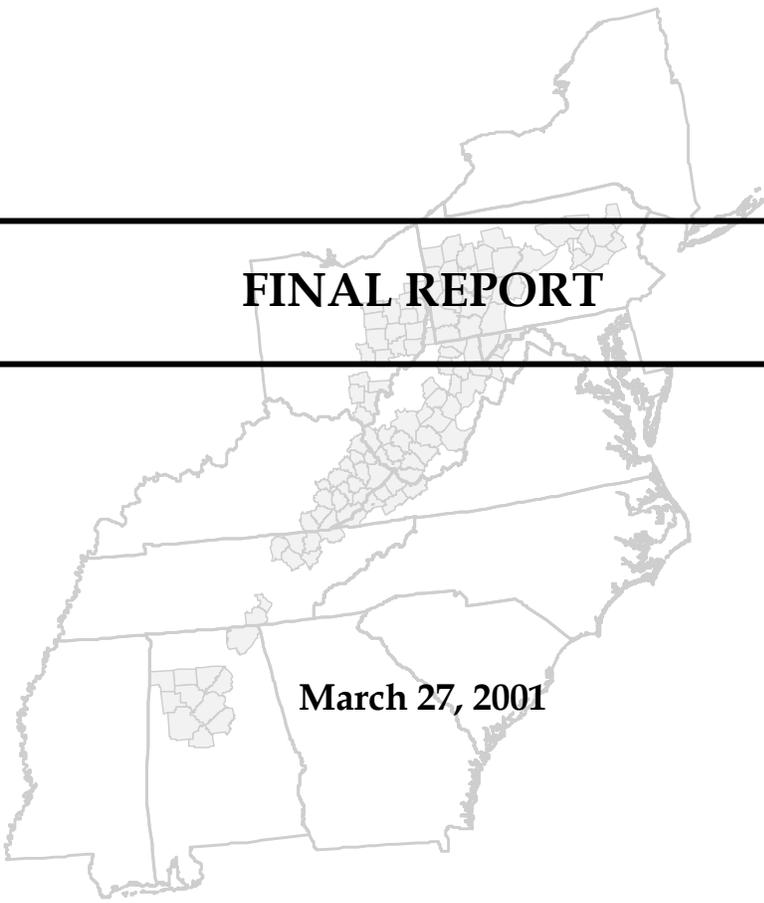


A Study on the Current Economic Impacts of the Appalachian Coal Industry and its Future in the Region



FINAL REPORT

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**Center for Business and Economic Research
Gatton College of Business and Economics
University of Kentucky**

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A Study on the Current Economic Impacts of the Appalachian Coal Industry and its Future in the Region

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Executive Summary

Few topics are capturing national attention more today than energy. The urgency of the issue in 2001 is nearly as great as it was in the mid-1970's and early 1980's, and the awareness of its importance is likely to endure. Of the energy-supplying sectors in the United States, coal is surely the most volatile. Even though its contribution to energy supply has declined in recent years, it remains the only abundant domestically produced energy resource and represents the primary fuel used by a large segment of industry. In Appalachia, coal mining is a vital part of the economy. Because of this importance, the region's economy and its residents remain vulnerable to changes in the industry's fortunes. In some counties, coal mining represents such a significant part of the economy that even small changes in demand and output often have a dramatic impact on the well-being of the residents. In recent years, improvements in mining productivity, competition from Western U.S. coal, coal imports from abroad, and environmental legislation all have contributed to substantial job losses in Appalachia. They have also reduced local business opportunities and have generally undermined social well-being in the region.

This report examines the current significance of the coal industry within Appalachia, and its prospects for the future. It was conducted by the University of Kentucky Center for Business and Economic Research (CBER) under contract with the Appalachian Regional Commission. The report identifies the areas within Appalachia where the coal industry is currently most active, and the local and regional economies where the industry has the largest impact on the overall economy. The report also addresses the expected future for the industry within Appalachia. How is the impact of the industry expected to change in the next decade? How would that change in impact vary under alternative macroeconomic scenarios for the economy, or under alternative environmental regulations? Which areas within Appalachia would be most affected by expected future changes in the coal mining industry?

The study examines 1997 data from 118 major coal-producing counties within Appalachia. Coal production and price data are from the Department of Energy's Energy Information Administration while employment and earnings data are from the Department of Commerce. The year 1997 was used as the "current" year due to lags in the data. The study also reports results for the industry within three regional groups: Northern Appalachia (PA, OH, MD, and Northern WV); Central Appalachia (KY, VA, and Southern WV); and Southern Appalachia (AL and TN). Forecast scenarios are based on the Energy Information Administration publications *Annual Energy Outlook 1999*, and *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*. The forecast scenarios used in the report about the Kyoto Protocol include a baseline scenario as well as six scenarios where greenhouse gas emissions are a certain percentage of their 1999 levels. These include 24%, 14%, and 9% above the 1990 levels,

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as well as 3% and 7% below the 1990 levels. The final scenario is one of stabilization at the 1990 level of emissions.

The following are the main findings of the study:

- Coal mining employment is concentrated in the region composed of the intersection of Kentucky, Virginia, and West Virginia. Additionally there is a small pocket of high employment in Alabama as well as several counties in Pennsylvania. Coal mining earnings in the ARC region follow a similar pattern with the highest concentration of earnings from coal mining occurring in the region of the intersection of Kentucky, Virginia and West Virginia. In 1997, Kentucky had five counties with coal mining earnings of more than \$50 million, including Harlan, Knott, Leslie, Perry, and Pike; Virginia had two counties, including Buchanan and Wise/Norton; and West Virginia had eight counties, including Boone, Kanawha, Logan, Mingo, Raleigh, and Wyoming in the southwestern part of the state and Marion and Marshall in the northern part of the state.
- The coal mining industry currently is a large share of the economy, measured in terms of the percentage of coal mining gross county product to total gross county product, in selected counties throughout the region, and in many counties in Central Appalachia. These counties include Knott County (54.0%) and Pike County (34.3%), Kentucky, Boone County (71.9%) and Mingo County (51.9%), West Virginia, and Buchanan County (39.4%), Virginia.
- The total economic impact of the coal mining industry was \$18.4 billion in output in 1997 in the 118 Appalachian coal-producing counties while the direct impact was approximately \$12.4 billion. The total earnings impact was \$6.2 billion per year, while the direct impact was approximately \$4 billion. The total employment impact was 135,000, while the direct impact was 60,000 jobs. The total annual impact on severance, income, and sales tax revenue was \$559.5 million. The total impact of the coal mining industry accounted for 4.4% of 1997 employment and 5.1% of 1997 worker earnings in these 118 counties overall, but accounted for 29.9% of employment and 27.6% of earnings in the Central Appalachia region.
 - Regionally, the total economic impact accounted for 3.1% of employment, 3.4% of earnings, and 2.7% of value-added in the Northern Appalachian Region. In the Central Appalachian region, the total impact accounted for 29.9% of employment, 27.6% of earnings, and 29.8% of value-added. Finally, in the Southern

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Appalachian region, the total impact accounted for 2.7% of employment, 3% of earnings, and 3.2% of value-added.

- The study found that even under moderate baseline conditions for future growth in the economy, the impact of the coal mining industry can be expected to drop in the next decade, particularly with respect to employment and earnings. Coal industry earnings and employment are expected to drop by 25% to 30%. The tax impact of the coal mining industry, including coal severance taxes, income and payroll taxes, and retail sales taxes, is expected to decline by 20%.
 - Regionally, the expected decline in tax revenue is largest in the Southern Appalachian region (33.9%). Declines in the other regions are 16.6% in the Northern Appalachian region and 20.4% in the Central Appalachian region
 - Population, under the baseline scenario, is expected to decline the most in the Central region (1.34%). Declines of 0.21% and 0.12% are forecast for the Northern and Southern regions, respectively.
- The relative size of the drop will be large in selected counties throughout the region, but many of these counties are located in Central Appalachia. The total economic impact of the coal mining industry will decline by the equivalent of 6.5% of regional employment and 6.1% of earnings in Central Appalachia under the baseline scenario. At the same time, transfer payments, including AFDC, SSI, Food Stamps, Unemployment Insurance, OASDI, and medical transfers (Medicare and Medicaid), for “income maintenance” programs would be expected to rise by between 5% and 15% in Central Appalachia under the baseline scenario.
 - Increases in transfer payments are generally expected to be the largest in the Central Appalachian region with approximately 5% increases in TANF and SSI payments and an approximate 11% increase in Food Stamps payments. Increases are also forecast to be significant for UI payments (15.78%) and medical transfer payments (2.49%).
 - Increases in transfer payments are substantially less in the Northern and Southern regions where TANF and SSI payments are forecast to increase less than 1%. Food Stamps payments in these two regions are forecast to grow slightly more than 1.5%. Forecasts for growth in UI payments and Medical Transfer payments are substantially smaller than the forecasted growth for the Central

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region. UI payments are forecast to grow around 2% and Medical Transfer payments less than 0.5%.

- The forecast decline in the economic impact of the coal mining industry varies little between the baseline forecasts and four alternative macroeconomic scenarios. In the macroeconomic scenarios, the same regional pattern also is evident, with the largest percent losses in earnings and employment occurring in Central Appalachia, where the economy is most dependent on the coal mining industry. The loss of earnings in Appalachia overall is less than 1% in all macroeconomic scenarios, and the percent losses are roughly 0.5% in both Northern and Southern Appalachia. The following provides details behind the basic assumptions of some of the macroeconomic scenarios:
 - The baseline case reflects considerable optimism about the potential for worldwide supply. Production from countries outside OPEC is expected to show a steady increase, reaching almost 47 million barrels per day by the year 2000 and increasing gradually thereafter to more than 55 million barrels per day by 2010. The total U.S. gross oil imports increase from 10.2 million barrels per day in 1997 to 14.1 million in 2010.
 - The high economic growth rate scenario includes higher growth rates for population, labor force, and labor productivity resulting in higher industrial output, lower inflation and lower interest rates. As a result, GDP increases at an average rate of 2.6 percent a year from 1997 to 2020, compared with a growth rate of 2.1 percent a year in the reference case. Total energy consumption in the high economic growth case is 129.4 quadrillion Btu in 2020, compared with 119.9 quadrillion Btu in the reference case.
 - The low economic growth case assumes lower growth rates for population, labor force, and productivity; resulting in higher prices, higher interest rates, and lower industrial output growth. In the low growth case, economic output increases by 1.5 percent per year from 1997 through 2020, and growth in GDP per capita slows to 0.9 percent per year. With lower economic growth, energy consumption in 2020 is reduced from 119.9 quadrillion Btu to 110.5 quadrillion Btu, and carbon emissions are 1,826 million metric tons, or 8 percent, lower than in the baseline case.
- The decline in the economic impact may vary a great deal under the new Kyoto protocol environmental initiative to reduce the emission of

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greenhouse gasses including carbon dioxide (CO₂), nitrous oxide (N₂O), methane, sulfur hexafluoride, perfluorocarbons, and hydrofluorocarbons. The percentage losses can be much higher than the baseline in several of the Kyoto scenarios

- The Kyoto Protocol scenarios include scenarios of 24%, 14%, and 9% above the 1990 level of emissions, as well as 3% and 7% below the 1990 level of emissions. The final scenario is one of stabilization at the 1990 level of emissions. The scenarios reflect alternative assumptions about the level of emissions reduction that will be required. The exact impact of implementing the Kyoto Protocol on emissions reduction is unknown. Implementing the protocol could require emissions to fall to or below 1990 levels in the United States, but smaller reductions may be possible if emissions trading or other innovative approaches are allowed. Although, larger emissions reductions may be required even in this case. The decline in the coal mine industry, and its economic impact, could be between two and three times greater if emissions must be reduced severely. However, none of these scenarios consider the possible mitigating effects of compensatory workforce and community adjustment programs on the employment and income repercussions associated with these scenarios.
 - Percent losses are much higher in the more restrictive Kyoto emissions reduction scenarios. The percent loss of earnings in the coal mining industry is near or above 2% in the Kyoto scenarios where emissions return to 1990 levels, or lower, while the employment loss is above 1%. In these same scenarios, the percentage losses are most substantial in Central Appalachia where industry losses account for near or above 8% of regional earnings and 5.5% to 6.1% of regional employment. The industry losses in these more restrictive emission scenarios also rise rapidly for Northern Appalachia, but never rise above 1.5% of earnings or 0.8% of employment.
 - Percent losses are less severe under the less restrictive Kyoto emissions reduction scenarios, particularly in Northern and Southern Appalachia. However, in Central Appalachia, the loss of earnings in the industry accounts for 6.0% of regional earnings even under the scenario where emissions are able to rise to 14% above 1990 levels. Earnings and job losses are only somewhat higher than those of the baseline forecast in the scenario where emissions are able to rise 24% above 1990 levels.

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Overall, the findings suggest that the coal mining industry remains a significant part of the Appalachian economy, and is a major part of the economy in selected counties and even whole regions within Appalachia. Significant losses in the industry have the potential to yield great changes to both the employment picture and aggregate socioeconomic indicators in those areas where the industry is most important. This said, however, it should be remembered that under all of these forecast scenarios, the reductions in employment, earnings, tax revenues, and population that are discussed, along with the increases in transfer payments, are forecast changes due to the coal mine industry alone, with other factors held equal. Once again, it should be noted that no special workforce or community economic adjustment programs are examined to determine how they might alter the estimated employment, income or transfer payment impacts. In addition, external factors, such as the growth in existing non-mining industries and the introduction of new ones, do change, which could have a substantial impact on the fortunes of these regions a decade from now.

Introduction

The coal mining industry has long been a vital part of the economy of Appalachia. Many residents of the Appalachian region are employed in the coal mining industry or are employed in other industries that depend upon coal mining for their business. In some major coal-producing counties within Appalachia, the overall employment in coal mining and related businesses is large enough to account for a significant share of the total local employment and earnings. Coal industry activity also can make a significant contribution to the tax base of some Appalachian states, and can significantly influence the rate of population growth and poverty in coal-producing regions. Taken together, this suggests that the coal mining industry can have a large and widespread impact on the economy in coal-producing regions, particularly in areas where coal mining is the main industry.

Many Appalachian residents benefit directly or indirectly from the significant coal mining industry in the region. The importance of the industry in the region, however, makes the region and its residents vulnerable to any changes in the industry that reduce local employment or business opportunities. Indeed, in recent years the industry has suffered some declines in employment as production technologies have changed and as demand for some types of Appalachian coal has decreased. Such changes should continue into the future, leading to additional reductions in earnings and employment opportunities in the industry within the region. In addition, there are new environmental regulations proposed for implementation over the next decade which could dramatically affect the coal mining industry, and therefore, the economies of many counties in the Appalachian region.

All of this suggests the need for a detailed accounting of the significance of the coal industry within Appalachia, and its prospects for the future. Such an assessment should examine where the industry is currently most active within the Appalachian region, and in which local and regional economies the industry has the largest impact on the overall economy. The assessment also should examine the expected future for the industry within Appalachia. How is the impact of the industry expected to change in the next decade? How would that impact change under alternative macroeconomic scenarios for the economy, or under alternative environmental regulations? Which areas within Appalachia would be most affected by expected future changes in the coal mining industry?

This study is a comprehensive economic impact analysis of the coal mining industry in the Appalachian region of the United States. The study examines both the existing impact of the coal mining industry within the Appalachian region, and the expected future impact of the industry in the year 2010 under a number of alternative scenarios for industry change over the next decade. The study was conducted by the

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University of Kentucky Center for Business and Economic Research (CBER) under contract with the Appalachian Regional Commission.

The study begins with an analysis of the current economic impact of the coal mining industry in the coal-producing counties of Appalachia. Given lags in the release of industry data, data from the year 1997 is used to describe the “current” situation in the coal mining industry. In Section 1 of the report, we provide estimates of the coal industry’s share of total output, employment, and worker income as a part of each county’s overall economy. These estimates are used to generate indirect and induced economic impacts for various groups of counties. Indirect effects can best be described as those changes in inter-industry purchases in response to the new demands of the industries that are directly affected. Induced effects are effects that reflect the changes in household spending as income or population changes due to changes in production. These effects, also called “multiplier” effects, are combined with direct industry output, employment, and worker earnings to estimate both the total impact of the coal mining industry to the counties under study and its importance to other industries in the region as they are affected by activity in the coal mining industry. Moreover, we estimate potential tax revenue impacts that are attributable to the coal mining industry, including coal severance taxes, personal income taxes, and sales tax revenue. Changes in the coal mining industry can also dramatically affect other economic indicators such as participation in social welfare and disability programs and population growth. We provide a current description of these indicators in the coal-producing counties.

Each aspect of the above analysis is provided for a list of 118 major Appalachian coal-producing counties. That list was developed based on a list of Appalachian Counties with coal production in the year 1997, but amended to exclude counties where production was being phased out and to include counties with significant production in earlier years but unmeasured production in 1997 due to exceptional reasons. Total or average results for all 118 counties also are presented, as are results in three regional groupings within Appalachia: Northern Appalachia, Central Appalachia, and Southern Appalachia.

Section 2 of the report examines forecasts for the coal mining industry in the year 2010. Coal industry change is examined for the 1997 to 2010 period for a number of measures of industry activity and economic impact. These measures mirror the types of information that was gathered in Section 1 of the report. The direct change in industry output, price, employment, earnings and value-added from 1997 to 2010 is examined, along with the change in the total impact of the industry over time on each of the 118 counties, the counties in total, and in each of the three regional groupings. The report also examines how changes in industry activity over time are expected to change the impact of the industry on tax revenue in the region and on population growth and participation in social welfare programs.

**A Study on the Current Economic Impacts
of the Appalachian Coal Industry and its Future in the Region**

Change is examined under a baseline forecast for the economy as well as under 10 alternative forecasts. This report utilizes Energy Information Administration forecasts for coal mining production, price, labor productivity, and wages for baseline and alternative scenarios. Forecast information is utilized to calculate information on the industry's economic impact in the year 2010, using the same approach as in Section 1 of the report.

The baseline forecast reflects changes in the industry resulting from expected changes in demand growth for coal, industry labor productivity, and existing environmental regulations. Two sets of alternative economic forecasts are examined. The first set includes four alternative forecasts under alternative assumptions about the macroeconomic conditions in the economy through the year 2010. These alternative assumptions include a high economic growth and low economic growth assumption for the national and world economies as well as a high world oil price and low world oil price assumption. These alternative forecast scenarios are the same as those in the U.S. Department of Energy Energy Information Administration's (EIA) *Annual Energy Outlook 1999*.

The second set of alternative forecasts reflect alternative scenarios related to the Kyoto environmental protocol to reduce greenhouse gas emissions. The scenarios reflect alternative assumptions about the level of emissions reduction that will be required. Reductions may require emissions to fall to or below 1990 levels in the United States, but smaller reductions may be possible if emissions trading or other innovative approaches are allowed. Although, larger emissions reductions may be required even in this case. The forecast for the Appalachian coal industry through 2010 is examined under 6 alternative emission scenarios, ranging from a requirement that emissions drop to 7 percent below 1990 levels by around 2010 to a requirement that emissions may average 24 percent above 1990 levels. These 6 alternative scenarios are the same as those examined in the EIA publication *The Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*. No workforce or community economic adjustment programs are examined to determine how these might alter the estimated employment, income or transfer payment impacts of the six scenarios.

All analyses contain comparisons between the baseline forecast and each of the 10 alternative forecasts. The result is a detailed forecast of the changing impact of the coal mining industry in the coal-producing regions of Appalachia under the baseline scenario, alternative macroeconomic conditions, and under alternative implementation rules for the Kyoto environmental protocol.