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THE CHANGING COAL INDUSTRY:

REGIONAL ECONOMIC IMPACTS – WORKFORCE ANALYSIS – TRANSITION STRATEGIES

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MONTANA DEPARTMENT OF COMMERCE

The findings and opinions contained within this document are solely those of the consultants contracted to create this report. The Montana Department of Commerce does not necessarily agree with the findings and opinions made by the report's authors.

EXECUTIVE SUMMARY

Six Issues Driving the MT Coal Impact Study

- Regional impact of closure of Colstrip Units 1-2
- Loss of Severance and Gross Proceeds tax revenue
- Economic impacts affecting many communities throughout region
- Need for replacement source of reliable and affordable power for MT process industries
- Workforce challenges from industry downsizing
- Need for enhanced regional competitiveness outside of mining

The transition strategy in this document for the Montana coal industry was compiled through a rigorous process of economic research, combined with input from stakeholders in Montana. The primary research began with a series of confidential interviews with key stakeholders and executives in the coal industry. The research process included an estimation of the economic and fiscal impacts of the coal industry on the 15 counties in Coal Country. That research confirmed that the coal industry is challenged by shifts in the domestic market and by environmental regulations issued by the EPA in the last eight years. The industry will decline in employment and tax collections over 2016 levels due to the closure of Colstrip units one and two.

Additional declines are possible, depending on whether the Montana coal industry increases export shipments and whether Colstrip units three and four close. The decline in employment in the region could range from 800-4,300 jobs, depending on the success of the transition strategies outlined in this document. Montana mines are more vulnerable to shifts in the domestic market since they are the marginal producers of Western Coal. Wyoming mines produce one-third more coal per worker hour than Montana mines (EIA Annual Coal Report 2015). In addition, severance and gross proceeds tax rates in Montana are double the tax rates that Wyoming mines pay. Since gross proceeds and severance taxes are the largest component of operating costs (exceeding payroll costs), Montana mines will be the first to close and the last to reopen when demand declines.

These nine transition strategies incorporate the research conducted by the Trent Lott Center for Economic Development on the retraining requirements from downsizing of the coal cluster. The Trent Lott study looked at simultaneous downsizings in coal mining, electricity generation, and wholesaling of mining and construction equipment. Most of the dislocated workers will find employment opportunities in pipeline construction, heavy construction, and transportation, albeit at reduced wages. For the ten percent of workers that lack employment opportunities in Coal Country, the region has significant numbers of job openings in refining and manufacturing that are highly compatible with skills gained in the coal cluster, provided these workers receive retraining.

The nine strategies in this final plan were selected by stakeholders as the priority strategies for transition in a series of three workshops on February 8-9, 2017 in Roundup, Billings, and Crow Agency. In addition, this plan addresses the barriers that stakeholders identified as most important for achievement of the strategies. The actions and background sections of the nine strategies were developed using the consultants' more than 75 years of experience in economic development and workforce development.

The transition strategies for coal are organized around four goals. **The first goal is to maintain shipments, employment and tax revenues from coal production.** The initial strategy in this goal is to develop a statewide consensus on the future of coal and electric power in Montana, including a statewide strategy that provides electric power for process industry throughout the state. Process industries in Montana, such as refining and mining, are vulnerable to higher prices and lower reliability of electric power if Colstrip units 3-4 close, because Montana will become a net importer of power from California, Oregon and Washington State.

The second goal is to provide incentives for Montana companies and inventors to commercialize technologies that lower carbon emissions while raising the thermal efficiency of coal-fired generators. A dedicated fund that earmarks gross proceeds and severance taxes is the strategy for achieving this goal.

The third goal is to diversify the economies of communities in Coal Country. This goal requires that Montana improve its business climate relative to those in surrounding states. The goal also includes a strategy of expanding access to broadband internet service in Montana. Montana is ranked 50th of the states in terms of broadband internet access by citizens and businesses.

The final goal is to reorganize the statewide training system in Montana. Montana is 41st of the 50 states in state funding for post-secondary training in community colleges and vocational schools. The graying workforce in Montana and the growing educational requirements for entry-level jobs mandates that the state provide more permanent funds to train workers. Acute skill shortages are anticipated throughout the United States in the next decade and Montana is less prepared than most states to meet the challenge.

The future of the Montana coal industry is not pre-determined. The transition strategies in this document provide tools for insuring that the coal industry has broader markets and stable employment in the future. The execution of the strategies in this document will result in a stronger economy in Coal Country and throughout the State of Montana.

Transition Strategies for Coal Country

1. Montana develops a statewide strategy for coal and electric power
2. Montana increases coal exports via Pacific Coast ports
3. The Western Coal Coalition influences EPA to modify or eliminate the Clean Power Plan
4. MT develops grant programs to commercialize technologies that reduce carbon emissions
5. Montana improves the business climate for mining and non-mining companies

6. Billings, Roundup, Colstrip, and Crow Nation, Hardin develop formal strategies for economic development
7. Montana invests in infrastructure that extends high speed internet broadband service to the majority of residents
8. Montana revamps its statewide training system
9. Montana retrains laid-off coal miners

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Executive Summary

The Montana coal industry represents a significant economic driver in the state. Mines employ more than 1300 workers directly. Electricity generated in the state is tied directly to Montana coal and is a part of the economic base of the state. Investments by the surface mining industry provide the primary market for construction and mining machinery in the state. These three industries, which we call the coal cluster, directly employ 1800 workers in the 15 county study area, and more than 4300 workers in total when the ripple effects of the industry are included.

Taxes and royalties are the primary input in Montana coal mining. Severance and gross proceeds taxes generated more than \$81 million to state and local governments in FY2016. The coal cluster generates more than \$87 million of tax revenues for state and local governments in Montana when spending in spinoff industries is included.

Montana coal production has fared well compared to production in Wyoming since 2008. The introduction of underground mining technology in 2009 and the growth in export coal have kept coal shipments level while they declined by 20 percent in Wyoming. The industry faces significant market and regulatory challenges that are likely to trigger a decline in coal shipments and employment in the next decade. New EPA regulations on mercury and sulfur equipment are favoring purchases of coal near electric generation in the Midwest rather than low sulfur Western coal. Electric utilities in the United States are replacing coal power with investments in natural gas generation. The Energy Information Administration forecasts a 30 percent decline in coal generation over the next decade and a larger decline of 20-76 million tons in Western coal production. Lower productivity in Montana mines and higher severance and gross proceeds tax rates make Montana surface mines the marginal producers of Western coal, the mines that are most likely to curtail future production. The decline in domestic shipments could be partially offset by increased exports of coal to North Asian buyers, provided the dollar is weak relative to the Australian dollar and new export terminal capacity is built at Oregon and Washington ports.

The uncertainty in market and regulatory forces does not allow us to make a single estimate of the impact of the decline in Montana coal shipments. We provide four scenarios based on different assumptions about future market and regulatory forces. The scenarios revolve around the future of electric generation in Colstrip and in export and domestic demand for coal outside of Montana.

Job losses in the 15-county study region range between 800-4300 jobs in the four scenarios (See Appendix C).



Introduction

This study, funded by the Big Sky Economic Development Trust Fund and the United States Economic Development Administration, examines the impact of the Montana coal industry on the economy of 15 counties in Eastern Montana as of 2015 (see Figure 1). While the study is limited to 15 counties in Eastern Montana, those counties comprise more than 99 percent of statewide coal production. The direct impacts of the coal industry on the statewide economy are therefore equivalent to the direct impacts of the coal industry within the study area. The year of 2015 represents the latest available annual data for the industry.

Mines in Montana produced 44.5 million tons of coal in 2014 and 42 million tons in 2015, the sixth largest of the 50 United States in coal production (Montana Department of Mines).

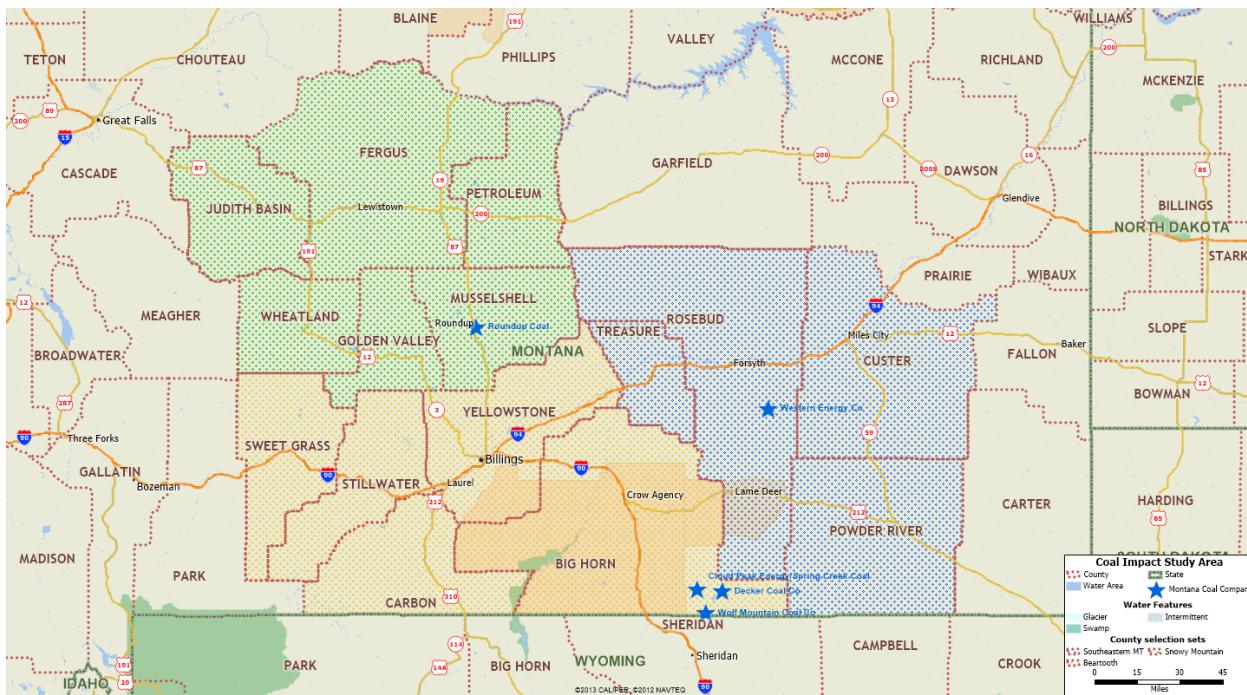
Montana accounted for 4.5% of national coal production in 2014 and 8 percent of national production in subbituminous coal. In short, Montana mines represent a significant share of national coal production.

The electric generation industry comprises a large portion of the direct economic impacts of coal in Montana because Colstrip units #1-4 are minemouth power plants. The impacts of coal therefore need to be modeled as an industry cluster with twin primary industries of coal mining and electric generation from fossil fuels. The Montana coal industry differs from the industry in eastern states because a significant share of coal moves directly from mine to power plant.

The data in this study comes primarily from published state and national sources listed in Appendix A. Published statistical data is supplemented with data collected through confidential interviews with the coal companies in the study area (See Figure 1 for locations of coal mines) and from project stakeholders. All economic models, including impact studies, are based on key assumptions. The critical assumptions in this study are contained in Appendix B.



Figure 1



Overview of Montana Coal Industry

The mining industry in Montana, net of oil and gas, generated \$1.7 billion of state GDP in 2014 (BEA 2016). Mining is a larger share of GDP than refining and utilities and is approximately of the same importance in economic output as agriculture. Coal mining represents the majority of GDP in the mining sector. Mining is 25 times as concentrated in the Montana economy as in the national economy; only eight states have a higher concentration of mining in GDP.

Montana has two of the 15 largest coal mines in North America. Montana mines produced 42 million tons of coal in 2015, sixth in ranking among the fifty United States in 2015 (see Table 1). The industry produces subbituminous coal in surface mines and bituminous coal in underground mines. Signal Peak is the newest of Montana mining companies. The mine began underground production in 2009 and has now become 15-20% of total coal production. Spring Creek mine in Big Horn County produces nearly half of Montana coal while Westmoreland produces 37 percent on short ton basis. The higher Btu content of bituminous coal is an important characteristic explaining its place in the export market.



Table 1

MT Coal Production in 2015

Mine	County	Type	Sort Tons	Percent
Signal Peak	Musselshell	Bituminous	6,419,640	15%
Decker	Big Horn	Subbituminous	2,964,070	7%
Spring Creek	Big Horn	Subbituminous	16,987,414	41%
Westmoreland	Big Horn	Subbituminous	5,844,619	14%
Westmoreland	Rosebud	Subbituminous	9,350,194	22%
Westmoreland	Richland	Lignite	270,286	1%
TOTAL			41,836,223	100%

Source: Historical Energy Statistics, Montana DEQ website

The coal industry had a direct employment of 1330 in 2015 (EIA 2015). Approximately 92 percent of the workforce in coal consists of production employees (Census of Mining 2012). The average wage in the coal industry in 2012 was \$27.00/hour (Table 2). Labor is a minor component in total cost at 11 percent of shipments. Operating Costs are half of sales, suggesting that profits, capital and overhead costs represent the other half of sales. Interviews with coal mines in Montana suggest that government royalties and taxes represent 30-40% of total value of shipments, the largest component of mining costs.

Capital investment by the coal industry is a significant component of the industry's economic impact on Montana.

Most coal produced in Montana is classified as "subbituminous", rather than the bituminous and anthracite coals produced in eastern mines. The subbituminous coal has a lower energy density than eastern coals. Coal from the Powder River Basin has a heat content of 8800 Btu per lb. but with a low sulfur content of 0.8 percent. The low sulfur content allowed power plants that burn Powder River coal to avoid costs for sulfur emission investments.

Ninety-five percent of Montana coal is used in the electric power sector with the balance used in industrial plants (EIA 2015). On a Btu basis, coal from Montana at mine mouth sells for a third of the price of Appalachian coal, which is located much closer to consumers and therefore has a lower transportation cost.



The majority of Montana coal is produced in surface mines (85%) although the study area has an underground mine in Musselshell County that uses the longwall mining technology (EIA 2015). The underground mine is non-union. The surface mines are a blend of union (70%) and non-union workforce.

Table 2

Coal Mining in Montana 2012

Employment and Wages		Percent
Total Employees	1,137	
Annual Payroll (\$000)	\$ 74,553	
Production Employees	1,049	92%
Production Payroll (\$000)	\$ 66,458	89%
Production Annual Hours	2,464	
Production Wage (\$/hour)	\$ 26.97	
Production Costs		
Value of Shipments (\$000)	\$ 670,490	
Supplies (\$000)	\$ 231,852	35%
Value Added (\$000)	\$ 497,360	74%
Capital Expenditure (\$000)	\$ 58,722	11%
Labor as % of shipment	\$ 74,553	11%
Operating Costs (\$000)	\$ 306,405	46%
Non-Production Wage	\$ 91,989	

Source: Census of Mining

The underground mine in Montana is more productive than counterparts in Wyoming and the Western Region but the surface mines in Montana are less productive than their counterparts in Wyoming (See Table 3). Economies of scale in Wyoming surface mines, which are ten times the size of Montana mines, provide a significant productivity advantage over Montana properties.



Table 3

Productivity Indices 2015

	Firms	Emp.	Tons (000)	Productivity Tons/ Hr.
Surface				
Montana	5	1,017	35,444	17.9
Wyoming	15	6,327	372,682	28.6
Western Region	35	10,262	NA	22.0
Underground				
Montana	1	313	6,420	9.5
Wyoming	1	308	3,090	4.4
Western Region	22	3,463	NA	6.0
Total				
Montana	6	1,330	41,864	15.8
Wyoming	16	6,635	375,773	27.4
Western Region	57	13,725	NA	17.9

*Western Region includes Arizona, California, Idaho, Nevada, Oregon, and Washington

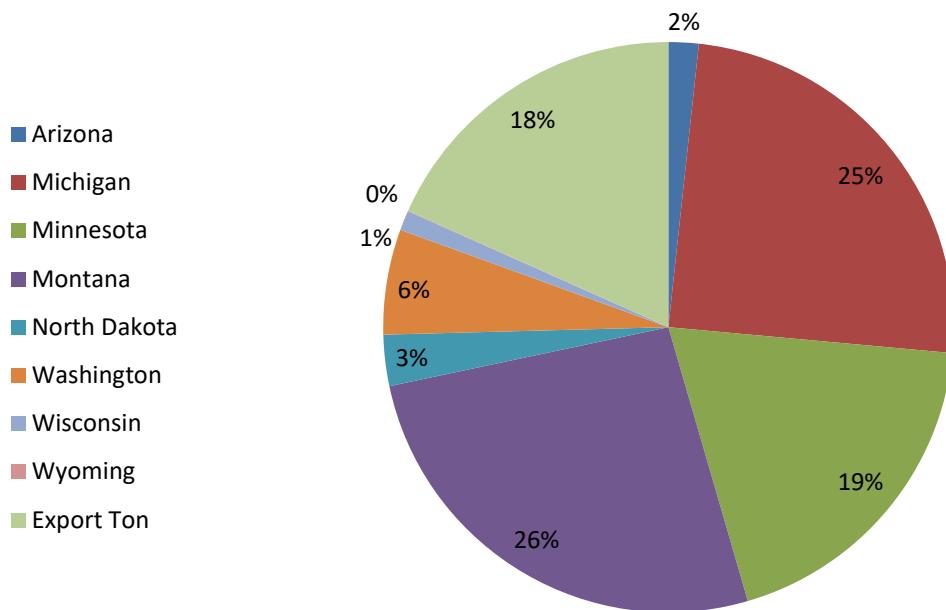
Source: EIA Annual Coal Report 2015

The principal customers for Montana coal are for in-state electricity production, followed by electricity production in Michigan and Minnesota. Export coal has become the third largest customer since 2009 (See Figure 2 for a pie chart of coal shipments by state).



Figure 2

Montana Coal Shipments by Destination: 2015



Source: EIA Coal Industry Report 2015

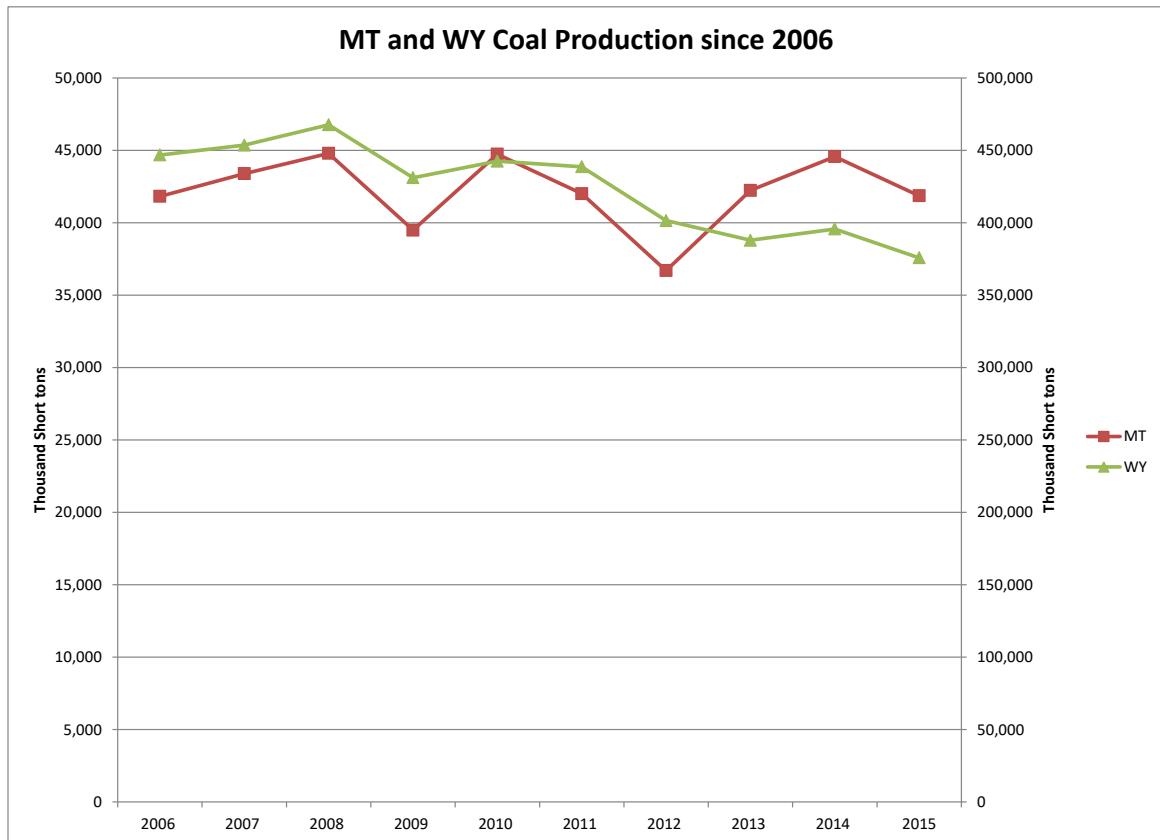
The price of Montana coal is constrained because of high shipping costs to customers. Customers for Montana coal in Michigan and Minnesota (the two largest markets) pay the equivalent of \$2.27 and \$1.78 per MMBtu (million Btus) for rail charges. This compares to the mine price of \$.73 per MMBtu in 2014. The Montana coal mines' share of delivered cost is approximately 32-40 percent.

Production and Price Trends

Unlike Wyoming, shipments of Montana coal have remained steady (on a tonnage basis) since 2008 (See Figure 3). Since the price per ton has increased since 2008, coal mine revenue, in current dollars, has increased. Coal mines in Wyoming, in contrast, witnessed a 20 percent decline in shipments since 2008. The introduction in Montana of underground mining in 2009 and a surge in export shipments explain the divergence between Montana and Wyoming shipments.



Figure 3



Source: EIA Coal Industry Reports—2006-2015

Demand Chain for Montana Coal

Coal is not a uniform commodity. Its mineral and energy content varies with geography and mine depth. Montana coal is in demand for power generation because of its low sulfur content.

The subbituminous coal produced in Montana is used exclusively for the generation of electric power. Surface mines produce coal with an average heat content of 8,800 Btu/lb while the underground coal is about 20 percent denser, with an energy content of 10,000 Btu/lb. These coals are below the threshold of 14,000 Btu/lb. of metallurgical coals.

The demand side supply chain for Montana coal consists of the mines, railroads to transport coal to customers, export terminals for coal shipped by water to Asian customers, and electric utilities



in the Midwest. The principal domestic customers for Montana coal (Historical Energy Statistics) are located in Montana (31%), Minnesota (21%), and Michigan (29%).

Exports of coal to North Asia occur in years when the value of the Australian dollar is strong relative to the US dollar. The ocean shipping distances from Australia and Seattle to utilities in Japan and Korea are nearly identical (www.sea.distances.org), so dry bulk shipping rates are insignificant in determining the competitiveness of Montana coal relative to Australia.

The coal consumed in Montana is used to generate electric power that is sold primarily to electric utilities within the Western Interconnection region (Idaho, Wyoming, Colorado, Utah, New Mexico, Arizona, California, Nevada, and Oregon). About 52 percent of the 29,302,401 Mwh of electricity generated in Montana are shipped to customers in other states. Northwestern Energy owns 222 MW of capacity in Unit #4 which is sold to retail customers in Montana. Talen Energy sells more than 100 Mw of power to wholesale and industrial customers in MT from Units 1-2. The closure of Colstrip unit #1-2 will affect a variety of heavy industries in Montana.

The principal transmission line from Montana runs from Colstrip to Puget Sound. Eastern Montana, east of Colstrip, lies in the Midwestern Reliability Organization, a separate grid which feeds electric utilities in Nebraska, the Dakotas, Iowa, Minnesota, Wisconsin, Manitoba, and Saskatchewan. Customers for power generated in Montana lie west of the state.

Supply Chain for Coal

The supply chain in coal mining is simple compared to supply chains in manufacturing industries. In the Montana supply chain, government is the principle production input (local and state taxes comprising 30 to 40 percent of production costs). Labor is the second largest input at 11 percent of sales.

The supply chain for surface mines differs from the chain for underground mines. For surface mines, diesel fuel and explosives are the most significant supplies. Diesel fuel and explosives comprise 15-20% of operating costs of surface mines. Overhead, profits and miscellaneous costs comprise the balance of the value chain in surface mining.

Underground mines consume electricity rather than diesel fuel. Additional details about the supplies and labor expense in the underground supply chain are not available.

A significant amount of the economic impact from the coal industry consists of capital investments in transportation and material moving equipment. These expenditures therefore should be modeled separate from the production part of the industry's supply chain. Since the equipment is not produced within state, the sector that receives the stimulus is wholesale trade.



Impact of MT Coal Cluster

The purpose of this study is to estimate the number of dislocated workers in Eastern Montana that will become available to other employers as coal mining decreases. The economic impact of the coal cluster in Montana has been studied extensively by others. Earlier studies by the Bureau of Business Research at the University of Montana have estimated statewide impacts while the scope of this study is to estimate impacts within a 15 county region. The estimates between the two studies will necessarily vary because some of the Montana impacts occur outside of the 15 counties in eastern Montana. The impacts estimated by the Bureau of Business Research therefore are larger than the impacts in this study.

The estimates also differ because the methodologies differ between the two studies. Our study relies on impact models that differ from the REMI general equilibrium model used by the Bureau of Business Research. Our impact estimates are derived from the RIMS II multipliers produced by the U.S. Department of Commerce and from the Social Accounting Matrix produced by EMSI. The EMSI model uses a modern gravitational flow matrix to estimate multipliers for the 15 county study area. Because of the differences in modeling, the BBR estimates and Taimerica estimates of impacts are not directly comparable.

We recap the findings of the Bureau of Business Research before presenting the impact estimates from our modeling.

Prior Estimates by the Bureau of Business Research

Barkey and Polzin (2010) estimate that Colstrip Power Plants 1-4 generate 3740 jobs in Montana, \$360 million of personal income, and \$638 million of economic output. Barkey and Polzin (B&P) estimates the combined impact of the power plant and the coal mines that support it. The B&P estimate is for a statewide geography. It does not, however, include economic impacts of coal consumed outside of Montana. In other words, the total impact of the coal mining industry in the 15 county study area is, in fact, larger than the estimate in the Barkey and Polzin model.

The Bureau of Business Research (2015) at the University of Montana produced an estimate of the economic impact of the implementation of the EPA Clean Power Plan on Montana. This impact study examines the impacts on mining and power generation from the closure of all coal-fired electric generators in Montana in 2018. The model assumes that the closures will be offset by the construction of new natural gas generators, with new supply pipelines and transmission improvements. The general equilibrium model used in the BBR study estimates the indirect impacts in wholesale and retail electricity markets from price changes in electric generation. The BBR study estimates that statewide employment in Montana will drop by 7137 jobs in 2025, with a drop in personal income of \$441 million, a loss of \$146 million in state tax revenues and a reduction of \$4 million in local property taxes. This scenario shrinks output in the Montana



economy by \$1.511 billion in 2025. The BBR scenario includes a reduction of statewide mining employment of 620, about 50 percent of the coal mining employment in the state.

The BBR study, like Barkey and Polzin (2010), does not estimate the economic impact of the entire Montana coal industry. It models only the share of the coal cluster (mining and power generation) that is tied to coal consumed in Montana. The portion of economic impacts from coal exports and from domestic shipments of coal to other states is not captured in these models.

Taimerica Estimates of Economic Impact of Montana Coal Industry

The central question in this study is: "what impact will the downturn of the coal industry have on the economy in the 15 county region?" The secondary question is: "what impact will the downturn in coal production have throughout the Montana economy?" The two answers are different since statewide impacts are larger than the regional impacts due to the tax structure in Montana. State Severance and Gross Proceeds taxes on coal are a substantial government revenue source in Montana. Since most of the jobs supported by state tax revenue are outside the study area, the impacts of coal are large outside the study area. Modeling the statewide impacts is beyond the scope of this study but they obviously are larger than the impacts within the 15 country region of this study. Besides the impact on government jobs discussed above, the statewide impacts potentially include reductions in mining and industrial employment in industries that are sensitive to changes in the price and supply of electricity. The general equilibrium modeling of the closure of Colstrip units 1-4 by the Bureau of Business Research in 2015 incorporates these kinds of impacts in their estimate (Bureau of Business and Economic Research 2015). That study estimates that the closure of Colstrip Units 1-4 would reduce MT employment by 7137 jobs in 2025 and reduce state revenue by \$146 million. Further details about those estimates and the differences in the assumptions in the BBR model are available in that document.

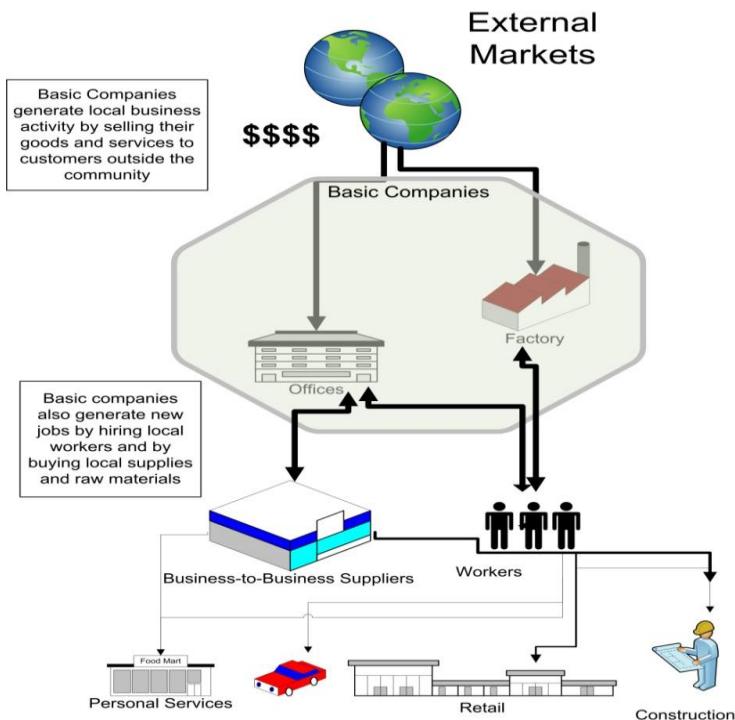
The primary research questions stated above cannot be answered until the current impact of the coal industry on the state and region are calculated. The next two sections of this report discuss the interpretation of impact statements followed by our estimate of the impact of the coal industry on the regional and statewide economy in 2015.

Understanding Impact Models

Impact studies use economic models to estimate the total changes in jobs, income, taxes and economic output from a reduction in employment in a primary industry (called the initial impact). Because declines in the primary industry ripple through the economy, suppliers to the primary industry reduce employment and output. The elimination of jobs in the primary industry also reduces consumer spending in the economy because payrolls shrink (See Figure 4). The process repeats through multiple rounds of ripple effects.



Figure 4



Curtailment of coal production would ripple through the coal mining industry but also would curtail the generation of electricity from fossil fuels, most of which is exported outside the state. The curtailment of coal would affect the wholesale sector because mines would not reinvest in construction and mining machinery used in their operations. The impact model must include all of these relationships in the initial impact.

The total impacts consist of four rounds of ripples: 1). The initial impacts in the primary industries; 2). The “indirect” impacts in the business-to-business spending by primary industries in Montana; 3). The “induced” impacts from consumer spending of payroll dollars generated in all affected industries; and, 4). The “investment” impacts from curtailment of new capital investments by the mining and fossil generation industries. The total economic impact of a reduction in the primary sector is the sum of these four impacts.

Estimate of Coal Industry Impact in 2015

In the case of Montana coal mining, the induced impacts or payroll spending impacts are spread between Montana and Wyoming. A third of the coal miners that work in Montana live in Wyoming (See Figure 5). The property tax and consumer spending for the coal mining industry

are reduced by 35 percent in our estimate to reflect the spending of induced incomes in Wyoming.

The jobs impacts of the curtailment of coal mining estimated using the RIMS II multipliers were approximately 10 percent larger than those estimated by the EMSI model. We chose to use the EMSI estimates because their model reflects improvements published in the modeling literature over the last decade.

The EMSI model estimates almost 4400 jobs in the 15 county study region and almost 5200 jobs in the state economy from the coal cluster (Table 4). These jobs generate \$250 million of earnings in the study area and \$350 million statewide. The EMSI estimates are that local and state tax losses are \$89 million regionally and \$92 million statewide, after adjustment for the taxes from induced spending that occur in Wyoming.

The EMSI impact model used to estimate tax impacts does not include all of the state and local severance and gross proceeds taxes on coal (See Table 5 for these taxes). The severance and gross proceeds taxes add \$81 million to the tax losses.

Table 4

	15 County	State
Earnings	-\$250,743,060	-\$350,655,085
Jobs	-4,369	-5,190
Taxes	-\$108,994,362	-\$112,689,792
Local	-\$43,644,655	-\$44,929,251
State	-\$45,641,476	-\$46,892,172
Federal	-\$19,708,231	-\$20,868,369

Source: EMSI Model with Reductions of 823 jobs in surface mining, 320 jobs in underground mining, 416 jobs in fossil fuel electric generation, and 58 million reduction in construction and mining equipment sales



Table 5

Coal Severance and Gross Proceeds Taxes in Montana

	FY2014	FY2015	FY2016
State			
Severance	\$54,067,610	\$59,125,563	\$56,923,643
Gross Proceeds	\$8,768,283	\$9,288,352	\$9,979,145
Total	\$62,835,893	\$68,413,915	\$66,902,788
Local			
Severance	\$2,129,440	\$1,765,851	\$3,434,905
Gross Proceeds	\$10,043,732	\$10,569,130	\$10,777,732
Total	\$12,173,172	\$12,334,981	\$14,212,637

Source: Montana Department of Revenue

The Future of Montana Coal

Energy economists and leaders in the coal industry generally agree that the demand for domestic coal will continue to decline as the electric power industry switches generation from coal to natural gas. The long lead time needed for construction of new power plants gives hard data for estimating the decline in national demand over the next decade. Energy economists also agree that coal from Montana and Wyoming mines is exportable to Korea, Japan and China when the U.S. dollar is weak relative to the Australian dollar. Coal exports could offset declines in domestic demand. While these factors driving market demand and prices for coal are understood, they are not sufficient for estimating the future demand for Montana coal.

The overall demand for coal depends on the wholesale and retail price of electricity. Consumption of electricity falls when energy prices increase. Without an accurate forecast of the price of crude oil (the predominate fossil fuel in global production) the overall consumption of electricity cannot be accurately estimated. The global petroleum market entered a new era in 2014 when Saudi Arabia decided not to adjust its oil output to support OPEC production quotas. The price of oil in global markets tumbled from over \$120/barrel to under \$30/barrel as a result of that change. Prices in the oil market have been set by market forces rather than by OPEC policy since late 2014. If the recently announced reductions in production by OPEC and Russia are enforced, market prices could rise significantly.

Exports of coal from Montana also depend on the value of the U.S. dollar relative to the Australian dollar. When the U.S. currency is weak, Montana mines have a price advantage over Australian mines. The exchange rates for those two currencies has moved by more than 25 percent since 2011. Because of these large shifts in comparative advantage, the level of exports is uncertain and could vary significantly from year to year.



Exports of coal compete against other fossil fuels in North Asia. The amount of competition between natural gas and coal changed in early 2016 when the United States began exporting Liquified Natural Gas (LNG). More than 600 million tons per year of LNG terminal expansions are underway in Australia and the United States (EIA 2014).

These uncertainties in market forces are compounded by uncertainties in climate and regulatory policy, which also affects the demand for coal and substitute forms of energy. The new President and his administration have expressed an interest in reversing national policies implemented by the prior administration. These changes could also affect the trajectory of domestic coal demand.

With all of these uncertainties in market and regulatory forces, a single estimate for the future impact of the coal industry is unsound. A series of scenarios that estimate the marginal impacts of economic events in the coal and electric power industry is a better method than an absoulte but inaccurate forecast.

We model four scenarios that are all plausible forecasts for the future. All four suggest a declining output of Montana coal and a decline in Severance and Gross Proceeds taxes. The difference is in the magnitude of that decline. The assumptions behind each of the scenarios are shown below. The table showing the jobs, tax and earnings losses for each scenario is shown in Appendix C.

All of the scenarios include differences in the future of electricity generation in Colstrip and in exports and domestic shipments of coal to customers outside of Montana. The scenarios for the decline in domestic demand for coal are based on research published by the Energy Information Administration in August 2016. That report is summarized before we present the details of the four impact summaries

EIA Estimate for Future Shipments of Western Coal

The Energy Information Administration published a comparison of four projections of future markets for Western coal in August, 2016 (EIA 2016). The projections are from a collection of government agencies, such as EIA and IEA (International Energy Agency) and private energy consultants, such as Wood Mackenzie, SNL Energy and BP.

The projections are unanimous in estimating that domestic shipments of Western coal will drop between 2015-2025 due to competition from alternative sources of energy but largely from regulatory changes in the United States. The CPP (Clean Power Program), if continued by the Trump administration, will have the largest impact ever on the generation of electricity from coal.

The declines in shipments of Western coal are due to more than the CPP, however. New EPA regulations requiring power plants to control sulfur emissions will also impact Western coal. Power producers in the Midwest were able to avoid costly controls by burning low-sulfur coal



from the Powder River. Now that controls are mandatory, coals mined closer to power plants are likely to retake market share from Western coal.

The sources are also unanimous in projecting an increasing export demand for Western coal. The EIA forecast is the most modest, suggesting that export shipments will grow by 11 percent in the next decade while the BP forecast is the most aggressive at 243 percent growth. The Wood Mackenzie forecast falls in the middle at 63 percent growth in shipments through 2025. Increases in export shipments are likely to partially offset declines in domestic shipments. Montana bituminous coal, which is closer to export terminals in Washington and Oregon, has a comparative advantage for reaching export markets in Asia.

The projections in net decline of Western coal range from a decline of 19-76 million tons in the decade ending in 2025, with the highest decline occurring with the adoption of the final EPA rules on carbon reduction.

Comparison of Impact Scenarios

The assumptions for the four scenarios for the future impact of the Montana coal industry are summarized below:

Scenario Assumptions

1. Colstrip units #1& #2 close. Increased exports of MT coal offset declines in domestic shipments
2. Colstrip units #1& #2 close. Domestic shipments of Western coal in MT and WY mines decline at same rates. Declines in domestic shipments are based on EIA's forecast for Western coal in the 2016 Annual Energy Outlook
3. Colstrip units #1-#4 close due to implementation of the EPA Clean Power Plan. Declines in domestic shipments of coal are the same as in Scenario #2
4. Colstrip units #1-#4 close. Because MT mines have the highest marginal cost of operation (due to higher severance and gross proceeds taxes and lower productivity), the decline in domestic shipments of Western coal forecast by EIA occur first in MT mines.

The best case scenario (Scenario One) is that exports of coal offset declines in domestic shipments. The loss in coal production is due to the closure of Colstrip units #1&2. The losses in jobs in the study region are less than 800. Those losses will occur when the Colstrip units cease production.

Scenarios Two and Three assume that export markets do not offset declines in domestic demand. These two scenarios assume that the decline in Montana production will parallel the decline in Western coal production. In other words, Montana and Wyoming mines will see the same rate of decline in shipments between 2015 and 2025. Scenario Two assumes that Colstrip units 3-4 continue to generate electricity while Scenario Three assumes that the Clean Power Plan remains

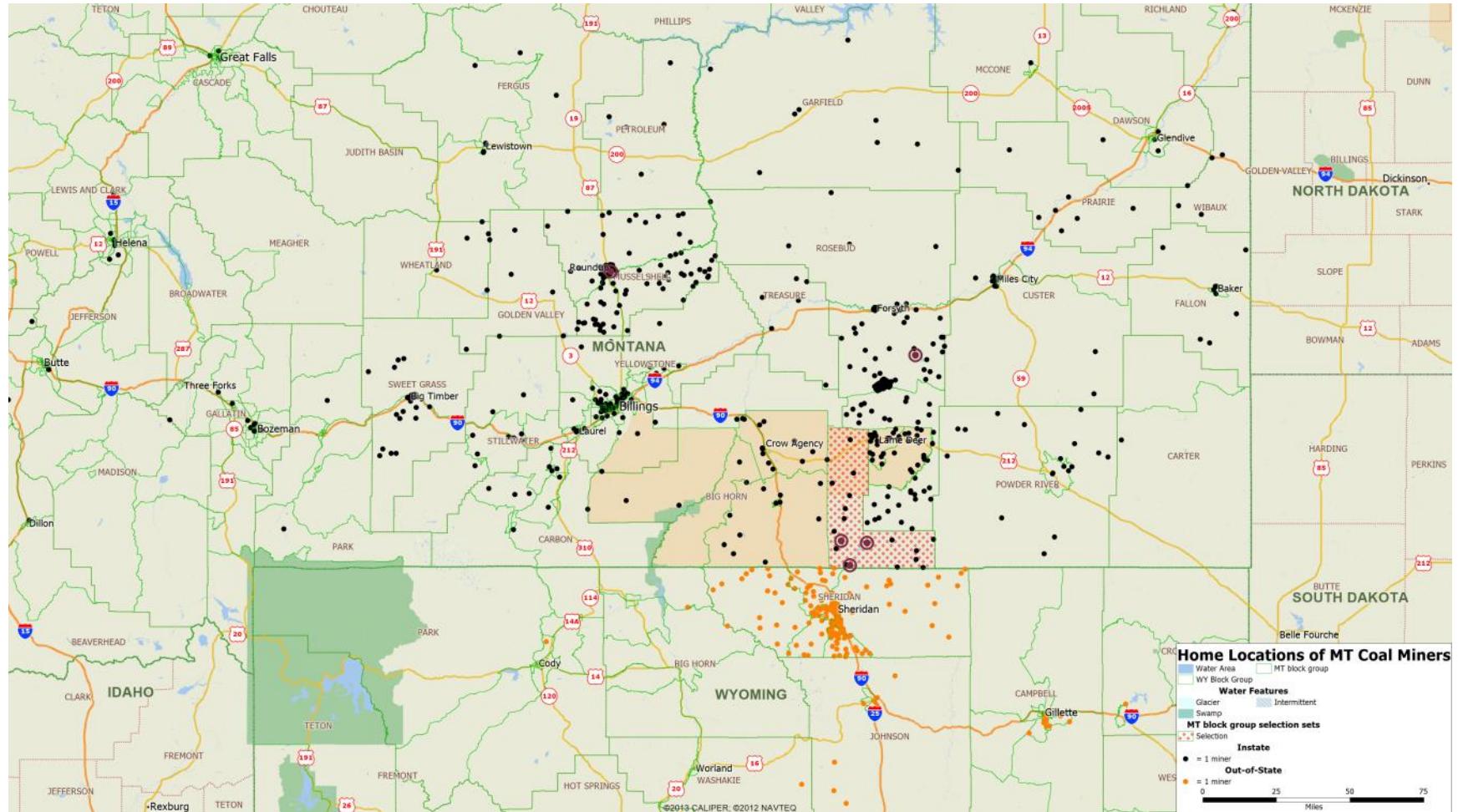


in force and these additional generating units close. The closure of the new Colstrip units has an incremental impact of 1000 jobs. The decline in regional employment in these two scenarios varies from 1300 to 2300 jobs.

The worst case scenario (Scenario Four) is that much of the domestic declines in Western subbituminous coal occur in Montana since the state is more remote from domestic customers than Wyoming, mine productivity rates are lower, and severance tax rates in Montana are double the tax rates in Wyoming. This makes the Montana mines the marginal producers in the Western coal industry. The severance tax rates are the variable of most importance in determining the marginal producer since taxes and royalties account for 30-40% of production costs for Montana mines. Taxes and royalties are in fact more than twice the amount of payroll. The projected decline in Western coal translates into the closure of all coal mines in Montana if Montana mines remain as the marginal producers in the industry.



Figure 5



Conclusion

This study suggest that the employment in the 15-county region of Montana declines by 800-4300 jobs from shifts in market and regulatory forces that shape export and domestic coal demand over the next decade. The impacts are felt throughout the region but are concentrated in Roundup, Colstrip, Yellowstone and Big Horn Counties.

The future impact depends in part on how Montana leaders react to the forces reshaping the industry. The impacts shift significantly if communities and legislators adopt strategies to make Montana mines more competitive.

The direct and indirect job losses that are expected will stimulate the need for retraining of workers. They also create a resource for diversifying the economy. The workforce assessment portion of this project will look in depth at the industries and occupations in which these job losses will occur.



REFERENCES

- Barkey, Patrick and Paul Polzin. 2010. *The Economic Contribution of Colstrip Steam Electric Station Units 1-4*. Missoula, MT.
- BEA (Bureau of Economic Analysis). 2016. "Gross Domestic Product by State: Second Quarter 2016." Online at
https://www.bea.gov/newsreleases/regional/gdp_state/qgsp_newsrelease.htm.
- Bureau of Business and Economic Research. 2015. *The Economic Implications of Implementing the EPA Clean Power Plan in Montana*, Working Paper. Missoula, MT: Bureau of Business and Economic Research.
- Crapuchettes, Jonathan, Timothy Nadreau, and M. Henry Robison. 2015. *EMSI I-O Model Documentation: Establishing the NAICS 6-digit US Base Model*, Working Paper. Moscow, ID: EMSI.
- EIA (Energy Information Administration). 2015. "Annual Coal Report 2015." Online at
<http://www.eia.gov/coal/annual/>.
- EIA. 2016. "Annual Energy Outlook 2016 with projections to 2040." Online at
<http://www.eia.gov/outlooks/aoe/>.
- Montana Bureau of Mines and Geology. 2014. "Montana Bureau of Mines and Geology Data Center." Online at <https://www.mbgm.mtech.edu/datacenter/datacenter.asp>.
- Montana Department of Environmental Quality. 2015. "Historical Energy Statistics." Online at
<http://deq.mt.gov/Energy/EnergizeMT/HistoricalEnergy/Historical-Energy-Statistics>.
- Montana Department of Revenue. 2016. "Montana Department of Revenue Biennial Report July 1, 2014-June 30, 2016." Online at
http://revenue.mt.gov/home/publications/biennial_reports.



Seadistances.org. 2016. "Distances." Online at <http://www.seadistances.org/>.

United States Census Bureau. 2012. "2012 Economic Census: Mining Geographic Area Series."

Online at <http://www.census.gov/newsroom/press-releases/2015/cb15-tps77.html>.



APPENDIX A

The primary source of output and employment data for this study is published by the Energy Information Administration, the Bureau of Economic Analysis, and the Bureau of the Census. State and local sources provide the data for modeling of tax revenues.

APPENDIX B

- the relative competitiveness of the Montana coal industry as of 2015 will not change in the next five years
- the price of Montana coal relative to other energy sources will move according to national and international trends
- Employment and tax revenue generated by the Montana coal industry will grow or decline proportional to changes in coal output
- The demand and supply chain for the Montana coal industry in 2015 has not changed appreciably since calendar year 2013 when the base data and impact multipliers were compiled.
- The price of coal (relative to prices for natural gas) will not shift within the next five years.
- The rates for transportation of Montana coal to customers will not change from rates in early 2016. The rates for export shipments of coal will move proportionately with movements in the Baltic Dry Bulk Index.
- LNG exports from the United States will bring natural gas prices in line with petroleum prices on an energy content basis.



APPENDIX C

Detailed Impact Model				
15 County Study Area in 2025				
		Scenario		
	One	Two	Three	Four
Tons of MT Coal	40,240,000	33,600,000	27,000,000	0
Severance Tax*	\$55,531,000	\$46,300,000	\$37,300,000	0
JOB IMPACTS				
		Jobs	Jobs	Jobs
Initial Impacts				
Surface Mining	-50	-173	-288	-823
Underground Mining	0	-51	-51	-320
Fossil Fuel Generation	-204	-204	-408	-416
Construction & Mining Machinery	-31	-108	-193	-249
Other Direct Impacts	-75	-153	-268	-592
Indirect Impacts	-17	-42	-72	-501
Induced Impacts	-346	-560	-1002	-1,468
Total Jobs Impact	-723	-1291	-2282	-4,369
OTHER IMPACTS				
Earnings	\$46,382,776	\$95,366,039	\$167,484,005	\$250,743,060
Local Taxes	\$9,461,644	\$15,580,063	\$28,189,929	\$43,644,655
State Taxes	\$8,189,231	\$13,532,154	\$24,468,501	\$45,641,476
Federal Taxes	\$3,091,962	\$5,309,140	\$9,532,393	\$19,708,231

* Assumes 2014 coal prices and tax rates

Source: Calculated using EMSI Impact Model

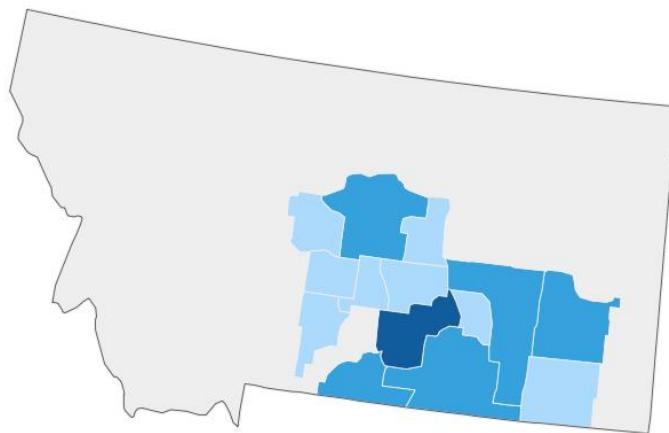
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4. Colstrip units #1-#4 close. Because MT mines have the highest marginal cost of operation (due to higher severance and gross proceeds taxes and lower productivity), the decline in domestic shipments of Western coal forecast by EIA occur first in MT mines.



2017 Montana Coal Industry

Workforce Analysis



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Executive Summary

The University of Southern Mississippi partnered with Taimerica, Inc to conduct a workforce analysis of Montana's coal industry which is anticipated to be negatively impacted by downturns in economic conditions. This potential downturn could impact between 800 and 4,300 workers. This report analyzed the coal industry sub-sectors and coal workers anticipated to be impacted to address opportunities to transition workers into other employment.

Economic conditions appear to be favorable in helping dislocated coal workers transition into other employment:

- The state's overall unemployment rate for the last three years was less than five percent.
- The job market for technical skills also remains strong in a number of other industry including agri-business, construction, and manufacturing.
- Overall employment is anticipated to grow over the next five years.

Challenges associated with transitioning dislocated workers into other employment include:

- Coal industry's workforce has benefited in earning higher wages than other industry sectors in the region. Anticipated decline in earnings could affect dislocated workers and their families.
- While technical skills and knowledge of coal workers are compatible with careers in other industry sectors, the transition into other jobs may require additional training beyond a high school diploma but less than a bachelor's degree.

Recommendations include:

- Leaders from across the region should ensure it has a comprehensive strategic workforce plan implemented that is responsive to dislocated workers in getting them re-employed as quickly as possible.
- Colleges in the region should align its training programs to be highly responsive and meeting the needs of middle skill workers (more than high school diploma but less than bachelor's degree).

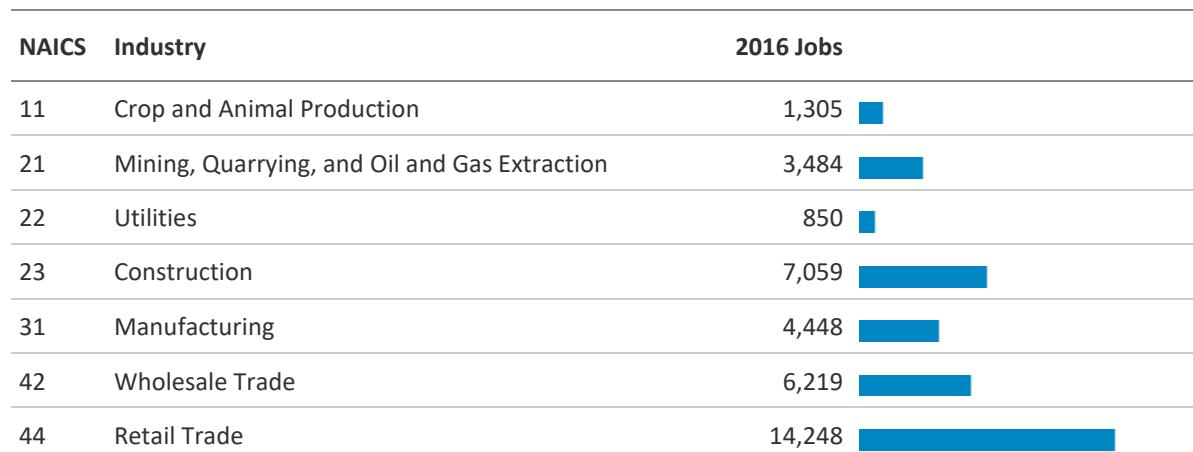
Regional Demographic Characteristics and Industry Overview

The Montana Coal Industry region analyzed in this study consists of 15 counties in the southeast corner of the state including Big Horn, Carbon, Custer, Fergus, Golden Valley, Judith Basin, Musselshell, Petroleum, Powder River, Rosebud, Stillwater, Sweet Grass, Treasure, Wheatland, and Yellowstone counties. In 2016, the general population of this region was 241,200 with an estimated 110,139 jobs with average earnings (wages and benefits) of \$54,273. This region contains 23.2% of the state's population and has experienced a 4.4% rate of population growth over the past 5 years compared to 4.3% at the state level. Montana's overall unemployment rate for the last three years was less than five percent (Montana Unemployment Insurance, 2017).

There are more than 110,000 jobs in the region of which the top industries are Government, Healthcare and Social Assistance, Retail Trade, Accommodations and Food Services, and Construction in terms of numbers of jobs. These 5 top industries make up 60% of all jobs within this region (see Table 1). The industry sector of Mining, Quarrying, and Oil/Gas Extraction (NAICS 22) employed over 3,400 workers in 2016. For displaced workers in the region, there are favorable positive trends in the economy that have potential to help workers transition into other employment. The state's overall unemployment rate for the last three years was less than five percent (Montana Unemployment Insurance, 2017). The job market for technical skills also remains strong in a number of industry sectors which will be analyzed in more detail in the subsequent sections.

110,139 Total All Jobs in Region (2016)	51.0% Male (National: 50.4%)	49.0% Female (National: 49.6%)
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Table 1. Regional Jobs by Industry Sector

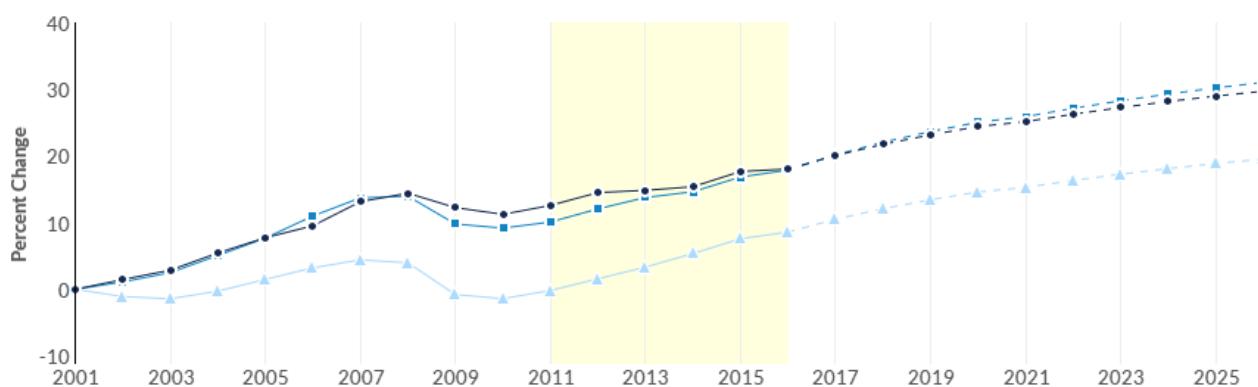


NAICS	Industry	2016 Jobs
48	Transportation and Warehousing	3,762
51	Information	1,598
52	Finance and Insurance	3,621
53	Real Estate and Rental and Leasing	1,275
54	Professional, Scientific, and Technical Services	5,292
55	Management of Companies and Enterprises	670
56	Administrative and Support and Waste Management and Remediation Services	3,864
61	Educational Services	1,063
62	Health Care and Social Assistance	15,955
71	Arts, Entertainment, and Recreation	2,657
72	Accommodation and Food Services	11,871
81	Other Services (except Public Administration)	4,183
90	Government	16,706
99	Unclassified Industry	<10

Historic, Current, and Projected Job Trends

Regional trends indicate the 15-county region has experienced job growth of 4.9% over the past 5 years although this is less than the state's growth rate of 7.1% and the national rate of 8.8% (see Table 2).

Table 2. Regional Job Trends



	Region	2011 Jobs	2016 Jobs	Change	% Change
●	Region	105,041	110,139	5,098	4.9%
●	State	422,727	452,680	29,953	7.1%
●	Nation	129,411,102	140,784,500	11,373,398	8.8%

A number of industry sectors are anticipated to grow over the next 5 years. In terms of overall percentage increase, Crop and Animal Production is forecasted to grow at a rate of 29% followed by Construction (17%), Real Estate & Rental Leasing (14%), Accommodations & Food Services (11%), and Manufacturing (11%) (EMSI, Economy Overview, 2016).

1. Crop and Animal Production – 296 new jobs – 29% growth
2. Construction – 1,039 new jobs – 17% growth
3. Real Estate and Rental Leasing - 152 new jobs – 14% growth
4. Accommodation and Food Services – 1,195 new jobs – 11% growth
5. Manufacturing – 428 new jobs – 11% growth

In terms of growth in jobs in the overall economy, General Medical and Surgical Hospital sector is anticipated to grow the most jobs by approximately 350 employees.

1. General Medical and Surgical Hospitals – 350 new jobs – 5% Growth
2. Limited-Service Restaurants – 319 new jobs – 10% growth
3. Local Government, Not Education and Hospitals – 318 new jobs – 6% growth
4. Wired Telecommunications Carriers – 268 new jobs – 41% growth
5. Sporting Goods Stores – 253 new jobs – 31% growth
6. Assisted Living Facilities for the Elderly – 179 new jobs – 25% growth
7. Engineering Services – 172 new jobs – 17% growth
8. Hotels (except Casino Hotels) and Motels – 165 new jobs – 9% growth
9. Plumbing, Heating, Air-Conditioning Contractors – 164 new jobs – 17% growth
10. Warehouse Clubs and Supercenters – 161 new jobs – 8% growth

With strong growth in these industry sectors, displaced workers will have favorable likelihood of being re-employed within the region.

Montana's Coal Mining Industry

The majority of all jobs in Montana's coal industry can be defined in three different industry sectors of the North American Industry Classification System (NAICS). These industries include:

1. Bituminous Coal and Lignite Surface Mining (NAICS 212111)
2. Bituminous Coal Underground Mining (NAICS 212112)
3. Fossil Fuel Electric Power Generation (NAICS 221112)

These three industries alone account for over 1,400 jobs within the region with average earnings per job of \$116,877. Between 2004 and 2014 these industries experienced extreme growth with a 41% increase in employment but between 2014 and 2016 growth was halted and these industries experienced a 4.8% decline in employment.

Overview of Jobs in Bituminous Coal and Lignite Surface Mining Jobs

Bituminous Coal and Lignite Surface Mining accounts for nearly 800 jobs within the region with average earnings per job of \$107,346.

Within the 15-county region, the majority of jobs within the Bituminous Coal and Lignite Surface Mining Industry are concentrated in only two counties of Big Horn and Rosebud counties.

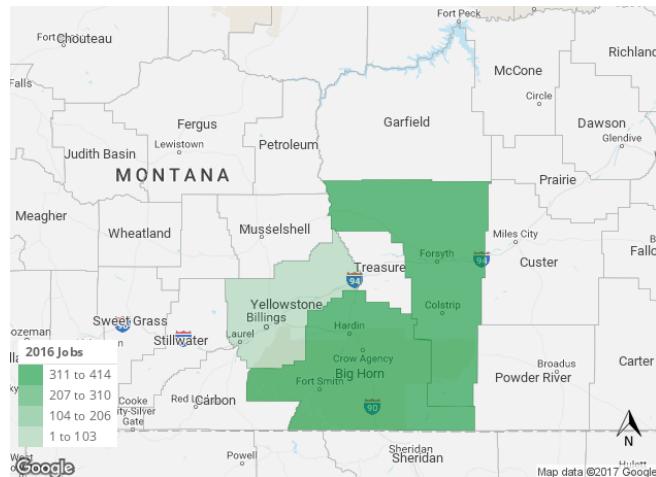


Figure 1. Concentration of Bituminous Coal and Lignite Surface Mining jobs.

The top occupations employed by this industry include Operating Engineers and Other Construction Equipment Operators, First-Line Supervisors of Construction Trades and Extraction Workers, Mobile Heavy Equipment Mechanics (Except Engines), and Electricians.

Overview of Jobs in Bituminous Coal Underground Mining

Bituminous Coal Underground Mining accounts for nearly 300 jobs within the region with average earnings per job of \$128,060.

Within the 15-county region, the majority of jobs within the Bituminous Coal Underground Mining Industry are concentrated in only Musselshell County.

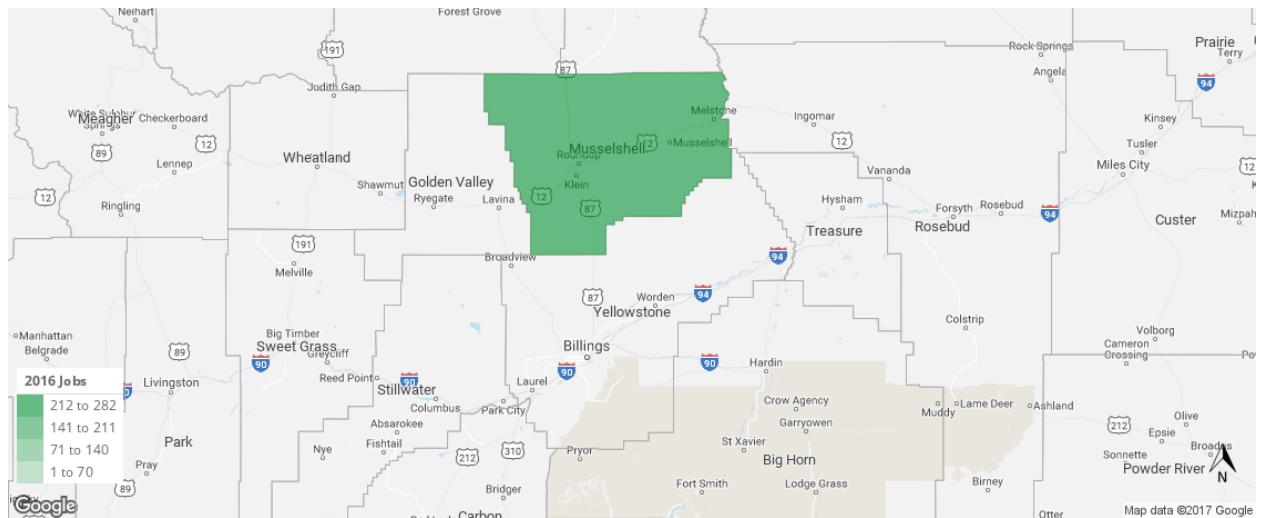


Figure 3. Concentration of Bituminous Coal Underground Mining

The top occupations employed by this industry include Operating Engineers and Other Construction Equipment Operators, First-Line Supervisors of Construction Trades and Extraction Workers, and Electricians.

Overview of Jobs in Fossil Fuel Electric Power Generation

Fossil Fuel Electric Power Generation accounts for 400 jobs within the region with average earnings per job of \$127,785.

Within the 15-county region, the majority of jobs within the Fossil Fuel Electric Power Generation Industry are concentrated in Yellowstone, Big Horn, and Rosebud Counties.

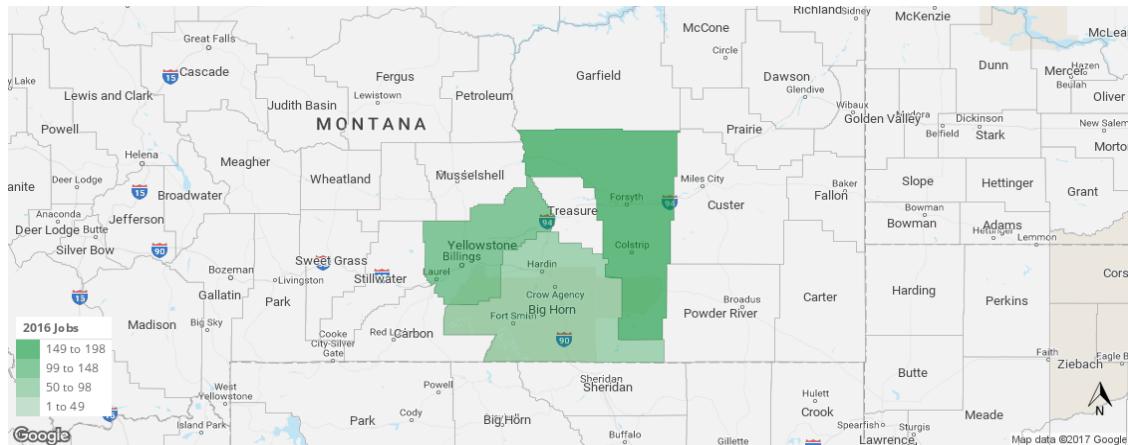


Figure 4. Concentration of Fossil Fuel Electric Power Generation

The top occupations employed by this industry include Power Plant Operators, Electrical Power-Line Installers and Repairers, Electrical Engineers, First-line Supervisors of Production and Operating Workers, and First-line Supervisors of Mechanics, Installers, and Repairers.

Occupations Employed by the Coal Mining Industry

The top occupations employed by Bituminous Coal and Lignite Surface Mining, Bituminous Coal Underground Mining, and Fossil Fuel Electric Power Generation include operating engineers, equipment operators, and extraction workers (see Table 3). The industry as a whole requires technical skills and knowledge beyond a high school diploma but less than a bachelor's degree. In order to understand the demand for these occupations as a whole, the table also shows the historical growth rates of the occupations within the 15-county region and includes all jobs under each occupation category. In most cases, the data shows a positive historical growth trend between 2009 and 2014 but then between 2014 and 2016 there is either a decline in growth or the growth is slower than in previous years.

Table 3. Regional Estimates of Top Occupations Employed within Coal Mining Industry Group within 15-County Region

Occupation	2016 Jobs in Industry Group*	2016 Jobs in All Industries	Historic 5-Year Rate in All Industries (2009-2014)	Historic 2-Year Rate in all Industries (2014-2016)
Operating Engineers & Other Construction Equipment Operators	188	927	17.8%	1.4%
First-Line Supervisors of Construction Trades and Extraction Workers	99	900	14.7%	4.9%
Electricians	73	583	0.7%	-3.6%
Mobile Heavy Equipment Mechanics, Except Engines	72	360	19.2%	-1.6%
Power Plant Operators	55	70	-6.3%	-5.4%
Excavating and Loading Machine and Dragline Operators	39	86	11.1%	-4.4%
Mine Cutting and Channeling Machine Operators	37	107	17.5%	-11.6%
First-line Supervisors of Mechanics, Installers, and Repairers	36	518	8.5%	1.6%
Electrical Power-line Installers and Repairers	35	184	8.0%	-2.1%
Heavy and Tractor-Trailer Truck Drivers	34	1,947	14.7%	0.2%
Maintenance and Repair Workers, General	32	1,072	5.5%	2.2%
Continuous Mining Machine Operators	30	80	13.8%	-12.1%
First-Line Supervisors of Production and Operating Workers	26	459	8.6%	-1.3%

*Industry Group refers to the 3 Coal Mining Industries discussed above. **Source:** EMSI, 2016 Workforce Analytics

Earnings, Education, Work Experience, and On-the-job Training Needs

Occupations in the coal industry as a whole fall in the middle-skill category recognizing that low-skill jobs require less than high school diploma and high-skill jobs require a bachelor's

degree, generally speaking. The highest ranking occupation category of Operating Engineers and Other Construction Equipment Operators (SOC 47-2073) earns \$22.30 median hourly earnings (wages and benefits), typically requires a high school diploma or higher, no prior work experience required, and requires moderate amount of on-the-job training. Comparatively, First-Line Supervisors (SOC 47-1011) earn higher wages and typically require five years or higher work experience (Table 4).

Some potential challenges could exist with occupations like Continuous Mining Machine Operators (SOC 47-5041) who earn among the highest hourly earnings (\$34.72 per hour) yet requires less than high school diploma and only moderate on-the-job training requirement. The higher-earnings to lower-education gap could create higher risk of not quickly rebounding into employment with similar career expectations.

Table 4. Coal Industry Occupations in 15-County Region-Number Employed, Median Hourly Earnings, Education/Training Requirements, and Work Experience

SOC	Description	Employed in Coal Industry in 15-County Region (2016)	Median Hourly Earnings	Typical Entry Level Edu.	Work Experience Required	Typical On-The-Job Training
47-2073	Operating Engineers and Other Construction Equipment Operators	181	\$22.30	HS/GED	None	Moderate OJT
47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	95	\$29.80	HS/GED	5 years or >	None
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	70	\$26.42	HS/GED	None	Long-term OJT
47-2111	Electricians	62	\$31.03	HS/GED	None	Apprenticeship
53-7032	Excavating and Loading Machine and Dragline Operators	38	\$26.02	HS/GED	< 5 years	Moderate OJT
47-5042	Mine Cutting and Channeling Machine Operators	37	\$34.27	HS/GED	None	Moderate OJT
53-3032	Heavy and Tractor-Trailer Truck Drivers	33	\$21.22	Certification	None	Short-term OJT
47-5041	Continuous Mining Machine Operators	30	\$34.72	Less than HS	None	Moderate OJT
49-9071	Maintenance and Repair Workers, General	22	\$14.81	HS/GED	None	Long-term OJT
47-2061	Construction Laborers	20	\$16.01	Less than HS	None	Short-term OJT
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	19	\$28.45	HS/GED	< 5 years	None
53-7011	Conveyor Operators and Tenders	19	\$20.58	Less than HS	None	Short-term OJT
51-4121	Welders, Cutters, Solderers, and Brazers	18	\$18.34	HS/GED	None	Moderate OJT
11-1021	General and Operations Managers	17	\$40.01	Bachelor's degree	5 years or >	None
43-3031	Bookkeeping, Accounting, and Auditing Clerks	15	\$15.57	Some college	None	Moderate OJT
43-9061	Office Clerks, General	14	\$14.40	HS/GED	None	Short-term OJT

SOC	Description	Employed in Coal Industry in 15-County Region (2016)	Median Hourly Earnings	Typical Entry Level Edu.	Work Experience Required	Typical On- The-Job Training
47- 5049	Mining Machine Operators, All Other	14	\$26.92	HS/GED	None	Moderate OJT
17- 2151	Mining and Geological Engineers, Including Mining Safety Engineers	14	\$43.36	Bachelor's degree	None	None
49- 9041	Industrial Machinery Mechanics	13	\$24.81	HS/GED	None	Long-term OJT
47- 5081	Helpers--Extraction Workers	13	\$20.87	HS/GED	None	Moderate OJT
53- 7111	Mine Shuttle Car Operators	12	\$28.42	Less than HS	None	Short-term OJT
53- 7062	Laborers and Freight, Stock, and Material Movers, Hand	11	\$12.95	Less than HS	None	Short-term OJT

Regionally Important Skill Sets

There is a need in the region to help workers negatively affected by the downturn in coal mining to quickly transition into other gainful employment. Many studies have validated that the longer a person is unemployed, the less likely he/she will find employment due to dampened hope and lowered self-esteem. Behavioral psychologists, Admundson and Borgen (1982) first coined the model, *Emotional Roller Coaster*, to better understand the dynamics of unemployment and its effects on people and their families. This model described the emotional highs and lows that individuals experience prior to, during, and after becoming unemployed. Evidence supports the need for career counseling services to help dislocated workers quickly transition by creating career plans and overcoming conflicts due to job loss (Hurst & Shepard, 1986).

An Occupational Compatibility Index is a tool used to determine other occupations in which the worker's knowledge, skills, and abilities are well suited. The top 15 affected, representing approximately 51% of total coal mining employment, were compared to other occupations that met the following criteria:

- Compatibility score of 85 or higher (out of a possible 100 points)
- Median hourly earnings equal to or greater than the local economy's average of \$20.40 per hour, and
- At least 5 job openings in 2016.

The Compatibility Matrix includes the compatibility score, median earnings for each occupation, number of jobs in 2016, estimated annual openings, and level of education needed.

Table 5. Compatible Occupations

Compatibility Index of Affected Occupations to Compatible Occupations in the Region																
COMPATIBLE OCCUPATIONS REQUIRING LESS THAN BACHELOR'S DEGREE	Median Hourly Earnings	2016 Jobs	Est. Ann. Openings (2016-2021)	AFFECTED OCCUPATIONS												
				\$21.97 Equip. Operators	Operating Eng. & Other Construction	\$26.34 First-Line Supervisors of Construction Trades & Extraction Workers	\$25.14 Mobile Heavy Equip. Mechanics	\$28.30 Electricians	\$43.05 Power Plant Operators	\$15.41 Bookkeeping, Accounting, & Auditing Clerks	\$28.62 First-Line Supervisors of Mechanics, Installers, & repairers	\$14.59 Office Clerks, General	\$15.12 Maintenance & Repair Workers	\$19.91 Heavy & Tractor-Trailer Truck Drivers	\$24.91 Excavating & Loading Machine & Dragline Operators	\$34.95 General & Operations Managers
Petroleum Pump System Operators, Refinery Operators	\$39.27	321	19	88		93	89	92	96		86		91	90	91	
Electrical Power-Line Installers	\$37.65	187	10	90		94	90	93	92		86		95	92	92	89
Sales Representatives, Wholesale and Manufacturing	\$33.82	154	7		96		86			86					93	
Solar Sales Representatives and Assessors	\$33.82	154	7		90		88		90		88				93	
Pipe Fitters and Steamfitters	\$29.35	711	27	91		92	92	94	89		85		94	87	92	88
Plumbers	\$29.35	711	27	88		93	91	96	88		87		95	85	89	
First-Line Supervisors of Mechanics, Installers, Repairers	\$28.62	550	20			85	92	88								
First-Line Supervisors of Transportation and Material-Moving Machine Operators	\$28.51	280	13				94			89					92	
Electricians	\$28.30	724	21			94	89			89		93		85		

Compatibility Index of Affected Occupations to Compatible Occupations in the Region

Compatibility Index of Affected Occupations to Compatible Occupations in the Region																																		
				AFFECTED OCCUPATIONS																														
COMPATIBLE OCCUPATIONS REQUIRING LESS THAN BACHELOR'S DEGREE				Median Hourly Earnings	2016 Jobs	Est. Ann. Openings (2016-2021)	\$21.97	Operating Eng. & Other Construction Equip. Operators	\$21.41	Sales Reps. Wholesale, & Manuf.	\$25.14	Mobile Heavy Equip. Mechanics	\$26.34	First-Line Supervisors of Construction Trades & Extraction Workers	\$28.30	Electricians	\$43.05	Power Plant Operators	\$15.41	Bookkeeping, Accounting, & Auditing Clerks	\$28.62	First-Line Supervisors of Mechanics, Installers, & repairers	\$14.59	Office Clerks, General	\$15.12	Maintenance & Repair Workers	\$19.91	Heavy & Tractor-Trailer Truck Drivers	\$24.91	Excavating & Loading Machine & Dragline Operators	\$34.95	General & Operations Managers	\$34.55	Mine Cutting & Channeling Machine Operators
and Mining																																		
Industrial Machinery Mechanics	\$23.13	331	24	87			96		93	88		85			87		94			85		93		89		89		89						
Inspectors, Testers, Sorters, Samplers, and Weighers	\$22.98	187	11	90	85			87			94									87	89	87	86			94		88						
First-Line Supervisors of Office and Admin Support Workers	\$22.87	1,062	30		90		87			88			88						86															
Executive Secretaries and Executive Administrative Assistants	\$22.56	299	6		92						95			95				95											86					
Roustabouts, Oil and Gas	\$22.15	161	11	95			86		85	91											93	93	93						95					
Operating Engineers, Other Construct Equipment Operators	\$21.97	983	34				88	87	87	92											93	93	96						94					
Municipal Firefighters	\$21.95	94	5				89		88												85	86	86											
Forest Firefighters	\$21.95	94	5				85																											
Farm Equipment Mechanics and Service Technicians	\$21.90	147	7	88			96	85	93	89			85			95		95	89	89							85							
Machinists	\$21.84	142	10	92			93	90	93	94									94	90	93							91						
Dispatchers, Except Police, Fire,	\$21.62	235	11		92		87			88			88			88													91					

Compatibility Index of Affected Occupations to Compatible Occupations in the Region																																		
				AFFECTED OCCUPATIONS																														
COMPATIBLE OCCUPATIONS REQUIRING LESS THAN BACHELOR'S DEGREE				Median Hourly Earnings	2016 Jobs	Est. Ann. Openings (2016-2021)	\$21.97	Operating Eng. & Other Construction Equip. Operators	\$21.41	Sales Reps. Wholesale, & Manuf.	\$25.14	Mobile Heavy Equip. Mechanics	\$26.34	First-Line Supervisors of Construction Trades & Extraction Workers	\$28.30	Electricians	\$43.05	Power Plant Operators	\$15.41	Bookkeeping, Accounting, & Auditing Clerks	\$28.62	First-Line Supervisors of Mechanics, Installers, & repairers	\$14.59	Office Clerks, General	\$15.12	Maintenance & Repair Workers	\$19.91	Heavy & Tractor-Trailer Truck Drivers	\$24.91	Excavating & Loading Machine & Dragline Operators	\$34.95	General & Operations Managers	\$34.55	Mine Cutting & Channeling Machine Operators
and Ambulance																																		
Sales Representatives, Wholesale and Manufacturing, Except Technical Products	\$21.41	1,843	71														90					88		93	95	96			90		97			
Helpers--Extraction Workers	\$21.26	75	7	94							91	85	89	93																				
First-Line Supervisors of Helpers, Laborers, Matl Movers	\$20.78	178	8			88		94											87															
Recycling Coordinators	\$20.78	178	8			89		94										86																
Wellhead Pumpers	\$20.78	529	56	94			88			86	93									93	91	90						91						
Computer User Support Specialists	\$20.62	564	14					90	85	85			86					86										87						
<i>Note: The compatibility index was compiled using the following criteria: First, the affected coal industry occupations were sorted from highest number to lowest number of workers in each occupation. Second, the compatibility index was run for each occupation, and scores less than 85 were removed. Third, compatible occupations that do not earn at or above the regional median average of \$20.40 were removed. The table was sorted by highest compatible median hourly earnings. Two matrices were created: 1-Occupations requiring a bachelor's degree or higher 2-Occupations requiring less than bachelor's degree.</i>																																		

Coal Mining Skill Sets Employable in Other Industries

The compatibility index compared occupations to other occupations. This section will identify different industry sectors that employ these same coal mining occupations for those workers who desire to continue working in the same occupation. Table 6 shows an example of the occupation Operating Engineers and Other Construction Equipment Operators which could transition into construction and other industries. Industries in the color grey are within the coal mining industry, therefore they should not be considered when identifying other industries for re-employment opportunities. Appendix D provides a full listing of other occupations employed in non-coal mining industries.

Table 6. Industries that Employ Operating Engineers and Other Construction Equipment Operators (SOC 47-2073)

15-County Region in Southeast Montana

NAICS	Industries	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
237310	Highway, Street, and Bridge Construction	154	17.7%
212111	Bituminous Coal and Lignite Surface Mining	139	16.0%
903999	Local Government, Excluding Education, Hospitals	75	8.7%
237120	Oil and Gas Pipeline and Related Structures Construction	63	7.2%
238990	All Other Specialty Trade Contractors	57	6.6%
237110	Water/Sewer Line, Related Structures Construction	43	4.9%
212112	Bituminous Coal Underground Mining	42	4.9%
238910	Site Preparation Contractors	39	4.4%
212299	All Other Metal Ore Mining	28	3.2%
212321	Construction Sand and Gravel Mining	26	3.0%
324110	Petroleum Refineries	20	2.3%
237990	Other Heavy and Civil Engineering Construction	18	2.0%
237130	Power and Communication Line and Related Structures Construction	17	1.9%
902999	State Government, Excluding Education, Hospitals	16	1.9%
236220	Commercial and Institutional Building Construction	15	1.7%

Opportunities for Education and Retraining

The Montana Workforce Investment Board and Department of Labor & Industry coordinate a network of employment, re-employment, and training services. Workers who have been laid off or terminated due to business downsizing qualify as a dislocated worker and become eligible for re-employment services. In some cases, dislocated workers' skills may need to be retooled for new credentials to help them achieve gainful employment. There are a wide variety of training and education offerings in the state. This section will address training opportunities

that are found in the 15-county region, although there may be additional services beyond those identified for this report.

RevUP Montana Initiative

In 2013, the State of Montana and thirteen community colleges were awarded a \$25-million-dollar grant from the United States Department of Labor targeting manufacturing and energy jobs (RevUP, 2017). The goal of the grant, coined the name RevUP, is to increase the number of qualified workers entering the workforce.



The partnership reported an increase of thirty-three percent in enrollment and student retention of thirteen percent. Academic programs offered by the partnership include welding, industry safety, Canadian Welding Bureau, machining, industrial electronics, industrial maintenance, oil & gas, diesel technology, commercial drivers licensing, and entrepreneurship. The grant period is Oct. 1, 2013-Sept. 30, 2017.

Colleges participating in the RevUP initiative include:

- Bitterroot College
- City College
- Dawson Community College
- Flathead Valley Community College
- Fort Peck Community College
- Gallatin College
- Great Falls
- Helena College
- Highlands College
- Little Big Horn
- Miles Community College
- Missoula College
- MSU Northern

RevUP Montana creates short-term degree, certificate and apprenticeship programs that lead students into high-wage, high-demand jobs in Montana. Filling available high-demand, high-paying jobs with skilled, experienced workers will help increase employment, strengthen Montana businesses, and grow the state's economy (RevUP website, 2017).

Montana's Registered Apprenticeship Program

Montana's Department of Labor and Industry offers a registered apprenticeship program for a variety of skill trades. Occupations offered through an apprenticeship follows these state and federal guidelines (Montana Department of Labor and Industry, 2017):

1. Is typically learned through a structured program of supervised on-the-job training.
2. Is clearly defined and recognized throughout an industry.
3. Involves special skills and knowledge that requires a minimum of 2,000 hours experience.
4. Requires related instruction directly related to the occupation to supplement on-the-job training.

Of the 610 employer sponsors which partner in the Apprenticeship Program, 137 are located in the 15-county region. Most employer sponsors fall in the categories of electrical, heating & air conditioning, plumbing, or child care. Montana's Apprenticeship Program is endorsed by sixteen unions. Union partners offer training programs consistent with needs of the coal mining industry in heavy equipment, operating engineers, electrical, and construction.

Montana Institutions of Higher Education

State of Montana is home to 46,000 students enrolled in sixteen universities and colleges governed by the Montana University System. The two university systems are Montana State University, which consists of 6 different university campuses, and University of Montana, which consists of 7 different university campuses. There are 3 community colleges within the state, including Dawson, Flathead Valley, and Miles. Outside of the Montana University System there is a system of Tribal Colleges, which consists of 7 different tribal community colleges. Within the 15-county region there are five different university and community college campuses that offer everything from 2-year technical degrees to a PHD. (Montana University System, 2017)



Figure 5. Map of Educational Institutions in Southeast Montana

Colleges in the 15-County Region

For coal mining occupations in the coal mining industry that require less than a bachelor's degree but more than a high school diploma, there are colleges within the 15-county region that provide technical skills and management training

Montana State University's Billings Campus has approximately 3,000 students as compared to its main campus of more than 15,000. The university offers technical and engineering degrees which align with coal mining careers in engineering, industrial technology, earth sciences, land rehabilitation, geospatial science, environmental science and general business.

Rocky Mountain College is located in Billings and offers liberal arts degrees to a student population of slighter more than 1,000 students. The college's geology degree aligns with the coal mining industry.

Miles Community College was the first community college founded in Montana in 1939 and offers associate of science, associate of applied science, and certificate options. Adults seeking employment in the coal mining industry have the option of taking training programs from Miles Community College that align with knowledge and skill requirements such as Heavy Equipment & Commercial Driver's Licensing and Agriculture Production.

Little Big Horn College was chartered in 1980 and became a Land Grant Institution in 1994. With approximately 400 students annually, the college offer associates degrees that align with coal mining jobs in the areas of information systems, math, science, welding and construction.

Chief Dull Knife College was originally chartered in September, 1975, by Tribal Ordinance as the Northern Cheyenne Indian Action Program, Incorporated, and granted funding by the Indian Technical Assistance Center of the Bureau of Indian Affairs (Chief Dull Knife website, 2017). Although the original curriculum of the College was directed at training students for mining jobs near the reservation, the College has quickly expanded its offerings to include post-secondary transfer programs.

Appendix D

Industries in the 15-County Region that Employ Skill Sets Similar to Coal Mining
Occupations

Industries that Employ Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products (SOC 41-4012)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
425120	Wholesale Trade Agents and Brokers	156	10.1%
424410	General Line Grocery Merchant Wholesalers	127	8.2%
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	116	7.5%
423830	Industrial Machinery and Equipment Merchant Wholesalers	62	4.0%
424810	Beer and Ale Merchant Wholesalers	59	3.9%
423110	Automobile and Other Motor Vehicle Merchant Wholesalers	51	3.3%
423720	Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	50	3.2%
424490	Other Grocery and Related Products Merchant Wholesalers	45	2.9%
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	41	2.6%
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers	39	2.5%
424910	Farm Supplies Merchant Wholesalers	37	2.4%
423610	Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	36	2.3%
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	35	2.3%
424690	Other Chemical and Allied Products Merchant Wholesalers	23	1.5%
424120	Stationery and Office Supplies Merchant Wholesalers	22	1.5%

Industries that Employ Mobile Heavy Equipment Mechanics, Except Engines (SOC 49-3042)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
212299	All Other Metal Ore Mining	66	15.6%
212111	Bituminous Coal and Lignite Surface Mining	50	11.9%
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	49	11.6%
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	32	7.5%
423830	Industrial Machinery and Equipment Merchant Wholesalers	25	5.9%
212321	Construction Sand and Gravel Mining	23	5.5%
212112	Bituminous Coal Underground Mining	20	4.7%
237310	Highway, Street, and Bridge Construction	19	4.5%
211111	Crude Petroleum and Natural Gas Extraction	14	3.4%

Industries that Employ First-Line Supervisors of Construction Trades and Extraction Workers (SOC 47-1011)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
237310	Highway, Street, and Bridge Construction	93	8.0%
236220	Commercial and Institutional Building Construction	87	7.5%
236115	New Single-Family Housing Construction (except For-Sale Builders)	74	6.3%
212111	Bituminous Coal and Lignite Surface Mining	70	6.0%
238990	All Other Specialty Trade Contractors	47	4.0%
238210	Electrical Contractors and Other Wiring Installation Contractors	47	4.0%
903999	Local Government, Excluding Education and Hospitals	45	3.8%
237120	Oil and Gas Pipeline and Related Structures Construction	44	3.8%
211111	Crude Petroleum and Natural Gas Extraction	43	3.7%
238910	Site Preparation Contractors	42	3.6%
238220	Plumbing, Heating, and Air-Conditioning Contractors	42	3.6%
213112	Support Activities for Oil and Gas Operations	40	3.4%
212299	All Other Metal Ore Mining	34	2.9%
236118	Residential Remodelers	34	2.9%
237110	Water and Sewer Line and Related Structures Construction	29	2.5%
238110	Poured Concrete Foundation and Structure Contractors	29	2.5%
236210	Industrial Building Construction	28	2.4%
238310	Drywall and Insulation Contractors	26	2.2%
212112	Bituminous Coal Underground Mining	24	2.1%
238320	Painting and Wall Covering Contractors	22	1.8%
238350	Finish Carpentry Contractors	21	1.8%
237130	Power and Communication Line and Related Structures Construction	15	1.3%
238290	Other Building Equipment Contractors	14	1.2%
212321	Construction Sand and Gravel Mining	13	1.1%
238170	Siding Contractors	13	1.1%
237990	Other Heavy and Civil Engineering Construction	13	1.1%
482110	Rail transportation	12	1.0%
324110	Petroleum Refineries	11	1.0%
238130	Framing Contractors	11	0.9%

Industries that Employ Electricians (SOC 47-2111)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
238210	Electrical Contractors and Other Wiring Installation Contractors	344	47.5%
212299	All Other Metal Ore Mining	52	7.2%
212111	Bituminous Coal and Lignite Surface Mining	48	6.7%
903999	Local Government, Excluding Education and Hospitals	18	2.4%
238910	Site Preparation Contractors	17	2.3%
236115	New Single-Family Housing Construction (except For-Sale Builders)	15	2.1%
212112	Bituminous Coal Underground Mining	14	1.9%
238990	All Other Specialty Trade Contractors	14	1.9%
324110	Petroleum Refineries	12	1.7%
221112	Fossil Fuel Electric Power Generation	11	1.6%
238220	Plumbing, Heating, and Air-Conditioning Contractors	11	1.5%

Industries that Employ Power Plant Operators (SOC 51-8013)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
221112	Fossil Fuel Electric Power Generation	55	78.7%
901199	Federal Government, Civilian, Excluding Postal Service	<10	0.8%
221111	Hydroelectric Power Generation	<10	1.4%
221115	Wind Electric Power Generation	<10	4.8%
221122	Electric Power Distribution	<10	6.9%
221210	Natural Gas Distribution	<10	0.8%
622110	General Medical and Surgical Hospitals	<10	1.1%
902612	Colleges, Universities, and Professional Schools (State Government)	<10	0.4%
902999	State Government, Excluding Education and Hospitals	<10	0.6%
903999	Local Government, Excluding Education and Hospitals	<10	4.3%

Industries that Employ Bookkeeping, Accounting, and Auditing Clerks (SOC 43-3031)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
903999	Local Government, Excluding Education and Hospitals	119	4.6%
541219	Other Accounting Services	119	4.6%
541211	Offices of Certified Public Accountants	76	2.9%
522110	Commercial Banking	61	2.4%
211111	Crude Petroleum and Natural Gas Extraction	53	2.0%
813110	Religious Organizations	50	1.9%
903611	Elementary and Secondary Schools (Local Government)	41	1.6%
441110	New Car Dealers	40	1.5%
622110	General Medical and Surgical Hospitals	39	1.5%
551114	Corporate, Subsidiary, and Regional Managing Offices	38	1.4%
713290	Other Gambling Industries	35	1.4%
721110	Hotels (except Casino Hotels) and Motels	33	1.3%
452910	Warehouse Clubs and Supercenters	32	1.2%
901199	Federal Government, Civilian, Excluding Postal Service	31	1.2%
524210	Insurance Agencies and Brokerages	29	1.1%
238220	Plumbing, Heating, and Air-Conditioning Contractors	29	1.1%
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	28	1.1%
902612	Colleges, Universities, and Professional Schools (State Government)	27	1.0%
445110	Supermarkets and Other Grocery (except Convenience) Stores	27	1.0%
112000	Animal Production and Aquaculture	26	1.0%
424410	General Line Grocery Merchant Wholesalers	25	1.0%
541213	Tax Preparation Services	25	1.0%
722511	Full-Service Restaurants	21	0.8%
561110	Office Administrative Services	21	0.8%
902999	State Government, Excluding Education and Hospitals	21	0.8%
561320	Temporary Help Services	21	0.8%
531210	Offices of Real Estate Agents and Brokers	20	0.8%
238210	Electrical Contractors and Other Wiring Installation Contractors	20	0.8%
451110	Sporting Goods Stores	19	0.7%
236115	New Single-Family Housing Construction (except For-Sale Builders)	19	0.7%
621111	Offices of Physicians (except Mental Health Specialists)	18	0.7%

Industries that Employ Bookkeeping, Accounting, and Auditing Clerks (SOC 43-3031)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
541330	Engineering Services	18	0.7%
541519	Other Computer Related Services	17	0.7%
621210	Offices of Dentists	17	0.6%
531110	Lessors of Residential Buildings and Dwellings	16	0.6%
811111	General Automotive Repair	16	0.6%
541110	Offices of Lawyers	16	0.6%
	Commercial and Industrial Machinery and Equipment		
811310	(except Automotive and Electronic) Repair and Maintenance	16	0.6%
236220	Commercial and Institutional Building Construction	15	0.6%
425120	Wholesale Trade Agents and Brokers	15	0.6%
237310	Highway, Street, and Bridge Construction	15	0.6%
423830	Industrial Machinery and Equipment Merchant Wholesalers	15	0.6%
423110	Automobile and Other Motor Vehicle Merchant Wholesalers	15	0.6%
511110	Newspaper Publishers	14	0.6%
324110	Petroleum Refineries	14	0.5%
813410	Civic and Social Organizations	14	0.5%
447110	Gasoline Stations with Convenience Stores	13	0.5%
423820	Farm and Garden Machinery and Equipment Merchant Wholesalers	12	0.5%
531311	Residential Property Managers	12	0.5%
522130	Credit Unions	12	0.5%
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	12	0.4%
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	12	0.4%
444110	Home Centers	12	0.4%
339910	Jewelry and Silverware Manufacturing	11	0.4%
484121	General Freight Trucking, Long-Distance, Truckload	11	0.4%
442110	Furniture Stores	11	0.4%
522220	Sales Financing	11	0.4%
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	11	0.4%
212111	Bituminous Coal and Lignite Surface Mining	11	0.4%
811121	Automotive Body, Paint, and Interior Repair and Maintenance	10	0.4%
444130	Hardware Stores	10	0.4%
541940	Veterinary Services	10	0.4%
212299	All Other Metal Ore Mining	10	0.4%

Industries that Employ Office Clerks, General (SOC 43-9061)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
903999	Local Government, Excluding Education and Hospitals	181	7.0%
902612	Colleges, Universities, and Professional Schools (State Government)	120	4.7%
622110	General Medical and Surgical Hospitals	79	3.1%
903611	Elementary and Secondary Schools (Local Government)	78	3.0%
561320	Temporary Help Services	67	2.6%
902999	State Government, Excluding Education and Hospitals	58	2.3%
903612	Colleges, Universities, and Professional Schools (Local Government)	55	2.1%
813110	Religious Organizations	44	1.7%
524210	Insurance Agencies and Brokerages	36	1.4%
621111	Offices of Physicians (except Mental Health Specialists)	35	1.4%
441110	New Car Dealers	33	1.3%
238220	Plumbing, Heating, and Air-Conditioning Contractors	33	1.3%
621210	Offices of Dentists	30	1.2%
901199	Federal Government, Civilian, Excluding Postal Service	29	1.1%
531210	Offices of Real Estate Agents and Brokers	28	1.1%
611310	Colleges, Universities, and Professional Schools	22	0.8%
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	21	0.8%
541330	Engineering Services	21	0.8%
424410	General Line Grocery Merchant Wholesalers	21	0.8%
561110	Office Administrative Services	20	0.8%
236115	New Single-Family Housing Construction (except For-Sale Builders)	19	0.7%
425120	Wholesale Trade Agents and Brokers	18	0.7%
238210	Electrical Contractors and Other Wiring Installation Contractors	18	0.7%
541110	Offices of Lawyers	18	0.7%
811111	General Automotive Repair	17	0.7%
511110	Newspaper Publishers	17	0.7%
541211	Offices of Certified Public Accountants	17	0.7%
811310	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	16	0.6%
541519	Other Computer Related Services	16	0.6%
522110	Commercial Banking	16	0.6%
324110	Petroleum Refineries	15	0.6%

Industries that Employ Office Clerks, General (SOC 43-9061)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	15	0.6%
541940	Veterinary Services	15	0.6%
211111	Crude Petroleum and Natural Gas Extraction	14	0.6%
551114	Corporate, Subsidiary, and Regional Managing Offices	14	0.6%
531110	Lessors of Residential Buildings and Dwellings	14	0.6%
811121	Automotive Body, Paint, and Interior Repair and Maintenance	14	0.6%
813410	Civic and Social Organizations	14	0.6%
423110	Automobile and Other Motor Vehicle Merchant Wholesalers	14	0.5%
484121	General Freight Trucking, Long-Distance, Truckload	14	0.5%
624410	Child Day Care Services	14	0.5%
442110	Furniture Stores	13	0.5%
541219	Other Accounting Services	13	0.5%
237310	Highway, Street, and Bridge Construction	13	0.5%
621310	Offices of Chiropractors	12	0.5%
339910	Jewelry and Silverware Manufacturing	12	0.5%
722511	Full-Service Restaurants	12	0.5%
611110	Elementary and Secondary Schools	12	0.5%
236220	Commercial and Institutional Building Construction	12	0.5%
451110	Sporting Goods Stores	11	0.4%
423830	Industrial Machinery and Equipment Merchant Wholesalers	11	0.4%
423120	Motor Vehicle Supplies and New Parts Merchant Wholesalers	11	0.4%
531311	Residential Property Managers	11	0.4%
112000	Animal Production and Aquaculture	10	0.4%
212111	Bituminous Coal and Lignite Surface Mining	10	0.4%
238990	All Other Specialty Trade Contractors	10	0.4%

Industries that Employ Maintenance and Repair Workers, General (SOC 49-9071)

NAICS	Industry	Maintenance Workers in Industry (2016)	% of Occupation in Industry (2016)
903999	Local Government, Excluding Education & Hospitals	121	10.1%
721110	Hotels (except Casino Hotels) and Motels	85	7.1%
531110	Lessors of Residential Buildings and Dwellings	38	3.2%
531311	Residential Property Managers	36	3.0%
622110	General Medical and Surgical Hospitals	35	2.9%
903611	Elementary/Secondary Schools (Local Government)	33	2.8%
813110	Religious Organizations	33	2.8%
811310	Comm and Ind Machinery and Equip (except Automotive and Electronic) Repair and Maintenance	30	2.5%
902612	Colleges, Universities, and Professional Schools (State Government)	29	2.4%
212299	All Other Metal Ore Mining	25	2.1%
713290	Other Gambling Industries	19	1.6%
531210	Offices of Real Estate Agents and Brokers	18	1.5%
902999	State Government, Excluding Education & Hospitals	16	1.3%
324110	Petroleum Refineries	16	1.3%
212111	Bituminous Coal and Lignite Surface Mining	16	1.3%
623110	Nursing Care Facilities (Skilled Nursing Facilities)	15	1.2%
561210	Facilities Support Services	14	1.2%
623312	Assisted Living Facilities for the Elderly	14	1.2%
531120	Lessors of Nonresidential Buildings (except Mini warehouses)	13	1.0%
112000	Animal Production and Aquaculture	12	1.0%
531130	Lessors of Mini warehouses and Self-Storage Units	12	1.0%
531190	Lessors of Other Real Estate Property	12	1.0%
721211	RV (Recreational Vehicle) Parks and Campgrounds	11	0.9%
713910	Golf Courses and Country Clubs	11	0.9%
901199	Federal Government, Civilian, Excluding Postal Service	11	0.9%
901149	US Postal Service	11	0.9%
221112	Fossil Fuel Electric Power Generation	10	0.8%

Industries that Employ Heavy and Tractor-Trailer Truck Drivers (SOC 53-3032)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
484121	General Freight Trucking, Long-Distance, Truckload	594	22.2%
484122	General Freight Trucking, Long-Distance, Less Than Truckload	279	10.4%
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	222	8.3%
484110	General Freight Trucking, Local	217	8.1%
484220	Specialized Freight (except Used Goods) Trucking, Local	187	7.0%
212299	All Other Metal Ore Mining	96	3.6%
424410	General Line Grocery Merchant Wholesalers	69	2.6%
237310	Highway, Street, and Bridge Construction	53	2.0%
212321	Construction Sand and Gravel Mining	46	1.7%
492110	Couriers and Express Delivery Services	42	1.6%
488490	Other Support Activities for Road Transportation	42	1.6%
488410	Motor Vehicle Towing	41	1.5%
484210	Used Household and Office Goods Moving	34	1.3%
327320	Ready-Mix Concrete Manufacturing	34	1.3%
424720	Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	33	1.2%
424490	Other Grocery and Related Products Merchant Wholesalers	30	1.1%
212111	Bituminous Coal and Lignite Surface Mining	25	0.9%
424710	Petroleum Bulk Stations and Terminals	23	0.9%
903999	Local Government, Excluding Education and Hospitals	22	0.8%
112000	Animal Production and Aquaculture	20	0.8%
213112	Support Activities for Oil and Gas Operations	19	0.7%
238990	All Other Specialty Trade Contractors	19	0.7%
488510	Freight Transportation Arrangement	18	0.7%
424810	Beer and Ale Merchant Wholesalers	18	0.7%
324110	Petroleum Refineries	18	0.7%
562111	Solid Waste Collection	17	0.6%
238910	Site Preparation Contractors	14	0.5%
454390	Other Direct Selling Establishments	14	0.5%
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	13	0.5%

Industries that Employ Excavating and Loading Machine and Dragline Operators (SOC 53-7032)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
212111	Bituminous Coal and Lignite Surface Mining	25	23.1%
212321	Construction Sand and Gravel Mining	14	13.0%
212112	Bituminous Coal Underground Mining	14	12.5%
212299	All Other Metal Ore Mining	13	11.6%
237120	Oil and Gas Pipeline and Related Structures Construction	<10	1.4%
484230	Specialized Freight (except Used Goods) Trucking, Long-Distance	<10	0.4%
484220	Specialized Freight (except Used Goods) Trucking, Local	<10	0.3%
237130	Power and Communication Line and Related Structures Construction	<10	0.3%
327320	Ready-Mix Concrete Manufacturing	<10	0.3%
212311	Dimension Stone Mining and Quarrying	<10	2.5%
237110	Water and Sewer Line and Related Structures Construction	<10	1.2%
212312	Crushed and Broken Limestone Mining and Quarrying	<10	1.0%
237310	Highway, Street, and Bridge Construction	<10	4.6%
212399	All Other Nonmetallic Mineral Mining	<10	0.9%
812210	Funeral Homes and Funeral Services	<10	0.4%
562991	Septic Tank and Related Services	<10	0.4%
236115	New Single-Family Housing Construction (except For-Sale Builders)	<10	1.4%
324110	Petroleum Refineries	<10	2.4%
482110	Rail transportation	<10	0.3%
221112	Fossil Fuel Electric Power Generation	<10	0.7%
562111	Solid Waste Collection	<10	0.4%
236220	Commercial and Institutional Building Construction	<10	0.6%
213112	Support Activities for Oil and Gas Operations	<10	0.4%
213113	Support Activities for Coal Mining	<10	0.3%
236118	Residential Remodelers	<10	0.8%
238110	Poured Concrete Foundation and Structure Contractors	<10	0.5%
237990	Other Heavy and Civil Engineering Construction	<10	0.8%
238320	Painting and Wall Covering Contractors	<10	0.7%
238310	Drywall and Insulation Contractors	<10	0.6%
238220	Plumbing, Heating, and Air-Conditioning Contractors	<10	0.7%
238350	Finish Carpentry Contractors	<10	0.7%
238910	Site Preparation Contractors	<10	3.3%
112000	Animal Production and Aquaculture	<10	1.0%
903999	Local Government, Excluding Education and Hospitals	<10	0.9%
238990	All Other Specialty Trade Contractors	<10	2.9%

Industries that Employ **Excavating and Loading Machine and Dragline Operators** (SOC 53-7032)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
238210	Electrical Contractors and Other Wiring Installation Contractors	<10	0.5%
238330	Flooring Contractors	<10	0.4%
238130	Framing Contractors	<10	0.2%
561730	Landscaping Services	<10	0.4%
423310	Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	<10	0.4%

Industries that Employ General and Operations Managers (SOC 11-1021)

NAICS	Industry	Occupation Jobs in Industry (2016)	% of Occupation in Industry (2016)
211111	Crude Petroleum and Natural Gas Extraction	248	17.3%
903999	Local Government, Excluding Education and Hospitals	34	2.4%
722511	Full-Service Restaurants	24	1.6%
901199	Federal Government, Civilian, Excluding Postal Service	19	1.3%
522110	Commercial Banking	18	1.3%
441110	New Car Dealers	15	1.1%
423810	Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	15	1.1%
452910	Warehouse Clubs and Supercenters	15	1.1%
541519	Other Computer Related Services	15	1.0%
551114	Corporate, Subsidiary, and Regional Managing Offices	15	1.0%
722513	Limited-Service Restaurants	14	1.0%
721110	Hotels (except Casino Hotels) and Motels	14	1.0%
445110	Supermarkets and Other Grocery (except Convenience) Stores	14	1.0%
541330	Engineering Services	13	0.9%
238220	Plumbing, Heating, and Air-Conditioning Contractors	13	0.9%
211112	Natural Gas Liquid Extraction	13	0.9%
324110	Petroleum Refineries	12	0.8%
212111	Bituminous Coal and Lignite Surface Mining	12	0.8%
451110	Sporting Goods Stores	11	0.8%
424410	General Line Grocery Merchant Wholesalers	11	0.8%
524210	Insurance Agencies and Brokerages	10	0.7%
813110	Religious Organizations	10	0.7%
447110	Gasoline Stations with Convenience Stores	10	0.7%

Works Cited

EMSI. (2017). Economic Modeling Specialists International. Retrieved from <http://www.economicmodeling.com/> on January 25, 2017.

Montana Unemployment Insurance. (2017). Unemployment rate annual average, seasonally adjusted. Retrieved from www.uid.dli.mt.gov on January 24, 2107.

Amundson, N.E., & Borgen, W.A. (1982). The dynamics of unemployment: Job loss and job search. *Personnel and Guidance Journal*, 60, 562-564.

Hurst, J.B., & Shepard, J.W. (1986, February). The dynamics of plant closings: An extended emotional roller coaster ride. *Journal of Counseling & Development*, 64(6), 401-406.

RevUp. (2017). Empowering Montana's Workforce. Retrieved from <http://www.revupmontana.com/> on January 24, 2017.

Colleges & Universities. (2017). Retrieved January 26, 2017, from http://mus.edu/Universities/university_main.asp

Montana State University. (2017). Retrieved January 24, 2017, from <http://www.montana.edu/>

Rocky Mountain College . (2017). Retrieved January 24, 2017, from <https://www.rocky.edu/>

Miles Community College. (2017). Retrieved January 24, 2017, from <https://www.milesccl.edu/>

Little Big Horn College. (2017). Retrieved January 24, 2017, from <http://www.lbhc.edu/>

Chief Dull Knife College. (2017). Retrieved January 24, 2017, from <http://www.cdkc.edu/>

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Services Offered by The University of Southern Mississippi

In addition to providing graduate education in economic development through the [Master of Science in Economic Development program \(MSED\)](#) and the [Graduate Certificate in Economic Development](#), the Department of Economic Development provides assistance to economic developers, communities, companies and non-profit organizations through four main approaches:

1. Researchers provide technical assistance in defining problems or opportunities; evaluating the effects of change; and providing recommendations for improvements.
2. Graduate students can work on class projects involving research for a community or organization (e.g., retail pull factor analysis).
3. Each student is required to do a thesis or capstone project. The capstone project involves completing an actual economic development research study (e.g., feasibility study).
4. Each student is required to do an internship in an economic development organization.
5. Communities can do sponsored research projects and tap into the faculty expertise and university data sources (e.g., EMSI and REMI).

Examples of class projects involving research for communities:

- Retail Analysis for the City of Greenwood
- Feasibility of a Livability Court for the City of Hattiesburg
- Economic Impacts of a Native American Casino in Jones County, Mississippi
- Ecotourism Development in Noxubee County
- Strategic Plans for Stone County, Sunflower County, Bolivar County and Historic Downtown Development Association
- Community Study for the Hattiesburg Mid-Town District
- Entrepreneurial Development Plan for the Area Development Partnership
- Multimodal transportation research for Mississippi Port Directors
- Workforce Analyses for Mississippi Association of Local Workforce Areas

The University of Southern Mississippi offers economic development training for working professionals and graduate students through its annual True South Basic Economic Development Course—an International Economic Development Council accredited introductory course. It fulfills one of the prerequisites for those who wish to take the Certified Economic Developer (CEcD) exam.

COAL TRANSITION STRATEGY

Introduction and Executive Summary

The transition strategy presented in this document was compiled through a rigorous process of research, combined with input from stakeholders throughout Montana. The primary research began with a series of confidential interviews with key stakeholders and executives in the coal industry. Additional information about the stakeholder and interview process is contained in Appendix 'A'. The research process included an estimation of the economic and fiscal impacts of the coal industry on the 15-county study area in Coal Country. The impact study confirmed that the coal industry is challenged by shifts in the domestic market and in environmental regulations issued by the EPA in the last eight years. The industry will decline in employment and tax collections due to the closure of Colstrip units one and two.

Additional declines are possible, depending on whether the Montana coal industry increases export shipments and whether Colstrip units three and four close. The decline in employment in the region could range from 800-4,300 jobs, depending on the success of the transition strategies outlined in this document. Montana mines are more vulnerable to shifts in the domestic market since they are the marginal producers of Western Coal. Wyoming surface mines are more productive than Montana mines due to economies of scale. Wyoming mines produce one-third more coal per hour than Montana mines (EIA Annual Coal Report 2015). In addition, severance and gross proceeds tax rates in Montana are double the tax rates that Wyoming mines pay. Since gross proceeds and severance taxes are the largest component of operating costs (exceeding payroll costs), Montana mines will be the first to close and the last to reopen when demand declines.

These transition strategies incorporate the research conducted by the Trent Lott Center for Economic Development on the retraining requirements from downsizing of the coal cluster. The Trent Lott study looked at simultaneous downsizings in coal mining, electricity generation, and wholesaling of mining and construction equipment. Most of the dislocated workers will find employment opportunities in pipeline construction, heavy construction, and transportation, albeit at reduced wages. For the ten percent of workers that lack ample employment opportunities in Coal Country, the region has significant numbers of job openings in refining and manufacturing that are highly compatible with skills gained in the coal cluster, provided these workers receive retraining.

The core strategies in this final plan were selected by stakeholders as the priority strategies for transition in a series of three workshops on February 8-9, 2017 in Roundup, Billings, and Crow Agency. In addition, this plan addresses the barriers that stakeholders identified as most important for achievement of the strategies. The two strategies for a state plan for coal and electricity generated from fossil fuels and for implementation of local and regional development strategies were added on the recommendations of the project stakeholders. The actions and background sections of the nine strategies were



developed using the consultants' more than 75 years of experience in economic development and workforce development.

Many of the strategies in this document have a state focus because they address issues of business climate that are of concern to communities throughout Montana. The success of local and regional economic development programs depends on strong state business climates and statewide development programs. The execution of the strategies in this document will result in a stronger economy in Coal Country and throughout the State of Montana.

GOAL 1: Montana Mines Maintain Shipments, Jobs, and Tax Revenues at 2015 Levels.

Strategy 1. MT develops a state strategy for Coal and Electric Power

State leaders in Montana need to better understand the significant impact that the Closure of Colstrip will have on the availability and price of electricity used in refining, metal mining, and other process industries in Montana. Jobs in these other industries are at risk as the supply of industrial electricity deteriorates and its price jumps because baseload power is no longer available in-state. Colstrip closure will leave industrial users of power in Montana without any influence on industrial power rates since they will become reliant on electricity rates set by regulators in other states.

Wind power has dropped in price until it is often competitive with power from fossil generation, but wind power has an inherent weakness for serving the needs of process industries that operate 24/7: it is intermittent and dependent on natural forces that can't be regulated. Until commercial technologies for energy storage become viable, wind power will not fill the need for reliable and affordable power to operate process industries in Montana.

The continuation of Colstrip units 3-4 is vital to sustaining Montana's refining, mining and process industries. Combined cycle turbines can provide reliable and cheap power from natural gas to fill the needs of Montana's refineries and mines but getting these projects financed, sited, permitted and built typically takes a decade or more. If pipelines have to be built to supply the natural gas for generation, the timeline is even longer. The closure of Colstrip units 3-4 will create an electricity gap for Montana industries that affect their competitiveness for at least the next decade.

The reduction of coal shipments also has unintended consequences on state and university payrolls throughout Montana. Severance and gross proceeds taxes generate nearly \$90 million per year for Montana governments.

The challenges of Western coal are not faced solely by Montana. The economic impact study suggests that one-third of the workforce in Montana mines live in Wyoming. Wyoming also generates a significant share of its tax revenues and economic activity from



coal. Wyoming recognized the challenges facing Western coal in 2014 and passed statutes to transition their coal industry to a low carbon future. The text box below describes these actions.

Develop State Strategy for Coal and Electric Power

Strengths	Weaknesses
<ul style="list-style-type: none">• MT mines generate significant employment• MT companies in metal mining, refining and process industries enjoy competitive advantages from Colstrip power due to its low fuel cost• MT severance and gross proceeds taxes from coal support significant levels of employment in state government and universities outside of Coal Country	<ul style="list-style-type: none">• State leaders outside of Coal Country need to better understand the economic consequences of reduced coal shipments and of Colstrip closure on the supply and price of industrial electricity for process industries.• MT leaders outside of coal country are ambivalent about the future of the coal industry in the state

Actions and Initiatives

Action 1.1 The Coal Country Coalition will meet in Billings to formalize our regional economic development partnership and strategy. The coalition will enlist participation by legislative and political allies.

Action 1.2. The Coal Country Coalition will develop a value proposition to share with political leaders in Montana about the coal industry. The value proposition will be assembled from the findings in the Coal Impact Study.

Action 1.3. The Coal Country Coalition will meet with the Governor of Montana and legislative leaders to advocate for the development and adoption of a statewide transition strategy for coal and for industrial electricity. The Governor's Office of Economic Development should be charged with the development of the strategy with the support and concurrence of the Coal Country Coalition. The legislature should appoint an interim committee to focus on the strategy. The state strategy should examine the indirect impacts of the closure of Colstrip on industrial electricity users outside of the coal industry. The strategy should investigate in-depth the strategies that Montana should adopt to generate new tax revenues to replace coal severance and gross proceeds taxes and actions to ensure that baseline electric power is available to industrial customers in Montana at competitive prices.

Action 1.4. The Governor and legislative leaders should endorse the findings and recommendations in the statewide strategy for coal and electric power.



Action 1.5. Members of the Coal Country Coalition will meet with civic groups throughout Montana, as well as key legislators and legislative committees, to build political support for the statewide coal and power strategy.

Action 1.6. Members of the Coal Country Coalition will meet with editorial boards and representatives of electronic media to present the economic rationale for the coal and power transition strategy.



For Reference: Publicly Funded Programs in Wyoming that Address the Transition in the Coal Industry

Wyoming's Coal and Power Initiatives

The Wyoming legislature has dedicated substantial financial resources to the diversification of the energy industry in Wyoming, with a specific focus on the electric power and coal industries. The Wyoming Infrastructure Authority (WIA), formed in 2004, is the vehicle for funding these initiatives.

The statutory mission of the WIA is “to diversify and expand the state’s economy by adding value to Wyoming’s energy resources and infrastructure” (<http://wyia.org/>). The authority has statutory powers to develop advanced coal technology and advanced energy technology, including the facilities and infrastructure needed to generate and transmit energy to customers. In 2014 HB147 expanded the powers of the WIA to include investment outside Wyoming in infrastructure needed to expand coal exports.

The WIA has \$1 billion in bonding authority for energy infrastructure investments, including investments outside the state’s borders that support transmission of wind power to grid interconnections in Oregon, Nevada, and Arizona. The WIA is actively supporting the development of the coal export facility at Millennium Bulk Terminal in Longview Washington. (The Millennium facility is located at the site of the former Reynolds Aluminum Smelter on the Columbia River.) The legislature authorized the WIA to invest in the financing of the terminal. The WIA has also spent its resources to educate Washington State and tribal leaders on the economic benefits of expanded coal exports on the economy of Washington State.

The WIA supports facilities to commercialize technologies for carbon capture and storage. These programs are tied to the Carbon Engineering Initiative at the University of Wyoming. The specific facilities that the WIA has funded are an integrated test center for pilot scale plants to capture carbon dioxide from generator flue gas and modular facilities for coal to liquids (CTL) and gas to liquids (GTL) technologies. Commercial technologies to convert coal into diesel fuel were pioneered by Germany during World War II. They have been used commercially in South Africa since the OPEC embargo of crude oil in the 1980's.

The Wyoming legislature has funded two institutes at the University of Wyoming to advance the science for carbon capture and storage and for diversification of coal into polymers and petrochemical feedstocks. The Carbon Management Institute (<http://www.uwyo.edu/cmi/>) advances the understanding of the science of geologic storage of carbon and of the policy of carbon management. The Carbon Engineering Initiative (<http://www.uwyo.edu/ser/research/carbon-engineering/>) is funded with \$100 million from the mineral severance tax fund. The mission of the initiative is to “develop, manufacture, and engineer advanced processes to convert coal and coal by-products into molecular intermediates of carbon materials (non-fuel) that may be considered long term carbon sinks or co-processed with other hydrocarbon feedstocks’ (Initiative web site). The initiative provides seed funding for commercialization of research that advances the idea of coal refineries that will co-exist with petroleum refineries. The initiative has eight research faculty that specialize in a) converting Wyoming coal to intermediate liquids and solids; and b) Identifying products that can be made from these intermediates.

Strategy 2. MT increases coal exports via Pacific coast ports.

The strategy of offsetting declines in domestic coal with exports has succeeded for Montana mines since 2010. Montana leaders, for example, initiated a trade mission in 2010 to China to lobby state enterprises to purchase Montana coal. Exports now account for one-fifth of Montana coal shipments. The advantage of this strategy is that it keeps MT coal companies operating while new technologies are developed to reduce carbon emissions and raise the conversion efficiency of coal generation. The commercialization of new coal technologies is a long-term strategy that will not support employment, taxes, and financial strength of Montana mines for a decade.

Develop Export Markets for MT Coal

Strengths	Weaknesses
<ul style="list-style-type: none">• MT mines closer to west coast export terminals than WY mines• Coal consumption continues to grow in Korea, Japan, and China• Same ocean distances to market as Australian coal terminals• Underground MT coal has higher Btu/ton content than Western surface coals and is cheaper to transport to Asia• Strategy maintains coal industry jobs and communities• Strategy maintains basis for severance and gross proceeds tax collection• Montana production costs of coal are below those for Australian and Indonesian mines• 	<ul style="list-style-type: none">• Lack of export terminal capacity in OR & WA ports• Environmental and community opposition to construction of Millennium Bulk Terminal in WA & OR• Opposition in WA to rail shipments of MT coal• Export shipments from MT mines will vary inversely with strength of U.S. dollar• LNG and global warming policies in Asia could reduce coal demand

Actions and Initiatives

Action 2.1. Business, government, tribal and legislative leaders and the Coal Council from Montana will form the Western Coal Coalition with business, government, tribal and legislative leaders from Wyoming. The stakeholders in the Western Coal Coalition will include the states' Washington delegations, Governors, BNSF, Montana Rail Link, Western Energy and utilities in Wyoming, the coal mining companies in Wyoming and Montana and the State Chamber of Commerce of Montana and of Wyoming plus regional economic development groups that are active in Coal Country. The mission of the Western Coal Coalition is to generate political support outside of Montana and Wyoming for regulatory changes that maintain coal-fired generation capacity and that expand export terminals for Western coal.



The Coal Country Coalition will serve as the conveners of the group. The process of forming the interstate group should begin by securing the support of the Montana delegation in Washington and having that delegation extend invitations to their house and senate colleagues in Wyoming.

Action 2.2. The Western Coal Coalition shall hold an organizational meeting in Billings or Sheridan to discuss the dues structure and governance of the organization. The Western Coal Coalition shall develop a mission statement and plan of action for influencing the permitting process for new coal terminals in Washington State, as well as for lobbying the EPA for changes to the carbon methodology and targets in the Clean Power Plan.

Action 2.3. The Western Coal Coalition will develop a 'Value Proposition' for generating support from representatives and senators in Washington for new coal terminals. The proposition could include new jobs, investments and taxes in Washington, infrastructure improvements to the Columbia River Navigation channel, resolutions to the fishing rights issues raised by the NookSack tribe, new rail alignments that bypass major population centers, or support of water or transportation projects in the State of Washington.

Action 2.4. Tribal leaders from Montana and Wyoming will meet with tribal leaders from Washington State to discuss and resolve issues with Indian fishing grounds on the Columbia River.

Strategy 3. The Western Coal Coalition will influence EPA to modify or eliminate the Clean Power Plan.

This strategy allows Colstrip units 3 and 4 to continue generating electric power for MT industry. As explained in Strategy One, it is the only measure that will allow large power users in Montana to purchase firm power in the Western grid from reliable in-state sources over the next decade. The strategy also offers lower power costs to industries throughout the Western grid because Colstrip has the lowest priced fuel for power generation of any fossil-generator in North America.

MT Influences EPA To Modify/Eliminate Clean Power Plan.

Strengths	Weaknesses
<ul style="list-style-type: none">Maintains a stable and low-cost electricity supply for power using industries in MontanaProvides the lowest cost fossil-fuel power in the Western gridSaves power plant and mining jobs in ColstripMaintains basis for coal severance taxes in Rosebud CountyPlan affects power plants in Midwestern states	<ul style="list-style-type: none">Mobilizes environmental opponents of coal in Washington, Oregon, and California



Actions and Initiatives

Action 3.1. The Economic Development members of the Western Coal Coalition shall assemble impact studies and other economic studies about the economic value of fossil-generated power in Wyoming and Montana. Economic development members will present the report of their findings to the entire coalition at a scheduled meeting.

Action 3.2. The utility members of the Western Coal Coalition will investigate reductions in emissions that can be accomplished with commercial technologies. Additionally, they should address the conversion efficiency of generators at Colstrip and at fossil-fuel plants in Wyoming. These members will present this report of findings to the entire coalition at a scheduled meeting.

Action 3.3. A delegation from the Western Coal Coalition will meet with the Secretary of EPA and other members of the Trump administration to communicate the national and regional issues created by the closure of Colstrip 3 and 4 and smaller coal-fired plants in Wyoming. The arguments should include lost jobs and tax revenue plus the economic consequences that the closure will have on power using industries throughout the Western Grid. The argument should also document the significant loss of economic efficiency in the national economy from the closure of the lowest cost fossil-fuel generation in the U.S. electrical grid.

Action 3.4. The Western Coal Coalition meets quarterly to review and adjust its program of work.

Goal 2: Montana companies and inventors have commercialized technologies that lower carbon emissions and that raise the thermal efficiency of coal power. Montana entities have developed new technologies that transform coal molecules into polymer and petrochemical products.

Strategy 4. MT will develop grant programs to commercialize technologies that reduce carbon emissions and increase conversion efficiency of coal-power generation.

This strategy provides a platform for continuance of coal-fired generation regardless of the administration in power in Washington. It provides a long-term strategy for the continued mining of coal in Montana and offers an opportunity for Montana to become a center for the production of technology solutions for carbon capture, improved thermal efficiency of coal generation, gasification, and coal to liquids technologies that open coal to petrochemical and polymer uses. This strategy also provides a mechanism to continue the generation of MT electricity using the cheapest fossil-fuels in the US power system. The closure of Montana power-plants will raise the cost of industrial power in the Western



grid. This is a strong national and regional argument for maintaining coal generation at Colstrip. It also continues the supply of low-priced wholesale power to big MT power users in refining and metal mining. ***These big power users will see big increases in electricity prices and uncertainty in power supply if a source of firm power is not available within the state of Montana.***

The Montana Board of Research and Commercialization Technology (<http://marketmt.com/MBRCT/About/About>) makes seed grants to commercialize university research. Only three of the 208 projects they have funded since 2000 have been in the energy sector. The board of directors does not include any members from the energy industry nor from Coal Country. The proposed fund in Strategy Four will not overlap nor duplicate the work funded by the Board of Research and Commercialization Technology. Nor are the problems facing the coal and fossil-generated electric industry likely to be addressed by the Board of Research and Commercialization Technology.

Montana Inventors Develop New Commercial Technologies that Lower Carbon Emissions and Increase Efficiency of Coal-fired Generators.

Strengths	Weaknesses
<ul style="list-style-type: none">• Maintains coal industry jobs and communities• Preserves basis for severance and gross proceeds tax collections• Provides new opportunities and jobs for MT science based industry• Pilot and commercial plants under construction in other states	<ul style="list-style-type: none">• Requires more dedicated public funding to support initiative as in WY• High risk and uncertainty of success• WY has established program with large funding in place and research university alliances• MT state leaders have not committed to using tax revenues from coal industry to solve technical problems with coal-fired electricity

Actions and Initiatives

Action 4.1. The Montana legislature, with the active support of the Governor, will earmark up to \$100 million of Coal Severance Tax Trust Fund monies to form the Montana Commercialization Fund. The legislation will require that funds be dedicated to the commercialization of technologies that lower carbon emissions from coal-powered electricity generators, that increase the conversion efficiency of electricity generated from coal, or that create new technologies for using coal molecules to produce petrochemicals, pharmaceuticals, and polymers.



Action 4.2. The Montana Commercialization Fund will develop guidelines for review and approval of applications from private sector companies in Montana for pilot or commercial scale demonstration projects.

Action 4.3 The Montana Commercialization Fund will coordinate and collaborate with the Carbon Engineering Initiative at UW and with the National Energy Technology Lab in Pittsburgh to support research on clean coal technologies.

Action 4.4 The Commercialization Fund will develop a series of 5-year and 10-year performance measures for guiding its commercialization programs.

Action 4.5 The Commercialization Fund will meet annually with the Coal Country Coalition to review progress towards attaining the adopted performance measures. The entities will collectively agree on changes needed to progress to attain goals.

GOAL 3: Communities in Coal Country diversify their economies with jobs in Manufacturing, Corporate Headquarters, Back Office Operations, and Pipeline Construction.

Strategy 5. MT will improve the business climate for mining and non-mining companies.

This strategy improves the opportunities to diversify the MT economy into office and manufacturing sectors, which will insulate the region from economic shocks within the mining sector, while generating job opportunities for residents in the fastest growing sectors of the national economy.



Improved Business Climate for Mining and Non-Mining (Node Communities Shown in Parentheses)

Strengths	Weaknesses
<ul style="list-style-type: none"> • Pipeline industry skills compatible to coal mining skills • Office and administrative operations are growing in MT suggesting new locations are possible • Program underway to attract remote call-centers to state (Roundup) • Some available building space for lease and sale in impacted communities (Roundup and Billings) • Frequent east-west rail service • Lack of highway traffic congestion • High rate of high school graduation in applicant pool • Available sites (Billings, Roundup) 	<ul style="list-style-type: none"> • Manufacturing opportunities not growing in MT • Lack of right-to-work and employment-at-will diminish MT competitiveness for relocation of manufacturing • Business income and property taxes and lack of incentive policy in MT not competitive with surrounding states for industry recruitment and expansions • Pool of laid off workers too small to affect attractiveness of region to outsiders • Remoteness of region a disadvantage for manufacturing production • Wage rates in office and manufacturing operations lower than in mining • Broadband infrastructure constrains office sector opportunities outside of population centers • Water and sewer capacity for new companies limited outside of Billings • Small pool of college-educated STEM workers for technology companies

Actions and Initiatives

Action 5.1. The Governor and an Interim Committee from the Montana legislature will appoint a Steering committee to evaluate the competitiveness of the Montana economy for mining, tourism, health care, manufacturing, pipeline, and office activities. The Interim Committee will include representatives of the state's business community, higher education, tribal leaders, and representatives from each of the diversification targets within the scope of their mission.

Action 5.2. The Steering Committee will engage a consultant to conduct a State Competitiveness Study. The study should evaluate the competitiveness of Montana with surrounding states and with the states that are attracting most of the nation's new investment, such as Colorado, Texas, and Georgia.



The scope of the study should include policy and legislative issues that are known to influence investment by out-of-state companies, such as severance tax rates in mining states, Right-to-Work laws, employment-at-will laws, business taxation, regulatory burdens, and incentives.

Action 5.3. The study should identify and evaluate training institutions and resources in Montana that support business growth and diversification. The study should include interviews, surveys, and collection of opinions of potential and actual investors in the diversification targets. Business regulation and taxation should be analyzed in comparison to other states.

Action 5.4. The Steering Committee should hire staff or consultants as needed to conduct the investigations using a peer reviewed and validated methodology. Other states that have conducted competitiveness studies include most recently, Mississippi, Louisiana, Texas, and Michigan.

Action 5.5. The Steering Committee will hold a series of meetings to receive and review the findings from the Consultants conducting the Competitiveness Study. At the conclusion of these sessions, the Steering Committee will adopt its final report of findings with recommendations to the Governor, Legislature and Citizens of Montana. The recommendations of the final report should be made available prior to the 2019 Legislative Session.

Action 5.6. Members of the Steering Committee will be assigned responsibility for drafting legislation and new regulations that enact the recommendations of the Steering Committee.

Action 5.7. The legislature will equalize severance tax and gross proceeds tax rates in Montana to match rates in Wyoming. This change lessens the risk of Montana mines acting as the industry's marginal producers, which close first and reopen last.

Strategy 6. Billings, Roundup, Colstrip and Crow Nation/Hardin and other employment centers in Coal Country develop formal strategies for economic diversification

The scope and timetable for this transition strategy did not permit a comprehensive analysis of the development assets in the employment centers in Coal Country. The consultants, however, identified general strengths and weaknesses for economic diversification in the employment nodes in Coal Country. Those strengths and weaknesses are shown in the table for Strategy Five, with differences for each of the employment centers noted in parentheses.



The success of the local and regional transition strategy will be strengthened by a state program for diversification. Economic diversification requires that communities plan and prioritize resources so they have the infrastructure and real estate ready that new businesses need to operate within their communities.

A community development plan is the first step in launching a diversification strategy. Communities must engage stakeholders from business, government and education in setting the priorities and strategies that these plans require. Research on the community workforce, utilities, training institutions, quality of life, real estate assets and other development assets should be conducted as part of these strategies. Target industries that match the assets of the community must be identified so that communities focus their resources into strategies where the success rate is likely to be high.

Colstrip is now completing a strategy based around this type of planning process. Other communities and regions in Coal Country have strategies in place, which don't need to be duplicated. Communities that lack a formal written diversification strategy could, however, benefit by following this diversification planning process.

Actions and Initiatives

Action 6.1 Major employment centers within Coal Country will form steering committees to develop economic diversification strategies for their communities. The strategy that Colstrip is finishing is a template that other communities can follow to build a consensus on the elements of their diversification strategies.

Action 6.2. The SE MT Development Corporation in Colstrip will secure and develop up to 100 acres of industrial park land with infrastructure for diversification industries.

Action 6.3 The City of Colstrip will extend water and wastewater utilities to the industrial park site. The initial capacity of these services should exceed 50,000 gallons per day (gpd).

Action 6.4. The Crow Nation will work with Hardin to further develop the existing industrial park in Hardin.

Action 6.5. The Crow Nation will identify and address obstacles to commercial development of bentonite and limestone deposits on tribal lands.

Action 6.6. The Yellowstone County Commission will extend water and wastewater facilities to the Lockwood TEDD. The initial capacity of these services should exceed 50,000 gallons per day (gpd).



Strategy 7. MT invests in infrastructure that extends internet broadband service to the majority of residents.

Companies and individuals interviewed identified the lack of broadband access in rural Montana as an infrastructure issue for their community's economic development. The lack of broadband access also came up in the stakeholder workshops in February.

Public information sources are the principal means that companies outside of Montana, including headquarters of Montana branch operations, use in screening investment locations. The National Map of Broadband Coverage (FCC) shows that the vast majority of Montana lacks broadband internet service (<https://www.broadbandmap.gov/speed>). This is in contrast to the situation in Wyoming, North Dakota, and South Dakota.

Broadband Now (<http://broadbandnow.com/mission>) ranks Montana as last of the 50 United States in terms of broadband connectivity. While Montana has 104 broadband providers, almost 800,000 people lack access to a wired connection capable of 25 mbps download speeds, 276,000 have access to only one wired provider and 74,000 don't have wired internet providers where they live. Eastern Montana in particular lacks broadband service (<http://broadbandnow.com/Montana>). The percent of population in Eastern Montana with access to a high speed wired connection (greater than 25 mbps download) is 28% in Big Horn County, 25% in Yellowstone County, but 0% in Rosebud and Musselshell Counties. This contrasts with 99.9% coverage in Bismarck, Minot, Sioux Falls, Casper, Cheyenne, Gillette and Laramie.

This strategy provides a critical technology to deliver education (worker training) and health care (tele medicine) throughout the state at reduced cost. It addresses the expense and time involved with delivering services in a state with a low-density population and rural footprint.

The Montana Infrastructure Coalition is advocating a state funded infrastructure program for Montana. The Montana legislature is currently hearing bills to address infrastructure needs. These initiatives do not encompass broadband service as a form of infrastructure. The needs for broadband service continually need to be addressed in Montana.



Investment in Infrastructure That Extends Internet Service

Strengths	Weaknesses
<ul style="list-style-type: none">• Provides a platform for lowering delivery costs of training and health care• Provides a platform for raising the accessibility of training for rural residents that are remote from training centers• Provides opportunities for entrepreneurship	<ul style="list-style-type: none">• Low population density in rural Montana makes returns on private investment marginal• The MT Broadband Program funded by the State Broadband Initiative was closed in 2014.• National sources report that almost 800,000 people in Montana lack access to a high-speed wired internet service (> 25 mbps download speed)

Actions and Initiatives

Action 7.1. The Governor's Office of Economic Development should compile data published on national web sites like BroadbandNow.Com to determine how businesses outside of Montana view the availability of broadband service within the state and within surrounding states. The Office of Economic Development should inform these national sites of errors in their reporting on Montana broadband. The data collected between 2010 and 2014 for the National Telecommunications Infrastructure Act (NTIA) should be updated to give an accurate picture of current coverage.

Action 7.2. The Coal Country Coalition, with support of the Governor's Office of Economic Development, should identify geographic areas within Coal Country that lack reliable broadband service that is capable of supporting remote training, health care initiatives, and support for economic diversification strategies. The Coalition should estimate, with the help of industry experts, the cost of extending service to the most critical underserved areas. The Coalition should also investigate cost or regulatory barriers that restrict the access to broadband within Coal Country. For purposes of this investigation, broadband should be defined as the 25 mbps download speed used by BroadbandNow.com and other national websites reporting broadband access.

Action 7.3. The Governor's office should investigate state broadband initiatives in Hawaii, Massachusetts, Wyoming, Kentucky, and Missouri to learn how to structure incentives and regulation of MT broadband initiatives so that the coverage extends to at least 85 percent of the state's residents.

Action 7.4. The Coal Country Coalition, representatives of the telecom industry, and the Governor's Office should work with Department of Labor and Industry to add satellite locations that can function as remote training sites with extension of broadband connections. At a minimum, the satellite locations should provide training venues within every major population center and county seat in Montana.



GOAL 4: Montana has a statewide partnership with community colleges and universities. It provides adequate funding for meeting the training and retraining needs of coal workers in transition. Additionally, it provides workers needed to fill positions opened by attrition and by the graying workforce.

Strategy 8. MT revamps its statewide Training System.

This strategy uses the changes in the coal industry to update the state's training infrastructure. The graying workforce in the state and the general requirement for more training and retraining in modern business operations mandates that Montana reshape its post high-school training infrastructure.

Coal Country has five post-secondary institutions that offer two and four year degrees and certifications in technical and professional fields: MSU Billings (including City College), Rocky Mountain College, Miles Community College, Little Big Horn College, and Chief Dull Knife College. Collectively these institutions have about 5,000 students.

To maintain global competitiveness, Montana must provide additional funds to train workers other than those designated as low income employees. Additionally, the state must provide funds and facilities for incumbent worker training, to retrain coal workers for positions in pipeline, refining, and heavy construction industries. The Montana Coal Industry Workforce Analysis by the Trent Lott National Center at USM suggests that all of the workers in the coal cluster, except for power plant operators, mining machine operators and dragline operators, can find employment in other industries in the region. For each of the leading occupations in the coal cluster, at least 5 times as many employees work outside of the coal industry as within it. Attrition and retirements should open ample opportunities for laid off workers to transition into other industries. The industries offering the best transition opportunities are heavy construction, oil and gas pipeline construction, refining, and metals mining.

Of the 1400 workers in the coal cluster, 124 are in the three occupations where local openings are not expected to exist outside of the coal cluster. The best retraining opportunities for these workers are in refinery operations, pipe fitters, electricians, sheet metal workers, mobile heavy equipment mechanics, industrial machinery mechanics, and wellhead pumpers. These positions pay between \$20-\$30/hr. and are the most compatible to the skills gained in the coal industry. Estimates by EMSI suggest that these occupations should provide 179 openings per year between 2015-2025.

A significant body of academic research in labor economics confirms that industry training is focused on job skills that increase the productivity of employees rather than on training needed for employment in an industry. **States that limit public resources for**



professional and craft training have talent pools that are unprepared for future jobs.

Skill shortages are found throughout the United States. It is the single most important issue in economic development. Transformative technologies are occurring at an accelerated pace placing enormous demands on the business community. The ability to innovate at an accelerated pace will be the most important capability differentiating the success of communities and countries. The global mobility of talent is becoming as critical as the global mobility of goods and capital. The National Association of Manufacturers estimates that nationally over 600,000 jobs are unfilled because applicants do not possess the appropriate skill sets for the changing, increasingly technical skill needs of today's businesses. Therefore, the strategic use of public policy as an enabler of economic development will intensify placing a premium on collaboration between policy makers and business leaders. Many states are placing a priority on resource allocation to ensure a capable workforce. States such as Louisiana, Mississippi, and Iowa have dedicated, recurring and flexible workforce training dollar pools that are available to support the business community. For example, in Mississippi approximately \$26 million is annually available for workforce training. Roughly \$21 million can be used for incumbent worker training and \$5 million can be used for new-to-the-state businesses. These resources do not sunset each year and multiyear commitments can be made to businesses that commit to successive workforce growth.

The low amount of state funding in Montana for workforce training is apparent when compared to the leading states and to states surrounding Montana (see table on next page). State funding in Montana for community college and vocational training is a fourth of the per student amounts spent in leading states, one-third of state-per-student amounts in Wyoming and just two-thirds of spending in the Dakotas. Montana ranks 41st of the 50 states in terms of state spending per student in community colleges and post-secondary vocational programs.



State Spending per Pupil in 2012 on Community College and Post-Secondary Education in Various States

State Spending per student				
Rank	State	Schools	Avg.	Std. Dev.
1	AK	5	\$ 20,883	\$ 10,381
2	WV	46	\$ 9,601	\$ 9,019
3	HI	14	\$ 9,182	\$ 3,798
4	FL	220	\$ 9,124	\$ 4,748
5	UT	47	\$ 8,189	\$ 4,523
7	WY	9	\$ 7,215	\$ 1,936
11	ND	10	\$ 6,130	\$ 2,371
21	ID	22	\$ 4,754	\$ 4,010
	USA	855	\$ 4,488	\$ 3,380
23	SD	12	\$ 4,470	\$ 1,453
41	MT	20	\$ 2,825	\$ 2,641

Source: Compiled from IPEDS Delta Cost Data, National Center for Education Statistics



Revamp Statewide Training System and Retrain Coal Workers

Strengths	Weaknesses
<ul style="list-style-type: none">• Looming worker shortage in MT from graying workforce enhances general need for retraining• Maintains jobs in rural communities• High percentage of workers have high school diplomas• Billings Works, Miles Community College, Little Big Horn College and Chief Dull Knife College training institutions are rated well by MT employers• Unemployment rate remains low in region• Job market for technical skills in region is strong• Regional employment has grown by 1 percent/year recently and the growth rate is forecast to continue• Existing training programs such as the Incumbent Worker and the Primary Sector Workforce Training grants• MSU Billings and Rocky Mountain College provide offer technical degrees at bachelor's and higher level	<ul style="list-style-type: none">• Aging workforce in coal industry limits pool of workers interested in retraining• Existing funding streams for training are small and unstable• Training centers are remote from impacted workers• Funding of training is local but need is regional and statewide• Low population density raises cost of retraining and raises commute times for students-low completion rates• Lack of rural broadband limits remote training and education options in MT• Wages in alternative industries are lower than those in mining• Small pool of college-educated STEM workers for technology companies• State SWIB needs to be strengthened• No guarantee of yearly funding for training programs leaving the State unable to fund the growing needs for worker training and retraining in MT• Training programs are first come first served, employee size restricted, tied to assessment of "value" or based on wage rates• Training programs require varied match amounts from private sector

Actions and Initiatives

Action 8.1. The Governor and Montana legislature shall introduce an unemployment insurance surcharge to support worker training and retraining. The surcharge will support a public/private worker training initiative with emphasis on incumbent workers. Once it has been strengthened (for example to include representatives of all relevant workforce training partners in the state), the utilization of these funds should be the responsibility of the State Workforce Innovation Board (SWIB). The SWIB will have a dedicated planning staff and will develop the guidelines and oversee the utilization of this grant program.

Action 8.2. The MT SWIB develops an estimate of training needs from graying workforce and shifting industrial structure in MT. Consideration should be given to determine if the workforce priorities of all relevant workforce training providers are aligned with the emerging workforce needs in the state. This would include but not be limited to the state departments of Commerce and Labor, the Board of Regents, the Office of Public Instruction, and the SWIB. The SWIB will develop a methodology for keeping the estimate of state training needs current. The findings from this assessment should be transmitted to the Governor and the legislature.

Action 8.3. MT SWIB identifies training regions for delivery of new training programs to MT businesses and residents.

Action 8.4. The SWIB redesigns the application process and considers the elimination or reduction of private sector matching requirements for securing workforce training funds so that the process is competitive with other states, more efficient, and quicker to access for applicants.

Action 8.5. The MT legislature will allocate severance tax trust funds to programs to deliver training to MT residents.

Action 8.6. The MT legislature funds mobile training labs and programs for non-credit hour training that can provide industrial training to MT residents in locations remote from community college campuses.

Action 8.7. The Montana SWIB will coordinate its actions steps and programs with the Montana Works program and the federal Workforce Innovation Opportunity Act plan in Montana.

Action 8.8. The MT Governor requests that the MT Board of Regents examine the higher education needs of companies in Eastern MT. Higher education institutions will develop training infrastructure and facilities to provide off-campus and remote delivery of higher education services in Eastern MT.

Action 8.9. The newly developed and launched Montana Works program should be adequately funded to sustain its electronic, web-based system that matches individuals seeking jobs or retraining with employers having available jobs. Data generated through this system should be used to formulate short and long term plans for workforce training



programs in Montana. National examples include The Virginia Workforce Connection and the Mississippi Works programs.

Action 8.10. The MT SWIB develops training infrastructure and off-campus training sites in rural areas to provide lab and classroom training for industry skills training.

Strategy 9. MT retrains laid-off coal miners through retraining for comparable occupations in related industries.

Actions and Initiatives

Action 9.1. Economic development stakeholders in the Coal Country Coalition share results of the USM Workforce Analysis by the Trent Lott National Center at USM with workforce training personnel in community colleges, tribal colleges, and school districts in Coal Country. The complete USM report should be sent to the energy worker retraining grant recipients at Northern Wyoming/Billings City College.

Action 9.2. Economic development stakeholders in the Coal Country Coalition will develop a list of regional companies in refining, pipeline construction, heavy construction, and mobile equipment maintenance. The list of companies and their HR directors will be shared with workforce training institutions.

Action 9.3. Workforce training institutions in Coal Country will develop curricula and programs to retrain workers in the coal industry to function as refinery operators, pipe fitters, electricians, sheet metal workers, heavy equipment mechanics, industrial machinery mechanics and wellhead pumbers.

Action 9.4. The Montana legislature will budget funds to retrain up to 150 workers for openings in the occupations identified in Action 9.3.

Action 9.5. Workforce training institutions will contact unions and coal companies to share marketing materials on the retraining programs.

Action 9.6. The Coal Country Coalition meets twice a year to review actions and program of work.

IMPLEMENTATION MATRIX

	TIMEFRAME			
	Ongoing	Short-Term Next 12-mo.	Mid-Term 12 to 24 months	Long-Term Over 2 years
GOAL 1: MONTANA MINES MAINTAIN SHIPMENTS, JOBS, AND TAX REVENUES AT 2015 LEVELS				
Strategy 1. Montana Develops a State Strategy for Coal and Electric Power				
Action 1.1. Coal Country Coalition meets in Billings		X		
Action 1.2. Coal Country Coalition develops a value proposition		X		
Action 1.3. Coal Country Coalition meets with MT governor and legislative leaders		X		
Action 1.4. Governor and legislative leaders endorse findings			X	
Action 1.5. Members of the Coal Country Coalition meet with MT civic groups			X	
Action 1.6. Members of the Coal Country Coalition meet with editorial boards			X	
Strategy 2. Montana Increases Coal Exports via Pacific Coast Ports				
Action 2.1. Form Western Coal Coalition		X		
Action 2.2. Organizational Meeting of WCC		X		
Action 2.3. Develop Value Proposition		X		
Action 2.4. MT and WY Tribal Leaders meet with WA Tribal Leaders			X	
Strategy 3. The Western Coal Coalition will influence EPA to Modify or Eliminate the Clean Power Plan				
Action 3.1. Econ. Dev. members of WCC assemble impact studies		X		
Action 3.2. Utility members of WCC investigate reductions in emissions		X		
Action 3.3. A delegation from WCC will meet with EPA Secretary			X	
Action 3.4. WCC meets quarterly	X			

	TIMEFRAME			
	Ongoing	Short-Term Next 12-mo.	Mid-Term 12 to 24 months	Long-Term Over 2 years
GOAL 2: MONTANA COMPANIES AND INVENTORS DEVELOP TECHNOLOGIES THAT LOWER CARBON EMISSIONS AND TRANSFORM COAL MOLECULES				
Strategy 4. MT will develop Grant Programs to Commercialize Technologies that Reduce Carbon Emissions				
Action 4.1. The MT legislature will form the MT Commercialization Fund		X		
Action 4.2. The MT Commercialization Fund will develop guidelines for review and approval of applications			X	
Action 4.3. The MT Commercialization Fund will coordinate with Carbon Engineering Initiative at UW			X	
Action 4.4. The Commercialization Fund will develop series of 5 and 10-year performance measures				X
Action 4.5. The Commercialization Fund will meet annually with the CCC	X			
GOAL 3: COMMUNITIES IN COAL COUNTRY DIVERSIFY THEIR ECONOMIES WITH JOBS IN MANUFACTURING, OFFICES, AND PIPELINE CONSTRUCTION				
Strategy 5. MT will improve the Business Climate for Mining and Non-Mining Companies				
Action 5.1. The Governor and an Interim Committee from the MT legislature will appoint a steering committee		X		
Action 5.2. The Interim Committee will engage a consultant to conduct State Competitiveness Study		X		
Action 5.3. The study will identify training institutions and resources in MT that support business growth			X	
Action 5.4. The Interim Committee should hire staff as needed to conduct the investigations		X		
Action 5.5. The Interim Committee will hold series of meetings			X	

	TIMEFRAME			
	Ongoing	Short-Term Next 12-mo.	Mid-Term 12 to 24 months	Long-Term Over 2 years
Action 5.6. Members of the Steering Committee will be assigned responsibility for drafting new regulations			X	
Action 5.7. The legislature will equalize severance tax in MT to those in WY				X
Strategy 6. Billings, Roundup, Colstrip, and Crow Nation/Hardin Develop Formal Economic Diversification Strategies				
Action 6.1. Employment centers within Coal Country will form steering committeees		X		
Action 6.2. SE MT Development Corporation will secure industrial park land with infrastructure			X	
Action 6.3. City of Colstrip will extend water and wastewater utilities to the industrial park site				X
Action 6.4. Crow Nation will work with Hardin to further develop existing industrial park		X		
Action 6.5. Crow Nation will identify obstacles to mining companies to extract bentonite and limestone deposits on tribal lands			X	X
Action 6.6. Yellowstone County Commission will extend water and wastewater facilities to Lockwood TEDD				X
Strategy 7. MT Invests in Infrastructure that Extends Internet Broadband Service to the Majority of Residents				
Action 7.1. Governor's Office will compile data from national sites on MT broadband service		X		

	TIMEFRAME			
	Ongoing	Short-Term Next 12-mo.	Mid-Term 12 to 24 months	Long-Term Over 2 years
Action 7.2. Coal Country Coalition Investigates Broadband Gaps in Coal Country		X		
Action 7.3. Governor's Office should investigate state broadband initiatives in HI, MA, KY, and MO		X		
Action 7.4. Coal Country Coalition/Governor's Office find new satellite training sites				X
GOAL 4: MONTANA HAS A STATEWIDE PARTNERSHIP WITH COMMUNITY COLLEGES AND UNIVERSITIES				
Strategy 8. MT revamps its statewide Training System				
Action 8.1. Governor and MT legislature shall introduce an unemployment insurance surcharge			X	
Action 8.2. MT SWIB develops an estimate of training needs from graying workforce in MT		X		
Action 8.3. MT SWIB identifies training regions for delivery of new training programs			X	
Action 8.4. SWIB redesigns the application process			X	
Action 8.5. MT Legislature will allocate severance tax trust funds to programs to deliver training to MT residents				X
Action 8.6. MT legislature funds mobile training labs and programs for non-credit hour training				X

	TIMEFRAME			
	Ongoing	Short-Term Next 12-mo.	Mid-Term 12 to 24 months	Long-Term Over 2 years
Action 8.7. Montana SWIB will coordinate its action steps and programs with the MT Works program				X
Action 8.8. MT Governor requests that the MT Board of Regents examine the higher education needs in Eastern MT		X		
Action 8.9. Montana Works program should be adequately funded			X	
Action 8.10. MT SWIB develops training infrastructure and off-campus training sites in rural areas				X
Strategy 9. MT retains laid-off coal miners through retraining for comparable occupations in related industries				
Action 9.1. Economic development stakeholders in the CCC share results of the USM Workforce Strategy		X		
Action 9.2. Economic development stakeholders in the CCC will develop a list of regional companies in refining		X		
Action 9.3. Workforce training institutions in Coal Country will develop curricula and programs to retrain workers		X		
Action 9.4. MT Legislature will budget funds to retrain up to 150 workers				X
Action 9.5. Workforce training institutions will contact unions and coal companies to share marketing materials			X	
Action 9.6. The CCC meets twice a year to review schedule and program of work	X			

APPENDIX E

EMPLOYER INTERVIEWS, SURVEYS, FOCUS GROUPS, & STAKEHOLDER WORKSHOPS

The consultants collected primary research in the development of this strategy from coal industry employers and stakeholders and training institutions. The following is a list of the focus groups, interviews and workshops in the primary data collection process.

Focus Groups with Project Stakeholders

These focus groups examined development issues that were constraints to local development and economic issues related to the downturn in the coal economy.

- Billings November 30, 2016
- Colstrip November 30, 2016
- Crow Agency December 1, 2016
- Roundup January 10, 2017

Interviews

The thirteen interviews with coal and electric companies, training institutions, and economic development groups, varied in content, depending on the entity interviewed. Interviews with coal companies focused on the business climate for mining companies in Montana, the cost structure of the industry, industry workforce characteristics and challenges, and experience with training providers in Montana. Interviews with training providers focused on courses offered, sources and stability of funding, trends in applicant pools, and challenges they are facing with maintaining training programs. The interviews with economic development groups focused on strategies and tactics for economic development.

- Northwestern Energy November 30, 2016
- BNSF Railroad November 30, 2016
- Billings Works November 30, 2016
- Westmoreland Coal December 8, 2016
- MT Coal Council December 9, 2016
- Cloud Peak Energy January 5, 2017
- City College, Billings January 9, 2017
- Governor's Office of E.D. January 10, 2017



- Governor's Office of Ed. January 10, 2017
- Montana State COC January 11, 2017
- Montana Dept. Labor & Ind. January 11, 2017
- Snowy Mountain EDC January 11, 2017
- Southeastern MT Dev. Corp. January 20, 2017

Stakeholder and Public Workshops for Identifying Priority Strategies

A series of workshops were held with stakeholders in economic development including county commissioners, educational leaders, private sector employers and training officials at the following places and times:

- Roundup Feb. 8, 2017
- Billings Feb. 8, 2017
- Crow Agency Feb. 9, 2017

Taimerica and the Billings office of KLI worked jointly to plan, organize and execute the workshops. Approximately 30 invited stakeholders attended the sessions. Participants were asked to rank a series of transition strategies in terms of their importance to the regional and local economy. Participants then ranked a number of development issues in terms of their importance for the growth and development of their communities and regions.

The following are the transition strategies that participants identified as priorities for transition:

- Partner with WY to lobby outside of state for coal exports and regulation changes
- Increase coal exports
- Grant programs to commercialize pilot plant research on carbon capture
- Diversify the economy
- Extend broadband access
- Revamp state training programs

The following is a list of the issues or barriers to achieving these strategies. These issues were identified as priorities using a Condorcet rank order vote:

- Public and policy makers that are uninformed about the importance of coal to Montana communities
- Poor business climate in MT
- State and national energy policies
- Political opposition in Pacific Northwest to coal exports
- Broadband service in rural areas
- Funding and financing of economic development and training



- State tax structure and business climate
- Regulations against fossil fuels and incentives for new technologies
- State division about what happens in coal country

Project Stakeholder Conference Calls

These calls among project stakeholders discussed interview and research findings and the mechanics of collecting primary data. The Billings office of KJL published agendas, minutes and action items for the meetings.

- December 9 2016
- December 23, 2016
- January 6, 2017
- January 20, 2017
- February 3, 2017
- February 17, 2017
- March 10, 2017
- March 17, 2017

