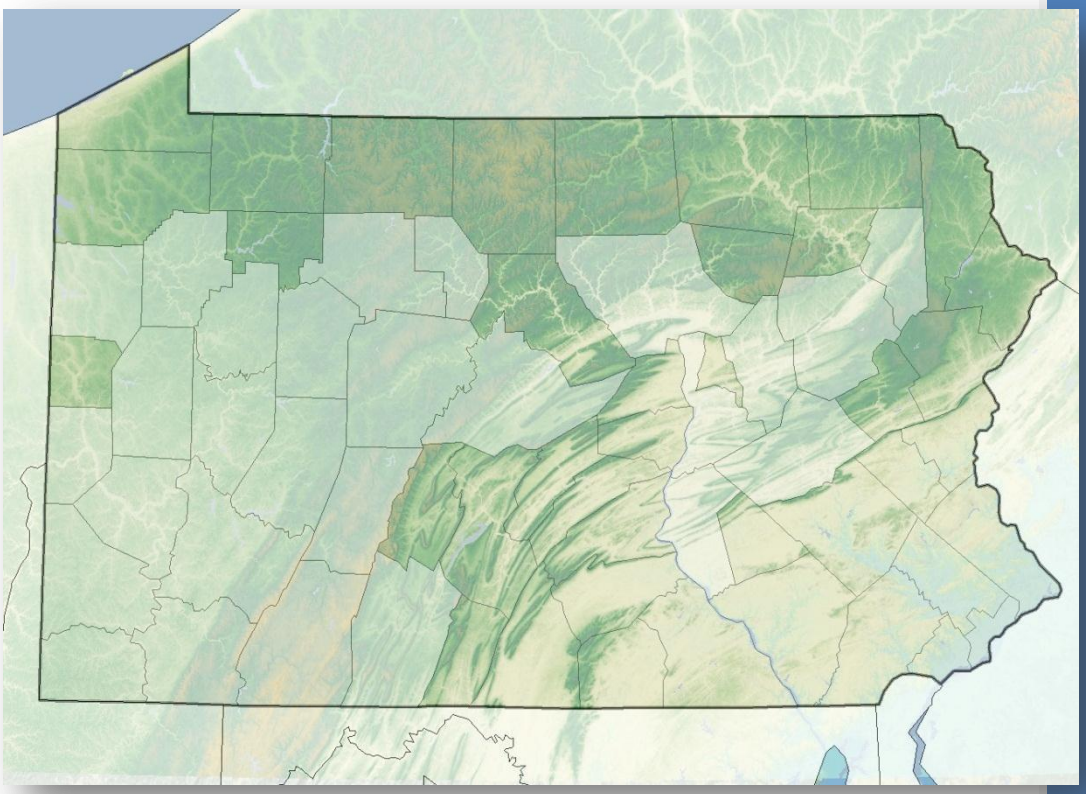
The Impact of Coal on the Pennsylvania State Budget



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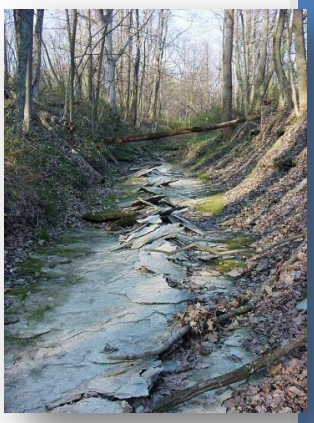

Prepared for:
Center for Coalfield Justice
www.coalfieldjustice.org

Downstream Strategies
building capacity for sustainability

October 3, 2012

The Impact of Coal on the Pennsylvania State Budget

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ABOUT THE REPORT

In 2009, the Mountain Association for Community Economic Development produced a report titled *The Impact of Coal on the Kentucky State Budget* (Konty and Bailey, 2009). 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.

This Pennsylvania report is modeled on the Kentucky report, and benefits from the completion of two subsequent such reports produced by Downstream Strategies for the states of West Virginia and Tennessee. The goal of this report is to add to the public dialog so that policymakers at the county and state level can fairly assess the full range of benefits and costs of the coal industry. The report's conclusions raise questions about Pennsylvania's policies related to energy and economic development, particularly given that coal accounts for such a small portion of the state's economic activity and employment while resulting in significant costs for other taxpayers. The additional realities of pending federal legislation that could reduce coal demand; the rising demand for natural gas; and the growing impact of coal on economic, social, and environmental health call into question Pennsylvania's commitment to supporting the coal industry.

ACKNOWLEDGEMENTS

We would first like to acknowledge our client, the Center for Coalfield Justice. The Center's mission is to improve policy and regulations for the oversight of fossil fuel extraction and use; to educate, empower and organize coalfield citizens; and to protect public and environmental health. For his time and patience in guiding this project forward, we would specifically like to recognize Patrick Grenter, the Center's Executive Director.

In addition, we would like to thank the Laurel Foundation, which provided the funding for this report. The mission of the Laurel Foundation is to preserve and promote the culture, environment, and history of the Pittsburgh area and all of southwestern Pennsylvania. Most of the Foundation's funding supports work in the areas of arts and culture, environment and conservation, vocational education, and community development and beautification.

We also appreciate the time, information, and expertise provided by various agencies and individuals that make up the government of the Commonwealth of Pennsylvania, as well as local government officials. These include the following Pennsylvania state agencies: Office of the Budget, Department of Revenue, Department of Environmental Protection, and Department of Transportation. Without the assistance of each of these agencies, this report could not have been completed. We would also like to thank Scott Kelley of the Greene County Budget and Finance Office, the Washington County Tax Revenue Department, the Somerset County Assessor's Office, the Armstrong County Assessment Office, the Clearfield County Controller's Office, Thelma Szarell of the West Greene School District, and Jeff Kern and Dave Falkenstern of Resource Technologies Corporation.

COVER PHOTOS

Each of the cover photos were provided courtesy of the Center for Coalfield Justice. The photos depict damage from longwall mining operations on a roads, home and stream in southwestern Pennsylvania.

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ABBREVIATIONS

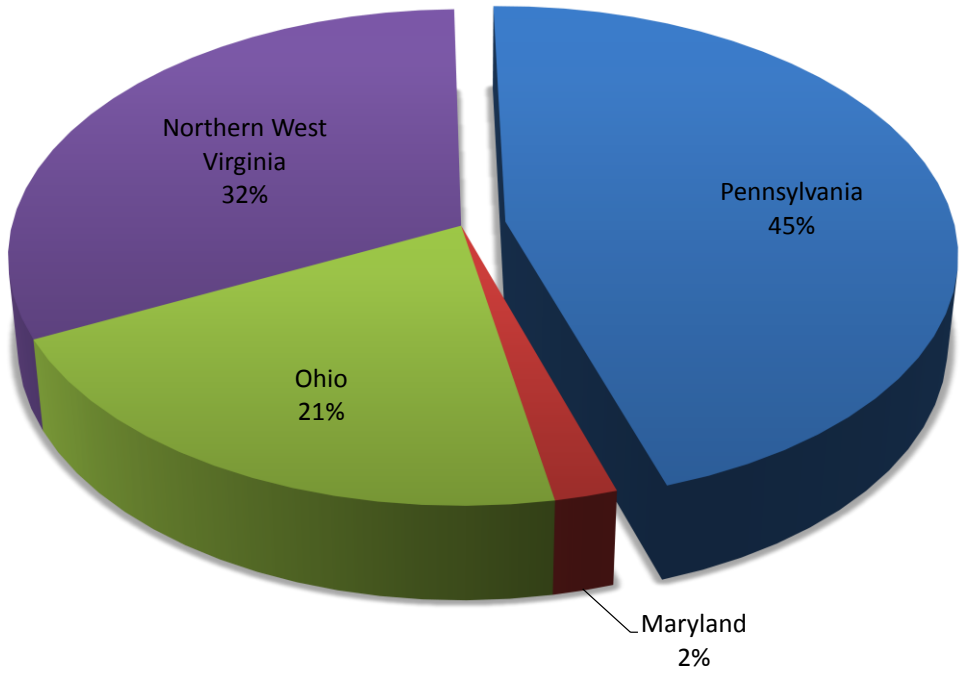
ABS	Alternative Bonding System
AML	abandoned mine land
AMLIS	Abandoned Mine Land Inventory System
ARC	Appalachian Regional Commission
BAMR	Bureau of Abandoned Mine Reclamation
BDMO	Bureau of District Mining Operations
BEA	Bureau of Economic Analysis
BFS	bond forfeiture site
BLS	Bureau of Labor Statistics
BMP	Bureau of Mining Programs
BMS	Bureau of Mine Safety
BTGS	Bureau of Topographic and Geologic Survey
CNIT	corporate net income tax
CPI	Consumer Price Index
CSFT	capital stock/foreign franchise tax
DVMT	daily vehicle miles traveled
EHB	Environmental Hearing Board
EIA	Energy Information Administration
ESAL	equivalent single axle loading
GF	General Fund
GVW	gross vehicle weight
ITEP	Institute on Taxation and Economic Policy
kWh	kilowatt-hour
MACED	Mountain Association for Community Economic Development
MLF	Motor License Fund
MSHA	Mine Safety and Health Administration
NAICS	North American Industry Classification System
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
OAAMO	Office of Active and Abandoned Mine Operations
OSMRE	Office of Surface Mining, Reclamation and Enforcement
OWM	Office of Water Management
PDCNR	Pennsylvania Department of Conservation and Natural Resources
PDEP	Pennsylvania Department of Environmental Protection
PDLI	Pennsylvania Department of Labor and Industry
PDOT	Pennsylvania Department of Transportation
PDR	Pennsylvania Department of Revenue
Pitt	University of Pittsburgh
PSU	Pennsylvania State University
RIMS	Regional Input-Output Modeling System
SMCRA	Surface Mining Control and Reclamation Act
US	United States

EXECUTIVE SUMMARY

Coal plays a relatively insignificant role in the Commonwealth of Pennsylvania's overall economy; however, the industry does contribute millions of dollars in state revenue and provides or supports well-paying jobs for thousands of Pennsylvania residents, while also providing tax revenues for many of the state's coal-producing counties. Despite these benefits, recent accounts of the economic impact of the coal industry for Pennsylvania have only presented coal's benefits; our estimates provide an initial accounting of both benefits and costs. Such an accounting is important particularly given coal's relatively small contribution to state revenues and employment, while the negative impacts resulting from coal industry activity will result in ongoing costs to the Commonwealth and its citizens.

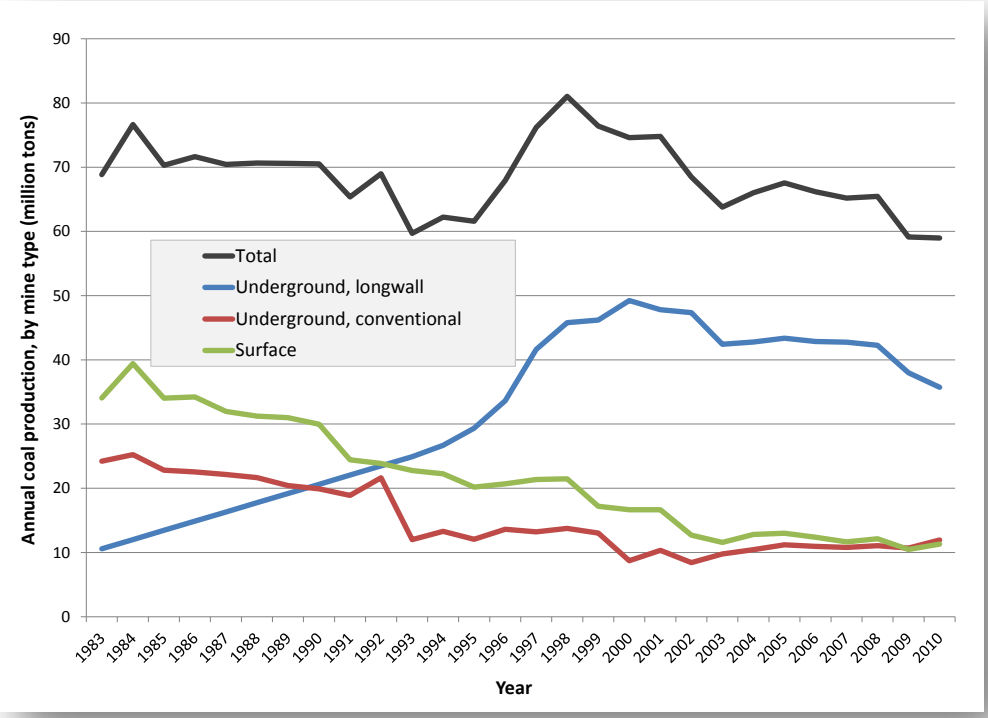
Pennsylvania's coal reserves are situated in the Northern Appalachian coal basin, which produced approximately 12% of United States coal in 2010. Of Pennsylvania's 67 counties, 27 counties produced approximately 59.0 million tons of coal in 2010 and directly employed a reported 8,268 miners, managers, and upper-level staff. Of the coal-producing counties, production in only five of the counties—Greene, Washington, Somerset, Clearfield, and Armstrong—accounted for 85% of total state production. Overall, Pennsylvania coal accounted for 45% of all coal mined in Northern Appalachia.

Figure ES-1: Northern Appalachian coal production by state, 2010



Pennsylvania's last peak in coal production occurred in 1998 at nearly 81 million tons, representing 7.3% of total United States production. Since then, Pennsylvania's share has fallen to 5.4%, and annual production has declined by 27%, reflected by the loss of nearly 12 million tons of underground coal production and over 10 million tons of surface production. Of the loss in underground mine production, 85% has been at longwall mines, even though longwall mining is generally the least expensive method of coal mining in Pennsylvania and is the predominant mining method. For over a decade, longwall mining has helped Pennsylvania maintain its price competitiveness. However, longwall mining's share of total state coal production has declined in recent years, dropping from approximately 70% of total production in 2002 to 60% by 2010.

Figure ES-2: Coal production in Pennsylvania by mine type, 1983-2010



Coal's importance for Pennsylvania is expected to grow somewhat as demand for Central Appalachian coal continues to decline and utilities with emissions control technologies installed begin purchasing more Northern Appalachian coal. Should this occur, coal's contribution to Pennsylvania's budget and state and local economies will likely grow to some extent. However, as coal's contribution grows, so will its costs. This reality raises questions about Pennsylvania's priorities as they relate to economic policy and energy development, particularly for the coal-producing counties throughout the state.

In this report, we examine the net impact of the coal industry on the Pennsylvania state budget by compiling data on and estimating both the tax revenues and the expenditures attributable to the industry for Fiscal Year 2010-11: July 1, 2010 through June 30, 2011. In the cases where we calculate our own estimates for revenues and expenditures, there is an inherent degree of uncertainty associated with the results. We do not claim that our estimates are precise; in fact, we round them in order to avoid a false impression of precision.

Overall, when taking all revenues and expenditures into account, we estimate that the total net impact of the coal industry on the Pennsylvania state budget in Fiscal Year 2010-11 amounted to a net cost to the Commonwealth of $164.9 million.

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 beneficial priorities and for their future impact on the economy, the environment, and the health of Pennsylvania residents.

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

Direct coal industry: Revenues. The coal industry benefits the state budget through the payment of taxes and fees that contribute to the General Fund, either directly or indirectly. In Fiscal Year 2010-11, the coal industry provided an estimated $10.9 million in revenues from the corporate net income, sales and use, and capital stock/foreign franchise taxes, while support activities for coal mining generated an additional $15.6 million. In total, contributions from the coal industry and support activities to the General Fund amounted to approximately 0.1% of total state-generated revenues. Due to tax exemptions for fuel purchases, the coal industry did not contribute to Pennsylvania's Motor License Fund.

Direct coal industry: On-budget expenditures. The Pennsylvania state budget includes a variety of expenditures that exist only because of the coal industry. We focus on coal-related expenditures paid for with General Revenue and Motor License Funds. These include, for example, units of government within the Department of Environmental Protection, as well as expenditures for the repair of roads and bridges damaged by coal trucks. We estimate that on-budget coal-related expenditures amounted to approximately $16.6 million for Fiscal Year 2010-11. Comparing only the on-budget expenditures to the direct revenues generated by the industry (not including support activities), we estimate that the coal industry directly resulted in a net cost to the state budget of approximately $5.7 million in Fiscal Year 2010-11.

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 and 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 to the coal industry amounted to $161.9 million in Fiscal Year 2010-11. The largest expenditure is the sales and use tax exemption for the purchase of coal, which accounted for 72% of the total tax expenditure for supporting the coal industry. The tax expenditures directly supporting coal mining exceed the total direct revenue impact by approximately $150.9 million.

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

A reported 8,268 Pennsylvania residents were directly employed in the coal industry in 2010. We estimate that total tax revenues related to direct employment in the coal industry amounted to $39.4 million. However, state expenditures to support those employees amounted to approximately $38.8 million. Therefore, we estimate that tax benefits for the state budget contributed by direct employees of the coal industry exceeded state expenditures for supporting those employees by approximately $0.6 million.

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 Pennsylvania. For Fiscal Year 2010-11, we estimate that indirect employment attributable to coal industry activity amounted to 16,609 jobs and generated approximately $64.4 million in state revenues. However, state expenditures to support those employees amounted to approximately $78.0 million. We therefore estimate that employment indirectly supported by the Pennsylvania coal industry resulted in a net cost of approximately $13.6 million for Fiscal Year 2010-11.

Legacy costs related to coal. While this report focuses on the 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 Pennsylvania, as in other Appalachian states, there are numerous abandoned mine lands that have yet to be reclaimed despite decades of federal funding dedicated to that purpose. For Pennsylvania, there have been 7,462 problems identified at 2,341 abandoned mine land sites. Ninety-four percent of the sites and more than 90% of the acreage lie within the 27 counties that produced coal in 2010. While $760 million had been spent to complete projects through Fiscal Year 2010-11, an additional $5 billion of work is required to reclaim the remaining sites. However, total distributions of federal funds to Pennsylvania for reclaiming abandoned mine lands are projected to be only $1.2 billion through the end of the collection period. Therefore, 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 no action is taken, then the Pennsylvania state budget could face additional expenditures in the future to finish the job of reclaiming these legacy sites. In addition, the historical impacts of longwall mining on the hydrology of mined areas, residential water supplies, and land surfaces are poorly documented while increasing in occurrence.

Conclusions and recommendations. Every job and every dollar of revenue generated by the coal industry provides an economic benefit for the Commonwealth of Pennsylvania and the counties where the coal is produced; however, the net impact of the Pennsylvania coal industry, when taking all revenues and expenditures into account, amounted to a net cost of $164.9 million in Fiscal Year 2010-11.

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.

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

Item	General Fund	Motor License Fund	Total
Direct coal industry			
Revenues (including support activities)	$26,540,000	$0	$26,540,000
On-budget expenditures	($15,310,000)	($1,280,000)	($16,590,000)
Estimated net impact	**$11,230,000**	**($1,280,000)**	**$9,950,000**
Off-budget expenditures	($143,360,000)	($18,510,000)	($161,870,000)
Direct coal employment			
Revenues	$35,830,000	$3,560,000	$39,390,000
Expenditures	($35,420,000)	($3,390,000)	($38,820,000)
Estimated net impact	**$410,000**	**$170,000**	**$570,000**
Indirect employment supported by coal			
Revenues	$57,270,000	$7,160,000	$64,430,000
Expenditures	($71,160,000)	($6,820,000)	($77,980,000)
Estimated net impact	**($13,890,000)**	**$340,000**	**($13,550,000)**
Total			
Revenues	$119,640,000	$10,720,000	$130,360,000
Expenditures	($265,250,000)	($30,000,000)	($295,250,000)
Estimated net impact	**($145,610,000)**	**($19,280,000)**	**($164,890,000)**

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 policymakers in that they offer a more complete 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 Pennsylvania, 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.

- Implement a state severance tax on coal and/or authorize local governments to levy a severance tax.
- Create a permanent mineral trust fund.
- Conduct a detailed analysis of the total fiscal impact of tax expenditures supporting coal.
- Ensure that funds for reclamation and water treatment of abandoned mines are sufficient for meeting all present and future needs.
- Strengthen regulation of longwall mining and more thoroughly examine and address historical and potential impacts.

Whether coal mining expands or declines in the future, the potential growth or loss of state revenues and associated costs to support and regulate the coal industry could make it difficult to cover the annual and legacy costs of coal. Therefore, state policy related to energy and economic development—to the extent that it supports the coal industry—should be examined and reconsidered, and new policies should be enacted that reflect a recognition of the costs associated with coal industry activity.

1. INTRODUCTION

Coal plays a relatively insignificant role in the overall economy of the Commonwealth of Pennsylvania; however, the industry contributes millions of dollars in state and local revenue and provides well-paying jobs to thousands of Commonwealth residents. Previous accountings of the industry's impact on the state budget and economy have only presented coal's benefits for Pennsylvania (Pennsylvania Economy League of Southwestern Pennsylvania, LLC, 2010); our estimates provide an initial accounting of both benefits and costs. Such an accounting is important, for despite projections that demand for Pennsylvania coal is likely to rise, a continued reliance on coal for energy and economic development may actually result in net costs to the state budget and will leave local economies vulnerable to continuous periods of growth and decline. In addition, should coal production expand, the negative impacts resulting from coal industry activity will continue, resulting in ongoing costs to the Commonwealth and its citizens.

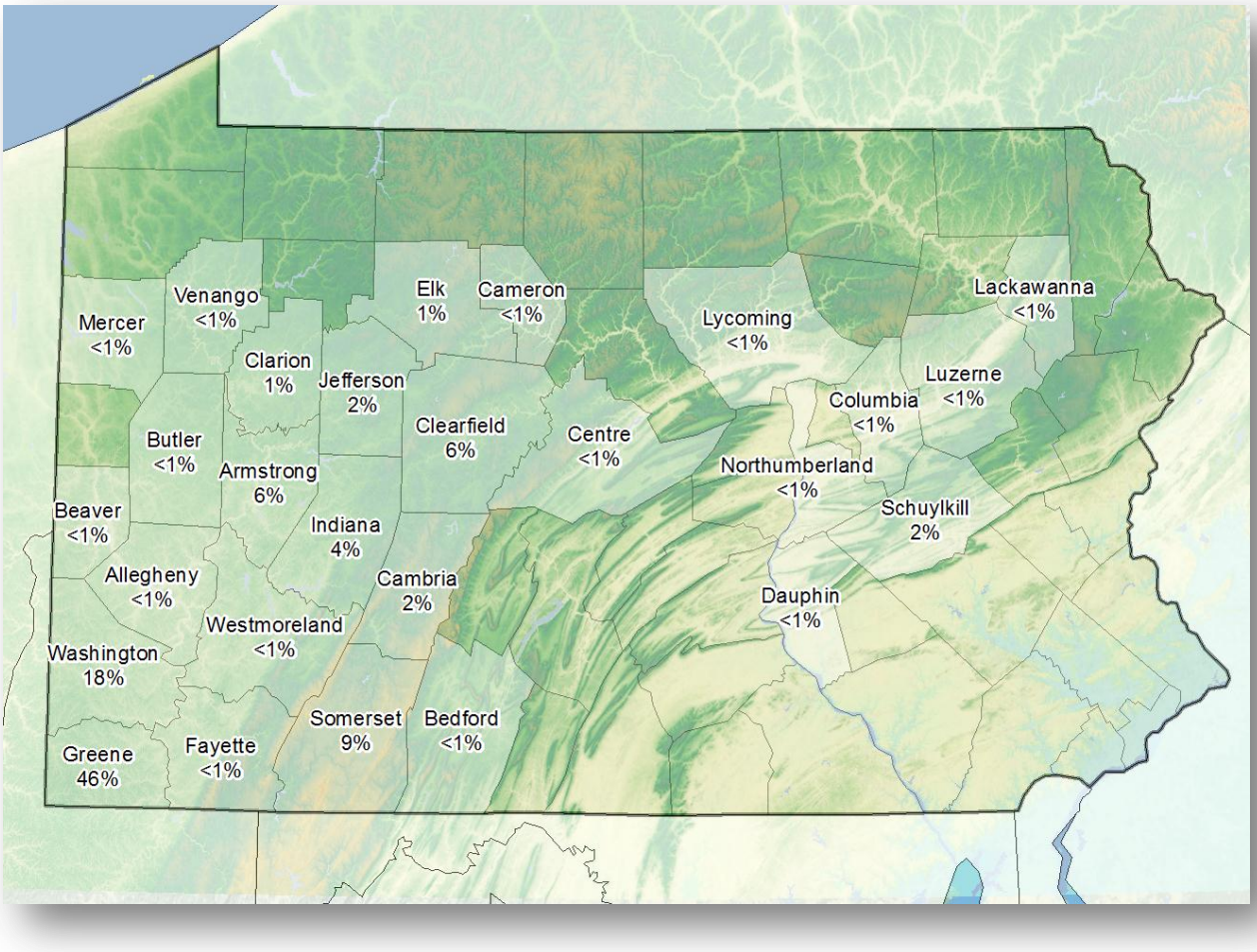
The structure of this report is modeled after a similar report for Kentucky released by the Mountain Association for Community Economic Development (MACED), which examined the coal industry's impact on the Kentucky state budget (Konty and Bailey, 2009), as well as previous reports on West Virginia (McIlmoil et al., 2010a) and Tennessee (McIlmoil et al., 2010b) released by Downstream Strategies.

1.1 Overview of the Pennsylvania coal industry

Pennsylvania's coal reserves are situated in the Northern Appalachian coal basin, which is characterized primarily as containing high energy content anthracite and high-sulfur bituminous coal. The federal Energy Information Administration (EIA) estimates that Pennsylvania has 11.4 billion tons of total recoverable reserves (10.7 billion tons of bituminous coal and 760 million tons of anthracite coal), and 571 million tons of recoverable reserves at actively producing mines (532 million tons of bituminous coal and 39 million tons of anthracite coal) (EIA, 2011a and b). At 2010 production rates, that is enough coal to last for approximately 10 years without opening any new mines.

EIA also reports that 27 of the Commonwealth's 67 counties produced coal in 2010, totaling approximately 59 million tons of coal production (EIA, 2011c). These counties employed 8,268 miners, managers, and upper-level staff (EIA, 2011d). As shown in Figure 1, only five counties accounted for 85% of total state production: Greene County (46%), Washington County (18%), Somerset County (9%), Clearfield County (6%), and Armstrong County (6%) (EIA, 2011e).

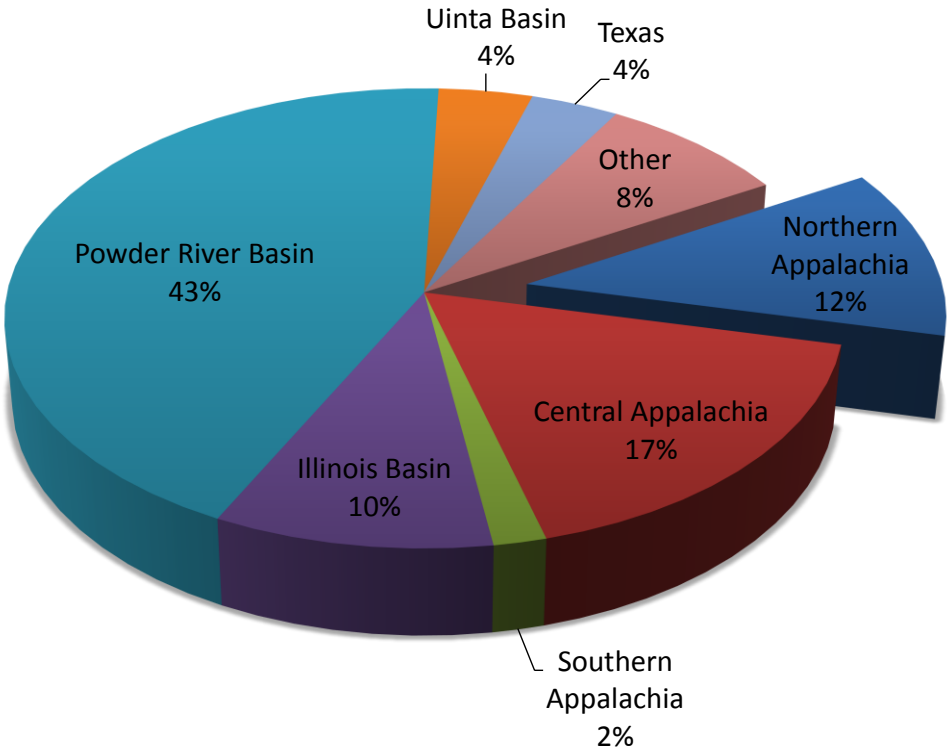
Figure 1: Pennsylvania's coal-producing counties and percent of total production by county, 2010



Source: EIA (2011e).

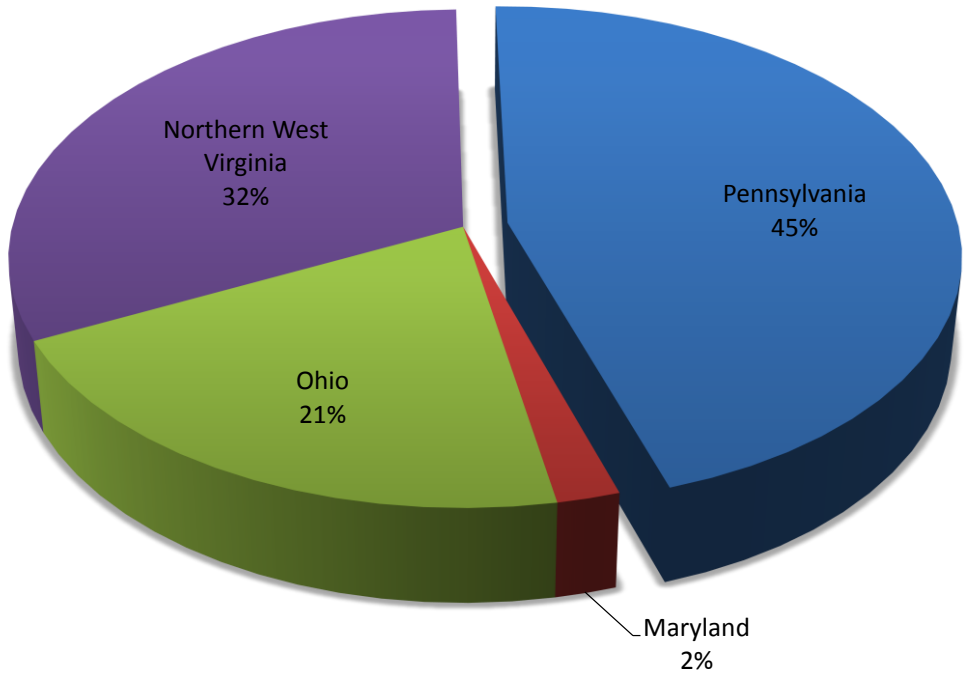
To put Pennsylvania coal production into perspective, in 2010, the Northern Appalachian coal basin accounted for 12% of total coal production in the United States (US) (see Figure 2). Of the 129.2 million tons of coal produced in the basin, Pennsylvania contributed 59.0 million tons, or approximately 45% of the total (see Figure 3). Overall, Pennsylvania accounted for approximately 5% of all coal produced in the US in 2010 (EIA, 2011c).

Figure 2: United States coal production by major basin, 2010



Source: EIA (2011c).

Figure 3: Northern Appalachian coal production by state, 2010



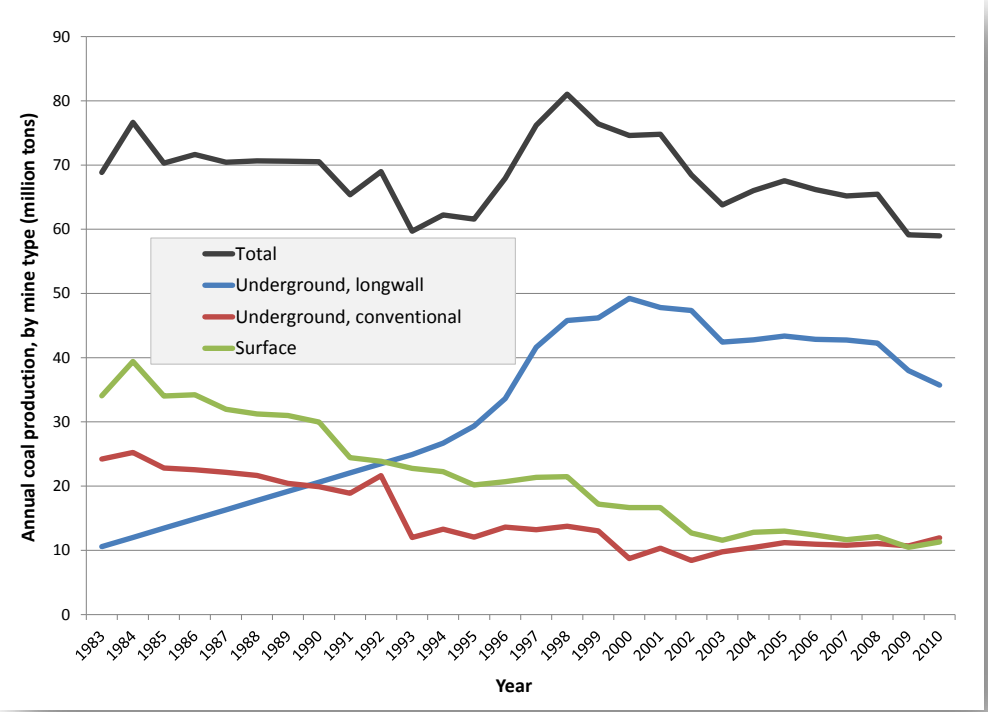
Source: EIA (2011c).

Of the coal produced in Pennsylvania, approximately 18.1 million tons were exported domestically to 23 states in 2010; exports to only four states—Ohio, Maryland, West Virginia, and Indiana—accounted for approximately 70% of the total domestic exports (EIA, 2011f). In the same year roughly 10.6 million tons were exported internationally (EIA, 2011g). In total, Pennsylvania exported approximately 28.7 million tons of coal in 2010, accounting for nearly half of total state coal production. The Commonwealth also imported over 19 million tons of coal in the same year, primarily for electricity generation.

1.2 Trends in coal production and employment

Pennsylvania's last peak in coal production occurred in 1998 at nearly 81 million tons, representing 7.3% of total US production. Since then, its share has fallen to 5.4%, and annual production has declined by 27%, reflected by the loss of 12 million tons of underground coal production and over 10 million tons of surface production (see Figure 4). Of the loss in underground mine production, 85% has been at longwall mines, even though longwall mining is generally the least expensive method of coal mining in Pennsylvania and is the most predominant mining method in terms of production. As a share of total coal production, longwall mining has declined from approximately 70% in 2002 to 60% by 2010 (EIA, 2011c; 2012a) (see Figure 5).

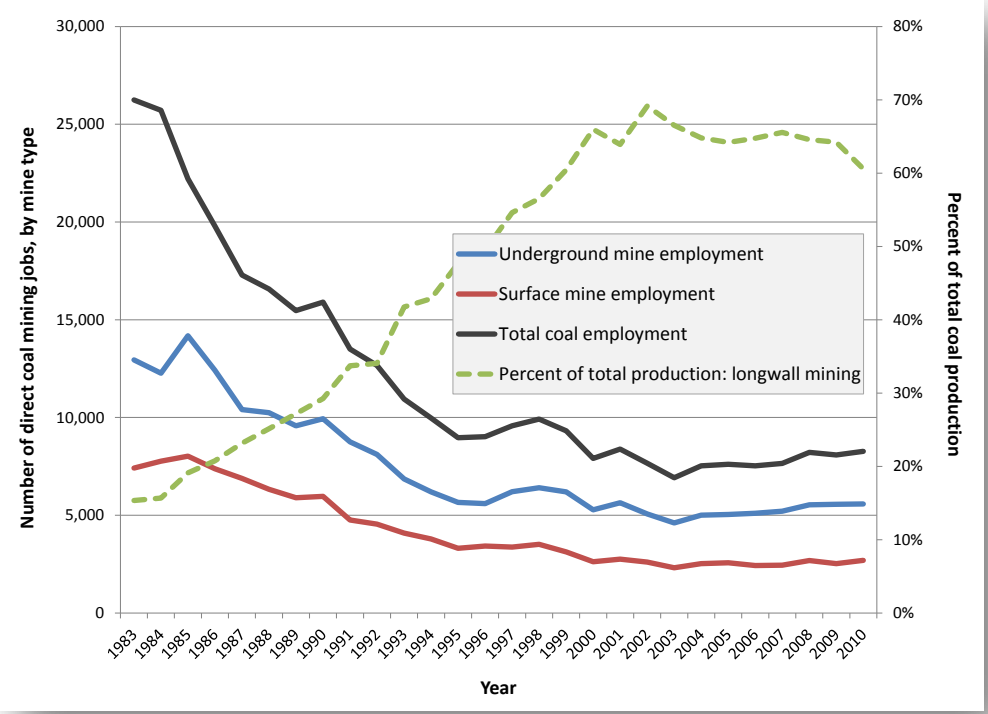
Figure 4: Coal production in Pennsylvania by mine type, 1983-2010



Source: EIA (2011c; 2012a).

Due to both a sharp decline in coal production since 1998 and the substantial growth in production from longwall mining since 1983, direct coal employment in Pennsylvania fell by 68% between 1983 and 2010 (see Figure 5). Declines in underground mining accounted for the majority of the drop in employment levels. Since reaching an all-time low for coal mining employment in 2004 at 7,524, employment has rebounded slightly, increasing to 8,268 in 2010, with gains at underground mines accounting for 77% of this increase (EIA, 2011d; 2012a).

Figure 5: Coal employment by mine type and longwall mining as percent of total production, 1983-2010



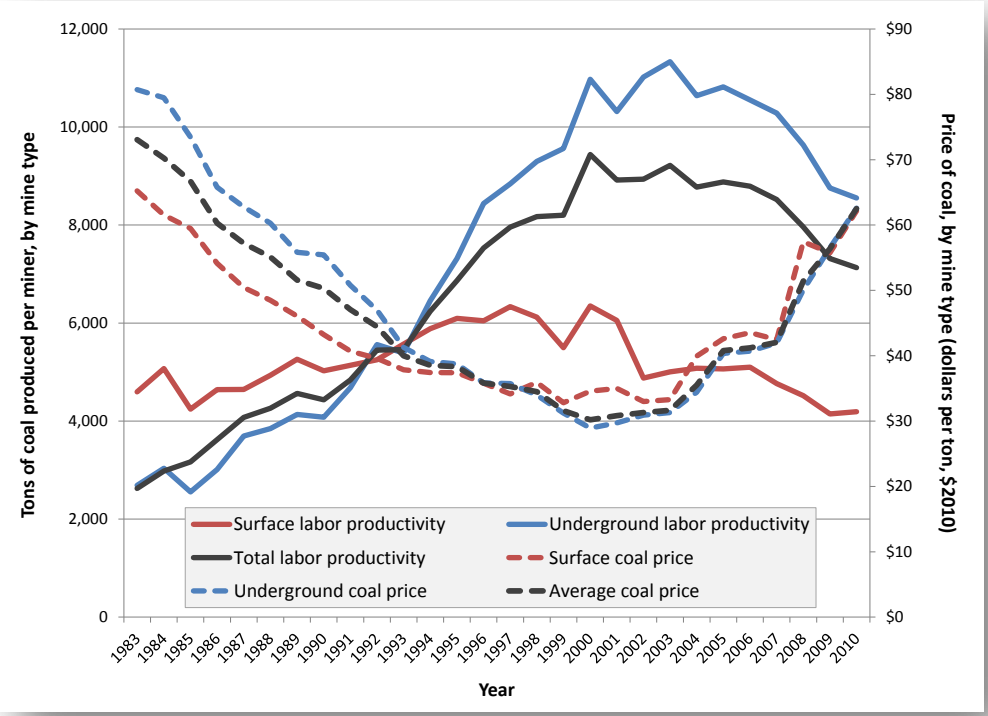
Source: EIA (2011d; 2012a).

The steady decline in Pennsylvania coal production since 1998 has coincided with a sharp increase in real prices (in 2010 dollars) for both surface and underground coal (see Figure 6) (Mellish, 2012). Between 1998 and 2010, the real price of surface-mined coal rose by 73%, while the real price of underground-mined coal rose by 84%. This rise in coal prices is largely the result of increased production costs for both mining types, which, in turn, is largely due to sharp declines in labor productivity, represented here as tons produced per miner.

The onset of the price increase for Pennsylvania coal closely corresponds with the beginning of the decline in labor productivity for both mining types. This pattern is significant because trends in labor productivity provide an indication of the accessibility and therefore the economic recoverability of the coal seams (McIlmoil and Hansen, 2010). For Pennsylvania coal mines, labor productivity for surface mining peaked in 2000, and productivity for underground mines peaked in 2003 (see Figure 6). Productivity for both mine types has declined sharply since their respective peak years, and this has had an impact on the price and competitiveness of Pennsylvania coal. Average labor productivity has declined by 24% since peak productivity in 2003, while the average real price of coal has increased by 107%, rising by $32.32 per ton over ten years.

As an illustration of the impact that rising coal prices have had on demand for (and therefore, production of) Pennsylvania coal, the rate of decline in production in the five years between 2005 and 2010 was 33% greater than the average rate of decline during the previous five years (2000-2005), meaning that through 2010 the decline in Pennsylvania coal production was accelerating.

Figure 6: Labor productivity and average coal prices, by mine type, 1983-2010



Source: Mellish (2012).

In summary, coal production and employment has diminished substantially in recent years, and recent trends in price and productivity suggest that the mining and use of Pennsylvania coal in the future may be more expensive. However, EIA projects that demand for Northern Appalachian coal is on the rise, with production expected to increase by 30% through 2020 as demand shifts northward from Central Appalachia (EIA, 2012b). Despite this projection, demand for Pennsylvania coal has been volatile and has gone through periods of growth and decline. Therefore, relying on coal to provide jobs and tax revenues for state and local economies leaves many areas vulnerable to the short-term shifts in demand. This is particularly true given the rapid growth in demand for natural gas extracted from the Marcellus Shale basin as well as the pending onset of tighter restrictions on emissions from coal-fired power plants. These realities, combined with the significant impacts on public health and the environment stemming from coal extraction, raise questions about Pennsylvania's priorities as they relate to economic policy and energy development, especially for the coal-producing counties situated throughout the state.

1.3 Focus and methodology

In this report, we examine the net impact of the coal industry on the Pennsylvania state budget by compiling data on and estimating both the tax revenues and the expenditures attributable to the industry for FY2010-11 (July 1, 2010 to June 30, 2011).[1] We rely heavily on official data sources, although in many cases it is necessary to generate our own estimates using what we determine to be the most appropriate methodology. For this report, we rely heavily on previous studies that addressed the same topic (Konty and Bailey, 2009; McIlmoil et al., 2010a and b). However, where previous methodologies are not applicable or where the data are limited, we construct the best possible methodology for estimating revenues or expenditures with available resources.

In calculating estimates for the items considered in this report that require an independent estimate, there is an inherent degree of uncertainty. In such cases, we do not claim that our accounting of revenues and expenditures is precise; in fact, we round calculation-based estimates so as not to create a false impression of precision. While these estimates certainly can and should be refined, they still provide an important starting place to examine the industry's costs and benefits.

In general, budget appropriations determine which programs, initiatives, and projects will receive state funding. More specifically, legislators distribute funds from the Pennsylvania state budget or provide tax subsidies based on politically and economically determined priorities, thereby impacting economic development in the Commonwealth, availability of educational opportunities, distribution and quality of infrastructure, and development of energy resources. 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 may be eliminated. Should the latter occur, legislators must determine Pennsylvania's true needs and priorities and generate new sources of revenue in order to maintain at least a minimum level of funding for vital social, environmental, and economic programs.

The need to ensure the availability of funds for vital programs is an important consideration when examining the net impact of a particular industry, and when 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 Pennsylvania state budget, we focus primarily on revenues and expenditures that are part of the General Fund (GF) and the Motor License Fund (MLF). We exclude non-discretionary funds that are earmarked for a specific purpose and only consider those that are applicable to the coal industry and its direct and indirect employees. We choose to focus on these two funds because they include revenues and appropriations from general state tax sources, while generally excluding revenues and appropriations from dedicated taxes and fees, federal revenues, and all other departmental revenue streams. This limitation allows us to accurately estimate the net impact of coal 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 the Commonwealth and (2) are not expended on pre-determined priorities.

In this report, we stray in a minor way from our previous reports, which calculate the revenues generated directly by the coal industry and do not calculate the indirect revenues—those contributed by the industries that supply coal companies with machinery, tools, equipment, or engineering services. These industries are supported in part by the coal industry, and they provide revenue for the state budget.

[1] While this report is being released during the 2012-13 Fiscal Year (FY), it focuses on the impact of the coal industry on the Pennsylvania state budget for FY2010-11. This is a result of the unavailability of certain 2011 and 2012 data that are essential for various sections of the report. Analyzing a more recent FY was not possible without making numerous additional assumptions based on recent trends.

For this report, to provide a more complete accounting of the revenues generated as a result of coal industry activity, we include those tax revenues contributed by supporting industries. Because we do not also estimate the associated cost to the state for supporting or regulating these industries, we essentially give the coal industry extra credit for its overall contribution. However, just as with the coal industry, the state expends funds to regulate and support the industries that supply equipment and provide services to coal companies.

For coal-related employment, we estimate the full fiscal impact of both direct coal employees—those working for the coal companies—and of indirect coal-related employment—or, employment that is indirectly supported by coal industry activity, such as in supply industries. We include state expenditures for supporting coal-related employees to assess both the benefits and costs of such employment. Further, we examine the impact of indirect employment because recent accountings of the jobs supported by coal include both the direct and the indirect jobs (Pennsylvania Economy League of Southwestern Pennsylvania, LLC, 2010), and it is therefore necessary to provide an accounting of both the revenues and state expenditures associated with indirect coal-related employment.

Finally, the report excludes an analysis of the impact of the coal industry on county budgets; however, an initial accounting of county-level coal-related revenues is provided in Appendix A.

1.4 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 or expenditure. These include:

- direct revenues generated by the coal industry from 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 the coal industry in the form of 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 general, we find that the relative importance of the coal industry to the state budget and economy is not substantial: The industry directly accounted for 0.1% of state-generated revenues and approximately 0.1% of total employment in FY2010-11. **Further, we find that the industry imposed a net cost on the Pennsylvania state budget of approximately $164.9 million.**

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 also be considered. Understanding these costs is important because of their potential impact on the availability of funds for various beneficial priorities, and because of their future impact on local and state economies, the environment, and the health of Pennsylvania residents. In Section 7, we analyze the legacy costs related to the reclamation of abandoned mine lands (AMLs) and bond forfeiture sites (BFSs) and the lasting impacts of longwall mining.

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, p. 7). This report aims to help develop that understanding for Pennnsylvania and to inform future policy related to energy and economic development.

2. DIRECT COAL INDUSTRY: REVENUES

The coal industry and related mining support activities generate revenue for the Pennsylvania state budget through the payment of taxes that contribute to the GF. Such taxes include the corporate net income tax (CNIT), (non-motor vehicle) sales and use tax and the capital stock/foreign franchise tax (CSFT). Coal and other mining companies are exempt from paying sales taxes on fuels used in mining processes; therefore, coal companies do not contribute tax revenues to the MLF. Fuel and transportation-related taxes and fees contributed by coal-related employees are estimated in Sections 5.1 and 6.1.

Coal companies also contribute to "special funds" (e.g., the Surface Mining Conservation and Reclamation Fund) and to individual agency budgets through the payment of other taxes, licenses, and fees. However, because the Pennsylvania General Assembly may only make discretionary appropriations from the GF, special fund revenues and expenditures are excluded from this analysis.

Data provided by the Pennsylvania Department of Revenue (PDR) report that coal companies contributed $10.9 million to Pennsylvania's GF in FY2010-11 (Gill, 2012). Additionally, using PDR data for tax revenue contributions from all companies classified under the "Support Activities for Mining" category, it is estimated that revenues generated by coal mining support activities contributed an additional $15.6 million (see Section 2.1) (Gill, 2012).

In total, coal-related activities contributed $26.5 million to the GF in FY2010-11, accounting for 0.1% of total GF tax revenues (see Table 1). This small contribution to the state budget illustrates the coal industry's minor role in the Commonwealth's economy. The total consisted of $10.9 million from CNIT revenues, $8.6 million in non-motor vehicle sales and use tax remittances, and $7.0 million from CSFT revenues.[2]

Table 1: Pennsylvania General Fund revenues attributable to coal-related activities, FY2010-11

Tax item	Direct coal (million $)	Coal support (million $)	Total coal (million $)	Percent of coal revenues	Percent of General Fund
Corporate net income tax	$1.2	$9.7	$10.9	41%	0.04%
Sales and use tax	$4.6	$4.0	$8.6	33%	0.03%
Capital stock/foreign franchise tax	$5.1	$1.9	$7.0	26%	0.03%
Total	**$10.9**	**$15.6**	**$26.5**	**100%**	**0.10%**

Source: Gill (2012). Note: Total GF tax revenues amounted to $26.5 billion in FY2010-11 (Pennsylvania Office of the Budget, 2012).

In addition to direct taxes paid to the Commonwealth, the coal industry generates additional revenue for city, school district, and county budgets through the payment of mineral property taxes. These revenues provide funding for local needs, particularly education. In some states, such revenues indirectly benefit the state budget as a portion of local educational funding is guaranteed by the state. In other words, local property tax revenues in these states reduce demand on state funds for local education funding. However, the same is not true in Pennsylvania, where any loss in local revenues is made up through an increase in property tax rates (Kelley, 2012a). Therefore, we do not include local property taxes on coal resources in our accounting of the coal industry's contribution to the Pennsylvania state budget. However, county-level revenues from property taxes on coal are considered in Appendix A.

[2] Tax "remittances" are transfers to the state of taxes paid by a purchaser and collected by a dealer. In the case of coal, coal companies sell products or services to a purchaser, collect the sales tax from the purchaser, and "remit" the tax revenues to the state. Therefore, the remittances do not reflect taxes paid by coal companies; such data is unavailable. The sales tax remittances are included in this report since they remain attributable to the coal industry. This is described further in Section 2.3.

2.1 Tax contributions from support activities for coal mining

Data provided by PDR included coal-related tax revenues for North American Industry Classification System (NAICS) categories 2121 ("Coal Mining") and 2131 ("Support Activity for Mining"). Revenue values for "Coal Mining" represent the actual tax revenues contributed by coal companies. However, the revenue values for "Support Activities for Mining" represent taxes paid by companies supporting not only coal mining but also the extraction of natural gas, oil, and non-fuel minerals such as sand, gravel, and gemstones.

Therefore, for the purposes of this report, it is necessary to estimate the share of tax revenues generated by all mining support activities that are associated with coal mining. To do this, it is assumed that since each of the tax revenues analyzed apply equally to all industries, then each industry's proportional share of revenues equate to its proportional share of gross production value.[3] As illustrated in Table 2, the gross production value of coal mined in Pennsylvania accounted for approximately 44% of the total gross production value of all fuel and non-fuel minerals extracted in 2010.[4]

Table 2: Estimated production value by mining industry, 2010

Industry	Production (2010)	Unit	Average price	Gross production value (million $)	Percent total "mining"
Coal	59,655,026	short tons	$62.51	$3,729.0	44%
Natural gas	572,902,000	1,000 cubic feet	$5.10	$2,921.8	35%
Non-fuel minerals	various	various	various	$1,530.0	18%
Oil	3,474,000	barrels	$69.80	$242.5	3%
Total				**$8,423.3**	**100%**

Source: Production and price for coal from Mellish (2012) and for natural gas and oil from EIA (2012c through f). Total production value for non-fuel minerals from USGS (2011). Notes: Amounts rounded to the nearest hundred thousand dollars. Natural gas wellhead prices for Pennsylvania are not available. Therefore, wellhead price was estimated by calculating the ratio of average wellhead prices to city gate prices for the US and applying this ratio to the city gate price reported by EIA for Pennsylvania in 2010. Wellhead prices are the more appropriate price value to use because they more closely reflect the raw production price of the natural gas.

Therefore, it is estimated that support activities for coal mining accounted for 44% of all tax revenues contributed to the GF by all companies that support mining in Pennsylvania. According to PDR, companies that support mining provided $35.3 million of tax revenues to the GF in FY2010-11 (Gill, 2012). **Applying 44% to the total, we estimate that coal-related support activities contributed $15.6 million to the GF (as reported in Table 1).**

[3] As illustrated in Table 2, gross production value is calculated as the product of total production and average unit price for each commodity. It represents the total "gross" value of the commodity produced over a given time period, and does not include any value added.

[4] Data for 2010 are used to approximate each industry's share of gross production value for FY2010-11. Ideally, an average of 2010 and 2011 values would be calculated; however, 2011 data are not yet available.

2.2 Corporate net income tax

In Pennsylvania, "domestic and foreign corporations are subject to the corporate net income tax for the privilege of doing business, carrying on activities, having capital or property employed or used in Pennsylvania; or owning property in Pennsylvania" (PDR, 2012a). The rate of the tax is 9.99% of a corporation's federal taxable income before any federal deductions are taken.

According to the 2012-2013 Executive Budget, revenues from the CNIT amounted to $2.1 billion in FY2010-11, accounting for 8% of all GF tax revenues. The CNIT is also the largest source of revenue from taxes on corporations (Pennsylvania Office of the Budget, 2012). However, revenues from the tax can vary year-to-year due to fluctuations in corporate profitability (which typically declines during a recession), the availability and use of state tax credits and deductions (which, unlike federal deductions, can be used to reduce taxable income), and the timing of final state tax payments based on when a corporation's tax year begins (Pennsylvania Office of the Budget, 2012).

Data provided by PDR report that coal companies paid a total of $1.2 million in CNIT taxes in FY2010-11, which accounted for less than 0.1% of all CNIT revenues (Gill, 2012). Using PDR data for CNIT revenues from the NAICS 2131 classification, we estimate that companies conducting support activities for coal mining contributed an additional $9.7 million, accounting for approximately 0.5% of total CNIT revenues.

Overall, coal-related activity generated $10.9 million in CNIT revenues for the GF in FY2010-11, amounting to less than 1% of total CNIT revenues and less than 0.1% of total GF revenues from state taxes.

2.3 Sales and use tax remittances

All corporations and individuals making purchases in the Commonwealth pay the state sales and use tax. This tax is imposed on "the retail sale, consumption, rental or use of tangible personal property in Pennsylvania" as well as "on certain services relating to such property and on the charge for specific business purposes" (PDR, 2012b). PDR reports that items exempt from the tax include unprepared food, clothing, computer services, sales for resale and residential heating fuels such as oil, electricity, gas, coal and firewood. The Pennsylvania sales and use tax rate is 6% of the sales price.

The sales and use tax serves as the second largest source of tax revenue for the GF. In FY2010-11, revenue from the sales and use tax on items other than motor vehicles amounted to $7.5 billion and accounted for 28% of the Commonwealth's total GF revenue (Pennsylvania Office of the Budget, 2012). PDR does not track sales and use tax revenue by purchaser; therefore, the agency does not report sales and use tax revenue paid to the state via coal industry purchases. PDR does, however, track taxable sales by dealer (seller), meaning that the agency collects data on sales and use tax revenue remitted to the state via coal company and support activity sales to other parties. In effect, our reported coal-related sales and use tax revenue reflects an indirect source of revenue attributable to coal.

Data provided by PDR report that coal companies remitted a total of $4.6 million in sales and use taxes in FY2010-11, which accounted for less than 0.1% of all non-motor vehicle sales and use tax revenues (Gill, 2012). Using PDR data for sales and use revenues from the NAICS 2131 classification, we estimate that companies conducting support activities for coal mining contributed an additional $4.0 million, accounting for less than 0.1% of non-motor vehicle sales and use tax revenues.

Overall, coal-related activity generated $8.6 million in sales and use tax revenues for the Pennsylvania GF in FY2010-11, amounting to approximately 0.1% of total non-motor vehicle sales and use tax revenues and less than 0.1% of total GF revenues from state taxes. Workers directly and indirectly employed by the coal mining industry also pay sales and use taxes; these are estimated in Sections 5.1 and 6.1.

2.4 Capital stock/foreign franchise tax

The CSFT is a tax "imposed on corporations with capital stock, joint-stock associations, limited liability companies, business trusts and all other entities classified as corporations for federal income tax purposes that were formed or do business in Pennsylvania" (PDR, 2012c). As noted by PDR, each of these two taxes is imposed on a corporation's capital stock value.

During the FY2010-11 period, the CSFT tax rate stood at 2.89 mills—or $2.89 for every $1,000 of capital stock value (Pennsylvania Office of the Budget, 2012). However, for the stated reason of bolstering the competitiveness of Pennsylvania businesses, previously enacted reductions to the tax rate continue to be implemented, and the tax is set to be entirely eliminated at the end of calendar year 2013 (Pennsylvania Office of the Budget, 2012).

For FY2010-11, CSFT revenue amounted to $819.4 million and accounted for approximately 3% of total GF revenues from state taxes (Pennsylvania Office of the Budget, 2012).

Data provided by PDR report that coal companies directly contributed $5.1 million in CSFT revenue to the GF in FY2010-11, which accounted for less than 1% of all such revenues but constituted 46% of total revenues paid by coal companies (Gill, 2012). Using PDR data for sales and use revenues from the NAICS 2131 classification, we estimate that companies conducting support activities for coal mining contributed an additional $1.9 million, also accounting for less than 1% of CSFT revenues.

Future of the CSFT and state revenues from coal

The CSFT generated $819.4 million in revenue in FY2010-11, accounting for 17% of all corporation taxes and 3% of all GF revenues from state taxes. Due to the phase-out of the tax, total revenue from the tax is projected to decline to $0 by FY2015-16. Without an increase in taxes elsewhere, the loss of over $800 million in state tax revenue will have a significant impact on funding for state programs.

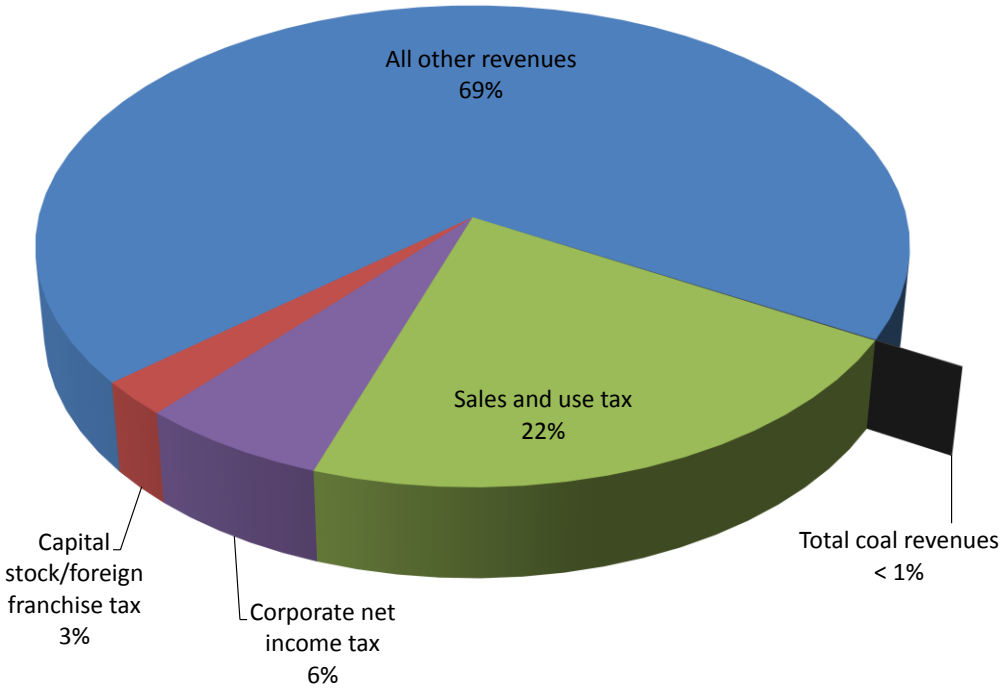
In addition, 26% of current revenues contributed by coal mining and support activities result from the CSFT, amounting to $7.0 million in FY2010-11. Therefore, the elimination of the CSFT will reduce the coal industry's overall benefit to the state budget.

Overall, coal-related activity generated $7.0 million in CSFT revenues for the GF in FY2010-11, amounting to approximately 1% of total CSFT revenues and less than 0.1% of total GF revenues from state taxes.

2.5 Summary

In sum, the coal industry directly contributed an estimated $10.9 million in direct tax revenues to the GF in FY2010-11, while support activities for coal mining generated an additional $15.6 million. **Therefore, the total benefit to the Pennsylvania state budget stemming from coal-related taxes amounted to approximately $26.5 million in FY2010-11, representing only 0.1% of total GF revenues from state taxes.**

Figure 7: Coal-related and other tax revenues making up the General Fund, FY2010-11



Source: Gill (2012); Pennsylvania Office of the Budget (2012). Note: the general tax revenues represented in this figure (CNIT, CSFT, etc.) do not include the coal-related revenues in the total values for each tax.

While only a minor component of total GF revenue, contributions from coal do support a variety of the Commonwealth's fiscal priorities. However, as an industry that has a significant impact on human health, the environment, and infrastructure—coal also imposes costs on the state budget. In other words, as a result of the existence of the coal industry, the state spends money to both support and regulate the industry, as well as to repair roads and bridges damaged by heavy coal trucks. These expenditures can be understood as "on-budget" expenditures financed through the GF and MLF, and are assessed in the following section.

3. DIRECT COAL INDUSTRY: ON-BUDGET EXPENDITURES

The Pennsylvania state budget includes numerous expenditures that exist only because of the state's coal industry. These expenditures include a wide range of activities and include, for example, environmental protection, clean-up, and restoration; oversight of mining activities; and the repair and maintenance of roads and bridges damaged by coal trucks.

Some on-budget coal-related expenditures are paid for using state GF and MLF revenues, while others are paid for using federal funds or revenues from special funds. In this section, we focus on expenditures from the GF and MLF only. These two sources of funding are the focus of both our revenue and expenditure calculations.[5]

Teasing out the precise amount of state coal-related expenditures from the GF and MLF 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, we can only estimate coal-related expenditures using available information. While this method is rough for several agencies, it is a valuable first step toward including not just revenues, but expenditures as well when discussing the impact of the coal industry in Pennsylvania. Our estimates can—and should—be refined in future analyses.

In some cases, entire units of state government exist only because the coal industry exists; in these cases, on-budget expenditures can be calculated relatively easily. For example, the Pennsylvania Bureau of Abandoned Mine Reclamation (BAMR) within the Pennsylvania Department of Environmental Protection (PDEP) is entirely focused on the coal industry. In other cases, however, a unit of government might spend only part of its 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. Additionally, the Pennsylvania Department of Transportation (PDOT) spends state money from the MLF to repair and maintain roads and bridges damaged by heavy coal trucks; these costs are not detailed separately in government documents.

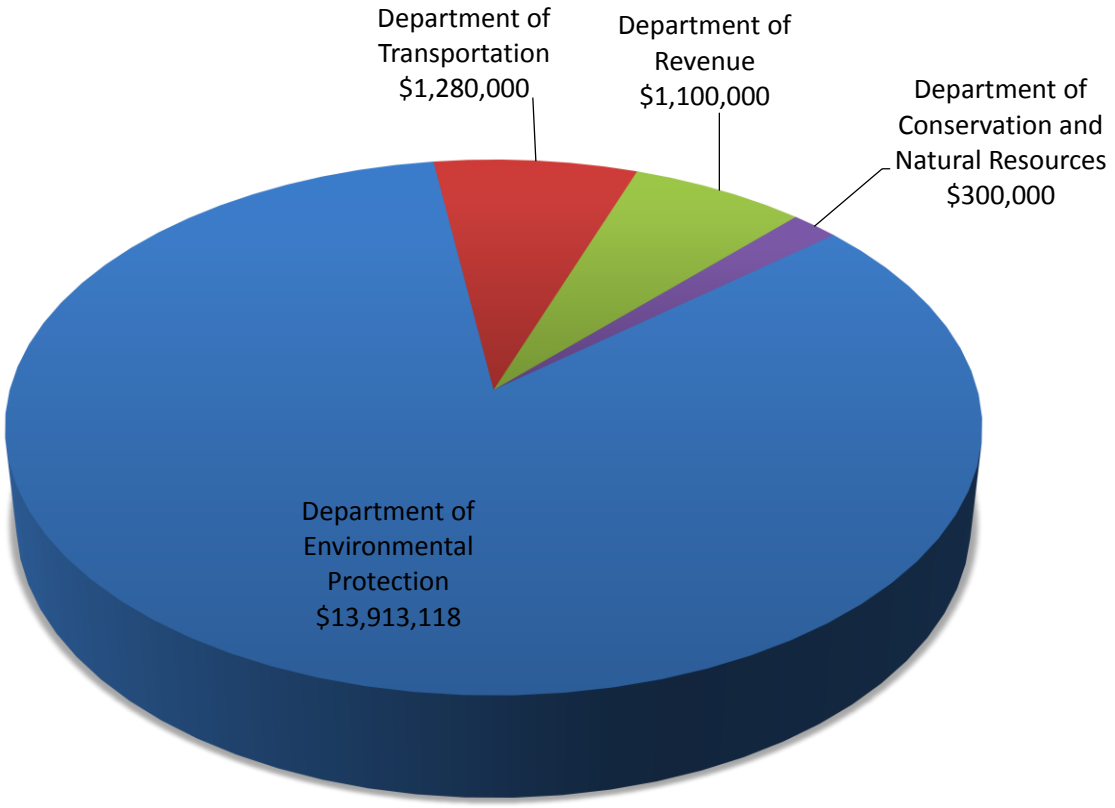
Our estimates for on-budget expenditures are based on actual FY2010-11 expenditure data and appropriation data from the state budget (Smith, 2012; Pennsylvania Office of the Budget, 2012). With available data and information, we estimate a percentage of each division's GF expenditures that are attributable to coal, and apply that percentage to produce a FY2010-11 coal-related expenditure. As shown in Figure 8, we estimate on-budget coal expenditures of $15.3 million, not including the cost of coal haul trucks on roads and bridges. The most significant on-budget expenditures are within PDEP.

State expenditures for replacing, repairing, and maintaining roads and bridges damaged by the operation of overweight coal trucks are estimated using an entirely different method, described in Section 3.1. We estimate these expenditures at $1.3 million.

In total, we estimate that on-budget expenditures attributable to the coal industry amounted to approximately $16.6 million for FY2010-11.

[5] We discuss some key special funds that are related to coal; however, these figures are not included in our tally of revenues and expenditures.

Figure 8: On-budget direct coal industry expenditures



Source: Estimated in this report.

3.1 Department of Environmental Protection

PDEP undertakes numerous activities that, in whole or in part, are tied to the coal industry. **As summarized in Table 3, GF expenditures tied to coal amount to an estimated $13.9 million in FY2010-11.**

Table 3: Department of Environmental Protection coal-related General Fund expenditures

Unit within PDEP	Total	Percent coal	Estimated coal-related
Office of Active and Abandoned Mine Operations			
Bureau of Mine Safety	$6,749,810	90%	$6,070,000
Bureau of Mining Programs	$899,253	30%	$270,000
Bureau of District Mining Operations	$9,346,745	30%	$2,800,000
Bureau of Abandoned Mine Reclamation	$2,553,118	100%	$2,553,118
Subtotal	**$19,548,926**	**60%**	**$11,693,118**
Bureau of Point and Non-Point Source Management	$14,974,719	5%	$750,000
Environmental Hearing Board	$1,578,000	21%	$330,000
General Government Operations	$12,830,000	9%	$1,140,000
Total	**$48,931,645**	**28%**	**$13,913,118**

Source: Totals from Smith (2012) except Environmental Hearing Board and General Government Operations, which are estimated in this report. Percent coal estimates from this report. Note: Amounts in the table are rounded to the nearest $10,000 when estimated.

3.1.1 *Office of Active and Abandoned Mine Operations*

Within PDEP, the Office of Active and Abandoned Mine Operations (OAAMO) is directly tied to coal mining. Four mining-related bureaus comprise OAAMO and are described in turn below: Bureau of Abandoned Mine Reclamation, Bureau of District Mining Operations, Bureau of Mining Programs, and Bureau of Mine Safety.

Bureau of Mine Safety

According to the Pennsylvania Bureau of Mine Safety (BMS):

> The Bureau of Mine Safety's mission is to reduce the possibility of accidents in the underground mines and commercial operations and to protect the property connected therewith, to provide for the health and safety of the miners and contribute to the public safety in relation to deep mining activities (BMS, 2012a).

BMS's services include mine inspection, emergency response, training, engineering and plan approval, accident investigations, equipment approvals, and certification and forms (BMS, 2012b). According to a January 2012 listing of active mining permits for coal mines and industrial mineral mines, 90% of all active underground mines are coal-related (BMP, 2012a through c).

Assuming that 90% of BMS's permitting activities and therefore expenditures are coal-related**, we estimate that in FY2010-11, of the total state-funded GF expenditures of $6.7 million (Smith, 2012), approximately $6.1 million was spent on the coal industry.**

Bureau of Mining Programs

Within OAAMO, the Pennsylvania Bureau of Mining Programs (BMP) handles programmatic issues related to mining. Permits are issued by the Bureau of District Mining Operations, described in a separate section.

BMP's 12 programs and services include, for example:

- coal ash beneficial use,
- permitting for coal,
- areas unsuitable for mining,
- mine subsidence insurance,
- underground mining, and
- remining incentives (BMP, 2012d).

In addition to coal mines, BMP also devotes resources toward non-coal mines and quarries for industrial minerals. These include, for example, soil, sand, gravel, clay, shale, slate, and sandstone (PDEP, 2012a). In fact, according to a January 2012 listing of active mining permits for coal mines and industrial mineral mines, 30% of active mines are coal-related (BMP, 2012a through c).

While BMP performs a wide range of activities related to mining, we estimate—based on the proportion of total permits issued for coal mines—that it focuses about 30% of its effort on coal mines. **Using this method, we estimate that of the $0.9 million in BMP expenditures from the GF in FY2010-11 (Smith, 2012), approximately $0.3 million was spent on the coal industry.**

Bureau of District Mining Operations

Also within OAAMO, the Pennsylvania Bureau of District Mining Operations (BDMO) reviews and issues mining and National Pollutant Discharge Elimination System (NPDES) permits for coal mines. BDMO's six district offices include: California, Cambria, Greensburg, Knox, Moshannon, and Pottsville. The Bureau's state-funded GF expenditures in FY2010-11 totaled $9.4 million (Smith, 2012).

We use the same method as described for BMP to estimate that 30% of BDMO's expenditures are coal-related, and **Based on this method, we estimate that in FY2010-11, approximately $2.8 million was spent on the coal industry.**

Bureau of Abandoned Mine Reclamation

The Pennsylvania Bureau of Abandoned Mine Reclamation (BAMR) oversees the abandoned mine reclamation program and addresses: "mine fires, mine subsidence, dangerous highwalls, open shafts and portals, mining impacted water supplies and other hazards which have resulted from past coal mining practices" (BAMR, 2012).

Reclamation is still required on numerous coal mines that were abandoned before the 1977 Surface Mining Control and Reclamation Act (SMCRA) was enacted. Without reclamation and water treatment at coal mines, the landscape will remain scarred, health and safety threats will remain, and streams and rivers will continue to be polluted. For a more substantial description of abandoned mine and reclamation issues facing Pennsylvania, see Section 7.

The federal government collects a fee on every ton of coal mined and provides funding for abandoned mine clean up. While these federal funds constitute the majority of funds spent by BAMR, in FY2010-11, BAMR also spent $2,553,118 in state-funded GF expenditures (Smith, 2012). **We estimate that this entire expenditure, $2,553,118, was directly related to the coal industry.**

3.1.2 *Bureau of Point and Non-Point Source Management*

Within PDEP, the Pennsylvania Office of Water Management (OWM) plans, directs, and coordinates programs associated with the management and protection of the water resources within Pennsylvania. Among of other things, these programs involve surface and groundwater quantity and quality planning; soil and water conservation; and policies, procedures, and regulations that influence public water supplies, wastewater treatment plants, other point source discharges, encroachments upon waterways and wetlands, dam safety, earth disturbance activities, stormwater, and nonpoint source pollution (OWM, 2012).

This section focuses on one of OWM's five bureaus: the Bureau of Point and Non-Point Source Management. In FY2010-11, this Bureau spent nearly $15.0 million from the GF (Smith, 2012). **As a lower bound, we estimate that 5% of its expenditures are coal-related, resulting in an estimated GF expenditure of $0.8 million attributable to coal.**

3.1.3 *Environmental Hearing Board*

The Pennsylvania Environmental Hearing Board (EHB) hears appeals of orders, permits, licenses, certifications, or decisions by PDEP. In addition, EHB hears appeals of certain letters that require specific actions on the part of a recipient as well as civil penalty assessments (Long, 2006). Many cases before the Board are coal-related; of these, some may be brought by coal companies and others may be brought by people or organizations.

EHB's docket in 2010 and 2011 included 364 cases; of these, 77 cases, for 21% of the total, clearly involve a coal company (EHB, 2012). The Board's expenditures from the GF in FY2010-11 amounted to an estimated $1.6 million, assuming all appropriated funds were expended (Pennsylvania Office of the Budget, 2012). **We estimate that 21% of EHB's GF expenditures, or about $0.3 million, are coal-related.**

3.1.4 *General Government Operations*

PDEP spends funds on general government operations that direct and support the department's programs. Expenditures for these operations from the GF in FY2010-11 amounted to an estimated $12,830,000 of state funds, assuming all appropriated funds were expended (Pennsylvania Office of the Budget, 2012).

We estimate PDEP general government operations expenditures on coal by calculating the percent of total PDEP expenditures from GF revenues that are spent to support and regulate the coal industry, not including for general government operations. In other words, we estimate that PDEP spent $12.8 million of its GF-sourced funds to support and regulate the coal industry in FY2010-11, while total PDEP expenditures from GF funds amounted to approximately $143.7 million. Therefore, we calculate that coal's share of PDEP expenditures on General Government Operations amounted to 9%. **Applying this percentage to PDEP's total government operations expenditures, we estimate that PDEP's General Government Operations related to coal resulted in a GF expenditure of $1.1 million in FY2010-11.**

3.2 Department of Transportation

According to its 2012 Fact Book, PDOT oversees programs and policies affecting highways, urban and rural public transportation, airports, railroads, ports, and waterways (PDOT, 2012), and its mission is to "provide a safe and sustainable transportation system with services that enhance Pennsylvania's communities and economy" (PDOT, 2010a, p. I).

PDOT expenditures from state revenue sources amounted to approximately $1.8 billion in FY2010-11 (Pennsylvania Office of the Budget, 2012). State-sourced revenues for the MLF come from the liquid fuels tax, motor licenses and fees, and lesser MLF revenues. Transportation funds are used for a variety of purposes, including highway and safety administration, planning, aviation and rail freight, local and area transportation, and driver and vehicle services, among others (PDOT, 2012).

The Commonwealth's road system spans approximately 120,000 miles, of which nearly 40,000 miles are owned by PDOT and 78,000 miles by local municipalities (PDOT, 2012). Many industries rely on these roads for transporting goods and materials that are extracted, manufactured, and sold within and outside of the state. Much of the transport of materials and goods often occurs in heavy trucks, which cause greater damage to roads and bridges than other vehicles.

The transport of coal is one such example. A minimum of 9.9 million tons of coal mined in Pennsylvania were transported by truck as the primary mode of transportation in 2010, accounting for 21% of all coal distributed (EIA, 2012f).[6] Most coal, however, was transported by rail, with 30.2 million tons being transported from the mine by rail, accounting for 63% of all coal distributed. The heavy reliance on rail for the transportation of coal in Pennsylvania helps avoid truck damage to roads and bridges located within or near coal-producing counties. However, the coal trucks that do operate are heavy and have a disproportionate impact on road infrastructure.

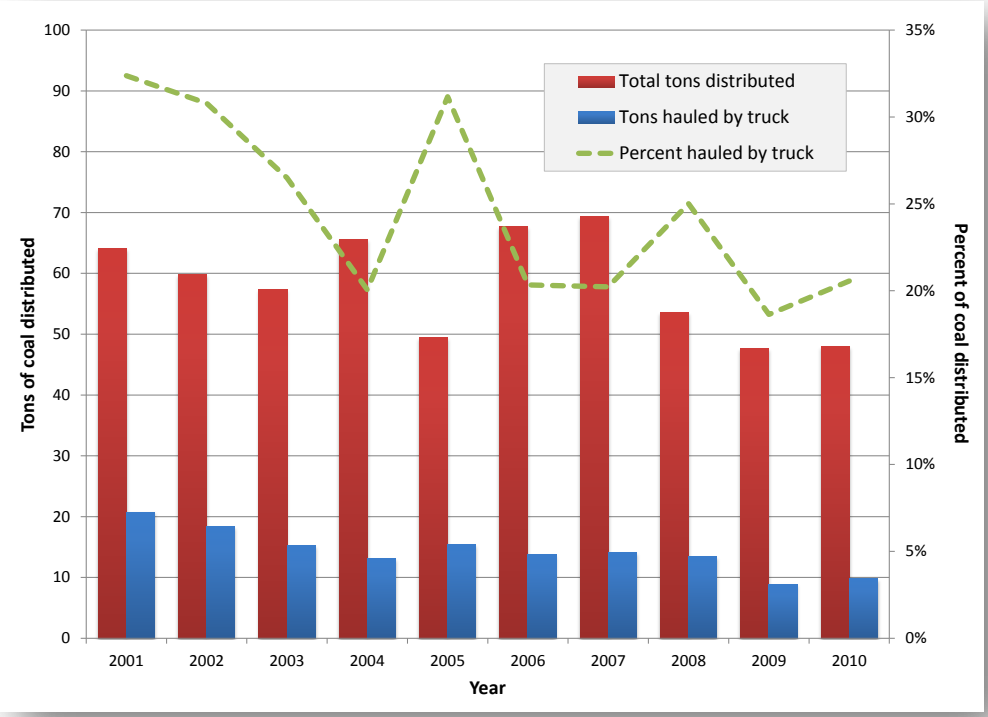
In Pennsylvania, haulers carrying raw coal can operate at a gross vehicle weight (GVW) of up to 95,000 pounds if they obtain a special permit (PDOT, 2008). However, the standard limit for tri-axle single or combination trucks, such as coal trucks, is 73,280 and 80,000 pounds GVW, respectively. Heavy trucks impose extra strain on roadways, resulting in the accelerated degradation of the roads and bridges over which the trucks travel, thereby requiring extra maintenance and more frequent and costly repair to the roads. The strain on roadways—and, therefore, the cost and required frequency of repair—increases exponentially with weight (Virginia Department of Transportation, 2011). The strain can be measured by looking at equivalent single-axle loadings (ESALs).

[6] There is a discrepancy with coal shipment data reported in EIA Form 923, which reports that 15.9 million tons of Pennsylvania coal were shipped by truck to electric utilities in 2010 (EIA, 2012g).

One ESAL is defined as the damage caused to the pavement by the passing of one 18,000-pound single-axle vehicle (PDOT, 2010b). ESALs are important because they allow comparisons of potential road damage from different types and weights of trucks. A typical six-axle combination coal truck (three-axle tractor, three axle trailer) produces 1.24 ESALs at a GVW of 80,000 pounds (WVDOH, 2002). In other words, the strain on roads resulting from a coal truck operating at a GVW of 80,000 pounds is approximately 24% greater than that from a single-axle 18,000-pound truck. The degree of road damage depends on various factors, which include pavement type and existing pavement condition, and other research has concluded that 80,000 pound trucks can have an ESAL of 2.0 or more (Informa Economics, 2009; Ohio Department of Transportation, 2009).

Damage to roads and bridges from the operation of coal haul trucks is an issue of significance for coal-producing counties. In Pennsylvania, the tons of coal distributed by truck, as well as the percent of total coal production transported by truck relative to other forms of transportation, has been generally declining since 2001, dropping from 20.7 million tons and 32% of total distribution, to approximately 9.9 million tons and 21% of distribution as of 2010 (EIA, 2011f; 2012h) (see Figure 9).

Figure 9: Total coal distributed and coal distributed by truck in Pennsylvania, 2001-2010



Source: EIA (2011f; 2012h).

In this section, we estimate the additional expenditures from the MLF for FY2010-11 that were attributable to the transport of coal by truck in the state's top ten coal-producing counties, which together accounted for 96% of the state's coal production in 2010. The first step in estimating these expenditures is to estimate total daily vehicle miles traveled (DVMT) by coal trucks in Pennsylvania's coal-producing counties. To do so, we use the following methodology:

1. Using state data for road mileage and total DVMT (PDOT, 2012), we estimate the proportion of total DVMT that was traveled on local municipally-owned roads in each of the ten coal counties.
2. We then apply the average statewide percent truck traffic as reported by PDOT during peak travel times (roughly 6.75%) to generate an estimate for DVMT by truck on municipally owned roads for each county (PDOT, 2010c).
3. Finally, we sum the county totals and multiply that value by coal's share of gross production value for extracted minerals (44%), as reported in Section 2.1, to estimate the total DVMT for coal trucks.[7]

Using this method, we estimate that coal trucks accounted for approximately 137,500 DVMT in 2010. This amounts to roughly 0.3% of all DVMT for municipally-owned roads.

We then use the estimated coal truck DVMT value as a starting point for estimating state transportation expenditures from the MLF for repairing roads and bridges damaged by coal trucks in FY2010-11. This is conducted using the following methodology:

1. We first calculate the amount of PDOT funds from state revenue sources that were allocated to the construction, repair, and maintenance of local, municipal, and county roads. Of the nearly $1.8 billion spent on transportation from state funds, approximately $293.1 million were allocated for local purposes (Pennsylvania Office of the Budget, 2012).
2. Then, we apply the coal truck share of total DVMT on municipal roads to state expenditures for local purposes, and estimate that $833,000 was spent on repairing roads and bridges damaged by coal trucks. Two adjustments to this estimate are then required.
3. The first adjustment corrects for the fact that heavy coal trucks impose greater damage on roads. To make this correction, we multiply the estimated expenditure of $833,000 by the ESAL value of 1.24 for six-axle trailer trucks noted previously. This results in a new estimated expenditure of $1.0 million.
4. The second adjustment corrects for the fact that only ten of the 27 coal-producing counties were included in the analysis. According to EIA, the ten counties we surveyed accounted for only 81% of total shipments of Pennsylvania coal by truck to coal-fired power plants in 2010. Therefore, we divide the ESAL-adjusted expenditure estimate by 81% to produce a final estimated expenditure.

Using this methodology, we estimate that $1.3 million in state funds were used to repair roads and bridges damaged by heavy coal trucks in FY2010-11.

[7] Lacking any other data or information to use for our calculation, we assume that all truck travel represents travel by trucks hauling extracted fuel and non-fuel mineral products.

3.3 Department of Revenue

PDR "collects all tax levies as well as various fees, fines and other monies due the commonwealth," and its mission is to "administer the tax laws of the commonwealth in a fair and equitable manner" (Pennsylvania Office of the Budget, 2012). As for all taxpayers, PDR administers various taxes related to the coal industry, as described in Section 2. State-funded GF expenditures (excluding tax refunds) for PDR in FY2010-11 were $182.8 million (Smith, 2012).

Using federal Bureau of Economic Analysis (BEA) data for GDP by industry in 2010 (BEA, 2012), we estimate that 0.6% of the state's total non-governmental GDP is attributable to coal mining. We assume that this percentage represents a proxy for PDR's relative workload related to the coal industry, and we apply this percentage to total PDR GF expenditures. **Using this method, we estimate approximately $1.1 million as coal-related PDR GF expenditure in FY2010-11.**

3.4 Department of Conservation and Natural Resources

3.4.1 *Bureau of Topographic and Geologic Survey*

Within the Pennsylvania Department of Conservation and Natural Resources (PDCNR), the Pennsylvania Bureau of Topographic and Geologic Survey's (BTGS's) mission is "to serve the citizens of Pennsylvania by collecting, preserving, and disseminating impartial information on the Commonwealth's geology, geologic resources, and topography in order to contribute to the understanding, wise use, and conservation of its land and included resources" (BTGS, 2012a).

While BTGS was at one time primarily focused on coal and petroleum resources, it has diversified its efforts to produce geologic maps; develop datasets and reports on groundwater; provide information to help avoid geologic hazards such as earthquakes, sinkholes, landslides, and radon gas; and create topographic base maps for online viewers (PDCNR, Undated). Despite this diversification, BTGS continues its coal-related research and reports. For example, it recently published six coal availability reports for specific quadrangles in Pennsylvania, which calculate how much coal remains available for extraction. BTGS also produces coal resource reports that include information on bedrock geology, structure, coal resources, and extent of past surface and underground coal mining (BTGS, 2012b). Its Web site also includes several coal resources maps, which include coal crop lines and structure contours (BTGS, 2012b).

In FY2010-11, BTGS spent $4.3 million in state expenditures from the GF (Smith, 2012). To estimate the percentage of BTGS's expenditures related to coal, we apply the percentage of publications released in 2010-2012 that are directly related to coal. Two of 27 publications, or approximately 7%, are related to coal. These include one in 2011 (a database of coalbed methane wells) and one in 2012 (a map of bedrock geology and coal resources) (PDCNR, 2012). **Applying the percent coal estimate of 7% to $4.3 million, we therefore estimate $0.3 million in coal-related GF expenditures for FY2010-11 for BTGS.**

3.5 Academic institutions

The Pennsylvania budget dedicated $1.4 billion to the general fund for higher education in FY2010-11 (Pennsylvania Office of the Budget, 2012). Of this, $479 million was appropriated to Pennsylvania State University (PSU) and University of Pittsburgh (Pitt). Both of these institutions have significant academic programming and research related to coal mining, safety, and technology. Due to difficulties in obtaining annual reports from coal research centers and in estimating GF expenditures on coal-specific programs, we do not estimate these expenditures for this report. However, this section provides a brief description of each of the pertinent coal-related programs. It is important to note that the state does spend monies supporting these programs, and that without coal in the state, it is doubtful that this programming would exist.

Pennsylvania State University

In FY2010-11, PSU was the recipient of 22% of higher education funding from the GF (Pennsylvania Office of the Budget, 2012). PSU has several coal-related academic programs, coal research facilities, and numerous research faculty members specializing in coal-related topics. For instance, the College of Earth and Mineral Sciences is home to several undergraduate and graduate academic programs dedicated to mining and coal research: the Mining Engineering Program, the Program in Energy and Mineral Engineering, and the Coal Science and Technology Program. In addition, at least five research faculty members focus on coal-related topics, including: mine safety, mine reclamation, mine operations management, and mine design. The Energy Institute, "one of the leading coal research institutes internationally," is one of two National Research Centers in Coal, and its Coal Sample Bank and Database "supplies coal to coal-researchers around the world" (PSU, 2012a). In addition, PSU's Miner Training Program provides mine safety courses for Pennsylvania mining companies and miners and offers training programs for Mine Safety and Health Administration (MSHA) inspectors (PSU, 2012b).

Pennsylvania State University—Fayette, the Eberly Campus

PSU's Fayette campus, located in the Pittsburgh metropolitan area, has an average enrollment of 1,100 students, most of whom are local residents. This campus offers four bachelor degree programs and nine associate degree programs. This includes a mining technology associate degree, which "is designed to prepare front-line foremen and supervisors in the mining industry" (PSU, 2012c). Students at the Fayette campus can also complete the first two years of PSU programs, including coal-related programs at the College of Earth and Mineral Sciences.

University of Pittsburgh

Pitt is one of the nation's oldest universities. In FY2010-11, Pitt received 11% of higher education funds from the GF (Pennsylvania Office of the Budget, 2012). Pitt has a Mining Engineering Program within its Swanson School of Engineering that offers mining engineering courses and awards students Mining Engineering Certificates. "Located in the heart of a region with a long and rich coal mining history," Pitt's Center for Energy devotes a portion of its research to coal (Pitt, 2012a). Along with Carnegie Mellon University and West Virginia University, Pitt has "pledged to work together to focus on making coal a more efficient and less polluting energy source" (Pitt, 2012a). In addition, Pitt hosts the annual International Pittsburgh Coal Conference and has an active student chapter of The Society of Mining Engineers (Pitt, 2012b).

3.6 Summary

Regulation of and support for the coal industry, combined with repairing roads and bridges damaged by heavy coal haul trucks, cost the state an estimated $16.6 million in FY2010-11. Of this total, $15.3 million was expended from the GF and $1.3 million from the MLF.

Of the on-budget expenditures, those from PDEP are most substantial, amounting to an estimated $13.9 million in FY2010-11. This is because PDEP expends significant financial resources for overseeing and regulating the coal industry.

Table 4: Estimated net direct impact of the coal industry on the state budget (million $)

Item	General Fund	Motor License Fund	Total
Direct industry revenues	$26.5	$0.0	$26.5
On-budget expenditures	($15.3)	($1.3)	($16.6)
Estimated net impact	**$11.2**	**($1.3)**	**$10.0**

Note: Totals may not equal sum of parts due to rounding.

As shown in Table 4, the net impact of the direct coal industry on the state budget amounted to an estimated benefit of $10.0 million for FY2010-11. This estimate considers only the direct revenues and on-budget expenditures attributable to coal. The estimated net impact is comprised of a net benefit to the GF of $11.2 million and a net cost to the MLF of $1.3 million.

These numbers are rough estimates; however, in considering the revenues generated by an industry, it is important to also consider the costs, as we have done in this section. These numbers can be refined in the future, and they provide a starting point for comparing revenues versus expenditures.

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 made available to the coal industry; these off-budget expenditures are discussed in the following section.

4. DIRECT COAL INDUSTRY: OFF-BUDGET EXPENDITURES

We estimate off-budget expenditures from the Pennsylvania state budget in the form of tax expenditures. The Governor's Executive Budget defines tax expenditures as "a reduction in revenue that would otherwise be collected by the commonwealth as the result of an exemption, reduction, deduction, limitation, exclusion, tax deferral, discount, refund, commission, credit, special rate, or special treatment" (Pennsylvania Office of the Budget, 2012, p. D4). The purpose of tax expenditures is to "confer special treatment to specific taxpayers, specific activities, or specific goods and services" (Pennsylvania Office of the Budget, 2012, p. D4).

In other words, Pennsylvania recognizes that tax expenditures represent a cost to state budget in the form of reduced state revenues. The state also recognizes that tax credits and exemptions are provided to certain taxpayers in order to confer special preference for some activities and industries—such as coal mining or the consumption of coal for electricity generation—over others. According to the Executive Budget document, these are the top two criteria for what defines a tax expenditure and are the most relevant for this report (Pennsylvania Office of the Budget, 2012, p. D4).

The fiscal impact of a tax expenditure can generally be equated with the amount of revenue lost that would have otherwise been generated in the absence of the credit or exemption. However, the Executive Budget cautions against this conclusion: "estimated revenue foregone due to a tax expenditure should not be construed as the revenue that could be gained if the tax expenditure provision were to be rescinded in legislation" (Pennsylvania Office of the Budget, 2012, p. D5). The most relevant reason given for this is that changes in taxpayer behavior resulting from changes in the tax law are unknown, meaning that if a certain exemption were rescinded for a particular industry such as manufacturing, the additional tax revenues gained might be offset by a reduction in manufacturing activity resulting from higher taxes. The reduction in activity could then result in the loss of other tax revenues generated by the manufacturing industry.

It is important to note that this is a theoretical scenario posited by the Executive Budget document. Despite referring to the tax expenditure section as a "comprehensive tax expenditure analysis" that permits "an ongoing evaluation of each tax expenditure," this document also states that "no attempt has been made" to account for the revenue impact of possible changes in taxpayer behavior (Pennsylvania Office of the Budget, 2012, p. D4-D5). In other words, the Commonwealth provides no evidence or analysis showing that rescinding any particular tax expenditure would result in a net negative impact on state revenues.[8] Therefore, the only information provided from which conclusions may be drawn about the fiscal impact of each tax expenditure are the estimates of foregone revenue reported in the Executive Budget.

As such, in this section we use the reported tax expenditure estimates for FY2010-11 in order to estimate coal mining-specific tax expenditures, and we assume that the estimated expenditures represent the full fiscal impact of the expenditures for the Pennsylvania state budget. Some tax expenditures supporting coal are not included in the budget's tax expenditure analysis. For these we generate estimates for this report. For the expenditures included in the tax expenditure analysis, the Executive Budget reports the following:

1. estimated costs associated with each tax expenditure;
2. actual or estimated costs of administering each tax expenditure; and
3. actual or estimated numbers and descriptions of benefitted taxpayers.

[8] In relation to extraction industries such as coal mining, recent studies suggest that taxpayer behavior changes little, if any, in response to changes in tax rates. For instance, a review of numerous studies analyzing the impact of tax rates on energy production found that tax rates have little impact on production, while significantly reducing state tax revenue (O'Leary, 2011). The same study found the inverse to be true as well—that higher production taxes on oil and gas had only a small effect on production but resulted in substantial increases in state revenue (O'Leary, 2011). A primary explanation given is that taxes represent only a small part of the overall cost of doing business—particularly for extraction industries that experience lower-than-average tax liabilities—and that wages and transportation costs can have a greater impact on production than changes in tax rates (O'Leary, 2011). In the case of coal, prices—and therefore, to a large extent, demand and production—are predominantly determined by domestic and foreign markets, not taxes.

The tax expenditures identified as being available to all corporations operating in Pennsylvania and that include coal companies are as follows:

1. employment incentive payments,
2. job creation tax credit,
3. alternative energy production tax credit (only starting in FY2011-12),
4. sales factor apportionment weight tax reduction,
5. CNIT exemption for limited liability companies (LLCs), and
6. apportionment formula and deduction from capital stock/foreign franchise tax liability.

For this report, only tax expenditures specifically designed to support extractive industries such as coal mining are analyzed. The expenditures listed above apply generally to all corporations and businesses and are excluded because they do not provide preferential treatment to companies engaged in mining. However, it is useful to note these expenditures because they can reduce the tax liability for many coal companies.

The tax expenditures available specifically to either all extraction companies or specifically to coal companies, and which will be discussed or analyzed in this section, are as follows:

1. tax exemption for the purchase and use of coal;
2. "direct use" tax exemption for mining equipment, machinery, and pollution control devices;
3. tax exemption for fuel and energy used in mining;
4. tax exemption for leases for the production or extraction of coal, oil, natural gas, or minerals;
5. pollution control device tax exemption; and
6. coal waste removal tax credit.

Finally, it is important to note that the use of coal for electricity generation is also subsidized through the provision of tax credits and exemptions for electric utilities, many of which purchase coal as a fuel for generating electricity. However, this report views electricity generation as an activity separate from coal production because electricity can be generated using a variety of fuels and technologies; therefore, tax expenditures that specifically support electricity generation are not considered in this report.

In total, tax expenditures supporting the Pennsylvania coal industry amounted to approximately $161.9 million in FY2010-11 (see Table 5). Of this, approximately $144.4 million impacted the GF and the remaining $18.5 million impacted the MLF—in terms of foregone revenue. Based on this estimate, we conclude and tax expenditures supporting the extraction and use of coal in Pennsylvania represent a significant source of foregone revenue for the GF and MLF. Additionally, not including revenues from support industries, the value of the expenditures exceeds the coal industry's total tax revenue contribution to the state budget by $150.9 million.

Table 5: Off-budget expenditures supporting the Pennsylvania coal industry

Tax expenditure	Applicable taxes	Coal-related expenditure (million $)	Percent of total
Tax exemption for purchase and use of coal	Sales and use taxes	$117.7	73%
"Direct use" tax exemption for mining equipment, machinery, and pollution control devices	Sales and use taxes	$25.7	16%
Tax exemption for fuel and energy used in mining	Liquid fuels/fuels taxes	$18.5	11%
Tax exemption for leases for the production or extraction of coal, oil, natural gas, or minerals	Realty transfer tax	nominal	0%
Pollution control device tax exemption	CSFT	nominal	0%
Coal waste removal tax credit	CSFT, CNIT	$0.0	0%
Total off-budget tax expenditure supporting coal		**$161.9**	**100%**

4.1 Sales and use tax exemptions

4.1.1 *Exemption for purchase or use of coal*

The purchase or use of coal is exempt from the Pennsylvania sales and use tax. As noted in the budget, "This exemption provides special tax treatment of coal versus alternative energy forms," and "other major energy sources are exempt only when used directly by the purchaser for residential use" (Pennsylvania Office of the Budget, 2012, p. D47). The exemption is provided explicitly for the purpose of promoting coal consumption and, by extension, production and coal mining employment: "Encouragement of coal consumption may have been perceived as providing or preserving employment when mining was a major employer within the commonwealth" (Pennsylvania Office of the Budget, 2012, p. D47). The budget document estimates that approximately 130,000 households and 3,400 businesses benefit from the exemption, but does not provide an estimate for the number of coal mining jobs that may be supported as a result of the expenditure.

For FY2010-11, the Executive Budget estimates the cost of the sales and use tax exemption for coal to be $117.7 million. This is a substantial cost for the Pennsylvania state budget, amounting to nearly a 2% reduction in total sales and use tax revenues.

4.1.2 *"Direct use" exemption for mining equipment, machinery, and pollution control devices*

The Pennsylvania state code provides an exemption from the sales and use tax for "tangible personal property or services performed thereon by a person engaged in the business of mining…if the property is predominantly used directly by the person in mining operations."[9] To determine whether property or services qualify as "direct use," the state takes into account the physical proximity of the property to the production process in which it is used; the proximity of the time of use of the property to production processes that precede and follow its use; the active causal relationship between the use of the property in question and the production of the mined product; and whether property used in two different activities is "predominantly" used for an activity directly related to mining.[10]

Qualifying property generally includes "machinery, equipment, parts and foundations thereof, and supplies which are used in the actual mining production, to transport or convey the product or production personnel, or to handle or store the product during the production," as well as repair parts that are installed and become an integral part of the property.[11] Specific property items exempt from the tax include:

1. digging and extracting equipment, machinery and tools, and earthmoving equipment and machinery used to remove the overburden in strip mining;
2. blasting and dislodging equipment and supplies;
3. drainage pumps, pipes, valves, fittings, and packing;
4. timber (props), roof-bolts and roof-bolting machines and their accessories, roof jacks, torque wrenches, and impact tools used to test roof bolts and make them secure;
5. rock dust and rock-dusting equipment;
6. trolley and mine telephones used predominantly in mining activities;
7. ventilation equipment used to extract impure air and extend production operations to the mine face;
8. transportation devices and equipment used to haul coal from the mine to the preparation plant, tipple, or breaker;
9. lighting equipment and supplies used to light production activities;
10. protective devices worn by production personnel in their work;
11. preparation plant machinery and equipment;
12. waste extraction and removal equipment and machinery used in production operations;

[9] 61 Pa. Code §32.35.
[10] "Predominant use" is defined as whether a mine operator makes use of the property more than 50% of the time directly in mining operations.
[11] 61 Pa. Code §32.35.

13. water well drilling rigs, bits, drills, casings, casing covers, and lubricants;
14. machinery and equipment—such as dozers and graders—and materials—such as fill, seedlings, grass seed, shrubs, stone, concrete, and soil nutrients—used in backfilling and reclamation of underground shafts, stripping pits, and other directly used mining facilities when required by law; and
15. pollution control devices.

The tax expenditure analysis in the budget document does not provide an estimate for, much less mention, the direct use exemption for mining activities. Further, PDR was unable and unwilling to generate an estimate of the cost of this tax expenditure. Therefore, we estimate the value of this exemption for this report.

To generate an estimate of the direct use exemption for property used in coal mining operations we begin with US Census Bureau data for the value of capital expenditures (except land and mineral rights) for the Pennsylvania coal industry in 2007—the last census year for which data are available. Capital expenditures are defined by the US Census Bureau as "permanent additions and major alterations as well as new and used machinery and equipment used for replacements and additions to plant capacity" (US Census Bureau, 2012). Expenditures include work done on contract as well as by coal mine operators. Expenditures cover the costs of assets leased from other entities and expenditures made during the year for the development and exploration of mineral properties. Excluded expenditures include the costs of maintenance and repairs and capital expenditures for land and mineral rights.

For 2007, capital expenditures for the Pennsylvania coal industry amounted to $448.1 million. To estimate a value for 2010, we first adjust the 2007 value in order to reflect the decline in coal production from 2007 to 2010, which is assumed to approximate a decline in the need for capital expenditures on mining equipment and other property. Between 2007 and 2010, Pennsylvania coal production declined by approximately 9.6% (EIA, 2011c; 2012a). Therefore, the production-adjusted capital expenditure value for 2010 is $405.3 million. However, a second adjustment is required in order to account for inflation.

To account for inflation, we use 2007 and 2010 Consumer Price Index (CPI) data for "All items less energy," which better reflects the value of goods and services not subject to the volatility of energy prices. The CPI value in 2010 is 220.458, while that for 2007 is 208.925 (BLS, 2012). Dividing the two results in a ratio of 1.055, meaning that inflation from 2007 to 2010 amounted to 5.5%. Applying this inflation rate to the production-adjusted value results in a new adjusted value for coal industry capital expenditures of approximately $427.7 million.

To estimate the value of the direct use exemption for the Pennsylvania coal industry, and therefore the cost to the state budget, we apply the sales and use tax rate of 6% to our estimate of coal-related capital expenditures in 2010. **Using this method, we estimate that the cost of providing the direct use exemption to support coal extraction amounted to $25.7 million in FY2010-11.**[12]

4.1.3 *Exemption for fuel and energy used in mining*

In addition to the direct use exemption for machinery and equipment used in mining, Pennsylvania allows for a direct use exemption from taxes on fuels and energy for the purchase or use of "steam, natural and manufactured gas and electricity, through a metered device; bottled gas; fuel oil; or kerosene" for a number of entities and industries.[13] Among the included industries are mining industries. As with the direct use exemption for mining machinery and equipment, PDR was unable and unwilling to generate an estimate of the cost of this tax expenditure. Therefore, we estimate the value of this exemption for this report.

[12] Given that production and CPI data are unavailable for 2011, we use the 2010 estimate to represent the tax expenditure for FY2010-11.
[13] 61 Pa. Code §32.25

To estimate the cost of the exemption for liquid fuels used in coal mining processes, we begin with the 2007 value for "Purchased fuels consumed" by "Mining, quarrying, and oil and gas extraction" industries in Pennsylvania: $219 million (BEA, 2012). We then follow the same methodology use in Section 4.1.2 to estimate coal's share of the fuel costs and adjust the value to reflect coal's fuel expenditures for 2010. Using this method we estimate that the coal industry spent approximately $92.5 million on liquid fuels such as diesel and gasoline in 2010. However, this value must be further adjusted to estimate the number of gallons purchased. To do so, we use the average 2010 per-gallon price of $3.112 for diesel fuel for Central Atlantic states (EIA, 2012i), and divide total fuel expenditures by this price in order to estimate the gallons of fuel consumed. The resulting value amounts to approximately 29.7 million gallons.

The tax on liquid fuels consists of two components: a 12 cent/gallon excise tax and a 26.1 cent/gallon oil company franchise tax (PDR, 2012d). Therefore, the total combined tax on diesel fuel in 2010 amounted to $0.381 per gallon. To estimate the value of the liquid fuels tax expenditure supporting the coal industry we multiply the tax rate by the number of gallons used by the industry in 2010. Using this method, we estimate the value of the liquid fuels tax expenditure at $11.3 million for FY2010-11.

To estimate the value of the expenditure for purchases of electricity, we begin with BEA's reported value for total electricity consumed by all mining industries in Pennsylvania for 2007, which amounts to over 1.8 billion kilowatt-hours (kWh). We then apply coal's share of total gross production value for mining as reported in Section 2.1 (44%) to estimate total electricity consumption for the coal industry, which amounts to 810 million kWh. We then adjust this value as before based on the change in production and estimate that the coal industry consumed 731.3 kWh of electricity in 2010. The alternative fuels tax rate for electricity in 2010 was $0.0093 per kWh (PDR, 2012e). Therefore, the unadjusted value for this exemption is estimated at $6.8 million. Applying the CPI adjustment factor of 5.5%, we arrive at a final estimated expenditure. Using this method, we estimate the value of the electricity fuel tax expenditure at $7.2 million for FY2010-11.

Overall, we estimate that the total tax expenditure for the exemption of fuels and energy used in coal mining amounted to $18.5 million in FY2010-11.

4.2 Realty transfer tax exemption for the production or extraction of coal, oil, natural gas or minerals

For transfers or leases of realty (including land and minerals), Pennsylvania imposes a 1% realty transfer tax on the value of the realty "conveyed, transferred, demised or released" by one party unto another.[14] However, certain transactions are excluded from the tax, including leases for the production or extraction of fossil fuels and minerals.[15] The stated purpose of the exemption is to "give tax relief to the mining and extracting industries to produce and extract coal, oil, natural gas, and minerals at a lower cost" (Pennsylvania Office of the Budget, 2012, p. D83).

While it notes the existence and purpose of the exemption, the Executive Budget document does not provide estimates of the cost of the exemption for any given year. However, BEA reports a total capital expenditure on land and mineral rights for all mining industries in 2007 of $9.1 million (BEA, 2012). Using the method described in Section 4.1.2 for the direct use exemption, and applying the realty transfer tax rate of 1%, we estimate that the value of the tax expenditure on the coal industry for FY2010-11 amounted to $40,000. **Given the low value of this expenditure, we report its value as nominal for the purposes of this report.**

[14] 61 Pa. Code §91.111
[15] 61 Pa. Code §91.193(b)22

4.3 Corporate tax exemptions

4.3.1 *Pollution control device tax exemption*

Companies employing or utilizing pollution control or abatement devices "for the benefit of the general public" in any given tax year are allowed a deduction from their CSFT tax liability. Each device must be certified by PDEP before the exemption is claimed.[16] For FY2010-11, PDR reports the total cost of the exemption at less than $100,000 (Pennsylvania Office of the Budget, 2012).

Therefore, we assume that the exemption taken by coal companies, if any, would be insignficant relative to the value of other exemptions provided to the coal industry, and we report the value of the exemption as nominal. However, it is useful to note the availability of the exemption.

4.3.2 *Coal waste removal tax credit*

Pennsylvania offers a tax credit for "qualifying expenditures on facilities producing fuels from coal, culm or silt" (Pennsylvania Office of the Budget, 2012, p. D11). The credit can be used against the sales and use tax, CNIT, and/or the CSFT. The total credit value is capped at $18 million per year, and the credit is set to expire on January 1, 2013.

According to the Executive Budget document, "this tax credit provides an incentive for taxpayers to develop facilities dedicated to the production of synthetic fuels within [the] Commonwealth while removing coal waste from the environment" (Pennsylvania Office of the Budget, 2012, p. D11). The credit does not necessarily benefit only coal producers because any entity could produce synthetic fuels using coal waste.

The Executive Budget estimates the cost of the tax credit for FY2010-11 to be zero. Because the budget document rounds to the nearest $100,000, it is unknown whether the actual cost of the credit is greater than zero. For the purposes of this report, we assume that this tax credit does not have a fiscal impact on the Pennsylvania state budget.

[16] 61 Pa. Code §155.11

4.4 Summary and analysis

While the coal industry benefits the Pennsylvania state budget and Commonwealth residents through the provision of jobs and tax revenue, the Commonwealth, in turn, supports the industry through the provision of tax credits and exemptions, resulting in foregone GF and MLF revenue. **This foregone revenue represents a real and significant cost to the state—a cost amounting to approximately $161.9 million in FY2010-11.**

This cost alone nearly accounts for the full net fiscal cost of the coal industry for Pennsylvania, as estimated in this report (see Table 15). Additionally, it is nearly 15 times the total GF revenues generated by the coal industry (not including support activities) in FY2010-11: $10.9 million (see Section 2). As a result, the balance of direct industry revenues and off-budget expenditures represents a net cost to the state of approximately $150.9 million.

Looking at it from another perspective, the estimated total tax expenditure is nearly ten times the estimated on-budget expenditures for supporting and regulating the coal industry and repairing transportation infrastructure damaged by heavy coal trucks: $16.6 million (see Section 3). This is significant because it means that the on-budget expenditures for supporting coal could be recouped through the collection of the otherwise foregone revenues detailed in this section.

Despite the scale of this cost, data on the impact of these tax expenditures for the coal industry or any other mining industry operating in the Commonwealth are incomplete. This is exemplified in two ways. First, the tax expenditure analysis omits or neglects various tax expenditures, including the sales and use tax exemptions for machinery, equipment, and pollution control devices directly used in mining-related processes. Second, the analysis fails to provide estimates for some of the tax expenditures it does describe, such as the realty transfer tax for the production of fossil fuels and minerals. Additionally, while the analysis in the Executive Budget notes that tax expenditures are "initiated, expanded, limited or deleted based on merit," the actual analysis of each expenditure fails to present any evidence or conclusions pertaining to the merit or effectiveness of the expenditure. Therefore, we conclude that the tax expenditure analysis fails to reflect what the document itself calls a "comprehensive tax expenditure analysis," and as such, the analysis falls far short of permitting "an on-going evaluation of each tax expenditure" (Pennsylvania Office of the Budget, 2012, p. D4).

A prime example of this is the description and "analysis" of the sales and use tax exemption for coal, which accounts for 73% of the total tax expenditure supporting the coal industry in FY2010-11. The Executive Budget analysis includes the non-committal statement that "encouragement of coal consumption may have been perceived as providing or preserving employment when mining was a major employer within the commonwealth" (Pennsylvania Office of the Budget, 2012, p. D47). As mining is no longer a major employer in Pennsylvania (see Sections 5 and 6), this statement itself suggests that the expenditure has failed to achieve its intended purpose—to provide or preserve employment in the coal industry.

Other than this suggestive statement, the Executive Budget analysis fails to draw any conclusions whatsoever about the effectiveness of sales and use tax exemption for coal, other than to state that approximately 130,000 households and 3,400 businesses benefit from the expenditure. No explanation is given as to how these entities benefit, and no recognition is made that coal mining employees, not households and businesses, were the intended beneficiaries. Further, key questions that the analysis fails to raise include whether or how the expenditure preserves existing coal employment, whether supporting coal over other alternative energy forms continues to provide a net benefit to the state in terms of employment or otherwise, and whether the cost of the expenditure is justified considering the resulting benefits—which, again, are only vaguely stated and are unrelated to the suggested intention of the tax exemption.

Overall, Pennsylvania may be losing tens to hundreds of millions of dollars in potential revenue to support coal and other mining industries through tax expenditures that fail to achieve their intended purpose, and as such impose a significant cost on the state budget and other taxpayers.

The value of the off-budget tax expenditures suggest that coal production has historically been and continues to be a priority for the state. However, tax expenditures provided to an industry that has a net negative impact on the state budget require considerable attention given the scale of potential offshoot impacts from the expenditures. For instance, the revenue lost through the provision of ineffective tax credits and exemptions may hinder the Commonwealth's ability to fund vital programs and services or, conversely, may shift the tax burden onto other sectors of the population and business community. Further, subsidizing coal to the detriment of other energy sources may in fact inhibit or depress the growth of new industries that may provide a greater economic benefit per dollar of tax expenditure.

Coal's overall fiscal impacts include benefits at the local level—which are summarized in Appendix A—as well as direct and indirect employment and tax revenue for the state stemming from such employment, which we estimate in the next two sections. These benefits should be considered in any analysis of the impact of state tax expenditures supporting coal, as should the full range of actual and potential costs of the tax expenditures.

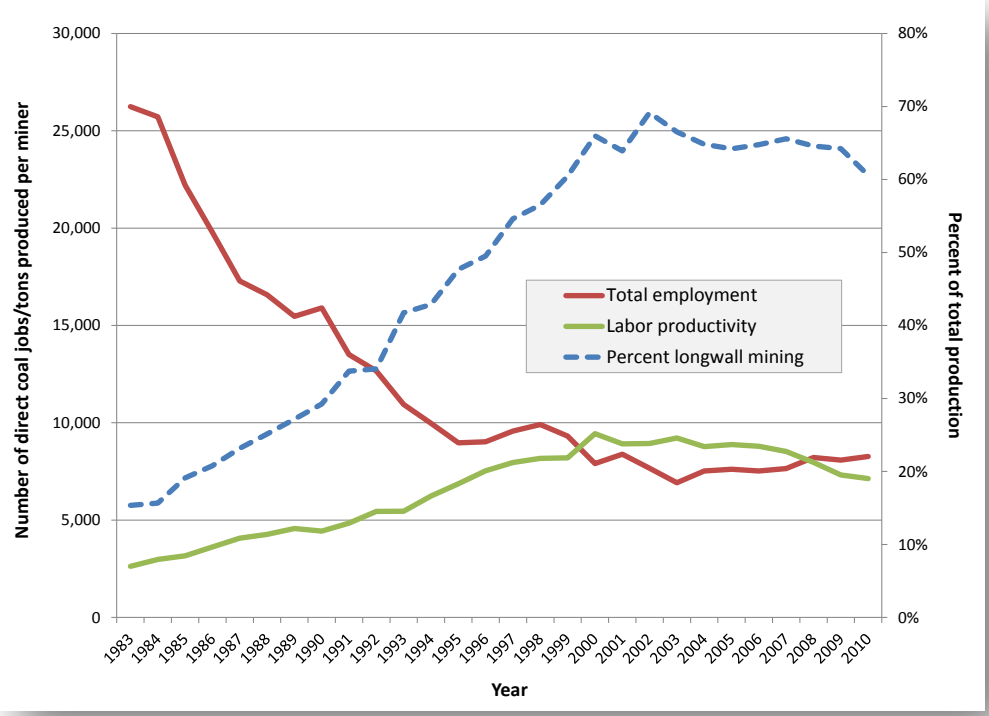
5. DIRECT COAL EMPLOYMENT: REVENUES AND EXPENDITURES

Sections 2 through 4 estimate the direct revenues and expenditures for the coal industry itself. A balanced total accounting of coal's impact also includes revenues and expenditures related to coal employment. This section focuses on direct employment, and the following section focuses on indirect employment. Direct employment in the coal industry includes those working directly in the mining, processing, and transportation of coal, as well as office workers, managers, and executive company officers.

Direct employment in the Pennsylvania coal industry amounted to 8,268 workers in 2010 (see Figure 10).[17] While employment has increased somewhat since 2003, the current number of employees is significantly lower than it was in 1983 (Mellish, 2012). This is largely the result of a shift to longwall mining, which requires fewer employees to produce a ton of coal than other forms of mining.

Coal mining employment is related to the total production, labor productivity (tons produced per miner), and the mining method. Pennsylvania's longwall mines in 2000 (the peak of total productivity) were 82% more labor-efficient than conventional mines and 92% more efficient than surface mines, and longwall mining accounted for 66% of total coal production (EIA, 2000). Figure 10 illustrates how an increasing share of Pennsylvania's coal production has come from less labor-intensive longwall mines since 1983, and how this trend contributed to the sharp decline in coal mining employment over this time period.

Figure 10: Direct coal employment, productivity, and the expansion of longwall mining, 1983-2010



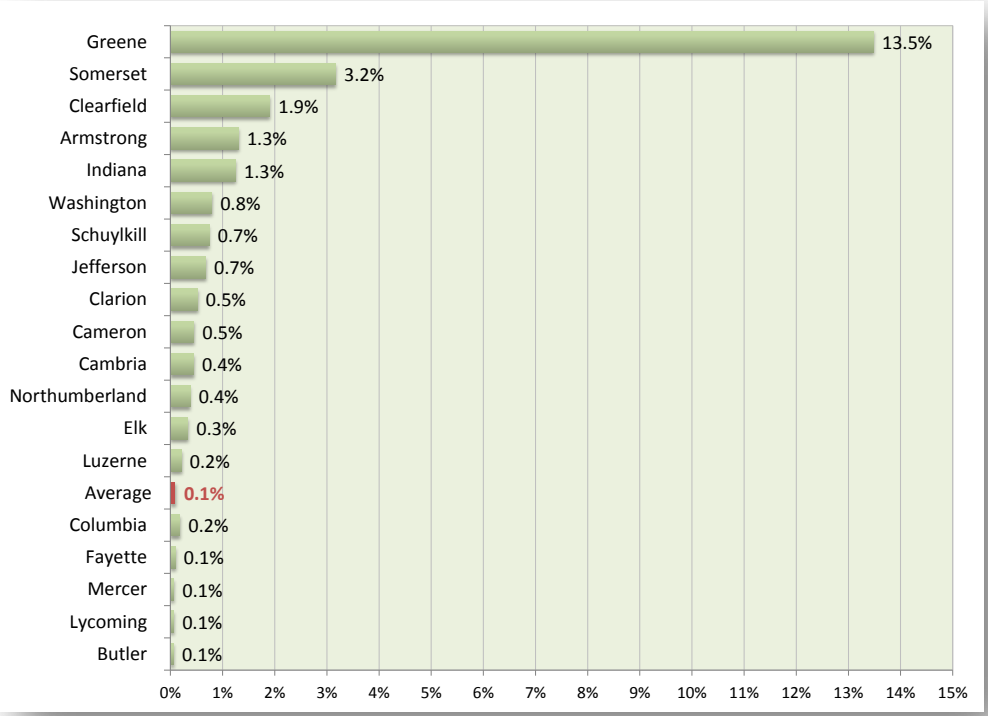
Sources: Mellish (2012); EIA (2012d and j).

[17] MSHA reports 7,879 direct coal employees (MSHA, 2012), while the Pennsylvania Coal Association (2011) reports a total of 8,724 employees. EIA reports an employment of 8,268 (EIA, 2012d), which falls in between the MSHA and the Coal Association figures.

Total employment across all sectors in the Commonwealth of Pennsylvania in 2010 amounted to 5,849,000 (PDLI, 2012a). **Therefore, direct employment in the coal industry accounted for approximately 0.1% of total employment in Pennsylvania in 2010.**

Jobs in the coal industry account for a greater portion of total employment in some of Pennsylvania's 27 coal-producing counties; however, on average coal accounts for only 0.4% of countywide employment in these counties. Figure 11 shows the percent of total county employment provided by direct coal mining jobs for Pennsylvania's coal-producing counties in 2010. The coal employment rate is highest in Greene County, which relied on direct coal jobs for nearly 14% of countywide employment in 2010. Somerset County ranks second at only 3.2% of total county employment (MSHA, 2012; Pennsylvania Coal Association, 2011).

Figure 11: Direct coal employment as a share of total jobs in coal-producing counties, 2010



Source(s): Total county-level employment from the Pennsylvania Department of Labor and Industry (PDLI, 2012b); county coal employment from MSHA (2012) and the Pennsylvania Coal Association (2011). Note: The eight counties that rely on coal for less than 0.1% of county employment are excluded from the chart. These include Allegheny, Beaver, Bedford, Center, Dauphin Lackawanna, Venango, and Westmoreland.

To calculate total coal wages earned by direct employees of the Pennsylvania coal industry in 2010, we use the reported average wage of $75,406 for all coal mining employees as identified by NAICS code 2121 (BLS, 2012b).[18]

Using this average wage, we estimate that the 8,268 direct employees of the Pennsylvania coal industry earned approximately $623.5 million in total wages in 2010.[19]

[18] BLS wage data only reflect direct income earned as a result of labor and exclude all other sources of income such as health benefits.
[19] This value is nearly equal to the average of the total wages for coal mining employees in 2010 and 2011 ($623.0 million) as reported by BLS (2012c).

5.1 Revenues

Coal industry employees contribute tax revenues to the state GF and MLF. GF revenues are generated from the payment of the personal income tax, state sales and use taxes, and other lesser taxes such as the realty transfer tax and inheritance tax. MLF revenues come from the liquid fuels tax, motor licenses and fees, and other motor license revenues (Pennsylvania Office of the Budget, 2012).

This section estimates GF and MLF tax revenues generated from direct employees of the Pennsylvania coal industry. MLF revenues are included because of the significance of state expenditures for maintaining and repairing roads and bridges, and it is necessary to examine whether coal employment-related revenues cover such costs. 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.

We estimate a total of approximately $39.4 million in direct employment-related revenues from coal industry employees in FY2010-11 (see Table 6). Of that, approximately $35.8 million benefited the GF—representing 0.1% of total GF revenues generated from taxes that apply to Pennsylvania residents. The remaining $3.6 million benefited the MLF—representing 0.1% of total non-federal MLF revenues.

Table 6: Direct coal employment-related revenues

Revenue	Amount	Percent of revenues
To General Fund		
Personal income tax	$19,140,000	49%
Sales and use tax	$13,090,000	33%
Other tax sources	$3,600,000	9%
Subtotal	**$35,830,000**	**91%**
To Motor License Fund		
Liquid fuels taxes	$1,720,000	4%
Motor licenses and fees	$1,260,000	3%
Other motor license revenues	$580,000	1%
Subtotal	**$3,560,000**	**9%**
Total	**$39,390,000**	**100%**

Note: Amounts are rounded to $10,000 when estimated. The total is also rounded because it includes specific amounts that are rounded.

5.1.1 *Personal income tax*

Pennsylvania authorizes a personal income tax on "the privilege of residents (and non-residents earning income from Commonwealth sources) receiving specified classes of income," the revenues from which are deposited into the GF.[20] Taxable income includes compensation, net profits, interest, dividends, income from the disposition of property, rents and royalties, gambling and non-Pennsylvania lottery winnings, and income from estates and trusts. The personal income tax is the largest source of tax revenues for the GF, contributing $10.4 billion in FY2010-11 (Pennsylvania Office of the Budget, 2012).

To estimate the revenue generated by personal income taxes paid by direct coal employees, we apply the tax rate (3.07% for all income classes) to total wages earned by those employees in 2010 ($623.5 million).[21] **This results in an estimated personal income tax contribution of $19.1 million for FY2010-11.**

5.1.2 *Sales and use tax*

As discussed in Section 2.3, the Pennsylvania sales and use tax is a tax of 6% on the sales price of each item of tangible property sold at retail.[22] The "use" part of the tax name refers to the tax imposed on all items of personal property used in the state that were bought from out-of-state retailers. In FY2010-11, state sales and use tax revenue served as the second largest source of non-corporate tax revenue, amounting to $8.6 billion. Of this, $1.1 billion came from the sale of motor vehicles, while the remaining $7.5 billion came from non-motor vehicle sales (Pennsylvania Office of the Budget, 2012).

Like all other residents, coal industry employees generate sales and use tax revenue when they spend their income. The effective sales tax rate—representing the percent of an individual's income spent on sales and use taxes—is not equal to the full state tax rate of 6% because employees do not spend all of their income on consumption. Therefore, to estimate total sales and use taxes paid by direct coal employees in FY2010-11, we use the combined effective tax rate for "general sales-individuals" and "other sales and excise—individuals" for the $56,000 to $89,000 income range as reported by the Institute on Taxation and Economic Policy (ITEP). We choose this range because the average annual wage for direct coal employees in 2010, $75,406, falls within the range. The combined effective rate for the selected income range is 2.1% for 2007 (ITEP, 2009). We assume for this report that the effective rate changed little through 2010. **Applying this rate to total wages, we estimate that Pennsylvania sales and use tax revenue attributable to direct coal industry employees amounted to $13.1 million in FY2010-11.**

5.1.3 *Other General Fund taxes*

Other non-corporate taxes that contribute to the GF include the inheritance tax and realty transfer tax, as well as luxury taxes such as the cigarette tax, liquor tax, malt beverage tax, a tax on table games, and other minor and/or repealed taxes. Total revenues generated by these taxes for FY2010-11 amounts to approximately $2.5 billion (Pennsylvania Office of the Budget, 2012).

Because effective tax rates are not available for the taxes considered here, we apply the percent of total state employment provided directly by the coal industry (approximately 0.1%) to the total state revenues generated from the taxes. We choose this method based on the assumption that all income earners spend, on average, the same amount for each of these taxes. **Using this method, we estimate that total "other" tax revenues attributable to direct coal industry employment amounted to $3.6 million in FY2010-11.**

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[20] 61 Pa. Code §103.1(a)
[21] Pennsylvania also authorizes a local earned income tax of 1.5%. This tax does not impact the state budget.
[22] 61 Pa. Code §31.1(1)

5.1.4 *Motor License Fund revenues*

Pennsylvania's MLF is categorized as a special revenue fund "composed of monies received from liquid fuels taxes, licenses and fees on motor vehicles, aviation fuel tax revenues, federal aid for highway and aviation purposes, contributions from local subdivisions for highway projects and other miscellaneous highway revenues" (Pennsylvania Office of the Budget, 2012, p. C2.1). Monies from the fund are used to improve, design, maintain, and purchase rights-of-way for highways and bridges, as well as for funding state highway patrol operations and to support local road construction and maintenance. State-sourced revenues for the MLF come from payment of liquid fuels taxes, motor licenses and fees, and other sources such as fines and other miscellaneous revenue. The total amount of transportation-related revenues that come from state funding sources, of which a portion could be attributable to direct coal employees, amounts to approximately $2.5 billion for FY2010-11.

Just as for personal income and sales and use taxes, employees of the coal industry pay taxes and fees related to transportation (unlike coal companies, which are exempt from such taxes). To calculate the coal industry and employment share of general vehicle and transportation taxes and fees, we again apply the percent of total employment directly employed by the coal industry (approximately 0.1%) to total state-sourced MLF revenues. **Using this method, we estimate that total transportation revenues for the MLF attributable to those directly employed by the coal industry amounted to $3.6 million in FY2010-11.**[23]

5.1.5 *Total revenues*

Direct employment in the coal industry generated an estimated $39.4 million in tax revenues for the Pennsylvania state budget in FY2010-11 (see Table 6). This consisted of approximately $35.8 million for the GF and $3.6 million for the MLF.

This may reflect either an overestimate or underestimate these employees' true contribution to the state budget. We recognize that our methodology for estimating tax revenue contributions does not produce precise estimates, but, given data constraints, we use the best methods available.

In any case, direct employment in the coal industry generates tax revenues for the GF and MLF from various tax sources, including the personal income tax, sales and use tax, and others. These revenues are then spent on government administration, education, infrastructure, health care, and other services required to support industries and residents operating and living within the Commonwealth. Those employed in the coal industry receive their share of these expenditures, along with the provision of other goods and services. Therefore, the impact of coal on the state budget requires an accounting of the share of state expenditures attributable to supporting the coal industry's employees.

[23] It is only by coincidence that this value is the same as the estimated revenues from "other" taxes as reported in Section 5.1.3.

5.2 Expenditures

Estimating state expenditures for supporting direct coal industry employment first requires an estimate of total state expenditures from the GF and MLF. Total expenditures from these funds amounted to approximately $27.5 billion for FY2010-11, of which $25.1 billion came from the GF and $2.4 billion came from the MLF (Pennsylvania Office of the Budget, 2012). These funds were spent mostly on education, health and human services, protection of persons and property (including environmental protection), and transportation and infrastructure. As such, these expenditures benefited all of Pennsylvania's residents including those employed in the coal industry.

For the purpose of estimating the portion of state expenditures necessary for supporting those directly employed by the coal industry, we adopt the methodology used by MACED in its 2009 report on the impact of the coal industry on the Kentucky state budget (Konty and Bailey, 2009). MACED's method assumes that those expenditures are proportional to the direct coal employment share of total state employment.[24]

As noted, direct coal employment accounted for approximately 0.1% of total state employment in 2010. Following MACED's methodology, we estimate direct coal-related employment expenditures by subtracting on-budget coal industry expenditures[25] from total GF and MLF expenditures (of state-generated revenues) and multiplying the remainder by coal's direct share of total state employment. **As shown in Table 7, this calculation results in a total estimated state expenditure in support of direct coal industry employees and their dependents of $38.8 million in FY2010-11**.

Table 7: Calculation of state expenditures supporting direct coal employees

Item	Amount
Total expenditures of state revenues	$27,476,922,000
Minus on-budget expenditures supporting coal	($16,590,000)
Net expenditures of state revenues	$27,460,332,000
Percent total employment, direct coal employees	0.1%
Estimated expenditures, direct coal employees	**$38,820,000**

Note: Reported employment percentage is rounded to the nearest tenth of a percent.

Applying the relative proportions of FY2010-11 state expenditures from the GF (91%) and MLF (9%), we estimate that expenditures from the GF attributable to direct coal employment amounted to $35.4 million, while those from the MLF amounted to $3.4 million (see Table 8).

[24] One possible criticism is that this method uses a per-employee factor instead of a per-capita factor and thereby overestimates state expenditures for supporting coal-related employment. This requires assuming that the only people receiving benefits from state expenditures are those who are employed, when in fact all citizens receive benefits from state expenditures. While we recognize that there is more than one possible method for calculating state expenditures for coal employees, we defer to the precedent for estimating expenditures based on a per-employee factor. For instance, this method uses the same approach that a 1980 study titled The Fiscal Impact of the Kentucky Coal Industry uses (Sims, 1980). That study was commissioned by the Kentucky Legislative Research Commission and conducted by respected economist Richard G. Sims. Sims's underlying assumption is that a coal miner's income supports more than just the miner, as the miner is most probably the primary income earner in the family. Calculating an employment-related expenditure based on a per-capita factor ignores this altogether. Therefore, the Sims methodology, upon which the MACED calculation is based, serves as a precedent that we choose to follow in conducting our analysis.

[25] The on-budget industry expenditures include those spent supporting and/or regulating the coal industry through administrative government activities as well as for repairing damage to the environment and local roads used for hauling coal.

5.3 Summary

Over 8,200 Pennsylvania residents were directly employed in the coal industry in 2010. These jobs support families and local economies in 27 counties. As shown above in Figure 10, employment in the coal industry declined sharply from 1983 through 2003, but has since increased somewhat. At the same time, the average wage of direct coal employees has risen, thereby increasing the revenues generated by that employment. However, absent a proportional increase in average mining wages, any future declines in employment, should they occur (as they have in the past), would result in smaller employment-related revenues from coal. Conversely, coal industry employees require support and services from the Commonwealth that are paid for directly from the state budget, so any change in employment could effect a change in the amount the state spends to support the coal industry and its employees.

However, for FY2010-11, those directly employed in the coal industry supported the state budget through the payment of various tax revenues, most notably via the personal income tax and state sales and use tax. At the same time, those employees require state support in various forms. For FY2010-11, we estimate that the tax revenues generated by direct coal industry employees amounted to approximately $39.4 million, while state expenditures to support those employees amounted to approximately $38.8 million.

In other words, the estimated impact on the Pennsylvania state budget of direct employment in the coal industry amounted to a net benefit of approximately $0.6 million. This means that the expenditures from the state budget for supporting direct coal industry employees were less than the tax benefits resulting from that employment. In other words, the tax revenues contributed by those directly employed by the coal industry were just sufficient to cover the cost to the state for supporting those employees. As Table 8 shows, this was the case for both the GF and MLF.

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

Item	General Fund	Motor License Fund	Total
Revenues from direct coal employment	$35,830,000	$3,560,000	$39,390,000
Expenditures supporting direct coal employees	($35,420,000)	($3,390,000)	($38,820,000)
Net impact of direct coal employment	**$410,000**	**$170,000**	**$570,000**

Note: Totals may not equal sum of parts due to rounding.

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. Like any industry, the coal industry relies on other industries and also generates economic activity and employment through this interdependence. This is the "indirect" impact of the coal industry. For example, in order to mine coal, companies must purchase machinery and supplies. These supply industries and their employees 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, coal employees earn income from their labor, and they spend that income on goods and services. Their spending creates and/or supports other industries and businesses. For example, coal miners earn income from mining coal, and they buy food and other items from a local 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.

For the purpose of simplifying the language used in this report, we combine indirect and induced impacts under the category of "indirect" impact. Employment indirectly supported by the coal industry results 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 indirect impacts, we use the Regional Input-Output Modeling System (RIMS-II) economic impact multipliers for the coal industry in Pennsylvania for 2008 (the most recent data year available). Despite some potential pitfalls, multipliers such as those provided by RIMS-II are often used by the coal industry and by researchers to estimate the industry's indirect impacts. We perform the calculations in this section with the recognition that, while imperfect, these multipliers allow us to clarify key issues and to establish initial estimates. A detailed explanation of RIMS-II and the use of economic multipliers is provided in Appendix B.

6.1 Revenues

As discussed, coal industry activity in Pennsylvania creates and supports economic activity and employment in supply and mining support industries. These other industries may include companies from the construction, manufacturing, and distribution sectors that provide goods and services used for the production, processing, and transportation of coal. Each of these industries and their employees then pay taxes on their income, purchases of goods and services, and fuel and other items. These revenues benefit the state budget by contributing to the GF and MLF.

As shown in Table 9, we estimate that the Pennsylvania coal industry indirectly supported 16,609 employees in 2010, representing approximately 0.3% of total state employment, including both full- and part-time employees. Total indirect wages amounted to $968.2 million, for an average wage for indirect employees of $58,293.[26] By comparison, the average reported wage for direct employees of the coal industry is $75,406 (BLS, 2012b).

[26] This value closely approximates the average wage of workers in the "support activities for coal mining" industry, reported to be $56,674 for 2010 (BLS, 2012d).

Table 9: RIMS-II multipliers applied to employment and wages

	Direct impact	RIMS-II impact multiplier	Total impact	Indirect impact
Employment	8,268	3.0088	24,877	16,609
Wages	$623,460,000	2.5529	$1,591,630,000	$968,170,000

Indirect coal employment generates tax revenue for the GF through payment of each of the same taxes considered in Section 5.1 for direct employment. To calculate transportation-related taxes and fees, we also use the same methodology as for direct employment.

For personal income taxes generated by indirect employment, we again use the tax rate of 3.07% and apply it to total wages earned. Based on this method, we estimate that personal income tax revenues generated by employment indirectly supported by coal amounts to $29.7 million for FY2010-11.

For the state sales and use tax contribution from indirect employment, we again apply ITEP's combined effective tax rate of 2.1% (ITEP, 2009) to the total income/wages for indirect coal-related employees. This results in an estimated state sales and use tax revenue attributable to indirect coal-related employment of approximately $20.3 million in FY 2010-2011.

Using the same methodology as for direct employment, we further estimate an indirect employment contribution for other taxes of approximately $7.2 million. Likewise, for contributions to the MLF, we estimate an indirect employment contribution of about $7.2 million for transportation-related taxes, licenses and fees.[27]

Therefore, we estimate that employment indirectly attributable to coal industry activity generated a total of approximately $64.4 million in tax revenues for FY2010-11 (see Table 10). This consisted of contributions of $57.3 million to the GF and $7.2 million to the MLF.

Table 10: Revenues related to employment indirectly supported by coal

Revenue	Amount	Percent of revenues
To General Fund		
Personal income tax	$29,720,000	46%
Sales and use tax	$20,330,000	32%
Other tax sources	$7,220,000	11%
Subtotal	**$57,270,000**	**89%**
To Motor License Fund		
Liquid fuels taxes	$3,460,000	5%
Motor licenses and fees	$2,530,000	4%
Other motor license revenues	$1,170,000	2%
Subtotal	**$7,160,000**	**11%**
Total	**$64,430,000**	**100%**

Note: Amounts are rounded to $10,000 when estimated. The total is also rounded because it includes specific amounts that are rounded.

[27] As with for the direct employment "other" and transportation tax calculation results, it is only by coincidence that the rounded estimates for these two tax categories are approximately equal. The un-rounded values differ somewhat.

6.2 Expenditures

Indirect coal industry employment generates a significant amount of revenues that benefit the state budget; however, just as the state budget supports direct employees through the provision of funding for health, education, public safety, transportation and infrastructure, and other services, it supports indirect employees to the same degree.

To estimate the total state expenditures supporting indirect employment attributable to the coal industry, we apply the same method that we use to estimate expenditures for direct industry employees. Indirect employment attributable to coal accounts for approximately 0.3% of total state employment. After subtracting state expenditures for supporting the coal industry directly (on-budget items and repairs to roads and bridges damaged by coal trucks), we multiply 0.3% by the remaining state expenditures from the GF and MLF that were paid for with state-generated revenues.

As shown in Table 11, based on this methodology we estimate that the state expenditure on employees indirectly supported by the coal industry amounted to approximately $78.0 million in FY2010-11.

Table 11: Calculation of state expenditures supporting indirect coal employees

Item	Amount
Total expenditures of state revenues	$27,476,922,000
Minus on-budget expenditures supporting coal	($16,590,000)
Net expenditures of state revenues	$27,460,332,000
Percent total employment, indirect coal employees	0.3%
Estimated expenditures, indirect coal employees	**$77,980,000**

Note: Reported employment percentage is rounded to the nearest tenth of a percent.

Applying the relative proportions of FY2010-11 state expenditures from the GF (91%) and MLF (9%), we estimate that expenditures from the GF attributable to employment indirectly supported by the coal industry amounted to $71.2 million, while those from the MLF amounted to $6.8 million (see Table 12).

6.3 Summary

As summarized in Table 12, we estimate that employment indirectly supported by the Pennsylvania coal industry resulted in a net cost to the Commonwealth of $13.6 million for FY2010-11.

Table 12: Net impact of indirect coal-related employment on the state budget

Item	General Fund	Motor License Fund	Total
Revenues from indirect coal employment	$57,270,000	$7,160,000	$64,430,000
Expenditures supporting indirect coal employees	($71,160,000)	($6,820,000)	($77,980,000)
Net impact of indirect coal employment	**($13,890,000)**	**$340,000**	**($13,550,000)**

Note: Totals may not equal sum of parts due to rounding.

While direct employees generated a net benefit, indirect employees generated a net cost. This is due to the fact that indirect employees make lower wages than do direct coal employees. The employees of the support industries then pay fewer taxes and contribute less, per person, to state revenues than do direct employees. However, each of these indirect employees benefits from the same proportional share of state expenditures, regardless of their wages. Consequently, the revenues generated from indirect coal-related employment through the payment of taxes and fees fail to make up for state expenditures in support of those employees.

The same is true when the impacts of both direct and indirect employment are summed together. **For Pennsylvania, we estimate that the net fiscal impact of direct and indirect coal-related employment amounts to an overall cost of approximately $13.0 million for FY2010-11.**

Our conclusion is similar to MACED's in its analysis of the total impact of direct and indirect coal-related employment on the Kentucky state budget: that the overall benefits of that employment were outweighed by the cost to the state for supporting those employees (Konty and Bailey, 2009). In other words, when examining employment alone, coal-related employment costs the Commonwealth more than it contributes in revenues from taxes and fees.

The significance of the employment analysis is not in the calculation of the net impact, however. In fact, even though our estimates are the best available estimates given data constraints, they are merely estimates, and should only be regarded as such. The significance of the analysis lies in the fact that while direct and indirect employees benefit the state through the payment of various taxes, those employees in turn rely on state expenditures for services and support. These costs must be included in any analysis of the net impact of the coal industry in Pennsylvania.

Further, as noted by MACED for Kentucky—and applicable for Pennsylvania or any other coal-producing state—these findings overlook other costs of the coal industry to the Commonwealth of Pennsylvania and its citizens. For example, the damage to land and streams in areas where coal is mined has lasting impacts on the environment, human health, and local and state economies. Because of their existing and potential impacts on the state and society for years to come, we consider coal legacy costs associated with AMLs, BFSs, and impacts from longwall mining in the following chapter.

7. LEGACY COSTS RELATED TO COAL

Coal industry activity has resulted in the accumulation of legacy costs for Pennsylvania that are not calculated in our analysis of coal's impact on the state budget. This is because they represent costs that have built up over time, have yet to be paid for, or do not currently impact the budget directly. In this section we address the legacy costs related to water contamination on AMLs and BFSs as well as the impacts resulting from longwall mining. However, additional costs associated with negative impacts on the health of miners and residents, property values, and natural resources also result from coal mining operations and associated activities and should be examined further.

7.1 Abandoned mine lands and bond forfeiture sites

In Pennsylvania, as in other coal-producing states, many coal mine operators have chosen to abandon their mines before full reclamation is complete, leaving a legacy of un-reclaimed land, polluted runoff, contaminated drinking water, and threatened health and safety. When this occurs, the mine operator deflects responsibility for the environmental clean-up to the state and federal government. Depending on when the mine was abandoned, the clean-up is paid for using different funding streams.

Some mines were abandoned before the SMCRA was enacted in 1977. This federal law requires that coal mines be reclaimed and cease to cause water pollution after a finite period of time . Pre-SMCRA sites are called AMLs. Post-SMCRA sites are those abandoned since 1977 and are typically called BFSs. SMCRA requires operators to post bonds for reclamation; if operators abandon their mines, they forfeit their bonds to the state government, rather than spending the money required for reclamation. This distinction between AMLs and BFSs is important because distinct funding mechanisms are available to reclaim each type.

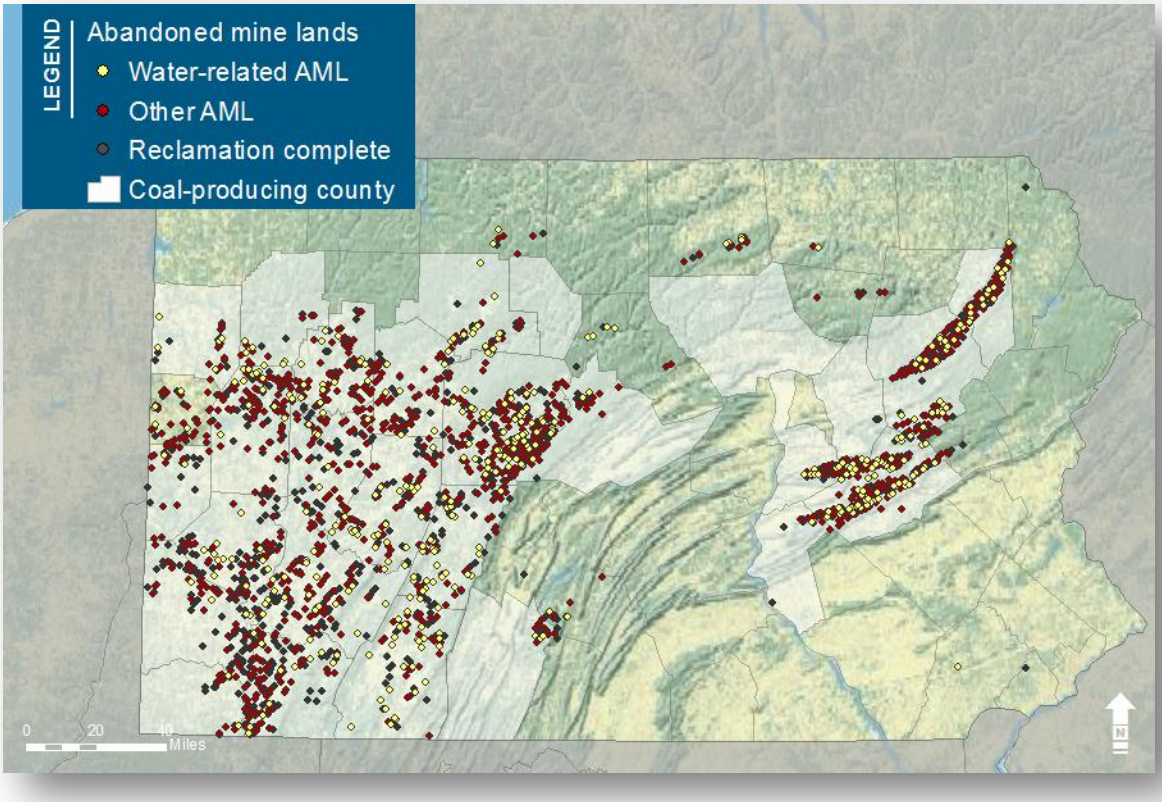
7.1.1 *Abandoned mine lands*

According to the Office of Surface Mining, Reclamation and Enforcement (OSMRE) (2012), which maintains the Abandoned Mine Land Inventory System (AMLIS), there were 7,462 AML problems at 2,341 sites identified in Pennsylvania at the end of FY2010-11; these sites are scattered across 41 counties (see Table 13 and Figure 12). Ninety-four percent of AML sites and more than 90% of the AML acreage lie within the 27 counties that produced coal in 2010. Through FY2010-11, only 43% of total reported AML acres have been reclaimed (OSMRE, 2012). It should be noted that, by definition, no new AMLs are being created as a result of mining, but the list of AMLs continues to grow as new sites are documented and surveyed. For instance, over 400 acres of AMLs, along with more than 13,000 linear feet of dangerous highwalls and 1.1 miles of clogged streams were added to the Pennsylvania inventory in FY2010-11 (OSMRE, 2012).

Table 13: Documented abandoned mine lands by county as of FY2010-11

County	Number of sites	New in FY2009-10	New in FY2010-11
Coal-producing counties (2010)			
Allegheny	107	5	3
Armstrong	85	3	2
Beaver	29	1	
Bedford	26		
Butler	122	4	
Cambria	107	2	2
Carbon	17		
Centre	46	1	1
Clarion	101	7	1
Clearfield	277	8	1
Columbia	18		
Dauphin	12		
Elk	46	6	2
Fayette	141	3	1
Greene	21		
Indiana	104	1	
Jefferson	66	3	
Lackawanna	99	4	
Luzerne	175	4	
Mercer	25	1	
Northumberland	75		
Schuylkill	224	3	
Somerset	75	4	2
Venango	17		
Washington	82	2	1
Westmoreland	128	4	
Non-coal producing counties			
Blair	5		
Bradford	2		
Clinton	10		
Fulton	1	1	
Huntingdon	13		
Lawrence	40		1
Lehigh	1		
McKean	8		
Northampton	1		
Potter	1		
Sullivan	6		
Susquehanna	4		
Tioga	19	2	
Wayne	3		
Wyoming	2		
Totals	**2,341**	**71**	**17**

Figure 12: Abandoned mine lands in Pennsylvania



Source: OSMRE (2012).

7.1.2 *Federal funding for abandoned mine land reclamation*

Approximately $760 million has been spent to complete reclamation projects on AML sites in Pennsylvania through FY2010-11 (OSMRE, 2012). However, it is estimated that an additional $5 billion worth of work is required to reclaim the remaining AML sites (OSMRE, 2012). This estimate is likely an underestimate because state agencies do not always address water quality discharges to the extent that surface water quality standards require. In addition, this database of AMLs may not be entirely complete. And finally, PDEP itself notes that the total AML legacy cost amounts to $15 billion, although no explanation could be found regarding how this estimate was produced (PDEP, 2010). In general, however, these estimates provide an initial approximation of the scale and cost of work that remains: between $5 billion and $15 billion.

The Abandoned Mine Reclamation Fund, established via provisions in Title IV of SMCRA, is the primary funding mechanism for reclaiming AMLs. This fund is generated by a federal tax on every ton of mined coal; the taxes are then allocated to state environmental agencies for reclamation projects. From 1977 through 2007, fees were set at 35 cents per ton for surface-mined coal and 15 cents per ton for underground-mined coal. Upon reauthorization in 2006, these fees were lowered. In FY2008-2012, fees will be 31.5 and 13.5 cents per ton, respectively. In FY2013-2021, the fees will decrease to 28 and 12 cents per ton.

Until the Fund was reauthorized in 2006, the federal government was not fully appropriating AML funds to the states. The unappropriated balance totaled $2.4 billion at the end of FY2009 (OSMRE, 2011a). States receive distributions from the Abandoned Mine Reclamation Fund based on a variety of formulas, which were also modified during the 2006 reauthorization. These changes dramatically increased the amount of money sent back to states that have a continuing legacy of unreclaimed AMLs.

In FY2010-11, $60 million was distributed to Pennsylvania, of which $48.0 million was for AML reclamation funding (OSMRE, 2011b).[28] Total distributions to Pennsylvania through the end of the program cannot yet be precisely calculated. However, Pennsylvania could receive an additional $1.2 billion through the end of the collection period (OSMRE, 2007). This amount is far short of the estimated minimum of $5 billion worth of remaining work. This amount is far short of the estimated minimum of $5 billion worth of remaining 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.**

Again, the estimated cost of $5 billion is likely an underestimate of remaining work because it likely will not be sufficient to meet water quality standards, AMLIS may not be entirely complete, and PDEP estimates the total cost to be triple that estimated by OSMRE. However, should Pennsylvania coal production increase as projected for the Northern Appalachian Basin, the state may receive a greater amount of annual funding.

7.1.3 *State funding of reclamation activities*

There are a number of state funding and incentive programs for reclaiming AMLs. According to PDEP, these incentive programs have proven successful, as coal mine operators using the programs had reclaimed over 5,000 AML acres equivalent to more than $33 million in reclamation value through 2010. Pennsylvania's reclamation programs have also received high recognition from OSMRE, which states that PDEP's AML program is "effective in abating safety and environmental problems on previously mined sites" and that Pennsylvania's programs "continue to effectively achieve or exceed the regulatory and reclamation goals of SMCRA" (OSMRE, 2011b, p. 1). A number of the available programs and incentives are described below.

Growing Greener (I and II)

The Environmental Stewardship and Protection Act or "Growing Greener" was signed into law in 1999 for the purposes of farmland preservation, state park and local recreation projects, waste and drinking water improvements, and watershed restoration programs (OSMRE, 2011b). BAMR receives funds from this program to reclaim AMLs. From Growing Greener's inception through FY2009-10, BAMR received about $29.7 million from the original program. Through an extension of the program established in 2005, the Commonwealth was authorized to borrow up to $625 million "for the maintenance and protection of the environment, open space and farmland preservation, watershed protection, abandoned mine land reclamation, acid mine drainage remediation and other environmental initiatives" (OSMRE, 2011, p. 14). Funds are allocated to a variety of government agencies for selected projects. For reclaiming AMLs, BAMR has been provided $93.9 million to use for awarding reclamation contracts. Of this amount, $49.4 million came from the program with the remainder being provided as a match from OSMRE.

Government-financed reclamation construction contracts

This program establishes contracts for mining companies to conduct operations that will reclaim AMLs at little or no cost to the public. According to PDEP, between January 1991 and December 2010, 224 contracts were issued, with a total reclamation value of over $9.1 million (PDEP, 2010).

Remining Operator Assistance Program

The Remining Operator Assistance Program creates an incentive to remine and reclaim AMLs by providing financial assistance for most of the cost of permitting the remining area. Through 2010, 30 mine operators had requested participation for reclaiming 60 remining sites. Of these, 45 remining permits were approved that will result in the reclamation of over 2,100 acres of AMLs with an approximate reclamation value of $12.6 million and a total cost to the Commonwealth of $980,797 (PDEP, 2010).

[28] The remaining $12 million includes funding for administration and regulatory enforcement and the Small Operator Assistance Grant Program (OSMRE, 2011b).

Financial Guarantees Program

This program is being developed to incentivize remining and concurrent reclamation of both AMLs and BFSs by providing low-cost bonding of remining areas. Qualifying operators accepted into the program do not have to pay the reclamation fee and pay only a percentage annually of the total bond liability for the remining area (PADEP, 2010). In exchange, they agree to reclaim the previously mined land now hosting their operation. Through 2010, financial guarantees were providing for bonding 644 mining permit increments totaling over 3,000 acres of AMLs. According to PDEP (2010), this saved Pennsylvania an estimated $18.7 million. In FY2010-11, 20 major AML reclamation projects were completed comprising 317 acres and 15,600 linear feet of dangerous highwalls at a total cost of $9.6 million. Non-Title IV matching funds made up $5.9 million of the total cost (OSMRE, 2011b).

7.1.4 *Summary*

The coal industry's thousands of legacy AML sites in Pennsylvania present a liability for the state. 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 future costs are not shifted to taxpayers. If no action is taken, the Pennsylvania state budget could face additional expenditures amounting to billions of dollars to reclaim these legacy sites.

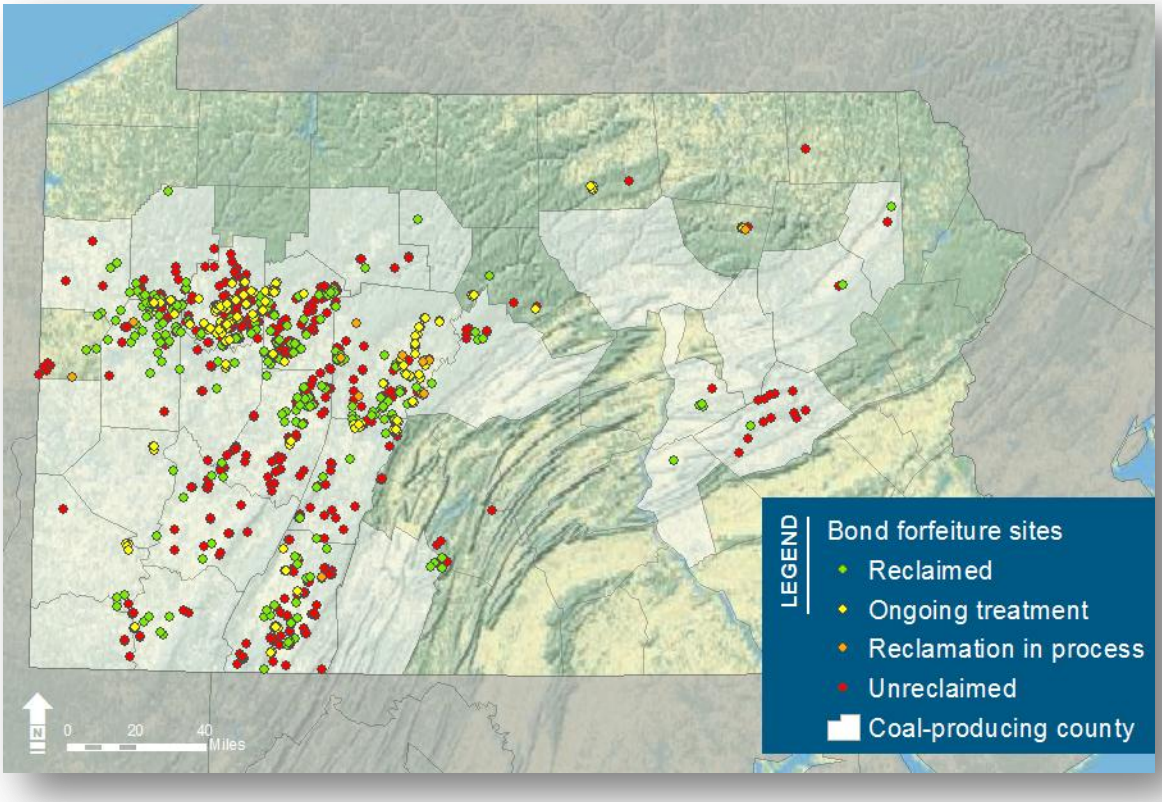
7.2 Bond forfeiture sites

Like AMLs, BFSs are concentrated in Pennsylvania's current coal-producing counties (see Figure 13). Bonds forfeited prior to 1982 are handled by BAMR. Primacy bond sites include those forfeited since 1982, when the state was granted primacy. Pennsylvania had a flat-rate alternate bonding system (ABS) in place from 1982 until 2002, when OSMRE and others filed suit against the state and claimed they had insufficient funds to reclaim existing BFSs (Carl, 2012).

Conventional bonding was implemented in 2002 and is calculated on an annual basis for active mines. The bonds are based on current three-year average AML reclamation costs and may go up or down based on factors including fuel and construction costs. Since 2002, bonds collected have generally been sufficient to cover reclamation costs (OSMRE, 2011b). The bond revenues collected for each permit may only be used for reclamation purposes at the sites for which they are collected. The minimum bond amount for bituminous mining and coal refuse disposal operations and for anthracite coal refuse disposal is $10,000, and for anthracite mining operations is $5,000.[29]

[29] 25 Pa. Code §86.150

Figure 13: Bond forfeiture sites in Pennsylvania



Source: PDEP (2012b).

PDEP is charged with reclaiming BFSs, starting with permits issued under Pennsylvania's coal surface mining regulatory program.[30] When PDEP determines that one of the following scenarios has occurred, the bond is considered forfeited and is collected and used to complete the reclamation plan.

1. The permittee violates the conditions of the bond.
2. Mining has been conducted in a manner which violates state and/or federal regulations.
3. The permittee has abandoned the permit area.
4. The permits for the area under the bond have been revoked, and the permittee has failed to complete the reclamation required by the law.
5. The permittee has failed to comply with a compliance schedule in an adjudicated proceeding, consent order or agreement approved by the Department.
6. The permittee has become insolvent or gone bankrupt.[31]

If the amount forfeited is insufficient to pay for the full cost of reclamation, the mining company ("permittee") is liable for covering any remaining costs. On the other hand, if the amount forfeited is more than the amount necessary to complete the reclamation, the excess funds may be used by PDEP for aa variety of purposes.[32]

[30] 25 Pa. Code §86.189. The program took effect July 31, 1982.
[31] 25 Pa. Code §86.182.
[32] 52 Pa. Code §1397.18(a)

In accordance with federal law, Pennsylvania has established a Surface Mining Conservation and Reclamation Fund to cover BFS reclamation: "If the Department determines that the funds received from bonds covering the bond forfeiture site exceed the amount which is required to reclaim the bond forfeiture site, the excess funds will be made available for expenditure from the fund only to reclaim land and restore water supplies affected by surface mining operations for which the Department has forfeited bonds."[33]

7.2.1 *Funding for reclaiming and treating discharges at legacy sites*

Four separate accounts currently exist for funding the reclamation of legacy BFSs, meaning those that were taken over by the state before the current bonding system was put in place in 1982. These accounts include: the Reclamation Fee Operations and Maintenance (O&M) Trust Account, Alternative Bonding System (ABS) Legacy Sites Trust Account, Released Bond Account, and ABS Land Reclamation Closeout Account. The first two accounts provide funding for treating mine discharges at BFSs, while the latter two accounts are used for funding land reclamation.

The ABS Legacy Sites Trust Account and Reclamation Fee O&M Trust Account are two new accounts created for reclaiming and managing historical, or legacy BFSs. The two accounts are situated within the Surface Mining Conservation and Reclamation Fund. The O&M account is specifically for funding the operation and maintenance costs of ABS mine drainage treatment systems once the systems are constructed. The Accounts are funded through per-acre reclamation fees for all new surface mining permits, which are set yearly based on the financial needs of PDEP for constructing, operating, and maintaining the treatment systems. Some funds are also generated from civil penalties, and the principal and interest from the O&M account are used exclusively for construction and O&M costs associated with the treatment of post-mining discharges.

The reclamation fee will be in effect until the ABS Legacy Sites Trust Account is deemed actuarially sound based on the following criteria:

1. PDEP determines there are sufficient funds to treat in perpetuity all potential discharges from mines permitted under ABS.
2. Construction of all necessary treatment facilities at ABS legacy sites is completed.
3. The trust accounts together generate sufficient interest to pay the total annual O&M costs to treat discharges at all ABS legacy sites (OSMRE, 2011b).

State law requires that a minimum balance of $3 million must be maintained in the O&M account. At the end of 2009, the balance in this account stood at around $4.1 million, while the balance in the ABS account stood at around $5.4 million. Total expenditures from the accounts amounted to approximately $110,000 in 2010 (OSMRE, 2011b).

Additionally, as of 2010, only about 50% of the identified legacy sites have had a complete treatment system put in place or have one under construction, with another 20 sites currently in the design phase and 30 sites for which PDEP has yet to begin work (OSMRE, 2011b).

The ABS Released Bond and Land Reclamation Closeout accounts are used primarily to fund land reclamation activities at ABS legacy sites. Overall, there are 22 ABS forfeited permits that remained unreclaimed at the end of 2010, down from 51 at the end of 2008 (OSMRE, 2011b). In 2010, nine ABS forfeited sites were resolved through remining permits or PDEP reclamation contracts, and several other projects were initiated. The balance in the Released Bond account at the end of 2010 was nearly $2.5 million, while the balance in the Land Reclamation Closeout Account stood at $3.3 million (OSMRE, 2011b).

[33] 25 Pa. Code §86.190

A 2009 analysis of the ABS program by PennFuture reported that the estimated total cost to complete the land reclamation for all primacy ABS bond forfeiture sites is $7,946,890, and that this is a conservative estimate given that some of the outstanding land reclamation at the ABS legacy sites will be completed through use of the remining incentives. In addition, PDEP has other funds to draw from should bond amounts for new forfeiture sites fall short of covering the cost of reclaiming those sites (PennFuture, 2009). Therefore, in terms of land reclamation, it does not seem as though there will be any future shortfalls in funding.

As for treating mine discharges, PDEP has calculated that the total capital cost to construct all necessary treatment facilities for the ABS forfeiture sites is approximately $2.1 million. This is more than covered by the $1.1 million in the Released Bond Account that may be used for treatment systems and the $14.4 million in the General Operations account that is unreserved or undesignated and also available for constructing treatment facilities (PennFuture, 2009).

Because sufficient funds exist for both reclaiming and treating mine discharges at ABS BFS sites, it is not expected that there will be any future unfunded legacy costs associated with reclaiming these sites.

7.3 Longwall mining

Longwall mining in Pennsylvania, which predominantly occurs in Pennsylvania's southwestern region, has resulted in significant impacts on water resources, land resources, and public property. In some cases, these impacts have gone unaddressed or have taken as many as four or five years to resolve (PDEP, 2009). In addition, the data collected by PDEP are not being used to analyze the cumulative effects of longwall mining on land or water resources, nor the permanence of those impacts (Schmid and Company, Inc., 2010). However, unfortunately, while the impacts of longwall mining have been well researched and documented, no research was found which quantifies the long-term legacy costs associated with longwall mining.

Therefore, for this report, we only summarize key data and information that illustrates the scale of the impacts and the failure of regulatory structures to prevent or mitigate them. Additional examination is required in order to assess the full long-term costs of longwall mining on land and water resources.

As shown in Figure 4, production from longwall mining in Pennsylvania has expanded rapidly, rising from 27 million tons to a peak of 49 million tons by 2000. From 2003 to 2008, production levels remained steady at around 42-43 million tons annually and 65-69% of total state production. According to EIA, longwall mining is one of the two basic methods of underground coal mining, with traditional "room-and-pillar" mining serving as the other. While room-and-pillar mining is characterized by "rooms" of coal being mined and "pillars" being left in place to support the mine roof, longwall mining is characterized by the complete extraction of the coal contained in a large block ("panel") of coal and the mine roof being allowed to collapse into the mined-out area (EIA, 1995). The primary advantages of longwall mining for coal companies are that it is generally a more productive (and therefore less costly) form of coal mining, and that it offers greater safety for miners due to better roof control, more predictable surface subsidence, and better automation (EIA, 1995). Additionally, the increased production resulting from a more complete extraction of coal results in a greater amount of tax revenues for state and local governments (PDEP, 2002).

Despite these benefits, longwall mining has become an increasingly contested form of underground coal mining in Pennsylvania, especially as the negative impacts to water resources and personal property have continued to accumulate (Citizens Advisory Council, 2012; Schmid and Company, Inc., 2010 and 2011). Much of the damage from longwall mining has occurred since 1994, when the Pennsylvania General Assembly passed amendments to the Mine Subsidence Act of 1966. These amendments, known collectively as Act 54, "essentially changed the focus of underground mining regulation from one of preventing damage to one of compensating for some (but not all) damages" (Schmid and Company, Inc., 2010, p. 11). As a result of Act 54, PDEP is required to produce a report every five years that analyzes the impacts of underground coal mining on surface structures and water resources.

Longwall mining has the potential to impact streams, private water supplies, land, and personal property. Each Act 54 report details the type and mechanism for each of these impacts. The primary reason for the occurrence of land and property-related impacts is subsidence. PDEP defines mine subsidence as the movement of the ground surface as a result of readjustments of the overburden due to collapse or failure of underground mine workings (PDEP, 1999). PDEP notes that subsidence impacts associated with active longwall mining operations are more frequent than those associated with room-and-pillar mining.

Impacts of longwall mining on the surface may include ground cracks, landslides, and changes in surface contours and drainage patterns of surface waters. Impacts to structures may include cracking of foundation walls and footings, tilting, and damage to roofs. Hydrologic impacts include detectable changes in permeability, storage capacity, groundwater flow direction and levels, groundwater chemistry, and surface-water/groundwater interactions, while impacts on surface water may include complete or partial loss and/or contamination of streams, ponds, and lakes. Additionally, changes in surface slope can adversely impact drainage along irrigated fields, canals, sewers, and natural streams. Finally, depending on the depth of mining, wells and springs can be temporarily or permanently dewatered (PDEP, 1999).

The following table summarizes data on the impacts of longwall mining over time as reported by PDEP in its Act 54 assessment reports for two time periods: 1993 to 1998 and 2003 to 2008. Due to the substandard quality of reporting and data provision in the second assessment (1998-2003), we cannot include data for that time period.

Table 14: Impacts of longwall mining on structures, water supplies, and land resources

	1993-1998	2003-2008
Acres of surface area undermined	39,000	24,607
Miles of stream undermined	91	88
Properties undermined	932	1,572
Incidents of damage to structures	321	427
Incidents of damage to water supplies	425	397
Incidents of damage to land	157	103
Total incidents of reported damage	**903**	**927**
Cases resolved	524	511
Cases unresolved at end of period	281	258
Cases not requiring remedial action	98	150
Percent unresolved at end of period	**31%**	**28%**

Source: PDEP (1999; 2009).

A report prepared for the Citizens Coal Council, which reviewed the most recent Act 54 report, provides a number of observations pertaining to the report and the regulation of longwall mining. Included among these are the following:

1. While the acreage and number of properties impacted by longwall mines declined during the 2003-2008 period (as compared to the 1998-2003 period), longwall mining accounted for 100% of the reported effects on streams, 95% of the reported land impacts, and 94% of the impacts on surface structures.
2. Due to a failure to present data and analysis on the length and nature of stream impacts, the actual extent of stream damage is unknown.
3. According to data presented in PDEP's Act 54 report, significant impacts on structures, land and water resources are increasing in occurrence as compared to the 1998-2003 period—overall, total reported effects increased by 14%.

4. Issues raised in previous Act 54 reports as well as those raised by the Citizens Advisory Council have gone unresolved, and as a result are repeated in the most recent report.
5. PDEP's report offers no recommendations regarding needed improvements in the regulation of underground mining.
6. Recognized impacts continually require unacceptably long times to resolve.
7. No effort was made to review monitoring data from hydrologic monitoring reports or discharge monitoring reports.
8. The Act 54 report fails to consider whether the laws and regulations in place allowed for the recorded impacts to occur or whether the impacts should have been prevented or minimized (Schmid and Company, Inc., 2011).

Given these observations, the report makes a number of recommendations to PDEP and other government officials for addressing the impacts of longwall mining. Many of the recommendations are relevant to the present report:

1. Mine-specific data should be compiled on the length of streams impacted, the nature of those impacts, and the resolution status of the impacts.
2. Direct and indirect water quality impacts from subsidence and pollution discharges should be given greater attention and all impacts of longwall mining on water resources should be routinely recorded.
3. Data from permit applications and monitoring and enforcement files should be included in the analysis conducted for the Act 54 report, and used in permit applications in order to identify and predict impacts of potential mining operations more precisely.
4. Future Act 54 reports should include a comparison of total costs associated with room-and-pillar and longwall mining methods in order to prevent or minimize impacts and costs for repairing, restoring or otherwise compensating for the impacts.
5. Future longwall mining should only be allowed where surface resources will be protected and impacts avoided and minimized (Schmid and Company, Inc., 2011).

8. CONCLUSIONS AND RECOMMENDATIONS

In the Commonwealth of Pennsylvania, the coal industry provides jobs and generates revenues that benefit citizens and the state budget. These benefits are generated directly through coal industry activity, such as the mining, processing, and transportation of coal. The industry also indirectly benefits the state by supporting supply sectors and other businesses, which generate additional jobs and state revenues. The revenues in turn benefit the public through the funding of various services such as education, infrastructure improvements, health support, environmental protection, and government administration.

However, as detailed in this report, the revenues generated directly by the coal industry did not constitute a substantial portion of state tax revenues for either the GF or the MLF in FY2010-11, and coal industry employment accounts for only a small portion of total state employment. There are various costs associated with the coal industry as well, and traditional accountings of the economic impact of the industry for Pennsylvania have not accounted for these costs. In this report, we provide a thorough and detailed accounting of the net impact of the coal industry on the Pennsylvania state budget by considering both the benefits and the associated costs of the industry, direct employment, and indirect employment.

8.1 Jobs

The Pennsylvania coal industry directly provided 8,268 jobs and supported another 16,609 jobs indirectly in 2010, representing a total of approximately 0.4% of total employment in the Commonwealth. This is a small portion of the state workforce. For some coal-producing counties, the impact was more significant: Direct coal industry employees comprised 14% of total county employment in Greene County, 3% in Somerset County, and 2% in Clearfield County. However, direct employment in the coal industry accounted for an average of only 0.2% of total employment for the remaining coal-producing counties in 2010.

Total wages for direct coal industry employees amounted to an estimated $623.5 million in FY2010-11, with an average wage of $75,406. Those indirectly employed as a result of coal industry activity earned a total of $968.2 million, with an average wage of $58,293.

8.2 State revenues and expenditures

The coal industry and its employees benefit the Pennsylvania state budget through the payment of taxes and fees, which are deposited into the GF and MLF. Despite our efforts to obtain official data and estimates for each revenue and expenditure, the lack of data and information for a number of items requires that we generate estimates. Therefore, our results for revenues, expenditures, and net impact should be regarded as estimates, and not precise numbers. Despite these uncertainties, we regard these figures as plausible estimates calculated with the best available data and methods, and they are instructive to understand the scale of coal's impact and to provide a foundation for future refinements.

With these caveats in mind, we report the revenues, expenditures, and net impact figures estimated in this report (see Table 15). The industry alone contributed $10.9 million to the GF from the direct payment of taxes, while support activities contributed an additional $15.6 million, resulting in a combined benefit to the state budget of $26.5 million. The largest source of direct revenues for the state was the industry's payment of the CSFT, which accounted for 46% of all state revenues generated from coal industry activity, while the largest source of revenues overall including support activities was the CNIT. In total, taxes generated by coal industry activity accounted for approximately 0.1% of total state revenues in FY2010-11.

In terms of the costs to the state attributable to the coal industry, we estimate that total on-budget expenditures supporting the industry amounted to $16.6 million in FY2010-11. This consisted of $15.3 million in agency expenditures from the GF and $1.3 million from the MLF for repairs to roadways required as a result of damage from heavy coal trucks. The greatest agency expenditure from the GF was for PDEP.

Comparing the total on-budget expenditures of $16.6 million to the direct industry revenues (not including support activities) of $10.9 million, we estimate that the direct impact of the coal industry amounted to a net cost to the Commonwealth of $5.7 million in FY2010-11.[34] However, the total cost associated with coal is even greater as this estimate does not account for the off-budget expenditures.

Table 15: Summary of revenues, expenditures, and net impact of coal for FY2010-11

Item	General Fund	Motor License Fund	Total
Direct coal industry			
Revenues (including support activities)	$26,540,000	$0	$26,540,000
On-budget expenditures	($15,310,000)	($1,280,000)	($16,590,000)
Estimated net impact	**$11,230,000**	**($1,280,000)**	**$9,950,000**
Off-budget expenditures	($143,360,000)	($18,510,000)	($161,870,000)
Direct coal employment			
Revenues	$35,830,000	$3,560,000	$39,390,000
Expenditures	($35,420,000)	($3,390,000)	($38,820,000)
Estimated net impact	**$410,000**	**$170,000**	**$570,000**
Indirect employment supported by coal			
Revenues	$57,270,000	$7,160,000	$64,430,000
Expenditures	($71,160,000)	($6,820,000)	($77,980,000)
Estimated net impact	**($13,890,000)**	**$340,000**	**($13,550,000)**
Total			
Revenues	$119,640,000	$10,720,000	$130,360,000
Expenditures	($265,250,000)	($30,000,000)	($295,250,000)
Estimated net impact	**($145,610,000)**	**($19,280,000)**	**($164,890,000)**

Off-budget expenditures supporting the coal industry in the form of tax exemptions and credits amounted to approximately $161.9 million in FY2010-11. The most significant tax expenditure was the sales and use tax exemption for coal, which amounted to $117.7 million. Overall, the total tax expenditure provided to the coal industry represents a significant source of lost revenue that, if collected, could benefit the state budget and help cover the various costs to the state associated with coal industry activity.

Direct employment in the coal industry also benefited the state budget through contributions of $35.8 million to the GF and $3.6 million to the MLF, for a total estimated benefit to the state budget of approximately $39.4 million for FY2010-11. These revenues were from the payment of personal income taxes—which accounted for 49% of revenues—as well as state sales and use taxes (33%), transportation-related taxes and fees (9%), and other tax sources (9%). State expenditures for supporting those employees through the provision of various services amounted to approximately $38.8 million, resulting in an estimated net benefit to the state of $0.6 million.

[34] This comparison is not reported directly in Table 15.

Employment indirectly supported by the coal industry generated an estimated $57.3 million for the GF and $7.2 million for the MLF in FY2010-11. Again, personal income taxes accounted for the greatest share at 46%. Estimated state expenditures supporting indirect coal-related employment amounted to approximately $78.0 million. Therefore, indirect coal-related employment resulted in a net cost to the state of approximately $13.6 million in FY2010-11. This result differs from that for direct coal employees because the average wage of indirect employees was significantly lower than the average wage of direct employees.

Overall, when taking all revenues and expenditures into account, we estimate that the impact of the coal industry on the Pennsylvania state budget in FY2010-11 amounted to a net cost to the state of $164.9 million, resulting from a net cost to the GF of $145.6 million and a net cost to the MLF of $19.3 million.

8.3 Legacy costs

Our net impact analysis also does not account for the legacy costs resulting from past or ongoing coal industry activities. For this report, this includes the lack of sufficient future funding for reclamation of AMLs, and the poorly understood historical and long-term costs associated with longwall mining.

In relation to AMLs, PDEP reports that $5 billion will be required to complete reclamation and water treatment of the remaining, unreclaimed pre-1977 mine sites. However, federal funding for AML reclamation efforts is set to expire in 2022, and it is expected that total state funding by then will amount to only $1.2 billion. Unless federal funding is continued, the remainder of the debt would have to be paid by the state, or the remaining sites left to pollute indefinitely. The projected legacy cost remaining after 2022 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, the AMLIS database of AMLs may be incomplete, and new AML sites may be listed in future years. Finally, the estimate of funds to be distributed through 2022 is only a hypothetical estimate, and Pennsylvania may not receive the full estimated level of funding.

For longwall mining, PDEP's most recent Act 54 report indicates that the occurrence of impacts on water resources, land resources, and public and personal property is rising in frequency, while many reported impacts continue to be unresolved. In addition, the data collected by PDEP are not being used to analyze the cumulative effects of longwall mining, nor the permanence of those impacts. As a result, the long-term costs for the state and impacted residents associated with longwall mining are not being considered.

Overall, the legacy costs associated with coal industry activity must be considered in examining coal's total impact. External costs resulting from coal industry activity, including the costs to human health, personal property damage, and the value of lost economic opportunities resulting from the contamination or loss of water resources, for instance, were not considered in this report. However, they all represent real costs to society that may impact the state budget, and should be considered in any full accounting of the benefits and costs of the coal industry.

8.4 Future trends

Pennsylvania's last peak in coal production occurred in 1998. Since then, annual production levels have declined by 27%. However, EIA projects that demand for Northern Appalachian coal is on the rise, with production expected to increase by 30% through 2020 as demand shifts northward from Central Appalachia. Despite the positive outlook, demand for Pennsylvania coal has historically gone through periods of growth and decline, and relying on coal to provide jobs and tax revenues for state and local economies leaves many areas vulnerable to the short-term shifts in demand. This is particularly true given the rapid growth in demand for natural gas extracted from the Marcellus Shale basin as well as the pending onset of tighter restrictions on emissions from coal-fired power plants.

8.5 Recommendations

We provide several recommendations aimed at minimizing future costs to the state attributable to the coal industry, and incentivizing new forms of economic development that will help diversify local economies in Pennsylvania's coal-producing counties. Some of the policy recommendations presented below complement others, in that the fiscal impact of one recommendation may support the financing of another. Additionally, other policy changes may be required beyond those suggested here in order to address other problems associated with the coal industry. Our recommendations are as follows:

Implement a state severance tax on coal and/or authorize local governments to levy a severance tax. The severance tax is a tax on the privilege of severing or extracting natural resources such as coal, natural gas, oil, timber, or other minerals. Severance taxes are usually structured to tax either the gross value of the resource after it is extracted or the volume of production. In many coal-producing states, severance taxes play an important role in funding education, health care, infrastructure, and other services provided at the state and local level. A total of 38 states have some type of severance tax (O'Leary, 2011). To better capture a portion of the wealth generated from coal extraction in Pennsylvania, while supporting state and local funding for education, health care, infrastructure, environmental protection, and economic development initiatives, Pennsylvania should implement a state severance tax on coal and/or authorize local governments to levy a severance tax. West Virginia provides a good model. The total state tax is 5%, of which 4.65% is deposited into the state's General Revenue Fund while the remaining 0.35% is distributed to local governments.

Create a permanent mineral trust fund. Coal and natural gas are finite resources, and their extraction is prone to periods of growth and decline. To expand and sustain the economic benefits of coal mining (and other natural resource industries), Pennsylvania should create a Permanent Mineral Trust Fund that would support short-term and long-term economic development goals and protect against any future decline in jobs and revenues provided by the coal industry. The Fund could either be financed through the elimination of existing tax expenditures supporting the coal industry and a dedication of the resulting revenues to the fund or, as in other states, with a state severance tax based on a percent of gross revenues. Monies from the Fund could be dedicated toward supporting economic diversification efforts in Pennsylvania's coal-producing counties or could cover any future funding shortfalls for reclaiming AMLs. Several western states have created permanent funds with dedicated severance tax dollars, and more recently both an Economic Diversification Trust Fund and a West Virginia Future Fund were proposed in West Virginia. Based on the model proposed for the Economic Diversification Trust Fund, we estimate that if Pennsylvania were to implement a permanent fund in 2014, financed by a 1% severance tax on coal and natural gas, the principal in the fund would reach $1.5 billion by 2025, while $440 million would have been available for funding targeted initiatives aimed at diversifying state and local economies. More details on permanent mineral trust funds and the potential benefits of implementing a permanent fund for Pennsylvania are provided in Appendix A.

Eliminate tax credits and exemptions for coal. One reason that coal's revenue contribution is so small is that the Commonwealth is losing $161.9 million in potential tax revenues from the sales tax exemption for the purchase and use of coal, the direct use tax exemption for mining equipment and machinery, and the tax exemption for fuel and energy used in mining. These tax expenditures are intended to provide special treatment to the coal industry, and for the latter two, other extractive industries as well. However, the expenditures represent a real cost to the state and reduce revenue that could be used for funding other state programs. Additionally, the declines in coal production and employment in Pennsylvania suggest that the credits and exemptions may have proven ineffective in supporting coal industry activity. If these credits and exemptions are ineffective, then eliminating them would increase state revenue while also removing coal's subsidized advantage relative to other energy sources.

Conduct a detailed analysis of the total fiscal impact of tax expenditures supporting coal. Pennsylvania's Executive Budget document states that tax expenditures are "initiated, expanded, limited or deleted based on merit," and refers to its analysis of the impact of tax expenditures as a "comprehensive tax expenditure analysis" that allows for "an ongoing evaluation of each tax expenditure" (Pennsylvania Office of the Budget, 2012, p. D4). However, the tax expenditure analysis omits or neglects various tax expenditures, fails to provide estimates for some of the tax expenditures it does describe, and, most importantly, fails to present any evidence or conclusions pertaining to the merit or effectiveness of each tax expenditure. Given the substantial cost to the state budget resulting from the provision of tax credits and exemptions to the coal industry or any other industry, and the apparent failure of the expenditures to bolster coal mining activity, the lack of a comprehensive evaluation and the resulting continuation of each expenditure represent irresponsible fiscal behavior. Responsible fiscal accounting would use accurate expenditure data and compare the expenditures against legislative intent, assessing whether the expenditure on a given item aligns with stated budgetary priorities. Further, responsible fiscal accounting requires the balancing of both the positive and negative impact of a given tax expenditure. We recommend that this type of assessment be carried out for each of the tax expenditures provided to the coal industry.

Ensure that funds for reclamation and water treatment of abandoned mines are sufficient for meeting all present and future needs. There is a significant likelihood that current funding streams for AML reclamation and water treatment will be insufficient to meet all present and future needs. In fact, agency estimates suggest a funding shortfall on the scale of billions of dollars. If and when shortfalls occur, there will be a need to find alternative funding sources, and one potential source is the GF. To prevent this from happening, we recommend that the Pennsylvania General Assembly explore mechanisms for generating new sources of revenue aimed at overcoming funding shortfalls expected to exist if AML funding expires, as scheduled, in 2022. The goal should be to ensure that remaining reclamation costs are not shifted from the coal industry to the public.

Strengthen regulation of longwall mining and more thoroughly examine and address historical and potential impacts. Longwall mining in Pennsylvania, which predominantly occurs in Pennsylvania's southwestern region, has resulted in significant impacts on water resources, land resources, and public property. According to PDEP's five-year Act 54 reports and independent analysis of the reports, these impacts are pervasive and increasing in frequency. As such, the laws and regulations pertaining to longwall mining and the implementation thereof have failed to prevent or minimize the impacts. PDEP and other state agencies should conduct a comprehensive evaluation of the historical and potential scale of impacts from longwall mining, openly review whether stronger implementation of current regulations would be sufficient for avoiding or minimizing those impacts, and explore regulatory improvements that would enhance and strengthen regulation of longwall mining.

To conclude, in this report we provide initial estimates of the benefits and costs of Pennsylvania's coal industry. We invite refinements of this analysis, and recognize that revised agency accounting practices that generate data on the impact of each industry would help facilitate these calculations for the coal industry, and indeed, any industry operating in the Commonwealth. We conclude that Pennsylvania's coal industry presents a substantial net cost to the state budget, and we offer several recommendations that would help the industry pay for its current state-level expenditures and cover its long-term legacy costs. Even if mining expands in the near future, the coal industry's small contribution to state revenues will continue to be insufficient for covering the annual and legacy costs associated with coal industry activity. Therefore, state policy related to energy and economic development—to the extent that it supports the coal industry—should be reconsidered, and new policies should be enacted that reflect a recognition of these realities.

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APPENDIX A: ESTABLISHING A PERMANENT MINERAL TRUST FUND IN PENNSYLVANIA

Coal and natural gas are finite resources, and their extraction is prone to periods of growth and decline. In Pennsylvania, for instance, coal production has been on a steady decline since 1998, but is expected to expand once more (EIA, 2012b). Pennsylvania's natural gas industry is currently booming due to advances in extraction techniques, opening the way for the exploitation of the new natural gas resources. Given that both of these industries are projected to expand over the next decade or more, the state could take advantage of this growth by establishing a permanent mineral trust fund.

Permanent mineral trust funds, or "permanent funds," help ensure a permanent source of wealth from the extraction of finite resources such as coal, natural gas, and oil—wealth that will last and continue to grow even during "bust" periods. Even more, after the resource has been exhausted, they also support economic development and diversification for state and local economies (O'Leary, 2011).

As of 2011, six states with strong natural resource extraction industries had created permanent funds, each of which is funded by a severance tax and/or lease payments collected on the extraction of the state's minerals (Boettner et al., 2012) (see Table 16). The states direct a portion of the revenues into the fund, and the principal is invested in any number of ventures promising a return on the investment. A percentage of the investment income is then made available for funding public needs (Boettner et al., 2012).

The manner and amount of revenue collected and deposited into each fund varies among states, ranging from a severance tax of 2.5% on the value of all minerals produced in Wyoming to 30% of total oil and gas tax collections in North Dakota. Additionally, while some states transfer the investment earnings into the general fund, others use it to fund infrastructure, economic development, and education (Boettner et al., 2012).

Table 16: Permanent mineral trust funds in other producing states

State	Trust fund name	Year created	Revenue source	Revenue in 2010/2011	Principal in 2010/2011
Alaska	Alaska Permanent Fund	1976	25% of oil income	$887 million	$38.2 billion
Montana	Coal Severance Tax Trust Fund	1976	50% of coal severance tax	$22 million	$836 million
New Mexico	Severance Tax Permanent Fund	1973	12.5% of total severance tax	$3.5 million	$3.6 billion
North Dakota	Legacy Fund	2010	30% of coal and oil severance tax	$613 million	$613 million
Utah	State Endowment Fund	2008	Severance tax revenues in excess of set amounts	$0	$23 million
Wyoming	Permanent Mineral Trust Fund	1974	2.5% severance tax on gas/oil	$290 million	$5.4 billion

Source: Boettner et al. (2012).

In 2012, an Economic Diversification Trust Fund was proposed for West Virginia that would be financed with a 1% increase in the severance tax on coal, natural gas, and oil, and 5% of the annual investment income would be used for funding a variety of priorities aimed at promoting economic diversification. It is estimated that if the proposed fund were implemented in 2013, its principal would reach $1.7 billion by 2025, while $600 million of the investment income would have funded economic initiatives (Boettner et al., 2012).

If Pennsylvania were to establish a permanent fund starting in 2014 using the West Virginia model, we conservatively estimate that by 2025, the principal in the fund would reach $1.5 billion, while $440 million would have been available for funding targeted initiatives aimed at diversifying state and local economies.

APPENDIX B: COUNTY-LEVEL ECONOMIC IMPACT OF COAL

Pennsylvania's top coal-producing counties—Greene, Washington, Somerset, Clearfield and Armstrong—which together accounted for 85% of total state coal production in 2010, are demographically dissimilar from other counties in the Commonwealth (see Table 17). On average, these five counties have lower population densities, lower median household incomes, and higher unemployment rates than the average of all counties in the Commonwealth. Furthermore, according to the Appalachian Regional Commission's (ARC's) rating of socioeconomic status in FY2011, all but Washington County are designated as "Transitional," meaning that they are transitioning between weak and strong economies. More specifically, a transitional county is defined as ranking between the worst 25% and the best 25% of the nation's counties (ARC, 2011).

Table 17: County demographics for the top coal-producing counties in Pennsylvania, 2010

	Statewide	Armstrong	Clearfield	Greene	Somerset	Washington
Population density (persons/square mile)	283.9	105.5	71.3	67.2	72.4	242.5
Median household income	$49,288	$43,695	$52,177	$40,398	$42,232	$34,512
Unemployment rate	8.50%	9.20%	9.70%	7.60%	9.20%	8.00%
ARC socioeconomic stress rating	N/A	Transitional	Transitional	Transitional	Transitional	Competitive

Sources: PDLI (2012c); ARC (2011).

The purpose of the above table is not to suggest that the presence of the coal industry suppresses economic development; however, a strong reliance on a single industry, particularly one that experiences periods of expansion and recession, leaves local economies vulnerable to rapid changes in market conditions. For instance, in Pennsylvania, many counties rely heavily on the collection of property taxes on minerals. For taxes on coal property, these taxes are only collected when a coal seam has been permitted for mining or is being actively mined. Therefore, if coal production declines and fewer mines are being permitted or operated, then this source of revenue can diminish over a short period of time.

As shown in Table 18, property taxes on coal generate local revenue for each of the top coal-producing counties, and in the case of Greene County taxes on coal account for a substantial share of total tax revenues. The coal industry also directly employs many residents in the counties where coal is produced. These employment impacts are discussed in detail in Section 5, and the following table includes data on the share of each county's total employment that is provided by the coal industry.

Table 18: Share of county revenues contributed by property taxes on coal, for select counties, 2010

County	Percent of state coal production	Coal property tax revenues	Total county tax revenues	Coal as a percent of tax revenues	Coal as a percent of total employment
Greene	46%	$3,270,000	$11,440,000	29%	14%
Washington	18%	$870,000	$32,440,000	3%	1%
Clearfield	6%	$80,000	$10,900,000	1%	2%
Somerset	9%	$140,000	$12,260,000	1%	3%
Armstrong	6%	$60,000	$11,690,000	< 1%	1%
Totals	**85%**	**$4,420,000**	**$78,730,000**	**6%**	**3%**

Note: Values for coal property tax revenues calculated using a ratio of assessed values for coal properties to all taxable properties for each county and applying that ratio to total county tax revenues. Property assessment data for Clearfield County could not be obtained from county government officials; therefore, the coal property tax revenue estimate for Clearfield County was generated for this report. Sources: Percent of state coal production calculating using data from EIA (2011c). Percent of total employment calculated using data from EIA (2012d) and PDLI (2012b). Estimates of coal property tax revenues for all counties except Clearfield County generated using assessment values provided by Kelley (2012b), Washington County Revenue Department (2012), Rizzo (2012), and Renosky (2012), and using values for total county tax revenues from Kelley (2012b), Clearfield County Controller's Office (2012), Washington County Finance Department (2012), Somerset County Auditor's Office (2011), and Armstrong County (2011).

APPENDIX C: RIMS-II AND THE USE OF ECONOMIC MULTIPLIERS

RIMS-II, created and provided by 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 Pennsylvania, or the regional impact of new projects such as an airport.[35]

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 Pennsylvania for FY2010-11.

A different tool, IMPLAN, is sometimes used for similar studies. We use RIMS-II economic multipliers for consistency with the similar Kentucky analysis (Konty and Bailey, 2009) and our previous West Virginia (McIlmoil et al., 2010a) and Tennessee analyses (McIlmoil et al., 2010b), and because of its wide use by other universities and organizations in the Appalachian region.[36]

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 Pennsylvania coal industry for employment and wages.[37] Using selected multipliers, detailed in Table 9, 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 Pennsylvania 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 the recognition that, while imperfect, these multipliers allow us to clarify key issues and to perform initial, if imprecise, calculations.

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[35] 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 Pennsylvania 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.

[36] 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).

[37] The multipliers selected were the direct effect, Type II, benchmark series multipliers for the Pennsylvania coal industry (NAICS code 2121). These provide total impact multipliers that include both indirect and induced impacts, whereas the Type I series provides only indirect impacts. 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.