Task 3C Report for the Powder River Basin Coal Review Cumulative Social and Economic Effects

ENSR INTERNATIONAL

Prepared for

Bureau of Land Management
Casper Field Office and
Wyoming State Office

Submitted by

ENSR Corporation
Fort Collins, Colorado
and
Sammons/Dutton, LLC
Denver, Colorado

December 2005
(with errata)

TASK 3C REPORT
FOR THE POWDER RIVER BASIN COAL REVIEW
CUMULATIVE SOCIAL AND ECONOMIC EFFECTS

Prepared for

BUREAU OF LAND MANAGEMENT
CASPER FIELD OFFICE
and
WYOMING STATE OFFICE

Submitted by

ENSR CORPORATION
Fort Collins, Colorado
and
SAMMONS/DUTTON, LLC
Denver, Colorado

December 2005
(with errata)

ES.1 EXECUTIVE SUMMARY

Socioeconomic analysis responds to the public's interest in knowing that decision-makers have considered how people and their communities, lifestyles, and activities will be affected by the management of public lands and resources. This study was designed to support these considerations and to disclose their results. By focusing on selected key indicators over a long term, the analysis includes temporal, geographic, and demographic detail that also is helpful in addressing the planning questions of where, when, and how additional community development could be needed in the future as a result of the reasonably foreseeable development (RFD) scenarios identified for this study.

The analysis is based on the two RFD scenarios defined in the Task 2 Report for the Powder River Basin (PRB) Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005b). Assumptions regarding future coal production levels are the primary differentiation between the two scenarios, increasing from 363 million tons per year (mmtpy) in 2003 to 508 mmtpy by 2020 under the lower production scenario and to 591 mmtpy under the upper production scenario. Under the lower production scenario, existing railroads would expand capacity, a new railroad line would be built, and three new power plants would begin operation. Expansions of rail transportation and electrical generation in the region also are part of the upper production scenario.

The structure of the two RFD scenarios is such that they do not represent a high and low bounded range within which there is a high likelihood of actual levels of economic activity and associated effects occuring. Rather, the two scenarios represent a range of economic activity derived by combining the range of future coal production with other identified foreseeable activity, all of which is assumed to occur. This formulation of the RFDs was done to assess the maximum cumulative environmental and socioeconomic consequences as a result of ongoing development activity. Changes affecting the other activities in terms of levels or timing (e.g., a different sequencing and phasing of new electrical generation capacity, a reduced pace of oil and gas well drilling, or an announcement and commencement of construction of a major new coal technology facility) would filter through as changes in the overall cumulative analysis.

REMI Policy Insight (REMI), a regional economic model, was used to develop the cumulative employment and population projections presented below. The version of the REMI model for this study was calibrated to represent two economic regions: the first consisting of Campbell County alone, and the second composed of the counties in Wyoming that border Campbell County and are linked to its economy by established industrial and consumer trade linkages and by work force commuting patterns. Results for the second region were then analyzed to focus on five counties, Converse, Crook, Johnson, Sheridan, and Weston, that are the most directly linked. Collectively, these five counties are referred to in this report as the surrounding counties. Additional analysis was undertaken to "disaggregate" REMI's population and employment forecasts for each of the surrounding counties and to derive housing requirements and project future school enrollment.

ES.2 CUMULATIVE SOCIOECONOMIC IMPACTS

Employment and Income

Employment is a key indicator of economic activity and changes in activity over time, particularly at the county level. It derives that status because data on employment, unemployment, and labor force data are collected monthly and reported, with only limited time lags, and the recognition that changes in employment typically are correlated with changes in population, housing demand, consumer spending, and public sector revenues and expenditures.

Within the PRB, energy and mineral development are the principal forces driving economic change. For the RFD scenarios, those forces include changes in coal mining, oil and gas development and production employment, and the construction of new power plants. The largest impetus to growth over the study period (2003 to 2020) is expected to occur by 2010. Under the lower production scenario, employment related to coal mining, oil and gas production, and oil field services is projected to increase by one-third, or more than 2,300 jobs, as compared to 2003 levels. A large portion of the jobs gained would be the result of increased oil and gas development, because while the number of coal mining jobs would increase, projected coal mine-related productivity gains would limit the increases in the number of mine employees required for operations.

Beyond 2010, as major infrastructure development (e.g., additional coal bed natural gas [CBNG] compression capacity) is completed and the pace of conventional oil and gas drilling decreases, total employment related to coal mining, oil and gas production, and oil field services would decline. Increases in CBNG production and coal mining employment would occur thereafter, such that total mining employment would approach pre-2010 levels by the end of the forecast period (2020). Under the RFD scenarios, concurrent construction of the three new power plants, having a combined capacity of 1,000 megawatts (MW) and a peak work force of approximately 1,550 workers in 2007-2008, is assumed to coincide with the increase in mining employment. Under the upper production scenario, a second temporary construction work force impact would occur between 2016 and 2020 in conjunction with the construction of an additional 700 MW power plant.

The net effects of these activities, including secondary effects on suppliers, retail merchants, service firms, and state agencies and local government in the region, would be the creation of more than 8,700 new jobs in the region between 2003 and 2010. Of those, more than 5,600 jobs, representing a 22 percent increase over 2003 employment, would be based in Campbell County (**Table ES-1**). The pace of economic expansion, at least in terms of jobs, would moderate after 2010. To illustrate, total employment growth of 2,017 additional jobs is projected in Campbell County between 2010 and 2020, with 1,741 additional jobs projected in the surrounding counties.

The employment effects identified above imply substantial pressures on local labor markets. Strong demand for labor would lower local unemployment, creating upward pressure on wages and salaries. Those influences would stimulate substantial economic migration into Campbell County, causing impacts to population, housing demand, and other economic and social conditions. Similar influences would occur in the surrounding counties, although the implications are less severe because the scale of the effects would be smaller and distributed over multiple communities and service providers.

Table ES-1
Total Employment in the PRB Study Area to 2020 under the Lower Production Scenario

Location	2003	2010	2015	2020	Change 2003 to 2020	CAGR[1] (percent)
Campbell	25,096	30,737	31,992	32,374	7,278	1.5
Surrounding Counties[2]	38,807	41,908	43,197	43,649	4,842	0.7
Six-county Study Area	**63,903**	**72,645**	**75,189**	**76,023**	**12,120**	**1.0**

[1]CAGR = compounded annual growth rate
[2]Includes Converse, Crook, Johnson, Sheridan, and Weston counties.
Source: U.S. Bureau of Economic Analysis 2005 (2003 data).

Several important issues arise in the context of the rapid economic expansion implied by the growth projections through 2010. One issue is that achieving the projected levels of energy and mineral development activity assumes that industry has access to the necessary equipment, materials, labor, and other vital inputs. Current oil and gas exploration and development interest across the Rocky Mountain region has absorbed the available inventory of drilling rigs and crews. A lack of additional resources could delay or limit the job gains below the levels projected, even though prospects for such growth remain. Secondly, the competition for equipment could combine with tight labor markets to negate the productivity gains that underlie the projections, such that the employment and associated impacts do materialize, but are associated with lower levels of activity (e.g., a lengthier construction period for a power plant or fewer new wells drilled each year).

Employment effects associated with the upper production scenario, assuming productivity gains in coal mining equivalent to those in the lower production scenario, would result in total employment gains of 11,563 jobs by 2010 in the six-county study area, with an additional 3,667 jobs by 2020[1] (**Table ES-2**). As compared to the employment projections under the lower production scenario, those gains would include 2,821 additional jobs in 2010 and 3,214 additional jobs in 2020. Most of the incremental gains would be based in Campbell County, further stressing labor markets, housing, and other community resources. Such pressures could delay or affect the development plans of individual firms and operators, such that the projected employment levels would not be realized in the time frames shown. Nonetheless, substantial growth in employment is expected to occur, and even if the projected total employment levels are not realized, substantial social and economic impacts still would be anticipated.

---

[1] Projected coal mining employment under the upper production scenario was estimated assuming future productivity gains equivalent to those under the lower production scenario. This assumption reflects a departure from the assumptions established in the Task 2 report, whereby a 16 percent higher production would be achieved with a 2.5 percent increase in work force. Those assumptions, although based on a continuation of historic productivity gains, may underestimate population and employment growth and related socioeconomic effects if the production is achieved but the productivity gains lag. Using the productivity gains from the lower production scenario thus provides a more conservative perspective on potential long-term population growth for the purposes of the cumulative analysis.

Table ES-2
Total Employment in the PRB Study Area to 2020 under the Upper Production Scenario

County	2003	2010	2015	2020	Change 2003 to 2020	CAGR (percent)
Campbell	25,096	33,316	34,386	35,206	10,110	2.0
Surrounding Counties[1]	38,807	42,150	43,453	43,927	5,120	0.7
Six-county Study Area	**63,903**	**75,466**	**77,839**	**79,133**	**15,230**	**1.3**

[1]Includes Converse, Crook, Johnson, Sheridan, and Weston counties.
Source: U.S. Bureau of Economic Analysis 2005 (2003 data).

The economic stimulus associated with the RFD scenarios also would stimulate increases in employment in other nearby counties. However, the potential effects in these areas are not addressed in this report because most of the effects would be indirect or induced growth that would be limited in scale relative to the size of the respective economies. Furthermore, the economic outlook for those areas also is heavily influenced by factors that are beyond the scope of this study, such as the role of the oil and gas support services in Natrona County that also support energy development in the south-central and southwestern portions of Wyoming.

Personal incomes in the region would increase over time, both in aggregate and on a per capita basis, in conjunction with the economic outlooks foreshadowed by the RFD scenarios. In 2003, total personal income was $1.12 billion in Campbell County and approximately $1.88 billion in the surrounding counties. Under the lower production scenario, total personal income would more than triple to $3.14 billion in 2020, and personal income in the surrounding counties would increase by approximately 111 percent to $4.43 billion (all in nominal dollars). By 2020, the upper production scenario would generate an additional $262 million per year in Campbell County and approximately $30 million in the surrounding counties. Annual per capita incomes are projected to increase by approximately 17 percent (in real terms) in Campbell County and 27 percent across the remainder of the region between 2003 and 2020. Households with one or more workers employed in the energy industry, associated key suppliers, and the construction industry likely would realize larger shares of the overall gains.

Population

The magnitude and timing of projected employment changes under either production scenario would trigger corresponding effects to population across the PRB, particularly in Campbell County (**Figure ES-1**).

Under the lower production scenario, Campbell County's population is projected to increase by more than 14,550 residents between 2003 and 2020, of which nearly 9,500 are anticipated by 2010. Recent population estimates indicate that a portion of the projected growth already has occurred. However, additional growth over the next 5 to 6 years would result in substantial pressures on housing and other community resources. The energy and mineral development in the lower production scenario also would result in substantial population growth elsewhere in the PRB, with Sheridan, Johnson, and Converse counties all projected to gain substantial population

(**Figure ES-2** and **Table ES-3**). Population growth, like employment growth, would moderate after 2010.
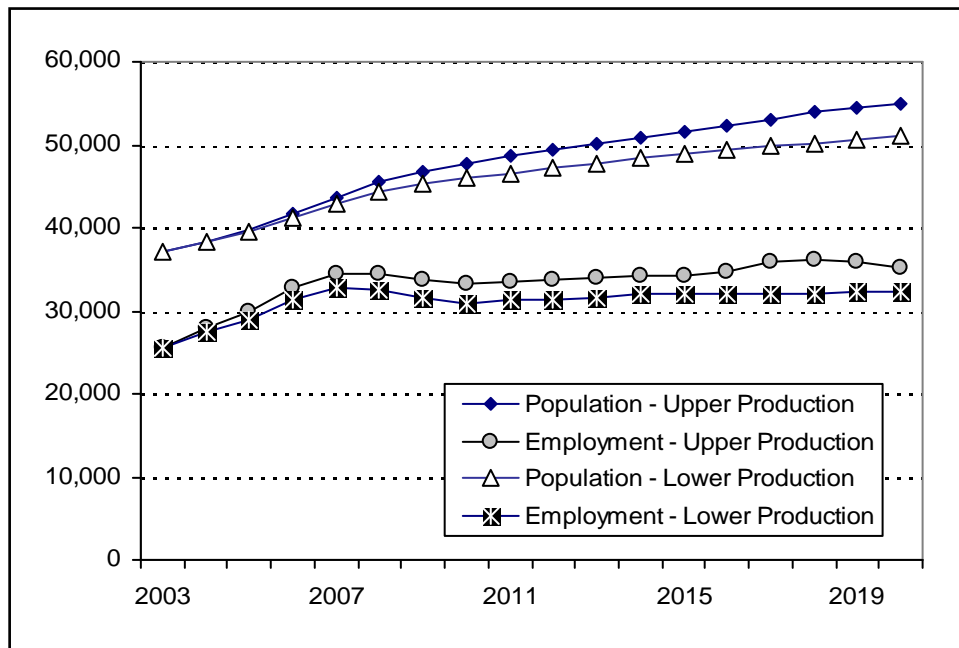

Figure ES-1. Projected Campbell County Population and Employment to 2020.

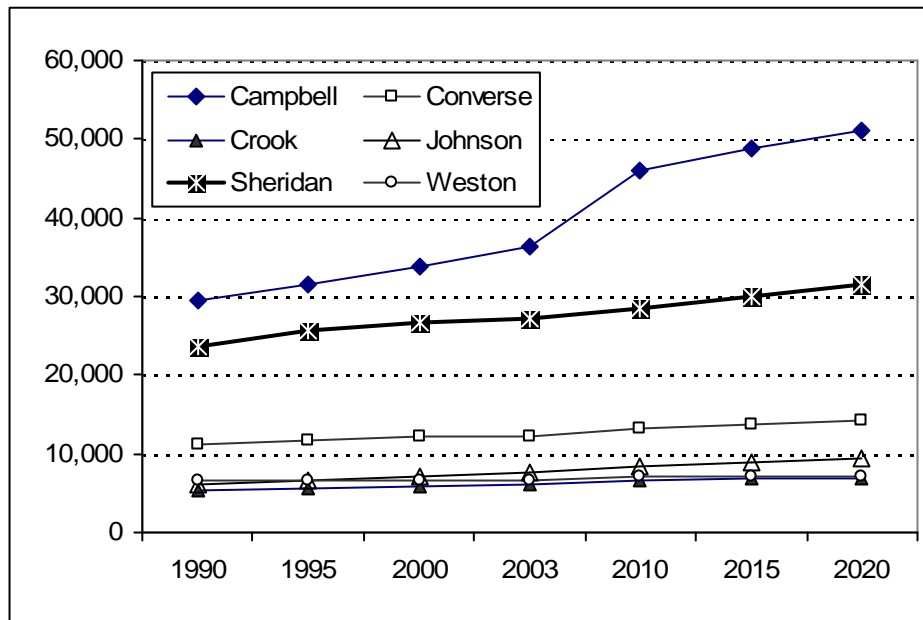Sources: U.S. Census Bureau 2005a,b (2003 data).

**Figure ES-2. Projected Population Growth in the PRB Study Area
Under the Lower Production Scenario**

Source: U.S. Census Bureau 2005a (1990 through 2003 data).

Table ES-3
Projected PRB Study Area Population to 2020 Under the Lower Production Scenario

County	2000	2003	2010	2015	2020	Change 2003 to 2020	CAGR (percent)
Campbell	33,698	36,438	45,925	48,905	50,995	14,557	2.0
Converse	12,104	12,314	13,103	13,671	14,193	1,879	0.8
Crook	5,895	5,986	6,542	6,759	6,989	1,003	0.9
Johnson	7,108	7,554	8,389	8,867	9,326	1,772	1.2
Sheridan	26,606	27,115	28,459	30,016	31,467	4,352	0.9
Weston	6,642	6,671	7,108	7,174	7,208	537	0.5
Six-county Study Area	**92,053**	**96,078**	**109,526**	**115,392**	**120,178**	**24,100**	**1.3**

Source: U.S. Census Bureau 2005b (2000 and 2003 data).

Projected population growth between 2003 and 2020 ranges from a 0.5 percent CAGR in Weston County to 2.0 percent CAGR in Campbell County. In absolute terms, the net change ranges from 537 additional residents in Weston County to a gain of 14,557 residents in Campbell County. The combined population of the six-county study area is projected to climb from 96,078 in 2003 to 120,178 in 2020, a 1.3 percent CAGR.

Population projections for selected communities in the region, corresponding with the county population projections in **Table ES-3**, are shown in **Table ES-4**. Gillette, Sheridan, and Buffalo are anticipated to experience the most growth.

Table ES-4
Projected Population to 2020 for Selected PRB Communities
Under the Lower Production Scenario

Community	2000	2003	2010	2015	2020	Change 2003 to 2020	CAGR (percent)
Gillette	20,499	22,113	29,392	30,810	31,617	9,504	2.1
Wright	1,357	1,418	1,952	1,956	1,989	571	2.0
Douglas	5,302	5,396	5,962	6,242	6,089	707	0.7
Moorcroft	804	826	860	918	981	159	1.0
Sundance	1,155	1,176	1,319	1,387	1,370	222	1.0
Buffalo	3,899	4,221	4,696	5,029	5,291	1,095	1.4
Sheridan	15,803	16,000	17,160	18,119	18,859	2,880	1.0
Newcastle	3,241	3,247	3,318	3,349	3,307	220	0.4

Source: U.S. Census Bureau 2005c (2000 and 2003 data are estimates for July 1 of the respective years).

As with employment, changing development conditions could result in actual population growth varying from that shown in **Table ES-4**. If project schedules or levels of development vary from the projected levels, there could be corresponding effects on population growth (e.g., delays could result in lower growth). Another possibility is that population demographics could change in response to migration and commuting, with relatively more immigrating construction workers being

single-status, rather than being accompanied by families. Another alternative is that the spatial distribution of population growth could shift as a result of housing or labor constraints, such that less growth would occur in Gillette and Campbell County, and more growth would occur elsewhere.

Projected population growth through 2020 under the upper production scenario is approximately 19 percent higher than under the lower production scenario (28,625 compared to 24,100), with the six-county population reaching 124,703 by 2020 (**Table ES-5**). Much of the incremental population growth would occur by 2010, in Campbell County, and in particular in and near Gillette.

Table ES-5
Projected County Population to 2020 under the Upper Production Scenario

County	2000	2003	2010	2015	2020	Change 2003 to 2020	CAGR (percent)
Campbell	33,698	36,438	47,662	51,558	54,943	18,505	2.4
Surrounding Counties[1]	58,355	59,640	63,870	66,922	69,760	10,120	0.9
Total	**92,053**	**96,078**	**111,532**	**118,480**	**124,703**	**28,625**	**1.5**

[1]Includes Converse, Crook, Johnson, Sheridan, and Weston counties.
Source: U.S. Census Bureau 2005b (2000 and 2003 data).

Community population growth under the upper production scenario generally would mirror growth under the lower production scenario (**Table ES-4**) but with higher growth in Wright, Douglas, and Newcastle due to the effects of higher coal production and power generation concentrated in the southern portion of Campbell County.

The cumulative population projections under either RFD scenario point to a period of strong growth in the PRB. The magnitude and timing of the growth is such that it raises concerns about other potential social and economic impacts.

Housing

Either RFD scenario would give rise to strong demand for housing across the six-county study area. Net new housing requirements under the lower production scenario would include approximately 11,270 units through 2020, a 26 percent increase above the total existing inventory in 2003 (**Figure ES-3**). New housing requirements under the upper production scenario are estimated at 13,060 units, a 31 percent increase compared to the 2003 inventory and 1,790 units more than under the lower production scenario. From 2003 to 2010, the demand for new housing under the lower production scenario would concentrate in Campbell County, as approximately 60 percent of the overall demand for additional housing under either RFD scenario would occur in Campbell County, and approximately two-thirds of that (between 4,300 and 5,000 additional units) would be needed within the next 3 to 5 years.
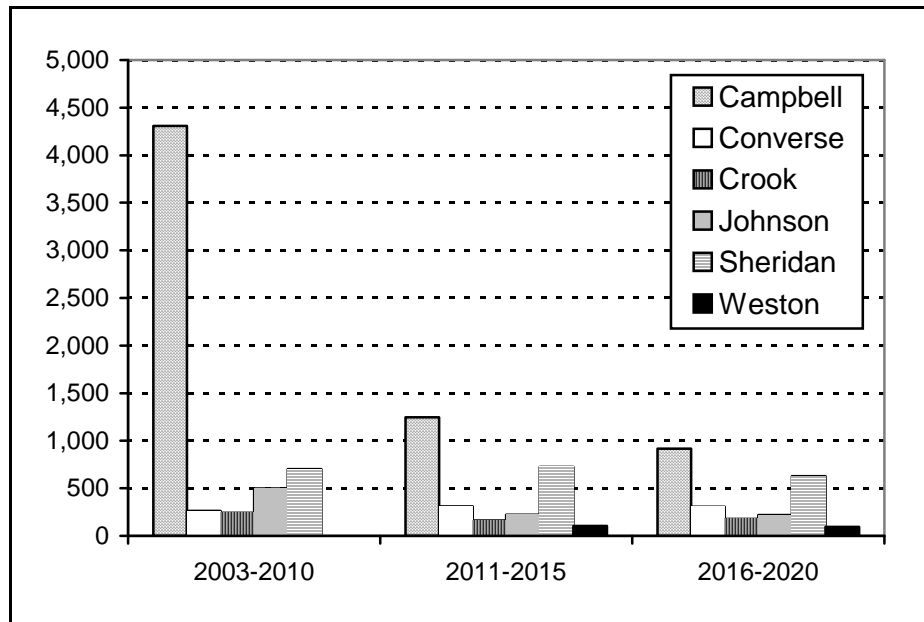
Figure ES-3. Projected Housing Demand in the PRB Study Area Under the Lower Production Scenario

A substantial portion of the near-term demand in Campbell County would be associated with the assumed concurrent construction of three power plants. If that occurs, one or more project sponsors may be required by the Wyoming Industrial Siting Administration to pro-actively provide housing (e.g., a construction-camp for single-status workers). Such actions could temper the needs for additional housing; however, the remaining needs would nonetheless be substantial, straining public and private sector residential development capacity. Although smaller in scale than those in Campbell County, housing demands in the surrounding counties also could strain the capabilities of the residential construction sector. Furthermore, residential contractors would be competing for available labor, contributing to the population growth and housing demands, and fueling increases in construction costs and housing prices.

The relative scale of the housing needs may be evaluated in comparison to past growth in the study area. One comparative benchmark is the rapid growth in the PRB during the 1970s. During that decade, the number of housing units in the six-county study area grew by approximately 14,900 units, approximately 1,500 units per year on average compared to the 850 to 975 new units per year projected under these scenarios through 2010. The rapid pace of development in the 1970s also coincided with a period of economic expansion and strained the region's construction trade and building supplier industries. Although the underlying economies of the region are larger now, the projected needs would tax the ability of communities to respond. Signs of strain are apparent in Gillette and could surface elsewhere as relatively more housing need would arise in the remaining counties of the six-county study area during the second 5-year period under the lower scenario.

Projected housing demands under either scenario, although lower than what Campbell County and the region experienced in the "boom" years of the 1970s, would exert substantial pressure on

housing markets, prices, and the real estate development and construction industries, all at a time when demand for labor and other resources would be high overall.

Public Education

Communities across the PRB study area would see population growth due to economic migration; however, the effect on public school enrollments would vary. As the demographic structure of the population changes, school districts in the PRB would be affected by new trends. In some counties, the size of that population (generally aged 5 to 17 years) may even trend in the opposite direction of total population in the short-term due to underlying demographics of the established resident population.

The demographic forecasts developed from the RFD scenarios project growth in the elementary school enrollments in Campbell County through 2010 and for almost all PRB school districts beyond 2010. Under the lower production scenario, Campbell County School District #1 (Campbell #1) would experience substantial growth in school enrollments through 2020 (an additional 1,587 students or 22 percent above recent levels). The impacts on Campbell #1 would be composed of two elements: a substantial increase in grades K-8 and small increases in grades 9-12. School districts in the surrounding counties are projected to experience declining elementary and middle school enrollments through 2010 and declining high school enrollments through 2015 under the lower production scenario. Thereafter, growth and the associated influences on demographics would generate renewed enrollment growth, particularly in the elementary grades in Johnson, Sheridan, and Converse counties. **Figure ES-4** illustrates projected school enrollments in Campbell #1 and the surrounding districts under the lower production scenario.
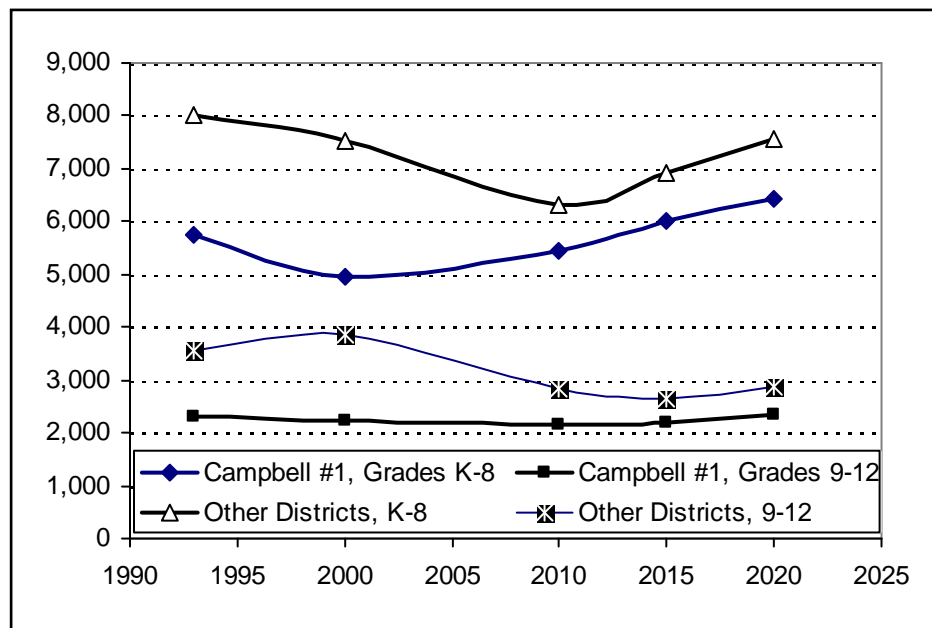

**Figure ES-4. Projected School Enrollment Trends to 2020
Under the Lower Production Scenario**

Source: Wyoming Department of Education 1975-2003 (1990 through 2003 data).

Executive Summary

Projected enrollments in Campbell #1 would be approximately 10 percent higher by 2020 under the upper production scenario, with those in the surrounding districts only approximately 1 percent higher. However, several districts would have total enrollments in 2020 that are below current levels, as growth from 2010 to 2020 would not offset recent declines or those projected to occur before 2010.

Under either scenario, forecasted enrollments may cause short-term school capacity shortages, depending on the specific grade-levels and geographic distributions of the additional students. Under Wyoming School Facilities Commission planning guidelines, impacted school districts generally would be expected to accommodate minor capacity shortages through temporary facilities, such as portable classrooms. For larger, more long-term increases, the Commission's policy is to fund capital expansion where warranted by projections developed during annual updates of school districts' 5-year plans. Presently, the Commission has approved $88.1 million for 31 school replacement and major improvement projects within the six-county study area (**Table ES-6**).

Table ES-6
Approved Capital Construction Budgets for Public Education

School District	Schools in Operation	Approved 5-year Capital Construction Funding (millions)	Number of New Schools and Remodeling and Improvement Projects
Campbell #1	20	$23.7	7
Surrounding Counties (9 Districts)	62	$64.4	24
Six-county Study Area	**82**	**$88.1**	**31**

Source: Wyoming School Facilities Commission 2005.

Facilities and Services

The RFD scenarios have the potential to affect local government facilities and services in two ways. First, population increases in affected counties and communities generally result in across the board increases in demand on services, and second, each RFD activity may result in increased demand for specific services (e.g., road maintenance, law enforcement, and emergency response).

Although energy development has the potential to affect all local government facilities and services, particularly in Campbell County, this report focuses on water supply and wastewater systems, two essential services that are costly and have the longest lead times to develop, and law enforcement, emergency response, and road maintenance, three services that typically are most affected by energy development.

Water supply and wastewater systems in all communities would have the capacity to accommodate the cumulative population growth associated with either RFD scenario through 2020, assuming ongoing or currently planned improvements are completed. In Gillette, the timing of planned water supply system improvements relative to growing demand may be an issue, as completion of improvements in the 2005 to 2009 period would occur when substantial growth is anticipated to

occur under both RFD scenarios. Consequently, Gillette may experience water shortages in summer during the 2003 to 2010 period, particularly under the upper development scenario.

The ability to provide desired levels of other public services to the anticipated energy-related population and development is less clear in Campbell County, Gillette, Wright, and outlying rural communities. Campbell County and its communities would experience a 25 percent increase in population between 2003 and 2010 under the lower production scenario and 30 percent under the upper production scenario. This growth would be fueled by a ramp-up of oil, natural gas, and CBNG drilling, coupled with the construction or reopening of a coal mine and construction of three power plants. Responding to the growth in service demand associated with these assumed developments would be challenging. The county is likely to have substantial revenues from current ad valorem property taxes on energy production, given recent increases in commodity prices; however, municipalities and most other service providers do not have access to property taxes on production and could have difficulty in funding service expansions. Moreover, the county and its municipalities would need to recruit, train, and equip service personnel, sometimes before the growth in RFD-related revenues begin accruing and at a time where they would be competing for employees in a tight job market. There have been times in the past when such conditions have posed a challenge to recruit and retain staff, given the higher wage scales in the energy industries and competition for trained staff in other communities.

Finally, if the ramp-up in oil and gas development and power plant construction projects were to occur simultaneously within the 2003 to 2010 period, Campbell County and its municipalities may need to add capacity in agencies that provide services to a transient, single-status population and agencies that provide human services to newcomers and established residents alike.

Growth rates and the resultant facility and service demand in other counties within the study area would be substantially less during the 2003 to 2010 period under either scenario; all communities other than Johnson County and Buffalo would grow substantially less than 10 percent during the period. The populations of Johnson County and Buffalo would increase 10 percent by 2010, driven primarily by CBNG development.

Growth rates and resultant increases in service demands would slow substantially during both the 2011 to 2015 and 2016 to 2020 periods under either RFD scenario. In most communities except Sheridan County and the City of Sheridan, there would be little difference in population growth and service demand between the two RFD scenarios.

It is important to note that communities in Crook, Weston and Converse counties that typically host a portion of mine and power plant construction work forces would receive no direct revenues from these facilities to fund any increases in service demand. It is possible that they could receive Impact Assistance Payments under the provisions of the Wyoming Industrial Information and Siting Act.

Fiscal

Federal mineral royalties and state and local taxes levied on coal and other mineral production are major sources of public revenue in Wyoming. Taxes, fees, and charges levied on coal and oil and gas infrastructure, real estate improvements, retail trade, and other economic activity supported by energy development provide additional sources of revenue to support public facilities and services. Revenues related to energy and mineral production benefit not only those jurisdictions within which

the production or activity occurs, but also the federal treasury, state coffers, school districts, and local governments across the state through various revenue-sharing and intergovernmental transfer mechanisms.

At the foundation of the mineral development revenue projections are projected levels of future energy and mineral resource production. The projected total value of annual mineral production under the lower production scenario will climb by $3.69 billion (nominal dollars) over 2003 levels, reaching $8.75 billion by 2020, a 73 percent increase over the current (2003) value. The aggregate value of energy and mineral resource production under the upper production scenario would increase to $9.42 billion in 2020. The incremental difference, compared to the value under the lower production scenario, would be $668 million per year, all of which represents the value of higher annual coal output.

As at present, the overwhelming majority of future mineral production value is anticipated to be in Campbell County. Over time, the future value of production in Sheridan and Johnson counties would climb. Total annual mineral production value by 2020 is projected to reach $6.5 billion in Campbell County and $2.3 billion in the surrounding counties.

Between 2005 and 2020, total receipts derived from the key selected sources range between $21.1 and $22.6 billion for the lower and upper production scenarios, respectively. Receipts derived from coal production would account for the majority of the totals under either scenario, with Federal Mineral Royalties on coal of $4.9 to $5.7 billion being the single largest source. Severance taxes of $6.3 to $6.7 billion levied on coal, oil, and gas would accrue to the state (**Tables ES-7** and **ES-8**).

Table ES-7
Summary of Mineral Development Tax Revenues Associated with Energy Resource Production Under the Lower Production Scenario
(millions of nominal dollars)

Industry and Taxes	2005-2010	2011-2015	2016-2020	Total
Coal[1]	$3,164.8	$3,178.9	$3,756.3	$10,100.0
CBNG	$2,915.2	$3,076.4	$3,288.7	$9,280.3
Conventional Oil and Gas	$568.5	$576.4	$614.0	$1,759.0
Totals	**$6,648.5**	**$6,831.7**	**$7,659.0**	**$21,139.3**
Severance Tax	$1,995.9	$2,012.4	$2,249.3	$6,257.6
Federal Mineral Royalties	$2,754.1	$2,839.4	$3,166.3	$8,759.8
State Mineral Royalties	$233.5	$225.8	$251.4	$710.7
Ad Valorem Tax (Counties)	$417.6	$443.0	$502.8	$1,363.3
Ad Valorem Tax (Schools)	$1,247.5	$1,311.1	$1,489.3	$4,047.9
Totals	**$6,648.6**	**$6,831.7**	**$7,659.1**	**$21,139.3**

[1]Does not include coal lease bonus bids due to the uncertainty regarding timing.

Table ES-8
Summary of Mineral Development Tax Revenues Associated with Energy Resource
Production Under the Upper Production Scenario
(millions of nominal dollars)

Industry and Taxes	2005-2010	2011-2015	2016-2020	Total[1]
Coal[1]	$3,538.0	$3,703.0	$4,350.0	$11,591.0
CBNG	$2,915.2	$3,076.4	$3,288.7	$9,280.3
Conventional Oil and Gas	$568.5	$576.4	$614.0	$1,759.0
Totals	**$7,021.7**	**$7,355.8**	**$8,252.7**	**$22,630.3**
Severance Tax	$2,104.1	$2,159.0	$2,415.4	$6,678.5
Federal Mineral Royalties	$2,946.3	$3,099.9	$3,461.4	$9,507.6
State Mineral Royalties	$233.5	$225.8	$251.4	$710.7
Ad Valorem Tax (Counties)	$435.8	$472.0	$535.0	$1,442.8
Ad Valorem Tax (Schools)	$1,302.3	$1,398.9	$1,589.8	$4,291.0
Totals	**$7,022.0**	**$7,355.6**	**$8,253.0**	**$22,630.6**

[1]Does not include coal lease bonus bids due to the uncertainty regarding timing.

The federal and state governments also would benefit from coal lease bonus bids derived from future coal leasing. Bonus bids have risen over time, with recent bids in the $0.60 to $1.00 per ton range. There is no guarantee of that trend continuing, and uncertainty exists with respect to the timing and scale of future leases, although leasing of 2.5 to 3.0 billion tons by 2020 is reasonably foreseeable under the lower production scenario. That level of leasing could generate $1.5 to $3.0 billion in bonus bid revenues based on recent bids. Net an administrative processing fee, these revenues accrue on a 50/50 basis to the Federal Treasury and the State of Wyoming.

Taxes and mineral royalties levied on energy and mineral resource production accruing to the state are disbursed to the Permanent Water Development Trust Fund, Wyoming School Foundation and Capital Facilities funds, state and local facilities capital construction fund, and other programs according to a legislatively-approved formula. Through these funds, the revenues derived from resource development benefit the entire state, not just agencies, businesses, and residents of the PRB.

County governments and school districts would realize benefits from future energy and mineral resource development in the form of property taxes. Such taxes, estimated on the basis of future coal, oil, and natural gas production, are estimated to range between $5.4 billion and $5.7 billion through 2020. Those sums do not include future property taxes levied on the new power plants, expanded rail facilities, or new residential and commercial development associated with future growth, or sales and use taxes levied on consumer and some industrial purchases. These latter revenues are not estimated, but they would be substantially lower than those on resource production.

Local governments would benefit from property taxes on new development, as well as from sales and use taxes on taxable sales within their boundaries. Such revenues are not estimated for this study due to the large number of jurisdictions and other analytical considerations.

Community and Social Effects

Cumulative energy development in the PRB, as expressed in the two RFD scenarios, has the potential to generate both beneficial and adverse effects on community social conditions. Social effects of RFD activities in the PRB would vary from county to county and community to community under the production scenarios developed for this study, based on the existing social setting and the type of development that would occur.

Beneficial social effects would be associated with an expanding economy and employment opportunities associated with energy development and resulting improvements in living standards for those employed in energy-related industries. Adverse social effects could occur as a result of conflicts over land use and environmental values. Negative social effects also could occur if the pace of growth exceeds the abilities of affected communities to accommodate energy-related employees and their families with housing and community services.

In the PRB, social conditions in Campbell County, the City of Gillette, and the Town of Wright are most likely to be affected, because the county would host much of the cumulative energy development work force, and the county and its municipalities would receive the largest increments in population growth. Campbell County and its municipalities have a long history of energy development, and they have developed infrastructure and management systems to plan for and manage growth; consequently, major adverse social effects would not be anticipated. However, under either scenario, the county and the two municipalities may face challenges in providing adequate housing and expanding community services in anticipation of population growth thru 2010, particularly if several power plant construction projects and a coal mine re-opening occur simultaneously. As municipalities receive only sales and use tax revenues directly from development and purchases made within their boundaries, Gillette and Wright could face challenges in securing the necessary funding to improve municipal facilities and services. Housing shortages and limitations in public services could contribute to adverse community social effects in these communities.

Many of the people who would immigrate to Campbell County for energy-related jobs are likely to share characteristics with much of the current population; therefore, few barriers to social integration are anticipated.

Social effects on other communities in the PRB are likely to be minimal to moderate. Energy-related population growth is anticipated to be moderate in other communities. Sheridan County, also familiar with coal mining, is the only other county anticipated to host a major construction project under the development assumptions used for either RFD scenario. Converse, Weston, and Crook counties could experience spillover growth from projects in Campbell County.

Johnson, Sheridan, and Campbell counties could experience continued conflict over split estate and water issues associated with CBNG development, and the pace and scale of energy development across the PRB is likely to continue to generate social and political conflict over environmental issues under either scenario.

ACRONYMS AND ABBREVIATIONS

BLM	Bureau of Land Management
BNSF	Burlington Northern and Santa Fe Railroad
CAGR	Compounded annual growth rate
Campbell #1	Campbell County School District #1
CBNG	coal bed natural gas
Converse #1	Converse County School District #1
Converse #2	Converse County School District #2
CREG	Consensus Revenue Estimating Group
Crook #1	Crook County School District #1
DM&E	Dakota, Minnesota, & Eastern
EA	Environmental Assessment
EAD	Economic Analysis Division
EIS	Environmental Impact Statement
EPS	Economic Profile System
FMR	federal mineral royalties
GUSA	Gillette Urban Service Area
IAPs	Impact Assistance Payments
Johnson #1	Johnson County School District #1
LBA	lease by application
mmcf	million cubic feet
mmcfpy	million cubic feet per year
mmtpy	million tons per year
MW	megawatts
NAICS	North American Industrial Classification System
NEPA	National Environmental Policy Act
P&M	Pittsburg and Midway Coal Mining Company
PILT	payments in lieu of taxes
PRB	Powder River Basin
PRRCT	Powder River Regional Coal Team
REMI	REMI Policy Insight
RFD	reasonably foreseeable development
Sheridan #1	Sheridan County School District #1
Sheridan #2	Sheridan County School District #2
Sheridan #3	Sheridan County School District #3
U.S.	United States
UP	Union Pacific
WDAI	Wyoming Department of Administration and Information
Weston #1	Weston County School District #1
Weston #7	Weston County School District #7
WSFC	Wyoming School Facilities Commission
WSFP	Wyoming School Foundation Program
WTA	Wyoming Taxpayers Association

CONTENTS

Contents

TECHNICAL APPENDIX

LIST OF TABLES

Contents

LIST OF FIGURES

1.0 INTRODUCTION

The Powder River Basin (PRB) of Wyoming and Montana is a major energy development area with diverse environmental values. Energy development has been occurring in the PRB for well over a century. The first coal mine in the basin was developed near Glenrock, in Converse County, in 1883 (Foulke et al. 2002). While coal can be found in several areas of Wyoming, the extensive surface-accessible coal resource is what sets the PRB apart from other energy-producing areas of the state and country. The Wyoming portion of the PRB is the largest coal-producing region in the United States (U.S.); PRB coal is used to generate electricity both within and outside of the region. The PRB also has vast oil and natural gas resources, which have been and continue to be produced. Within the last decade, the region has experienced nationally significant development of natural gas from coal seams.

The geographic focus of the PRB Coal Review for cumulative effects on social and economic conditions is on Campbell County, reflecting the geographic location of the active coal mines. However, the coal resource and the associated mining industry is the economic dynamo for the entire region. Consequently, it is necessary to consider potential effects in nearby counties also affected by coal mining. Although coal mining in the PRB indirectly affects the entire state and areas far outside of Wyoming, this analysis focuses on those immediately adjacent counties in Wyoming that are affected by work force commuting to and from the coal mines. Included are Crook, Johnson, Sheridan, and Weston counties (**Figure 1-1**). Niobrara and Natrona counties also experience economic, social, or demographic effects due to coal mining in the PRB. However, it generally is accepted that the impacts are limited in scale, and are primarily secondary or tertiary level effects arising not strictly from mining per se, but from a related industry or indirect economic linkages.

The majority of the surface ownership in the PRB study area is private. Conversely, the majority of the mineral ownership in the study area is federal (see the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Future Activities [ENSR 2005b]). Federal mineral ownership may include all minerals in some locations and only specific minerals (e.g., coal or oil and gas) in other locations. As a result, split-estates (where the surface ownership is different than the mineral ownership) exist in a large portion of the PRB.

Federal coal leasing is a high profile activity as over 90 percent of the PRB's coal is federally owned. Between 1974 and 1982, the Bureau of Land Management (BLM) issued three and started a fourth separate regional coal environmental impact statement (EIS), all addressing federal coal leasing and related development, as well as other regional development. Following decertification of the region by the Powder River Regional Coal Team (PRRCT), the BLM has used the lease by application (LBA) process to meet the need for additional coal resources. Each LBA requires an EIS or environmental assessment (EA) as part of the leasing process.

Starting with the first LBAs, the BLM met the need for cumulative analysis in each EIS or EA with a discrete chapter addressing cumulative impacts. This approach served to highlight and focus cumulative impacts as distinct from site-specific impacts. Each cumulative impact analysis was based on the earlier regional EISs and added new information, as available. With each subsequent EIS, the cumulative analysis was updated and new information added. In the mid-1990s, the BLM conducted a study called the PRB Coal Development Status Check to evaluate how actual
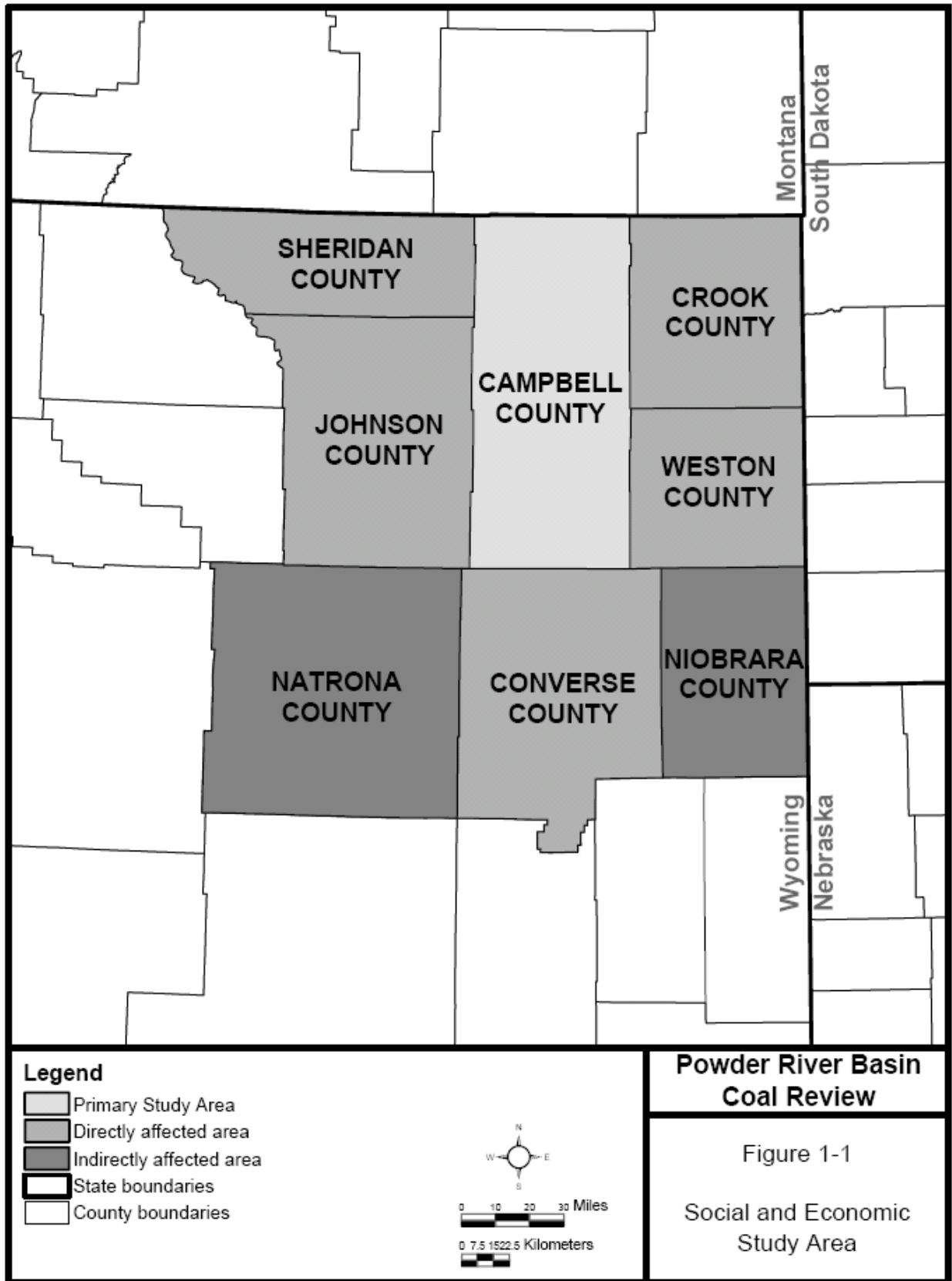
Figure 1-1. Social and Economic Study Area

development levels compared to the development levels predicted in the earlier regional EISs. The results of this study were presented to the PRRCT in 1996. Then, in the late 1990s, annual coal production and associated impacts drew closer to the maximum projections in the regional EISs. Furthermore, the large scale oil and gas development associated with coal bed natural gas (CBNG) development had not been foreseen in those EISs.

For the most recent LBAs, the BLM used the cumulative analysis from the Wyodak EIS (BLM 1999) and PRB Oil and Gas EIS (BLM 2003), particularly for air and water resources. Both EISs projected regional development including the CBNG activity, but did not project coal development over a long-term period.

In early 2003, BLM completed a PRB coal demand study through 2020 (Montgomery Watson Harza 2003). The study projected production to increase at a steady pace with current mines able to meet the demand as long as these mines have access to additional coal reserves; therefore, the need for leasing using LBAs will continue into the foreseeable future. As part of processing these LBAs, BLM will need to maintain a current cumulative impact analysis. An initial step in that direction is this PRB Coal Review, which includes the identification of current conditions (Task 1 reports), identification of reasonably foreseeable development (RFD) actions and future coal production scenarios (Task 2 report), and predicted future cumulative impacts (Task 3 reports) in the PRB.

The Task 2 component of the PRB Coal Review defines the past and present development actions in the study area that have contributed to the current environmental and socioeconomic conditions in the PRB study area. This report also defines the projected RFD scenarios in the Wyoming and Montana PRB for years 2010, 2015, and 2020. For the Wyoming PRB, the past and present development and RFD scenarios include coal mine development as well as coal-related activities (e.g., railroads and coal-fired power plants) and non-coal-related activities (e.g., other minerals, CBNG, and conventional oil and gas). Coal mine development and coal-related activities in the Montana PRB study area are included in this study to provide the basis for the analysis of cumulative air quality impacts and to facilitate the concurrent development of the Miles City Resource Management Plan. The past and present activities identified in the Task 2 report are based on the most recent data available at the end of 2003 and provide the basis for the resource-specific descriptions of current conditions presented in the PRB Coal Review Task 1 reports.

The RFD scenarios presented in the Task 2 report provide the basis for the analysis of potential cumulative impacts in the Task 3 component of the study. The accuracy of any projected cumulative impact analysis is dependent on the adequacy and accuracy of information regarding potential future development activities in the affected area. While it is impossible to identify all potential future activities over the next 15 years, it is possible and desirable to identify RFDs based on current industry announcements, agency plans, economic trends, and technological advances affecting major industry sectors. Information regarding potential new development is constantly changing; however, to facilitate development of the information in this study, the RFDs identified in the Task 2 report reflect information available through the end of 2004.

The past and present actions in the Task 2 report were identified based on information in existing National Environmental Policy Act (NEPA) documents on file with federal and state agencies, and the Coal Development Status Check (BLM 1996). The RFD scenarios in the Task 2 report were developed based on recent information that identifies proposed and anticipated development in the PRB, including NEPA documents; various other technical reports and studies; federal, state, and

local (county) agency management plans; and permit applications. The specific development scenarios and development activities identified in these sources were assessed as to their current status prior to inclusion in the RFD scenarios for the PRB Coal Review. In addition, potential additional projects were identified through interviews with agency and industry representatives, review of published news articles and trade publications, and discussions with community leaders.

The identified RFD activities subsequently were evaluated as to their probability for occurrence. Due to the lack of detailed information for many developments beyond the next few years, the degree of uncertainty associated with the predicted developments and trends increases as the timeframe extends further into the future.

For each of the past and present and RFD projects and activities, project-specific impact-causing parameters (e.g., disturbance acreage, emission levels, employment levels, etc.) have been compiled from the sources identified above. Where specific information was unavailable, assumptions were developed and included based on typical industry-specific standards, permit criteria for similar existing industries, and professional judgment. This information is summarized in the Task 2 report.

In order to account for the variables associated with future coal production, two detailed coal production scenarios (reflecting upper and lower production estimates) were projected for this study to bracket the most likely foreseeable regional coal production level and to provide a basis for quantification of related impact-causing parameters. These future production levels were derived from the analysis of historic production levels and current PRB coal market forecasts, public and private information sources, and input from individual PRB coal operators, and they are summarized in the Task 2 report[1].

1.1   Objectives

This PRB Coal Review is a regional technical study to assess cumulative impacts associated with past, present, and reasonably foreseeable development in the PRB. The PRB Coal Review:

- Describes past and present (through 2003) development activities in the PRB that have affected the environmental conditions in the study area;

- Describes the current (through 2002-2003) environmental conditions in the study area and compares these conditions to the conditions projected in the BLM's Coal Development Status Check (BLM 1996), as applicable;

- Estimates reasonably foreseeable development in the study area through the year 2020, based on available information; and

- Estimates the environmental impacts associated with reasonably foreseeable development through the year 2020.

---

[1] Some of the information provided by coal operators is considered proprietary. Consequently, mine-specific information is not presented in the PRB Coal Review studies; the information is combined into mine subregions to protect the confidentiality of data.

The PRB Coal Review will provide data, models, and projections to facilitate cumulative analyses for future agency land use planning efforts and for future project-specific impact assessments for project development in compliance with NEPA. It should be noted that the PRB Coal Review itself is not a NEPA document. It is not a policy study, nor is it an analysis of regulatory actions or the impacts of project-specific development.

This report summarizes Task 3C of the PRB Coal Review, a description of predicted future cumulative social and economic impacts associated with RFD activities in the PRB cumulative effects study area. This report describes the predicted cumulative social and economic impacts under two coal production scenarios (lower and upper) for the years 2010, 2015, and 2020.

The PRB Coal Review Task 3 descriptions of predicted cumulative impacts for air quality, water resources, and environmental conditions are presented in separate stand-alone reports.

1.2 Agency Outreach, Coordination, and Review

The BLM directed the preparation of this PRB Coal Review. In order to ensure the credibility of the data, projections, interpretations, and conclusions of the study and to ensure the study's usefulness for other agencies' needs, the BLM initiated contact with other federal and state agencies early in the study. This contact included meetings, periodic briefings, and written communications.

The BLM conducted an agency outreach program to solicit input from other governmental agencies relative to their:

- Interest in and potential level of involvement in the study;
- Available data for use in the study;
- Input to the technical approach for resource evaluations; and
- Review of project deliverables.

As part of this agency outreach and technical oversight, the BLM organized technical advisory groups. These groups were composed of agency representatives with technical expertise in the applicable resources.

Relative to the social and economic component of the PRB Coal Review, other federal and state agencies were informed of the study by the BLM at the outset of the project. Several agencies subsequently forwarded references to documents that might serve as information resources for the baseline portion of the study (Task 1). For the impact analysis portion of the study (Task 3), a Socioeconomic Workgroup composed of individuals representing community, industry, government, and academic interests was assembled to serve in a technical advisory and review capacity.

1.3 Key Issues for this Report

Energy development in the PRB has been one of the primary factors affecting social and economic conditions within the PRB, although the effects have varied by county, community, and time frame. PRB energy resources are a major component of the Wyoming economy and have been a major contributor of state and local tax revenues for the last quarter century.

1.0 Introduction

Energy development has produced periodic surges in population in some PRB communities, occasionally followed by periods of population loss. However, the nationwide growth in energy consumption, coupled with the PRB's vast and relatively diverse energy resource base (coal, oil, natural gas, uranium), has resulted in a 50-year growth trend in Campbell County and other parts of the basin, without the busts and resultant ghost towns that have followed many other western U.S. resource booms.

This extended period of energy development has yielded substantial economic and community development benefits, including economic growth, employment opportunity, tax revenue growth, and infrastructure development for most local governments and for the State of Wyoming as a whole. At the same time, periods of rapid growth have stressed communities and their social structures, housing resources, and public infrastructure and service systems[2].

The recent wave of activity associated with CBNG development in the region, and the prospect of expanded coal production and expanded electric power generation in the future, raises several socioeconomic issues for the cumulative impact analysis as identified below:

- What is the status of the local labor market, and how is it likely to respond to changing conditions?

- What is the expected role of migration in terms of future growth?

- To what extent will energy development in Campbell County affect socioeconomic conditions in neighboring counties?

- Is community infrastructure and service capacity adequate for foreseeable needs?

- What are the implications of future resource development on key fiscal linkages?

- What is the current social climate regarding future energy development?

---

[2] Economic and demographic baseline data are available for states, counties, communities, county subdivisions and Indian Reservations throughout the west via the Economic Profile System (EPS). Developed by the Sonoran Institute, a non-profit organization, under an agreement with the BLM, the EPS produces standard economic and demographic profiles using data from various government agencies. EPS is not an impact model: it cannot quantify the economic effects of proposed policies and plans. Additional information and EPS software and database downloads are available on the internet at: http://www.sonoran.org/programs.si_se_program_tools.html.

2.0   TECHNICAL APPROACH

Socioeconomic analysis responds to the public's interest in knowing that decision-makers have considered how people and their communities, lifestyles, and activities will be affected by the management of public lands and their resources. The technical approach used in this study was designed to support these considerations and to disclose their results.

As an impact topic, socioeconomic effects are difficult to fully disclose, not because information is lacking but because information is abundant and there are many ways to view and interpret it. This study has adopted an approach to the socioeconomic analysis that addresses the complexity of the subject by viewing the task from a long-term planning perspective. A long-term planning perspective focuses on the principal social and economic indicators that are typically tracked by local governments and other providers of community development, social, and educational services. By focusing on selected key indicators, a planning analysis focuses its resources toward developing additional mid-scale temporal, geographic, and demographic detail that can be helpful at the community level. The additional dimensions of detail directly relate to the planner's goal of determining of where, when, and how additional community development could be needed in the future under the Wyoming PRB RFD scenarios.

2.1   Projected Levels of Activity

The projection of future socioeconomic conditions directly depends on economic assumptions associated with the two RFD scenarios that were developed for the PRB Coal Review. Assumptions regarding future coal production are the primary factors differentiating the two scenarios, although substantial increases in future annual coal production are anticipated under both scenarios: increasing from 363 million tons per year (mmtpy) in 2003 to 508 mmtpy in 2020 under the lower production scenario and 591 mmtpy under the upper production scenario. In addition to increased coal production, both scenarios include expansion of coal rail shipment capacity, and the upper production scenario also includes expansion of electrical generation capacity in the PRB.

The key assumptions underlying the RFD scenarios are summarized in **Tables 2-1** and **2-2**, with the assumptions related to coal production depicted graphically in **Figure 2-1**, and the assumptions regarding conventional oil and natural gas and CBNG development depicted graphically in **Figure 2-2**. In keeping with the protocol established in Task 2, the development assumptions are reported for specific milestone years, though they represent activity that would occur during the intervening period since the previous milestone. For example, the +18,809 CBNG wells reported in 2015 indicates the number of new wells since 2010.

Imbedded within the coal production scenarios are a resumption of production or startup of two coal mines (Coal Creek Mine and P&M Ash Creek Mine) under the lower scenario and upper scenario both prior to 2010. The 12 currently active coal mines would continue production throughout the forecast under either scenario.

2.0 Technical Approach

Table 2-1
Summary of Wyoming PRB RFD Assumptions

Industry	2003 Existing	2003-2010	2011-2015	2016-2020	Total Increase
Active Coal Mines					
Lower Scenario	12[1]	+2[2]	0	0	+2[2]
Upper Scenario	12[1]	+2[2]	0	0	+2[2]
Conventional Oil and Gas Wells[3]	18,302[4]	+5,194	+2,379	+1,946	+9,519
CBNG Wells[5]	17,515[4]	+23,999	+18,809	+20,060	+62,868
Coal-fired Power Plants	6[6]	+3	0	+1 (upper scenario only)	+3 (lower scenario) +4 (upper scenario
Operating Railroads	2	0	+1	0	+1

[1]Reflects active coal mines only.

[2]Includes one temporarily inactive mine (as of 2003), which is projected to reinitiate operations, and one projected new mine near Sheridan.

[3]Due to the concurrent refinement of the database for the Task 2 report and the REMI modeling conducted for this report, the projected levels new conventional oil and gas well development used in the socioeconomic analysis (as shown in this table) reflect an initial set of development assumptions that differ from those in the final Task 2 report (ENSR 2005b). The differences do not materially alter the anticipated impacts or conclusions of the overall socioeconomics assessment, but rather, they primarily affect the projected timing of anticipated tax revenues.

[4]Estimated total number of wells drilled including producing, inactive, and plugged and abandoned.

[5]The CBNG well projections for this study were being refined concurrently with the REMI modeling conducted for this report. As a result, the initial well numbers, as used in the REMI model and shown in this table, differ somewhat from the final well numbers in the database for the Task 2 report (ENSR 2005c). The final projections for new CBNG wells drilled in 2003-2010, 2011-2015, and 2016-2020 are 24,167, 19,206, and 16,361, respectively. The refined CBNG well projections, if incorporated into this analysis, would result in slightly higher cumulative employment and population changes and growth-related impacts in the near term, and slightly lower cumulative employment and population impacts in the long term (2016-2020) than what is presented in this report. However, the differences would be relatively minor in magnitude in any given time period and would tend to be somewhat offsetting when considered over the entire analysis horizon (2003 through 2020).

[6]Excludes the Dave Johnston Power Plant, which is located outside the study area near Glenrock.

Source: ENSR 2005b.

Table 2-2
Summary of Wyoming PRB RFD Production Assumptions

Industry	2003 Existing	2010	2015	2020	Total Change
Annual Coal Production					
Lower Scenario (mmtpy)	363.4	416.0	476.0	508.0	+ 144.6
Upper Scenario (mmtpy)	363.4	484.0	553.0	591.0	+ 227.6
Conventional Oil[1] (barrels per year)	12,979,659	15,736,000	14,292,000	13,793,000	+ 813,341
Conventional Gas[1] (mmcfpy)	39,981	42,750	38,910	35,100	- 4,891
CBNG[2] (mmcfpy)	338,300	773,800	836,200	900,400	+ 562,100
Electrical Generation (MW of capacity)	702[3]	+1,000	0	+700 (upper scenario only)	+1,700
Railroad Coal-hauling Capacity (mmtpy)	350	400	440	500	+150

[1]Due to the concurrent refinement of the database for the Task 2 and the REMI modeling conducted for this report, the projected levels of annual conventional oil and gas production used in the socioeconomic analysis (as shown in this table) reflect an initial set of development assumptions that differ from those in the final Task 2 report (ENSR 2005b). The differences do not materially alter the anticipated impacts or conclusions of the overall socioeconomics assessment, but rather, they primarily affect the projected timing of anticipated tax revenues.

[2]The CBNG production projections for this study were being refined concurrently with the REMI modeling conducted for this report. As a result, the initial production numbers, as used in the REMI model and shown in this table, differ somewhat from the final annual production projections in the Task 2 report (ENSR 2005b) and associated database. The final projections for annual CBNG production in 2010, 2015, and 2020 generally are lower than those used in the modeling for this report. The differences in projected annual production would translate into corresponding effects on the projected public sector revenues presented in this report. In some cases, differences of as much as 40 percent may result. The cumulative differences, considering the value of coal and conventional oil and gas would be moderate; however, it would not be substantial in terms of the relative orders of magnitude of revenues that would be generated.

[3]Excludes the Dave Johnston Power Plant which is located outside the study area near Glenrock.

Source: ENSR 2005b.

Note: mmcfpy = million cubic feet per year
     MW = megawatts
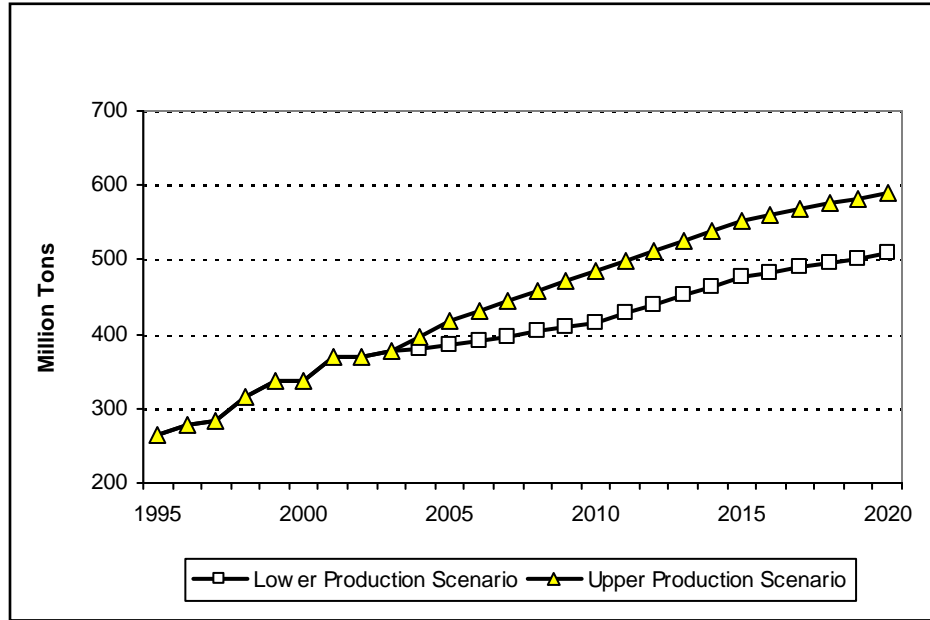
Figure 2-1. Projected Annual Coal Production in the Wyoming PRB

Source: Wyoming State Inspection of Mines 1995 to 2003.
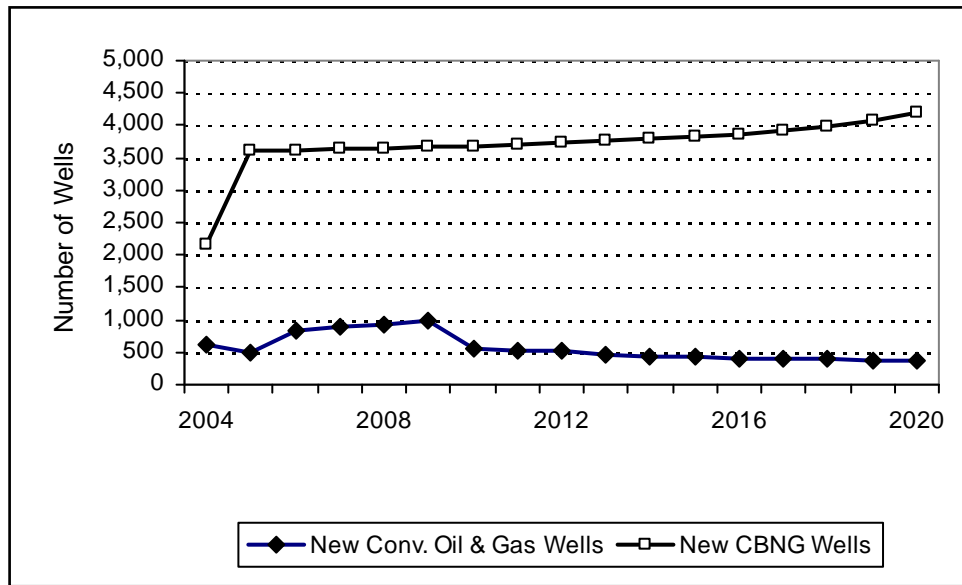
Figure 2-2. New Conventional Oil and Gas and CBNG Wells Drilled in the Wyoming PRB from 2004 to 2020

Under the lower coal production scenario, the Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) railroads would expand shipment capacity, and one new line would be built and operational by 2015. Three new power plants also would begin operations by 2010.

Expansion of electrical transmission line and generating capacity are projected as part of the upper production scenario. However, the timing and location of such a transmission line is so speculative as to be excluded from the current analysis. A fourth power plant is assumed to be built during the final 5-year period for this analysis (2016 to 2020). That power plant is assumed to locate in Campbell County to minimize coal transportation costs.

Cumulative development assumptions for oil and gas between 2004 and 2020 are 9,653 additional conventional oil and gas wells and 62,868 additional CBNG wells. That development outlook is intended to represent full development of the presently defined CBNG resource base in terms of the estimated number of well pads, with an allowance for multiple completions of some pads (see the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities [ENSR 2005b] for additional information regarding projected development), based on current pricing, geologic understanding of the PRB, regulatory environment, and technology. These assumptions contrast to those in the PRB Oil and Gas EIS (BLM 2003), which represented an interim, 10-year perspective on future oil and gas development. Consequently, the results and implications for socioeconomic conditions presented in this report are not directly comparable to those in the PRB Oil and Gas EIS.

For this study, future levels of new conventional oil and gas and CBNG development were combined with assumptions regarding annual drilling rates, success rates, average well life, and typical production per well to derive profiles of the oil and gas industry activity over time. Those profiles are shown in **Figures 2-2**, **2-3**, and **2-4**.
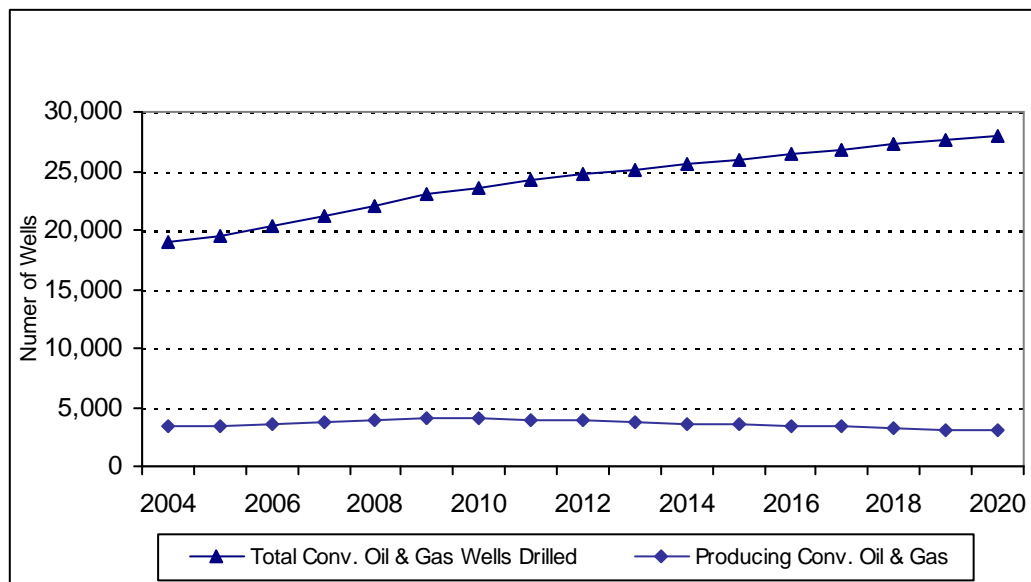
Figure 2-3. Cumulative and Producing Conventional Oil and Gas Wells in the Wyoming PRB from 2004 to 2020

By 2020, nearly 28,000 conventional oil and gas wells are projected under the two RFD scenarios. The interim development assumptions include 5,328 new wells through 2010, an average of approximately 750 wells per year. Thereafter, the rate of drilling would decline steadily, such that

the number of new wells drilled would fall below 400 in 2018. More than 62,000 additional CBNG wells are projected to be drilled through 2020, an average of approximately 3,650 wells annually.
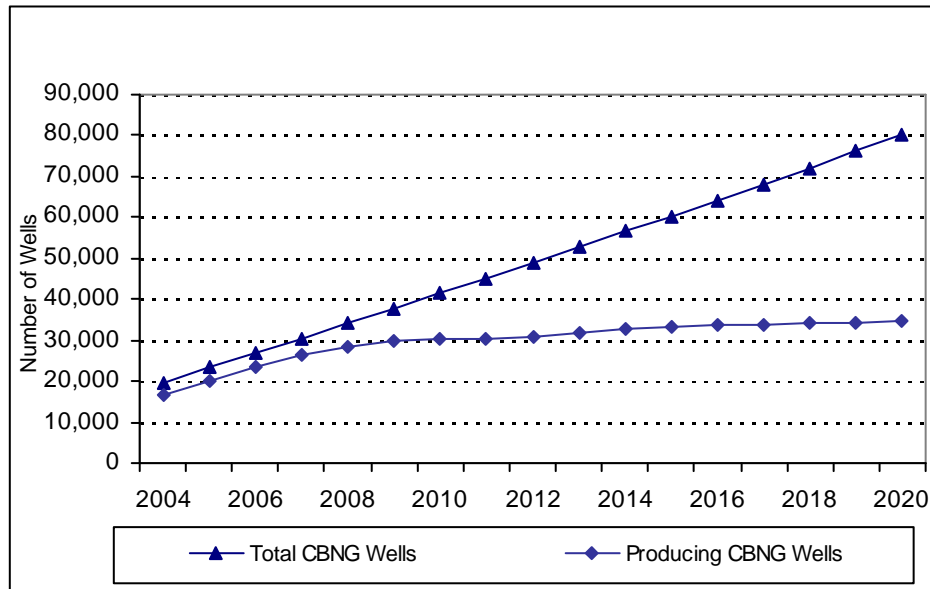
Figure 2-4. Cumulative and Producing CBNG Wells in the Wyoming PRB from 2004 to 2020

Based on the drilling rates outlined above, the number of active producing conventional oil and gas wells, excluding seasonally active wells, would increase to a peak of approximately 4,100 wells in 2009, after which it would decline to just over 3,000 in 2020 (**Figure 2-3**).

The RFD scenarios assume development of nearly 24,000 new CBNG wells from 2004 through 2010, an additional 18,809 during the subsequent 5 years, and 20,060 in the final 5-year period of this study. By 2020, the cumulative number of CBNG wells to be developed would be approximately 80,383, with the number of active producing wells increasing steadily to more than 34,700 (**Figure 2-4**).

Annual output projections that correspond to the development parameters outlined above are shown in **Table 2-2**. These output projections were derived to support the fiscal impact analysis. Relative to the 2003 annual production, the increases in coal production represent 39.8 and 62.6 percent, respectively, for the lower and upper production scenarios.

Annual oil production would climb through the middle of the cumulative analysis period, peaking at 15.7 million barrels in 2015, after which it would steadily decline. By 2020, total annual oil production is projected to decline by nearly 2.0 million barrels compared to the peak; however, it would be more than 800,000 barrels higher than the annual oil production in 2003.

Conventional natural gas production also is anticipated to peak during the cumulative analysis period, with the peak coming 5 years sooner than that for oil. After climbing by 6.9 percent between 2003 and 2010, annual conventional gas production is projected to decline by 18 percent to 35,100 mmcfpy in 2020, approximately 12 percent below the 2003 production level.

CBNG production would increase sharply over the cumulative analysis period, climbing from 338,300 mmcf in 2003 to 900,400 mmcf in 2020, a 166 percent increase. That increase primarily would be a result of the continued high pace of new well development, combined with the high success rates for CBNG wells.

Electrical generating capacity located within the PRB would more than double under the low scenario, from 702 MWs to 1,702 MWs by 2010. An additional 700 MWs of capacity, over and above the incremental capacity added under the lower production scenario, is assumed to come online by 2020 under the upper production scenario.

Railroad shipment capacity to export coal is assumed to increase to 400 mmtpy under the lower and upper production scenarios, as both the BNSF and UP expand their existing systems to accommodate additional production. In addition, the Dakota, Minnesota, & Eastern (DM&E) railroad is assumed to be operational by 2015, initially with capacity to haul 40 mmpty. By 2020, its capacity is assumed to increase to its full initial design capacity of 100 mmtpy. The capacity assumptions are based on the Draft EIS for the DM&E Powder River Basin Expansion Project (Surface Transportation Board 2001).

The development and production parameters outlined above provided the basis for the economic modeling for this analysis.

2.2   Economic Modeling and Analytical Methods

From the assumptions presented in Section 2.1, which were developed primarily from a resource policy and engineering perspective, a set of economic inputs was derived as a starting point for the Wyoming PRB regional impact analysis that used specific data and models to project future conditions in socioeconomic terms.

The regional socioeconomic impact analysis for this study started with the mathematical modeling of the total effect of change to the regional economy. Economic change starts with the "injection" of outside money into a study area through spending on new developments, such as those represented in the RFD scenarios. Economic change occurs as new money is spent and re-spent within the local economy. The mathematical model simulates the economic transactions that would occur and calculates the resulting total effect. General concepts like jobs and income are used to measure the impacts, along with estimates of many additional specific economic outcomes.

2.2.1   REMI Model

The regional model used in this study is REMI Policy Insight (REMI). REMI is a fully developed forecasting model that projects how changes in a local economy cause economic effects on an annual basis. The REMI model for this study was customized to represent two economic regions, one encompassing only Campbell County, and the other comprising of the seven Wyoming counties bordering Campbell County and linked to its economy by established industry and consumer trading and work force commuting patterns. Results for the second region then were analyzed to focus on the five counties (Converse, Crook, Johnson, Sheridan, and Weston) that are

the most directly linked to development influences in the PRB. The five-county area is sometimes referred to as the surrounding counties in the remainder of this report.

An important feature of REMI is it capability to model how local population is involved in the economy and how it changes in response to new economic opportunities. This component of the model explicitly addresses the key issues identified in Section 2.1 regarding local labor markets and their response to change, the role of migration in future growth, the spillover of energy development effects from Campbell County to neighboring counties, the adequacy of community infrastructure and services to meet projected needs, and the fiscal effects of future development on affected units of local government and public schools.

2.2.2   Economic Inputs to REMI

REMI is sensitive to a wide range of economic activities, and its software interface facilitates "what if" analysis. An important step in the technical approach to this regional analysis is the translation of activities defined in the Task 2 Report of the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005b) into economic terms for input into REMI as two different scenarios that can be compared and contrasted.

The "what if" framework for the analysis involved two steps. First, the lower production scenario for RFD activities was derived by translating assumptions regarding the number of new wells, tons of coal, and cubic feet of gas into a series of changes to future jobs and industry sales in each of the affected industries directly involved in the activity. Second, the upper production scenario translated a similar series meant to add in the changes to future jobs and industry sales that would occur if the economy were to experience activity levels under the upper production scenario instead of the lower production scenario. Changes in annual production and the value of power generated were the basis for estimating future operating employment for utilities.

In each step, industries that were modeled in REMI were selected to represent the activities assumed by the RFD scenarios. These industries were the mining industry for coal, conventional oil and gas, CBNG, and the contractors and professionals who support all types of mining; the construction industry for direct investment in new power plants and railroad lines; utilities for the operations of new power plants; and transportation for the operations of new railroad lines. Each series was a set of annual numbers from 2003 through the year 2020. The key inputs are presented in the appendix to this report.

Based on the specified inputs, REMI calculates the total effect on the economy and population, the distribution of effects between Campbell County and its neighbors, the timing of any highs and lows in overall development, flows of economic migration and commuting between the two model regions, and changes to the demographics of the population by age.

The forecasts and their implications are discussed fully in Chapter 3.0. These include details selected to provide planning insight and for use in estimating other variables not directly modeled in REMI. For example, REMI directly models population change by age. Change specific to the school aged population of 5 to 17 years of age is directly relevant to considering impacts to the public schools, while change to the population aged 65 years or older is relevant to a range of interests specific to retirees and the elderly. However, in two cases, detailed results that are goals of this study were not modeled directly by REMI. The first is the employment and population effects of the

upper and lower production scenarios in each of the five individual counties in the surrounding counties region. The second is the demand for housing in each county in the study area. The approach to deriving these effects from REMI results is described in the following sections.

2.2.3   Economic and Demographic Projections

A number of considerations led to the use of the two-region REMI model for the PRB Coal Review. Since a principal goal of the study was to estimate employment and population for individual counties throughout the PRB study area, it was necessary to undertake additional analysis and forecasting to disaggregate REMI's surrounding counties' forecasts. Separate spreadsheet models were used to divide REMI's aggregated forecasts (the control totals) into a separate forecast for each of the surrounding counties.

Similar procedures were used to disaggregate each control total into employment by industry for each county and county population by age (including school age population). All used a mathematical function fitted by regression analysis to project shares for the sub-areas contained within the study area. The sub-area shares then were used to allocate the regional control total. Data to support the analyses were obtained from the Wyoming Department of Administration and Information, Economic Analysis Division (WDAI) and U.S. Census Bureau.

County-level Employment by Industry

WDAI provided the principal data input for the disaggregation of REMI employment by industry (WDAI 2005a). Industry control totals for the 24 REMI industries were grouped to match the 15-industry Wyoming data. County shares of each industry were projected for each county, and the projected shares for 2010, 2015, and 2020 were used to allocate the REMI control totals. Initial results were compared to employment data assumptions from the PRB scenarios and to the disaggregated population projections (described below). Some ad hoc adjustments were made to the results for both PRB scenarios to smooth the transition from the last year of historical data in 2003 and to assure overall consistency with observed relationships between employment and population. Ad hoc adjustments were made to the results to adjust employment in the transportation industry for consistency with employment assumptions.

County-level Population by Age

WDAI Economic Analysis Division and the U.S. Census Bureau provided the principal data input for the disaggregation of county population by age (WDAI 2005b; U.S. Census Bureau 2005e). Wyoming historical data were grouped as five age groups within each county and matched by age group to REMI control totals for the upper and the lower production scenarios. County shares of each age group were projected for each county, and the projected shares for 2010, 2015, and 2020 were used to allocate the REMI control totals. Initial results were compared to employment data assumptions and to the disaggregated employment projections. Small ad hoc adjustments were made to the results in selected counties for both RFD scenarios to enhance consistency with employment assumptions.

<u>**Regional Population by County and Community**</u>

WDAI and the U.S. Census Bureau provided the principal data input for the disaggregation of total county population into total community population. Wyoming historical data on county and community population were assembled, and the community shares were projected for each county. Shares for 2010, 2015, and 2020 were used to allocate the estimated total county populations. Initial results were compared to employment data assumptions in the RFD scenarios, and small ad hoc adjustments were made in selected communities for consistency with those assumptions.

2.2.4   Housing Requirements

The procedure used to forecast total housing requirements in the future principally was driven by projected population levels and long-term national and local trends toward smaller household sizes. Projected housing requirements also factored in allowances for vacancy rates associated with the normal functioning real estate market.

The trends affecting household size are expected to continue. However, population growth and immigration may offset such declines under localized conditions. This may occur in Campbell, Sheridan, and Johnson counties. Thus, some ad hoc adjustments were made to the initial projections to reflect the demographic impact of younger economic migrants drawn by the job opportunities represented in the RFD scenarios. The adjustments marginally raised the number of persons per household and lowered housing requirements from trend-projected levels.

Data on household formation and housing vacancy rates for each county in the PRB study area were obtained from historical decennial censuses and local survey data. These were projected forward using exponential growth trends fitted to decennial data from 1940 to 2000. Housing requirements were derived from relationships among projected population, household size, the "normal" vacancy rate (3.5 percent) in the PRB study area, and the number of units typically held as "vacant" for seasonal, recreational, occasional, or other temporary uses.

2.2.5   Fiscal Analysis

Determining the fiscal impact of current and future energy production in the PRB involved several steps. The methodology is summarized below, and results are presented in Chapter 3.0. A full presentation of the underlying spreadsheets and input assumptions appears in the Appendix of this report. The methodology discussion described below is divided into two elements. The first is projected production, in terms of quantity (cubic feet, tons, or barrels, as appropriate) and monetary value. The second part discusses the approach to estimating the fiscal consequences associated with that production.

2.2.5.1   Production Quantity and Value

Due to differences in data sources, approach, and potential impacts, the production calculations were conducted differently for each of three energy commodities:

- Coal
- CBNG

- Conventional Oil and Gas

Furthermore, there are subcategories within each commodity.

Coal

Coal production was addressed as a range with figures given for a lower and an upper production level as described in the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005b) in 5-year intervals. In the fiscal analysis, the figures were interpolated into annual totals and were allocated to each affected county and school district based on the location of specific mines.

Production value was calculated by multiplying the production tonnage by a value per ton using the prices adopted by the State's Consensus Revenue Estimating Group (CREG) through 2010 and a 1.0 percent real annual increase thereafter, consistent with the CREG's projections up to that point.

CBNG

CBNG production was calculated separately for existing wells and those drilled in 2005 and beyond. Total production was disaggregated to account for federal, state, and private (fee) mineral interests, and also by county.

For future new wells, the calculation started with the number of wells to be drilled each year, as projected in the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005b). The fiscal analysis assigned annual production levels to each new well based on a lifetime production expectation of 234 mmcf and a production profile wherein annual production rises rapidly, peaks in the second year, and declines thereafter until the well is capped following 11 years of production. (See the appendix of this report for additional information on typical well productivity.)

For existing wells, the number of wells and their aggregate production were decreased over time in a similar manner but recognizing that, for the most part, the existing wells already had passed their most productive first 3 or 4 years.

Future prices were taken from the CREG[3] January 2005 report; however, unlike coal, there was no escalation in the unit price of CBNG beyond 2006 (and an actual decline from the 2005 figure). In calculating the total production value, an adjustment was made to the unit price to reflect a credit available to the producer to offset the cost of production (assumed to be $0.50 per mmcf).

---

[3] CREG is the official estimating body of revenues to be received by the Wyoming State Government. Formed by agreement between the executive and legislative branches, CREG consists of representatives from numerous state agencies, commissions, and the University of Wyoming. Semi-annually, CREG produces projections of major revenue streams for the upcoming 5 years, considering anticipated levels of mineral production, valuation, earnings on investments, and general fund sources of revenue (e.g., sales tax receipts). The projections help guide state budgeting. The projections generally are released in January and October and are available at http://eadiv.state.wy.us/CREG/CREG.asp. Information in CREG's January 2005 report was used in this analysis. The October 2005 report assumes higher energy resource prices. Incorporating the updated assumptions would result in a proportional increase the revenue projections presented later in this report.

Conventional Oil and Gas

Production of oil and gas from conventional (non-CBNG) wells was projected for the Wyoming PRB in the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005b). In the fiscal analysis, the production was allocated to the various counties and each leasehold type (federal, state, or fee) based on a constant factor that is, in turn, based on the known 2004 production and the expected location of future facilities.

The unit pricing for natural gas (per mmcf) and oil (per barrel) were taken from the CREG report with an adjustment for the production cost credit for natural gas.

2.2.5.2   Development-related Public Sector Revenue Effects

Most of the fiscal consequences of RFD activities stem directly from the value of production in the various sources described above. The fiscal consequences on public sector revenues addressed in this analysis include:

- Federal Mineral Royalties
- Severance Taxes
- State Mineral Royalties
- Ad Valorem Taxes
- Federal Coal Lease Bonus Bids

The fiscal analysis projects each of these on a year-by-year basis using the applicable geographic location of the production activity. Note that there also are royalties or lease payments to the fee holders where the production involves privately held mineral rights; however, those have not been calculated, nor are they a part of the public fiscal benefit. Severance tax and ad valorem taxes accrue from all three forms of ownership.

Federal Mineral Royalties

Lessees pay a royalty to the federal government based on the value of the production taken from federal lands. The current royalty rate is 12.5 percent for coal and natural gas and 6.0 percent for oil. The total receipts, less a processing and administration fee, are split equally between the state and federal governments. Funds disbursed to the State of Wyoming are distributed according to a legislatively approved formula. A summary of the distribution formula is shown in **Figure 2-5**.

Severance Taxes

Severance taxes are collected by the state on all mineral extraction based on the total production value. The current rate is 7.0 percent for coal and 6.0 percent for oil and natural gas. The state distributes the funds according to a formula to various entities, primarily the General Fund, the Budget Reserve, and the Permanent Wyoming Mineral Trust Fund. A certain amount of the total up to a cap goes to other entities including local jurisdictions. At least for now, that cap is being met by existing statewide production, although a substantial portion comes from production in the PRB.
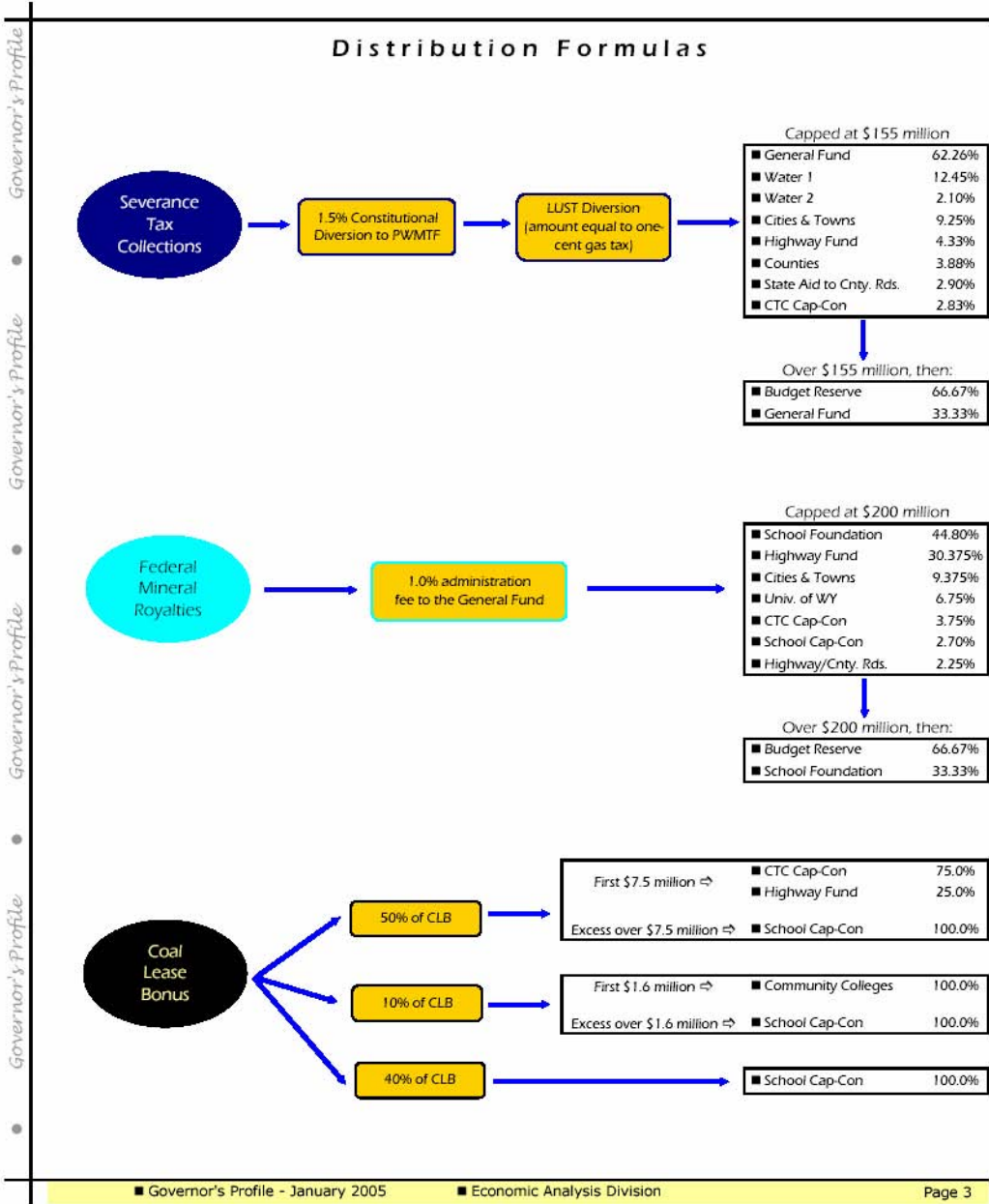
Figure 2-5. Distribution Formulas for State Revenues Derived From Energy Mineral Production

Source: CREG 2005.

2.0 Technical Approach

State Mineral Royalties

Production from state-owned lands is assessed a royalty of 16.67 percent of the production value. All of these royalties accrue to the Wyoming Office of State Lands.

Ad Valorem Taxes

Ad valorem taxes are assessed by local jurisdictions bases on a combination of the assessed value of taxable property and the local mill levy. In Wyoming, the total production value of extracted minerals is considered taxable property in the year it is extracted (collected the following year, as with other ad valorem taxes). In the case of coal and natural gas, and additional taxable amount has been added to account for the buildings and equipment associated with the production activity.

The fiscal analysis has calculated the potential ad valorem tax revenue for each county in the PRB based on its current mill levy. It should be noted that assessments and mill levies change each year, and a large increase in production could result in a reduction in the mill levy, offsetting some or all of the potential increase in the total amount of taxes collected. In either case, it is a benefit to the taxpayers in that jurisdiction.

Federal Coal Lease Bonus Bids

Coal producers interested in securing rights to produce from federal coal resources must submit competitive bids to secure such reserves. To be accepted by the BLM, a winning bid must meet or exceed a minimum established by the agency that represents the estimated fair market value of the resource allowing for future mine development and production costs and a reasonable profit. One-half of the successful bonus bid amounts are returned to the state, with payments due within 5 years of the sale. Uncertainty exists with respect to the timing and size of future leases, although leasing of 2.5 to 3.0 billion tons by 2020 is reasonably foreseeable. Bonus bids have been rising over time, with recent bids in the $0.60 to $1.00 per ton range. Future bonus bids are assumed to remain in that range.

3.0 CUMULATIVE SOCIAL AND ECONOMIC EFFECTS

The cumulative development scenarios developed in the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005b) and summarized in Chapter 2.0 of this report define an extended period of sustained energy development in the PRB study area. Employment in the economic sectors that drive the regional economy is expected to increase in response to the anticipated levels of future development activity and production. In the short-term, expanding labor demand would result in tight labor markets, characterized by competition for available labor, shortages of available and qualified labor, and higher wages, some of which already is occurring in the PRB study area (Bigelow 2004). Secondary employment gains in the trades, services, and other local industries associated with increased business and consumer spending may exacerbate the situation. Over time, such conditions may prompt migration, population growth, and a wide range of associated socioeconomic changes and effects, or constrain the pace of economic development activity.

This report describes the anticipated future effects of the cumulative development scenarios on the following key dimensions of the socioeconomic environment:

- Employment
- Population
- Housing
- Public Education
- Facilities and Services
- Selected Fiscal Revenue Effects

The assessment of cumulative impacts presented below maintains a macro-level perspective on anticipated changes, focusing on indicators of change over time at the county level and reporting projected levels of key indicators that can be monitored as a means of assessing the adequacy of the cumulative development scenario as a basis for NEPA compliance in future coal leasing actions. For purposes of this study, conditions as of year-end 2003 are the base or benchmark for the analysis, and 2010, 2015, and 2020 are the milestone years for projected cumulative effects.

The discussion and presentation of results for each key dimension of the socioeconomic environment begins with a general overview and conclusion of the projected effects under the lower production scenario, with an emphasis on changes in Campbell County and Gillette. That emphasis reflects both the fact that much of the development activity is and would be located in Campbell County, and that Gillette serves as the employment, trade, and service center for a large share of that activity. The assessment initially addresses anticipated effects at a regional scale over the entire time horizon of this study (2003 through 2020). The assessment then narrows to examine the effects at a more localized level, as well as highlighting timing issues in terms of how the changes would occur over time with respect to the three milestone years and the intervening periods they define (2003 to 2010, 2011 to 2015, and 2016 to 2020). Effects associated with the upper production scenario are presented in a parallel fashion.

3.1   Employment and Personal Income

3.1.1   Lower Production Scenario

Total employment of 63,903 was reported in the six-county study area in 2003. Another 48,300 jobs were based in Natrona and Niobrara counties. In the same year, total employment in Campbell County, where most of the coal mining and oil and gas related jobs were located, was 25,906 (U.S. Bureau of Economic Analysis 2005).

Total employment in the study area under the lower production scenario is projected to increase by 12,500 jobs, to 76,403 in 2020. Approximately 61 percent of the total increase, nearly 7,700 additional jobs, would be based in Campbell County. Sheridan, Johnson, and Converse counties also are expected to experience substantial gains in employment, while Crook and Weston counties would see modest long-term increases in employment. Across the region, the growth would be characterized by more rapid gains through 2010, followed by a much reduced pace of growth as gains in coal mining employment would be tempered by productivity gains, and construction of three power plants would be completed.

The projected employment gains over the entire analysis period (through 2020) translate to overall growth of 1.1 percent compounded annual growth rate (CAGR) across the six-county study area. Among the individual counties, the growth rate in employment is projected to range from 0.1 percent CAGR in Crook County, to 0.9 percent CAGR in Sheridan County and 1.5 percent in Campbell County (**Table 3-1**).

Table 3-1
Total Employment by County to 2020 Under the Lower Production Scenario

County	2000	2003	2010	2015	2020	Change 2003 to 2020	CAGR (percent)
Campbell	23,418	25,096	30,737	31,992	32,374	7,278	1.5
Converse	7,043	7,001	7,415	7,567	7,575	574	0.5
Crook	3,692	3,808	3,973	3,984	3,904	96	0.1
Johnson	4,839	5,261	5,830	6,146	6,315	1,054	1.1
Sheridan	16,610	17,928	19,651	20,385	20,743	2,815	0.9
Weston	4,853	4,809	5,039	5,115	5,112	303	0.4
Six-county Study Area	**60,455**	**63,903**	**72,645**	**75,189**	**76,023**	**12,500**	**1.0**

Source: U.S. Census Bureau 2005b (2000 and 2003 data).

Anticipated increases in coal mine employment, coupled with the associated secondary impacts on other industries, would account for approximately 9 percent of the total cumulative employment change through 2020. Increases in oil- and gas-related employment, including both conventional and CBNG, would account for an estimated 34 percent of the total increase. Another driving force behind projected growth, particularly in the surrounding counties, is underlying growth projected in

other sectors, including health and education, accommodations and food service, and professional services, that reflect local manifestations of larger-scale national trends.

The strong growth in employment, particularly in Campbell County through 2010, would outpace the capacity of the resident labor force to satisfy the projected demand. The imbalance is expected to set in motion forces that would result in labor force and population migration into the region. The net level of commuting into Campbell County by workers who reside in the surrounding counties and elsewhere also is projected to increase over time (**Table 3-2**). By 2020, an estimated 3,780 jobs in Campbell County would be filled by such commuters. At the same time, 430 Campbell County residents are expected to commute to jobs based elsewhere, many of those being associated with mining and other energy-related jobs in Converse County.

Table 3-2
Work Force Commuting in the PRB Under the Lower Production Scenario

County	2003	2010	2015	2020	Change 2003 to 2020
Campbell County					
Non-residents Commuting In	2,990	3,600	3,740	3,780	790
Residents Commuting Out	360	390	410	430	70
Net In	2,630	3,210	3,330	3,350	720
Neighboring Counties					
Non-residents Commuting In	1,550	1,680	1,730	1,750	200
Residents Commuting Out	6,100	6,990	7,160	7,200	1,100
Net Out	4,550	5,310	5,430	5,450	900

Historical data show that most of the work force commuting affecting Campbell County is to or from adjacent counties in Wyoming (see the Task 1C Report for the PRB Coal Review, Current Social and Economic Conditions [ENSR 2005a]). Thus, the increase of commuters into Campbell County would have a corollary effect on the levels of outbound commuting projected from the surrounding counties and from Natrona County. However, comparing the numbers of commuters into Campbell County to the numbers of residents in the neighboring counties who travel outside their place of residence to work suggests that substantial cross-commuting also occurs between counties in the surrounding region, for example, between Converse and Natrona counties and between counties in the study area and locations outside the study area. An example of the latter are residents of Sheridan employed at mines in southern Montana.

Another implication of the projected increases in the level of commuting would be increases in the net outflow of wage and salary earnings from Campbell County to the surrounding counties. Such flows of earnings and the consumer expenditures they produce support additional employment in the surrounding counties. Under the lower production scenario, the net annual outflow from Campbell County is projected to increase by approximately $75 million (in 2003 dollars) relative to the 2003 base of $115 million. The increases in net outflows are the combined results of increase in the level of commuting and increases in average real wages and salaries, particularly in energy-related industries.

The economic expansion associated with the lower production scenario would stimulate growth in personal income across the PRB, both in aggregate and on a per capita basis. In 2003, total

3.0 Cumulative Social and Economic Effects

personal income in Campbell County was $1.12 billion and $1.88 billion in the surrounding counties. Under the lower production scenario, total personal income in Campbell County is projected to increase by approximately 180 percent to $3.14 billion (nominal) in 2020. After accounting for inflationary effects, total personal income is projected to increase by 58 percent between 2005 and 2020, to $2.02 billion (2003 dollars). Total personal income in the surrounding counties is projected to increase by 111 percent to $4.43 billion (nominal). In real terms, that increase amounts to approximately $833 million (2003 dollars), although only a portion of the total change would be attributable to RFD activities.

The gains in total personal income would be reflected in rising real per capita personal incomes across the region. In Campbell County, real per capita income is projected to climb from $32,870 (2003 dollars) in 2005, to $36,737 in 2007 when construction of the three power plants is occurring. Per capita income then would decline to approximately $34,300 in 2010, before resuming a steady upward climb to $38,463 (2003 dollars) in 2020; a net increase of 17 percent through 2020. Real per capita income in the surrounding region also is anticipated to increase through 2020, from $35,145 in 2005 to $44,368 (both in 2003 dollars), or 27 percent[4].

Year 2010

Employment increases through the year 2010 is projected to total 8,742 jobs across the study area, raising total employment to 72,645. Gains of 5,641 jobs would be based in Campbell County, with an additional 3,101 jobs created elsewhere in the study area. The added economic stimulus associated with RFD activities in the PRB also may result in job gains in nearby areas beyond the surrounding counties, primarily in response to the indirect and induced effects of energy industry demands and higher consumer income. Those effects are not addressed in this study.

Employment in Campbell County is expected to jump to nearly 34,000 total jobs in 2007-2008 when three power plant construction projects are projected to be active concurrently at a time that also coincides with a projected surge in conventional oil and gas drilling and continued CBNG development. That construction is expected to be completed by 2010, such that projected employment in the milestone year actually reflects a decline compared to the temporary peak.

Employment gains across much of the remainder of the region, particularly Natrona County, are predicated as much on energy development in other parts of the state or on national trends (e.g., gains in health care services in response to general aging trends) as they are to future development assumptions outlined in the lower production RFD scenario. Consequently, employment growth in the surrounding counties is expected to occur more steadily over time.

Year 2015

The pace of employment growth is projected to moderate between 2011 and 2015, with 2,544 net new jobs being added, only about 30 percent of the total job growth between 2003 and 2010. The gains would be less heavily concentrated in Gillette and other counties in the primary study area

---

[4] The apparent anomaly of per capita income being higher in the surrounding counties than in Campbell County reflects the combined effects of: larger average household sizes in Campbell County (i.e., more children), the net inflows of labor income from Campbell County to the surrounding counties, and the continued influence of higher-than-average non-labor income in Sheridan and Natrona counties on the overall average. The latter is a residual impact of the structure of the REMI model which included Natrona and Niobrara counties in the second region even though they are not included in the six-county study area.

than during the preceding period (49 percent compared to 65 percent, respectively) as more oil and gas development and new mining activity moves into Johnson and Sheridan counties. The DM&E railroad also is projected to become operational during this period, resulting in both temporary construction and long-term operations job gains. Total employment in the six-county study area in 2015 is projected at 75,179.

Year 2020

Total employment of 76,023 is projected for the six-county study area. During the period from 2016 to 2020, the key forces shaping the economic outlook would be a slow down in the rate of conventional oil and gas development and gains in coal mining employment, although such gains would be tempered by anticipated long-term productivity increases in mining allowing for annual production to increase with relatively fewer employees.

3.1.2   Upper Production Scenario

Total employment in the six-county study area is projected to increase by 15,230 jobs, to 79,133 in 2020 under the upper production scenario. The difference in employment, relative to the lower production scenario, would be 2,730 jobs in 2020. That difference would amount to an approximate 3.6 percent increase in total employment, or approximately 23 percent higher than the increase projected under the lower production scenario. Factors contributing to the additional growth include higher annual coal production, higher levels of coal shipment by rail, and the completion of a fourth new power plant in the PRB. This analysis estimates future coal mining employment for the upper production scenario based on productivity improvements comparable to those assumed for the lower production scenario. This assumption represents a departure from the more aggressive productivity assumptions developed in Task 2, whereby the higher production was achieved with little additional employment. Although such productivity increases may be realized, this analysis adopted the more conservative approach as a means of assessing the potential implications of higher employment growth on social and economic conditions.

As in the lower production scenario, the job gains would be concentrated in Campbell County, as more than 10,100 new jobs would be added. Gains of nearly 3,000 jobs in Sheridan and 1,100 jobs in Johnson counties also are projected under the upper production scenario. A substantial portion of the gains in Sheridan would be tied to underlying migration and national economic trends fueling growth in trade and services employment that would be unrelated to specific activities identified in the RFD.

The projected employment gains over the entire analysis period translate to a 1.3 percent CAGR across the region, with a 2.0 percent CAGR in Campbell County (**Table 3-3**).

3.0 Cumulative Social and Economic Effects

Table 3-3
Total Employment by County to 2020 Under the Upper Production Scenario

County	2000	2003	2010	2015	2020	Change 2003-2020	CAGR (percent)
Campbell	23,418	25,096	33,316	34,386	35,206	10,110	2.0
Converse	7,043	7,001	7,459	7,614	7,625	624	0.5
Crook	3,692	3,808	3,994	4,006	3,927	119	0.2
Johnson	4,839	5,261	5,862	6,182	6,355	1,094	1.1
Sheridan	16,610	17,928	19,768	20,507	20,877	2,949	0.9
Weston	4,853	4,809	5,067	5,144	5,143	334	0.4
Six-county Study Area	**60,455**	**63,903**	**75,466**	**77,839**	**79,133**	**15,230**	**1.3**

Source: U.S. Census Bureau 2005b (2000 and 2003 data).

Local labor market conditions associated with the upper production scenario would foster higher levels of work force commuting into Campbell County. By 2020, an estimated 4,110 workers would commute from surrounding communities and more distant locations to jobs in Campbell County, 1,120 more than the estimated number of such commuters in 2003. Some of the commuting may be on a daily basis, while others may travel to and from their permanent residence on a less frequent basis. The projected numbers of workers living in neighboring communities who commute to Campbell County or elsewhere also would increase, with more than 7,600 such workers in 2020 (**Table 3-4**).

Table 3-4
Work Force Commuting In the PRB Under the Upper Production Scenario

County	2003	2010	2015	2020	Change 2003 to 2020
Campbell County					
Non-residents Commuting In	2,990	3,900	4,010	4,110	1,120
Residents Commuting Out	360	390	410	420	60
Net In	2,630	3,510	3,600	3,690	1,060
Surrounding Counties					
Non-residents Commuting In	1,550	1,690	1,740	1,760	210
Residents Commuting Out	6,100	7,380	7,510	7,610	1,510
Net Out	4,550	5,690	5,770	5,850	1,300

The increase in work force commuting under the upper production scenario would increase the net annual outflow from Campbell County by an additional $21 million (2003 dollars). This would be over and above the $75 million in additional outflow projected under the lower production scenario, thereby raising the net annual outflow to $212 million (2003 dollars)

The incremental economic expansion associated with the upper production scenario would stimulate additional personal income growth across the PRB, both in aggregate and on a per capita basis. Total personal income in Campbell County is projected to increase to $3.4 billion (nominal) in 2020, $262 million higher than under the lower production scenario. After accounting for inflationary effects, total personal income is projected to increase by 60 percent between 2005 and 2020, to

$2.18 billion (2003 dollars). Total personal income in the surrounding counties is projected to increase by 112 percent to $4.46 billion (nominal). In real terms, that increase would amount to approximately $850 million (2003 dollars) although only a portion of the total change would be attributable to PRB energy mineral resource development activity.

The gains in total personal income would be reflected in rising real per capita personal incomes across the region. In Campbell County, real per capita income is projected to climb from $32,870 (2003 dollars) in 2005, to $37,704 in 2007 when the combined effects of additional coal mining employment and construction of the three power plants are projected to occur. Per capita income then would decline to approximately $35,512 in 2010, before resuming a steady upward climb to $38,649 (2003 dollars) in 2020; a net increase of 18 percent through 2020. Real per capita income in the surrounding region also is anticipated to increase through 2020, from $35,214 to $44,361 (both in 2003 dollars), or 27 percent[5].

Year 2010

Employment increases through the year 2010 are projected to total 11,563 jobs across the study area, raising total employment to 75,466. Construction of three power plants is assumed to be completed by 2010, such that projected employment in the milestone year actually reflects a decline compared to the temporary peak. Relative to the lower production scenario, the projected employment in 2010 is 2,821 jobs higher, the differences being attributable to projected higher levels of coal production. Most of the gains (8,220 jobs) would be based in Campbell County, with 3,343 additional jobs projected elsewhere in the study area.

Some gains in the region are predicated on national trends (e.g., gains in health care services in response to general aging trends) as much as they are on future development assumptions outlined in the cumulative development scenario. Consequently, employment growth in the surrounding counties region is expected to occur more steadily over time.

Year 2015

The pace of employment growth is projected to moderate between 2011 and 2015, with 2,373 net new jobs being added, only about one-fifth the total added between 2003 and 2010. The gains would be relatively more concentrated outside of Campbell County, due to increases in mine employment in Sheridan County and the stimulus associated with the construction and initial operations of the DM&E railroad. Total employment in the six-county primary study area in 2015 is projected at 77,839.

Year 2020

Another short-term spike in employment is projected to occur over a 3-to-4 year period in Campbell County due to the assumed construction of another power plant. That project temporarily would support as many as 1,400 jobs. Completion of the project would result in a subsequent reduction in

---

[5] The apparent anomaly of per capita income being higher in the surrounding counties than in Campbell County reflects the combined effects of: larger average household sizes in Campbell County (i.e., more children), the net inflows of labor income from Campbell County to the surrounding counties, and the continued influence of higher-than-average non-labor income in Sheridan and Natrona counties on the overall average. The latter is a residual impact of the structure of the REMI model which included Natrona and Niobrara counties in the second region even though they are not included in the six-county study area.

employment, such that the net gain between 2016 and 2020 under the lower production scenario would be 1,294 net new jobs across the six-county study area, of which 820 would be located in Campbell County.

Total employment of 79,133 jobs is projected for the six-county study area. Assumed long-term productivity gains in mining factor into the forecasts as those gains would allow annual production to increase with relatively few additional mine employees. Campbell and Weston counties would gain jobs associated with operations of the DM&E railroad.

3.2   Effects on Population

3.2.1   Lower Production Scenario

The economic expansion associated with cumulative development under the lower production scenario would stimulate substantial population growth in the study area, arresting or stabilizing recent trends of declining population. Total population growth of more than 24,100 residents between 2003 and 2020 is projected across the entire six-county study area, a CAGR of 1.3 percent (**Table 3-5**).

Table 3-5
Projected County Population to 2020 Under the Lower Production Scenario

County	2000	2003	2010	2015	2020	Change 2003-2020	CAGR (percent)
Campbell	33,698	36,438	45,925	48,905	50,995	14,557	2.0
Converse	12,104	12,314	13,103	13,671	14,193	1,879	0.8
Crook	5,895	5,986	6,542	6,759	6,989	1,003	0.9
Johnson	7,108	7,554	8,389	8,867	9,326	1,772	1.2
Sheridan	26,606	27,115	28,459	30,016	31,467	4,352	0.9
Weston	6,642	6,671	7,108	7,174	7,208	537	0.5
Six-county Study Area	**92,053**	**96,078**	**109,526**	**115,392**	**120,178**	**24,100**	**1.3**

Source: U.S. Census Bureau 2005b (2000 and 2003 data).

Approximately 60 percent of the net population growth in the study area through 2020 is projected to occur in Campbell County, with the addition of 14,557 net new residents raising the county's total population to 50,995 (**Figure 3-1**). Such growth equates to a CAGR of 2.0 percent, compared to a 1.3 percent CAGR for the overall study area. Sheridan, Johnson, Converse, and Crook counties also would experience substantial population growth over the time horizon of this analysis (2003 to 2020). Population gains in Weston County would be smaller, despite the growth stimulus associated with future energy resource development, due to anticipated declines in agriculture and other economic sectors in the local economy. Although not part of the six-county study area, Natrona County also would realize long-term population growth, both as an indirect consequence of the activity in the PRB and its role as a trade and services center for much of the state.
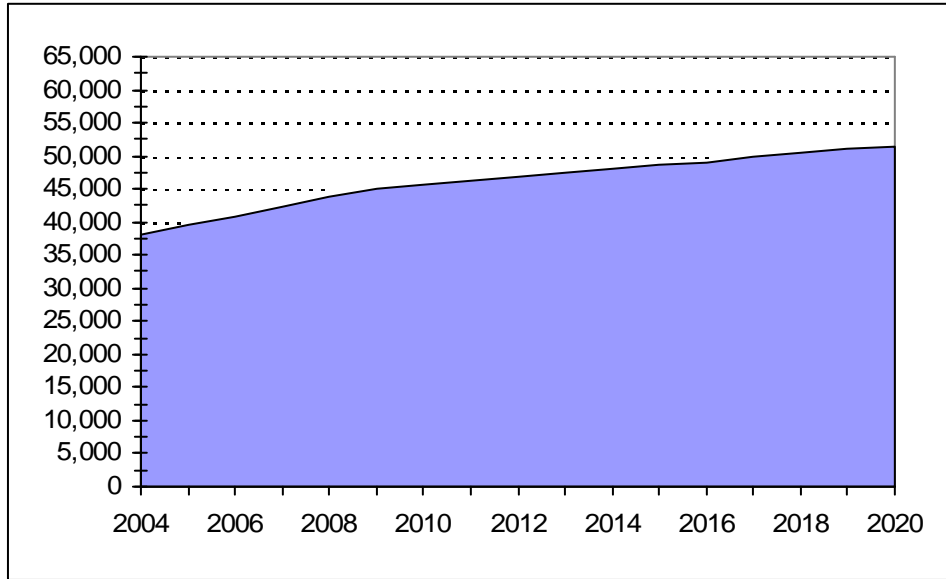
Figure 3-1. Campbell County Population Under the Lower Production Scenario

Resident labor is expected to satisfy much, but not all, of the expanded labor demand associated with the lower production scenario. Consequently, labor force shortages would trigger net labor force immigration to meet the strong demand for workers. Approximately 61 percent of the total population growth between 2003 and 2020 would be the result of net migration (**Table 3-6**).

Table 3-6
Projected Net Migration by County to 2020 Under the Lower Production Scenario

County	2003-2010	2011-2015	2016-2020	Total
Campbell County	6,150	469	33	6,652
Surrounding Counties	3,119	2,356	2,567	8,042
Total	**9,269**	**2,825**	**2,600**	**14,694**

As is presently the case, the majority of the population growth would be concentrated in Gillette, Sheridan, Douglas, and Buffalo. Smaller towns such as Newcastle, Wright, and Sundance that serve as local employment, trade, and service centers also would see gains. Collectively, these communities are projected to gain 15,581 residents between 2003 and 2020, a 27 percent increase compared to 2003. An aggregate population gain of 8,519 residents is projected in the unincorporated rural areas and remaining smaller communities in the study area by 2020, a 22 percent gain (**Table 3-7**).

Of the communities in the region, Gillette would experience the largest population gains, approximately 9,500 additional residents between 2003 and 2020. When compared to the estimated 2003 population of 22,113, the growth would represent a 43 percent increase and a continuation of the strong growth that has characterized the past three decades. Although smaller in magnitude, the projected population growth of approximately 5,600 residents in the unincorporated

areas near Gillette, Wright, and other parts of the county also would represent strong growth with attendant pressures on public services.

Table 3-7
Projected Population to 2020 for Counties and Selected Communities Under the Lower Production Scenario

County/Community	2000	2003	2010	2015	2020	Change 2003 - 2020
Campbell County						
Gillette	20,494	22,113	29,392	30,810	31,617	9,504
Wright	1,357	1,418	1,952	1,956	1,989	571
Rest of county	12,129	12,907	14,581	16,139	17,389	4,482
Total	**33,980**	**36,438**	**45,925**	**48,905**	**50,995**	**14,557**
Converse County						
Douglas	5,302	5,396	5,962	6,220	6,103	707
Glenrock	2,241	2,284	2,366	2,428	2,478	194
Rest of county	4,511	4,634	4,775	5,023	5,612	978
Total	**12,054**	**12,314**	**13,103**	**13,671**	**14,193**	**1,879**
Crook County						
Moorcroft	804	826	896	940	985	159
Sundance	1,155	1,176	1,341	1,386	1,398	222
Rest of county	3,908	3,984	4,305	4,433	4,606	622
Total	**5,867**	**5,986**	**6,542**	**6,759**	**6,989**	**1,003**
Johnson County						
Buffalo	3,899	4,221	4,698	5,010	5,316	1,095
Rest of county	3,172	3,333	3,691	3,857	4,010	677
Total	**7,071**	**7,554**	**8,389**	**8,867**	**9,326**	**1,772**
Sheridan County						
Sheridan	15,803	16,000	16,933	18,010	18,880	2,880
Rest of county	10,788	11,115	11,526	12,006	12,587	1,472
Total	**26,591**	**27,115**	**28,459**	**30,016**	**31,467**	**4,352**
Weston County						
Newcastle	3,241	3,247	3,447	3,465	3,467	220
Upton	869	872	889	897	901	29
Rest of county	2,515	2,552	2,772	2,812	2,840	288
Total	**6,625**	**6,671**	**7,108**	**7,174**	**7,208**	**537**
Six-county Study Area						
Selected Places	55,165	57,553	67,876	71,122	73,134	15,581
Rest of area	37,023	38,525	41,650	44,270	47,044	8,519
Total	**92,188**	**96,078**	**109,526**	**115,392**	**120,178**	**24,100**

Source: U.S. Census Bureau 2005c (2000 and 2003 data).

The growth implications of the lower production scenario for Gillette may be even more pronounced than suggested by the projections outlined above. Long-term monitoring of the local housing stock and vacancy rates by the city suggest many dwelling units in the community are occupied on an extended-term basis by individuals or groups of unrelated individuals who consider their primary place of residence to be elsewhere. By U.S. Census Bureau definitions, those individuals, although they spend considerable time in the community and impose demands on public services while simultaneously supporting local retail and service establishments and generating tax revenues, are not classified as residents and the dwelling units they inhabit are considered vacant. The

projections presented in **Table 3-7** are consistent with the U.S. Census Bureau definition. From the city's perspective, these individuals are more like residents than, for example, motorists traveling along the Interstate-90 corridor who overnight in Gillette. The city has developed the concept of a Gillette Service Population to characterize the situation. In recent years, the city estimates its effective population is 2,300 to 2,800 higher than estimates reported by the U.S. Census Bureau. Thus, assuming that current trends continue in the future, the city's effective service population would increase to approximately 34,000 by 2020.

Year 2010

The continuing level of CBNG development, combined with a surge in conventional oil and gas drilling and new power plant construction, is expected to trigger strong growth through 2010. A total population change of 13,448 is projected across the region between 2003 and 2010; 56 percent of the total projected growth through 2020. Interim periods of accelerated growth would occur in 2007 and 2008 due to the simultaneous development of several power plants. Of the total change, 71 percent is expected to occur in Campbell County. Sheridan County would gain 1,344 residents during the same period, reaching a total population of 28,459. Johnson and the other counties in the study area also would see population gains, but of lesser magnitudes.

The strong demand for labor associated with energy development would result in a considerable influx of new residents. Migration is expected to account for 69 percent of the net population change during the period. In addition, the level of net commuting into Campbell County from neighboring counties is expected to increase.

Year 2015

Population growth across the region is projected to moderate between 2011 and 2015, with the total regional population climbing to 115,392 by 2015. The moderation would occur as activity at the proposed power plants transitions from construction to less labor-intensive operations, the pace of conventional oil and gas abates, and the construction of ancillary CBNG gas field development slows. At the same time, the level of oil and gas production and well service employment would climb as the number of wells in production and the number of wells being plugged and abandoned increases. Direct employment associated with coal mines would increase by an estimated 150 workers, accounting for less than one-half of the total change in mining and about one-third of the total population change. Sheridan County's population would top 30,000 for the first time during this period

Year 2020

The population growth trends established in the preceding 5-year period are anticipated to continue between 2016 and 2020 as the mining sector continues to expand in response to increases in coal production and the cumulative oil and gas field services and production employment. Consequently, the net result of the lower production scenario is a projected population of 120,178 across the six-county study area. Campbell County's population would exceed 50,000 for the first time at some point between 2015 and 2020.

3.2.2 Upper Production Scenario

The added economic stimulus could translate into an incremental population growth of 4,525 residents by 2020 relative to the projected population under the lower production scenario. Of that total, Campbell County would gain nearly 3,950 additional residents, Converse County approximately 120 residents, and Sheridan County almost 270 residents. The remaining counties in the PRB also would register modest additional population gains relative to the lower production scenario.

With the additional growth, the total population in the six-county study area is projected to reach 124,703 by 2020 (**Table 3-8**). The net gain across the six-county study area would be 28,625 residents, a compounded annual growth rate of 1.5 percent compared to 1.3 percent under the lower production scenario. The impetus for the additional growth primarily would occur over time in relation to coal mining employment increases, construction of another new power plant, and increases in rail shipment of coal. As a result, the differences in projected population under the lower and upper production scenarios would climb from 2,006 in 2010 to 4,525 in 2020 (**Table 3-9**).

Table 3-8
Projected County Population to 2020 Under the Upper Production Scenario

County	2000	2003	2010	2015	2020	Change 2003 – 2020	CAGR (percent)
Campbell	33,698	36,438	47,662	51,558	54,943	18,505	2.4
Converse	12,104	12,314	13,160	13,763	14,313	1,999	0.9
Crook	5,895	5,986	6,570	6,802	7,045	1,059	1.0
Johnson	7,108	7,554	8,424	8,924	9,403	1,849	1.3
Sheridan	26,606	27,115	28,579	30,214	31,733	4,618	0.9
Weston	6,642	6,671	7,137	7,219	7,266	595	0.5
Six-county Study Area	**92,053**	**96,078**	**111,532**	**118,480**	**124,703**	**28,625**	**1.5**

Source: U.S. Census Bureau 2005b (2000 and 2003 data).

Table 3-9
Differences in Projected County Population Lower Versus Upper Production Scenarios

County	2010	2015	2020
Campbell	1,737	2,653	3,948
Converse	57	92	120
Crook	28	43	56
Johnson	35	57	77
Sheridan	120	198	266
Weston	29	45	58
Six-county Study Area	**2,006**	**3,088**	**4,525**

Higher levels of immigration would account for virtually all of the additional population growth, with most of that occurring by 2010. By 2010, nearly 7,800 individuals, 68 percent of the newly in-migrating persons, would be expected to settle in Campbell County, compared to 3,665 new residents locating elsewhere in the region, which in this case includes Natrona County. Beyond 2010, the pace of labor demand growth would slow, with an attendant slowdown in migration. Net migration into Campbell County would decline to approximately 1,200 and 1,000, respectively, in each of the subsequent 5 year periods. Net migration into the surrounding counties would be approximately 2,600 to 2,700 per 5 years in the subsequent periods, only marginally higher than under the lower production scenario (**Table 3-10**).

Table 3-10
Projected Net Population Migration by County to 2020 Under the Upper Production Scenario

County	2003-2010	2011-2015	2016-2020	Total
Campbell County	7,773	1,187	1,003	9,963
Surrounding Counties	3,665	2,632	2,777	9,074
Total	**11,438**	**3,819**	**3,780**	**19,037**

At the local level, population changes affecting communities under the upper production scenario would mirror those outlined under the lower production scenario, with the majority of the gains occurring in Gillette, Sheridan, Buffalo, and Douglas. Gillette would be anticipated to gain nearly 12,000 residents by 2020 under the upper production scenario, climbing to 34,065, approximately 2,450 higher than under the lower production scenario (**Tables 3-7** and **3-11**). Including allowances for persons who work and live in the community on a long-term basis, but who consider the primary residence to be elsewhere, the estimated Gillette Service Area population would exceed 36,400. The Gillette area also would see additional population growth in the nearby unincorporated portions of the county. Wright and the communities and unincorporated areas of Converse and Sheridan counties would experience population gains upwards of 200 residents above the corresponding forecasts for the lower production scenario.

Year 2010

Realization of the upper production scenario would imply a 30 percent increase, more than 120 mmtpy, in total annual coal production in the PRB by 2010. Projected gains in average employee productivity would temper the increases in employment needed to achieve the projected production levels. Although one set of forecasts developed in the Task 2 report (ENSR 2005b) assumed productivity gains that would minimize the need for additional employees to achieve the increased production, the socioeconomic analysis maintains the more conservative productivity assumptions embodied in the lower production scenario. The consequences of doing so include higher population growth projections. The need for more coal mine employees, coupled with the other cumulative activities, would result in a total population change of 15,454 across the six-county study area between 2003 and 2010. That change would account for approximately 54 percent of the total change projected through 2020. Periods of accelerated growth would occur in 2007 and 2008 due to the projected simultaneous development of several power plants. Of the total population change, approximately 73 percent is expected to occur in Campbell County. Sheridan County would gain over 1,400 residents during the period, reaching a total population of nearly

28,600. Other counties in the study area would experience population gains, but of lesser magnitudes.

Table 3-11
Projected Population for Counties and Selected Communities in the PRB to 2020 Under the Upper Production Scenario

County/Community	2000	2003	2010	2015	2020	Change 2003 - 2020
Campbell County						
Gillette	20,494	22,113	30,504	32,500	34,065	11,952
Wright	1,357	1,418	2,026	2,064	2,143	725
Rest of county	12,129	12,907	15,133	17,024	18,736	5,829
Total	**33,980**	**36,438**	**47,662**	**51,588**	**54,943**	**18,505**
Converse County						
Douglas	5,302	5,396	5,988	6,262	6,155	759
Glenrock	2,241	2,284	2,376	2,444	2,499	215
Rest of county	4,511	4,634	4,796	5,057	5,659	1,025
Total	**12,054**	**12,314**	**13,160**	**13,763**	**14,313**	**1,999**
Crook County						
Moorcroft	804	826	900	945	993	167
Sundance	1,155	1,176	1,347	1,394	1,409	233
Rest of county	3,908	3,984	4,323	4,463	4,643	659
Total	**5,867**	**5,986**	**6,570**	**6,802**	**7,045**	**1,059**
Johnson County						
Buffalo	3,899	4,221	4,717	5,042	5,360	1,139
Rest of county	3,172	3,333	3,707	3,882	4,043	710
Total	**7,071**	**7,554**	**8,424**	**8,924**	**9,403**	**1,849**
Sheridan County						
Sheridan	15,803	16,000	17,005	18,128	19,040	3,040
Rest of county	10,788	11,115	11,574	12,086	12,693	1,578
Total	**26,591**	**27,115**	**28,579**	**30,214**	**31,733**	**4,618**
Weston County						
Newcastle	3,241	3,247	3,461	3,487	3,495	248
Upton	869	872	892	902	908	36
Rest of county	2,515	2,552	2,783	2,830	2,863	311
Total	**6,625**	**6,671**	**7,137**	**7,219**	**7,266**	**595**
Six-County Study Area						
Selected Places	55,165	57,553	69,216	73,168	76,067	18,514
Rest of area	37,023	38,525	42,316	45,342	48,636	10,111
Total	**92,188**	**96,078**	**111,532**	**118,510**	**124,703**	**28,625**

Source: U.S. Census Bureau 2005c (2000 and 2003 data).

The strong demand for labor associated with energy development would result in a considerable influx of new residents. Migration is expected to account for 74 percent of the net population change during the period. In addition, the level of net commuting into Campbell County from neighboring counties is expected to increase.

<u>**Year 2015**</u>

Population growth across the region is projected to moderate between 2011 and 2015, with the total regional population climbing to 118,510 by 2015, a net change of 6,978 residents (or 6 percent) during the 5-year period. The moderation would occur as the new power plants transition from construction to less labor intensive operations, the pace of conventional oil and gas abates, and the construction of ancillary CBNG gas field infrastructure slows.

Campbell County's population would exceed 50,000 for the first time in approximately 2013 or 2014, approximately 5 years earlier than would be anticipated under the lower production scenario.

<u>**Year 2020**</u>

The population growth trends established in the preceding 5-year period is projected to continue between 2016 and 2020 as the mining sector expands in response to increases in coal production and cumulative oil and gas field services and production employment. Consequently, the net result of the upper production RFD scenario is a projected population of 124,703 across the six-county study area. Because most of the incremental economic activity associated with the upper production scenario would be centered around Gillette, other communities in the study area would not experience major additional growth under the upper production scenario.

3.3   Housing

Effects of the RFD scenarios on regional housing demand would link population change to social conditions in the PRB communities that potentially would be affected by the cumulative development. The private sector generally produces housing when presented with new market opportunities. However, when housing demand is created by short-term projects or by sustained rapid growth, supply may not expand sufficiently in quantity or in the appropriate time frame to match a community's housing needs.

Both RFD scenarios substantially would increase the need for new housing in the six-county study area. In terms of new housing requirements (a measure that assumes that the housing supply would grow in response to a rising number of households but would not shrink when households decrease) the lower production scenario would require approximately 11,268 housing units through 2020, an approximate 27 percent growth over 2003 levels. New housing requirements under the upper production scenario would be 13,601 units more, an approximately 31 percent growth over current inventories and 1,800 units more than under the lower production scenario. Approximately 60 percent of the projected demand for new housing under either RFD scenario would occur in Campbell County.

The relative size of the housing impacts from the two RFD scenarios may be evaluated by a comparison to past growth in the study area. One comparative benchmark is the dramatic growth that occurred in the PRB in the 1970s. During that decade alone, the number of housing units in the six-county study area grew by approximately 78 percent (14,900 units) (see the Task 1C Report for the PRB Coal Review, Current Social and Economic Conditions [ENSR 2005a], p. 3-40). This was 1,500 units per year on average for the "boom" decade, compared to an average of 1,100 to 1,200 units under these scenarios. That pace of development, while acknowledged as coinciding

with a period of economic expansion and prosperity, also strained the region's construction trade and building supplier industries. Although the underlying economies are larger now, the projected needs would tax the ability of communities to respond. Signs of strain already are apparent in Gillette and could surface elsewhere. The forecasted rate of growth under the upper production scenario, and to only a slightly lesser extent under the lower production scenario, would be large enough to exert substantial pressure on housing markets and the housing development and construction industries, all at a time when demands for labor and other resources already would be high.

3.3.1   Lower Production Scenario

More than two-thirds of the new housing potentially required in Campbell County under the lower production scenario would be needed by 2010. This forecast, along with requirements for other counties in the study area, is presented in **Tables 3-12** and **3-13**. Other counties of the six-county study area, as well as Natrona County, would see demand for new housing emerge more gradually.

Table 3-12
Total Housing Requirements to 2020 Under the Lower Production Scenario

County	2003	2010	2015	2020
Campbell	13,707	18,015	19,260	20,177
Converse	5,741	6,004	6,314	6,621
Crook	3,036	3,277	3,438	3,615
Johnson	3,622	4,119	4,340	4,560
Sheridan	12,861	13,563	14,290	14,917
Weston	3,273	3,420	3,523	3,618
Six-county Study Area	**42,240**	**48,398**	**51,165**	**53,508**

Source: U.S. Census Bureau 2005d (2003 data).

Table 3-13
Net New Housing Required to 2020 Under the Lower Production Scenario

County	2003-2010	2011-2015	2016-2020	Total
Campbell	4,308	1,245	917	6,470
Converse	263	310	307	880
Crook	241	161	177	579
Johnson	497	221	220	938
Sheridan	702	727	627	2,056
Weston	147	103	95	345
Six-county Study Area	**6,158**	**2,767**	**2,343**	**11,268**

Year 2010

From the present to 2010, the potential need for new housing under the lower production scenario would be most heavily concentrated in Campbell County. The requirement to house an expanding

population would create a demand for approximately 4,300 new units in Campbell County, approximately 70 percent of the total needs within the six-county study area and 67 percent of the total housing requirement in Campbell County through 2020 under the lower scenario.

Projected housing needs in Sheridan and Johnson counties between 2003 and 2010 are approximately 700 and 500 units, respectively, or approximately 34 and 53 percent of the respective housing requirement for these counties through 2020.

In Converse and Crook counties, the estimated housing requirement through 2010 would be approximately 260 units (30 percent of the total need through 2020) and approximately 240 units (42 percent of total need), respectively. The estimated new housing requirement in Weston County is for 147 units through 2010 under the lower production scenario. Although smaller in magnitude than the estimated needs in Campbell and Sheridan counties, the needs in the other counties also would tax the capabilities of the construction sector to respond in a timely manner.

Year 2015

Relatively greater housing needs would emerge among the smaller counties of the six-county study area during the second 5-year period of the lower production scenario. In Converse County, the potential housing requirement would be approximately 310 units (approximately 35 percent of the total need through 2020), while in Crook County, it would be lower than during the previous period through 2010 at approximately 160 units (approximately 28 percent of the total need). Weston County potentially would require approximately 100 units to accommodate new households during the period, or about a third of the county's projected total need through 2020 under the lower scenario.

Campbell County's demand for new housing from 2011 to 2015 is estimated at approximately 1,245 new units, or approximately 19 percent of the total demand through 2020 under the lower scenario. Sheridan and Johnson counties potentially would require approximately 730 and 220 units, respectively, during the period, or approximately 35 percent and 24 percent of the total need in each county, respectively, through 2020.

Year 2020

In the final 5-year period of the forecast (2016 through 2020), Campbell County would require nearly 920 additional new housing units, 14 percent of the total requirement through 2020.

Given the projected population growth, Sheridan and Johnson counties would require approximately 630 and 220 additional units, respectively, or approximately 30 and 23 percent of the total needs through 2020 in the westernmost counties of the six-county study area.

In Converse and Crook counties, potential housing requirements from 2016 to 2020 respectively would be approximately 310 units (approximately 35 percent of the total need through 2020) and approximately 180 units (approximately 24 percent of the total need). Weston County potentially would require another 100 units to accommodate net household growth from 2016 through 2020, or approximately the remaining half of the county's projected total housing need for the entire forecasted period (2003 through 2020).

3.3.2   Upper Production Scenario

Housing requirements under the upper production scenario would reflect increased mining in Campbell and Converse counties, construction of an additional power plant, and increased rail shipments affecting the southeast portion of the six-county study area. Based on the timing of the development activities and the related production level, a somewhat higher proportion of all new housing potentially demanded in Campbell and Converse counties through 2020 would be needed from 2003 through 2010. **Tables 3-14** and **3-15** present the total and incremental new housing requirements in the study area under the upper production scenario.

Table 3-14
Total Housing Requirements to 2020 Under the Upper Production Scenario

County	2003	2010	2015	2020
Campbell	13,707	18,674	20,273	21,694
Converse	5,741	6,026	6,358	6,677
Crook	3,036	3,289	3,459	3,642
Johnson	3,622	4,133	4,368	4,596
Sheridan	12,861	13,613	14,388	15,045
Weston	3,273	3,433	3,545	3,647
Six-county Study Area	**42,240**	**49,168**	**52,391**	**55,301**

Source: U.S. Census Bureau 2005d (2003 data).

Table 3-15
Net New Housing Required to 2020 Under the Upper Production Scenario

County	2003-2010	2011-2015	2016-2020	Total
Campbell	5,010	1,599	1,421	7,987
Converse	286	332	319	936
Crook	253	170	183	606
Johnson	511	235	228	974
Sheridan	755	775	657	2,184
Weston	-	112	102	374
Six-county Study Area	**6,815**	**3,223**	**2,910**	**13,061**

Year 2010

RFD activities under the upper production scenario would add to the housing requirements projected for Campbell County through 2010. The upper scenario implies demand for approximately 4,970 new units in Campbell County for the period. This is approximately 15 percent above housing needs under the lower scenario and approximately 62 percent of the total housing requirement forecasted for Campbell County through 2020 under the upper scenario.

During the same time frame, Sheridan and Johnson counties potentially would require approximately 750 and 510 units, respectively, or 35 and 52 percent of their total housing requirements through 2020. Housing impacts through 2010 under the upper scenario would be

7 percent higher than under the lower scenario in Sheridan County and 3 percent higher in Johnson County.

In Converse and Crook counties, projected new housing requirements through 2010 would be approximately 285 units (about 30 percent of total need through 2020) and approximately 253 units (approximately 42 percent of the total need), respectively. Through 2010, housing impacts under the upper scenario would be 8 percent higher than under the lower scenario in Converse County and 5 percent higher in Crook County.

New housing demand through 2010 in Weston County is projected at 160 units under the upper production scenario.

Year 2015

As the upper production scenario includes more development in the southeastern part of the PRB, Weston County would need 112 units of additional housing from 2011 to 2015. This would be approximately 9 percent higher than under the lower production scenario and approximately 30 percent of the cumulative new housing requirements in Weston County through 2020.

Under the upper production scenario, Campbell County potentially would need nearly 1,600 units of additional housing from 2011 to 2015, approximately 20 percent of the total needs through 2020. This level of housing need would be approximately 350 units and 28 percent higher than under the lower scenario in Campbell County through 2010.

New housing requirements in other counties under the upper production scenario from 2011 to 2015 would include:

- Converse County – 332 units, 35 percent of the total upper scenario requirements through 2020

- Crook County – 170 units, 9 units more than under the lower scenario and 28 percent of total requirements through 2020

- Sheridan County – 775 units, 48 units more than under the lower scenario and 35 percent of total requirements under the upper production scenario

- Johnson County – 235 units, 24 percent of total requirements under the upper production scenario

Year 2020

From 2016 to 2020, new housing needs under the upper production scenario would include:

- Campbell County – 1,421 units
- Converse County – 319 units
- Crook County – 183 units
- Sheridan County – 657 units
- Johnson County – 228 units

- Weston County – 102 units

3.4   Public Education

Communities across the PRB study area likely would see higher total population as a result of economic migration; however, the effects on the sizes of the school-age populations would vary by location. In some counties, the size of that group (aged 5 to 17 years) may even trend in the opposite direction of the total population trend.

As the age structure of the population changes, school districts in the PRB would be among the public service providers most affected. The demographic forecasts developed from the RFD scenarios project an end to recent declines in school enrollments across much of the PRB, with growth resuming and then continuing beyond 2010 for all PRB school districts except those serving Weston County. However, some districts still may have enrollments in 2020 that are lower than current levels as growth from 2010 to 2020 would not offset the recent declines they have experienced.

From 2010 to 2020, annual growth in projected school enrollments would range from 0.7 percent to 2.2 percent CAGR, depending on the district, with one exception. The exception, Weston County, potentially would lose school-age children from 2010 to 2020.

Impacts to school enrollment of the magnitude described above likely would be accommodated within the normal operation of the state's system for funding operations and construction of school facilities. The Wyoming School Foundation Program (WSFP) provides a guaranteed level of funding to every school district. When enrollment growth occurs, the WSFP's provisions generally ensure adequate funding for operations, although the WSFP practice of funding on a 3-year moving average can cause a gaps when unanticipated rapid growth occurs in a short period (e.g., 1 or 2 years). School districts are eligible for additional funding when they experience rapid growth of more than 10 percent above the previous year.

In the past, appropriations for extraordinary facility needs in the public schools have been funded from the state's budget reserve account, which in turn receives revenue from the mineral severance tax, mineral royalties, and coal lease bonus distributions. Additionally, under Wyoming School Facilities Commission (WSFC) planning guidelines, minor capacity shortages generally are accommodated through temporary facilities, such as portable classrooms.

Finally, capital construction programs are under way at every school district in the study area as part of the 5-year planning process, and all districts have included energy and natural resource development in their planning considerations, although not necessarily at levels implied by the RFD scenarios analyzed in this report. Presently, the Commission has approved $88.1 million for 31 school replacement and major improvement projects within the six-county study area. **Table 3-16** summarizes current capital construction plans for the study area's school districts and the potential for upcoming projects to position the districts for the growth potential implied by the RFD scenarios.

Table 3-16
Approved Capital Construction for Public Education in the PRB Study Area

County School District	Schools in Operation	Approved Capital Construction Under 2004 5-year Plans (millions)	Number of New Schools and Remodeling and Improvement Projects
Campbell #1 – Gillette	20	$23.7	7
Converse #1 – Douglas	8	$3.27	1
Converse #2 – Glenrock	5	$9.6	9
Crook #1 – Sundance	10	$11.5	6
Johnson #1 – Buffalo	8	$19.3	4
Sheridan #1 – Ranchester	7	$2.5	1
Sheridan #2 – Sheridan	12	$11.6	2
Sheridan #3 – Clearmont	4	$4.4	1
Weston #1 – Newcastle	5	$0.1	--
Weston #7 – Upton	3	$2.1	--
Six-county Study Area	**82**	**$88.1**	**31**

Source: WSFC 2005.

3.4.1   Lower Production Scenario

Under the lower production scenario, Campbell County would experience a substantial increase in school-age children through 2020 (an added 1,587 children or 22 percent). The impacts in Campbell County would be composed of two elements: a substantial increase in grades K-8 and a modest increase in grades 9-12. Beyond 2020, secondary enrollments would increase as the school-age population matures and moves through the system. Johnson County's school enrollments, which had been declining, would bottom out and then begin climbing, eventually registering a net increase of 100 children, or 8 percent, under the lower production scenario.

Other counties in the six-county study area are expected to experience net declines in school enrollments between 2000 and 2010, followed by enrollment growth from 2010 to 2015 and from 2016 to 2020. During the latter two periods of the study, the school enrollments in Johnson County would grow substantially by a total of 279 students.

In those school districts where enrollment growth would occur under the lower production scenario, the response under WSFC planning guidelines generally would be to accommodate minor capacity shortages through temporary facilities, such as portable classrooms. For larger, more long-term increases, the Commission's policy is to fund capital expansion where warranted by projections developed during annual updates of school districts' 5-year plans. The projections of school-age population under the lower production scenario are presented in and illustrated in **Tables 3-17** and **3-18** and **Figures 3-2** and **3-3**.

Year 2010

From 2000 to 2010, the school-age population is projected to decline in all counties in the PRB study area except for Campbell County. Projected changes in school enrollment include:

3.0 Cumulative Social and Economic Effects

- Campbell County – approximately 440 additional (up 6 percent for the period)
- Converse County – approximately 570 fewer (down 22 percent)
- Crook County – 195 fewer (down 16 percent)
- Johnson County – approximately 180 fewer (down 14 percent)
- Sheridan County – approximately 960 fewer (down 20 percent)
- Weston County – approximately 340 fewer (down 27 percent)

Table 3-17
School-age Population (Ages 5 through 17) Under the Lower Production Scenario

County	2000	2010	2015	2020	Change 2000/2020
Campbell	7,182	7,620	8,225	8,769	1,587
Converse	2,607	2,038	2,115	2,293	(314)
Crook	1,252	1,057	1,069	1,128	(124)
Johnson	1,323	1,144	1,248	1,423	100
Sheridan	4,947	3,983	4,240	4,715	(232)
Weston	1,265	928	893	892	(373)
Six-county Study Area	**18,576**	**16,770**	**17,790**	**19,220**	**644**

Source: Wyoming Department of Education 1975-2003 (2000 data).

Table 3-18
Campbell County School-age Population By Grade Group Under the Lower Production Scenario

School Grades	2000	2010	2015	2020	Change 2000/2020
Primary/Middle (K-8)	4,936	5,447	6,022	6,428	1,492
Secondary (9-12)	2,246	2,173	2,203	2,341	95

Source: Wyoming Department of Education 1975-2003 (2000 data).

In Campbell County, public school enrollment would rise by approximately 511 children (up 10 percent) in grades K–8 but fall by approximately 73 students (down 3 percent) for the age group in grades 9–12.

Year 2015

From 2010 to 2015, total school enrollment is projected to rise in all counties in the PRB study area except Weston County. Projected changes in enrollments based on the population aged 5 to 17 years include:

- Campbell County – approximately 605 additional (up 8 percent)
- Converse County – approximately 80 additional (up 4 percent)
- Crook County – approximately 10 additional (up 1 percent)
- Johnson County – approximately 100 additional (up 9 percent)

- Sheridan County – 257 additional (up 6 percent)
- Weston County – approximately 35 fewer (down 6 percent)
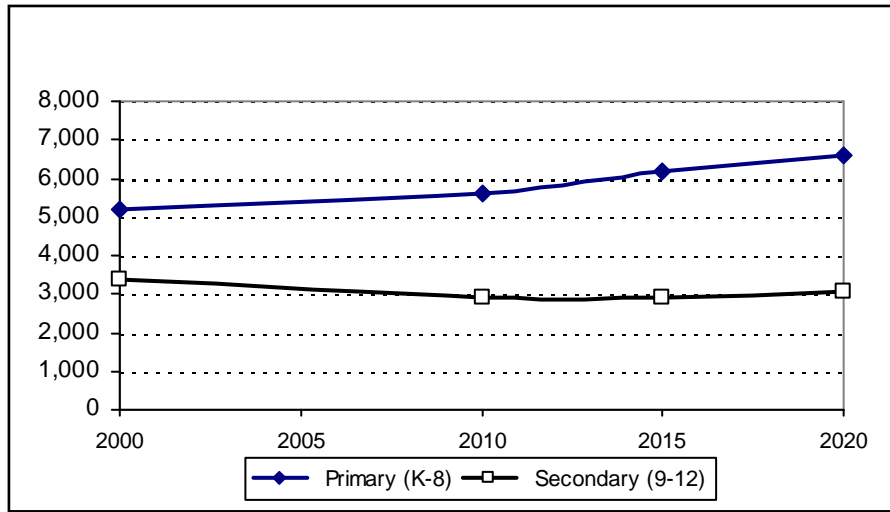
**Figure 3-2. School Enrollment in Campbell County School District #1 from 2000 to 2020
Under the Lower Production Scenario**

Source: Wyoming Department of Education 1975-2003 (2000 data).
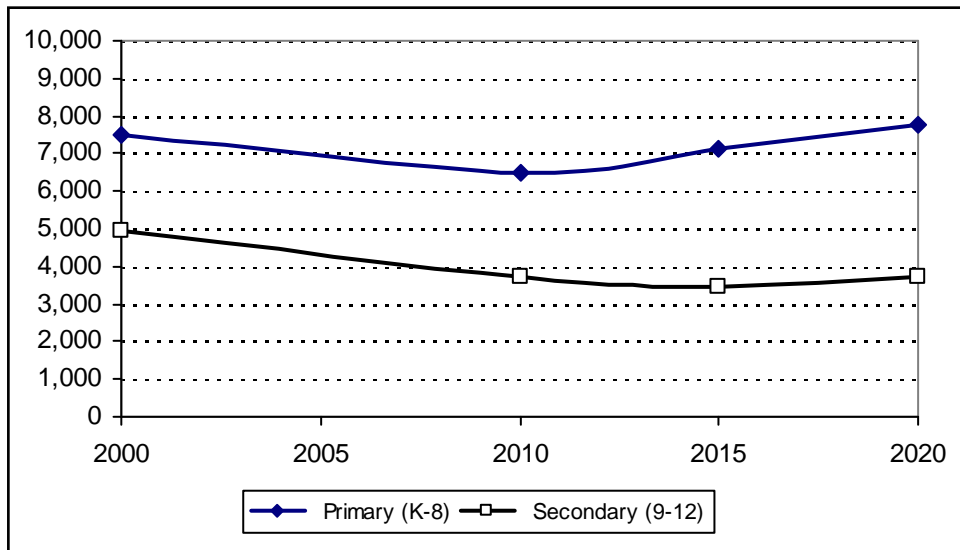
**Figure 3-3. School Enrollment in the Surrounding Counties from 2000 to 2020
Under the Lower Production Scenario**

Source: Wyoming Department of Education 1975-2003 (2000 data).

In Campbell County, school enrollment would rise by 575 students (up 11 percent) for grades K-8 from 2010 to 2015 and by 30 students (up 1 percent) in grades 9-12.

Year 2020

From 2016 to 2020, total school enrollments is projected to rise across virtually the entire PRB study area. Projected changes in enrollment include:

- Campbell County – approximately 44 additional (up 7 percent)
- Converse County – approximately 180 additional (up 8 percent)
- Crook County – approximately 60 additional (up 6 percent)
- Johnson County – approximately 175 additional (up 14 percent)
- Sheridan County – 475 additional (up 11 percent)
- Weston County – no substantial change.

In Campbell County, the school enrollment grades K-8 would rise by approximately 410 children (up 7 percent) from 2016 to 2020 and by approximately 140 children (up 6 percent) in grades 9-12.

3.4.2   Upper Production Scenario

The upper production scenario substantially would increase total school-age population growth in Campbell County through 2020. The projected increase of 2,408 students would be 34 percent growth over the entire forecast time frame and 52 percent higher than potentially would occur under the lower production scenario.

RFD activities under the upper scenario also would raise the level of growth in Johnson County's school-age population. The age group would increase by approximately 140 children or 9.5 percent over the entire forecast time frame (2003 to 2020). This would exceed total growth under the lower scenario by approximately 16 percent.

Among the other counties of the six-county study area, losses of school-age children still would occur under the upper production scenario through 2020.

For the school districts in Campbell and Johnson counties, where net enrollment growth would occur, the response under WSFC planning guidelines generally would be to accommodate minor capacity shortages through temporary facilities, such as portable classrooms, and to fund capital expansion where warranted by projections developed during the annual updates of school districts' 5-year plans. The projections of school-age population under the upper production scenario are presented in **Tables 3-19** and **3-20**.

Table 3-19

School-age Population (Ages 5 through 17) Under the Upper Production Scenario

County	2000	2010	2015	2020	Change 2000/2020
Campbell	7,182	7,940	8,770	9,590	2,408
Converse	2,607	2,049	2,133	2,319	(288)
Crook	1,252	1,063	1,079	1,141	(111)
Johnson	1,323	1,150	1,259	1,439	116
Sheridan	4,947	4,005	4,277	4,770	(177)
Weston	1,265	933	901	902	(363)
Six-county Study Area	**18,576**	**17,140**	**18,419**	**20,161**	**1,585**

Source: Wyoming Department of Education 1975-2003 (2000 data).

Table 3-20

Campbell County School-age Population by Grade Group Under the Upper Production Scenario

School Grade	2000	2010	2015	2020	Change 2000/2020
Primary/Middle (K-8)	4,936	5,695	6,447	7,058	2,122
Secondary (9-12)	2,246	2,245	2,323	2,532	286

Source: Wyoming Department of Education 1975-2003 (2000 data).

Under the WSFC and WSFP programs, school districts in Converse, Sheridan, and Weston counties, which are facing protracted declining enrollments, may encounter pressures to reduce staff and facility capacity.

Year 2010

From 2000 to 2010, all counties in the PRB study area except for Campbell County would see a net decline in enrollments under the upper production scenario. However, the projected 2010 enrollments reflect an increase in the latter years following an expected bottoming out of enrollments in 2005 or 2006. Projected enrollment changes in the PRB based on the 5 to 17 year old population include:

- Campbell County – approximately 760 additional (up 11 percent) and 320 above the lower scenario

- Converse County – approximately 560 fewer (down 21 percent) and 10 above the lower scenario

- Crook County – approximately 190 fewer (down 15 percent), just slightly higher than the lower scenario

3.0 Cumulative Social and Economic Effects

- Johnson County – approximately 170 fewer (down 13 percent), approximately the same as the lower scenario

- Sheridan County – approximately 940 fewer (down 19 percent), 20 above the lower scenario

- Weston County – approximately 30 fewer (down 3 percent) and approximately the same as the lower scenario

Under the lower production scenario Campbell #1 would experience a net increase of approximately 760 elementary and middle school students (grades K-8) between 2000 and 2010, with no effective change in secondary enrollment (grades 9-12).

Year 2015

Between 2010 and 2015, total school enrollments would climb in all counties in the PRB study area, except Weston County. Projected changes in the public school enrolments based on the 5 to 17 year old population include:

- Campbell County – 830 higher (up 11 percent) and 545 students above the lower scenario

- Converse County – approximately 80 higher (up 4 percent) and 20 additional students than under the lower scenario

- Crook County – 16 higher (up 2 percent)

- Johnson County – approximately 110 additional (up 10 percent)

- Sheridan County – approximately 270 additional (up 7 percent) and nearly 40 students above projected enrollment under the lower scenario

- Weston County – 32 fewer (down 3 percent)

In Campbell County, elementary and middle school enrollments would increase by about 480 students (up 13 percent) K-8 from 2010 to 2015 and nearly 80 additional students (up 1 percent) in grades 9-12.

Year 2020

From 2016 to 2020, public school enrollments would increase in all counties in the PRB study area. Projected changes during this 5-year period (by county) based on the school-age population aged 5 to 17 years include:

- Campbell County – 820 additional (up 9 percent)
- Converse County – approximately 190 additional (up 9 percent)
- Crook County – approximately 60 additional (up 6 percent)
- Johnson County – 180 additional (up 14 percent)
- Sheridan County – 493 additional (up 12 percent)

- Weston County – no substantial change

In Campbell County, the number of students grades K-8 would rise by approximately 610 children (up 9 percent) from 2016 to 2020 and by approximately 210 students (up 9 percent) for grades 9-12.

3.5 Facilities and Services

This section discusses potential local government facility and service demand associated with cumulative energy-related employment and population growth as presented in Sections 3.1 and 3.2, respectively, of this report. Also discussed is the potential service demand associated with other aspects of energy development in the PRB.

As noted in Section 3.8 of the Task 1C Report of the PRB Coal Review, Current Social and Economic Conditions (ENSR 2005a), local government facilities and services not only reflect demand but revenue availability and community values regarding appropriate services and service levels. Although energy development typically affects all services provided by local governments, this report focuses on water supply and wastewater systems, two of the facilities, along with schools (discussed in the previous section) that require substantial cost and long lead times to develop, and law enforcement and emergency response, two of the services most immediately affected by energy development. This report also identifies areas where potential demands on county administrative capacities and road maintenance departments may result from energy development.

Counties and some special districts that would receive increased service demand from energy development also would receive substantial revenues, in the form of ad valorem property taxes on facilities and production and, for counties, sales and use taxes on materials and supplies purchases. Municipalities, on the other hand, typically receive no property taxes from energy development, relying instead on sales and use tax revenues from energy development, which typically are substantially lower than property taxes, and on other revenues and bonded indebtedness to fund expansion of facilities and services to meet energy-related demand.

Additionally, counties and municipalities often face the need to expand facilities and services in advance of energy development. Such expansion often precedes the receipt of substantial revenues from the development.

There are several mechanisms at the state level available to municipalities to help address these problems.

The Wyoming Joint Powers Act (described in section 3.10.3 of the Task 1C Report for the PRB Coal Review, Current Social and Economic Conditions [ENSR 2005a]) allows counties to cooperate with municipalities to fund development and operation of public facilities and services, which allows municipalities to benefit directly from the larger source of energy revenues.

Energy developers intending to construct coal mines and power plants with a construction cost over a threshold amount ($255.2 million in 2005) would be required to satisfy the provisions of the Wyoming Industrial Information and Siting Act (described in section 3.10.4 of the Task 1C Report for the PRB Coal Review, Current Social and Economic Conditions [ENSR 2005a]). Communities

identified as affected by the project would be eligible for impact assistance payments (IAPs), which could help fund needed expansions of facilities and services.

In addition to the above sources of funding, the Wyoming State Land and Investment Board administers a variety of loan and grant programs that may help local governments expand facilities to address energy development-related demand (see section 3.10.5 of the Task 1C Report for the PRB Coal Review, Current Social and Economic Conditions [ENSR 2005a]).

3.5.1   Lower Production Scenario

<u>2010</u>

Campbell County. The addition of a re-opened coal mine and three new electric power generating facilities, coupled with the anticipated increase level of drilling and field development for conventional oil and gas and CBNG, would generate relatively high levels of both population and project-driven demand for local government facilities and services in Campbell County during the next 5 years.

In addition to the population-driven demand resulting from nearly 9,500 new residents and 4,300 new homes in the county between 2003 and 2010, increases in services would be required to respond to specific localized demand associated with mine and power plant construction and more dispersed demand resulting from conventional oil and gas and CBNG development. As noted in Section 3.1.1, construction of multiple power plants would result in 3,000 construction jobs in Campbell County between 2006 and 2009, with a peak expected in 2007 – 2008 under either coal production scenario. Anticipating demand from these projects, the recruiting, hiring, training, and retention of staff, given the attractiveness of often higher-paying jobs in the energy industries, are likely to challenge county law enforcement, fire protection, emergency response, and road maintenance agencies during this period. Campbell County and its municipalities may continue to use the mechanism of the Wyoming Joint Powers Act to fund fire and emergency response needs throughout the county.

Campbell County also may need to expand its administrative and human service functions during this period, particularly if the conventional oil and gas and CBNG ramp-up coincides with construction or reopening of coal mines and construction of power plants. Some human services in the county are provided by non-profit agencies that receive funding from the county.

Campbell County would receive substantial property tax revenues from energy development and production during this period, and, for the re-opening of a coal mine and construction/operation of three new power plants, the county would receive sales tax revenues and IAPs, which could be substantial. These funds could be used by the county to offset higher facility and service costs, particularly if they are available in a timely fashion. In that regard, the county budget has been benefiting from higher revenues as a result of rising CBNG production and energy prices in recent years, which translates into added fiscal capacity to respond to the impending demands.

City of Gillette. Under the lower production scenario, the City of Gillette could grow by approximately 7,300 by 2010 to 29,392 (or 33 percent) over its estimated 2003 population. In addition, the Gillette Department of Community Development estimates that the city routinely hosts 2,300 to 2,800 temporary or non-permanent residents and provides water and wastewater service

to some homes outside the city in the Gillette Urban Service Area (GUSA). The number of temporary residences served in Gillette likely would increase in 2007–2008 when it would host many single-status construction workers associated with construction of three additional power plants. The temporary and longer-term growth during this period correspondingly would increase demand on municipal facilities and services. Improvements to the city's wastewater treatment facility, scheduled to be completed by 2006, would provide service capacity for a design population of 41,000 residents, plus associated commercial and municipal demands; therefore, the city would have ample capacity to accommodate the anticipated population for 2010 under the lower production scenario. The city water system currently has limited capacity. A number of planned water supply, storage, and transmission improvements would provide capacity to serve the city's 20 year population projection. However, full capacity would not be reached until 2009 under the current Capital Improvements Plan funding schedule; consequently, timing could be an issue, particularly if multiple construction projects occur early in the 2003–2010 period.

Given that Gillette could experience a 33 percent population increase during this period, the resultant demand would require expansion in all city services and may require expansion of some facilities to meet demand. Funding service demand may challenge the city financially, as the addition of new staff and equipment may occur before the receipt of additional revenues. The city's capital improvements program includes replacement and expansion of some facilities to keep pace with its 20-year population projections, but the rate and type of growth may require unplanned expansion of certain facilities.

Town of Wright. Under the lower production scenario, population growth in Campbell County would provide the impetus for the Town of Wright to add 534 persons (38 percent) between 2003 and 2010. This growth rate and the resultant new demand for public facilities and services likely would result in strains for some services; however, key public facilities such as water and wastewater have existing capacity to accommodate this level of population growth. As with Gillette, Wright may incur service and facility expansion costs in advance of energy-development revenues.

Wright's ability to accommodate additional growth may be limited in the short term until the town is able to recover from the August 12, 2005, tornado which destroyed or damaged a total of 92 homes. Wright was declared a federal disaster area, making the town eligible for low interest loans and federal disaster assistance.

One possibility not included in the projections is that Wright may, after recovering from the tornado, host a construction camp for an electric power generating facility. The temporary population increase would place additional demands on local facilities and services, but, depending on the size of the camp, these demands probably could be accommodated by existing utilities. As with Campbell County and the City of Gillette, the Town of Wright would benefit from any IAPs that accompany future mine or power plant construction.

Converse County. Under the lower production scenario, Converse County would grow by an estimated 789 persons by 2010 or approximately 6 percent above the county's 2003 population level. The county's population in 2010 still would be almost 1,000 persons below the peak population level attained in 1980s. The moderate rate of projected population increase likely would allow the county to plan for and accommodate growth. However, because energy revenues within the county are anticipated to decline, the county may need to seek other sources to fund any needed expansion in facility and service systems.

The anticipated development of three additional power plants during this period may result in some spillover of temporary construction workers seeking accommodations in Douglas, particularly if one or more power plants are located in the southern portion of Campbell County. The county also could host railroad construction, maintenance, and operating crews as the UP and BNSF lines make anticipated improvements to their lines serving the PRB. This circumstance would place particular demands on some county services such as law enforcement, emergency response, and health care. The county would not receive substantial tax revenues to help fund the required services, but could be eligible for IAPs.

City of Douglas. Under the lower production scenario, the City of Douglas would be anticipated to grow by 566 persons over 2003 levels, approaching a population of 6,000 in 2010. This level would be substantially below the water system design capacity of 10,000 and the wastewater system design capacity of approximately 15,000.

Douglas also could host temporary power plant and railroad construction workers and have associated law enforcement, emergency response, and health care demands. As with Converse County, the city could be eligible for IAPs.

Town of Glenrock. The Town of Glenrock is anticipated to gain 82 persons between 2003 and 2010 under the lower production scenario, reaching a level of 2,366 persons, which is below its 1980 peak of 2,736. The town's water system currently is designed to accommodate a population of 5,000 with plans to expand capacity to 7,500 to 8,000 residents, and the wastewater system is designed to accommodate a population of 3,000. Consequently, the town would be able to accommodate anticipated growth under this scenario.

Crook County. Crook County would grow by 556 persons (about 9 percent) between 2003 and 2010 under the low production scenario. Given that power plant construction may occur in the part of Campbell County near Crook County, there may be some temporary construction worker impacts during this period. The construction worker impact, coupled with the recreation impact at Keyhole Reservoir where many Campbell County residents recreate, would place additional demands on law enforcement and emergency response services during this period. Crook County would receive no energy-related property tax revenues and little sales tax to offset these additional costs, but could be eligible for IAPs for power plant construction projects.

Town of Moorcroft. The Town of Moorcroft would add 70 people between 2003 and 2010 under the low production scenario. Moorcroft's water system currently is at capacity, and the town purchases raw water from Gillette. The town has drilled a new water well and has applied for funding to construct a water transmission line to the town. The wastewater treatment system could accommodate this relatively small population increment.

Moorcroft may host power plant construction workers during this period which would add to the town's service demand. As with the county, the town might be eligible for IAPs, which could offset some of these costs.

Johnson County. Johnson County would add an estimated 835 residents between 2003 and 2010 under this scenario. Most of this population growth would be attributed to CBNG development and general population growth. CBNG development can be anticipated to continue to generate demand

for law enforcement, emergency response, road maintenance, and county administrative services. This demand would be dispersed in nature, at times creating higher levels of demand in relatively remote parts of the county. The increased demand would exacerbate overcrowding at the county jail, unless a new jail is constructed during this period. Increasing energy-related revenues in Johnson County would provide additional fiscal resources for the county to expand facility and service systems.

City of Buffalo. Buffalo is anticipated to grow by 477 persons by 2010, or approximately 11 percent under the lower production scenario. With the planned improvements to the water system, the city would have adequate capacity to handle this level of growth. The wastewater treatment system also would be able to handle the projected growth.

Sheridan County. Sheridan County would grow by 1,344 persons, or approximately 5 percent between 2003 and 2010 under the lower production scenario. In the latter part of the period, part of the growth is assumed to be associated with construction of the P&M Ash Creek coal mine in the northern part of the county. The construction work force, coupled with ongoing CBNG development and general population growth would result in increasing demands for law enforcement, emergency response, road maintenance, and county administrative services. Sheridan County is anticipated to experience strong growth in energy revenues, and may be eligible for IAPs during construction of P&M's Ash Creek Mine, which would offset the county's service costs.

City of Sheridan. The City of Sheridan would grow by 933 persons or approximately 6 percent between 2003 and 2010 under the lower production scenario. This population easily could be served by the city's water and wastewater systems.

Weston County. Weston County would add 437 people by 2010 under the lower production scenario. The addition of a new coal mine in central Campbell County and possibly the construction of new power plants could result in Weston County hosting some construction workers. The county might experience demand for law enforcement and emergency response services in that case, and also could be eligible for IAPs. Weston County is not anticipated to receive substantial other energy-related tax revenues.

City of Newcastle. Newcastle would add 200 residences by 2010 under the lower production scenario. The city possibly could host some construction workers under this scenario; however, it has adequate water and wastewater system capacity to accommodate substantial growth.

Town of Upton. Upton would add 17 people by 2010 under the lower production scenario. Like Newcastle, the town potentially could host some construction workers under this scenario; however, it has adequate water and wastewater system capacity to accommodate substantial growth.

<u>2015</u>

Campbell County. Campbell County would grow by an additional 2,980 persons or approximatley 6 percent between 2011 and 2015 under the lower production scenario. As there are no major construction projects projected during this period, law enforcement and emergency response demands would be associated with ongoing operations and continued CBNG development and production. Some increased demand would result from construction of the proposed DM&E railroad. Although the rate of growth during this period would be relatively substantial and constant,

3.0 Cumulative Social and Economic Effects

the county would receive increased energy-related revenue, which could be used to fund expansion of county facilities and services to accommodate the anticipated growth.

City of Gillette. Under the lower production scenario, Gillette's resident population would grow by approximately 1,418 to 30,810 between 2011 and 2015. Including the city's service area population, which could be several thousand people higher, the city should be able to accommodate the anticipated population gains with water and wastewater services, assuming anticipated improvements are completed. This slower rate of growth (the city would grow by an estimated 7 percent over the 5-year period), as compared to the preceding period, and the absence of large scale construction projects would reduce the need for major service demand and facility expansion. However, if anticipated improvements are not completed, the city would face residual needs from the rapid growth expected prior to 2010.

Town of Wright. Wright would see little new growth between 2011 and 2015 under the lower production scenario. The town's projected population of 1,956 in 2015 would be within the capacity of the town's water and wastewater systems.

Other Counties and Municipalities in the Study Area. As shown in **Table 3-7**, the other counties and municipalities in the study area would experience moderate population increases during this period, ranging from a low of 3 percent in Upton (a net gain of 21 new residents) to 9 percent in Moorcroft (a net gain of 79 new residents). Although other counties and municipalities would add more population during the 5-year period, (e.g. Converse County 709; Sheridan County 1,169), the rate of growth in these areas would be moderate (e.g., 6 percent and 4 percent, respectively, for these two counties), owing to their larger size. The relatively steady nature of this growth (no large scale construction projects are anticipated) would be unlikely to generate population-related strains on local facilities and services. Johnson and Sheridan counties could experience service demands in new areas as CBNG development expands westward.

Water and wastewater systems in all municipalities would have capacity to accommodate the anticipated lower production scenario growth, assuming completion of planned improvements.

<u>**2020**</u>

Campbell County. Campbell County would grow by an estimated 2,343 persons or approximately 5 percent between 2016 and 2020 under the lower production scenario, reaching an estimated 48,545. As there would be no major construction projects during this period, law enforcement and emergency response demands would be associated with ongoing operations. Although the rate of growth during this period would be relatively substantial and constant, the county also would receive energy-related revenue increases, which could be used to fund expansion of county facilities and services to accommodate the anticipated growth.

City of Gillette. Under the lower production scenario, the City of Gillette would grow by approximately 1,392 to a total of 30,743 between 2016 and 2020. Including the city's service area population, which could be several thousand people higher, the city should be able to accommodate the anticipated population gains with its water and wastewater systems, assuming anticipated improvements are completed. It should be noted that the Gillette population estimate for the lower production scenario is some what lower than the preliminary 2020 population estimate (34,449) developed for the city's comprehensive planning process.

Town of Wright. Wright would grow by an estimated 63 persons to 1,917 between 2016 and 2020 under the lower production scenario, which still would be within the capacity of the town's water and wastewater systems.

Other Counties and Municipalities in the Study Area. As shown in **Table 3-7**, the other counties and municipalities in the study area would experience moderate population growth during this period, at levels similar to the preceding 5-year period. Again, the relatively moderate and steady nature of the growth associated with RFD activities under the lower production scenario during this period would be unlikely to generate population-related strains on local facilities and services.

Water and wastewater systems in all municipalities would have capacity to accommodate the anticipated lower development scenario growth during this period, assuming completion of planned improvements.

3.5.2   Upper Production Scenario

<u>2010</u>

Campbell County. Under the upper production scenario, Campbell County population growth would be 1,737 residents higher than the lower production scenario (during the 2003–2010 period) reaching 47,662 by 2010. This level of growth (31 percent over 7 years) would further increase demand for local government services over the lower development scenario, and spread demand as the county would have to provide services to one re-opened coal mine. The substantial increment in energy-related tax revenues could help offset service costs, but the timing of revenues versus the increases in demand and the staff hiring and retention issues would be exacerbated under this scenario. Similarly, county administrative and human service functions would require greater expansion than under the lower production scenario.

City of Gillette. Gillette would grow by an additional 8,391 people under the upper production scenario (1,112 more residences than under the lower production scenario) reaching a population of 30,504 by 2010. Assuming completion of planned improvements, the city water and wastewater systems should be able to accommodate this level of growth, as well as the 2,300 to 2,800 temporary workers that the City routinely hosts and the population in the GUSA.

Given that Gillette would experience a 31 percent population increase under the upper production scenario during this period, the resultant demand would require additional expansion in city services and some facilities beyond that associated with the lower production scenario.

Unlike Campbell County, Gillette receives little property tax revenue directly from energy development and production, although revenues would be derived indirectly on new residential and commercial construction located within the city. The city could receive substantial sales and use tax revenues and IAPs from coal mine and power plant construction, but the city might need to expand services in advance of its receipt of sales tax revenues and IAPs.

Town of Wright. The Town of Wright would be expected to grow by 608 (43 percent) between 2003 and 2010 under the upper production scenario, 74 persons more than under the lower

production scenario. Consequently, there would be little difference in service demand for Wright between the two scenarios, and the town's water and wastewater systems would be adequate.

Other Counties and Municipalities in the Study Area. Other counties and municipalities in the study area would experience negligible differences in population gains (less than 100 persons, except for Sheridan County where the difference would be 120 persons) during the 2003–2010 period, as contrasted to the lower production scenario, and correspondingly experience negligible differences in facility and service demand between the two scenarios.

2015

Campbell County. Campbell County's population would grow by 3,896 to 51,558 residences between 2011 and 2015 under the upper production scenario, 2,653 persons higher than under the lower production scenario. The incremental growth under this scenario substantially would increase service demand over the lower production scenario. A portion of this increase would result from construction of the proposed DM&E railroad, increasing county law enforcement and emergency response costs during this period.

City of Gillette. The population of Gillette would increase to an estimated 32,500 by 2015 under the upper production scenario, 1,690 higher than the 2015 population under the lower production scenario. This population coupled with the typical temporary and GUSA population still would be within the capacity of the water and wastewater systems, assuming the planned improvements are completed. However, other city facilities and services could require expansion during this period.

Town of Wright. Wright would add an estimated 38 residents between 2011 and 2015 under the upper production scenario, 108 persons more than anticipated under the lower production scenario. Consequently, there would be negligible differences in service demand between the two scenarios.

Other Counties and Municipalities in the Study Area. During the 2011–2015 period, other counties and municipalities in the study area would experience negligible differences in population growth under the upper production scenario as compared to the lower production scenario, and correspondingly would experience little difference in facility and service demand between the two scenarios.

2020

Campbell County. Under the upper production scenario, Campbell County population would reach an estimated 54,943 by 2020, approximately 3,950 higher then the 2020 estimate for the lower production scenario. This population gain would be fueled by the construction of another power plant, and the county could receive IAPs in addition to the substantial ad valorem property tax increases associated with higher coal production and the ongoing level of conventional oil and gas and CBNG production. These revenues could offset the cost of meeting the increased service demand resulting from the temporary and longer term population gains.

City of Gillette. Population in the City of Gillette is projected to reach an estimated 34,065 by 2020, approximately 2,450 higher than the 2020 population estimate for the city under the lower production scenario. It should be noted that this estimate is close to the city's recent comprehensive planning 2020 population estimate of 34,449. Including the traditional temporary population hosted

by the city and homes served in the Gillette Urban Service area, the water and wastewater systems would have adequate capacity to accommodate the anticipated growth, assuming planned improvements are completed. The city would need to expand some other municipal services and facilities during this period. IAPs from the construction of an additional power generating facility could help offset these costs.

Town of Wright. The Town of Wright would have a projected population of 2,143 by 2020 under the upper production scenario, approximately 154 higher than the 2020 population under the lower production scenario. This population level is within the capacity of the Wright water and wastewater systems. It is possible that Wright could host a portion of the construction work force during the construction of the fourth power generating facility assumed under this scenario. In that case, expansion of town services could be offset by IAPs.

Other Counties and Municipalities in the Study Area. Population gains between 2016 and 2020 in other counties and municipalities within the study area would be negligibly higher than those estimated for the lower production scenario, resulting in similarly negligible differences in facility and service demand between the two scenarios. Water and wastewater systems in all municipalities should be able to accommodate the anticipated 2020 population levels associated with the RFD activities under the upper production scenario, assuming the completion of planned improvements.

3.6   Mineral-related Public Sector Revenue Effects

Federal mineral royalties and state and local taxes levied on coal and other mineral production are important sources of public revenue in Wyoming. Taxes, fees, and charges levied on real estate improvements, retail trade, and other economic activity supported by energy development provide additional sources of revenue to support public facilities and services. These revenues benefit not only those jurisdictions within which the production or activity occurs, but also the federal treasury, state coffers, school districts, and local governments across the state through various revenue-sharing and intergovernmental transfer mechanisms. This section examines the changes in some of the key revenue sources associated with the cumulative development activity under the two RFD scenarios. The projected changes primarily reflect changes in future production levels, as the prices for oil and gas, assessment basis, and tax rates are held constant at current level over the entire analysis period (2003 through 2020). Nominal coal prices are assumed to increase 1.0 percent per year over time. Public expenditures by affected units of local government, school districts, and other special districts would increase over time in response to growing demand for services, changing regulations, and other factors. The current study does not project future expenditures due to the large number of affected entities and complexities associated with estimating expenditures over time.

At the foundation of the mineral development revenue projections are projected levels of future energy and mineral resource production (i.e., tons of coal mined and barrels of oil produced). In fiscal year 2003/2004, the total value of such production is estimated at $5.05 billion. Slightly over half ($2.57 billion) was the value of coal production (CREG 2005; Wyoming Taxpayers Association [WTA] 2004)[6]. Projections of future coal production, summarized in Section 2.1 of this report, were developed for the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably

---

[6] Note: all monetary values are reported in nominal dollar terms.

3.0 Cumulative Social and Economic Effects

Foreseeable Development Activities (ENSR 2005b). Projected conventional oil and gas and CBNG production was based on the number of new wells drilled and typical per well production profiles. Production of other minerals also contribute mineral development revenues; however, the values on other resources are relatively minor in comparison to coal, oil, and natural gas and are, consequently, not included in this analysis.

Under the lower production scenario, the aggregate value of annual mineral production would climb by $3.69 billion to $8.75 billion (nominal dollars) by 2020, a 73 percent increase over the current value. As shown in **Figure 3-4**, the annual production values would increase over time, topping $7.0 billion in 2010 and $8.0 billion in 2015. The combined value of coal, oil, and natural gas production under the upper production scenario, all of which represents the incremental value of higher coal production, would increase by 86 percent to $9.41 billion in 2020. The incremental difference, as compared to the value under the lower production scenario, would be $670 million.
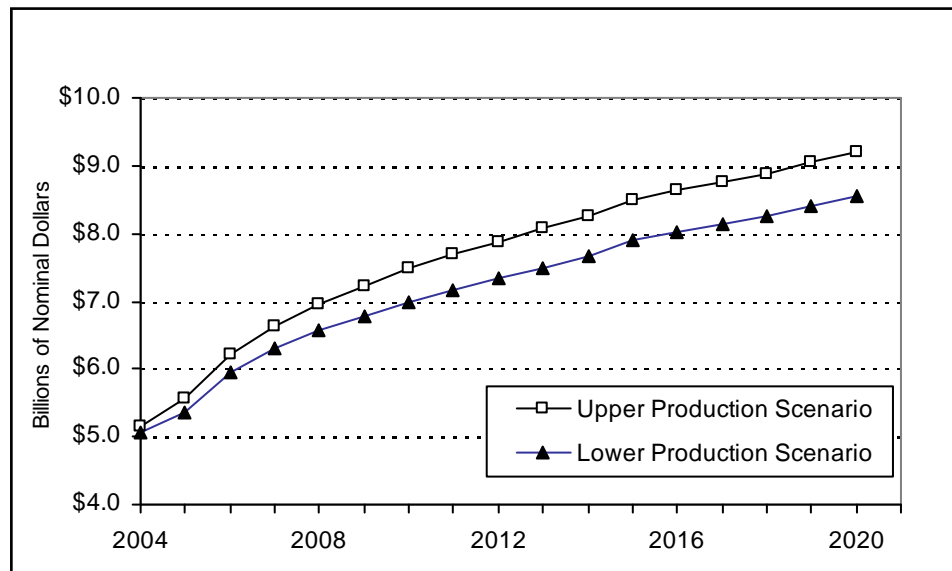
Figure 3-4. Projected Value of Coal, Oil, and Natural Gas Production in the Wyoming PRB

As occurs presently, the overwhelming majority of the mineral production value is anticipated to be in Campbell County, with more than $2.1 billion in additional production. Approximately 40 percent of the incremental production value ($1.5 billion by 2020) would be located in Sheridan and Johnson counties, as the value of annual production in Converse County would decline over time. By comparison, approximately 20 percent of the 2003/04 total mineral development value was located in those and other surrounding counties. Total annual mineral production value by 2020 is projected to reach $6.6 billion in Campbell County and $2.1 billion in the surrounding counties (**Figure 3-5** and **Table 3-21**).
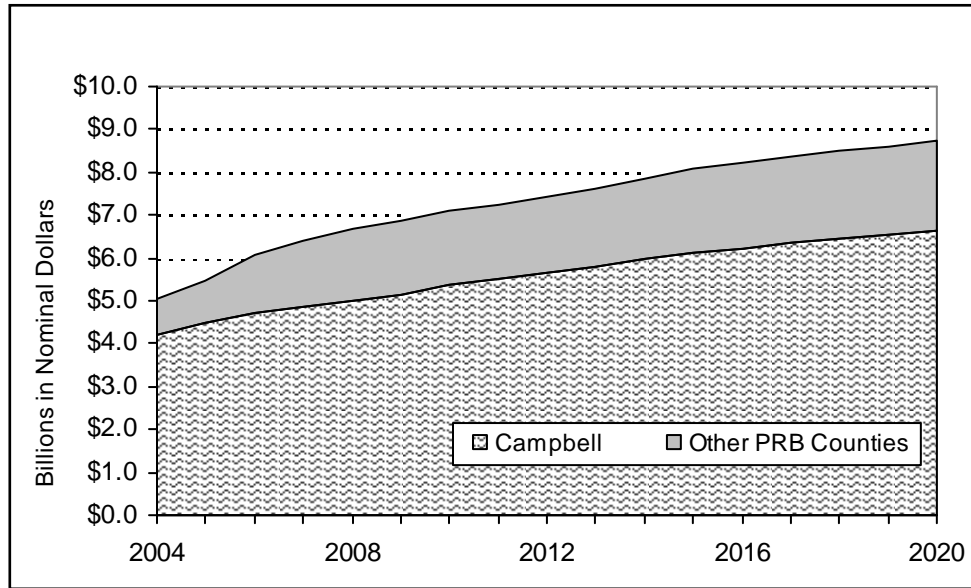
Figure 3-5. Value of Energy Resource Production in Campbell and Other Counties in the PRB from 2004 to 2020 Under the Lower Production Scenario

Table 3-21
Projected Value of Energy Resource Production in Selected PRB Counties
(millions in nominal dollars)

County	2005 Amount	2005 Share (percent)	2010 Amount	2010 Share (percent)	2015 Amount	2015 Share (percent)	2020 Amount	2020 Share (percent)
Lower Production Scenario								
Campbell	$4,413.0	80.7	$5,298.0	73.3	$5,980.0	74.1	$6,469.0	73.9
Converse	$416.5	7.6	$335.4	4.6	$189.2	2.3	$220.8	2.5
Johnson	$329.8	6.0	$964.5	13.3	$1,116.7	13.8	$1,198.2	13.7
Sheridan	$310.6	5.7	$630.0	8.7	$783.7	9.7	$870.6	9.9
Total	**$5,469.9**	--	**$7,227.9**	--	**$8,069.6**	--	**$8,758.6**	--
Upper Production Scenario								
Campbell	$4,642.0	81.5	$5,794.0	75.0	$6,452.0	75.5	$7,006.0	74.3
Converse	$416.5	7.3	$335.4	4.3	$189.9	2.2	$335.8	3.6
Johnson	$329.8	5.8	$964.5	12.5	$1,116.7	13.1	$1,198.2	12.7
Sheridan	$310.6	5.5	$630.0	8.2	$791.3	9.3	$886.6	9.4
Total	**$5,698.9**	--	**$7,723.9**	--	**$8,550.0**	--	**$9,426.6**	--

Projected production values under the upper production scenario mirror the profiles shown in **Figure 3-5**, with slightly more rapid growth beyond 2010. Most of the incremental value would accrue in Campbell County as most of the additional production would come from mines in the Gillette area.

The composition of mineral production value would shift over time due to increased CBNG production. Under the lower production scenario, the annual value of CBNG production would more than double from $1.86 billion in 2004 to $3.75 billion in 2020. Expanded coal production would be responsible for another $1.53 billion, raising the total annual value to $4.1 billion (**Figure 3-6**).
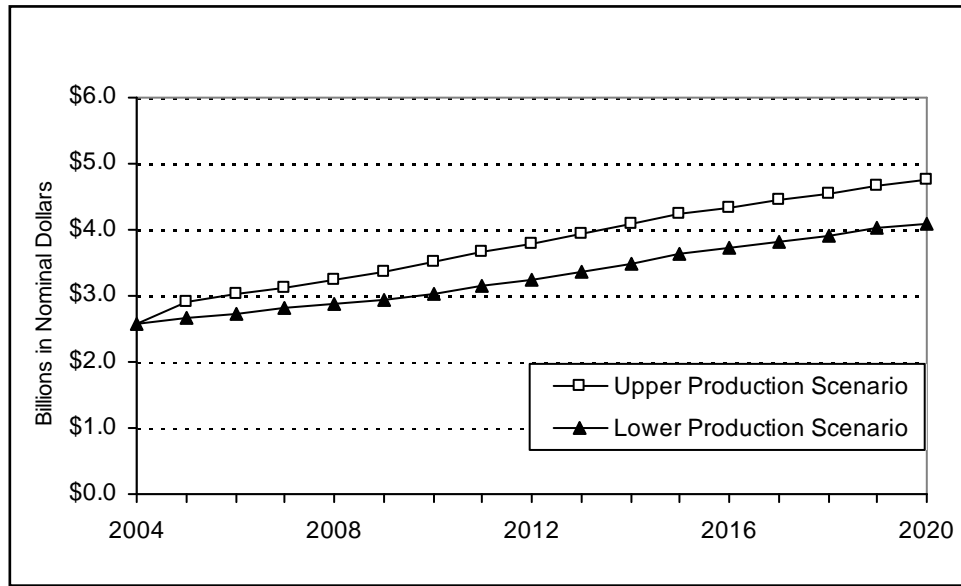
Figure 3-6. Annual Value of Coal Production in the Wyoming PRB

More than 9,600 new conventional oil and gas wells are projected to be drilled in the PRB through the end of the cumulative analysis period (by 2020). Of those, approximately 60 percent are expected to be successful, adding almost 5,800 new producing wells. While resulting in short-term production increases, those gains would be offset by declining production from existing wells. Consequently, the value of gas from conventional wells is projected to decrease by 14 percent over the period, to approximately $149 million by 2020. The value of oil production is expected to peak at approximately $688 million in 2015, before declining to $682 million in 2020, still above the $456 million produced in 2004. Probably more so than coal, the production values for both oil and gas could be dramatically affected by market forces. (Note: the projections of the value of oil are based on a price of $35 per barrel.)

As a result of the above changes and as depicted in **Figure 3-7** for the lower production scenario, coal would account for approximately 47 percent of the total mineral production value in 2020, compared to 51 percent in 2004. The share of mineral production value attributable to CBNG would increase from 39 to 43 percent, with conventional oil and gas accounting for 10 percent of the total value in 2020, compared to the current 12 percent.

Under the upper production scenario, the share of total annual value from coal would increase to 51 percent of the total, as nearly $4.8 billion in annual production is projected. The estimated $3.8 billion in CBNG, the same as under the lower production scenario, would account for 40 percent of the $9.4 billion annual total, with conventional oil and gas accounting for 9 percent.
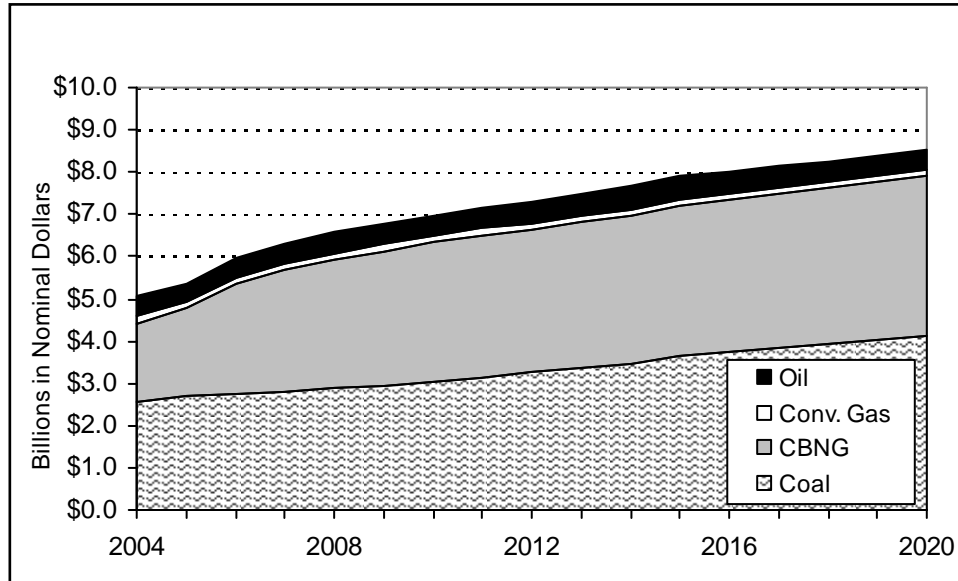
Figure 3-7. Value of Energy Resource Production to 2020 by Major Resource Group Under the Lower Production Scenario

Projected increases in the level and values of mineral production would have dramatic implications for future mineral development revenues. These revenues, which include federal and state mineral royalties, as well as state severance and local ad valorem taxes, would accrue to federal, state, and local governments. Future leasing of federal coal reserves would produce coal lease bonus bid revenues. Energy resource production also would generate substantial sales and use taxes, which would benefit state and local governments. However, future receipts of such tax revenues are not projected as part of this study due to the complexities associated with developing assumptions of the underlying relationships between development activity, the taxable elements and locations of those activities, locations of those activities or events, and tax receipts.

Between 2005 and 2020, total projected receipts derived from the selected revenue sources are $21.1 and $22.6 billion, for the lower and upper production scenarios, respectively, exclusive of any coal lease bonus bids. Receipts derived from coal production would account for the majority of the totals under either scenario, with Federal Mineral Royalties (FMR) representing the single largest revenue source; ranging from $4.9 to $5.7 billion (nominal dollars), for the lower and upper production scenarios, respectively (**Table 3-22**). Net of an administrative processing fee, these revenues accrue on a 50/50 basis to the Federal Treasury and the State of Wyoming. The revenues returned to the state are distributed to multiple funds according to a legislatively established formula as discussed in Section 2.5 of this report.

The combined revenues on future coal production derived from property taxes and state royalties would be comparable to the FMR revenues, with $2.8 billion in state severance taxes and $2.3 billion in cumulative property tax revenues paid to local counties and school districts under the lower production scenario. Such revenues under the higher production scenario are projected at $3.2 billion in state severance taxes and $2.7 billion in cumulative property tax revenues.

3.0 Cumulative Social and Economic Effects

Table 3-22
Selected Tax Revenues Associated with Energy Resource Production in Campbell,
Converse, Johnson, and Sheridan Counties
(millions in nominal dollars)

Resource/Taxes	2005-2010	2011-2015	2016-2020	Total
Coal: Lower Production				
Severance Tax	$868.8	$875.7	$1,034.2	$2,778.7
Federal Mineral Royalties	$1,543.7	$1,556.0	$1,837.6	$4,937.2
State Mineral Royalties	$0.0	$0.0	$0.0	$0.0
Ad Valorem Tax-Counties	$186.0	$185.6	$219.5	$591.0
Ad Valorem Tax-Schools	$566.3	$561.6	$665.1	$1,793.0
Subtotal	**$3,164.7**	**$3,178.9**	**$3,756.3**	**$10,099.9**
Coal: Upper Production				
Severance Tax	$977.0	$1,022.3	$1,200.3	$3,199.6
Federal Mineral Royalties	$1,735.9	$1,816.5	$2,132.7	$5,685.1
State Mineral Royalties	$0.0	$0.0	$0.0	$0.0
Ad Valorem Tax-Counties	$204.1	$214.7	$251.7	$670.5
Ad Valorem Tax-Schools	$621.1	$649.4	$765.6	$2,036.1
Subtotal	**$3,538.2**	**$3,702.8**	**$4,350.3**	**$11,591.3**
CBNG				
Severance Tax	$907.2	$913.8	$981.5	$2,802.4
Federal Mineral Royalties	$1,071.3	$1,147.9	$1,190.4	$3,409.5
State Mineral Royalties	$181.4	$174.1	$197.9	$553.4
Ad Valorem Tax-Counties	$192.4	$215.9	$236.4	$644.7
Ad Valorem Tax-Schools	$563.0	$624.6	$682.6	$1,870.3
Subtotal	**$2,915.2**	**$3,076.4**	**$3,288.7**	**$9,280.3**
Conventional Oil and Gas				
Severance Tax	$219.9	$222.8	$233.6	$676.4
Federal Mineral Royalties	$139.1	$135.5	$138.4	$413.0
State Mineral Royalties	$52.1	$51.7	$53.5	$157.3
Ad Valorem Tax-Counties	$39.2	$41.4	$46.9	$127.6
Ad Valorem Tax-Schools	$118.1	$124.9	$141.6	$384.7
Subtotal	**$568.5**	**$576.4**	**$614.0**	**$1,759.0**
Grand Totals				
Lower Production Scenario	**$6,648.5**	**$6,831.7**	**$7,659.0**	**$21,139.2**
Upper Production Scenario	**$7,022.0**	**$7,355.7**	**$8,253.0**	**$22,630.6**

Projected revenues on future CBNG production total $9.3 billion between 2005 and 2020. FMR of $3.4 billion would account for the single largest share (37 percent) of the total, followed by severance taxes of $2.8 billion or 30 percent, and ad valorem taxes for public education of $1.9 billion, or 20 percent. The state would receive an estimated $553 million in mineral royalties on state mineral interests. Projected revenues from CBNG are the same under both RFD production scenarios.

Public sector tax and royalty revenues to be derived from conventional oil and gas production are estimated at $1.8 billion through 2020. Severance taxes and FMR would account for the largest shares of those revenues, $676 million (38 percent) and $413 million (23 percent), respectively. Ad valorem taxes, to support public education, paid on conventional oil and gas production are estimated at $385 million through 2020, with $157 million in state mineral royalties and $128 million in ad valorem taxes paid to county governments.

Campbell County would be the principal beneficiary of the higher property tax payments to local counties, with Converse, Sheridan, and Johnson counties also benefiting. School districts whose boundaries encompass the mineral production areas also would benefit from additional revenues. However, Campbell #1 would realize only part of the benefits due to the recapture provisions of the WSFP. Under those provisions, revenues generated locally that are in excess of certain limits are forwarded to the state for redistribution to other districts. It is anticipated that property taxes accruing to Campbell #1 would continue to exceed the limits, with the surplus revenues benefiting district across the entire state.

Future development of energy and mineral resources in the PRB would generate other federal revenues beyond those outlined above and the sales and use tax revenues that are not analyzed in this analysis. Two of those revenue sources, payments-in-lieu of taxes and coal lease bonus bids, portions of which are returned to the state or affected counties, are described below.

Payments in Lieu of Taxes

Payments in lieu of taxes (PILT), is a federal programming administered by the BLM that makes annual payments to local governments containing federal lands within their jurisdictional boundaries. In the PRB, a county's eligibility for PILT is based primarily on the acres of federal lands in the National Forest and National Park systems, and lands administered by BLM (section 6902). PILT payments are to help offset the diminished property taxes receipts due to nontaxable federal lands within their boundaries. Eligibility for PILT is reserved for local governments (usually counties) that provide services related to public safety, environment, housing, social services, and transportation. PILT receipts may be used for any governmental purpose and are not required to be further distributed to other local government units such as school districts or cities.

As provided for in the legislation, the BLM computes the eligible PILT payments authorized under section 6902 using two alternative approaches, with the higher of the two amounts establishing the base entitlement. Payments are subject to a population ceiling limitation computed by multiplying the county population times a corresponding dollar value (adjusted annually for inflation). Actual PILT payments are affected by Congressional appropriations with any funding limitations resulting from such appropriations pro-rated equitably across all jurisdictions in the program.

In fiscal year 2005, PILT payments to counties in the PRB ranged from $125,029 for Weston County to $568,276 for Johnson County. PILT payments to Campbell County were $343,904. Among the study area counties, the population limitations only affect payments to Johnson County (Foulke et al. 2005).

Acreages of federal land ownership in the PRB are not expected to change substantially under the cumulative development scenarios, leaving the basic PILT entitlements and subsequent revenues unaffected for most counties. Population increases in Johnson County would raise its population-related cap on PILT revenues by approximately 6 percent in 2008 or 2009 when its population would exceed 8,000, with a further 5 percent increase after 2015 when its resident population would exceed 9,000.

<u>**Coal Lease Bonus Bids**</u>

Coal producers are liable for FMR and state severance taxes on all production from federal coal reserves. In addition, operators must submit competitive bids to secure additional reserves. To be accepted by the BLM, the winning bid must meet or exceed a minimum established by the agency, with that minimum representing the estimated fair market value of the resource allowing for future mine development and production costs and a reasonable profit. Bonus bids have risen over time, with recent bids in the $0.60 to $1.00 per ton range. One-half of the successful bid amounts are returned to the state, with payments due within 5 years of the sale even if the time required to mine the resources extends for a longer period. Coal lease bonus bids are tied to individual leasing actions, which occur periodically but not necessarily on a regular schedule. Consequently, the state's receipts of coal leases are used to fund the state's highway fund, school construction, community colleges, and other non-recurrent capital construction projects for cities, towns, counties, and special districts.

Future coal lease bonus bid revenues would be subject to the timing and size of future leasing actions. With up to 9.2 billion tons of production projected through 2020 and current estimated reserves of 8 to 9 billion tons under lease, leasing of 2.5 to 3.0 million tons is foreseeable in order to maintain an adequate level of reserves for mine planning and operational purposes. In turn, such leasing would generate $1.5 to $3.0 billion in bonus bid revenues. Net an administrative processing fee, these revenues would accrue to the Federal Treasury and the State of Wyoming on a 50/50 basis.

3.6.1   Lower Production Scenario

The future production of coal, CBNG, and conventional oil and gas would climb steadily over time, exceeding $7.2 billion in 2010 and approaching $8.9 billion by 2020. Over the entire cumulative analysis period (2003 through 2020), total production of these three resources would approach $119 billion (all in nominal dollars) (**Table 3-23**).

Table 3-23
Annual Mineral Production in the PRB Under the Lower Production Scenario
(millions in nominal dollars)

	2010	**2015**	**2020**	**Total**
Value of Annual Mineral Production	$7,227.9	$8,069.6	$8,758.6	$118,770.0

Mineral development revenues derived from that production, excluding coal lease bonus bids and state and local sales and use taxes, are projected to total $21.1 billion. Of that total, approximately $4.6 billion would accrue to the Federal Treasury (50 percent of the FMR), and $17 billion would accrue to state and local coffers (**Table 3-24**). Under state revenue distribution formulas established by the Wyoming legislature, revenues collected by the state ultimately benefit the entire state.

Table 3-24
Summary of Mineral Development Tax Revenues Associated with Energy Resource
Production Under the Lower Production Scenario
(millions in nominal dollars)

Resource/Taxes	2005-2010	2011-2015	2016-2020	Total[1]
Coal[2]	$3,164.7	$3,178.9	$3,756.3	$10,099.9
CBNG	$2,915.2	$3,076.4	$3,288.7	$9,280.3
Conventional Oil and Gas	$568.5	$576.4	$614.0	$1,759.0
Totals	**$6,648.4**	**$6,831.7**	**$7,659.0**	**$21,139.2**
Severance Tax	$1,995.9	$2,012.4	$2,249.3	$6,257.5
Federal Mineral Royalties	$2,754.1	$2,839.4	$3,166.3	$8,759.8
State Mineral Royalties	$233.5	$225.8	$251.4	$710.7
Ad Valorem Tax-Counties	$417.6	$443.0	$502.8	$1,363.3
Ad Valorem Tax-Schools	$1,247.5	$1,311.1	$1,489.3	$4,047.9
Totals[1]	**$6,648.6**	**$6,831.7**	**$7,659.1**	**$21,139.2**

[1]Totals may differ due to rounding.
[2]Coal-based revenues exclude coal lease bonus bids due to uncertainties regarding the amount and timing of coal leases and
the bonus bids received.

Year 2010

Energy and coal production in the PRB is projected to generate more than $6.6 billion in severance, royalties, and property taxes between 2005 and 2010. Average annual revenues over the 6-year period would be $1.1 billion. Revenues derived on coal production would account for 48 percent of the total, with CBNG contributing 44 percent of the total and conventional oil and gas accounting for the remaining 8 percent.

Of those total revenues, approximately $1.4 billion would accrue to the Federal Treasury, $3.6 billion to the state, and $1.7 billion to local governments and school districts, the latter including revenues collected on development and activity in Campbell County, but distributed to other districts under the provisions of the WSFP recapture program.

Year 2015

Revenues derived from the selected sources on production between 2011 and 2015 (5 years) would be $6.8 billion, or $1.4 billion per year on average, and 23 percent higher than during the preceding period. CBNG would account for a slightly higher increased share of the total, with the gains offset by a comparable decline on revenues derived from coal.

The cumulative revenue accruing to the Federal Treasury during the period, excluding coal lease bonus bids, would be approximately $1.4 billion, approximately $284 million per year on average and 24 percent higher than the $229 million annual average during the preceding period.

Revenues totaling $3.7 billion would accrue to the state between 2011 and 2015 from projected energy and mineral development included in the lower production scenario, with another $1.8 billion in property taxes.

<u>**Year 2020**</u>

Revenues derived from the selected sources on production between 2016 and 2020 would climb to $7.7 billion, or $1.5 billion per year on average, and 12 percent higher than during the preceding period. Coal revenues derived on increased coal production would account for 49 percent of the total, with CBNG contributing 43 percent of the total and declining conventional oil and gas production accounting for the remaining 6 percent.

The cumulative revenue accruing to the Federal Treasury during the period would be approximately $1.6 billion, approximately $316 million per year on average, compared to $284 million annual average during the preceding period.

Revenues totaling $4.1 billion would accrue to the state between 2016 and 2020 from projected energy and mineral development included in the lower production scenario, with another $2.0 billion in property taxes.

3.6.2   Upper Production Scenario

Future production of coal, CBNG, and conventional oil and gas would climb steadily over time, exceeding $7.7 billion in 2010 and exceeding $9.4 billion by 2020. The difference in production value between the lower and upper production scenarios in 2020 is $668 million annually, or 8 percent relative to the lower value. Over the entire cumulative analysis period, total production of these three resources would approach $127 billion (in nominal dollars) (**Table 3-25**), that difference attributable entirely to higher coal production.

Table 3-25
Annual Mineral Production in the PRB Under the Upper Production Scenario
(millions in nominal dollars)

	2010	2015	2020	Total
Value of Annual Mineral Production	$7,723.9	$8,550.0	$9,426.6	$126,900

Mineral development revenues derived from that production, excluding coal lease bonus bids and state and local sales and use taxes, are projected to total $22.6 billion, excluding coal lease bonus bids. Of that total, approximately $4.8 billion would accrue to the Federal Treasury (50 percent of the FMR), with $13.8 billion accruing to state and local coffers (**Table 3-26**). Under state revenue distribution formulas, the revenues collected by the state ultimately benefit the entire state.

Table 3-26
Summary of Mineral Development Tax Revenues Associated with Energy Resource
Production Under the Upper Production Scenario
(millions in nominal dollars)

Resource/Taxes	2005-2010	2011-2015	2016-2020	Total[1]
Coal[2]	$3,538.0	$3,703.0	$4,350.0	$11,591.0
CBNG	$2,915.2	$3,076.4	$3,288.7	$9,280.3
Conventional Oil & Gas	$568.5	$576.4	$614.0	$1,759.0
Totals	**$7,021.7**	**$7,355.8**	**$8,252.7**	**$22,630.3**
Severance Tax	$2,104.1	$2,159.0	$2,415.4	$6,678.5
Federal Mineral Royalties	$2,946.3	$3,099.9	$3,461.4	$9,507.6
State Mineral Royalties	$233.5	$225.8	$251.4	$710.7
Ad Valorem Tax-Counties	$435.8	$472.0	$535.0	$1,442.8
Ad Valorem Tax-Schools	$1,302.3	$1,398.9	$1,589.8	$4,291.0
Totals[1]	**$7,022.0**	**$7,355.6**	**$8,253.0**	**$22,630.6**

[1]Totals differ due to rounding.
[2]Coal-based revenues exclude coal lease bonus bids due to uncertainties regarding the amount and timing of coal leases and the bonus bids received.

Year 2010

Energy and coal production in the PRB is projected to generate nearly $7.0 billion in severance, royalties, and property taxes between 2005 and 2010, approximately 6 percent more than under the lower production scenario. Average annual revenues over the 6-year period would be approximately $1.2 billion. Revenues derived on coal production would account for 50 percent of the total, with CBNG contributing 42 percent of the total and conventional oil and gas accounting for the remaining 8 percent. Coal lease bonus bids on future coal leasing would generate additional revenues that would be shared between the federal and state governments.

Of those total revenues, approximately $1.5 billion would accrue to the Federal Treasury (excluding coal lease bonus bids) $3.8 billion to the state, and $1.7 billion to local governments and school districts, the latter including revenues collected on development and activity in Campbell County, but distributed to other districts under the provisions of the WSFP recapture program.

Year 2015

Revenues derived from the selected sources on production between 2011 and 2015 (5 years) would be $7.4 billion, or $1.5 billion per year on average, 26 percent higher than during the preceding period and 8 percent higher than projected under the lower production scenario for the same time period. CBNG would account for 42 percent of the total, coal 42 percent and conventional oil and gas the remaining 8 percent.

The cumulative revenue accruing to the Federal Treasury during the period would be approximately $1.5 billion, approximately $309 million per year on average and 26 percent higher than the $246 million annual average during the preceding period.

Revenues totaling $3.9 billion would accrue to the state between 2011 and 2015 from projected energy and mineral development included in the upper production scenario, with another $1.9 billion in property taxes.

Year 2020

Revenues derived from the selected sources on production between 2016 and 2020 would climb to $8.3 billion, or $1.7 billion per year on average, and 12 percent higher than during the preceding period. Revenues derived on increased coal production would account for 53 percent of the total revenues during the period, with CBNG contributing 40 percent of the total and declining conventional oil and gas production accounting for the remaining 7 percent.

The cumulative revenue accruing to the Federal Treasury during the period would be approximately $1.7 billion (excluding coal lease bonus bids) or approximately $346 million per year on average.

Revenues totaling $4.4 billion would accrue to the state between 2016 and 2020 from projected energy and mineral development included in the upper production scenario, with another $2.1 billion in property taxes.

3.7   Community and Social Effects

The BLM's goal of social assessment is to estimate the effects of a proposed action on the well being of people over both the short and long term (Branch et al. 1982). Virtually any action has the potential to affect community social conditions. Social effects can be positive or adverse, major or minor, long-term or temporary. Examples of potential positive social effects associated with energy development include higher standards of living and better quality of life associated with increased income, enhanced economic opportunities, expanded shopping alternatives, and improved community and health care services resulting from economic and population growth and increased tax revenues. Examples of potential adverse social effects associated with energy development include rapid population growth resulting in housing shortages, overwhelmed community facilities and services, increases in social problems such as crime, substance abuse and domestic violence, conflicts between new and existing cultures, and disruptions of community social fabric and ways of life. In many cases, an action can result in both positive and adverse social effects.

Given the broad geographic scope and time frame of the PRB Coal Review, this study does not focus on specific types of social change; rather it assesses the potential for change in each affected county and community, considering the energy development assumed for each production scenario.

The social effects of RFD activities in the PRB would vary from county to county and community to community under the production scenarios developed for this study, based on the existing social setting and the type of development that is projected to occur. A key theme of this study is that the energy development activities associated with either production scenario are not new to the affected communities; rather they are continuations of activities that have been occurring for decades, with the exception of CBNG development.

Other sections of this report discuss topics that influence social change, including:

- Employment and income
- Population growth
- Housing demand
- Public education
- Local government facilities and services
- Local, state, and federal tax and royalty revenues and their distribution to local governments

3.7.1   Lower Development Scenario

<u>2010</u>

Campbell County, the City of Gillette, and the Town of Wright. The populations of Campbell County, the City of Gillette, and the Town of Wright each would grow between 26 and 38 percent from 2003 and 2010 under assumptions associated with the lower production scenario. This accelerated rate of growth would be higher than the recent past but lower than occurred between the mid-1960s and mid-1980s. Much of the projected growth in Campbell County would be generated directly by energy development from the coal, CBNG, and electric power generation industries.

Campbell County has had more recent experience with growth from diverse types of energy development than perhaps any other area in the country. However, this relatively high rate of growth could be accompanied by an array of social effects in any community, regardless of the source/growth and regardless of the community's experience with growth.

Over the last 50 years, the county has seen the development of coal mines and the expansion of railroads to move the coal, the drilling and development of conventional oil and natural gas and CBNG fields and pipelines, the development and closure of uranium mines, and the development and operation of electric power generating facilities.

The local experience with energy development and Gillette's evolution from a small, predominately ranching community to the self-proclaimed "Energy Capitol of the Nation" has helped prepare it for ongoing energy development. Similarly, the Town of Wright came into being as a coal mining community, and it was designed to accommodate additional population as mines in the southern part of Campbell County developed.

Factors that would shape the social effects of the RFD activities under the two RFD scenarios considered for this study include the following:

- The RFD activities identified for both development scenarios are continuations of activities that have been occurring locally for decades, with the exception of CBNG, which has been more recent. Consequently, these activities and the growth resulting from them are part of the social fabric of Campbell County and its municipalities. Many current residents came to Campbell County specifically to take advantage of the economic opportunities associated with these industries, and any resident of the county for more than a few years has experienced the social

3.0 Cumulative Social and Economic Effects

and community effects of CBNG development, coal mine expansion, and power plant construction.

- Energy workers immigrating to Campbell County are likely to have economic, demographic, educational, and vocational characteristics similar to those of many current residents.

- Campbell County, its communities, and the range and capacity of public services, facilities, and management have grown to the point that individual energy developments are more easily accommodated. Any individual project is more likely to be a part of the ongoing social and community evolution in Campbell County and much less likely to dominate local conditions.

- Over the past 30 years, the State of Wyoming has put in place numerous programs and mechanisms to assist communities in dealing with energy and industrial growth. These include the Wyoming Industrial Information and Siting Act (designed specifically for large industrial projects; conventional oil and gas and CBNG development are exempt from the Act), the Joint Powers Act, and the various loan and grant programs administered by the Wyoming State Land and Investment Board. As noted elsewhere in this report, these mechanisms are more effective with discrete projects such as coal mines and power plants and less effective with more diffuse projects such as CBNG development.

The above notwithstanding, the capabilities of the county and its municipalities to accommodate growth likely would be challenged given the anticipated high rate of growth, particularly if development of multiple, large-scale energy projects were to occur simultaneously, or if the more diffuse conventional oil and gas or CBNG industries were to ramp-up substantially without adequate coordination and planning. Similarly, if the Town of Wright were to host construction camps for one or more power plant construction projects, the proponents, the town, and the county would need to cooperate to maximize the benefits and minimize potential adverse social effects of a large, single status, temporary work force.

The lower production scenario assumes the addition of one re-opened coal mine and three new electric power generating facilities in Campbell County during the 2003 to 2010 period, as well as an acceleration and subsequent stabilization of conventional oil and gas and CBNG drilling and field development activities and some expansion of railroad capacity. Between 2003 and 2010, Campbell County would add an estimated 9,500 residents under the assumptions used for the lower production scenario, Gillette would add nearly 7,300, and Wright would add approximately 530. During periods of coal mine re-opening and power plant construction, the county and its communities also might host substantial numbers of temporary construction workers.

As a city and urban service area of approximately 25,000, Gillette has substantial public, commercial, and recreational infrastructure in place. The city's population includes a large energy industry work force that is mobile in nature, and the city is accustomed to hosting large numbers of temporary industry and construction workers. Gillette supports many churches, social organizations, and recreational opportunities. Consequently, assimilation into the social fabric of the community can be easy for newcomers, and there would be few barriers to community integration for most new residents.

Similarly, Wright was built to house coal mine workers, and many current community residents are employed in the energy industries. The town actively has solicited the development of construction

worker housing facilities in the past, and newcomers would encounter few barriers to community integration.

The estimated 5,500 new jobs that would be created in Campbell County between 2003 and 2010, many in the high-paying energy industries, would create economic opportunities for newcomers and existing residents alike. There are likely to be employment opportunities for graduating high school students, which could stem the exodus of young residents common in many rural communities, although the abundance of job opportunities also is cited as a reason for some students to drop out prior to graduation.

During this period, CBNG-related employment is anticipated to increase and subsequently stabilize. The duration of anticipated CBNG development may change the nature of the work force, which historically has included a large single-status, temporary component. The prospect of long-term work and the gradual consolidation of the industry may encourage more CBNG workers to relocate to Campbell County with their families, reducing social issues associated with a temporary, single status work force. However, seasonal wildlife restrictions and other lease stipulations on federal lands may reduce the potential for this transition.

It is important to note that, given the relatively high rate of growth (26 percent or higher in 7 years), it is likely that Campbell County and its municipalities may experience housing shortages during the 2003–2010 period without substantial intervention from the energy industries. Housing shortages could result in stress for in-migrating families and encourage some workers to relocate to Campbell County on a single-status, work-week basis, returning to their home communities and households on days off, increasing the service demands associated with a single-status work force.

It also is possible that the accelerated rate of growth in Campbell County and its communities could result in strained community services and crowding in some public facilities. Key public facilities such as water and wastewater systems generally would be adequate, although summertime shortages in Gillette would be possible during the 2006-2010 period as growth likely would occur before planned water system expansions have been completed.

Campbell County provides some human services and provides funding for a number of non-profit human service providers. Given the accelerated rate of growth anticipated between 2003 and 2010, demands on human service agencies are likely to increase substantially, requiring new staff, equipment, and potentially some facility improvements. The county would receive substantial energy-related tax revenues during this period, which it could use to expand services; however, there is a concern that increased demand may precede commensurate revenue increases.

It would require time and substantial fiscal resources to plan for and expand public services and facilities in advance of anticipated growth in Campbell County and its municipalities by 2010 (which already is occurring). It also would be challenging to recruit, train, and equip staff in advance of growth and to retain staff, given the higher energy industry wage scales.

As noted in Sections 3.5 and 3.6 of this report, municipalities in Wyoming receive a limited amount of direct energy-related tax revenues, primarily sales and use tax revenues and a small amount of severance tax and federal energy royalty revenues. The provisions of the Wyoming Industrial Information and Siting Act also would provide affected municipalities with IAPs from new power plants and a re-opened mine as well as a mechanism to cooperate with industry to develop plans to

3.0 Cumulative Social and Economic Effects

more effectively accommodate construction work forces. Nevertheless, Gillette and Wright may face challenges in securing funding to improve and maintain facilities and services in the face of rapid energy-related population growth.

Historically, familiarity with energy development and management capacity to deal with growth and development are qualities of Campbell County and its communities that would facilitate the accommodation of the relatively high level, energy-related growth associated with the RFD activities under the lower production scenario without widespread social and community effects. However, with the high level of anticipated growth, the fact that population growth already is occurring, and the substantial challenges facing the county and its communities in providing housing, expanding facilities and adding staff could contribute to adverse community social effects, particularly if several large construction projects occur at once. In such a case, it would be important for industry and state and federal agencies to cooperate with Campbell County and its municipalities to plan and implement measures to accommodate the development.

Even with appropriate planning, it is likely that some individuals and families would have problems with relocation and integration into the community. Moreover certain groups likely would experience conflict with the accelerated pace of energy development. Conflicts would be most likely to arise over split estate and water issues associated with CBNG and oil and gas development, and over environmental concerns given the magnitude of development anticipated. These conflicts likely would occur between ranchers and the CBNG and conventional oil and gas industries in the first case and between the environmental community and energy companies in the second case. In both cases, it is likely that the conflicts would involve institutional responses, such as appeals to the judicial system and legislative proposals, both at the state and federal levels.

Converse County, the City of Douglas, and the Town of Glenrock. Like Campbell County, Converse County and its municipalities are accustomed to energy development and have developed community infrastructure and management capabilities to accommodate growth. Local economic development organizations are actively recruiting energy-related development, specifically coal technologies.

The addition of approximately 800 residents during this period would result in a 6 percent increase in population in the county and approximately 10 percent increase in Douglas and Glenrock. At the end of the study period (2020), all communities still would be below their previous high populations experienced in the 1980s. The moderate rate of growth plus the familiarity with energy-related growth would result in few negative social affects for Converse County, Douglas, and Glenrock during this period. However, if power plant construction were to occur in the southern part of Campbell County, Douglas could host a number of construction workers, with the potential for social issues that sometimes accompany a single status work force. Neither Douglas nor Converse County would receive direct revenues from construction of a Campbell County power plant to offset the costs of providing service to construction workers; however, both entities could be eligible for IAPs.

Crook County and the Town of Moorcroft. Crook County would grow by an estimated 556 residents between 2003 and 2010 and Moorcroft would grow by 70 residents under the lower production scenario. Although these are relatively small numbers, the percentage of growth would be approximately 9 percent for both the county and the Town of Moorcroft.

Both the county and the town are familiar with energy development. Perhaps the largest potential for social effects in Crook County and the Town of Moorcroft stems from the construction of electric power generating facilities. Moorcroft is one of the closer communities to the Black Hills/Wyodak power plant/coal mine complex and is therefore familiar with the social and community effects of power plant construction projects. However, neither the county nor the town would receive direct revenues from power plant construction to offset the costs of increased service demand, although both likely would be eligible for IAPs and also would see some increase in sales tax revenues. Nevertheless, both the county and the city would be limited in their ability to expand services in anticipation of power plant construction projects.

Crook County is indirectly affected by energy development in two ways. First, many people employed in Campbell County have chosen to live in Crook County, particularly in and around Moorcroft and in the Pine Haven area. This circumstance results in added demand for local government services without an increase in tax base and, in the case of Pine Haven, potential social conflict as residential development encroaches on agricultural lands and a recreational area.

Second, an increasing number of Campbell County residents recreate at Keyhole Reservoir in Crook County generating some minor problems and public service demands associated with recreation attractions.

Johnson County and the City of Buffalo. Johnson County and the City of Buffalo are projected to grow by 837 and 477 residents, respectively, between 2003 and 2010 under the lower production scenario, which would translate into overall growth of 11 percent for the county and 10 percent for Buffalo. The energy component of this growth would be associated with CBNG, as the areas of concentrated new development proceed westward. Other growth influences would include economic and non-economic migration attracted by the area's quality of life amenities.

The largest potential for social effects would stem from the expanding level of CBNG activity (an industrial land use) onto historically agricultural lands. Split estate conflicts and the concern for environmental affects of CBNG development are likely to continue to generate organizational and institutional response in both the legislature and the courts.

Both Johnson County and the City of Buffalo have been growing in recent years. As a result, the energy component of anticipated population growth is unlikely to generate specific social effects.

Sheridan County and the City of Sheridan. Sheridan County would be anticipated to grow by 1,344 residents or 5 percent between 2003 and 2010 under the lower production scenario, and the City of Sheridan would grow by 933 residents, also 6 percent. The energy-related component of this growth would be associated with the projected construction and operation of the P&M Ash Creek coal mine in the northern part of the county and with some additional oil and gas development. As with neighboring Johnson County to the south, economic and non-economic migration unrelated to RFD activities would contribute to growth in Sheridan.

The construction of a new coal mine holds potential for certain social effects associated with a temporary, single status work force, although the county's established familiarity with coal mining and the size of Sheridan relative to the anticipated work force likely would result in few negative social affects.

3.0 Cumulative Social and Economic Effects

As with Johnson County, the potential for energy-related social effects lies primarily with CBNG development and conflicts with split estate and development of areas increasingly valued for their scenic and residential potential.

Weston County and the Towns of Newcastle and Upton. Weston County and the towns of Newcastle and Upton are anticipated to grow by 437 (7 percent), 200 (6 percent), and 17 (2 percent) residents, respectively, during the 2003–2010 period under the lower production scenario. The energy component of this growth would result from the proximity of Newcastle and Upton to coal mines in the southern and central portion of Campbell County. Weston County and its communities also could host power plant construction workers, if a plant is built in the southern part of Campbell County, with the potential for social effects associated with a temporary, single status work force.

Given the relatively moderate rate of energy-related population growth, substantial social effects are not anticipated during this period.

2015

Campbell County, the City of Gillette, and Town of Wright. Population growth would moderate during the 2010–2015 period under the lower production scenario. Campbell County would grow by 6 percent during the 5-year period, while Gillette's growth would be slightly less at 5 percent. Wright could experience some temporary population gains associated with the construction of the DM&E railroad, although the forecast for the overall period is for little change in population. Given the anticipated stable energy economy during this period, Campbell County and its municipalities would enjoy a period of relative stability in terms of population growth. Substantial energy development-related social issues would not be anticipated during this period.

Other Study-area Counties and Communities. As with Campbell County, energy development is anticipated to stabilize and population growth would moderate during the 2010–2015 period under the lower production scenario. Substantial energy development-related social issues are not anticipated during this period.

2020

Campbell County, the City of Gillette, and Town of Wright. Campbell County and Gillette would grow by less than 5 percent between 2015 and 2020, and Wright's projected population growth would be approximately 2 percent. Community social conditions would continue to stabilize, and the relatively high energy industry salaries and substantial tax revenues would be positive influences on community social conditions.

Other Study-area Counties and Communities. Population growth in other PRB study area communities similarly would continue to moderate during the 2015–2020 period under the lower production scenario. Community social conditions would be little affected by energy development during this period, under the energy industry development assumptions associated with the lower scenario.

3.7.2   Upper Production Scenario

<u>2010</u>

Campbell County, the City of Gillette, and the Town of Wright. Under the upper production scenario, Campbell County and its municipalities would grow by 31 to 43 percent between 2003 and 2010. This accelerated growth rate would increase the potential for community social issues during this period, considering that Campbell County and its communities could host the construction work force associated with a re-opened coal mine and three new power plants in addition to ongoing CBNG development and railroad improvements. The potential for housing shortages and crowding in commercial public facilities, coupled with the challenges that local governments would have in enhancing services to anticipate demand could result in stress on newcomers and long-term residents alike. While Campbell County and its municipalities are perhaps better equipped to deal with social issues associated with rapid growth from energy development, substantial planning and coordination between industry and local, state, and federal officials in anticipation of growth would be required to reduce the potential for negative social effects.

Other Study-area Counties and Communities. Differences in estimated rates of growth between the lower and upper production scenarios are negligible for other study area counties and communities during the 2003–2010 period; therefore, differences in social effects of energy development between the two scenarios also would be negligible.

<u>2010 – 2015</u>

Campbell County, the City of Gillette, and the Town of Wright. Under the upper production scenario, the populations of Campbell County and Gillette would grow by 3,926 and 1,481 residents (8 and 7 percent), respectively, and Wright would grow by 2 percent (32 residents). While this rate of growth would be less than the previous period, the assumed construction of a new railroad would introduce an additional single status work force into the community. Nevertheless, social conditions in Campbell County and its communities likely would stabilize during this period.

Other study-area Counties and Communities. Differences in estimated rates of growth between the lower and upper production scenarios are negligible for other study area counties and communities during the 2010–2015 period; therefore, differences in social effects of energy development between the two scenarios also would be negligible.

<u>2015 – 2020</u>

Campbell County, the City of Gillette, and the Town of Wright. Campbell County and the City of Gillette would continue to grow during the 2015–2020 period under the upper production scenario, although at the more moderate rate of 7 percent, 3,355 and 1,208 residents, respectively. Wright would grow by an estimated 4 percent (69 residents). Under this scenario, an additional electric power plant would be constructed, temporarily adding a single status work force to Campbell County and its communities. However, during this period, social effects generally would moderate under the assumptions associated with the upper production scenario, and the county and its communities would enjoy a period of relative stability and economic prosperity given the higher than average energy industry wages and tax revenues.

Other Study-area Counties and Communities. Differences in estimated rates of growth between the lower and upper production scenarios are negligible for other study area counties and communities during the 2015–2020 period; therefore, differences in social effects of energy development between the two scenarios also would be negligible.

4.0   REFERENCES

Bigelow, S. 2004. Executive Director, Campbell County Economic Development Corporation. Personal communication with G. Blankenship, Blankenship Consulting LLC. July 9, 2004.

Branch, K., J. Thompson, J. Creighton, and D. Hooper, 1982. BLM_YA-PT-82-007-1606.

Bureau of Land Management. 2003. Powder River Basin Oil and Gas Project – Final Environmental Impact Statement and Proposed Plan Amendment (WY-070-02-065).

_____. 1999. Wyodak Coalbed Methane Project – Final Environmental Impact Statement.

_____. 1996. Coal Development Status Check – Powder River Federal Coal Region, Montana and Wyoming Data Tables. For presentation at the Powder River Regional Coal Team Meeting, Cheyenne, Wyoming. April 23, 1996.

Consensus Revenue Estimating Group (CREG). 2005. Projections of major revenue streams. Internet web site: http://eadiv.state.wy.us/CREG/CREG.asp. January 2005.

ENSR. 2005a. Task 1C Report for the Powder River Basin Coal Review, Current Social and Economic Conditions. March 2005.

_____. 2005b. Task 2 Report for the Powder River Basin Coal Review, Past and Present and Reasonably Foreseeable Development Activities. October 2005.

Foulke, T., R. Coupal, and D. Taylor. 2005. 2004 Payment in Lieu of Taxes (PILT) to Wyoming Counties. Internet web site: http://agecon.uwyo.edu/EconDev/PILT1.htm.

_____. 2002. Economic Trends in Wyoming's Mineral Sector: Coal. University of Wyoming Cooperative Extension Service. January 2002.

Montgomery Watson Harza. 2003. Coal Planning Estimates Report. Prepared for the Bureau of Land Management, Wyoming State Office. March 2003.

Surface Transportation Board. 2000. Draft Environmental Impact Statement – Dakota, Minnesota, & Eastern Railroad Corporation, Powder River Expansion Project, Finance Docket No. 33407.

U.S. Bureau of Economic Analysis. 2005. Regional Economic Information System (REIS), Personal Income by Major Source and Earnings by Industry and Full-time and Part-time Employment by Industry, 1969 - 2003. Internet web site: http://www.bea.gov.

U.S. Census Bureau, Population Division. 2005a. Annual Population for Wyoming, Counties and Municipalities, 1990 to 2000 (SU-99-7). Internet web site: http://www.census.gov.

_____. 2005b. Table 1: Annual Estimates of the Population for Counties of Wyoming: April 1, 2000 to July 1, 2004 (CO-EST2004-01-56). Internet web site: http://www.census.gov.

4.0 References

_____. 2005c. Table 4: Annual Estimates of the Population for Incorporated Places in Wyoming, Listed Alphabetically: April 1, 2000 to July 1, 2004 (SUB-EST2004-04-56). Internet web site: http://www.census.gov.

_____. 2005d. Table 4: Annual Estimates of Housing Units for Counties in Wyoming: April 1, 2000 to July 1, 2004 (HU-EST2004-04-56). Internet web site: http://www.census.gov.

_____. 2005e. Estimates of Wyoming Population by Age and Sex: 2000 to 2004 (SC-EST2004-02-56). Internet web site: http://www.census.gov.

Wyoming Department of Administration and Information (WDAI), Economic Analysis Division (EAD). 2005a. Employment by Industry Forecast to 2020. Unpublished electronic file. Available from Wenlin Liu, Senior Economist.

_____. 2005b. Wyoming and County Population Projections by Age: 2003 to 2020. Internet web site: http://eadiv.state.wy.us/pop/agsx00_20.htm.

Wyoming Department of Education. 1975-2003. Statistical Report Series #3 Financial and Enrollment Data, 1975 to 2003. Internet web site: http://www.k12.wy.us/DATATECH/pub/stat_index.asp.

Wyoming State Inspector of Mines 1995 to 2003. Annual Report of the State Inspector of Mines of Wyoming.

Wyoming Taxpayers Association (WTA). 2004. Wyoming Property Taxation-2004, an annual series.

Wyoming School Facilities Commission (WSFC). 2005. School District 5-year Master Plans – unpublished on file at the Commission's offices in Cheyenne. Reviewed in 2005.

5.0   GLOSSARY

Ad Valorem Tax	A tax paid as a percentage of the assessed value of property. Often used interchangeably with the term property tax.
Assessed Value (assessed valuation)	The value of real property for purposes of levying ad valorem taxes. The value is a function of the market value of property and the assessment rate, which ranges from 9.5 percent for residential property to 100 percent for minerals and mine products.
Coal Bed Natural Gas (CBNG)	Natural gas that is generated during the coal-formation process.
Coal bonus bids	The amount in excess of the minimum value of coal reserves established by the BLM, bid by coal companies, during competitive coal leasing process, for the right to develop those coal reserves.
Compounded Annual Growth Rate (CAGR)	The average annualized growth rate over a defined period, which equates to the total change between the starting and ending values, as if the change had occurred at a constant rate.
Consensus Revenue Estimating Group (CREG)	The Consensus Revenue Estimate Group (CREG) is the official estimating body for revenues to be received by the Wyoming State Government. Formed by agreement between the executive and legislative branches, CREG consists of representatives from numerous state agencies, commissions, and the University of Wyoming.
Mill Levy	A mill is 1/10 of $.01 or $.001 (one thousandth). A mill levy is the number of dollars a tax payer must pay for every $1,000 of assessed value. The mill levy is determined by the amount of revenue that the taxing entity needs to collect from ad valorem taxes.
Mineral Royalty	A share of the value of production that is free of the production expenses. It generally is paid by a lessee. The federal government receives a 12.5 percent royalty on coal produced from federal leases.
Payments in Lieu of Taxes	Payments in lieu of taxes (PILT) is a federal program administered by the BLM that makes annual payments to local governments having federal lands within their jurisdictional boundaries. PILT payments are to help offset the diminished property taxes receipts due to nontaxable federal lands within their boundaries and may be used for any governmental purpose.
Severance Tax	A tax on the removal of minerals from the ground. The State of Wyoming imposes a severance tax of 7.0 percent on the value of all coal produced.
Split Estate	Situations where ether surface ownership and mineral ownership are held by different parties/owners.

TECHNICAL APPENDIX

**MODELING DATA INPUT, MODELING METHODOLOGY,
AND MODELING RESULTS**

A.1 MODELING DATA INPUT

Projected energy resource development in the PRB is the major set of economic forces driving the cumulative analysis in this study. The assumptions used in the socioeconomics analysis for this study regarding such development are presented in the Task 2 Report of the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (ENSR 2005b) or based on the associated database, with the following exceptions:

- Total coal production data for reporting years (2010, 2015, and 2020) were based on the Task 2 report (ENSR 2005b). Between reporting years, production data were determined through linear interpolation to facilitate fiscal modeling.

- Based on the location of existing and potential future coal reserves in Campbell and Converse counties, production from areas within each of the two counties would vary over time, which in turn, would have implications for future ad valorem property taxes accruing to the respective counties and school districts. The allocations of coal production between Campbell and Converse counties reflect assumptions regarding the rate and location of projected future production, which may or may not be consistent with those of the operator. However, the overall totals are consistent with the production projections outlined in the Task 2 report (ENSR 2005b).

- The CBNG well projections for this study were being refined concurrently with the REMI modeling conducted for this report. As a result, the initial well numbers, as used in the REMI model and shown in this Appendix, differ somewhat from the final well numbers in the Task 2 database (ENSR 2005b). However, as noted in the main text of this report, the differences in potential impacts would be relatively minor in magnitude in any given time period and would tend to be somewhat offsetting when considered over the entire analysis period (2003 through 2020).

- The CBNG production projections for this study were being refined concurrently with the REMI modeling conducted for this report. As a result, the initial production numbers, as used in the REMI model and shown in this Appendix, differ somewhat from the final annual production projections in the Task 2 report and database (ENSR 2005b). As noted in the main text of this report, the cumulative differences, considering the value of coal and conventional oil and gas would be moderate; however, it would not be substantial in terms of the relative orders of magnitude of revenues that would be generated.

- Projected CBNG production for the socioeconomic analysis assumed an average life-of-well production of 234 mmcf per well.

- Due to the concurrent refinement of the Task 2 database and the REMI modeling conducted for this report, the projected levels of annual conventional oil and gas production used in the socioeconomic analysis (as shown in this Appendix) reflect an initial set of development assumptions that differ from those in the final Task 2 report (ENSR 2005b). As discussed in the main body of this report, the differences do not materially alter the anticipated impacts or conclusions of the overall socioeconomic assessment, but rather, they primarily affect the projected timing of anticipated tax revenues.

- Employment data include coal mine-related employment from the Task 2 database (for reporting years 2010, 2015, and 2020), plus allowances for other mining and oil and gas sectors as developed for the socioeconomic analysis. Between reporting years, data were determined through linear interpolation.

- The socioeconomic analysis estimated future coal mining employment for the upper production scenario based on productivity improvements comparable to those assumed for the lower production scenario. This assumption represents a departure from the more aggressive productivity assumptions developed in Task 2 (ENSR 2005b), whereby the higher production was achieved with little additional employment. Although such productivity increases may be realized, this analysis adopted the more conservative approach as a means of assessing the potential implications of higher employment growth on social and economic conditions.

The assumptions used in the socioeconomics analysis are summarized in this appendix in **Tables A–1** through **A–9**, and **Figures A–1** to **A-5**. In terms of resource development, only the level of future coal production varies between the upper and lower production scenarios, although an additional power plant also is included in the upper production scenario.

Table A-1
Projected Annual Coal Production by County Under the Lower and Upper Production Scenarios[1]
(mmtpy)

Year	Campbell	Converse	Sheridan	Total
Lower Production Scenario				
2005	364	21	0	385
2006	370	21	0	391
2007	375	21	0	396
2008	381	21	0	402
2009	386	21	0	407
2010	409	2	5	416
2011	419	2	5	426
2012	429	2	6	437
2013	439	2	7	448
2014	449	2	8	459
2015	461	6	9	476
2016	467	6	9	482
2017	473	6	10	489
2018	479	6	11	496
2019	485	6	12	503
2020	489	6	13	508
Upper Production Scenario				
2005	397	21	0	418
2006	409	21	0	430
2007	421	21	0	442
2008	433	21	0	454
2009	445	21	0	466
2010	477	2	5	484
2011	489	2	6	497
2012	501	2	7	510
2013	514	2	8	523
2014	527	2	9	537
2015	522	21	10	553
2016	528	21	11	560
2017	534	21	12	567
2018	541	21	13	574
2019	548	21	14	581
2020	555	21	15	591

Table A-2
New CBNG Wells Drilled Between 2005 and 2020 by Mineral Ownership and County

County	Mineral Ownership			Total
	Federal	State	Fee	
Numbers of New CBNG Wells Drilled				
Campbell	19,676	1,543	10,219	31,497
Converse	167	32	62	260
Johnson	11,333	1,153	3,434	15,941
Sheridan	3,751	1,347	5,495	10,515
Total Wells	**34,928**	**4,075**	**19,210**	**58,213**
Percent Distribution of New CBNG Wells				
Campbell	33.8	2.7	17.6	54.1
Converse	0.3	0.1	0.1	0.4
Johnson	19.5	2.0	5.9	27.4
Sheridan	6.4	2.3	9.4	18.1
Totals	**60.0**	**7.0**	**33.0**	**100.0**

Table A-3
Number of Producing CBNG Wells by County from 2005 through 2020

Year	County				Total
	Campbell	Converse	Johnson	Sheridan	
2005	13,867	880	2,305	2,630	19,681
2006	15,698	893	3,248	3,249	23,087
2007	17,496	902	4,192	3,864	26,452
2008	19,286	910	5,138	4,478	29,811
2009	21,009	914	6,080	5,083	33,083
2010	22,610	907	7,012	5,669	36,196
2011	24,156	895	7,942	6,247	39,239
2012	24,558	801	8,747	6,637	40,743
2013	23,412	594	9,383	6,770	40,159
2014	23,023	441	10,111	7,033	40,607
2015	23,703	363	10,969	7,478	42,512
2016	24,701	307	11,870	7,979	44,856
2017	25,130	208	12,718	8,390	46,446
2018	25,333	209	12,821	8,457	46,821
2019	25,574	211	12,943	8,538	47,266
2020	25,873	214	13,094	8,638	47,819
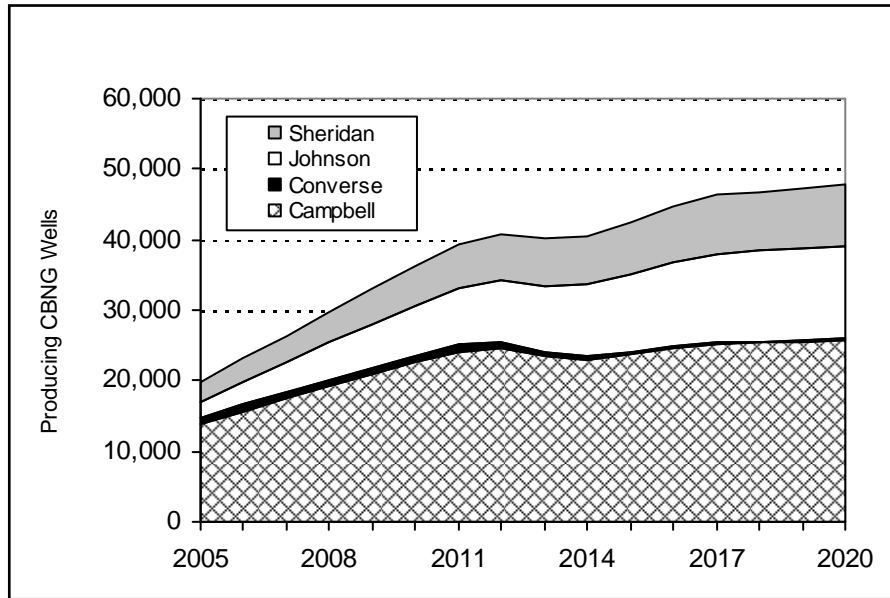
Figure A-1. Producing CBNG Wells by County

	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
■ **mmcfpy**	40.2	93.6	30.6	20.4	13.2	9.3	6.3	5.1	4.5	3.9	3	2.7	1.2
□ **Percent Of Total**	17.2%	40.0%	13.1%	8.7%	5.6%	4.0%	2.7%	2.2%	1.9%	1.7%	1.3%	1.2%	0.5%
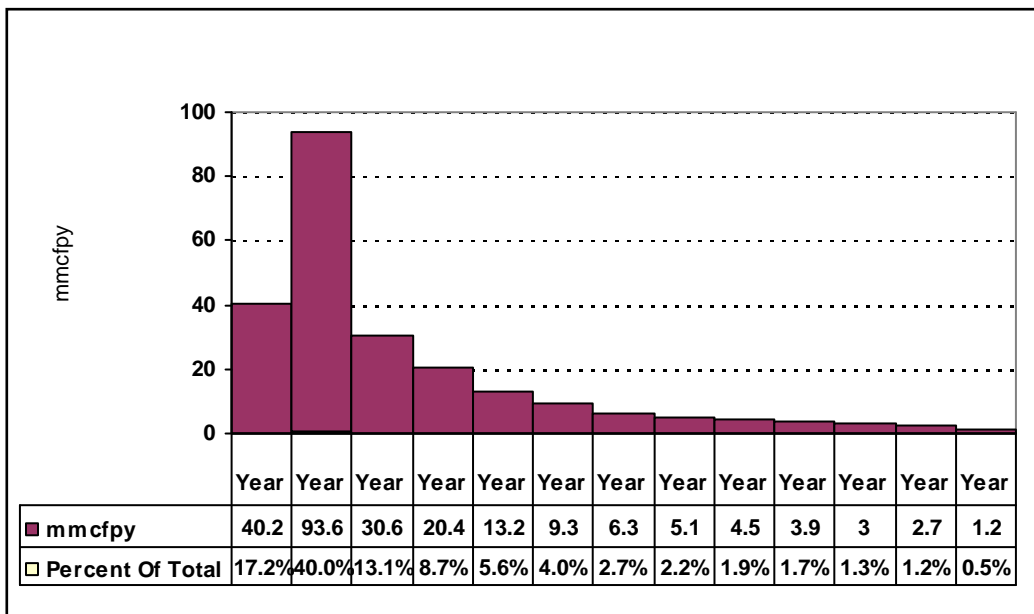
Figure A-2. Typical CBNG Well Production by Year
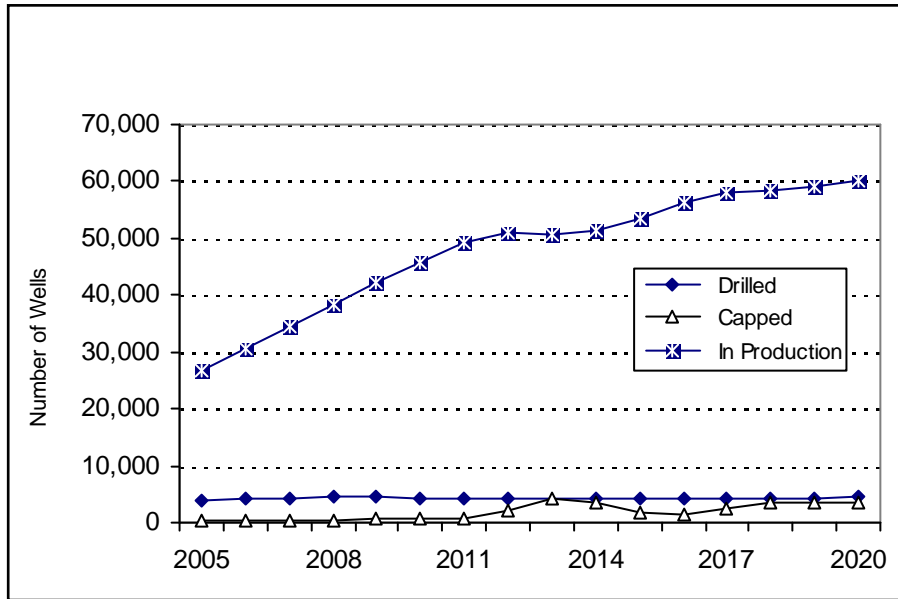
Figure A-3. Summary of Conventional Oil and Gas and CBNG Well Development in the PRB

Table A-4
Projected CBNG Production
(mmcfpy)

Year	Campbell County Existing Wells	Campbell County New Wells	Campbell County Total	Converse County Existing Wells	Converse County New Wells	Converse County Total	Johnson County Existing Wells	Johnson County New Wells	Johnson County Total	Sheridan County Existing Wells	Sheridan County New Wells	Sheridan County Total	4-County Total Existing Wells	4-County Total New Wells	4-County Total Total
2005	232,861	75,042	307,903	14,645	620	15,265	18,568	37,979	56,547	35,236	25,053	60,289	301,310	138,694	440,004
2006	115,623	250,067	365,690	7,272	2,066	9,338	9,219	126,559	135,778	17,496	83,485	100,981	149,610	462,177	611,787
2007	81,549	308,257	389,806	5,129	2,547	7,676	6,502	156,010	162,512	12,340	102,912	115,252	105,520	569,725	675,245
2008	60,211	347,736	407,947	3,787	2,873	6,660	4,801	175,990	180,791	9,111	116,092	125,203	77,910	642,691	720,601
2009	46,764	373,971	420,735	2,941	3,090	6,031	3,729	189,268	192,997	7,076	124,850	131,926	60,510	691,179	751,689
2010	36,509	393,128	429,637	2,296	3,248	5,544	2,911	198,963	201,874	5,524	131,246	136,770	47,240	726,585	773,825
2011	28,989	406,983	435,972	1,823	3,363	5,186	2,311	205,976	208,287	4,387	135,871	140,258	37,510	752,193	789,703
2012	20,774	418,836	439,610	1,306	3,461	4,767	1,656	211,974	213,630	3,143	139,828	142,971	26,880	774,099	800,979
2013	12,922	429,878	442,800	813	3,552	4,365	1,030	217,563	218,593	1,955	143,515	145,470	16,720	794,507	811,227
2014	7,520	440,197	447,717	473	3,637	4,110	600	222,785	223,385	1,138	146,960	148,098	9,730	813,580	823,310
2015	4,583	449,226	453,809	288	3,712	4,000	365	227,355	227,720	693	149,974	150,667	5,930	830,267	836,197
2016	1,592	458,181	459,773	100	3,786	3,886	127	231,887	232,014	241	152,963	153,204	2,060	846,817	848,877
2017	-	465,109	465,109	-	3,843	3,843	-	235,393	235,393	-	155,277	155,277	-	859,622	859,622
2018	-	470,771	470,771	-	3,890	3,890	-	238,259	238,259	-	157,167	157,167	-	870,086	870,086
2019	-	477,806	477,806	-	3,948	3,948	-	241,819	241,819	-	159,515	159,515	-	883,089	883,089
2020	-	487,183	487,183	-	4,026	4,026	-	246,565	246,565	-	162,646	162,646	-	900,420	900,420

Table A-5
Projected Conventional Gas Production by County
(mmcfpy)

| Year | County | | | | Total |
	Campbell	Converse	Johnson	Sheridan	
2005	16,980	18,720	1,840	240	37,780
2006	17,440	19,240	1,840	250	38,770
2007	17,900	19,760	1,840	260	39,760
2008	18,360	20,280	1,840	270	40,750
2009	18,820	20,800	1,840	280	41,740
2010	19,290	21,340	1,840	280	42,750
2011	18,950	20,950	1,810	270	41,980
2012	18,610	20,560	1,780	260	41,210
2013	18,270	20,170	1,750	250	40,440
2014	17,930	19,780	1,720	240	39,670
2015	17,570	19,410	1,680	250	38,910
2016	17,230	19,020	1,650	240	38,140
2017	16,890	18,630	1,620	230	37,370
2018	16,550	18,240	1,590	220	36,600
2019	16,210	17,850	1,560	210	35,830
2020	15,870	17,480	1,530	220	35,100

Table A-6
Projected Oil Production by County
(barrels)

| Year | County | | | | Total |
	Campbell	Converse	Johnson	Sheridan	
2005	10,541,000	1,172,000	1,000,000	142,000	12,855,000
2006	10,780,600	1,194,800	1,022,200	145,000	13,142,600
2007	11,020,200	1,217,600	1,044,400	148,000	13,430,200
2008	11,259,800	1,240,400	1,066,600	151,000	13,717,800
2009	11,499,400	1,263,200	1,088,800	154,000	14,005,400
2010	11,739,000	1,286,000	1,111,000	157,000	14,293,000
2011	11,979,200	1,308,600	1,133,800	160,000	14,581,600
2012	12,219,400	1,331,200	1,156,600	163,000	14,870,200
2013	12,459,600	1,353,800	1,179,400	166,000	15,158,800
2014	12,699,800	1,376,400	1,202,200	169,000	15,447,400
2015	12,940,000	1,399,000	1,225,000	172,000	15,736,000
2016	12,616,800	1,368,200	1,194,600	167,800	15,347,400
2017	12,293,600	1,337,400	1,164,200	163,600	14,958,800
2018	11,970,400	1,306,600	1,133,800	159,400	14,570,200
2019	11,647,200	1,275,800	1,103,400	155,200	14,181,600
2020	11,324,000	1,245,000	1,073,000	151,000	13,793,000

Table A-7
Mining and Oil and Gas Employment by Location Under the Lower Production Scenario

Year	Campbell County	Other Counties	Total
2004	6,566	1,673	8,239
2005	7,062	1,906	8,968
2006	7,555	2,095	9,650
2007	7,657	2,128	9,785
2008	7,765	2,163	9,928
2009	7,717	2,117	9,834
2010	6,965	2,175	9,140
2011	7,171	2,318	9,489
2012	7,157	2,306	9,463
2013	7,116	2,296	9,412
2014	7,219	2,369	9,588
2015	7,157	2,458	9,615
2016	7,173	2,466	9,639
2017	7,192	2,477	9,669
2018	7,220	2,491	9,711
2019	7,254	2,507	9,761
2020	7,242	2,585	9,827
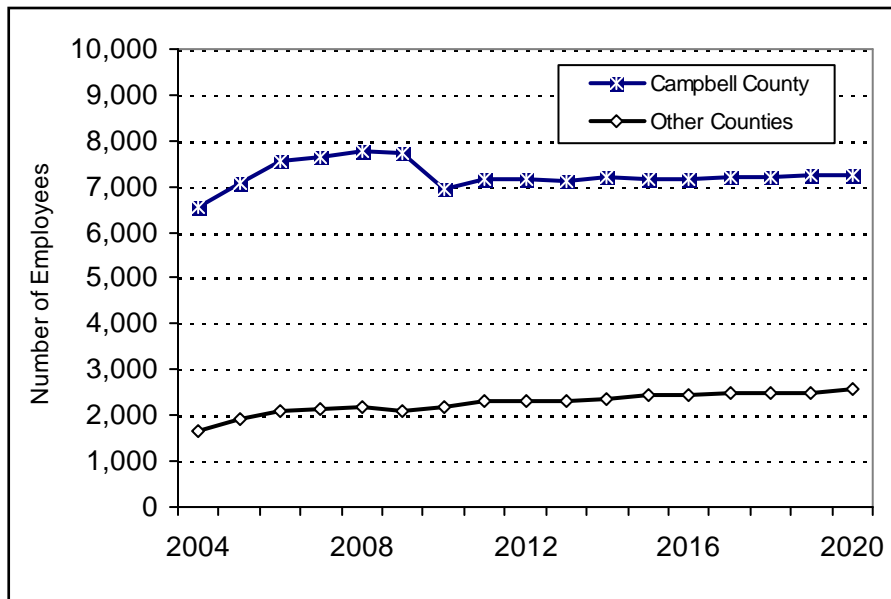
Figure A-4. Mining Sector Employment by Location Under the Lower Production Scenario

Table A-8

Mining and Oil and Gas Employment by Industrial Segment Under the Lower Production Scenario

Year	Coal Mining	Oil, Gas, and Other Mining	Total
2004	5,115	3,124	8,239
2005	5,209	3,759	8,968
2006	5,236	4,414	9,650
2007	5,262	4,523	9,785
2008	5,286	4,642	9,928
2009	5,312	4,522	9,834
2010	5,338	3,802	9,140
2011	5,372	4,117	9,489
2012	5,407	4,056	9,463
2013	5,440	3,972	9,412
2014	5,474	4,114	9,588
2015	5,508	4,107	9,615
2016	5,538	4,101	9,639
2017	5,567	4,102	9,669
2018	5,597	4,114	9,711
2019	5,627	4,134	9,761
2020	5,657	4,170	9,827

Note: Data include coal mine-related employment from the Task 2 database (for reporting years 2010, 2015, and 2020), plus allowances for other mining and oil and gas sectors as developed for the socioeconomics analysis. Between reporting years, data was determined through linear interpolation.
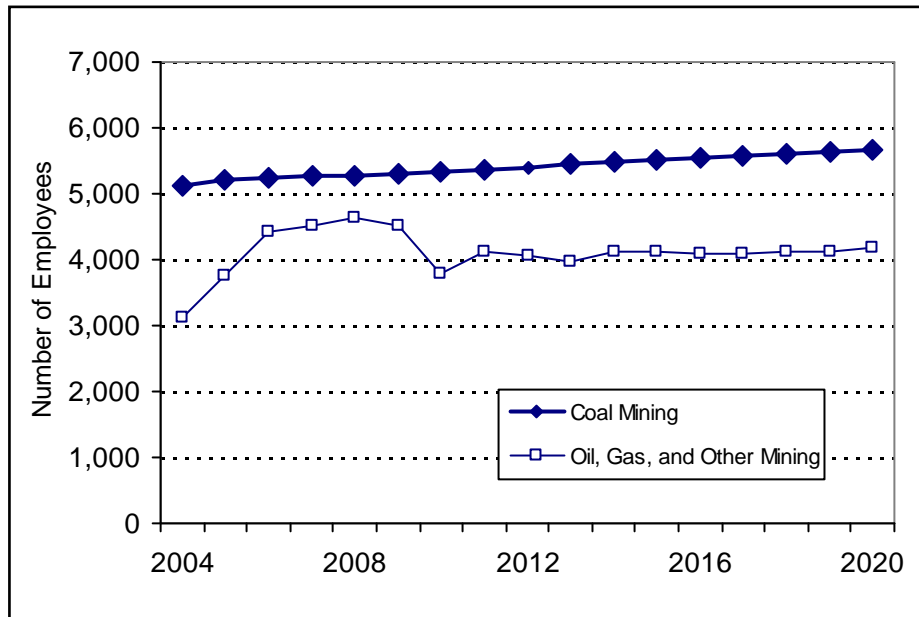
Figure A-5. Mining and Oil and Gas Employment by Industry Under the Lower Production Scenario

Table A-9
Mining and Oil and Gas Employment, Upper Versus Lower Production Scenario

Year	Upper Production Scenario	Lower Production Scenario	Differences
2004	8,462	8,239	223
2005	9,415	8,968	447
2006	10,183	9,650	533
2007	10,405	9,785	620
2008	10,637	9,928	709
2009	10,630	9,834	796
2010	10,150	9,140	1010
2011	10,375	9,489	886
2012	10,351	9,463	888
2013	10,304	9,412	892
2014	10,482	9,588	894
2015	10,512	9,615	897
2016	10,541	9,639	902
2017	10,578	9,669	909
2018	10,625	9,711	914
2019	10,680	9,761	919
2020	10,752	9,827	925

Projections of future tax revenues directly associated with mineral development were based on the overall value of production. The production values were, in turn, based on projected production and long-term prices. The prices used in this analysis were taken from the Wyoming CREG's January 2005 publication and are summarized in **Table A-10**.

Table A-10
Pricing Assumptions For Energy Resources

	2005	**2006**	**2007 to 2020**
Coal (per ton)	$6.95	$7.02	1% annual increase (nominal dollars)
Oil (per barrel)	$33.00	$35.00	$35.00
Natural Gas (per Mcf)	$4.75	$4.25	$4.25

Source: CREG 2005.
Note: Mcf = thousand cubic feet.

Semi-annually, CREG produces projections of major state government revenue streams for the upcoming 5 years, considering anticipated levels of mineral production, valuation, earnings on investments, and general fund sources of revenue (e.g., sales tax receipts). The projections help guide state budgeting. The projections generally are released in January and October and are available at http://eadiv.state.wy.us/CREG/CREG.asp. Information in CREG's January 2005 report was used in this analysis. The October 2005 report assumes higher energy resource prices, which, had they been incorporated into this report, would have resulted in proportional increases in the projected revenues presented in this report.

Ad valorem taxes were based on the most recent property tax mill levies of the affected counties and school districts. Those mill levies are presented in **Table A-11**.

Table A-11
Total 2004 Property Tax Levies for Selected PRB Counties and Affected School Districts

Taxing Entity	Total Mills
Counties	
Campbell	14.418
Converse	12.178
Johnson	18.542
Sheridan	14.000
School Districts	
Campbell #1	43.500
Converse #1	43.500
Converse #2	43.500
Johnson #1	47.500
Sheridan #1	45.720
Sheridan #2	43.000

Source: WTA 2005.

A.2 DESCRIPTION OF SOCIOECONOMIC MODELING METHODOLOGY

The principal socioeconomic impact analysis tool used for the PRB Coal Review was the REMI regional economic and demographic forecasting model. Steps were taken to configure and calibrate the default REMI forecast to baseline conditions in PRB. This step was necessary, because the default REMI forecast is predicated on historical trends and national economic forecasts that may not reflect any specific localized knowledge.

Calibrating the model was accomplished by analyzing local data and comparing it to information in the RFD scenarios. A set of inputs to the model was quantified and entered into the model. Once the model runs were completed, further analysis was needed to derive additional geographic detail in employment and population and to forecast future housing.

The version of the REMI model implemented for this analysis contained two economic regions. Region 1 consisted of a single county, Campbell County. Region 2, also called the surrounding counties region, consisted of Converse, Crook, Johnson, Natrona, Niobrara, Sheridan, and Weston counties. Counties included in the second region were selected because they adjoin or nearly adjoin Campbell County and are linked to the PRB by trade and commuting patterns. The nature of the trade and commuting patterns and the analysis of those patterns were presented in the Task 1C Report for the PRB Coal Review, Current Social and Economic Conditions (ENSR 2005a).

The last year of historical data in the REMI model available for the PRB Coal Review was 2002. The delivered model contains a default or "control" forecast that reflects a continuation of recent local economic trends modified to reflect projected changes in national economic conditions. The control forecast provided in REMI subsequently was recalibrated to reflect economic information available since 2002. REMI uses the "control" forecast as the basis for deriving differences (i.e., the impacts associated with alternative sets of assumed economic shocks entered into the model). The adjustments were based on available data and combined with the estimated economic values derived to represent the RFD scenarios. The combined values then were entered into the model. By using this approach, two processes (that of calibrating the model and that of inputting economic changes to cause the model to simulate a baseline RFD scenario) were accomplished in a single step. The rationale for the single step approach to calibration and baseline forecasting, as well as how the economic inputs to the model were developed, is discussed below.

A.2.1 RFD Scenarios and the REMI Control Forecast

The socioeconomic assessment drew directly on the Task 2 report and database. What emerged from Task 2 were two scenarios, termed the "lower" and "upper" production scenarios. An important step in the socioeconomic analysis was to translate the scenarios defined in Task 2 into economic terms that could be input into REMI.

The key data from Task 2 for the RFD scenarios are summarized in the following tables. **Table A-12** presents the RFD projections in terms of the numbers of mines, wells, power plants, etc., through the year 2020. **Table A-13** presents the development projections in terms of the volumes of commodities produced.

Table A-12
Summary of Wyoming PRB RFD Assumptions

Industry	2003 Existing	2003-2010	2011-2015	2016-2020	Total Increase
Active Coal Mines					
Lower Scenario	12[1]	+2[2]	0	0	+2[2]
Upper Scenario	12[1]	+2[2]	0	0	+2[2]
Conventional Oil and Gas Wells	18,302[3]	+5,194	+2,379	+1,946	+9,519
CBNG Wells	17,515[1]	+23,999	+18,809	+20,060	+62,868
Coal-fired Power Plants	6[4]	+3	0	+1 (upper scenario only)	+3 (lower scenario) +4 (upper scenario
Operating Railroads	2	0	+1	0	+1

[1]Reflects active coal mines only.
[2]Includes one temporarily inactive mine (as of 2003), which is projected to reinitiate operations, and one projected new mine near Sheridan.
[3]Estimated total number of wells drilled including producing, inactive, and plugged and abandoned.
[4]Excludes the Dave Johnston Power Plant, which is located outside the study area near Glenrock.
Source: ENSR 2005b.

Table A-13
Summary of Wyoming PRB RFD Production Assumptions

Industry	2003 Existing	2010	2015	2020	Total Change
Annual Coal Production					
Lower Scenario (mmtpy)	363.4	416.0	476.0	508.0	+ 144.6
Upper Scenario (mmtpy)	363.4	484.0	553.0	591.0	+ 227.6
Conventional Oil (barrels per year)	12,979,659	15,736,000	14,292,000	13,793,000	+ 813,341
Conventional Gas (mmcfpy)	39,981	42,750	38,910	35,100	- 4,891
CBNG (mmcfpy)	338,300	773,800	836,200	900,400	+ 562,100
Electrical Generation (MW of capacity)	702[1]	+1,000	0	+700 (upper scenario only)	+1,700
Railroad Coal-hauling Capacity (mmtpy)	350	400	440	500	+150

[1]Excludes the Dave Johnston Power Plant which is located outside the study area near Glenrock.
Source: ENSR 2005b.
Note: mmcfpy = million cubic feet per year
      MW = megawatts

The decision to simultaneously calibrate the model to establish the revised baseline or "control" projection, as described above, was based on an understanding of how Task 2 assessed the prospects for energy development in the PRB. The key consideration was that Task 2 is at least implicitly predicated on three premises:

- The extension of past trends suggests a future for the PRB economy that could resemble the lower production scenario and its local economic effects.

- Additional coal production and other energy activities are a definite possibility (i.e., the upper production scenario could occur, albeit requiring advances in mining technology and substantial capital investments by the operators).

- Lower levels of energy and mineral resource activity than those assumed in the two scenarios are possible; however, the levels of development in the two RFD scenarios provide decision-makers and local communities with a form of potential "maximum impact" outlook on long-term economic and social conditions, based on information available through the end of 2004.

To implement this understanding, a decision was made to calibrate the REMI model to reflect the development assumptions of the lower coal production scenario. This would, in effect, establish the result as the baseline forecast for the study. The development assumptions of the upper production scenario then were entered into the REMI model as a separate simulation run consisting of just the incremental development that could occur. The development of inputs to represent the two "runs" is described below.

A.2.2 REMI Lower Production Scenario Inputs

Briefly summarized, the RFD lower production scenario for the socioeconomic analysis assumed the following:

- Coal production would increase to 508 mmtpy in 2020;

- Startup of two coal mines (one new and one currently idle);

- Coal mine labor productivity would increase;

- Development of 9,653 additional conventional oil and gas wells and 62,868 additional CBNG wells between 2004 and 2020;

- New capacity at the BNSF and UP railroads and the initial construction and start-up of the new DM&E line; and

- Three new power plants would begin operations by 2010.

The lower scenario's development assumptions were converted to the amounts of required direct employment (in jobs) and, as needed, additional output delivered (in dollars of sales of commodities) to

represent the new economic stimulus represented by the scenario. These values were compared to the employment and output assumptions implicit in the default forecast delivered with the REMI model. Adjustments then were made to other variables embedded in REMI to raise or lower the defaults to RFD scenario levels. The REMI default forecast then was re-run and the new results saved as the new control forecast, or baseline, for the analysis.

A.2.3 REMI Upper Production Scenario Inputs

For comparison to the above, the RFD upper production scenario for the socioeconomic analysis assumed the following:

- Coal production would increase to 591 mmtpy in 2020;

- Startup of two coal mines (one new and one currently idle);

- Coal mine labor productivity would increase, but at the same rate as under the lower production scenario;

- Cumulative oil and gas development would be equivalent to that under the lower production scenario;

- New capacity at the BNSF and UP railroads, with the construction and startup of the DM&E railroad in the "out years" of the forecast period; and

- Three new power plants would begin operations by 2010 and a fourth would begin operation by 2020.

The upper scenario's development assumptions were converted to the amounts of direct employment required (in jobs) and, as needed, additional direct output delivered (in dollars of sales of commodities) to represent the additional economic stimulus generated by the upper scenario. These values were entered into REMI, which was then re-run and the new results used as the simulation of the upper production scenario.

A.2.4 Geographic Detail for Region 2 Employment

Employment estimates for the separate counties of REMI Region 2, the surrounding counties region, were made in the following steps. These were conducted in a separate "spreadsheet" model that used REMI forecasts and State of Wyoming data as inputs:

- A forecast of employment by industry by county was obtained from the State of Wyoming Economic Analysis Division (EAD)[1];

- EAD data were presented in terms of 15 NAICS sectors, so REMI employment data were "rolled up" to match;

---

[1] "Employment by Industry Forecast to 2020". Unpublished electronic file dated February 2005. Available from the Wyoming Department of Administration and Information, EAD.

- The EAD forecast was sorted by industry, and county shares of each industry were calculated from the EAD forecast data;

- Projected shares for 2010, 2015, and 2020 were used to allocate the REMI control totals.

- Initial results were compared to employment data assumptions from the PRB scenarios and to the disaggregated population projections, and small ad hoc adjustments were made to the results for both PRB scenarios to smooth the transition from the last year of historical data in 2003 and to assure overall consistency with observed relationships between employment and population; and

- Ad hoc adjustments also were made to the results for the upper production scenario to adjust employment in the transportation industry for consistency with employment assumptions in the PRB scenario.

A.2.5 Geographic Detail for Region 2 Population

Age-specific population estimates for the separate counties of REMI Region 2 were made as follows, using a separate spreadsheet model, REMI forecasts, and State of Wyoming data:

- Historical data on population by age by county were obtained from the U.S. Census Bureau and Wyoming EAD[2];

- The Wyoming EAD data were sorted into 5 age groups, and shares were calculated for historical years from 1990 through 2003;

- The historical trend in the shares of each age group within each county was projected from the historical data to the forecast years of 2010, 2015, and 2020 using an exponential growth model (Excel "GROWTH" function);

- The shares projected for each year were normalized to add up to 100 percent within each county;

- The REMI projection of Region 2 population by age was assembled as the control total for the detailed projections;

- Projected shares were used to allocate the REMI control totals;

- Initial results were compared to employment data assumptions and to the disaggregated employment projections (described above); and

- Small ad hoc adjustments were made to the results for both PRB scenarios to selected counties for consistency with employment assumptions in the PRB scenario.

---

[2] "Annual Population for Counties, Cities, and Towns: 1990-2000" and "Estimates of City and Town Population: July 1, 2004". Available online at http://eadiv.state.wy.us/pop/pop.asp.

Total population estimates also were projected for selected communities within the counties of REMI Region 2. These were made as follows, again using a separate spreadsheet model, REMI forecasts, and standard historical data:

- Data were obtained from the Wyoming EAD and the U.S. Census Bureau on population of incorporated places by county[3];

- The shares of selected communities and the balance of county population in each county were projected from historical data from 2000 through 2004 using the Excel "GROWTH" function;

- The shares projected for each year were pro rated to add up to 100 percent within each county;

- The REMI projection of Region 2 population by county was assembled from the previous disaggregation model to use as the control total for the detailed projections;

- Projected shares were used to allocate the REMI control totals; and

- Initial results were compared to employment data assumptions in the PRB scenarios, and small ad hoc adjustments were made in selected communities for consistency with those assumptions.

A.2.6 Detailed Housing Demand

The procedure used to forecast total housing requirements in the future reflected projections of the long-term trend toward smaller household sizes:

- Data on household formation and vacancy for each county in the PRB study area were obtained from historical U.S. censuses;

- Population-to-household ratios were projected forward to 2005, 2010, and 2015 using the Excel "GROWTH" function fitted to decennial data from 1940 to 2000;

- Small ad hoc adjustments were made in Campbell, Sheridan, and Johnson counties to lower household formation rates and housing requirements from trend-projected levels to reflect the demographic impact of younger economic migrants drawn by job opportunities in the PRB;

- The REMI projection of Region 2 population by county was assembled from the previous disaggregation model to use as the control total for the detailed projections;

- Preliminary estimates of household were derived by dividing county population by the projected population-to-household ratios; and

---

[3] "Annual Population for Counties, Cities, and Towns: 1990-2000" and "Estimates of City and Town Population: July 1, 2004". Available online at http://eadiv.state.wy.us/pop/pop.asp.

- Two final adjustments were applied based on historical data to reach the final forecast of housing units: a 3.5 percent housing vacancy allowance and a fixed amount for an assumed standing pool of seasonal units.

A.3   REMI RESULTS

The results of a REMI run are estimated outcomes for many different economic variables that could occur under the given scenarios. The PRB Coal Review used four of these variables in particular to develop the information presented in this Task 3C report:

- Employment (in terms of jobs), disaggregated by North American Industrial Classification System (NAICS) sector;

- Population, by key age groups;

- Work force commuting, with estimated numbers of employed persons that commute in and out of each model region; and

- Net migration for each model region.

The REMI model produced an estimate of each variable and its subcategories for the two model regions, Campbell County (Region 1) and the surrounding counties (Region 2). In the case of Region 2, the REMI model produced one lump-sum estimate of each variable and category to represent the region as a whole. The method used to expand the lump-sum Region 2 estimates into separate estimates for each county and for selected communities in Region 2 is described below.

A.3.1 Total Projected Employment

Simulations for the PRB Coal Review were conducted with REMI[4], a regional economic impact forecasting model. Resource policy and engineering assumptions presented in the RFD scenarios were interpreted and expressed in terms of the economic-policy categories available in REMI. **Tables A-14** through **A-18** present the projected employment, by major industrial sector, resulting from the anticipated economic stimuli in the study area, as defined by the lower and upper production scenarios.

For this study, employment by industry for Campbell County was taken directly from the REMI model. Totals by REMI's 24 industries were grouped to match the 15-industry data from the State of Wyoming. These results are presented in **Tables A-14** and **A-15**. All industry categories are based on NAICS.

---

[4] REMI Policy Insight is a product of Regional Economic Models, Inc. 306 Lincoln Ave., Amherst, Massachusetts, 01002.

Table A-14
REMI Results for Employment by Industry in Campbell County Under the
Lower Production Scenario
(thousands)

15-Sector Summary	2005	2010	2015	2020
Natural Resources and Mining	7.229	7.133	7.331	7.436
Utilities	0.225	0.402	0.368	0.319
Construction	3.266	3.510	3.661	3.763
Manufacturing	0.457	0.493	0.513	0.473
Wholesale Trade	1.153	1.154	1.116	1.052
Retail Trade	2.721	2.879	2.891	2.816
Transportation and Warehousing	1.007	1.030	1.118	1.148
Information	0.211	0.233	0.245	0.248
Financial Activities	1.118	1.115	1.136	1.147
Professional and Business Services	2.248	2.463	2.654	2.755
Education and Health Services	1.255	1.508	1.765	2.036
Leisure and Hospitality	2.184	2.366	2.472	2.461
Other Services (excluding government)	1.324	1.388	1.418	1.400
Government	3.845	4.496	4.777	4.841
Farm	0.600	0.567	0.527	0.479
Total Employment	**28.843**	**30.737**	**31.992**	**32.374**

Table A-15
REMI Results for Employment by Industry in Campbell County Under the
Upper Production Scenario
(thousands)

15-Sector Summary	2005	2010	2015	2020
Natural Resources and Mining	7.676	8.126	8.210	8.359
Utilities	0.234	0.452	0.402	0.467
Construction	3.376	3.845	3.946	4.111
Manufacturing	0.459	0.527	0.536	0.476
Wholesale Trade	1.184	1.220	1.173	1.108
Retail Trade	2.823	3.126	3.110	3.055
Transportation and Warehousing	1.014	1.046	1.132	1.168
Information	0.214	0.241	0.253	0.257
Financial Activities	1.170	1.208	1.217	1.234
Professional and Business Services	2.354	2.694	2.881	3.023
Education and Health Services	1.273	1.568	1.838	2.144
Leisure and and Hospitality	2.263	2.545	2.629	2.639
Other Services (excluding government)	1.367	1.487	1.502	1.493
Government	3.873	4.664	5.030	5.193
Farm	0.600	0.567	0.527	0.479
Total Employment	**29.880**	**33.316**	**34.386**	**35.206**

Total REMI employment by industry for Region 2 was consolidated from 24 industries to the 15 industries in the data from the State of Wyoming. These results are presented in **Tables A-16** and **A-17**.

Table A-16
REMI Results for Employment by Industry in Region 2 Under the Lower Production Scenario
(thousands)

15-Sector Summary	2005	2010	2015	2020
Natural Resources and Mining	6.611	6.402	6.374	6.219
Utilities	0.377	0.364	0.356	0.346
Construction	7.641	7.740	8.215	8.553
Manufacturing	2.475	2.433	2.455	2.465
Wholesale Trade	3.335	3.305	3.156	2.976
Retail Trade	11.093	11.553	11.405	10.947
Transportation and Warehousing	2.576	2.546	2.546	2.537
Information	1.065	1.144	1.187	1.202
Financial Activities	7.312	7.698	7.975	8.055
Professional and Business Services	8.041	8.624	9.145	9.501
Education and Health Services	9.689	11.014	12.493	14.098
Leisure and Hospitality	8.720	9.336	9.550	9.370
Other Services (excluding government)	5.210	5.508	5.602	5.497
Government	12.997	13.584	14.020	14.048
Farm	3.315	3.131	2.914	2.645
Total Employment	**90.457**	**94.382**	**97.393**	**98.459**

Note: Region 2 consists of Converse, Crook, Johnson, Natrona, Niobrara, Sheridan, and Weston counties. For this analysis, the totals were adjusted to net out employment in Natrona and Niobrara counties.

Table A-17
REMI Results for Employment by Industry in Region 2 Under the Upper Production Scenario
(thousands)

15-Sector Summary	2005	2010	2015	2020
Natural Resources and Mining	6.651	6.488	6.457	6.301
Utilities	0.378	0.366	0.358	0.347
Construction	7.672	7.834	8.308	8.644
Manufacturing	2.477	2.436	2.458	2.468
Wholesale Trade	3.34	3.316	3.167	2.986
Retail Trade	11.128	11.638	11.487	11.033
Transportation and Warehousing	2.578	2.549	2.549	2.541
Information	1.066	1.147	1.191	1.205
Financial Activities	7.333	7.744	8.019	8.101
Professional and Business Services	8.065	8.68	9.203	9.564
Education and Health Services	9.699	11.04	12.525	14.147
Leisure and Hospitality	8.751	9.404	9.612	9.435
Other Services (excluding government)	5.226	5.548	5.639	5.535
Government	13.005	13.635	14.1	14.147
Farm	3.315	3.131	2.914	2.645
Total Employment	**90.684**	**94.956**	**97.987**	**99.099**

Note: Region 2 consists of Converse, Crook, Johnson, Natrona, Niobrara, Sheridan, and Weston counties. For this analysis,
the totals were adjusted to net out employment in Natrona and Niobrara counties.

Employment by industry for each county in Region 2 was estimated in a separate "spreadsheet" model. A forecast of employment by industry from the State of Wyoming EAD provided the initial basis for the disaggregation. Those results were compared to employment data assumptions from the PRB scenarios and Bureau of Economics and Wyoming Labor Market Information System data and to the disaggregated population projections. Small ad hoc adjustments were made to the results for the PRB scenarios to establish consistency between employment and population and to adjust transportation employment for consistency with assumptions in the PRB scenario. The adjusted, projected shares for 2010, 2015, and 2020 were used to allocate REMI industry control totals. **Table A-18** presents these allocation assumptions.

Table A-18
Disaggregation Assumptions for Employment by Industry in the Surrounding Counties

Industry/Location	2005	2010	2015	2020
Natural Resources and Mining				
Converse County	12.2%	12.0%	11.8%	11.6%
Crook County	5.8%	5.6%	5.4%	5.2%
Johnson County	7.2%	8.0%	8.8%	9.6%
Sheridan County	9.3%	9.5%	10.0%	10.2%
Weston County	8.7%	8.4%	8.1%	7.9%
Natrona and Niobrara	56.8%	56.5%	55.9%	55.5%
Utilities				
Converse County	30.9%	31.1%	31.3%	31.5%
Crook County	2.5%	2.6%	2.6%	2.6%
Johnson County	1.6%	1.8%	2.2%	2.2%
Sheridan County	33.2%	32.9%	32.5%	32.3%
Weston County	5.3%	5.3%	5.3%	5.3%
Natrona and Niobrara	26.4%	26.3%	26.1%	26.1%
Construction				
Converse County	8.8%	8.8%	8.8%	8.8%
Crook County	4.9%	4.8%	4.8%	4.8%
Johnson County	4.4%	4.5%	4.7%	4.8%
Sheridan County	22.5%	22.6%	22.7%	22.8%
Weston County	4.0%	4.0%	4.0%	4.0%
Natrona and Niobrara	55.3%	55.2%	55.0%	54.8%
Manufacturing				
Converse County	15.3%	17.9%	19.4%	20.4%
Crook County	4.6%	4.4%	4.4%	4.4%
Johnson County	0.6%	0.8%	1.0%	1.2%
Sheridan County	14.3%	13.3%	12.6%	12.6%
Weston County	4.9%	4.5%	4.5%	4.5%
Natrona and Niobrara	60.3%	59.1%	58.1%	56.9%
Wholesale Trade				
Converse County	2.2%	2.4%	2.6%	2.8%
Crook County	1.0%	0.9%	0.8%	0.7%
Johnson County	3.8%	4.0%	4.2%	4.3%
Sheridan County	11.6%	11.3%	11.0%	10.8%
Weston County	1.0%	1.0%	1.0%	1.0%
Natrona and Niobrara	80.4%	80.4%	80.4%	80.4%
Retail Trade				
Converse County	6.7%	6.5%	6.3%	6.1%
Crook County	3.0%	3.2%	3.2%	3.2%
Johnson County	5.5%	5.8%	6.1%	6.4%
Sheridan County	21.0%	21.8%	22.1%	22.7%
Weston County	4.5%	4.5%	4.5%	4.5%
Natrona and Niobrara	59.3%	58.2%	57.8%	57.1%
Transportation and Warehousing				
Converse County	6.5%	6.1%	5.9%	5.7%
Crook County	12.0%	11.5%	11.0%	10.6%
Johnson County	3.5%	3.6%	3.7%	3.8%
Sheridan County	21.1%	22.3%	23.5%	24.7%
Weston County	14.0%	14.0%	14.0%	14.0%
Natrona and Niobrara	43.0%	42.4%	41.9%	41.2%
Information				
Converse County	7.3%	6.8%	6.3%	5.8%
Crook County	1.5%	1.3%	1.1%	0.9%
Johnson County	5.5%	5.5%	5.5%	5.5%
Sheridan County	19.5%	22.4%	24.8%	26.0%
Weston County	3.9%	3.5%	3.1%	2.7%
Natrona and Niobrara	62.3%	60.5%	59.2%	59.1%

Table A-18 (continued)

Industry/Location	2005	2010	2015	2020
Financial Activities				
Converse County	5.4%	5.6%	5.8%	6.0%
Crook County	2.0%	2.0%	2.0%	2.0%
Johnson County	5.0%	5.2%	5.3%	5.5%
Sheridan County	21.7%	22.0%	22.8%	23.8%
Weston County	2.7%	2.8%	2.9%	3.1%
Natrona and Niobrara	63.1%	62.4%	61.2%	59.6%
Professional and Business Services				
Converse County	4.0%	4.0%	4.1%	4.1%
Crook County	1.3%	1.4%	1.5%	1.6%
Johnson County	2.2%	3.0%	3.5%	4.0%
Sheridan County	17.9%	18.2%	18.6%	18.9%
Weston County	5.0%	5.0%	5.0%	5.0%
Natrona and Niobrara	69.5%	68.4%	67.3%	66.4%
Education and Health Services				
Converse County	4.4%	4.3%	4.1%	4.1%
Crook County	1.0%	0.9%	0.8%	0.8%
Johnson County	2.7%	2.8%	2.9%	3.0%
Sheridan County	25.0%	23.8%	22.3%	21.5%
Weston County	3.3%	3.2%	3.0%	3.0%
Natrona and Niobrara	63.6%	65.0%	66.8%	67.6%
Leisure and Hospitality				
Converse County	8.3%	8.1%	8.1%	8.3%
Crook County	4.3%	4.7%	4.7%	4.6%
Johnson County	7.5%	7.7%	7.8%	7.9%
Sheridan County	23.6%	23.7%	23.8%	23.9%
Weston County	3.9%	3.9%	3.9%	3.9%
Natrona and Niobrara	52.4%	51.9%	51.7%	51.4%
Other Services				
Converse County	3.9%	3.9%	4.0%	4.0%
Crook County	1.8%	1.6%	1.5%	1.4%
Johnson County	5.6%	5.8%	5.9%	5.9%
Sheridan County	22.5%	23.7%	24.8%	25.5%
Weston County	5.0%	4.8%	4.6%	4.4%
Natrona and Niobrara	61.2%	60.1%	59.2%	58.8%
Government				
Converse County	10.8%	10.7%	10.6%	10.5%
Crook County	5.3%	5.3%	5.3%	5.3%
Johnson County	7.2%	7.3%	7.4%	7.4%
Sheridan County	24.0%	23.6%	23.2%	22.7%
Weston County	5.8%	5.8%	5.8%	5.8%
Natrona and Niobrara	46.8%	47.4%	47.7%	48.3%
Farm				
Converse County	13.3%	13.3%	13.2%	13.1%
Crook County	18.2%	18.5%	18.9%	19.2%
Johnson County	13.6%	13.4%	13.3%	13.2%
Sheridan County	22.9%	22.8%	22.8%	22.8%
Weston County	9.0%	9.1%	9.2%	9.2%
Natrona and Niobrara	23.1%	22.9%	22.7%	22.5%

Note: Region 2 consists of Converse, Crook, Johnson, Natrona, Niobrara, Sheridan, and Weston counties. For this analysis,
the totals were adjusted to net out employment in Natrona and Niobrara counties.

A.3.2 Detailed Demographic Projections

For this study, population by age for Campbell County was taken directly from the REMI model. These results are presented in **Tables A-19** and **A-20**.

Table A-19
Population by Age for Campbell County Under the Lower Production Scenario
(000s)

Age Group	2005	2010	2015	2020
<5	2.837	3.602	3.684	3.431
5-18	8.155	8.542	9.108	9.71
19-24	4.120	3.567	3.028	2.88
25-64	22.189	27.156	28.469	28.221
65+	2.199	3.058	4.616	6.753
Total	**39.500**	**45.925**	**48.905**	**50.995**

Table A-20
Population by Age for Campbell County Under the Upper Production Scenario
(000s)

Age Group	2005	2010	2015	2020
<5	2.870	3.816	3.984	3.806
5-18	8.210	8.901	9.713	10.622
19-24	4.172	3.781	3.239	3.183
25-64	22.357	28.207	30.069	30.454
65+	2.200	3.077	4.679	6.878
Total	**39.809**	**47.782**	**51.684**	**54.943**

Population by age in each county of the surrounding counties region was estimated in a separate "spreadsheet" model, beginning with total REMI population by age for the region as a whole. The regional population data are presented in **Tables A-21** and **A-22**.

Table A-21
Population by Age for the Surrounding Counties Under the Lower Production Scenario
(000s)

Age Group	2005	2010	2015	2020
<5	7.842	8.870	9.472	9.390
5-18	23.650	22.320	23.146	25.180
19-24	12.300	10.689	9.374	8.666
25-64	68.582	73.162	74.595	73.558
65+	18.669	20.645	24.055	28.540
Total	**131.043**	**135.686**	**140.642**	**145.334**

Table A-22
Population by Age for the Surrounding Counties Under the Upper Production Scenario
(000s)

Age Group	2005	2010	2015	2020
<5	7.853	8.936	9.571	9.502
5-18	23.669	22.435	23.347	25.464
19-24	12.319	10.757	9.448	8.758
25-64	68.641	73.49	75.135	74.254
65+	18.671	20.652	24.075	28.579
Total	**131.153**	**136.270**	**141.576**	**146.557**

A forecast of population by age from the State of Wyoming EAD provided the initial basis for developing age group shares for each county. Initial results were compared to employment data assumptions from the PRB scenarios and to the disaggregated employment projections. Small ad hoc adjustments were made to the results for both PRB scenarios for consistency between employment and population. The adjusted, projected shares for 2010, 2015, and 2020 were used to allocate REMI industry control totals. **Table A-23** presents these allocation assumptions.

Table A-23
Disaggregation Assumptions for Population by Age in the Surrounding Counties

County/Age	2005	2010	2015	2020
Converse				
<5	9.4%	9.1%	8.9%	8.7%
5-18	10.3%	10.2%	10.1%	10.0%
19-24	7.5%	7.6%	7.4%	6.9%
25-64	9.9%	10.2%	10.3%	10.3%
65+	8.1%	8.5%	8.9%	9.3%
Crook				
<5	3.3%	3.3%	2.8%	2.4%
5-18	4.9%	5.3%	5.1%	4.9%
19-24	3.5%	3.7%	3.6%	3.5%
25-64	4.7%	4.9%	4.9%	4.9%
65+	5.1%	5.3%	5.5%	5.7%
Johnson				
<5	4.6%	4.7%	4.7%	4.7%
5-18	5.5%	5.7%	6.0%	6.2%
19-24	3.7%	4.5%	4.1%	3.7%
25-64	5.9%	6.5%	6.7%	6.9%
65+	7.2%	7.1%	6.9%	6.8%
Sheridan				
<5	18.7%	19.2%	19.9%	20.4%
5-18	20.1%	20.3%	20.5%	20.7%
19-24	19.6%	20.1%	20.7%	21.4%
25-64	21.4%	21.7%	22.0%	22.4%
65+	22.9%	22.3%	21.6%	20.9%
Weston				
<5	4.3%	4.1%	3.8%	3.6%
5-18	4.7%	4.3%	4.0%	3.7%
19-24	4.2%	4.1%	4.0%	3.8%
25-64	5.1%	5.0%	4.9%	4.7%
65+	5.9%	5.9%	5.9%	5.9%

A.3.3 Projected Housing Requirements

Total housing requirement projections were driven by projections of total population per household ratios. Total population projections were divided by the ratios to estimate new households requiring housing. **Tables A-24** through **A-26** present the total population by county and the corresponding ratios. Small ad hoc adjustments were made in Campbell, Sheridan, and Johnson counties. The adjustments marginally raised the population-to-households ratio and lowered housing requirements from trend-projected levels to reflect the demographic impact of younger economic migrants drawn by job opportunities in the PRB.

Table A-24
Housing Requirements Assumptions Under the Lower Production Scenario

County	2003	2010	2015	2020
Campbell	13,707	18,015	19,260	20,177
Converse	5,741	6,004	6,314	6,621
Crook	3,036	3,277	3,438	3,615
Johnson	3,622	4,119	4,340	4,560
Sheridan	12,861	13,563	14,290	14,917
Weston	3,273	3,420	3,523	3,618
Six-County Study Area	**42,240**	**48,398**	**51,165**	**53,508**

Table A-25
Housing Requirements Assumptions Under the Upper Production Scenario

County	2003	2010	2015	2020
Campbell	13,707	18,674	20,273	21,694
Converse	5,741	6,026	6,358	6,677
Crook	3,036	3,289	3,459	3,642
Johnson	3,622	4,133	4,368	4,596
Sheridan	12,861	13,613	14,388	15,045
Weston	3,273	3,433	3,545	3,647
Six-County Study Area	**42,240**	**49,168**	**52,391**	**55,301**

Table A-26
Average Persons per Household for Estimated Housing Requirements

County	2005	2010	2015	2020
Campbell	2.74	2.73	2.71	2.69
Converse	2.53	2.50	2.46	2.42
Crook	2.49	2.43	2.37	2.31
Johnson	2.38	2.37	2.36	2.35
Sheridan	2.37	2.36	2.35	2.35
Weston	2.47	2.41	2.35	2.29