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North Dakota Lignite Energy Industry's Contribution to the State Economy for 2013 and Projected for 2014

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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 2013 and projected expenditures for 2014. 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. 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 2012 and the resulting level of business activity were compared to 2012 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. An updated methodology was adapted to estimate secondary employment in 2012 (Coon et al. 2012). 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 $1.1 billion in 2013 and were projected at $1.1 billion for 2014 (Table 1). Actual expenditures for 2013 were very close to those projected ($1.1 billion) by the previous year's study (Coon et al. 2013). Lignite energy industry expenditures were considerably higher than those for earlier years. For example, expenditures in 2013 were 214 percent higher than those for 1986, ($346.2 million) (Coon and Leistritz 1987). Inflation was about 113 percent, nationwide, during this period.

Actual 2013 outlays were similar to projections, being only $3.7 million more than projected. Construction expenditures were $6.0 million less than projected, but outlays for Professional and Social Services were $16.4 million more than projected. Lignite energy industry firms are projecting 2014 expenditures to increase by only $1.7 million from 2013 levels. During this period, Household Sector expenditures (primarily wages and salaries) are projected to increase by $7.9 million.

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 $100 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, 2013 and Preliminary 2014

Sector	2013	2014
	-million dollars-	
Construction	118.2	91.4
Transportation	25.9	26.9
Comm & public utilities	118.2	119.3
Wholesale trade & misc mfg	157.2	159.7
Retail trade	161.4	169.9
Fin, ins & real estate	86.0	91.9
Bus & personal serv	55.3	56.4
Prof & social serv	83.9	84.4
Households	279.4	287.3
Total	1,085.5	1,087.2

Expenditures from firms involved in lignite-related activities generated total business activity over $3.3 billion in 2013 with projected business activity of $3.4 billion for 2014 (Table 2). Expenditures by lignite-related firms resulted in $762.5 million of retail sales activity in the state in 2013 and were projected to be $775.6 million for 2014. Also, the industry's activities generated over $1.0 billion in personal income in 2013 and 2014.

Lignite energy companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be $97.7 million in 2013 and $97.9 million in 2014 (Table 3). Coal severance and energy conversion taxes were 10.1 percent and 23.8 percent of the total, respectively, in 2013. The lignite energy industry directly employed 3,883 workers in 2013 and was projected to provide employment for 3,979 workers for 2014. Business activity attributed to the lignite energy industry provided employment for over 11,000 indirect workers (secondary employment) in 2013 and projected to support nearly 11,500 in 2014 (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 2012 ($1.7 billion) were compared to the total economic base (sales for final demand or exports) for North Dakota for 2012 ($42.3 billion), the lignite energy industry comprised 4.0 percent of the state's total (Coon et al. 2014). When petroleum and natural gas exploration, extraction, and refining were included, the energy sectors accounted for 31.9 percent of the state's total economic base in 2012. Business activity generated by the lignite industry's sales for final demand ($3.9 billion) was 3.2 percent of the 2012 state's total gross business volume ($121.1 billion). This was slightly less than the 3.9 percent reported in 2011. 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 to disclosure problems the coal mining industry is now

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, 2013 and Preliminary 2014

Item	2013	2014
		-million dollars-
Personal income	1,039.3	1,050.0
Retail sales	762.5	775.6
Business activity for all business sectors[a]	2,003.6	2,007.9
Total business activity	3,346.9	3,367.1

[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, 2013 and Preliminary 2014

Tax Revenue	2013	2014
	-million dollars-	
Coal severance	9.9	10.5
Energy conversion	23.3	22.3
Sales and use	35.3	35.9
Personal and corporate income	21.8	22.0
Other	7.4	7.2
Total	97.7	97.9

Table 4. Estimated Direct and Secondary Employment for Companies Involved in Lignite-related Activities, 2013 and Preliminary 2014		
Employment	2013	2014
Direct	3,883	3,979
Secondary	11,416	11,497

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 $77,380 in 2012. 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 2009 to 2012 period, the latest years data were available (Table 5). Mining, except oil and gas, average annual wages have increased each year from 2009 to 2012. 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 2011 ($93,512) and also had the highest 2012 per employee wages ($99,640). 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 2011 and McLean and Oliver Counties for 2012, 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 2011 or 2012. Average mining wage for Mercer County was $89,745 in 2011, and remained virtually unchanged at $89,326 in 2012. In 2011, Williams County had a slightly higher annual mining wage ($92,926) than Mercer County. Williams County average mining wages increased to over $100,000 in 2012, influenced by oil production in the 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, 2009-2012				
Industry	2009	2010	2011	2012
	----------$----------			
Agriculture	34,579	34,994	36,174	39,489
Mining	73,055	79,976	89,730	96,569
Mining, except oil & gas	72,318	75,585	76,167	77,380
Construction	45,406	46,536	51,201	56,478
Manufacturing	41,577	43,408	44,778	46,717
Trans, Comm, Util	48,599	51,215	56,168	60,609
Elec Prod	76,833	78,406	81,639	81,712
Gas Prod	81,427	83,649	87,810	88,434
Wholesale Trade	48,772	51,358	57,560	63,658
Retail Trade	23,233	24,159	25,653	27,470
FIRE	42,805	44,391	48,655	52,218
Services	34,171	36,163	38,351	41,430
Government	37,282	38,565	40,281	41,223
TOTAL	35,970	38,127	41,778	45,909

Source: Job Service North Dakota, 2010, 2011, 2012 and 2013.

Table 6. Covered Annual Average Wages for Mining and All Industries, For State Planning Regions Involved in Mining 2011 and 2012				
	2011		2012	
Region	Mining	Total	Mining	Total
	----------$----------			
Region 1	92,103	68,333	98,866	76,027
Region 2	83,615	40,741	89,887	46,042
Region 7	85,608	46,539	89,622	43,034
Region 8	93,512	46,850	99,640	55,400

Source: Job Service North Dakota, 2012 and 2013

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. The Leland Olds Station and Milton R. Young Station each recently completed $400 million upgrades, that include scrubbers 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. Construction of the Dakota Spirit AgEnergy ethanol plant (owned by Great River Energy) would add an additional 65 million gallons annually to the state's ethanol production. The Spiritwood Station, which uses lignite coal as a fuel source, is expected to become operational in November 2014. It will provide electricity for Minnesota residents and steam for Dakota Spirit AgEnergy and the adjacent malt plant.

The North American Coal Corporation is scheduled to open the Coyote Creek Mine in 2016, annually supplying 2.5 million tons of coal to the Coyote Power Station. Dakota Gasification Company plans to start construction in 2015 on a 1,100 tons per day urea fertilizer plant, with start up in early 2017. Projected cost for the plant is $402 million. BNI Coal has currently scheduled new mine construction to begin in 2014 with completion in 2015.

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. One obstacle to the future growth of the lignite energy industry is the greenhouse gas regulations recently announced by the U.S. Environmental Protection Agency (EPA). What effect these rules will have on existing power plants and construction of new coal-fixed electric generation facilities has not yet been determined. EPA rules are not finalized at this time, but when they are, the impact they will have on the lignite energy industry can be more accurately estimated.

Table 7. Covered Annual Average Wages for Mining and All Industries, For Counties Involved in Mining 2011 and 2012

	2011		2012	
Region	Mining	Total	Mining	Total
	----------$----------			
Adams	N/A	32,325	57,580	35,156
Bowman	70,496	37,325	75,323	40,764
McLean	N/A	43,139	N/A	44,736
Mercer	89,745	54,837	89,326	56,727
Oliver	N/A	59,832	N/A	60,808
Williams	92,926	70,027	100,452	78,364
N. D.	89,730	41,778	96,569	45,909

Source: Job Service North Dakota, 2012 and 2013

This study estimated the 2013 and projected 2014 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 Leistritz (annually 1985-2011); and Coon et al. (2012, 2013).

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