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North Dakota Lignite Energy Industry's Contribution to the State Economy for 1999 and Projected for 2000

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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 1999 and projected expenditures for 2000. 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. Thirdly, 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 1998 and the resulting level of business activity were compared to 1998 state values (the most recent data available) to indicate the industry's role in the economy. All values in this analysis are expressed in terms of 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 $509.8 million in 1999 and were projected at $486.3 million for 2000 (Table 1), based on a survey of firms in the industry. Actual expenditures for 1999 were slightly lower than the level projected for that year--520.8 million (Coon and Leistritz 1999b). [Overall, expenditures during the 1987-1999 period were higher than those for earlier years. In fact, 1999 expenditures were 47 percent higher than those for 1986, which were $346.2 million (Coon and Leistritz 1987). It should be noted, however, that inflation was about 44 percent, nationwide, over this period.]

Actual 1999 outlays were less than previous projections resulting primarily because construction sector expenditures were not as large as projected.

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Table 1. Estimated North Dakota Direct Expenditures by Economic Sector for Companies Involved in Lignite-related Activities, 1998 and Preliminary 2000

Sector	1999	2000
	-million dollars-	
Construction	90.9	40.2
Transportation	15.8	15.8
Communications and public utilities	38.6	39.9
Wholesale trade and misc. manufacturing	31.1	33.2
Retail trade	85.9	96.4
Finance, insurance, and real estate	61.2	68.2
Business and personal services	16.8	17.5
Professional and social services	23.5	23.8
Households	146.0	151.3
Total	509.8	486.3

Low oil prices worldwide in early 1999 may also have contributed to less than expected growth in the lignite energy industries. However, since mid-1999 oil prices have risen rather dramatically and could lead to increased demand for lignite energy products. Construction expenditures were lower than in 1996, the principal construction year for an anhydrous ammonia plant and an ammonium sulfate plant at the Dakota Gasification facility near Beulah. Construction expenditures are projected to decrease in 2000 as projects are being completed.

Expenditures from firms involved in lignite-related activities generated total business activity of nearly $1.5 billion for each year (Table 2). Expenditures by lignite-related firms resulted in $364.4 million of retail sales activity in the state in 1999 and are projected at $368.0 million for 2000. Also, the industry's activities generated 494.3 million in personal income in 1999, with the 2000 level projected to be $487.8 million.

Lignite industry companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be

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, 1999 and Preliminary 2000

Item	1999	2000
	-million dollars-	
Personal income	494.3	487.8
Retail sales	364.4	368.0
Business activity for all business sectors[a]	891.0	852.1
Total business activity	1,496.0	1,452.0

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

$64.9 million in 1999 and $65.2 million in 2000 (Table 3). Coal severance and energy conversion taxes constituted 31 percent and 23 percent of the total, respectively, in 1999. In addition to the 3,068 workers directly employed in 1999 and the projected 3,019 workers for 2000, the industry supported jobs for over 16,000 indirect workers (secondary employment) from business activity attributable to the lignite industry in each of these years (Table 4).

Table 3. Estimated State Tax Revenue Resulting from Activities of Companies Involved in Lignite-related Activities, 1999 and Preliminary 2000

Tax Revenue	1999	2000
	-million dollars-	
Coal severance	20.3	20.1
Energy conversion	14.9	14.9
Sales and use	16.9	17.6
Personal and corporate income	9.2	9.0
Other	3.6	3.6
Total	64.9	65.2

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 1998 ($889.7 million) were compared with the total economic base (sales for final demand or exports) for North Dakota for 1998, the last year the data were available ($12,332.8 million), they comprised 7.2 percent of

Table 4. Estimated Direct and Secondary Employment for Companies Involved in Lignite-related Activities, 1999 and Preliminary 2000		
Employment	1999	2000
Direct	3,068	3,019
Secondary	16,726	16,028

the state's total (Coon and Leistritz 1999b). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 10.5 percent of the state's total economic base in 1998. Business activity generated by the lignite industry's sales for final demand ($2,016.4 million) was 5.1 percent of the 1998 state total gross business volume ($39,448.5 million). These measures show that the lignite energy industry plays an important role in the North Dakota economy.

Wages paid in the state's coal mining sector were the highest of any in North Dakota ($57,051 in 1997 and $60,444 in 1998)(Table 5). These salaries were more than 2.5 times that of all covered wages in North Dakota in 1997 and 1998, the latest years data were available. Following closely behind coal mining wages were gas production and electrical production salaries. The lignite energy industry (coal production and conversion) provides the highest 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 wages in 1997 ($54,816) and 1998 ($57,781). 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. Mercer County had the highest mining wages of all counties in 1997 and 1998. 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 5. North Dakota Covered Annual Average Wages By Industry, 1997 and 1998		
Industry	1997	1998
Agriculture	18,866	20,740
Mining	38,924	40,770
Coal Mining	57,051	60,444
Construction	27,282	28,808
Manufacturing	27,396	28,992
Trans,Comm,Utilities	31,228	33,115
Electrical Production	46,288	49,551
Gas Production	52,277	55,629
Wholesale Trade	28,343	29,872
Retail Trade	12,427	12,849
FIRE	26,889	28,132
Services	20,084	20,782
Government	24,147	24,965
TOTAL	22,045	22,992
Source: Job Service North Dakota, 1998 and 1999.		

Table 6. Covered Annual Average Wages For Mining a and All Industries, For State Planning Regions Involved in Mining, 1997 and 1998				
	1997		1998	
Region	Mining	Total	Mining	Total
	----------$----------			
Region 1	30,484	20,762	35,686	20,851
Region 2	30,871	19,763	31,391	20,437
Region 7	54,816	23,866	57,781	24,741
Region 8	35,643	18,866	36,445	19,632
Source: Job Service North Dakota, 1998 and 1999.				

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 1996, see Coon et al. (1983) and Coon and Leistritz (annually 1985-1999).

Table 7. Covered Annual Average Wages For Mining and All Industries, For Counties Involved in Mining, 1997 and 1998

	1997		1998	
Region	Mining	Total	Mining	Total
	----------$----------			
Adams	N/A	18,174	N/A	18,256
Bowman	33,599	16,959	31,719	17,523
McLean	49,213[a]	23,835	51,212[a]	24,886
Mercer	55,626[b]	32,620	59,243	33,905
Oliver	52,878[a]	39,228	50,831[c]	40,576
Williams	35,880	21,407	36,952	21,403
North Dakota	38,924	22,045	40,770	22,992

[a] Includes agriculture, mining, and construction industries to avoid disclosure.
[b] Includes agriculture and mining industries to avoid disclosure.
[c] Includes agriculture, mining, construction, and manufacturing industries to avoid disclosure.

Source: Job Service North Dakota, 1998 and 1999.

References

Coon, Randal C., and F. Larry Leistritz. 1985. *The Contribution of North Dakota's Lignite Industry to the State Economy, 1984 and 1985: A Statistical Analysis*. AE 85016. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1986. *North Dakota Lignite Industry's Contribution to the State Economy*. Agr. Econ. Misc. Rpt. No. 99. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1987. *The Contribution of North Dakota's Lignite Industry to the State Economy, 1986 and 1987: A Statistical Analysis*. AE 87003. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1988. *A Statistical Analysis of the North Dakota Lignite Industry's Contribution to the State Economy for 1987 and Projected 1988*. AE88002. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1989. *A Statistical Analysis of the North Dakota Lignite Industry's Contribution to the State Economy for 1988 and Projected 1989*. AE89008. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1990. *A Statistical Analysis of the North Dakota Lignite Industry's Contribution to the State Economy for 1989 and Projected 1990*. AE90004. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1991. *A Statistical Analysis of the North Dakota Lignite Industry's Contribution to the State Economy for 1990 and Projected 1991*. AE91002. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1992. *A Statistical Analysis of the North Dakota Lignite Industry's Contribution to the State Economy for 1991 and Projected 1992*. AE92001. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1993. *A Statistical Analysis of the North Dakota Lignite Energy's Contribution to the State Economy for 1992 and Projected 1993*. AE93001. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1994. *A Statistical Analysis of the North Dakota Lignite Energy Industry's Contribution to the State Economy for 1993 and Projected for 1994*. AE94001. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1995. *A Statistical Analysis of the North Dakota Lignite Energy Industry's Contribution to the State Economy for 1994 and Projected for 1995*. AE95002. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1996. *A Statistical Analysis of the North Dakota Lignite Energy Industry's Contribution to the State Economy for 1995 and Projected for 1996*. AE96005. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1997. *A Statistical Analysis of the North Dakota Lignite Energy Industry's Contribution to the State Economy for 1996 and Projected for 1997*. AE97002. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1998. *A Statistical Analysis of the North Dakota Lignite Energy Industry's Contribution to the State Economy for 1997 and Projected for 1998.* AE98003. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., and F. Larry Leistritz. 1999a. "Sales for Final Demand by Economic Sector." Unpublished data. Fargo: North Dakota State University, Dept. of Ag. Econ.

Coon, Randal C., and F. Larry Leistritz. 1999b. *A Statistical Analysis of the North Dakota Lignite Energy Industry's Contribution to the State Economy for 1998 and Projected for 1999.* AE99001. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., F. Larry Leistritz, and Thor A. Hertsgaard. 1989. *North Dakota Input-Output Economic Projection Model (NDIO/EPM): Documentation and User's Guide*. Agr. Econ. Software Series No. 4. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., F. Larry Leistritz, Thor A. Hertsgaard, and Arlen G. Leholm. 1985. *The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages*. Agr. Econ. Rpt. No. 187. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., F. Larry Leistritz, and T. Alexander Majchrowicz. 1992. *The Role of Agriculture in the North Dakota Economy.* Agr. Econ. Stat. Series No. 50. Fargo: North Dakota State University, Dept. of Agr. Econ.

Coon, Randal C., John F. Mittleider, and F. Larry Leistritz. 1983. *Economic Analysis of the North Dakota Lignite Industry*. Agr. Econ. Misc. Rpt. No. 67. Fargo: North Dakota State University, Dept. of Agr. Econ.

Job Service North Dakota. 1998. North Dakota Employment and Wages: 1997. Bismarck: Job Service North Dakota, Labor Market Information.

Job Service North Dakota. 1999. North Dakota Employment and Wages: 1998. Bismarck: Job Service North Dakota, Labor Market Information.