

North Dakota Lignite Energy Industry's Contribution to the State Economy for 2007 and Projected for 2008

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This report provides estimates of the lignite industry's contribution to the North Dakota economy, using key economic indicators such as retail trade activity, personal income, total business activity, employment, and tax revenues. The estimates are based on actual industry expenditures for 2007 and projected expenditures for 2008. This analysis contains several measures of the relative importance of the lignite energy industry in North Dakota. First, the industry's share of the state's total sales to final demand (or exports) is evaluated. Second, the business volume generated by the industry is compared to the total gross business volume for the state. Expenditures were obtained from a survey of firms involved in lignite-related activities (mining or conversion) in North Dakota. Third, annual wages paid by lignite energy related industries will be compared to all industry wages in the state.

The methods used for this analysis are similar to those described in Coon et al. (1983) and Coon and Leistriz (1986). Expenditures of companies involved in lignite-related activities in North Dakota constitute the basic data for the study. The North Dakota Input-Output Model was used to analyze these data. The model uses interdependence coefficients, or multipliers, that measure the level of total gross business volume generated in each sector from an additional dollar of sales to final demand in a given sector. The input-output model applies the industry's expenditures to these interdependence coefficients. For a complete description of the input-output model, a listing of the coefficients, and how the model can be used to perform an economic contribution study, see Coon et al. (1985 and 1989). Resulting levels of business activity were used to estimate tax revenues and indirect and induced employment, based on historic relationships (Coon et al. 1992). Lignite industry sales for final demand for 2006 and the resulting level of business activity were compared to 2006 state values (the most recent data available) to indicate the industry's role in the economy. All values in this analysis are expressed in current year dollars (i.e., nominal dollars).

The expenditures of firms involved in lignite-related activities are assumed to work their way through the local economy the same as expenditures of firms in

other sectors of the North Dakota economy. The estimated ratio of secondary employment (jobs generated in other sectors of the North Dakota economy) to direct employment (jobs in the mines and plants using lignite in the state) is higher for the lignite industry than for some other sectors of the state's economy. Firms in the lignite industry have higher levels of expenditures per employee than do most other economic sectors in the state, making the indirect employment per worker in the lignite and lignite conversion industries higher.

Results

The North Dakota lignite industry's in-state expenditures totaled \$806.8 million in 2007 and were projected at \$995.4 million for 2008 (Table 1), based on a survey of firms in the industry. Actual expenditures for 2007 were significantly higher than the level projected for that year--\$734.4 million (Coon and Leistriz 2007). [Overall, expenditures during the 1987-2007 period were higher than those for earlier years. In fact, 2007 expenditures were 133 percent higher than those for 1986, which were \$346.2 million (Coon and Leistriz 1987). It should be noted, however, that inflation was about 89 percent, nationwide, over this period.]

Actual 2007 outlays were higher than previous projections resulting primarily because communications and public utilities and retail trade sectors expenditures were more than projected. Much of the increased expenditures were for the purchase of wholesale electric power to satisfy customer demand. Lignite energy industry firms are expecting their 2008 expenditures to grow by over \$188 million from 2007 levels. This expansion is highlighted by \$165.7 million more in retail trade purchases. Rising oil prices worldwide since 2000 are a key reason for projected growth in the lignite energy industries. Since mid-1999, oil prices have risen rather dramatically and currently oil prices are at all time highs with the price exceeding \$110 per barrel. Oil prices, which were \$60 per barrel when this analysis was done a year ago, have almost doubled during the past 12 months. This situation has led to increased demand for lignite energy products. In fact, electric energy shortages in

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the United States in 2000 have stimulated discussions for building coal conversion plants in western North Dakota. The construction sector could experience even larger increases in the future with an emphasis on more domestic energy production.

Sector	2007	2008
	-million dollars-	
Construction	101.6	103.3
Transportation	25.9	28.3
Comm & public utilities	113.1	107.2
Wholesale trade & misc mfg	85.1	88.8
Retail trade	132.0	297.7
Fin, ins & real estate	54.1	59.5
Bus & personal serv	48.5	50.9
Prof & social serv	42.9	43.2
Households	<u>203.6</u>	<u>216.5</u>
Total	806.8	995.4

Expenditures from firms involved in lignite-related activities generated total business activity of over \$2.4 billion in 2007 and projected to be nearly \$2.8 billion for 2008 (Table 2). Expenditures by lignite-related firms resulted in \$563.5 million of retail sales activity in the state in 2007 and are projected at \$790.8 million for 2008. Also, the industry's activities generated \$752.9 million in personal income in 2007, with the 2008 level projected to be \$849.4 million.

Lignite industry companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be \$89.2 million in 2007 and \$103.2 million in 2008 (Table 3). Coal severance and energy conversion taxes constituted 17 percent and 30 percent of the total, respectively, in 2007. In addition to the 3,882 workers directly employed in 2007 and the projected 4,074 workers for 2008, the industry supported jobs for over 21,000 indirect workers (secondary employment) in 2007 and nearly 24,000 in 2008 from business activity attributable to the lignite industry in each of these years (Table 4).

Item	2007	2008
	-million dollars-	
Personal income	752.9	849.4
Retail sales	563.5	790.8
Business activity for all business sectors ^a	1,446.8	1,740.7
Total business activity	2,400.7	2,825.1

^a Includes all sectors except agriculture (livestock and crops), households, and government.

Tax Revenue	2007	2008
	-million dollars-	
Coal severance	14.9	14.7
Energy conversion	26.9	28.3
Sales and use	26.1	36.6
Personal and corporate income	15.8	18.1
Other	<u>5.5</u>	<u>5.5</u>
Total	89.2	103.2

Two additional measures can be used to show the importance of the lignite industry to the North Dakota economy: sales for final demand and business activity. When lignite energy industry sales for final demand for 2006 (\$1,559.3 million) were compared with the total economic base (sales for final demand or exports) for North Dakota for 2006, the last year the data were available (\$22,136.0 million), they comprised 7.0 percent of the state's total (Coon and Leistritz 2008). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 16.3 percent of the state's total economic base in 2006. Business activity generated by the lignite industry's sales for final demand (\$3,520.7 million) was 5.2 percent of the 2006 state total gross business volume (\$67,282.2 million). This has increased from 4.5 percent in 2004, reflecting the increased value of lignite energy production. These measures show that the lignite energy industry plays an important role in the North Dakota economy.

Table 4. Estimated Direct and Secondary Employment for Companies Involved in Lignite-related Activities, 2007 and Preliminary 2008		
Employment	2007	2008
Direct	3,882	4,074
Secondary	21,666	23,915

Table 5. North Dakota Covered Annual Average Wages By Industry, 2003-2006				
Industry	2003	2004	2005	2006
Agriculture	25,212	27,029	27,353	27,99
Mining	50,970	52,998	57,054	64,642
Mining, except oil & gas	54,954	57,620	59,559	62,160
Construction	32,551	34,284	35,704	37,923
Manufacturing	34,082	36,016	36,375	38,274
Trans, Comm, Util	37,339	39,701	41,130	42,587
Elec Prod	62,879	67,151	69,876	67,934
Gas Prod	62,733	68,496	70,100	71,393
Wholesale Tr	36,126	38,380	40,120	41,927
Retail Trade	19,268	19,802	20,204	20,672
FIRE	33,614	35,508	35,752	37,418
Services	26,232	27,362	28,607	29,846
Government	<u>29,361</u>	<u>30,545</u>	<u>31,536</u>	<u>31,526</u>
TOTAL	27,629	28,987	29,955	31,316

Source: Job Service North Dakota, 2004, 2005, 2006 and 2007.

Previous versions of this analysis have reported that the state's coal mining sector wages were the highest in the state. This could still be the case, but due to disclosure problems the coal mining industry is now reported as all mining, except oil and gas. The 2006 average annual wage for all mining, except oil and gas, is considerably lower than the last year coal mining salaries were available. However, the mining, except oil and gas, wages were near the highest in North Dakota, following gas production and electrical production. Mining, except oil and gas, salaries were nearly 2 times that of all covered wages in North Dakota for the 2003 to 2006 period, the latest years data were available. Mining, except oil and gas, average annual wages have increased each year from 2003 to 2006. The lignite energy industry (coal production and conversion) provides average wages above almost all other industries in North Dakota.

Table 6 presents data that shows mining wages are much higher than all wages for state regions that have lignite energy activities. State Region 7 had the highest mining industry annual wages per employee in 2005 (\$67,431) and 2006 (\$70,664). County mining and all industry wages are presented in Table 7 for those with mining activities. Data were not available for Adams, McLean, and Oliver Counties for 2005 and 2006 to avoid disclosure problems. McLean County had the highest mining wages of all counties in 2004, but due to data disclosure problems it was not possible to determine if it continued to have the highest mining wages in 2005 or 2006. Average mining wages for Mercer County was \$73,235 in 2006, increasing from \$69,958 in 2005. Wage data presented helps to show the benefits the lignite energy industry provides in North Dakota. It contributes to the state's economy through business activity, tax revenues, and employment. On a local and regional basis, the lignite energy industry provides good paying jobs that help keep people in North Dakota

Table 6. Covered Annual Average Wages for Mining and All Industries, For State Planning Regions Involved in Mining 2004 and 2005				
	2005		2006	
Region	Mining	Total	Mining	Total
-----\$-----				
Region 1	57,708	30,490	68,800	35,656
Region 2	49,808	26,805	55,140	27,530
Region 7	67,431	32,001	70,664	33,172
Region 8	53,408	25,696	60,018	27,878

Source: Job Service North Dakota, 2006 and 2007

The world energy situation has been changing rapidly in recent years. Demand for oil has increased significantly with more nations becoming industrialized. Demand for oil, turmoil in oil producing countries, and oil production quotas have resulted in price increases. These price increases (crude oil prices spiked over \$110 per barrel) have resulted in our nation's industries looking for new sources of domestic energy. Along with the prospect of producing renewable energy (ethanol, biodiesel, wind energy, etc.), further development of domestic reserves now seems feasible. North Dakota has massive lignite coal reserves that could help supply our nation's energy needs.

This is an exciting time for North Dakota's lignite energy industry. Currently, an ethanol plant in western North Dakota which will use lignite coal as its energy source, just became operational. A second ethanol

Table 7. Covered Annual Average Wages for Mining and All Industries, For Counties Involved in Mining 2004 and 2005

Region	2005		2006	
	Mining	Total	Mining	Total
-----\$-----				
Adams	N/A	23,912	N/A	24,834
Bowman	47,798	23,581	53,047	26,366
McLean	N/A	32,579	N/A	34,131
Mercer	69,958	42,403	73,235	45,167
Oliver	N/A	44,676	N/A	46,234
Williams	58,689	31,768	69,550	37,273
N. Dak	57,054	29,955	64,642	31,316

Source: Job Service North Dakota, 2006 and 2007

plant in western North Dakota will team with an electrical generation plant to use waste water heat to form a highly efficient plant. A lignite mine in southwest North Dakota is in the planning stages, with a potential synthetic natural gas plant to follow. Several other projects are being discussed that would also use lignite coal. The U.S. Air Force is considering building a plant in North Dakota that would convert lignite coal into jet fuel. This would be a 30,000 barrel per day plant that would produce both power and liquid fuel. Also, two 500 megawatt electrical generation plants are under consideration. These examples provide an indication of what may be ahead for North Dakota's lignite energy industry.

This study estimated the 2007 and projected 2008 economic contribution of the lignite energy industry to the North Dakota economy. The industry currently provides high-wage jobs for western North Dakota residents and generates levels of business activity that benefit the entire state. Each of the lignite energy related projects previously discussed would be a large-scale development for the state. Construction and operation of any, or all, of these projects would greatly increase the level of economic activity attributed to the lignite energy sector. North Dakota could realize significant economic benefits as a result of growth and development of the lignite energy industry. The role of North Dakota's lignite-energy industry in the state's economy will be increasingly important as the lignite coal reserves are utilized.

The lignite energy industry's economic contribution to the North Dakota economy has been assessed annually since 1982. The North Dakota Lignite Council, the North Dakota Industrial Commission, and recently the Lignite Energy Council have funded these studies. For a discussion of the annual economic contributions the lignite energy industry (that is, those firms involved in the mining or conversion of the state's lignite) has made from 1982 through 2006, see Coon et al. (1983) and Coon and Leistriz (annually 1985-2007).

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