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A Statistical Analysis of the
**North Dakota Lignite Energy Industry's Contribution
to the State Economy for 1993 and Projected for 1994**

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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 1993 and projected expenditures for 1994. 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 1992 and the resulting level of business activity were compared to 1992 state values (the most recent data available) to indicate the industry's role in the economy.

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 \$425.8 million in 1993 and were projected at \$459.9 million for 1994 (Table 1), based on a survey of firms in the industry. Actual expenditures for 1993 were slightly higher than the level projected for that year--\$423.8 million (Coon and Leistritz 1993). [Overall, expenditures during the 1987-1993 period were higher than those for earlier years. In fact, 1993 expenditures were 23 percent higher than those for 1986, which were \$346.2 million (Coon and Leistritz 1987). It should be noted, however, that inflation was about 28 percent, nationwide, over this period.] Increasing industry expenditures indicate that the period of stable coal production and conversion activities in North Dakota in the mid 1980s 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 demand for North Dakota's lignite and lignite products (particularly electricity). Also, the state's synthetic natural gas plant, which uses large quantities of lignite, 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 \$286.4 million of retail sales activity in the state in 1993 and are projected at \$317.5 million for 1994. Also, the industry's activities generated \$442.2 million in personal income in 1993, with the 1994 level projected to be \$467.8 million.

Lignite industry companies contribute heavily to state tax revenues. Total taxes attributable to the industry were estimated to be \$61.4 million in 1993 and \$64.9 million in 1994 (Table 3). Coal severance and energy conversion taxes constituted 40 percent and 22 percent of the total, respectively. In addition to the 3,705 workers directly employed in 1993 and the projected 3,623 workers for 1994, the industry provided jobs for over 15,000 indirect workers (secondary employment) from business activity attributable to the lignite industry in each of these years (Table 4). While the number of secondary jobs estimated for 1993 is slightly lower than for 1992, this difference is primarily attributable to revision of the input-output model's productivity ratios, reflecting increasing levels of (real) output per worker in recent years.

Table 1. Estimated North Dakota Direct Expenditures by Economic Sector for Companies Involved in Lignite-related Activities, 1993 and Preliminary 1994

Sector	1993	1994
	million dollars	
Construction	56.6	67.0
Transportation	3.3	3.1
Communications and public utilities	41.0	40.9
Wholesale trade and misc. manufacturing	36.0	35.2
Retail trade	42.1	58.5
Finance, insurance, and real estate	36.2	39.0
Business and personal services	40.6	38.3
Professional and social services	18.2	19.1
Households	<u>151.8</u>	<u>158.8</u>
Total	425.8	459.9

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, 1993 and Preliminary 1994

Item	1993	1994
	-million dollars-	
Personal income	442.2	467.8
Retail sales	286.4	317.5
Business activity for all business sectors*	742.0	795.6
Total business activity	1,283.5	1,367.4

*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, 1993 and Preliminary 1994

Tax Revenue	1993	1994
	-million dollars-	
Coal severance	24.7	24.4
Energy conversion	13.7	15.6
Sales and use	13.3	14.7
Personal and corporate income	8.1	8.5
Other	<u>1.6</u>	<u>1.7</u>
Total	61.4	64.9

Table 4. Estimated Direct and Secondary Employment for Companies Involved in Lignite-related Activities, 1993 and Preliminary 1994

Employment	1993	1994
Direct	3,705	3,623
Secondary	15,081	15,755

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 1992 (\$770.1 million) were compared with the total economic base (sales for final demand or exports) for North Dakota for 1992, the last year the data were available (\$9,235.7 million), they comprised 8.3 percent of the state's total (Coon and Leistritz 1994). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 12.5 percent of the state's total economic base in 1992. Business activity generated by the lignite industry's sales for final demand (\$1,751.6 million) was 5.7 percent of the 1992 state total gross business volume (\$30,745.4 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 1992, see Coon et al. (1983) and Coon and Leistritz (annually 1985-1993).

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