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A Statistical Analysis of the
**North Dakota Lignite Energy Industry's Contribution
to the State Economy for 1991 and Projected 1992**

Randal C. Coon and F. Larry Leistritz*

The economic contribution the lignite energy industry makes to the North Dakota economy has been assessed on an annual basis since 1982. Funding for these studies has been provided by the North Dakota Lignite Council and in recent years by the North Dakota Industrial Commission. For a discussion of the economic contributions the lignite energy industry (that is, those firms involved in the mining or conversion of the state's lignite) has made on an annual basis for the period 1982 to 1991, see Coon et al. 1983; Coon and Leistritz 1985, 1986, 1987, 1988, 1989, 1990, and 1991.

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. These items are estimated for 1991 based on actual industry expenditures and for 1992 using projected levels of spending. In addition, this analysis contains two measures of the relative importance of the lignite energy industry in North Dakota. The industry's share of the state's total sales to final demand (or exports) is evaluated. The second measure compares the business volume generated by the industry 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.

Methodology for this analysis is similar to that used previously (for a complete description see Coon et al. 1983 and Coon and Leistritz 1986). Expenditures in North Dakota (as reported by companies involved in lignite-related activities) constitute the basic data for the study, and the North Dakota Input-Output model was used to analyze these data. The interdependence coefficients or multipliers (that measure of the level of total gross business volume generated in each sector as a result of an additional dollar of sales to final demand in a given sector) of the input-output model were applied to these expenditures. 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 such economic indicators as tax revenues and indirect and induced employment based on historic relationships (Coon et al. 1992). Lignite industry sales for final demand for 1990 and the resulting level of business activity are compared to 1990 state values (the most recent data available) to provide an indication of the industry's role in the economy.

*Coon is research specialist and Leistritz is professor, Department of Agricultural Economics, North Dakota State University, Fargo.

The expenditures made by firms involved in lignite-related activities are assumed to work their way through the local economy in much the same way as expenditures made by firms in other sectors of the North Dakota economy. The estimated ratio of secondary employment (that is, jobs generated in other sectors of the North Dakota economy) to direct employment (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. This is to be expected because of the capital-intensive nature of the industry. That is, firms in the lignite industry have much higher levels of expenditures per employee than do most other economic sectors in the state so that the indirect and induced employment per worker in the lignite and lignite conversion industries is higher than for other basic economic sectors.

Results

The North Dakota lignite industry is an important component of the state's economy. The industry's in-state expenditures totaled \$375.7 million in 1991 and were estimated at \$416.9 million for 1992 (Table 1). Actual expenditures for 1991 were slightly lower than the projected level for that year (Coon and Leistriz 1991). Annual expenditures during the 1988-1991 period were significantly larger than those for 1987 (Coon and Leistriz 1988). This trend of increasing industry expenditures indicates that the period of stable coal production and conversion activities in North Dakota has given way to a moderate growth trend in recent years. The abundant supplies of lower-priced petroleum that existed several years ago have been reduced, resulting in renewed growth in demand for North Dakota's lignite and lignite products (particularly electricity). Also, the state's synthetic natural gas plant has operated essentially at full capacity since 1987.

Expenditures from firms involved in lignite-related activities generated total business activity in excess of \$1 billion for each year (Table 2). Expenditures by lignite-related firms resulted in \$267.4 million in retail sales activity in the state in 1991 and a projected \$294.4 million for 1992. In addition, the industry's activities were responsible for generation of \$379.2 million in personal income in 1991, with the 1992 level projected to be \$411.7 million.

Table 1. Estimated North Dakota Direct Expenditures By Economic Sector For Companies Involved In Lignite-Related Activities, 1991 And Preliminary 1992

Sector	1991	1992
	million dollars	
Construction	39.9	52.2
Transportation	2.0	2.1
Communications and public utilities	41.1	43.1
Wholesale trade & misc. manufacturing	31.5	35.5
Retail trade	57.7	64.8
Finance, insurance, real estate	25.5	29.5
Business and personal services	30.7	37.2
Professional and social services	17.1	17.4
Households	<u>130.2</u>	<u>135.1</u>
Total	375.7	416.9

Table 2. Estimated Direct Plus Indirect Personal Income, Retail Sales Activity, Business Activity of All Business Sectors, and Total Business Activity for Companies Involved in Lignite-Related Activities, 1991 and Preliminary 1992		
Item	1991	1992
	-million dollars-	
Personal income	379.2	411.7
Retail sales	267.4	294.4
Business activity for all business sectors ^a	648.3	723.7
Total business activity	1,115.1	1,232.1
^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, 1991 And Preliminary 1992		
Tax Revenue	1991	1992
	-million dollars-	
Coal severance	24.4	25.1
Energy conversion	11.9	11.9
Sales and use	12.4	13.6
Personal and corporate income	6.9	7.6
Other	<u>0.8</u>	<u>0.9</u>
Total	56.4	59.1

Lignite industry companies contribute heavily to state tax revenues; total taxes attributable to the industry were estimated to be \$56.4 million in 1991 and \$59.1 million in 1992 (Table 3). Coal severance and energy conversion taxes constituted the major portion of the total. In addition to the 3,414 workers directly employed in 1991 and the projected 3,495 workers for 1992, the industry provided jobs for over 14,000 indirect and induced workers (secondary employment) in each of these years as a result of the levels of business activity attributable to the lignite industry (Table 4).

Two measures can be used to show the importance of the lignite industry to the North Dakota economy. Lignite energy industry sales for final demand for 1990 (\$685.8 million) can be compared with the total economic base (sales for final demand or exports) for North Dakota for 1990, the last year the data were available (\$8,227.5 million) (Coon et al. 1992). Sales for final demand by the lignite industry comprised 8.3 percent of the state's total. When petroleum exploration, extraction, and refining are included, the energy sectors accounted for 14.1 percent of the state's total economic base in 1990 (Coon et al. 1992). Business activity generated by the lignite industry's sales for final demand (\$1,564.0 million) was 5.7 percent of the 1990 state total gross business volume (\$27,452.5 million). These measures show that the lignite energy industry does play a significant role in the North Dakota economy.

Table 4. Estimated Direct and Secondary Employment For Companies Involved In Lignite-Related Activities, 1991 And Preliminary 1992		
Employment	1991	1992
Direct	3,414	3,495
Secondary	14,237	14,506

References

- Coon, Randal C. and F. Larry Leistriz. 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 Leistriz. 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 Leistriz. 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., John F. Mittleider, and F. Larry Leistriz. 1983. *Economic Analysis Of The North Dakota Lignite Industry*. Agr. Econ. Misc. Rpt. No. 67. Fargo: North Dakota State University, Dept. of Agr. Econ.
- Coon, Randal C., Carlene F. Vocke, William Ransom-Nelson, and F. Larry Leistriz. 1984. *North Dakota Economic-Demographic Assessment Model (NEDAM): Technical Description Of Update And Enhancement*. Agr. Econ. Misc. Rpt. No. 75. Fargo: North Dakota State University, Dept. of Agr. Econ.
- Coon, Randal C., F. Larry Leistriz, 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. and F. Larry Leistriz. 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 Leistriz. 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., F. Larry Leistriz, 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 Leistriz. 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 Leistriz. 1991. *A Statistical Analysis of the North Dakota Lignite Industry's Contribution to the State Economy for 1990 and Projected 1991*. AE910002. Fargo: North Dakota State University, Dept. of Agr. Econ.
- Coon, Randal C., F. Larry Leistriz, and T. Alexander Majchrowicz. 1992. *The Role of Agriculture in the North Dakota Economy*. Agricultural Economics Statistical Series No. 50. Fargo: North Dakota State University, Dept. of Agr. Econ.