

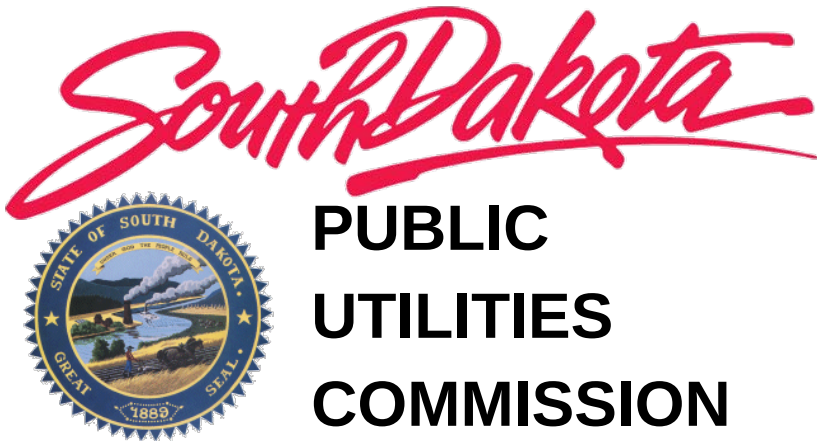
Wind Energy Facility Siting and Permitting in South Dakota

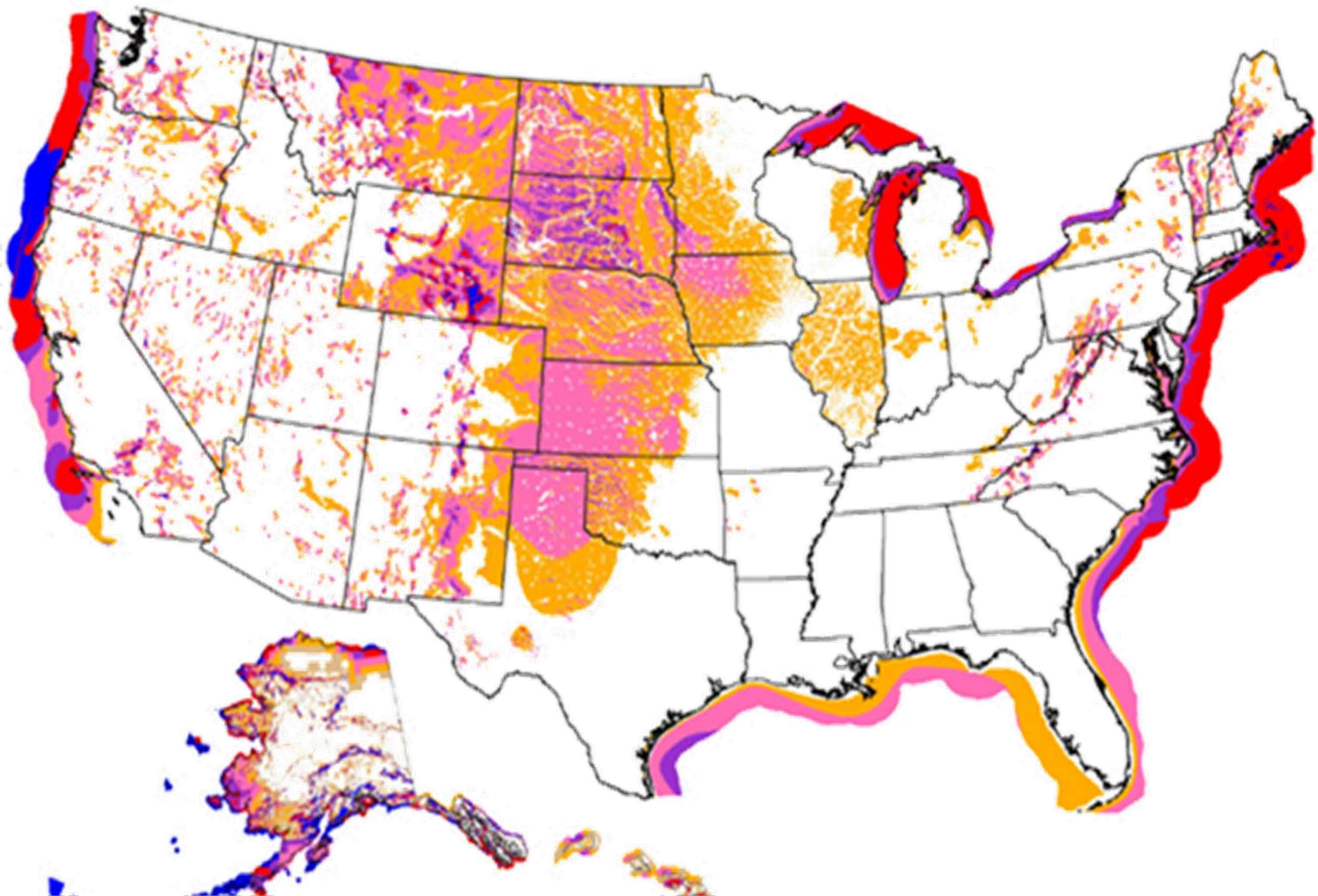
Tim Binder

Staff Analyst

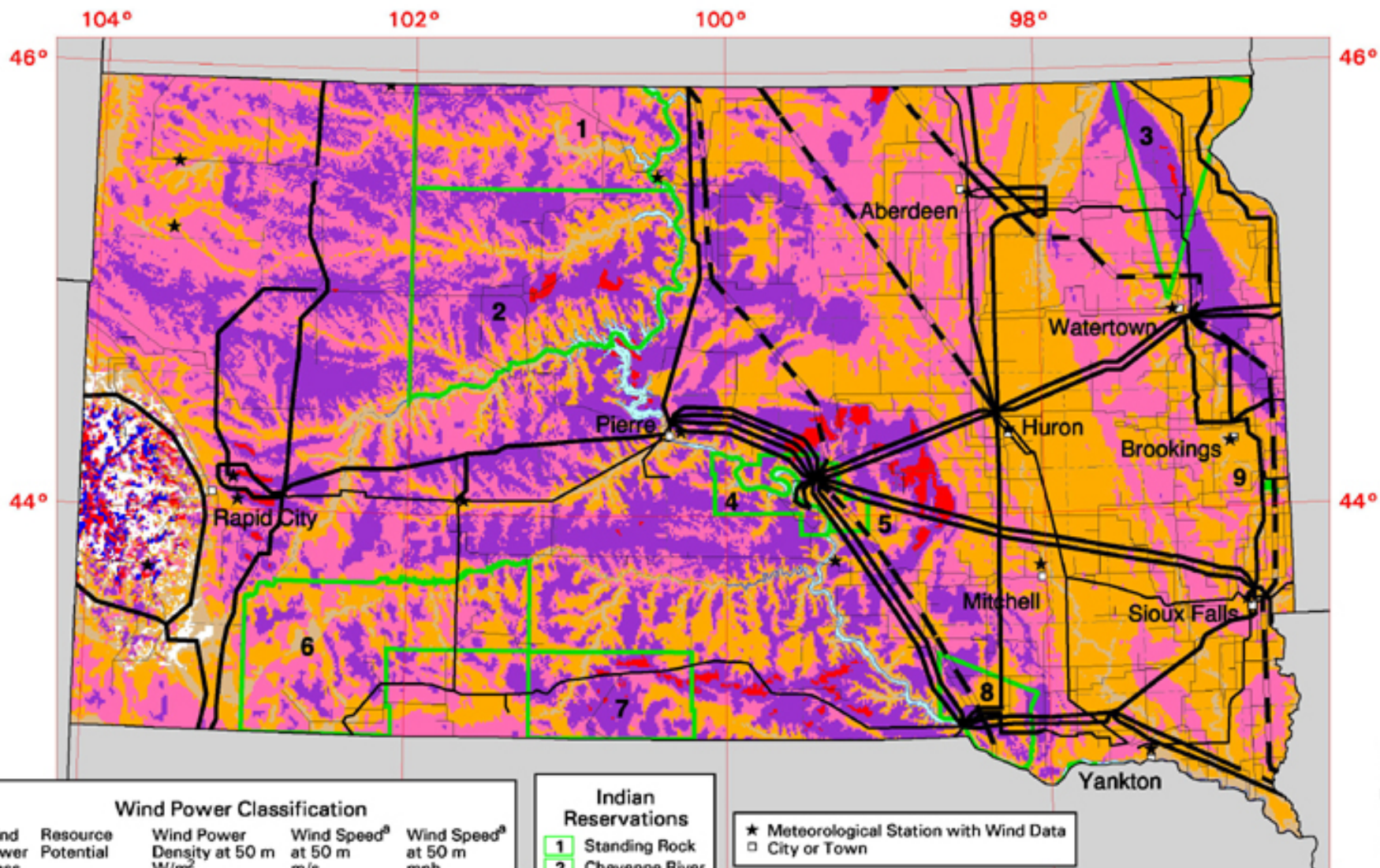
Tim.Binder@state.sd.us

21 October 2009





South Dakota - Wind Resource Map



Wind Power Classification

Wind Power Class	Resource Potential	Wind Power Density at 50 m W/m ²	Wind Speed ^a at 50 m m/s	Wind Speed ^a at 50 m mph
2	Marginal	200 - 300	5.6 - 6.4	12.5 - 14.3
3	Fair	300 - 400	6.4 - 7.0	14.3 - 15.7
4	Good	400 - 500	7.0 - 7.5	15.7 - 16.8
5	Excellent	500 - 600	7.5 - 8.0	16.8 - 17.9
6	Outstanding	600 - 800	8.0 - 8.8	17.9 - 19.7
7	Superb	800 - 1600	8.8 - 11.1	19.7 - 24.8

^aWind speeds are based on a Weibull k value of 2.0

Indian Reservations

- 1 Standing Rock
- 2 Cheyenne River
- 3 Lake Traverse
- 4 Lower Brule
- 5 Crow Creek
- 6 Pine Ridge
- 7 Rosebud
- 8 Yankton
- 9 Flandreau

★ Meteorological Station with Wind Data
□ City or Town

Transmission Line Voltage

- 69 Kilovolts
- 115 Kilovolts
- 230 Kilovolts
- 345 Kilovolts

50 0 50 100 Kilometers

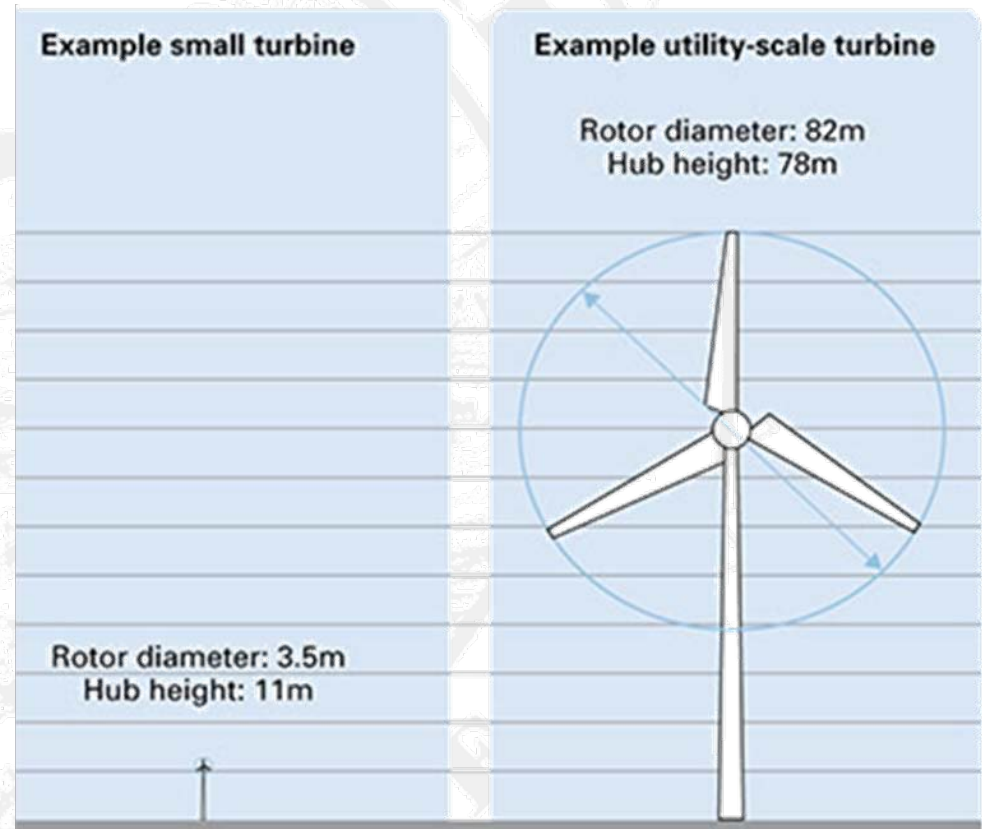
25 0 25 50 75 Miles



U.S. Department of Energy
National Renewable Energy Laboratory

Wind Energy Basics

- Large Wind
 - Wind Farms: Buffalo Ridge, Hyde County
- Small Wind
 - Residential and Small Commercial Use
- Medium Wind
 - Local Commercial Use, CBED



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Small Wind Turbines

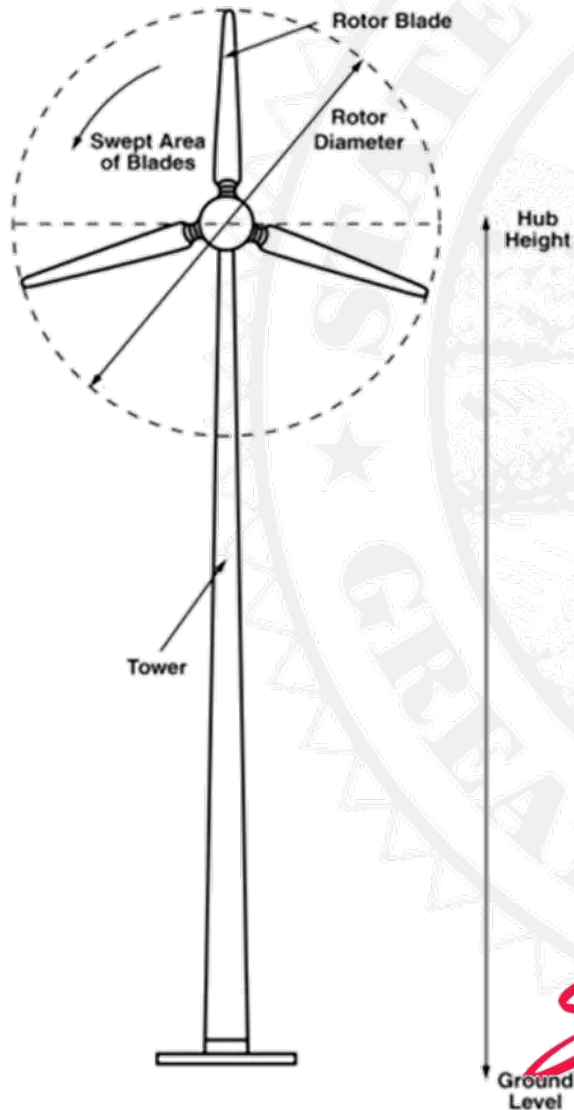
- Generators < 100 kW
- Tower heights range from 30' to 120'
- Typically used for residential consumption
- Siting small wind not at all the same as siting large wind farms



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Large Wind Turbines



- Towers are typically 250'
- Blades @ about 150'
- Total tower height is about 400'
- Generating Capacity of 1.5MW to 3MW

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Large Wind Basics

- Sited in rural areas along ridges:
 - Turbine Strings
 - Access Roads
 - O&M Facilities
 - Collector Lines and Transmission Lines
 - Substation*



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Sample Large Wind Projects

- SD Wind Energy Center – 40.5 MW
- MinnDakota – 54 MW
- Tatanka I – 88.5 MW
- Buffalo Ridge I – 50.4 MW
- Wessington Springs – 51 MW
- Buffalo Ridge II – 300+ MW



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Wind Development Benefits

- Local Tax Contributions
- Lease payments to landowners can be substantial
 - \$2,000 to \$8,000 per tower per year
- Temporary construction jobs
- Small number of permanent operation & maintenance jobs



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Wind Challenges

1. Unpredictability
2. Generation profile vs. load
3. SD load growth/market
4. Cost



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Incentives for Development

- Alternative Tax
 - \$3/kWh of nameplate capacity
 - 2% gross receipts tax
- Rebate for collector and transmission lines
 - 90% of cost for first five years
 - 50% of cost for next five years
 - May be a rebate or tax credit



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Wind Energy Development

1. Wind Resource - Does the wind blow?
2. Site Control - Do you have land access?
3. Financing - Got cash?
4. Buyer/Market – Where will the power go?
5. Permits - Have you received the go ahead?



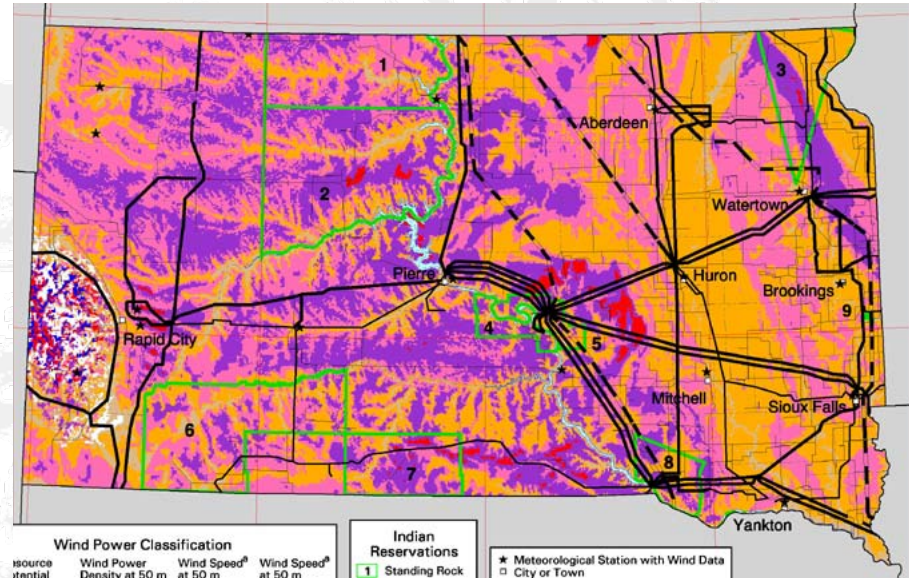
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Wind Energy Development:

1. Wind Resource

- Not just “Windy”:
 - Height
 - Speed
 - Direction
 - Time of Day
 - Seasonality
 - Consistency/Force



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Wind Energy Development:

2. Site Control

- Option for Easements or Leases
 - Void if no development within 5 years
- Wind Easements or Leases
 - Maximum term of 50 years per agreement
- Wind rights not severable from the land
- Landowner Beware!

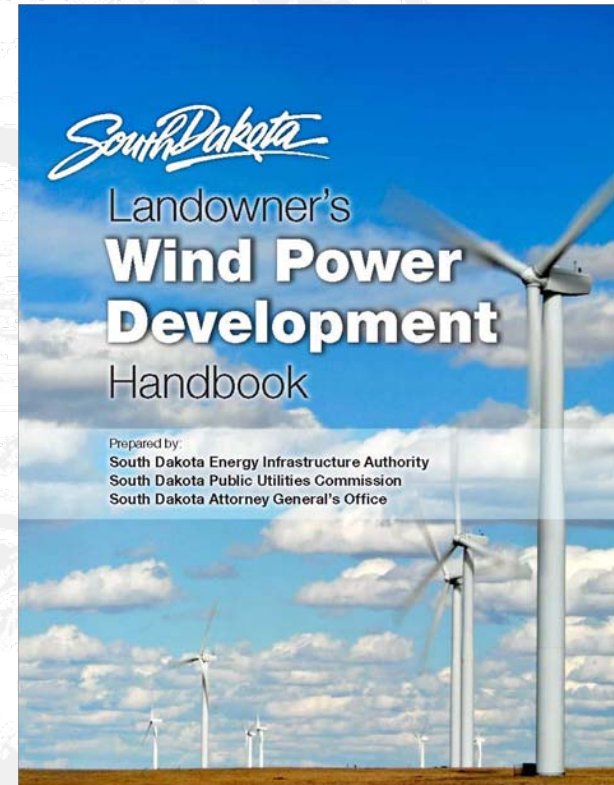


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Landowner's Handbook

- Available:
 - www.SDEIA.com
 - 605-773-3201
 - wind@state.sd.us



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Wind Energy Development:

3. Financing

- Tower/Turbine \$1.5-2.5 million each
- Buffalo Ridge II estimated \$620 million
 - 306MW from 150-200 towers
- Federal Tax Credits
 - PTC Production Tax Credit
 - ITC Investment Tax Credit



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Wind Energy Development:

4. Buyer

- Power Purchase Agreement (PPA)
- Location, Location, Location
- Existing sources of power are cheap
 - Wholesale 3.5¢
- Wind is more expensive
 - w/o PTC = 6.5¢ w/ PTC = 4.5¢



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Wind Energy Development:

5. Permits

- State Level Permitting
 - South Dakota Laws
 - SDPUC Permitting
 - State Agencies
- Local Government
 - County Commissions/Zoning
 - City Councils/Townships
- Federal Considerations



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SD PUC Jurisdiction

- “Wind Energy Facility” **Siting** $\geq 100\text{MW}$
- “Small” Wind Facility **Notification** $\geq 5\text{MW}$



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SD PUC Permitting Process

- Six month notification of intent
- Application for Permit
- Public Hearing within 60 Days
- Decision within Six Months of application



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Siting

- Permit the “Box”
 - Turbine Strings
 - Collector Lines
 - Transmission to Substation
- Setbacks (New for 2009!)
 - 500 ft or 1.1 height for property lines
 - SDCL 43-13-21 - 24
- EL08-31 “Buffalo Ridge II”



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Other State Agencies

- SD Game, Fish & Parks (GF&P)
 - Protecting grasslands, wetlands and wildlife
- State Historic Preservation Office (SHPO)
 - Protecting culturally significant land and sites
- Dept. Environment & Natural Resources (DENR)
 - Protecting Air and Water Quality
- Dept. of Transportation (SDDOT)



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Local Government

- PUC may supersede local rules
- Local Control
 - Current PUC Commission generally defers to local ordinances and permits if available
 - Road use/damage a prime concern
- Model Ordinances
 - Tower Working Group
 - Guidance for County and City Governments



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Tower Working Group's Model Wind Ordinance

Brian Rounds

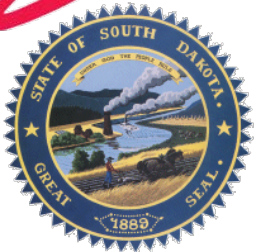
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Tower Working Group

Objective:

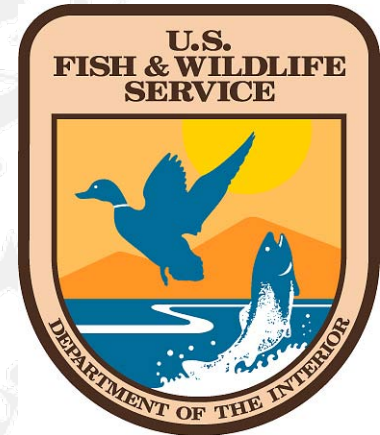
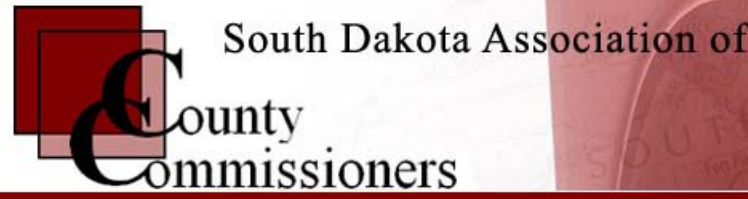
To provide local government officials with the information they need to site wind and wireless towers **responsibly** and **efficiently**



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The Tower Working Group



Wind Tower Concerns

Noise

- Can be as high as 70 dB right next to the turbine
- Large wind setback of 1000-1500' from residences will keep noise level down
- Noise levels for small wind turbines varies
- Best to Practices levels such as 55 dB



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Wind Tower Concerns

Aesthetics

- Beauty is in the eye of the beholder
- Modern towers are huge: 200-400 feet tall
- Shadow Flicker: Strobe-like effect caused by shadows of moving blades
- Local property values are a concern to homeowners
- Tourism may be affected positively or negatively



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Wind Tower Concerns

Decommissioning

- For projects > 100 MW, SDPUC has siting authority, and typically requires decommissioning bonding
- For projects < 100 MW, local authorities may want to take this into account
- Wind farms may limit urban sprawl due to 1,000 to 1,500 ft setbacks
- Safety net should be in place in case of project failure



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Wind Tower Concerns

Siting Authority

- 100MW+ SDPUC; Less than 100MW???
- Brookings, Yankton, and Deuel counties have established siting ordinances for large farms
- Lawrence and Yankton counties have specific ordinances for **Small Wind**.
- Otherwise typically a variance for towers over 35'



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TWG Model Wind Ordinance

- 2 Classes of Wind Turbines
- **Small Wind**
 - Tower Height < 75'
 - Primarily used for on-site consumption
- **Large Wind**
 - Everything else



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TWG Model Wind Ordinance

Small Wind

- Setbacks of 1.1 times the system height
- Noise 55 dBA at the closest neighbor
- Utility notification required
- Applicant must attain a building permit
 - Procedure is established
 - Application requirements are defined
 - Permit expires after 2 years w/out installation



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TWG Model Wind Ordinance

Large Wind

- Setbacks
 - 1,000' from residences, business, public buildings
 - 500' or 1.1 system height from landowner's residence, right-of-way, or property lines
- Noise limits of 55 dBA at the closest neighbor's dwelling
- Minimum blade height of 25'



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TWG Model Wind Ordinance

Large Wind

- Special requirements for electromagnetic interference, lighting, turbine spacing, electric cables, and feeder lines
- A list of mitigation measures are defined which include requirements to identify heavy use roads and develop a soil erosion and sediment control plan



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TWG Model Wind Ordinance

Large Wind

Permit application requirements also include:

- Consultation with SDGFP, SD State Historical Society, and USFWS
- Project Schedule and Mitigation Measures
- Developers must file preliminary turbine layouts, as well as an “as-built” survey following completion
- Decommissioning



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Tower Working Group's Model Wind Ordinance

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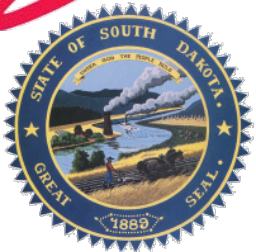
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