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*A Statistical Analysis of the*  
**North Dakota Lignite Energy Industry's Contribution  
to the State Economy for 1997 and Projected for 1998**

**Randal C. Coon and F. Larry Leistritz\***

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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 1997 and projected expenditures for 1998. This analysis contains two 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.

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 1996 and the resulting level of business activity were compared to 1996 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.

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## Results

The North Dakota lignite industry's in-state expenditures totaled \$453.1 million in 1997 and were projected at \$464.9 million for 1998 (Table 1), based on a survey of firms in the industry. Actual expenditures for 1997 were slightly higher than the level projected for that year--\$447.0 million (Coon and Leistriz 1997b). [Overall, expenditures during the 1987-1996 period were higher than those for earlier years. In fact, 1997 expenditures were 31 percent higher than those for 1986, which were \$346.2 million (Coon and Leistriz 1987). It should be noted, however, that inflation was about 39 percent, nationwide, over this period.]

Actual 1997 outlays were greater than previous projections, with the higher level of industry expenditures for 1997 resulting primarily from increases in construction and professional and social services outlays. 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.

Expenditures from firms involved in lignite-related activities generated total business activity in excess of \$1.3 billion for each year (Table 2). Expenditures by lignite-related firms resulted in \$317.2 million of retail sales activity in the state in 1997 and are projected at \$320.6 million for 1998. Also, the industry's activities generated \$474.1 million in personal income in 1997, with the 1998 level projected to be \$490.5 million.

Lignite industry companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be \$62.3 million in 1997 and \$63.4 million in 1998 (Table 3). Coal severance and energy conversion taxes constituted 37 percent and 23 percent of the total, respectively, in 1997. In addition to the 3,078 workers directly employed in 1997 and the projected 3,078 workers for 1998, the industry supported jobs for over 15,000 indirect workers (secondary employment) from business activity attributable to the lignite industry in each of these years (Table 4).

Table 1. Estimated North Dakota Direct Expenditures by Economic Sector for Companies Involved in Lignite-related Activities, 1997 and Preliminary 1998		
Sector	1997	1998
	-million dollars-	
Construction	49.2	48.8
Transportation	10.4	10.4
Communications and public utilities	47.6	46.9
Wholesale trade and misc. manufacturing	36.2	34.8
Retail trade	55.1	47.9
Finance, insurance, and real estate	46.2	44.2
Business and personal services	18.3	21.4
Professional and social services	31.8	52.4
Households	<u>158.3</u>	<u>158.1</u>
<b>Total</b>	<b>453.1</b>	<b>464.9</b>

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, 1997 and Preliminary 1998

Item	1997	1998
	-million dollars-	
Personal income	474.1	490.5
Retail sales	317.2	320.6
Business activity for all business sectors <sup>a</sup>	<u>794.9</u>	<u>825.0</u>
Total business activity	1,375.8	1,423.3

<sup>a</sup>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, 1997 and Preliminary 1998

Tax Revenue	1997	1998
	-million dollars-	
Coal severance	23.2	23.6
Energy conversion	14.3	14.6
Sales and use	14.7	14.8
Personal and corporate income	8.6	8.9
Other	<u>1.5</u>	<u>1.5</u>
Total	62.3	63.4

Table 4. Estimated Direct and Secondary Employment for Companies Involved in Lignite-related Activities, 1997 and Preliminary 1998

Employment	1997	1998
Direct	3,078	3,078
Secondary	15,724	17,175

Two 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 1996 (\$852.3 million) were compared with the total economic base (sales for final demand or exports) for North Dakota for 1996, the last year the data were available (\$11,216.7 million), they comprised 7.6 percent of the state's total (Coon and Leistritz 1997a). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 12.4 percent of the state's total economic base in 1996. Business activity generated by the lignite industry's sales for final demand (\$1,935.4 million) was 5.3 percent of the 1996 state total gross business volume (\$36,639.7 million). These measures show that the lignite energy industry plays an important role in the North Dakota economy.

*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 1985-1997).*

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