EFFECTS OF ENERGY DEVELOPMENT ON SECONDARY LABOR MARKETS IN NORTH DAKOTA

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The last 10 years have brought a modern version of the gold rush to the western United States. Increased prices and demand for energy have spurred exploration and development of coal, oil, natural gas, oil shale, and uranium reserves, bringing vastly accelerated population growth and economic development to many rural areas of Wyoming, Utah, Texas, North Dakota, and other Western and Great Plains states. This increased demand for energy has also led to construction of large power plants and synfuel projects.

North Dakota has reaped its share of economic benefits in the form of oil and gas development in the Williston Basin and lignite mining in western and central regions of the state. In the past five years, three major coal-fired electric generating plants have been completed in central North Dakota: Coal Creek Station (McLean County), Coyote Station, and Antelope Valley Station (both Mercer County). In addition, the Great Plains Coal Gasification Project in Mercer County, the nation's largest coal gasification plant, is expected to be operational in 1984.

Energy-related growth can bring economic prosperity in the form of high-paying jobs and expanded business opportunities. However, the additional population drawn to this prosperity may impose severe demands on small communities, resulting in shortages of housing, public service, recreational facilities, and educational opportunities unless careful advance planning has been done.

Another accompanying feature of energy-related population influxes is an increase in demands for goods and services in the private sector. Construction and operation workers and their families may demand retail goods and services in greater quantity and variety than local merchants had been accustomed to supplying, thereby spurring expansion of existing firms and attracting new firms to the area.

Gilmore et al. (1981) in a study of nine development sites, found that for every 10 construction jobs at an energy facility, between two and seven local trade and service sector jobs were created. This effect may be even higher for facility operation. It can be concluded that the secondary business and public service sectors provide a significant source of employment. Few attempts have been made to measure the behavior and impacts of the secondary business sector and its employees on energy development communities. Similarly, few attempts have been made to isolate characteristics of public sector employees in these communities. If these secondary jobs are filled by previously unemployed local residents or dependents of inmigrating project workers, inmigration to the community (and additional demands on housing and services) will be reduced. If these jobs are not filled by locals, additional workers and their dependents may move to the area. The source and socioeconomic characteristics (such as previous residence and family size) of these workers is therefore important to planners and community officials dealing with rapid growth.

It has also been speculated that high wages offered at energy developments may lure workers away from local businesses and force owners to pay higher wages to attract qualified employees. On the positive side, increased economic activity has been thought to lead to expansion of existing firms and attraction of new firms to the area and thus to the creation of new job opportunities for area workers.

PROCEDURES

This study was based on a survey of secondary business and public sector employers and employees in Mercer and McLean counties, North Dakota. Each of these counties had experienced substantial growth in recent years due to the construction of energy facilities. Hettinger County, which had not experienced energy-related growth in the past decade, was also surveyed so that a comparison of business trends between growth and nongrowth counties could be made. A description of the three counties is provided in Table 1.

Specific objectives of this article are to

1. Identify difficulties experienced by secondary business owners in attracting qualified workers and estimate the extent to which floor space and

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Table 1. Characteristics of North Dakota Counties Surveyed.

County Towns Surveyed	1970 Population	1980 Population	Development Impact	Peak Work Force (Yr)
Hettinger	5,075	4,275	(Control)	NA
New England	1,368	1,315		
Mott	906	825		
McLean	11,251	12,288	Power Plant	2,224
Underwood	781	1,329		(1978)
Washburn	804	1,767		
Mercer	6,175	9,404	Power Plant	6,117
Beulah	1,344	2,908	Coal Gasification	(1983)
Hazen	1,240	2,378		

SOURCES: U.S. Department of Commerce, Bureau of the Census (1982); ITAT (1983); Leistritz and Maki (1981).

inventory were expanded to accommodate the community's rapid growth;

2. Identify characteristics of secondary business workers, especially family size, previous residence, and relationship to workers at the energy facilities;
3. Identify characteristics of employees in public sector occupations such as education, law enforcement, and health care, and compare these with employee characteristics in the private sector;
4. Evaluate implications of these findings and possible planning measures which might apply.

Three surveys were conducted in fall and winter 1982-83 in each county: a business, secondary business employee, and public sector employee survey. The business survey was conducted by personal interview with local owners and managers. Businessmen were asked to distribute employee surveys to their employees, who returned them for pick up or mailed them to North Dakota State University in a stamped envelope provided by the interviewer. Public sector employee questionnaires were distributed to public officials in the three counties and collected via interviewer pickup or return envelope.

The surveyor attempted to contact all town businesses, using lists obtained from area chambers of commerce. Employer response rates were 97.5 percent (Hettinger), 93.3 percent (McLean), and 84.7 percent (Mercer). No response rates were available for public sector surveys. Response rates for employee surveys were 61.6 percent (Hettinger), 55.5 percent (Mercer), and 52.0 percent (McLean), based on the number of employees indicated by each responding employer.

RESULTS

The Business Survey

Results of the survey of business owners and managers in Hettinger, McLean and Mercer counties are shown in Table 2. Although hourly wages vary somewhat, these differences are not statistically significant; that is, it cannot be proven that wage rates vary substantially among the three counties. Average age of

Table 2. Characteristics of Secondary Businesses, Three North Dakota Counties, 1983.

	Hettinger	McLean	Mercer
Wages Paid (hourly)	$5.31	$6.40	$5.50
Business Age			
Mean	19	18	14
Median	10	8	8
No. of Employees (Full & Part-Time)			
1977	3.3	5.2	3.1
1978	3.0	5.6	4.0
1979	3.4	6.0	4.8
1980	3.1	5.3	5.1
1981	3.0	5.7	5.5
1982	2.9	5.0	5.6
Wage Increase in Past Five Years			
Yes	41 (53.2)	36 (66.7)	59 (64.1)
No	66 (46.8)	18 (33.3)	33 (35.9)
Difficulty Attracting Quality Workers			
Yes	25 (27.5)	25 (39.7)	49 (46.2)
No	66 (72.5)	38 (60.3)	57 (53.8)
Increased Turnover			
Yes	14 (15.7)	20 (31.7)	42 (40)
No	75 (84.3)	43 (68.3)	63 (60)
Expansion in Past Five Years			
Yes	42 (35.9)	33 (50.8)	65 (57.5)
No	75 (64.1)	32 (49.2)	48 (42.5)
Business Type			
Franchise	3 (2.5)	6 (8.7)	4 (3.5)
National Chain	4 (3.3)	1 (1.4)	5 (4.4)
Regional Chain	2 (1.7)	0	3 (2.6)
Privately Owned	111 (92.5)	62 (89.9)	102 (89.5)
Sample Size	120	70	116

Numbers in parentheses are percent of total.

these businesses varied from 14 to 19 years, but median values for Mercer and McLean counties were eight years while median for Hettinger was over 10.

Economic growth caused by energy development is indicated by the number of employees per firm. McLean County businesses showed increased staffs during peak construction years of 1978 and 1979 and a leveling off as construction on the Coal Creek Plant was completed. In Mercer County, where construction on the Great Plains Gasification Project and Antelope Valley Station was in full gear, employees per firm increased an average of 2.5, or 80.6 percent over the five-year survey period. In contrast Hettinger County business staffs were more stable, actually declining slightly between 1977 and 1982. Another growth indicator is that over half the businesses surveyed in McLean and Mercer counties (50.8 percent and 57.5 percent, respectively) had expanded during the five-year period, in contrast with Hettinger County where only 35.9 percent had expanded.[1]

Energy development is thought to cause wage inflation in the secondary sector and also make quality

[1]These differences between Hettinger and the other two counties are statistically significant at the 90 percent level.

workers harder to attract and keep. However, while high percentages of businesses in Mercer and McLean counties indicated substantial wage increases over the past five years, a comparably high percentage was found in Hettinger County; in fact, the differences in wage increases between Hettinger and the other counties were not significant. Both turnover rates and difficulty attracting workers were noted as problems in Mercer and McLean counties, while these were viewed as problems by significantly fewer businesses in Hettinger County, indicating energy facilities have constricted the job market, making quality workers harder to attract and keep. Still, less than 50 percent of the businesses in either growth county indicated that these were major problems.

The Secondary Business Employee Survey

As noted, the source of secondary workers filling new jobs — that is, whether workers are local or nonlocal — can strongly affect a county's adjustment to growth. If workers are new to the county and bring their families, population increases will be larger than if workers were already county natives or dependents of workers at one of the energy facilities. Only slightly more than one in five workers in either McLean or Mercer had a spouse employed at an energy facility (Table 3). Half of the workers surveyed had lived in McLean County seven years or less, and less than five years in Mercer County. Finally, the fact that married workers averaged 3.6 family members (workers and dependents) combined with the previous information indicates that inmigration to fill secondary jobs has a substantial impact on the host county. In response to questions asked on expected length of stay in the county, 76.4 percent of McLean County respondents indicated intentions of permanent residents, compared to 86.1 percent in Hettinger County. Statistically, there is no significant difference between these two values. (This question was not asked in the Mercer County survey.)

Since more than half of the population surveyed in Mercer and McLean counties had moved into the area after development of the energy facilities had begun, this group was separated from the total to see whether recent inmigrants differed from longtime residents. A slightly higher percentage in McLean County had spouses employed at an energy facility; a slightly lower percentage had in Mercer County. Otherwise, the only notable difference between recent inmigrants and the overall sample is age (Table 4).

Table 3. Characteristics of Secondary Business Workers, Three North Dakota Counties, 1983.

	Hettinger	McLean	Mercer
Number of Dependents per Married Worker[a]	2.7	2.6	2.6
Marital Status			
Married	115 (72.3)	93 (64.4)	189 (60.0)
Single	44 (27.7)	44 (33.6)	126 (40.0)
Spouse Occupation			
Energy	4 (3.5)	19 (20.4)	42 (22.2)
Nonenergy or Not Employed	111 (96.5)	74 (79.6)	147 (77.8)
Previous Residence			
County[b]	32 (26.7)	21 (17.2)	56 (21.0)
Elsewhere in State	65 (54.2)	77 (63.1)	135 (50.8)
Out of State	23 (19.1)	24 (19.7)	75 (28.2)
Years of Local Residence[a]	18.1	13.3	9.8
Gender			
Male	72 (45.6)	64 (46.0)	155 (50.2)
Female	86 (54.4)	75 (54.0)	154 (49.8)
Age[a]	37.1	32.3	31.7
Wage Received[a]	$5.74	$4.84	$5.89
Expected Length of Stay			
Less than 3 months	1 (0.7)	2 (1.6)	[c]
3-11 months	4 (2.6)	4 (3.1)	
1-2 years	10 (6.6)	7 (5.5)	
3-5 years	6 (4.0)	17 (13.4)	
Permanently	130 (86.1)	97 (76.4)	
Sample Size	159	140	315

Numbers in parentheses are percent of total.
[a]Represents mean values.
[b]This term represents those employees who moved to the survey town from other parts of the county.
[c]This question was not asked of Mercer County respondents.

Table 4. Characteristics of Recently Immigrating Secondary Business Workers, Two North Dakota Counties, 1983.

	McLean	Mercer
Number of Dependents per Married Worker[a]	2.7	2.6
Marital Status		
Married	54 (74.0)	120 (63.1)
Single	19 (26.0)	70 (36.9)
Spouse Occupation		
Energy	12 (22.8)	26 (21.7)
Nonenergy or Not Employed	42 (77.8)	94 (78.3)
Previous Residents		
County[b]	8 (11.3)	29 (15.6)
Elsewhere in State	48 (67.6)	99 (53.2)
Out of State	15 (21.1)	58 (31.2)
Years of Local Residence[a]	3.7	2.9
Gender		
Male	31 (42.5)	98 (52.4)
Female	42 (57.5)	89 (47.6)
Age[a]	28.1	30.0
Wage Received[a]	$4.69	$5.92
Expected Length of Stay		
Less than 3 months	2 (2.9)	[c]
3-11 months	2 (2.9)	
1-2 years	4 (5.9)	
3-5 years	11 (16.2)	
Permanently	49 (72.1)	
Sample Size	73	190

Numbers in parentheses are percent of total.
[a]Represents mean values.
[b]This term represents employees who moved to the survey town from other parts of the county.
[c]This question was not asked of Mercer County respondents.

The Public Sector Employee Survey

Conducted in conjunction with a community leaders survey of energy-impacted communities, the public sector employee survey was similar to the business employee survey. Respondents included school district, health, law enforcement, and fire protection personnel, as well as library, recreational, and county agent staff.

As might be expected, the survey results reveal a population that was better educated, higher paid, and older than the private sector group (Table 5). Over 50 percent of the Mercer and McLean county public sector employee sample possessed a college degree, compared to less than 10 percent of the business employee sample (Table 6). Higher percentages of the public sector sample were married for all three counties surveyed. However, of those married, percentages of workers with spouses at an energy facility were comparable to those of the employee group. Years of residence averaged lower for the public sector sample in Hettinger and McLean and slightly higher in Mercer. Mean income levels for public sector employees were higher than in the business employee sector, because many respondents held professional positions. Mean age was also higher for the public sector sample.

Table 5. Characteristics of Public Sector Employees, Three North Dakota Counties, 1983.

	Hettinger	McLean	Mercer
Number of Dependents per Married Worker[a]	2.6	2.4	2.4
Marital Status			
Married	81 (78.6)	22 (81.5)	38 (76.0)
Single	22 (21.4)	5 (18.5)	12 (24.0)
Spouse Occupation			
Energy	0	8 (27.6)	9 (23.7)
Nonenergy or Not Employed	81 (100.0)	21 (72.4)	29 (76.3)
Previous Residence			
County[b]	32 (36.0)	3 (12.0])	5 (10.6)
Elsewhere in State	43 (48.3)	18 (72.0)	33 (70.2)
Out of State	14 (15.7)	4 (16.0)	9 (19.1)
Years of Local Residence[a]	17.6	10.4	10.6
Gender			
Male	38 (37.6)	5 (18.5)	19 (38.0)
Female	63 (62.4)	22 (81.5)	31 (62.0)
Age[a]	38.5	36.2	36.1
Annual Income ($)			
0- 4,999	0	1 (3.7)	4 (8.2)
5,000- 9,999	20 (25.0)	9 (33.3)	4 (8.2)
10,000-14,999	39 (48.7)	7 (25.9)	10 (20.4)
15,000-19,999	16 (20.0)	8 (29.6)	20 (40.8)
20,000-24,999	2 (2.5)	1 (3.7)	9 (18.4)
25,000-29,999	2 (2.5)	1 (3.7)	2 (4.1)
30,000 +	1 (1.3)	0	0
Expected Length of Stay			
Less than 3 months	--	--	--
3-11 months	2 (2.1)	--	--
1-2 years	6 (6.4)	5 (18.5)	2 (4.1)
3-5 years	7 (7.4)	5 (18.5)	5 (10.2)
Permanently	79 (84.0)	17 (63.0)	42 (85.7)
Sample Size	103	27	50

Numbers in parentheses are percent of total.
[a]Represents mean values.
[b]This term represents employees who moved to the survey town from other parts of the county.

CONCLUSIONS

This study confirmed some initial hypotheses while disproving others. The contention that energy development stimulates the secondary business sector seems to be justified, because many firms reported expansion and a large number of establishments were founded after the areas' energy projects began. However, prior speculation on development causing radically higher turnover, difficulty attracting new workers, and much higher wages would seem unfounded. Although a high percentage of employers felt that they had increased worker compensation substantially, analysis indicated that these increases were generally no more than simple cost-of-living adjustments (see Halstead and Leistritz, 1983). Few employers noted severe problems in employee attraction or retention. Overall, the survey did not verify some of the supposed negative impacts which energy development causes on secondary businesses. It should be noted however, that employers in the control, nonimpacted county experienced lower turnover, less difficulty attracting workers, and less need to increase compensation than those in the two energy-impacted counties.

Results of the employee survey revealed two important points. First, a high percentage of these workers were recent inmigrants to the county; second, only about one employee in five had a spouse working at an energy facility. These findings indicate that inmigrating secondary workers and their dependents may constitute

Table 6. Education Levels of Survey Respondents by County and Employment.

	Hettinger		McLean		Mercer	
	Private Sector	Public Sector	Private Sector	Public Sector	Private Sector	Public Sector
Primary	8 (5.1)	7 (7.1)	10 (7.2)	0	30 (9.7)	2 (4.0)
Some High School	12 (7.6)	4 (4.0)	20 (14.4)	2 (7.4)	38 (12.3)	2 (4.0)
High School	80 (50.6)	32 (32.3)	59 (42.4)	4 (14.8)	123 (39.8)	9 (18.0)
Some College	47 (29.7)	29 (29.3)	45 (32.4)	7 (25.9)	98 (31.7)	11 (22.0)
College	11 (7.0)	27 (27.3)	5 (3.6)	14 (51.9)	20 (6.5)	26 (52.0)
TOTAL	158 (100.0)	99 (100.0)	139 (100.0)	27 (100.0)	309 (100.0)	50 (100.0)

Numbers in parentheses represent percentages.

a substantial portion of population increases in energy-impacted counties, whereas it was previously assumed that many or most of the workers filling secondary jobs were either locals or relatives of inmigrating project workers.

Public sector employees were better educated, higher paid, and less likely to change jobs than their private sector counterparts. Percentages of public sector employees with a spouse at an energy facility were comparable to the private sector.

It is possible that communities may want to take steps prior to project development to lessen secondary worker inmigration, just as many mitigation plans try to reduce project work force in migration (Leistritz et al., 1982; Halstead et al., 1982). Active recruitment of unemployed local workers and energy-related spouses and dependents by local businesses can decrease the need for additional outside workers to fill secondary jobs. Ensuring that adequate, reasonably priced day-care facilities are available for parents wishing to join the labor force may also prove useful.

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Table 1. Summary of yield and agronomic characteristics of ND-01 high oleic sunflower synthetic and the inbred line HA 89, 1983, Fargo, N.D.

Line	Yield	50% Flowering	Height	200 Seed Weight
	(lb/acre)	(days)	(in)	(g)
ND01				
Mean	1220	81	69	17.3
Range		77-85	54-72	11.4-23.6
HA 89	918	76	51	10.2

Table 2. Summary of oil quality characteristics of ND-01 high oleic sunflower synthetic and the inbred line HA 89, 1983, Fargo, N.D.

Line	Oleic acid	Lineolic acid	Oil
	(% of total fatty acids)	(% of total fatty acids)	(%)
ND01			
Mean	88.9	4.4	40.7
Range	81.1-90.6	2.3-9.5	37.8-48.4
HA 89	13.9	76.1	41.2

select plants from this synthetic would need to eliminate severe plant type extremes. Individual plants were also variable for 200 seed weight, although most plants had seed weights larger than HA 89.

Final selections of plants to be random-mated ranged from 81.1 percent to 90.6 percent for oleic acid content (Table 2). in the final group, 49 random-mated plants were selected. Fifteen plants were not selected, three having oleic percentages between 70-80 percent, six between 50-70 percent, and six lower than 50 percent. Linoleic acid content of ND-01 averaged 4.5 percent. Oil percentage of the original Pervenets was quite high and several of the final selections were 44-48 percent oil. The average of the ND-01 synthetic was 40.7 percent oil.

Seed Distribution

Germplasm seed quantities of the ND-01 high oleic acid synthetic will be maintained by the Seedstocks Project, Agronomy Department, North Dakota State University, Fargo, ND 58105. Seed of this synthetic will be distributed to researchers upon request. In addition, the North Central Regional Plant Introduction Station, USDA—ARS, Iowa State University, Ames, Iowa 50011, will maintain this synthetic as P.I. 483077. Plant materials are available for distribution from this station.