

FILED
December 5, 2014
Data Center
Missouri Public
Service Commission

*added at DAB-3
p. 1-94*

Search WINDEXchange

B-6
iQ



for 30% capacity factor

WINDEXchange

- HOME
- ABOUT
- WIND BASICS & EDUCATION
- RURAL COMMUNITIES
- DEPLOYMENT ACTIVITIES
- MAPS & DATA
- INFORMATION, RESOURCES
- NEWS
- EVENTS

EERE » Wind Program » WINDEXchange » Maps & Data

Printable Version [SHARE](#)

- Utility-Scale Land-Based Maps
- Wind Resource Potential
- Offshore Maps
- Community-Scale Maps
- Residential-Scale Maps
- Anemometer Loan Programs & Data

Missouri 80-Meter Wind Map and Wind Resource Potential

The U.S. Department of Energy's Wind Program and the National Renewable Energy Laboratory (NREL) published an 80-meter (m) height wind resource map for Missouri. This map is a key piece of understanding the state's wind resource potential from a development, policy, and a jobs and economic development impact perspective.

About the 80-Meter Missouri Wind Resource Map

The wind resource map shows the predicted mean annual wind speeds at an 80-m height, presented at a spatial resolution of about 2 kilometers that is interpolated to a finer scale for display. Areas with annual average wind speeds around 6.5 meters per second and greater at 80-m height are generally considered to have a resource suitable for wind development. Utility-scale, land-based wind turbines are typically installed between 80 and 100 m high.

Missouri Wind Resource Potential

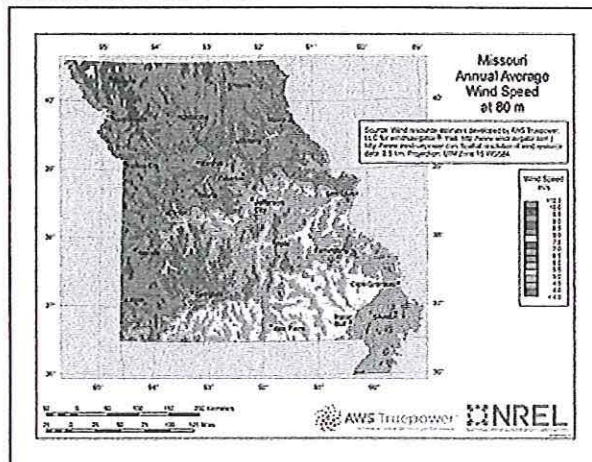
The chart to the right shows the wind resource potential above a given gross capacity factor at both 80-m and 100-m heights for Missouri.

NREL estimated the windy land area and wind energy potential in various capacity factor ranges for each state using AWS Truepower's gross capacity factor data. The [table](#) lists the estimates of windy land area with a gross capacity of 30% and greater at an 80-m height and the wind energy potential from development of the "available" windy land area after exclusions.

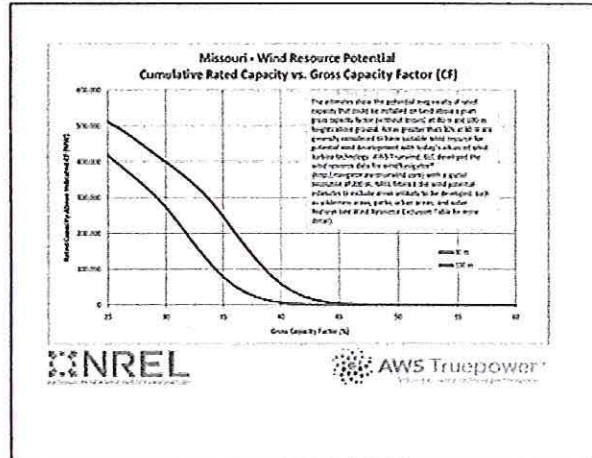
"Installed capacity" refers to the potential megawatts of rated capacity that could be installed on the available windy land area, and "annual generation" refers to the estimated annual wind energy generation in gigawatt-hours that could be produced from the installed capacity. NREL reduced the wind potential estimates by excluding areas unlikely to be developed, such as wilderness areas, parks, urban areas, and water features (see Wind Resource Exclusion Table for more detail). Additional wind potential tables are included for various capacity factor ranges.

These maps and wind potential estimates resulted from a collaborative project between NREL and AWS Truepower. This is the first comprehensive update of the wind energy potential by state since 1993. NREL has worked with AWS Truepower for almost a decade on updating wind resource maps for 36 states and producing validated maps for 50-meter heights. The U.S. Department of Energy's WINDEXchange initiative supported the mapping efforts.

Note: The average wind speeds indicated on this map are model-derived estimates that may not represent the true wind resource at any given location. Small terrain features, vegetation, buildings, and atmospheric effects may cause the wind speed to depart from the map estimates. Expert advice or detailed wind resource assessments should be sought when estimating energy production potential.



Enlarge image
This Missouri wind map shows the wind resource at an 80-m height. Download a [printable map](#).



Enlarge image
The chart shows the potential megawatts of rated capacity above a given gross capacity factor (without losses) at 80-m and 100-m heights. Download a [printable chart](#).

Exhibit No. 328
Date 11-14-14 Reporter KF
File No. EA-2014-0207



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas >= 30% Capacity Factor at 80m



February 4, 2010 (updated April 13, 2011 to add Alaska and Hawaii)

These estimates show, for each of the 50 states and the total U.S., the windy land area with a gross capacity factor (without losses) of 30% and greater at 80-m height above ground and the wind energy potential that could be possible from development of the "available" windy land area after exclusions. The "Installed Capacity" shows the potential megawatts (MW) of rated capacity that could be installed on the available windy land area, and the "Annual Generation" shows annual wind energy generation in gigawatt-hours (GWh) that could be produced from the installed capacity. AWS Truewind, LLC developed the wind resource data for windNavigator® (<http://navigator.awstruewind.com>) with a spatial resolution of 200 m. NREL produced the estimates of windy land area and windy energy potential, including filtering the estimates to exclude areas unlikely to be developed such as wilderness areas, parks, urban areas, and water features (see Wind Resource Exclusion Table for more detail).

State	Windy Land Area >= 30% Gross Capacity Factor at 80m					Wind Energy Potential	
	Total (km ²)	Excluded ² (km ²)	Available (km ²)	Available % of State	% of Total Windy Land Excluded	Installed Capacity ³ (MW)	Annual Generation (GWh)
Alabama	80.4	56.7	23.6	0.02%	70.6%	118.2	333
Alaska	412,610.7	313,670.1	98,940.6	6.57%	76.0%	494,702.9	1,620,792
Arizona	4,545.0	2,364.1	2,180.8	0.74%	52.0%	10,904.1	30,616
Arkansas	4,663.2	2,823.2	1,840.1	1.34%	60.5%	9,200.3	26,906
California	26,901.3	20,079.2	6,822.0	1.67%	74.6%	34,110.2	105,646
Colorado	95,830.4	18,386.5	77,443.9	28.73%	19.2%	387,219.5	1,288,490
Connecticut	31.4	26.1	5.3	0.04%	83.1%	26.5	73
Delaware	36.6	34.7	1.9	0.04%	94.8%	9.5	26
Florida	9.6	9.5	0.1	0.00%	99.2%	0.4	1
Georgia	281.3	255.3	26.0	0.02%	90.7%	130.1	380
Hawaii	4,537.0	3,884.0	653.0	3.91%	85.6%	3,264.9	12,363
Idaho	13,420.4	9,805.3	3,615.1	1.67%	73.1%	18,075.6	52,118
Illinois	70,763.6	20,787.1	49,976.4	34.25%	29.4%	249,882.1	763,529
Indiana	46,255.2	16,609.7	29,645.5	31.63%	35.9%	148,227.5	443,912
Iowa	134,900.1	20,757.3	114,142.8	78.32%	15.4%	570,714.2	2,026,340
Kansas	211,861.3	21,387.1	190,474.2	89.38%	10.1%	952,370.9	3,646,590
Kentucky	48.7	36.6	12.1	0.01%	75.1%	60.6	173
Louisiana	125.5	43.6	82.0	0.07%	34.7%	409.8	1,100
Maine	6,026.5	3,776.2	2,250.2	2.69%	62.7%	11,251.2	33,779



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas >= 30% Capacity Factor at 80m



February 4, 2010 (updated April 13, 2011 to add Alaska and Hawaii)

These estimates show, for each of the 50 states and the total U.S., the windy land area with a gross capacity factor (without losses) of 30% and greater at 80-m height above ground and the wind energy potential that could be possible from development of the "available" windy land area after exclusions. The "Installed Capacity" shows the potential megawatts (MW) of rated capacity that could be installed on the available windy land area, and the "Annual Generation" shows annual wind energy generation in gigawatt-hours (GWh) that could be produced from the installed capacity. AWS Truewind, LLC developed the wind resource data for windNavigator® (<http://navigator.awstruewind.com>) with a spatial resolution of 200 m. NREL produced the estimates of windy land area and windy energy potential, including filtering the estimates to exclude areas unlikely to be developed such as wilderness areas, parks, urban areas, and water features (see Wind Resource Exclusion Table for more detail).

State	Windy Land Area >= 30% Gross Capacity Factor at 80m					Wind Energy Potential	
	Total (km ²)	Excluded ² (km ²)	Available (km ²)	Available % of State	% of Total Windy Land Excluded	Installed Capacity ³ (MW)	Annual Generation (GWh)
Maryland	567.7	271.1	296.6	1.18%	47.8%	1,482.9	4,269
Massachusetts	1,709.0	1,503.4	205.6	0.99%	88.0%	1,028.0	3,323
Michigan	19,761.3	7,952.9	11,808.5	7.85%	40.2%	59,042.3	169,221
Minnesota	121,884.7	24,030.6	97,854.1	44.83%	19.7%	489,270.6	1,679,480
Mississippi	0.0	0.0	0.0	0.00%	N/A	0.0	0
Missouri	69,676.8	14,805.8	54,871.0	30.39%	21.2%	274,355.1	810,619
Montana	232,768.6	43,967.7	188,800.9	49.60%	18.9%	944,004.4	3,228,620
Nebraska	199,627.8	16,028.0	183,599.7	91.64%	8.0%	917,998.7	3,540,370
Nevada	5,873.6	4,424.2	1,449.4	0.51%	75.3%	7,247.1	20,823
New Hampshire	1,663.8	1,236.8	427.1	1.78%	74.3%	2,135.4	6,706
New Jersey	280.8	254.5	26.4	0.14%	90.6%	131.8	373
New Mexico	111,445.8	13,029.1	98,416.7	31.25%	11.7%	492,083.3	1,644,970
New York	17,705.8	12,549.6	5,156.3	4.10%	70.9%	25,781.3	74,695
North Carolina	1,155.6	994.1	161.5	0.13%	86.0%	807.7	2,395
North Dakota	182,374.6	28,335.4	154,039.2	84.25%	15.5%	770,195.8	2,983,750
Ohio	17,189.9	6,205.9	10,983.9	10.28%	36.1%	54,919.7	151,881
Oklahoma	123,243.6	19,879.2	103,364.4	57.10%	16.1%	516,822.1	1,788,910
Oregon	17,109.8	11,689.7	5,420.1	2.16%	68.3%	27,100.3	80,855
Pennsylvania	2,123.5	1,462.1	661.4	0.56%	68.9%	3,307.2	9,673

= 33% capacity factor



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas >= 30% Capacity Factor at 80m



February 4, 2010 (updated April 13, 2011 to add Alaska and Hawaii)

These estimates show, for each of the 50 states and the total U.S., the windy land area with a gross capacity factor (without losses) of 30% and greater at 80-m height above ground and the wind energy potential that could be possible from development of the "available" windy land area after exclusions. The "Installed Capacity" shows the potential megawatts (MW) of rated capacity that could be installed on the available windy land area, and the "Annual Generation" shows annual wind energy generation in gigawatt-hours (GWh) that could be produced from the installed capacity. AWS Truewind, LLC developed the wind resource data for windNavigator® (<http://navigator.awstruewind.com>) with a spatial resolution of 200 m. NREL produced the estimates of windy land area and windy energy potential, including filtering the estimates to exclude areas unlikely to be developed such as wilderness areas, parks, urban areas, and water features (see Wind Resource Exclusion Table for more detail).

State	Windy Land Area >= 30% Gross Capacity Factor at 80m					Wind Energy Potential	
	Total (km ²)	Excluded ² (km ²)	Available (km ²)	Available % of State	% of Total Windy Land Excluded	Installed Capacity ³ (MW)	Annual Generation (GWh)
Rhode Island	74.0	64.7	9.3	0.35%	87.4%	46.6	153
South Carolina	102.8	65.8	37.0	0.05%	64.0%	185.0	504
South Dakota	193,828.3	17,345.8	176,482.5	88.36%	8.9%	882,412.4	3,411,690
Tennessee	359.9	298.1	61.9	0.06%	82.8%	309.3	900
Texas	435,638.6	55,332.7	380,305.9	55.54%	12.7%	1,901,529.7	6,527,850
Utah	5,273.6	2,652.8	2,620.7	1.19%	50.3%	13,103.7	37,104
Vermont	2,569.6	1,979.8	589.7	2.39%	77.0%	2,948.7	9,163
Virginia	1,567.2	1,208.5	358.7	0.35%	77.1%	1,793.3	5,395
Washington	11,932.6	8,236.9	3,695.7	2.12%	69.0%	18,478.5	55,550
West Virginia	1,495.2	1,118.6	376.6	0.60%	74.8%	1,883.2	5,820
Wisconsin	30,228.8	9,477.3	20,751.4	14.29%	31.4%	103,757.1	300,136
Wyoming	146,166.2	35,751.7	110,414.5	43.58%	24.5%	552,072.6	1,944,340
U.S. Total	2,988,328	796,945	2,191,382	22.36%	26.7%	10,956,912	38,552,706

¹ NREL's wind potential estimates were based on maps produced by AWS Truewind using their MesoMap® system.

² Excluded lands include protected lands (national parks, wilderness, etc.), incompatible land use (urban, airports, wetland, and water features), and other considerations. See Table 1 for full listing.

³ Assumes 5 MW/km² of installed nameplate capacity