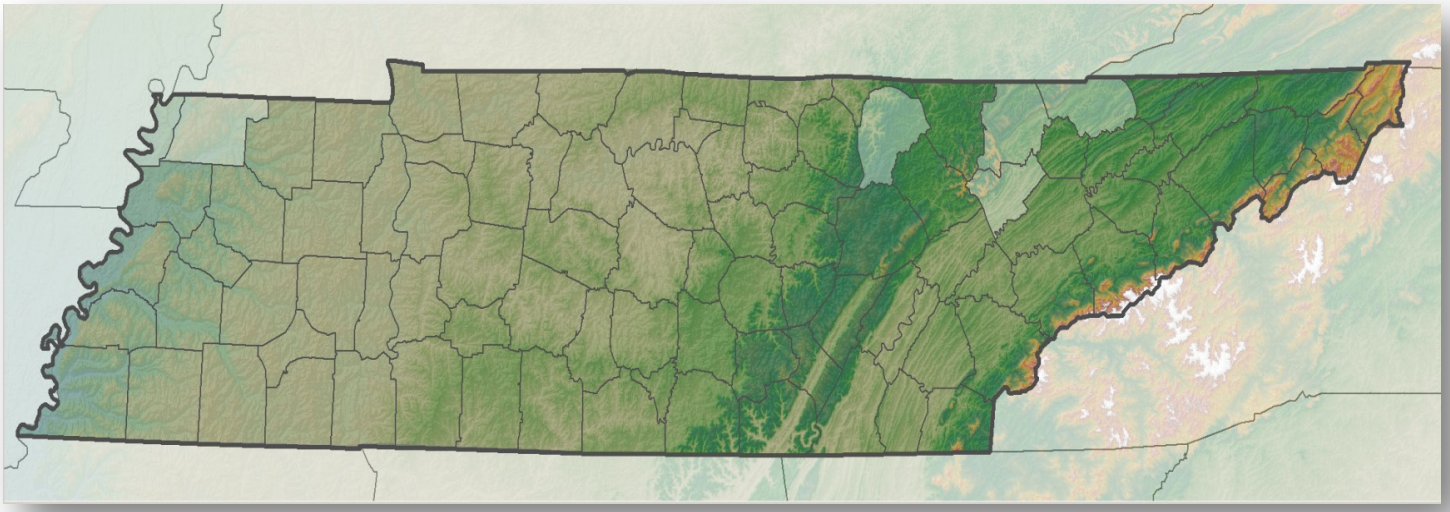
Coal and Renewables in Central Appalachia

The Impact of Coal on the Tennessee State Budget



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One of a series of reports on the impact of coal and renewables in Central Appalachia

The Impact of Coal on the Tennessee State Budget

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ABOUT THE PROJECT

In 2009, the Mountain Association for Community Economic Development produced a report titled *The Impact of Coal on the Kentucky State Budget*. The report analyzed the Kentucky coal industry's net fiscal impact on the state budget by estimating the amount of tax revenues contributed by the industry, as well as the state expenditures associated with supporting the industry and its employees. The study concluded that the coal industry had a net negative impact on the state budget for Fiscal Year 2006, primarily as a result of the annual cost of repairing and replacing the roads impacted by the operation of overweight coal trucks. Other costs attributable to the industry included state agency expenses for supporting or regulating the coal industry, tax expenditures such as exemptions and credits, and general state expenditures supporting those directly and indirectly employed as a result of coal industry activity.

The report showed that, while the coal industry provided significant benefits to the state and local economies in Kentucky, a true accounting of coal's economic impact must also consider the associated costs, and for Kentucky, those costs were significant. The report's conclusions raise questions about Kentucky's policies related to energy and economic development, particularly given the realities of a decline in coal production, pending legislation that could reduce the competitiveness of Kentucky coal, and the growing impact of coal on economic, social, and environmental health.

This Tennessee report is the first of three similar reports for other Central Appalachian states; the other two focus on West Virginia and Virginia. This study is also part of a broader "Coal and Renewables in Central Appalachia" project. The project is comprised of a series of research reports that will look not only at the impact of coal on state budgets, but will also investigate county-level impacts of the coal industry in Central Appalachia. In addition, this broader project will investigate the potential benefits that could result from renewable energy development and energy efficiency improvements within the region. The goal of these reports is to add to the public dialog so that policy makers at the county, state, and federal level can fairly assess the current benefits and costs of the coal industry and the potential for economic diversification.

ACKNOWLEDGEMENTS

We would first like to acknowledge the various organizations whose contributions made this report possible. They include (in alphabetical order): Blue Moon Fund; Mary Reynolds Babcock Foundation; Natural Resources Defense Council; Sierra Club; and University of Colorado, Denver, School of Public Affairs–Central Appalachian Prosperity Project. We would particularly like to acknowledge the ongoing encouragement and support received from Bill Becker of Natural Capitalism Solutions. We greatly appreciate the support of all individuals and groups who have contributed to this effort, and, more broadly, who are committed to sustainable economic development in Central Appalachia.

For their time and willingness to assist and advise our research and development of methodology, and for their review and edits of the report, we would like to thank Melissa Fry Konty and Jason Bailey of the Mountain Association for Community Economic Development. Their research and reporting on *The Impact of Coal on the Kentucky State Budget* served as the inspiration for this report.

For their comments and suggestions on drafts of the report, contributions to portions of the research, and help in understanding Tennessee fiscal policy, the Tennessee state budget, and issues related to energy and economic development in the Tennessee coalfields, we thank Amy Anderson, David Beaty, Cathie Bird, Ann League, Vickie Terry, and Ryan Wishart of Statewide Organizing for Community eMpowerment (SOCM); Brad Stephens; Bill Becker of Natural Capitalism Solutions; and Allen Hershkowitz and Sammi Yassa of Natural Resources Defense Council.

We also appreciate the time, information, and expertise provided by representatives of various agencies that make up the Tennessee state government, including the Department of Revenue, Department of Transportation, Department of Environment and Conservation (Division of Geology and Division of Water Pollution Control), and Department of Labor and Workforce Development (Division of Mines). In addition, we also appreciate the data and explanations provided by the Knoxville office of the federal Office of Surface Mining, Reclamation and Enforcement. Without the assistance of the directors and employees of these agencies, this report could not have been completed.

COVER PHOTOS

From left to right: Statewide Organizing for Community eMpowerment (SOCM), Strip mine in Claiborne County, Tennessee; photograph of a solar panel installed at the residence of Lenora Clark in Tennessee; and, an aerial photograph of the Zeb Mountain surface mine in Tennessee.

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ABBREVIATIONS

ARC	Appalachian Regional Commission
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
DVMT	daily vehicle miles traveled
EIA	Energy Information Administration
ESAL	equivalent single-axle loading
FY	fiscal year
GDP	gross domestic product
GVW	gross vehicle weight
ITEP	Institute on Taxation and Economic Policy
MACED	Mountain Association for Community Economic Development
MSHA	Mine Safety and Health Administration
NAICS	North American Industry Classification System
NPDES	National Pollutant Discharge Elimination System
OSMRE	Office of Surface Mining, Reclamation and Enforcement
PADD	Petroleum Administration for Defense Districts
RIMS	Regional Input-Output Modeling System
SMCRA	Surface Mining Control and Reclamation Act
TDEC	Tennessee Department of Environment and Conservation
TDFA	Tennessee Department of Finance and Administration
TDLWD	Tennessee Department of Labor and Workforce Development
TDT	Tennessee Department of Transportation
USGS	United States Geological Survey
WVDOH	West Virginia Division of Highways

SUGGESTED REFERENCE

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EXECUTIVE SUMMARY

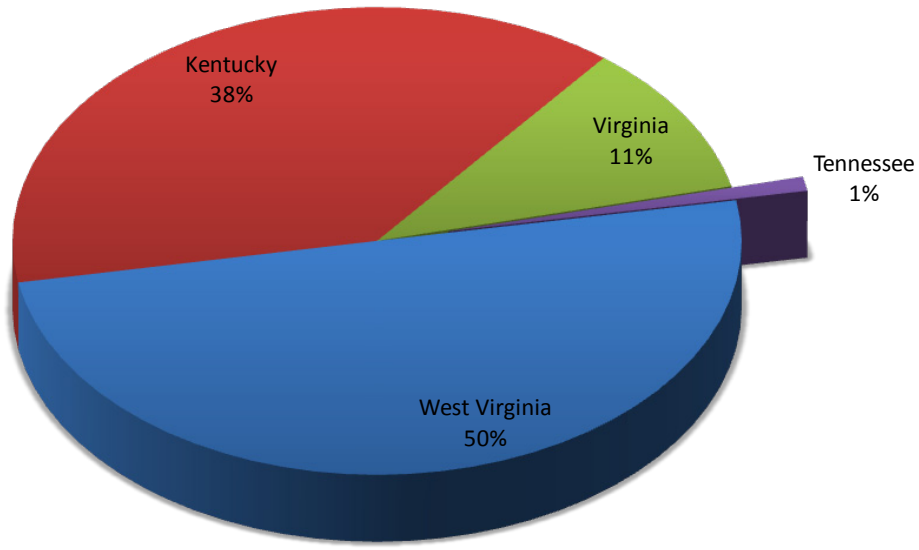
Although coal has played an important historical role, the Tennessee coal industry now provides few jobs to state residents, and does not provide significant revenues to the state budget. In fact, as estimated in this report, the industry itself—together with its direct and indirect employees—actually cost Tennessee state taxpayers more than they provide. Our estimates provide an initial accounting of not only the industry's benefits, but also its costs.

This report is one in a series of reports on the Central Appalachian states of Kentucky, Tennessee, Virginia, and West Virginia. It follows a similar report for Kentucky released by the Mountain Association for Community Economic Development, which examined the coal industry's impact on the Kentucky state budget. Additional reports will investigate county-level impacts of the coal industry in Central Appalachia and the potential energy and economic benefits that could result from the development of renewable energy and energy efficiency improvements.

Since 1985, coal production in Tennessee has fallen by 5.3 million tons of annual production. The decline in coal production, combined with an increase in surface mining as a share of total production, also led to a sharp decline in direct coal mining employment in Tennessee. In 2008, six Tennessee counties produced about 2.3 million tons of coal and employed 558 people. Three of these counties—Claiborne, Campbell, and Anderson—accounted for 98% of total coal production.

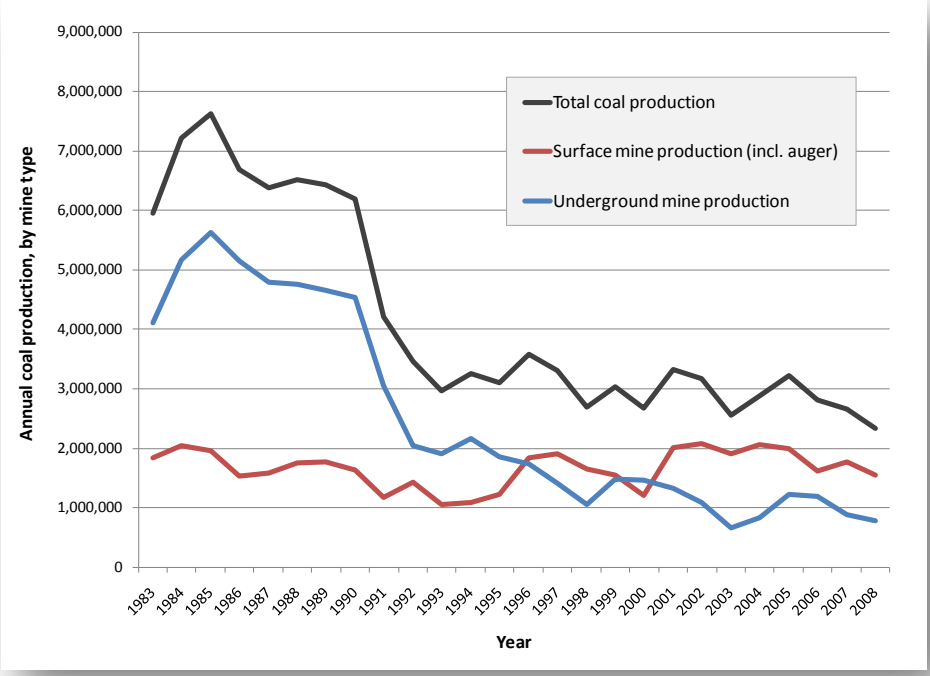
Central Appalachia produced approximately 235 million tons in 2008, accounting for about 20% of total coal production in the United States. Within Central Appalachia, eastern Tennessee, which accounts for virtually all of Tennessee's production, accounted for 1% of the total. Overall, then, eastern Tennessee accounted for 0.2% of United States coal production in 2008.

Figure ES-1: Central Appalachian coal production, by state, 2008



Coal mined in Tennessee also does not play an important role in the state's electricity generation: In 2008, 3% or less of the coal burned in the state's power plants was mined in Tennessee. Coal is simply not critical for electricity generation in the state, nor to the state and local economies. In fact, as calculated for this report, no county in Tennessee relies on coal for more than 2% of its total employment, and the two counties that have historically produced the most coal—Campbell and Claiborne—are designated as "At Risk" counties by the Appalachian Regional Commission, which reports a poverty rate for both counties at over 180% of the United States average as of 2000.

Figure ES-2: Annual coal production in Tennessee, by mine type, 1983-2008



Coal's importance for Tennessee is not likely to grow in the future based on the declining competitiveness of Tennessee coal resulting from the depletion of the lowest cost coal reserves. Implementation of the Clean Air Interstate Rule, climate legislation, tighter restrictions on mercury emissions, regulations on coal combustion wastes, and pending restrictions on valley fills from surface mining are all likely to result in future declines in coal production. Should this occur, then coal's already limited presence as an industry in the state will continue to diminish. This reality should raise questions about Tennessee's priorities as they relate to economic policy and energy development.

In this report, we examine the net impact of the coal industry on the Tennessee state budget by compiling data on and estimating both the tax revenues and the expenditures attributable to the industry for Fiscal Year 2009: July 1, 2008 through June 30, 2009. In calculating these estimates, there is an inherent degree of uncertainty associated with the results. We do not claim that our accounting of revenues and expenditures is precise; in fact, we round our estimates so as not to provide a false impression of precision.

In general, we find that the relative importance of the coal industry to the state budget and economy is negligible, accounting for less than 1% of state revenues and an even smaller percentage of total employment. Further, in certain accounts, the industry imposes a net cost on the state budget for FY2009.

Finally, it is important to note that the impacts of coal extend beyond traditional accountings of revenues and expenditures. While the focus of this report is on the industry's net impact on the state budget for a single year, legacy costs resulting from past and future coal industry activity must be considered. These are important both for their potential impact on the availability of funds for various and more beneficial priorities, and for their future impact on the local and state economies, on the environment, and on the health of Tennessee residents.

The following is a summary of findings for each of the types of revenues and expenditures examined in this report:

Direct coal industry: Revenues. Every industry in Tennessee, including the coal industry, benefits the state budget through the payment of various taxes and fees that contribute to revenues accounted for in the State Taxpayers Budget. In Fiscal Year 2009, the coal industry provided an estimated $1.1 million in revenues from the sales and use taxes, franchise and excise taxes, and coal severance tax. This accounted for less than one-tenth of 1% of state tax revenues.

Direct coal industry: On-budget expenditures. The Tennessee state budget includes a variety of expenditures that exist only because of the state's coal industry. We focus on certain expenditures that are paid for through the State Taxpayers Budget; these include general expenditures on revenue administration; environmental protection and oversight; workforce development; and the maintenance, repair, replacement, and construction of Tennessee roadways. We calculate that estimated on-budget coal-related expenditures amounted to approximately $1.1 million for FY2009. The estimated on-budget expenditures roughly equal the direct revenues generated by the industry, with the net impact to the state budget amounting to only about $50,000 in net costs.

Direct coal industry: Off-budget expenditures. In addition to on-budget expenditures, we estimate off-budget expenditures in the form of tax expenditures. Tax expenditures are foregone revenues resulting from the provision of tax exemptions, credits, and reduced or preferential tax rates. Tax expenditures have the same fiscal impact as direct on-budget government expenditures. They both result in a loss of tax revenue to state government, thereby reducing the funds available for other government programs and services. We estimate that total tax expenditures provided by the State of Tennessee to the coal industry amounted to approximately $440,000 in FY2009.

Direct coal employment: Revenues and expenditures. While the coal industry generates business-related tax revenues for the state associated with the mining, processing, and transportation of coal, the state budget also benefits through the collection of taxes paid by those directly and indirectly employed as a result of the Tennessee coal industry. Therefore, a complete accounting of the impact of the coal industry on the Tennessee state budget requires a calculation of the revenues and expenditures associated with coal-related employment.

Approximately 600 Tennessee residents were employed in the coal industry in FY2009. We estimate that total tax revenues related to direct employment in the coal industry amounted to approximately $1.7 million. However, state expenditures to support those employees amounted to approximately $2.2 million. Therefore, we estimate that the net impact on the state budget from direct coal-industry employment was negative, amounting to a net cost to the state of approximately $540,000.

Indirect employment supported by coal: Revenues and expenditures. When discussing the total economic impact of any industry, it is necessary to include not only the direct impacts in terms of employment, tax revenues, and expenditures, but also the indirect and induced impacts of the industry. The coal industry, like other industries, relies on other companies and generates economic activity and employment. To calculate the indirect impacts, we used the Regional Input-Output Modeling System economic impact multipliers for the coal industry in Tennessee.

For FY2009, we estimate that indirect employment attributable to coal industry activity generated approximately $3.0 million in state revenues. However, state expenditures to support those employees amounted to approximately $5.0 million. We therefore estimate that employment indirectly supported by the Tennessee coal industry resulted in a net cost of approximately $2.0 million for FY2009.

Legacy costs of coal in Tennessee. While this report focuses on impacts of the coal industry and its employees on the state budget, there are certain legacy costs that will continue to require funding long into the future. For example, in Tennessee, as in other Central Appalachian states, many coal mine operators have chosen to step away from their mines before full reclamation is complete, leaving a legacy of polluted drainage, drinking water contamination, and health and safety threats. There are 359 abandoned mine lands in Tennessee. While $35 million has been spent to complete projects, an additional $43 million of work is required. In addition, more recent bond forfeiture sites are also in need of reclamation.

These legacy sites present a liability for the coal industry. Because the main funding mechanism in place to reclaim these sites is insufficient and scheduled to end in 2022, action is needed to ensure that reclamation is completed and that the costs are not shifted to taxpayers. If action is not taken, then the Tennessee state budget could face additional expenditures in the future to finish the job of reclaiming these legacy sites.

Conclusions and recommendations. While every job and every dollar of revenue generated by the coal industry provides an economic benefit for the state of Tennessee and the counties where the coal is produced, the Tennessee coal industry has a negligible impact on the state budget. In fact, when all revenues and expenditures are considered, the coal industry and its direct and indirect employees present a net cost of approximately $3.0 million.

Table ES-1: The estimated impact of the coal industry on the Tennessee state budget

Item	Amount
Direct coal industry	
Revenues	$1,080,000
On-budget expenditures	($1,130,000)
Estimated net impact	**($50,000)**
Off-budget expenditures	($440,000)
Direct coal employment	
Revenues	$1,670,000
Expenditures	($2,210,000)
Estimated net impact	**($540,000)**
Indirect employment supported by coal	
Revenues	$3,000,000
Expenditures	($4,960,000)
Estimated net impact	**($1,960,000)**
Total	
Revenues	$5,750,000
Expenditures	($8,740,000)
Estimated net impact	**($2,990,000)**

While this number is a reasonable and plausible first approximation, it cannot be represented as a precise calculation. However, the estimates provided in this report are based on the data that are available, and provide a useful first step toward considering not just the industry's revenues, but its costs as well.

The process of thinking through the revenues and expenditures as they pertain to the coal industry, and the provision of these initial estimates, is of benefit for state policy-makers in that it offers a better understanding of the role of the coal industry at the state level. We encourage the generation of additional data, and the calculation of refined estimates, to help move this dialog forward.

The following policy recommendations address the direct and indirect costs attributable to coal industry activity in Tennessee, with the overall goal being to ensure that the costs are covered through revenues collected from the industry rather than being paid for by the public.

- Continue and strengthen the state's efforts toward diversifying state and local economies in clean energy industries.
- Reduce tax expenditures supporting the coal industry.
- Increase the coal severance tax, and base it on a percent of gross sales.
- Collect a per-ton fee for the transportation of coal by haul truck.
- Set a goal of reclaiming all abandoned mine lands to meet in-stream water quality standards, and ensure that sufficient funding is provided over time from the coal industry.
- Ensure that Tennessee's bond forfeiture program is sufficiently funded.

To conclude, the coal industry's small contribution to the Tennessee economy, both on the state and local levels, means that policy-makers can be creative in seeking ways to diversify, particularly in the coal-producing counties. Even with today's policies, coal's importance for Tennessee is not likely to grow in the future. This reality raises questions about Tennessee's priorities related to economic policy and energy development, and requires a re-examination of state policies as they apply to the Tennessee coal industry.

1. INTRODUCTION

Although coal has played an important historical role, the Tennessee coal industry now provides few jobs to state residents, and does not provide significant revenues to the state budget. In fact, as estimated in this report, the industry itself—together with its direct and indirect employees—actually cost Tennessee state taxpayers more than they provide. Our estimates provide an initial accounting of not only the industry's benefits, but also its costs.

This report is one of a series of reports on the Central Appalachian states of Kentucky, Tennessee, Virginia, and West Virginia. It follows a similar report for Kentucky released by the Mountain Association for Community Economic Development (MACED), which examined the coal industry's impact on the Kentucky state budget (Konty and Bailey, 2009). Additional reports will investigate county-level impacts of the coal industry in Central Appalachia and the potential energy and economic benefits that could result from the development of renewable energy and energy efficiency improvements.

1.1 The declining importance of coal for Tennessee

The federal Office of Surface Mining, Reclamation and Enforcement (OSMRE) notes that twenty-two counties in Tennessee have coal reserves, and that the state's total recoverable reserves amount to 60.7 million short tons[1] (to be described merely as "tons" in this report). OSMRE describes the mining as occurring in steep slope areas of the Cumberland Mountain range in the northern counties, and in the relatively flat Cumberland Plateau in the southern counties (OSMRE, 2009a).

Six of the twenty-two counties produced coal in 2008, producing over 2.3 million tons of coal and employing a reported 558 miners, managers, and upper-level staff (MSHA, 2010). The producing counties included Claiborne, Campbell, Anderson, Lake, Fentress, and Obion counties. Of these, only three—Claiborne, Campbell, and Anderson—accounted for 98% of total coal production.

Figure 1: Tennessee coal-producing counties, and percent of total production by county for 2008

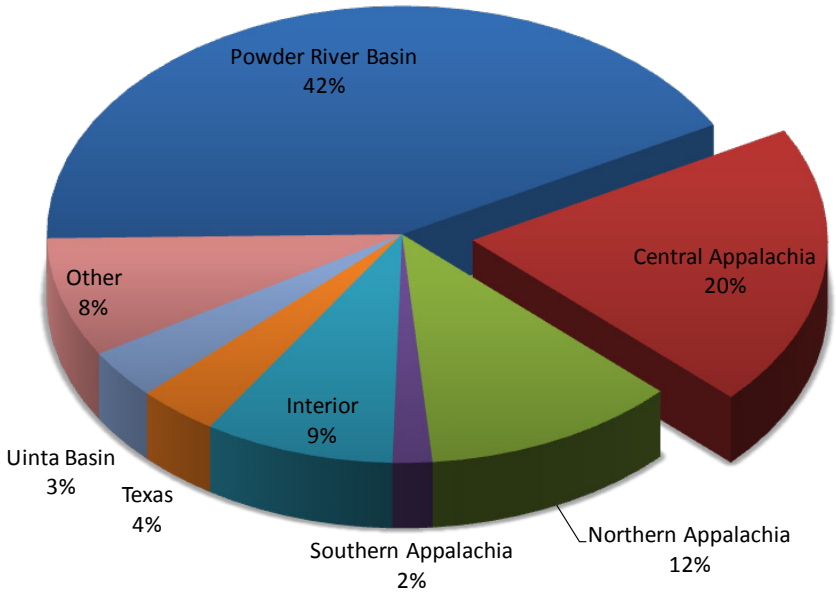
[1] By comparison, the Energy Information Administration estimates that Tennessee's estimated recoverable reserves amount to 451 million tons, but that recoverable reserves at production mines amount to only 10 million tons (EIA, 2009a).

Of the 2.3 million tons produced, approximately 1.5 million tons, or 66%, were produced by surface mining methods, although surface mining employed only 54% of all direct coal employees (MSHA, 2010). Further, of the 1.5 million tons of Tennessee coal for which distribution data is reported, nearly 1.4 million tons were exported out-of-state for use in manufacturing and electricity generation (EIA, 2009b). The destination states for Tennessee coal included Alabama, Florida, Georgia, Kentucky, Missouri, North Carolina, and South Carolina.

By contrast, Tennessee imported nearly 30 million tons of coal in 2008 from ten different states, with approximately 12 million tons imported from the Powder River Basin states of Colorado and Wyoming, nearly 7 million tons from the Interior Basin, including western Kentucky and Illinois, and only 9 million tons imported from the Central Appalachian portion of the nearby states of Kentucky, Virginia, and West Virginia (EIA, 2009b).

To put Tennessee coal production into perspective, in 2008, Central Appalachia—of which eastern Tennessee is a part[2]—produced a total of approximately 235 million tons of coal, accounting for approximately 20% of total coal production in the United States (Figure 2).

Figure 2: United States coal production by major coal basin, 2008

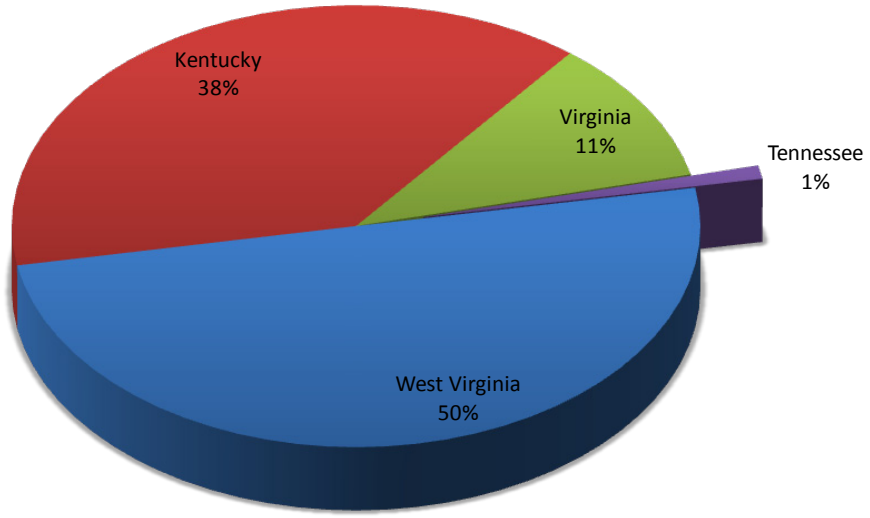


Source: MSHA (2010).

Of the 235 million tons of Central Appalachian coal production, eastern Tennessee contributed approximately 2.3 million tons, for 1% of the total (eastern Tennessee accounts for 99% of total state coal production) (Figure 3). Overall, then, eastern Tennessee accounted for 0.2% of United States coal production in 2008 (MSHA, 2010).

[2] The Central Appalachian region, as defined by the EIA, consists of southern West Virginia, eastern Kentucky, southwest Virginia, and eastern Tennessee (EIA, 2009c).

Figure 3: Central Appalachian coal production, by state, 2008

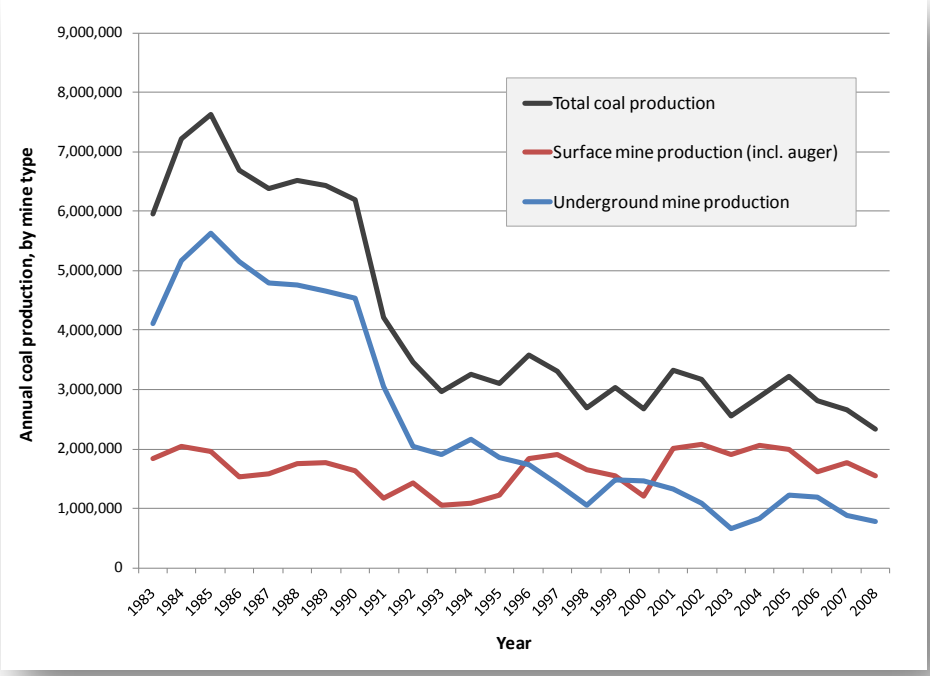


Source: MSHA (2010).

Tennessee's role in national and regional production has declined since 1990. The Clean Air Act Amendments of 1990 impacted demand for high-sulfur Tennessee coal, and total production declined by 52% between 1990 and 1993. Underground mining was most negatively impacted, accounting for 81% of the total decline in production. Since then, total production levels have fluctuated around 3 million tons; however, since 2005, annual coal production has dropped by 884,000 tons, or 27%.

Overall, since 1985, coal production in Tennessee has fallen by 5.3 million tons of annual production (Figure 4), for a total decline of 69% (MSHA, 2010). Additionally, as recently as 1990, Tennessee coal mines in eleven counties produced 6.2 million tons of coal. Eight of those counties had production levels of over 100,000 tons. Less than 20 years later, only six counties produce a total of 2.3 million tons, with only two exceeding 100,000 tons of production (MSHA, 2010). These trends illustrate the declining importance of Tennessee coal for state and local economies.

Figure 4: Annual coal production in Tennessee, by mine type, 1983-2008

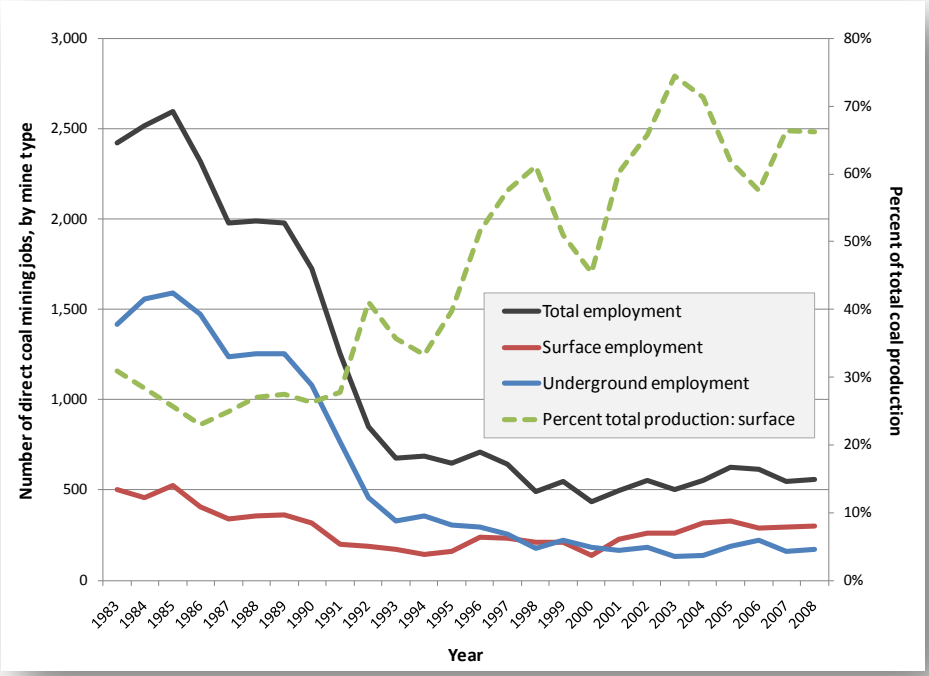


Source: MSHA (2010).

The decline in coal production, combined with an increase in surface mining as a share of total production, led to a sharp decline in direct coal mining employment in Tennessee, with underground employment accounting for 72% of the decline (Figure 5). Since the last peak in total production and employment in 1985, direct coal mining employment has fallen by 79%, with the total job loss exceeding 2,000 coal miners.

As of 2008, only 558 direct jobs existed in the coal mining industry in Tennessee, 470 of which were actual jobs mining coal. Approximately 300 of those were jobs at surface mines. This is the result of the continuous expansion of surface mining, which has grown from a low of 23% of total production in 1986 to over 66% by 2008 (MSHA, 2010).

Figure 5: Coal mining employment in Tennessee, by mine type, and percent of total production from surface mining, 1983-2008

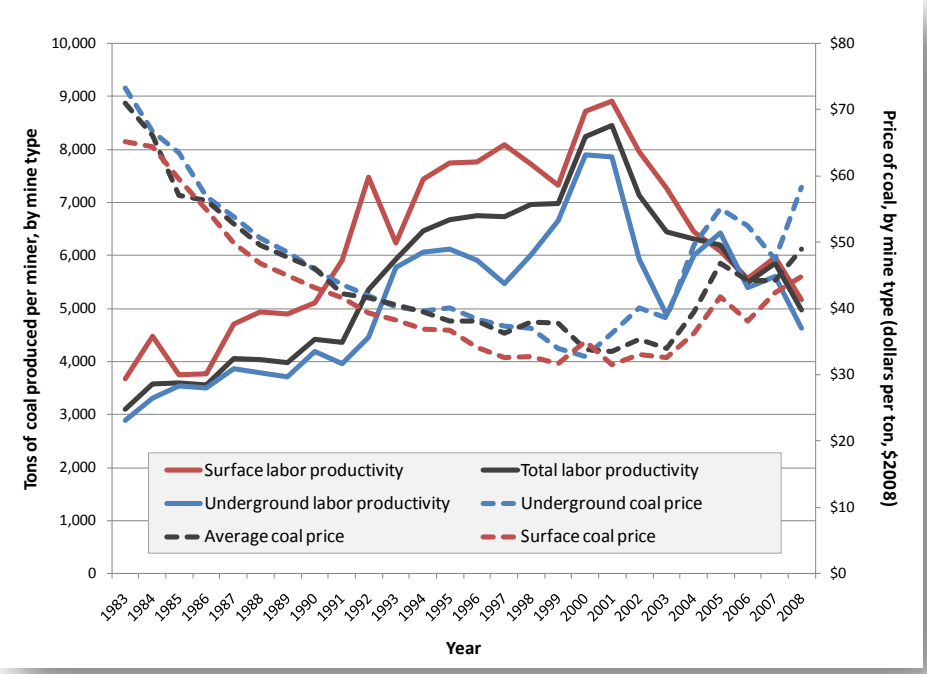


Source: MSHA (2010).

While coal production in Tennessee has risen slightly since 2000, labor productivity for both surface and underground mining—represented in Figure 6 as the tons produced per miner—peaked around 2001, and has declined sharply since then. This is significant because trends in labor productivity provide an indication of the accessibility and therefore the economic recoverability of the coal seams in terms of thickness and cost of production (McIlmoil and Hansen, 2010).

Consequently, the decline in the labor productivity for Tennessee coal mines has resulted in a sharp increase in the price of Tennessee coal, for both mining types, with the onset of the price increase corresponding with the beginning of the decline in labor productivity. While average labor productivity has declined by over 40% since 2001, the average price of Tennessee coal has increased by 78%, rising by over $21 per ton over seven years (Figure 6).

Figure 6: Labor productivity and average coal prices for Tennessee, by mine type, 1983-2008[3]



Source: Productivity calculated using data from MSHA (2010); Average prices for 1994 through 2007, and surface and underground prices for 2000-2007 from EIA (2009d); all prices for 2008 from EIA (2009e).

While such a trend would normally have an impact on electricity prices in Tennessee, very little electricity is generated in the state using Tennessee coal; only a maximum of 830,000 tons of coal mined in Tennessee was burned at the state's power plants in 2008.[4] The rest was exported to other states. The state does depend heavily on coal for electricity, however, burning nearly 27 million tons in 2008 and relying on it for 63% of state electricity generation (EIA, 2009f), but only up to 3% (and possibly as little as 0.1%) of the coal burned was from Tennessee coal mines (EIA, 2009b). In other words, at least 97% of the coal burned for electricity generation in Tennessee is imported from other states and even regions, while between 64% and 99% of coal produced in Tennessee is exported to other states (EIA, 2009b).[5]

In summary, Tennessee coal is simply not critical for electricity generation in the state, nor to the state and local economies. In fact, as calculated for this report, no county in Tennessee relies on coal for more than 2% of its total employment. Further, the two counties that have historically produced the most coal—Campbell and Claiborne—are designated as "At Risk" counties by the Appalachian Regional Commission (ARC), which reports a poverty rate for both counties at over 180% of the United States average as of 2000 (ARC, Undated).

[3] Prices for surface and underground mining through 1999 were unavailable from the EIA for Tennessee. Therefore, we calculated the prices by taking an average of surface and underground prices, respectively, for each of the other three Central Appalachian states. Further, average mine prices for Tennessee were unavailable for years preceding 1994, so we again took an average of prices for the other three Central Appalachian states in order to calculate the average price for Tennessee. All prices for the remaining years were available from the EIA.

[4] We report a maximum because not all of Tennessee's coal production in 2008—as reported by both MSHA and the EIA—is accounted for in the EIA Coal Distribution report for 2008 (EIA, 2009b). One reason for this may be that a portion of the unaccounted-for coal may have been produced at or near the point of consumption, and, therefore, would not have been accounted for in the distribution report. Another reason could be that, following extraction, the coal had yet to be shipped to the point of consumption and was stockpiled at the mine site. Therefore, the maximum estimate for coal burned at Tennessee power plants assumes that 100% of the unaccounted-for coal was burned for electricity generation, while the minimum percentage assumes that the coal was exported out of state or used in-state for other purposes such as manufacturing.

[5] We report a range for coal exports from Tennessee in order to provide a sense of to what extent Tennessee actually benefits from the use of coal produced within the state.

Coal's importance for Tennessee is not likely to grow in the future based on the declining competitiveness of Tennessee coal resulting from the depletion of the lowest cost coal reserves. Implementation of the Clean Air Interstate Rule, climate legislation, tighter restrictions on mercury emissions, regulations on coal combustion wastes, and pending restrictions on valley fills from surface mining are all likely to result in future declines in coal production. Should this occur, then coal's already limited presence as an industry in Tennessee will continue to diminish. This reality should raise questions about Tennessee's priorities as they relate to economic policy and energy development.

1.2 Focus and methodology

In this report, we examine the net impact of the coal industry on the Tennessee state budget by compiling data on and estimating both the tax revenues and the expenditures attributable to the industry for Fiscal Year 2009 (FY2009), which covers the period between July 1, 2008 and June 30, 2009. Whenever possible, we attempt to replicate the methodologies used by MACED (Konty and Bailey, 2009) in order to generate a degree of consistency across each of the four state budget reports. However, this is difficult to achieve given the differences in the structure of state budgets among the four states, in the types of revenues and expenditures that exist, and in the availability and accessibility of the data and information necessary to conduct the various analyses. Nevertheless, for each of the revenues and expenditures in this report where MACED's methodology is not appropriate or where the data are limited, we construct the best methodology we can, given available resources, for estimating revenues or expenditures.

That said, it should be stressed that in calculating estimates for the items considered in this report, there is an inherent degree of uncertainty associated with the results. We do not claim that our accounting of revenues and expenditures is precise; in fact, we round our estimates that are based on calculations so as not to provide a false impression of precision. In many cases, more than one method is tested and examined, and we choose the method that seems most appropriate and that has the best chance of producing a plausible estimate. While these estimates certainly can and should be refined, they still provide an important starting place to examine not just the industry's benefits, but also its costs.

The importance of examining the impact of an industry, a policy, or of economic trends on the state budget is that it provides an indication of how the state economy is impacted as a whole. This is because the state budget distributes funds among programs, initiatives, and projects based on a politically and economically-determined set of priorities, thereby determining to a large extent how the state will be developed economically, what types of educational opportunities will be available, where roads will be built, and what sources of energy will be supported and developed. As state revenues increase, more funds are available for supporting a wider variety of priorities; conversely, as revenues decline, funding for certain projects and services are in many cases eliminated. The challenge for states is to make determinations about what the state's true needs and priorities are, and how to generate new sources of revenue in order to maintain at least a minimum level of funding available for vital social and economic programs.

This is an important consideration as well when examining the net impact of a particular industry, and determining whether support for the industry results in a net positive or negative impact on the state budget. In examining the net impact of the coal industry on the Tennessee state budget in this report, we focus only on those revenues and expenditures that are part of the State Taxpayers Budget, and we only consider those that are applicable to the coal industry and its employees. We choose to focus on the State Taxpayers Budget because it reports only the revenues and appropriations from general state tax sources, while excluding revenues and appropriations from dedicated taxes and fees, from federal revenues, and from all other departmental revenues. This allows us to estimate the net impact of coal more directly by excluding flows of money that (1) do not originate from the collection of general taxes applicable to all industries or citizens operating or living in Tennessee, and (2) are not expended on pre-determined priorities that may or may not apply to coal.

1.3 Structure of the report and initial findings

The body of this report is divided into five main chapters, each focused on a separate type of revenue and/or expenditure. These include, in the order they are presented:

- the direct revenues generated by the coal industry, from applicable taxes and fees;
- on-budget expenditures supporting the coal industry, representing expenditures by state agencies that support and/or regulate the coal industry, as well as transportation-related expenditures;
- off-budget expenditures supporting coal, in the form of various tax credits and exemptions;
- revenues and expenditures related to direct coal industry employment; and
- revenues and expenditures related to employment indirectly supported by the coal industry.

In Section 7, we also provide an overview and analysis of the legacy costs of past coal mining operations in terms of payment for reclaiming abandoned mine lands, bond forfeiture sites, and the cost of repairing and treating streams impacted by mining.

In general, we find that the relative importance of the coal industry to the state budget and economy is negligible, accounting for less than 1% of state revenues and an even smaller percentage of total employment. Further, in certain accounts, the industry imposes a net cost on the state budget for FY2009.

Finally, it is important to note that the impacts of coal extend beyond traditional accountings of revenues and expenditures. While the focus of this report is on the industry's net impact on the state budget for a single year, legacy costs resulting from past and future coal industry activity must be considered. These are important both for their potential impact on the availability of funds for various and more beneficial priorities, and for their future impact on the local and state economies, on the environment, and on the health of Tennessee residents.

In MACED's words, "Decisions, especially concerning public policy and the investment of public dollars to meet energy and economic challenges, should be made based on a clear understanding of the full costs and benefits of the alternatives before us" (Konty and Bailey, 2009).

This report aims to help develop that understanding for Tennessee, and to inform future policy related to energy and economic development. A forthcoming report will provide a more detailed accounting of coal's impact on local economies.

2. DIRECT COAL INDUSTRY: REVENUES

Every industry in Tennessee, including the coal industry, benefits the state budget through the payment of various taxes and fees that contribute to revenues accounted for in the State Taxpayers Budget. This chapter describes the various state tax revenues that are generated as a result of the existence and operation of the coal industry in Tennessee. This includes companies involved in the extraction, processing, and transport of coal.[6]

Despite the relatively small size of the Tennessee coal industry, the taxes and fees paid by the industry do contribute to the state budget, through which the public benefits from the government provision of funds for education, health, safety, environmental protection, and infrastructure development and maintenance.

In Tennessee, the largest sources of tax revenue include the sales and use taxes, franchise and excise taxes, motor vehicle and gasoline taxes (in combination), insurance and banking taxes, and gross receipts and privilege taxes. These five sources of tax revenue make up 90% of all revenues for the State Taxpayers Budget, with the sales tax accounting for 60% alone (Tennessee Department of Revenue, 2010).

Only those revenues directly applicable to the coal industry and its employees are discussed in this report; therefore, the insurance and banking and gross receipts taxes will not be addressed. The state sales and use taxes and franchise and excise taxes are applicable to the coal industry and are discussed in this section. Transportation taxes are also applicable to the coal industry, but will be addressed in Section 5.1.2, when we estimate industry- and employment-related tax revenues and expenditures. The coal severance tax, while not a source of revenue for the state budget beyond a small administrative fee, will be addressed in this section.

This report only provides estimates, rather than actual values, for the taxes considered in this section due to the fact that industry-specific data for tax revenues is not readily available from the Tennessee Department of Revenue. This is a result of the fact that the state's coal industry has a small relative presence in the state and a negligible impact on the state budget. Therefore, the estimates contained in this report are the best estimates we can make based on available data and information.

Given that, we estimate that total state tax revenues directly attributable to the coal industry in Tennessee for FY2009 amounted to approximately $1.1 million (Table 1). This accounts for 0.02% of the state's general fund—into which the applicable revenues are deposited—for FY2009. The following subsections explain in detail how we calculated the coal industry's share of the coal severance, sales and use, and franchise and excise tax revenues.

Table 1: Direct tax revenues paid by the coal industry in Tennessee, FY2009

Source	Amount	Percent of total revenues from coal
Sales and use taxes	$670,000	62%
Franchise and excise taxes	$400,000	37%
Coal severance tax	< $10,000	< 1%
Total	**$1,080,000**	**100%**

[6] A useful way to classify the coal industry is to use the North American Industry Classification System (NAICS). The coal industry is designated under NAICS code 2121, and is comprised of various occupations directly related to the mining, transportation, and processing of coal.

2.1 State sales and use tax

The sales and use tax is the largest source of revenue for the Tennessee State Budget, amounting to $6.4 billion in FY2009 and accounting for 60% of total revenues for the State Taxpayers Budget (Tennessee Department of Revenue, 2010). The state sales tax rate is 7% of gross sales for any business operating in the state, and is imposed on all retail sales, leases, and rentals of most goods, along with taxable services. The tax is also imposed on tangible personal property purchased outside the state and imported into the state for use or consumption. Food is taxed at a reduced rate of 5.5%. Energy fuels, gas, electricity, and fuel oil are taxed even lower, at 1.5% for individual purchasers and small businesses. Local governments also have the option of imposing the tax, but only up to an additional 2.75% (Tennessee Department of Revenue, 2009).

As is true in West Virginia and Kentucky, most coal company purchases are exempt from the sales and use tax, including the purchase of industrial machinery and materials,[7] as well as the purchase, leasing, or contracting of coal haul trucks.[8] The purchase of coal for electricity generation is also exempt from the sales tax. Each of these exemptions results in a loss of potential revenues for Tennessee. As such, they will be discussed further in Section 4.

The Tennessee Department of Revenue reports that the "mining" industry paid approximately $6.1 million in sales and use taxes in FY2009 (Tennessee Department of Revenue, 2010), accounting for less than 0.10% of total state sales and use tax revenues. The coal industry is only one component of the mining sector in Tennessee, which also includes the extraction of oil and natural gas, ball clay, sandstone, marble, limestone, sand, and gravel.

We estimate that the total gross production value for all mining industries in Tennessee amounted to $1.04 billion in 2008, with coal generating $114.2 million (Table 2).

Table 2: Estimated production value by Tennessee mining industry, 2008

	Production	Unit	Price	Gross value	Percent of total
Non-fuel minerals	various	various	various	$856,000,000	82%
Coal	2,332,776	Short tons	$48.94	$114,170,000	11%
Natural gas	4,700,000	1,000 cubic feet	$8.85	$41,600,000	4%
Oil	344,000	barrels	$92.51	$31,820,000	3%
Total				**$1,043,580,000**	**100%**

Source: Production and price for natural gas and oil: EIA (2010a and b; 2009g and h).[9] Production for coal: MSHA (2010). Price for coal: EIA (2009e). Production and price for non-fuel minerals: USGS (2009).

Therefore, coal mining accounted for approximately 11% of the total gross value of fuel and non-fuel minerals mined in the state in 2008. In other words, 11% of Tennessee's total mining industry is coal mining. Therefore, we apply this percentage to total sales and use taxes collected from the mining industry for FY2009 in Tennessee.

Based on this methodology, we estimate total sales and use taxes paid by the coal industry in Tennessee in FY2009 to be approximately $670,000. This accounts for approximately 0.01% of total sales and use taxes collected in Tennessee.

[7] TN State Code, 67-6-102.
[8] TN State Code, 67-6-206.
[9] We were unable to find specific sale prices for Tennessee for 2008. Therefore, we used 2008 crude oil first purchase prices for the Petroleum Administration for Defense Districts (PADD) II region. This is the region that includes Tennessee, but since Tennessee is the seller and not the purchaser, we assume that other states within the PADD II region are those most likely to purchase Tennessee crude oil, and so we use the average 2008 purchase price for the region. This may have resulted in a slight over-estimate of the total production value of Tennessee crude oil.

2.2 Franchise and excise taxes

Franchise and excise taxes are privilege taxes imposed on corporations, limited partnerships, limited liability companies, and business trusts chartered, organized, or operating their business within Tennessee.[10] Total franchise and excise tax collections for Tennessee in FY2009 amounted to $1.34 billion, accounting for approximately 13% of total state revenues (Tennessee Department of Revenue, 2010).

The franchise tax is a tax of 0.25% of a corporation's net worth or real and tangible personal property, whichever amount is greater. The excise tax is a tax on net earnings or income, at a rate of 6.5%. Each of these taxes applies to most coal companies in Tennessee; only unincorporated companies are exempt.

The Tennessee Department of Revenue was unable to provide the amount of franchise and excise taxes paid by the coal industry in FY2009. Therefore, we estimate the coal industry contribution based on its share of total gross domestic product (GDP) in Tennessee for 2008.

Using the GDP for the mining industry (BEA, 2009), we calculate the percent of total Tennessee GDP that is generated by mining (Table 3). As noted in the previous section, this sector includes coal, oil, gas, and non-fuel minerals. We calculate that the mining sector, as a whole, accounted for about 0.3% of Tennessee's GDP in 2008. This represents the portion of all gross income earned in Tennessee that was earned by mining companies operating in the state.

Table 3: Mining as a percent of Tennessee gross domestic product, 2008

	GDP (million $)	Percent of total
Mining industry	696	0.3%
All other industries	251,431	99.7%
Total	**252,127**	**100.0%**

Source: BEA (2009).

We then multiply the 0.3% by the coal industry's 11% share of total gross production value for all mining industries, as presented in Table 2. This provides an estimate for the coal industry share of total industry GDP for Tennessee: 0.03%. We then apply this percentage to total franchise and excise tax revenues in FY2009.

Using this methodology, we estimate that the total franchise and excise taxes paid by the Tennessee coal industry in FY2009 amounted to approximately $400,000.

This is an imperfect way to estimate coal industry revenues for these taxes, mostly because we are unable to account for actual net income for coal companies after deducting for losses, depreciation, and other taxes paid. Additionally, it assumes the same rate for the franchise tax as it does for the excise tax, even though the calculation is more appropriate for estimating coal's contribution to the excise tax.[11]

In any case, lacking actual data on franchise and excise taxes paid by the coal industry in FY2009, this is the best methodology based on available resources and data and represents an initial estimate that can be refined in the future as additional data become available.

[10] The franchise tax corresponds most closely with the business franchise tax in West Virginia, while the excise tax corresponds with the corporate net income tax in West Virginia and the corporate income tax in Kentucky.

[11] For instance, applying our methodology only to the excise tax would have resulted in an excise tax contribution from the coal industry of $250,000. If we consider this to be the excise tax portion of our total estimated franchise and excise tax contribution from coal of $400,000, then the franchise portion would be $150,000. Based on the franchise tax rate of 0.25% of net worth or tangible personal property, for the estimated franchise tax portion of our calculation to be accurate, the total taxable net worth (or, value of tangible personal property) would have to amount to approximately $64 million. If the true taxable value is more than this, then we have underestimated coal's contribution to franchise tax revenues in Tennessee for FY2009. If the true value is less, then we have over-estimated.

2.3 Coal severance tax

As in other Central Appalachian coal-producing states, Tennessee collects a tax on the severance of all coal products from the ground within state boundaries, regardless of where the coal is sold. In breaking from the norm, however, the coal severance tax in Tennessee is levied for the benefit of local governments only, with the state retaining only a small portion to cover the administration of the tax.

About 99% of the tax is distributed to the county of severance, of which 50% is earmarked for the county educational system and 50% is earmarked for highway and stream cleaning.[12] The remainder is retained by the Tennessee Department of Revenue.

By comparison, 93% of coal severance tax revenues in West Virginia are retained by the state, with local governments receiving only a formulated portion of the remaining 7%,[13] and in Kentucky the state currently retains 50% of the revenues and distributes the other 50% to the counties (Kentucky Office of Energy Policy and Kentucky Coal Association, 2008). Furthermore, Tennessee counties are allocated the revenues collected specifically from the coal extracted within county boundaries, and counties where coal is not extracted do not receive any portion of the revenues. This contrasts with West Virginia, where all counties receive some portion of the county share of severance taxes, regardless of whether the county produced coal or not.

The rate of the Tennessee coal severance tax during FY2009 was 20 cents per ton. For FY2009, total coal severance tax revenues amounted to $460,758 (Tennessee Department of Revenue, 2010). While the distribution of the severance tax to the coal-producing counties may reduce the amount of revenues the state might have contributed to those counties for services and support, this amount would be no more than the severance tax distribution. Because the true amount cannot be calculated, we calculate the coal severance tax's impact on the state budget as being equal to the administrative fee. The amount of the fee is not reported in the state budget report, so we estimate the state share through direct calculation.

For FY2009, the estimated state share of the coal severance tax was approximately $5,000.

For the purpose of placing the Tennessee coal severance tax in context, it is useful to compare the revenues generated from coal severance in Tennessee based on the state's tax rate to what the revenues would be if the severance tax rate were based on a percentage of the gross value of the coal sold, such as in West Virginia and Kentucky, rather than on a per-ton basis. In 2009, the Tennessee legislature passed legislation that will increase the per-ton rate to $1 per ton by 2013, so this rate will be included in the comparison. The West Virginia severance tax rate is 5% of the gross value of the coal sold, while the Kentucky rate is 4.5%.

As shown in Table 4, the estimated gross value of all coal severed and sold from Tennessee coal mines in 2008 was approximately $114 million.

Table 4: Gross production value of coal produced in Tennessee, by mine type, 2008

	Coal production (tons)	Average price	Value (million $)
Underground	788,748	$58.30	$46
Surface	1,544,028	$44.83	$69
Total	**2,332,776**	**$48.94**	**$114**

Source: Production: MSHA (2010). Price: EIA (2009e). Note: Total value does not equal sum due to rounding.

[12] TN State Code, 67-7-110.
[13] WV State Code, WV 11-13A-3.

We use the figures in Table 4 to compare potential severance tax revenues that Tennessee would collect under different tax structures. It should be noted that the 4.5% tax rate in Kentucky is equal to the amount of the rate as was proposed for Tennessee in 2009 under House Bill 1274, and therefore represents the amount of severance tax that would have been generated in 2008 with a rate of 4.5% on the gross value of coal produced and sold.

Table 5: Potential coal severance tax revenues for Tennessee at various rates

	Tennessee rate ($0.20 per ton)	Tennessee rate ($1.00 per ton)	Kentucky rate (4.5% of value)	West Virginia rate (5%of value)
Tax revenues	$460,758	$2,332,776	$5,180,000	$5,760,000
Average tax, per ton	$0.20	$1.00	$2.22	$2.47

Note: Potential tax revenues are calculated based on 2008 coal production in Tennessee.

As shown in Table 5, if Tennessee were to implement a coal severance tax rate equal to that in either West Virginia or Kentucky, the tax would generate more than ten times the revenue than at current rates. Declines in sales taxes and available highways funds, in combination with a particular dependence on sales tax revenues on the state and local level, damaged local economies during the economic recession (Tennessee General Assembly, 2010). Therefore, an increase in severance tax collections would benefit local governments by increasing the amount of revenues available for education and highway infrastructure funding, as well as for environmental clean-up of damage and contamination to lands and streams from coal mining activities.

Even at its current rate, the coal severance tax does provide a benefit to local governments, as it supports the various expenditures outlined above. While small, the state budget benefits through the retainer of administrative fees; however, this impact is negligible.

2.4 Summary

While the coal industry does generate tax revenues that benefit the state budget, the impact is relatively negligible. As estimated in this section, direct tax revenues attributable to the coal industry, essentially generated from only two taxes, amounted to only $1.1 million for FY2009. This accounted for less than one-tenth of 1% of state tax revenues. Further, this estimate does not present the net impact on the State Taxpayer Budget, as it fails to account for on-budget state expenditures supporting and regulating the coal industry.

3. DIRECT COAL INDUSTRY: ON-BUDGET EXPENDITURES

Although Tennessee's coal industry is small in comparison to that of nearby states such as Kentucky, West Virginia, and Virginia, the Tennessee state budget includes a variety of expenditures that exist only because of the state's coal industry. In this section, we focus on certain expenditures that are paid for through the State Taxpayers Budget; these include general expenditures on revenue administration; environmental protection and oversight; workforce development; and the maintenance, repair, replacement, and construction of Tennessee roadways. The reason for focusing only on the State Taxpayers Budget is that it excludes appropriations from dedicated taxes and fees, as well as other departmental revenues and federal revenues.

Teasing out the precise amount of state coal-related expenditures from the State Taxpayers Budget would be possible only with a detailed breakdown of the programs funded by each unit of government and the revenue sources for each program. Such a breakdown is not available. Therefore, our only option is to estimate coal-related expenditures using available information. While this method is imprecise for several agencies, it is a valuable first step toward including not just revenues, but also expenditures when discussing the impact of the coal industry in Tennessee. Our estimates can—and should—be refined in future analyses.

Several units of government might spend only part of their funds on the coal industry, but agency expenditure data are not organized in such a way as to make it easy to separate out this portion, nor do departmental accounts provide industry-specific expenditures. Given the importance of road infrastructure to economic development, one key example is the Department of Transportation's expenditures to maintain the roads over which coal is hauled, which are not detailed separately in government documents. Of course, there are various industries in the state that rely on being able to operate heavy trucks in order to remain competitive. However, many of the roads on which such trucks operate—particularly roads in rural areas where most extractive industries exist—are not designed to carry the loads they currently experience. This holds true for the transport of coal, and as presented in Section 3.1, annual repair to roads damaged by coal trucks, however small in relation to total transportation and infrastructure expenses, are real expenses for the state. More importantly, the damages impose real costs in the form of degraded infrastructure and negative impacts on economic development for the counties within which the coal is hauled.

Our estimates in this section are based on actual FY2009 expenditure data whenever possible, but these data are supplemented with data and information provided in agency annual reports, on agency web sites, from external sources, and from personal communications. With available data and information, where necessary, we estimate a percentage of each division's expenditures that are attributable to coal.

As shown in Table 6, we calculate that estimated on-budget coal-related expenditures amounted to approximately $1.1 million for FY2009.

The most significant on-budget expenditures include the repair of coal haul roads, and mining-related expenditures for the Division of Geology, Division of Water Pollution Control, Abandoned Mine Lands Reclamation program, and the Division of Mines. Combined, these expenditures account for an estimated $1.0 million, or about 92% of total on-budget expenditures related to coal.

Table 6: On-budget expenditures supporting coal in Tennessee, FY2009

Agency	Total estimated expenditures	Percent coal	Coal-related expenditure
Repair of coal haul roads	$804,500,000	< 1%	$320,000
Department of Revenue	$75,311,400	< 1%	$10,000
Department of Environment and Conservation			
Division of Geology	$1,078,000	11%	$120,000
Division of Water Pollution Control	$10,892,000	1%	$110,000
Abandoned Mine Lands Reclamation program	$735,938	45%	$330,524
Department of Labor and Workforce Development			
Division of Mines	$391,300	40%	$160,000
Division of Workers' Compensation	$14,057,100	< 1%	$70,000
Total			**$1,130,000**

Note: The percent of total expenditures from the Abandoned Mine Lands Reclamation program and Division of Water Pollution Control are calculated directly based on total expenditures and the information provided directly by agency representatives. Therefore, they differ from the other reported percentages in that they are actual percentages rather than a percentage estimated for this report. Total coal-related expenditure may not equal sum of individual expenditures due to rounding.

3.1 Transportation expenditures: Coal haul road repair

The Tennessee State Budget reports that FY2009 appropriations to the State Taxpayers Budget highway fund in FY2009 amounted to an estimated $804.5 million (TDFA, 2010). This is significantly greater than the amount of revenues collected for and distributed to the fund, which amount to an estimated $671.1 million. Highway funds are used for the planning, construction, and maintenance of the state network of roads, as well as for the support of other modes of transportation such as aeronautics, public transit, railroads, and waterways (TDFA, 2010).

The Tennessee state road system spans 92,175 miles. Of these, 69,720 miles, or approximately 75%, are rural roads (TDT, 2008). Tennessee's broad array of industries relies on these roads for the transport of goods and materials that are extracted, manufactured, and sold within and outside of the state. Without a well-maintained road system, Tennessee's state and local economies would suffer.

However, these economies rely heavily on transportation, and the transport of materials and goods often occurs by heavy trucks. The transport of coal is one such example. A total of 98% of the state's coal is produced, and therefore transported from and within three counties: Anderson, Campbell, and Claiborne (MSHA, 2010). Given that the processing or consumption of the coal is not likely to be confined to the counties where the coal is produced, it is likely that nearby counties, such as Scott County, also experience traffic from coal haul trucks. Based on an average of coal distribution for 2008 and 2009, we estimate that approximately 175,000 tons of coal were transported by truck in Tennessee in FY2009 (EIA, 2009b; EIA, 2010c).

Coal trucks operating on a standard weight permitting system often operate at a gross vehicle weight (GVW) of 80,000 pounds. In West Virginia and Kentucky, coal truck operators who buy special permits can transport coal on designated roads at GVWs of up to 120,000 pounds. Tennessee also provides a permitting system for the transportation of loads for weights up to and exceeding 120,000 pounds. However, no coal truck operators applied for such a permit in 2008 or 2009 (Phillips, 2010). Therefore, we can assume, at least for FY2009, that any coal trucks hauling coal were doing so at a GVW of 80,000 pounds or less.

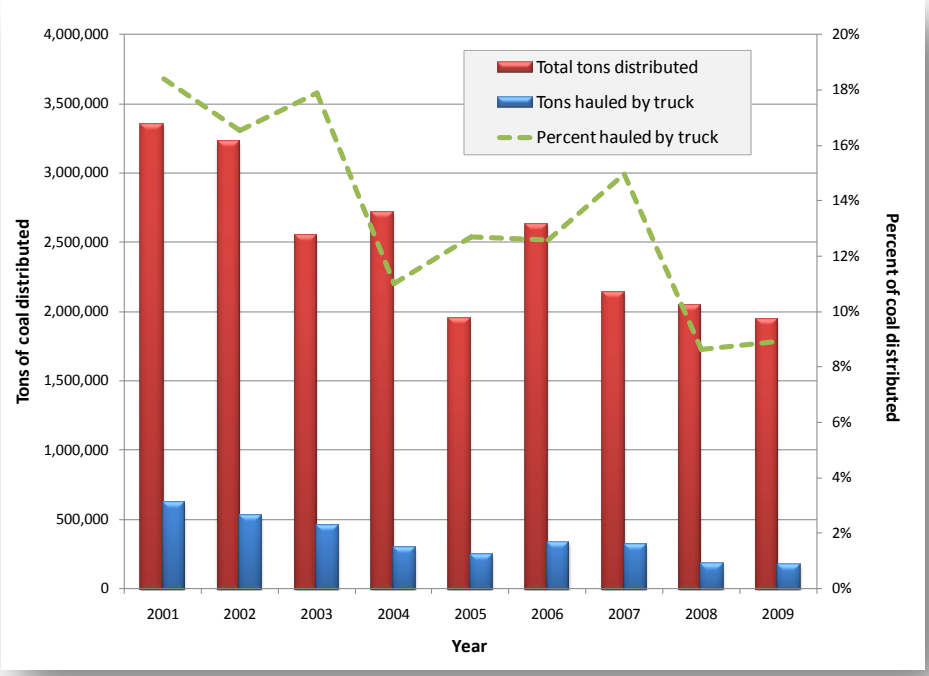
Even trucks with GVW's of 80,000 pounds impose extra strain on the roadways. This results in extra maintenance and more frequent and costly repair to the roads and bridges than if such trucks were absent. Additionally, coal is often hauled on rural roads, which are not engineered to bear heavier loads and are thus less capable of enduring frequent heavy loads than interstates. What results is the accelerated degradation of the integrity of the roads and bridges over which the trucks travel. As noted by the West Virginia Division of Highways in 2002, "It is known that costly rehabilitation and replacement (of roads and bridges) will be required much earlier than anticipated where heavier loads are imposed on a regular basis" (WVDOH, 2002, p. 2).

The strain on roadways—and, therefore, the cost and required frequency of repair—increased exponentially with weight. The strain can be measured by looking at equivalent single-axle loadings, or ESALs. At a GVW of 80,000 pounds, a truck produces 1.24 ESALs. However, at a GVW of 120,000 pounds, it produces 6.87 ESALs (WVDOH, 2002). In other words, the strain on roads resulting from a truck carrying 120,000 pounds is 454% greater than that from a truck carrying 80,000 pounds.

The extra damage—and therefore the extra funding required for repairs and maintenance—resulting from the operation of coal haul trucks can be significant. MACED estimated that the cost to the Kentucky Commonwealth in FY2006 for repairing the extended weight coal haul road system due to extra damage from heavy coal trucks operating at up to 120,000 pounds amounted to nearly $240 million (Konty and Bailey, 2009). The West Virginia Division of Highways estimated that repairing all coal haul roads within the state, merely to meet minimal federal standards, would require $2.8 billion in state funds (WVDOH, 2002). In 2009, the same agency estimated that $300 million would be required to make the necessary repairs and replacement to haul road bridges to ensure their stability and safety (West Virginia Department of Transportation, 2009).

Damage to roads and bridges from the operation of coal haul trucks is an issue of significance for Tennessee as well, though less so every year. As Figure 7 shows, the tons of coal distributed by coal truck, both absolutely and as a proportion of total coal distribution, has been generally declining since 2001, dropping from 616,000 tons and 18% of total distribution, to approximately 175,000 tons and 9% of distribution (EIA, 2009b; 2010c; 2010d).

Figure 7: Total coal distributed, and coal distributed by truck in Tennessee, 2001-2009



Source: EIA (2009b; 2010c; 2010d).

Nevertheless, coal trucks likely cause additional damage to even a small portion of Tennessee's roadways, thereby adding to the cost of maintaining and repairing the roads and bridges over which the coal is hauled. In this section, we estimate the additional expenditures from the Tennessee highway fund for FY2009 that were attributable to the transport of coal by truck in the state's major coal-producing counties. To do so, we use state highway data and some assumptions to estimate the proportion of state daily vehicle miles traveled (DVMT) traveled by coal truck. We then apply that to total FY2009 highway fund expenditures.

Within the three coal-producing counties noted above, total travel within these three counties—as measured by DVMT—accounts for 3% of all traffic within the state. On average, the percent of DVMT within these three counties that are traveled by truck is approximately 5% (TDT, 2010).

To estimate the total state DVMT traveled by coal trucks specifically, we must make an assumption about the percent of trucks traveling within each county that are coal trucks, which we base on the amount of coal each county produces. The estimates for Campbell and Anderson counties depend on our initial assumption for Claiborne County.

Claiborne County produced 1.3 million tons, or 56% of the state's total coal production in 2008 (MSHA, 2010). This is a fairly substantial amount of coal for a county with one of the lowest DVMT in the state. For Claiborne County, given the relatively high level of coal production in the county, we assume that 50% of total truck DVMT was by coal trucks.

Campbell County produced 60% of the amount of coal that Claiborne County produced, so we multiply 50% by 60% and estimate that 30% of truck travel in Campbell County was coal trucks. Finally, Anderson County produced 14% of the coal that Claiborne County produced, and using the same method we estimate that approximately 7% of truck travel in Anderson County was coal trucks.

Using data provided by the Tennessee Department of Transportation for the percent of trucks and total DVMT for these three counties (TDT, 2010; 2009), we calculate a total truck DVMT for each county, and apply our county coal truck percentages in order to generate an estimated DVMT by coal trucks for each of the three counties. We add these and divide by the state total DVMT to estimate total DVMT by coal trucks in Tennessee (Table 7).

Table 7: Estimating the percent of state road travel attributable to coal trucks in Tennessee

County	Total DVMT	Percent trucks	Truck DVMT	Estimated percent coal trucks	Coal truck DVMT
Claiborne	789,743	5.17%	40,819	50%	20,410
Campbell	1,804,295	6.41%	115,744	30%	35,270
Anderson	2,193,663	3.52%	77,111	7%	5,470
Total					**61,150**
State total					**190,333,487**
Percent total DVMT, coal					**0.03%**

Source: DVMT from TDT (2009). Percent trucks from TDT (2010). Total state DVMT from TDT (2008). Percent coal trucks estimated by authors.

Using this method, we estimate that coal trucks in Tennessee accounted for 0.03% of total DVMT. Assuming, initially, that relative travel is proportional to impact on roads and bridges, we apply this percentage to total highway fund expenditures from the State Taxpayer's Budget for FY2009, which amounted to $804.5 million in FY2009. Doing so results in an estimated state expenditure of approximately $260,000 for FY2009.

However, we also note that an 80,000 pound truck has an ESAL of 1.24 (WVDOH, 2002), meaning that the strain on the roads from an 80,000 pound coal truck is approximately 24% higher than a truck or car imposing minimal strain. Therefore, to account for the additional impact of a truck in relation to other normal traffic on Tennessee's roadways, we multiply the $260,000 by 1.24 to produce a final estimate for additional state expenditures on roads and bridges for FY2009 attributable to the hauling of coal.

Based on this method, we estimate that the total expenditure in FY2009 for repairing damages imposed on Tennessee's roads by coal haul trucks amounted to approximately $320,000.

3.2 Department of Revenue

The Tennessee Department of Revenue is charged with administering Tennessee's taxes and fees, ensuring taxpayer compliance, and apportioning tax revenues to state and local funds. The department fulfills these responsibilities through administrative support, revenue collection, and regulatory services (TDFA, 2010).

For estimating the amount of annual operating expenditures for the Department of Revenue directly attributable to the coal industry, we do not examine specific divisions within the department. Instead, we assume that the department as a whole serves as a single functioning unit with the general overall responsibility of collecting revenues and distributing those revenues as required or appropriate.

Estimated appropriations to the Department of Revenue for FY2009 amount to $75,311,400 (TDFA, 2010). Based on the assumption that departmental expenditures attributable directly to the coal industry are proportional to the industry share of total tax revenues, we use our estimate of coal's share of state tax revenues for FY2009 and apply it to the appropriated funds for the Department of Revenue in order to generate the on-budget state taxpayer expenditure related to coal.

Based on this method, we estimate the FY2009 Department of Revenue expenditure supporting the coal industry amounted to approximately $10,000.

3.3 Department of Environment and Conservation

The Tennessee Department of Environment and Conservation (TDEC) is described as "protecting, preserving, and improving the quality of Tennessee's air, land, and water; providing an understandable and responsive regulatory system; conserving and promoting Tennessee's natural and cultural resources; and providing a variety of quality recreational experiences. The department has three bureaus: Administration, Tennessee State Parks and Conservation Services, and Environment." (TDFA, 2010, p. 523)

The Environment Bureau, which is "responsible for the preservation and enhancement of the state's environmental resources and for ensuring compliance with state and federal regulations," (TDFA, 2010, p. 531), appears to be the sole branch of TDEC with coal-related expenditures. Within the bureau are several divisions that perform coal-related regulatory and administrative functions:

- Geology,
- Air Pollution Control,
- Water Pollution Control, and
- Abandoned Lands.

3.3.1 *Geology*

The Division of Geology maps and identifies mineral resources, geology, and geological hazards across the state. The division also serves as a clearinghouse for geological information. Study results are published and distributed in the form of maps and reports. The program maps mineral deposits including coal, oil, and gas and maintains production records for oil and gas wells. The program is a primary source of information, advice, and education about Tennessee's geology, mineral resources, geological hazards, and oil and gas activity for the public, schools, professional geologists, state and federal agencies, environmental regulators, and industries. Estimated state taxpayer expenditures for FY2009 amounted to $1,078,000.

To estimate the coal-related expenditure, we apply the percent of total mining-related industrial activity attributable to coal of 11% for FY2009 as estimated in Section 2.1 (See, in particular, Table 2).

Using this method, we estimate that FY2009 Division of Geology state taxpayer expenditures supporting coal in FY2009 amounted to approximately $120,000.

3.3.2 *Air Pollution Control*

As described in the state budget report, the Division of Air Pollution Control "regulates air contaminants that are emitted into the atmosphere. State, local, and federal agencies monitor air quality at several sites across the state to determine if public health and welfare are being protected" (TDFA, 2010, p. 534). Total state taxpayer expenditures for the Division amounted to $1,498,000. The Division's website describes its role in the following way:

> "The Division establishes emission standards and procedure requirements to monitor industries in the State through the issuance of construction and operating permits. Established to carry out control and abatement of air pollution, the Tennessee Air Pollution Control Board adopts regulations, holds hearings, and initiates court actions to enforce regulations. Division staff function as the administrative agency of the Board. Other duties include conducting source visits and compliance inspections, developing enforcement cases on violations of the regulations, maintaining surveillance of the state's ambient air sampling stations, performing and observing stack tests, certifying persons as Visible Emissions Readers, and collecting and disseminating information relative to the control of air pollution" (TDEC, 2010a).

Neither the state budget report, nor language, data, or information available on the division website, provides an indication of the percent of the division's workload that is related to coal mining. To estimate coal's share of the state taxpayer on-budget expenditures for the Division of Air Pollution Control, as related to air quality issues arising from the mining, transportation, and processing of coal in Tennessee, would require more detailed emissions data than is currently available.

Given this limitation, and considering that coal mining is an insignificant part of the state's economic activity, we do not provide an estimate for FY2009 expenditures for air pollution control.

However, it should be noted that coal mining, especially surface mining, releases fine coal and rock particles into the air during the mining process. The transportation of coal produces diesel emissions, results in the generation of dust from roads, as well as the fugitive release of coal dust from the coal being transported. The processing of coal generates a substantial amount of coal dust as well. Each of these emissions sources can impact air quality.

3.3.3 *Water Pollution Control*

The Division of Water Pollution Control is responsible for protecting the state's waters through a program of water quality planning, monitoring and assessment, and regulation. The division regulates stream channel modification, wetlands alteration, gravel dredging, and mine water discharge (TDFA, 2010, p. 536). Estimated state taxpayer expenditures for the division amounted to $10,892,000 in FY2009.

While the coal industry is clearly related to many of the division's activities, there are other industries that the division regulates and supports. However, many water control activities could be attributed to coal, generally. For example, the coal mine sites, including active sites, abandoned mine lands and bond forfeiture sites, are a primary source of water pollution in coal-producing areas across Appalachia, and are also a source of pollution to streams that the Water Pollution Control division monitors. Additionally, active and abandoned coal mines are integral parts of numerous total maximum daily load reports (TDEC, 2010b).

One way to estimate coal's share of this variety of water related activities is through the proportion of NPDES permits issued to the coal industry. NPDES permits are required to discharge pollution into rivers and streams; therefore, the fraction of permits tied to the coal industry provides an approximation of the industry's impact on water quality, and therefore the agency's activities.

The division reports that, since January 1, 2009, 6 of the 614 individual National Pollutant Discharge Elimination System (NPDES) permits it has issued were associated with coal mining, comprising approximately 1% of such permits issued during that time (Murphy, 2010). To estimate the state taxpayer expenditures for the Water Pollution Control Division attributable to the coal industry, we assume that the coal-related share of the Division's NPDES permitting workload is representative of the coal-related share of the division's overall workload.

Using this methodology, we estimate that coal-related expenditures from state taxpayer dollars for water pollution control amounted to approximately $110,000 in FY2009.

3.3.4 *Abandoned Lands*

Abandoned mine lands and bond forfeiture sites are issues of great significance that would benefit from increased attention throughout the coalfields of Appalachia. Insufficient funds have left many former coal mines unreclaimed and many contaminated waterways untreated. The Tennessee Abandoned Mine Land program is housed within the Division of Water Pollution Control, and is responsible for reclaiming these sites (TDEC, 2010c). For a more substantial description of abandoned mine and reclamation issues facing Tennessee, see Section 7.

Mine reclamation is funded using fees on each ton of mined coal, forfeited bonds, and general fund appropriations. The federal government collects a fee on every ton of coal mined and provides funding for abandoned mine clean up in Tennessee. However, in FY2009, $330,524 of general fund revenues were also used (Eagle, 2010a and b).

For FY2009, the state taxpayer expenditure on the coal industry amounted to $330,524, representing the amount expended on abandoned mine land reclamation projects.

3.4 Department of Labor and Workforce Development

3.4.1 *Division of Mines*

The state budget report states that the Division of Mines "promotes the safety and welfare of miners through training and licensing of mine operators and employing mine rescue workers" (TDFA, 2010, p. 560). Estimated appropriations for FY2009 were $391,300.

The Division of Mines is responsible for maintaining two mine rescue teams in a state of readiness for response to mine emergencies in underground mines in Tennessee. Each underground mine that participates in the mine rescue program provides two members for the team. Each team consists of eight members that are compensated by the state for eight hours per month (Frederick, 2010).

The division also employs mine safety instructors certified by the federal Mine Safety and Health Administration. The instructors are available to teach mine safety classes statewide. The division further oversees mine safety training, which is required for all miners working in coal mines, crushed stone quarries, sand and gravel pits, and any other mining operations in the state. Certain contractors who enter mine properties are also required to receive comprehensive safety training before performing work on mine properties. The division's safety instructors conduct new miner, annual refresher training, first aid/CPR, and other courses as requested by the industry (Frederick, 2010).

The division also collects mine license fees from all underground coal and metal mines and surface coal mines. Mine foreman examinations are conducted quarterly by the division, and each applicant passing the exam is certified as a Tennessee mine foreman (TDLWD, 2010a).

The Division of Mines estimates that there are five active underground coal mines and 12 active surface mines in Tennessee as of the writing of this report (Frederick, 2010). The division further estimates that approximately 40% of the division's expenditures and workload is devoted to the regulation of coal mines (Frederick, 2010). We apply this percentage to the estimated FY2009 appropriations.

Using this method, we estimate that state taxpayer expenditures supporting coal from the Division of Mines amounted to approximately $160,000 in FY2009.

3.4.2 *Division of Workers' Compensation*

The state budget notes that the Division of Workers' Compensation within the Tennessee Department of Labor and Workforce Development "administers the workers' compensation benefit review program…; administers the drug free workplace program…; approves proposed settlements in disputed claims; administers programs for medical case management and utilization review of claims which require medical services; administers the Second Injury Fund; administers safety programs established by the workers' compensation law; maintains the official record for workers' compensation coverage and claims; informs workers of their rights under the law; and ensures benefits paid to injured employees are within statutory requirements" (TDFA, 2010, p. 562). The total estimated appropriations for the Division of Workers' Compensation from state taxpayer dollars amounted to $14.1 million.

To estimate the FY2009 expenditures related to coal, we assume that the division's workload is proportional to estimated claims related to coal mining. Actual claim data are not available; therefore, we base our estimate on available data.

The budget report notes that 67% of a total of 3,457 workers' compensation claims were settled in FY2009. In 2008, there were a total of 25 injuries at coal mines in Tennessee (MSHA, 2009). Applying the 67% to the 25 injuries, we estimate that there were approximately 16 claims made and settled related to coal mining injuries in FY2009. This amounted to approximately 5% of the 3,457 total claims settled. Assuming that the greater majority of the division's workload is related to administering various aspects of workers' compensation, we apply this percentage to the total estimated expenditures to produce an estimate of coal-related expenditures.

Based on this methodology, we estimate that state taxpayer expenditures supporting coal for the administration of workers' compensation amounted to approximately $70,000.

3.5 Summary

While a relatively insignificant annual cost for the state, the regulation of the coal industry, and the expenditures related to reclaiming former coal mine sites, treating water contaminated by coal mining, and repairing damages to roads and bridges resulting from the operation of coal haul trucks, did cost the state more than $1 million in FY2009. More importantly, many of these costs will continue into the future even if coal production continues to decline, particularly the costs related to mine reclamation and the treatment of contaminated streams. These are real expenditures, and they detract from funding that could be available for other, more beneficial uses such as economic development and education.

Table 8: Estimated net direct impact of the coal industry on the state budget

Item	Amount
Direct industry revenues	$1,080,000
On-budget expenditures	($1,130,000)
Estimated net impact	**($50,000)**

Further, as shown in Table 8, the estimated on-budget expenditures for FY2009 nearly equal the direct revenues generated by the industry, with the net impact to the state budget amounting to an approximate net cost of $50,000. The on-budget expenditures are not the only expenditures from the state budget that go toward supporting the coal industry, however. The state also loses potential revenue through the provision of certain tax credits and exemptions that are available to the coal industry.

4. DIRECT COAL INDUSTRY: OFF-BUDGET EXPENDITURES

In this report, we estimate off-budget expenditures from the Tennessee state budget in the form of tax expenditures. Tax expenditures are foregone revenues resulting from the provision of tax exemptions, credits, and reduced or preferential tax rates. Tax expenditures have the same fiscal impact as direct on-budget government expenditures. They both result in a loss of tax revenue to state government, thereby reducing the funds available for other government programs and services. Whether the state appropriates $1 million to fund a program or authorizes $1 million in tax credits, the state must either spend $1 million less or collect $1 million more in taxes. This "spending through the tax system" is also similar to direct spending in that they are tools lawmakers devise to achieve certain policy objectives.

As noted in the Tennessee State Budget, Tennessee State Code requires the Department of Finance and Administration to compile a report "identify(ing) all exemptions, to the extent that is practical, and estimate the amount of revenue which would have been collected by the state in the fiscal year…" (TDFA, 2008, p. 80). For FY2009, the report provides estimates for two categories of tax expenditures.

The first category estimates the foregone revenue from the exemption of various services and activities. These include various construction services, education services, health care and social services, information services, engineering services, and transportation services, to name a few. The total estimated expenditure for FY2009 for tax-exempt services and activities was $3.7 billion.

The second category of expenditures reported in the budget includes exemptions and credits against the sales and use tax, corporate franchise and excise taxes, motor vehicle registration fees, gross receipts taxes, and miscellaneous taxes. The estimated total expenditure for this category in FY2009 was $3.3 billion. Therefore, the total tax expenditures—or, off-budget expenditures—were estimated at $7 billion for FY2009 (TDFA, 2008).

Unfortunately, the report does not specify the amount of the expenditure by industry. For example, in relation to sales tax exemptions, the report states that "tax returns filed with the Department of Revenue do not show detailed statistics on exempt sales by type of exempt entity" (TDFA, 2008, p. 80). However, there are certain tax exemptions that we know to be applicable to coal mining, and in this section we estimate the expenditures for each of these.

As the tax expenditure report in the state budget cautions, it is difficult to estimate the true cost of tax exemptions. On the one hand, each exemption in the report is considered separately, without regard to how it overlaps with other provisions of the tax code. This becomes problematic, for instance, when considering the industrial machinery and equipment tax credit, because the credit can be taken against both the sales and use tax and the franchise and excise taxes. So, as noted in the report, summing tax exemptions may result in double-counting in cases where exemptions overlap.

Additionally, there are many reasons why tax exemptions, credits, and preferential tax rates are provided. These may include supporting small business, attracting new industry, incentivizing job creation generally, or supporting the public through suppressing costs for vital public services. In other words, the reported expenditure estimates do not take into account the positive economic and revenue benefits of providing tax exemptions and credits. Or, as the report puts it, "the estimates of revenue loss provided in the tables do not generally take into account the impact of a change in a particular tax provision on taxpayer behavior which impacts other taxes (the estimates do not reflect secondary or feedback effects)…" (TDFA, 2008, p. 80).

With that in mind, however, in order to estimate the true impact of an industry on the state budget, tax expenditures must be considered, and they are considered here in the sense that they represent foregone revenues for the state. The expenditures for which we provide estimates are those we identified as applying to the coal industry and are able to estimate.

We estimate that total tax expenditures provided by the State of Tennessee to the coal industry amounted to approximately $440,000 in FY2009.

Table 9: Off-budget expenditures supporting the coal industry, FY2009

Expenditure	Amount
Purchase of coal (sales)	$350,000
Industrial machinery/materials (sales)	$60,000
Industrial machinery (excise)	$10,000
Transportation services	$20,000
Total	**$440,000**

Note: Total may not equal sum of individual expenditures due to rounding.

4.1 Sales tax on coal

Tennessee provides a sales tax exemption on the sale of coal and other energy fuels to individuals for residential use,[14] and both a full exemption[15] and a reduced sales tax rate for coal and other energy fuels sold to manufacturers,[16] depending on specific conditions. We are unable to identify a specific exemption for the sale of coal for electricity generation. However, 99% of the coal consumed for electricity generation in Tennessee in 2008 was used by the Tennessee Valley Authority (EIA, 2009f). The Tennessee Valley Authority is a federally-owned entity and, as such, is not subject to state sales taxes. For this reason, we will not provide an estimate for the sales tax expenditure related to the sale of coal for electricity generation.

With respect to the manufacturing exemption, the estimated expenditure for "energy and water sales" subject to the full tax exemption amounted to $195.3 million in FY2009, while the expenditure resulting from sales subject to the reduced 1.5% tax rate amounted to $70.6 million, for a total expenditure of approximately $265.9 million (TDFA, 2008). Since we are unable to separate out the energy portion of these expenditures, we estimate the expenditure related to coal under the conservative assumption that all coal sold for manufacturing purposes received only the reduced tax rate and not the full exemption.

An annual average of 132,610 tons of coal mined in Tennessee was distributed to Tennessee manufacturers for 2008 and 2009,[17] at an average price of $48.94 per ton, for an estimated gross production value of approximately $6.5 million. At a tax rate of 7%, the sale of coal for manufacturing would have generated about $450,000 in sales tax revenues. At the reduced rate of 1.5%, however, we estimate that actual revenues amounted to approximately $100,000.

Therefore, we estimate that the total sales tax expenditure attributable to the coal sold for manufacturing purposes during FY2009 amounted to approximately $350,000. This accounted for 0.13% of the total expenditure for energy fuels and water sold for manufacturing purposes.

[14] TN Code 67-6-334.
[15] TN Code 67-6-206(b)(3).
[16] TN Code 67-6-206(b)(1-2).
[17] We use this as an estimate and representation of coal sold within Tennessee for manufacturing purposes during FY2009. This provides a minimum estimate given that it only represents the coal sold in the state that actually originated in the state, and does not account for tax expenditures related to coal imported for manufacturing purposes.

4.2 Industrial machinery and industrial materials

While applicable to all industries, as it relates to coal, the Tennessee State Code defines "industrial machinery" as:

> "machinery, apparatus and equipment with all associated parts…that is necessary to, and primarily for, the fabrication or processing of tangible personal property for resale and consumption off the premises, or pollution control facilities primarily used for air pollution control or water pollution control,…also mining machinery, apparatus equipment and materials, with all associated parts and accessories, including repair parts and any necessary repair or installation labor, that is necessary to and primarily for:
>
> - The removal, extraction or detachment of coal from land by surface, underground or other lawful methods of mining and the construction or maintenance of necessary ingress and egress from the mine;
> - The removal, handling and replacement of overburden and spoils materials; or,
> - The reclamation of mined areas reclaimed under state or federal laws, rules or regulations."[18]

Tennessee State Code allows for an industrial machinery tax credit against both the sales and excise taxes.

4.2.1 *Sales tax exemption*

For the credit against the sales tax, the Code states that no tax is due with respect to industrial machinery,[19] and the state budget estimates a total industrial machinery sales tax expenditure of $187.7 million for FY2009 (TDFA, 2008). In order to estimate the sales tax exemption for coal, we apply the percent of total state GDP attributable directly to the coal industry (0.03%), to the total value of the industrial machinery and materials ($187.7 million).

Based on this method, we estimate the industrial machinery sales tax exemption supporting coal to be approximately $60,000 in FY2009.

4.2.2 *Credit against the excise tax*

For the credit against the excise tax, the state code allows for a credit equal to 1% of the purchase price of the machinery purchased during the year, to be taken against the sum total of a company's taxes imposed by the franchise and excise taxes.[20] The total industrial machinery credit against the franchise and excise taxes amounted to $32 million in FY2009 (TDFA, 2008). As for the exemption from the sales tax, in order to estimate the industrial machinery excise tax credit supporting the coal industry, we apply the percent of total state GDP attributable directly to the coal industry (0.03%), to the total value of the credit ($32.0 million).

Based on this methodology, we estimate the value of the excise tax credit provided to the coal industry for the purchase of industrial machinery to be approximately $10,000.

[18] TN Code 67-6-102(47)(a).
[19] TN Code 67-6-206(a).
[20] TN Code 67-4-2009.

4.3 Transportation services (local trucking only)

Approximately 175,000 tons of coal produced in Tennessee were transported by truck in 2008 (EIA, 2009b). Therefore, we estimate the tax expenditure provided to the coal industry for local contract trucking. We chose not to examine various other service-related exemptions that may apply to the coal industry.[21]

The state provides a full exemption of the 7% sales tax on the cost of local contract truck transportation. For FY2009, the total foregone revenue resulting from the Transportation Services expenditure amounted to $59.5 million.

Assuming that all industries classified as "Mining" in Tennessee—as discussed in Section 2.1—transport the same proportion of their total product by truck; and, further, assuming that all industries operating in Tennessee use contract trucking,[22] we estimate the transportation services tax expenditure for the coal industry based on its percent of total state GDP. This was calculated as 0.03% for our estimates on direct industry revenues, and we apply this percentage to the total expenditure to estimate coal's share.

Based on this methodology, we estimate that the transportation services tax expenditure for coal amounted to approximately $20,000.

4.4 Conclusions

While the coal industry provides benefits for Tennessee and the state budget through the provision of jobs and tax revenues, the state in turn supports the industry through the provision of tax credits and exemptions, resulting in foregone revenues. We estimate that the total state tax expenditure to support the coal industry amounted to approximately $440,000 for FY2009. This amount alone offsets over 40% of the direct coal industry revenues estimated in Section 2. As the purpose of tax credits and exemptions are to support industries that provide positive economic benefits for the state, a net negative balance suggests that the intention of these tax expenditures as they relate to the coal industry is not being fulfilled.

We recognize that the tax expenditures considered in this section are supportive of various industries, not just the coal industry. Therefore, the coal industry cannot be singly excluded from applying for them. We also recognize that coal's benefits include the direct employment generated by the industry and the generation of tax revenues for the state stemming from such employment. These will be estimated in the next section.

However, subsidies provided to an industry that has a relatively negligible impact on the state budget, or that generates revenues less than the costs the industry imposes on society in terms of health, infrastructure, and the environment, requires considerable attention. One option for addressing this disparity would be to recoup the lost revenues through other means such as imposing additional taxes on coal dedicated for the purpose of environmental remediation or economic development.

It is also important to note that tax expenditures on coal result in the suppression of coal prices, thereby artificially maintaining coal's competitive advantage over cleaner sources of fuel and energy, which themselves would provide jobs and tax revenues while reducing the external costs resulting from energy development in Tennessee. For reasons such as these, tax policy is critical when making decisions that determine the statewide benefits of supporting the coal industry in Tennessee, and changes to such policy will be necessary in order to support the growth of cleaner energy and the development of economic alternatives.

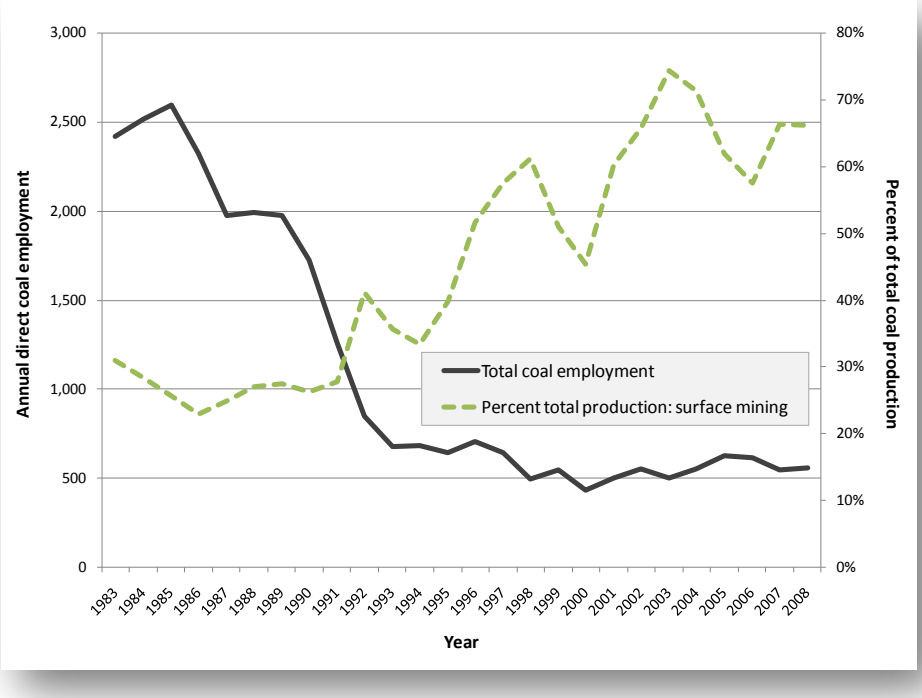
[21] These include construction services (heavy construction, special trade contractors, general contracting) and engineering services. We exclude these because of the difficulty in generating a defensible methodology for estimating the coal-related expenditure given the broad nature of the service areas.
[22] Various industries are less likely to use contract trucking services, or to employ such services for a substantial portion of their business activity, especially when compared to mining industries. Therefore, we consider our estimate to be conservative.

5. DIRECT COAL EMPLOYMENT: REVENUES AND EXPENDITURES

While the coal industry generates business-related tax revenues for the state associated with the mining, processing, and transportation of coal, the state budget also benefits through the collection of taxes paid by those directly and indirectly employed as a result of the Tennessee coal industry. Therefore, a complete accounting of the impact of the coal industry on the Tennessee state budget requires a calculation of the revenues and expenditures associated with coal-related employment. Of note, however, is that, while the taxes paid by each of the coal mining employees benefit the state budget—and, therefore, the rest of society—coal industry and employment-related revenues provide substantially less benefit to the state than they did 20-25 years ago. This is because there was a significant loss in coal mining employment between 1985 and 1998, which coincided with a substantial decline in coal production (Figure 8).

Coal mining employment is related to the total tons produced, and also to the mining method. Figure 8 illustrates how a generally increasing share of Tennessee's coal production comes from less labor-intensive surface mines, and each new ton of coal mined from surface mining instead of underground mining requires fewer miners than it otherwise would have. As a result of both the relative shift to surface mining and the passage of the 1990 Clean Air Act amendments—which reduced the demand for Tennessee's higher-sulfur coal—direct coal mining employment has fallen by 79% since the last peak in total production and employment in 1985, with the total job loss exceeding 2,000 coal miners. This coincided with a decline in annual production of 5.3 million tons, and—depending on various factors—is likely to have resulted in a decline in state tax revenue attributable to the coal industry, given the scale of the decline.

Figure 8: Direct coal mining employment and percent of total production from surface mining in Tennessee, 1983-2008



Source: MSHA (2010).

However, employment in the industry has remained more or less steady since 1998, hovering around 500-600 annual direct jobs in the coal industry. As of 2008, there were 558 direct coal jobs in Tennessee, 470 of which were actual jobs mining the coal, with the remainder being managerial and executive positions. More recent data suggest that employment increased to 643 employees in 2009.[23]

In order to generate more accurate estimates of total taxes paid by direct coal employees during FY2009, we average Tennessee coal employment data for 2008 and 2009 (MSHA, 2010). This results in a FY2009 direct coal industry employment estimate of 600 workers. Average total employment in Tennessee for FY2009 was 2,783,492 (TDLWD, 2009 and 2010b). Therefore, direct employment in the coal industry accounted for 0.02% of total employment in Tennessee in FY2009.

Table 10: Calculation of FY2009 coal employment and percent of total employment in Tennessee

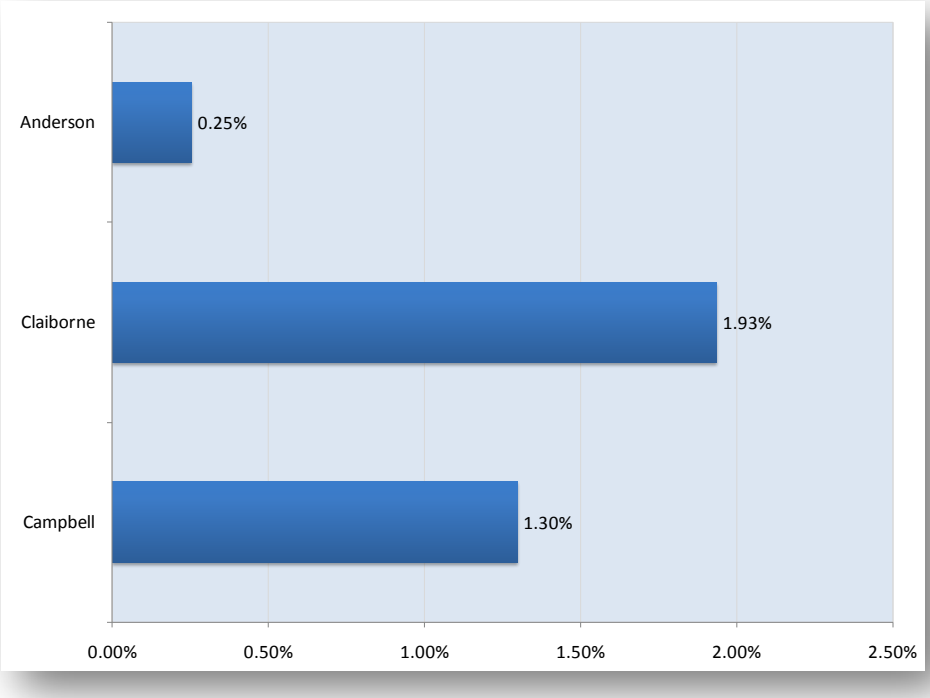
Direct coal employment (2008)	Direct coal employment (2009)	Direct coal employment (FY2009)	Statewide employment (FY2009)	Direct coal employment as percent of total employment (FY2009)
558	642.5	600	2,783,492	0.02%

Source: Coal employment: MSHA (2010). Statewide employment: TDLWD (2009 and 2010b).

Jobs in the coal industry account for a greater portion of total employment in coal-producing counties, however, than for the state as a whole. In the top three producing counties combined—Anderson, Campbell, and Claiborne—coal jobs accounted for approximately 1% of total employment. Of the three, Claiborne County had the highest rate of direct coal employment at approximately 2% of total county employment. These three counties accounted for 94% of total direct coal employment and 98% of total coal production in Tennessee in 2008. Figure 9 provides detailed percentages for these three counties.

[23] Data for 2009 production and employment are not included in our figures because we are unable to verify that 2009 data reflect final data for the year. However, MSHA (2010) reports that, even with an increase in direct coal employment, production levels in 2009 dropped approximately 340,000 tons below 2008 levels.

Figure 9: Direct coal employment as a share of total county employment for the top coal-producing counties in Tennessee, 2008



Source: TDLWD (2009 and 2010b).

In terms of wages, the Bureau of Labor Statistics (BLS) (2010a) reports that the average wage for an employee of the Tennessee coal industry in 2008 was $41,739. Using this average wage, we estimate that the 600 employees earned approximately $25,043,000 in FY2009.

Table 11: Calculation of total wages for direct coal employment, and percent state wages from coal

Direct coal employment (FY2009)	Average coal wage (2008)	Total coal wages (million $)	Total state wages (million $)	Coal as percent of total wages
600	$41,739	$25.0	$108,868	0.02%

Source: Coal employment: MSHA (2010). Coal and state wages: BLS (2010a and b).

Using data for total wages from the BLS (2010a) as shown in Table 11, and for total employment from the TDLWD (2009), we calculate that the average wage for all Tennessee workers was $39,110 in 2008. Therefore, the reported average wage for those directly employed by the coal industry would suggest that the average coal miner earns more than the statewide average. However, it should be noted that the average direct coal wage is skewed by a small number of wage earners earning well above the average wage of an actual coal miner. These employees, represented by managers and high-level executives, are included in the accounting of direct coal industry employment; yet, it is inappropriate to include the wages of higher-level employees in calculating and presenting an average wage for actual coal miners.

We note this because it is important from a budget and economic policy perspective to understand that common representations of average wages of coal miners fail to account for the wage disparities among different categories of employment. Additionally, the employment and wage data are also partially skewed by the fact that many coal miners are not full-time paid employees; this means that data for coal industry employment fails to capture underemployment in the industry, as represented by part-time workers.

In any case, for the purpose of estimating tax revenues and state expenditures related to coal industry employment, we consider the taxes paid by all direct employees, including both the miners and the executives. The employment and wage information calculated here serves as the basis for estimating state tax revenues and expenditures associated with coal employment.

5.1 Revenues

Employees of the coal industry contribute tax revenues to the State Taxpayers Budget, through which they are distributed to the general fund, education fund, the debt service fund, and the highway fund. Some state tax revenues are also distributed to cities and counties. General fund revenues are generated from the payment of sales and use taxes, individual income taxes (on interest and dividends), as well as other miscellaneous taxes.

Transportation-related taxes collected by the state are deposited into the highway fund, and include the gas and motor fuel taxes, the special petroleum products and export tax, motor vehicle registration taxes and title fees, and other lesser transportation-related taxes and fees.

This section estimates the tax revenues generated by those directly employed by the coal industry. Direct employment in the coal industry includes those working directly for the coal company in the mining, processing, and transportation of coal, as well as the office workers, managers, and executive company officers. Each of these jobs generates income for employees who then pay taxes that benefit the state budget. Precise data showing tax revenues paid by employees of the coal industry are not available, so for each tax, we use available data to generate our own estimates.

In total, we estimate that Tennessee received approximately $1.7 million in direct employment-related revenues from coal industry employees in FY2009 (Table 12).

Table 12: Direct employment-related revenues

Revenue	Amount	Percent of revenues
Sales and use tax	$1,350,000	81%
Transportation taxes/fees	$170,000	10%
Indirect taxes/fees	$150,000	9%
Individual income tax	$0	0%
Total	**$1,670,000**	**100%**

By comparison, total state revenues not including the "Other State Revenue" category[24] amounted to an estimated $10.24 billion in FY2009 (Tennessee Department of Revenue, 2010), which represents the amount generated through taxes and fees imposed on the public and collected by the Department of Revenue. Therefore, direct employment-related tax revenues attributable to the coal industry amounted to 0.02% of total state revenues collected by the Department of Revenue.

5.1.1 *Sales and use taxes*

As discussed in Section 2.1, the sales and use taxes are the greatest source of revenue for the Tennessee State Budget, amounting to $6.4 billion in FY2009 and accounting for approximately 60% of total state tax revenue (as collected by the Department of Revenue). The tax rate varies depending on the item or service being purchased. Local governments also collect sales taxes; however, these do not impact the state budget directly and are not included in our calculation of coal employment-related sales tax revenues.

[24] "Other State Revenue" includes special revenue funds collected by state agencies specifically for their own purposes. These are dedicated funds and are not included in the category of general funds..

In order to estimate the amount of sales and use tax revenues collected by employees of the coal industry, we use the combined 2007 effective rate[25] for "General Sales-Individuals" and "Other Sales and Excise-Individuals" as reported for Tennessee by the Institute on Taxation and Economic Policy (ITEP) for the "Middle 20%" income group, which has an income range of $29,000 to $47,000 (ITEP, 2009). We choose this range based on the average annual wage of an employee of the coal industry as discussed above. The total effective sales tax rate on income for individuals in this group was 5.4% for 2007. We apply this percentage to the total wages earned by direct coal employees to estimate sales and use tax revenues attributable to direct coal employment.

Based on this methodology, we estimate that total sales and use taxes paid by direct employees of the coal industry amounted to approximately $1.4 million in FY2009.

5.1.2 *Transportation-related taxes and fees*

Those employed by the coal industry pay taxes and fees related to transportation. The mining and transportation of coal generates transportation revenues as well through the registration and titling of coal trucks and the consumption of diesel and gasoline.

The main direct state-generated revenues for the highway fund include the gasoline tax, motor fuel tax, gasoline inspection tax, and motor vehicle registration tax and title fees. In total, these three sources of revenues generated $784 million in state revenues for FY2009 (TDFA, 2010).

To calculate the coal industry and employment share of general vehicle and transportation taxes and fees, we follow the methodology used in MACED's 1986 *Public Sector Impact Statement* (Sims, 1986), just as MACED did in their updated report published in 2009 (Konty and Bailey, 2009). This methodology assumes that coal's total direct share of transportation revenues, both from industry activity and from taxes and fees paid by direct coal employees, is directly proportional to its share of total state employment: 0.02% (Table 10).

Based on our methodology, we estimate that total transportation-related revenues attributable to direct coal employment and the industry amounted to approximately $170,000 in FY2009.

5.1.3 *Indirect taxes and fees*

There are various other taxes and fees that are not transportation-related, and that residents pay indirectly. These include the inheritance and estate tax, beer tax, alcoholic beverage tax, tobacco tax, mixed drink tax, coin-operated amusement tax, and privilege taxes. We will not provide detailed descriptions of these here; however, most of these taxes apply to businesses rather than individuals. We include them in our analysis because businesses are able to operate only as a result of the spending of income by residents, and they only choose to operate and pay various taxes and fees to the state based on the expectation of having a consumer base for their product sufficient enough to generate a profit. Therefore, we estimate the indirect contribution to revenues generated from these extra taxes and fees that could be attributable to expenditures by direct employees of the coal industry.

[25] As opposed to the tax rate for a given tax, the "effective rate" represents the percent of an individual's gross income that is expended on particular taxes. Therefore, an effective sales tax rate of 5.4% for Tennessee citizens means that, on average, those in the "Middle 20%" income range spend 5.4% of their gross income on sales and use taxes. The effective rate is used most commonly in relation to personal income taxes, but is useful for our calculations in this section.

Because effective tax rates are not available for the taxes considered here, we apply the percent of total employment provided directly by the coal industry and apply that to the total state revenues from the various taxes for FY2009. We choose this method based on the assumption that all income earners spend, on average, the same amount on the goods being considered.[26] Additionally, our method assumes that the total taxes paid are equally attributable to purchases made by individuals from all income groups, and therefore that all Tennessee workers, on average, spend equal amounts on luxury goods such as beer and tobacco.

The total revenues generated for the state by the tax revenues considered here amounted to $691 million in FY2009 (Tennessee Department of Revenue, 2010), while direct coal industry employment accounted for 0.02% of total employment in Tennessee (Table 10).

Multiplying these together, we estimate that total indirect tax revenues attributable to direct coal industry employment amounted to approximately $150,000 in FY2009.

5.1.4 *Individual income taxes*

As noted previously, the individual income tax is not imposed on personal income; however, a 6% tax is imposed on the interest earned from bonds and notes and dividends from stock. Because it is likely that those directly employed as a result of the coal mining industry may be receiving income from taxable interest and dividends, the individual income tax revenues received by the state from those employees are estimated and included in the accounting of direct employment-related benefits of the coal industry on the state budget. Total individual income tax collections were $221.7 million for FY2009.

ITEP reports an effective rate of 0% for income taxes paid by the middle 20% income range in Tennessee. In fact, ITEP reports a rate of 0% for all income ranges below the top 5% of wage earners. This does not mean that those residents do not generate income from interest and dividends; it only means that in their annual tax accounting, these residents do not end up owing Tennessee any taxes from individual income. Because we have no way of estimating the total wages for the top 5% of wage earners directly employed in the coal industry, we cannot estimate the individual income tax contributions from these employees. It can be noted, however, that this corresponds to only 30 direct employees.

We use the ITEP effective income tax rate of 0% reported for the bottom 95% of wage earners and apply it to total coal wages to generate our estimate.

Based on this methodology, we estimate that total individual income taxes paid by direct employees of the coal industry amounted to $0 in FY2009.

5.1.5 *Total revenues*

Summing these revenues together, direct employment in the coal industry generated an estimated $1.7 million in tax revenues for the Tennessee state budget in FY2009 (Table 12). This amounts to 0.02% of total revenues for the State Taxpayers Budget.

We recognize that our methodology for estimating tax revenue contributions does not produce precise estimates, but given data constraints, we used the best methods available. The method of estimating tax revenues based on a ratio of coal employment to total employment likely over-estimates those revenues, because it assumes that people who are not employed do not have income to spend, and therefore do not pay taxes. In doing so, this method attributes a greater amount of tax revenues to coal-related employees—both direct and indirect—than they are likely to have paid.

[26] This estimate assumes that coal employees consume particular luxury goods such as tobacco and beer at a rate equal to other income earners in the state. We only make this assumption in order to treat each coal employee as an equal consumer in relation to all other income earners and consumers in Tennessee. We make no particular assumptions about the habits and consumption patterns of employees of the coal industry.

The alternative method of estimating these revenues—based on a ratio of coal employment to total working-age population, with the assumption that transfer payments received by the unemployed also generate tax revenues—would have resulted in a smaller estimate for payments of the additional transportation taxes and fees, as well as indirect taxes and fees attributable to those directly employed in the coal industry.

Therefore, based on our choice to use the first method, it is likely that we have over-estimated, rather than under-estimated, the true contribution to the state budget from direct coal employment.

In any case, direct employment in the coal industry generates tax revenues for the state from various taxes and fees. These revenues are then spent on education, infrastructure, health care, and other services required to support industries and the residents operating and living within the state, including those employed in the coal industry.

5.2 Expenditures

Estimated total expenditures from the State Taxpayers Budget in FY2009 equaled $11.93 billion. However, for the purposes of this section, and to ensure a more precise calculation of net impact of the coal industry on the FY2009 state budget, we estimate coal employment-related expenditures based on FY2009 revenues rather than reported expenditures. In other words, we assume that total revenues for the State Taxpayers Budget equal total expenditures from the budget, and thus we exclude interfund transfers and payments from bonds. This ensures that we account only for the expenditures that were enabled in part by monies from coal industry revenues. In doing so, we ensure that our calculations do not attribute a greater amount of expenditures to coal than is deserved.

Funds from the State Taxpayers Budget were spent mostly on education (46%), health and social services (25%), public safety (10%), transportation (6%), and other public services such as environmental protection, general government and regulation, and economic development. Highway funds are dedicated for the most part to funding transportation and infrastructure needs (TDFA, 2010).

Each of these expenditure categories benefits every resident of Tennessee. Additionally, each expenditure is enabled by the existence and activity of the various industries and businesses operating within the state, and therefore by the employment of state residents, which supports industrial and commercial activity. Without such activity, the state would receive few revenues, for these activities facilitate the generation of corporate and personal income, which then generates revenue through the various taxes considered in this report (amongst others not considered).

Public funds are spent to support residents and businesses of a state through providing a range of public services and through the development and maintenance of general infrastructure. For the purpose of roughly estimating the portion of state expenditures related to those directly employed by the coal industry, we adopt the methodology used by MACED.

MACED's method for estimating state expenditures supporting those directly employed by the industry assumed that those expenditures were proportional to the direct coal employment share of total state employment, which we calculate as 0.02% for Tennessee. Following MACED's methodology, we estimate direct coal-related employment expenditures by subtracting on-budget coal industry expenditures[27] from total GRF and SRF expenditures (of state-generated revenues) and multiply the remainder by 0.02%.

This resulted in an estimated state expenditure supporting direct coal industry employment of approximately $2.2 million for FY2009.

[27] The on-budget industry expenditures include those spent supporting the coal industry through administrative government activities as well as for repairing damage to the environment and coal haul roads. The coal haul road portion was adjusted based on relative shares of state and federal funding spent on the state-maintained roads in Tennessee across which coal was hauled by truck.

Table 13: Calculation of state expenditures supporting direct coal employment, FY2009

Item	Amount
Total state revenues, FY2009	$10,239,310,613
Minus on-budget expenditures supporting coal	($1,130,000)
Net state revenues, FY2009	$10,238,180,613
Percent total employment, direct coal employees	0.02%
Estimated expenditures, direct coal employees	**$2,210,000**

5.3 Summary

Approximately 600 Tennessee residents were employed in the coal industry in FY2009. These are generally well-paying jobs earning wages slightly above the state average. Coal industry employees support families and local economies to some degree in six counties at each end of the state. These workers also support the state budget through the payment of various taxes, most notably sales and use taxes and transportation-related taxes and fees.

As shown in Figure 5, direct employment in the coal industry declined sharply following a substantial decline in production after 1990, but has remained more or less stable since 1998. Absent a proportional increase in average mining wages, any future decline in employment will result in fewer employment-related revenues attributable to the coal industry. Conversely, coal industry employees require support and services from the state that are paid for directly from the state budget, so any change in employment will effect a change in the cost to the state of supporting the coal industry and its employees.

For FY2009, we estimate that total tax revenues related to direct employment in the coal industry amounted to approximately $1.7 million. However, state expenditures to support those employees amounted to approximately $2.2 million.

Therefore, we estimate that the net impact on the state budget from direct coal-industry employment was negative, amounting to a net cost to the state of approximately $540,000 (Table 14).

Table 14: Estimated net impact of direct coal employment on the Tennessee state budget

Item	Amount
Revenues from direct coal employment	$1,670,000
Expenditures supporting direct coal employees	($2,210,000)
Net impact of direct coal employment	**($540,000)**

Coal industry activity also supports employment indirectly by requiring, for example, machinery and services to support the mining, processing, and transportation of coal. The next chapter estimates the revenues and expenditures attributable to indirect employment.

6. INDIRECT EMPLOYMENT SUPPORTED BY COAL: REVENUES AND EXPENDITURES

When discussing the total economic impact of any industry, it is necessary to include not only the direct impacts in terms of employment, tax revenues, and expenditures, but also the indirect and induced impacts of the industry. The coal industry, like other industries, relies on other companies and generates economic activity and employment. This is the "indirect" impact of the coal industry. An example would be that, in order to mine coal, companies must purchase machinery and supplies. These supply industries and their employees that manufacture and distribute the machines and supplies, therefore support the coal industry, and are included in estimates of indirect employment impact.

"Induced" impacts are those generated and supported by spending in the economy. In the case of coal, employees spend their income on goods and services, creating and/or supporting other industries and businesses. For example, coal miners earn income from mining coal, and buy food at the grocery store. In this case, employment at the grocery store is supported by coal, to the extent that coal employees (and/or family members supported by their income) account for a certain percentage of the total spent by all customers at the store.

To simplify the language used in this report, we will take MACED's lead and combine indirect and induced impacts under the category of "indirect" impact (Konty and Bailey, 2009). The indirect employment impacts of the coal industry result in the generation of employment-related tax revenues, just as outlined for direct employment in the previous chapter. However, just as for direct employment, the jobs that are indirectly supported by coal require general government support and services from the state.

To calculate the indirect impacts, we again followed MACED's lead and used the Regional Input-Output Modeling System (RIMS-II) economic impact multipliers for the coal industry in Tennessee (Konty and Bailey, 2009). Despite some potential pitfalls, multipliers such as RIMS-II are often used by the industry itself and by researchers to estimate an industry's indirect impacts. We perform the calculations in this section with a recognition that, while imperfect, these multipliers allow us to clarify key issues and to perform initial, if imprecise, calculations. A more detailed explanation of RIMS-II and the use of economic multipliers is provided in the Appendix.

6.1 Revenues

As discussed, coal industry activity in Tennessee creates and supports economic activity and employment in supply and related industries. These may include construction, manufacturing, and distribution sectors that provide goods and services used for the production, processing, and transportation of coal. Each of these indirect industries and their employees then pay taxes on their income, on their property, and on their purchase of goods, services, and gasoline. These revenues benefit the state budget by contributing to the general and highway funds within the State Taxpayers Budget.

As shown in Table 15, using the RIMS-II multipliers, we estimate that the Tennessee coal industry indirectly supported 1,348 employees in FY2009. This includes both full- and part-time employees. Total indirect wages amounted to $35.7 million, for an average wage for indirect employees of $26,480. By comparison, the average reported wage for direct employees of the coal industry was $41,739, substantially more than the average wage earned by those in support industries and local businesses.

Table 15: RIMS-II multipliers applied to employment and wages

	RIMS-II impact multiplier	Direct impact	Indirect impact	Total impact
Employment	3.2462	600	1,348	1,949
Total wages	2.4256	$25,040,000	$35,700,000	$60,750,000
Average wage		$41,739	$26,480	$31,175

Indirect employment supported by coal generates tax revenues for each of the same taxes considered for direct employment in the previous section. To calculate transportation-related taxes and fees and property taxes paid by indirect employees, we use the same methodology as we did for direct employment. We also use the same methodology for estimating indirect employment revenues from the sales and use tax and the indirect taxes and fees as we did for direct employment. We do not explicitly discuss the individual income tax because, as for direct employees, the resulting revenue would be zero.

For the sales and use tax contribution from indirect employment related to coal, we again use a combined "Individual" effective tax rate of 6.4%. This rate corresponds to the "Second 20%" income group and an income range of $17,000-$29,000, because that is the range within which the average indirect wage lies. Applying this tax rate to total indirect wages results in a sales and use tax revenue from indirect employment supported by the coal industry of $2.3 million.

Using the same methodology as for direct employment, we find that indirect employment supported by the coal industry accounts for 0.05% of total employment statewide. We apply that percentage to transportation-related taxes and fees and indirect taxes and fees. This results in an estimated contribution of approximately $380,000 in transportation-related taxes and fees and an estimated $330,000 in state tax revenues from indirect taxes and fees.

As summarized in Table 16, for FY2009, we estimate that indirect employment attributable to coal industry activity generated approximately $3.0 million in state revenues.

Table 16: Indirect employment-related revenues

Revenue	Amount	Percent of revenues
Sales and use tax	$2,280,000	76%
Transportation taxes/fees	$380,000	13%
Indirect taxes/fees	$330,000	11%
Individual income tax	$0	0%
Total	**$3,000,000**	**100%**

Note: Total may not equal sum of individual estimated expenditures due to rounding.

However, just as the state budget supports direct employees by providing funding for health, education, public safety, transportation, infrastructure, and other services, it also supports indirect employees.

6.2 Expenditures

To estimate the total state expenditures supporting indirect employment attributable to the coal industry, we use the same method as was used to estimate expenditures for direct industry employees. Indirect employment attributable to coal accounts for 0.05% of total state employment. After subtracting state expenditures for supporting the coal industry directly (on-budget items), we apply this percentage to the remaining state-generated revenues in the State Taxpayers Budget.

As summarized in Table 17, this results in an estimated indirect employment expenditure of approximately $5.0 million for FY2009.

Table 17: Calculation of state expenditures supporting indirect coal employment

Item	Amount
Total state revenues, FY2009	$10,239,310,613
Minus on-budget expenditures supporting coal	($1,130,000)
Net state revenues, FY2009	$10,238,180,613
Percent total employment, indirect coal employees	0.05%
Estimated expenditures, indirect coal employees	**$4,960,000**

6.3 Summary

As summarized in Table 18, we estimate that employment indirectly supported by the Tennessee coal industry resulted in a net cost of approximately $2 million for FY2009.

This is due to the fact that those indirectly employed as a result of coal industry activity make substantially lower wages than direct coal employees, thereby paying fewer taxes and contributing less, per person, to state revenues. However, each of these employees benefits from the same proportional share of state expenditures as direct employees do, regardless of their wages. Consequently, the revenues generated from indirect employment through taxes and fees fail to make up for state expenditures in support of those employees. This was true for direct employees as well, only to a lesser extent.

Table 18: Net impact of indirect coal employment on the Tennessee state budget

Item	Amount
Revenues from indirect coal employment	$3,000,000
Expenditures supporting indirect coal employees	($4,960,000)
Net impact of indirect coal employment	**($1,960,000)**

However, as this report has already shown, even comparing only the direct industry revenues to the state on-budget expenditures attributable to coal, the coal industry had a net negative impact on the Tennessee state budget in FY2009.

While the provision of jobs and tax revenues resulting directly and indirectly from the industry are of benefit to state and local economies, the state also expends taxpayer dollars to support those employees through support for education, health care, infrastructure development and maintenance, economic development, and environmental protection. While they are merely estimates, and should only be regarded as such, our estimates for employment-related expenditures are the best estimates that we could make based on available information.

The significance of the employment analysis is not in the calculation of the net impact; rather, it is in the presentation of the finding that, while those directly and indirectly employed as a result of coal industry activity do benefit the state through the payment of various tax revenues, those employees in turn benefit from and rely upon state expenditures for various services and forms of support.

Further, while the actual net impact of coal-related employment may differ from what is estimated in this report, it can still be concluded that the wages earned by direct coal employees—and, to a greater extent, indirect employment supported by coal—are not sufficient for ensuring that revenues generated as a result of that employment meet or exceed the amount the state spends to support those employees as residents.

One reason this is true is because Tennessee does not have a personal income tax on employment wages, and instead relies mostly on sales tax revenues for funding the greater portion of the state budget. Were coal employees to make higher wages in Tennessee, or were the state to begin collecting a personal income tax, the calculations presented in this section and in Section 5 would produce a different result.

Finally, as noted by MACED for Kentucky—and applicable for Tennessee or any other coal-producing state—these findings overlook the more important elements illustrating the cost of the coal industry to the state and citizens of Tennessee. One such element in need of sincere consideration due to its lasting impacts on the environment, on human health, and on local and state economies, is the fact that coal extraction-related processes result in severe and lasting damage to the land and streams in the areas where the coal is mined, leaving behind legacy costs that will impact the state and society for years to come.

7. LEGACY COSTS RELATED TO COAL

In Tennessee, as in other Central Appalachian states, many coal mine operators have chosen to step away from their mines before full reclamation is complete, leaving a legacy of polluted drainage, drinking water contamination, and health and safety threats. When this occurs, the operators shift responsibility for the environmental clean-up to the government. Depending on when the mine was abandoned, the clean-up is paid for with different funding streams.

Some mines were abandoned before the 1977 Surface Mining Control and Reclamation Act (SMCRA), which requires that coal mines be reclaimed and not cause water pollution for an indefinite period of time (OSMRE, 2009b). These pre-SMCRA sites are called "abandoned mine lands." Sites abandoned since 1977 are typically called "bond forfeiture sites" because SMCRA requires operators to post bonds; when operators abandon their mines, they forfeit their bonds rather than spend the money required for reclamation. This distinction between abandoned mine lands and bond forfeiture sites is important because distinct funding mechanisms are typically available to reclaim them.

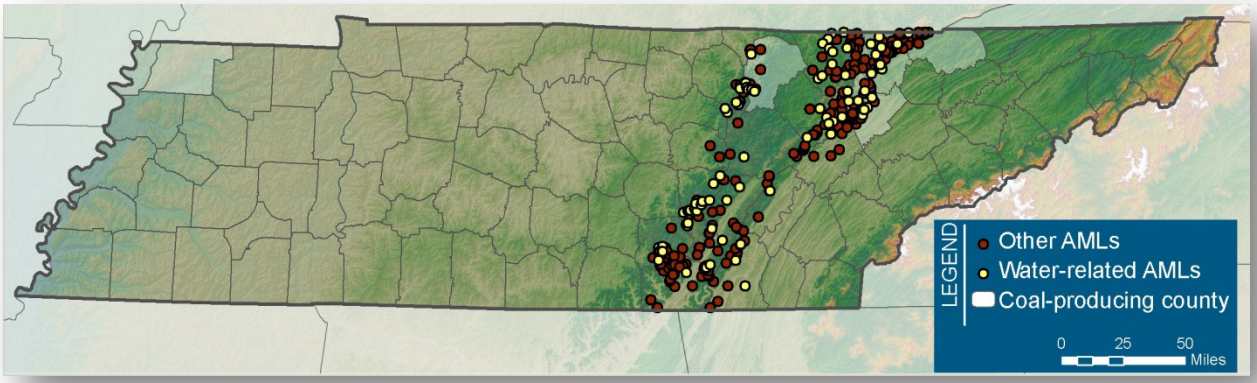
7.1 Abandoned mine lands

According to OSMRE (2009c), there are 359 abandoned mine lands in Tennessee (Figure 10); these sites are scattered across 20 counties (Table 19).

Table 19: Tennessee abandoned mine lands by county

County	Number of abandoned mine lands
Campbell	59
Scott	43
Marion	32
Morgan	32
Grundy	29
Sequatchie	23
Anderson	22
Hamilton	20
Van Buren	18
Fentress	17
Bledsoe	15
Claiborne	14
Overton	10
Cumberland	8
White	5
Rhea	4
Roane	3
Pickett	2
Putnam	2
Coffee	1
Total	**359**

Figure 10: Abandoned mine lands in Tennessee



While $35 million has been spent to complete projects on these sites, an additional $43 million of work is required. This estimate is likely an underestimate because state agencies do not always address water quality discharges to the extent that surface water quality standards are met. In addition, this database of abandoned mine lands may not be entirely complete (Eagle, 2010c). Still, this estimate provides an initial approximation of the scale of work that remains.

The Abandoned Mine Reclamation Fund, established via provisions in Title IV of SMCRA (OSMRE, 2009b), is the primary mechanism used to pay to reclaim abandoned mine lands. This fund is generated by a federal per-ton tax on every ton of mined coal; these taxes are then allocated to state environmental agencies for reclamation projects. Until the 2006 reauthorization of this program, the federal government was not fully appropriating these funds to the states. This unappropriated balance totaled $2.2 billion at the end of FY2008 (OSMRE, 2009d).

From 1977 through 2007, fees were set at 35 cents per ton for surface-mined coal and 15 cents per ton on underground-mined coal. Upon reauthorization, these fees were lowered. In FY 2008-2012, fees will be 31.5 and 13.5 cents per ton, respectively. In FY 2013-2021, the fees will decrease to 28 and 12 cents per ton.

Formulas are used to divide the funds among the states. Distributions changed with the 2006 reauthorization, dramatically increasing the amount of money sent back to states like those in Central Appalachia that have a continuing legacy of unreclaimed abandoned mine lands. The full unappropriated balance is to be sent back to states—and the entire program is to be shut down—in 2022, whether or not it provides sufficient funding to address all remaining abandoned mine lands.

In 2009, $2 million was distributed to Tennessee from the Fund (OSMRE, 2009d), while in 2010, the distribution was increased to $3 million (OSMRE, 2009e). Total distributions through the end of the program cannot be calculated with precision yet. However, according to one estimate, Tennessee would receive only $18 million (West Virginia Department of Environmental Protection, 2009), less than one-half of the $43 million in required work. If this estimate is correct, and without new sources of federal revenue, state funds would be required to cover any remaining costs in the future.

In Tennessee, starting in the mid-1980s, general revenue funds have been allocated to help fund abandoned mine land reclamation. Allocations started at $1 million per year, but these allocations have declined significantly in recent years now.

Tennessee's Surface Mine Reclamation Fund, into which forfeited bonds are deposited (See Section 7.2 on bond forfeiture sites), is also used to help pay for pre-1977 abandoned mine land reclamation projects.

Additionally, there are other, less significant sources of funding for abandoned mine lands, including Watershed Cooperative Agreement Program grants and Clean Water Act Section 319 grants.

Three Watershed Cooperative Agreement Program grants have been provided in Tennessee from 1999 through 2009, for a total of $0.5 million (OSMRE, 2010). These grants focus on water-related abandoned mine lands and provide funding directly to watershed associations, raising their capacity and effectiveness.

Within TDEC's Division of Water Pollution Control, the Abandoned Mine Lands Reclamation program is responsible for reclaiming abandoned mine lands. As shown in Table 20, nine abandoned mine land reclamation projects were completed in FY2009; three of these projects were paid for from the general fund.

Table 20: Abandoned mine land reclamation projects completed in FY2009

Completion date	Project	County	Amount	Acres
General fund				
7/1/2008	Jared Henry Phase 2	Scott	$4,790	1
9/9/2008	Bill Branch	Overton	$225,734	14
2/2/2009	New River Waterline Anderson	Anderson	$100,000	1
Subtotal			**$330,524**	**16**
Surface mine reclamation fund				
4/29/2009	Hatfield Cemetery Claiborne	Claiborne	$0	1
5/13/2009	Eddie Walls Phase 2 Morgan	Morgan	$233,985	3
6/15/2009	Charles Burke Scott	Scott	$44,847	1
6/26/2009	Huntsville Recreation Scott	Scott	$32,006	1
Subtotal			**$310,838**	**5**
Federal				
8/1/2008	New River Mussel Survey	Scott	$42,000	0
4/30/2009	High Point Landslide I Scott	Scott	$52,576	2.5
Subtotal			**$94,576**	**2.5**
Total			**$735,938**	**24.5**

Source: Eagle (2010a and b).

In FY2009, $330,524 of general revenue funds from the State Taxpayers Budget were expended on abandoned mine land reclamation projects in Tennessee.

7.2 Bond forfeiture sites

Bond forfeiture sites are coal mines that have been abandoned since SMCRA required the posting of bonds in 1977. For these mines, operators have chosen to forfeit their bonds rather than continue to pay for reclamation. In Tennessee as of September 30, 2008, five sites had bonds forfeited and collected but remain unreclaimed, for a total of 125 acres. An additional site of 30 acres was forfeited in FY2009, bringing the total to six sites and 155 acres. However, two sites comprising 15 acres were reclaimed in FY2009. Therefore, four sites, comprising 140 acres, remain unreclaimed (OSMRE, 2009f).

The Land Reclamation Section within TDEC's Division of Water Pollution Control is also responsible for reclaiming bond forfeiture sites. Many of these sites require earthmoving and revegetation, and the bonds collected are not usually sufficient for full reclamation. The Section therefore prioritizes the sites and, in some cases, applies bonds from stable sites to those needing the most work. The Abandoned Mine Lands Reclamation program only reclaims the highest priority sites because the bond fund is insufficient to reclaim all sites (TDEC, 2010c).

7.3 Summary

The coal industry's hundreds of legacy sites, which include abandoned mine lands and bond forfeiture sites, present a liability for the coal industry. Because the main funding mechanism in place to reclaim these sites is insufficient and scheduled to end in 2022, action is needed to ensure that reclamation is completed and that the costs are not shifted to taxpayers. If action is not taken, then the Tennessee state budget could face additional expenditures in the future to finish the job of reclaiming these legacy sites.

8. CONCLUSIONS AND RECOMMENDATIONS

While every job and every dollar of revenue generated by the coal industry provides an economic benefit for the state of Tennessee and the counties where the coal is produced, the Tennessee coal industry has a negligible impact on the state budget. In fact, when all revenues and expenditures are considered, the coal industry and its direct and indirect employees present a net cost to the state budget, and therefore to Tennessee taxpayers.

Our look at the state budget, however, does not present the full picture of coal in Tennessee. The industry certainly provides benefits to the state's coal-producing counties through severance taxes and other mechanisms; this will be a focus of a follow-up report. However, only three Tennessee counties produce substantial amounts of coal, and coal jobs accounted for approximately 1% of total employment in these counties.

Because of the coal industry's negligible impact on the state budget, the few jobs it provides, and its environmental and health costs, it is important for Tennessee policy-makers to consider whether alternative and emerging industries could provide net revenues to the state budget, additional local jobs, and fewer externalities. In short, policy-makers should re-examine budgetary priorities and focus resources toward providing support for more sustainable forms of economic development. Additionally, state policy related to energy and economic development, to the extent that it supports the coal industry in Tennessee, should be reconsidered, and new policies enacted that reflect recognition of existing realities.

The coal industry's impact on the Tennessee economy, and Tennessee's contribution to regional and national coal production, have both declined since the mid-1980s. Since 1985, coal production in Tennessee has declined by 69%, with total production amounting to only 2.3 million tons in 2008. This accounted for approximately 1% of total coal production in the Central Appalachian basin, and 0.2% of all coal produced in the United States. Of the coal produced in Tennessee, less than 3% is burned for electricity generation in the state's power plants, and at least 67% of the coal is exported for use in other states.

The impact of coal on local economies has declined as well. Of the 95 counties in Tennessee, only six produced coal in 2008 and 2009; of these, three counties—Claiborne, Campbell, and Anderson—accounted for 98% of total coal production. Additionally, the number of counties producing coal fell from eleven in 1990 to only six in 2008, while the number of counties producing at least 100,000 tons fell from eight to two.

Employment in the coal industry has declined substantially as well. The decline in production, combined with an increase in surface mining as a share of total production—which requires fewer workers to mine each ton of coal—resulted in a 79% decline in employment between 1985 and 2008, reflecting a total job loss of over 2,000 miners. As of 2008, only 558 direct jobs existed in the coal mining industry in Tennessee, and approximately 300 of those were jobs at surface mines.

Overall, the coal industry has an insignificant impact on the state economy, accounting for less than one-tenth of 1% of both state GDP and total state employment in FY2009. As estimated in this report, the industry's impact on the state budget is equally negligible, and in some accounts, results in a net cost to the state.

Table 21: The estimated impact of the coal industry on the Tennessee state budget

Item	Amount
Direct coal industry	
Revenues	$1,080,000
On-budget expenditures	($1,130,000)
Estimated net impact	**($50,000)**
Off-budget expenditures	($440,000)
Direct coal employment	
Revenues	$1,670,000
Expenditures	($2,210,000)
Estimated net impact	**($540,000)**
Indirect employment supported by coal	
Revenues	$3,000,000
Expenditures	($4,960,000)
Estimated net impact	**($1,960,000)**
Total	
Revenues	$5,750,000
Expenditures	($8,740,000)
Estimated net impact	**($2,990,000)**

As shown in Table 21, the coal industry itself contributed an estimated $1.1 million to the state budget in FY2009. This accounted for approximately one-tenth of 1% of total state revenues.

However, employees directly employed in the coal industry, as well as those whose jobs are supported by coal industry activity, also generate revenues for the state through the payment of various taxes and fees, primarily sales and use taxes and transportation-related taxes. Estimated revenues generated by direct coal employment amounted to approximately $1.7 million in FY2009, while those from indirect employment amounted to approximately $3.0 million. Therefore, total estimated employment-related revenues attributable to the coal industry were approximately $4.7 million and the total estimated benefit of the coal industry to the state budget for FY2009—not including expenditures—was approximately $5.8 million.

However, excluded from common discussions about the impact of the coal industry are the costs associated with supporting and regulating the industry, off-budget expenditures, and support for direct and indirect employees. These costs totaled an estimated $8.7 million in FY2009.

Therefore, it could be concluded that the total net impact of the coal industry on the Tennessee state budget in FY2009 amounted to an approximate net cost of $3.0 million. While this number is a reasonable and plausible first approximation, it cannot be represented as a precise calculation. However, the estimates provided in this report are based on the data that are available, and provide a useful first step toward considering not just the industry's revenues, but its costs as well.

The process of thinking through the revenues and expenditures as they pertain to the coal industry, and the provision of these initial estimates, is of benefit for state policy-makers in that it offers a better understanding of the role of the coal industry at the state level. We encourage the generation of additional data, and the calculation of refined estimates, to help move this dialog forward.

Additionally, the mining, transportation, processing, and burning of coal all impose costs that are excluded from single-year accountings, or are insufficiently accounted for. These include costs in the form of degraded environmental quality and associated treatment or reclamation, impacts on human health from contaminated air and water, damage to infrastructure such as roads and bridges, and—particularly from surface mining—the loss of resources upon which alternative forms of economic development could be based. Whether or not these costs are paid for in the short-term, they represent actual costs that will impact the state budget over time.

The following policy recommendations address the direct and indirect costs attributable to coal industry activity in Tennessee, with the overall goal being to ensure that the costs are covered through revenues collected from the industry rather than being paid for by the public.

Continue and strengthen the state's efforts toward diversifying state and local economies in clean energy industries. Given the coal industry's negligible impact on the state budget and economy, and the costs it imposes on the environment and human health, Tennessee policy-makers should continue to consider whether alternative and emerging industries could provide net revenues to the state budget, create additional local jobs, and impose fewer externalities. Tennessee has taken great strides in this regard, attracting a solar manufacturing plant to Anderson County that is expected to create 200 permanent jobs, conducting a state-funded study of the potential for green job growth, and introducing related legislation that would develop green jobs programs with a focus on economically distressed communities to be funded through a green jobs fund. Additionally, state law provides for an "emerging industry" tax credit for clean energy technology development, as well as green energy and carbon charge credits for certified green energy supply chain manufacturers. Each of these policies and financial incentives promote and support the creation of new jobs and sources of revenue in industries likely to provide a greater and more lasting benefit to Tennessee than the coal industry currently does. However, there are various policy and financial instruments available for building upon existing incentives.

Reduce tax expenditures supporting the coal industry. One of the reasons that coal's revenue contribution is so small is that most coal company purchases, just like purchases made by various other industries not associated with coal, are exempt from the sales and use tax. These include the purchase of industrial machinery and materials required for the mining and processing of coal, as well as the purchase, leasing, or contracting of trucks for the transportation of coal. The result is that the mining and transportation of coal is subsidized by the state, even as each of these activities, in turn, imposes costs that the state eventually pays for. For instance, the mining of coal often results in the contamination of streams, and, occasionally, the need for reclaiming lands left unreclaimed when coal companies forfeit their reclamation bonds. As discussed, state funds are eventually dedicated to treating streams and reclaiming the abandoned lands, even as tax expenditures subsidized the mining. Reducing the tax expenditures currently benefiting the coal industry would ensure a greater source of revenue available to the state for covering future costs of treatment and reclamation.

Increase the coal severance tax, and base it on a percent of gross sales. Increased severance taxes would impact the state budget indirectly by generating more revenues at the county level for purposes currently funded by the state. It would also generate additional funds not currently available from either state appropriations or county revenues. Currently, state law requires 50% of a county's coal severance tax receipts to be dedicated to infrastructure improvements and the treatment of streams, presumably impacted by coal mining. The low level of severance tax revenues is insufficient for supporting economic development in coal-producing counties. To supplement the cost of treating streams and repairing roads, and to provide a greater amount of county revenue available for economic development and other beneficial initiatives, Tennessee should implement a coal severance tax rate equal to that in either West Virginia or Kentucky. A bill to accomplish this was introduced to the Tennessee Legislature in 2009. House Bill 1274 would have changed the coal severance tax rate to 4.5% of the gross value of the coal sold—the current rate in Kentucky.

This would have generated over ten times the revenues for county governments than was collected in FY2009. The bill proposed that half of the revenues would be dedicated for beneficial county purposes, one-fourth for a special fund for reclaiming abandoned mines, and one-fourth for offsetting lost revenue from proposed tax breaks on equipment for solar or wind generation. A bill such as this would generate more revenues for reclamation and water treatment, increase revenues for county governments to spend on beneficial uses, and incentivize the development of renewable energy.

Collect a per-ton fee for the transportation of coal by haul truck. Various industries rely on the operation of heavy trucks on Tennessee roads, and the impact of coal trucks on the state budget is negligible for Tennessee as a whole. However, the transport of coal has local impacts on roads, bridges, and air quality, and does result in additional costs of repair and replacement of roads and bridges. Some of these costs are paid for through the dedication of limited county revenues, as well as through the use of coal severance tax revenues. We recommend that Tennessee impose a per-ton fee on hauling coal dedicated specifically for improvements to haul roads. This will allow other state and county funds, now spent on road and bridge repair, to be spent on other important uses such as economic development and education.

Set a goal of reclaiming all abandoned mine lands to meet in-stream water quality standards, and ensure that sufficient funding is provided over time from the coal industry. At both the state and federal levels, the goal should be set to reclaim all remaining legacy coal mines. Without such an explicit goal, the reclamation programs currently in place are not likely to be funded sufficiently to finish the job. Today, the federal Abandoned Mine Reclamation Fund sets a low priority for water pollution problems and does not set an explicit goal of remediating every AML. TDEC also does not design remediation projects with the goal of meeting water quality standards in now-polluted streams. Further compounding the problem, the federal Abandoned Mine Reclamation Fund will sunset in FY2022, long before sufficient funding is provided to finish the job. Congress should adjust this sunset date and peg it to the completion of reclamation work at all remaining sites, and TDEC should attempt to meet water quality standards in all receiving streams. If these adjustments are not made, then future reclamation costs would likely have to be shifted to taxpayers from the industry that created the problems in the first place.

Ensure that Tennessee's bond forfeiture program is sufficiently funded. The state's Surface Mine Reclamation Fund is not sufficient to fully reclaim all bond forfeited sites. TDEC should find a way to ensure that this program is sufficiently funded so that they can meet their obligations to reclaim forfeited sites and treat polluted water into the indefinite future. It will be a challenge to ensure that this program remains solvent as statewide coal production decreases.

To conclude, the coal industry's small contribution to the Tennessee economy, both on the state and local levels, means that policy-makers can be creative in seeking ways to diversify the economic base. Even with today's policies, coal's importance for Tennessee is not likely to grow in the future. This reality raises questions about Tennessee's priorities related to economic policy and energy development, and requires a re-examination of state policies as they apply to the Tennessee coal industry.

APPENDIX: RIMS-II AND THE USE OF ECONOMIC MULTIPLIERS

RIMS-II, created and provided by the BEA, was developed primarily for estimating the economic impact of a change in economic activity for a particular industry, such as the coal industry in Tennessee, or the regional impact of new projects such as an airport.[28]

However, economic impact multipliers are also used, by state and local governments, for instance, to calculate a snapshot estimate of the state or regional impacts of government policies or projects, or of single industries or firms located within the state or region. It is in this manner that we use RIMS-II for this study—in order to estimate the indirect impacts of the coal industry in Tennessee for FY2009.

A different tool, IMPLAN, is sometimes used for similar studies (Minnesota IMPLAN Group, 2004). We use RIMS-II economic multipliers for consistency with the similar Kentucky analysis (Konty and Bailey, 2009), and because of its wide use by other universities and organizations in the Central Appalachian region.[29]

Both IMPLAN and RIMS-II provide impact multipliers for output and for earnings, or wages. We use RIMS-II to calculate the indirect impact of the Tennessee coal industry for employment and wages.[30] Using selected multipliers, detailed in Table 15, we then estimate the revenues and expenditures associated with indirect employment supported by the coal industry, and therefore the net impact of such employment on the state budget.

However, as a final note, it is worth repeating a note of caution expressed by MACED:

> "The RIMS II, and all economic impact multipliers, is surrounded by criticism of the models based on the assumptions built into the models and the resulting limits of their applicability and accuracy. The model assumes that all direct, indirect and induced effects would not otherwise occur without the project. The absence of the counterfactual—meaning we really have no way of knowing or modeling what activities would occur without the project—is problematic. The base assumption of the RIMS II (and all multiplier models), that it places all other economic activity on hold is significant and presents obvious problems under the best circumstances. In addition to these concerns, the application of this method to an industry that has been in the region for more than 100 years and is tied to a place-specific natural resource violates basic principles of a model designed to assess the impact of economic shocks such as development projects or firm closures." (Konty and Bailey, 2010, p. 20)

Despite these potential pitfalls, multipliers are often used by the industry itself and by researchers to estimate an industry's indirect impacts. We perform these calculations with a recognition that, while imperfect, these multipliers allow us to clarify key issues and to perform initial, if imprecise, calculations.

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[28] To do so, it accounts for inter-industry relationships within regions, measuring the impact on output (i.e., coal production) effected by a change in inputs purchased (i.e., mining machinery), and vice versa. In this way, it provides a tool for measuring how one industry, such as the coal industry, impacts other industries within a regional, state, or local economy. RIMS-II uses direct employment data, detailed information on inputs and outputs related to and generated by an industry operating in a particular geographic region, as well as consumer behavior in the region, to determine the indirect economic impacts, or "spill-over effects," of a specific industry, firm, or development project. For instance, any change in coal production will have an impact on industries that supply coal companies with tools and machines used in the coal mining process. If coal production in Tennessee increases by a substantial amount, or a new mine opens, then supply industries benefit by supplying the coal company, and employment in the supply industries will increase, thereby having an additional positive impact on wages and tax revenues. Conversely, if production declines, the industries that supply the coal industry will be negatively impacted, and employment in and revenues from those supply industries will decline.

[29] For instance, according to MACED, RIMS-II multipliers are used by the Kentucky Coal Association and the University of Kentucky Center for Business and Economic Research (Konty and Bailey, 2009).

[30] The multipliers selected were the direct effect, Type II, benchmark series multipliers for the Tennessee coal industry (NAICS code 2121) Type II series provide total impact multipliers that include both indirect and induced impacts, whereas Type I series provides only direct impact. Benchmark series multipliers are available for detailed industries, such as NAICS 2121 for the coal industry. The alternative was to choose the Annual series multipliers, which are only available for aggregated industries, such as "Mining," which includes all forms of mining.

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