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North Dakota Lignite Energy Industry's Contribution to the State Economy for 2012 and Projected for 2013

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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. These estimates were based on actual industry expenditures for 2012 and projected expenditures for 2013. 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 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 business activity generated in each sector from an additional dollar of sales to final demand in a given sector. For a complete description of the input-output model, see Coon et al. (1985 and 1989). 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 2011 and the resulting level of business activity were compared to 2011 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 \$954.0 million in 2012 and were projected at \$1.1 billion for 2013 (Table 1). Actual expenditures for 2012 were less than projected (\$1.2 billion) by the previous year's study (Coon et al. 2012). Lignite energy industry expenditures were considerably higher than those for earlier years. For example, expenditures in 2012 were 176 percent higher than those for 1986, (\$346.2 million) (Coon and Leistriz 1987). Inflation was about 110 percent, nationwide, during this period.

Actual 2012 outlays were less than previous projections primarily because construction sector expenditures were less than projected. Other sectors were only slightly lower than projected values. Lignite energy industry firms are projecting 2013 expenditures to increase by \$127.8 million from 2012 levels. This increase is primarily the result of \$78.9 million in construction expenditures for plant improvements that were planned for 2012, but delayed until 2013.

Rising oil prices worldwide since 2000 are a key reason for projected growth in the lignite energy industry. Oil prices have risen rather dramatically 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 mid \$90 per barrel range. This is less than the all-time highs during July 2008, but still high enough to create strong demand for lignite energy products.

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Table 1. Estimated North Dakota Direct Expenditures by Economic Sector for Companies Involved in Lignite-related Activities, 2012 and Preliminary 2013		
Sector	2012	2013
	-million dollars-	
Construction	45.3	124.2
Transportation	21.3	25.1
Comm & public utilities	117.8	122.7
Wholesale trade & misc mfg	154.4	159.6
Retail trade	153.0	163.4
Fin, ins & real estate	84.6	88.9
Bus & personal serv	51.3	54.6
Prof & social serv	54.0	67.5
Households	<u>272.3</u>	<u>275.8</u>
Total	954.0	1,081.8

Expenditures from firms involved in lignite-related activities generated total business activity of nearly \$3.0 billion in 2012 with projected business activity of \$3.3 billion for 2013 (Table 2). Expenditures by lignite-related firms resulted in \$689.5 million of retail sales activity in the state in 2012 and were projected to be \$758.5 million for 2013. Also, the industry's activities generated \$938.6 million in personal income in 2012, with 2013 personal income projected to be \$1.0 billion.

Lignite energy companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be \$91.9 million in 2012 and \$97.1 million in 2013 (Table 3). Coal severance and energy conversion taxes were 12.1 percent and 26.3 percent of the total, respectively, in 2012. The lignite energy industry directly employed 3,950 workers in 2012 and was projected to provide employment for 4,319 workers for 2013. Business activity attributed to the lignite energy industry provided employment for nearly 11,000 indirect workers (secondary employment) in 2012 and projected to support over 12,000 in 2013 (Table 4).

The importance of the lignite industry to the North Dakota economy can be measured using sales for final demand (value of exported goods and services) and gross business volume (economy-wide business activity resulting from exports). When lignite energy industry sales for final demand for 2011 (\$1.7 billion) were compared to the total economic base (sales for final

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, 2012 and Preliminary 2013		
Item	2012	2013
	-million dollars-	
Personal income	938.6	1,028.8
Retail sales	689.5	758.5
Business activity for all business sectors ^a	1,761.0	1,994.7
Total business activity	2,983.6	3,328.1

^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, 2012 and Preliminary 2013		
Tax Revenue	2012	2013
	-million dollars-	
Coal severance	11.1	10.8
Energy conversion	24.2	24.2
Sales and use	31.9	35.1
Personal and corporate income	19.5	21.6
Other	<u>5.2</u>	<u>5.4</u>
Total	91.9	97.1

demand or exports) for North Dakota for 2011 (\$33.2 billion), the lignite energy industry comprised 5.1 percent of the state's total (Coon, Bangsund, and Hodur 2013). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 21.1 percent of the state's total economic base in 2011. Business activity generated by the lignite industry's sales for final demand (\$3.9 billion) was 3.9 percent of the 2011 state's total gross business volume (\$99.4 billion). This was slightly more than the 3.8 percent reported in 2010. The industry has maintained a consistent share of the state's economic base, which illustrates the role that the lignite energy industry plays in the North Dakota economy.

Previous versions of this analysis have reported that the state's coal mining sector wages were the highest in the state. This may still be the case, but due

Table 4. Estimated Direct and Secondary Employment for Companies Involved in Lignite-related Activities, 2012 and Preliminary 2013		
Employment	2012	2013
Direct	3,950	4,319
Secondary	10,749	12,102

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 Leistritz, 2007). Industry wages continue to increase, reaching an average annual wage of \$76,167 in 2011. 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 2008 to 2011 period, the latest years data were available (Table 5). Mining, except oil and gas, average annual wages have increased each year from 2008 to 2011. The lignite energy industry (coal production and conversion) provides average wages higher than almost all other industries in North Dakota.

Mining wages are much higher than all wages in state regions that have lignite energy activities (Table 6). State Region 8 had the highest mining industry annual wages per employee in 2010 (\$87,265) and also had the highest 2011 per employee wages (\$93,512). County mining and all industry wages are presented in Table 7 for those with mining activities. Wages were not available for Adams, McLean, and Oliver Counties for 2010 and 2011 to avoid disclosing proprietary data because of the number of firms located in these counties. 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 2010 or 2011. Average mining wage for Mercer County was \$84,127 in 2010, and increased to \$89,745 in 2011. In 2011, Williams County had a higher annual mining wage (\$92,926) than Mercer County. Wage data clearly illustrates that the lignite energy industry provides high paying jobs in North Dakota.

The lignite energy industry contributes to the state's economy through business activity, tax revenues, and employment. On a local and regional basis, the lignite energy industry also provides good paying jobs that help retain people in coal-producing counties.

Table 5. North Dakota Covered Annual Average Wages By Industry, 2008-2011				
Industry	2008	2009	2010	2011
-----\$-----				
Agriculture	31,693	34,579	34,994	36,174
Mining	74,949	73,055	79,976	89,730
Mining, except oil & gas	68,417	72,318	75,585	76,167
Construction	44,099	45,406	46,536	51,201
Manufacturing	41,720	41,577	43,408	44,778
Trans, Comm, Util	47,470	48,599	51,215	56,168
Elec Prod	74,879	76,833	78,406	81,639
Gas Prod	75,814	81,427	83,649	87,810
Wholesale Trade	48,163	48,772	51,358	57,560
Retail Trade	22,863	23,233	24,159	25,653
FIRE	41,674	42,805	44,391	48,655
Services	32,871	34,171	36,163	38,351
Government	35,887	37,282	38,565	40,281
TOTAL	35,075	35,970	38,127	41,778
Source: Job Service North Dakota, 2009, 2010, 2011 and 2012.				

Table 6. Covered Annual Average Wages for Mining and All Industries, For State Planning Regions Involved in Mining 2010 and 2011				
Region	2010		2011	
	Mining	Total	Mining	Total
-----\$-----				
Region 1	80,933	55,121	92,103	68,333
Region 2	72,263	35,392	83,615	40,741
Region 7	86,348	38,892	85,608	46,539
Region 8	87,265	40,640	93,512	46,850
Source: Job Service North Dakota, 2011 and 2012				

The world energy situation has been changing rapidly in recent years. The demand for oil has increased significantly with more nations becoming industrialized. Demand for oil, instability in oil producing countries, and oil production quotas have resulted in price increases. These price increases (crude oil prices have previously spiked over \$140 per barrel) have promoted demand for reliable sources of domestic

energy. Along with the prospect of producing renewable energy (ethanol, biodiesel, wind energy, etc.), new technologies have led to development of domestic oil reserves. 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 has partnered with an electrical generation plant to use waste heat to power a highly efficient plant. A demonstration facility in southwest North Dakota is in the process of testing coal beneficiation to convert lignite coal from around the world to a higher BTU content fuel source, for use in conversion facilities. In May, the Leland Olds Station will complete a \$400 million upgrade that includes a scrubber which will greatly reduce emissions.

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. The plant would produce 25,000 barrels per day of refined fuel products including gasoline, diesel, and jet fuel. Great River Energy will begin construction on Dakota Spirit AgEnergy, a 65 million gallon per year ethanol plant in the summer of 2013, with an anticipated completion date of late 2014. The Spiritwood Station, which uses lignite coal as a fuel source, is expected to become operational in January 2015. It will provide electricity for Minnesota residents and steam for Dakota Spirit AgEnergy and the adjacent malt plant.

Also, two major lignite-generated electricity transmission projects are either underway or soon will be. One project will bring electricity from the Milton R. Young Station to the Red River Valley, and another large transmission line will bring electricity from Antelope Valley Station to the oil fields in western North Dakota. These projects illustrate how North Dakota's lignite energy industry is helping to meet the energy needs of residents, businesses, and industries in North Dakota and regionally.

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

The U.S. Environmental Protection Agency (EPA) continues to impose regulations that threaten the vitality of power plants and coal mines in North Dakota. EPA has proposed to regulate greenhouse

Table 7. Covered Annual Average Wages for Mining and All Industries, For Counties Involved in Mining 2010 and 2011

Region	2010		2011	
	Mining	Total	Mining	Total
	-----\$-----			
Adams	N/A	30,578	N/A	32,325
Bowman	62,473	33,859	70,496	37,325
McLean	N/A	41,542	N/A	43,139
Mercer	84,127	52,196	89,745	54,837
Oliver	N/A	61,424	N/A	59,832
Williams	81,927	56,858	92,926	70,027
N. D.	79,976	38,127	89,730	41,778

Source: Job Service North Dakota, 2011 and 2012

gases from new power plants and expects to finalize the rule in 2013. Unless significant modifications are made, the proposed rule would effectively ban the construction of any new conventional coal-based power plants. EPA is also considering greenhouse gas regulations for existing power plants. The billions of dollars that have been invested in coal-based power plants could be jeopardized if new regulations are not cost-effective.

This study estimated the 2012 and projected 2013 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. Construction and operation of new 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 2011, see Coon et al. (1983); Coon and Leistriz (annually 1985-2011); and Coon et al. (2012).

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