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

## Executive Summary

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## Executive Summary

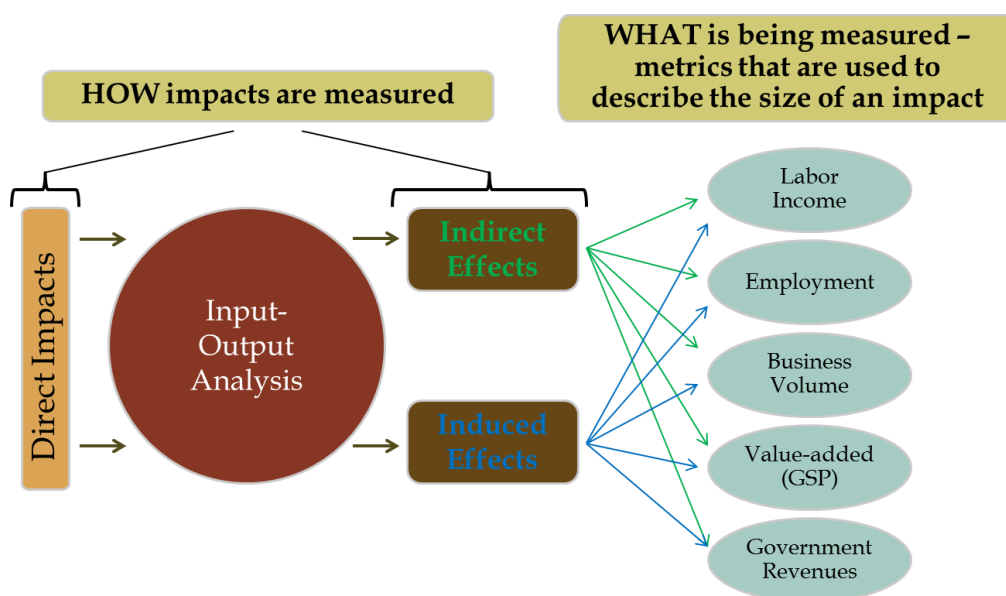
The wind Energy Industry has grown substantially since 2002. With less than 5 megawatts (MW) of generating capacity in 2002, the Wind Energy Industry has grown to 3,600 MW of generating capacity in 2019. The industry continues to tap into North Dakota's abundant wind resources, and has grown to become 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 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, and capital outlays. Additional data was collected from various federal and state government agencies.

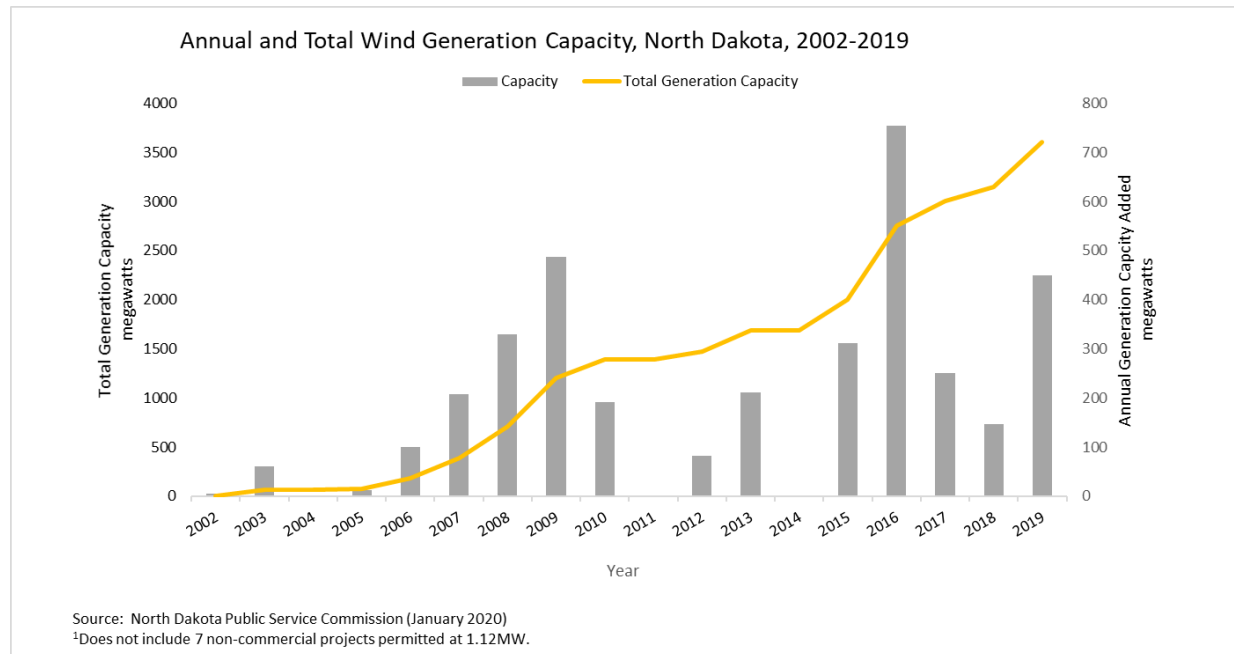
Survey data represented over 60 percent of the generating capacity of wind farms in North Dakota and was extrapolated to estimate all farms operating in the state.

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. As is typical with economic contribution assessments, information from the industry helps to estimate both indirect (output from businesses) and induced (output from households) effects to produce various metrics that describe the economic footprint of the industry.



## Generation Capacity

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 3,600 MW of electricity in 2019.



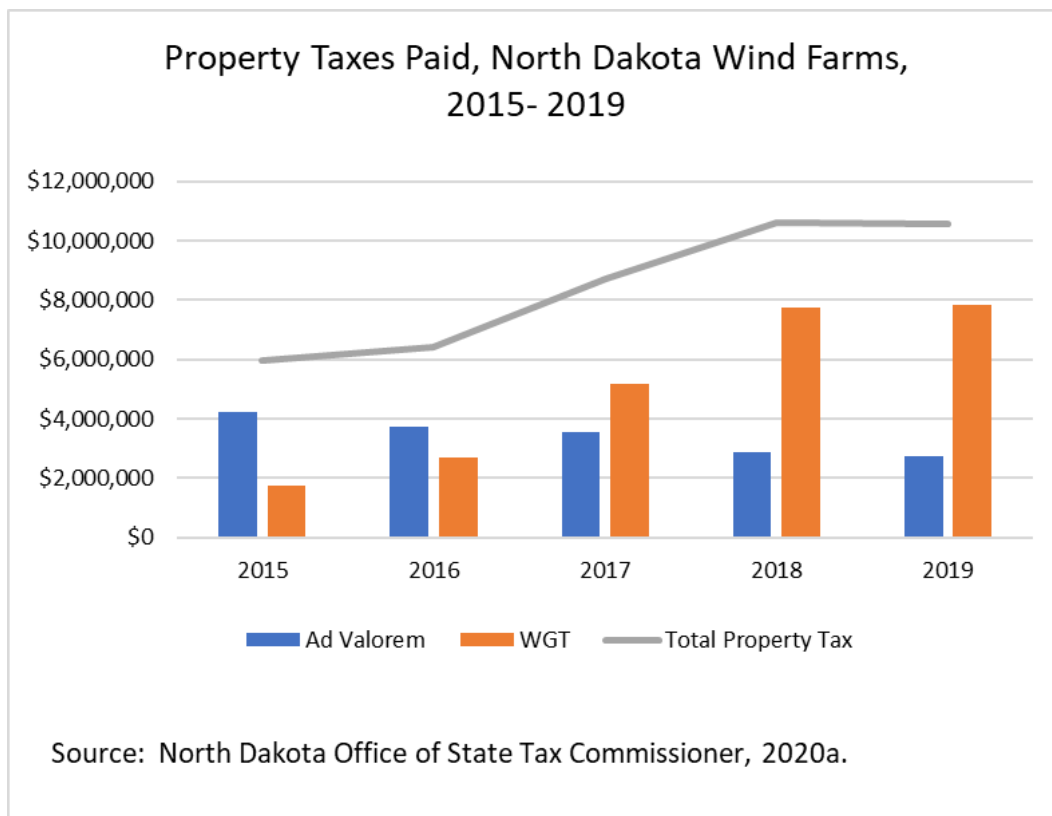
## Property Tax Revenues

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, similar to 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 State Tax Commissioner 2017).

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 (North Dakota Office of State Tax Commissioner, 2020a).

### Property Taxes, Wind Farms, North Dakota, 2015-2019

Year	Ad Valorem	Wind Generation Tax	Total Property Tax
-----nominal dollars-----			
<b>2015</b>	4,232,656	1,730,037	5,962,693
<b>2016</b>	3,717,396	2,683,391	6,400,787
<b>2017</b>	3,534,304	5,175,554	8,709,857
<b>2018</b>	2,866,719	7,741,353	10,608,072
<b>2019</b>	2,726,251	7,846,120	10,572,386
<b>Total</b>	17,077,326	25,176,470	42,253,796
Source: North Dakota Office of 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, \$6.8, \$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.

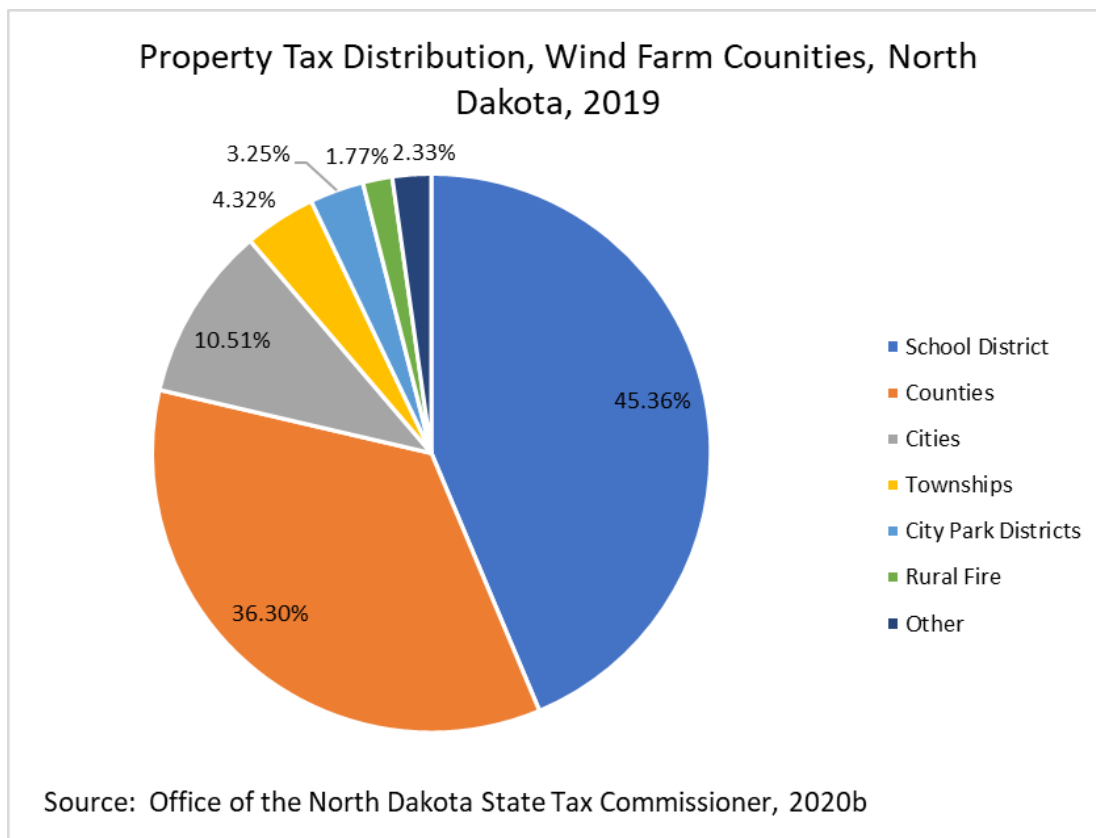
<b>Property Taxes Collected, Counties with Wind Farms, North Dakota, 2015-2019</b>						
<b>County</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>Grand Total</b>
<b>Morton</b>	1,207,734	1,522,077	1,212,774	1,611,181	1,340,647	6,894,412
<b>Oliver</b>	769,375	716,648	1,493,405	1,470,437	1,371,288	5,821,154
<b>Barnes</b>	1,032,938	891,959	853,303	795,148	702,358	4,275,706
<b>Cavalier</b>	654,441	590,505	560,154	527,219	658,811	2,991,130
<b>Stark</b>			562,092	874,104	1,033,860	2,470,056
<b>Rolette</b>		390,780	686,113	697,016	679,759	2,453,667
<b>Burleigh</b>	591,374	513,567	479,326	429,088	387,051	2,400,405
<b>Stutsman</b>			543,192	878,201	856,966	2,278,358
<b>Ward</b>	323,148	358,972	388,243	545,256	494,882	2,110,500
<b>Adams</b>		274,337	487,222	487,930	591,579	1,841,068
<b>Hettinger</b>			381,709	701,374	682,598	1,765,680
<b>Griggs</b>	447,036	359,723	313,214	286,230	235,410	1,641,613
<b>Pierce</b>	342,585	263,932	248,647	223,361	213,180	1,291,705
<b>Williams</b>				615,058	654,740	1,269,798
<b>Dickey</b>	222,844	204,293	199,400	196,803	166,992	990,332
<b>Steele</b>	152,778	132,356	127,915	119,433	104,920	637,402
<b>LaMoure</b>	125,449	110,233	99,070	84,014	64,960	483,725
<b>McHenry</b>	27,162	6,341	9,991	8,829	277,753	330,076
<b>Bowman</b>	62,077	61,664	56,985	50,823	47,629	279,178
<b>Nelson</b>	3,752	3,401	7,105	6,567	7,004	27,829
<b>Total</b>	5,962,693	6,400,787	8,709,857	10,608,072	10,572,386	42,253,796
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: 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.

<b>Property Tax Distributions, by Political Subdivision, Wind Farm Counties and Statewide, 2019 and 2015-2019, North Dakota</b>			
<b>Political Subdivision</b>	<b>Wind Counties (2019)</b>	<b>Statewide (2019)</b>	<b>Statewide (2015-2019)</b>
	-----percent-----		
<b>School Districts</b>	43.43	42.90	41.37
<b>Counties</b>	34.48	36.79	38.66
<b>Cities</b>	10.37	8.65	8.51
<b>Townships</b>	4.60	4.37	4.35
<b>City Park Districts</b>	3.21	2.59	2.53
<b>Rural Fire Protection</b>	1.67	1.88	1.92
<b>Rural Ambulance</b>	0.55	0.94	0.81
<b>Soil Conservation Districts</b>	0.64	0.79	0.77
<b>State</b>	0.48	0.50	0.50
<b>Garrison Diversion</b>	0.27	0.25	0.25
<b>Hospital Districts</b>	0.12	0.19	0.21
<b>Southwest Water Authority</b>	0.17	0.13	0.13
<b>Recreation Service District</b>	0.00	0.00	0.00
<b>Total</b>	100.00	100.00	100.00
Source: North Dakota Office of State Tax Commissioner, 2020b.			

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 of the political subdivisions supported by property taxes.

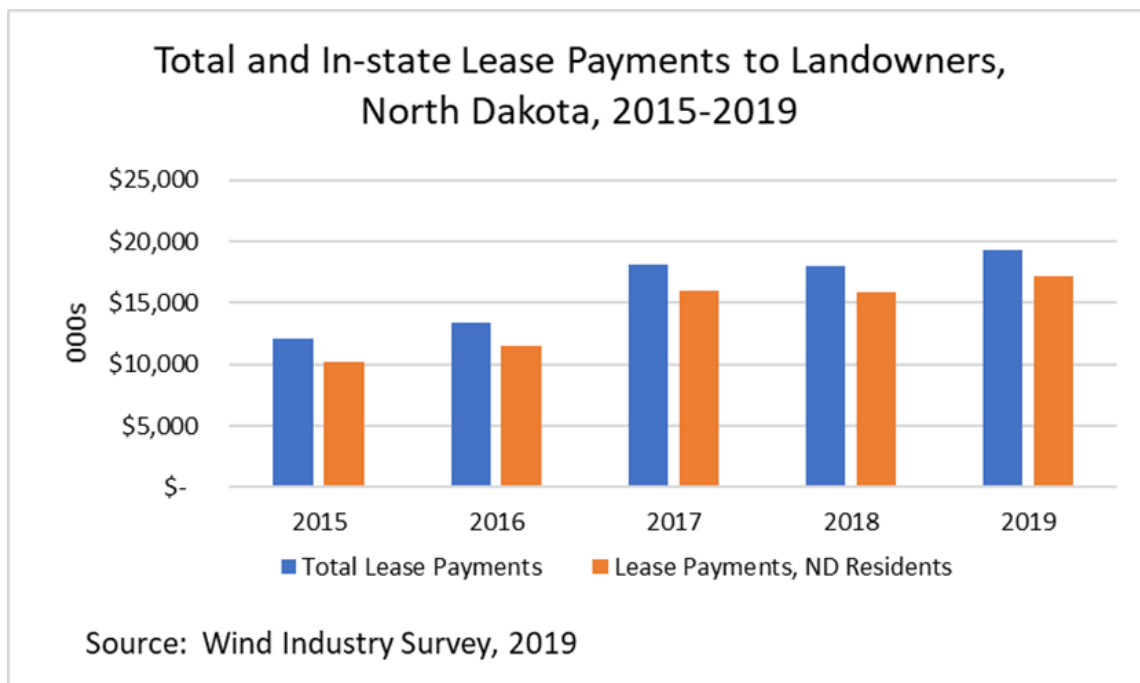


### *Land Lease Payments*

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 \$19.2 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*

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, classified as indirect or 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. 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.

<b>Wind Industry Employment, by Industry Segment, North Dakota, 2019</b>			
<b>Industry Segment</b>	<b>Direct Employment</b>	<b>Secondary Employment (Indirect and Induced)</b>	<b>Total Employment</b>
<b>Wind Operations</b>	168	468	636
<b>Construction, Manufacturing and Non-construction Capital Outlays</b>	1,658	1,125	2,783
<b>Combined Segments</b>	1,826	1,593	3,419

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 1,826. Secondary employment sustained by the industry in 2019 from construction and manufacturing activities were estimated at 1,593, 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.

## *Economic Effects*

A number of economic metrics, in addition to employment (jobs), are used to measure the size of an economy, and therefore also are 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) also are used to explain how values are created or generated by an industry.

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.

### KEY ECONOMIC METRICS

#### **Labor Income:**

Includes wages, salaries, bonuses, sole-proprietor's income, and all employment benefits.

#### **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.

#### **Gross Output:**

This is the total business volume generated by an industry. It is analogous to the sum of gross receipts in all economic sectors. This measure does count the purchases of inputs used in the production of other goods and services.

### Key Economic Measures of Wind Energy Industry, North Dakota, 2019

Industry Segment and Economic Metric	Direct	Secondary (Indirect and Induced)	Total (Direct and Secondary)
<b>Wind Farm Operations:</b>	----- 000s 2019 \$ -----		
Labor Income	14,160	24,490	38,650
Value Added	264,841	37,134	301,975
Gross Output	320,014	71,572	391,586
<b>Construction, Manufacturing, and non-construction Capital Outlays</b>			
Labor Income	131,221	65,686	19877
Value Added	220,577	106,929	327,506
Gross Output	670,397	204,803	874,480

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

Type of Economic Effect	Employment <sup>1</sup>	Labor Income	Value-added	Output
	----- 000s 2019 \$ -----			
Direct	1,826	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
<b>Total</b>	<b>3,421</b>	<b>237,555.3</b>	<b>629,481.5</b>	<b>1,266,065.3</b>

<sup>1</sup> Employment represents total jobs and does not represent employment in FTE.

### *Total Industry Generated State and Local Tax 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. 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.

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

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