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Wind Energy Industry's Contribution to the North Dakota Economy in 2019

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The authors assume responsibility for any errors of omission, logic, or otherwise. Any opinions, finding, and conclusions expressed in this publication are those of the authors and do not necessary reflect the view of the Department of Agribusiness and Applied Economics, North Dakota State University, or the study sponsors.

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Executive Summary

Dean A. Bangsund and Nancy M. Hodur[1]

Introduction

The wind Energy Industry has grown substantially since 2002. With less than 5 megawatts (MW) of generating capacity in 2002, the Wind Energy Industry has grown to 3,600 MW of generating capacity in 2019. As the industry has continued to expand, so has the industry's economic footprint. This study represents the third economic assessment of the Wind Energy Industry in North Dakota in the last decade and represents a much-needed update to work completed five years ago. The objective of this study was to estimate the contribution the Wind Energy Industry makes to the North Dakota economy.

Data and Analysis

As with past studies, firms owning wind farms in North Dakota were surveyed to gather data on revenues, employment and payroll, operating expenditures, lease payments and capital outlays. Additional data was collected from various federal and state government agencies. Survey data represented over 60 percent of the generating capacity of wind farms in North Dakota and was extrapolated to estimate all farms operating in the state. A customized input-output matrix was developed within IMPLAN to approximate the economic structure of the Wind Energy Industry. The model was used, along with information on wind farm operations, construction, non-construction capital outlays, and wind component manufacturing, to estimate the overall size of the Wind Energy Industry. Both indirect (output from businesses) and induced (output from households) effects were estimated to describe the economic footprint of the industry.

Key Findings

Key findings and summary economic metrics are outlined below. See the full report for more detailed findings and explanation

Property Tax Revenues

Direct property taxes paid by wind farms have increased substantially since 2015. Taxes paid have nearly doubled increasing from $5.9 million in 2015 to $10.5 million in 2019. Total property taxes paid from 2015-2019 were $42.2 million and include both traditional ad valorem taxes and wind generation taxes.

[1] Bangsund is a Research Scientist with the Department of Agribusiness and Applied Economics and Hodur is Director at the Center for Social Research, North Dakota State University, Fargo.

Naturally, counties with greater wind production received larger property tax payments from the Wind Energy Industry. Property taxes collected from 2015-2019 were greatest in Morton, Oliver and Barnes Counties, $6.8, $5.8 and $4.2 million, respectively. Payments to most other counties with wind farms ranged from $1 to $3 million over the five-year period.

Most property taxes on wind farms accrue to three political subdivisions: school districts, counties and cities. School districts, counties and cities received 43 percent, 34 percent, and 10 percent, respectively, of county-level property taxes and centrally assessed wind generation taxes over the 2015 to 2019 period.

Land Lease Payments

Wind farms generally lease land from private landowners. The private landowners receive a payment for the use of that land in the form of a land lease payment. An important component of localized economic effects is the revenue distributed to landowners in the state. Total land lease payments increased from $12 million in 2015 to $19.2 million in 2019. Most (87 percent) of the land lease payments from 2015-2019 accrued to landowners that live in North Dakota. Of total land lease payment made in 2019, $17.1 of the $19.2 million were made to residents of North Dakota.

Employment

Direct employment from firms that own wind farms was estimated at 168 jobs in 2019. Many firms that own wind farms contract with other firms for maintenance and operation services. Contracted services employment between wind farm owners and service-firms is considered indirect employment. For every one direct job associated with wind farms the industry supported another 2.8 jobs in the state.

Total labor income created and sustained by the wind energy industry was estimated at $238 million in 2019. About $147 million was labor income from direct employment in the industry. The remainder, $90 million, is labor income associated with indirect and induced jobs supported by the wind energy industry's economic output. Labor income associated with wind farms was nearly $39 million while the remaining $200 million in labor income was from construction, manufacturing, and non-construction capital outlays.

Value-added can be used to examine an economic sector or industry's contribution to gross state product. Value-added economic output for the wind energy industry was estimated at nearly $630 million. The majority, about $485 million, is from direct effects related to firms in the wind energy industry, as opposed to those businesses that are supported by the wind industry. Those businesses collective accounted for $144 million in value-added output to the state's economy.

Gross output of the wind energy industry was estimated at $1.27 billion in 2019. This represents the exchange of dollars among businesses and from households to businesses. Nearly $1 billion of that value was from direct effects of the industry. Wind farm operations

sustained over $390 million in business output in 2019. Business activity associated with manufacturing, construction, and non-construction capital outlays in 2019 was over $870 million.

Total government revenues directly attributed to the wind energy industry were estimated at $20 million in 2019. The $20 million in direct revenues includes $10.6 million in property taxes. The additional business volume associated with indirect and induced economic effects was estimated to generate an additional $7 million in government revenues. The combination of direct taxes paid by the wind industry and government revenues from indirect and induced economic output was estimated at $27 million in 2019.

Conclusions

Wind energy generation capacity and production has increased substantially over the past decade. Wind energy generation capacity has grown to 3,600 megawatts since 2005 when the state's wind energy generation capacity was only 65 megawatts. Electricity produced from wind in North Dakota has increased from roughly zero percent in 2003 to 27.3 percent the state's total generating capacity in 2019.

Wind energy represents another element of the state's energy complex that creates jobs and uses the export of electricity to create additional business activity in the state. Wind generating capacity and output has continued to expand for over a decade in North Dakota. As of January 2020, an additional 450 megawatts of generation capacity were under construction with another 405 megawatts of generating capacity represented in pending permit applications.

The industry continues to tap into North Dakota's abundant wind resources and has grown to become an important source of electricity generation and electricity exports for the state. Wind generated electricity represents a growing segment of the state's energy complex.

Wind Energy Industry's Contribution to the North Dakota Economy in 2019

Dean A. Bangsund and Nancy M. Hodur[2]

Introduction

The wind energy industry has grown substantially since 2002. With less than 5 megawatts (MW) of generating capacity in 2002, the Wind energy industry has grown to 3,600 MW of generating capacity in 2019. The industry continues to tap into North Dakota's abundant wind resources and has become an important source of electricity generation and electricity exports for the state. As the industry has continued to expand, so has the industry's economic footprint. This study represents the third economic assessment of the Wind energy industry in North Dakota in the last decade and represents a needed update to work completed five years ago. The objective of this study was to estimate the contribution the Wind energy industry makes to the North Dakota economy.

Data Collection and Methods

The methods used to collect data for this study are similar to previous wind energy industry assessments (Coon et al. 2016; 2012). Financial information for the industry was obtained by surveying firms and companies that own wind farms in the state (Appendix A contains an industry questionnaire). The study sponsor assisted in soliciting industry buy-in and provided contact information for firms within the industry.

The survey collected information on sales, employment, employment compensation, total operational expenditures, and the share of those expenditures obtained from in-state sources, lease payments, capital outlays, and taxes paid in North Dakota. The survey data was extrapolated to represent state totals for the industry. Additional information on property tax payments and wind farm generating characteristics were obtained from the ND Office of the State Tax Commissioner and the ND Public Service Commission.

Analysis performed on the Wind energy industry represents an economic *contribution* assessment. The economic contribution approach measures the gross size of an industry. Not to be confused with an economic *impact* study, contribution assessments do not include economic offsets associated with alternative conditions (e.g., measuring and including the loss of commodity production from wind turbines and service roads located on crop land). Economic *impact* studies measure the net effects associated with industry activity. Appendix C provides additional insights on the differences between *impact* and *contribution* assessments.

[2] Bangsund is a Research Scientist with the Department of Agribusiness and Applied Economics and Hodur is Director at the Center for Social Research, North Dakota State University, Fargo.

As typical with economic contribution assessments, information from the industry is critically important to quantify the direct economic effects of an industry. Direct effects are usually measured as injections (or reductions) of money into a specified economy. Direct effects can represent a change in economic sector sales, labor income, household income, government revenues and spending patterns, industry production functions, and institutional spending.

Direct effects, which represent the first round of economic activity, are inputs into an economic model that calculates various forms of business activity resulting from those direct effects. Secondary economic effects result from changes in demand created by the first round (direct) effects and are delineated into indirect and induced economic effects. Both direct and secondary effects use the same metrics of economic change, such as sales, employment (jobs), wages and salaries, labor income, tax revenues, contribution to gross state product, and so on (Figure 1).

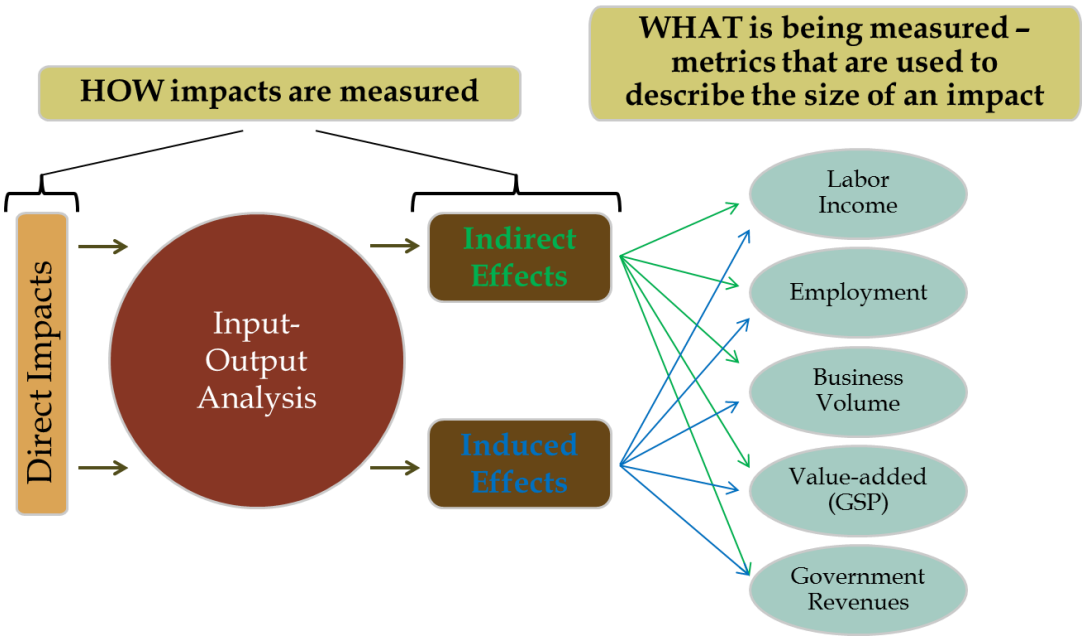

Figure 1. Impact Assessment Methodology
Source: DA Bangsund, Department of Agribusiness and Applied Economics NDSU

Input-Output Analysis

Input-output (I-O) analysis was used to estimate indirect and induced efforts. I-O is a mathematical representation of the production and consumption of goods and services within a given economy and is premised on the notion of inter-industry transactions, where industries use products/services from other industries to generate their output, and outputs from one industry usually represent inputs to another industry. The basis for the interdependence (linkages) within input-output analysis between consuming and producing industries forms the foundation for development of multiplier effects. Multiplier effects can then be used to estimate how initial changes in economic activity result in economy-wide

changes in a given area and represent the core component of input-output analysis. While input-output analysis is a popular methodology used by a host of different stakeholders, the methodology has a number of fundamental assumptions and limitations (see Appendix C for more discussion of input-output modeling).

Wind energy industry survey data was used to customize an input-output matrix within the IMPLAN modeling platform to approximate the economic structure of the Wind energy industry in North Dakota. Survey data represented over 68 percent of the generating capacity of wind farms in North Dakota and was extrapolated to estimate all farms operating in the state. The extrapolated total for the industry represents the direct effects used within the IMPLAN matrix.

Property Tax Revenues

Taxes paid by an industry are part of an economic sector profile that contains various types of economic activity (see Appendix C for additional details on the composition of economic sector profiles). In the case of the Wind energy industry, property taxes represent a substantial portion of the taxes paid by that industry and are of particular interest to local stakeholders. An in-depth analysis of property taxes paid by the Wind Industry was conducted to estimate the volume of property taxes allocated to various political subdivisions and also was used in the development of a custom I-O matrix for the Wind Industry.

Wind energy generation is taxed using two methods. Farms built prior to January 1, 2015 are taxed on an Ad Valorem basis. Ad Valorem taxes are based on assessed value, like other real property subject to property tax. Wind farms completed after December 31, 2014 are subject to a Wind Generation Tax (WGT) in lieu of property taxes based on a combination of nameplate capacity and actual generation. Taxes are assessed as the sum of $2.50 per kilowatt of nameplate capacity plus one half of one mill ($.0005) per kilowatt-hour of electricity generated (North Dakota Office of the State Tax Commissioner 2017).

The North Dakota Office of the State Tax Commissioner collects annual property tax payments by wind farms and then allocates those revenues to counties that contain the wind farms. County governments then disperse the revenues from wind farms to various local political subdivisions.

Property tax revenues accruing to various political subdivisions within each county containing wind farms were estimated using data from the North Dakota Property Tax Statistical Reports and total property tax revenue received by those counties. The percentage of total taxes paid to individual political subdivisions was calculated by dividing total property tax revenues for individual political subdivisions by the total amount of property taxes collected. That percentage was multiplied by property tax revenues from wind farms to estimate property tax revenues accruing to various political subdivisions from the Wind Industry. This approach assumes the distribution of property tax revenues from wind farms is the same as the overall distribution for other classes of real property in each county. For example, if the overall distribution of property tax revenues to school districts in County A is

45 percent, then 45 percent of the property tax revenues from wind farms in County A were allocated to school districts in County A.

Capital Outlays for Construction

Capital outlays by the industry represent investments in machinery, structures, buildings, facilities, and equipment. The vast majority of capital outlays in 2019 in ND were for construction (labor expenses to construct wind farms and all necessary materials and equipment of new wind farms). Other capital expenditures represented vehicle purchases and replacement components for wind towers.

Information on capital expenditures for construction from industry survey participants was combined with secondary sources to evaluate both the timing and type of expenditures relating to wind farm construction. Several wind farms were identified as having some construction occurring in 2019. Start dates and start-up dates were combined with information on the approximate timing of construction outlays for wind farms. The timing of those outlays was then further refined to reflect the share of those expenditures that accrued to the North Dakota economy.

Expenditures for the primary wind generating components (i.e., towers, blades, rotors, nacelles, and generators) were excluded from analysis. While some wind farms purchase blades from the state's primary manufacturer of wind generating components, the value of those components was included in the industry's manufacturing segment. Other primary components are not manufactured in the state and would represent an out-of-state acquisition on either the part of the construction firm or the wind farm owner.

In-state Expenditures for Wind Farm Operations

Operational expenditures are defined as expenses firms incur to manage, operate, and maintain a facility or activity, excluding capital outlays for new construction or expansion of operations. Expenditures for operations produce annual economic impacts because spending to support operations reoccur each year a plant, facility, or activity is operational.

Wind energy farms in North Dakota are owned and operated by a handful of firms. All wind farms were contacted, and while not all firms responded to the request for data, survey data collected from participating firms represented approximately 68 percent of the wind generation capacity in North Dakota. Appendix A contains the questionnaire used in the study and Appendix B contains summary data from the survey of wind farm owners.

Lease Payments

Expenditures for land lease payments are made directly to landowners and industry stakeholders are interested in understanding the magnitude of those payments. Estimates of industry-wide lease payments in North Dakota were based on data obtained from the survey of wind farm owners. An additional question asked for the percentage of land lease payments

that went to North Dakota, as opposed to an absentee landowner living outside the state. The questionnaire did not refine the in-state payments for where the in-state landowner resides, so it is not possible to determine what percentage of land lease payments are retained in local economies based on this study's survey data.

In recent years, the structure of land lease payments has begun to change and evolve. In the early years of wind energy development, land lease payments were largely based on the physical footprint of the turbine and payments based on the number of turbines. More recently land lease payments are based not only on the number of turbines, but also electricity generated (Harms 2020). At least one wind development project in the state negotiated lease payments with all landowners in the project area, not only with landowners with a turbine located on their property (Bakken 2017).

Survey data and generation capacity from participating wind energy firms was used to extrapolate total statewide land lease payments. Lease payments were extrapolated based on generating capacity, not the number of turbines. Survey data on lease payments was representative of 68 percent of the industry's generating capacity, but the data was not delineated based on age of the lease or if the lease terms included provisions for electricity generated. Therefore, it is possible that the total lease payments made by the Wind energy industry could differ slightly from the values estimated in this study.

Payments for land leases were included in the estimate of industry expenditures to the *Households* sector. Other payments to households such as salaries and wages for industry employees were also included. Given that the industry makes substantial land lease payments directly to landowners, those payments were also estimated and reported separately. These separate estimates of lease payments to landowners should not be added to estimates of industry direct expenditures to the *Households* sector. Data collected from the survey of wind energy firms included payments for land leases and land lease payments are included in the estimate of industry total (direct and secondary) contribution. Estimates of payments to landowners for land leases is for illustrative purposes.

Wind Energy Component Manufacturing

Secondary data was used to estimate the size of this segment of the industry. Since only one firm was identified in this industry segment, all direct and secondary effects of manufacturing were combined with capital outlays.

Wind Generation Capacity and Production

Wind farms are located throughout the state with some of the largest concentrations of farms west of Bismarck, south of Minot, and near Valley City (Figure 2).

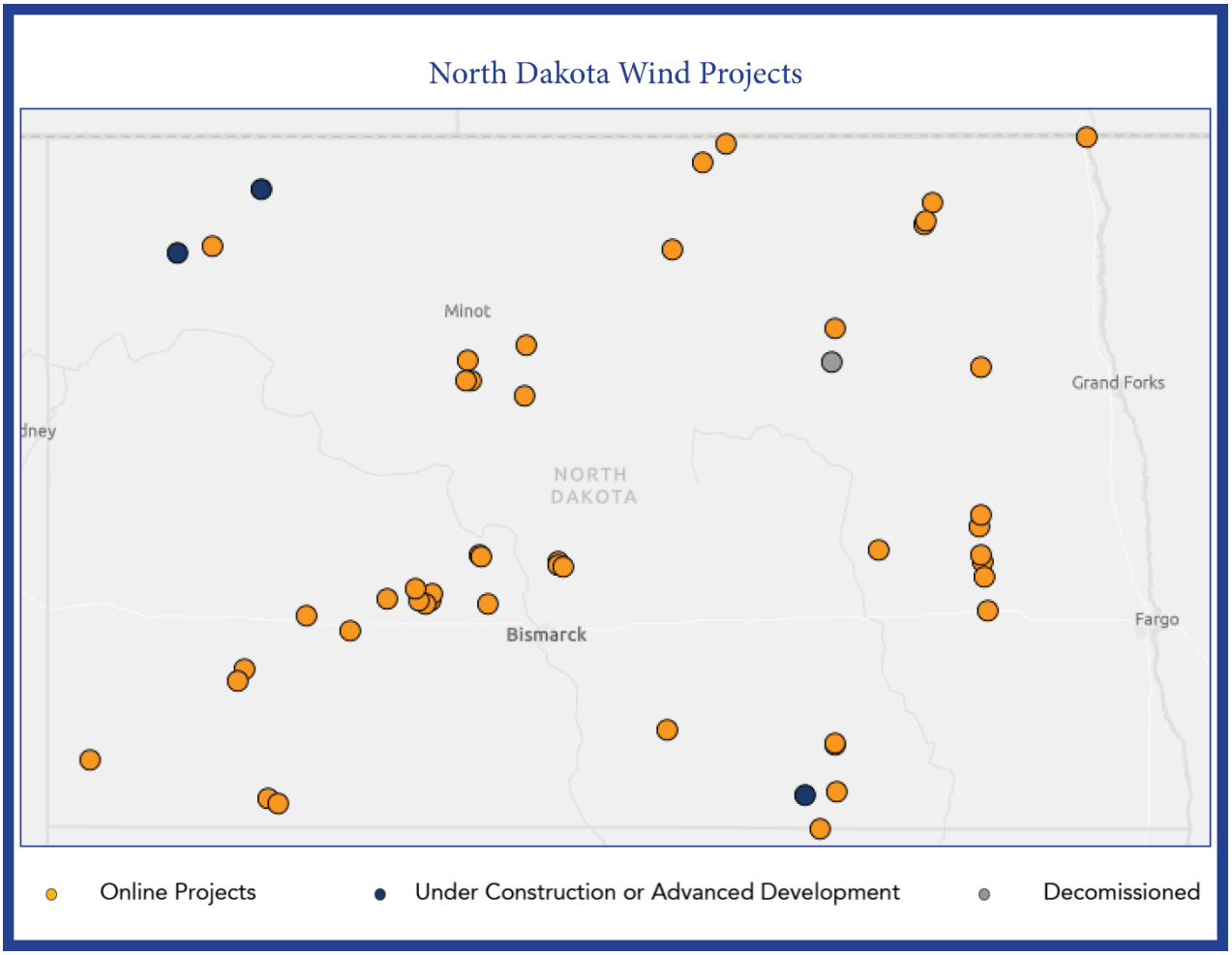

Figure 2. Commercial Wind Farms, North Dakota, 2020
Source: American Wind Energy Association (2020).

The wind energy industry in North Dakota has grown from a few small turbines with 4.4 megawatts (MW) production capacity in 2002 to maximum production capacity of 3,602 MW of electricity in 2019 (Table 1, Figure 3).

Table 1. Annual and Total Wind Turbine Electric Generating Capacity, North Dakota, 2002- 2019

Year	Number of Turbines Added Per Year	Capacity (MW) Added Per Year	Cumulative Generation Capacity (MW)[1]
2002	4	4.4	4.4
2003	41	61	65.4
2004	0	0	65.4
2005	18	12	77.4
2006	55	100.1	177.5
2007	138	207	384.5
2008	219	330	714.5
2009	289	488.1	1,202.6
2010	120	191.9	1,394.5
2011	0	0	1,394.5
2012	33	81.8	1,476.3
2013	71	211.6	1,687.9
2014	0	0	1,687.9
2015	107	312.3	2,000.2
2016	262	754.5	2,754.7
2017	123	250	3,004.7
2018	65	147	3,151.7
2019[2]	227	450	3,601.7

Source: North Dakota Public Service Commission (2020).
[1]Does not include 7 permitted non-commercial projects with a total permitted capacity of 1.12MW.
[2]As of January 8, 2020.

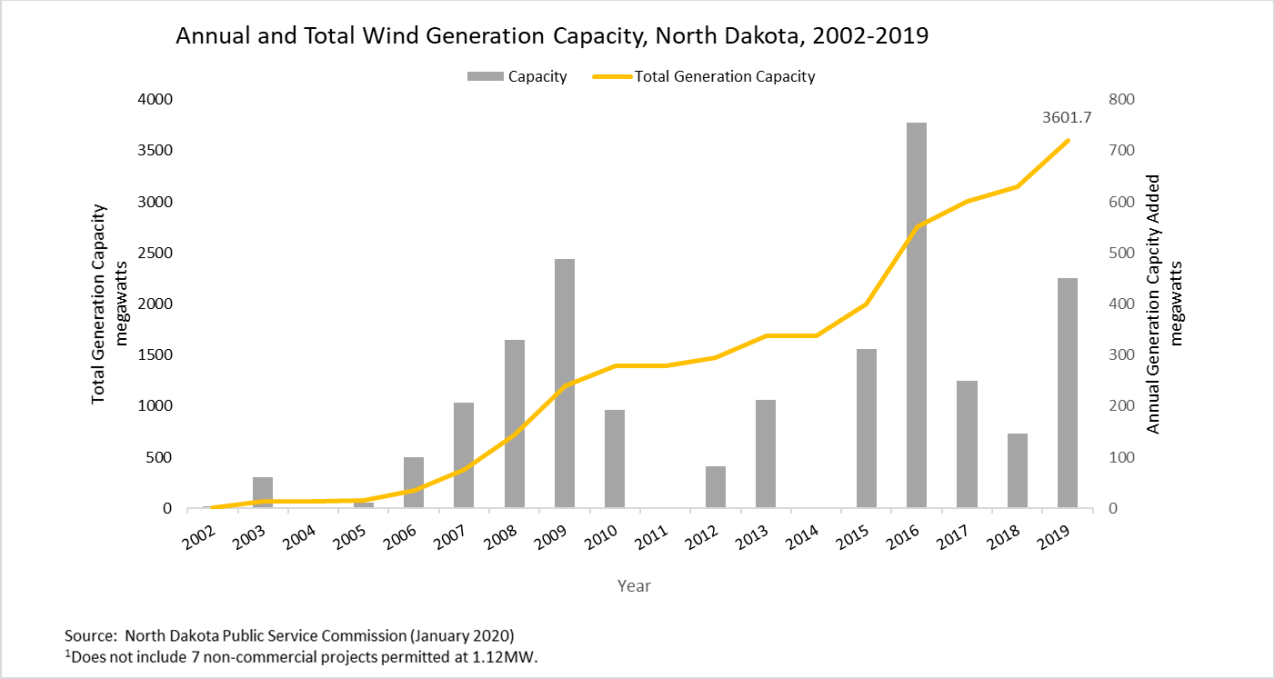

Figure 3. Annual and Total Wind Generation Capacity, North Dakota, 2002-2019
Source: North Dakota Public Service Commission (2020)

Electricity Generation by Energy Source

Energy generation capacity is measured as the maximum potential capacity and does not necessarily represent actual electricity output. Among North Dakota's key electricity generating sectors, coal has the largest generation capacity of 3,949 MW. Generation capacity from coal has remained relatively unchanged since the industry was developed in the 1970s and 1980s until 2010. From 2010 to 2019, electricity generation capacity from coal declined by 4.3 percent from 4,153 MW to 3,949 MW (Figure 4 and Appendix E).

Energy generation capacity for wind is measured assuming turbines operate at nameplate capacity. Using those metrics, wind generation capacity in North Dakota grew from less than 100 megawatts in 2005 to 3,529 megawatts in 2019 (Figure 4). Energy generation capacity from natural gas also grew, increasing from nearly zero generation capacity in 2012 to 581 megawatts in 2019 (Figure 4 and Appendix E).

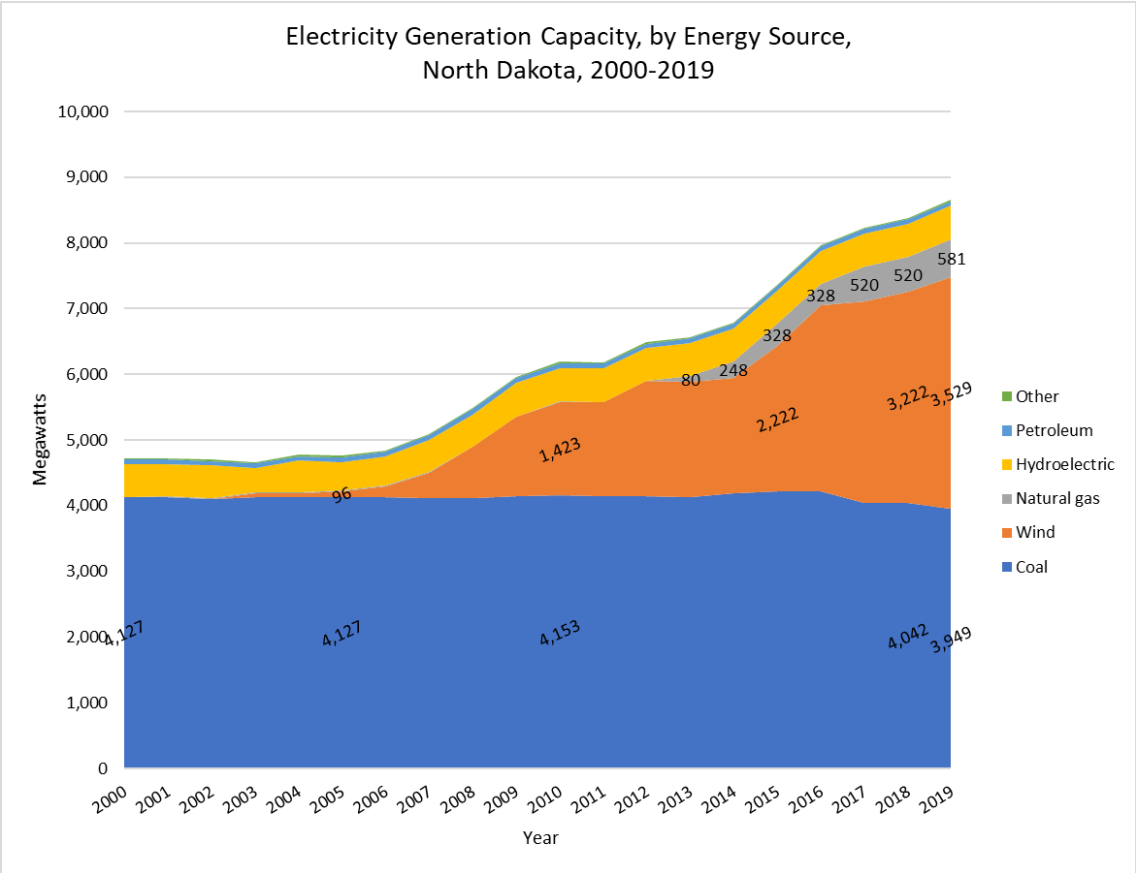

Figure 4. Electricity Generation Capacity, by Energy Source, North Dakota, 2000-2019
Source: U.S. Energy Information Administration (2020).

Another metric to describe industry capacity is to examine actual megawatt of electricity produced. Coal is the dominant electricity source, generating 61 percent of all megawatt hours of electricity produced in North Dakota in 2019. Total megawatt generated from coal has historically been relatively constant, however in the last 10 years electricity produced from coal has declined from 29,607 thousand megawatt TMWH) in 2009 to 25,151 TMWH in 2019, a 15 percent reduction (Figure 5 and Appendix E).

Electricity generated from wind has increased from zero in 2002 to 11,213 TMWH in 2019. The percentage of electricity produced in North Dakota from wind over the same period has increased from zero percent in 2002 to 27.3 percent in 2019. Since 2010 the percentage of electricity generated from wind has more than doubled increasing from 12 percent to 27 percent. Wind generation has provided much of the additional generation capacity and production in recent years. Megawatt hours of electricity generated from natural gas has also increased. While total megawatt hours of electricity generated from natural gas is relatively small, production has increased substantially in recent years, from 16 TMWH in 2010 to 1,470 TMWH in 2019 (Figure 5 and Appendix E).

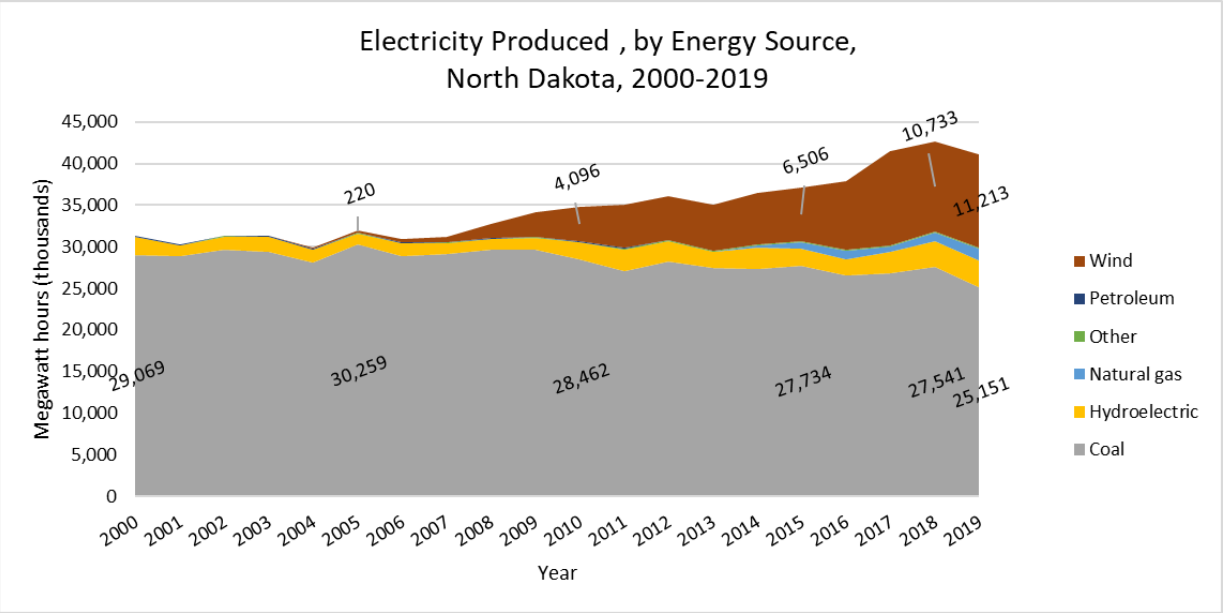

Figure 5. Electricity Produced, by Energy Source, North Dakota, 2000-2019

Source: U.S. Energy Information Administration (2020).

Economic Contribution

A number of economic metrics, in addition to employment (jobs), are used to measure the size of an economy, and are also used to estimate the size of an economic sector or industry. Not to be confused with an economic metric, the mechanisms that create economic activity (i.e., direct, indirect, and induced effects) also are used to explain how values are created or generated by an industry.

Employment

The Wind energy industry supports direct jobs that represent employment within the industry (e.g., wind farm technician) and support additional secondary jobs within the local and state economy. Secondary employment, both indirect and induced, is sustained in the economy through the purchase of goods and services. Business-to-business purchases support indirect jobs and spending by employees and household members (i.e., in all effected economic sectors) for consumer goods and services support induced jobs.

Direct employment in the industry includes employment at firms that own wind farms, jobs associated with construction firms that build and maintain wind farms and related infrastructure, and jobs at the manufacturing plant(s) that produce wind generating components (e.g., blades, towers, nacelles).

Direct employment from firms that own wind farms was estimated at 168 jobs in 2019 (Table 2). Many firms that own wind farms contract with other firms for maintenance and operation services. Contracted services employment between wind farm owners and service-

firms is considered indirect employment. For every one direct job associated with wind farms, the industry supported another 2.8 jobs in the state.

As with most of the state's key industries, employment and economic output is not limited to a single economic sector. The Wind energy industry has direct employment in the Construction and Manufacturing sectors. Those two segments of the industry were combined to suppress individual company data. Total direct jobs associated with construction and manufacturing segments of the industry were estimated at 1,633 (Table 2). Secondary employment sustained by the industry in 2019 from construction and manufacturing activities were estimated at 1,115, or about 0.9 secondary jobs for every direct job.

Caution is required when interpreting the permanence of some of the employment in the industry. A common axiom in economic contribution and economic impact assessments is that construction represents economic output (and associated employment) that is not sustained by an industry (or entity) over multiple years or extend periods. As a result, jobs associated with construction (both direct and secondary) usually are not considered permanent employment. Manufacturing employment, and the indirect and induced employment sustained by manufacturing output, is traditionally considered permanent as it would be expected those jobs remain relatively constant over time.

The problem with permanence of construction employment has to do with the time horizon under consideration. As the Wind energy industry continues to expand, construction, while ebbing and flowing with capital expenditures made by the industry, is more analogous to permanent jobs than temporary employment. However, expansion of wind farms will not continue indefinitely, and when the physical expansion of wind generating facilities ceases, employment associated with building new wind farms will decline substantially. How long the industry will continue to expand in North Dakota is unknown, but under current market conditions and federal policies, continued expansion is likely.

Table 2. Direct, Indirect, and Induced Economic Effects, Key Economic Metrics by Key Industry Segment, North Dakota Wind Energy Industry, 2019				
Economic Sector/Type of Economic Effect	**Employment[1]**	**Labor Income**	**Value-added**	**Gross Output**
Wind Farm Operations		---------- 000s 2019 $ ----------		
Direct effects	168	14,159.9	264,841.4	320,013.5
Indirect effects	293	16,309.5	23,509.8	46,024.7
Induced effects	175	8,180.3	13,624.3	25,546.9
Total economic effects	636	38,649.7	301,975.4	391,585.1
Construction of Wind Farms and Manufacturing of Wind Farm Components				
Direct effects	1,633	131,012.3	218,358.5	668,078.6
Indirect effects	521	37,042.8	59,378.4	114,831.9
Induced effects	594	28,149.6	46,727.9	87,701.2
Total economic effects	2,748	196,204.6	324,464.8	870,611.7
Other Capital Expenditures (non-construction)				
Direct effects	25	2,206.6	2,219.1	2,318.7
Indirect effects	0.3	18.0	31.2	63.7
Induced effects	10	476.4	791.1	1,486.2
Total economic effects	35	2,700.9	3,041.3	3,868.6

[1] Employment represents total jobs and does not represent employment in FTE.

Employment Compensation and Labor Income

Labor income measures wages, salaries, bonuses, sole-proprietor's income, and all employment benefits. By contrast, employment compensation, another commonly used metric, only includes salaries, wages and benefits. Therefore, labor income is a more inclusive measure of the value of direct and secondary employment in an industry.

Total labor income created and sustained by the wind energy industry was estimated at $238 million in 2019 (Table 3). About $147 million was labor income from direct employment in the industry. The remainder, $90 million, is labor income associated with indirect and induced jobs supported by the wind energy industry's economic output. Labor income associated with wind farms was nearly $39 million while the remaining $200 million in labor income was from construction, manufacturing, and non-construction capital outlays (Table 3, Figure 6).

Value-added

This measure is analogous to gross state product or gross domestic product (GDP). This measure counts labor income, all taxes, and net operating surplus. This measure does not count the purchase of inputs (goods and services) used in the production of another good or service.

Value-added can be used to examine an economic sector or industry's contribution to gross state product. Value-added economic output for the wind energy industry was estimated at nearly $630 million (Table 3, Figure 6). The majority, about $485 million, is from direct effects related to firms in the wind energy industry, as opposed to those economic sectors that are supported by the wind industry. Those economic sectors collectively accounted for $144 million in value-added output to the state's economy.

Gross Output

Gross output is the total business volume generated by an industry and is equal to the sum of gross receipts in all economic sectors. The purchases of inputs used in the production of other goods and services is not included in gross output.

Gross output of the wind energy industry was estimated at $1.27 billion in 2019 (Table 3, Figure 6). This represents the exchange of dollars among businesses and from households to businesses. Nearly $1 billion of that value was from direct effects of the industry (Table 3, Figure 6). Wind farm operations sustained $391.6 million in business output in 2019. Business activity associated with manufacturing, construction, and non-construction capital outlays in 2019 was $870.6 million.

Table 3. Direct, Indirect, and Induced Economic Effects, Key Economic Metrics, All Segments, North Dakota Wind Energy Industry, 2019

Type of Economic Effect	Employment[1]	Labor Income	Value-added	Gross Output
ND Wind Energy Industry		---------- 000s 2019 $ ----------		
Direct	1,825	147,378.7	485,418.9	990,410.7
Indirect	815	53,370.3	82,919.3	160,920.3
Induced	780	36,806.2	61,143.2	114,734.3
Total	3,420	237,555.3	629,481.5	1,266,065.3

[1] Employment represents total jobs and does not represent employment in FTE.

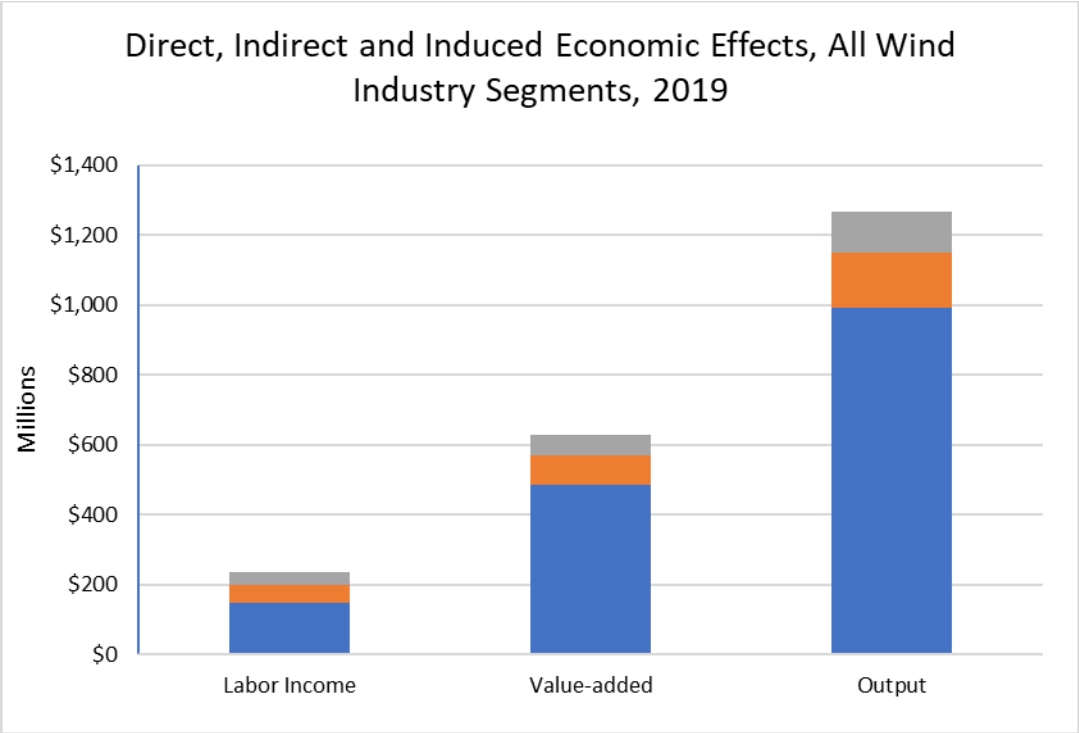

Figure 6. Direct, Indirect, and Induced Economic Effects, All Wind Industry Segments, 2019

Government Revenues

Much in the same manner that an industry creates and supports various types of employment, labor income, value-added output, and gross output, it creates revenue streams that accrue to state and local governments. As part of an input-output analysis for an economic contribution study, government revenues are measured based on jurisdiction, economic causality (i.e., indirect and induced), and type of government revenue.

Total government revenues directly attributed to the wind energy industry were estimated at $20 million in 2019 (Table 4). The $20 million in direct revenues includes $10.6 million in property taxes. Sales and corporate taxes, along with property tax paid on real estate other than wind generation facilities were estimated at $6.8 million. The additional business volume associated with indirect and induced economic effects was estimated to generate an additional $7 million in government revenues. The combination of direct taxes paid by the wind industry and government revenues from indirect and induced economic output was estimated at $27 million in 2019.

Table 4. State and Local Government Revenues, Wind Energy Industry, North Dakota, 2019			
Government Revenue	Paid Directly by the Industry	Collected from Indirect and Induced Economic Output	Total Collections
	---------- 000s 2019 $ ----------		
Wind Farm Property Tax (Ad Valorem valuation method)	2,726	---	2,726
Wind Farm Property Tax (Generation and Capacity valuation method)	7,846	---	7,846
Sales, Property, and Corporate Income taxes[1]	6,827	See below	6,827
Dividends	331	134	464
Social Insurance Tax	817	696	1,513
Personal Income	618	560	1,178
Sales Tax	See above	2,818	2,818
Property Tax	See above	1,715	1,715
Corporate Income	See above	157	157
Other Taxes	437	312	750
Non-Taxes	747	658	1,405
Totals	20,349	7,050	27,399

[1]Property tax in this grouping represents taxes paid on real estate other than wind generation facilities.

Effects by Economic Sector

Direct effects of the industry primarily affect the utilities, construction and manufacturing sectors in North Dakota. Indirect and induced economic effects, by contrast, are spread among most economic sectors in the state (Figures 7 through 12). Since wind farm maintenance and operation are usually contracted to firms specializing in those services, wind energy generation shows a considerably higher level of indirect effects in professional services than found in most other economic sectors. Consistent with the effects of household spending, most of the economic effects observed in the personal services sectors are induced economic effects.

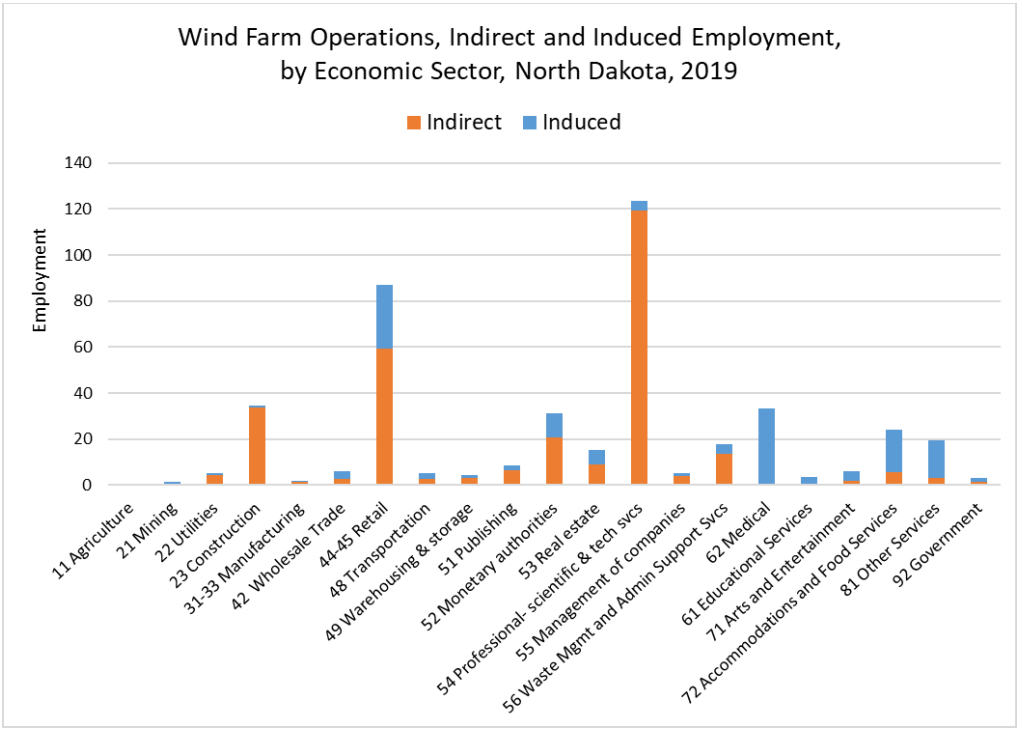

Figure 7. Wind Farm Operations, Indirect and Induced Employment, by Economic Sector, North Dakota, 2019

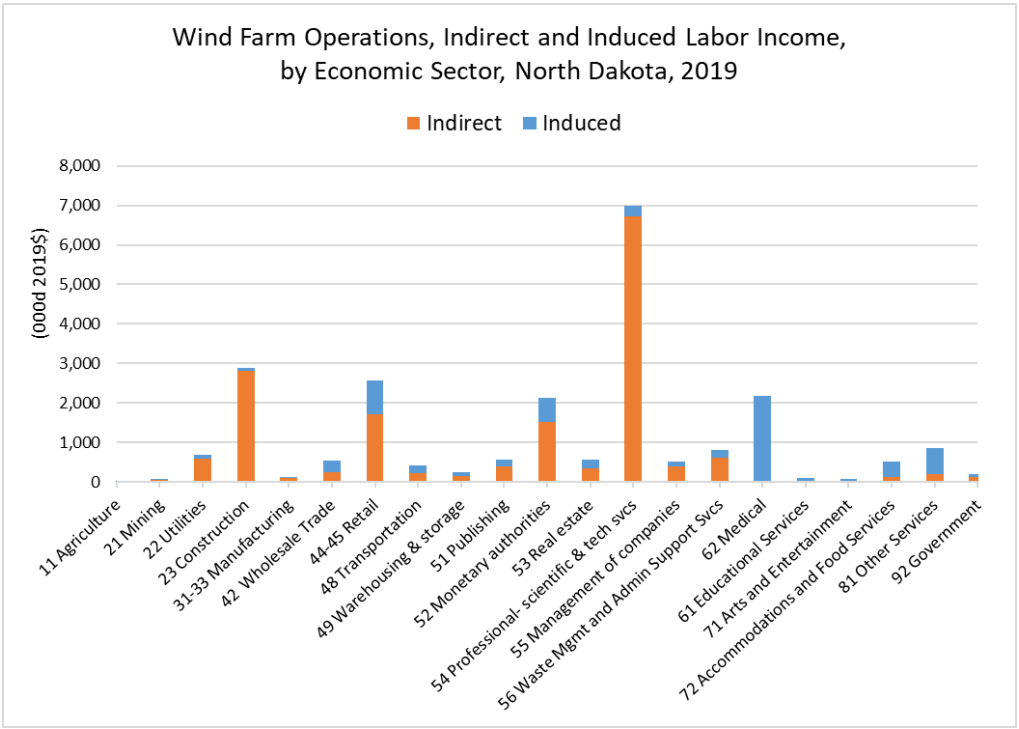

Figure 8. Wind Farm Operations, Indirect and Induced Labor Income, by Economic Sector, North Dakota, 2019

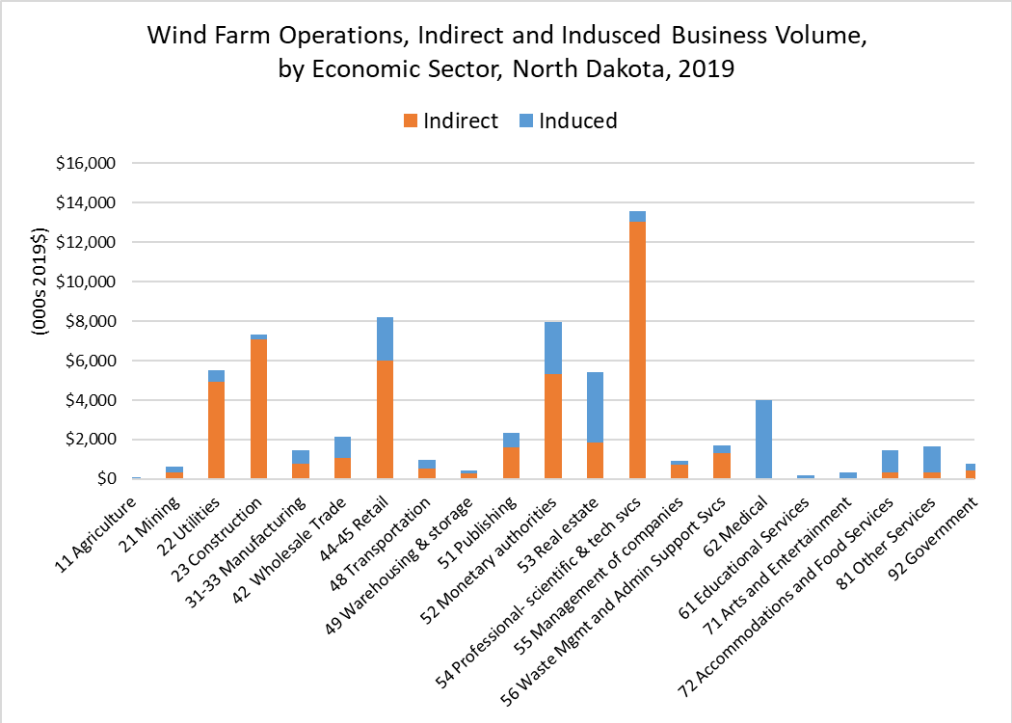

Figure 9. Wind Farm Operations, Indirect and Induced Business Volume, by Economic Sector, North Dakota, 2019

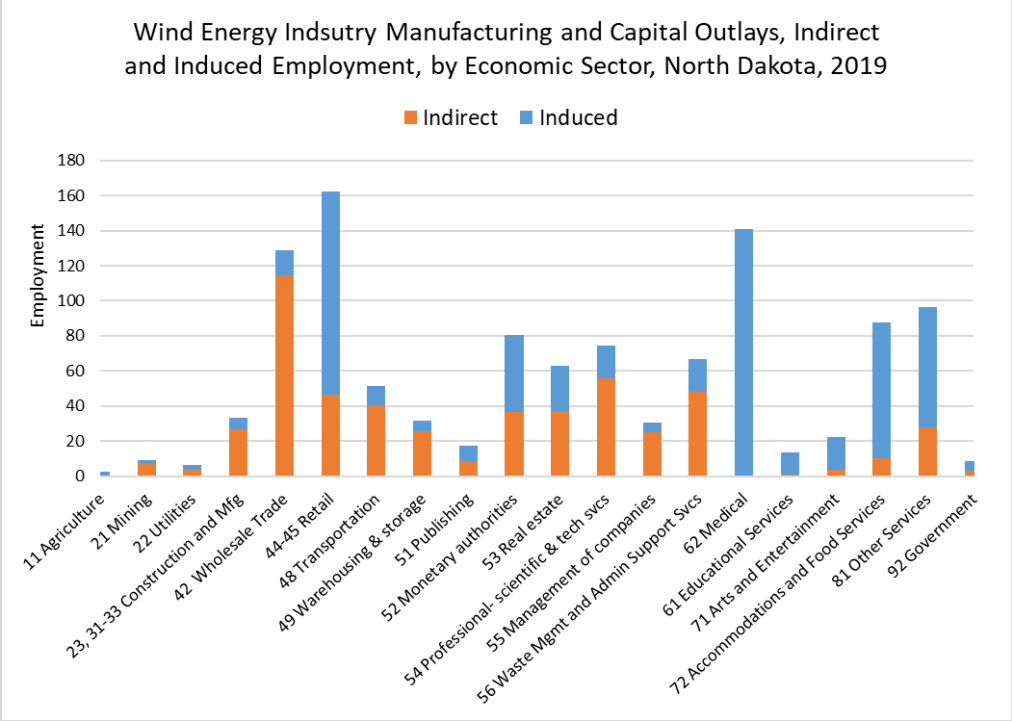

Figure 10. Wind Energy Industry Manufacturing and Capital Outlays, Indirect and Induced Employment, by Economic Sector, North Dakota, 2019

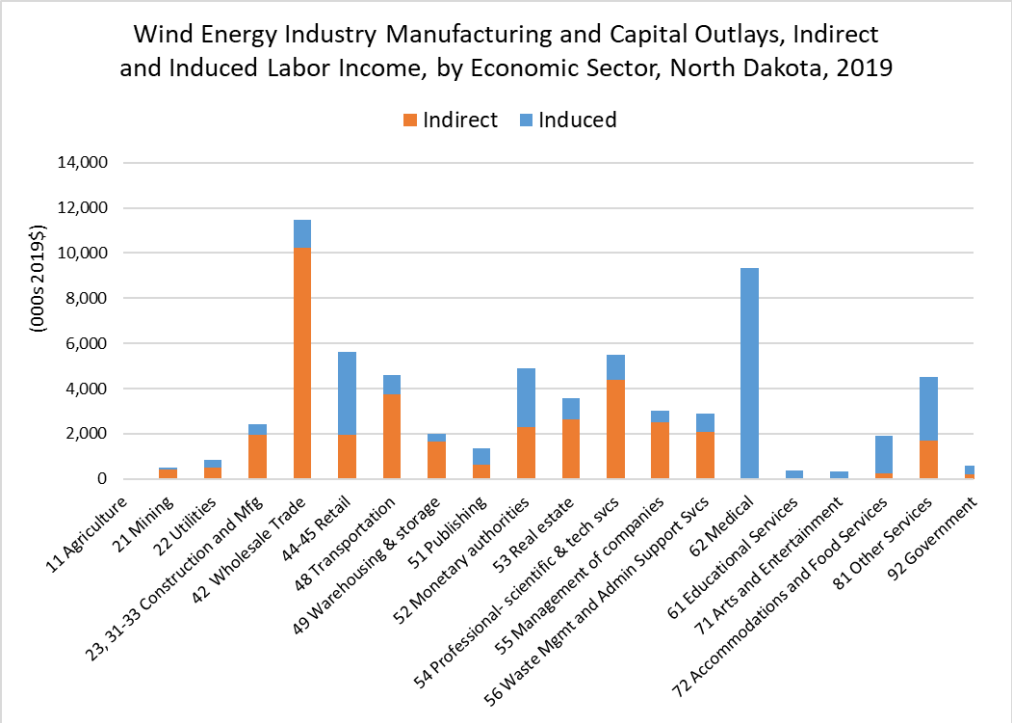

Figure 11. Wind Energy Industry Manufacturing and Capital Outlays, Indirect and Induced Labor Income, by Economic Sector, North Dakota, 2019

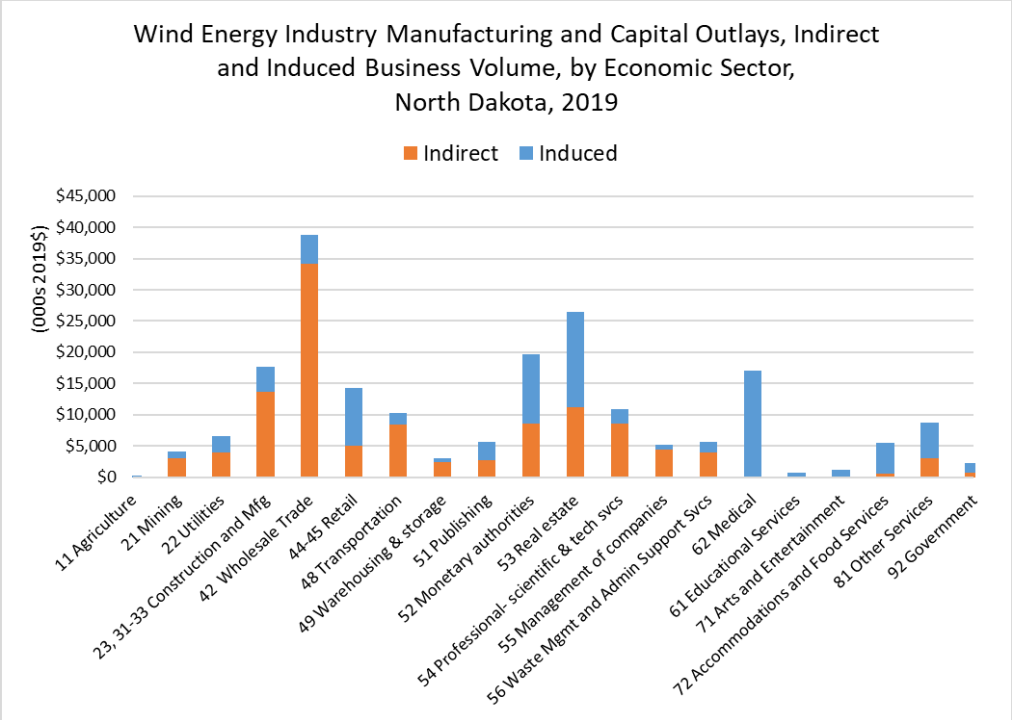

Figure 12. Wind Energy Industry Manufacturing and Capital Outlays, Indirect and Induced Business Volume, by Economic Sector, North Dakota, 2019

Property Tax Revenues and Land Lease Payments

Direct property taxes paid by wind farms have increased substantially since 2015. Taxes paid have nearly doubled increasing from $5.9 million in 2015 to $10.6 million in 2019. Total property taxes paid from 2015-2019 were $42.2 million and include both traditional ad valorem taxes and wind generation taxes (Table 5, Figure 13) (North Dakota Office of the State Tax Commissioner 2020a).

Table 5. Property Taxes Paid, Wind Farms, North Dakota, 2015-2019

Year	Ad Valorem	Wind Capacity and Generation	Total Property Tax
	---------- nominal $ ----------		
2015	4,232,656	1,730,037	5,962,693
2016	3,717,396	2,683,391	6,400,787
2017	3,534,304	5,175,554	8,709,857
2018	2,866,719	7,741,353	10,608,072
2019	2,726,251	7,846,120	10,572,386
2015-2019	17,077,326	25,176,470	42,253,796

Source: North Dakota Office of the State Tax Commissioner 2020a.

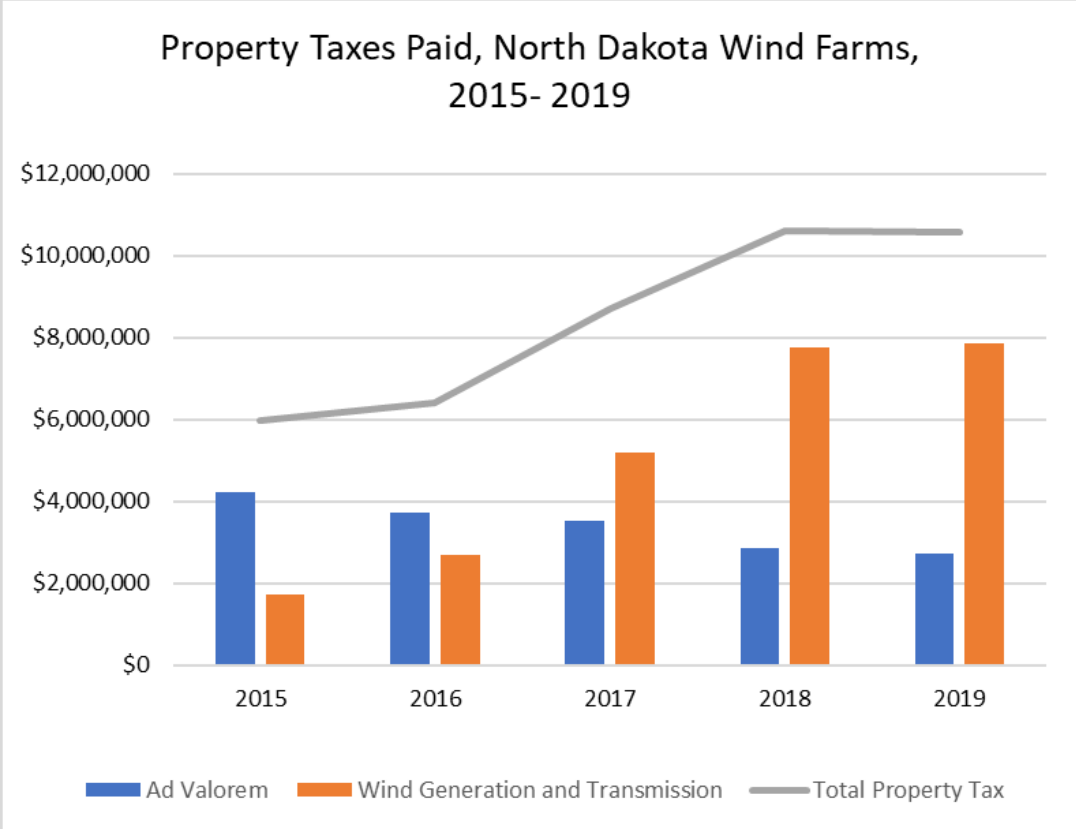

Figure 13. Property Taxes Paid, North Dakota Wind Farms, 2015-2019
Source: North Dakota Office of the State Tax Commissioner (2020a).

Property Taxes Collected by County

Naturally, counties with greater wind production received larger property tax payments from the Wind energy industry. Property taxes collected from 2015-2019 were greatest in Morton, Oliver, and Barnes counties, $6.9, $5.8 and $4.3 million, respectively (Table 6). Payments to most other counties with wind farms ranged from $1 to $3 million over the five-year period. In 2019 total property taxes paid to all wind producing counties was $10.5 million. Property taxes paid were greatest in Oliver, Morton, and Stark counties in 2019, $1.4, $1.3 and $1.0 respectively (Table 6). Payments to other wind producing counties in 2019 varied widely ranging from only $7,000 in Nelson County to $857,000 in Stutsman County. Property tax collections for all wind producing counties are detailed in Table 6. Additional property detail is contained in Appendix F.

Table 6. Property Tax Collections from Wind Farms, by County, North Dakota, 2015-2019

County	2015	2016	2017	2018	2019	Total 2015-2019
	---------- nominal $ ----------					
Morton	1,207,734	1,522,077	1212,774	1,611,181	1,340,647	6,894,412
Oliver	769,375	716,648	1,493,405	1,470,437	1,371,288	5,821,154
Barnes	1,032,938	891,959	853,303	795,148	702,358	4,275,706
Cavalier	654,441	590,505	560,154	527,219	658,811	2,991,130
Stark			562,092	874,104	1,033,860	2,470,056
Rolette		390,780	686,113	697,016	679,759	2,453,667
Burleigh	591,374	513,567	479,326	429,088	387,051	2,400,405
Stutsman			543,192	878,201	856,966	2,278,358
Ward	323,148	358,972	388,243	545,256	494,882	2,110,500
Adams		274,337	487,222	487,930	591,579	1,841,068
Hettinger			381,709	701,374	682,598	1,765,680
Griggs	447,036	359,723	313,214	286,230	235,410	1,641,613
Pierce	342,585	263,932	248,647	223,361	213,180	1,291,705
Williams				615,058	654,740	1,269,798
Dickey	222,844	204,293	199,400	196,803	166,992	990,332
Steele	152,778	132,356	127,915	119,433	104,920	637,402
LaMoure	125,449	110,233	99,070	84,014	64,960	483,725
McHenry	27,162	6,341	9,991	8,829	277,753	330,076
Bowman	62,077	61,664	56,985	50,823	47,629	279,178
Nelson	3,752	3,401	7,105	6,567	7,004	27,829
Total	5,962,693	6,400,787	8,709,857	10,608,072	10,572,386	42,253,796

Source: North Dakota Office of the State Tax Commissioner (2020b).

Property Tax Distribution by Political Subdivisions

Most property taxes on wind farms accrue to three political subdivisions in North Dakota: school districts, counties and cities (Table 7, Figure 14). School districts, counties, and cities received 45 percent, 36 percent, and 11 percent, respectively, of county-level property taxes and centrally assessed wind generation taxes in 2019.

The distribution of property taxes in counties with wind farms should not be confused with the amount of tax generated. The presence of a wind farm does not alter the "distribution percentages" of property taxes to political subdivisions. Rather the distribution of property taxes illustrate how total property taxes are allocated among all political subdivisions supported by property taxes. Distributions to various political subdivisions in wind producing counties was similar to distributions statewide.

Table 7. Average Property Tax Distributions, Wind Farm Counties and Statewide, North Dakota, 2019

Political Subdivision	Wind Farm Counties	Statewide
School District	45.36%	42.90%
Counties	36.30%	36.79%
Cities	10.51%	8.65%
Townships	4.32%	4.37%
City Park Districts	3.25%	2.59%
Rural Fire	1.77%	0.94%
Soil Conservation Districts	0.70%	0.79%
Rural Ambulance	0.60%	0.94%
State Government	0.49%	0.50%
Garrison Diversion District	0.25%	0.25%
SW Water Authority	0.18%	0.13%
Hospital Districts	0.11%	0.19%
Recreation Service Districts	0.00%	0.00%

Source: North Dakota Office of the State Tax Commissioner (2020b).

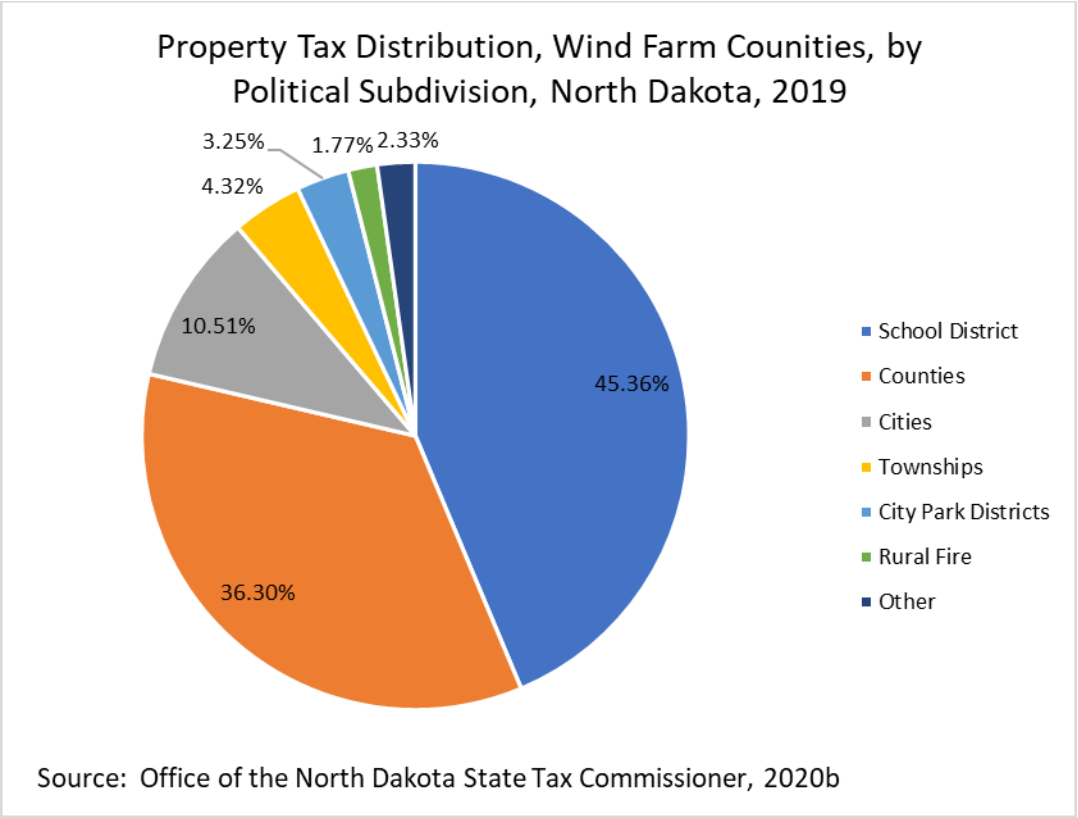

Figure 14. Property Tax Distributions for Wind Farm Counties, by Political Subdivision, North Dakota, 2019
Source: North Dakota Office of the State Tax Commissioner (2020b).

Total taxes paid to school districts, counties, and cities in 2019 was $4.7, $3.6 and $1.2 million, respectively (Table 8, Figure 15). Total taxes paid to township and all remaining other political subdivisions totaled $1.0 million (Table 8).

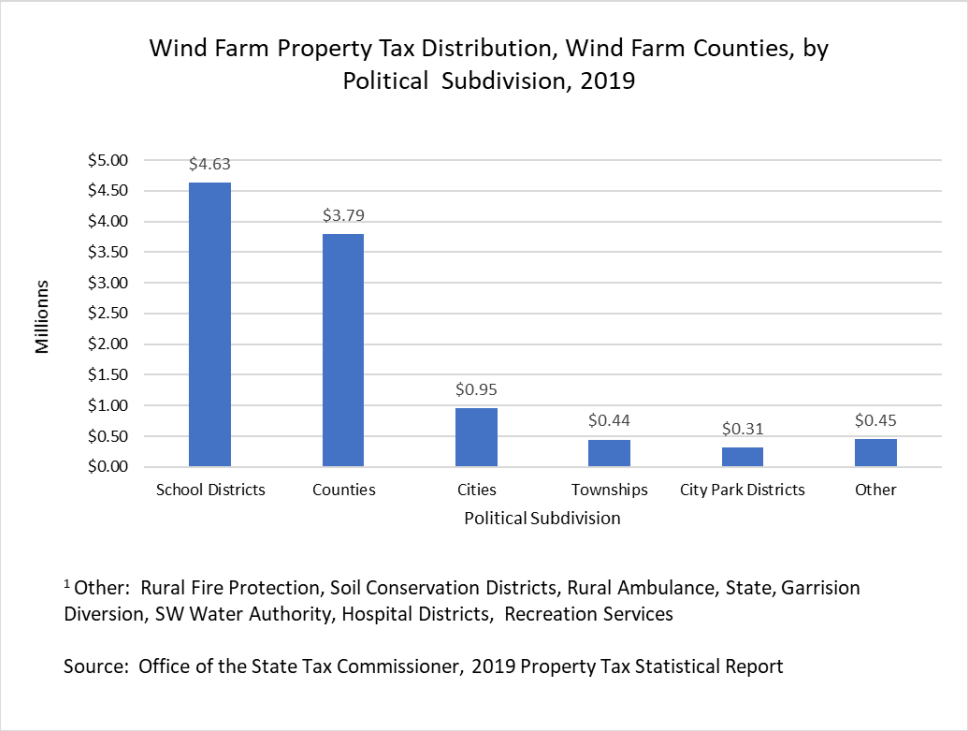

Figure 15. Wind Farm Property Tax Distribution, Wind Farm Counties, by Political Subdivision, 2019
Source: Office of the State Tax Commissioner, 2019 Property Tax Statistical Report

Table 8. Wind Farm Property Tax Distribution, by Political Subdivision, 2019

Political Subdivisions	Wind Farm Property Taxes
	----- 2019 $ ----
School Districts	4,629,523
Counties	3,788,650
Cities	949,787
Townships	442,352
City Park District	312,230
Fire Protection	203,167
Soil Conservation Districts	77,365
Rural Ambulance	72,745
State	49,857
Garrison Diversion	25,981
SW Water Authority	18,956
Hospital Districts	1,680
Recreation Service District	92
Total	10,572,386

Source: Office of the North Dakota State Tax Commissioner, 2019 Property Tax Statistical Report

Land Lease Payments

Wind Farms generally lease land from private landowners. The private landowners receive a payment for the use of that land in the form of a land lease payment. An important component of localized economic effects is the revenue distributed to landowners in the state. The survey of firms owning wind farms solicited information on payments made for land leases over the 2015-2019 period.

Total land lease payments increased from $12 million in 2015 to $19.3 million in 2019 (Figure 8, Table 9). Most (87 percent) of the land lease payments from 2015-2019 accrued to landowners that live in North Dakota. Of total land lease payment made in 2019, $17.2 of the $19.3 million were made to residents of North Dakota.

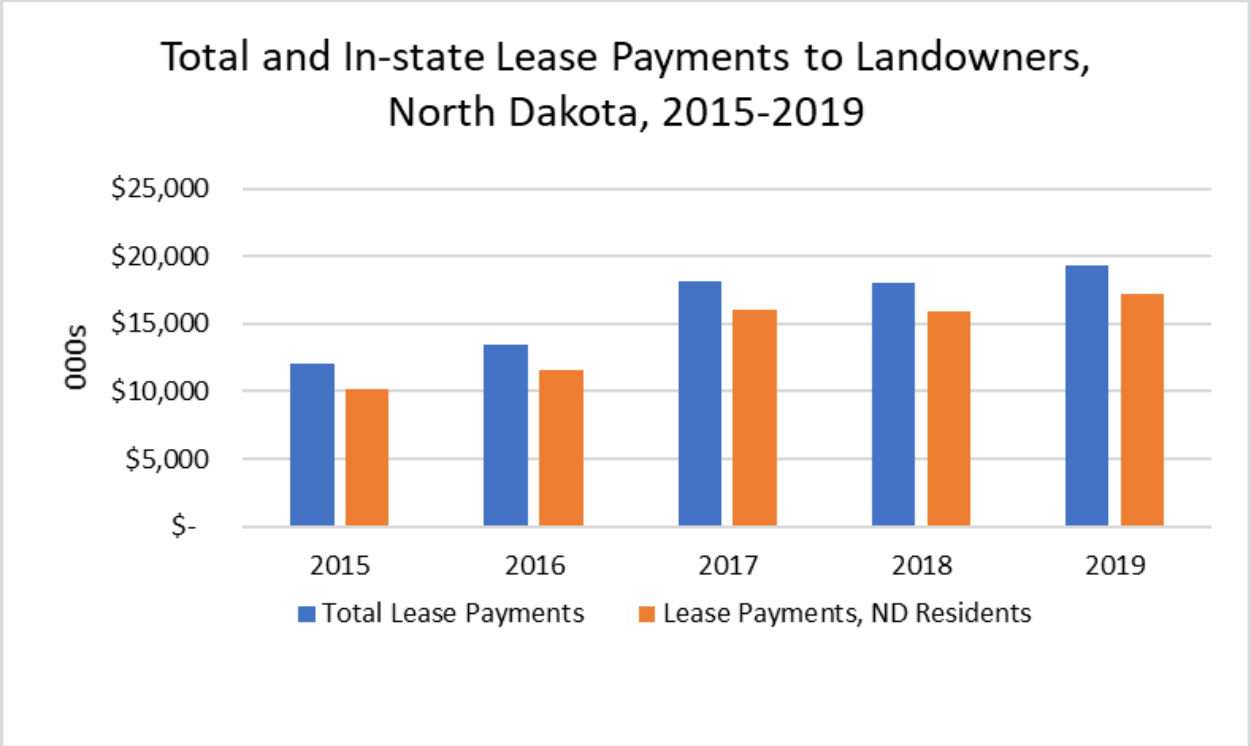

Figure 16. Total and In-state Lease Payment to Landowners, North Dakota, 2015-2019

Table 9. Landowner Lease Payments, North Dakota Wind Energy Industry, North Dakota, 2015- 2019					
Year	Total Paid, Survey Data	In-state Share	Total Paid, All Wind Farms	In-state Share	Total Paid In-state, All Wind Farms
	--- 000s $ --	-- % --	--- 000s $ --	-- % --	--- 000s $ --
2019	13,095	89.1	19,264	89.1	17,158
2018	12,220	88.3	17,976	88.3	15,880
2017	12,307	88.4	18,104	88.4	15,996
2016	9,124	85.8	13,422	85.8	11,522
2015	8,216	84.4	12,087	84.4	10,196

Conclusions

Much of North Dakota's economy is directly associated with the use and development of the region's natural resources—oil and gas, coal, agriculture, and tourism are all examples of natural resource-based industries in North Dakota. Wind, while not often mentioned as a natural resource, is being used to produce electricity in the state. Wind generated electricity represents a growing segment of the state's energy complex.

Wind energy generation capacity and production has increased substantially in the last decade. Wind energy generation capacity has grown to 3,600 megawatts since 2005 when the state's wind energy generation capacity was only 65 megawatts. Electricity produced from wind in North Dakota has increased from roughly zero percent in 2003 to 27.3 percent the state's total generating capacity in 2019.

The purpose of this report was to estimate the economic contribution of wind-generated electricity to the North Dakota economy. Wind energy affects the North Dakota economy through the manufacture, construction, and operation of wind generating facilities. A survey of wind farm owners collected information on sales, employment, employment compensation, total operational expenditures, and the share of those expenditures obtained from in-state sources, lease payments, capital outlays, and taxes paid in North Dakota. The survey data was extrapolated to represent state totals for the industry.

Operation of wind farms was estimated to have $320 million in sales of electricity in 2019. Of the total in sales, about $66.8 million represented in-state expenditures for wages and salaries, lease payments to landowners, taxes and acquisition of operating inputs. Indirect and induced economic effects from wind farm operations were estimated $46 million and $25.5 million, respectively. Direct jobs associated with wind farm operations, which is limited to those employment by the firms owning the wind farms, was estimated at 168 jobs. Indirect employment, which represents many jobs associated with maintaining and serving wind farms, was estimated at 293 jobs. Induced employment from wind farm operations was estimated at 175 jobs. Overall, wind farm operations supported 636 jobs. Capital expenditures for

purchases of capital equipment (e.g., vehicles) and repower activities were estimated independently from wind farm operations.

The wind energy industry makes payments to landowners in North Dakota through leases for wind farms. While payments to landowners were included in the estimate of the industry economic contribution, land lease payments were identified from 2015 through 2019 for illustrative purposes. Lease payments to landowners were estimated to be $19.3 million in 2019, of which, $17.2 million went to in-state landowners. Mirroring the expansion of wind farms in North Dakota, total lease payments were estimated at $12.1 million in 2015, with $10.2 million going to in-state land owners.

The Wind energy industry also comprises the manufacture of components for wind towers. Since that segment of the industry only represents one firm, the economic effects of manufacturing were combined with construction and other capital outlays.

The largest segment of the industry in previous economic assessments was the development or construction of new wind generating facilities. Five wind farms were estimated to be in some phase of construction during calendar year 2019. The direct effects from the construction of wind farms in 2019 and manufacturing of wind tower components was estimated $668 million. The overall economic contribution of those activities was estimated at $871 million. Direct employment associated with construction and manufacturing activities was estimated at 1,633 jobs. An additional 1,115 jobs were estimated to be supported through indirect and induced economic effects.

Capital outlays for activities other than construction were estimated at $2.3 million, and included repower activities and purchases of non-consumable production-related items (e.g., vehicles). The total economic contribution from those activities was estimated at $3.9 million and supported 35 jobs in the state.

Wind energy represents another element of the state's energy complex that creates jobs and uses the export of electricity to create additional business activity in the state. Wind generating capacity and output has continued to expand for over a decade in North Dakota. As of January 2020, an additional 450 megawatts of generation capacity was under construction with another 405 megawatts of generating capacity represented in pending permit applications (ND Public Service Commission 2020).

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Appendix A

Industry Questionnaire

NDSU AGRIBUSINESS AND APPLIED ECONOMICS

Economic Contribution of the Wind Energy Industry

Wind Farm Operations
2019

NDSU | CENTER FOR SOCIAL RESEARCH

Funding for this study is provided by **GA Group**

This survey is being conducted by the **Department of Agribusiness and Applied Economics** and the **Center for Social Research** at **NDSU**

Confidentiality

This is a confidential request -- only the immediate research team has access to this information, and the information is never shared with any interests during or after the study. A confidentiality agreement can be provided upon request.

Guidelines and Instructions

Please use the following guidelines.

1. Please provide information for 2019.

2. For firms with multiple locations in North Dakota, please combine all locations into one questionnaire or complete a separate questionnaire for each wind farm location.

3. When information is not available, please estimate.

4. Definitions for selected expenditure items are included to help in determine allocation of expenditures.

5. Please complete the survey by August 31, 2020.
   Please email the questionnaire to Dean Bangsund or you may mail the questionnaire to the postal address shown below.

Study Contacts

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Richard H. Barry Hall
Dept # 7610, PO Box 6050
North Dakota State University
Fargo, ND 58108-6050

Wind Farm Operations in 2019 in North Dakota

Company: _____

Wind Farm Location(s) _____

Contact Person: _____

Email: _____

Phone_____

General Characteristics in 2019	
Electricity Generating Capacity in ND (no. of wind towers x rated capacity)	MWh
Electricity Generated in ND	MWh
Sale of Electricity from Wind Farms in ND	$
Other revenues (please specify)	$
(please specify)	$

Payroll in North Dakota (do not include payroll associated with jobs outside ND)			
Jobs associated with operations, inspections, maintenance, testing, and repairs of Wind Farm Facilities	**Number**	**Wages and Salaries[1]**	**Benefits[2]**
Full-time jobs		**$**	**$**
Part-time and seasonal		**$**	**$**
Corporate, sales, managers, office and support positions (all positions excluding operation jobs listed above)	**Number**	**Wages and Salaries[1]**	**Benefits[2]**
Full-time jobs		**$**	**$**
Part-time and seasonal		**$**	**$**

General Operating Expenditures[3] *(North Dakota Operations Only)*	Total Expenses for ND Operations	Percentage paid to ND Entities[4]
Note: Values can be rounded to the nearest thousand dollars		
Example: Retail Purchases (Retail Trade sector)	**$15,000**	**85%**
Construction (please include construction-related expenses in the *Capital Expenditures* section)		
Utilities	**$**	**%**
Manufacturing	**$**	**%**
Wholesale Trade	**$**	**%**
Retail Trade	**$**	**%**
Transportation and Warehousing	**$**	**%**
Communication and Information	**$**	**%**
Finance and Insurance	**$**	**%**
Equipment, Building, and Vehicle Rental and Leasing	**$**	**%**
Land leases (report expenses in *Land Leasing* section)	--	--
Professional, Scientific, and Technical Services	**$**	**%**
Administrative, Support, Building, and Waste Services	**$**	**%**
Education and Training	**$**	**%**
Lodging, Dining, Beverage, Travel, and Entertainment	**$**	**%**
Contracted Services for Wind Farm Operation/Maintenance	**$**	**%**
Other expenses (please specify)	**$**	**%**
(please specify)	**$**	**%**
(please specify)	**$**	**%**
(please specify)	**$**	**%**
(please specify)	**$**	**%**
(please specify)	**$**	**%**
(please specify)	**$**	**%**
(please specify)	**$**	**%**

Capital Expenditures[5] *(North Dakota Capital Expenditures Only)*	**Acquisition for ND Operations**	**Percentage paid to ND Entities[4]**
Purchases of replacement equipment for wind farms (blades, tower components)	$	%
Purchases of other capital goods (e.g., vehicles, service equipment, buildings)	$	%
Construction of new wind farms	$	%
Construction and/or remodeling of office, commercial , and other buildings and facilities (excluding wind towers)	$	%
Others (please specify)	$	%
(please specify)	$	%
(please specify)	$	%

Land Lease Payments[6] *(North Dakota Land Lease Payments Only)*	**Total Payments for ND Wind Farms**	**Percentage paid to ND Entities[4]**
Payments in 2019	$	%
Payments in 2018	$	%
Payments in 2017	$	%
Payments in 2016	$	%
Payments in 2015	$	%

Taxes Paid in North Dakota in 2019 *(please exclude payroll taxes)*	
Property Tax	$
Generation Tax	$
Sales and Use	$
Corporate Income	$
Others (please specify)	$
(please specify)	$

[1]Wages, salaries, and bonuses for part-time, seasonal, and full-time employees. Any pensions paid to retired employees. Please exclude payroll benefits.

[2]Includes payments for health, dental, and vision insurance, retirement contributions, unemployment taxes, and Workforce Safety Insurance contributions.

[3]Operational expenditures can be rounded to the nearest thousand dollars. Definitions for the NAICS codes are listed at the end of the questionnaire.

[4]Estimate the percentage of expenditures made in North Dakota, or to North Dakota based firms and entities.

[5]Capital expenditures can be rounded to the nearest thousand dollars. Include all purchases of vehicles, equipment, towers, blades, and buildings. Do not include any land purchases.

[6]The study would like to show yearly and cumulative payments to landowners so we are requesting information for multiple years. Also, not all landowners live in ND so please estimate the share of land lease payments that are paid to ND entities or only payments that go to ND zip codes. These entities can be businesses, trusts, and individuals.

Thank You for completing this questionnaire

Study results will be available in late 2020. Please contact Edie Nelson in the Department of Agribusiness and Applied Economics at North Dakota State University for more information on our departmental reports. Phone 701-231 7441, fax 701-231-7400, email: ndsu.agribusiness@ndsu.edu or visit our departmental listing of research reports on the internet at http://agecon.lib.umn.edu

DEFINITIONS FOR EXPENDITURE CATEGORIES

The following definitions are derived from North American Industrial Classification System (NAICS). Please refer to the following web site for additional information: https://www.census.gov/programs-surveys/economic-census/guidance/understanding-naics.html#par_textimage_0

Utilities (NAICS code 22): Expenses for natural gas, electricity, water supply, and sanitary (sewer) services.

Manufacturing (NAICS codes 31-33): Expenses for on-site fabrication of processing components, contract manufacturing for items used in processing operations, and the rebuilding of machinery and equipment at plants or other commercial facilities. Note: please include purchases of wind blades and other wind-related machinery in the *Capital Expenditures* section.

Wholesale Trade (NAICS code 42): Expenses paid to establishments primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, or professional users; or to other wholesalers, or acting as agents in buying merchandise for or selling merchandise to such persons or companies.

Retail Trade (NAICS codes 44-45): Expenses for building materials, hardware, groceries, general merchandise, office supplies, automobile fuel, computers, work uniforms, and most other business and office-related supplies. Note: Purchases of vehicles, machinery, and related-equipment should be included in *Capital Expenditures* section.

Transportation and Warehousing (NAICS codes 48-49): Expenses for railroad, motor freight, water transportation, air transportation, and all packing and crating services.

Communications and Information (NAICS code 51): Expenditures for telephone, radio, television, satellite services, Internet service, and other communication services.

Finance and Insurance (NAICS code 52): Expenses for short-term and long-term loan service and interest, brokerage fees, and any other financial service expenditures. Insurance for property, liability, business interruption, and vehicles. Insurance associated with employees and payroll (e.g., worker's compensation) should be included in payroll benefits.

Equipment, Building, and Vehicle Rental and Leasing (NAICS code 53): Expenditures for real estate brokers, appraisers, and vehicle, machinery, and equipment rental and/or leasing. Note: please include land lease payments in *Land Lease* section of the questionnaire.

Professional, Scientific, and Technical Services (NAICS code 54): Includes legal, accounting, tax, engineering, advertising, public relations, and computer support services.

Administrative, Support, Building, and Waste Services (NAICS code 56): Includes facilities upkeep, janitorial, landscaping, payroll services, photocopying and duplication services, brochure and document printing, and garbage collection.

Education (NAICS code 61): Expenditures for safety training and vocational education of employees.

Lodging, Dining, Beverage, Travel, and Entertainment (NAICS codes 71-72): Expenditures for motel/hotel, business travel arrangements, meals and dining, liquor and beverage, catering, golf outings, entertainers, and any other entertainment expenses associated with corporate activities.

Other Services (NAICS code 81): Expenditures for repairing vehicles, computers, office equipment, and buildings; expenses for civic, social, political, and business organizations and associations; and donations, grants, and outlays to non-profits, communities, and other local government jurisdictions.

Appendix B

Summary of Industry Survey Data

Appendix Table B1. Aggregated and Extrapolated Survey Data of Wind Farm Operations, North Dakota, 2019							
Survey Sections and Items	**Source**	**Metric**	**Total from Survey Responses**	**In-state %**	**Extrapolation to Entire Industry in ND**	**In-state %**	**Final In-State for Wind Operations**
Estimate of Capacity	PSC/survey	MW	2,449	---		---	3,602.82
Estimate of Capacity	PSC/survey	MWh	21,454,116	---		---	31,560,703.2
Share of State	PSC/survey	%	68.0%	---			
Extrapolation Factor	calculation	number	1.471079172	---			
General Characteristics							
Electricity Generating Capacity	survey	MW	2,449.1	---	3,602.82	---	3,602.82
Electricity Generated in ND	survey	MWh	7,892,062.0	---	31,560,703.2	---	31,560,703.2
Sale of Electricity from Wind Farms in ND	survey	$	$217,347,560	---	$319,735,469	---	$319,735,469
Other revenues (please specify)	survey	$	$90,526,000	---	$133,170,913	---	$133,170,913
(please specify)	survey	$	$189,000	---	$278,034	---	$278,034
Utilization Rate and Key Metrics	calculation	%	36.8%	---	36.8%	---	36.8%
Gross Revenue per MW capacity	calculation	$/MW	$88,746	---	$88,746	---	$88,746
Gross Revenue per MWh generated	calculation	$/MWh	$27.54	---	$27.54	---	$27.54
Jobs per MW	calculation	jobs/MW	0.0445	---	0.0445	---	0.0445
MW per Job	calculation	MW/job	22.5	---	22.5	---	22.5
Jobs associated with wind farm operations, inspections, maintenance, testing							
Full-time jobs	survey	jobs	109.0	100.0	160.3	100.0	160.3
Wages/Salaries	survey	$	$7,359,769	100.0	$10,826,802	100.0	$10,826,802
Benefits	survey	$	$1,610,727	100.0	$2,369,507	100.0	$2,369,507
	calculation	$/job	$67,521	100.0	$67,521	100.0	$67,521

	calculation	$/job	$14,777	100.0	$14,777	100.0	$14,777
	calculation	$/job	$82,298	100.0	$82,298	100.0	$82,298
Part-time and seasonal	survey	jobs	0.0				
Wages/Salaries	survey	$	$0				
Benefits	survey	$	$0				
Jobs associated with corporate, sales, managers, office and support positions							
Full-time jobs	survey	jobs	5.0	100.0	7.4	100.0	7.4
Wages/Salaries	survey	$	$455,000	100.0	$669,341	100.0	$669,341
Benefits	survey	$	$200,000	100.0	$294,216	100.0	$294,216
	calculation	$/job	$91,000	100.0	$91,000	100.0	$91,000
	calculation	$/job	$40,000	100.0	$40,000	100.0	$40,000
	calculation	$/job	$131,000	100.0	$131,000	100.0	$131,000
Part-time and seasonal	survey	jobs	0.0				
Wages/Salaries	survey	$	$0				
Benefits	survey	$	$0				
General Operating Expenditures							
Construction (separate section)							
Utilities	survey	$	$1,884,480	100.0	$2,772,220	100.0	$2,772,220
Manufacturing	survey	$	$400,000	25.0	$588,432	25.0	$147,108
Wholesale Trade	survey	$	$321,311	18.0	$472,673	18.0	$85,081
Retail Trade	survey	$	$4,548,500	50.2	$6,691,203	50.2	$3,361,886
Transportation and Warehousing	survey	$	$73,692	36.1	$108,407	36.1	$39,131
Communication and Information	survey	$	$252,176	44.8	$370,971	44.8	$166,232
Finance and Insurance	survey	$	$3,048,369	75.5	$4,484,392	75.5	$3,383,482
Equipment, Building, and Vehicle Rental and Leasing	survey	$	$267,886	62.0	$394,081	62.0	$244,165
Land leases (separate section)							

Professional, Scientific, and Technical Services	survey	$	$1,842,908	33.3	$2,711,064	33.3	$902,125
Administrative, Support, Building, and Waste Services	survey	$	$684,529	99.2	$1,006,996	99.2	$998,736
Education and Training	survey	$	$63,225	22.8	$93,009	22.8	$21,208
Lodging, Dining, Beverage, Travel, and Entertainment	survey	$	$47,362	75.2	$69,673	75.2	$52,386
Contracted Services for Wind Farm Operation/Maintenance	survey	$	$21,731,843	35.5	$31,969,262	35.5	$11,358,980
Other expenses (please specify) Donations	survey	$	$6,000	100.0	$8,826	100.0	$8,826
(please specify) vehicle maintenance	survey	$	$200	100.0	$294	100.0	$294
(please specify) asset management	survey	$	$1,917,000	35.5	$2,820,059	35.5	$1,000,334
(please specify) inter-connect	survey	$	$415,000	40.0	$610,498	40.0	$244,199
Capital Expenditures							
Purchases of replacement equipment for wind farms (blades, tower	survey	$	$8,561,000	5.0	xxx		$424,960
Purchases of other capital goods (e.g., vehicles, service equipment	survey	$	$73,000	68.5	xxx		$50,000
Construction of new wind farms	survey	$	$456,000,000	11.1	xxx		separate analysis
Construction and/or remodeling of office, commercial , and other building	survey	$	$2,000,000	0.0	xxx		$0
Others (please specify)		$					
Land Lease Payments							
Payments in 2019	survey	$	$13,095,019	89.1	$19,263,810	89.1	$17,158,164
Payments in 2018	survey	$	$12,219,640	88.3	$17,976,057	88.3	$15,880,428
Payments in 2017	survey	$	$12,306,791	88.4	$18,104,264	88.4	$15,996,287
Payments in 2016	survey	$	$9,123,774	85.8	$13,421,794	85.8	$11,521,827
Payments in 2015	survey	$	$8,216,479	84.4	$12,087,091	84.4	$10,196,229

Taxes Paid in North Dakota in 2019							
Property Tax	survey	$	$5,533,921	100.0	$8,140,836	100.0	Separate analysis
Generation Tax	survey	$	$1,799,830	100.0	$2,647,692	100.0	Separate analysis
Sales and Use	survey	$	$34,365	100.0	$50,554	100.0	$50,554
Corporate Income	survey	$	$21,000	100.0	$30,893	100.0	$30,893
(please specify) real property tax	survey	$	$4,700	100.0	$6,914	100.0	$6,914

Appendix C

Economic Impact Modeling

Overview

Economic impact and contribution assessments measure the economic activity from a project, program, policy, or activity. Economic activity is categorized into direct and secondary impacts. Direct impacts are those changes in output, employment, or income that represent the initial or first-round effects of a project, program, or event. Secondary impacts result from subsequent rounds of spending and re-spending within an economy.

Direct economic impacts are usually measured as injections (or reductions) of money into a specified economy. Direct impacts therefore represent inputs into an economic model to trace linkages among sectors of an economy and calculate various forms of business activity resulting from a direct impact in an economic sector.

Input-Output Analysis

Input-output analysis is a mathematical representation of the production and consumption of goods and services within a given economy. The basic premise to input-output modeling can be traced to economic base theory, or the understanding that a given economy is comprised of both 1) economic sectors or industries which produce goods/services for export outside the economy (basic sectors) and 2) economic sectors which produce goods/services within the economy for use by those exporting industries (non-basic sector). However, most current I-O modeling platforms do not limit economic activity in non-basic sectors to be driven or determined entirely by basic sector output.

Input-output analysis is premised on the notion of inter-industry transactions, where industries use products/services from other industries to generate their output, and outputs from one industry usually represent inputs to another industry. The basis for the interdependence (linkages) within input-output analysis between consuming and producing industries forms the foundation for development of multiplier effects. Multiplier effects can then be used to estimate how initial changes in economic activity result in economy-wide changes in a given area and represent the core component of input-output analysis.

While input-output analysis is a popular methodology used by a host of different stakeholders, the methodology has a number of fundamental assumptions or limitations. Key assumptions in input-output methodologies include 1) the economy is in equilibrium, 2) any expansion or contraction is linear, constant, and fixed, 3) no price and substitution effects, and 4) no supply constraints. This means that I-O models are a static representation of an economy and do not provide for dynamic adjustments that are likely to occur in an economy, especially those relating to large, fundamental changes in the size or structure of an area's key industries.

Since I-O models are widely available and used, output from those models is often accepted without much scrutiny. Despite development and use of other modeling processes (e.g., general equilibrium models) to mitigate the limitations and shortcomings of I-O modeling, I-O analysis remains the most widely used approach to conducting economic impact and contribution assessments.

Types of Economic Evaluations

Input-Output analysis provides a tool for economists to perform ***economic impact*** and ***economic contribution*** analyses. These analyses can be applied to programs, projects, developments, industries,

and other economic activities. Key macro-economic indicators such as retail trade activity, employment compensation, labor income, value-added output, total business activity, secondary economic business activity (indirect and induced), selected government tax collections, and secondary (indirect and induced) employment can be estimated using input-output analysis.

Economic impact analysis estimates the change in key economic indicators resulting from the 'new' dollars (either gained or lost) from a specific project or development within a given economy. An economic impact analysis measures the net effect of two possible situations–often these situations would be the presence or absence of some type of economic activity, development, or program. Measures of the business activity generated in secondary industries are included in economic impact figures.

Economic contribution analysis differs in that it includes all relevant revenues and expenditures in the generation of the amount of economic activity created in an economic unit. Economic contribution analyses attempt to capture all economic activity without regard to the net change or value of alternative economic activities; therefore, economic contribution assessments provide measures of the gross effects. Typically, an economic contribution analysis will show more economic activity than found in an economic impact study for the same industry or activity. Measures of the business activity generated in secondary industries are included in economic contribution figures.

Key Definitions

Direct Economic Effects: Direct economic effects represent the first-round of payments for services, labor, and materials. Direct effects can be interpreted to represent jobs, labor income, and business activity that comprise the Agriculture Industry.

Indirect Economic Effects: Indirect economic effects arise from the additional consumption of goods and services triggered by businesses that supply inputs to firms in a given sector/industry. Indirect effects can be interpreted as the additional economic activity created through purchases by businesses.

Induced Economic Effects: Induced economic effects arise from the additional spending by households from changes in personal income associated with direct effects and indirect effects. Changes in personal income can come from payrolls of businesses that are directly impacted, changes in payroll from businesses that supply goods and services to an impacted sector (induced effects), and proprietor income resulting from a change in business volume. Induced effects measure the additional business activity that is triggered as changes in personal income are translated into the purchase of goods and services for personal consumption.

Value-added Effects: Value-added economic activity is a measure of the payment to labor and capital, and includes labor income, business taxes, and business/proprietor income (profit). This economic effect is sometimes referred to a measure of the value that is added to purchased inputs by a business or industry, and is analogous to gross state product. The use or consumption of goods and services in the production of another good or service is not included in value-added measures.

Total Economic Output: Total output is a measure of the business activity created by summing direct economic effects, indirect economic effects, and induced economic effects. This economic

measure is sometimes called gross business volume. Total output therefore represents the sum of gross receipts of all economic sectors.

Employment and Employment Compensation: Employment is perhaps one of the most important economic measures associated with impact and contribution assessments. Direct employment represents the jobs employed by the business or economic sector for which the activity or event is being modeled. I-O analysis also estimates employment associated with indirect and induced economic effects. Changes in employment compensation include wages, salaries, and employment benefits linked to changes in employment levels.

Government Revenue: Changes in revenues to state and local governments are another important measure in most contribution studies. I-O models estimate changes in selected government revenues such personal income, sales and use, corporate income, severance, and property taxes, and a variety of miscellaneous revenues such as permits, fees, licenses, and dividends. Government revenues are not generally additive to economic effects, as most government revenues are either imputed internally or directly comprise a component of an industry balance sheet.

Selection of Input-output Model

The Department of Agribusiness and Applied Economics at NDSU developed an I-O model for North Dakota back in the 1960s and it was an important economic tool examining energy development projects in the state during the 1970s. The basic data for the model came from surveys of firms and businesses in the state, and key economic statistics included a corresponding data set defining state-level net exports (economic base and export-based sales to final demand), employment productivity ratios, and tax coefficients. The model and supporting economic data were widely-used for examining economic impact and economic contribution effects in the region. Maintenance and use of the North Dakota Input-output Model was suspended in 2018 as personnel and resources were no longer available to support the model. This prompted the impact assessment research team, spearheaded jointly by Dean Bangsund, Department of Agribusiness and Applied Economics, and Dr. Nancy Hodur, Director, Center for Social Research, to devise a new modeling platform.

A number of commonly used input-output models are available for conducting impact assessments for North Dakota. Publicly available models include RIMS II (Regional Input-Output Modeling System), IMPLAN (Impact Analysis for Planning), REMI (Regional Economic Models Inc.), and EMSI Analytics (Economic Modeling Specialists). There are other commercial models that are 1) not available for state-level analysis (e.g., REdyn, which combines I-O factors with CGE processes but is only used for the U.S. national economy), 2) specialize in fiscal effects and do not provide the same degree of impact assessment as the more common I-O models (e.g., LOCI, which only examines government costs of various types of impacts), and 3) built with varying degrees of sophistication primarily targeting subject-matter issues (e.g., JEDI-NREL that examines some economic impacts of constructing and/or operating energy-based facilities).

REMI was considered the best option from an empirical capacity, but the cost of acquiring the model and subscribing to annual baseline data was prohibitive. RIMs II is inexpensive, but the analytical capacity is substantially limited, and does not have any baseline or supporting data sets. IMPLAN was chosen as the modeling system since it is supported with detailed baseline data and cost was not prohibitive.

IMPLAN

IMPLAN modeling system is a popular input-output methodology because of its flexibility and customizability for structuring economic scenarios and ease of access to key data sets used in the modeling process (IMPLAN Group LLC 2020). IMPLAN can be structured to evaluate economic effects through a number of model operations. Those operations range from a change in sales for an entire industry to personal spending patterns for households with a specific income level. The flexibility to structure an assessment using multiple economic criteria, along with customization of baseline data, allow IMPLAN to be tailored to most economic conditions.

IMPLAN modeling system uses a variety of data sets to construct the I-O model. In general, those data sets begin with federal data, work through regional and state-level economic statistics, and if available, attempt to combine information for counties or other smaller geographic units. [see www.implan.com for more detail regarding data sets used to construct the model]. Some of the key data sets for IMPLAN include the following:

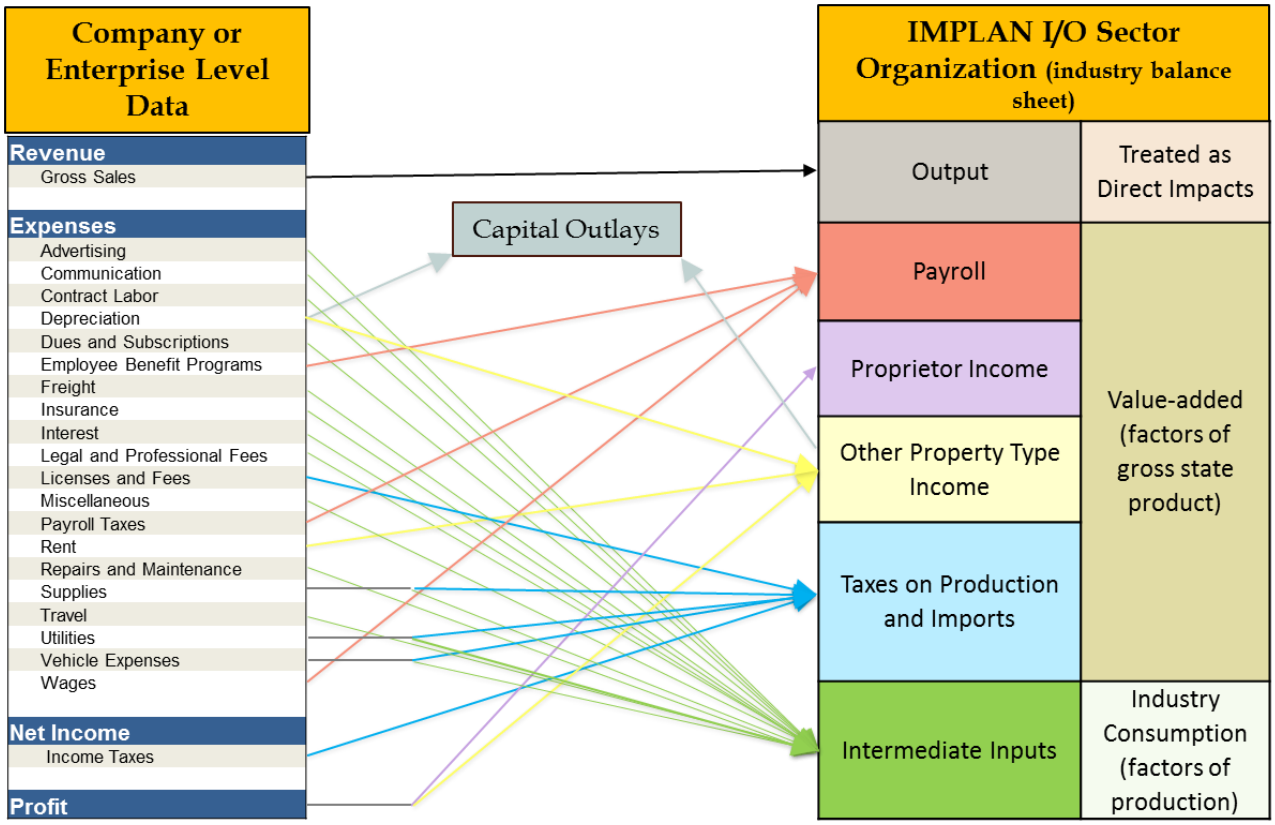
-) U.S. Bureau of Labor Statistics Covered Employment and Wages (ES202)

-) Bureau of Economic Analysis Benchmark I/O Accounts of the U.S. and Output Estimates
-) U.S. Census Bureau's Program and Consumer Expenditure Survey, County Business Patterns, Decennial Census and Population Surveys, Censuses and Surveys
-) U.S. Department of Agriculture National Agricultural Statistics Service
-) U.S. Geological Survey
-) Information is also collected on military and non-military federal activities, railroads, personal consumption patterns based on various income levels, local and state tax collections, state and local government purchases and expenditures, and transfers among inter-institutional entities.

IMPLAN modeling system is a widely used and well-recognized source of economic data—this process is desirable because it allows for consistency and compatibility across regional, state, and sub-state economies. However, not all industries within all economies are accurately represented using federal, state, and local secondary data in combination with IMPLAN baseline data generation techniques (Downes 2012, Booz Allen Hamilton 2008). To address potential problems, IMPLAN has built flexibility into the modeling system so that local or other primary data can be substituted for default values within the model.

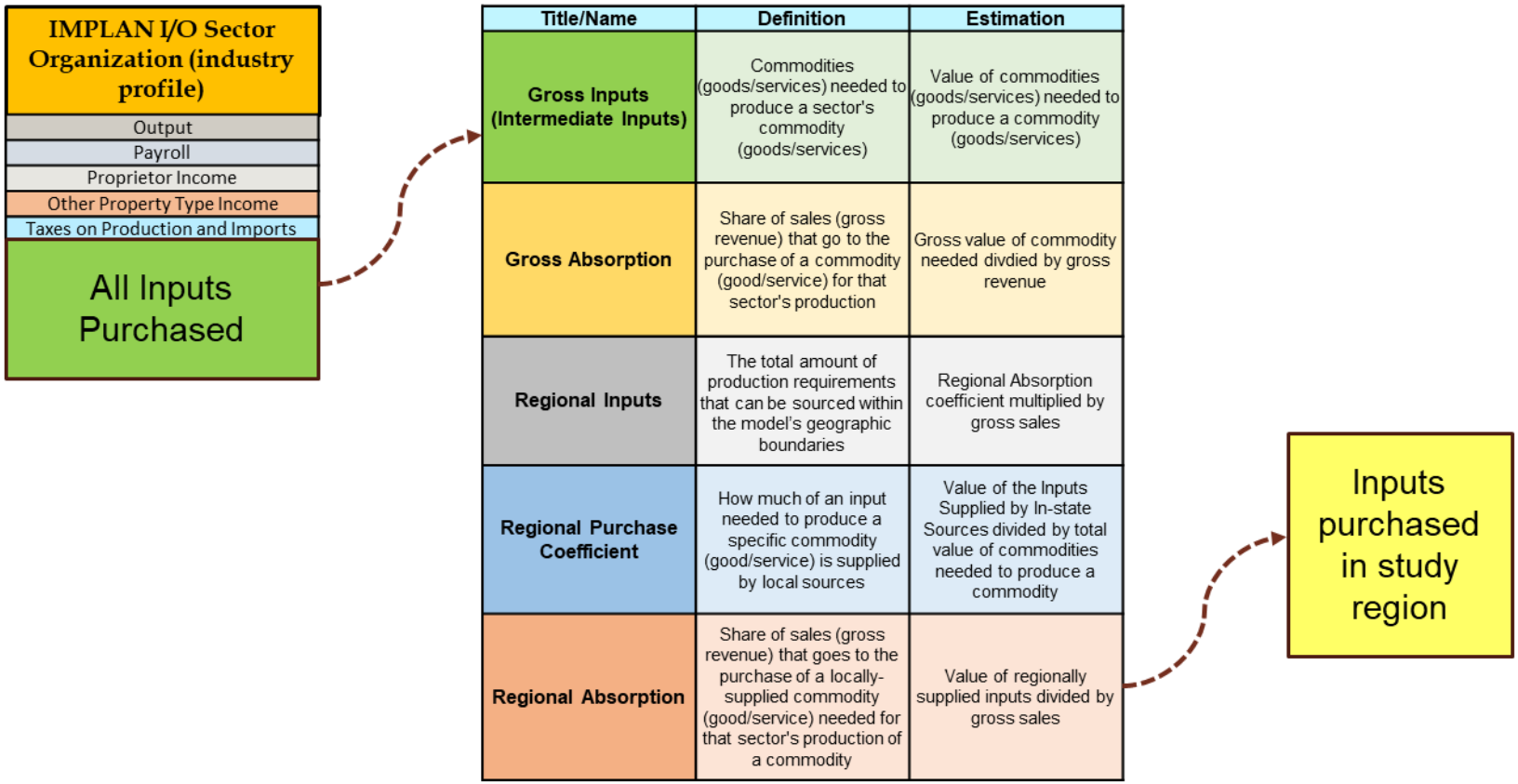
IMPLAN's Industry Structure

IMPLAN organizes financial information for industries in a manner different from traditional enterprise budgets or income statements.



General Transposition of Financial Information into IMPLAN Economic Sector Profiles

Source: DA Bangsund, Department of Agribusiness and Applied Economics, NDSU



Adjusting Gross Purchases of Inputs to Share of Inputs Purchased within a Study Region through IMPLAN Economic Sector Profiles

Source: DA Bangsund, Department of Agribusiness and Applied Economics, NDSU

IMPLAN Mapping

IMPLAN uses a variety of mechanisms, or economic triggers, to introduce a direct impact into a specified economy. Using a variety of mechanisms is one of the key attributes of the model that provides substantial flexibility in tailoring assessments to match expected economic activity.

An ***Industry Change*** represents adjusting the demand for the goods and services produced by an economic sector by varying that sector's revenue. Within this context, changes in sector gross revenues automatically result in changes in required labor, goods and services used to produce the sector's output (intermediate inputs), taxes on production and inputs (e.g., sales tax, property tax), and sector income. After setting the level of revenue change for an economic sector, IMPLAN allows custom values for employment, employment compensation, and sector income to be entered if default values are not desired.

Industry Spending Patterns can be used to change an economic sector's use of intermediate inputs without triggering changes in revenues, labor expenses or requirements, or sector income. The specific input is the sum of the total expenses that are expected to be purchased by that economic sector.

Labor Income Change is not specific to an economic sector, rather it introduces an increase in the payment for labor inputs within an economy. This approach also by-passes the need to change other aspects of an industry's balance sheet to achieve a change in labor income; however, the *Labor Income Change* requires a manual (i.e., calculated outside of the IMPLAN model) estimate of the change in direct employment based on assumptions for payroll expenses per job.

Household Income Change is used when personal spending capacity within an economy is increased, but there is not necessarily any direct link to output changes in any particular economic sector or when personal spending capacity is not directly linked to changes in labor income. These types of changes in household income might be represented by income from royalties, trusts, easements, gifts, inheritances, lotteries, and social transfer payments.

Institutional Spending Patterns are used to estimate how changes in public sector revenues influence the consumption of goods and services by government entities, educational institutions, non-profits and other non-governmental organizations. *Institutional Spending Patterns* also provide options for use of household spending patterns by income levels, which can be used to approximate the consumption of goods and services by households.

IMPLAN Fiscal Analysis Methodology

IMPLAN estimates fiscal impacts by examining total government revenues from a variety of data sources. The model then estimates the share of government revenues based on the individual source of revenue (e.g., sales tax, income tax, severance tax, fees, and licenses). IMPLAN compares total government revenues, from all sources, with total industry output from all sectors in the economy. That process produces an estimate of tax revenue per unit of average industry output (e.g., gross sales, state gross product). The model does not estimate tax collections stemming from individual economic sectors or industries. Therefore, to estimate the fiscal impacts of a project, program, or activity, IMPLAN estimates the change in economy-wide business output, and then estimates the fiscal effects by multiplying that change in business output by the ratio of government revenues to economy-wide output. This process produces a direct relationship between expected new government revenues and a change in industrial or economic output.

Shortcomings and limitations of IMPLAN's fiscal impact methodology in North Dakota include:

A. IMPLANs fiscal impact methodology is locked on the premise that all government revenues are intrinsically linked to changes in economy-wide economic output. This relationship is embedded within IMPLANs default tax ratios and leads IMPLAN to generate large changes in some tax revenues even when direct causation is not contained in the economic assessment (i.e., without linking an economic impact to a specific change in a tax base or tax rate, or linking tax revenues on a per-sector basis). For some tax revenues, such as severance taxes, that methodology produces erroneous estimates. For other tax revenues, general economic output is a reasonable proxy for estimated changes in tax revenues.

B. IMPLAN's fiscal impact methodology cannot be adjusted internally to reflect state rules and stipulations affecting the specific taxes relating to unique conditions or special treatment that adjusts the tax base or tax rate.

IMPLAN Fiscal Data Sources and Treatment of Tax Data

The following discussion of data sources is provided by IMPLAN Group LLC (2020).

IMPLAN's tax impact report values are based on the existing relationships of the data found in the IMPLAN database. The sources for these data are listed below, followed by a description of each data element in the tax impact report.

- **NIPA Tables.** All items in the IMPLAN data sets are ultimately controlled to the U.S. level values from the Bureau of Economic Analysis' (BEA) National Income and Product Accounts (NIPA). Section 3 of the NIPA tables covers Government Current Receipts and Expenditures.

- **Consumer Expenditure Survey (CES).** The U.S. Census Bureau through the Consumer Expenditure Survey annually conducts surveys and daily samplings of household expenditure patterns. The survey data are reported for nine different categories of household income, which we control to the NIPA's Personal Consumption Expenditure (PCE) totals (which are not split out by income category). From these data, we can establish the tax-to-income relationships for the nine different household income categories. It is based on these relationships that we can distribute many of the national-level tax data to states and state-level tax data to counties,

using the number of households in each of the nine household categories in the state or county.

- **Annual Survey of State and Local Government Finances (SLGF).** The U.S. Census Bureau also collects annual State/Local Government receipts and expenditures data. These data act as preliminary controls for state-level values (subject to controlling to the national NIPA values). These data also provide the proportional split of the Tax on Production and Inputs (TOPI) value amongst the various types (sales, property, etc.). The actual value of total TOPI (at the state level) comes from the BEA's REA series.
    - The annual survey also provides local government collections by tax type. These data are used to estimate, for the total state/local tax receipts, the share of each type of tax that belongs to local government. The data for each local government is then used to apportion that local total (at the state level) to each county. Since the local total for each county is estimated, the model can distinguish between the state and local tax revenue in the tax impact report. In IMPLAN Online, the tax impact report includes four types of governments that compose State/Local Government:
        - State government
        - County government
        - Sub-county general government, which includes city and township governments, for example
        - Sub-county special government, which includes fire and public school districts, for example
    - IMPLAN supplements gaps in the SLGF with 5-year Census of Governments data, and supplements the SLGF state tax revenue with current-year state tax collections data from the Census.

- **Regional Economic Accounts (REA).** The Bureau of Economic Analysis collects and reports income, wealth, tax, and employment data on a regional, state, and county basis. The REA data from these two tables are used to distribute the U.S. NIPA values to states and counties:
        - Table CA05 -- Personal Income by Major Source and Earnings by Industry
        - Table SA50 -- Personal Tax and Non-tax Payments

IMPLAN Tax Identification Scheme						
	Description	Employee Compens-ation	Proprietor Income	Tax on Production and Import	House holds	Corpor-ations
State and Local Taxes						
	Dividends					O
	Social Insurance Tax- Employee Contribution	A	C			
	Social Insurance Tax- Employer Contribution	B				
	Tax on Production and Imports: Sales Tax			D		
	Tax on Production and Imports: Property Tax			E		
	Tax on Production and Imports: Motor Vehicle Licence			F		
	Tax on Production and Imports: Severance Tax			G		
	Tax on Production and Imports: Other Taxes			H		
	Tax on Production and Imports: S/L NonTaxes			I		
	Corporate Profits Tax					P
	Personal Tax: Income Tax				J	
	Personal Tax: Non-Taxes (Fines- Fees				K	
	Personal Tax: Motor Vehicle License				L	
	Personal Tax: Property Taxes				M	
	Personal Tax: Other Tax (Fish/Hunt)				N	
Federal Taxes						
	Social Insurance Tax- Employee Contribution	Q	S			
	Social Insurance Tax- Employer Contribution	R				
	Tax on Production and Imports: Excise Taxes			T		
	Tax on Production and Imports: Custom Duty			U		
	Tax on Production and Imports: Fed NonTaxes			V		
	Corporate Profits Tax					X
	Personal Tax: Income Tax				W	
Source: IMPLAN Group LLC (2020).						

The following definitions and sources are provided by IMPLAN Group LLC (2020) and correspond with labeling in the IMPLAN Tax Identification Scheme.

A. Employee-paid portion for State/Local social insurance. This represents retirement plans and temporary disability insurance. The U.S. value comes from National Income and Products Accounts (NIPA) Table 3.6. This value is distributed to states based on each state's share of the following items from the State and Local Government Finances report (SLGF).

Employee Retirement – Local Employee Contribution;
Employee Retirement – State Employee Contribution;
Workers Compensation – Other Contributions.

These state values are distributed to counties based on each county's proportion of the state's State/Local Government Non-Education Employee Compensation. The county-level State/Local Employee Compensation figures come from U.S. Bureau of Economic Analysis. These are then split into Education vs. Non-Education using various data from the U.S. Census Bureau and the U.S. Department of Education.

B. Employer-paid portion for State/Local social insurance funds. This represents workers' compensation and temporary disability insurance. The U.S. value comes from NIPA Table 3.6. This value is distributed to states and based on each state's share of the following items from the SLGF:

Employee Retirement – From Local Government;
Employee Retirement – From State Government;
Unemployment Compensation – Contribution;
Workers Compensation – Own Contributions.

County distribution is based on county portion of state and local government non-education employee compensation from IMPLAN.

C. State/Local social insurance paid by self-employed. Self-employed individuals do not make payments to State/Local government, so this entry will always have a value of $0.

D. Sales Taxes on "Other Property Type Income" (TOPI) paid to State and Local Governments. The U.S. value comes from NIPA Table 3.5. The U.S. value is distributed to states based on each state's proportion of Total General Sales Tax from the SLGF. State government values are then distributed to counties based on total retail output.

E. TOPI property taxes paid to State and Local Governments. The U.S. value comes from NIPA Table 3.5. The U.S. value is distributed to states based on each state's proportion of Total Property Tax from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

F. TOPI motor vehicle license taxes paid to State and Local Governments. The U.S. value comes from NIPA Table 3.5. The U.S. value is distributed to states based on each state's proportion of Motor Vehicle Operator's License Tax and Motor Vehicle License Tax from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

G. TOPI severance taxes paid to State and Local Governments. The U.S. value comes from NIPA Table 3.5. The U.S. value is distributed to states based on each state's proportion of Severance Tax from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

H. TOPI other taxes paid to State and Local Governments. This item consists largely of business licenses and documentary and stamp taxes. The U.S. value comes from NIPA Table 3.5. The U.S. value is distributed to states based on each state's proportion of the following tax items from the SLGF: Corporation License; Amusement License; Other License; Documentary & Stock Transfer; Public Utility License; Alcoholic Beverage License; Occupation & Business License, NEC; and NEC. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

I. TOPI non-taxes paid to State and Local Governments. This item includes rents and royalties, special assessments, fines, settlements, and donations. The U.S. value comes from NIPA Table 3.5. The U.S. value is distributed to states based on each state's proportion of the following tax items from the SLGF: Miscellaneous – Rents; Miscellaneous – Special Assessments; Miscellaneous – Royalties; and Miscellaneous – Donations from Private Sources. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

J. Personal income tax payments to State and Local Governments. The U.S. value comes from NIPA Table 3.3. The U.S. value is distributed to states based on Individual Income Tax from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

K. Personal non-tax payments to State and Local Governments. This item includes payments for fines and donations. The U.S. value comes from NIPA Table 3.3. The U.S. value is distributed to states based on Motor Vehicle License Tax from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

L. Personal motor vehicle fee payments to State and Local Governments. The U.S. value comes from NIPA Table 3.4. The U.S. value is distributed to states based on Miscellaneous – Fines & Forfeits from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

M. Personal property tax payments to State and Local Governments. The U.S. value comes from NIPA Table 3.4. The U.S. value is distributed to states based on Property Tax from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

N. Personal other tax payments to State and Local Governments. This item consists largely of hunting, fishing, and other personal licenses. The U.S. value comes from NIPA Table 3.4. The U.S. value is distributed to states based on Hunting and Fishing License Tax from the SLGF. State government values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

O. State/Local Government Dividends. This item represents net dividend payments to government by corporations from investments. The U.S. value comes from NIPA Table 3.3. The U.S. value is distributed to states based on the following items from the SLGF:

Employee Retirement – Securities – Mortgages;
Employee Retirement – Securities – Corporate Stocks;
Employee Retirement – Securities – Corporate Bonds;
Employee Retirement – Total Other Securities.

State government values are distributed to counties is based on their proportion of state Other Property Income (from IMPLAN database).

P. State/Local Government corporate profits tax. The U.S. value comes from NIPA Table 3.3. The U.S. value is distributed to states based on Corporate Net Income Tax from the SLGF. State government values are then distributed to counties is based on counties based on their proportion of the state's Other Property Income (from IMPLAN database).

Q. Employee-paid portion for Federal social insurance. This item includes social security, survivors insurance, disability insurance, hospital insurance, supplemental medical insurance, unemployment insurance, veterans' life insurance, and railroad retirement plans. The U.S. value comes from NIPA Table 3.6. The U.S. value is distributed to states and counties based on Personal Contribution for Social Insurance from the BEA's CA05 table.

R. Employer-paid portion for Federal social insurance. This item includes social security, survivors insurance, disability insurance, hospital insurance, military medical insurance, unemployment insurance, pension benefit guaranty, veterans' life insurance, and railroad retirement plans. The U.S. value comes from NIPA Table 3.6. The U.S. value is distributed to states and counties based on Personal Contribution for Social Insurance from the BEA's CA05 table.

S. Self-Employed contribution to Federal social insurance. This item includes social security, survivors insurance, disability insurance, and hospital insurance. The U.S. value comes from NIPA Table 3.6. The U.S. value is distributed to states and counties based on Personal Contribution for Social Insurance from the BEA's CA05 table.

T. TOPI Federal Excise Taxes. This item includes federally levied excise taxes on alcohol, tobacco, telephones, coal, fuels, air transportation, vehicles, etc. The U.S. value comes from NIPA Table 3.2. The U.S. value is distributed to states and counties based on IMPLAN estimates of total TOPI for all industries in relationship to U.S. total TOPI.

U. TOPI Federal Custom Duties. These are gross collections less refunds. The U.S. value comes from NIPA Table 3.2. The U.S. value is distributed to states and counties based on IMPLAN estimates of total TOPI for all industries in relationship to US total TOPI.

V. TOPI Federal Non-taxes. This item includes rents and royalties4. The U.S. value comes from NIPA Table 3.2. The U.S. value is distributed to states and counties based on IMPLAN estimates of total TOPI for all industries in relationship to U.S. total TOPI.

W. Personal Income taxes paid to the Federal Government. These are taxes paid through withholding, declarations and final settlement less refunds. The U.S. value comes from NIPA Table 3.2. The same value can also be found in NIPA Table 3.4. The U.S. value is distributed to states based on each state's value of "Federal government: Individual Income taxes (net of refunds)" from the BEA's SA50 table. State values are then distributed to counties based on total Personal Income from the BEA's CA05 table.

X. Federal Corporate profits tax. The U.S. value comes from NIPA Table 3.2. The U.S. value is distributed to states and counties based on their proportion of U.S. Other Property Income (from IMPLAN database).

Definition of Government Revenues Produced by IMPLAN	
Government Unit and Applicable Government Revenue	**Definition**
State and Local Government Revenues	
Dividends	State and Local government dividends represent dividend payments to government by corporations from investments.
Social Insurance Taxes: Employee Contribution	The social insurance contributions paid by state employees towards State sponsored pensions, in lieu of social security.
Social Insurance Taxes: Employer Contribution	The social insurance contributions paid by the State towards State sponsored pensions, in lieu of social security.
Indirect Business Tax: Sales Tax	Sales taxes paid to State and Local government.
Indirect Business Tax: Property Tax	Real estate-based property taxes paid by firms to State and Local governments. Because of the special situation encountered with Sector 361, this includes payments of property taxes made on homes.
Indirect Business Tax: Motor Vehicle	Motor vehicle license taxes paid by firms to State and Local governments.
Indirect Business Tax: Severance Tax	Taxes imposed by a State on the extraction of natural resources.
Indirect Business Tax: Other Taxes	Other taxes paid to State and Local governments include business licenses, documentary and stamp taxes.
Indirect Business Tax: S/L Non-taxes	IBT state and local non-tax payments include fines (such as parking and speeding tickets), fees (State and County park passes or day fees) and donated funds.
Corporate Profits Tax	Corporate profits taxes paid to State and Local governments.
Personal Tax: Income Tax	Income taxes paid by individuals to State and Local Government through withholding, declarations and final settlement, less refunds.
Personal Tax: Non-taxes (fines and fees)	Household personal nontax payments to State and Local governments include fines, donations, passport and immigration fees, and migratory bird-hunting stamps.
Personal Tax: Motor Vehicle Licenses	Household personal motor vehicle fee payments to State and Local governments.
Personal Tax: Property Taxes	Household personal property tax payments to State and Local governments. Dividend, interest, and rental income of persons with capital consumption adjustment are sometimes referred to as property income.
Personal Tax: Other Tax (Fishing/Hunting)	Other taxes consist of miscellaneous fees and licenses (such as hunting and fishing licenses, marriage licenses, registration of pleasure boats, and licenses for pets) to State and Local governments.

Federal Government Revenues	
Social Insurance Taxes: Employee Contribution	The employee paid portion for Federal social insurance. These contributions include payments by employees, the self-employed, and other individuals who participate in the following government programs: Old-age, survivors, and disability insurance (social security, FICA); hospital insurance; supplementary medical insurance; unemployment insurance; railroad retirement; veterans life insurance; and temporary disability insurance.
Social Insurance Taxes: Employer Contribution	The employer paid portion for Federal social insurance. This includes social security, unemployment insurance, medical and retirement plans.
Indirect Business Tax: Excise Taxes	Includes Federally levied excise taxes on alcohol, tobacco, telephones, coal, fuels, air transportation, vehicles, etc.
Indirect Business Tax: Custom Duty	Custom duties are gross collections net refunds.
Indirect Business Tax: Non-Taxes	IBT Federal non-tax payments include petroleum royalties, fines, regulatory fees, forfeitures and donated funds.
Corporate Profits Tax:	Corporate profits taxes paid to Federal governments.
Personal Income Tax	Income taxes paid by individual to the Federal Government through withholding, declarations and final settlement, less refunds.
Source: IMPLAN Group LLC (2020).	

Appendix D

IMPLAN Customization

IMPLAN Customization

For sake of brevity, industry financial data that has been collected from the wind energy industry through surveys conducted by the Department of Agribusiness and Applied Economics at North Dakota State University are labeled as 'survey data.'

The following discussions highlight the process that was used to re-calibrate various IMPLAN sectors using survey data, government information, and other secondary materials.

Wind Generation Sector

1) Reconstruct the Wind Energy Sector Profile

Survey data, extrapolated to represent the entire wind energy generating sector, formed the basis to re-construct the economic profile for that sector in IMPLAN. The reconstruction required changing the size of industry sales, total employment, employment compensation, proprietor income, property-type income, taxes on production and imports, and intermediate inputs.

Appendix Table D1. Industry Profile, Wind Energy Survey Data, North Dakota, 2019

Sector Profile Components	Wind Energy Sector
Output (sales)	$320,013,503
Employment[1]	167.7
Employment Compensation	$14,159,866
Sole Proprietor Income	----
Property-type Income	$240,020,846
Tax on Production and Inputs	$10,660,731
Total Value-added	$264,841,443
Intermediate Inputs	$55,172,060
Intermediate Inputs (in-state)	$24,786,393

[1]Represents total jobs (full-time and part-time).
Source: Industry Survey Data (2020).

The listing of "intermediate inputs" within IMPLAN represents all the goods and services consumed in the production of a commodity (i.e., a good or service). Intermediate inputs are sometimes referred to as an industry production function and are a component of an economic sector's profile. The importance of having accurate spending patterns is fundamental to generating realistic economic impacts for any activity, policy, program, or event. Appendix C

contains the technical definitions for financial information relating to IMPLAN's economic profiles and additional detail on industry purchases of goods and services.

2) Organize Survey Expenditure Data into 2-digit North American Industrial Classification System (NAICS) Codes

Survey data are collected using loosely defined expenditure categories that align to either Standard Industrial Classification (SIC) definitions or NAICS codes, although some firms provide expenditure data based on the actual expense or purchase. Survey data on industry expenditures are placed into NAICS 2-digit groupings. Each 2-digit grouping has an estimate of the industry's total expenditures and in-state expenditures.

3) Examine Survey Data and Other Information to IMPLAN's Intermediate Inputs

In some cases, the default production function for the target industry may contain inputs that are not relevant or appropriate for the industry in North Dakota. This condition has been observed with the lignite energy industry. The lignite energy industry is contained in the electricity from fossil fuels sector in IMPLAN. Nearly 100 percent of the electricity generated from fossil fuels on a commercial scale comes from the lignite industry. Yet, IMPLAN's default production function implies that purchases of natural gas are larger than purchases of lignite coal. These types of conditions are fixed by either eliminating the purchase within the industry production function or adjusting it to a level that is more appropriate. In the case of eliminating a purchase, all gross absorption coefficients are normalized after the adjustment before exporting expenditure data for the next step in the customization process.

4) Adjust Gross Inputs and Regional Inputs for the Target Industry

IMPLAN's intermediate inputs are first identified as gross inputs, which represent the total amount of goods and services used by the target industry within the defined study area. The amount of goods or services purchased within the study area (i.e., purchases from local sources) is called regional inputs. Survey data represent the primary source of information used to adjust an industry production function. Information from the survey of firms comprising the wind energy industry was used to estimate gross and regional inputs (expenditures) (Appendix B contains summarized survey data).

Survey-based financial data are used to adjust the industry spending profile (production function) for an industry within the IMPLAN modeling platform using two adjustments. The first adjustment is to change internal coefficients for individual sectors so that the industry's production function has the correct level of gross inputs (total expenditures) and the second adjustment sets the level of regional inputs (typically considered in-state expenditures when evaluating an industry with the entire state) to ensure the target industry purchases the correct amount of goods and services from in-state sources.

However, while the above circumstances would appear to be straightforward, IMPLAN does not use an expenditure value which is typically considered when examining a production budget or expenditure sheet. Instead, the total expenditure for any particular good or service is represented by a coefficient that is the dollar value of the expenditure divided by the level of

sales for the target industry. Appendix C contains additional insights on how IMPLAN's model platform handles total expenditures and in-state expenditures.

IMPLAN's default spending profiles for any particular industry can include purchases or acquisitions from any of the matrix's 540 distinct economic sectors, which necessitates grouping IMPLAN data and survey data into comparable categories. IMPLAN default data for the target industry's production function are assigned a 2-digit NAICS code.

The targeted level of overall expenditures (gross absorption coefficients) and in-state share of total expenditures that are made in the state (regional purchase coefficients) for each economic sector contained in the target industry's production function is approximated using an optimization process. The process of changing the level of gross inputs within IMPLAN's production functions requires proportional adjustments to each input that is included in any of the 2-digit NAICS codes. For example, expenditures for communications (2-digit NAICS code 51) for intermediate inputs for IMPLAN Sector XYZ may contain $30 for Internet, $50 for phone, and $20 for data processing, for a total of $100. However, if survey data suggest that Sector XYZ's total inputs for communications should more closely approach $200, then a new allocation of expenditures among the production function for Sector XYZ would be $60 for Internet, $100 for phone, and $40 for data processing. The optimization process converts IMPLAN's default data into dollar volumes, compares those dollar volumes to the targeted level, and then adjusts (proportionally) the gross absorption coefficients for all IMPLAN sectors within the 2-digit NAICS group until the desired level of gross inputs is achieved. The adjustment of gross absorption coefficients is performed using coefficients derived from the new industry balance sheet.

The optimization process then adjusts the individual IMPLAN sectors contained within each 2-digit NAICS grouping in a proportional manner until the regional purchase coefficients approximate the amount those expenditures made in North Dakota using the newly estimated gross absorption coefficients.

5) Adjusting Employment and Employment Compensation

IMPLAN combines wages and salaries and employee benefits into 'employment compensation. Survey data for wages, salaries and employee benefits were combined to be consistent with the IMPLAN modeling system. Both the level of employment and employment compensation were adjusted within IMPLAN to match survey data. In some economic sectors, proprietor income and sole proprietors are present and would need to be treated separately; however, those conditions are not present in any substantive capacity in the wind energy industry.

Appendix Table D2. Development and Comparison of Survey Data to Default IMPLAN Industry Profile for Wind Generation Sector, North Dakota Wind Industry, 2019						
IMPLAN Economic Sector	**Gross Sales**	**Total Intermediate Inputs**	**In-state Purchase of Inputs**	**Gross Absorption**	**Regional Purchase Coefficient**	**Regional Absorption**
IMPLAN Sector 43 Electric Power Generation -- Wind						
2019 IMPLAN State Model Data	$18,602,707	$9,881,855	$7,985,436	0.531205	0.808091	0.429262
2019 NDSU Study Final Figures	$320,013,503	$55,172,060	$24,786,393	0.172405	0.449256	0.077454

Manufacturing Sector

IMPLAN sector 281 represents the manufacture of electrical turbine and turbine components (NAICS code 281). The sector-level data in IMPLAN was compared to recent estimates of employment at the LM Wind Power manufacturing plant in Grand Forks. Information current for the study period suggested the plant had substantially larger total employment than found with IMPLAN default data.

The balance sheet for that sector was rebuilt using ratios of sales and jobs, jobs and employment compensation, and ratios between sales and Other Property Type Income, Taxes on Production and Imports, and intermediate inputs. Property taxes would represent a component of TPI, and were obtained from Grand Forks County tax records.

The process of adjusting the industry balance sheet for the LM Wind Power manufacturing plant assumed that changes in sales volume would be approximately equal to similar magnitude changes in overall employment, and that average employment compensation found with IMPLAN's default data would be sufficient to estimate a new level of employment compensation commensurate with the increased level of employment. While it is possible that expanded employment could represent employment, positions hired at a compensation rate lower than the plant average, data to refine the extrapolation was not available. Further, the magnitude of job growth with the recent data on employment at the plant would suggest that overall employment gains would not be limited to only low-pay positions.

This study used survey data from the plant obtained from a previous industry assessment to compare approximate values for gross absorption and regional absorption. Survey data and current default data for that sector in IMPLAN were normalized to approximately the same level of overall sales. Total intermediate expenditures and coefficients to estimate the in-state purchase of those expenditures were exported from IMPLAN. The survey data were then placed into a similar context to how IMPLAN evaluates industry production functions. The result of the normalization and comparison revealed that IMPLAN was suggesting a substantially higher level

of overall inputs were acquired from in-state sources than the data obtained from a completed survey in 2015.

The 2015 survey data lacked the detail necessary to conduct a thorough rebuilding of the content of the sector's production function. To overcome the issue of IMPLAN generating too much in-state spending in the rebuilt manufacturing sector, the percentage difference between the 2015 survey and the level of indirect output from that sector using the updated employment value was used to lower IMPLAN's projected level of in-state spending. This approach assumed that the default spending pattern for that sector contained a reasonably accurate portrait of the mix of goods and services purchased by the plant. Under that premise, simply changing the degree (i.e., ratio of regional absorption to gross absorption) of in-state acquisition of those goods and services would suffice to produce a reasonable estimate of the indirect economic effects.

Since indirect effects can influence the level of induced effects, the employment compensation from the updated industry balance sheet was used to estimate the induced labor response from direct employment at the plant. That value was subtracted from the sector total induced output, and that net value was then lowered to represent the approximate revisions needed to reduce the level of indirect effects.

The adjustments resulted in a higher direct effect for the sector than IMPLAN default data. However, additional adjustments were then used to modify IMPLAN's estimate of indirect and induced economic effects to account for lower levels of in-state acquisition of goods and services comprising the industry's production function. After all adjustments were performed, indirect effects were reduced by 45 percent and induced effects were reduced by 15 percent compared to the levels found with the rebuilt industry balance sheet using default industry data from IMPLAN.

Construction and Capital Outlays

All input values used in IMPLAN need to represent an annual equivalent. This means that if the study period is limited to 2019, construction expenditures that lap over into another year or those that were expended in the prior year need to be removed from consideration.

The survey of firms received limited information on when the capital expenditures for construction were expended, or what share of the capital cost of construction flowed through a general contractor versus represented direct purchases by the firm owning the wind farm. Survey data were combined with generalized secondary data to compile a portfolio of new wind farms that were in some stage of development in calendar year 2019. The wind farms identified as having some new construction (repower construction is treated separately in this study) included Merricourt, Aurora, Glen Ullin, Foxtail and Logan/Emmons.

Three issues were addressed with respect to modeling the in-state economic effects of capital outlays for wind farm construction.

Timeline of construction and timing of expenditures for stages of construction;
Removal of the capital cost of towers, nacelles, blades, rotors; and
In-state versus out-of-state labor employed during construction.

Personal interviews with contractors that build wind farms in ND indicated purchases of key wind tower components are actually direct acquisitions between the wind farm owner and the manufacturing or supplying firm. The implication of those expenditures representing direct purchases is that the approximate cost of those components must be removed from the analysis for purposes of estimating secondary economic effects. This is the case even if some of the wind farms under construction during the study period purchased components from the LM Wind Power plant in Grand Forks. The LM Wind Power was treated as a standalone segment of the wind energy industry, which is consistent with an economic contribution analysis.

IMPLAN contains several construction sectors, proprietary to IMPLAN's sector descriptions. IMPLAN creates construction sectors based on U.S. Census definitions for the type of structures built. These definitions differ from the NAICS treatment of construction sectors. The construction sector used in IMPLAN for wind farms was sector 52 *Construction of New Power and Communication Structures.*

To ensure that sector 52 does not make additional purchases of goods from sector 281 based on the sector's default production function, backward linkages were disconnected within the custom IMPLAN I-O matrix between sector 52 and sector 281.

Another adjustment was to examine the approximate stages of construction from initiation to start-up. Industry interviews and information from National Renewable Energy Laboratory (2019) wind farm construction costs were used to adjust the approximate construction spending over the wind farm build period.

Appendix Table D3. Wind Farms under Some Phase of Construction, North Dakota, 2019

	Wind Farm				
Metric / Descriptor	**Merricourt**	**Aurora**	**Glen Ullin**	**Foxtail**	**Emmons / Logan**
Owner	Otter Tail	Enel	Allete	NSP/Excel	NextEra
Capacity (MW)	150	300	106	150	200
Total Months Construction	15	13-15			
Estimated Months in 2019	5	1.25	9	9	11
Approximate Construction Start Date	Aug-19	Nov-19	2018	May-18	2019
Online Date	2020/21	Dec-20	Dec-19	Dec-19	Dec-19
Publicly Stated Capital Value (millions 2019$)	270	450	177.8	200	415
Cost/MW (millions of 2019$)	1.8	1.5	1.677	1.333	2.075
General Contractor	Wanzek	---	---	Wanzek	---
Reported Peak Construction Jobs	150	300	250	200	255
Reported In-state Construction Jobs	150	45			
Estimated Construction Jobs in 2019	50	29	188	150	234
Estimated Out-of-state Construction Jobs in 2019	0	22	182	0	228

Cost of Tower Components

NREL (2019) data was used to approximate the cost of tower, blades, rotor, nacelle, and generator. These costs for wind farm construction were removed from values used in sector 52 in IMPLAN.

The state is likely to capture some of the freight expenses from shipments of components and materials supplied by out-of-state entities. Those impacts were estimated as a revenue change in the truck transportation sector in IMPLAN and were based on a percentage of the value of shipment.

Spending Patterns for Non-resident Construction Labor

The development of wind farms was modeled to include construction workers who are not residents of North Dakota. If those non-resident construction workers' annual salaries are treated in IMPLAN as a direct impact from construction of wind farms, IMPLAN will overestimate the induced economic effects associated with out-of-state construction workers. This occurs because the model assigns an amount of personal consumption for goods and services reflective of state residents with similar salaries.

To correct for overestimation of induced effects from out-of-state construction workers' employment compensation, a personal spending pattern, tailored to the expected spending by out-of-state construction workers, was developed by adjusting IMPLAN's default household spending pattern. These adjustments eliminated the spending for goods and services not expected to occur with non-resident workers (e.g., mortgage payments, home repairs). The level of spending expected by out-of-state construction workers was based on expected daily purchases for food, lodging, essential care, and recreation.

<u>IMPLAN Mapping</u>

IMPLAN uses a variety of mechanisms, or economic triggers, to introduce a direct impact into a specified economy. The capability of using a variety of mechanisms is one of the key attributes of the IMPLAN modeling platform that provides substantial flexibility in tailoring assessments to match expected economic activity. Appendix C includes descriptions of IMPLAN's options for modeling economic effects.

This study used a variety of IMPLAN activities to estimate the effects of capital expenditures relating to wind energy generation. The activities included industry change for construction, transportation, retail trade, custom household spending pattern, and labor income change. A labor income change was used with estimated employment compensation for resident construction workers for wind farm repower activities. Institutional spending patterns were customized and used to represent personal spending in North Dakota by out-of-state construction workers. The portion of leases representing compensation for lost land output during construction was not included in the analysis since those payments represents a change in the source of income for landowners and not a change in income.

Appendix Table D4. IMPLAN Mapping, Capital Outlays and Manufacturing, Wind Energy Industry, North Dakota, 2019	
Economic Activity and Associated IMPLAN Mapping	**Description**
Capital Outlays	
Construction of Wind Farms	
Industry Change	Revenues to Sector 52 *Construction of Power and Related Structures* with customized level of employment compensation representing estimated total employment compensation less employment compensation for non-resident construction workers
Manual Adjustment	Non-resident labor employment compensation added back to Industry Change for Sector 52 as part of direct effects
Household Spending Pattern	Modified Spending Profile for non-resident construction workers while employed in North Dakota, determines level of induced effects from spending of non-resident labor while working in ND
Other Capital Expenditures	
Industry Change	Purchase of Vehicles which represent revenues to Sector 402 *Retail – Motor Vehicle and Parts Dealers* using retail trade margin
Labor Income Change	Labor for repower operations, determines level of induced effects from labor income used to carryout repower activities
Industry Change	Revenues to Sector 417 *Truck Transportation* for capture of transportation expenditures to transport repower components from out-of-state locations to in-state wind farms
Manufacturing	
IMPLAN Sector 281	
Industry Change	Custom Level of Sales using revised Industry Balance Sheet
Industry Change	Using IMPLAN default level of sales to gauge unadjusted levels of indirect and induced economic effects

Appendix E

Electricity Generation Capacity and Electricity Generation by Energy Source, North Dakota

Appendix Table E1. Electricity Generation Capacity, by Energy Source, North Dakota, 2000-2019						
Source	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	----------megawatts----------					
Coal	4,127	4,128	4,105	4,129	4,126	4,127
Hydroelectric	497	497	497	371	485	432
Natural gas	10	10	10	10	10	10
Other	0	0	0	0	0	0
Other biomass	9	10	10	10	10	10
Other gas	7	8	8	8	8	8
Petroleum	66	64	69	70	71	75
Wind	0	0	0	64	64	96
Total	4,716	4,717	4,699	4,662	4,774	4,758
	2006	**2007**	**2008**	**2009**	**2010**	**2011**
Source:	----------megawatts----------					
Coal	4,127	4,119	4,119	4,148	4,153	4,147
Hydroelectric	443	486	486	508	508	508
Natural gas	10	10	10	10	10	10
Other	0	0	0	5	5	5
Other biomass	10	10	10	10	10	10
Other gas	8	8	8	8	8	8
Petroleum	77	75	75	71	71	72
Wind	164	383	776	1,202	1,423	1,423
Total	4,839	5,091	5,484	5,962	6,188	6,183
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
Source	----------megawatts----------					
Coal	4,141	4,128	4,185	4,214	4,222	4,042
Hydroelectric	508	510	510	510	510	510
Natural gas	0	80	248	328	328	520
Other	5	5	5	5	5	5
Other biomass	10	10	10	10	10	10
Other gas	8	8	8	8	8	8
Petroleum	59	65	65	65	62	65
Wind	1,759	1,759	1,759	2,222	2,824	3,073
Total	6,490	6,565	6,790	7,362	7,970	8,233

- continued -

Appendix Table E1. (cont).		
Source	**2018**	**2019**
	---megawatts--	
Coal	4,042	3,949
Hydroelectric	510	510
Natural gas	520	581
Other	5	5
Other biomass	10	10
Other gas	8	8
Petroleum	63	63
Wind	3,222	3,529
Other		
Total	8,380	8,655

Other biomass includes agricultural byproducts, landfill gas, biogenic municipal solid waste, other biomass (solid, liquid and gas) and sludge waste. Other gases include blast furnace gas, and other manufactured and waste gases derived from fossil fuels. Other includes non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat and miscellaneous technologies.

Source: U.S. Energy Information Administration (2020).

Appendix Table E2. Electricity Produced, by Energy Source, North Dakota, 2000-2019						
Source	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	----------megawatt hours----------					
Coal	29,069,203	28,877,175	29,611,524	29,427,311	28,064,224	30,258,759
Hydro-electric	2,122,561	1,332,076	1,592,616	1,723,904	1,545,864	1,341,824
Wind	0	0	0	58,878	214,523	220,345
Natural gas	2,087	2,536	8,042	9,446	9,044	8,012
Other[1]	117,345	55,551	94,130	102,590	102,451	103,676
Total	31,311,196	30,267,338	31,306,312	31,322,129	29,936,106	31,932,616
	2006	**2007**	**2008**	**2009**	**2010**	**2011**
	----------megawatt hours----------					
Coal	28,878,991	29,163,553	29,672,230	29,606,966	28,462,040	27,108,926
Hydro-electric	1,521,034	1,305,393	1,252,790	1,475,251	2,042,118	2,580,042
Wind	369,485	620,772	1,693,458	2,997,530	4,095,641	5,235,590
Natural gas	7,065	16,574	-51	16,606	16,353	19,902
Other[1]	104,562	117,813	116,152	100,114	123,390	135,440
Total	30,881,137	31,224,105	32,734,579	34,196,467	34,739,542	35,079,900
	2012	**2013**	**2014**	**2015**	**2016**	**2017**
	----------megawatt hours----------					
Coal	28,214,364	27,477,822	27,394,068	27,734,413	26,580,350	26,756,465
Hydro-electric	2,477,230	1,852,421	2,531,360	2,094,168	1,912,005	2,582,107
Wind	5,274,509	5,518,958	6,202,412	6,505,704	8,171,922	11,359,233
Natural gas	21,697	54,195	234,315	711,044	1,071,107	676,031
Other[1]	137,358	118,277	100,352	111,284	121,068	131,238
Total	35,021,673		36,462,507	37,156,613	37,856,452	41,505,074
	2018	**2019**				
	----------megawatt hours----------					
Coal	27,540,665	25,151,437				
Hydro-electric	3,180,154	3,179,292				
Wind	10,732,913	11,213,025				
Natural gas	1,019,273	1,470,585				
Other[1]	142,316	132,985				
Total	42,615,321	41,147,324				

[1]Other biomass (agricultural byproducts, landfill gas, biogenic municipal solid waste, and sludge waste), Other gases blast furnace gas, and other manufactured and waste gases derived from fossil fuels), Other non-biogenic municipal solid waste, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, tire-derived fuels, waste heat and miscellaneous technologies), petroleum.

Note: Totals may not equal sum of components because of independent rounding.

Source: U.S. Energy Information Administration (2020).

Appendix F

Property Tax Distributions, by Year, by County, North Dakota Wind Farms, 2015 through 2019

Appendix Table F1. Property Taxes Paid, by Political Subdivision, by Wind Producing County, by Year, 2015-2019

County/ Year	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Dist. 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
	dollars													
Adams	1,841,068	8,191	-	822,569	59,553	40,984	60,365	3,496	44,596	-	776,767	-	16,356	8,191
2016	274,337	1,162	-	139,639	7,819	6,466	8,756	527	6,284	-	100,196	-	2,325	1,162
2017	487,222	2,147	-	222,575	15,665	10,925	16,468	926	11,429	-	200,645	-	4,294	2,147
2018	487,930	2,243	-	198,775	16,002	11,226	17,289	962	12,356	-	222,350	-	4,485	2,243
2019	591,579	2,639	-	261,580	20,067	12,367	17,852	1,081	14,527	-	253,576	-	5,252	2,639
Barnes	4,275,706	18,263	18,258	1,780,959	320,121	146,642	391,653	-	54,926	-	1,525,995	-	18,889	-
2015	1,032,938	4,473	4,472	416,297	82,909	35,820	100,476	-	13,333	-	370,685	-	4,472	-
2016	891,959	3,804	3,803	383,248	65,456	29,923	82,116	-	11,260	-	308,546	-	3,803	-
2017	853,303	3,678	3,677	348,366	63,565	28,973	80,354	-	10,808	-	310,206	-	3,677	-
2018	795,148	3,384	3,384	339,592	56,867	26,943	65,068	-	9,847	-	286,341	-	3,722	-
2019	702,358	2,924	2,923	293,456	51,324	24,984	63,639	-	9,677	-	250,216	-	3,215	-
Bowman	279,178	1,666	-	75,700	11,478	11,467	25,638	4,115	3,588	-	140,208	-	3,652	1,666
2015	62,077	393	-	17,689	2,697	2,562	5,625	1,109	892	-	30,103	-	613	393
2016	61,664	340	-	19,111	2,527	2,559	5,323	841	678	-	29,093	-	851	340
2017	56,985	341	-	14,047	2,279	2,666	5,237	765	798	-	29,657	-	853	341
2018	50,823	305	-	12,541	2,096	1,883	4,914	673	635	-	26,708	-	762	305
2019	47,629	286	-	12,312	1,879	1,796	4,539	727	584	-	24,646	-	573	286
Burleigh	2,400,405	10,799	10,799	438,549	19,070	283,993	505,185	1,876	31,015	-	1,092,451	-	6,669	-
2015	591,374	2,582	2,582	123,946	3,538	69,365	126,828	451	7,355	-	253,898	-	828	-
2016	513,567	2,258	2,258	104,687	3,854	59,025	109,932	359	6,657	-	223,165	-	1,372	-
2017	479,326	2,201	2,201	81,998	4,128	57,517	98,070	329	6,288	-	225,033	-	1,561	-
2018	429,088	2,011	2,011	65,316	4,110	52,523	89,706	396	5,720	-	205,889	-	1,408	-
2019	387,051	1,747	1,747	62,602	3,439	45,563	80,649	341	4,995	-	184,467	-	1,501	-

Appendix Table F1. Property Taxes Paid, by Political Subdivision, by Wind Producing County, by Year

County/ Year	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Dist. 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
	dollars													
Cavalier	2,991,130	13,930	-	1,367,132	263,670	35,050	205,523	-	53,419	-	1,024,546	-	27,861	-
2015	654,441	3,042	-	339,389	54,789	7,414	38,517	-	11,679	-	193,526	-	6,085	-
2016	590,505	2,701	-	285,326	50,298	6,228	42,934	-	10,469	-	187,146	-	5,403	-
2017	560,154	2,647	-	246,180	51,567	6,277	42,345	-	10,189	-	195,655	-	5,294	-
2018	527,219	2,500	-	221,439	47,990	6,535	37,907	-	9,531	-	196,316	-	5,001	-
2019	658,811	3,039	-	274,799	59,026	8,595	43,820	-	11,551	-	251,903	-	6,078	-
Dickey	990,332	4,278	4,278	393,738	61,892	21,660	102,742	-	13,677	-	383,682	-	4,385	-
2015	222,844	924	924	94,801	12,797	4,831	20,454	-	2,780	-	84,354	-	979	-
2016	204,293	865	865	84,815	12,074	4,173	20,387	-	2,726	-	77,531	-	856	-
2017	199,400	881	881	75,645	13,076	4,323	21,632	-	2,838	-	79,103	-	1,022	-
2018	196,803	867	867	76,063	12,676	4,295	21,431	-	2,777	-	76,958	-	867	-
2019	166,992	741	741	62,413	11,269	4,038	18,839	-	2,556	-	65,736	-	659	-
Griggs	1,641,613	7,545	7,545	661,607	80,023	11,620	97,791	7,545	9,726	54,143	696,644	-	7,425	-
2015	447,036	1,807	1,807	190,909	20,143	3,055	25,405	1,807	2,383	17,922	179,919	-	1,879	-
2016	359,723	1,565	1,565	154,974	15,730	2,447	20,298	1,565	1,941	15,530	142,446	-	1,659	-
2017	313,214	1,539	1,539	121,397	16,531	2,385	20,230	1,539	1,921	7,635	136,990	-	1,508	-
2018	286,230	1,405	1,405	107,041	14,735	2,057	17,479	1,405	1,720	6,967	130,683	-	1,334	-
2019	235,410	1,229	1,229	87,284	12,884	1,676	14,379	1,229	1,761	6,090	106,605	-	1,044	-
Hettinger	882,840	4,044	-	303,598	46,016	16,613	52,398	25,059	19,812	-	403,640	-	8,348	3,311
2017	190,854	916	-	64,196	10,458	3,957	11,933	5,321	4,257	-	87,289	-	1,777	751
2018	350,687	1,669	-	122,016	17,682	6,311	20,663	10,029	7,884	-	160,827	-	2,521	1,085
2019	341,299	1,459	-	117,387	17,877	6,345	19,802	9,709	7,671	-	155,524	-	4,051	1,475

Appendix Table F1, cont. Property Taxes Paid, by Political Subdivision, by Wind Producing County, by Year

County/ Year	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Dist. 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
	dollars													
LaMoure	483,725	2,272	2,272	209,844	31,136	5,604	32,233	-	1,113	-	196,979	-	2,272	-
2015	125,449	601	601	57,337	7,851	1,257	7,583	-	306	-	49,310	-	601	-
2016	110,233	498	498	51,462	5,887	1,110	6,245	-	251	-	43,783	-	498	-
2017	99,070	462	462	40,963	6,570	1,173	7,782	-	218	-	40,977	-	462	-
2018	84,014	397	397	33,848	5,964	1,142	5,983	-	186	-	35,698	-	397	-
2019	64,960	314	314	26,233	4,863	922	4,640	-	152	-	27,209	-	314	-
McHenry	330,076	1,705	1,705	107,739	20,196	4,049	23,316	1,139	9,385	-	158,095	-	2,747	-
2015	27,162	134	134	10,424	1,617	291	1,592	-	699	-	11,982	-	289	-
2016	6,341	30	30	2,496	361	69	396	21	156	-	2,720	-	60	-
2017	9,991	52	52	3,272	621	134	761	33	281	-	4,698	-	87	-
2018	8,829	46	46	2,848	532	112	667	34	255	-	4,214	-	73	-
2019	277,753	1,442	1,442	88,698	17,065	3,443	19,900	1,051	7,994	-	134,480	-	2,238	-
Morton	7,228,808	31,461	-	2,399,973	1,649	495,592	1,121,865	7,033	59,858	-	3,058,939	-	20,980	31,459
2015	1,293,551	5,363	-	487,152	-	87,863	200,099	368	9,916	-	494,318	-	3,110	5,362
2016	1,603,614	6,815	-	568,598	-	109,827	239,996	422	11,710	-	655,481	-	3,952	6,814
2017	1,324,340	5,913	-	430,303	529	90,226	212,996	324	11,853	-	562,853	-	3,429	5,913
2018	1,544,333	6,858	-	474,487	583	105,443	240,308	3,060	13,672	-	687,656	-	5,408	6,858
2019	1,462,970	6,512	-	439,433	537	102,233	228,466	2,859	12,706	-	658,631	-	5,080	6,512

Appendix Table F1, cont. Property Taxes Paid, by Political Subdivision, by Wind Producing County, by Year

County/ Year	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Dist. 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
	dollars													
Nelson	27,829	128	128	12,488	2,051	302	1,553	486	705	-	9,749	-	239	-
2015	3,752	17	17	1,787	285	37	183	54	97	-	1,242	-	33	-
2016	3,401	15	15	1,646	247	33	180	39	85	-	1,111	-	30	-
2017	7,105	33	33	3,117	529	79	412	104	186	-	2,547	-	64	-
2018	6,567	30	30	2,941	509	75	363	131	165	-	2,269	-	54	-
2019	7,004	32	32	2,998	481	78	415	158	172	-	2,580	-	57	-
Oliver	5,503,214	34,080	-	2,755,988	-	12,866	142,575	-	128,549	-	2,324,464	-	70,612	34,080
2015	683,558	3,618	-	406,182	-	407	15,408	-	14,381	-	233,901	-	6,042	3,618
2016	635,111	3,316	-	361,288	-	1,037	14,712	-	12,598	-	233,075	-	5,769	3,316
2017	1,381,839	8,081	-	749,491	-	3,884	29,218	-	29,391	-	538,499	-	15,193	8,081
2018	1,446,009	10,055	-	647,413	-	3,121	47,254	-	37,975	-	664,998	-	25,138	10,055
2019	1,356,696	9,010	-	591,613	-	4,417	35,982	-	34,205	-	653,990	-	18,470	9,010
Pierce	1,291,705	5,767	5,767	395,209	69,289	18,363	152,168	5,068	17,570	-	615,873	-	6,633	-
2015	342,585	1,401	1,401	125,904	17,229	4,287	34,842	-	3,861	-	151,785	-	1,877	-
2016	263,932	1,181	1,181	77,231	13,713	3,817	31,828	1,311	4,382	-	127,859	-	1,429	-
2017	248,647	1,133	1,133	71,046	13,751	3,891	30,366	1,186	3,427	-	121,386	-	1,326	-
2018	223,361	1,035	1,035	63,774	12,565	3,277	27,366	1,292	2,872	-	109,110	-	1,035	-
2019	213,180	1,017	1,017	57,255	12,030	3,091	27,766	1,278	3,027	-	105,733	-	966	-
Stark	3,336,440	14,745	-	1,055,057	-	150,208	447,650	13,923	54,322	-	1,571,045	-	14,744	14,745
2017	752,946	3,448	-	244,218	-	30,034	100,622	2,676	12,167	-	352,885	-	3,448	3,448
2018	1,316,067	5,820	-	414,783	-	60,853	177,163	5,717	21,247	-	618,845	-	5,820	5,820
2019	1,267,427	5,477	-	396,057	-	59,321	169,865	5,530	20,908	-	599,315	-	5,477	5,477

Appendix Table F1. Property Taxes Paid, by Political Subdivision, by Wind Producing County, by Year

County/ Year	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Dist. 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
	dollars													
Steele	637,402	3,154	3,154	259,189	68,092	6,771	20,707	5,519	16,429	-	251,232	-	3,154	-
2015	152,778	761	761	62,205	15,140	1,707	5,157	2,931	3,928	-	59,427	-	761	-
2016	132,356	670	670	53,758	14,001	1,428	4,428	2,588	3,495	-	50,648	-	670	-
2017	127,915	640	640	53,351	13,991	1,403	4,281	-	3,341	-	49,626	-	640	-
2018	119,433	581	581	48,363	13,300	1,391	3,827	-	3,109	-	47,701	-	581	-
2019	104,920	502	502	41,512	11,660	842	3,016	-	2,556	-	43,830	-	502	-
Stutsman	2,278,358	9,349	9,349	662,653	125,126	135,079	428,917	-	41,639	-	865,603	-	642	-
2017	543,192	2,279	2,279	162,020	30,653	34,005	93,603	-	7,078	-	211,092	-	182	-
2018	878,201	3,575	3,575	251,415	47,999	50,198	172,923	-	17,244	-	331,019	-	250	-
2019	856,966	3,495	3,495	249,217	46,474	50,875	162,391	-	17,317	-	323,492	-	210	-
Towner	1,226,834	6,096	-	547,991	81,035	17,221	65,695	20,171	28,018	-	451,410	-	9,196	-
2016	195,390	1,003	-	92,235	12,003	2,632	9,979	2,366	4,231	-	69,776	-	1,164	-
2017	343,056	1,732	-	153,353	22,506	5,330	17,627	6,072	7,310	-	127,137	-	1,991	-
2018	348,508	1,711	-	152,872	23,343	4,538	19,150	6,000	8,387	-	130,590	-	1,917	-
2019	339,879	1,650	-	149,531	23,184	4,722	18,939	5,732	8,091	-	123,907	-	4,124	-
Ward	2,110,500	7,356	7,357	486,001	38,435	169,039	535,799	3,348	30,001	-	829,988	-	3,177	-
2015	323,148	1,244	1,232	78,595	6,120	24,482	68,832	403	13,366	-	128,475	-	399	-
2016	358,972	1,367	1,367	87,444	6,596	28,859	77,829	615	3,225	-	150,975	-	694	-
2017	388,243	1,328	1,341	94,205	7,310	29,791	98,168	646	3,456	-	151,283	-	717	-
2018	545,256	1,754	1,754	126,018	9,122	39,975	153,448	864	5,102	-	206,532	-	686	-
2019	494,882	1,662	1,662	99,740	9,287	45,933	137,521	819	4,852	-	192,723	-	681	-
Williams	1,269,798	7,823	7,823	295,828	44,076	7,913	166,419	5,719	15,381	-	711,379	-	7,437	-
2018	615,058	3,863	3,863	149,012	22,291	4,183	80,246	2,461	7,695	-	337,926	-	3,518	-
2019	654,740	3,960	3,960	146,816	21,785	3,730	86,173	3,258	7,686	-	373,453	-	3,919	-

Appendix Table F1, cont. Property Taxes Paid, by Political Subdivision, by Wind Producing County, by Year

County/ Year	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Dist. 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
	dollars													
Rolette	1,226,834	5,088	-	551,028	5,771	16,755	103,255	-	23,851	-	509,543	141	11,402	-
2016	195,390	806	-	90,150	1,016	2,515	17,046	-	3,970	-	78,107	23	1,757	-
2017	343,056	1,460	-	146,820	1,810	4,508	29,291	-	5,823	-	150,122	40	3,182	-
2018	348,508	1,439	-	157,818	1,594	4,843	29,102	-	7,137	-	143,253	40	3,282	-
2019	339,879	1,383	-	156,240	1,351	4,889	27,815	-	6,921	-	138,061	38	3,181	-
Grand Total	42,253,796	197,741	78,435	15,582,839	1,348,678	1,607,792	4,683,447	104,496	657,580	54,143	17,598,233	141	246,819	93,451

Appendix Table F2. Property Taxes Paid, by Political Subdivision, by Year, by County, 2015-2019

Row Labels	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Districts 2200	Sum of Soil Cons. Districts 2300	Sum of SW Water Authority 2400
2015	5,962,693	26,362	13,932	2,412,618	225,114	243,379	651,002	7,123	84,975	17,922	2,242,927	-	27,968	9,373
Barnes	1,032,938	4,473	4,472	416,297	82,909	35,820	100,476	-	13,333	-	370,685	-	4,472	-
Bowman	62,077	393	-	17,689	2,697	2,562	5,625	1,109	892	-	30,103	-	613	393
Burleigh	591,374	2,582	2,582	123,946	3,538	69,365	126,828	451	7,355	-	253,898	-	828	-
Cavalier	654,441	3,042	-	339,389	54,789	7,414	38,517	-	11,679	-	193,526	-	6,085	-
Dickey	222,844	924	924	94,801	12,797	4,831	20,454	-	2,780	-	84,354	-	979	-
Griggs	447,036	1,807	1,807	190,909	20,143	3,055	25,405	1,807	2,383	17,922	179,919	-	1,879	-
LaMoure	125,449	601	601	57,337	7,851	1,257	7,583	-	306	-	49,310	-	601	-
McHenry	27,162	134	134	10,424	1,617	291	1,592	-	699	-	11,982	-	289	-
Morton	1,293,551	5,363	-	487,152	-	87,863	200,099	368	9,916	-	494,318	-	3,110	5,362
Nelson	3,752	17	17	1,787	285	37	183	54	97	-	1,242	-	33	-
Oliver	683,558	3,618	-	406,182	-	407	15,408	-	14,381	-	233,901	-	6,042	3,618
Pierce	342,585	1,401	1,401	125,904	17,229	4,287	34,842	-	3,861	-	151,785	-	1,877	-
Steele	152,778	761	761	62,205	15,140	1,707	5,157	`2,931	3,928	-	59,427	-	761	-
Ward	323,148	1,244	1,232	78,595	6,120	24,482	68,832	403	13,366	-	128,475	-	399	-
2016	6,400,787	28,399	12,254	2,558,108	211,582	262,149	692,384	10,655	84,119	15,530	2,481,660	23	32,293	11,632
Adams	274,337	1,162	-	139,639	7,819	6,466	8,756	527	6,284	-	100,196	-	2,325	1,162
Barnes	891,959	3,804	3,803	383,248	65,456	29,923	82,116	-	11,260	-	308,546	-	3,803	-
Bowman	61,664	340	-	19,111	2,527	2,559	5,323	841	678	-	29,093	-	851	340
Burleigh	513,567	2,258	2,258	104,687	3,854	59,025	109,932	359	6,657	-	223,165	-	1,372	-
Cavalier	590,505	2,701	-	285,326	50,298	6,228	42,934	-	10,469	-	187,146	-	5,403	-
Dickey	204,293	865	865	84,815	12,074	4,173	20,387	-	2,726	-	77,531	-	856	-
Griggs	359,723	1,565	1,565	154,974	15,730	2,447	20,298	1,565	1,941	15,530	142,446	-	1,659	-
LaMoure	110,233	498	498	51,462	5,887	1,110	6,245	-	251	-	43,783	-	498	-
McHenry	6,341	30	30	2,496	361	69	396	21	156	-	2,720	-	60	-

Appendix Table F2. Property Taxes Paid, by Political Subdivision, by Year, by County, 2015-2019

Row Labels	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Districts 2200	Sum of Soil Cons. Districts 2300	Sum of SW Water Authority 2400
Morton	1,603,614	6,815	-	568,598	-	109,827	239,996	422	11,710	-	655,481	-	3,952	6,814
Nelson	3,401	15	15	1,646	247	33	180	39	85	-	1,111	-	30	-
Oliver	635,111	3,316	-	361,288	-	1,037	14,712	-	12,598	-	233,075	-	5,769	3,316
Pierce	263,932	1,181	1,181	77,231	13,713	3,817	31,828	1,311	4,382	-	127,859	-	1,429	-
Steele	132,356	670	670	53,758	14,001	1,428	4,428	2,588	3,495	-	50,648	-	670	-
Towner	195,390	1,003	-	92,235	12,003	2,632	9,979	2,366	4,231	-	69,776	-	1,164	-
Ward	358,972	1,367	1,367	87,444	6,596	28,859	77,829	615	3,225	-	150,975	-	694	-
Rolette	195,390	806	-	90,150	1,016	2,515	17,046	-	3,970	-	78,107	23	1,757	-
2017	8,709,857	40,911	14,238	3,326,563	275,540	321,481	921,395	19,920	133,061	7,635	3,577,684	40	50,707	20,681
Adams	487,222	2,147	-	222,575	15,665	10,925	16,468	926	11,429	-	200,645	-	4,294	2,147
Barnes	853,303	3,678	3,677	348,366	63,565	28,973	80,354	-	10,808	-	310,206	-	3,677	-
Bowman	56,985	341	-	14,047	2,279	2,666	5,237	765	798	-	29,657	-	853	341
Burleigh	479,326	2,201	2,201	81,998	4,128	57,517	98,070	329	6,288	-	225,033	-	1,561	-
Cavalier	560,154	2,647	-	246,180	51,567	6,277	42,345	-	10,189	-	195,655	-	5,294	-
Dickey	199,400	881	881	75,645	13,076	4,323	21,632	-	2,838	-	79,103	-	1,022	-
Griggs	313,214	1,539	1,539	121,397	16,531	2,385	20,230	1,539	1,921	7,635	136,990	-	1,508	-
Hettinger	190,854	916	-	64,196	10,458	3,957	11,933	5,321	4,257	-	87,289	-	1,777	751
LaMoure	99,070	462	462	40,963	6,570	1,173	7,782	-	218	-	40,977	-	462	-
McHenry	9,991	52	52	3,272	621	134	761	33	281	-	4,698	-	87	-
Mercer	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Morton	1,324,340	5,913	-	430,303	529	90,226	212,996	324	11,853	-	562,853	-	3,429	5,913
Nelson	7,105	33	33	3,117	529	79	412	104	186	-	2,547	-	64	-
Oliver	1,381,839	8,081	-	749,491	-	3,884	29,218	-	29,391	-	538,499	-	15,193	8,081
Pierce	248,647	1,133	1,133	71,046	13,751	3,891	30,366	1,186	3,427	-	121,386	-	1,326	-
Stark	752,946	3,448	-	244,218	-	30,034	100,622	2,676	12,167	-	352,885	-	3,448	3,448

Appendix Table F2. Property Taxes Paid, by Political Subdivision, by Year, by County, 2015-2019

Row Labels	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Districts 2200	Sum of Soil Cons. Districts 2300	Sum of SW Water Authority 2400
Steele	127,915	640	640	53,351	13,991	1,403	4,281	-	3,341	-	49,626	-	640	-
Stutsman	543,192	2,279	2,279	162,020	30,653	34,005	93,603	-	7,078	-	211,092	-	182	-
Towner	343,056	1,732	-	153,353	22,506	5,330	17,627	6,072	7,310	-	127,137	-	1,991	-
Ward	388,243	1,328	1,341	94,205	7,310	29,791	98,168	646	3,456	-	151,283	-	717	-
Rolette	343,056	1,460	-	146,820	1,810	4,508	29,291	-	5,823	-	150,122	40	3,182	-
2018	10,608,072	51,550	18,949	3,668,375	309,959	390,924	1,232,257	33,026	175,517	6,967	4,625,884	40	68,259	26,365
Adams	487,930	2,243	-	198,775	16,002	11,226	17,289	962	12,356	-	222,350	-	4,485	2,243
Barnes	795,148	3,384	3,384	339,592	56,867	26,943	65,068	-	9,847	-	286,341	-	3,722	-
Bowman	50,823	305	-	12,541	2,096	1,883	4,914	673	635	-	26,708	-	762	305
Burleigh	429,088	2,011	2,011	65,316	4,110	52,523	89,706	396	5,720	-	205,889	-	1,408	-
Cavalier	527,219	2,500	-	221,439	47,990	6,535	37,907	-	9,531	-	196,316	-	5,001	-
Dickey	196,803	867	867	76,063	12,676	4,295	21,431	-	2,777	-	76,958	-	867	-
Griggs	286,230	1,405	1,405	107,041	14,735	2,057	17,479	1,405	1,720	6,967	130,683	-	1,334	-
Hettinger	350,687	1,669	-	122,016	17,682	6,311	20,663	10,029	7,884	-	160,827	-	2,521	1,085
LaMoure	84,014	397	397	33,848	5,964	1,142	5,983	-	186	-	35,698	-	397	-
McHenry	8,829	46	46	2,848	532	112	667	34	255	-	4,214	-	73	-
Mercer	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Morton	1,544,333	6,858	-	474,487	583	105,443	240,308	3,060	13,672	-	687,656	-	5,408	6,858
Nelson	6,567	30	30	2,941	509	75	363	131	165	-	2,269	-	54	-
Oliver	1,446,009	10,055	-	647,413	-	3,121	47,254	-	37,975	-	664,998	-	25,138	10,055
Pierce	223,361	1,035	1,035	63,774	12,565	3,277	27,366	1,292	2,872	-	109,110	-	1,035	-
Stark	1,316,067	5,820	-	414,783	-	60,853	177,163	5,717	21,247	-	618,845	-	5,820	5,820
Steele	119,433	581	581	48,363	13,300	1,391	3,827	-	3,109	-	47,701	-	581	-
Stutsman	878,201	3,575	3,575	251,415	47,999	50,198	172,923	-	17,244	-	331,019	-	250	-
Towner	348,508	1,711	-	152,872	23,343	4,538	19,150	6,000	8,387	-	130,590	-	1,917	-

Appendix Table F2. Property Taxes Paid, by Political Subdivision, by Year, by County, 2015-2019

Row Labels	Sum of Property Tax Paid	Sum of State 1000	Sum of Garrison Diversion	Sum of Counties 1200	Sum of Townships 1500	Sum of City Park Districts 1700	Sum of Cities 1600	Sum of Rural Ambulance	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Districts 2200	Sum of Soil Cons. Districts 2300	Sum of SW Water Authority 2400
Ward	545,256	1,754	1,754	126,018	9,122	39,975	153,448	864	5,102	-	206,532	-	686	-
Williams	615,058	3,863	3,863	149,012	22,291	4,183	80,246	2,461	7,695	-	337,926	-	3,518	-
Rolette	348,508	1,439	-	157,818	1,594	4,843	29,102	-	7,137	-	143,253	40	3,282	-
2019	10,572,386	50,520	19,063	3,617,176	326,482	389,859	1,186,410	33,771	179,907	6,090	4,670,079	38	67,592	25,399
Grand Total	42,253,796	197,741	78,435	15,582,839	1,348,678	1,607,792	4,683,447	104,496	657,580	54,143	17,598,233	141	246,819	93,451

Appendix Table F3. Property Taxes Paid, Annual County Summary, by Political Subdivision and Year, North Dakota, 2015-2019

Row Labels	Sum of State 1000	Sum of Garrison Diversion 1100	Sum of Counties 1200	Sum of Townships 1500	Sum of Cities 1600	Sum of City Park Districts 1700	Sum of Rural Ambulance 1800	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Districts 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
ADAMS													
2015	0.41%	0.00%	54.03%	2.70%	3.29%	2.36%	0.00%	2.09%	0.00%	33.90%	0.00%	0.82%	0.41%
2016	0.42%	0.00%	50.90%	2.85%	3.19%	2.36%	0.19%	2.29%	0.00%	36.52%	0.00%	0.85%	0.42%
2017	0.44%	0.00%	45.68%	3.22%	3.38%	2.24%	0.19%	2.35%	0.00%	41.18%	0.00%	0.88%	0.44%
2018	0.46%	0.00%	40.74%	3.28%	3.54%	2.30%	0.20%	2.53%	0.00%	45.57%	0.00%	0.92%	0.46%
2019	0.45%	0.00%	44.22%	3.39%	3.02%	2.09%	0.18%	2.46%	0.00%	42.86%	0.00%	0.89%	0.45%
BARNES													
2015	0.43%	0.43%	40.30%	8.03%	9.73%	3.47%	0.00%	1.29%	0.00%	35.89%	0.00%	0.43%	0.00%
2016	0.43%	0.43%	42.97%	7.34%	9.21%	3.35%	0.00%	1.26%	0.00%	34.59%	0.00%	0.43%	0.00%
2017	0.43%	0.43%	40.83%	7.45%	9.42%	3.40%	0.00%	1.27%	0.00%	36.35%	0.00%	0.43%	0.00%
2018	0.43%	0.43%	42.71%	7.15%	8.18%	3.39%	0.00%	1.24%	0.00%	36.01%	0.00%	0.47%	0.00%
2019	0.42%	0.42%	41.78%	7.31%	9.06%	3.56%	0.00%	1.38%	0.00%	35.63%	0.00%	0.46%	0.00%
BOWMAN													
2015	0.63%	0.00%	28.50%	4.34%	9.06%	4.13%	1.79%	1.44%	0.00%	48.49%	0.00%	0.99%	0.63%
2016	0.55%	0.00%	30.99%	4.10%	8.63%	4.15%	1.36%	1.10%	0.00%	47.18%	0.00%	1.38%	0.55%
2017	0.60%	0.00%	24.65%	4.00%	9.19%	4.68%	1.34%	1.40%	0.00%	52.04%	0.00%	1.50%	0.60%
2018	0.60%	0.00%	24.68%	4.12%	9.67%	3.71%	1.33%	1.25%	0.00%	52.55%	0.00%	1.50%	0.60%
2019	0.60%	0.00%	25.85%	3.95%	9.53%	3.77%	1.53%	1.23%	0.00%	51.75%	0.00%	1.20%	0.60%
BURLEIGH													
2015	0.44%	0.44%	20.96%	0.60%	21.45%	11.73%	0.08%	1.24%	0.00%	42.93%	0.00%	0.14%	0.00%
2016	0.44%	0.44%	20.38%	0.75%	21.41%	11.49%	0.07%	1.30%	0.00%	43.45%	0.00%	0.27%	0.00%
2017	0.46%	0.46%	17.11%	0.86%	20.46%	12.00%	0.07%	1.31%	0.00%	46.95%	0.00%	0.33%	0.00%
2018	0.47%	0.47%	15.22%	0.96%	20.91%	12.24%	0.09%	1.33%	0.00%	47.98%	0.00%	0.33%	0.00%
2019	0.45%	0.45%	16.17%	0.89%	20.84%	11.77%	0.09%	1.29%	0.00%	47.66%	0.00%	0.39%	0.00%
CAVALIER													

Appendix Table F3. Property Taxes Paid, Annual County Summary, by Political Subdivision and Year, North Dakota, 2015-2019

Row Labels	Sum of State 1000	Sum of Garrison Diversion 1100	Sum of Counties 1200	Sum of Townships 1500	Sum of Cities 1600	Sum of City Park Districts 1700	Sum of Rural Ambulance 1800	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Districts 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
2015	0.46%	0.00%	51.86%	8.37%	5.89%	1.13%	0.00%	1.78%	0.00%	29.57%	0.00%	0.93%	0.00%
2016	0.46%	0.00%	48.32%	8.52%	7.27%	1.05%	0.00%	1.77%	0.00%	31.69%	0.00%	0.91%	0.00%
2017	0.47%	0.00%	43.95%	9.21%	7.56%	1.12%	0.00%	1.82%	0.00%	34.93%	0.00%	0.95%	0.00%
2018	0.47%	0.00%	42.00%	9.10%	7.19%	1.24%	0.00%	1.81%	0.00%	37.24%	0.00%	0.95%	0.00%
2019	0.46%	0.00%	41.71%	8.96%	6.65%	1.30%	0.00%	1.75%	0.00%	38.24%	0.00%	0.92%	0.00%
DICKEY													
2015	0.41%	0.41%	42.54%	5.74%	9.18%	2.17%	0.00%	1.25%	0.00%	37.85%	0.00%	0.44%	0.00%
2016	0.42%	0.42%	41.52%	5.91%	9.98%	2.04%	0.00%	1.33%	0.00%	37.95%	0.00%	0.42%	0.00%
2017	0.44%	0.44%	37.94%	6.56%	10.85%	2.17%	0.00%	1.42%	0.00%	39.67%	0.00%	0.51%	0.00%
2018	0.44%	0.44%	38.65%	6.44%	10.89%	2.18%	0.00%	1.41%	0.00%	39.10%	0.00%	0.44%	0.00%
2019	0.44%	0.44%	37.37%	6.75%	11.28%	2.42%	0.00%	1.53%	0.00%	39.36%	0.00%	0.39%	0.00%
GRIGGS													
2015	0.40%	0.40%	42.71%	4.51%	5.68%	0.68%	0.40%	0.53%	4.01%	40.25%	0.00%	0.42%	0.00%
2016	0.44%	0.44%	43.08%	4.37%	5.64%	0.68%	0.44%	0.54%	4.32%	39.60%	0.00%	0.46%	0.00%
2017	0.49%	0.49%	38.76%	5.28%	6.46%	0.76%	0.49%	0.61%	2.44%	43.74%	0.00%	0.48%	0.00%
2018	0.49%	0.49%	37.40%	5.15%	6.11%	0.72%	0.49%	0.60%	2.43%	45.66%	0.00%	0.47%	0.00%
2019	0.52%	0.52%	37.08%	5.47%	6.11%	0.71%	0.52%	0.75%	2.59%	45.29%	0.00%	0.44%	0.00%
HETTINGER													
2015	0.48%	0.00%	44.69%	5.72%	5.81%	2.10%	0.00%	2.25%	0.00%	37.54%	0.00%	0.93%	0.48%
2016	0.43%	0.00%	38.35%	5.09%	6.39%	2.28%	1.20%	1.98%	0.00%	42.94%	0.00%	0.92%	0.43%
2017	0.48%	0.00%	33.64%	5.48%	6.25%	2.07%	2.79%	2.23%	0.00%	45.74%	0.00%	0.93%	0.39%
2018	0.48%	0.00%	34.79%	5.04%	5.89%	1.80%	2.86%	2.25%	0.00%	45.86%	0.00%	0.72%	0.31%
2019	0.43%	0.00%	34.39%	5.24%	5.80%	1.86%	2.84%	2.25%	0.00%	45.57%	0.00%	1.19%	0.43%
LAMOURE													
2015	0.48%	0.48%	45.71%	6.26%	6.05%	1.00%	0.00%	0.24%	0.00%	39.31%	0.00%	0.48%	0.00%

Appendix Table F3. Property Taxes Paid, Annual County Summary, by Political Subdivision and Year, North Dakota, 2015-2019

Row Labels	Sum of State 1000	Sum of Garrison Diversion 1100	Sum of Counties 1200	Sum of Townships 1500	Sum of Cities 1600	Sum of City Park Districts 1700	Sum of Rural Ambulance 1800	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Districts 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
2016	0.45%	0.45%	46.69%	5.34%	5.66%	1.01%	0.00%	0.23%	0.00%	39.72%	0.00%	0.45%	0.00%
2017	0.47%	0.47%	41.35%	6.63%	7.85%	1.18%	0.00%	0.22%	0.00%	41.36%	0.00%	0.47%	0.00%
2018	0.47%	0.47%	40.29%	7.10%	7.12%	1.36%	0.00%	0.22%	0.00%	42.49%	0.00%	0.47%	0.00%
2019	0.48%	0.48%	40.38%	7.49%	7.14%	1.42%	0.00%	0.23%	0.00%	41.89%	0.00%	0.48%	0.00%
MCHENRY													
2015	0.49%	0.49%	38.38%	5.95%	5.86%	1.07%	0.00%	2.57%	0.00%	44.11%	0.00%	1.06%	0.00%
2016	0.48%	0.48%	39.37%	5.69%	6.25%	1.09%	0.34%	2.47%	0.00%	42.89%	0.00%	0.95%	0.00%
2017	0.52%	0.52%	32.75%	6.22%	7.61%	1.34%	0.33%	2.82%	0.00%	47.02%	0.00%	0.87%	0.00%
2018	0.53%	0.53%	32.26%	6.03%	7.55%	1.27%	0.39%	2.89%	0.00%	47.73%	0.00%	0.83%	0.00%
2019	0.52%	0.52%	31.93%	6.14%	7.16%	1.24%	0.38%	2.88%	0.00%	48.42%	0.00%	0.81%	0.00%
MERCER	**2.56%**	**0.00%**	**215.64%**	**0.00%**	**63.73%**	**26.65%**	**0.26%**	**7.11%**	**0.00%**	**178.93%**	**0.00%**	**2.56%**	**2.56%**
2015	0.52%	0.00%	42.75%	0.00%	12.96%	5.71%	0.00%	1.37%	0.00%	35.65%	0.00%	0.52%	0.52%
2016	0.52%	0.00%	41.64%	0.00%	13.38%	5.74%	0.00%	1.42%	0.00%	36.25%	0.00%	0.52%	0.52%
2017	0.51%	0.00%	43.37%	0.00%	12.68%	5.44%	0.00%	1.42%	0.00%	35.56%	0.00%	0.51%	0.51%
2018	0.51%	0.00%	44.44%	0.00%	12.52%	4.94%	0.13%	1.46%	0.00%	34.99%	0.00%	0.51%	0.51%
2019	0.50%	0.00%	43.44%	0.00%	12.20%	4.82%	0.13%	1.44%	0.00%	36.49%	0.00%	0.50%	0.50%
MORTON													
2015	0.41%	0.00%	37.66%	0.00%	15.47%	6.79%	0.03%	0.77%	0.00%	38.21%	0.00%	0.24%	0.41%
2016	0.42%	0.00%	35.46%	0.00%	14.97%	6.85%	0.03%	0.73%	0.00%	40.88%	0.00%	0.25%	0.42%
2017	0.45%	0.00%	32.49%	0.04%	16.08%	6.81%	0.02%	0.90%	0.00%	42.50%	0.00%	0.26%	0.45%
2018	0.44%	0.00%	30.72%	0.04%	15.56%	6.83%	0.20%	0.89%	0.00%	44.53%	0.00%	0.35%	0.44%
2019	0.45%	0.00%	30.04%	0.04%	15.62%	6.99%	0.20%	0.87%	0.00%	45.02%	0.00%	0.35%	0.45%
NELSON													
2015	0.46%	0.46%	47.62%	7.59%	4.89%	0.98%	1.44%	2.58%	0.00%	33.11%	0.00%	0.88%	0.00%
2016	0.45%	0.45%	48.39%	7.26%	5.30%	0.98%	1.14%	2.51%	0.00%	32.66%	0.00%	0.87%	0.00%

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Row Labels	Sum of State 1000	Sum of Garrison Diversion 1100	Sum of Counties 1200	Sum of Townships 1500	Sum of Cities 1600	Sum of City Park Districts 1700	Sum of Rural Ambulance 1800	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Districts 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
2017	0.47%	0.47%	43.87%	7.45%	5.80%	1.11%	1.46%	2.62%	0.00%	35.85%	0.00%	0.91%	0.00%
2018	0.46%	0.46%	44.78%	7.74%	5.52%	1.14%	2.00%	2.51%	0.00%	34.55%	0.00%	0.83%	0.00%
2019	0.46%	0.46%	42.80%	6.87%	5.92%	1.12%	2.25%	2.46%	0.00%	36.84%	0.00%	0.82%	0.00%
OLIVER													
2015	0.53%	0.00%	59.42%	0.00%	2.25%	0.06%	0.00%	2.10%	0.00%	34.22%	0.00%	0.88%	0.53%
2016	0.52%	0.00%	56.89%	0.00%	2.32%	0.16%	0.00%	1.98%	0.00%	36.70%	0.00%	0.91%	0.52%
2017	0.58%	0.00%	54.24%	0.00%	2.11%		0.00%	2.13%	0.00%	38.97%	0.00%	1.10%	0.58%
2018	0.70%	0.00%	44.77%	0.00%	3.27%	0.22%	0.00%	2.63%	0.00%	45.99%	0.00%	1.74%	0.70%
2019	0.66%	0.00%	43.61%	0.00%	2.65%	0.33%	0.00%	2.52%	0.00%	48.20%	0.00%	1.36%	0.66%
PIERCE													
2015	0.41%	0.41%	36.75%	5.03%	10.17%	1.25%	0.00%	1.13%	0.00%	44.31%	0.00%	0.55%	0.00%
2016	0.45%	0.45%	29.26%	5.20%	12.06%	1.45%	0.50%	1.66%	0.00%	48.44%	0.00%	0.54%	0.00%
2017	0.46%	0.46%	28.57%	5.53%	12.21%	1.57%	0.48%	1.38%	0.00%	48.82%	0.00%	0.53%	0.00%
2018	0.46%	0.46%	28.55%	5.63%	12.25%	1.47%	0.58%	1.29%	0.00%	48.85%	0.00%	0.46%	0.00%
2019	0.48%	0.48%	26.86%	5.64%	13.02%	1.45%	0.60%	1.42%	0.00%	49.60%	0.00%	0.45%	0.00%
STARK													
2015	0.47%	0.00%	41.20%	0.00%	13.51%	3.44%	0.24%	1.66%	0.00%	38.53%	0.00%	0.47%	0.47%
2016	0.46%	0.00%	39.85%	0.00%	12.53%	3.45%	0.28%	1.76%	0.00%	40.75%	0.00%	0.46%	0.46%
2017	0.46%	0.00%	32.43%	0.00%	13.36%	3.99%	0.36%	1.62%	0.00%	46.87%	0.00%	0.46%	0.46%
2018	0.44%	0.00%	31.52%	0.00%	13.46%	4.62%	0.43%	1.61%	0.00%	47.02%	0.00%	0.44%	0.44%
2019	0.43%	0.00%	31.25%	0.00%	13.40%	4.68%	0.44%	1.65%	0.00%	47.29%	0.00%	0.43%	0.43%
STEELE													
2015	0.50%	0.50%	40.72%	9.91%	3.38%	1.12%	1.92%	2.57%	0.00%	38.90%	0.00%	0.50%	0.00%
2016	0.51%	0.51%	40.62%	10.58%	3.35%	1.08%	1.96%	2.64%	0.00%	38.27%	0.00%	0.51%	0.00%

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Row Labels	Sum of State 1000	Sum of Garrison Diversion 1100	Sum of Counties 1200	Sum of Townships 1500	Sum of Cities 1600	Sum of City Park Districts 1700	Sum of Rural Ambulance 1800	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Districts 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
2017	0.50%	0.50%	41.71%	10.94%	3.35%	1.10%	0.00%	2.61%	0.00%	38.80%	0.00%	0.50%	0.00%
2018	0.49%	0.49%	40.49%	11.14%	3.20%	1.16%	0.00%	2.60%	0.00%	39.94%	0.00%	0.49%	0.00%
2019	0.48%	0.48%	39.56%	11.11%	2.87%	0.80%	0.00%	2.44%	0.00%	41.77%	0.00%	0.48%	0.00%
STUTSMAN													
2015	0.39%	0.39%	37.27%	5.38%	15.79%	5.59%	0.00%	1.25%	0.00%	33.91%	0.00%	0.03%	0.00%
2016	0.39%	0.39%	36.14%	5.31%	15.98%	5.66%	0.00%	1.02%	0.00%	35.07%	0.00%	0.03%	0.00%
2017	0.42%	0.42%	29.83%	5.64%	17.23%	6.26%	0.00%	1.30%	0.00%	38.86%	0.00%	0.03%	0.00%
2018	0.41%	0.41%	28.63%	5.47%	19.69%	5.72%	0.00%	1.96%	0.00%	37.69%	0.00%	0.03%	0.00%
2019	0.41%	0.41%	29.08%	5.42%	18.95%	5.94%	0.00%	2.02%	0.00%	37.75%	0.00%	0.02%	0.00%
TOWNER													
2015	0.53%	0.00%	46.79%	6.60%	4.86%	1.47%	1.02%	2.16%	0.00%	35.90%	0.00%	0.67%	0.00%
2016	0.51%	0.00%	47.21%	6.14%	5.11%	1.35%	1.21%	2.17%	0.00%	35.71%	0.00%	0.60%	0.00%
2017	0.50%	0.00%	44.70%	6.56%	5.14%	1.55%	1.77%	2.13%	0.00%	37.06%	0.00%	0.58%	0.00%
2018	0.49%	0.00%	43.86%	6.70%	5.49%	1.30%	1.72%	2.41%	0.00%	37.47%	0.00%	0.55%	0.00%
2019	0.49%	0.00%	44.00%	6.82%	5.57%	1.39%	1.69%	2.38%	0.00%	36.46%	0.00%	1.21%	0.00%
WARD													
2015	0.39%	0.38%	24.32%	1.89%	21.30%	7.58%	0.12%	4.14%	0.00%	39.76%	0.00%	0.12%	0.00%
2016	0.38%	0.38%	24.36%	1.84%	21.68%	8.04%	0.17%	0.90%	0.00%	42.06%	0.00%	0.19%	0.00%
2017	0.34%	0.35%	24.26%	1.88%	25.29%	7.67%	0.17%	0.89%	0.00%	38.97%	0.00%	0.18%	0.00%
2018	0.32%	0.32%	23.11%	1.67%	28.14%	7.33%	0.16%	0.94%	0.00%	37.88%	0.00%	0.13%	0.00%
2019	0.34%	0.34%	20.15%	1.88%	27.79%	9.28%	0.17%	0.98%	0.00%	38.94%	0.00%	0.14%	0.00%
WILLIAMS													
2015	0.64%	0.64%	32.81%	4.46%	13.08%	0.65%	0.26%	1.19%	0.00%	45.76%	0.00%	0.50%	0.00%
2016	0.64%	0.64%	30.88%	4.44%	13.91%	0.62%	0.30%	1.20%	0.00%	46.74%	0.00%	0.63%	0.00%
2017	0.65%	0.65%	26.47%	4.18%	13.90%	0.51%	0.40%	1.30%	0.00%	51.26%	0.00%	0.68%	0.00%

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Row Labels	Sum of State 1000	Sum of Garrison Diversion 1100	Sum of Counties 1200	Sum of Townships 1500	Sum of Cities 1600	Sum of City Park Districts 1700	Sum of Rural Ambulance 1800	Sum of Rural Fire Protection 1900	Sum of Hospital Districts 2000	Sum of School Districts 2100	Sum of Recreation Service Districts 2200	Sum of Soil Conservation Districts 2300	Sum of Southwest Water Authority 2400
2018	0.63%	0.63%	24.23%	3.62%	13.05%	0.68%	0.40%	1.25%	0.00%	54.94%	0.00%	0.57%	0.00%
2019	0.60%	0.60%	22.42%	3.33%	13.16%	0.57%	0.50%	1.17%	0.00%	57.04%	0.00%	0.60%	0.00%