennsylvania | 3 | 206 | 284 | 63 |
| 42005 | Armstrong County, Pennsylvania | 1 | 182 | 47 | 93 |
| 42007 | Beaver County, Pennsylvania | 1 | 23 | 43 | 10 |
| 42009 | Bedford County, Pennsylvania | 3 | 183 | 231 | 202 |
| 42013 | Blair County, Pennsylvania | 6 | 293 | 160 | 219 |

| | | | | | |
|---|---|---|---|---|---|
| 42015 | Bradford County, Pennsylvania | 3 | 137 | 385 | 74 |
| 42019 | Butler County, Pennsylvania | 7 | 262 | 303 | 170 |
| 42021 | Cambria County, Pennsylvania | 4 | 240 | 98 | 108 |
| 42023 | Cameron County, Pennsylvania | 6 | 345 | 128 | 301 |
| 42025 | Carbon County, Pennsylvania | 4 | 355 | 171 | 131 |
| 42027 | Centre County, Pennsylvania | 7 | 305 | 342 | 117 |
| 42031 | Clarion County, Pennsylvania | 3 | 149 | 257 | 155 |
| 42033 | Clearfield County, Pennsylvania | 1 | 108 | 135 | 30 |
| 42035 | Clinton County, Pennsylvania | 7 | 287 | 377 | 206 |
| 42037 | Columbia County, Pennsylvania | 8 | 344 | 339 | 262 |
| 42039 | Crawford County, Pennsylvania | 8 | 286 | 273 | 233 |
| 42047 | Elk County, Pennsylvania | 4 | 334 | 131 | 183 |
| 42049 | Erie County, Pennsylvania | 4 | 314 | 186 | 92 |
| 42051 | Fayette County, Pennsylvania | 1 | 196 | 126 | 123 |
| 42053 | Forest County, Pennsylvania | 8 | 296 | 374 | 270 |
| 42057 | Fulton County, Pennsylvania | 3 | 46 | 376 | 73 |
| 42059 | Greene County, Pennsylvania | 3 | 44 | 393 | 48 |
| 42061 | Huntingdon County, Pennsylvania | 6 | 221 | 138 | 248 |
| 42063 | Indiana County, Pennsylvania | 1 | 22 | 36 | 12 |
| 42065 | Jefferson County, Pennsylvania | 7 | 283 | 280 | 201 |
| 42067 | Juniata County, Pennsylvania | 8 | 417 | 219 | 406 |
| 42069 | Lackawanna County, Pennsylvania | 7 | 211 | 291 | 134 |
| 42073 | Lawrence County, Pennsylvania | 4 | 215 | 154 | 64 |
| 42079 | Luzerne County, Pennsylvania | 3 | 61 | 294 | 38 |
| 42081 | Lycoming County, Pennsylvania | 7 | 232 | 391 | 104 |
| 42083 | McKean County, Pennsylvania | 6 | 289 | 74 | 217 |
| 42085 | Mercer County, Pennsylvania | 6 | 330 | 110 | 303 |
| 42087 | Mifflin County, Pennsylvania | 6 | 357 | 210 | 317 |
| 42089 | Monroe County, Pennsylvania | 8 | 342 | 266 | 305 |
| 42093 | Montour County, Pennsylvania | 1 | 181 | 5 | 41 |
| 42097 | Northumberland County, PA | 1 | 178 | 144 | 61 |
| 42099 | Perry County, Pennsylvania | 8 | 348 | 307 | 313 |
| 42103 | Pike County, Pennsylvania | 8 | 388 | 302 | 399 |
| 42105 | Potter County, Pennsylvania | 3 | 31 | 406 | 35 |
| 42107 | Schuylkill County, Pennsylvania | 3 | 135 | 338 | 46 |
| 42109 | Snyder County, Pennsylvania | 8 | 386 | 295 | 249 |
| 42111 | Somerset County, Pennsylvania | 3 | 193 | 218 | 185 |
| 42113 | Sullivan County, Pennsylvania | 1 | 91 | 147 | 82 |
| 42115 | Susquehanna County, Pennsylvania | 3 | 55 | 414 | 72 |
| 42117 | Tioga County, Pennsylvania | 3 | 59 | 404 | 87 |

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| 42119 | Union County, Pennsylvania | 7 | 349 | 233 | 156 |
| 42121 | Venango County, Pennsylvania | 1 | 151 | 173 | 102 |
| 42123 | Warren County, Pennsylvania | 3 | 95 | 357 | 79 |
| 42125 | Washington County, Pennsylvania | 3 | 176 | 401 | 143 |
| 42127 | Wayne County, Pennsylvania | 8 | 273 | 324 | 316 |
| 42129 | Westmoreland County, Pennsylvania | 7 | 222 | 329 | 163 |
| 42131 | Wyoming County, Pennsylvania | 3 | 140 | 402 | 45 |
| 45007 | Anderson County, South Carolina | 7 | 264 | 325 | 187 |
| 45021 | Cherokee County, South Carolina | 3 | 81 | 337 | 68 |
| 45045 | Greenville County, South Carolina | 3 | 113 | 332 | 161 |
| 45073 | Oconee County, South Carolina | 1 | 6 | 14 | 15 |
| 45077 | Pickens County, South Carolina | 6 | 246 | 94 | 265 |
| 45083 | Spartanburg County, South Carolina | 8 | 234 | 359 | 253 |
| 47001 | Anderson County, Tennessee | 3 | 92 | 215 | 37 |
| 47007 | Bledsoe County, Tennessee | 6 | 303 | 113 | 345 |
| 47009 | Blount County, Tennessee | 5 | 209 | 381 | 287 |
| 47011 | Bradley County, Tennessee | 3 | 117 | 275 | 133 |
| 47013 | Campbell County, Tennessee | 1 | 45 | 182 | 69 |
| 47015 | Cannon County, Tennessee | 6 | 304 | 104 | 346 |
| 47019 | Carter County, Tennessee | 6 | 376 | 82 | 368 |
| 47025 | Claiborne County, Tennessee | 6 | 299 | 121 | 341 |
| 47027 | Clay County, Tennessee | 6 | 336 | 96 | 359 |
| 47029 | Cocke County, Tennessee | 3 | 51 | 304 | 94 |
| 47031 | Coffee County, Tennessee | 5 | 136 | 353 | 228 |
| 47035 | Cumberland County, Tennessee | 3 | 74 | 382 | 121 |
| 47041 | DeKalb County, Tennessee | 1 | 110 | 112 | 194 |
| 47049 | Fentress County, Tennessee | 6 | 353 | 69 | 372 |
| 47051 | Franklin County, Tennessee | 5 | 159 | 348 | 241 |
| 47057 | Grainger County, Tennessee | 6 | 309 | 165 | 330 |
| 47059 | Greene County, Tennessee | 3 | 160 | 259 | 210 |
| 47061 | Grundy County, Tennessee | 6 | 252 | 49 | 321 |
| 47063 | Hamblen County, Tennessee | 3 | 154 | 254 | 197 |
| 47065 | Hamilton County, Tennessee | 1 | 35 | 148 | 65 |
| 47067 | Hancock County, Tennessee | 6 | 414 | 175 | 411 |
| 47073 | Hawkins County, Tennessee | 1 | 80 | 31 | 56 |
| 47087 | Jackson County, Tennessee | 3 | 102 | 308 | 184 |
| 47089 | Jefferson County, Tennessee | 3 | 87 | 392 | 172 |
| 47091 | Johnson County, Tennessee | 1 | 98 | 51 | 144 |
| 47093 | Knox County, Tennessee | 3 | 172 | 335 | 178 |
| 47099 | Lawrence County, Tennessee | 3 | 26 | 387 | 51 |

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|---|---|---|---|---|---|
| 47101 | Lewis County, Tennessee | 8 | 343 | 349 | 365 |
| 47105 | Loudon County, Tennessee | 1 | 48 | 194 | 58 |
| 47107 | McMinn County, Tennessee | 3 | 86 | 221 | 52 |
| 47111 | Macon County, Tennessee | 1 | 75 | 85 | 145 |
| 47115 | Marion County, Tennessee | 5 | 173 | 223 | 259 |
| 47121 | Meigs County, Tennessee | 1 | 67 | 9 | 86 |
| 47123 | Monroe County, Tennessee | 1 | 147 | 167 | 196 |
| 47129 | Morgan County, Tennessee | 1 | 205 | 117 | 165 |
| 47133 | Overton County, Tennessee | 6 | 326 | 177 | 354 |
| 47137 | Pickett County, Tennessee | 6 | 242 | 38 | 310 |
| 47139 | Polk County, Tennessee | 1 | 106 | 81 | 122 |
| 47141 | Putnam County, Tennessee | 8 | 282 | 277 | 332 |
| 47143 | Rhea County, Tennessee | 3 | 1 | 415 | 4 |
| 47145 | Roane County, Tennessee | 3 | 14 | 378 | 6 |
| 47151 | Scott County, Tennessee | 2 | 186 | 92 | 224 |
| 47153 | Sequatchie County, Tennessee | 6 | 291 | 152 | 336 |
| 47155 | Sevier County, Tennessee | 5 | 162 | 270 | 212 |
| 47159 | Smith County, Tennessee | 3 | 28 | 412 | 53 |
| 47163 | Sullivan County, Tennessee | 3 | 200 | 239 | 110 |
| 47171 | Unicoi County, Tennessee | 1 | 41 | 90 | 89 |
| 47173 | Union County, Tennessee | 6 | 367 | 114 | 351 |
| 47175 | Van Buren County, Tennessee | 6 | 363 | 67 | 380 |
| 47177 | Warren County, Tennessee | 1 | 90 | 200 | 174 |
| 47179 | Washington County, Tennessee | 3 | 185 | 367 | 189 |
| 47185 | White County, Tennessee | 3 | 70 | 253 | 142 |
| 51005 | Alleghany County, Virginia | 3 | 168 | 355 | 118 |
| 51017 | Bath County, Virginia | 1 | 10 | 30 | 23 |
| 51021 | Bland County, Virginia | 8 | 331 | 245 | 342 |
| 51023 | Botetourt County, Virginia | 8 | 284 | 344 | 278 |
| 51027 | Buchanan County, Virginia | 1 | 100 | 48 | 132 |
| 51035 | Carroll County, Virginia | 8 | 236 | 271 | 306 |
| 51045 | Craig County, Virginia | 3 | 17 | 366 | 22 |
| 51051 | Dickenson County, Virginia | 3 | 36 | 419 | 34 |
| 51063 | Floyd County, Virginia | 6 | 405 | 46 | 374 |
| 51071 | Giles County, Virginia | 1 | 65 | 18 | 44 |
| 51077 | Grayson County, Virginia | 8 | 340 | 343 | 361 |
| 51089 | Henry County, Virginia | 4 | 231 | 172 | 181 |
| 51091 | Highland County, Virginia | 6 | 364 | 100 | 381 |
| 51105 | Lee County, Virginia | 1 | 109 | 106 | 146 |
| 51121 | Montgomery County, Virginia | 4 | 224 | 103 | 90 |

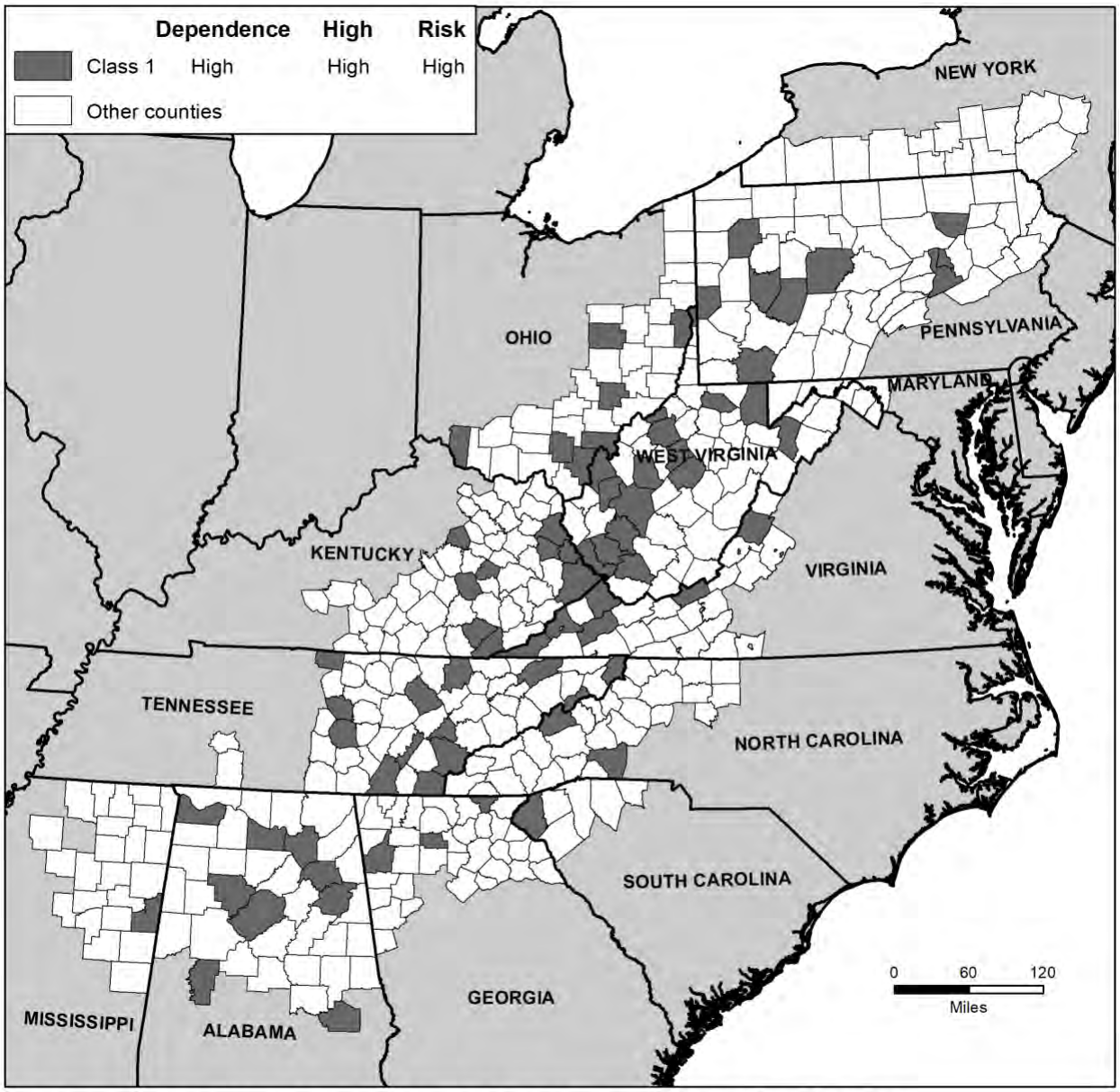
| | | | | | |
|---|---|---|---|---|---|
| 51141 | Patrick County, Virginia | 8 | 319 | 300 | 322 |
| 51155 | Pulaski County, Virginia | 6 | 306 | 142 | 291 |
| 51163 | Rockbridge County, Virginia | 6 | 335 | 159 | 328 |
| 51167 | Russell County, Virginia | 1 | 125 | 17 | 54 |
| 51169 | Scott County, Virginia | 6 | 321 | 91 | 256 |
| 51173 | Smyth County, Virginia | 6 | 313 | 195 | 315 |
| 51185 | Tazewell County, Virginia | 6 | 218 | 206 | 235 |
| 51191 | Washington County, Virginia | 6 | 317 | 125 | 292 |
| 51195 | Wise County, Virginia | 1 | 107 | 161 | 57 |
| 51197 | Wythe County, Virginia | 6 | 324 | 123 | 353 |
| 54001 | Barbour County, West Virginia | 6 | 372 | 79 | 367 |
| 54003 | Berkeley County, West Virginia | 6 | 253 | 149 | 323 |
| 54005 | Boone County, West Virginia | 1 | 97 | 12 | 179 |
| 54007 | Braxton County, West Virginia | 1 | 88 | 176 | 173 |
| 54009 | Brooke County, West Virginia | 8 | 346 | 217 | 334 |
| 54011 | Cabell County, West Virginia | 6 | 290 | 174 | 220 |
| 54013 | Calhoun County, West Virginia | 2 | 123 | 3 | 216 |
| 54015 | Clay County, West Virginia | 6 | 397 | 7 | 407 |
| 54017 | Doddridge County, West Virginia | 3 | 15 | 420 | 26 |
| 54019 | Fayette County, West Virginia | 5 | 156 | 235 | 238 |
| 54021 | Gilmer County, West Virginia | 1 | 49 | 27 | 103 |
| 54023 | Grant County, West Virginia | 1 | 2 | 4 | 2 |
| 54025 | Greenbrier County, West Virginia | 5 | 187 | 322 | 239 |
| 54027 | Hampshire County, West Virginia | 3 | 174 | 258 | 164 |
| 54029 | Hancock County, West Virginia | 1 | 210 | 202 | 175 |
| 54031 | Hardy County, West Virginia | 6 | 419 | 196 | 410 |
| 54033 | Harrison County, West Virginia | 3 | 53 | 394 | 43 |
| 54035 | Jackson County, West Virginia | 3 | 190 | 375 | 204 |
| 54037 | Jefferson County, West Virginia | 8 | 369 | 318 | 384 |
| 54039 | Kanawha County, West Virginia | 1 | 118 | 80 | 177 |
| 54041 | Lewis County, West Virginia | 3 | 103 | 244 | 151 |
| 54043 | Lincoln County, West Virginia | 6 | 260 | 78 | 294 |
| 54045 | Logan County, West Virginia | 1 | 79 | 122 | 153 |
| 54047 | McDowell County, West Virginia | 2 | 175 | 56 | 260 |
| 54049 | Marion County, West Virginia | 1 | 19 | 86 | 16 |
| 54051 | Marshall County, West Virginia | 3 | 29 | 403 | 24 |
| 54053 | Mason County, West Virginia | 1 | 3 | 16 | 1 |
| 54055 | Mercer County, West Virginia | 2 | 166 | 169 | 225 |
| 54057 | Mineral County, West Virginia | 3 | 64 | 405 | 84 |
| 54059 | Mingo County, West Virginia | 1 | 54 | 42 | 113 |

| | | | | | |
|---|---|---|---|---|---|
| 54061 | Monongalia County, West Virginia | 3 | 132 | 398 | 78 |
| 54063 | Monroe County, West Virginia | 8 | 385 | 227 | 355 |
| 54065 | Morgan County, West Virginia | 6 | 278 | 164 | 285 |
| 54067 | Nicholas County, West Virginia | 6 | 251 | 155 | 320 |
| 54069 | Ohio County, West Virginia | 3 | 203 | 321 | 176 |
| 54071 | Pendleton County, West Virginia | 6 | 266 | 168 | 279 |
| 54073 | Pleasants County, West Virginia | 1 | 5 | 2 | 3 |
| 54075 | Pocahontas County, West Virginia | 6 | 393 | 101 | 403 |
| 54077 | Preston County, West Virginia | 1 | 164 | 32 | 157 |
| 54079 | Putnam County, West Virginia | 1 | 32 | 60 | 21 |
| 54081 | Raleigh County, West Virginia | 5 | 184 | 247 | 266 |
| 54083 | Randolph County, West Virginia | 5 | 179 | 287 | 221 |
| 54085 | Ritchie County, West Virginia | 1 | 104 | 95 | 150 |
| 54087 | Roane County, West Virginia | 1 | 84 | 35 | 167 |
| 54089 | Summers County, West Virginia | 8 | 235 | 212 | 273 |
| 54091 | Taylor County, West Virginia | 8 | 294 | 310 | 254 |
| 54093 | Tucker County, West Virginia | 6 | 223 | 132 | 226 |
| 54095 | Tyler County, West Virginia | 6 | 271 | 208 | 269 |
| 54097 | Upshur County, West Virginia | 6 | 325 | 44 | 335 |
| 54099 | Wayne County, West Virginia | 6 | 245 | 87 | 245 |
| 54101 | Webster County, West Virginia | 2 | 198 | 39 | 277 |
| 54103 | Wetzel County, West Virginia | 3 | 204 | 395 | 186 |
| 54105 | Wirt County, West Virginia | 6 | 402 | 21 | 412 |
| 54107 | Wood County, West Virginia | 6 | 249 | 198 | 264 |
| 54109 | Wyoming County, West Virginia | 1 | 58 | 34 | 126 |

Data Sources: Bureau of Labor Statistics, Bureau of Economic Analysis and Mine Safety and Health Administration

# Appendix V. Typology Class Maps

## Class 1




Data Source: U.S. Bureau of Labor Statistics and U.S, Energy Information Administration

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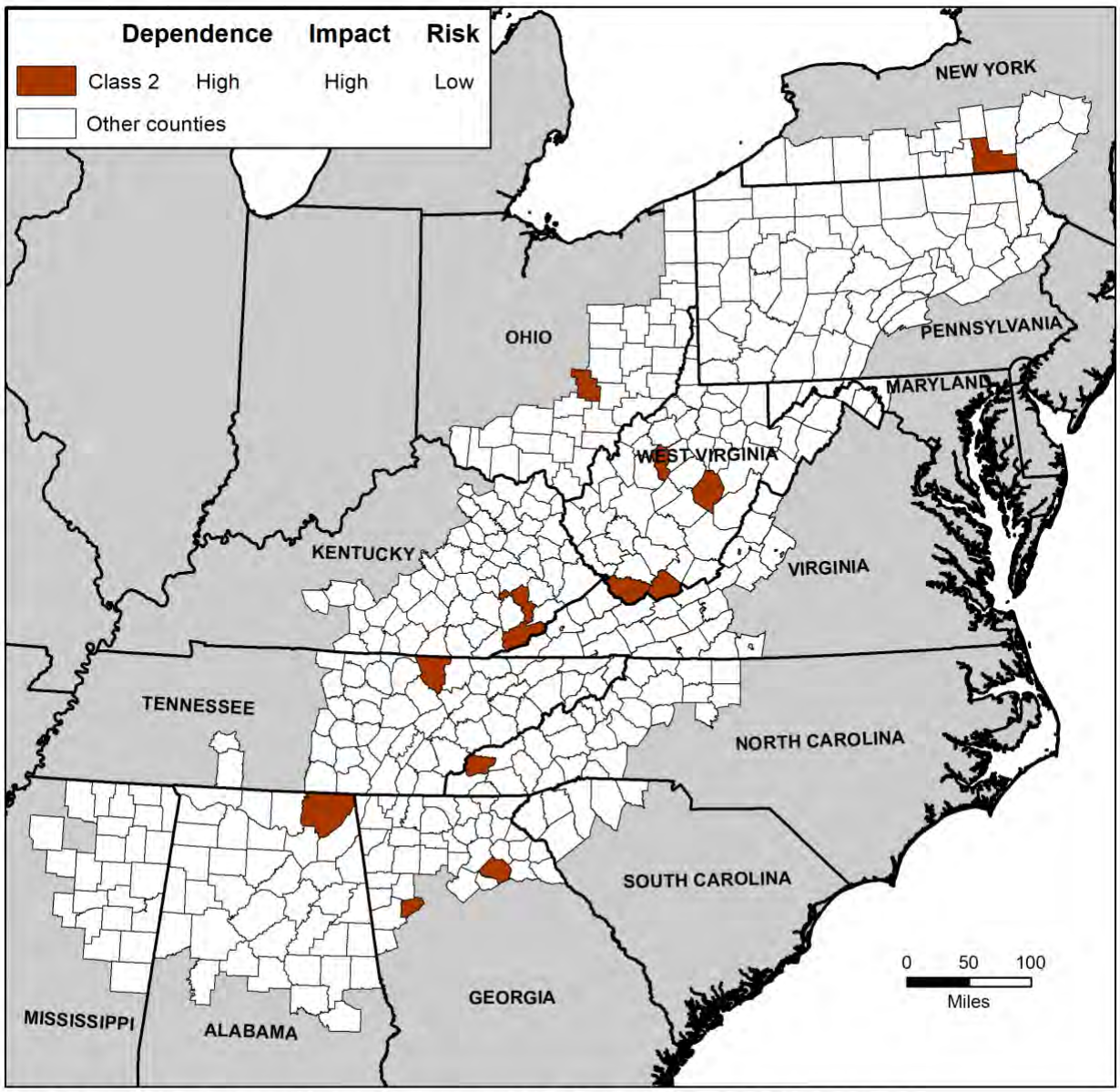


Data Source: U.S. Bureau of Labor Statistics and U.S, Energy Information Administration

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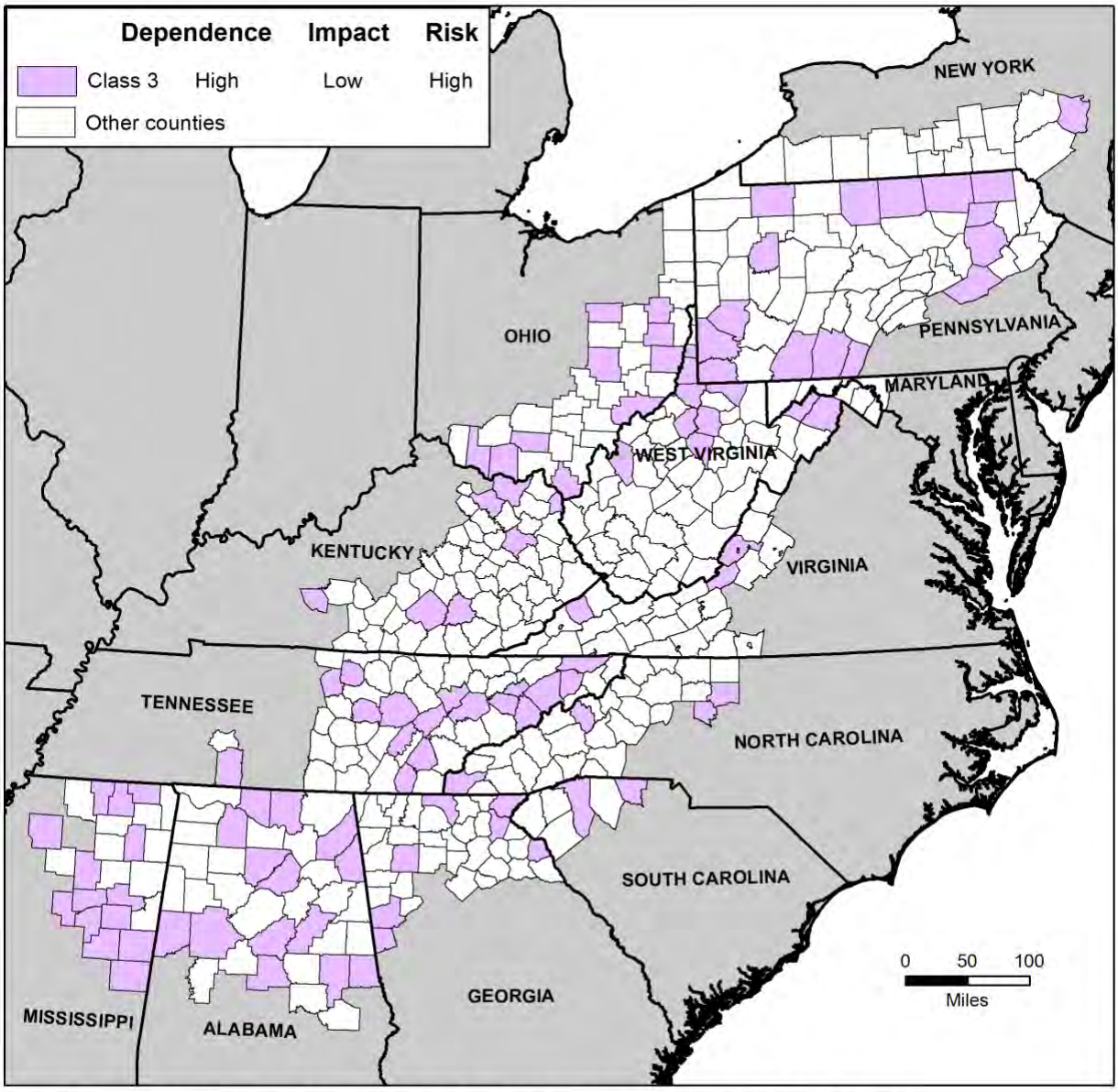


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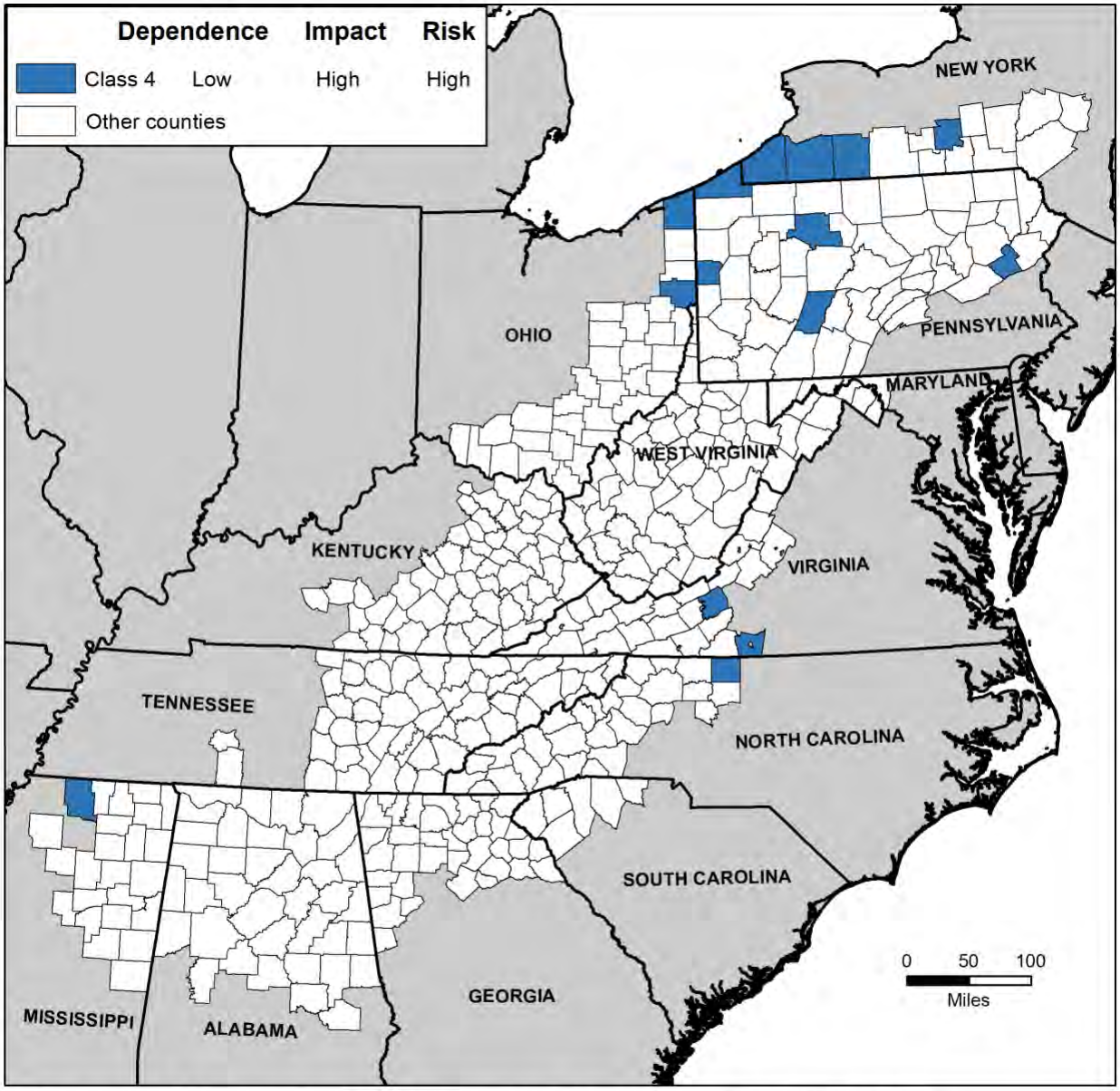


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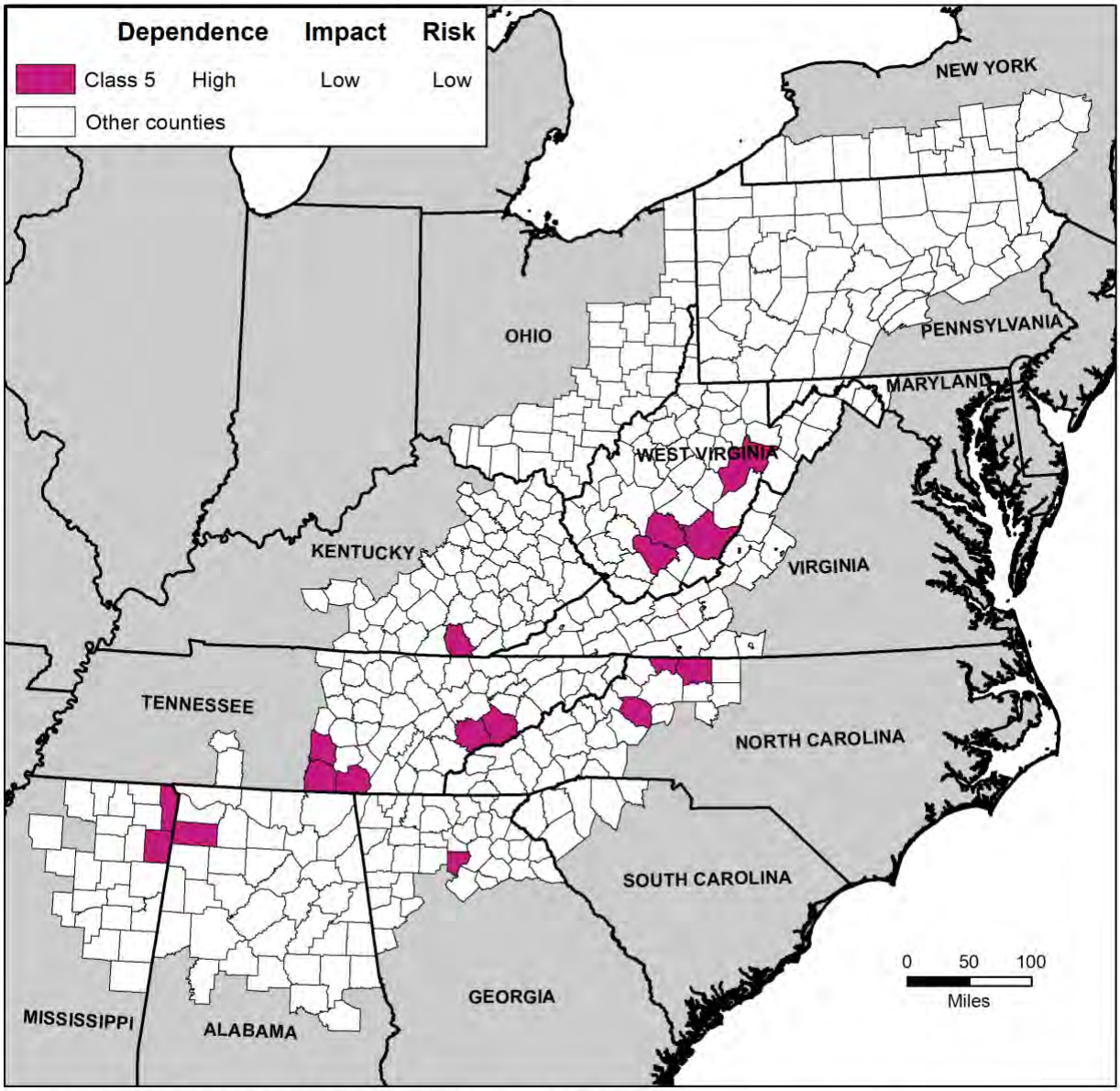


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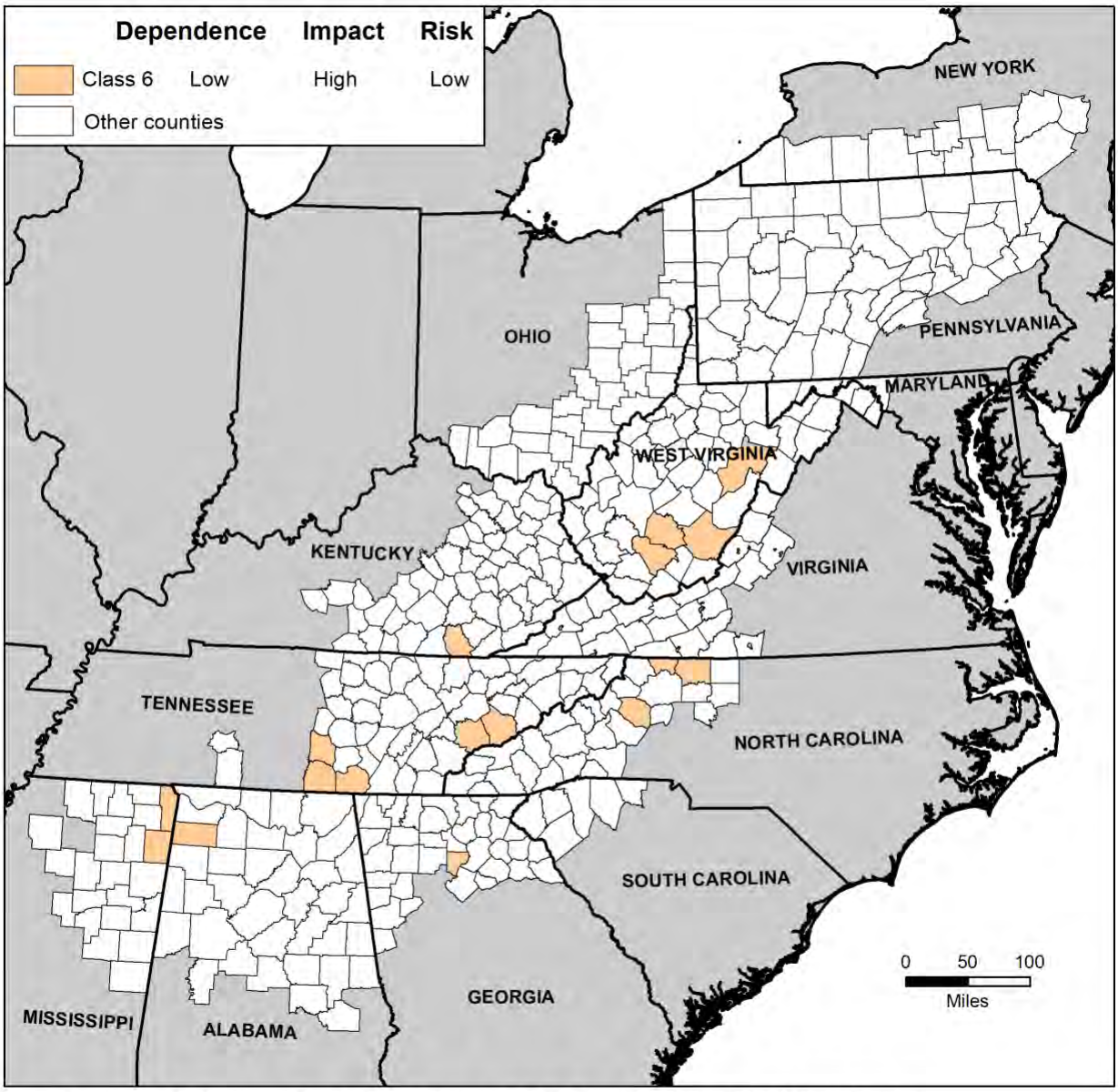


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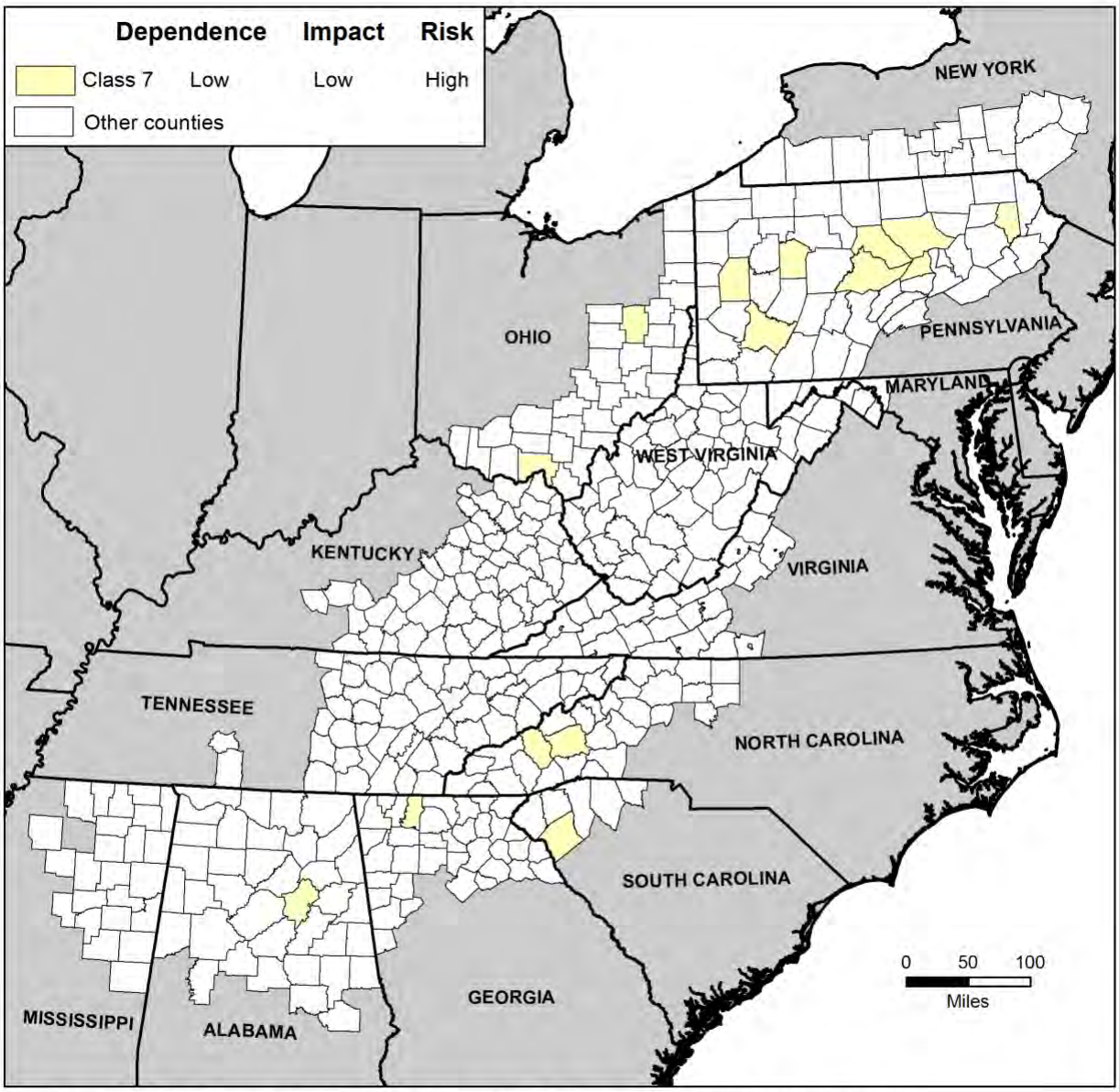


Data Source: U.S. Bureau of Labor Statistics and U.S. Energy Information Administration

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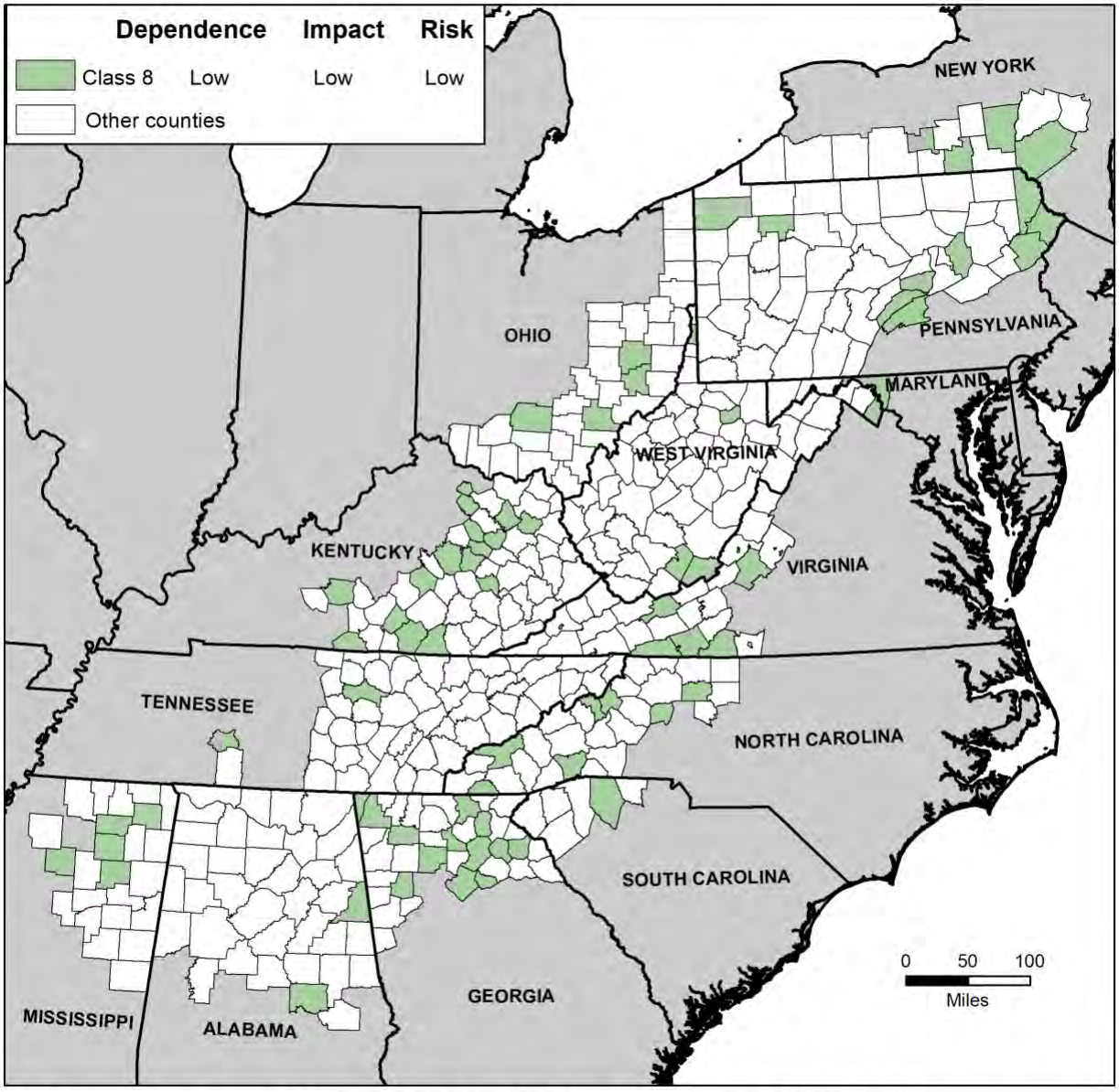


Data Source: U.S. Bureau of Labor Statistics and U.S. Energy Information Administration