

The Economic Contribution of Colstrip Steam Electric Station Units 1-4

FINAL REPORT

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Prepared by: Patrick M. Barkey, Ph.D.  
Paul E. Polzin, Ph.D.

1222 Lincolnwood Road  
Missoula, MT 59802

Prepared for: The Colstrip Steam Electric Station Owners

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## Executive Summary

This report describes an independent analysis of the economic contribution of the Colstrip electric generating facility operated by PPL Montana, and jointly owned by PPL Montana, LLC, NorthWestern Energy, LLC, Puget Sound Energy, Inc., Portland General Electric, Avista Corporation, and PacifiCorp. Puget Sound Energy, Inc. owns 50% each of Units 1 and 2 and 25% of Units 3 and 4, respectively. PPL Montana owns 50% each of Units 1 and 2 and 30% of Unit 3. Portland General Electric owns 20% each of Units 3 and 4. Avista Corporation owns 15% each of Units 3 and 4, and PacifiCorp owns 10% each of Units 3 and 4. NorthWestern Energy owns 30% of Unit 4. Since 1986 when the final generating unit came on-line, this coal-fired, zero discharge electricity generating station has provided power to Montana and the Northwest.

The research question posed in this study is: what would the economy of Montana look like if the Colstrip facility did not exist? Since the construction of the plant is long completed, the study is confined to an examination of the operation of the plant only.

The study was conducted by performing a comprehensive assessment of the direct contribution of the facility's operations on income, production and expenditure flows in the economy. As a mine-mouth plant, those operations are closely linked to production at the Western Energy Company's mine that is adjacent to the facility. Since energy production forms an important part of the state tax base in Montana, special emphasis is placed on the contribution of Colstrip operations to state and local tax revenues as well. This information was used to construct an economic scenario where Colstrip operations did not take place. The difference between the actual baseline and this hypothetical scenario represents the total contribution of Colstrip operations on the state economy.

## The Economic Contribution of the Colstrip Steam Electric Station Units 1-4 Impacts Summary

Category	Units	Impact	
		Montana	Eastern MT
Total Employment	Thousands (Jobs)	3.7	3.5
Private Non-Farm Employment	Thousands (Jobs)	2.7	2.5
Gross Domestic Product	Millions of Dollars	638.5	621.1
Personal Income	Millions of Dollars	362.1	340.4
Disposable Personal Income	Millions of Dollars	322.9	303.4
Population	Thousands	7.8	7.3

The basic finding of this report is that the economy of Montana is larger, more prosperous and more populous because of the operations of Colstrip. Specifically, we find that because of Colstrip there exist

- 3,740 more jobs, including 2,688 private sector jobs,
- \$360 million more in personal income received by Montanans,
- \$638 million more net output produced across Montana, and
- 7,700 more people

than would be the case otherwise. These changes occur because of the new expenditure flows that come into the region and the state, at least part of which are received by Montana businesses and households as income, which are in turn spent again within the economy.

The statewide impact of Colstrip is significant – the impact on the economy of eastern Montana is even more sizable. In an environment where good paying jobs are hard to find, the workers at the generating plants and the Western Energy Company coal mine enjoy wages and benefits that are more than three times greater than the average for Eastern Montana. Colstrip operations ultimately produce an eastern Montana economy with more than 7 percent more jobs, more than 9 percent more income, and more than 17 percent higher production that would exist otherwise.

Energy taxes form a critical part of the tax base in the state of Montana, both for state and local governments. Without Colstrip, significantly less tax revenues would be available for schools, roads, parks, and public services of all kinds. Tax revenues are an important way in which the benefits of Colstrip propagate to every corner of the state.

The ultimate impact of Colstrip operations is to raise state and local tax collections by almost \$104 million. The state of Montana's proportion of this total amounts to 4.5 percent of all state revenue collections. The bulk of this revenue flows into the general fund, which is used to fund the general operations of state government.

Local property and natural resource taxes paid to Rosebud County and the City of Colstrip help to keep their tax rates among the lowest in the state. But almost two-thirds of the \$104 million in total taxes associated with Colstrip go to the State of Montana, and these benefit persons statewide. For example, about \$12 million is collected in property taxes intended for school equalization. This amount has historically been distributed to all school districts across the state.

The fundamental conclusion of this study is that the contribution that has been made, and continues to be made, by the generating facility in Colstrip, Montana is larger than many Montanans may realize. The information in this study will hopefully be of use in policy and other decisions that steer Montana's economic future.

## 1. Introduction and Overview

This is a study of the contribution to the Montana economy of the operations of the Colstrip Steam Electric Station (SES) Units 1-4. Operated by PPL Montana, LLC, and jointly owned by PPL Montana, NorthWestern Energy, LLC, Puget Sound Energy, Inc., Portland General Electric, Avista Corporation, and PacifiCorp, the coal-fired electric generation facility located in Rosebud County, Montana, is the largest industrial facility in the state. The authors of this report were retained by the Colstrip owners to conduct an independent assessment of how the operations of the plant interact with the economy of the region and the state to grow the economic pie. This report presents the results of that assessment, together with a description of the methods and assumption used to derive the results.

This is an economic impact study of a facility which has already been built. The time span of the 1970's and the 1980's when Units 1 and 2, followed by Units 3 and 4, were built, was a period of strong economic activity and growth in Colstrip as well as Rosebud County. The impacts of plant construction, while significant, were also temporary. They are not included in any of the estimates presented in this report. The impacts we report represent the continued, ongoing contribution to the economy that is due to the operations of the plant. The basis for these estimates is the actual, historical experience of its operation over the last decade.

The purpose of this study is to achieve a better understanding of how the operations of the Colstrip generating facility affect the economic well-being of Montanans. As will be shown below, not only are the ultimate economic impacts of Colstrip's operation sizable in magnitude, but they also propagate throughout the entire state economy.

### Background

The Montana Power Company (MPC) conceived the Colstrip complex in the late 1960s as a mine-mouth generation facility. In conjunction with Puget Sound Energy (PSE), construction of Colstrip units 1 and 2 were begun in the early 1970s and completed in 1975 and 1976. Each unit has a net generating capacity of about 307 megawatts. A transmission line was built from Colstrip to Broadview (north of Billings) and the electric power was fed into the MPC'S grid and to the Bonneville Power Administration for transfer to the PSE's service area.

After lengthy regulatory hearings, Colstrip units 3 and 4 were begun in the late 1970s. Unit 3 began operation in 1984 and unit 4 came on line in 1986. Each unit has a net generating capacity of 740 megawatts. Colstrip 3 and 4 were owned by MPC plus a number of other utilities in the Norwest. A transmission line was constructed from Colstrip across central and western Montana to connect the generating plants with the BPA distribution system and deliver the electricity to the service areas of the other utilities.

During the deregulation heyday of the 1990s and early 2000s, MPC sold its ownership interests in the Colstrip complex to PPL Montana. The associated coal mine was sold to Westmoreland Resources, but retained the Western Energy Company name. Northwestern Energy, the successor to MPC, purchased a 30 percent interest in Colstrip 4 in 2008.

## Objectives of this Study

The objective of this study is to derive and present the economic contribution of the operations of Colstrip, to better inform decisions that impact its competitiveness and viability.

As the state's largest industrial facility by both output and employment, the footprint of Colstrip is large, both in the local and state economies. Its wages are significantly above the state average, and its contribution to state and local taxes is significant. The state taxes directly and indirectly paid by Colstrip mean that residents far from eastern Montana receive benefits. At the local level, the small city of Colstrip still has the third highest taxable property tax base among incorporated areas statewide. Presenting the difference the facility makes to the economy aids in understanding its value as part of our economic landscape.

## The Research Question

The fundamental question asked by this study is, what would the economy of eastern Montana, as well as the state as a whole, look like if the Colstrip generating facility did not exist? This counter-factual scenario is not a shut-down of the actual facility. Rather the scenario considered is one where it never existed. To answer this question, we need to construct an economy where the employment, purchases, maintenance and capital spending, and taxes paid by the plant are removed. This is accomplished with the aid of a dynamic economic model, the REMI model. (The REMI model is more fully explained in Chapter 2).

In a no-Colstrip scenario, the generation of electric power and all of the activities associated with that activity do not take place. Thus the employment of regular and contract employees, both full time and temporary, the purchases of the full spectrum of intermediate goods and services, the purchases of coal from the Western Energy mine, spending on plant overhauls and maintenance, capital spending, as well as tax payments, are no longer present. We refer to this as the direct impact of Colstrip.

There are additional activities which, while not directly part of the process of producing electricity, are fundamentally linked to that process. By far the most significant of these is the operations of the Western Energy Company's (WECO) coal mine which serves the plant. Approximately 89 percent of the output of the WECO mine goes to Colstrip. In a no-Colstrip scenario, this mine is sharply reduced in scale. The mine is part of what we refer to as the indirect impact of Colstrip.

The direct and indirect impacts of Colstrip propagate and reverberate throughout the local and state economies. Compensation to employees is spent, in part, in the community on goods and services which employ others. Spending on vendors impacts the economy as well, to varying degrees. These induced impacts are estimated with the use of the REMI model, as described in the next Chapter. The economic impact of Colstrip is the sum of direct, indirect, and induced impacts.

In this study we have made no effort to represent how the loss of the generating capacity located within Montana would impact price levels and price stability for electric power for the state’s residential, commercial and industrial customers. This essentially amounts to the assumption that the loss of Colstrip has no impact on prices or reliability of power. This is not a realistic assumption, yet our limited access to the tools to allow us to credibly analyze and incorporate the impacts produced by markets for electric power left us with no other alternative. The assumption of no disruption or change to electric prices tends to make actual impacts of Colstrip larger than those presented in this study.

### The Eastern Montana Economy

The contribution of the Colstrip generating facility to the economy of the region and the state needs to be understood in the context of the performance and characteristics of the economy as it exists today. The eastern Montana (see the next chapter for a precise definition) economy is characterized by a large land area with a small population. As shown in table 1.1, the total population is approximately 74,300 persons. There are about 49,000 jobs in the area, including proprietors and the self-employed. The driving economic activities are agriculture, oil and gas exploration and extraction, and coal mining.

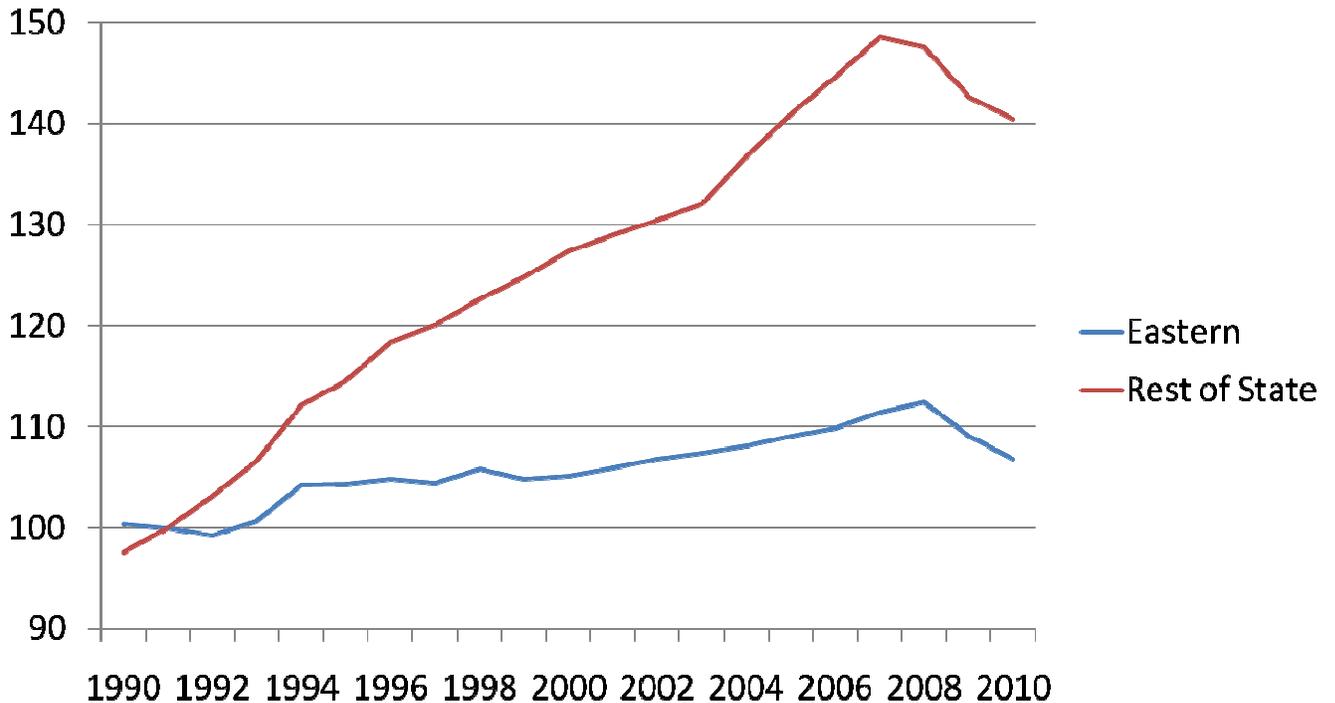
The dominant economic development issue in eastern Montana, as in many rural areas in the west, is the lack of good paying jobs. Table 1.1 presents four measures of well-being and average job quality that can be used to evaluate the Colstrip jobs. Per capita income is total income (wages, dividends, retirement, etc) divided by total population. Average annual wages are the amounts received by people who work for wages. Average annual compensation includes wages plus employer paid benefits. Earnings are compensation plus the earnings of the self-employed (which includes many farmers and ranchers).

**Table 1.1**  
**The Eastern Montana Economy**

Category	Eastern Montana	Rest of State
Population (persons)	74,300	896,400
Employment (persons)	49,000	564,000
Per Capita Income	\$30,800	\$33,100
Average Annual Wages	\$23,400	\$25,100
Average Annual Compensation	\$28,600	\$30,500
Average Annual Earnings	\$33,500	\$36,700

This study will demonstrate the significant impact the operations at Colstrip have on both employment levels and on average wages in eastern Montana. As can be seen from the table, compensation levels today are lower in eastern Montana than in the rest of the state. Without Colstrip, these differences would be even larger, as we will demonstrate.

**Figure 1.1**  
**Employment as a Percent of 1991 Employment,**  
**Eastern Montana and the Rest of the State, 1990-2010**



Relative to the remainder of the state, economic growth has been slower in eastern Montana. Over the last two decades, employment growth has been significantly faster in the rest of the state, as shown in Figure 1.1. Even though employment in both parts of the state has declined due to the recession, there are 40 percent more jobs in the remainder of the state today than there were in 1991. The comparable figure for eastern Montana is only 8 percent.

#### Organization of this Report

The remainder of this report details the methodology and the results of this study. Since the characteristics of an economy without Colstrip cannot be observed directly, they must be estimated with the use of an economic model. In the next section we describe the nature and the capabilities of the model leased for this study from Regional Economic Models, Inc. We then detail the direct contributions of Colstrip operations and the closely linked Western Energy Company mine to the economy in terms of income, production, jobs and other economic variables. The findings of the study are reported in full detail in Chapter 5. This is followed by a chapter with full detail on the tax impacts of Colstrip operation. Chapter 7 ends the report with a summary and conclusions.

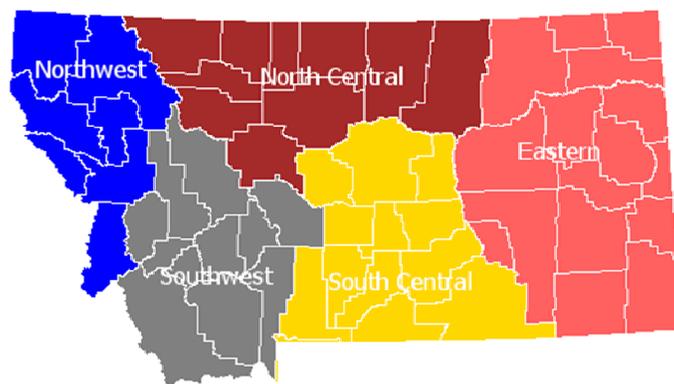
## 2. Policy Analysis with the REMI Model

Economic impacts occur because of events or activities that create new expenditures. Spending which is new – which is over and above existing expenditures and does not simply displace spending elsewhere in the region – not only adds to economic activity in its own right, but it also induces further spending as the recipients of wages, sales and tax revenues spend a portion of their income in the local economy. Changes in the path of investment, migration, and prices and wages are possible as well.

The basic tool used in this study to assess the economic contribution of Colstrip is an economic model, calibrated to represent the interactions in the Montana economy, leased from Regional Economic Models, Inc.. The REMI model is one of the best known and most respected analytical tools in the policy analysis arena, and has been used in more than a hundred previous studies as well as dozens of peer-reviewed articles in scholarly journals. It is a state-of-the-art econometric forecasting model that incorporates dynamic feedbacks between economic and demographic variables. The REMI model forecasts employment, income, expenditures and populations for counties and regions based on a model containing over 100 statistically estimated behavioral and dynamic relationships as well as a number of identities. A full explanation of the design and operation of the model can be found in Treyz (1988).

The model used in this study disaggregated the state economy into five regions: Northwest, Southwest, North Central, South Central, and Eastern. It explicitly recognizes trade flows that exist between these regions, as well as between the regions and the rest of the world. The definition of the regions is shown in Figure 2.1 below.

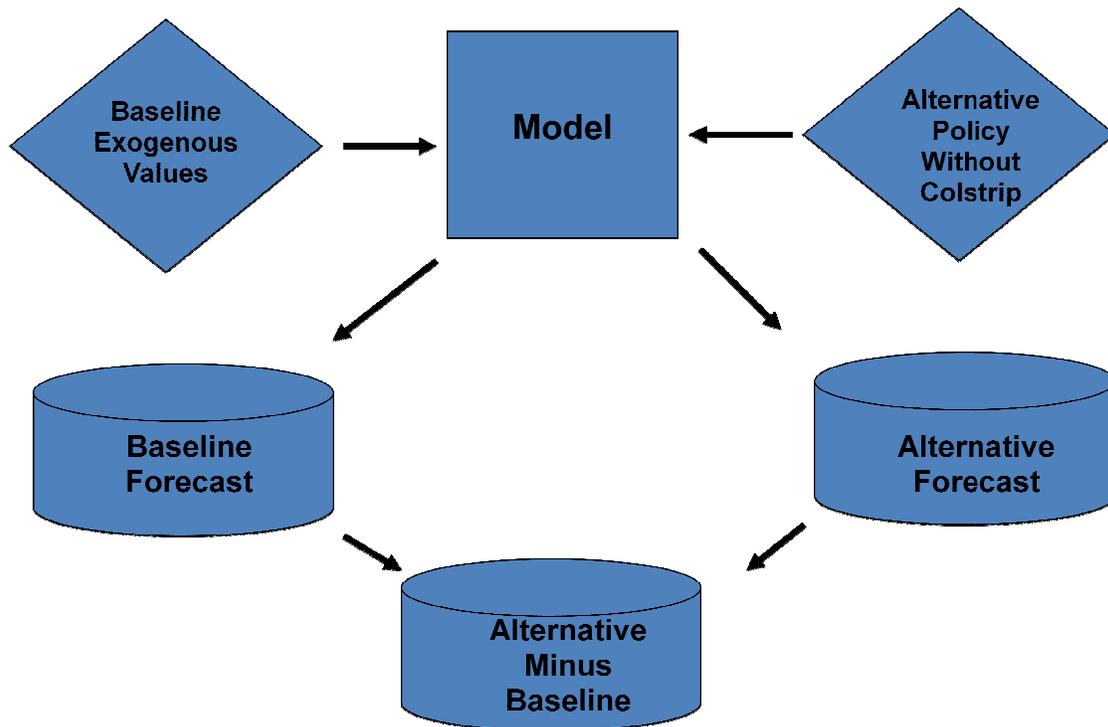
**Figure 2.1**  
**Economic Regions**



**Table 2.1**  
**Eastern Montana Counties**

Carter	Powder River
Custer	Prairie
Daniels	Richland
Dawson	Roosevelt
Fallon	Rosebud
Garfield	Sheridan
McCone	Valley
Phillips	Wibaux

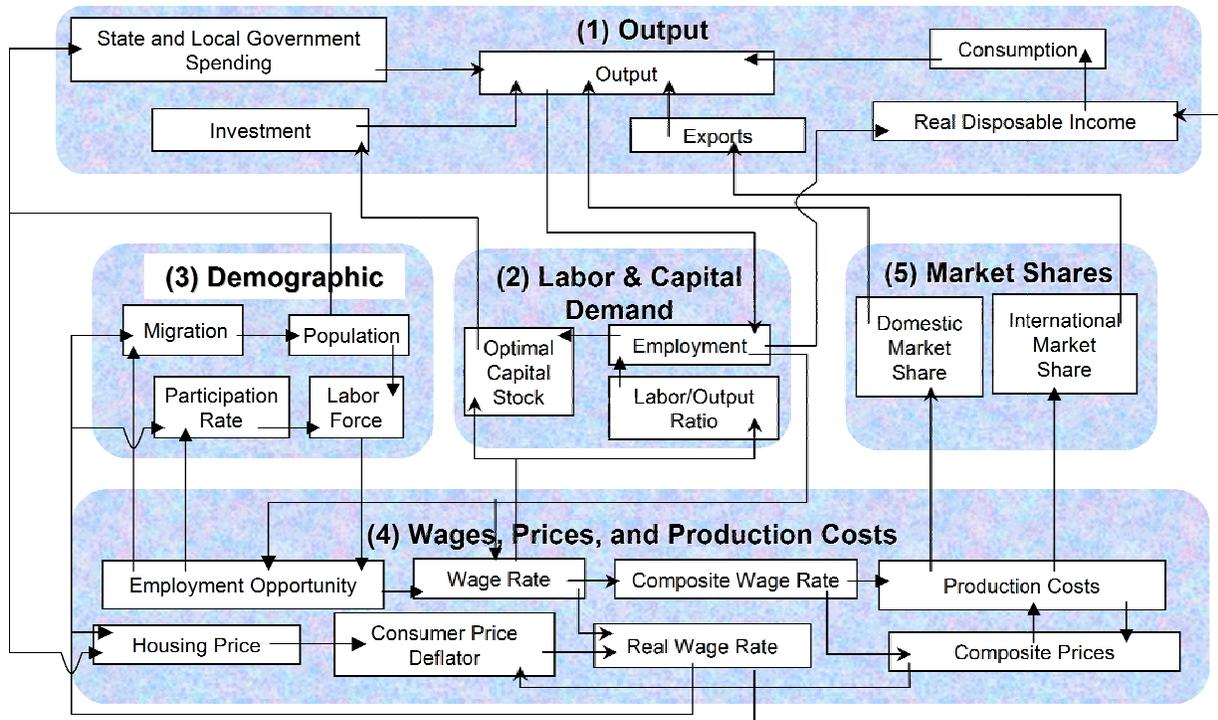
**Figure 2.2**  
**Policy Analysis With the REMI Model**



The use of the model to derive the results of this study is illustrated graphically in Figure 2.2. First, a baseline projection of the economy is produced using the model, utilizing inputs and assumptions which extrapolate growth and conditions of recent history. The model is then used a second time, with identical inputs – except that in this alternative scenario, the activity of

Colstrip is removed. Thus the activity of Colstrip is an input that ultimately produces a different economy, reflecting not only the removal of the production, employment, and expenditures of the plant, but how the rest of the economy reacts to those changes. The difference between the baseline and alternative scenarios of the economy represents the economic impact of Colstrip.

## REMI Model Linkages (Excluding Economic Geography Linkages)



The model utilizes historical data on production, prices, trade flows, migration and technological change to calibrate the relationship between five basic blocks of the regional economy as depicted above: output, labor and capital demand, population and labor force, wages and prices and market shares. The changes in production, labor demand and intermediate demand caused by the hypothetical cessation of Colstrip operation causes these blocks of the economy to react and adjust to a new equilibrium. As described above, the difference between the baseline and the alternate scenario is the ultimate impact of Colstrip.

The essential philosophy of the model is that regions throughout the country compete for investment, jobs, and people. When events occur in a region, they set off a chain reaction of actions where dollars flow towards better investment and production opportunities, followed over time by a flow of workers and households towards employment opportunities and higher wages. The model embodies an 82-sector input-output matrix that describes the technological interdependence of production sectors of the economy, as well as extensive trade and capital flow data to determine the share of each sector's demand that can be met by local production.

The model is extremely well suited for the analysis described in this report. As seen in several of the energy studies listed in the references section, it has been used for similar analyses of energy-related investment and opportunities.

As powerful and flexible as the model is, the answers it provides are only as good as the questions posed to it. The majority of work in this study is carefully crafting the inputs used to construct a scenario of the Montana economy that does not include Colstrip operations. We now turn to this task.

### 3. The Direct Economic Contribution of Colstrip

The analysis begins with a comprehensive examination of the expenditures and income flows that stem from the operation of the Colstrip generating facility itself. In order to produce an economic scenario where those operations are assumed to be absent, we must carefully and completely quantify the footprint of the facility's ongoing activity.

The source for much of this information comes from PPL Montana, LLC, the operator of the plant. Using historical records we constructed a "typical" annual expenditure profile of the facility. This profile is one in which no unusual, unplanned shutdowns or outages take place, and in all other respects the operating levels are "normal."

Normal in this context does not mean that the units are in operation for the entire year. In the normal course of events, scheduled shutdowns for maintenance and refurbishment occur on the individual units of the plant in each year, which take them off line for approximately 6 weeks. During these times, approximately 550 contractor employees are working at the facility on unit overhauls and other work. There are also contractor employees at the site during ordinary plant operation times, both in overhaul and operations.

The separate mechanisms through which Colstrip operations add to the income and expenditure flows in the Montana economy are as follows:

#### Employment

- The number of employees of PPL Montana who work at the Colstrip facility in a typical year is 393. These include 287 union, 83 non-union, and 23 part-time employees.
- There are approximately 45 year-round contractors at the site working on overhaul projects, as well as 55 additional contractors working year-round on aspects of plant operations.
- With four generating units and a three year cycle of scheduled overhauls, there are 1.3 units of Colstrip's facility shut down for maintenance in any given year. With 550 contractors working on overhaul during these periods, this yields a full-time equivalent of an additional 84.6 employees who are contractors working at the facility.
- Thus we estimate year-round facility employment to be just over 577 workers, including both PPL Montana and contract employment.

#### Compensation

- Total labor costs paid by PPL Montana for a typical year are \$43.1 million, which includes wages and benefits. Benefits include health insurance, life insurance and pension contributions. This is an average compensation per worker in excess of \$100,000.

- Actual compensation per worker for contractor employees was not made available for this study. Industry averages were instead used.

#### Coal Purchases

- Intermediate demand of the Colstrip facility is dominated by fuel purchases, largely coal. All coal for the plant comes from the adjacent WECO mine, delivered to the facility via trucks and conveyors.
- In a typical year the generating units consume \$146.5 million in coal from the WECO mine. This figure is an average of actual purchases over the last four years. This is approximately 10.1 million tons of coal per year.

#### Other Intermediate Demand

- The Colstrip facility purchases \$35 million in other goods and materials each year. These purchases create an intermediate demand for 82 individual industries, some with a presence in Montana.
- PPL Montana also spends an additional \$91.6 million in contracts with vendors, including overhaul costs. Roughly a third of this spending reflects operations and maintenance, and the remainder is for capital costs that take place in a typical year.

#### Output

- In a typical year the four units of Colstrip produce about 17,000 GWH of electricity.

#### State and Local Taxes

- The facility and its employees pay \$39.1 million in state and local taxes in a typical year.
- More detail on taxes is presented in Chapter 6.

Each of these mechanisms was carefully crafted and implemented as a change to the economy in the appropriate block of the REMI model as described in the previous section. But the operation of the generating facility fundamentally depends on the operation of the adjacent Western Energy Coal mine that supplies its coal needs. Thus we must consider the operation of the mine as well, as described in the next section.

#### 4. The Western Energy Coal Mine

The Colstrip facility was conceived and developed as a mine-mouth generation plant. Its coal needs are currently served by the adjacent coal mine operated by Western Energy Company (WECO) and Colstrip and the mine are closely linked. Thus an analysis of the contribution of Colstrip must proceed in tandem with the contributions of the mine which are part of its operation.

Approximately 89 percent of WECO coal is delivered to Colstrip, via conveyor and specially designed trucks. The cost of coal to Colstrip represents both the cost of the coal and the cost of delivery. In the no-Colstrip scenario constructed as part of this impact study, 89 percent of WECO operation, including the transportation of the coal, would also cease to exist.

In total, the WECO mine represents:

- 373 employees
- \$39 million in annual compensation
- \$74 million in intermediate demand for goods and services

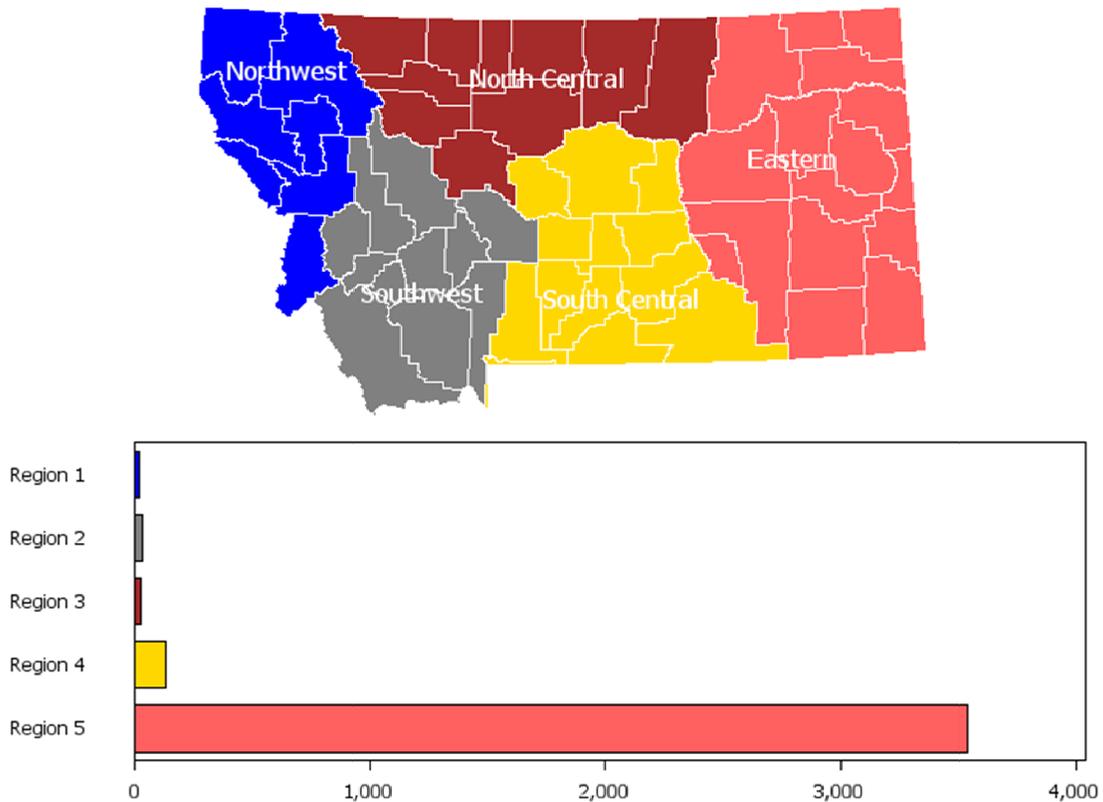
As was the case with the Colstrip facility itself, the intermediate demand is spread across 82 industries representing the production of goods and services both from within Montana and elsewhere. Removing the portion of the mine's output that serves Colstrip removes that spending, as well as the payroll and tax contributions of the mine.

This information on the Colstrip operation in the previous chapter and the WECO mine's activity as described above comprise what we have referred to as the direct and indirect impacts of Colstrip, respectively. The total impact of the facility is derived by generating an alternative projection of the state and regional economies with our economic model, taking into account the direct and indirect impacts described above. We now turn to the results of that analysis.

## 5. Economic Impacts

The operations of the Colstrip Steam Electric Station, together with the operations of the WECO mine which directly serves its operation, ultimately produce a state economy that is significantly larger, more populous, and more prosperous than would exist in its absence. A comparison of income, employment, and investment between the baseline and an economic scenario with no Colstrip reveals the size of its ultimate contribution to the economy.

**Figure 5.1**  
**The Economic Contribution of the Colstrip Steam Electric Station Units 1-4**  
**Employment Impacts by Region**

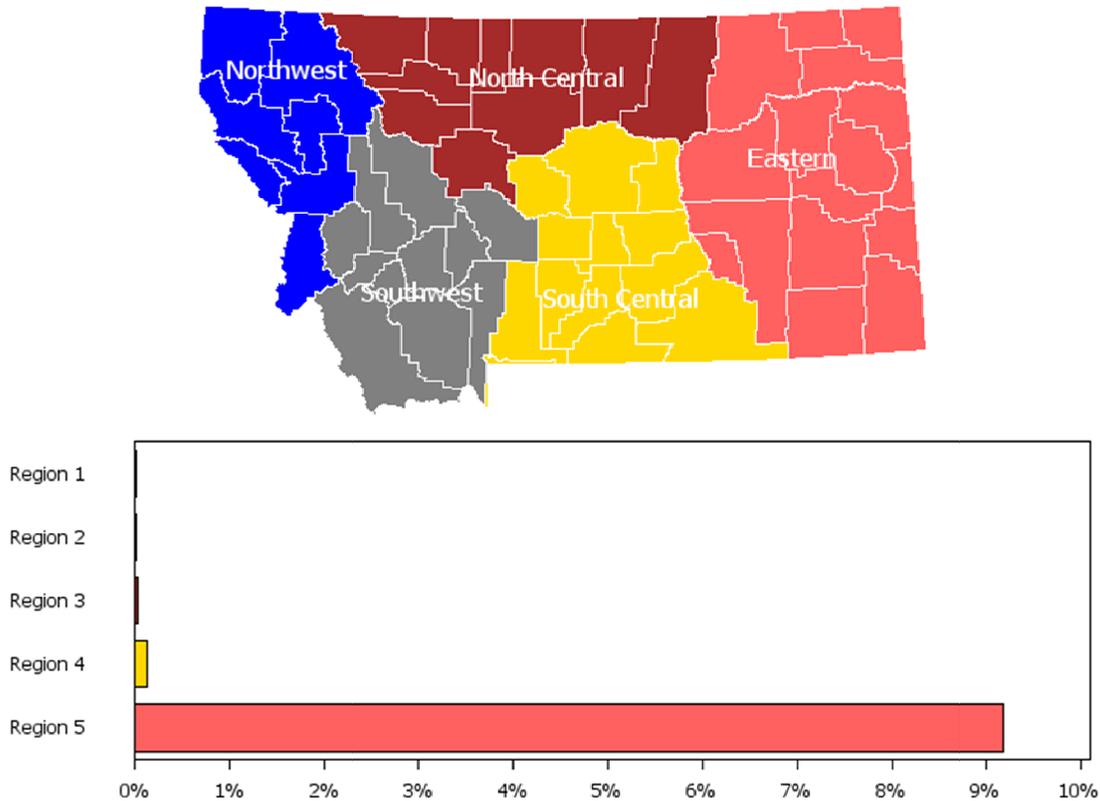


Most, by no means all, of the economic impacts of Colstrip are in the eastern Montana region which contains Rosebud County. The employment impacts of the generating facility are positive in all five regions of the state, as shown in Figure 5.1 above. The south central region, which contains Billings, does see some significant increase in employment as a result of Colstrip operation, which is due to the significant trade flows that exist between the regions. But the most of the employment impacts are clearly in the eastern Montana region.

Given the smaller size of the eastern Montana economy compared to the other four regions, this contrast is even more apparent when examined in percentage terms. In Figure 5.2 we present the impacts of Colstrip for the five regions on personal income as a percent of the baseline projection. Because of Colstrip, eastern Montana personal income – total income received by

person – is more than 9 percent higher than it would have been in the absence of the facility. As can be seen, the relative impact of Colstrip on personal income in the other regions is positive, but much smaller than in the east.

**Figure 5.2**  
**The Economic Contribution of the Colstrip Steam Electric Station Units 1-4**  
**Personal Income Impacts by Region, as Percent of Baseline**



Thus in presenting the other findings of the analysis of this study, we will focus on two geographic areas: eastern Montana, and the state of Montana as a whole.

A summary of the aggregate impacts of Colstrip operation on the state and regional economy, presented in Table 5.1, reveals the extent of the facilities contribution to economic well-being. The generation of electrical power at the site is ultimately responsible for more than 3,700 jobs statewide – significantly more than the average of 393 employed by PPL Montana and the 373 workers at the WECo mine. The impacts reported in Table 5.1 and throughout this section include those induced elsewhere in the economy as a result of the facility’s operation.

Of the total jobs impact, almost 2,700 jobs are private sector payroll jobs. The other jobs are in government, mostly local government workers in public schools. Those jobs are a direct response to the additional 7,776 people whose presence in Montana is due to Colstrip operation.

**Table 5.1**  
**The Economic Contribution of the Colstrip Steam Electric Station Units 1-4**  
**Impacts Summary**

Category	Units	Impact	
		Montana	Eastern MT
Total Employment	Thousands (Jobs)	3.7	3.5
Private Non-Farm Employment	Thousands (Jobs)	2.688	2.508
Gross Domestic Product	Millions of Dollars	638.5	621.1
Personal Income	Millions of Dollars	362.1	340.4
Disposable Personal Income	Millions of Dollars	322.9	303.4
Population	Thousands	7.8	7.3

There is more than \$600 million of additional output produced by the Montana economy as a result of Colstrip. This represents about 1.1 percent of total output in the entire state, attributable to the operations of a facility in Rosebud County. The \$621 million of total economic output due to Colstrip in eastern Montana is more than 17 percent of the output of the entire region.

Much of the benefits from Colstrip go to individual Montanans as income. Personal income is \$362.1 million higher in Montana as a result of Colstrip. As a state which relies heavily on the personal income tax, that represents a sizable contribution to the state's treasury, as we detail further in the next chapter. Almost \$323 million of that income is available to persons in after-tax income for saving and spending.

As shown in Table 5.2, the employment impacts of Colstrip are spread across many industries. Not surprisingly, the largest private-sector impact is in the utilities industry, due to the direct contribution of the facility itself. But there are significant job impacts in other industries due to the induced demand of Colstrip and WECO employees as well as vendors and businesses who receive revenue from Colstrip. Retail trade employment is almost 400 jobs higher. Health care employment, impacted by both population and the relative affluence of Colstrip workers, is 372 jobs higher than it would be without Colstrip.

Employment in state and local government is significantly affected by Colstrip operation. Both receive significant tax revenue, both directly from the facility as well as from other activities induced by its operation, as more fully detailed in the Chapter 6. But Colstrip operation also impacts the demand for government services as well. This is because workers and households have moved to Montana from elsewhere because of the economic opportunities created by

Colstrip. This increases the population of school-aged children and increases demand for K-12 schools, as well as other demands for government services.

**Table 5.2**  
**Employment Impacts Summary**

Industry	Impact ( jobs)	
	Montana	Eastern MT
Forestry, Fishing, Related Activities, and Other	-2	-2
Mining	323	320
Utilities	572	571
Construction	252	232
Manufacturing	-3	-5
Wholesale Trade	19	15
Retail Trade	397	369
Transportation and Warehousing	2	-1
Information	4	3
Finance and Insurance	15	13
Real Estate and Rental and Leasing	22	12
Professional and Technical Services	114	100
Management of Companies and Enterprises	1	1
Administrative and Waste Services	68	57
Educational Services	8	4
Health Care and Social Assistance	372	342
Arts, Entertainment, and Recreation	78	68
Accommodation and Food Services	246	227
Other Services, except Public Administration	201	184
State Government	128	122
Local Government	924	911
<b>TOTAL</b>	<b>3,740</b>	<b>3,541</b>

The employment impacts can also be examined from a different perspective, namely, how Colstrip creates jobs for those in different occupations. As can be seen in Table 5.3, almost one in four new jobs due to Colstrip operations are in the sales, office and administrative occupational category, which includes teachers. Colstrip-induced jobs can also be found across a very broad spectrum of skills and occupations. A significant proportion of these jobs are in construction and extraction, maintenance and repair, as well as production and material moving

workers. There are also more than 300 management jobs in the Montana economy that are due to Colstrip operation.

**Table 5.3**  
**Impacts on Employment by Occupation**

Category	Impact (jobs)	
	Montana	Eastern MT
Management, business, financial occupations	309	294
Computer, math, architect, engineer occupations	163	156
Life, physical, social science occupations	42	40
Community, social service occupations	106	101
Legal occupations	37	36
Education, training, library occupations	57	52
Arts, design, entertainment, sports, media occupations	26	24
Healthcare occupations	249	232
Protective service occupations	271	264
Food preparation, serving related occupations	289	267
Building, grounds, personal care, service occupations	251	232
Sales, office, administrative occupations	820	769
Farm, fishing, forestry occupations	4	4
Construction, extraction occupations	388	372
Installation, maintenance, repair occupations	337	325
Production occupations	181	175
Transportation, material moving occupations	210	198
<b>Total</b>	<b>3,740</b>	<b>3,541</b>

**Table 5.4**  
**Impacts on Disposition of Personal Income**

Category	Impact (\$ mill.)	
	Montana	Eastern MT
Total Earnings by Place of Work	331.1	319.7
Total Wage and Salary Disbursements	220.0	211.0
Supplements to Wages and Salaries	72.8	70.3
Employer contributions for employee pension and insurance funds	48.9	47.4
Employer contributions for government social insurance	23.9	23.4
Proprietors' income with inventory valuation and capital consumption adjustments	38.3	37.8
Less: Contributions for government social insurance	44.6	43.2
Employee and self-employed contributions for government social insurance	20.7	19.7
Employer contributions for government social insurance	23.9	23.4
Plus: Adjustment for residence	-5.3	-11.7
Gross In	6.4	0.0
Gross Out	11.7	11.7
Equals: Net earnings by place of residence	281.2	264.8
Plus: Rental, Personal interest, and Personal dividend income	40.4	36.8
Plus: Personal current transfer receipts	40.4	38.4
Equals: Personal Income	361.9	340.5
Less: Personal current taxes	39.3	36.8
Equals: Disposable personal income	323.1	303.2

Additional workers in the state economy translate into higher earnings and more tax collections. But it is important to note that wage income is only one part of the overall increase in income received by Montanans because of the operations of Colstrip. As shown in Table 5.4, about \$220 million of the total increase of almost \$362 million in personal income due to Colstrip is accounted for by higher wage and salary disbursements to payroll employees. Accounting for the difference are supplements to wages, including contributions by employers to employee pensions, income of business proprietors and the self-employed, rent and property income, and

income transfers from the federal government. The personal tax impacts noted in Table 5.4 include federal as well as state and local taxes. We focus on state and local tax impacts in more detail in the next section.

**Table 5.5**  
**Impacts on Private Sector Compensation and Earnings**

Category	Units	Impacts	
		Montana	Eastern MT
Wage and Salary Disbursements	\$ Millions	163.7	156.1
Compensation	\$ Millions	212.6	203.6
Earnings by Place of Work	\$ Millions	251.4	241.9
Average Annual Wage Rate	\$ Thousands	0.116	1.818
Average Annual Compensation Rate	\$ Thousands	0.164	2.562
Average Annual Earnings Rate	\$ Thousands	0.203	3.213

One of the factors helping to account for the very significant additional economic impact induced by the wages and expenditures of the Colstrip facility is the fact that the jobs at both Colstrip and the WECO mine pay wages significantly in excess of the state and regional average. This represents more dollars available to be spent in the local communities, helping to increase second round employment effects.

Thus the impact of Colstrip is not to simply add jobs and to add income, but to actually raise the average pay for all jobs in the economy. As shown in Table 5.5, the average annual wage of all workers in the private sector of the state economy is \$116 higher per worker as a result of Colstrip. The average annual earnings, which include both benefits as well as proprietors' income, is increased by \$203 for all state workers in the private sector. In eastern Montana, the impacts are much more pronounced – Colstrip raises average annual earnings in the region by more than \$3,200 per worker.

The operation of Colstrip adds significantly to economic output as well. This occurs through three basic mechanisms. First, the facility itself produces electricity. Secondly, as part of the production process, the plant induces output from other firms in Montana – most notably the coal from the WECO mine, but also services and materials from everything from legal firms to maintenance and overhaul services. Finally there are the output increases across the economy to satisfy the locally produced component of demand induced by second round spending.

The gross output increases in the economy that are attributable to Colstrip, as shown in Table 5.5, are highest in the utility industry itself, followed by the mining industry. There are also significant output impacts in retail trade, health care and construction. As with most impacts, these are largest in the eastern Montana region.

The negligible impact of Colstrip on manufacturing output in the state economy is largely an artifact of the structure of this study. As discussed in the introduction, this study does not explicitly consider the impact of the loss of Colstrip operation on electricity markets in Montana. Were those impacts to be considered, they would likely show a positive impact most markedly on manufacturing, since the presumably lower and more stable electricity prices in a with-Colstrip economy would lower production costs for energy-intensive industrial applications.

**Table 5.6**  
**Impacts on Output by Major Industry**

Category	Impact (\$ mill.)	
	Montana	Eastern MT
Forestry, Fishing, Related Activities, and Other	0.0	0.0
Mining	138.2	137.0
Utilities	537.6	537.6
Construction	24.3	21.8
Manufacturing	0.0	-1.3
Wholesale Trade	7.7	6.4
Retail Trade	55.0	49.9
Transportation and Warehousing	1.3	1.3
Information	2.6	1.3
Finance and Insurance	5.1	3.8
Real Estate and Rental and Leasing	3.8	2.6
Professional and Technical Services	7.7	6.4
Management of Companies and Enterprises	0.0	0.0
Administrative and Waste Services	3.8	2.6
Educational Services	0.0	0.0
Health Care and Social Assistance	30.7	28.2
Arts, Entertainment, and Recreation	5.1	5.1
Accommodation and Food Services	7.7	7.7
Other Services, except Public Administration	6.4	6.4

The impact of Colstrip on Montana output and employment is dependent on the composition of the state economy. The increases in demand for goods such as clothing or motor vehicles that may come about due to Colstrip operation will not significantly increase the manufacturing of those items in Montana simply because there is very little, if any, presence of those industries in the state to begin with. However, increased demand for manufactured goods produced elsewhere still has an impact on the state’s retail, wholesale, and transportation industries.

As shown in Table 5.7, Colstrip operations do produce higher demands among Montana consumers for a wide spectrum of goods and services. Consumers in eastern Montana spend \$26.2 million on motor vehicles and parts, \$37.5 million on food and beverages, and \$56.2 million on medical care in the region because of Colstrip. To put it another way, auto dealers and repair shops, restaurants and grocery stores, and hospitals and clinics in the eastern part of the state would have their business collectively reduced by these amounts if Colstrip did not exist.

**Table 5.7**  
**Impacts on Personal Consumption Expenditures**

Category	Impacts (\$ mill.)	
	Montana	Eastern MT
Vehicles & Parts	27.2	26.2
Computers & Furniture	82.9	78.7
Other Durables	13.6	13.7
Food & Beverages	40.8	37.5
Clothing & Shoes	13.6	13.7
Gasoline & Oil	6.2	6.2
Fuel Oil & Coal	0.0	0.0
Other Non-Durables	23.5	22.5
Housing	54.4	51.2
Household Operation	13.6	12.5
Transportation	12.4	11.2
Medical Care	59.4	56.2
Other Services	74.2	71.2

The mobility of people, jobs, and investment in response to changing opportunities is a fundamental process that drives economic growth. The presence of Colstrip in the Montana economy has drawn people as well as resources to Rosebud County and, to a lesser degree, the state of Montana as a whole. Workers who move in response to job opportunities – who would not have moved but for the operations of Colstrip – bring their current or future children with them, fundamentally altering the demographic profile of the population.

A comparison of the age distribution of the population with and without the presence of Colstrip reveals significant increases in those in the prime working age groups aged 20-55 years, as well as in the younger cohorts made up of their children. As shown in Table 5.8, the impact of Colstrip operation among 5-year age cohorts of the population is highest among those aged 40-44, with the presence of 800 people in that age category living in the state of Montana because of Colstrip. Roughly half of the 7,776 increase in population statewide due to Colstrip operations are in prime working ages between 20 and 55 years of age. In eastern Montana, the presence of almost 2,000 school-aged children between 5 and 19 years of age is attributable to the Colstrip generating facility.

**Table 5.8**  
**Impacts on Population by Age**

Category	Impact (people)	
	Montana	Eastern MT
Ages 0-4	579	544
Ages 5-9	657	616
Ages 10-14	726	681
Ages 15-19	685	641
Ages 20-24	504	470
Ages 25-29	430	400
Ages 30-34	451	420
Ages 35-39	612	569
Ages 40-44	800	746
Ages 45-49	670	625
Ages 50-54	498	465
Ages 55-59	386	360
Ages 60-64	306	286
Ages 65-69	210	196
Ages 70-74	137	128
Ages 75-79	85	79
Ages 80-84	38	35
Ages 85+	2	2
<b>Total</b>	<b>7,776</b>	<b>7,263</b>

Thus the state, and particularly the eastern region of the state, is significantly younger, with a higher fraction of productive, working-aged people and their children with the presences of Colstrip in its economy than it would be without.

## Conclusion

It is difficult to overstate the economic contribution of the Colstrip generating facility's operations to eastern Montana. More than 7 percent of all jobs, 17 percent of all production, 9 percent of all income, and 13 percent of school-aged population are in the region because of the operations of the plant. The spending by Colstrip employees as well as those at the WECO mine is only part of the stimulus to the region represented by the plant. The subsequent activity as the as Colstrip dollars are re-spent is substantial as well. These results highlight how large and diverse those economic contributions are.

Even when measured against the much larger economy of the entire state, the contributions of Colstrip are substantial. Businesses and consumers do benefit from Colstrip statewide through the trade flows that connect the state's regions, particularly to Billings. The higher than average wages of the Colstrip and WECO jobs produce a measurable impact on average compensation of all jobs statewide.

There is an additional way in which Colstrip-induced changes in the economy propagate throughout the state. That is the tax system. We now turn to a discussion of how Colstrip activities ultimately increase state and local tax revenues, many of which are spend throughout the state.

## 6. Tax Impacts

This section identifies and quantifies the amounts of nonfuel tax payments to state and local governments directly and indirectly associated with Colstrip. The amounts presented in the following tables represent taxes paid during a “typical” year. This procedure corrects for significant year to year changes in tax payments due to variations in electricity production (perhaps caused by planned maintenance), the overall profitability of the parent companies, national business cycle impacts, and other factors.

Whenever possible the tax payments were estimated from administrative records or other reliable sources. But Montana has a complex system for determining and collecting taxes and then distributing the proceeds to various governments. It is not always possible to determine the amount of taxes paid to various jurisdictions simply by looking at tax bills. Therefore, a variety of indirect methods and other procedures were used to estimate tax payments. For example, property taxes and certain natural resource taxes were calculated by first deriving the taxable value for each category and then applying the relevant mill rates imposed by the jurisdictions. Similarly, individual income taxes were derived by applying an average tax rate to the total income earned.

Payments were estimated for each tax and then aggregated into four categories:

### 1. *Individual and corporate income taxes*

These taxes are paid by individuals and the companies that own Colstrip SES or provide the coal. The proceeds go to the state government and are deposited in the General Fund.

### 2. *Natural resource taxes*

Three of the Montana’s twelve natural resource taxes are relevant for Colstrip. The Coal Severance Tax is applied to the value of the coal and the proceeds go to state government. The Coal Gross Proceeds Tax is five percent of the gross proceeds of coal and is distributed to local taxing jurisdictions. The Resource Indemnity and Groundwater Assessment Tax is applied to the gross value of coal extracted and is allocated to state government accounts to fund remediation. Although not levied by the state, Montana receives about 48 percent of the revenue collected from U.S. Mineral Royalties and the proceeds are split between state and county governments.

### 3. *Property Taxes*

The proceeds from property taxes go to the state, counties, school districts, cities and towns, and other jurisdictions. The property tax bills are sent out by the counties. Assets (such as homes, buildings, and electrical generation equipment) are assessed by the state and the relevant mill levies applied for the jurisdiction where the assets are located.

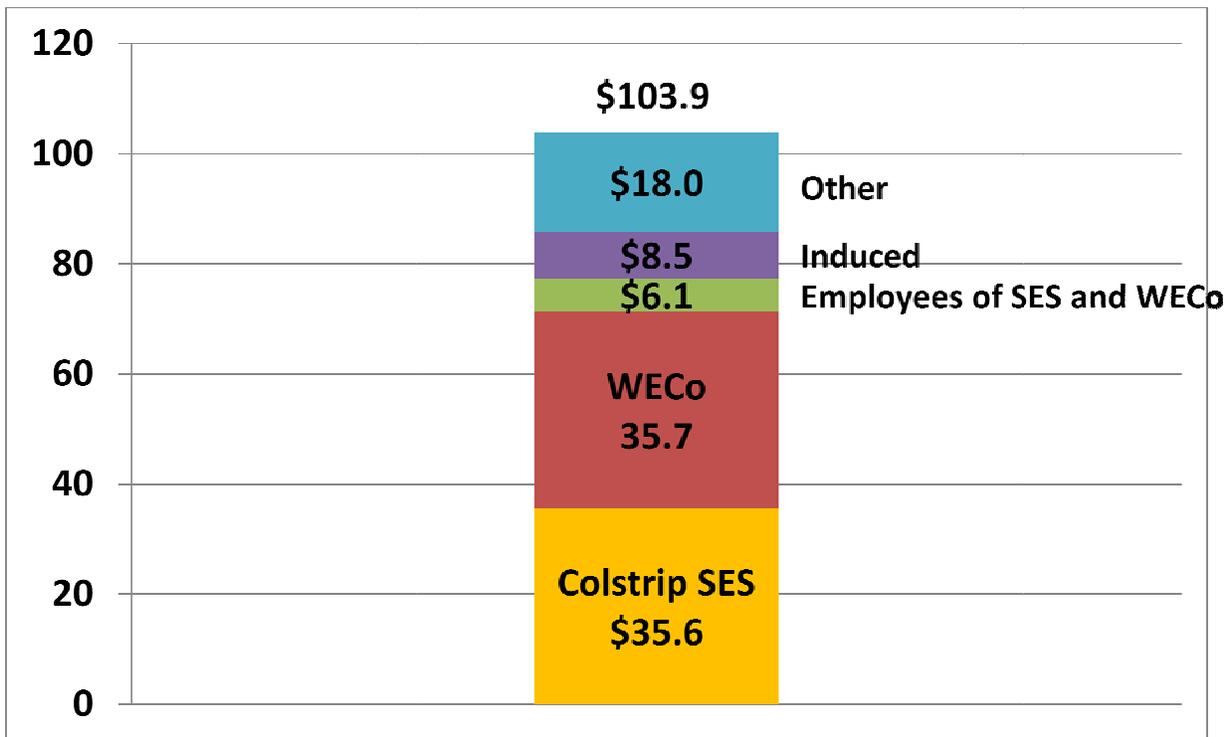
### 4. *Other Taxes*

There are 26 other taxes levied in Montana ranging from the Beer Tax to the Rail Car Tax. Seventeen were judged to be directly or indirectly tied to Colstrip and each was estimated separately. Two of the most important are the Electric Energy Producer's License Tax and the Wholesale Energy Transaction Tax, which are levied against the electric energy produced and transported in Montana. There is also a separate tax category which includes mostly other state and local intergovernmental revenue directly or indirectly associated with Colstrip, its workers, and others.

### Tax Impacts by Taxpayer

As shown in Figure 6.1, the total state and local tax impact of Colstrip operations is substantial. Totaling the taxes paid by the facility itself, the WECO mine, the employees of both WECO and Colstrip, as well as payments associated with the induced economic impacts, they amount to \$103.9 million. The Colstrip generating plant itself accounts for about \$35.6 million, or roughly 34 percent of the total. The Western Energy Company coal mine paid approximately \$35.7 million. The employees of the two companies paid about \$6.1 million, or roughly 6 percent of the total. The induced economic activity accounted to \$8.5 million in estimated tax payments, and about \$18.0 million came from other sources.

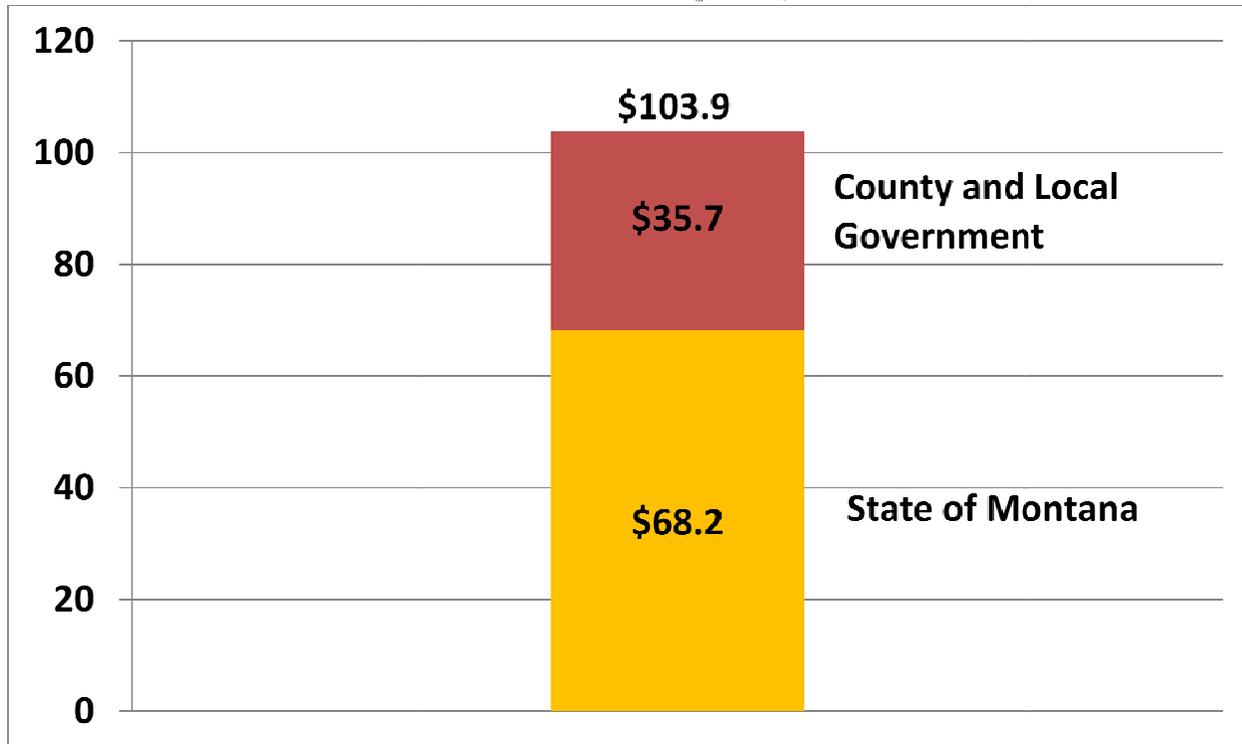
**Figure 6.1**  
**State and Local Tax Impacts by Taxpayer, Millions of Dollars**



## State and Local Tax Impacts

The \$103.9 million in non-federal tax payments attributable to Colstrip operations flow to both state and local governments, as shown in Figure 6.2. The State of Montana received approximately \$68.3 million, or 65.7 percent. Counties, cities, school districts, and special taxing districts (such as SIDs) received roughly \$35.7 million, or approximately 34.3 percent.

**Figure 6.2**  
**State and Local Tax Impacts, Millions of Dollars**



The distribution of taxes shown in Figure 6.2 may not represent the final incidence of the funds. For example, included in the \$68.3 million paid to state government is roughly \$11 to \$13 million intended for school equalization. Legislation calls for a statewide property tax with the proceeds to be deposited in the state's General Fund. The Legislature is supposed to appropriate an amount to be distributed to all the state's school districts to support basic education. Since the actual amounts depend on legislative decisions, they cannot be reliably estimated.

## State and Local Tax Impacts by Category and Taxpayer

The various taxpayers pay different taxes, as shown in Table 6.1. Of the \$35.6 million paid by Colstrip, about \$26.3 million or roughly 73.9 percent were in property taxes. The remaining taxes include the Montana Corporate License Tax paid by the owners and the Electric Energy Production Tax and the Wholesale Energy Transaction Tax.

**Table 6.1**  
**State and Local Tax Impacts, by Taxpayer**  
**Millions of Dollars**

	SES & WEC0					Total
	Colstrip	WEC0	Employees	Induced	Other	
Natural Resource Taxes	-	34.9	-	-	-	34.9
Property Taxes	26.3	0.6	1.9	4.1	-	32.9
Income Taxes	3.4	0.2	3.3	3.1	-	10.0
All Other Taxes	5.9	-	0.9	1.3	18.0	26.1
<b>Total</b>	<b>35.6</b>	<b>35.7</b>	<b>6.1</b>	<b>8.5</b>	<b>18.0</b>	<b>103.9</b>

The Western Energy coal mine pays about \$34.9 million in natural resource taxes, or about 97.7 percent of its \$35.7 million in total taxes. Income taxes accounted for \$3.3 million, or more than one-half of the total, in taxes estimated for the employees of the Colstrip generating plants and Western Energy coal mine.

Property taxes were about \$4.1 million and income taxes approximately \$3.1 million for the induced activity associated with Colstrip. Property taxes were relatively smaller for the employees than for the induced activity because more Colstrip and Western Energy workers live in Rosebud County, which has the lowest property taxes rates in Montana.

#### Statewide Benefits of Colstrip Taxes

The tax payments directly and indirectly associated with Colstrip benefit all the state's residents, not just those in Eastern Montana. This section presents a number of concrete examples of the statewide benefits.

- State government receives approximately \$68.3 million in tax and royalty receipts directly or indirectly associated with Colstrip, representing about 4.5 percent of Montana Department of Revenue collections in 2008. Other taxpayers would have had to pay more or government expenditures reduced if it were not for these payments.
- As was mentioned earlier, about \$11 million to \$13million is collected in property taxes intended for school equalization. This amount would be distributed to all school districts across the state.
- The Colstrip generating plant itself pays about \$26.3 million in property taxes on pollution control and electric generation equipment. Approximately \$8.1 million of this total is intended for school equalization and would be distributed statewide.

- Much of the electricity generated at Colstrip is delivered to out-of-state customers via transmission lines. These lines pay property taxes to the counties through which it travels. Table 6.2 presents the estimated property taxes paid to these counties.

**Table 6.2**  
**Transmission Line Property Taxes by**  
**County**

County	Millions of Dollars
Yellowstone	1.5
Missoula	0.6
Big Horn	0.3
Powell	0.3
Stillwater	0.4
Treasure	1.1
Broadwater	0.7
Wheatland	0.7
Granite	0.4
Meagher	1.1
Jefferson	0.5
Golden Valley	0.4
Mineral	0.8
<b>Total</b>	<b>8.8</b>

### Summary

Colstrip directly and indirectly accounts for \$103.9 million in taxes paid to state and local governments in Montana. About two-thirds of this total is paid to the state and benefit all Montanans. For example, a significant amount of the property taxes paid directly by Colstrip flows into the state’s general fund and are used to fund school districts statewide. Further, the property taxes on the transmission lines associated with Colstrip are paid directly to 13 counties in central and western Montana.

## 7. Summary and Conclusions

The research question posed by this study is “what would the economy of Montana look like if Colstrip Steam Electric Station did not exist?” It is a hypothetical question – the facility has been in full operation for more than twenty years. Yet in a policy and political environment where the contributions of the plant to the state economy are poorly understood or perhaps taken for granted, it deserves to be carefully analyzed and answered.

Using a state-of-the-art policy analysis model of the Montana economy that has been peer-reviewed and used in dozens of other studies, we have carefully examined the contribution made to both the economy of eastern Montana as well as to the state economy as a whole by the continuing operations of the Colstrip generating facility. Our study has revealed the footprint of this single facility occupying less than three square miles in Rosebud County to be substantial. Comparing the actual economy to one that would exist if the operations of Colstrip were not present, we find that

- 3,740 jobs, including 2,688 private sector jobs,
- more than \$360 million of personal income received by Montanans,
- \$638 million in net output produced in Montana, and
- more than 7,700 additional people

exist in our state today whose presence is attributable to Colstrip operations. To state it another way, without Colstrip, the economy around us would be smaller, less prosperous, and less populous by these same amounts.

There are several aspects of Colstrip that lead directly to this impressive result. First, the facility pays wages and benefits to its workforce that are substantially above the state and regional average. When employees spend part of their money in the local and state economy, many other jobs are supported. Second, a huge expenditure of the plant is for a product that is totally made in Montana – namely, coal from the adjacent Western Energy Company mine. Keeping those dollars within the state greatly increases the ultimate impact of Colstrip operations.

Finally, the product made by Colstrip – electricity delivered to Montana and other states – does not displace or crowd out other Montana producers. Thus it’s activities add to, rather than supplant or replace, other activities in the economy. The uses and demand for electricity continue to grow, and the continued operation of plants such as Colstrip is part of meeting that need.

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