



Center for Energy Economics
and Public Policy

Summary Report

The Impact of the Coal Economy on Wyoming

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EXECUTIVE SUMMARY

Coal production has been a cornerstone of the modern Wyoming economy since the 1970's, and has served as Wyoming's most stable source of tax revenues over the past four decades. In the current market environment, the coal industry in Wyoming is facing significant pressure. Despite its critical role in Wyoming, few studies have quantified the coal industry's impact on the statewide economy, and those that have are significantly out of date. This study addresses this information gap by describing the importance of the coal sector to Wyoming's economy today. It documents the risks and challenges facing the coal industry in the future due to market conditions and regulatory threats, and using the most recent data available, conducts an impact analysis to determine how these risks could affect the Wyoming economy and state revenues through 2030. The potential impacts of proposed carbon regulations introduced by the Environmental Protection Agency's (EPA) Clean Power Plan are also estimated, as are the potential impacts that large-scale international coal exports could have on Wyoming's economy. This report concludes with analysis of the policy choices Wyoming faces in response to these market challenges.

The Importance of Coal to the Wyoming Economy Today

Since 2008, coal production in Wyoming has fallen by 17%, and coal markets remain depressed. Assessment of market forces that may have caused this decline suggests that the three most important contributors to the decline have been:

- Falling natural gas prices, causing some coal to be displaced as a generation fuel nationally
- Slow national economic growth, which has reduced electricity demand and the need for Wyoming coal
- Growth of renewable energy production, which has displaced some coal-fired generation

Figure ES-1 summarizes the outlook from five well-known energy market forecasters regarding coal production over the next 25 years. Four of the five forecasts suggest zero or negative growth in the near term relative to the current national output of

WYOMING COAL ECONOMY QUICK FACTS

	<i>Coal economy</i>	<i>Coal mining only</i>
Share of gross state product (GSP):	14.0 %	11.3 %
Share of total labor income:	9.3 %	4.7 %
Share of total employment:	5.9 %	1.8 %
State revenue directly from coal mining, not including other activities:	\$1.3 billion, or 11.2% of all government revenues collected in the state	

*The "coal economy" includes all activity caused by the presence of coal mining, rail-shipping and coal-fired electricity generation in Wyoming.
All figures used are for fiscal year 2012.*

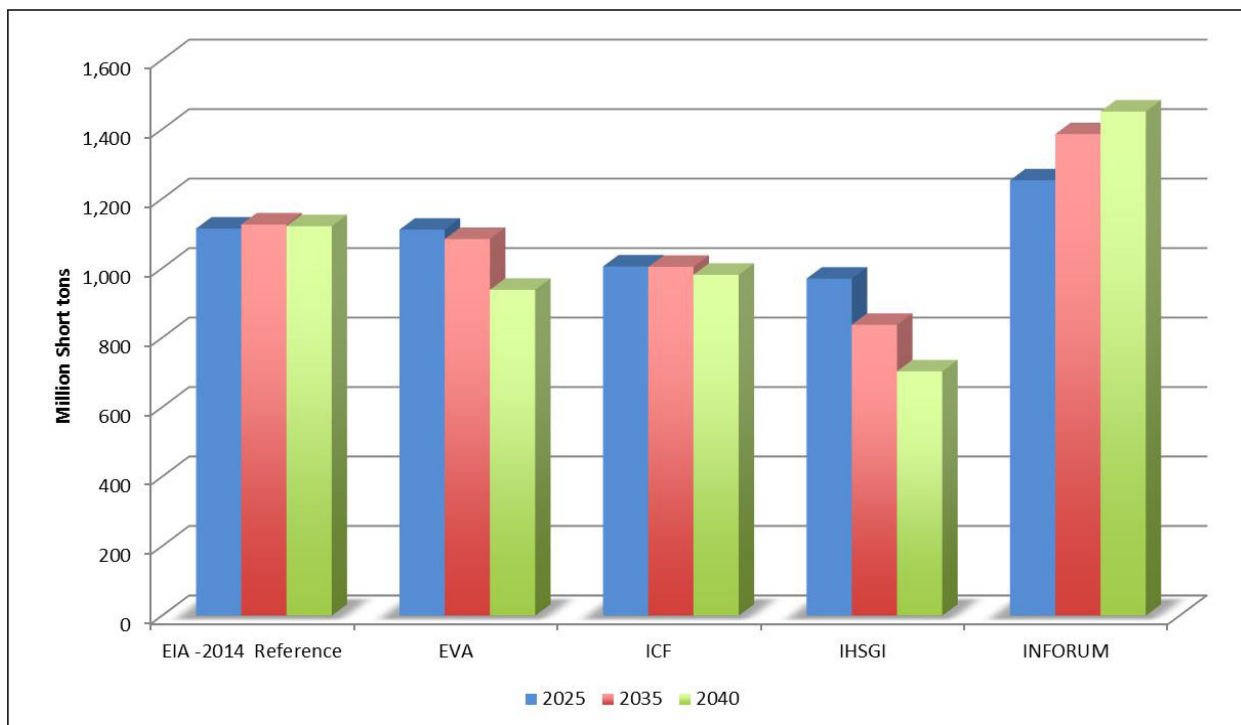


Figure ES-1. Forecasts of U.S. coal production.

approximately 1 billion tons annually. Through 2040, the outlook for coal production gets considerably weaker in several cases, particularly those that assume more stringent carbon regulations occur.

The Potential of Expanded International Coal Exports from Wyoming

Coal exports to international markets provide one possible means of protecting and expanding future coal production in Wyoming. The primary challenge facing a major expansion of Wyoming coal exports to foreign destinations is a lack of port capacity that would allow expansion of export shipments at competitive cost. Development of such ports has proven difficult, and has often been opposed outside Wyoming on environmental grounds. Concerns associated with port development - primarily in Oregon and Washington - range from local traffic congestion problems, dust and air quality concerns, and the implication that such exports could contribute significantly to global climate change.

In addition to environmental concerns, however, the greatest challenge in achieving such port expansion may be the perceived weakness of the coal market and domestic coal producers themselves. For example, Arch Coal, Inc., a financial backer of one of two proposed large west coast port expansions (Millennium Bulk Terminal in Longview, Washington) has experienced a sharp decline in its capital value. Arch Coal holds a 38% investment in the project. In November 2014, Ambre Energy, Ltd., the majority backer of the Millennium Bulk Terminal project, announced in a regulatory filing that it was divesting its North American coal export assets, selling them to a Denver-based private-equity firm. Further, Peabody Energy Corporation, owner of half of the proposed Gateway Pacific Terminal in Bellingham, Washington is also in weak financial condition. Cloud Peak Energy, Inc., with an interest at both planned terminals recently reported losses on coal exports and divested of export mine interests. Weakness in U.S. coal markets has left domestic firms with limited ability to finance large-scale investments. The general market willingness to support such projects is also uncertain.

If opposition to proposed new terminals could be overcome and the projects financed, the impact on the Wyoming economy could be substantial, especially if all of the proposed terminal capacity were accessible. Most of these potential economic benefits would accrue to the Powder River Basin; however, the secondary effects would be felt throughout the state.

Threats to the Domestic Coal Market

In addition to international export scenarios, this report analyzed the potential impact of existing domestic market challenges. Using the U.S. Energy Information Agency’s (EIA) Annual Energy Outlook 2014 (AEO2014) projections, authors assembled several Wyoming coal production scenarios. These scenarios considered the following influences on coal production:

1. *Fundamental market effects driving coal market demand and production costs:*

- Continued weak demand due to low natural gas prices caused by recent increases in domestic natural gas production
- Continued weak demand due to slower national economic growth leading to slower electricity load growth
- Decreases in productivity growth in the coal mining sector, resulting in increased coal production costs

2. *Regulatory changes affecting Wyoming energy markets:*

- U.S. EPA proposed Clean Power Plan for new and existing electricity-generating power plants¹

¹ The EPA Clean Power Plan is also referred to as “111(d)” - the section number of the Clean Air Act that the rule falls under.

ESTIMATED BENEFITS OF 100 MILLION TON ANNUAL COAL EXPORTS EXPANSION

Increase in Gross State Product:
\$1.2 billion annually

Increase in jobs:
4,000+ new jobs

Increase in labor income:
\$345 million annually

Analysis of EIA coal production projections using an impact model constructed specifically for this study suggests that of the fundamental factors that may decrease Wyoming coal production, rising coal costs pose the greatest threat. For example, using the EIA’s scenarios and assumptions, in a worst-case scenario assuming an economy at full employment and growing normally, coal production in Wyoming could fall by 20% from 2012 levels by 2030. The decrease could occur due to lower productivity growth at mines and higher wage and capital cost growth than recent historic norms. Based on these assumptions, employment losses in the state would total nearly 4,800 jobs by 2030, relative to 2012 employment levels.

Assuming no changes to the regulatory landscape of 2012, EIA projections suggest low natural gas prices and slowing economic growth present a much smaller threat to future Wyoming coal production than rising coal production costs. In both low gas price and slow growth scenarios considered, coal output levels would be between 4% and 8% greater by 2030. While adverse market effects could result in less output than these estimates, especially if multiple market effects occurred simultaneously, the analysis suggests that fundamental market factors pose a less serious threat to Wyoming coal production than those presented by potential carbon regulations.

Potential Impacts of the EPA’s Clean Power Plan Proposal

The EPA’s Clean Power Plan targets carbon dioxide emissions reductions of 30% of 2005 levels, but places the burden of reduction unevenly among states. In Wyoming, the proposed rules would require a reduction in the state’s CO₂ emissions rate by 19% from 2012 levels.

The EPA’s proposed 111(d) rules allow states to determine the means of meeting mandated emissions reductions goals. These may include energy efficiency as a reduction mechanism, and states may choose to design regional compliance programs, cooperating with other states. Given the range and uncertainty of the policy combinations states may choose, projections of the potential impact of the proposed regulation were performed as four separate scenarios. Scenarios considered include allowing energy efficiency (EE) to be used as a compliance strategy, and the degree of state cooperation (nationwide or regional). Scenario 1 considers national scale cooperation with energy

efficiency; Scenario 2 considers national scale cooperation without energy efficiency. Similarly, Scenario 3 considers regional level cooperation with energy efficiency and Scenario 4 considers regional level cooperation without energy efficiency.

To define the potential impacts of the EPA 111(d) proposals, authors enlisted the help of Rhodium Group, a New York-based consultancy that shared a set of proprietary simulations developed to estimate the impact of the EPA’s proposed greenhouse gas (GHG) regulations on the national economy. A comparison of the Rhodium Group modeled scenarios corresponding to those scenarios considered in this study for Wyoming coal production is presented in Figure ES-2.

Regardless of how policy is implemented, imposition of proposed 111(d) rules results in a significant decline in projected Wyoming coal output in all scenarios. By 2030, these declines range from approximately 20% to 45% decreases from 2012 production levels, depending on the scenario.

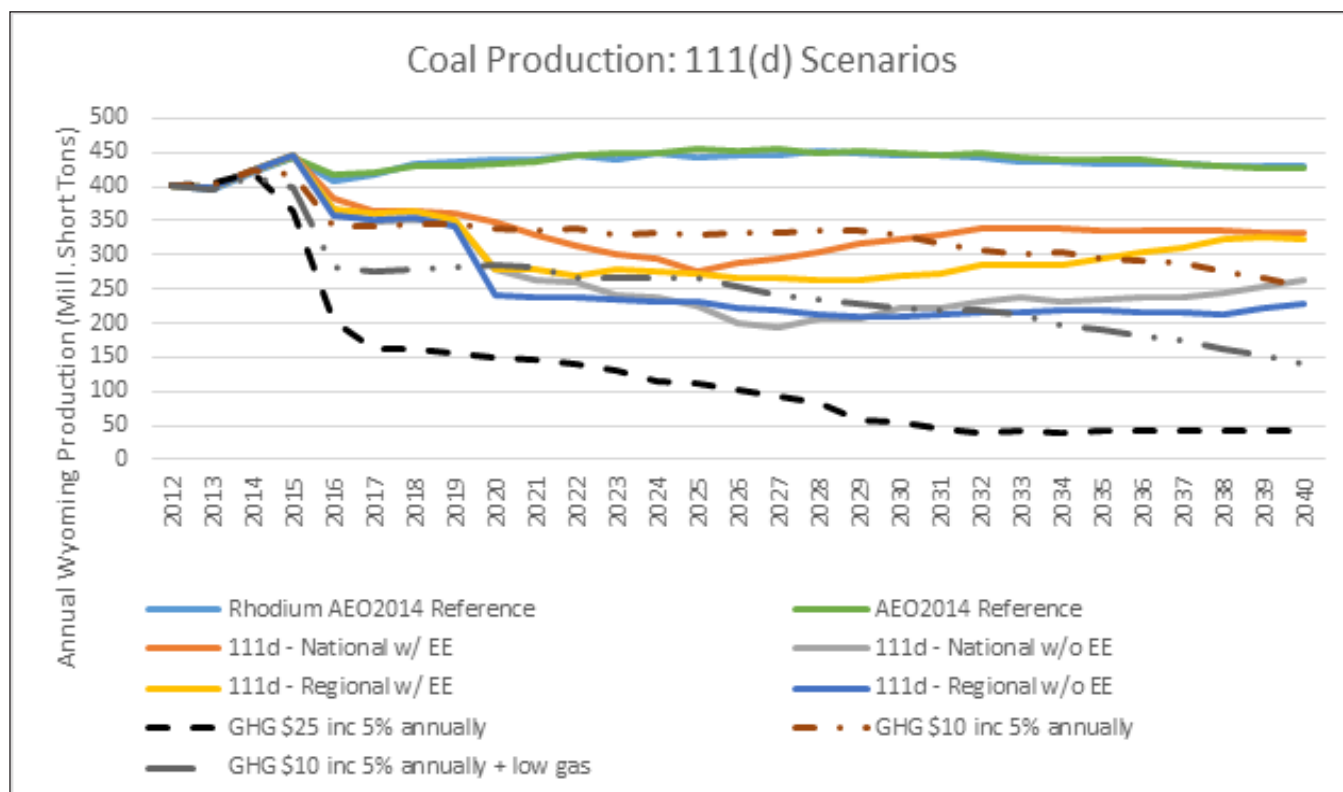


Figure ES-2. Coal production projections across 111(d) regulatory scenarios.

For comparison, authors show how forecasts for various carbon taxes, a commonly considered policy option, compare to the EPA’s 111(d) rules using the EIA AEO2014 carbon tax scenarios. The impact of a greenhouse gas tax of \$25/ton results in the most detrimental hypothetical outcome for coal production, and other scenarios with a \$10/ton tax level have an impact similar to the various 111(d) scenarios modeled.

The ways in which other states choose to implement 111(d) compliance measures have an impact on Wyoming. In order of production outcome from best (greatest production) to worst (least production), the policy scenarios considered rank as follows:

1. National cooperation with energy efficiency
2. Regional cooperation with energy efficiency
3. National cooperation without energy efficiency
4. Regional cooperation without energy efficiency

Including energy efficiency, regardless of the scale of cooperation with other states, results in greater coal production than scenarios that do not include

energy efficiency. Energy efficiency measures reduce electricity demand and effectively result in carbon reductions across the wider economy.

The 111(d) climate regulation has the potential to drastically decrease Wyoming coal production. Projected coal output under the most favorable production circumstances decreases by 32% of 2012 production by 2025. Using the production outcomes described in Figure ES-2, even in the best case, impact modeling of the 111(d) scenario suggests a loss of over 7,000 jobs across the state by 2025, relative to 2012 employment. Other scenarios analyzed exhibit continuous and greater losses. Effects of the regulations would impact the Powder River Basin region of Wyoming most severely, where one in ten jobs would be eliminated.

Complicating the analysis of the economic impact of the EPA’s 111(d) rule on the Wyoming economy is the potential to use fuel-switching between coal and natural gas as a means for the state to comply with the regulation. Since Wyoming produces a significant amount of natural gas, authors accounted for potentially mitigating effects of the natural gas sector to determine the overall impact of the EPA’s proposed Clean Power Plan regulations on the state.

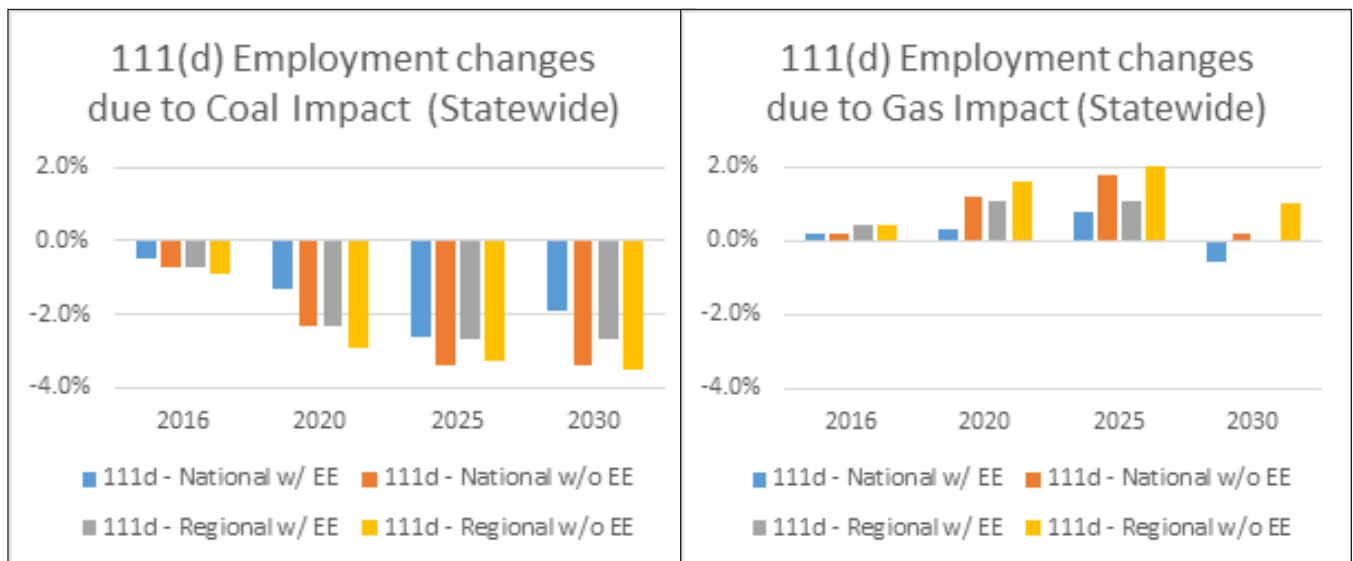


Figure ES-3. Combined coal and natural gas employment effects due to EPA 111(d) impacts.

This analysis indicates that despite the 111(d) rules stimulating Wyoming’s natural gas sector, employment losses in the state’s coal industry are not offset by the additional natural gas production prompted by carbon regulation. The negative impact to employment in Wyoming from reduced coal production is approximately two to four times larger than the positive employment effects from natural gas production. Across all scenarios analyzed, the total impact on statewide employment ranges from a 0.3% decline in 2016 to a 3.2% decline in 2030, relative to 2012 employment levels. The impact of the regulations would be expected to lead to a contraction in statewide economic activity and employment regardless of any other offsetting economic growth in Wyoming.

State Revenues

Authors analyzed both the effect of changes in coal production from fundamental market risks (shown in Figure ES-4 - adverse production cost changes, slow economic growth, and continued low natural gas prices) and potential 111(d) impacts on state revenues. Of the fundamental market risk scenarios, state revenues were highest in the case of higher coal production costs, the worst outcome for the wider Wyoming economy in terms of employment and production. Conversely, state revenues were lowest in the low coal production costs scenario, the best outcome for the statewide economy. Other scenarios had little impact on state revenues.

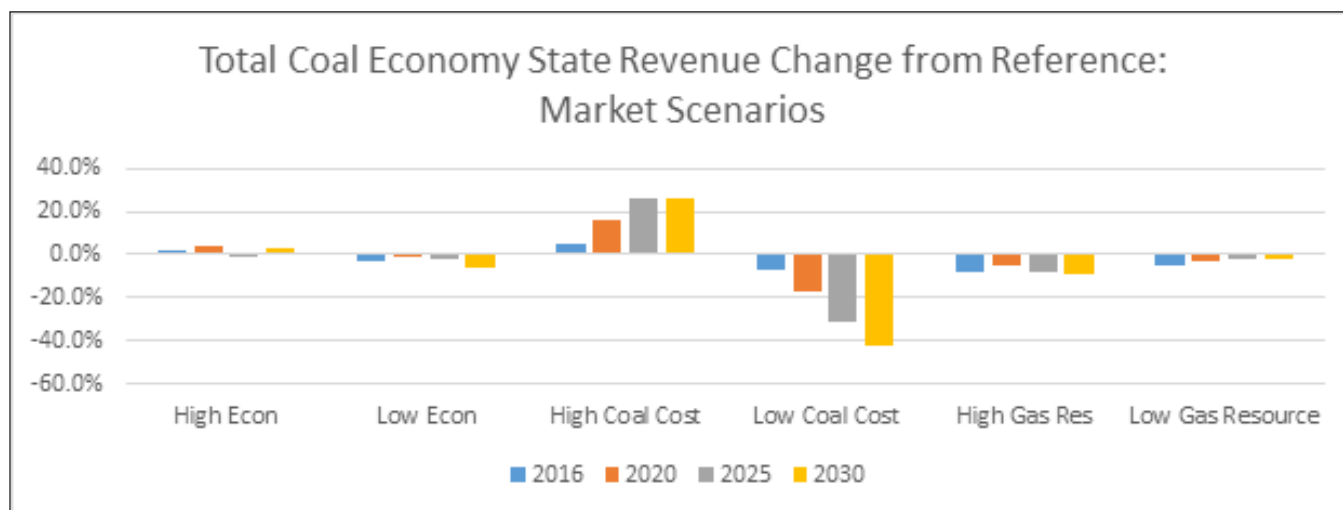


Figure ES-4. Total coal economy tax revenue change.

The scenario in which coal production is highest results in the lowest tax revenues to Wyoming.

The potential impacts of proposed carbon regulations on state revenues are severe. The most favorable outcomes for state revenues are those in which energy efficiency is used as a compliance strategy, as shown in Figure ES-5.

Because EPA’s 111(d) is anticipated to increase demand for natural gas in electricity generation, authors also considered the potentially offsetting effects this could have on state revenues. Combined coal and gas effects on state revenues are shown in Figure ES-6. Tax revenues continue to decline in all policy implementation scenarios, suggesting that positive natural gas effects do not offset the

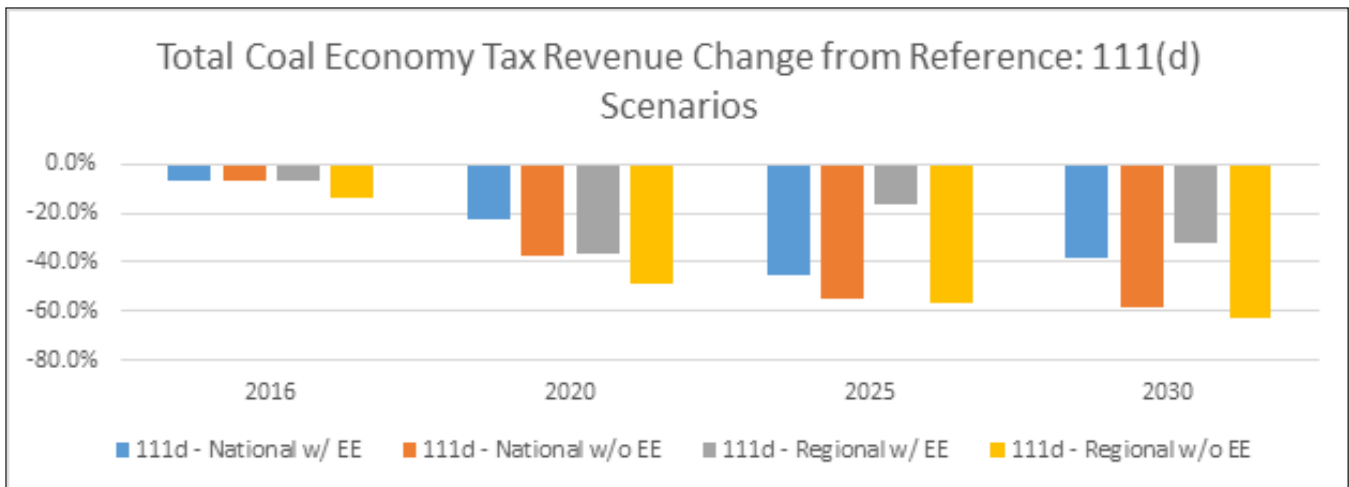


Figure ES-5. Total economy tax revenue change: 111(d) scenarios.

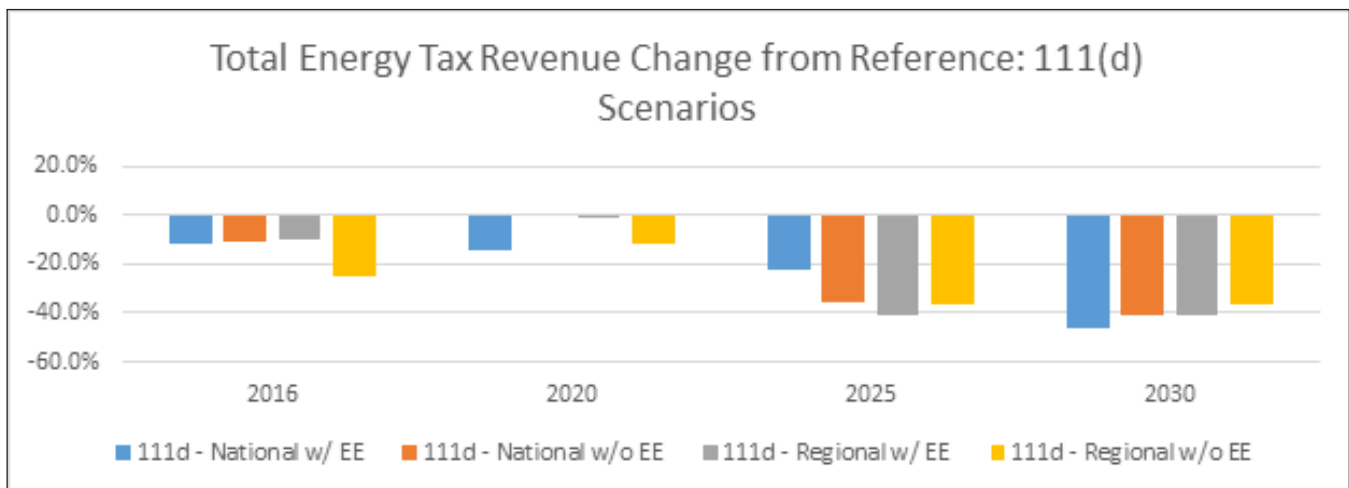


Figure ES-6. Total energy economy tax revenue change: 111(d) scenarios.

losses in state revenue due to lower coal production caused by 111(d). Authors also found that state revenue is highest in the scenario worst for coal production. Overall, proposed carbon regulations result in a predicted decline in the state’s combined coal and natural gas revenues of between 36% and 46% by 2030, as shown in Figure ES-6.

Conclusions

The greatest risks Wyoming’s coal industry faces, and by extension the greatest risks to state revenues derived from coal production, are posed by proposed carbon regulations. Significant expansion of international coal exports on the order of 100 million tons annually may be possible with the opening of proposed new export terminals, which would have significant economic benefit to Wyoming.

Wyoming may have to choose whether to prioritize production and employment or its own revenues in implementing its carbon mitigation strategies.

By 2030, the terminals would not, however, entirely offset the potential coal production losses resulting from carbon regulations in any of the policy scenarios considered in this study.

The ways in which policymakers in Wyoming and across the nation implement strategies to meet new carbon regulations is critical to the economic impacts the state will experience. Greater use of energy efficiency measures coupled with wider cooperation among states at a national scale are critical to minimizing the impact of the regulation on Wyoming's economy.

The ways in which Wyoming implements policies to meet carbon regulations will also have an impact on state revenues. Policies that result in the highest state revenues have the worst impacts on the coal industry and by extension statewide production and employment. This suggests that the state may have to choose whether to prioritize state production and employment or its own revenues in implementing its carbon mitigation strategies. More important will be whether Wyoming can influence other states to implement carbon control strategies least detrimental to its coal industry.

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