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North Dakota Lignite Energy Industry's Contribution to the State Economy for 2006 and Projected for 2007

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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 2006 and projected expenditures for 2007. 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 Leistritz (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 2004 and the resulting level of business activity were compared to 2004 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 $633.6 million in 2006 and were projected at $734.4 million for 2007 (Table 1), based on a survey of firms in the industry. Actual expenditures for 2006 were slightly lower than the level projected for that year--$675.8 million (Coon and Leistritz 2006). [Overall, expenditures during the 1987-2006 period were higher than those for earlier years. In fact, 2006 expenditures were 83 percent higher than those for 1986, which were $346.2 million (Coon and Leistritz 1987). It should be noted, however, that inflation was about 84 percent, nationwide, over this period.]

Actual 2006 outlays were lower than previous projections resulting primarily because retail trade sector expenditures were less than projected. It is not uncommon for the actual expenditures to be slightly less than projected. Lignite energy industry firms are expecting their 2007 expenditures to grow by nearly $101 million from 2006 levels. This expansion is highlighted by $55.6 million more in construction activities. 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 $60 per barrel. This situation has led to increased demand for lignite

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energy products. In fact, electric energy shortages in the United States in 2000 have stimulated discussions for building coal-fired plants in western North Dakota. The construction sector could experience even larger increases in the future with an emphasis on more domestic energy production.

Table 1. Estimated North Dakota Direct Expenditures by Economic Sector for Companies Involved in Lignite-related Activities, 2006 and Preliminary 2007

Sector	2006	2007
	-million dollars-	
Construction	42.4	98.0
Transportation	24.0	25.3
Comm & public utilities	70.8	72.2
Wholesale trade & misc mfg	66.1	77.5
Retail trade	106.3	123.5
Fin, ins & real estate	50.3	54.2
Bus & personal serv	40.2	41.9
Prof & social serv	40.3	42.0
Households	193.2	199.8
Total	633.6	734.4

Expenditures from firms involved in lignite-related activities generated total business activity of over $1.9 billion in 2006 and projected to be nearly $2.2 billion for 2007 (Table 2). Expenditures by lignite-related firms resulted in $459.8 million of retail sales activity in the state in 2006 and are projected at $522.3 million for 2007. Also, the industry's activities generated $627.1 million in personal income in 2006, with the 2007 level projected to be $696.9 million.

Lignite industry companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be $78.8 million in 2006 and $83.6 million in 2007 (Table 3). Coal severance and energy conversion taxes constituted 15 percent and 35 percent of the total, respectively, in 2006. In addition to the 4,041 workers directly employed in 2006 and the projected 4,070 workers for 2007, the industry supported jobs for over 18,000 indirect workers (secondary employment) in 2006 and nearly 21,000 in 2007 from business activity attributable to the lignite industry in each of these years (Table 4).

Table 2. Estimated Direct Plus Indirect Personal Income, Retail Sales Activity, Business Activity for All Business Sectors, and Total Business Activity for Companies Involved in Lignite-related Activities, 2006 and Preliminary 2007

Item	2006	2007
	-million dollars-	
Personal income	627.1	696.9
Retail sales	459.8	522.3
Business activity for all business sectors[a]	1,127.7	1,311.3
Total business activity	1,916.7	2,192.2

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

Table 3. Estimated State Tax Revenue Resulting from Activities of Companies Involved in Lignite-related Activities, 2006 and Preliminary 2007

Tax Revenue	2006	2007
	-million dollars-	
Coal severance	12.0	11.9
Energy conversion	27.2	27.5
Sales and use	21.3	24.2
Personal and corporate income	12.9	14.5
Other	5.4	5.5
Total	78.8	83.6

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 2004 ($1,140.5 million) were compared with the total economic base (sales for final demand or exports) for North Dakota for 2004, the last year the data were available ($18,528.1 million), they comprised 6.2 percent of the state's total (Coon and Leistritz 2006). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 12.1 percent of the state's total economic base in 2004. Business activity generated by the lignite industry's sales for final demand ($2,581.6 million) was 4.5 percent of the 2004 state total gross business volume ($57,845.0 million). 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, 2006 and Preliminary 2007		
Employment	2006	2007
Direct	4,041	4,070
Secondary	18,610	20,959

Table 5. North Dakota Covered Annual Average Wages By Industry, 2002-2005				
Industry	2002	2003	2004	2005
Agriculture	25,829	25,212	27,029	27,353
Mining	49,153	50,970	52,998	57,054
Coal Mining	65,037	66,166	68,157	70,938
Construction	31,862	32,551	34,284	35,704
Manufacturing	32,474	34,082	36,016	36,375
Trans, Comm, Util	35,554	37,339	39,701	41,130
Elec Prod	58,572	62,879	67,151	69,876
Gas Prod	59,112	62,733	68,496	70,100
Wholesale Tr	34,493	36,126	38,380	40,120
Retail Trade	18,776	19,268	19,802	20,204
FIRE	31,920	33,614	35,508	35,752
Services	25,265	26,232	27,362	28,607
Government	28,283	29,361	30,545	31,536
TOTAL	26,550	27,629	28,987	29,955

Source: Job Service North Dakota, 2003, 2004, 2005, and 2006.

Wages paid annually in the state's coal mining sector were the highest of any in North Dakota ($65,037 in 2002, $66,166 in 2003, and $70,938 in 2005) (Table 5). In 2004, coal mining wages ($68,157) were slightly less than gas production wages ($68,496). These salaries were nearly 2.4 times that of all covered wages in North Dakota for the 2002 to 2005 period, the latest years data were available. Coal mining average annual wages have increased each year from 2002 to 2005. This reverses the slight decline from 2001 to 2002 which may have been due in part to the data reporting switching from SIC codes to NAICS classifications. Following closely behind coal mining wages were gas production and electrical production salaries. The lignite energy industry (coal production and conversion) provides the highest average wages of any industry 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 2004 ($65,138) and 2005 ($67,431). County mining and all industry wages are presented in Table 7 for those with mining activities. These data were consolidated to avoid disclosure problems but still provide a good indication of the extent mining wages were above those for all industries. McLean County had the highest mining wages of all counties in 2004. Due to data disclosure problems it was not possible to determine if McLean County continued to have the highest mining wages 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				
	2004		2005	
Region	Mining	Total	Mining	Total
	----------$----------			
Region 1	52,559	27,718	57,708	30,490
Region 2	44,742	25,803	49,808	26,805
Region 7	65,138	31,369	67,431	32,001
Region 8	47,939	24,420	53,408	25,696

Source: Job Service North Dakota, 2005 and 2006

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 $70 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

	2004		2005	
Region	Mining	Total	Mining	Total
	----------$----------			
Adams	N/A	23,105	N/A	23,912
Bowman	41,963[a]	22,813	47,798	23,581
McLean	70,024[b]	31,088	N/A	32,579
Mercer	66,457[c]	42,055	69,958	42,403
Oliver	61,990[d]	46,141	N/A	44,676
Williams	54,126	28,715	58,689	31,768
N. Dak	52,998	28,987	57,054	29,955

[a]Includes mining and utilities industries to avoid disclosure.
[b]Includes mining, agriculture, and utilities industries to avoid disclosure.
[c]Includes mining and agriculture industries to avoid disclosure.
[d]Includes mining, agriculture, utilities, and construction industries to avoid disclosure.
Source: Job Service North Dakota, 2005 and 2006

plant in western North Dakota will team with an electrical generation plant to use waste water heat to form a highly efficient plant. 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 2006 and projected 2007 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 2004, see Coon et al. (1983) and Coon and Leistritz (annually 1985-2006).

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