

Issues and Opportunities Associated with Leasing State Lands for Wind
Energy Development

Report to the Legislature Pursuant to

Laws of Minnesota 2010

Chapter 361, Article 4, Section 75

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Prepared and Submitted by

The Minnesota Department of Natural Resources

Section 1: Introduction and Background

Project Scope

Laws of Minnesota 2010 Chapter 361, Article 4, Section 75 direct the Commissioner of Natural Resources to report on:

- 1) Information on the benefits and costs of using state-owned lands for wind energy systems;
- 2) The effects of wind energy systems on state-owned lands;
- 3) Recommendations for a regulatory system and restrictions that will be necessary protect the state's land and water resources when using state-owned lands for wind energy systems; and
- 4) Identification of state-owned lands that would be suitable for wind energy systems and state-owned lands that would be unsuitable, including recommendations for restrictions on the use of state-owned lands based on their designation as units of the outdoor recreation system under Minnesota Statutes, section 86A.05.

This report addresses large scale commercial wind energy development on state owned lands, primarily DNR administered lands. The report does not address the installation of small scale wind energy development designed to provide power directly to DNR or other state administered facilities. The scale, nature and impacts of those projects are significantly different from commercial wind development.

The report addresses both general wind development leases as well as wind buffer leases. A general wind development lease would allow the construction of wind turbines and ancillary facilities such as access roads, transformers, substations and power lines on lands held in fee title by the state. Wind buffers leases allow a wind developer to install wind turbines closer to the property line than typical setbacks allow. The permitting practice of the Minnesota Public Utilities Commission (PUC) has been to require a setback of five rotor diameters in the direction of prevailing winds (typically north and south) and three rotor diameters in the direction of non-prevailing winds (typically east and west) from non-participating landowners. The resulting wind buffer zones vary based on the size of the turbines used, but are approximately 750 feet east to west and 1,250 feet north to south. The wind buffers zones are established to minimize the impact on the free flow of air across adjacent properties. PUC does not apply wind access buffers to linear features such as trails and roads, rather smaller setbacks based on public safety are applied.

The report will not specifically address development of power lines or similar facilities that may be developed in conjunction with a wind project. Authority, practices and procedures to address power lines and similar utilities proposed to cross state lands and public waters have been developed under Minnesota Statutes, Section 84.415. A license to cross can be issued for 25 or 50 years. In this case, the disturbance is well understood and the process to manage these transactions is well established. This report shall primarily focus on projects that would install actual wind turbine with the ancillary facilities on or adjacent to state owned lands.

Wind Energy Development and Minnesota Energy Policy

Minnesota's first utility scale wind farm was developed in Lincoln County in 1994. Since that time, total operating capacity in Minnesota has grown to 1,800 Megawatts (MW) with over 600 MW under construction.¹ Continued wind energy development and growth is anticipated through 2025 under the Minnesota Renewable Electricity Standard (RES). The RES calls for all utilities serving Minnesota customers to supply 25% of their sales with renewable resources by 2025. The state's largest utility, Xcel Energy, is required to supply 30% of their sales with renewable supplies by 2020.

Wind Development Requests and DNR Administered Lands

It is not clear how attractive State owned lands are to wind energy developers. The Minnesota Department of Natural Resources (DNR) administered lands are concentrated in Northeast Minnesota, where wind resources tend to be least robust and transmission infrastructure is limited. However, wind development has been spreading throughout the state into areas once deemed unsuitable. DNR administers four management units that have or will soon have leased some form of wind right to a private developer. In 2009, the Section of Wildlife accepted the donation of the Windy Acres WMA from the Nobles County Pheasants Forever Chapter. The parcel was donated to the state with a wind buffer easement already placed on the land. The developer will not be allowed to install turbines on the unit, but will be allowed to encroach into the wind buffer zone. The DNR did issue a wind buffer lease to on a section of the Casey Jones State trail located in Pipestone County. This was a situation where the project was already permitted by the Minnesota Public Utilities Commission, but the developer choose to work with the DNR to secure a wind buffer lease as part of project due diligence. The most significant lease stems from legislative direction to sign a wind development lease with the Mountain Iron Economic Development Authority.² On February 24, 2010 a lease agreement was executed for 320 acres of School Trust Lands in St. Louis County. The fourth case is being negotiated and involves a wind buffer lease on a minor, inadvertent encroachment. Other inquiries have sporadically been brought to the DNR. However, without clear guidance and authority the DNR's ability to respond to requests and opportunities more proactively is limited.

Wind Development Trends

Wind energy production, and therefore cost, is very sensitive to wind speeds. Therefore developers target the windiest locations first. The first Minnesota developments were located in on the glacial moraine known as Buffalo Ridge in Southwest Minnesota. This is the windiest location in Minnesota. However, wind development is no longer confined to the Buffalo Ridge or Southwest Minnesota for three reasons. First, the windiest locations on the Buffalo Ridge and surrounding highlands are

1 American Wind Energy Association, US Projects Database, http://www.awea.org/la_usprojects.cfm as of December 21, 2010.

2 Laws of Minnesota 2009, Chapter 176, Article 3, Section 12

developed. Second, transmission capacity to move the power to market quickly became a limiting factor in Southwest Minnesota. Third, the growing size of wind turbines and other technological improvements have dramatically expanded the areas considered economically viable for wind energy development. Wind resource maps are included in Appendix 1.

Minnesota is part of a regional grid. There are substantial flows of power between utilities and across state and province lines. The size of the Minnesota wind industry will ultimately depend upon the relative costs and transmission capacities for different project locations across the Upper Midwest.

Another trend impacting the future of wind energy siting in Minnesota is local response to wind development. In most rural communities, wind energy has been greeted as much needed economic development. However, as wind development pushes into areas with higher population density and higher per capita income it has met with more resistance. Concerns about noise, shadows and visual impacts have been aggressively raised in locations such as Goodhue and Nicollet Counties. Wind developers may focus on places with the lowest population density. These are areas where state owned conservation lands are held in greatest concentration.

Wind Energy and Public Lands Nationally

Wind energy development has occurred on both federal and state lands across the country. Though, most such development has tended to occur in the west where the public land base is much more dominant. The federal Bureau of Land Management (BLM) completed a programmatic Environmental Impact Statement in 2005 addressing wind energy leasing, by 2009 there were 327 MW of commercial wind capacity installed on BLM lands with substantially more projects in the approval pipeline.³

States have also been evaluating and implementing wind energy development leasing programs. The Western States Land Commissioner Association commissioned a survey of state land managers in 2008 regarding wind and other renewable energy leasing programs. At that time, five states had well established wind leasing programs for state lands including: Texas, Colorado, New Mexico, Washington, and Wyoming. The report noted that several other states including Alaska, Hawaii, Maryland, Montana, Ohio, Oklahoma, Oregon, and Utah were actively investigating programs for leasing public lands to wind developers.⁴ Several of those states have proceeded with development of programs.

3 Bureau of Land Management, Renewable Energy and the BLM: WIND January, 2009 (http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/energy.Par.58306.File.dat/09factsheetmap_Wind.pdf)

4 Nancy Welch Rodman, Wind, Wave/Tidal, and In-River Flow Energy: A review of the Decision Framework of State Land Management Agencies. Prepared for Western State Land Commissioners Association, Welch and Associates, July 2008.

Overview of State Lands

The legislative direction calls for the DNR to complete a legislative report on the development of wind energy on “state-owned lands”. The legislative direction does not limit the scope of the report to DNR administered lands though the language directs that DNR provide recommendations on the applicability of wind energy development on lands included in the Outdoor Recreation System. Lands designated under the Outdoor Recreation Systems are primarily DNR administered lands but also include lands administered by the Minnesota Historical Society and the Minnesota Department of Transportation. These lands will be the primary focus, but there are other state lands that might be suitable or targeted for wind energy development.

DNR Administered

DNR administers and manages approximately six million acres of fee title lands across the state. These lands are predominately state forests and predominately located in North Central and Northeast Minnesota. However, DNR administered lands also include a range of other conservation lands located throughout the state. The largest blocks of these other lands are Wildlife Management Areas, the rest being comprised of Scientific and Natural Areas, State Parks, Trails and other holdings such as water access sites, and administrative facilities. The vast majority of DNR administered lands are designated under the outdoor recreation system, under Minnesota Statutes, section 86A.05.

About 2.5 million acres of DNR administered lands are School Trust lands. School Trust status is separate from designation under the Outdoor Recreation Systems. DNR has additional responsibility to generate revenue for the Permanent School Trust Fund from these lands. This fiduciary responsibility is separate from the purposes for each type of unit purposes established under Minnesota Statutes, section 86A.05.⁵

Navigable Waters

The State of Minnesota was granted ownership, by the federal government, of the beds of navigable waters, though riparian landowners maintain a right to reasonable use of these same lands. Currently there is no universal list of navigable waters in the state. The U.S. Corp of Engineers has developed a list of navigable waters but it only lists major water ways and associated reservoirs. Navigability is based on the ability to and evidence of use in commerce at the time of statehood. Navigability is generally determined on a case-by-case basis. Determination of navigability can be an expensive process that must withstand litigation and may include archeological survey and other field documentation methods.

⁵ School Trust lands are those lands granted by the United States for the use of schools within each township (Sections 16 and 36), the swamp lands granted to the state, the indemnity trust lands granted to the state if the United States had previously patented title to Section 16 or 36 in a township, and the internal improvement lands granted to the state.

Tax-Forfeit Lands – County Administered

The state holds title to tax-forfeit lands in trust for the taxing districts. The 87 counties administer the tax-forfeit lands within their respective counties. Tax-forfeit lands comprise over 2.8 million acres of land throughout the state, with the vast majority of tax-forfeit lands located in Northern Minnesota.

MN DOT Administered Lands

The Minnesota Department of Transportation (MNDOT) manages approximately 175,000 acres of Rights-of-Way (ROW) throughout the state. These ROWs are needed to operate the Interstate and trunk highway systems. However, much of the MNDOT ROW is held in easement or even through prescriptive rights. Fee title ROWs are held by the State for all Interstate Freeway ROWs and some trunk highways. MNDOT holdings also include travel rest areas (part of the Outdoor Recreation System), maintenance facilities and gravel pits scattered throughout the state.

State Lands Administered by Other Agencies

Many state agencies hold land to support their administrative needs. Department of Administration oversees much of the core holding located in the capital complex and other St. Paul locations. However, state holdings that may be most suited to some kind of wind development are those with large campuses, such as Department of Corrections Facilities, State Hospital facilities and Minnesota State Colleges and University Campuses. These sites will have dramatically different issues associated with wind energy development than will DNR administered facilities. Agencies with custodial control of real property are identified in Appendix 3.

University of Minnesota

The University of Minnesota has several types of land holdings including the main Twin Cities Campuses, Greater Minnesota Campuses (Crookston, Duluth, Morris) as well as the Agricultural Research and Outreach Centers (ROCs) operated by the Extension Service. In addition to the campuses, the University of Minnesota holds title to the approximately 26,500 acres of Permanent University Fund lands. Though, the DNR administers and manages those lands on behalf of the University.⁶ At this time, the University has installed and operates a utility scale turbine at the West Central ROC at Morris and is working to install a second turbine. This project feeds power to the U of MN system and will also be part of a research program focusing on hydrogen production.

⁶ Permanent University Fund land in Minnesota includes those lands granted by the United States to the University by act of Congress in 1861 for development of the university system (see Minn. Stat. Sec. 92.03), and the salt spring lands granted to the state (see Minn. Stat. Sec. 92.05).

Section 2: Benefits and Costs of Using State-Owned Lands for Wind Energy Systems

The primary financial benefit from wind development leases would be revenue generated under the lease. The primary financial cost would be forgone opportunities to harvest commercial timber. Other costs, such as negotiating leases and site management, are presumed to be relatively minor or relatively constant regardless of wind development. This benefit and cost analysis provides a comparison of 100 year revenue streams associated with aspen pulpwood production and leasing lands for wind energy development. The report will also provide a high level qualitative assessment of how wind development might impact various public benefits derived from wind energy generally and derived from current public lands management.

Timber Production Revenue:

The value per acre of timber sales was calculated under several scenarios. The basic method for determining value was to establish a 100 year revenue stream associated with commercial timber harvest and then discount the revenue back to present value using Excel spreadsheet functions. It was assumed that the real price of pulpwood will remain constant (that is mirror broader inflation) at \$30 per cord. The timber revenues were based on the assumption of a highly productive timber stand, producing 40 cords per acre on a 60 year rotation. Seven scenarios based on initial stand age were evaluated.

There will be one or two timber harvests during the 100 year analysis period depending upon the initial stand age. In addition, the analysis assumes that the value of the standing timber in year 100 is the same as commercial pulpwood (\$30 in 2010 dollars). The value of the timber revenue increases with initial stand age. This occurs for two reasons: 1) the older the initial stand the more value is captured from growth that occurs prior to the analysis period, and 2) earlier harvest of older stands is valued higher in the discounting process.

The analysis varied discount rates from 0% to 5%. Choice of discount rates has a significant impact on determining the present value of timber revenue. Lower discount rates tend to increase long term values, and higher discount rates tend to decrease long term values. A real discount rate of 3% is a discount rate typical of public sector benefit cost analysis. Private sector investors will typically use higher discount rates to reflect greater cost of capital or shorter investment horizons than the public sector. The analysis is based on real dollar values rather than nominal dollar values. It is assumed that wood prices will track with general inflation, and therefore inflation rates are eliminated from the analysis.

The present value of timber revenue per acre ranges from about \$250 to \$1,600 per acre at a 3% discount rate. The value of the timber harvest will, of course, vary based on rotation length, stumpage

price and site productivity. The assumptions used here are intended to generate relatively high timber revenue in order to provide a conservative comparison between timber and wind development.

Table 1: Per Acre Present Value of Timber Revenue for Alternative Discount Rates and Stand Ages.

Discount Rate	Initial Stand Age						
	0 years	10 years	20 Years	30 Years	40 years	50 Years	60 Years
0%	\$2,004.00	\$2,205.00	\$2,400.00	\$2,601.00	\$2,802.00	\$3,003.00	\$3,204
2%	\$476.72	\$584.56	\$709.11	\$892.14	\$1,109.19	\$1,367.68	\$1,820
3%	\$245.51	\$326.02	\$430.31	\$588.76	\$798.10	\$1,075.85	\$1,564.04
5%	\$70.36	\$112.29	\$179.58	\$294.05	\$479.54	\$780.72	\$1,311.31

Assumptions

Harvest age:	60 years
Yield:	40 cords
Growth rate:	0.67 cord per year
Price:	\$30 per cord (2010 dollars)
Standing timber value (year 100)	\$30 per cord (2010 dollars)

Wind Lease Revenue Generation

Just as with timber revenue, wind leasing revenue will vary between sites. High quality sites, in terms of wind resource, cost to develop and access to transmission, will garner higher market values than low quality sites. This analysis is based on the wind lease MN DNR has executed with Mountain Iron Economic Development Authority in accordance with Minnesota Statutes, section 92.502.

Lease payments are set for pre and post turbine construction. Pre-construction payments are \$5 per acre for up to three years, and then \$10 per acre for up to two years. If no turbines are installed by the end of five years both parties have the right to terminate the lease. Post-construction payments are \$2,000 per megawatt of installed wind capacity. For this analysis, it was assumed that the project would include four 1.5 megawatt turbines with a total capacity of six megawatts. The post construction payments would be \$12,000 per year for a 320 acre lease. Thus, the payment rate on a per acre basis is assumed to be \$37.50 per year per acre.

A similar 100 year revenue stream was created for a wind project using the same initial stand ages and discounted with the same discount rates as the timber revenue analysis above. This provides the opportunity to directly compare revenue stream from a wind project versus traditional timber harvests.

The wind revenue analysis sought to be conservative. Lease payments are assumed to stay at \$2,000 per MW in 2010 dollars. The Mountain Iron EDA wind lease provides for escalators based on any escalators that the project might negotiate with a utility customer. It is assumed that escalators will be provided and match general inflation rates, so that the actual lease payments will remain constant in 2010 dollars. It is assumed that the annual payment escalates on average with inflation. However, the revenue assumptions also assume that the project developer will execute a lease right to remove vegetation on the entire parcel eliminating any timber revenue from the whole site. However, many wind projects in forested areas only much smaller areas, about 5 acres per turbine, for access roads and turbine sites. This analysis assumes that the lease will not be renewed after 30 years. It further assumes that there will be no timber production or revenue on the site after the wind project is decommissioned. This last assumption is not realistic, but was used to simplify the analysis and provide an extremely conservative revenue estimate.

Table 2: Per Acre Present Value of Wind Lease for Alternative Discount Rates and Stand Ages.

Discount Rate	Initial Stand Age						
	0	10	20	30	40	50	60
0%	\$1,027.50	\$1,027.50	\$1,027.50	\$1,027.50	\$1,837.50	\$2,047.50	\$2,227.50
2%	\$746.14	\$746.14	\$746.14	\$746.14	\$1,540.26	\$1,746.14	\$1,922.61
3%	\$643.09	\$643.09	\$643.09	\$643.09	\$1,429.49	\$1,633.38	\$1,808.14
5%	\$487.96	\$487.96	\$487.96	\$487.96	\$1,259.39	\$1,459.39	\$1,630.82

Assumptions

Wind project life	30 years
Operation commences	Year 4
Project capacity	6 MW
Project area	320 acres
Timber harvest	Year 1 and none thereafter
Commercial timber	40 years and older
Commercial timber price	\$30 cord (2010 dollars)
Non-commercial timber price	\$0
Growth rate:	0.67 cord per year (40 cord on a 60 year rotaion)

The net present value of the wind lease ranges from \$643 per acre to \$1,800 per acre at a 3% discount rate. The primary difference between wind development scenarios is the value of timber harvested in year one to clear the site for the wind project.

Wind - Timber Revenue Comparisons

Table 3: Comparison of Wind Lease and Timber Revenues @ 3% Discount Rate

Revenue Scenario	Initial Stand Age						
	0	10	20	30	40	50	60
Wind	\$643.09	\$643.09	\$643.09	\$643.09	\$1,429.49	\$1,633.38	\$1,808.14
Timber	\$245.51	\$326.02	\$430.31	\$588.76	\$798.10	\$1,075.85	\$1,583.91
Difference	\$397.58	\$317.07	\$212.78	\$54.33	\$631.39	\$557.53	\$224.23

This analysis suggests that where the opportunity exists wind energy leasing will generate more revenue for the State than commercial timber harvest. This is partly because a wind project returns more income in early years and forestry returns more income in the later years. Thus, a present value analysis will tend to favor wind energy. However, one has to nearly eliminate the time-value of money before timber harvest becomes more financially attractive. This analysis did suggest that 30 year old pulpwood stands are least financially attractive for converting to wind development. This is the result of the assumption that the material has no commercial value, and that the lost harvest in year 30 would not have been as heavily discounted as the younger stands. However, the benefit – cost ratio will vary from site to site based on both the potential wind lease revenue and the forgone timber harvest revenue. Each potential lease would require an economic evaluation prior to being executed.

The wind revenues were calculated very conservatively and the timber harvest revenues were calculated optimistically. The assumed pulpwood stumpage used (\$30 per cord) is considerably higher than current market conditions. Also, no forest management costs were ascribed to the timber production scenarios. The wind lease scenarios assumed that the entire 320 acre parcel would be cleared of trees eliminating any forestry activity. The wind lease scenario also assumed that there would be no lease extension or “repowering” of the wind site. It is quite likely that a new lease would be sought and turbines replaced after the end of the project, generating revenue in the later years. Further, the analysis assumes that there would be no forestry activity post - wind development, even if the lease was not extended. Even using these assumptions, wind energy development leases will deliver more present value revenue per acre than conventional aspen pulpwood management. These assumptions that overall maximize assumed timber scenario revenue and minimize wind scenario revenue was used in lieu of further sensitivity analysis.

Mineral Leases:

The report did not conduct a revenue comparison between wind leases and mineral leases. It is assumed that, where marketable resources exist, mineral leases will generate higher revenue than wind leases. As with timber production, wind leases need to be financially evaluated on a case-by-case basis in order to ensure appropriate management of the fiscal benefits.

Wind Buffer Leases

The State also has the opportunity to issue wind buffer leases. In this case, the State could provide a lease to use the State's wind resource by allowing a turbine on adjacent lands within the wind buffer area (three or five times the diameter of the wind turbines rotors). The revenues from such leases are typically much smaller than payments associated with the actual turbine, but they would likely be structured so that there is no lost income or use of the state land for existing purposes.

The lease payment for the wind buffer zone lease on the Casey Jones trail was a one-time payment of about \$450 per acre for the 30 year term of the lease. There was no fiscal cost imposed on the state other than the staff time required to negotiate and execute the necessary legal documents. The transaction costs should decline over time as DNR becomes more familiar with such agreements.

Non-Financial Benefits and Costs of Wind Development on State Lands

There are non-financial benefits and costs associated with leasing state lands or wind resources to developers. The environmental and recreational impacts of wind development on state lands would constitute the major non-financial cost of wind development on state lands. Depending upon the specific unit involved, its designation under the Outdoor Recreation System, the natural resources on site and the recreational activities provided these costs can be very significant and unacceptable. These impacts are more generally described in Section 3 below. The first step in responding to a proposal for a lease must be a thoughtful site specific assessment of the suitability and impact to natural resources and recreational use that would be created by the project.

A significant benefit of making state lands potentially available directly or through buffer leases would be to expand the universe of land potentially available for wind development. Leasing state lands or wind buffers may also help to keep larger wind projects more compact, thereby reducing development costs and the overall project footprint. Wind buffer leases can provide a good neighbor benefit to the owners of land adjacent to state lands. Where wind buffer setbacks do not appreciably contribute to the protection of natural resource or recreational values, adjacent owners would not have reduced opportunities to host wind turbines and receive the associated payments from the project developer.

The State of Minnesota has supported and encouraged the development of wind energy for two primary reasons; 1) the economic opportunity associated with the development of an in-state energy resource and 2) the reduced environmental impact of wind energy relative to other sources of electricity. As a non-combustion source of electric power, wind energy does not emit any pollutants to the air as a part of normal operation. Nor, once constructed, does wind energy induce land disturbance as part of a fuel cycle. Finally, wind energy requires no water resources for operation. In contrast, conventional thermal power plants are enormous consumers of water resources.

Section 3: the effects of wind energy systems on state-owned lands

Energy production, in all its forms, creates significant environmental impacts. Wind energy, while providing an overall reduction of environmental impacts, does have its own impacts. Poorly sited or laid out wind projects can have very significant negative impacts on natural resources and associated recreational opportunities. This section is intended to provide a high level overview of the types of impacts that can occur in association with wind energy development. It is not intended to be an exhaustive environmental analysis or review, nor is it intended to identify specific parcels where wind energy development would or would not be acceptable. The environmental and recreation impacts of wind development will vary from site-to-site. DNR will not move forward in pursuing a wind lease without a thoughtful assessment of suitability and impacts.

Description of Wind Energy Development

Wind energy development occurs at a variety of scales. Commercial scale wind development, the subject of this report, can vary from a single wind turbine of 1 MW to several hundred turbines spread over many square miles. Project development will typically consist of four phases; 1) pre-construction site assessment, 2) construction 3) operation and 4) decommissioning. Preconstruction site assessment will likely involve the installation of a metrological tower for one to two years. These towers are typically supported with guy wires. Construction involves building roads and clearing land as needed to move heavy equipment and facility components on site. Construction requires the operation of heavy equipment to erect the wind turbines and ancillary facilities. Construction will vary with project size, but typically occur over one to two years. Each turbine will require up to five acres of cleared land during the construction phase. The operation phase will typically last for approximately 25 to 30 years. The primary on-site activity will be maintenance. Periodic heavy maintenance requiring large cranes can be anticipated. The final phase is decommissioning. After the turbines reach the end of their useful life, they must be removed from the site. Other ancillary facilities, such as substations, power lines and access roads, must also be removed if the site is not repowered.

Modern commercial wind turbines are very large. They can produce from one to three MW of electric power each. The turbines are supported on steel towers ranging in height from 230 to 330 feet (70 to 100 meters) in height. The rotor blades that drive the turbine also range in size from 230-330 feet (70 to 100 meters) in diameter. The overall height of the structure may range from 350 feet to nearly 600 feet. Wind turbines with in a wind farm are spaced to reduce wake interference between individual wind turbines. A wind project may require up to a square mile for every ten MWs of project capacity in order to meet setbacks and properly space individual turbines.

Although the size and density of wind developments are a factor in determining a project's environmental effects, the primary concerns currently center on the where the wind turbines and ancillary facilities are sited.

Construction

Construction of wind developments includes such features as access roads, tower placement, crane walk, collector lines, transmission lines and substations. Environmental effects related to construction of these features are typical of construction activities and include: erosion and sedimentation from areas where soil is exposed, introduction and spread of invasive plant species from construction equipment and fill materials, temporary wetland impacts during construction, and direct habitat loss from construction of access roads, turbine pads, and substations.

Habitat Fragmentation

Habitat fragmentation occurs when wind energy development projects break habitat into smaller tracts by removing vegetation and altering the landscape with project infrastructure (i.e. access roads, collector lines, transmission lines, substations, and turbine towers). The degree of habitat fragmentation is dependent on the location and layout of the project and its facilities. Fragmentation results in direct habitat loss, decrease in interior habitat (more habitat edge), smaller habitat patch sizes and habitat isolation. These changes will likely result in a shift from species requiring larger habitat patch sizes to generalist edge species. Many of the species requiring interior habitats are already classified as species of greatest conservation need or state listed. Species using interior forests or large tracts of grassland would be impacted the most from the loss of suitable habitat due to fragmentation.

Birds and Bats

Bird and bat fatalities occur when they strike the blades of operational turbines or for bats that experience barotrauma (pressure change causes lung hemorrhaging). Longer lived species with a lower reproductive rate are more susceptible to population level impacts. The degree to which this occurs and the relative risk compared to other activities that cause bird and bat mortality (i.e. communication towers, buildings, and cars) is the subject of recent and pending scientific inquiry. While the influence of wind turbine mortality to a species population and future existence is uncertain, it is clearly understood that turbine siting is a key factor influencing bird and bat fatalities. Poorly sited projects in eastern states have been associated with large numbers of bat fatalities.

Avoidance

Wildlife avoidance or displacement can occur when turbines are constructed in areas with avian species that are sensitive to tall structures, noise and shadow flicker from turbines, or increased vehicular traffic from operation and maintenance activities. Forest interior avian species will avoid forest areas fragmented by wind energy development, and many grassland avian species prefer open horizons. The result of avoidance is a reduction in available habitat that supports the species. The impact of wind projects on avian species is undergoing scientific investigation, but the current literature on the subject indicates that some grassland bird species will avoid otherwise suitable habitat due to the presence of wind turbines.

Rare features

Rare features include state-listed plant and animal species and Minnesota County Biological Survey Sites of Biodiversity Significance. Species state-listed as threatened or endangered are protected under Minnesota's endangered species law (Minnesota Statutes, section 84.0895) and associated rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134). Effects to rare features from wind energy development are similar to other species and habitat effects such as habitat fragmentation, fatalities, and avoidance. In addition, given the low population sizes and/or statewide extent of rare species, detrimental effects to these species may result in significant impacts at population or statewide levels. The Wind Advisory Committee Recommendations to the U.S. Fish and Wildlife Service emphasized the presence of rare features as a site feature that would warrant consideration of other sites for wind development or collection of additional information to understand the effects to rare features.⁷

Loss of Working Forests

Minnesota's forest industries rely upon state timber lands for critical raw material. Concentrated, large scale development of wind energy on productive forest lands could begin to impact timber supplies locally, if large treeless clear zones are required around each turbine. These impacts can be managed by minimizing clear zones around wind turbines in forested areas to a level sufficient to construct, operate and maintain the wind turbines and ancillary facilities.

Recreation

Recreational impacts are more subjective and harder to assess due to the differences in how individuals define the quality of the experience. Wind projects change the viewshed and create noise, shadow flicker, and traffic. Many outdoor enthusiasts, including hunters, trappers, fishermen, trail users, bird watchers, and hikers seek an outdoor experience away from noise, commotion, manmade structures, and the opportunity to come into contact with wildlife. Safety of the outdoor enthusiast must also be considered because turbines, on rare occasion, can malfunction resulting in fires, falling debris, or have ice shedding from the blades. Wind developers may seek to close a project area to public hunting during construction and maintenance activities out of concern for worker safety.

Cumulative Impacts

Wide spread activities that have small incremental impacts can have a significant impact in aggregate. Individual wind farms may have limited impacts on natural resources, working forest lands and

⁷ US Fish and Wildlife Service Wind Turbine Advisory Committee, Preamble to Committee Recommendations: Committee Policy Recommendation: Committee Recommended Guidelines, March 4, 2010.

The committee was a US Fish and Wildlife Service and industry sponsored work group that developed a recommendations on the identification and evaluation of wildlife impacts associated with wind energy development proposals.

recreational opportunities. However, extensive wind development on state lands might pose a risk that the cumulative impacts to the resource and use of the resource will be unacceptable.

Siting

Wildlife professionals, the scientific community, and wind industry professionals agree that environmental effects from wind energy development are best addressed during project siting. A properly sited project that avoids sensitive habitat and landscape features could result in very little environmental effect, while just one poorly sited wind turbine could result in unacceptable environmental effects. The US Fish and Wildlife Wind Turbine Advisory Committee and the Minnesota Department of Commerce, Office of Energy Security, Energy Facility Siting Program recommend a tiered approach to assessing the suitability of sites for wind energy development. This tiered approach focuses on identification of species of concern, important habitat features, large tracts of intact habitat, and areas where development is precluded such as scientific and natural areas, federally designated critical habitat, or high priority conservation areas. The presence of these types of features can result in more in depth investigation of the site to identify potential risks, or a decision that the site is not suitable for wind development.

Section 4: Recommendations for a regulatory system and restrictions that will be necessary to protect the state's land and water resources when using state-owned lands for wind energy systems

Existing Regulatory Controls

The environmental aspects of wind energy projects are regulated by either local government or the Minnesota Public Utilities Commission (PUC). If the project is under five megawatts in capacity, then the local government with land use control authority is responsible for the permitting of wind energy projects. If the project exceeds five megawatts, it is subject to the authority of the Minnesota PUC. However, counties may take a delegated authority to permit wind projects up to 25 Megawatts under a zoning ordinance compliant with PUC's January 11, 2008 Order Establishing General Wind Permit Standards which establishes minimum standards consistent with state permitting practices.⁸ The PUC process is supported by the Minnesota Office of Energy Security which conducts environmental review on all wind projects permitted by the state. This environmental review and PUC site permits will apply to all projects regardless of their location on state or privately owned lands.

⁸ Minnesota Public Utilities Commission Docket No. E.G-999/M-07-1102

The DNR will review and evaluate natural resource and recreational impacts prior to issuing a lease that would enable a project developer to apply for a PUC permit involving DNR administered lands.

Authorities for DNR Administered Lands

The DNR has multiple authorities that could be used to establish wind energy development leases on state lands. Minnesota Statutes, section 92.50 provides general authority to lease state lands for a variety of purposes including commercial use. However, this statute limits the Commissioner of DNR to lease terms of no more than 10 years. The Commissioner can extend commercial leases for a period of up to 40 years with the approval of the State Executive Council (Governor, Lieutenant Governor, Secretary of State, State Auditor, and Attorney General). This statute is not well suited for wind development because of the limitation on the lease duration or cumbersomeness of State Executive Council Approval. The Commissioner of DNR has additional authority to issue commercial leases of state forest lands under Minnesota Statutes, section 89.17 for up to 21 years.

Minnesota Statutes, section 92.502 was passed in 2008 to provide the Commissioner with explicit authority to “enter a 30 year lease of land administered by the Commissioner for a wind energy project”. The Legislature then directed the Commissioner to negotiate a lease with the Mountain Iron Economic Development Authority for a specific parcel of land in St. Louis County.⁹ The Statutes authorizing DNR to issue a 30 year wind lease did not direct or explicitly authorize rule making. The DNR will require rule making authority and then appropriate rules prior to any significant effort to lease lands to wind developers.

Authorities for Non-DNR Administered Lands

County Administered Tax Forfeit Lands

The Minnesota Legislature has provided St. Louis County with authority to enter into a 30 year wind leases on county administered tax forfeit lands.¹⁰ No other county is explicitly authorized to enter into wind development leases on tax forfeit lands.

Other Agency Administered Lands

DNR Staff did not evaluate the statutory authority for other agencies or managers of state owned lands to lease those lands to wind energy developers. They will each be subject to the laws and rules governing their use and management of land.

External Constraints on DNR Administered Lands

⁹ Laws of Minnesota 2009, Chapter 176, Article 3, Section 12

¹⁰ Minnesota Statutes, Section 92.502

Pittman-Robertson Act Federal Aid

The DNR's Division of Fish and Wildlife receives significant financial support from the U.S. Fish and Wildlife Service under the Federal Aid in Wildlife Restoration Act of 1937, as amended, (also known as the Pittman-Robertson Act). When the Section of Wildlife uses federal aid in the acquisition, development or management of Wildlife Management Areas, a federal interest in those lands is established. This federal interest obligates DNR resource managers to abide by strict rules that are intended to prevent the diversion of federal aid from its intended purpose. This includes a restriction on the use of federal aid, and therefore properties with a federal interest, for the purpose of producing revenue. Before any WMA land could be leased for wind development, federal aid clearance would be required. Much of the WMA land base has a federal interest.

Land and Water Conservation Fund

The Land and Water Conservation Fund Act of 1965 authorized a program to provide matching grants to state and local governments to acquire and develop outdoor recreation facilities. Lands and facilities acquired and developed with Land and Water Conservation (LAWCON) funds must remain available for the intended recreational purpose in perpetuity unless a conversion with replacement is approved by the Secretary of the Interior. LAWCON funds and associated restrictions are widely incorporated into State Parks, and may impose limitations on the ability of the state to lease those lands for wind energy development.

Timber Certification

DNR administered commercial forest lands are certified under both the Sustainable Forestry Initiative and the Forest Stewardship Council programs. These are independent third party certification programs that seek to ensure that forest products are produced from sustainably managed forests. This certification provides value to key Minnesota forest products industries through enhanced marketing and access to key markets. Maintaining the certificates on DNR lands requires adherence to specific guidelines such as the protection of high conservation value forests. Wind energy development on forested lands will need to be accomplished within the constraints of these forest certification programs.

Recommendations for Regulating Wind Development on DNR Administered Lands

DNR will need to develop rules for guiding any significant development of wind energy leasing. These rules must address two issues; 1) mechanisms for fair and efficient transactions and 2) mechanisms for protecting natural resources and recreational opportunities.

Currently, when making resources, such as minerals and timber, or land available for private commercial use the DNR uses a mix of set fees, negotiated transactions and public auctions. The goal of all transaction processes is that they are fair, open and efficient. The DNR will seek to secure the full fair market value for any state resource that it sells or leases for private use. The process should not favor one market participant over another, but the cost of transaction also needs to be managed at a level

commensurate with the value of the transaction. State lands could be leased through some combination of public auction and negotiated leases.

Public Auction of State Wind Development Leases

Wind leasing could be patterned on mineral lease auctions. The Division of Lands and Minerals accepts industry nominations for specific potential mining sites. The nominations are confidential for three years. Sites that have significant industry interested are subject to an interdisciplinary review of natural resource impacts. Then if acceptable, a site is included in a public lease auction. Wind development leases could follow this approach as follows: 1) request that companies engaged in wind development projects nominate areas they would like to see the DNR offer at a sale; 2) DNR staff would review and screen the nominated areas for natural resource concerns, Outdoor Recreation Unit suitability and appropriate legal control; 3) for sites passing internal review, DNR would notify public interest groups and prospective bidders of the areas under consideration; and 4) require bidders to submit sealed bids on areas that a company would establish its project. This option would require Legislative authority for DNR develop rules necessary to carry such a program out.

Negotiated Leases

A second option for the issuance of wind development leases would be for the DNR to negotiate leases as opportunities arise on a case-by-case basis. The process could be generally structured as follows: 1) developers interested in specific parcels or units would contact the DNR to request a wind lease; 2) DNR staff would review and screen the nominated areas for natural resource concerns, Outdoor Recreation Unit suitability and appropriate legal control, 3) for sites passing internal review, negotiate terms and conditions of a lease. The terms and conditions would include both financial consideration as well as actions to avoid, minimize and mitigate impacts on natural resources. This option would also require Legislative authority for DNR to develop rules necessary to carry such a program out.

Environmental Protections

In either an auctioned or negotiated lease arrangement, the sites involved would be subject to appropriate environmental review to evaluate the potential impacts, means of avoiding, minimizing and mitigating impacts. Environmental review would at minimum address the types of concerns and issues raised in review of wind development on private lands.

In all cases, regardless of general Outdoor Recreation System unit suitability or mechanism to issue a wind development lease, the DNR would exclude wind turbines and ancillary facilities within the following types of natural resources:

- public waters or wetlands or between adjacent wetlands
- native prairies
- a high conservation value forest, including designated old growth forest sites
- a site of Outstanding Biodiversity Significance

- a natural heritage registry site, where development is incompatible with the preservation of the registry element.

The DNR would also generally restrict wind turbines and ancillary facilities from the following types of areas:

- adjacent to wetlands and public waters
- adjacent to native prairie
- a site containing listed species
- a site of high biodiversity significance
- adjacent to designated old growth forest

Standards for siting and protection of resources on states lands will evolve with the scientific understanding wind energy impacts on natural resources.

Section 5: Suitability of State-Owned Lands for Wind Energy Development Based on Their Designation as Units of the Outdoor Recreation System under Minnesota Statutes, Section 86A.05.

Outdoor Recreation System

Minnesota Statutes, Section 86A.05 establishes the Outdoor Recreation System. This act provide a brief description and legislative purpose for different land management units. These units are primarily administered by the DNR, and the bulk of DNR administered lands are designated as one of the Outdoor Recreation System units.¹¹

This report provides a generalized suitability classification for each type of land management unit established in the Minnesota Outdoor Recreation System under Minnesota Statutes, Section 86A.05. An internal DNR work group was organized in 2008 after the Mountain Iron EDA wind project was proposed. This interdisciplinary team evaluated the suitability of different units of DNR administered lands for wind energy development. This report incorporates and expands upon that effort.

The DNR identified three suitability classifications for wind energy development leasing. In consultation with the Minnesota Department of Transportation and Minnesota Historical Society, these

¹¹ The DNR administers approximately 800,000 acres of land that is yet to be designated under the Outdoor Recreation System. The majority of this land is administered by the Division of Forestry in a manner consistent with State Forests. A fraction of this land, which is not suitable for commercial timber production, is managed by the Section of Wildlife in a manner consistent with Wildlife Management Areas.

classifications have been applied to units of the outdoor recreation system administered by those agencies. These classifications are defined below and applied to the Outdoor Recreation System in Table 4.

Table 4: Outdoor Recreation Unit Suitability Classification for Wind Energy Development

Outdoor Recreation System Designation	Recommended Suitability Classification	Reason
State Park	Restricted	Generally inconsistent with the statutory purpose
State Recreation Area	Restricted	Generally inconsistent with intensive recreational use.
State Trail	Restricted	Trail ROW will not be compatible with trail use or the safety of trail users.
State Scientific and Natural Area	Excluded	Inconsistent with the statutory purpose
State Wilderness	Excluded	Inconsistent with the statutory purpose
State Forests	Allowed with Conditions	Statutory authority for commercial leases are exists for state forests, wind would be consistent with that historical precedent.
State forest subareas (Day use, campground or	Restricted	Inconsistent with the uses associated state forest subareas and user safety
State Wildlife Management Areas	Restricted	Generally inconsistent with the statutory purpose. Federal Aid restrictions will likely apply.
State Water Access Site	Excluded	Inconsistent with size and use.
State Wild, Scenic and Recreational River	NA	These are not state owned lands, but are subject to land use controls that will likely restrict wind energy development.
State Historic Sites	Restricted	Managed by Minnesota State Historical Society. Generally, inconsistent with the statutory purpose.
State Rest Area	Restricted	Managed by Minnesota Department of Transportation. MN DOT will be conducting an Accommodation Policy Study and will address wind energy development within that process.
Aquatic Management Areas	Restricted	Generally inconsistent with the statutory purpose
Undesignated Lands	Allowed with Conditions	These lands are managed outside the ORS, but generally managed as a WMA or State forest based on their capacity to support commercial timber production.

Outdoor Recreation System Suitability Classifications

Excluded: These units are not suitable for wind development. No wind power development will be permitted on these state-owned lands. Development buffers will be considered in this category only under exceptional circumstances and under tightly controlled management conditions.

Restricted: These units are generally not suitable for wind development. Wind power development will only be considered on these state-owned lands if there are exceptional wind resources and there are exceptional reasons for harvesting them. Any wind development will be subject to tightly controlled management conditions. Development buffers may be considered in this category, but only in limited circumstances and with appropriate management conditions.

Allowed with Conditions: These units may be suitable for wind development. Prior to considering a lease, potential environmental impacts must be vetted and any lease issued must include appropriate conditions to minimize and mitigate environmental and recreational impacts. Development buffers may be considered in this category with appropriate management restrictions.

School Trust Lands

School Trust lands are those lands granted by the United States for the use of schools within each township (Sections 16 and 36), the swamp lands granted to the state, the indemnity trust lands granted to the state if the United States had previously patented title to Section 16 or 36 in a township, and the internal improvement lands granted to the state.¹²

The Legislature specified that the goal of the Permanent School Funds was to secure the maximum long-term economic return from the school trust lands consistent with the fiduciary responsibilities imposed by the trust relationship established in the Minnesota Constitution, with sound natural resource conservation and management principles, and with other specific policy provided in state law.¹³

School Trust land status is independent of the Outdoor Recreation System designation. School Trust lands have been designated under several of the Outdoor Recreation System units. Undesignated lands are also predominately Trust Fund lands. School Trust lands are predominately administered by the Division of Forestry. Because of the direction to secure maximum long-term economic return from school trust lands, it is appropriate to provide additional consideration to opportunities to lease these lands for economic uses such as wind energy development. However, the revenue generation obligation is subject to limitations imposed by sound natural resource conservation and management. School trust fund status would not automatically make a site eligible for wind energy development leases.

¹² Minnesota Constitution, Article XI, Section 8; Minnesota Statutes, Section 92.025

¹³ Minnesota Statutes, section 127A.31.

Many School Trust land parcels are scattered and isolated from larger DNR management units, often Section 16 or 36 of a township. As these may not be designated under the Outdoor Recreation System, have additional fiduciary responsibilities and are more challenging to efficiently manage for commercial timber production, they appear to be the most generally suitable sites for wind energy development.

Section 6: Conclusions and Recommendations

Wind developers have periodically expressed interest in leasing state owned lands for project development. While it is not clear how large the opportunity is, wind energy development will likely generate higher levels of revenue than commercial timber production, where wind development is feasible.

However, wind development can have significant and unacceptable impacts on natural resources associated with state lands, particularly DNR administered lands. Any proposed wind development lease would require suitability screening based on the site's designation within the Outdoor Recreation System and the potential impacts to the natural resources and recreational use associated with the site.

Currently, the DNR has statutory authority to enter into wind energy development leases. This authority is general, and has allowed the DNR to react to limited instances where a wind lease was appropriate. However, to comply with the Minnesota Statutes, chapter 14, rule making regarding wind leasing is necessary. Yet, existing statutory authorities do not provide specific authorization for rule making.

The DNR recommends that the Legislature modify Minnesota Statutes, section 92.502 to enable the agency to conduct the necessary rule making. Rule making would 1) establish the process and guidelines to evaluate the suitability of and standards for wind development on DNR administered lands and 2) establish the mechanisms to negotiate and issues leases to wind energy developers.

Appendix 1: Maps of Wind Resources and State Lands

Minnesota State Lands and Known Wind Turbines also Included Electric Transmission Lines and Substations

Minnesota Wind Power Potential at 30 Meters above Ground Surface and Electric Transmission Lines and Substations

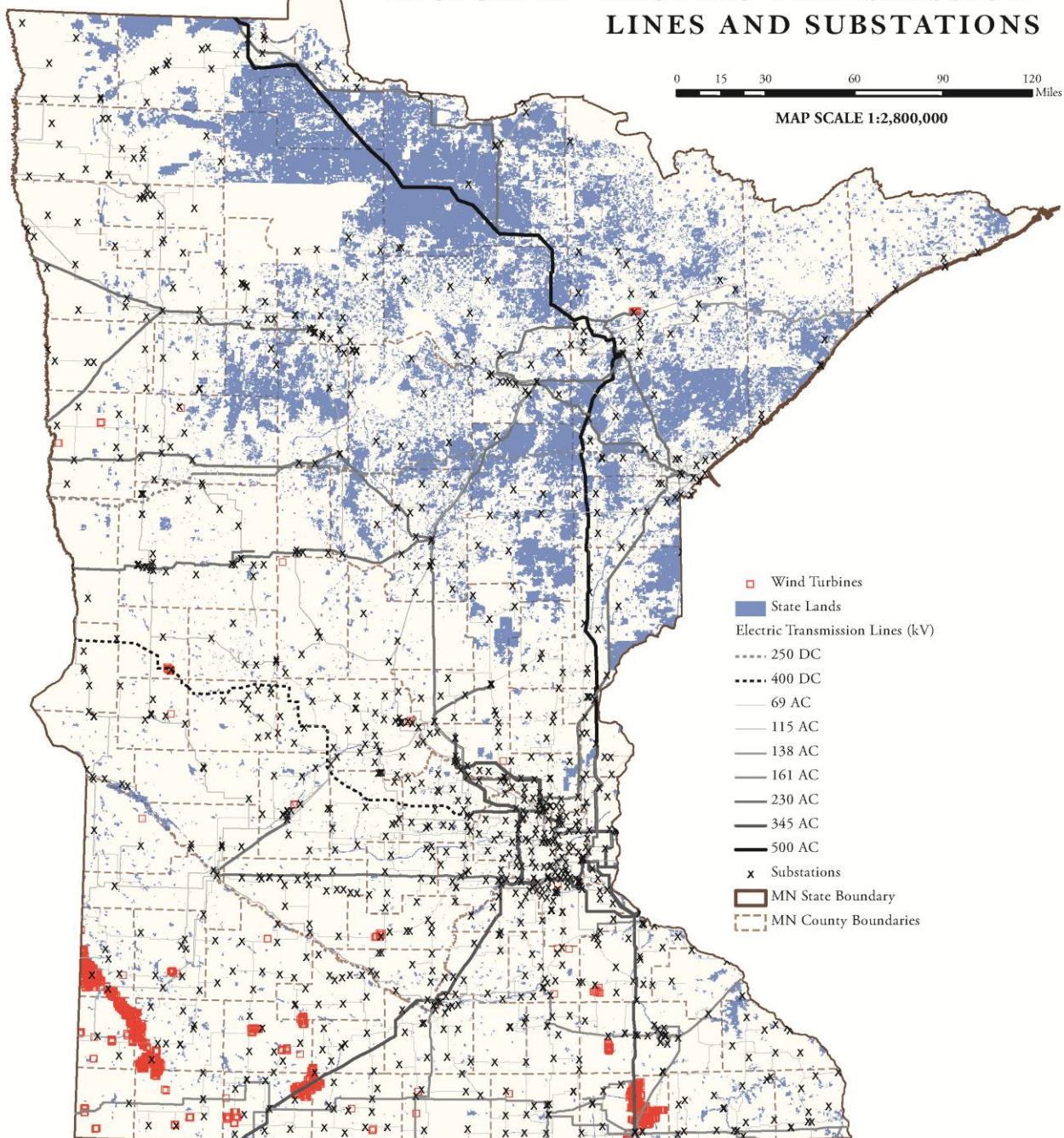
Minnesota Wind Power Potential at 100 Meters above Ground Surface and Electric Transmission Lines and Substations

Wind Power Potential on Minnesota State Lands at 100 Meter above Ground Surface and Electric Transmission Lines and Substations

Wind Power Potential on Minnesota Trust Fund Lands at 100 Meters above Ground Surface and Electric Transmission Lines and Substations



MINNESOTA STATE LANDS (BLUE) AND KNOWN WIND TURBINES (RED), ALSO INCLUDED ELECTRIC TRANSMISSION LINES AND SUBSTATIONS

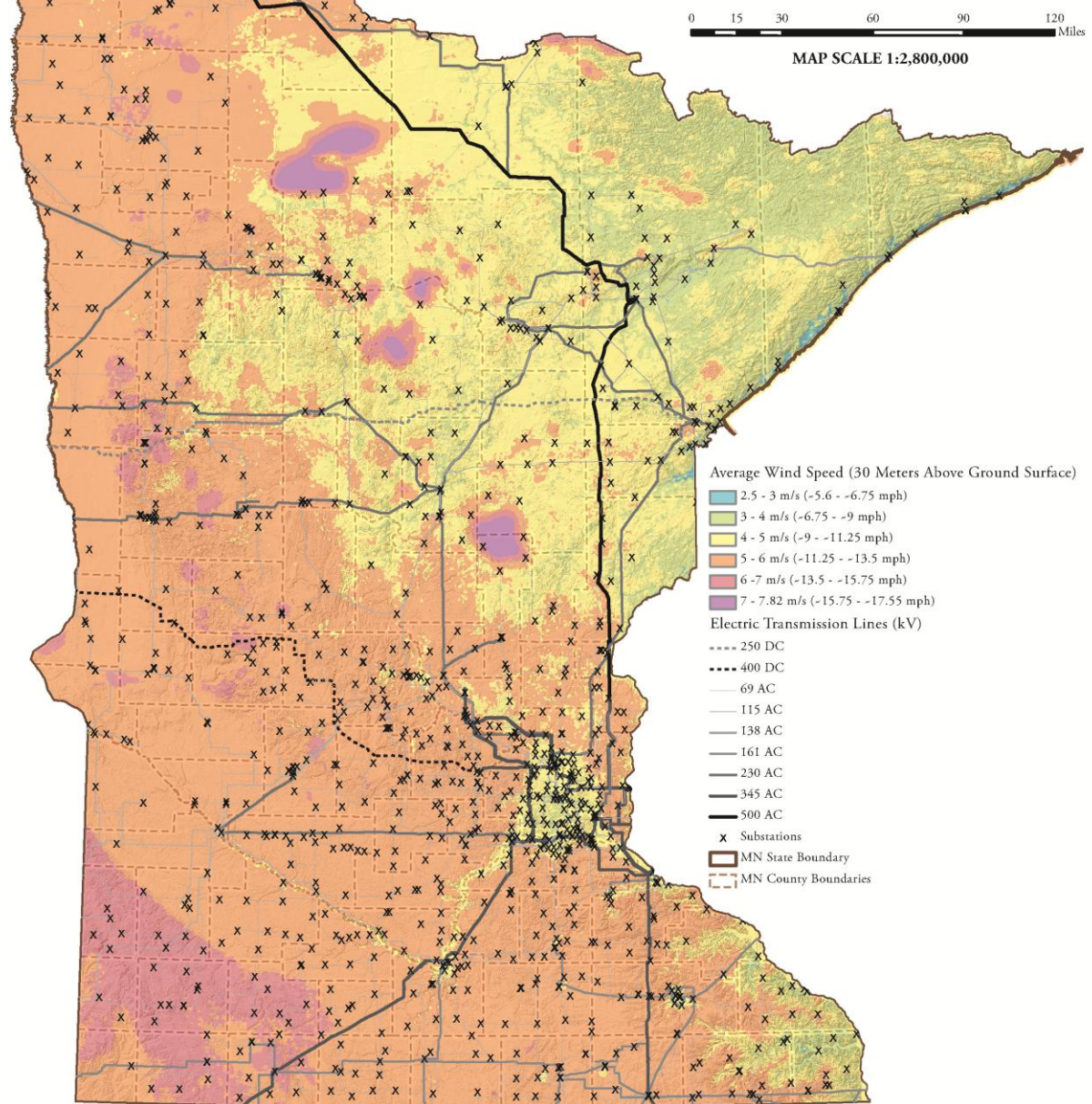


Map Created February 2011, MN DNR, Division of Lands and Minerals.



MINNESOTA WIND POWER POTENTIAL AT 30 METERS ABOVE GROUND SURFACE AND ELECTRIC TRANSMISSION LINES AND SUBSTATIONS

Wind Power Analysis Completed by Wind Logics.

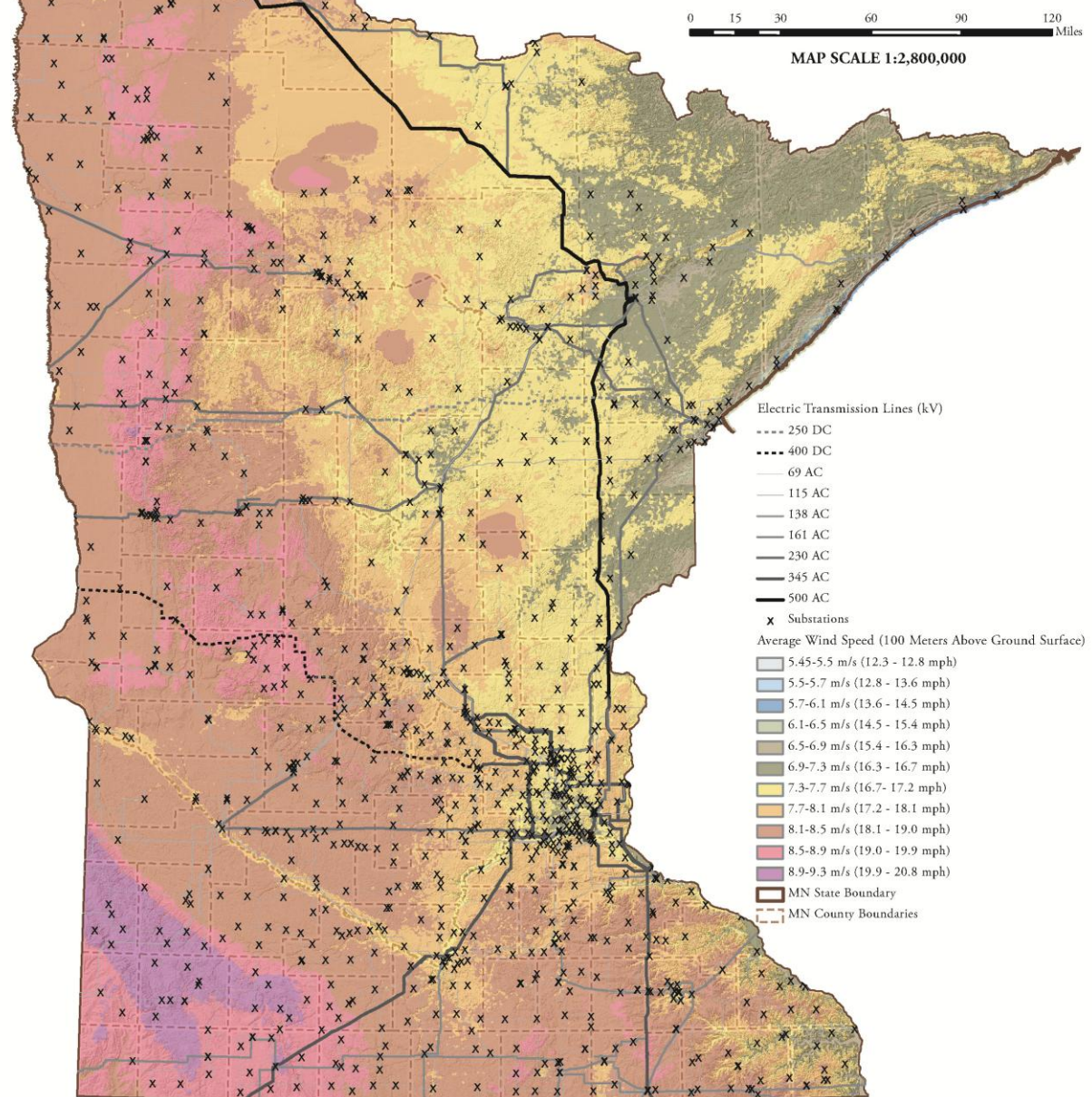


Map Created February 2011, MN DNR, Division of Lands and Minerals.



MINNESOTA WIND POWER POTENTIAL AT 100 METERS ABOVE GROUND SURFACE AND ELECTRIC TRANSMISSION LINES AND SUBSTATIONS

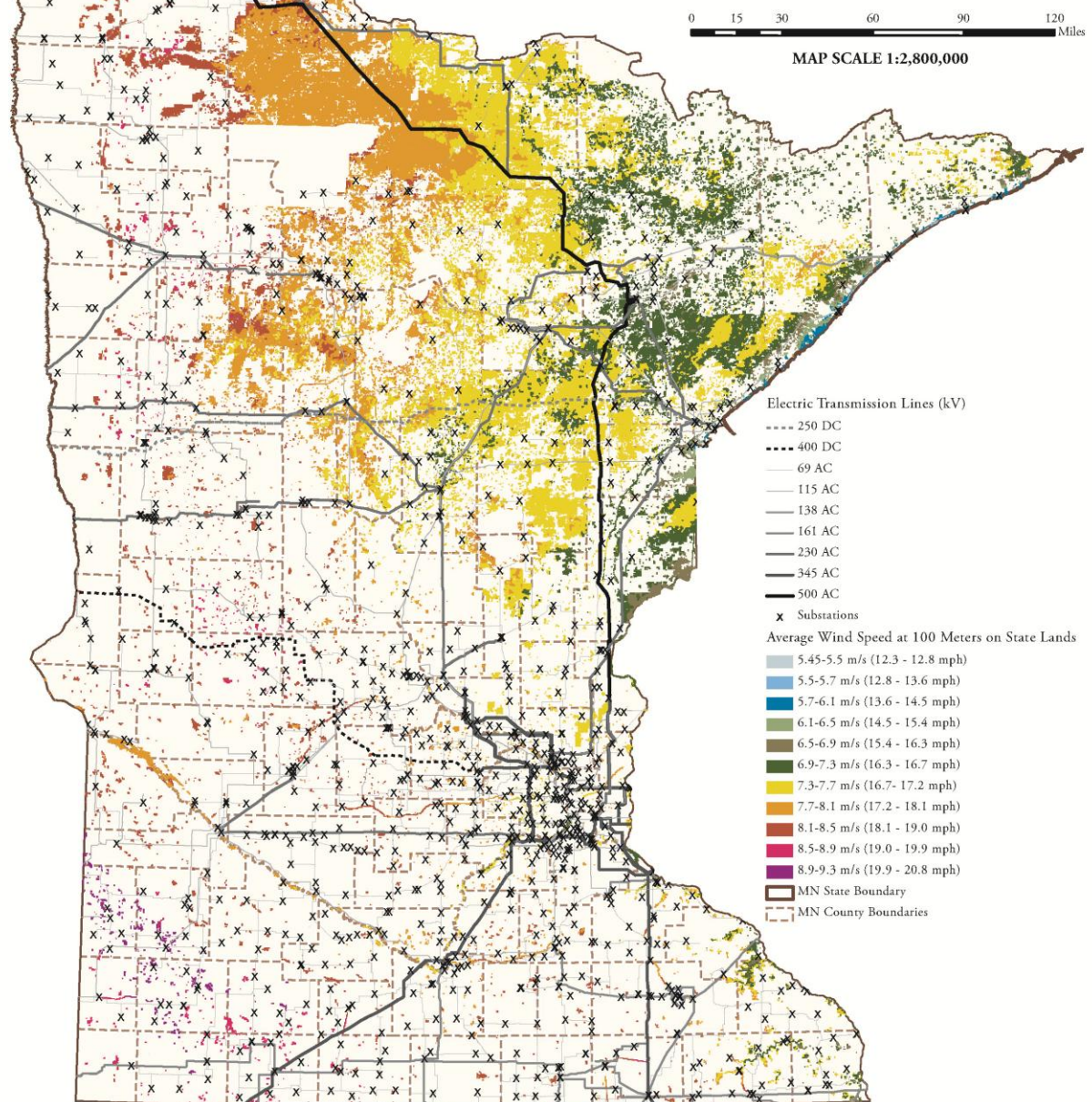
Wind Power Analysis Completed by Wind Logics.



Map Created February 2011, MN DNR, Division of Lands and Minerals.



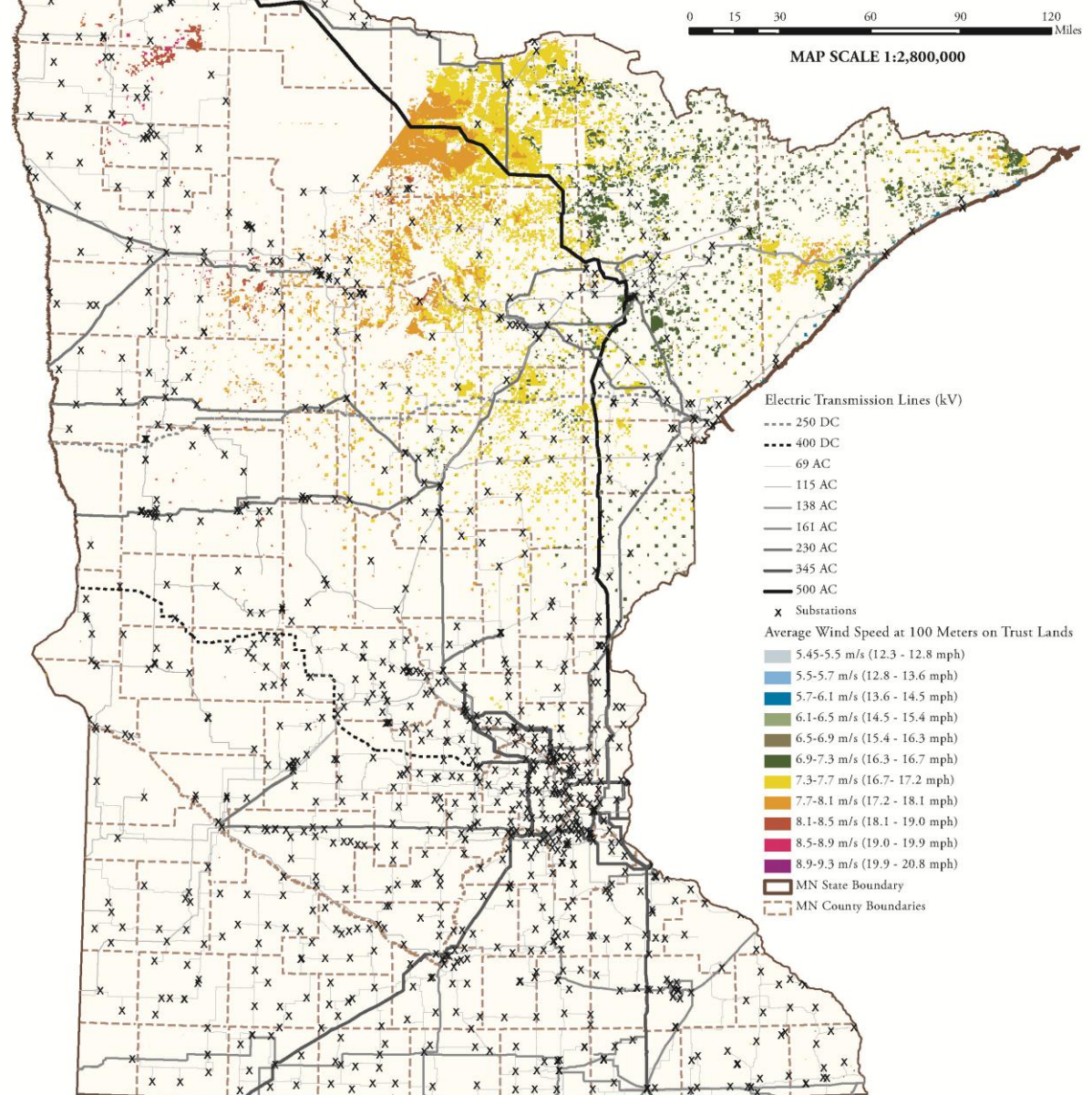
WIND POWER POTENTIAL ON MINNESOTA STATE LANDS AT 100 METERS ABOVE GROUND SURFACE AND ELECTRIC TRANSMISSION LINES AND SUBSTATIONS Wind Power Analysis Completed by Wind Logics.



Map Created February 2011, MN DNR, Division of Lands and Minerals.



WIND POWER POTENTIAL ON MINNESOTA TRUST FUND LANDS AT 100 METERS ABOVE GROUND SURFACE AND ELECTRIC TRANSMISSION LINES AND SUBSTATIONS Wind Power Analysis Completed by Wind Logics.



Map Created February 2011, MN DNR, Division of Lands and Minerals.

Appendix 2: 100 Year Revenue Stream for Aspen Production and Wind Energy Development Leasing

100 Year Timber Revenue Stream on a Highly Productive Aspen Stand

Age of Stand	0	10	20	30	40	50	60
Cords available	0	0	0	20	27	34	40
Value	\$30	\$30	\$30	\$30	\$30	\$30	\$30
Year	Revenue from Timber Operations						
1	0	0	0	0	0	0	\$1,200
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0
10	0	0	0	0	0	\$1,200	0
11	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0
20	0	0	0	0	\$1,200	0	0
21	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0
30	0	0	0	\$1,200	0	0	0
31	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0
40	0	0	\$1,200	0	0	0	0
41	0	0	0	0	0	0	\$1,200
42	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0

50	0	1200	0	0	0	0	0
51	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0
60	\$1,200	0	0	0	0	0	0
61	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0
70	0	0	0	0	0	\$1,200	0
71	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	\$1,200	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0
90	0	0	0	\$1,200	0	0	0
91	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0
100 (Residual Value)	\$804	\$1,005	\$1,200	\$201	\$402	\$603	\$1,185.90
Total revenue	\$1,200	\$1,200	\$1,200	\$2,400	\$2,400	\$2,400	\$2,400
Total revenue + residual	\$2,004	\$2,205	\$2,400	\$2,601	\$2,802	\$3,003	\$3,585.90
Present value at 0%	\$2,004.00	\$2,205.00	\$2,400.00	\$2,601.00	\$2,802.00	\$3,003.00	\$3,585.90

2%	\$476.72	\$584.56	\$709.11	\$892.14	\$1,109.19	\$1,367.68	\$1,872.98
3%	\$245.51	\$326.02	\$430.31	\$588.76	\$798.10	\$1,075.85	\$1,583.91
5%	\$70.36	\$112.29	\$179.58	\$294.05	\$479.54	\$780.72	\$1,314.21

100 Year Wind Energy Lease Revenue Stream on a Highly Productive Aspen Stand, Assuming No Repowering or Resumption of Forestry Activities

Age of Stand	0	10	20	30	40	50	60
Cords available	0	0	0	0	27	34	40
Value	\$30	\$30	\$30	\$30	\$30	\$30	30
Year	Revenue from Wind Lease and Timber Operations						
1	5	5	5	5	815	1025	1205
2	\$5	\$5	\$5	\$5	\$5	\$5	\$5
3	\$5	\$5	\$5	\$5	\$5	\$5	\$5
4	37.5	37.5	37.5	37.5	37.5	37.5	37.5
5	37.5	37.5	37.5	37.5	37.5	37.5	37.5
6	37.5	37.5	37.5	37.5	37.5	37.5	37.5
7	37.5	37.5	37.5	37.5	37.5	37.5	37.5
8	37.5	37.5	37.5	37.5	37.5	37.5	37.5
9	37.5	37.5	37.5	37.5	37.5	37.5	37.5
10	37.5	37.5	37.5	37.5	37.5	37.5	37.5
11	37.5	37.5	37.5	37.5	37.5	37.5	37.5
12	37.5	37.5	37.5	37.5	37.5	37.5	37.5
13	37.5	37.5	37.5	37.5	37.5	37.5	37.5
14	37.5	37.5	37.5	37.5	37.5	37.5	37.5
15	37.5	37.5	37.5	37.5	37.5	37.5	37.5
16	37.5	37.5	37.5	37.5	37.5	37.5	37.5
17	37.5	37.5	37.5	37.5	37.5	37.5	37.5
18	37.5	37.5	37.5	37.5	37.5	37.5	37.5
19	37.5	37.5	37.5	37.5	37.5	37.5	37.5
20	37.5	37.5	37.5	37.5	37.5	37.5	37.5
21	37.5	37.5	37.5	37.5	37.5	37.5	37.5
22	37.5	37.5	37.5	37.5	37.5	37.5	37.5
23	37.5	37.5	37.5	37.5	37.5	37.5	37.5
24	37.5	37.5	37.5	37.5	37.5	37.5	37.5
25	37.5	37.5	37.5	37.5	37.5	37.5	37.5
26	37.5	37.5	37.5	37.5	37.5	37.5	37.5
27	37.5	37.5	37.5	37.5	37.5	37.5	37.5
28	37.5	37.5	37.5	37.5	37.5	37.5	37.5
29	37.5	37.5	37.5	37.5	37.5	37.5	37.5
30	37.5	37.5	37.5	37.5	37.5	37.5	37.5
31	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0
40	0	0	\$0	0	0	0	0
41	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0

44	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0
51	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0
58	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0
61	0	0	0	0	0	0	0
62	0	0	0	0	0	0	0
63	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0
65	0	0	0	0	0	0	0
66	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0
70	0	0	0	0	0	\$0	0
71	0	0	0	0	0	0	0
72	0	0	0	0	0	0	0
73	0	0	0	0	0	0	0
74	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0
76	0	0	0	0	0	0	0
77	0	0	0	0	0	0	0
78	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	\$0	0	0
81	0	0	0	0	0	0	0
82	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0
85	0	0	0	0	0	0	0
86	0	0	0	0	0	0	0
87	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0
90	0	0	0	\$0	0	0	0
91	0	0	0	0	0	0	0
92	0	0	0	0	0	0	0
93	0	0	0	0	0	0	0
94	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0
99	0	0	0	0	0	0	0

100	\$0.00	\$0.00	\$0	0	\$0.00	\$0.00	0
Total revenue	1,028	1,028	1,028	1,028	1,838	2,048	2,228
Total revenue + residual	1,028	1,028	1,028	1,028	1,838	2,048	2,228
Present value at		2					
0%	\$1,027.50	\$1,027.50	\$1,027.50	\$1,027.50	\$1,837.50	\$2,047.50	\$2,227.50
2%	\$746.14	\$746.14	\$746.14	\$746.14	\$1,540.26	\$1,746.14	\$1,922.61
3%	\$643.09	\$643.09	\$643.09	\$643.09	\$1,429.49	\$1,633.38	\$1,808.14
5%	\$487.96	\$487.96	\$487.96	\$487.96	\$1,259.39	\$1,459.39	\$1,630.82

Appendix 3: Minnesota State Agencies with Custodial Control of Property

State Agencies With Custodial Control of Property (2010)					
(excluding MN State Colleges and Universities and University of Minnesota)					
	Agency	Number of Buildings	Gross Square Feet	Acres	Primary Use
1	Employment & Econ Dev	3	49,087	3.36	Workforce Centers, Call Center, Unemployment Ctrs
2	Iron Range Resources	68	309,467	3,299.29	Golf & Ski Resort, Interp Center, Museum, Office
3	Perpich Center for Arts Educ	5	171,307	33.00	Educational Facilities
4	Historical Society	140	961,401	587.41	Historical Sites
5	MN State Academies	18	360,513	96.57	Educational Facilities
6	Zoological Gardens	55	466,894	463.91	MN Zoo, Educational Facilities
7	Administration	24	3,735,104	116.26	Office, Capitol Grounds & Support Services
8	MN State Retirement System	1	146,981	4.50	Office
9	Human Services	140	2,465,988	1,100.67	Regional Treatment Centers, Group Homes
10	Military Affairs	553	4,392,140	52,612.39	National Guard Training Facilities, Office
11	Corrections	304	5,727,411	1,744.60	Correctional Facilities
12	Natural Resources	2,697	3,285,215	2,998,781.05	State Forests, Wildlife Mgmt, State Parks & Recreation Areas, Scientific & Natural Areas, Building Sites and Admin Processing, State Trails, Mineral Lands, Water Access Sites, Wild & Scenic Rivers, Canoe & Boating Routes, Dams
				(does not include Con-Con & Selected)	
13	Transportation	1,272	5,840,321	2,433.96	State Highway Rest Areas, Support Facilities
				plus 369.16 miles of rail	
14	Agriculture	1	8,500	0.16	Grain & Potato Inspection
15	State Agricultural Society	76	1,506,269	359.54	State Fair Grounds
16	Amateur Sports Commission	14	505,607	245.21	Athletic Fields, Stadium, Arena
17	Commerce	1	2,900	0.83	Master Scale
18	Pollution Control Agency	16	16,140	2,810.50	Closed Landfill Program
19	Indian Affairs Council			11.68	Burial Grounds
20	Board of Water & Soil Res			0.00	Wetland Mitigation Sites
21	Veterans Affairs	40	815,244	290.71	Veterans Services, Veterans Homes
22	Public Safety	6	17,040	34.87	Driver Exam Facilities
	TOTALS	5,434	30,783,529	3,065,030.47	
Notes:					
1. Agencies "Number of Buildings" and "Gross Square Feet" column numbers are from the Facility Condition Audit (FCA) with the exception of the State Agricultural Society.					
2. Agencies acreage column numbers are from the legislatively mandated Land Inventory.					
3. The information contained herein was gathered from multiple sources and may not be a complete inventory of State owned real property.					

1/25/2011

Appendix 4: Cost of Report Preparation

DATE: 2/22/11

LEGISLATIVE REPORT – Cost of Preparation

NAME OF LEGISLATIVE REPORT – Issues and Opportunities Associated with Leasing State Lands for Wind Energy Development

Based on:

Minnesota Statute Reference: Laws of Minnesota 2010 Chapter 361, Article 4, Section 75

Prepared by: Mark Lindquist, Department of Natural Resources

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Description of Cost	Further explanation if necessary	Amount
Staff Time		
66 hours @\$40 (Mark Lindquist, Paul Pojar, Dave Schuller, Randall Doneen, Aaron VandeLinde)	Meetings, analysis, writing and review.	\$2,640
Duplication Cost (includes paper)		
350 copied pages @ 10 cents each	35 page document X 10 copies	\$35
Other:	Travel 400 miles @ .50 per mile	\$200
TOTAL TO PREPARE REPORT		
(Note: Right click on amount cell and choose update to complete)		\$2,875