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North Dakota Lignite Energy Industry's Contribution to the State Economy for 2011 and Projected for 2012

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The lignite energy industry's contribution to the North Dakota economy has been measured using key economic indicators, including retail trade activity, personal income, total business activity, employment, and tax revenues. The estimates were based on actual industry expenditures for 2011 and projected expenditures for 2012. This analysis contains several measures of the relative importance of the lignite energy industry in North Dakota. First, expenditures (obtained from a survey of firms involved in lignite mining and conversion) were used to estimate the business activity the industry generates in the sectors of the state's economy. Second, the industry's share of the state's total sales to final demand (or exports) is evaluated. 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 business activity 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 2010 and the resulting level of business activity were compared to 2010 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) in previous studies was higher for the lignite industry than for some other sectors of the state's economy. A new methodology was used in this study to estimate secondary employment. This methodology was used to avoid possible overestimation of secondary workers, and to provide direct to indirect ratios more in line with other industries in the state.

Results

The North Dakota lignite industry's in-state expenditures totaled \$969.3 million in 2011 and were projected at \$1.2 billion for 2012 (Table 1), based on a survey of firms in the industry. Actual expenditures for 2011 were slightly less than the level projected for that year--\$979.3 million (Coon and Leistritz 2011). [Overall, expenditures during the 1987-2011 period were higher than those for earlier years. In fact, 2011 expenditures were 180 percent higher than those for 1986, which were \$346.2 million (Coon and Leistritz 1987). It should be noted, however, that inflation was about 105 percent, nationwide, over this period.]

Actual 2011 outlays were less than previous projections resulting primarily because the construction sector expenditures were less than projected. Transportation and wholesale trade were slightly lower than their projected values, but all other sectors were very close to their projections. Lignite energy industry firms are expecting their 2012 expenditures to increase by \$196.2 million from 2011 levels. This increase is primarily the result of \$69.9 million additional expenditures to the construction sector for planned plant improvements. Rising oil prices worldwide since 2000 are a key reason for projected growth in the lignite energy industries. Oil prices have risen rather dramatically

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since mid-1999, reaching over \$140 per barrel in 2008. Oil prices have been extremely volatile the past couple of years and currently are in the \$100 per barrel range. This is less than the all-time highs during July 2008, but still high enough to cause concerns among consumers. The current rise in oil prices is being driven by unrest in the Middle East and increasing demand as countries start to recover from a world-wide recession. This situation also has led to increased demand for lignite energy products. The construction sector could potentially experience large 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, 2011 and Preliminary 2012		
Sector	2011	2012
-million dollars-		
Construction	132.1	202.0
Transportation	26.9	30.0
Comm & public utilities	96.6	122.9
Wholesale trade & misc mfg	118.7	157.3
Retail trade	155.3	174.5
Fin, ins & real estate	83.9	88.2
Bus & personal serv	51.7	54.8
Prof & social serv	43.6	55.7
Households	<u>260.5</u>	<u>280.1</u>
Total	969.3	1,165.5

Expenditures from firms involved in lignite-related activities generated total business activity of over \$2.9 billion in 2011 and projected to be over \$3.5 billion for 2012 (Table 2). Expenditures by lignite-related firms resulted in \$684.1 million of retail sales activity in the state in 2011 and are projected at \$800.9 million for 2012. Also, the industry's activities generated \$922.1 million in personal income in 2011, with the 2012 level projected to be \$1.1 billion.

Lignite industry companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be \$91.9 million in 2011 and \$101.6 million in 2012 (Table 3). Coal severance and energy conversion taxes constituted 12.1 percent and 26.9 percent of the total, respectively, in 2011. In addition to the 3,915 workers directly employed in 2011 and the projected

4,097 workers for 2012, the industry supported jobs for over 11,000 indirect workers (secondary employment) in 2011 and projected to support over 13,000 in 2012 from business activity attributable to the lignite energy industry (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, 2011 and Preliminary 2012		
Item	2011	2012
-million dollars-		
Personal income	922.1	1,076.6
Retail sales	684.1	800.9
Business activity for all business sectors ^a	1,749.6	2,128.6
Total business activity	2,926.2	3,517.6
^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, 2011 and Preliminary 2012		
Tax Revenue	2011	2012
-million dollars-		
Coal severance	11.1	11.1
Energy conversion	24.7	25.4
Sales and use	31.7	37.1
Personal and corporate income	19.2	22.7
Other	<u>5.2</u>	<u>5.3</u>
Total	91.9	101.6

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 2010 (\$1.7 billion) were compared with the total economic base (sales for final demand or exports) for North Dakota for 2010 (\$32.2 billion), they comprised 5.1 percent of the state's total (Coon, Bangsund, and Hodur 2012). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 14.8 percent of the state's total economic base in 2010. Business activity generated by the lignite industry's sales for final

demand (\$3.7 billion) was 3.8 percent of the 2010 state's total gross business volume (\$98.3 billion). This is slightly less than the 4.3 percent in 2009, but has remained a consistent share of the state's economic base. These measures show that the lignite energy industry plays an important role in the North Dakota economy.

Employment	2011	2012
Direct	3,915	4,097
Secondary	11,638	13,347

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 2009 average annual wage for all mining, except oil and gas, for the first time exceeded 2005 coal mining salaries of \$70,938, (Coon and Leistriz, 2007). Wages for this industry continue to increase, reaching an average annual wage of \$75,585 in 2010. Also, mining wages, except oil and gas, were near the highest in North Dakota, following gas and electrical production. Mining salaries, except oil and gas, were nearly double that of all covered wages in North Dakota for the 2007 to 2010 period, the latest years data were available (Table 5). Mining, except oil and gas, average annual wages have increased each year from 2007 to 2010. 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 2009 (\$82,845) and Region 8 had the highest in 2010 (\$87,265). 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 2009 and 2010 to

Industry	2007	2008	2009	2010
	-----\$-----			
Agriculture	29,715	31,693	34,579	34,994
Mining	70,004	74,949	73,055	79,976
Mining, except oil & gas	65,333	68,417	72,318	75,585
Construction	40,532	44,099	45,406	46,536
Manufacturing	40,170	41,720	41,577	43,408
Trans, Comm, Util	44,580	47,470	48,599	51,215
Elec Prod	71,702	74,879	76,833	78,406
Gas Prod	75,563	75,814	81,427	83,649
Wholesale Trade	44,415	48,163	48,772	51,358
Retail Trade	21,700	22,863	23,233	24,159
FIRE	39,402	41,674	42,805	44,347
Services	31,313	32,871	34,171	36,163
Government	34,258	35,887	37,282	38,565
TOTAL	33,086	35,075	35,970	38,127
Source: Job Service North Dakota, 2008, 2009, 2010, and 2011.				

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 2009 or 2010. Average mining wage for Mercer County was \$82,201 in 2009, and increased to \$84,127 in 2010. Wage data presented helps 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.

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

Table 6. Covered Annual Average Wages for Mining and All Industries, For State Planning Regions Involved in Mining 2009 and 2010

Region	2009		2010	
	Mining	Total	Mining	Total
-----\$-----				
Region 1	73,086	45,998	80,933	55,121
Region 2	62,115	32,516	72,263	35,392
Region 7	82,845	37,382	86,348	38,892
Region 8	80,868	34,834	87,265	40,640

Source: Job Service North Dakota, 2010 and 2011

resulted in price increases. These price increases (crude oil prices have previously spiked over \$140 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. An ethanol plant in western North Dakota teams with an electrical generation plant to use waste water heat to form a highly efficient plant. A demonstration facility in southwest North Dakota is in the process of testing coal beneficiation to convert lignite coal to a high efficiency fuel source for a conversion facility. Several other projects are being discussed that would also use lignite coal. American Lignite Energy is considering building a plant that would use 6 million tons of lignite coal per year to produce liquid fuels. This plant would produce 25,000 barrels per day of refined fuel products including gasoline, diesel, and jet fuel. Also, an electrical generation plant in east-central North Dakota uses lignite coal as a fuel source. These examples provide an indication of what may be ahead for North Dakota's lignite energy industry.

New technologies and processes (i.e., coal beneficiation) have made North Dakota's lignite coal a more efficient and environmentally friendly energy source. With the state's vast lignite reserves, this points to continued strength in the lignite energy industries. However, the continued growth in the

Table 7. Covered Annual Average Wages for Mining and All Industries, For Counties Involved in Mining 2009 and 2010

Region	2009		2010	
	Mining	Total	Mining	Total
-----\$-----				
Adams	N/A	28,290	N/A	30,578
Bowman	67,327	31,441	62,473	33,859
McLean	N/A	42,027	N/A	41,542
Mercer	82,201	52,384	84,127	52,196
Oliver	N/A	60,202	N/A	61,424
Williams	73,395	47,027	81,927	56,858
N. Dakota	73,055	35,970	79,976	38,127

Source: Job Service North Dakota, 2010 and 2011

lignite energy industry could be hampered by policies in Washington, D.C. Projects that could benefit North Dakota and provide energy for the rest of the nation are currently being delayed. New tax proposals could also add significantly to the cost of producing energy products.

This study estimated the 2011 and projected 2012 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 2010, see Coon et al. (1983) and Coon and Leistriz (annually 1985-2011).

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