

ECONOMIC CONTRIBUTION OF THE LIGNITE INDUSTRY TO THE NORTH DAKOTA ECONOMY

Randal C. Coon, John F. Mittleider, and F. Larry Leistritz

Lignite reserves in North Dakota account for 351 billion tons, or about two-thirds of the United States' total lignite reserves (4). Recoverable reserves, located in 23 counties, have been estimated between 16 and 35 billion tons (1, 4). These reserves place North Dakota 11th among the 50 states in demonstrated coal reserves (4). Total North Dakota lignite production in 1982 was 17.5 million tons, a sevenfold increase since 1960 when production was 2.5 million tons (2, 5).

The North Dakota lignite industry, as known today, began in the early 1960s with the construction of two power plants having a total generating capacity of 316 megawatts (MW) and the expansion of the two supplying mines. Today, the industry has grown to 12 mines, producing approximately 18 million tons annually, and nine power plants with a total generating capacity of 3,173 MW. A tenth power plant which is currently under construction will add an additional 876 MW capacity. The Great Plains Coal Gasification Project, when completed in 1985, will consume 4.7 million tons of coal annually and produce an estimated 125 million cubic feet of synthetic natural gas per day. Other facilities (sugarbeet processing, charcoal production, and domestic heating) utilize North Dakota lignite for their own conversion or production processes.

Need and Purpose

The demand for stable energy supplies has caused the lignite industry to continually expand, creating additional employment opportunities for residents and tax revenues for the state. Total lignite-related operating employment is expected to exceed 4,600 workers by 1985 upon completion of facilities currently under construction. Completion of the Great Plains Gasification Project, the most capital-intensive project to occur in the history of the North Dakota lignite industry, will create employment opportunities for approximately 650 workers within the state. Coal severance and conversion tax collections, a function of the amount of coal mined and converted to alternative energy sources, will ob-

viously increase with this development. Construction of additional facilities positively affects employment within the state, although construction employment opportunities may be relatively short-run in nature (generally from three to five years). Operational impacts occur annually for as long as the plants are operational.

The purpose of this study was to estimate the direct and secondary (indirect and induced) economic effects of the North Dakota lignite industry on the state's economy for the 1981-1983 biennium (July 1, 1981 through June 30, 1983). Economic contributions by the lignite industry to the state include employment, personal income, increased levels of business activity, and numerous sources of tax revenues such as severance, coal conversion, and sales and use taxes.

Direct effects of the lignite industry include additional employment and income for North Dakota residents. Lignite mining and conversion industries pay several different types of taxes at the federal, state, and local levels. Federal and state governments also receive royalties from coal production on public lands. Economic impacts also result from purchases of goods and services by firms in the industry from other segments of North Dakota's economy. Expenditures by the lignite mining and conversion industry are recirculated within the local economy via the multiplier process in the form of purchases of goods and services, taxes to governmental agencies, and wages and salaries to households. These expenditures result in indirect and induced effects because of subsequent rounds of re-spending. Indirect and induced effects include increases in business activity, personal income, employment for residents, and tax collections to the state.

Methodology

Lignite industry impacts were analyzed for North Dakota. A combination of primary and secondary data was utilized to estimate impacts. A survey was administered to lignite mining and coal conversion companies to obtain information concerning current and anticipated employment, payroll, and expenditures to North Dakota entities. The questionnaire was designed to provide each company's fiscal 1982 expenditure data and estimated increases in levels of activities for fiscal 1983. Expenditure data were requested by specific sector

Coon is research specialist, Mittleider is research associate, and Leistritz is professor, Department of Agricultural Economics.

with an estimate of the percentage paid to North Dakota entities. Breakdown of the survey data in this manner allowed for estimation of those expenditures which occur in-state and permitted estimation of the indirect and induced impacts of the lignite industry in North Dakota. Current and anticipated company employment data also were requested.

Historic and anticipated severance and conversion tax collections were obtained from the North Dakota Tax Department. Indirect and induced expenditures and employment as a result of the lignite industry in the state were estimated using the North Dakota Input-Output Model (3), which characterizes the linkages throughout the North Dakota economy.

Tax revenues also were estimated from the results of the input-output model. Sales and use, personal income, and corporate income tax receipts associated with specific levels of business activity were estimated using tax revenue equations developed previously.

Survey respondents were divided into two groups: lignite mining companies and conversion companies (companies converting lignite to electricity or other products). Survey data included construction and payroll expenditures for those facilities currently being built and operating expenditures for all other firms.

Economic Impact

Total lignite industry expenditures in North Dakota amounted to over \$1.0 billion in the 1981-1983 biennium (Table 1). Nearly 62 percent of these expenditures was for construction. This will undoubtedly decline in the future unless additional facilities are constructed. Lignite industry expenditures were to many sectors of the North Dakota economy. The construction, retail trade, and household (wages, salaries, and lease payments) sectors received the largest portion of industry expenditures during the 1981-1983 biennium. Construction accounted for over \$665 million of in-state expenditures during this period (fiscal years 1982 and 1983), while expenditures to households totaled over \$218 million. Over 90 percent of the construction expenditures resulted from construction of energy conversion facilities. Construction expenditures are expected to decline dramatically in the next biennium unless additional plant development occurs. However, this will be partially offset by additional expenditures to other sectors as facilities currently under construction begin operating. Nearly 97 percent of total industry wages, salaries, and lease payments was made to in-state households. Expenditures to the household sector were the fastest growing category, and are projected to increase over \$33 million from fiscal 1982 to fiscal 1983. The energy conversion facilities accounted for over \$819 million, or 76 percent of all North Dakota lignite industry in-state expenditures.

Personal income, retail sales, and the level of business activity resulting from the lignite industry expenditures

Table 1. Estimated North Dakota Expenditures by Economic Sector for Companies Involved in Lignite-Related Activities, 1981-1983 Biennium (Thousand Dollars).

Sector	Energy		Total
	Mining	Conversion	
Construction	46,688	618,402	665,090
Transportation	7,898	6,938	14,836
Communication & Public Utilities	5,188	863	6,051
Wholesale Trade & Ag Processing	39,122	8,196	47,318
Retail Trade	44,935	67,591	112,526
Finance-Insurance-Real Estate	3,021	1,465	4,486
Business & Personal Services	1,903	728	2,631
Professional & Social Services	1,512	1,174	2,686
Households	104,375	113,848	218,223
Total	254,642	819,205	1,073,847

were estimated for the biennium through the North Dakota Input-Output Model. Business activity generated to the household sector is personal income. The level of business activity was determined for all business sectors (gross business volume of all business sectors) and for the entire economy (total gross business volume). Gross business volume of all business sectors, resulting from the lignite industry's expenditures, is the level of economic activity for all sectors of the economy except agriculture (crops and livestock), government, and households. Total gross business volume is the level of economic activity applicable to all sectors of the economy.

The total gross business volume generated as a result of the lignite industry in North Dakota exceeded \$2.8 billion for the 1981-1983 biennium (Table 2). Expenditures by the energy conversion companies accounted for over 73 percent of the total. It is estimated that for every dollar spent by the lignite industry, another \$1.64 is generated elsewhere in the economy for a total of \$264. Personal income of over \$850 million and retail sales of nearly \$625 million will be generated as a result of the industry's expenditures.

Table 2. Estimated Personal Income, Retail Sales, Gross Business Volume of all Business (Nonagricultural) Sectors, and Total Gross Business Volume, For Companies Involved in Lignite-Related Activities, 1981-1983 Biennium (Thousand Dollars).

Item	Energy		Total
	Mining	Conversion	
Personal Income	256,265	596,648	852,913
Retail Sales	188,531	435,693	624,224
Gross Business Volume			
All Business Sectors ^a	433,755	1,371,179	1,804,934
All Sectors	763,381	2,073,724	2,837,105

^aIncludes all sectors except agriculture (crops and livestock), households, and government.

Several types of tax collections accrue to the state as a result of the lignite industry. Firms mining lignite coal are required to pay a severance tax for each ton of coal mined (presently \$1.02 per ton) plus a \$.10 per ton

federal reclamation fee; coal-fired electric-generating plants pay a conversion tax based on the amount of electricity produced (presently .5 mills per KWH). When operational, the coal gasification plant will be taxed on the amount of gas produced or gross receipts (\$.10 per thousand cubic feet of gas produced or 2.5 percent of gross receipts), whichever is greater. These taxes may be changed through either legislative action or a change in the consumer price index. In-state expenditures by the lignite industry result in revenue from sales and use tax and personal and corporate income tax. Lignite facilities also are subject, in some instances, to local jurisdictional taxes such as property and transmission line taxes.

Tax revenue collections directly and indirectly attributable to lignite industry expenditures were estimated at \$79.6 million for the 1981-1983 biennium (Table 3). Severance tax collections were estimated to account for 45 percent of all taxes collected, followed by sales and use tax collections which accounted for 24 percent. In addition, the lignite industry provided state revenues in the form of coal royalties and federal reclamation fees. State coal royalties were estimated to amount to \$800,000 during the 1981-1983 biennium, while the state share of federal coal royalties and reclamation fees provided an additional \$600,000 and \$1,750,000, respectively. Total royalties and reclamation fees realized by the state were approximately \$3.2 million for the 1981-1983 biennium.

Table 3. Estimated Tax Revenues Associated with Companies Involved in Lignite-Related Activities, 1981-1983 Biennium (Thousand Dollars)

Tax	Tax Revenues
Sales and Use	19,476
Personal and Corporate Income	13,734
Local Jurisdictions	2,449
Severance	36,168
Energy Conversion	7,780
Total	79,607

Nearly 6,500 people were directly employed by the lignite industry in fiscal 1982 with employment expected to increase to nearly 8,000 in fiscal 1983 (Table 4). Of the 8,000 workers directly employed by North Dakota's lignite industry in fiscal year 1983, approximately 1,500 were employed in lignite mines and 2,500 in energy conversion facilities. The remaining 4,000 are part of the construction work force in Mercer County. The total payroll during fiscal year 1983 for the mining and conversion employees was over \$120 million. This does not include the construction workers' payroll which was included in the expenditures for the construction sector.

Lignite industry expenditures are responsible for creating secondary (indirect and induced) employment as a result of large expenditures injected into the state's

Table 4. Estimated Direct and Secondary Employment Totals for Companies Involved in Lignite-Related Activities, Fiscal 1982 and 1983.

Year	Direct Employment	Secondary Employment
1982	6,458	31,981
1983	7,996	32,211

economy. Secondary employment was estimated at 31,981 jobs for fiscal 1982 and 32,211 jobs for fiscal year 1983. For every permanent job created within the North Dakota lignite industry, another 4.1 to 5.0 jobs are created to provide goods and services within the economy. Or, for every \$1 million of expenditures by the lignite industry, approximately 13 direct and 60 secondary jobs are created.

Summary

North Dakota's lignite industry is an important generator of business activity, tax revenues, and employment for the state. Impacts accruing to the state are in the form of increased levels of business activity, personal income, tax collections, and employment. During the 1981 to 1983 biennium, more than \$2.8 billion of total gross business volume was generated in-state from activities of lignite-related companies. During that same period, tax revenues exceeded \$79 million and the state realized an additional \$3.15 million from state and federal royalties and from federal reclamation fees. In addition, direct employment was estimated at 6,458 for fiscal year 1982 and nearly 8,000 for fiscal year 1983. Secondary employment remained at approximately 32,000 through the biennium.

REFERENCES

1. Brant, R. A. **Lignite Resources of North Dakota**. U.S. Geological Survey Circular 22G and Modified Circular 22G, Government Printing Office, Washington, D.C., 1953 and March 1974.
2. Isler, Rudolph. **North Dakota Annual Coal Mine Report**. State Coal Inspection Department, Bismarck, North Dakota, 1973.
3. Leistritz, F. Larry, William Ransom-Nelson, Richard W. Rathge, Randal C. Coon, Robert A. Chase, Thor A. Hertsgaard, Steve H. Murdock, Norman E. Toman, Rakesh Sharma, and Pai-Sung Yang. **North Dakota Economic-Demographic Assessment Model (NEDAM): Technical Description**. Agricultural Economics Report No. 158, Department of Agricultural Economics, North Dakota State University, Fargo, 1982.
4. Nielson, George F. **Keystone Coal Industry Manual**. Mining Information Services, McGraw-Hill Mining Publications, New York, 1982.
5. Office of the State Tax Commissioner. **Tons of Coal Severed**. Quarterly Reports for July 1, 1975 through June 30, 1982, Bismarck, North Dakota.