



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

North Dakota Lignite Energy Industry's Contribution to the State Economy for 2003 and Projected for 2004

Randal C. Coon and F. Larry Leistritz*

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 2003 and projected expenditures for 2004. 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. Third, 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 2002 and the resulting level of business activity were compared to 2002 state values (the most recent data available) to indicate the industry's role in the economy. All values in this analysis are expressed in 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 \$541.4 million in 2003 and were projected at \$583.7 million for 2004 (Table 1), based on a survey of firms in the industry. Actual expenditures for 2003 were slightly lower than the level projected for that year--\$555.7 million (Coon and Leistritz 2003). [Overall, expenditures during the 1987-2003 period were higher than those for earlier years. In fact, 2003 expenditures were 56 percent higher than those for 1986, which were \$346.2 million (Coon and Leistritz 1987). It should be noted, however, that inflation was about 64 percent, nationwide, over this period.]

Actual 2003 outlays were lower than previous projections resulting primarily because retail trade sector expenditures were less than projected. Rising oil prices worldwide since 2000 may also have contributed to growth in the lignite energy industries. Since mid-1999, oil prices have risen rather dramatically which could lead to increased demand for lignite energy products. In fact, electric energy shortages in the United States in 2000 have stimulated discussions for building a new coal-fired plant in western North Dakota. 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

*Research specialist and professor, Department of Agribusiness and Applied Economics, North Dakota State University, Fargo.

Table 1. Estimated North Dakota Direct Expenditures by Economic Sector for Companies Involved in Lignite-related Activities, 2003 and Preliminary 2004		
Sector	2003	2004
	-million dollars-	
Construction	34.2	42.1
Transportation	20.1	24.0
Communications and public utilities	43.9	44.3
Wholesale trade and misc. manufacturing	57.4	60.4
Retail trade	104.8	107.1
Finance, insurance, and real estate	42.2	45.9
Business and personal services	38.4	40.8
Professional and social services	22.0	31.7
Households	<u>178.4</u>	<u>187.4</u>
Total	541.4	583.7

facility near Beulah. Construction expenditures are projected to increase only slightly in 2004, but this could be a sector with even larger increases in the future with the possible addition of a power plant.

Expenditures from firms involved in lignite-related activities generated total business activity over \$1.6 billion for each year (Table 2). Expenditures by lignite-related firms resulted in \$406.0 million of retail sales activity in the state in 2003 and are projected at \$433.0 million for 2004. Also, the industry's activities generated \$537.1 million in personal income in 2003, with the 2004 level projected to be \$578.8 million.

Lignite industry companies contribute substantially to state tax revenues. Total taxes attributable to the industry were estimated to be \$74.5 million in 2003 and \$76.1 million in 2004 (Table 3). Coal severance and energy conversion taxes constituted 16 percent and 37 percent of the total, respectively, in 2003. In addition to the 3,849 workers directly employed in 2003 and the projected 3,905 workers for 2004, 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 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, 2003 and Preliminary 2004		
Item	2003	2004
	-million dollars-	
Personal income	537.1	578.8
Retail sales	406.0	433.0
Business activity for all business sectors ^a	948.6	1,028.5
Total business activity	1,625.2	1,756.6

^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, 2003 and Preliminary 2004		
Tax Revenue	2003	2004
	-million dollars-	
Coal severance	12.2	12.2
Energy conversion	27.8	27.0
Sales and use	18.8	20.0
Personal and corporate income	11.0	11.9
Other	<u>4.7</u>	<u>5.0</u>
Total	74.5	76.1

Table 4. Estimated Direct and Secondary Employment for Companies Involved in Lignite-related Activities, 2003 and Preliminary 2004		
Employment	2003	2004
Direct	3,849	3,905
Secondary	16,437	18,122

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 2002 (\$1,094.2 million) were compared with the total economic base (sales for final demand or exports) for North Dakota for 2002, the last year the data were available (\$15,490.8 million), they comprised 7.1 percent of the state's total (Coon and Leistritz 2004). When petroleum exploration, extraction, and refining were included, the energy sectors accounted for 11.2 percent of the state's total

economic base in 2002. Business activity generated by the lignite industry's sales for final demand (\$2,471.4 million) was 5.1 percent of the 2002 state total gross business volume (\$47,999.8 million). These measures show that the lignite energy industry plays an important role in the North Dakota economy.

Wages paid annually in the state's coal mining sector were the highest of any in North Dakota (\$66,177 in 2001 and \$65,037 in 2002) (Table 5). These salaries were more than 2.5 times that of all covered wages in North Dakota in 2001 and 2002, the latest years data were available. Coal mining average annual wages showed a slight decline from 2001 to 2002. This is hard to explain, but may be due in part to the data reporting switching from SIC codes to NAICS classifications. Following closely behind coal mining wages were gas production and electrical production salaries. The lignite energy industry (coal production and conversion) provides the highest average wages of any industry in North Dakota.

Industry	2001	2002
Agriculture	22,093	25,829
Mining	48,296	49,153
Coal Mining	66,177	65,037
Construction	31,849	31,862
Manufacturing	31,494	32,474
Trans, Comm, Utilities	35,547	35,554
Electrical Production	56,777	58,572
Gas Production	60,226	59,112
Wholesale Trade	32,657	34,493
Retail Trade	14,491	18,776
FIRE	31,729	31,920
Services	23,994	25,265
Government	<u>27,283</u>	<u>28,283</u>
TOTAL	25,707	26,550

Source: Job Service North Dakota, 2002 and 2003.

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 per employee in 2001 (\$63,402) and 2002 (\$61,688). 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 2001 and 2002. 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.

Region	2001		2002	
	Mining	Total	Mining	Total
-----\$-----				
Region 1	44,309	24,264	45,733	24,302
Region 2	38,880	22,746	36,567	23,447
Region 7	63,402	27,686	61,688	28,408
Region 8	43,468	21,893	46,821	22,704

Source: Job Service North Dakota, 2002 and 2003.

Region	2001		2002	
	Mining	Total	Mining	Total
-----\$-----				
Adams	N/A	21,302	N/A	21,655
Bowman	39,475	20,101	39,664	20,840
McLean	48,642 ^a	27,140	63,586 ^b	28,172
Mercer	64,281	38,045	64,493 ^c	37,821
Oliver	61,144 ^d	46,464	58,342 ^e	42,154
Williams	45,332	24,810	46,584	24,841
N. Dakota	48,296	25,707	49,153	26,550

^aIncludes mining and construction industries to avoid disclosure.
^bIncludes mining, agriculture, and utilities industries to avoid disclosure.
^cIncludes mining and agriculture industries to avoid disclosure.
^dIncludes agriculture, mining, construction, and manufacturing industries to avoid disclosure.
^eIncludes mining, agriculture, utilities, and construction industries to avoid disclosure.
Source: Job Service North Dakota, 2002 and 2003

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 1985-2003).

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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, Dept. of Agr. Econ.
- Coon, Randal C., and F. Larry Leistritz. 1999. *A Statistical Analysis of the North Dakota Lignite Energy Industry's Contribution to the State Economy for 1998 and Projected for 1999*. AE99001. Fargo: NDSU, Dept. of Agr. Econ.
- Coon, Randal C., and F. Larry Leistritz. 2000. *North Dakota Lignite Energy Industry's Contribution to the State Economy for 1999 and Projected for 2000*. AE20001. Fargo: NDSU, Dept. of Agribusiness and Applied Econ.
- Coon, Randal C., and F. Larry Leistritz. 2001. *North Dakota Input-Output Model DataBase*. Unpublished Data. Fargo: NDSU, Dept. of Agribusiness and Applied 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: NDSU, 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: NDSU, 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: NDSU, 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: NDSU, Dept. of Agr. Econ.
- Coon, Randal C., and F. Larry Leistritz. 2000. *North Dakota Lignite Energy Industry's Contribution to the State Economy for 1999 and Projected for 2000*. AE20001. Fargo: NDSU, Dept. of Agribusiness and Applied Econ.
- Coon, Randal C., and F. Larry Leistritz. 2001. *North Dakota Lignite Energy Industry's Contribution to the State Economy for 2000 and Projected for 2001*. AE01004. Fargo: NDSU, Dept. of Agribusiness and Applied Econ.
- Coon, Randal C., and F. Larry Leistritz. 2002. *North Dakota Lignite Energy Industry's Contribution to the State Economy for 2001 and Projected for 2002*. AE02003. Fargo: NDSU, Dept. of Agribusiness and Applied Econ.
- Coon, Randal C., and F. Larry Leistritz. 2003. *North Dakota Lignite Energy Industry's Contribution to the State Economy for 2002 and Projected for 2003*. AAE03002. Fargo: NDSU, Dept. of Agribusiness and Applied Econ.
- Coon, Randal C., and F. Larry Leistritz. 2004. *North Dakota Input-Output Model Data Base*. Unpublished Data. Fargo: NDSU, Dept. of Agribusiness and Applied Econ.
- Job Service North Dakota. 2002. *North Dakota Employment and Wages: 2001*. Bismarck: Job Service North Dakota, Labor Market Information.
- Job Service North Dakota. 2003. *North Dakota Employment and Wages: 2002*. Bismarck: Job Service North Dakota, Labor Market Information.

NOTICE:

The analyses and views reported in this paper are those of the author(s). They are not necessarily endorsed by the Department of Agribusiness and Applied Economics or by North Dakota State University.

North Dakota State University is committed to the policy that all persons shall have equal access to its programs, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

Information on other titles in this series may be obtained from: Department of Agribusiness and Applied Economics, North Dakota State University, P.O. Box 5636, Fargo, ND 58105. Telephone: 701-231-7441, Fax: 701-231-7400, or e-mail: cjensen@ndsuxext.nodak.edu.

Copyright © 2004 by Randal C. Coon and F. Larry Leistritz. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.