



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 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 \geq 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



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	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



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State	Windy Land Area \geq 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



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 35% Capacity Factor at 80m



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State	Windy Land Area \geq 35% 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	15.9	13.3	2.6	0.00%	83.4%	13.2	42
Alaska	267,897.7	209,673.4	58,224.3	3.87%	78.3%	291,121.3	1,051,210
Arizona	611.7	417.3	194.4	0.07%	68.2%	972.1	3,100
Arkansas	1,130.0	687.5	442.5	0.32%	60.8%	2,212.5	7,215
California	11,456.4	8,650.1	2,806.3	0.69%	75.5%	14,031.7	49,073
Colorado	64,296.7	10,914.6	53,382.1	19.80%	17.0%	266,910.6	945,484
Connecticut	1.3	1.1	0.2	0.00%	84.8%	1.0	3
Delaware	1.2	1.2	0.0	0.00%	100.0%	0.0	0
Florida	0.0	0.0	0.0	0.00%	N/A	0.0	0
Georgia	99.2	93.0	6.1	0.00%	93.8%	30.6	101
Hawaii	3,312.4	2,815.8	496.7	2.98%	85.0%	2,483.3	10,179
Idaho	4,652.2	4,006.9	645.3	0.30%	86.1%	3,226.3	10,938
Illinois	30,709.2	6,585.0	24,124.1	16.53%	21.4%	120,620.7	391,737
Indiana	12,238.0	2,436.9	9,801.1	10.46%	19.9%	49,005.4	160,827
Iowa	111,938.1	15,455.1	96,483.0	66.20%	13.8%	482,414.9	1,772,460
Kansas	200,304.4	17,463.9	182,840.5	85.80%	8.7%	914,202.3	3,535,480
Kentucky	6.9	5.4	1.5	0.00%	78.0%	7.6	24
Louisiana	0.0	0.0	0.0	0.00%	N/A	0.0	0
Maine	2,134.3	1,444.3	690.0	0.82%	67.7%	3,450.0	11,961



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	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	103.8	66.1	37.7	0.15%	63.7%	188.6	607
Massachusetts	722.5	615.3	107.2	0.52%	85.2%	536.0	1,945
Michigan	4,182.6	1,850.3	2,332.3	1.55%	44.2%	11,661.6	37,619
Minnesota	92,937.6	15,156.2	77,781.4	35.64%	16.3%	388,907.2	1,392,590
Mississippi	0.0	0.0	0.0	0.00%	N/A	0.0	0
Missouri	19,137.3	3,353.8	15,783.4	8.74%	17.5%	78,917.2	256,650
Montana	174,285.7	30,585.0	143,700.6	37.75%	17.5%	718,503.2	2,581,510
Nebraska	191,998.9	14,259.8	177,739.1	88.72%	7.4%	888,695.6	3,455,480
Nevada	1,436.2	1,178.1	258.1	0.09%	82.0%	1,290.4	4,263
New Hampshire	837.3	644.8	192.5	0.80%	77.0%	962.3	3,405
New Jersey	55.6	52.6	3.0	0.02%	94.6%	15.0	47
New Mexico	71,483.6	6,483.3	65,000.3	20.64%	9.1%	325,001.5	1,170,490
New York	3,972.1	3,011.1	961.1	0.76%	75.8%	4,805.3	15,826
North Carolina	401.2	361.9	39.3	0.03%	90.2%	196.3	695
North Dakota	179,145.7	27,138.8	152,006.9	83.13%	15.1%	760,034.4	2,954,260
Ohio	969.2	736.6	232.6	0.22%	76.0%	1,163.0	3,662
Oklahoma	91,844.2	11,709.4	80,134.9	44.26%	12.7%	400,674.3	1,457,740
Oregon	7,098.1	5,479.2	1,618.9	0.64%	77.2%	8,094.3	27,517
Pennsylvania	526.6	364.4	162.2	0.14%	69.2%	810.9	2,685



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State	Windy Land Area \geq 35% 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	26.1	20.6	5.5	0.21%	78.8%	27.6	99
South Carolina	9.4	8.8	0.6	0.00%	93.2%	3.2	11
South Dakota	184,910.2	14,435.9	170,474.4	85.35%	7.8%	852,371.8	3,325,230
Tennessee	114.0	101.1	12.9	0.01%	88.7%	64.5	220
Texas	302,837.0	30,799.9	272,037.1	39.73%	10.2%	1,360,185.5	4,989,570
Utah	861.6	558.1	303.4	0.14%	64.8%	1,517.1	4,939
Vermont	1,042.2	803.2	239.0	0.97%	77.1%	1,195.2	4,243
Virginia	647.4	524.5	122.9	0.12%	81.0%	614.5	2,070
Washington	5,952.6	4,693.0	1,259.6	0.72%	78.8%	6,298.1	21,289
West Virginia	693.4	529.4	164.0	0.26%	76.3%	820.2	2,822
Wisconsin	6,239.9	2,091.8	4,148.1	2.86%	33.5%	20,740.5	66,171
Wyoming	113,309.6	26,892.9	86,416.6	34.11%	23.7%	432,083.1	1,601,240
U.S. Total	2,168,587	485,171	1,683,416	17.18%	22.4%	8,417,082	31,334,728

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



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 40% Capacity Factor at 80m



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State	Windy Land Area \geq 40% 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	3.2	3.2	0.0	0.00%	100.0%	0.0	0
Alaska	159,215.7	130,223.5	28,992.2	1.93%	81.8%	144,960.9	580,479
Arizona	47.9	40.4	7.4	0.00%	84.5%	37.2	135
Arkansas	194.6	145.7	48.9	0.04%	74.9%	244.4	901
California	4,035.0	2,986.3	1,048.7	0.26%	74.0%	5,243.5	20,543
Colorado	33,040.8	6,225.2	26,815.6	9.95%	18.8%	134,078.1	507,885
Connecticut	0.0	0.0	0.0	0.00%	0.0%	0.2	1
Delaware	0.0	0.0	0.0	0.00%	N/A	0.0	0
Florida	0.0	0.0	0.0	0.00%	N/A	0.0	0
Georgia	27.2	26.0	1.2	0.00%	95.6%	6.0	22
Hawaii	2,379.2	1,987.9	391.3	2.35%	83.6%	1,956.4	8,474
Idaho	2,121.0	1,948.8	172.2	0.08%	91.9%	861.0	3,294
Illinois	1,001.5	101.2	900.2	0.62%	10.1%	4,501.2	15,942
Indiana	1,396.6	210.4	1,186.3	1.27%	15.1%	5,931.4	21,387
Iowa	72,119.2	8,400.1	63,719.0	43.72%	11.6%	318,595.1	1,232,860
Kansas	163,169.6	11,104.9	152,064.8	71.36%	6.8%	760,323.9	3,024,280
Kentucky	0.0	0.0	0.0	0.00%	N/A	0.0	0
Louisiana	0.0	0.0	0.0	0.00%	N/A	0.0	0
Maine	856.8	633.3	223.4	0.27%	73.9%	1,117.2	4,411



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	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	6.0	3.6	2.4	0.01%	60.0%	12.0	43
Massachusetts	267.1	203.0	64.1	0.31%	76.0%	320.7	1,237
Michigan	432.2	353.4	78.8	0.05%	81.8%	394.0	1,420
Minnesota	41,476.1	6,439.9	35,036.2	16.05%	15.5%	175,181.0	681,616
Mississippi	0.0	0.0	0.0	0.00%	N/A	0.0	0
Missouri	1,507.3	144.1	1,363.2	0.76%	9.6%	6,815.9	24,672
Montana	98,308.5	18,737.2	79,571.4	20.91%	19.1%	397,856.8	1,529,560
Nebraska	165,445.2	10,012.2	155,433.0	77.58%	6.1%	777,165.0	3,084,090
Nevada	267.1	223.2	43.9	0.02%	83.6%	219.6	810
New Hampshire	421.6	340.6	81.0	0.34%	80.8%	404.8	1,593
New Jersey	0.4	0.4	0.0	0.00%	100.0%	0.0	0
New Mexico	39,573.8	2,424.7	37,149.1	11.80%	6.1%	185,745.3	712,877
New York	934.8	801.3	133.4	0.11%	85.7%	667.1	2,560
North Carolina	149.4	132.2	17.2	0.01%	88.5%	86.0	337
North Dakota	160,496.5	21,932.3	138,564.2	75.78%	13.7%	692,821.1	2,728,620
Ohio	45.1	44.9	0.2	0.00%	99.6%	0.8	3
Oklahoma	55,593.0	6,038.4	49,554.6	27.37%	10.9%	247,773.2	952,678
Oregon	2,969.1	2,527.8	441.3	0.18%	85.1%	2,206.6	8,439
Pennsylvania	85.0	55.3	29.6	0.03%	65.1%	148.2	546



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 40% 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 40% 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 \geq 40% 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	18.7	15.8	2.8	0.11%	84.8%	14.2	55
South Carolina	0.3	0.1	0.2	0.00%	42.9%	0.8	3
South Dakota	163,280.6	10,004.1	153,276.5	76.74%	6.1%	766,382.5	3,039,460
Tennessee	33.6	30.2	3.4	0.00%	90.0%	16.8	66
Texas	180,822.4	15,425.8	165,396.6	24.15%	8.5%	826,982.8	3,240,930
Utah	120.7	93.0	27.8	0.01%	77.0%	138.8	511
Vermont	464.0	362.0	102.0	0.41%	78.0%	510.1	2,013
Virginia	227.9	196.7	31.2	0.03%	86.3%	156.1	592
Washington	2,889.1	2,571.4	317.6	0.18%	89.0%	1,588.2	6,052
West Virginia	284.4	228.4	56.1	0.09%	80.3%	280.3	1,066
Wisconsin	375.6	326.8	48.8	0.03%	87.0%	243.8	872
Wyoming	70,268.4	17,786.5	52,481.9	20.72%	25.3%	262,409.5	1,043,890
U.S. Total	1,426,372	281,492	1,144,880	11.68%	20.0%	5,724,399	22,487,228

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



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 30% Capacity Factor at 100m



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 100-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 \geq 30% Gross Capacity Factor at 100m					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	291.8	178.2	113.6	0.08%	61.1%	567.8	1,588
Alaska	500,318.5	371,938.9	128,379.6	8.53%	74.3%	641,898.0	2,135,249
Arizona	9,658.0	4,499.7	5,158.3	1.75%	46.6%	25,791.4	72,732
Arkansas	18,041.9	8,049.5	9,992.3	7.25%	44.6%	49,961.7	141,856
California	33,786.3	24,916.7	8,869.6	2.17%	73.7%	44,348.2	137,340
Colorado	108,399.8	22,508.7	85,891.1	31.86%	20.8%	429,455.6	1,489,820
Connecticut	195.3	158.0	37.2	0.29%	80.9%	186.2	519
Delaware	165.2	145.1	20.1	0.40%	87.8%	100.6	274
Florida	75.4	75.3	0.1	0.00%	99.9%	0.4	1
Georgia	517.4	458.7	58.7	0.04%	88.7%	293.6	863
Hawaii	5,096.1	4,383.3	712.8	4.27%	86.0%	3,564.1	13,694
Idaho	23,875.2	14,921.3	8,953.9	4.14%	62.5%	44,769.5	128,647
Illinois	99,669.2	33,745.6	65,923.5	45.18%	33.9%	329,617.6	1,072,740
Indiana	60,058.5	23,292.0	36,766.5	39.23%	38.8%	183,832.4	590,581
Iowa	144,082.8	23,691.4	120,391.3	82.60%	16.4%	601,956.7	2,325,420
Kansas	213,094.6	22,046.9	191,047.7	89.65%	10.3%	955,238.7	3,944,270
Kentucky	274.9	135.2	139.7	0.13%	49.2%	698.7	1,899
Louisiana	944.5	376.5	568.0	0.48%	39.9%	2,840.0	7,719
Maine	15,175.8	9,006.4	6,169.5	7.38%	59.3%	30,847.3	91,894



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 30% Capacity Factor at 100m



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 100-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 \geq 30% Gross Capacity Factor at 100m					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	1,083.2	540.6	542.6	2.15%	49.9%	2,713.0	7,975
Massachusetts	2,779.1	2,396.4	382.6	1.85%	86.2%	1,913.2	6,082
Michigan	61,324.4	25,513.2	35,811.2	23.81%	41.6%	179,056.0	523,374
Minnesota	159,799.4	39,114.1	120,685.3	55.29%	24.5%	603,426.7	2,170,610
Mississippi	0.0	0.0	0.0	0.00%	N/A	0.0	0
Missouri	108,688.2	28,761.2	79,927.0	44.27%	26.5%	399,635.0	1,267,920
Montana	254,873.9	52,402.8	202,471.1	53.19%	20.6%	1,012,355.4	3,661,840
Nebraska	200,331.2	16,116.1	184,215.1	91.95%	8.0%	921,075.4	3,847,090
Nevada	8,478.8	6,072.1	2,406.8	0.84%	71.6%	12,033.9	34,478
New Hampshire	2,830.4	2,046.6	783.8	3.27%	72.3%	3,918.9	12,263
New Jersey	586.0	516.3	69.7	0.36%	88.1%	348.7	997
New Mexico	131,710.8	18,088.3	113,622.5	36.08%	13.7%	568,112.4	1,966,290
New York	38,771.9	27,244.2	11,527.7	9.17%	70.3%	57,638.6	172,787
North Carolina	1,793.1	1,493.1	300.0	0.24%	83.3%	1,500.1	4,461
North Dakota	182,775.4	28,417.2	154,358.2	84.42%	15.5%	771,791.2	3,230,900
Ohio	38,572.8	13,907.2	24,665.6	23.08%	36.1%	123,327.8	359,816
Oklahoma	150,674.1	27,713.2	122,960.9	67.92%	18.4%	614,804.3	2,236,000
Oregon	28,313.7	18,200.4	10,113.3	4.03%	64.3%	50,566.4	151,033
Pennsylvania	4,580.9	3,136.4	1,444.4	1.23%	68.5%	7,222.2	21,214



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 30% Capacity Factor at 100m



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 100-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 \geq 30% Gross Capacity Factor at 100m					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	216.1	199.3	16.8	0.63%	92.2%	83.8	267
South Carolina	483.0	240.0	243.1	0.30%	49.7%	1,215.3	3,362
South Dakota	196,871.0	18,745.8	178,125.2	89.18%	9.5%	890,626.1	3,690,490
Tennessee	692.1	528.8	163.3	0.15%	76.4%	816.5	2,355
Texas	539,779.4	75,620.9	464,158.6	67.79%	14.0%	2,320,792.9	8,299,400
Utah	9,553.7	4,306.2	5,247.5	2.39%	45.1%	26,237.3	74,704
Vermont	4,246.1	3,118.7	1,127.4	4.56%	73.4%	5,637.2	17,394
Virginia	2,550.4	1,857.3	693.1	0.67%	72.8%	3,465.7	10,336
Washington	17,636.2	11,115.0	6,521.2	3.74%	63.0%	32,606.1	98,132
West Virginia	2,197.6	1,643.2	554.4	0.88%	74.8%	2,772.0	8,627
Wisconsin	61,964.9	18,875.4	43,089.5	29.68%	30.5%	215,447.4	650,776
Wyoming	159,158.9	40,405.2	118,753.8	46.88%	25.4%	593,768.8	2,176,620
U.S. Total	3,607,038	1,052,863	2,554,175	26.06%	27.8%	12,770,877	46,864,699

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



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 35% Capacity Factor at 100m



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 35% and greater at 100-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 \geq 35% Gross Capacity Factor at 100m					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	40.4	30.9	9.5	0.01%	76.5%	47.6	154
Alaska	355,349.4	273,164.8	82,184.6	5.46%	76.9%	410,922.8	1,489,752
Arizona	1,267.5	761.9	505.6	0.17%	60.1%	2,527.8	8,075
Arkansas	4,148.2	2,510.6	1,637.6	1.19%	60.5%	8,187.9	27,217
California	14,811.1	11,120.7	3,690.4	0.90%	75.1%	18,451.8	64,398
Colorado	79,322.2	13,830.0	65,492.2	24.29%	17.4%	327,461.1	1,198,210
Connecticut	13.0	11.1	1.8	0.01%	86.0%	9.1	29
Delaware	11.3	11.1	0.2	0.00%	98.2%	1.0	3
Florida	0.0	0.0	0.0	0.00%	N/A	0.0	0
Georgia	198.4	182.9	15.5	0.01%	92.2%	77.7	259
Hawaii	3,831.0	3,278.6	552.3	3.31%	85.6%	2,761.7	11,434
Idaho	7,132.8	5,756.4	1,376.4	0.64%	80.7%	6,882.2	23,041
Illinois	65,500.9	18,808.2	46,692.7	32.00%	28.7%	233,463.3	799,298
Indiana	39,818.2	13,774.6	26,043.6	27.79%	34.6%	130,218.0	437,101
Iowa	133,932.0	20,538.9	113,393.0	77.80%	15.3%	566,965.2	2,224,020
Kansas	211,507.6	21,212.7	190,294.9	89.30%	10.0%	951,474.6	3,933,090
Kentucky	19.5	14.4	5.1	0.00%	73.8%	25.5	82
Louisiana	0.1	0.1	0.0	0.00%	100.0%	0.0	0
Maine	4,825.5	3,070.0	1,755.5	2.10%	63.6%	8,777.4	30,106



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 35% Capacity Factor at 100m



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 35% and greater at 100-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 \geq 35% Gross Capacity Factor at 100m					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	323.6	152.5	171.1	0.68%	47.1%	855.3	2,753
Massachusetts	1,401.9	1,233.7	168.2	0.81%	88.0%	841.0	3,074
Michigan	13,825.4	5,963.1	7,862.3	5.23%	43.1%	39,311.6	129,467
Minnesota	119,553.2	22,861.4	96,691.8	44.30%	19.1%	483,459.1	1,832,230
Mississippi	0.0	0.0	0.0	0.00%	N/A	0.0	0
Missouri	62,448.0	12,954.0	49,493.9	27.42%	20.7%	247,469.6	831,473
Montana	212,850.8	39,248.4	173,602.4	45.61%	18.4%	868,012.1	3,247,260
Nebraska	199,209.1	15,977.2	183,231.8	91.46%	8.0%	916,159.2	3,832,600
Nevada	2,153.5	1,770.1	383.4	0.13%	82.2%	1,916.9	6,328
New Hampshire	1,353.2	1,011.9	341.4	1.42%	74.8%	1,706.9	6,046
New Jersey	176.6	166.0	10.6	0.05%	94.0%	53.0	171
New Mexico	90,370.2	8,818.2	81,552.0	25.90%	9.8%	407,760.1	1,509,690
New York	14,306.3	10,222.7	4,083.6	3.25%	71.5%	20,418.0	67,619
North Carolina	691.4	621.9	69.5	0.05%	89.9%	347.6	1,220
North Dakota	182,172.4	28,276.5	153,895.8	84.17%	15.5%	769,479.2	3,224,180
Ohio	8,699.3	3,734.6	4,964.6	4.65%	42.9%	24,823.2	78,712
Oklahoma	120,001.2	18,949.4	101,051.7	55.82%	15.8%	505,258.6	1,923,820
Oregon	11,610.6	8,493.0	3,117.6	1.24%	73.1%	15,588.2	53,040
Pennsylvania	1,218.0	845.4	372.6	0.32%	69.4%	1,862.9	6,195



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 35% Capacity Factor at 100m



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 35% and greater at 100-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 \geq 35% Gross Capacity Factor at 100m					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	47.7	39.6	8.2	0.30%	82.9%	40.8	148
South Carolina	34.1	30.3	3.8	0.00%	89.0%	18.8	60
South Dakota	191,677.7	16,666.0	175,011.7	87.62%	8.7%	875,058.5	3,645,620
Tennessee	201.8	173.2	28.6	0.03%	85.8%	142.8	479
Texas	401,122.2	49,651.1	351,471.1	51.33%	12.4%	1,757,355.6	6,696,500
Utah	1,588.3	910.3	678.0	0.31%	57.3%	3,389.9	10,988
Vermont	1,808.2	1,371.0	437.2	1.77%	75.8%	2,185.8	7,710
Virginia	1,035.4	813.2	222.2	0.22%	78.5%	1,110.8	3,747
Washington	8,546.5	6,289.9	2,256.5	1.29%	73.6%	11,282.7	38,403
West Virginia	1,047.3	793.3	254.0	0.40%	75.7%	1,270.0	4,394
Wisconsin	25,108.6	7,835.0	17,273.6	11.90%	31.2%	86,368.2	284,709
Wyoming	130,722.6	31,296.2	99,426.4	39.25%	23.9%	497,132.2	1,900,530
U.S. Total	2,727,034	685,247	2,041,787	20.83%	24.3%	10,208,933	39,595,435

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



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 40% Capacity Factor at 100m



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 40% and greater at 100-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 \geq 40% Gross Capacity Factor at 100m					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	7.6	7.4	0.3	0.00%	96.3%	1.4	5
Alaska	217,303.4	173,988.1	43,315.3	2.88%	80.1%	216,576.4	861,262
Arizona	78.5	63.5	15.0	0.01%	80.9%	75.1	272
Arkansas	824.8	530.0	294.8	0.21%	64.3%	1,473.8	5,430
California	5,190.1	3,865.4	1,324.7	0.32%	74.5%	6,623.3	25,977
Colorado	49,736.1	7,974.6	41,761.4	15.49%	16.0%	208,807.2	810,145
Connecticut	0.3	0.2	0.1	0.00%	57.1%	0.6	2
Delaware	0.0	0.0	0.0	0.00%	N/A	0.0	0
Florida	0.0	0.0	0.0	0.00%	N/A	0.0	0
Georgia	62.0	58.8	3.2	0.00%	94.8%	16.1	59
Hawaii	2,780.4	2,359.3	421.2	2.52%	84.9%	2,105.9	9,320
Idaho	2,918.2	2,621.7	296.5	0.14%	89.8%	1,482.6	5,653
Illinois	19,833.0	4,094.8	15,738.2	10.79%	20.6%	78,691.0	286,858
Indiana	7,009.0	1,058.3	5,950.8	6.35%	15.1%	29,753.9	109,526
Iowa	107,932.0	14,672.6	93,259.5	63.99%	13.6%	466,297.4	1,890,360
Kansas	196,844.6	16,725.8	180,118.9	84.52%	8.5%	900,594.3	3,762,740
Kentucky	1.1	0.8	0.3	0.00%	71.4%	1.6	6
Louisiana	0.0	0.0	0.0	0.00%	N/A	0.0	0
Maine	1,705.4	1,182.5	522.9	0.63%	69.3%	2,614.4	10,158



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 40% Capacity Factor at 100m



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 40% and greater at 100-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 \geq 40% Gross Capacity Factor at 100m					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	24.9	15.7	9.2	0.04%	62.9%	46.1	167
Massachusetts	554.4	459.6	94.8	0.46%	82.9%	474.0	1,887
Michigan	2,612.6	1,298.3	1,314.3	0.87%	49.7%	6,571.3	23,774
Minnesota	87,655.8	13,674.1	73,981.7	33.89%	15.6%	369,908.6	1,457,950
Mississippi	0.0	0.0	0.0	0.00%	N/A	0.0	0
Missouri	13,994.0	2,231.0	11,763.1	6.52%	15.9%	58,815.3	215,946
Montana	142,955.3	25,603.6	117,351.7	30.83%	17.9%	586,758.3	2,318,760
Nebraska	189,910.8	13,917.7	175,993.1	87.85%	7.3%	879,965.6	3,712,120
Nevada	381.4	317.6	63.8	0.02%	83.3%	319.1	1,179
New Hampshire	663.7	520.9	142.8	0.60%	78.5%	714.2	2,815
New Jersey	16.4	16.4	0.0	0.00%	100.0%	0.0	0
New Mexico	56,235.5	4,294.1	51,941.4	16.49%	7.6%	259,707.2	1,025,110
New York	2,904.0	2,262.9	641.1	0.51%	77.9%	3,205.3	11,982
North Carolina	266.3	240.1	26.2	0.02%	90.2%	131.0	518
North Dakota	178,085.7	26,786.3	151,299.4	82.75%	15.0%	756,497.2	3,180,710
Ohio	360.3	289.6	70.7	0.07%	80.4%	353.5	1,258
Oklahoma	86,538.4	10,671.4	75,867.0	41.91%	12.3%	379,335.0	1,509,670
Oregon	4,711.2	3,832.7	878.5	0.35%	81.4%	4,392.7	16,760
Pennsylvania	234.6	165.3	69.3	0.06%	70.5%	346.5	1,290



Estimates of Windy¹ Land Area and Wind Energy Potential, by State, for areas \geq 40% Capacity Factor at 100m



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 40% and greater at 100-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 \geq 40% Gross Capacity Factor at 100m					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	22.4	18.0	4.4	0.16%	80.3%	22.0	87
South Carolina	0.7	0.3	0.4	0.00%	41.2%	2.0	7
South Dakota	179,679.6	12,900.9	166,778.6	83.50%	7.2%	833,893.1	3,508,870
Tennessee	58.0	52.3	5.8	0.01%	90.0%	28.9	113
Texas	271,765.4	26,438.8	245,326.5	35.83%	9.7%	1,226,632.6	4,953,700
Utah	197.6	142.7	55.0	0.02%	72.2%	274.8	1,007
Vermont	797.3	619.8	177.5	0.72%	77.7%	887.6	3,495
Virginia	356.2	307.1	49.1	0.05%	86.2%	245.4	931
Washington	4,034.6	3,404.7	629.9	0.36%	84.4%	3,149.4	11,969
West Virginia	439.8	346.8	93.0	0.15%	78.8%	465.2	1,771
Wisconsin	3,730.6	1,420.4	2,310.2	1.59%	38.1%	11,551.2	41,634
Wyoming	92,551.3	22,177.9	70,373.4	27.78%	24.0%	351,866.9	1,421,170
U.S. Total	1,933,966	403,631	1,530,335	15.62%	22.2%	7,651,675	31,204,421

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

Wind Resource Exclusions	
Criteria for Defining Available Windy Land (numbered in the order they are applied):	
<i>Environmental Criteria</i>	<i>Data/Comments:</i>
2) 100% exclusion of National Park Service and Fish and Wildlife Service managed lands	USGS Federal Lands shapefile, Dec 2005
3) 100% exclusion of federal lands designated as park, wilderness, wilderness study area, national monument, national battlefield, recreation area, national conservation area, wildlife refuge, wildlife area, wild and scenic river or inventoried roadless area.	USGS Federal Lands shapefile, Dec 2005; Inventoried Roadless Areas, 2004; BLM Areas of Critical Environmental Concern (2008)
4) 100% exclusion of state and private lands equivalent to criteria 2 and 3, where GIS data is available.	State/GAP land stewardship data management status 1, from Conservation Biology Institute Protected Lands database, 2004
7) 50% exclusion of remaining USDA Forest Service (FS) lands (incl. National Grasslands) except ridgecrests	USGS Federal Lands shapefile, Dec 2005
8) 50% exclusion of remaining Dept. of Defense lands except ridgecrests	Military Lands boundary files, internal dataset (2007)
9) 50% exclusion of state forest land, where GIS data is available	State/GAP land stewardship data management status 2, from Conservation Biology Institute Protected Lands database, 2004
<i>Land Use Criteria</i>	
5) 100% exclusion of airfields, urban, wetland and water areas.	USGS North America Land Use Land Cover (LULC), version 2.0, 1993; ESRI airports and airfields (2006); U.S. Census Urbanized Areas (2000 and 2003)
10) 50% exclusion of non-ridgecrest forest	Ridge-crest areas defined using a terrain definition script, overlaid with USGS LULC data screened for the forest categories.
<i>Other Criteria</i>	
1) Exclude areas of slope > 20%	Derived from 90 m national elevation dataset.
6) 100% exclude 3 km surrounding criteria 2-5 (except water)	Merged datasets and buffer 3 km
Note - 50% exclusions are not cumulative. If an area is non-ridgecrest forest on FS land, it is just excluded at the 50% level one time.	