



Wind Energy Development in South Dakota

Introduction

The development of electricity from wind energy has been a major area of activity in the nation and in South Dakota in recent years as the search for alternative and renewable energy sources continues. Since 2003 when South Dakota's first major wind farm was built, South Dakota's generating capacity from wind power has increased more than ten-fold, with more development on the way. South Dakota's efforts, including the use of various incentives to promote wind energy development, have been encouraging, but obstacles to the development of South Dakota's wind resources remain.

Wind Resource

South Dakota's potential for wind energy development, in terms of the amount of wind and quality of wind conditions, is among the best in the nation. A study by the National Renewable Energy Laboratory ranked South Dakota fourth in the nation in wind energy potential, behind North Dakota, Texas, and Kansas. Other states in this area, including Montana, Nebraska, Wyoming, Minnesota, and Iowa, also finished in the top ten in this study. South Dakota's Wind Resource Assessment Network (WRAN), which consists of a series of monitoring stations across the state, collects wind data in various locations for analysis by researchers at South Dakota State University. This information is useful in the selection of sites for wind energy facilities.

Wind energy development over the last ten years has proceeded differently for individual Midwest and Plains states and for other areas in the nation, and a variety of factors, such as population, markets, transmission capacity, and the structure of the electrical production and distribution system, will determine the extent of wind energy development here and elsewhere.

Wind Development in South Dakota and the Nation

South Dakota's first large-scale wind energy project was constructed in 2003 near Highmore with a capacity of 40.5 MW. Since then, other large-scale projects have included Minn-Dakota (54 MW) in Brookings County, Tatanka I (88.5 MW) near Long Lake, Wessington Springs Wind Project (51 MW), Buffalo Ridge I (50.4 MW) in Brookings County, Titan I (25 MW) near Ree Heights, and Day County wind (99MW) in Day County. Table 1 lists large-scale wind power projects in South Dakota that are in

operation. In addition to the large-scale projects, there is an increasing number of residential wind energy systems and other small scale-wind energy development projects in South Dakota. The Wind for Schools program is an example of small-scale wind development in the state.

Table 1 -- Large-Scale Wind Energy Projects in South Dakota

Year	Name	Location	Size	Developer	Purchaser
2001	Howard Turbines	Near Howard	216 kW	MCCR/City of Howard	City of Howard
2001	Chamberlain Wind Project	Near Chamberlain	2.6 MW	Crown Butte Wind Power	Basin Electric East River Electric
2002	Gary Wind Energy Project	Gary	90 kW	EMS	EMS
2002	Canova Turbine	Near Canova	108 kW	MCCR/City of Canova	City of Canova
2003	Alex Little Soldier Wind Turbine	Near Rosebud Casino	750 kW	Native Energy DISGEN	East River Electric
2003	Carthage Turbine	Near Carthage	108 kW	MCCR/City of Carthage	City of Carthage
2003	South Dakota Wind Energy Center	Near Highmore	40.5 MW	FPL Energy	Basin Electric
2006	Oaklane Colony	Near Alexandria	160 kW	Oaklane Colony	Oaklane Colony
2007	Minn- Dakota Wind Farm	Brookings County	54 MW	PPM Energy	Xcel Energy
2008	Tatanka I	Near Long Lake	88.5 MW	Acciona Energy	Merchant
2008	Sisseton Wahpeton Community College	SWCC	130 kW	SWCC and USDA	SWCC
2009	Wessington Springs Wind Project	Wessington Springs	51 MW	Babcock & Brown	Heartland Consumers Power District
2009	Buffalo Ridge I	Brookings County	50.4 MW	Iberdrola Renewables	Northern Indiana Public Service Co
2009	Titan I	Near Ree Heights	25 MW	Clipper Wind/ BP Alt. Energy	NorthWestern Energy
2010	Day County Wind	Day County	99 MW	NextEra Energy	Basin Electric

Source: South Dakota Public Utilities Commission

A “utility scale” wind turbine produces from 750 KW to 2.5 MW, has a tower height from 170 to 330 feet, and a blade diameter of 75 to 312 feet, with a weight of 8,000 to 14,000 pounds. The cost to install is approximately \$2 million per MW. One 1.5 MW turbine can produce 5 million kWh per year, enough to power 400 to 500 homes. Six to twelve turbines can be placed on a section of land. A large-scale wind power development has a total generating capacity of 40 MW or more and consists of 35 or more turbines. Each wind turbine requires approximately 40 acres to avoid interfering with other turbines. (Roger A. McEowen, Kansas State University; SD Public Utilities Commission)

Table 2 lists South Dakota wind power projects that are in the later stages of the development process. In the last two to three years, South Dakota moved from 40 MW to more than 400 MW of wind energy generating capacity, and we are likely to reach more than 700 MW of capacity soon. However, at this level of development, South Dakota would be nearing the limits of the capacity of the transmission system unless extensive transmission upgrades are made.

Table 2 -- South Dakota Wind Projects at Late Stages of Development

Year	Name	Location	Size	Developer	Status
2010	Buffalo Ridge II	Brookings/Deuel counties	210 MW	Iberdrola Renewables	Construction completed; precommission testing
Early 2011	Crow Lake Wind	Near Crow Lake	151.5 MW	Basin Electric	Under Construction
Early 2011	SD Wind Partners	Near Crow Lake	10.5 MW	SD Wind Partners (constructed by Basin Elec)	Under Construction

Source: South Dakota Public Utilities Commission

Table 3 illustrates the nationwide growth of wind energy on a state-by-state basis during the period 2000-2009. South Dakota began the decade with no installed wind power capacity, while California led the nation with 1,615.9 MW of wind power capacity. Since then, there has been significant growth in wind energy production in the US, with total wind power capacity increasing from 2539.3 MW in 2000 to 34,863.4 MW in 2009. During that time, Texas (9403.4 MW) and Iowa (3603.9 MW) surpassed California’s capacity, and many other states made major gains. States such as Minnesota, Illinois, Washington, and Oregon ended the decade with large increases in their wind power capacity. The states in the Great Plains corridor stretching from North Dakota to Texas are all in the top ten in the nation in wind energy potential, but South Dakota and Nebraska have lagged behind the other states in the region in wind development. Also, states such as New York, Pennsylvania, Indiana, Colorado, and Wyoming have greatly increased their wind energy capacity and are at the same level as states in the Great Plains.

Table 3 -- Wind Power Capacity by State (Megawatts – MW)

State	2000	2002	2004	2006	2008	2009
Alaska	0.8	0.9	1.2	1.7	3.7	8.6
Arizona	--	--	--	--	--	63.0
Arkansas	--	--	--	--	--	0.1
California	1,615.9	1,823.0	2,094.9	2,376.1	2,536.7	2,798.0
Colorado	21.6	61.2	230.7	290.8	1,067.7	1,244.3
Connecticut	--	--	--	--	--	--
Delaware	--	--	--	--	--	--
Florida	--	--	--	--	--	--
Georgia	--	--	--	--	--	--
Hawaii	1.6	8.6	8.6	42.1	63.1	63.1
Idaho	--	--	0.2	75.3	75.6	146.8
Illinois	--	--	51.1	107.2	915.1	1,547.5
Indiana	--	--	--	--	130.5	1,036.0
Iowa	242.4	422.7	634.0	932.2	2,791.2	3,603.9
Kansas	1.5	113.7	113.7	364.2	921.0	1,021.0
Maine	0.1	0.1	0.1	9.1	46.6	174.7
Maryland	--	--	--	--	--	--
Massachusetts	0.3	1.0	1.0	3.5	5.7	145.0
Michigan	0.6	2.400	2.400	2.595	144.395	138.5
Minnesota	291.2	337.7	600.1	895.9	1,752.8	1,810.0
Missouri	--	--	--	--	162.5	308.5
Montana	0.1	0.4	1.1	145.9	271.5	375.0
Nebraska	2.8	14.0	14.0	73.4	116.9	152.9
Nevada	--	--	--	--	--	--
New Hampshire	0.1	0.1	0.1	1.1	25.1	25.2
New Jersey	--	--	--	7.5	7.5	7.6
New Mexico	0.7	0.7	266.0	496.0	497.5	597.5
New York	18.2	48.5	48.5	370.3	831.8	1,274.3
North Carolina	--	--	--	--	--	--
North Dakota	0.4	4.8	66.3	178.3	714.5	1,202.6
Ohio	--	--	7.2	7.4	7.4	7.4
Oklahoma	--	--	176.3	534.5	708.1	1,031.2
Oregon	25.1	218.3	262.6	438.1	1,067.2	1,758.1
Pennsylvania	10.5	34.5	129.0	179.0	360.7	748.2
Rhode Island	--	--	--	0.7	0.7	2.4
South Dakota	--	3.0	44.3	44.3	186.8	313.2
Tennessee	2.0	2.0	29.0	29.0	29.0	29.0
Texas	183.5	1,095.8	1,290.3	2,735.8	7,112.7	9,403.4
Utah	0.2	0.2	0.2	0.9	19.8	223.3

Vermont	6.1	6.1	6.1	6.1	6.1	6.2
Virginia	--	--	--	--	--	--
Washington	--	228.3	240.6	818.1	1,375.0	1,848.9
West Virginia	--	66.0	66.0	66.0	330.0	330.0
Wisconsin	23.0	53.0	53.0	53.0	449.0	449.1
Wyoming	90.6	140.6	284.6	288.5	676.3	1,099.3
Total	2,539.3	4,687.4	6,723.1	11,574.5	25,410.0	34,863.4

Source: US Department of Energy, National Renewable Energy Laboratory.

State and Federal Incentives for Wind Energy Development

A variety of incentives have been used in many states and at the federal level to promote the development and use of wind energy and other forms of alternative energy. Federal incentives include corporate depreciation, corporate tax credits, federal grant programs, federal loan programs, industry recruitment and support, performance-based incentives, personal exemptions, and personal tax credits. These programs include large-scale, small-scale, and residential wind energy producers. Probably the best-known and most important of the federal wind energy incentives is the Renewable Electricity Production Tax Credit (PTC). The production tax credit is a corporate tax credit that applies to many types of renewable energy producers, including wind energy. The production tax credit program provides a 2.2 cent per kWh tax credit for electricity generated from wind power and other qualifying renewable energy technologies. The PTC program was first enacted in 1992 and has been revised numerous times; in 2009 the in-service deadline for wind energy facilities was extended through the end of 2012. The credit is in place for ten years after the facility begins service. (Database of State Incentives for Renewables and Efficiency – DSIRE.) Another federal incentive for wind energy development, which was part of the American Recovery and Reinvestment Act of 2009, is the 1603 Cash Grant Program. This program pays a 30% cash grant for wind energy projects after they are commissioned. Most South Dakota wind projects constructed in 2009 and later have used the 1603 grant program rather than the Production Tax Credit. (SD Department of Tourism and State Development.)

Many states offer wind energy incentives. These include tax credits and exemptions for personal and corporate income taxes, sales tax, and property tax, as well as rebates, grants, loans, industry support programs, bonds, and performance-based incentives. Table 4 illustrates wind energy development incentives in South Dakota and the surrounding states.

Table 4. Wind Energy Incentives in South Dakota and Surrounding States

Incentive Type	MN	IA	ND	NE	WY	MT	SD
Personal Income Tax		X				X	
Corporate Tax		X	X			X	
Sales Tax	X	X		X	X		X*
Property Tax	X	X	X			X	X
Rebates (by state or utility)	X-Ut,St	X-Ut			X-St		

Grants (by state or utility)	X-Ut					X-Ut	
Loans	X	X				X	

*South Dakota's sales tax incentives include contractors excise tax.

Source: Database of State Incentives for Renewables and Efficiency – DSIRE.

South Dakota's wind energy development incentives have changed over time, including significant changes made during the 2008 and 2010 Legislative Sessions. Before the 2010 Session, several tax incentives had been enacted by the Legislature. In 2002, a reduced contractors excise tax rate for facilities producing renewable energy was enacted (SDCL chapter 10-46C). In 2003, blades and turbines were excluded from local property taxes. In 2008, wind farms were exempted from local property taxes; instead, they were subject to a tax based on generation capacity and a gross receipts tax based on electricity produced. That legislation also provided a credit for costs of building a related transmission line.

Under the 2008 legislation, (HB 1320, SDCL 10-35-16 through 10-35-22), wind farms constructed after July 1, 2007, are subject to an alternative taxation calculation in lieu of all taxes on real and personal property. The alternative tax applies only to facilities producing electricity for commercial sale and with a minimum capacity of five megawatts (MW). All property used to interconnect individual wind turbines within a wind farm into a common project is eligible for the exemption and alternative taxation. The alternative taxation method has two components. The first component is an annual tax equal to \$3 per kilowatt (kW) of capacity of the wind farm, prorated according to when the wind farm begins operation during the first calendar year. The second component is a 2% annual tax on the gross receipts of the wind farm. The gross receipts are calculated as the number of kilowatt-hours (kWh) produced multiplied by a base electricity rate of \$0.0475/kWh in 2008, with the base rate increasing by 2.5% annually thereafter. A partial rebate of the taxes paid under this formula is available for the construction of transmission lines in South Dakota that serve an eligible facility. The money generated by the alternative taxation method described above will be deposited into the state's wind energy tax fund. All of the receipts from the capacity tax and 20% of the gross receipts tax will be redistributed back to the county treasurer of the county where the wind farm is located. (Database of State Incentives for Renewables and Efficiency – DSIRE.)

In 2010, the Legislature established a new property tax incentive for smaller wind energy systems that replaced two existing property tax incentives for renewable energy (SB 58, SDCL 10-4-42 through 10-4-45). Facilities that generate electricity using wind or other renewable sources are eligible for this incentive. For eligible facilities of less than five megawatts (MW) in capacity, all real property used or constructed for the purpose of producing electricity is assessed in the same manner as other real property. However, the first \$50,000 or 70% of the assessed value of eligible property, whichever is greater, is exempt from the real property tax. (Database of State Incentives for Renewables and Efficiency – DSIRE.)

Also in 2010, the Legislature (HB 1060, SDCL 10-45B-16 and 10-45B-17) established a tax refund for new and expanded wind-energy facilities, new or upgraded electric

transmission lines and associated facilities, and business facilities that manufacture or distribute wind or transmission components. This refund applies to sales or use taxes and contractors' excise taxes on project costs and is available to facilities constructed on or after January 1, 2010. Refunds are not awarded for any project cost incurred on or after January 1, 2013, except for certain performance retainage amounts related to the project. In general, the amount of the tax refund is a percentage of the taxes paid, as follows:

- For project costs less than \$10 million, there is no refund.
- For project costs of \$10 million or more but less than \$40 million, the refund is 45% of the taxes paid.
- For project costs of \$40 million or more, the refund is 55% of the taxes paid.

(Database of State Incentives for Renewables and Efficiency – DSIRE.)

House Bill 1060 was amended numerous times and generated considerable controversy during the 2010 Legislative Session. HB 1060 in its final form was vetoed by the Governor because it provided a special advantage for wind power projects with a tax refund program patterned after an existing refund program for other types of agricultural, business, and economic development. HB 1060 provides refunds with no upper limit on project size for wind projects, while other types of development projects costing more than \$500 million would not be eligible for a refund (SB 195, SDCL 10-45B-2.3). However, the Legislature supported additional benefits for wind development and overrode the Governor's veto, leaving separate refund criteria for wind energy projects and other types of development projects. Another part of the discussion relating to HB 1060, in the context of budget difficulties facing the state, was whether the final version, even without the cap for large projects, provided the same degree of wind energy incentives as were in place in previous years.

South Dakota's set of incentives for wind energy development has evolved over time and has been helpful in promoting the development that is currently underway. Incentives vary from state to state, but South Dakota's efforts have been generally reasonable and productive. The problems that South Dakota faces in the development of wind energy on a large scale are not the result of lack of effort or incentives and are largely beyond the control of the State.

Obstacles to Wind Development

As noted above, South Dakota currently has approximately 400 MW of installed wind energy capacity, and additional projects being planned or developed would bring the total to 780 MW in the near future. However, this level of development would put South Dakota near the limits of its transmission system, and there are numerous obstacles, beyond the control of state policymakers, to upgrading the transmission system. The development of wind power has three basic requirements: a sufficient wind resource, markets for the electricity that is produced, and a transmission system capable of transporting the electricity to the consumer. South Dakota has an excellent wind resource, but faces serious obstacles with respect to markets and transmission capability. (SD Public Utilities Commission)

South Dakota has a small, rural population that is dispersed over a wide area. South Dakota's electrical needs are already being served through conventional sources of electricity at prices that are competitive with, or less expensive than, electricity produced from wind energy. South Dakota markets are too small to absorb power from large-scale wind energy sources. For continued expansion of wind energy development, electricity produced in South Dakota from wind power must be sold in more heavily populated areas, primarily to the east, particularly Minnesota, and to urban areas such as Minneapolis, Chicago, and Milwaukee. Moving power to the west and potential markets in Colorado is difficult because links to South Dakota from this part of the transmission grid are extremely limited, making markets to the west not viable for South Dakota wind power. Moreover, transmission issues in moving and marketing power to the east also present serious problems. Constructing long-distance transmission lines is expensive and cannot be supported economically by wind power alone, and the question of who pays for the cost of constructing transmission facilities is another unresolved problem. This means that new transmission lines would need to handle power from conventional sources, such as coal or nuclear, which sometimes leads to opposition to proposed development regardless of the cost. In addition, transmission systems in states other than South Dakota must be upgraded to accommodate large-scale wind power coming from South Dakota. It is not simply a matter of increasing transmission capability within South Dakota. (South Dakota Energy Infrastructure Authority)

Other problems with transmission of wind energy produced in South Dakota have to do with how the nation's electrical grid systems are set up. South Dakota is split between two electricity grids, the Eastern Interconnection, which serves most of the state and the Western Interconnection, which serves the southwest corner of the state, including Rapid City and the Black Hills. (A third interconnection covers most of the state of Texas.) In addition, South Dakota is divided between two major transmission system operators: the Midwest Independent System Operator (MISO) on the eastern edge of the state and in states to the east, and the Western Area Power Administration (WAPA) covering the remainder of the state and a 15-state area in the central and western United States. One unresolved issue, known as the "seams" issue, arises from the requirement that any entity that moves electricity from the WAPA grid to the MISO grid must currently pay two transmission fees, one to WAPA and another to MISO, which significantly increases the cost of transmission. Negotiations are ongoing to resolve this problem, but it is not a simple issue because the two systems have different pricing mechanisms and changing the tariff structure in one system to match the other system will negatively affect rates to customers in the first system. (South Dakota Energy Infrastructure Authority)

Clearly, there are obstacles to the large-scale development of wind power in South Dakota. These are not insurmountable, but their resolution is often beyond the control of the State and State policymakers. In the long run, the transmission needs and other issues may be resolved if the demand in large markets for additional electricity makes the construction of new transmission capability economically justified. (South Dakota Energy Infrastructure Authority)

Land Owner and Property Issues

One of the most important benefits of the development of wind energy in South Dakota is the provision of a steady source of income for landowners on whose land the wind turbines are built. Wind power developments also provide an additional source of tax revenue to local governments. Typically, a wind energy project developer gains access to the property owner's land through a wind easement or a lease that allows development of the project on the property. In return, and as a part of the easement or lease agreement, the property owner receives payment from the developer as specified in the easement or lease.

South Dakota adopted a wind easement law in 1996 based in part on Minnesota law and subsequently amended (SDCL 43-13-16 through 43-13-20). The original 1996 wind easement law provided that a wind easement must be in writing and recorded with the register of deeds. The easement could not run longer than fifty years and was void if no development had taken place within five years. In addition, wind rights under the easement could not be severed from the surface estate, although the statute did allow wind rights to be leased for a period not to exceed fifty years. In 2009 the wind easement statutes were amended (HB 1112) to require the easement to specify that if the developer mortgages or encumbers the easement, the land owner is not responsible for that debt. In 2010, there was substantial amendment (HB 1263) to the wind easement law, partly to provide more protection to land owners whose property is subject to wind easements, and partly to provide more flexibility for wind energy project developers. The 2010 amendments allowed the five-year development period to be extended to twelve years for large-scale projects (500 MW or greater) with Public Utilities Commission approval; the amendments also defined when "development" begins (when the foundation is poured for the project's first turbine). The 2010 amendments included a number of provisions to protect landowners. The amendments required a ten-day waiting period from the time the proposed easement or lease is delivered to the property owner until the easement or lease is effective or may be executed. Also, a developer is not allowed to require the property owner to keep negotiations or terms of the agreement confidential unless agreed to by both parties. The amendment also included a list of items that must be included in the easement or lease agreement, such as a description of any restrictions placed on the property for the provision of essential services (rural water, electric power, telecommunications), the name of any third-party for which the easement is acquired, and a description of the property rights conveyed, the term of the easement or lease agreement, the names of the parties involved, and a legal description of the affected property.

As wind power development becomes more widespread and project organizational structures more complex, land owners need to take precautions before entering into wind easements or leases that will affect their property. Developers are trying to secure the best terms that they can, and they have experience with the process while land owners do not. There are many factors to consider, and land owners are strongly advised to familiarize themselves with the situation and to consult with an attorney before signing an agreement. Considerations include payments to land owners and payment structures. Are payments one-time, up-front, or are they on an annual basis? Are payments based on a percentage of turbine revenue, or is there a guaranteed

minimum payment? Has the developer identified specific markets for the electricity produced, and have transmission issues been resolved to move the power to market? The agreement should address activities during the construction period, such as access roads, disruption of cropping or grazing, duration, and cleanup of construction materials and equipment, as well as longer-term issues such as buffer zones, setbacks, and size of the footprint of the turbine and associated equipment. The agreement should address liability issues, trespass, nuisance potential (noise or flicker from the turbines), environmental and aesthetic issues, and safety issues, such as losing a turbine blade, ice thrown from blades, attractive nuisance possibilities, bird kill, and potential danger to aircraft. Land use issues, such as crop and livestock concerns, hunting access, and aerial spraying should be addressed. Other considerations include who pays if taxes are increased or impacted, how the agreement may be terminated, insurance issues, and obtaining the same treatment as development on neighboring property. The agreement should also address project reclamation: when the project is no longer in service, who removes the equipment and cleans up the property? What protections are provided for the land owner if the project fails? Should a bond or financial assurance be used? (South Dakota Energy Infrastructure Authority; Roger A. McEowen, Kansas State University.)

There is a host of factors to consider before executing a wind easement or lease, and the items discussed above are only a sampling of potential issues to be addressed. Land owners need to take precautions to protect themselves and are strongly urged to obtain legal and technical assistance before committing themselves. However, providing land for wind energy development purposes can be a significant source of income for landowners over an extended period of time. Leases for wind power development average between twenty and thirty-five years and can involve payments of several thousand dollars per turbine per year. Landowners should pursue these opportunities as they arise, but they should proceed with caution.

Summary

South Dakota has excellent wind resources and has made major strides in recent years in the development of wind energy, and we can expect further development in the future. Wind energy is a renewable resource that provides numerous environmental benefits, as well as providing financial benefits for our rural land owners and local governments. However, current shortcomings in the electrical transmission system, along with the structure of the nation's electrical grid systems, make it unlikely that South Dakota's full wind energy potential can be developed without fundamental changes in those areas, changes that are beyond the State's control. The current development activity in South Dakota has been helpful in terms of economic development and has provided valuable knowledge and experience with wind energy. South Dakota should continue its wind development efforts and be in a position to expand those efforts when markets and transmission capabilities warrant.

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This issue memorandum was written by Tom Magedanz, Principal Research Analyst for the Legislative Research Council. It is designed to supply background information on the subject and is not a policy statement made by the Legislative Research Council.
