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The South Dakota Wind Blueprint

Envisioning One Thousand Megawatts of New Capacity

An Economic Impact Analysis

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Prepared for:
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Table of Contents

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At a Glance Executive Summary[1,2,3]

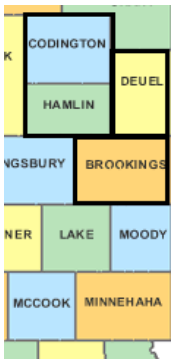
General Model Inputs: 2010 - 2011	*State Impact*	*County Impact*
South Dakota Blueprint Project Budget ($2010)		
Total Project Cost (All Sources)	$2,019 Million	$2,019 Million
South Dakota Direct Construction Activity	$334.7 Million	$25.5 Million
Construction Economic Activity		
Budgeted Direct Construction Costs	$334.7 Million	$25.5 Million
Estimated Output Economic Impact	$538.8 Million	$27.0 Million
Estimated Value Added or Income	$163.8 Million	$12.0 Million
Estimated Full and Part Time Jobs (over 2yrs)	5,360	238
Blueprint Project Operating Budget		
Budgeted Direct Operations ($2010)	$2.5 Million	$2.5 Million
Estimated Output Economic Impact	$19.8 Million	$17.2 Million
Estimated Value Added or Income	$6.5 Million	$7.4 Million
Estimated Full and Part Time Jobs	184	132
Agricultural Income Estimated Loss		
Estimated Turbine Footprint Loss	$29.5 Thousand	$29.5 Thousand
Estimated Transmission Tower Footprint Loss	$24.6 Thousand	$24.6 Thousand
Land Lease		
Payments to Landowners		$2.7 Million
Tax Revenues		
Nameplate Tax (Immediate - $3/kW Nameplate Capacity)		$3.0 Million
Production Tax (See Page 25 for table showing tax revenues)		$349.5 Thousand
Contractor Excise, Sales & Use Tax ($2.0 Billion Project)	$32.9 Million	
Contractor Excise, Sales & Use Tax ($0.4 Billion Project)	$6.8 Million	
Transmission CE, Sales & Use ($169.1 Million)	$3.2 Million	
Transmission Economic Activity	*State Impact*	*County Impact*
Budgeted Direct Construction Costs	$42.3 Million	$42.3 Million
Estimated Output Economic Impact	$56.9 Million	$52.0 Million
Estimated Value Added or Income	$21.6 Million	$19.1 Million
Estimated Full and Part Time Jobs (over 2yrs)	445	411

[1] All dollar amounts presented are in 2010 dollars.
[2] South Dakota Blueprint Project is a summary of smaller projects totaling 1,000 MW of capacity.
[3] Construction activities for generation and transmission are one-time expenditures. The operating budget, land lease payments, tax revenues and agricultural income losses due to land change of use are annual flows.

The Economic Impact of Adding 1,000 Megawatts of New Wind Generation Capacity

The South Dakota Wind Energy Association (SDWEA) requested an economic impact estimate for 1,000 megawatts of wind energy capacity constructed in Deuel County. The hypothetical project included in the South Dakota Wind Blueprint is located in Deuel County, a wind rich geography in South Dakota just across the border from Minnesota's Buffalo Ridge wind development. Estimating the magnitude of business activity using reasonable assumptions is the goal of this project. Clearly, clean energy development of this magnitude would provide substantial economic benefits to landowners and construction workers immediately and more generally create business activity, bring new jobs, new wealth and tax contributions for South Dakotans at the time of construction and ongoing economic benefits into the future.

The analysis assumes that Deuel County is the direct beneficiary of economic impacts with all structures and machines being located in that county. It is assumed that the indirect purchases from surrounding businesses and the households' induced expenditures will benefit the nearby trade centers of Brookings and Watertown.



Geographically, Brookings County is located south of Deuel County while Codington and Hamlin counties share Deuel County's western border. Grant County is situated north of Deuel. Economically, the two prominent trade centers nearest to Deuel County are the communities of Brookings and Watertown. These counties are located in Brookings and Codington counties, respectively.

Watertown is located 27 miles north and west of Deuel County's seat of government in Clear Lake. The Watertown community is part of a Micropolitan Statistical Area with a designation that includes Codington and Hamlin counties. The community of Brookings is also a Micropolitan Statistical Area that includes all of Brookings County. Brookings, the community, is located approximately 36 miles from Clear Lake. Sioux Falls is the state's largest trade center; it is a Metropolitan Statistical Area and is located approximately 90 miles south of Clear Lake in Minnehaha County. All three trade center communities are locate on I-29 and are a substantial part of the economically important I-29 corridor which continues south beyond Sioux Falls to the Iowa border and the community of Sioux City.

Table 1
Proximity of Trade Center Communities Surrounding Deuel County

Trade Centers	2007 Population[4]	Distance from Brookings[5]	Retail Trade Employment[6]
Brookings, SD	19,463	36	2,208
Sioux Falls, SD	151,505	90	20,478
Watertown, SD	20,530	27	3,413

Introduction

This economic analysis addresses estimates of the financial impact that would result from constructing and operating wind projects that would have nameplate capacity totaling 1,000 MW as described in the South Dakota Wind Blueprint Project (SDWBP). Four (4) counties border Deuel County: Brookings, Codington, Hamlin, and Grant counties. Two (2) of the 4 border counties and Deuel County are included in the economic impact estimate: Brookings and Codington counties. Brookings and Codington counties host the area's two trade centers and are expected to economically benefit from a substantial wind generation resource located in a neighboring county.

The operation of the power generation facilities will have economic impacts affecting businesses and government services throughout the state of South Dakota and spill into the business and governmental sectors of neighboring states. The construction of the facility will have regional and potentially national impacts as workers are brought in from a much larger geography to install the necessary infrastructure, assemble the wind machines and construct support structures and facilities.

In addition to the construction and installation of the wind energy generation capacity, 115 kV transmission network upgrades will be required in the area surrounding the projects to move power from the wind generators to new 345 kV transmission lines located in Brookings, Deuel and Grant counties.

Beyond the construction impacts, the energy project would be expected to provide long term employment for 10 to 12 people that will live in the greater Deuel county area which may include the area's larger communities of Brookings and Watertown in South Dakota.

Economic Impacts will be estimated for two levels of geography. The first estimate is the expected economic impact on the state of South Dakota. The second impact analysis will be for Deuel County and the 2 counties hosting the area trade centers: Brookings and Codington.

[4] Population Finder, US Census Bureau, 2007 estimate
[5] MapQuest Direction Finder
[6] Retail Trade Employment in the Sioux Falls Area and the Brookings and Watertown Micropolitan Areas, Bureau of Economic Analysis, Regional Economic Accounts, Local Personal Income, CA25N

Economic impacts are estimated for the construction of the wind machines, the administrative facility and for the operation of this clean energy resource. Construction activity and the resulting economic impact will occur over a 2 year period starting in 2010 and ending in 2011.[7]

Economic Impact Estimation using JEDI Wind Energy Model

The Jobs and Economic Development Impact (JEDI) wind energy tool was developed by the National Renewable Energy Laboratory (NREL) to assist with the estimation of economic impacts resulting from the constructing and operation of wind energy projects. The JEDI model was developed in 2002 by Marshall Goldberg of MRG & Associates under contract with NREL. State, county or region specific multipliers are obtained using the Impact Analysis for PLANing (IMPLAN) modeling software was developed and is maintained by the Minnesota Implan Group. More on IMPLAN is presented later.

The JEDI model is intended to provide a reasonable estimate of gross economic impact to a specific geography given a set of project inputs. These inputs include hardware or equipment costs, construction costs, and other costs including utility connection, engineering, land easements, and permitting on the front end. That is followed by the employment of operation and maintenance inputs for the calculation of benefits when the project is completed and made operational. The default values in the model are average costs and spending patterns derived by the model's developer over a period of 10 years. MRG & Associates provide default input data for each of the 50 states which when combined with the geography specific IMPLAN model provides impact estimates of jobs, output, earnings, local spending land lease payments and taxes. JEDI organizes the inputs that make up a wind project into categories or industries that efficiently uses the structure of the IMPLAN model to estimate economic impacts.

Economic Impact Estimation using IMPLAN

The multiplier estimation product used in the (JEDI) analysis is IMPLAN (IMpact Analysis for PLANning). IMPLAN was developed at the University of Minnesota over a period of years in conjunction with the U.S. Forest Service's Land Management Planning Unit in Fort Collins. Governmental agencies and leading universities across the nation use this product for estimating economic impacts.

IMPLAN is an input-output (I-O) estimation model. The versatility of this model enables specific analysis for each area of interest, including county, multi-county regions, a state or a group of states. Naturally, some estimation error will remain. The I-O technique describes an enterprise based on average ingredient and performance measures and therefore best predicts the impact of an average enterprise. While the I-O modeling technique has been designed and refined to minimize error, estimation error does occur because of our inability to distinguish the specific enterprise from the average. [8]

[7] All expenditures and impacts are expressed in 2010 dollars.
[8] See Technical Note on page 44 for further comments.

Three multiplier effects are presented: the *output*, *value-added*, and *employment* effects. Each of these in turn reflects three components: the *direct* effect, the *indirect* effect, and the *induced* effect. The output multiplier is the change in the economy required to deliver an additional dollar of construction services to demand. The initial response in final demand is the direct effect, always with a multiplier of 1. The construction contractors will in turn buy goods and services from other industries to produce the dollar's worth of construction, and these industries buy inputs themselves, creating a whole series of additional purchases that are captured by the indirect effect component. Finally, there will be additional purchases motivated by the income generated for households in these transactions; these are called induced effects. All three effects combine to create the output multiplier.

The output multiplier measures the economic activity that will occur as a result of the initial stimulus. It will rise as more inputs are purchased and more income is spent in the region in question. If most inputs are purchased and most income is spent outside the region, the output multiplier will be relatively small. Small counties, for example, will have smaller output multipliers than counties with large wholesale and retail operations, and county multipliers will be smaller than the state multipliers.

The output multiplier is appropriate for sizing up the total economic activity that will occur in an area as a result of a project. The value-added effect is a better measure of the income created for people and the government by the project. Payments for raw materials continue through the system, but payments for labor, or proprietors' income, or distributed corporate profits represent added wealth for people, and thus value-added. Payments for input materials are referred to as "leakages" from the stream of payments. Eventually a dollar spent on the final product ends up split among many income recipients, some of whom live outside the region under consideration. As a result, the value-added multiplier effect is expected to be below one. Like the output multiplier, the value-added effect will typically be larger for the state than for individual counties.

Value-added is decomposed into the same three parts as the output multiplier: direct effects, indirect effects, and induced effects. The direct component will be income generated over and above the cost of resources in the immediate enterprise. The indirect multiplier effect similarly measures net income created in the upstream industries that supply inputs for the final good. The induced component reflects the on-going effect of the income created directly and indirectly: income that is spent on goods and services creates demand for additional goods and services, thus creating a repeating cycle of expenditures. The sum of the three parts creates the value-added multiplier effect.

Finally, the analysis in this report provides an employment multiplier, showing the estimated number of jobs created by one million dollars of output. Again, the multiplier is comprised of three parts. The direct component shows the number of jobs created by the immediate enterprise of the Deuel County Project. The indirect component refers to jobs created in supporting industries, and the induced component reflects jobs created by additional demand throughout the area's economy.

Data Sources for Deuel County Project

The project data used in these analyses to revise JEDI model assumptions for South Dakota was provided to Stuefen Research, LLC by the South Dakota Wind Energy Association (SDWEA). Where data is not available from industry knowledgeable sources, default settings in the JEDI model as developed for projects in South Dakota are used. Much of the actual cost data required to estimate economic impacts using the National Renewable Energy Laboratory (NREL) JEDI model are considered proprietary by many developers and are not available for inclusion in this hypothetical project. Similarly, costs do vary among projects and substantial differences in economic impact estimates can result. Stuefen Research has worked with SDWEA and industry representatives to organize the project data upon which the following economic impact analysis is based with the goal of input costs be reasonable given the present technology.

The default values in the JEDI model represent average costs and spending patterns "derived from a number of sources (project specific data contained in reports and studies) and research and analysis of renewable resources undertaken by the model developer during the past 10 years." A full list of project-specific data sources for the default JEDI average cost data is available in the sited conference paper.[9] The result is a reasonable estimate for a defined geography given MRG & Associates experience with input costs and economic impact estimates for substantial wind generation projects.

Economies of Scale

History suggests the JEDI model was designed around projects averaging less than 100 MW in size. It is reported in the 2009 Wind Technologies Market Report that the average size of wind power projects in the United States was 91 MW. The only year reported as having an average wind farm size greater than 100 MW was in 2007 at 120 MWs.[10] The South Dakota Wind Blueprint anticipates the construction of wind farms of less than 100 MW in size consistent with historical average. The consideration of economies of scale, decreasing costs associated with larger projects, may result in some costs being overstated. The cost of a 100 MW project may be less than the average 91 MW wind farm because of efficiencies garnered in a bigger project.

The JEDI model is a scalar model. The inputs and their costs are scaled to reflect the size of the project without adjustment for economies of size. JEDI model results for a 1,000 MW wind energy project will have the same result as a sum of ten 100 MW projects. This analysis addresses the economic impact of 1,000 MWs of wind farm capacity which is the equivalent of ten 100 MW or eleven 91 MW wind farm projects.

[9] User-Friendly Tool to Calculate Economic Impacts from Coal, Natural Gas, and Wind: The Expanded Jobs and Economic Development Impact Model (JEDI II). S. Tegen, M. Goldberg and M. Milligan, June 2006, p.21

[10] 2009 Wind Technologies Market Report, Ryan Wiser, Mark Bolinger, et al., Lawrence Berkeley National Laboratory, August 2010

Economic Impact Estimates

The South Dakota Wind Blueprint economic impact analysis includes impact estimates for: 1) construction and installation of 1,000 MW of wind power generation and transmission capacity 2) the ongoing operation of the wind energy development; and 3) opportunity costs resulting from the change of agricultural land use. Each of these impacts will be estimated for two levels of geography: the state of South Dakota and three selected South Dakota counties. The counties included in the analyses are Deuel, Codington and Brookings. The South Dakota Wind Blueprint project is a hypothetical renewable energy investment envisioned for location in Deuel County. The neighboring counties, Brookings and Codington, contain two of the state's larger trade centers; Brookings and Watertown. Brookings and Codington counties are included in the economic impact analysis because of their proximity and economic importance to Deuel County.

Project Description

The JEDI model requires data descriptive of the project or for a hypothetical project data based upon reasonable assumptions. The data below is the project description used in the JEDI model to facilitate the calculation of economic impact estimates.

Table 2
Project Description

Project Description	*South Dakota*
Year of Construction	2010
Total Project Size – Nameplate Capacity (MW)	1,000
Number of Projects (included in Total Project Size)	1
Turbine Size (KW)	1,500
Number of Turbines	667
Installed Project Cost ($/KW)	$2,019
Operations and Maintenance Cost ($/kW)	$19.75
Money Value – Current or Constant (Dollar Year)	2010

Project Expenditure Summary

The information below is an expenditure summary for the hypothetical development project included in the South Dakota Wind Blueprint project. The distribution of expenditures is based upon the cost structure shown above and the historical expenditure patterns of the JEDI model.[11]

Table 3
Project Expenditure Summary

Project Expenditure Summary	*South Dakota*
Installed Project Cost	$2,019,466,432
Local Spending During Construction Period	$334,684,124
Total Annual Operational Expenses	$337,324,590
Direct Operating and Maintenance Costs	$19,750,000
Local Spending	$5,414,518
Other Annual Costs	$317,574,590
Local Spending	$6,026,251
Debt and Equity Payments	$0
Nameplate Capacity Production Tax	$3,000,000
Land Lease	$2,668,000
Production Tax in Year One (2012 Rate)	$358,251

[11] South Dakota levies a production tax in lieu of property taxes assessed at 3 dollars per kilowatt delivered. The local tax revenues from this source will vary with annual production of wind power.

The South Dakota Wind Blueprint Projects' Economic Impact

Three multiplier effects are presented: the *output*, *value-added*, and *employment* effects. These measures describe the impact on South Dakota's economy resulting from the construction, operation and agricultural production. Construction and operation economic activity are gains to the state's economy. Any decrease in agricultural productivity resulting from the conversion of land from crop to wind energy facilities is an offset or agricultural loss. O*utput*, *value-added*, and *employment estimates* are estimated for three effects: the *direct* effect, the *indirect* effect, and the *induced* effect. The output multiplier is the change in the economy required to deliver an additional dollar of construction services to demand. The initial response in final demand is the direct effect, always with a multiplier of 1. The construction contractors will in turn buy goods and services from other industries to produce the dollar's worth of construction, and these industries buy inputs themselves, creating a whole series of additional purchases that are captured by the indirect effect component. Finally, there will be additional purchases motivated by the income generated for households in these transactions; these are called induced effects. All three effects combine to create the output multiplier.

An estimated output multiplier of 1.6 means the initial investment will be spent throughout the economy an additional 0.6 times. A project direct investment of 334.7 million dollars will have a 538.8 million dollar total economic impact as money makes its way through the economy.

The value-added effect is a measure of the income created for people and the government by the project. Payments for raw materials continue through the system, but payments for labor, or proprietors' income, or distributed corporate profits represent added wealth for people and or are the value-added. Value-added is decomposed into the same three parts as the output multiplier: direct effects, indirect effects, and induced effects. The direct component will be income generated over and above the cost of resources in the immediate enterprise. The indirect multiplier effect similarly measures net income created in the upstream industries that supply inputs for the final good. The induced component reflects the on-going effect of the income created directly and indirectly: income that is spent on goods and services creates demand for additional goods and services, thus creating a repeating cycle of expenditures. The sum of the three parts creates the value-added multiplier effect. The new wealth or income created throughout the economy in the form of payments for labor, proprietors' income, or distributed corporate profits is estimated to total 163.8 million dollars.

Table 4
State Construction Summary

Project Multipliers	Output	Value Added	Employment
Direct Expenditures	$ 334,684,124		
Total Direct, Indirect and Induced	$ 538,760,442	$ 163,814,452	5,360
Output Multiplier	1.6		

Finally, the analysis in this report provides an employment multiplier. Again, the multiplier is comprised of three parts. The direct component of the multiplier shows the number of jobs created onsite by the South Dakota Wind Blueprint Project. The indirect component refers to jobs created in supporting industries, and the induced component reflects jobs created by additional demand throughout the area's economy. There will be 5,360 full-time and part time jobs created throughout the state by 1,000 MW of wind farm capacity in Deuel County.

Operation of 1,000 MWs of Wind Power Capacity

It is estimated that the operation of 1,000 MWs of wind farm capacity would employ 51.3 operations and maintenance personnel and add 2.5 million dollars of new wealth to the local economy. Plant capacity of this size would require 12.3 million dollars of purchases from local businesses adding 2.5 million dollars of new wealth annually to the economy. The new wealth created throughout the economy as workers onsite and those of supporting businesses spend money in South Dakota will create an additional 1.5 million dollars of new wealth. The annual operations impact is estimated to total 6.5 million dollars in new wealth and support 184.3 full- and part-time jobs.

Table 5
State Operation Summary

Project Multipliers	Output	Value Added	Employment
Onsite Labor Impacts	$ 2,462,912	$ 2,462,912	51.3
Local Revenenue / Supply Chain Imapacts	$ 12,250,995	$ 2,523,477	78.0
Induced Impacts	$ 5,113,922	$ 1,536,378	55.0
Total Operations Economic Impact	$ 19,827,829	$ 6,522,768	184.3

Net Farm Income Effect from Change in Land Use

The footprint of 667 turbines with generation capacity totaling 1,000 MW is estimated to displace between 267 and 334 acres which is between .4 to .5 acres per turbine. In the 2007 Census of Agricultural it was reported that Deuel County had 317,164 acres of land in production. A change of use from crop production to energy production would be a change in use totaling approximately one tenth of one percent (0.1%) of current farm acres.

The average farm size in Deuel County in 2007, the most recent census, was 544 acres with an average income of 53,551dollars. The loss of farm income associated with 267 to 334 acres would have been 49.0 to 61.3 percent of the average farm size in that year and the approximate loss in farm income would have been between 26,264 and 32,830 dollars had the wind turbines been in place.

The individual loss of crop and livestock income from .5 acres or less to the generation location for a wind turbine will be more than offset by the 4,000 dollar per turbine land lease payment to the farm proprietor.

New 345 kV Transmission Capacity in South Dakota

The South Dakota Wind Blueprint includes the construction and operation a 1,000 MW transmission system upgrade. Bringing the power to market from Deuel County will require transmission upgrades to move power from the farm to the consumer. The Blueprint calls for the construction of four 345 kV transmission lines that total 478 miles in length. Deuel County wind generated power will access the grid and reach the market over two paths. One is an existing path without need for additional resources. The new resource or path is the installation of a 345 kV transmission system originating in Brookings County, traversing Deuel County and integrating with the grid in Grant County at a substation located near the community of Big Stone. From the Big Stone substation the power moves to the state border and on through Canby terminating at Hazel Creek in Minnesota. The leg from Brookings to Big Stone is approximately 80 miles in length. The distance from the Big Stone substation to the Minnesota border is 3.4 miles. The remainder of the 81 miles distance from substation to Hazel Creek is in Minnesota is a span of approximately 77.6 miles.

The South Dakota Wind Blueprint provides a vision for transmission capacity outside the state of South Dakota. It calls for the installation of 160 miles of 345 kV line between Lakefield, Minnesota and Mitchell County in Iowa. The fourth call for new transmission that is included in the Blueprint is for a new 345 kV line that would move power across the state of Wisconsin. It originates near North Lacrosse, passes through North Madison and terminates near the community of Cardinal, Wisconsin.

Table 6
Total New Regional 345 kV Transmission Capacity Envisioned
in the South Dakota Wind Blueprint

	Project	Miles	Costs ($ M)
1	Big Stone (SD)-Canby (MN)-Hazel Creek (MN) 345kV	81	170
2	Big Stone (SD)-Brookings (SD) 345kV	80	162
3	Lakefield (MN)-Mitchell County (IA) 345 kV	160	572
4	North LaCrosse (WI)-North Madison (WI)-Cardinal (WI) 345kV	157	440
	Total	478	1,344

The 345 kV line from Lakefield to Mitchell City has a design specification meeting 765 kV standards.

Table 7
Total New South Dakota 345 kV Transmission Capacity Envisioned
in the South Dakota Wind Blueprint

	Project	Miles	Costs ($ M)
1	Big Stone (SD)-Canby (MN)-Hazel Creek (MN) 345kV	3.4	7.1
2	Big Stone (SD)-Brookings (SD) 345kV	80.0	162.0
	Total	83.4	169.1

The total 345 kV transmission capacity in South Dakota is 83.4 miles which is the distance from the project's origin in Brookings County to the Big Stone substation in Grant County (80 miles) plus the 3.4 miles from the substation there to the Minnesota border.

The cost for 83.4 miles of new 345 kV transmission capacity in South Dakota is estimated at 169.1 million dollars. It is assumed that 25 percent of the construction budget is from local sources. That amount includes the purchase of local construction materials and labor costs. With that assumption, it is estimated that the construction of the 83.4 miles of line will have a direct impact of 42.3 million dollars in the South Dakota economy. ($169.1 x 25% = $42.3)

An estimated output multiplier of 1.35 (1.6 model adjusted) means the initial investment will be spent throughout the economy an additional 0.35 times. A project direct investment of 42.3 million dollars will have a 56.9 million dollar total economic impact as money makes its way through the economy. That new wealth for people includes payments for labor, proprietors' income, or distributed corporate profits represent added. It is the employee's or proprietor's income plus any profits realized by owners of corporations serving the entities that is new wealth to the local economy. The new wealth or value added to the South Dakota economy is estimated to be 21.6 million dollars with 78% of that money going to labor.

It is estimated that 321.4 people will be employed directly on site, an additional 105.7 full and part time jobs will be created in the state's businesses providing goods and services to the project, and 17.8 full and part time jobs will be created as the worker's income and the business owners spend money to support themselves and their households in the local economy. In total, there will be 444.8 full-time and part time jobs created throughout the state as a result of 345 kV transmission construction.

Table 8
The Economic Impact of Constructing 345 kV Power Transmission Line
in the State of South Dakota

Transmission Impacts	Output	Value Added	Employment
Direct Effect	42,283,951	14,020,681	321.4
Indirect Effect	12,747,300	6,556,000	105.7
Induced Effect @ 15%	1,868,033	1,063,742	17.8
Total Effect	56,899,284	21,640,423	444.8

Net Farm Income Effect from Change in Land Use

The estimated tower footprint for 83.4 miles of transmission line in South Dakota is estimated to displace 3 acres per mile or approximately 250 acres. In the 2007 Census of Agricultural it was reported that Deuel County had 317,164 acres of land in production. A change of use from crop production to transmission tower sites would be a change in use totaling less than one tenth of one percent (0.08%) of farm acres.

The average farm size in Deuel County in 2007, the most recent census, was 544 acres with an average income of 53,551dollars. The loss of farm income associated with 250 acres would have been approximately 46.0 percent of the average farm size in that year and would equate to an approximate loss in farm income of 24,610 dollars had the transmission towers been in place.

The Opportunity for Green Jobs in South Dakota

South Dakota has wind power economic development potential that goes beyond the construction and operation of large wind developments. The JEDI model doesn't currently assign wind power component manufacturing to the South Dakota economy. While plant capacity may not be sufficient in size to be the sole supplier for a large wind project, there is manufacturing capacity in Aberdeen, South Dakota that is currently producing blades for wind turbines. Molded Fiber Glass of Aberdeen is a part of a composite manufacturing business with origins in Ohio. It manufactures numerous products large and small that includes the manufacture of blades for wind turbines. A Brandon plant, Tower Tech, is a new enterprise that has capacity in place and plans to produce towers for wind turbines. The success of these plants and other entrants into the marketplace holds the economic potential of increasing the number of green jobs in South Dakota.

Construction of wind capacity totaling 1,000 MW would provide local manufacturers with an opportunity for a share of the 217.6 million and 240.9 million dollar estimated cost for blade and tower acquisitions.[12] The baseline JEDI model assumes neither the purchase of locally manufactured blades or towers nor the purchase of South Dakota transportation services.

Component purchases in South Dakota would increase the 334.7 million dollar baseline local expenditures estimate in the JEDI model benefiting the state's economy. It would directly add new manufacturing or trucking jobs and increase the wealth of workers, businessmen and corporations with the state. In addition, the new manufacturing business activity would indirectly benefit the businesses that would have an opportunity to provide goods and services in support of the manufacturing and transportation activities. New direct, indirect and induced expenditures related to wind power component manufacturing would combine to create increased economic activity, income and employment in the state.

The baseline description in the JEDI model output in the table below shows no local share of purchases for turbines, blades, towers or transportation costs. It is assumed that all equipment acquisitions and transportation services are out of state purchases.

[12] JEDI Model, p29.

Baseline Equipment Investment with No Local Purchase Share

Table Series 9
No Local Share of the Investment

Equipment and Transportation Costs	Cost	Local Share	Local Investment
Turbines	$929,286,794	0%	$0
Blades	$217,558,781	0%	$0
Towers	$240,868,651	0%	$0
Transportation	$166,277,068	0%	$0
Equipment Total	$1,553,991,294		$0

Baseline Economic Impact with "No Local Share" of Equipment Investment

	Jobs	Earnings	Output
During construction period			
Project Development and Onsite Labor Impacts	520	$23,587,025	$31,270,064
Construction and Interconnection Labor	433	$19,817,211	$0
Construction Related Services	87	$3,769,814	$0
Turbine and Supply Chain Impacts	3,541	$103,948,700	$386,734,593
Induced Impacts	1,299	$36,278,727	$120,755,785
Total Impacts	5,360	$163,814,452	$538,760,442

Baseline Investment plus $100 Million Local Purchase Investment in Blades

The first opportunity scenario is the baseline model with 100 million dollars of "blade" purchases attributed to South Dakota manufacturers. In this scenario, it is assumed that the other major component purchases shown are made in other states or countries. It is recognized that transportation costs would decrease with shorter delivery distances from plant to installation site and that issue is addressed in Table Series 12.

Table Series 10
Local Purchase of Blades Scenario

Equipment and Transportation Costs	Cost	Local Share	Local Investment
Turbines	$929,286,794	0%	$0
Blades	$217,558,781	46%	$100,000,000
Towers	$240,868,651	0%	$0
Transportation	$166,277,068	0%	$0
Equipment Total	$1,553,991,294		$100,000,000

An expenditure of 100 million dollars in South Dakota for "blades" manufactured in the state would increase the JEDI model local content 334.7 million dollar baseline estimate by 100 million dollars to 434.7 million dollars. The purchase of the blades in South Dakota would create an estimated 787 additional jobs and an additional 29.2 million dollars of new wealth in the state.

Economic Impact Including $100 Million Dollars of Local Blade Production

	Jobs	Earnings	Output
During construction period			
Project Development and Onsite Labor Impacts	520	$23,587,025	$31,270,064
Construction and Interconnection Labor	433	$19,817,211	$0
Construction Related Services	87	$3,769,814	$0
Turbine and Supply Chain Impacts	4,099	$126,791,674	$517,517,209
Induced Impacts	1,527	$42,655,387	$141,980,859
Total Impacts	6,147	$193,034,086	$690,768,132

Economic Impact Added by $100 Million Dollars of Local Blade Production

	Jobs	Earnings	Output
Economic Impact including $100 million of Blade Production	6,147	$193,034,086	$690,768,132
Baseline Economic Impact (no local share)	5,360	$163,814,452	$538,760,442
Economic Impact of $100 million of Local Blade Production	787	$29,219,634	$152,007,690

Baseline Investment plus $100 Million Local Purchase of Towers

The second scenario estimates the economic impact of purchasing "towers" for windmills from manufacturers in South Dakota. It is recognized that transportation costs would change with shorter delivery distances from plant to installation site and that issue is addressed in Table Series 12.

Table Series 11
Local Purchase of Towers Scenario

Equipment and Transportation Costs	Cost	Local Share	Local Investment
Turbines	$929,286,794	0%	$0
Blades	$217,558,781	0%	$0
Towers	$240,868,651	42%	$100,000,000
Transportation	$166,277,068	0%	$0
Equipment Total	$1,553,991,294		$100,000,000

An expenditure of 100 million dollars in South Dakota for "towers" manufactured in the state would increase the JEDI model local content 334.7 million dollar baseline estimate by 100 million dollars to 434.7 million dollars. The purchase of the towers in South Dakota would create an additional 727 jobs and an additional 32.3 million dollars of new wealth in the state.

Economic Impact Including $100 Million Dollars of Local Tower Production

	Jobs	Earnings	Output
During construction period			
Project Development and Onsite Labor Impacts	520	$23,587,025	$31,270,064
Construction and Interconnection Labor	433	$19,817,211	$0
Construction Related Services	87	$3,769,814	$0
Turbine and Supply Chain Impacts	4,031	$129,612,004	$503,468,501
Induced Impacts	1,535	$42,866,316	$142,682,950
Total Impacts	6,087	$196,065,345	$677,421,515

Economic Impact Added by $100 Million Dollars of Local Tower Production

	Jobs	Earnings	Output
Economic Impact including $100 million of Tower Production	6,087	$196,065,345	$677,421,515
Baseline Economic Impact (no local share)	5,360	$163,814,452	$538,760,442
Economic Impact of $100 million of Local Tower Production	727	$32,250,894	$138,661,073

Baseline Investment plus $100 Million Local Purchase of Transportation Services

Table Series 12
Local Purchase of Transportation Services

Equipment and Transportation Costs	Cost	Local Share	Local Investment
Turbines	$929,286,794	0%	$0
Blades	$217,558,781	0%	$0
Towers	$240,868,651	0%	$0
Transportation	$166,277,068	60%	$100,000,000
Equipment Total	$1,553,991,294		$100,000,000

Transportation services associated with the activity of delivering components to final demand also have direct, indirect and induced impacts. The JEDI model is used to estimate the economic impact of adding 100 million dollars of transportation services to the state's economy.

An expenditure of 100 million dollars in South Dakota for "transportation" from local operators would increase the JEDI model local content 334.7 million dollar baseline estimate by 100 million dollars to 434.7 million dollars. An additional 1,047 jobs would result from 100 million dollars of transportation provided by the state's truckers and there would be an additional 38.7 million dollars of new wealth created in the state.

Economic Impact Including $100 Million Dollars of Transportation Services

	Jobs	Earnings	Output
During construction period			
Project Development and Onsite Labor Impacts	520	$23,587,025	$31,270,064
Construction and Interconnection Labor	433	$19,817,211	$0
Construction Related Services	87	$3,769,814	$0
Turbine and Supply Chain Impacts	4,270	$133,816,340	$519,485,020
Induced Impacts	1,617	$45,149,929	$150,284,081
Total Impacts	6,407	$202,553,294	$701,039,166

Economic Impact Added by $100 Million Dollars of Transportation Services

	Jobs	Earnings	Output
Economic Impact including $100 million of Transportation Costs	6,407	$202,553,294	$701,039,166
Baseline Economic Impact (no local share)	5,360	$163,814,452	$538,760,442
Economic Impact of $100 million of Local Transportaion	1,047	$38,738,842	$162,278,724

In-state production of blades or towers may result in shorter average hauls from the component manufacturing facilities to the wind power development site and result in reduced transportation costs. Lower transportation costs could have a positive impact on the industry and the financial attractiveness of future wind power investments.

Summary of Green Opportunities

A summary of economic impacts expected from blade, tower or transportation sectors in 100 million dollar increments is summarized in the following table. The impacts of larger or smaller purchases from the state's manufacturers or transportation providers can be estimated by scaling the estimates presented in Table 13.

Table 13
Potential Impacts from Green Opportunities
$100 and $10 Million Dollar Estimates

	Jobs	Earnings	Output
Economic Impact of $100 million of Local Blade Production	787	$29,219,634	$152,007,690
For each $10 million of Local Blade Production	79	2,921,963	15,200,769
Economic Impact of $100 million of Local Tower Production	727	$32,250,894	$138,661,073
For each $10 million of Local Tower Production	73	3,225,089	13,866,107
Economic Impact of $100 million of Local Transportaion	1,047	$38,738,842	$162,278,724
For each $10 million of Local Transportation	105	3,873,884	16,227,872

State Sales, Use and Contractor Excise Taxes

Energy related construction projects including wind power developments are subject to South Dakota's sales, use and contractor excise taxes. There are, however, partial refunds granted to energy related construction projects including wind power developments.

The Tax Calculations for a 403.9 Million Dollar Development Project

The typical wind development project is substantially smaller than the 2 billion dollar total development envisioned in the South Dakota Wind Blueprint. The project size chosen for a tax refund calculation is 1/5 of the 2 billion dollar blueprint total or a 403.9 million dollar project. The estimate of tax liability prior to the state's partial refund is 14.5 million dollars. That amount less a 7.7 million dollar refund yields an actual tax paid estimate of 6.8 million dollars.

Table 14
Total Tax to Be Paid[13]

Tax Due	**$14,477,529**
Minus Refund	**$7,657,959**
Total Tax To Be Paid	**$6,819,570**

CET - calculated as 2.041% on the entire project amount

[13] All Sales, Use and Contractor Excise Tax estimates provided by the South Dakota Department of Revenue.

The calculation of the Contractor Excise Tax (CET) and the Sales (ST) and Use Tax (UT) refund for a 403.9 million dollar wind development project is presented in the following table.

Table 15
Contractor Excise Tax and Sales and Use Tax
Refund Calculations

Increments	%	Project Costs	CET Refund	ST/UT Refund
$0 - $9.99 m	0%	$10,000,000	$0	$0
$10 m - $39.99 m	45%	$30,000,000	$59,698	$424,209
$40 m & greater	55%	$363,893,287	$885,037	$6,289,016
Refunds by Tax Type		$403,893,287	**$944,735**	**$6,713,224**
Total Refund			**$7,657,959**	

South Dakota has a stepped refund system. There is no refund on the first 10 million dollars of construction activity. On the next 30 million dollars of construction activity, the refund is 45% of tax liability with the state retaining 55% of the pre-refund taxes paid. On amounts of 40 million dollars or greater the refund is 55% of the tax liability. On these larger amounts, the state retains 45% of the pre-refund taxes paid.

Tax Calculations for a 169.1 Million Dollar 345kV Transmission Construction Project

The total 345 kV transmission capacity in South Dakota is 83.4 miles which is the distance from the project's origin in Brookings County to the Big Stone substation in Grant County (80 miles) plus the 3.4 miles from the substation there to the Minnesota border. The cost for the instate 83.4 miles of new 345 kV transmission capacity is estimated at 169.1 million dollars. The estimated total tax to be paid is estimated by the South Dakota Department of Revenue to be approximately 3.2 million dollars after refunds.

Table 16
Total Tax to Be Paid

Tax Due	**$6,443,343**
Minus Refund	**$3,219,957**
Total Tax To Be Paid	**$3,223,386**

CET - calculated as 2.041% on the entire project amount

The Contractor Excise Tax (CET) and the Sales (ST) and Use Tax (UT) refund calculations are presented in the table on the following page for a 169.1 million dollar 345kV transmission project.

Table 17
Contractor Excise Tax and Sales and Use Tax
Refund Calculations

Increments	%	Project Costs	CET Refund	ST/UT Refund
$0 - $9.99 m	0%	$10,000,000	$0	$0
$10 m - $39.99 m	45%	$30,000,000	$68,924	$445,476
$40 m & greater	55%	$129,100,000	$362,517	$2,343,039
Refunds by Tax Type		$169,100,000	**$431,442**	**$2,788,515**
Total Refund			**$3,219,957**	

South Dakota's stepped refund system also applies to transmission construction. There is no refund on the first 10 million dollars of construction activity. On the next 30 million dollars of construction activity, the refund is 45% of tax liability. The state retains 55% of the pre-refund taxes paid. On amounts of 40 million dollars or greater the refund is 55% of the tax liability and the state retains 45% of the pre-refund taxes paid.

Three County Economic Impacts from 1,000 MW of Wind Power Development

Three multiplier effects are presented: the *output*, *value-added*, and *employment* effects. These measures describe the impact on South Dakota's economy resulting from the construction, operation and agricultural production. Construction and operation economic activity are gains to the state's economy. Any decrease in agricultural productivity resulting from the conversion of land from crop to wind energy facilities is an offset or agricultural loss. O*utput*, *value-added*, and *employment estimates* are estimated for three effects: the *direct* effect, the *indirect* effect, and the *induced* effect. The output multiplier is the change in the economy required to deliver an additional dollar of construction services to demand. The initial response in final demand is the direct effect, always with a multiplier of 1. The construction contractors will in turn buy goods and services from other industries to produce the dollar's worth of construction, and these industries buy inputs themselves, creating a whole series of additional purchases that are captured by the indirect effect component. Finally, there will be additional purchases motivated by the income generated for households in these transactions; these are called induced effects. All three effects combine to create the output multiplier.

An estimated output multiplier of 1.06 (1.1) means the initial investment will be spent throughout the three county regional economy an additional 0.06 times. A project direct investment of 25.5 million dollars will have a 27.0 million dollar total economic impact as money makes its way through the three county regional economy.

The value-added effect is a measure of the income created for people and the government by the project. Payments for raw materials continue through the system, but payments for labor, or proprietors' income, or distributed corporate profits represent added wealth for people and or are the value-added. Value-added is decomposed into the same three parts as the output multiplier: direct effects, indirect effects, and induced effects. The direct component will be income generated over and above the cost of resources in the immediate enterprise. The indirect multiplier effect similarly measures net income created in the upstream industries that supply inputs for the final good. The induced component reflects the on-going effect of the income created directly and indirectly: income that is spent on goods and services creates demand for additional goods and services, thus creating a repeating cycle of expenditures. The sum of the three parts creates the value-added multiplier effect. The new wealth or income created throughout the economy in the form of payments for labor, proprietors' income, or distributed corporate profits is estimated to total 12.0 million dollars.

Table 18
Economic Impact Summary for Three County 1,000 MW Development Construction

Project Multipliers	Output	Value Added	Employment
Direct Expenditures	$ 25,501,172		
Total Direct, Indirect and Induced	$ 26,955,336	$ 12,046,111	238
Output Multiplier	1.1		

Finally, the analysis in this report provides an employment multiplier. Again, the multiplier is comprised of three parts. The direct component of the multiplier shows the number of jobs created onsite by the South Dakota Wind Blueprint Project. The indirect component refers to jobs created in supporting industries, and the induced component reflects jobs created by additional demand throughout the area's economy. There will be 5,593 full-time and part time jobs created throughout the state by 1,000 MW of wind farm capacity in Deuel County.

Operation of South Dakota Wind Blueprint in Deuel County

It is estimated that the operation of 1,000 MWs of wind farm capacity would employ 51.3 operations and maintenance personnel and add 2.5 million dollars of new wealth to the local economy. Plant capacity of this size would require 11.8 million dollars of purchases from local businesses adding 3.2 million dollars of new wealth annually to the economy. The new wealth created throughout the economy as workers onsite and those of supporting businesses spend money in South Dakota will create an additional 1.7 million dollars of new wealth. The annual operations impact is estimated to total 7.4 million dollars in new wealth and support 132.0 full- and part-time jobs.

Table 19
Three County Operations Economic Impact Estimate

Project Multipliers	Output	Value Added	Employment
Onsite Labor Impacts	$ 2,462,912	$ 2,462,912	51.3
Local Revenenue / Supply Chain Imapacts	$ 11,770,805	$ 3,199,123	50.5
Induced Impacts	$ 2,914,368	$ 1,707,513	30.2
Total Operations Economic Impact	$ 17,148,085	$ 7,369,548	132.0

Net Farm Income Effect from Change in Land Use

The footprint of 667 turbines with generation capacity totaling 1,000 MW is estimated to displace between 267 and 334 acres which is between .4 to .5 acres per turbine. In the 2007 Census of Agricultural it was reported that Deuel County had 317,164 acres of land in production. A change of use from crop production to energy production would be a change in use totaling approximately one tenth of one percent (0.1%) of current farm acres.

The average farm size in Deuel County in 2007, the most recent census, was 544 acres with an average income of 53,551. The loss of farm income associated with 267 to 334 acres would have been 49.0 to 61.3 percent of the average farm size in that year and the loss of farm income from the land use change would have been 26,264 and 32,830 dollars.

New Instate 345 kV Transmission Capacity

The total 345 kV transmission capacity in South Dakota is 83.4 miles which is the distance from the origin in Brookings County to Big Stone in Grant County and the 3.4 miles from the substation there to the Minnesota border.

Table 20
New South Dakota 345 kV Transmission Capacity Envisioned
in the South Dakota Wind Blueprint

	Project	Miles	Costs ($ M)
1	Big Stone (SD)-Canby (MN)-Hazel Creek (MN) 345kV	3.4	7.1
2	Big Stone (SD)-Brookings (SD) 345kV	80.0	162.0
	Total	83.4	169.1

The cost for 83.4 miles of new 345 kV transmission capacity in South Dakota is estimated at 169.1 million dollars. It is assumed that 25 percent of the construction budget is from local sources. That amount includes the purchase of local construction materials and labor costs. With that assumption, it is estimated that the construction of the 83.4 miles of line will have a direct impact of 42.3 million dollars in the South Dakota economy. ($169.1 x 25% = $42.3)

An estimated output multiplier of 1.2 (1.4 model adjusted) means the initial investment will be spent throughout the economy an additional 0.2 times. A project direct investment of 42.3 million dollars will have a 52.0 million dollar total economic impact as money makes its way through the four county economy. That new wealth for people includes payments for labor, proprietors' income, or distributed corporate profits represent added. It is the employee's or proprietor's income plus any profits realized by owners of corporations serving the entities that is new wealth to the local economy. The new wealth or value added to the economy in the four county area is estimated to be 19.1 million dollars with 82% of the money going to labor.

It is estimated that 321.4 people will be employed directly on site, an additional 80.3 full and part time jobs will be created in the state's businesses providing goods and services to the project, and 9.1 full and part time jobs will be created as the workers and business owners spend money to support themselves or their households in the local economy. In total, there will be 410.8 full-time and part time jobs created throughout the four county area as a result of new 345 kV transmission construction.

Table 21
The Economic Impact of Constructing a 345 kV Transmission Line
in a Defined Four County Area

Transmission Impacts	Output	Value Added	Employment
Direct Effect	42,283,951	14,145,588	321.4
Indirect Effect	8,614,636	4,408,060	80.3
Induced Effect @ 12%	1,134,633	517,332	9.1
Total Effect	58,462,805	22,864,750	410.8

Local Tax and Property Tax Reduction Fund Impacts

The full implementation of the South Dakota Wind Blueprint would provide local government two primary sources of revenue beyond local sales tax receipts. Both taxes, the "Nameplate Tax" and the "Production Tax" are levied when the project starts producing power; however, much of the production tax is rebated for the first 10 years.

The nameplate tax yields 3 dollars per kilowatt of generation capacity as rated on the machines. Development of 1,000 MWs of generation capacity or 667 machines rated at 1.5 MWs each will yield local tax revenues of 3.0 million dollars. Tax revenues from this source are immediate. The law makes no provision for exemption, rebate or delay in the levy of the nameplate tax.

The production tax is an "in lieu of" normal property tax local levy calculated as a percentage of value when the power is delivered to the marketplace. The production tax is a 2 percent gross receipts tax applied to the "cost of electricity" and the total power produced by the wind development.

A 1,000 MW wind development operating at 39 percent production capacity would deliver 390 MW of power to the market. The "cost of electricity" for 2012 production tax purposes is 0.0512 dollars per kW or 51.15 dollars per MW hour. The gross receipts tax liability before rebates is the amount of power delivered (390 MW) multiplied by the wholesale price of the power ($51.15 / MW) multiplied by the tax rate (2%). That calculation yields a "pre rebate" tax liability amount 90 percent of which is rebated to the wind development for a period of five years. For years six through ten, the gross receipt tax rebate decreases to 50 percent.

Table 22
The Production Gross Receipts Tax Revenue Stream
To Local Government and the Property Tax Reduction Fund

	Year 1 2012	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016	Year 6 2017	Year 7 2018	Year 8 2019	Year 9 2020	Year 10 2021
Formula Local Government Share Calculation @ 20%	699,027	716,503	734,415	752,776	771,595	790,885	810,657	830,923	851,696	872,989
Actual Local Government Share After Rebate @ 10%	349,513	358,251	367,208	376,388	385,797					
Actual Local Government Share After Rebate @ 20%						790,885	810,657	830,923	851,696	872,989
State Actual Property Tax Reduction Fund After Rebate @ 80%						1,186,327	1,215,985	1,246,385	1,277,545	1,309,483

Assumes 390 MW of Power Produced Annually from 1,000 MW of Nameplate Capacity (39% Production Capacity) See Appendix.

Technical Notes:

It is technically appropriate that the "direct" value added amounts in the economic impact estimates for construction and startup are attributed to the South Dakota economy. The value added impact is assigned to the geography where the activity is delivered. That is where the jobs and income to proprietors and corporations is located. That is not to say that the full measure of new wealth described will remain in that geography. A large percentage of the new wealth described in the construction and startup activities for the NextGen project is expected to leak from the state's economy as a result of out-of-state workers and businesses participating in the construction of the energy conversion facility. Many of the skills required for the construction of an energy conversion facility, its startup and testing are skill sets not available from professionals and laborers currently living in South Dakota. The job estimates reflect expectations as modeled. The value added or new wealth to South Dakota from "direct impacts" plus "indirect impacts" that will be kept in South Dakota is assumed to be stated percentages and is the basis for the partial "induced" impact estimates in the construction and startup tables. The indirect impacts are assumed to be purchases from firms located in South Dakota.

IMPLAN Model

There are numerous assumptions in the IMPLAN model methodology and in its use. The relationship of inputs to output is one.

IMPLAN is a fixed input model that assumes relative prices of inputs do not affect the firm's purchase of inputs and that the technology represented in the model will not change. The model assumes output will increase in proportion to inputs given a fixed technology.

IMPLAN Modeling

IMPLAN allows customization of income variables to fit the project. Income variables include employee compensation, proprietary income, other property type income and indirect business taxes.

Employee compensation as estimated in the project budgets was used when possible throughout the analysis. The proprietary income on the project and the indirect business taxes were held in proportion to the employee compensation or entered as estimated in the budget data. Assumptions are consistent for the state or five county general models. Other property income includes payments for rents, royalties and dividends. These items are for the most part are either included in the project or have the most substantial impact out of state. Inclusion of this variable in the model would increase the value added to the state's economy. To be conservative in the estimate, the construction estimates do not include an allowance for other property type income. The full model is impacted by this exception but not substantially.

JEDI Model Limitations

"As with other economic forecasting tools, JEDI has several assumptions and limitations (Costanti 2004). For example, JEDI is not intended to be a precise forecasting tool. Rather, it provides a reasonable profile of how investment in a wind park may affect a given economy. Additionally, JEDI offers a *gross analysis* rather than a *net analysis*; that is, the model does not account for the net impacts associated with alternate spending of project funds or replacement of existing electricity generation facilities that may exist within a given local economy (e.g., electricity generated by wind replacing electricity generated by an existing gas-fired generation plant). JEDI also assumes that adequate revenue exists to cover all debt and/or equity payments and annual operations and maintenance costs associated with a given project. Specific model outputs for Utah County are discussed in detail in the body of the report." (An Analysis of the Economic Impact on Utah County, Utah from the Development of Wind Power Plants, US Department of Energy, DOE/GO-102006-2316, May 2006)

Appendix – JEDI Summary Data

I. Statewide Economic Impacts from 1,000 MW of Wind Power Development

Project Location	**SOUTH DAKOTA**
Year of Construction	**2010**
Total Project Size - Nameplate Capacity (MW)	**1000**
Number of Projects (included in total)	**1**
Turbine Size (KW)	**1500**
Number of Turbines	**667**
Installed Project Cost ($/KW)	**$2,019**
Annual Direct O&M Cost ($/KW)	**$19.75**
Money Value (Dollar Year)	**2010**
Installed Project Cost	**$2,019,466,432**
Local Spending	**$334,684,124**
Total Annual Operational Expenses	**$337,324,590**
Direct Operating and Maintenance Costs	**$19,750,000**
Local Spending	**$5,414,518**
Other Annual Costs	**$317,574,590**
Local Spending	**$5,668,000**
Debt and Equity Payments	**$0**
Property Taxes	**$3,000,000**
Land Lease	**$2,668,000**

	Jobs	Earnings	Output
During construction period			
Project Development and Onsite Labor Impacts	520	$23,587,025	$31,270,064
Construction and Interconnection Labor	433	$19,817,211	
Construction Related Services	87	$3,769,814	
Turbine and Supply Chain Impacts	3,541	$103,948,700	$386,734,593
Induced Impacts	1,299	$36,278,727	$120,755,785
Total Impacts	**5,360**	**$163,814,452**	**$538,760,442**
During operating years (annual)			
Onsite Labor Impacts	51	$2,462,912	$2,462,912
Local Revenue and Supply Chain Impacts	78	$2,523,477	$12,250,995
Induced Impacts	55	$1,536,378	$5,113,922
Total Impacts	**184**	**$6,522,768**	**$19,827,829**

Detailed Wind Farm Project Data Costs

SOUTH DAKOTA

Construction Costs	Cost	Local Share
Equipment Costs		
Turbines	$929,286,794	0%
Blades	$217,558,781	0%
Towers	$240,868,651	0%
Transportation	$166,277,068	0%
Equipment Subtotal	$1,553,991,294	
Balance of Plant		
Materials		
Construction (concrete rebar, equip, roads and site prep)	$224,551,745	90%
Transformer	$25,401,458	0%
Electrical (drop cable, wire,)	$26,774,853	100%
HV line extension	$36,200,000	70%
Materials Subtotal	$312,928,056	
Labor		
Foundation	$6,683,840	95%
Erection	$7,570,398	75%
Electrical	$11,032,350	70%
Management/supervision	$5,724,707	0%
Misc.	$77,786,000	50%
Labor Subtotal	$108,797,294	
Development/Other Costs		
HV Sub/Interconnection		
Materials	$2,449,630	90%
Labor	$750,370	10%
Engineering	$20,999,882	0%
Legal Services	$11,444,936	100%
Land Easements	$0	100%
Site Certificate	$8,104,970	100%
Other Subtotal	$43,749,788	
Balance of Plant Total	$465,475,138	
Total Project Costs	$2,019,466,432	

Wind Farm Annual Operating and Maintenance Costs

	Cost	Local Share
Labor		
Personnel		
Field Salaries	$1,874,222	100%
Administrative	$333,195	100%
Management	$444,260	100%
Labor/Personnel Subtotal	$2,651,677	
Materials and Services		
Vehicles	$488,454	100%
Site Maint/Misc. Services	$190,497	80%
Fees, Permits, Licenses	$95,248	100%
Utilities	$380,994	100%
Insurance	$3,663,403	0%
Fuel (motor vehicle gasoline)	$190,497	100%
Consumables/Tools and Misc. Supplies	$1,238,230	100%
Replacement Parts/Equipment/ Spare Parts Inventory	$10,851,000	2%
Materials and Services Subtotal	$17,098,323	
Debt Payment (average annual)	$190,334,711	0%
Equity Payment - Individuals	$0	100%
Equity Payment - Corporate	$121,571,879	0%
Property Taxes	$3,000,000	100%
Land Lease	$2,668,000	100%
Total Annual Operating and Maintenance Costs	$337,324,590	

Other Parameters

Financial Parameters		
Debt Financing		
Percentage financed	65%	0%
Years financed (term)	10	
Interest rate	10%	
Equity Financing		
Percentage equity	35%	
Individual Investors (percent of total equity)	0%	100%
Corporate Investors (percent of total equity)	100%	0%
Return on equity (annual interest rate)	16%	
Repayment term (years)	10	
Tax Parameters		
Local Property/Other Tax Rate (percent of taxable value)	na	
Assessed value (percent of construction cost)	na	
Taxable Value (percent of assessed value)	na	
Taxable Value	na	
Taxes per MW	$3,000	
Local Taxes	$3,000,000	100%
Land Lease Parameters		
Land Lease Cost (per turbine)	$4,000	
Land Lease (total cost)	$2,668,000	
Lease Payment recipient (F = farmer/household, O = Other)	F	100%
Payroll Parameters		
Construction Labor	**Average Wage per hour**	**Employer Payroll Costs**
Foundation	$13.33	37.6%
Erection	$15.10	37.6%
Electrical	$20.00	37.6%
Management/Supervision	$27.19	37.6%
O&M Labor	**Average Wage per hour**	**Employer Payroll Costs**
Field Salaries (technicians, other)	$18.19	37.6%
Administrative	$11.64	37.6%
Management	$29.10	37.6%

II. Three County Economic Impacts from 1,000 MW of Wind Power Development

Year of Construction	**2010**
Total Project Size - Nameplate Capacity (MW)	**1000**
Number of Projects (included in total)	**1**
Turbine Size (KW)	**1500**
Number of Turbines	**667**
Installed Project Cost ($/KW)	**$2,019**
Annual Direct O&M Cost ($/KW)	**$19.75**
Money Value (Dollar Year)	**2010**
Installed Project Cost	**$2,019,466,432**
Local Spending	**$25,501,172**
Total Annual Operational Expenses	**$340,046,406**
Direct Operating and Maintenance Costs	**$19,750,000**
Local Spending	**$3,392,949**
Other Annual Costs	**$320,296,406**
Local Spending	**$8,389,816**
Debt and Equity Payments	**$0**
Property Taxes	**$5,721,816**
Land Lease	**$2,668,000**

Local Economic Impacts - Summary Results

	Jobs	Earnings	Output
During construction period			
Project Development and Onsite Labor Impacts	15	$680,181	$680,181
Construction and Interconnection Labor	15	$680,181	
Construction Related Services	0	$0	
Turbine and Supply Chain Impacts	163	$8,015,452	$20,525,914
Induced Impacts	59	$3,350,478	$5,749,241
Total Impacts	**238**	**$12,046,111**	**$26,955,336**
During operating years (annual)			
Onsite Labor Impacts	51	$2,462,912	$2,462,912
Local Revenue and Supply Chain Impacts	51	$3,199,123	$11,770,805
Induced Impacts	30	$1,707,513	$2,914,368
Total Impacts	**132**	**$7,369,548**	**$17,148,085**

Detailed Wind Farm Project Data Costs

Construction Costs	Cost	Local Share
Equipment Costs		
Turbines	$929,286,794	0%
Blades	$217,558,781	0%
Towers	$240,868,651	0%
Transportation	$166,277,068	0%
Equipment Subtotal	$1,553,991,294	
Balance of Plant		
Materials		
Construction (concrete rebar, equip, roads and site prep)	$224,551,745	7%
Transformer	$25,401,458	0%
Electrical (drop cable, wire,)	$26,774,853	0%
HV line extension	$36,200,000	0%
Materials Subtotal	$312,928,056	
Labor		
Foundation	$6,683,840	5%
Erection	$7,570,398	1%
Electrical	$11,032,350	2%
Management/supervision	$5,724,707	0%
Misc.	$77,786,000	0%
Labor Subtotal	$108,797,294	
Development/Other Costs		
HV Sub/Interconnection		
Materials	$2,449,630	0%
Labor	$750,370	0%
Engineering	$20,999,882	0%
Legal Services	$11,444,936	0%
Land Easements	$0	100%
Site Certificate	$8,104,970	100%
Other Subtotal	$43,749,788	
Balance of Plant Total	$465,475,138	
Total Project Costs	$2,019,466,432	

Wind Farm Annual Operating and Maintenance Costs

	Cost	Local Share
Labor		
Personnel		
Field Salaries	$1,874,222	100%
Administrative	$333,195	100%
Management	$444,260	100%
Labor/Personnel Subtotal	$2,651,677	
Materials and Services		
Vehicles	$488,454	0%
Site Maint/Misc. Services	$190,497	3%
Fees, Permits, Licenses	$95,248	100%
Utilities	$380,994	100%
Insurance	$3,663,403	0%
Fuel (motor vehicle gasoline)	$190,497	100%
Consumables/Tools and Misc. Supplies	$1,238,230	6%
Replacement Parts/Equipment/ Spare Parts Inventory	$10,851,000	0%
Materials and Services Subtotal	$17,098,323	
Debt Payment (average annual)	$190,334,711	0%
Equity Payment - Individuals	$0	100%
Equity Payment - Corporate	$121,571,879	0%
Property Taxes	$5,721,816	100%
Land Lease	$2,668,000	100%
Total Annual Operating and Maintenance Costs	$340,046,406	

Other Parameters

Financial Parameters		
Debt Financing		
Percentage financed	65%	0%
Years financed (term)	10	
Interest rate	10%	
Equity Financing		
Percentage equity	35%	
Individual Investors (percent of total equity)	0%	100%
Corporate Investors (percent of total equity)	100%	0%
Return on equity (annual interest rate)	16%	
Repayment term (years)	10	
Tax Parameters		
Local Property/Other Tax Rate (percent of taxable value)	1.0%	
Assessed value (percent of construction cost)	85.0%	
Taxable Value (percent of assessed value)	33.3%	
Taxable Value	$572,181,584	
Taxes per MW	$3,000	
Local Taxes	$5,721,816	100%
Land Lease Parameters		
Land Lease Cost (per turbine)	$4,000	
Land Lease (total cost)	$2,668,000	
Lease Payment recipient (F = farmer/household, O = Other)	F	100%
Payroll Parameters		
Construction Labor	**Average Wage per hour**	**Employer Payroll Costs**
Foundation	$13.33	37.6%
Erection	$15.10	37.6%
Electrical	$20.00	37.6%
Management/Supervision	$27.19	37.6%
O&M Labor	**Average Wage per hour**	**Employer Payroll Costs**
Field Salaries (technicians, other)	$18.19	37.6%
Administrative	$11.64	37.6%

Production Gross Receipts Tax Calculation

The production gross receipts tax liability calculation below assumes that a wind development of 1,000 MW per hour of nameplate capacity produces on average 390 MW of power per hour. The achievement of 39 percent production capacity would result in 3.4 million MW of power production annually. The gross receipts start at 174.8 million in 2012 and increase by 2.5 percent each year thereafter.

The production gross receipts tax liability after rebates is 10 percent in the first 5 years with the full 10 percent not rebated given to local government. The rebate for the initial five years is 90 percent of tax liability. In year 6, the rebate decreases from 90 percent of tax liability to 50 percent of gross receipt tax liability.

The local share of the gross receipts tax liability increases from 10 percent in the first 5 years to 20 percent in the second 5 years. The table shows the local government share increasing from 385,797 in year five to 790,885 in year six.

Contributions to the property tax reduction fund start in year 6 when the rebate decreases from 90 percent to 50 percent. The contribution to the property tax reduction fund is the production tax liability less the 50 percent rebate and the local government share of the receipts.

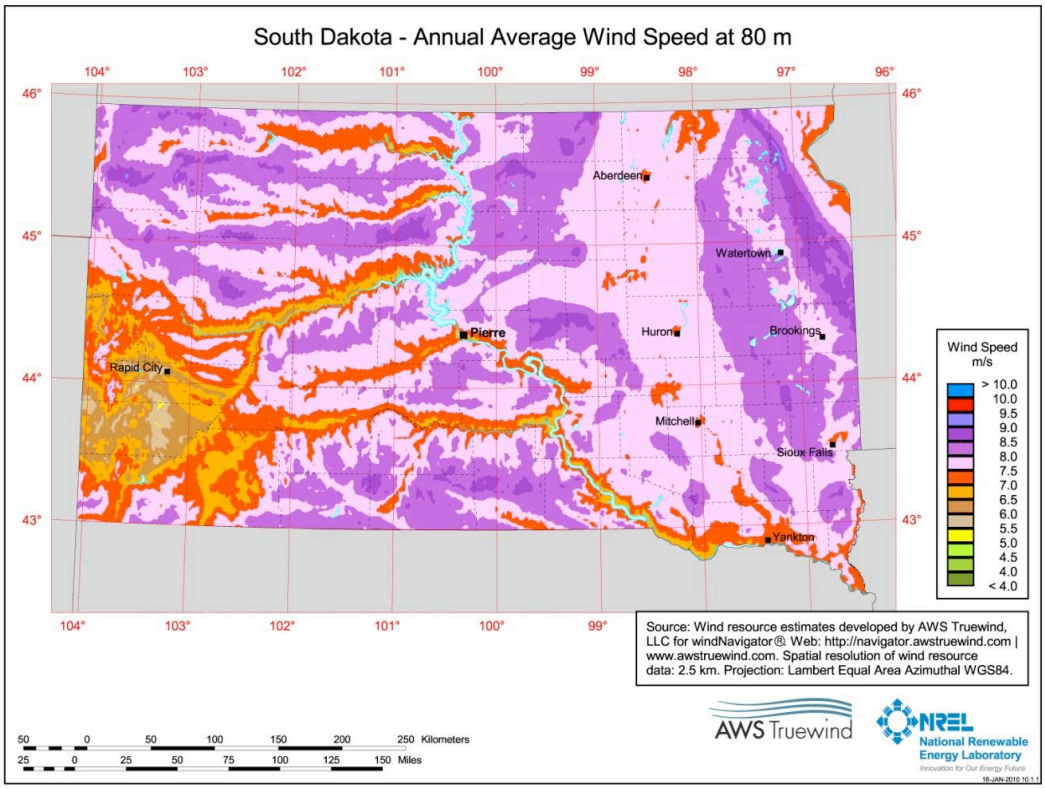
The Production Gross Receipts Tax Revenue Stream To Local Government and the Property Tax Reduction Fund

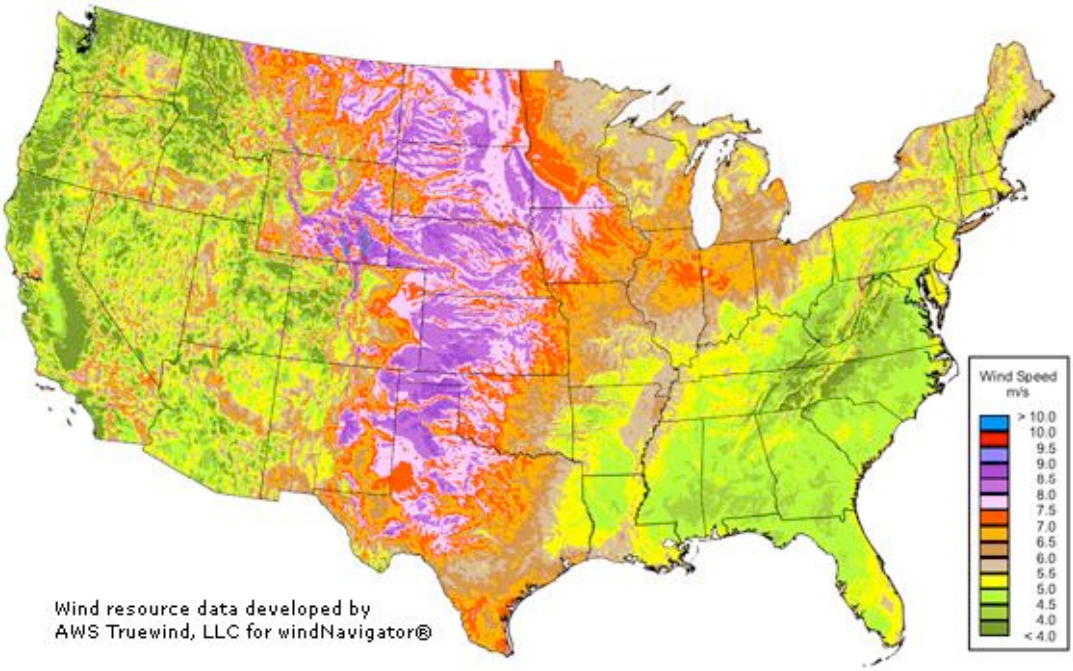
	Year 1 2012	Year 2 2013	Year 3 2014	Year 4 2015	Year 5 2016	Year 6 2017	Year 7 2018	Year 8 2019	Year 9 2020	Year 10 2021
1,000 MW Nameplate / Hour @ 39% Capacity Assumption	390	390	390	390	390	390	390	390	390	390
MW Produced 24 Hours	9,360	9,360	9,360	9,360	9,360	9,360	9,360	9,360	9,360	9,360
MW Produced Per Year	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400	3,416,400
Gross Receipts / MW (2.5% Annual Increase)	51.15	52.43	53.74	55.09	56.46	57.87	59.32	60.80	62.32	63.88
Total Taxable Gross Receipts	174,756,734	179,125,652	183,603,793	188,193,888	192,898,735	197,721,204	202,664,234	207,730,840	212,924,111	218,247,214
Tax Liablity for Wind Development @ 2%	3,495,135	3,582,513	3,672,076	3,763,878	3,857,975	3,954,424	4,053,285	4,154,617	4,258,482	4,364,944
Less Rebates Returned to Wind Development @ 90%	349,513	358,251	367,208	376,388	385,797					
Less Rebates Returned to Wind Development @ 50%						1,977,212	2,026,642	2,077,308	2,129,241	2,182,472
Formula Local Government Share Calculation @ 20%	699,027	716,503	734,415	752,776	771,595	790,885	810,657	830,923	851,696	872,989
Actual Local Government Share After Rebate @ 10%	349,513	358,251	367,208	376,388	385,797					
Actual Local Government Share After Rebate @ 20%						790,885	810,657	830,923	851,696	872,989
State Actual Property Tax Reduction Fund After Rebate @ 80%						1,186,327	1,215,985	1,246,385	1,277,545	1,309,483

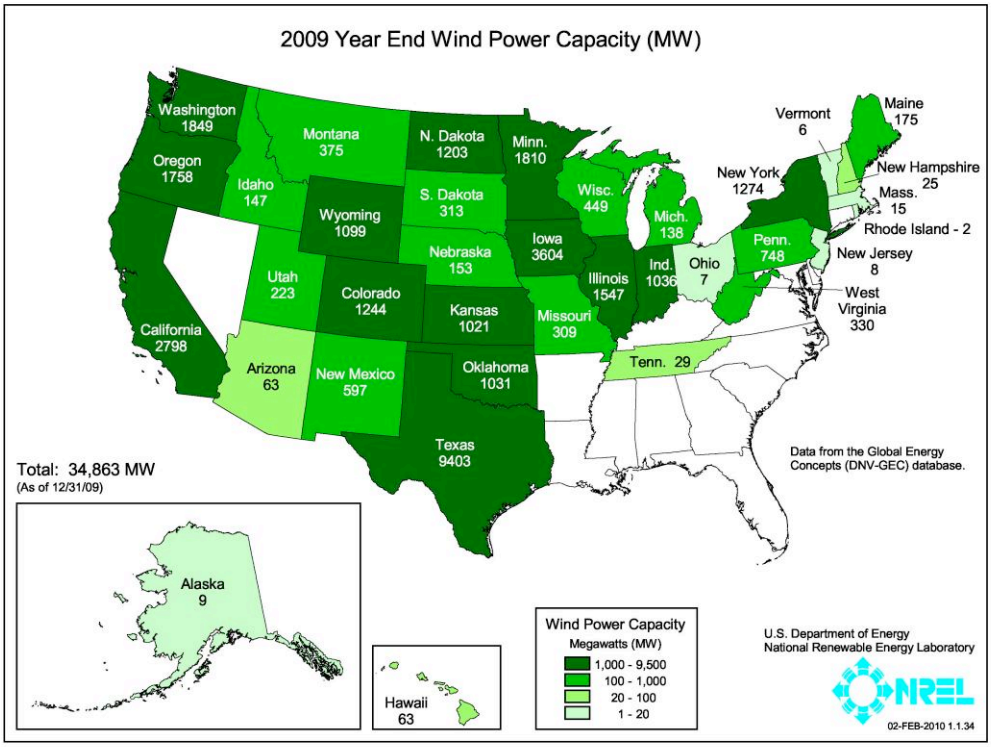
Assumes 390 MW of Power Produced Annually from 1,000 MW of Nameplate Capacity (39% Production Capacity)

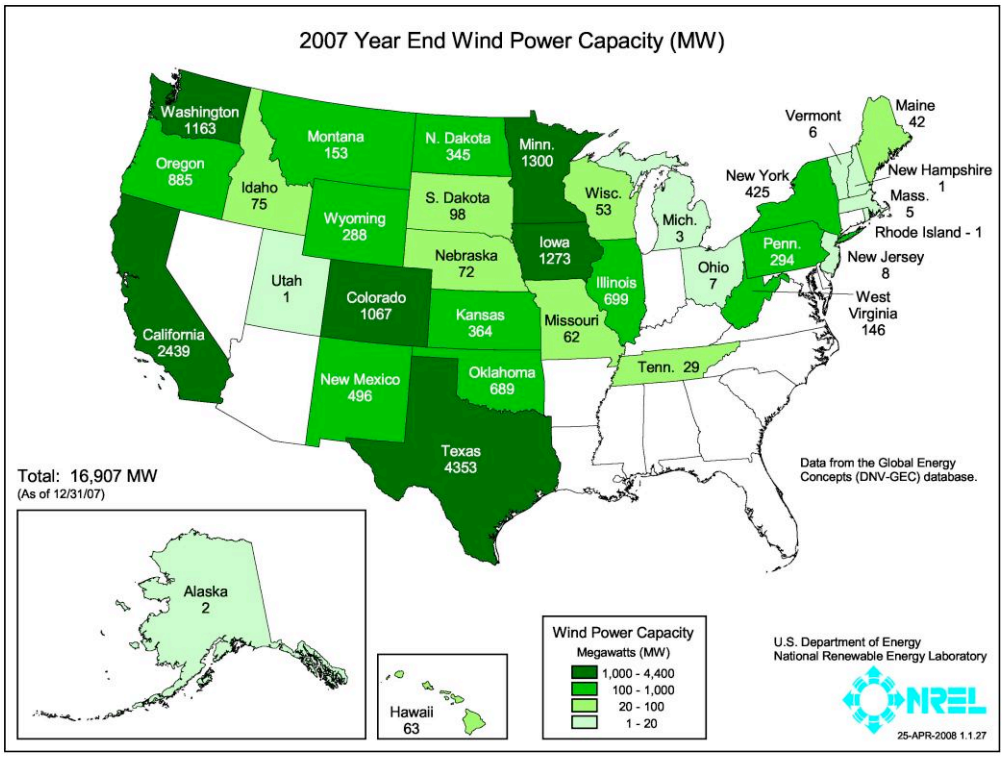
The Department of Revenue summarizes that … "all of the nameplate tax and 20% of the gross receipts tax goes to the local governments. Each local government gets the same percentage of the tax as they would receive if the revenue was agricultural property tax. The remaining 80% of the gross receipts tax goes to the property tax reduction fund."

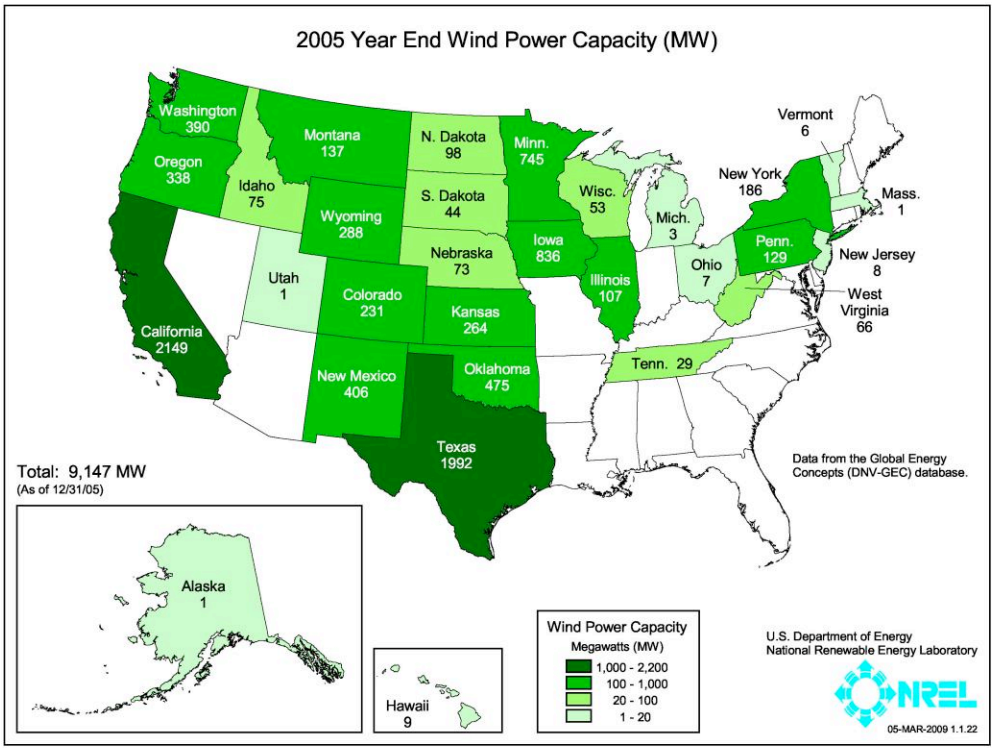
Wind Resource Perspectives

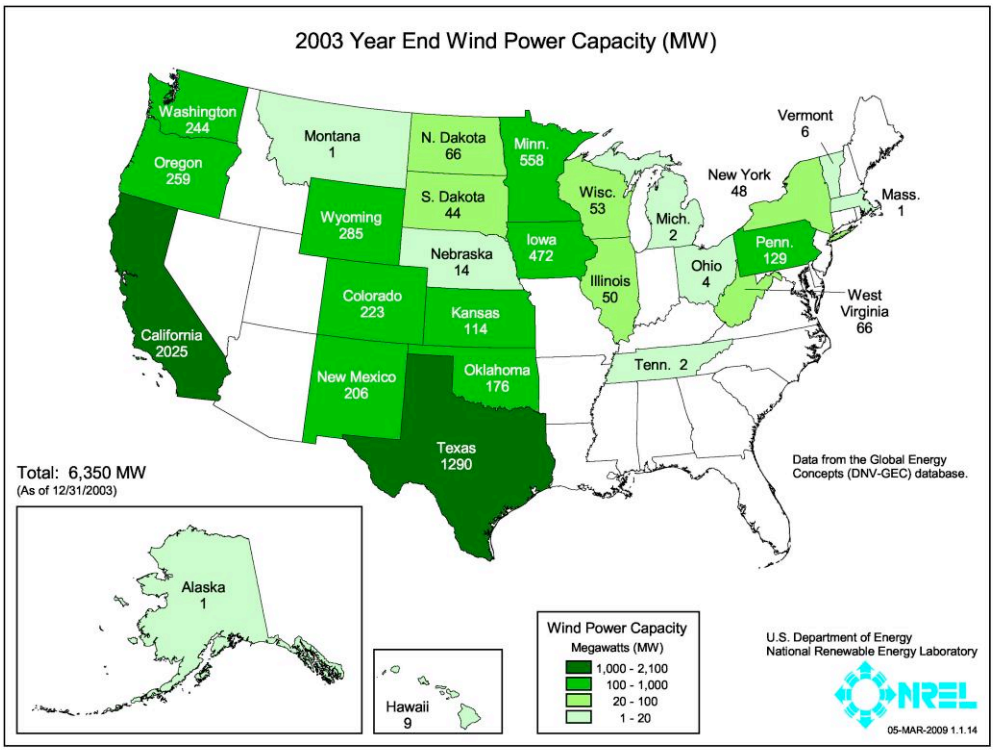


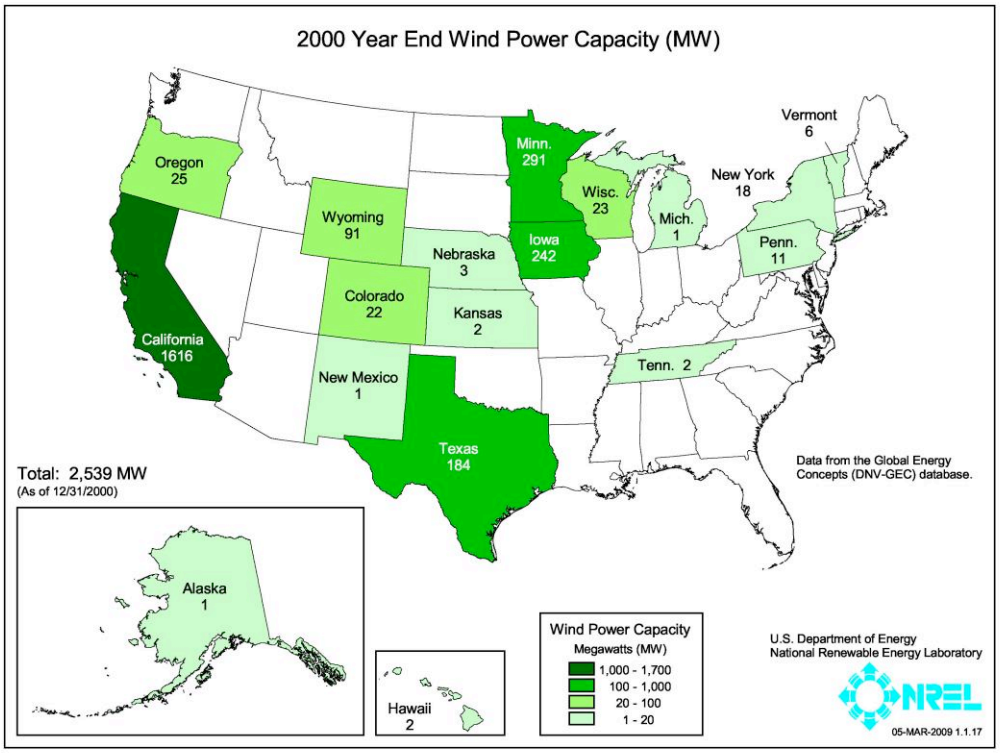


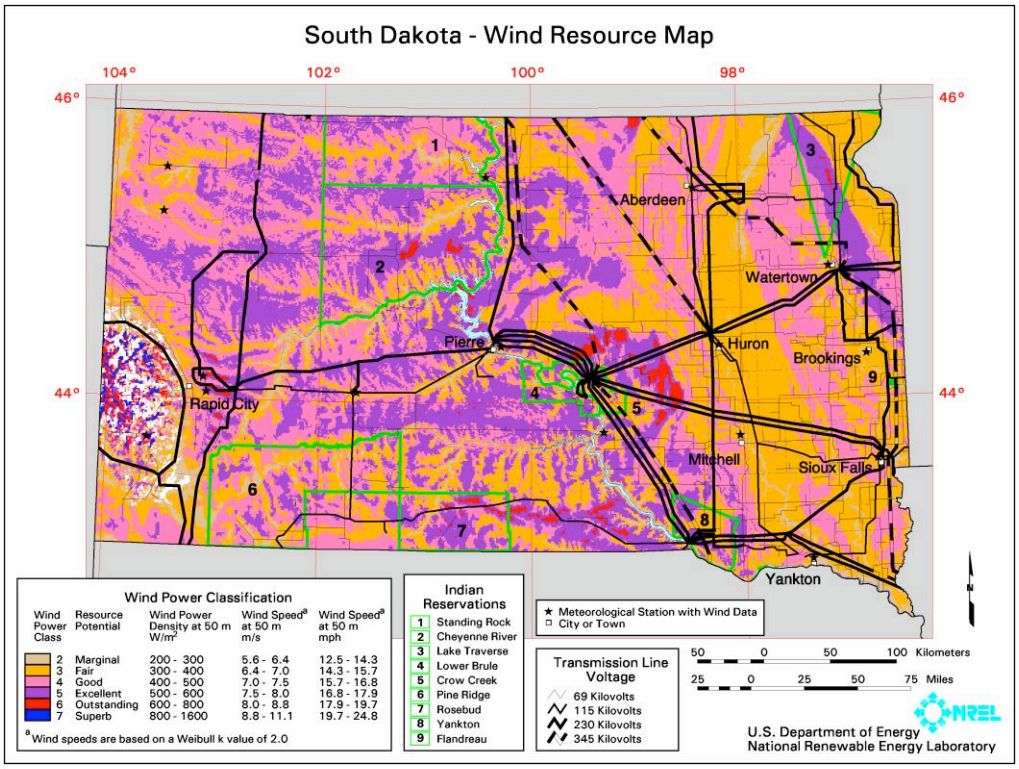

2009 Year End Wind Power Capacity (MW)
Washington 1849
Oregon 1758
California 2798
Idaho 147
Montana 375
Wyoming 1099
Utah 223
Arizona 63
Colorado 1244
New Mexico 597
N. Dakota 1203
S. Dakota 313
Nebraska 153
Kansas 1021
Oklahoma 1031
Texas 9403
Minn. 1810
Iowa 3604
Missouri 309
Arkansas
Louisiana
Wisc. 449
Illinois 1547
Mich. 138
Ind. 1036
Ohio 7
Tenn. 29
Penn. 748
New York 1274
Vermont 6
Maine 175
New Hampshire 25
Mass. 15
Rhode Island - 2
New Jersey 8
West Virginia 330
Total: 34,863 MW
(As of 12/31/09)
Alaska 9
Hawaii 63
Wind Power Capacity
Megawatts (MW)
1,000 - 9,500
100 - 1,000
20 - 100
1 - 20
Data from the Global Energy Concepts (DNV-GEC) database.
U.S. Department of Energy
National Renewable Energy Laboratory
NREL
02-FEB-2010 1.1.34


2007 Year End Wind Power Capacity (MW)
Washington 1163
Oregon 885
California 2439
Idaho 75
Montana 153
Wyoming 288
Utah 1
Colorado 1067
New Mexico 496
N. Dakota 345
S. Dakota 98
Nebraska 72
Kansas 364
Oklahoma 689
Texas 4353
Minn. 1300
Iowa 1273
Missouri 62
Arkansas
Louisiana
Wisc. 53
Illinois 699
Mich. 3
Ind.
Ohio 7
Tenn. 29
Penn. 294
New York 425
Vermont 6
Maine 42
New Hampshire 1
Mass. 5
Rhode Island - 1
New Jersey 8
West Virginia 146
Total: 16,907 MW
(As of 12/31/07)
Alaska 2
Hawaii 63
Wind Power Capacity
Megawatts (MW)
1,000 - 4,400
100 - 1,000
20 - 100
1 - 20
Data from the Global Energy Concepts (DNV-GEC) database.
U.S. Department of Energy
National Renewable Energy Laboratory
NREL
25-APR-2008 1.1.27

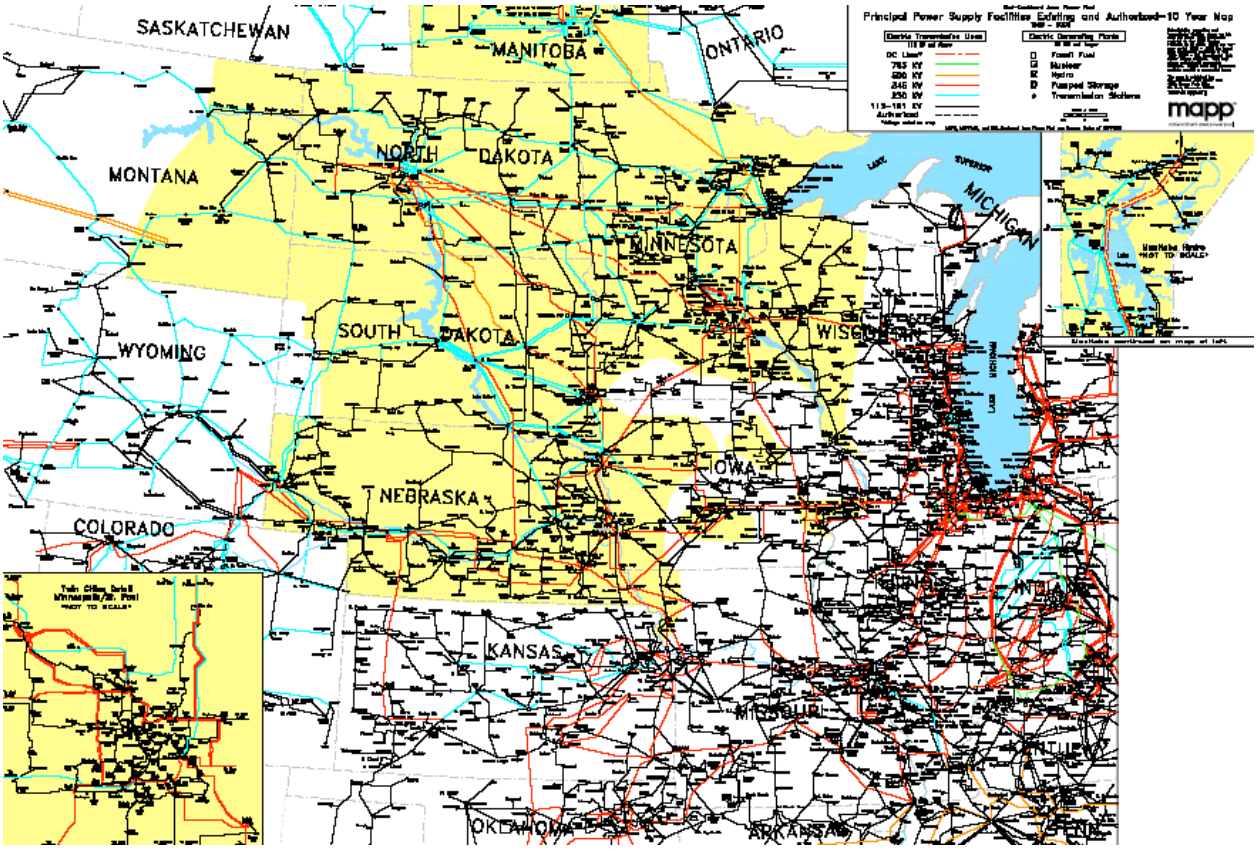

2005 Year End Wind Power Capacity (MW)
Washington 390
Oregon 338
Idaho 75
Montana 137
N. Dakota 98
Minn. 745
S. Dakota 44
Wyoming 288
Wisc. 53
Mich. 3
Vermont 6
New York 186
Mass. 1
Iowa 836
Nebraska 73
Utah 1
Colorado 231
Kansas 264
Illinois 107
Ohio 7
Penn. 129
New Jersey 8
West Virginia 66
California 2149
New Mexico 406
Oklahoma 475
Tenn. 29
Texas 1992
Total: 9,147 MW
(As of 12/31/05)
Data from the Global Energy Concepts (DNV-GEC) database.
Alaska 1
Hawaii 9
Wind Power Capacity
Megawatts (MW)
1,000 - 2,200
100 - 1,000
20 - 100
1 - 20
U.S. Department of Energy
National Renewable Energy Laboratory
NREL
05-MAR-2009 1.1.22


2003 Year End Wind Power Capacity (MW)
Washington 244
Oregon 259
Montana 1
N. Dakota 66
Minn. 558
S. Dakota 44
Wyoming 285
Wisc. 53
Mich. 2
Vermont 6
New York 48
Mass. 1
Iowa 472
Nebraska 14
Illinois 50
Ohio 4
Penn. 129
West Virginia 66
Colorado 223
Kansas 114
California 2025
New Mexico 206
Oklahoma 176
Tenn. 2
Texas 1290
Total: 6,350 MW
(As of 12/31/2003)
Data from the Global Energy Concepts (DNV-GEC) database.
Alaska 1
Hawaii 9
Wind Power Capacity
Megawatts (MW)
1,000 - 2,100
100 - 1,000
20 - 100
1 - 20
U.S. Department of Energy
National Renewable Energy Laboratory
NREL
05-MAR-2009 1.1.14


2000 Year End Wind Power Capacity (MW)
Oregon 25
Wyoming 91
Minn. 291
Wisc. 23
Mich. 1
New York 18
Vermont 6
Iowa 242
Nebraska 3
Penn. 11
Colorado 22
Kansas 2
California 1616
New Mexico 1
Tenn. 2
Texas 184
Total: 2,539 MW
(As of 12/31/2000)
Data from the Global Energy Concepts (DNV-GEC) database.
Alaska 1
Hawaii 2
Wind Power Capacity
Megawatts (MW)
1,000 - 1,700
100 - 1,000
20 - 100
1 - 20
U.S. Department of Energy
National Renewable Energy Laboratory
NREL
05-MAR-2009 1.1.17


South Dakota - Wind Resource Map
104°
102°
100°
98°
46°
44°
Aberdeen
Watertown
Pierre
Huron
Brookings
Rapid City
Mitchell
Sioux Falls
Yankton
Wind Power Classification
Wind Power Class
Resource Potential
Wind Power Density at 50 m W/m²
Wind Speed[a] at 50 m m/s
Wind Speed[a] at 50 m mph
2 Marginal 200 - 300 5.6 - 6.4 12.5 - 14.3
3 Fair 300 - 400 6.4 - 7.0 14.3 - 15.7
4 Good 400 - 500 7.0 - 7.5 15.7 - 16.8
5 Excellent 500 - 600 7.5 - 8.0 16.8 - 17.9
6 Outstanding 600 - 800 8.0 - 8.8 17.9 - 19.7
7 Superb 800 - 1600 8.8 - 11.1 19.7 - 24.8
[a] Wind speeds are based on a Weibull k value of 2.0
Indian Reservations
1 Standing Rock
2 Cheyenne River
3 Lake Traverse
4 Lower Brule
5 Crow Creek
6 Pine Ridge
7 Rosebud
8 Yankton
9 Flandreau
Meteorological Station with Wind Data
City or Town
Transmission Line Voltage
69 Kilovolts
115 Kilovolts
230 Kilovolts
345 Kilovolts
50 0 50 100 Kilometers
25 0 25 50 75 Miles
U.S. Department of Energy
National Renewable Energy Laboratory
NREL

Name	Location	Power Capacity (MW)	Units	Turbine Mfr.	Developer	Owner	Power Purchaser	Year Online
PrarieWinds, SD1	Aurora, Brule & Jerauld	151.5	100	GE Energy	Basin Electric	Basin Electric	Basin Electric	2011
SD Wind Partners	Jerauld	10.5	10	GE Energy	Basin Electric	SD Wind Partners	Basin Electric	2011
Buffalo Ridge II	Brookings & Deuel	200	100	Gamesa	Iberdrola Renewables	Iberdrola Renewables		2011
Day County Wind Project	Day County	99	66	GE Energy	NextEra Energy Resources	NextEra Energy Resources	Basin Electric	2010
Titan I	Hand County	25	10	Clipper	BP Alternative Energy/Clipper	BP Alternative Energy/Clipper	Northwestern Energy	2009
Buffalo Ridge	Brookings County	50.4	24	Suzlon	Iberdrola Renewables	Iberdrola Renewables	NIPSCO	2009
Wessington Springs	Jerauld County	51	34	GE Energy	Babcock & Brown	NextEra Energy Resources	Heartland Consumers Power District	2009
Tatanka Wind Project	McPherson County	88.5	59	Acciona	Acciona Energy	Acciona Energy		2008
Minn-Dakota Wind Farm	Brookings County	54	36	GE Energy	PPM Energy	PPM Energy	Xcel Energy	2007
Highmore Wind Energy Project	Hyde County	40.5	27	GE Energy	FPL Energy	FPL Energy	Basin Electric	2003
Rosebud Sioux Wind Energy Project	Rosebud Sioux reservation	0.75	1	NEG Micon	Rosebud Sioux	Rosebud Sioux	Rosebud Sioux	2003
Chamberlain	Brule County	2.2	2	NEG	Basin Electric	Basin Electric & Others	Basin Electric	2002
Canova	Miner County	0.11	1	Micon	City of Howard	City of Howard	Xcel Energy	2002
Howard	Miner County	.11	1	Micon	City of Howard	City of Howard	City of Howard	2002
Carthage	Miner County	.11	1	Micon	City of Howard	City of Howard	Xcel Energy	2002


SASKATCHEWAN
MANITOBA
ONTARIO
MONTANA
NORTH DAKOTA
MINNESOTA
SOUTH DAKOTA
WYOMING
WISCONSIN
IOWA
NEBRASKA
COLORADO
KANSAS
MISSOURI
OKLAHOMA
ARKANSAS
LAKE SUPERIOR
LAKE MICHIGAN
Principal Power Supply Facilities Existing and Authorized-10 Year Map
mapp