

Sample Output

June 7, 2019

```
[1]: import renewable  
[2]: renewable.getWikiTables()
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Saving file to Plot_Data/WikiTables/Plot_Data/WikiTables/List_of_U.S._states_by_electricity_production_from_renewable_sources/Table0  
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[3]: `renewable.get_data_generation_1999_2019()`

	Year	Coal	Oil	Gas	Subtotal_fossil	Nuclear	Hydro	\
0	2018	1,146.39	24.57	1,480.20	2,651.17	807.08	291.72	
2	2017	1,205.84	21.39	1,308.89	2,536.12	804.95	300.33	
4	2016	1,239.15	24.20	1,391.11	2,654.47	805.69	267.81	
6	2015	1,352.40	28.25	1,346.60	2,727.25	797.18	249.08	
8	2014	1,581.71	30.23	1,138.63	2,750.57	797.17	259.37	
9	2013	1,581.12	27.16	1,137.69	2,745.97	789.02	268.57	
10	2012	1,514.04	23.19	1,237.79	2,775.02	769.33	276.24	
11	2011	1,733.4	30.2	1,025.3	2,788.9	790.2	319.4	
12	2010	1,847.3	37.1	999.0	2,883.4	807.0	260.2	

14	2009	1,755.9	38.9	931.6		2,726.5	798.9	273.4		\
15	2008	1,985.8	46.2	894.7		2,926.7	806.2	254.8		
16	2007	2,016.5	65.7	910.0		2,992.2	806.4	247.5		
17	2000	1,966	111	615		2,692	754	260		
19	1999	1,881	118	571		2,570	728	319.5		
		Geothermal	Solar	Wind	Wood	Bio_other	Subtotal_renewable	Misc		\
0		16.73	66.60	274.95	41.41	21.35		712.77	51.26	
2		15.93	53.29	254.30	41.15	21.61		686.61	62.90	
4		15.83	36.05	226.99	40.95	21.81		609.45	67.49	
6		15.92	24.89	190.72	41.93	21.70		544.24	75.61	
8		15.88	17.69	181.655	42.34	21.65		538.58	60.50	
9		15.78	9.04	167.84	40	20.83		522.07	55.64	
10		15.56	4.33	140.82	37.8	19.82		494.57	56.1	
11		15.3	1.82	120.2	37.4	19.2		513.32	46	
12		15.2	1.21	94.7	37.2	18.9		427.4	33.3	
14		15.0	0.89	73.9	36.1	18.4		417.7	41.4	
15		14.8	0.86	55.4	37.3	17.7		380.9	38.3	
16		14.6	0.61	34.5	39.0	16.5		352.7	36.6	
17		14	0.49	5.6	37.6	23		318.7	38.6	
19		14.8	0.50	4.5	37	22.6		392.8	55	
		Total								
0		4,222.28								
2		4,090.58								
4		4,137.10								
6		4,144.27								
8		4,146.2								
9		4,112.7								
10		4095								
11		4138.4								
12		4,151.0								
14		3,984.4								
15		4,152.2								
16		4,188.0								
17		3,836								
19		3,723.8								

[4]: renewable.get_data_hydro_2004_2018()

0	2018	79.89	291.72	0.417	
1	2017	79.79	300.05	0.430	
2	2016	79.91	267.81	0.383	
3	2015	79.66	249.08	0.357	
4	2014	79.24	258.75	0.373	
5	2013	79.22	268.57	0.387	
6	2012	78.7	276.24	0.401	

7	2011	78.65	319.36	0.464
8	2010	78.83	260.2	0.377
9	2009	78.52	273.45	0.398
10	2008	77.93	254.83	0.373
11	2007	77.89	247.51	0.363
12	2006	77.82	289.25	0.424
13	2005	77.54	270.32	0.398
14	2004	77.64	268.42	0.395

	Year	Growth	Capacity	Year	Growth	Produced	Portion of Renewable	\
0		0.12%			-2.7%		40.9%	
1		-0.2%			12%		43.7%	
2		0.3%			7.50%		43.9%	
3		0.56%			-4.0%		45.77%	
4		0.05%			-3.66%		47.93%	
5		0.64%			-2.78%		51.44%	
6		0.06%			-13.50%		55.85%	
7		-0.23%			22.74%		62.21%	
8		0.39%			-4.85%		60.88%	
9		0.76%			7.31%		65.47%	
10		0.05%			2.96%		66.90%	
11		0.09%			-14.43%		70.18%	
12		0.36%			7.00%		74.97%	
13		-0.13%			0.71%		75.57%	
14		-1.33%			-2.68%		76.36%	

	Portion of Total
0	7.0%
1	7.44%
2	6.57%
3	6.11%
4	6.32%
5	6.61%
6	6.82%
7	7.79%
8	6.31%
9	6.92%
10	6.19%
11	5.95%
12	7.12%
13	6.67%
14	6.76%

[5]: renewable.get_data_hydro_production()

	Rank	Rank w/o Hydropower	state	with Hydro	w/o Hydro	\
0			United States	17.1	9.6	
1	1	2	Vermont	99.6	41.3	

2	2	10	Idaho	81.6	21.9
3	3	21	Washington	80.0	8.2
4	4	16	Oregon	76.3	13.6
5	5	1	Maine	75.9	46.1
6	6	6	South Dakota	73.1	30.2
7	7	8	California	47.2	26.5
8	8	23	Montana	45.1	7.8
9	9	3	Iowa	38.8	37.2
10	10	4	Kansas	36.2	36.1
11	11	5	Oklahoma	36.1	32.3
12	12	35	Alaska	33.3	3.45
13	13	7	North Dakota	31.8	26.9
14	14	31	New York	27.8	5.0
15	15	9	Minnesota	24.9	22.8
16	16	11	Nevada	24.8	20.1
17	17	12	Colorado	23.4	19.6
18	18	18	New Hampshire	19.9	12.5
19	19	15	Nebraska	19.3	14.9
20	20	13	New Mexico	17.7	16.9
21	21	14	Texas	16.0	15.6
22	22	17	Hawaii	14.2	13.5
23	23	30	Arizona	11.8	5.3
24	24	20	Utah	11.6	9.4
25	25	19	Wyoming	11.6	9.4
26	26	49	Tennessee	11.2	1.42
27	27	22	Massachusetts	10.5	7.8
28	28	26	North Carolina	10.3	6.6
29	29	34	Maryland	9.8	4.07
30	30	32	Wisconsin	9.3	4.90
31	31	42	Alabama	9.2	2.57
32	32	44	Arkansas	8.8	2.45
33	33	25	Michigan	8.3	6.9
34	34	29	Georgia	7.9	5.5
35	35	24	Rhode Island	7.2	7.2
36	36	50	Kentucky	6.9	0.67
37	37	27	Illinois	6.6	6.5
38	38	33	Virginia	6.4	4.72
39	39	28	Indiana	6.0	5.5
40	40	36	South Carolina	5.9	2.99
41	41	46	West Virginia	4.60	2.19
42	42	37	Pennsylvania	4.35	2.99
43	43	43	Missouri	4.24	2.57
44	44	38	Louisiana	4.15	2.88
45	45	40	Connecticut	3.46	2.70
46	46	39	New Jersey	2.89	2.85
47	47	41	Mississippi	2.60	2.60
48	48	45	Florida	2.53	2.44

49	49	47	Ohio	2.48	2.02
50	50	48	Delaware	1.68	1.68

	with Hydro(GWH)	w/o Hydro(GWH)	Total electricity
0	687,290	387,245	4,014,804
1	2,069	858	2,077
2	12,989	3,480	15,926
3	92,342	9,517	115,474
4	44,623	7,980	58,516
5	8,492	5,163	11,192
6	7,651	3,156	10,464
7	97,298	54,606	206,107
8	12,753	2,192	28,269
9	21,933	21,018	56,478
10	18,590	18,561	51,366
11	27,598	24,737	76,545
12	1,987	206	5,971
13	13,029	10,993	40,931
14	35,505	6,440	127,880
15	14,885	13,628	59,701
16	9,414	7,621	37,967
17	12,686	10,668	54,318
18	3,483	2,195	17,494
19	6,945	5,351	35,937
20	5,933	5,683	33,566
21	72,345	70,759	452,235
22	1,399	1,332	9,848
23	12,536	5,564	105,833
24	4,263	3,444	36,732
25	5,434	4,398	46,826
26	8,725	1,111	78,103
27	3,291	2,466	31,456
28	13,398	8,682	130,689
29	3,352	1,389	34,132
30	6,040	3,195	65,247
31	12,782	3,580	139,194
32	5,470	1,519	62,109
33	9,344	7,732	112,367
34	10,194	7,054	128,979
35	378	376	5,244
36	4,948	483	72,116
37	11,976	11,847	181,911
38	6,027	4,410	93,500
39	6,001	5,533	100,492
40	5,497	2,793	93,467
41	3,376	1,607	73,410
42	8,705	5,981	200,201

43	3,552	2,152	83,801
44	4,027	2,796	96,978
45	1,180	920	34,108
46	2,153	2,127	74,541
47	1,573	1,573	60,574
48	6,006	5,811	237,821
49	2,954	2,401	118,974
50	129	129	7,662

[6]: `renewable.get_data_hydro_potential()`

	New Jersey	Rhode Island	Massachusetts	Connecticut	Maryland	New York	\			
0	549	59	1197	922	814	6711				
	Delaware	Florida	Ohio	Pennsylvania	...	Utah	Nebraska	Nevada	Idaho	\
0	31	682	3046	8368	...	3528	3142	846	18758	
	New Mexico	South Dakota	North Dakota	Montana	Wyoming	Alaska				
0	1363	1047	347	14547	4445	23676				

[1 rows x 50 columns]

[7]: `renewable.scrape_wind_data_from_wiki()`

Saved wind wiki data to Plot_Data/wind_wiki.csv

	2015	2014	2013	2012	2011	2010	2009	2008	2007	\
State										
Alaska	158.2	153.6	145.3	37.39	12.45	12.61	7.027	0.068	1.012	
Arizona	445.5	472.5	449.8	531.6	255.6	134.9	29.54	0	0	
California	12228	13776	12822	9754	7752	6079	5840	5385	5585	
Colorado	7441	7351	7204	5969	5200	3452	3164	3221	1292	
Connecticut	0	0	0	0	0	0	0	0	0	
Delaware	4.923	4.705	4.458	3.638	4.825	2.556	0	0	0	
Hawaii	601.3	585.3	503.3	378.2	340.8	261.1	251.4	240	238.2	
Idaho	2457	2778	2460	1891	1307	440.7	313.4	207.5	172.3	
Illinois	10733	10077	9625	7727	6213	4454	2820	2337	664.4	
Indiana	4516	3495	3481	3210	3285	2934	1403	238.4	0	
Iowa	17878	16295	15568	14032	10709	9170	7421	4084	2757	
Kansas	10927	10844	9433	5195	3720	3405	2863	1759	1153	
Maine	1273	1095	1048	886.9	706.6	499.2	298.6	131.6	99.07	
Maryland	433.5	323.5	321.7	321.7	270.7	1.494	0	0	0	
Massachusetts	220.1	224	204.9	89.67	61.38	22.07	5.956	3.672	0	
Michigan	4778	3875	2800	1132	456.5	360.3	300.2	141.2	2.723	
Minnesota	9797	9060	8259	7615	6726	4792	5053	4355	2639	
Missouri	1034	1131	1167	1245	1178	925.5	499.4	203.3	0	
Montana	1962	1966	1755	1262	1265	930.2	820.9	593.1	495.8	
Nebraska	3154	2736	1802	1284	1051	421.6	382.6	214.2	216.8	
Nevada	309.7	300.1	250.5	128.8	0	0	0	0	0	

New Hampshire	419.2	416.8	389.2	208.7	66.09	75.69	62.48	10.32	0
New Jersey	22.14	11.9	10.88	11.57	10.52	12.65	20.92	20.89	20.41
New Mexico	2067	2263	2193	2226	2104	1832	1547	1643	1393
New York	3956	3971	3539	2680	2828	2596	2266	1251	833.5
North Carolina	0	0	0	0	0	0	0	0	0
North Dakota	6530	6349	5519	5275	5236	4096	2998	1693	620.8
Ohio	1206	1152	1146	985.5	198.4	12.58	14.11	15.08	14.75
Oklahoma	14018	11862	11162	8158	5605	3808	2698	2358	1849
Oregon	6675	7580	7456	6343	4775	3920	3470	2575	1247
Pennsylvania	3352	3584	3352	2129	1794	1854	1075	729.4	470
Rhode Island	14.77	7.025	2.59	1.38	2.912	3.124	0	0	0
South Dakota	2481	2916	2688	2915	2668	1372	421	145.1	150
Tennessee	45.84	51.14	46.74	47.49	53.14	40.57	51.75	50.12	49.94
Texas	44959	39371	35874	32214	30548	26251	20026	16225	9006
Utah	621.4	664.8	539.8	703.9	572.8	447.7	159.5	23.9	0
Vermont	322.7	305.6	236	106.9	33.18	13.89	11.59	10.24	10.51
Washington	7101	7264	7004	6600	6262	4745	3572	3657	2438
West Virginia	1376	1451	1387	1286	1103	939.2	742.4	391.9	167.6
Wisconsin	1641	1609	1558	1558	1188	1088	1052	487.1	109.3
Wyoming	3768	4420	4433	4369	4612	3247	2226	962.5	754.9
Alabama	0	0	0	0	0	0	0	0	0
Arkansas	0	0	0	0	0	0	0	0	0
Florida	0	0	0	0	0	0	0	0	0
Georgia	0	0	0	0	0	0	0	0	0
Kentucky	0	0	0	0	0	0	0	0	0
Louisiana	0	0	0	0	0	0	0	0	0
South Carolina	0	0	0	0	0	0	0	0	0
Mississippi	0	0	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0	0	0

State	2006	2005
Alaska	0.788	0.589
Arizona	0	0
California	4883	4262
Colorado	865.5	776.2
Connecticut	0	0
Delaware	0	0
Hawaii	79.674	6.632
Idaho	169.6	0
Illinois	254.6	141.15
Indiana	0	0
Iowa	2318	1647
Kansas	991.9	425.8
Maine	0	0
Maryland	0	0
Massachusetts	0	0

Michigan	2.212	1.848
Minnesota	2055	1582
Missouri	0	0
Montana	436	0
Nebraska	261.2	96.61
Nevada	0	0
New Hampshire	0	0
New Jersey	15.99	0
New Mexico	1255	794.6
New York	655.4	103
North Carolina	0	0
North Dakota	369.5	220.3
Ohio	14.4	13.27
Oklahoma	1712	847.8
Oregon	931.2	734.3
Pennsylvania	361.1	284.2
Rhode Island	0	0
South Dakota	149	158.1
Tennessee	54.6	3.339
Texas	6671	4237
Utah	0	0
Vermont	10.69	11.49
Washington	1038	498.5
West Virginia	173.8	153.9
Wisconsin	101.4	92.54
Wyoming	759.1	717.3
Alabama	0	0
Arkansas	0	0
Florida	0	0
Georgia	0	0
Kentucky	0	0
Louisiana	0	0
South Carolina	0	0
Mississippi	0	0
Virginia	0	0

[8]: `renewable.scrapeEIA()`

```
C:\Users\swapn\Documents\ECE 143\project\Upload_dir\git\renewable.py:354:
UserWarning: No parser was explicitly specified, so I'm using the best available
HTML parser for this system ("lxml"). This usually isn't a problem, but if you
run this code on another system, or in a different virtual environment, it may
use a different parser and behave differently.
```

The code that caused this warning is on line 354 of the file
C:\Users\swapn\Documents\ECE 143\project\Upload_dir\git\renewable.py. To get rid
of this warning, pass the additional argument 'features="lxml"' to the
BeautifulSoup constructor.

```
soup = Soup(driver.page_source)
C:\Users\swapn\Documents\ECE 143\project\Upload_dir\git\renewable.py:401:
UserWarning: No parser was explicitly specified, so I'm using the best available
HTML parser for this system ("lxml"). This usually isn't a problem, but if you
run this code on another system, or in a different virtual environment, it may
use a different parser and behave differently.
```

The code that caused this warning is on line 401 of the file
C:\Users\swapn\Documents\ECE 143\project\Upload_dir\git\renewable.py. To get rid
of this warning, pass the additional argument 'features="lxml"' to the
BeautifulSoup constructor.

```
soup = Soup(html)

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Saving data for 201501 to 201512 to path
Plot_Data/eiadata/10.02C/renewable201501-201512.txt
Saving data for 201601 to 201612 to path
```

```
Plot_Data/eiadata/10.02C/renewable201601-201612.txt
Saving data for 201701 to 201712 to path
Plot_Data/eiadata/10.02C/renewable201701-201712.txt
Saving data for 201801 to 201812 to path
Plot_Data/eiadata/10.02C/renewable201801-201812.txt
Saving data for 201901 to 201901 to path
Plot_Data/eiadata/10.02C/renewable201901-201901.txt
Saving data for 197301 to 197312 to path
Plot_Data/eiadata/10.05/renewable197301-197312.txt
Saving data for 197401 to 197412 to path
Plot_Data/eiadata/10.05/renewable197401-197412.txt
Saving data for 197501 to 197512 to path
Plot_Data/eiadata/10.05/renewable197501-197512.txt
Saving data for 197601 to 197612 to path
Plot_Data/eiadata/10.05/renewable197601-197612.txt
Saving data for 197701 to 197712 to path
Plot_Data/eiadata/10.05/renewable197701-197712.txt
Saving data for 197801 to 197812 to path
Plot_Data/eiadata/10.05/renewable197801-197812.txt
Saving data for 197901 to 197912 to path
Plot_Data/eiadata/10.05/renewable197901-197912.txt
Saving data for 198001 to 198012 to path
Plot_Data/eiadata/10.05/renewable198001-198012.txt
Saving data for 198101 to 198112 to path
Plot_Data/eiadata/10.05/renewable198101-198112.txt
Saving data for 198201 to 198212 to path
Plot_Data/eiadata/10.05/renewable198201-198212.txt
Saving data for 198301 to 198312 to path
Plot_Data/eiadata/10.05/renewable198301-198312.txt
Saving data for 198401 to 198412 to path
Plot_Data/eiadata/10.05/renewable198401-198412.txt
Saving data for 198501 to 198512 to path
Plot_Data/eiadata/10.05/renewable198501-198512.txt
Saving data for 198601 to 198612 to path
Plot_Data/eiadata/10.05/renewable198601-198612.txt
Saving data for 198701 to 198712 to path
Plot_Data/eiadata/10.05/renewable198701-198712.txt
Saving data for 198801 to 198812 to path
Plot_Data/eiadata/10.05/renewable198801-198812.txt
Saving data for 198901 to 198912 to path
Plot_Data/eiadata/10.05/renewable198901-198912.txt
Saving data for 199001 to 199012 to path
Plot_Data/eiadata/10.05/renewable199001-199012.txt
Saving data for 199101 to 199112 to path
Plot_Data/eiadata/10.05/renewable199101-199112.txt
Saving data for 199201 to 199212 to path
Plot_Data/eiadata/10.05/renewable199201-199212.txt
Saving data for 199301 to 199312 to path
```

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Plot_Data/eiadata/10.05/renewable199301-199312.txt
Saving data for 199401 to 199412 to path
Plot_Data/eiadata/10.05/renewable199401-199412.txt
Saving data for 199501 to 199512 to path
Plot_Data/eiadata/10.05/renewable199501-199512.txt
Saving data for 199601 to 199612 to path
Plot_Data/eiadata/10.05/renewable199601-199612.txt
Saving data for 199701 to 199712 to path
Plot_Data/eiadata/10.05/renewable199701-199712.txt
Saving data for 199801 to 199812 to path
Plot_Data/eiadata/10.05/renewable199801-199812.txt
Saving data for 199901 to 199912 to path
Plot_Data/eiadata/10.05/renewable199901-199912.txt
Saving data for 200001 to 200012 to path
Plot_Data/eiadata/10.05/renewable200001-200012.txt
Saving data for 200101 to 200112 to path
Plot_Data/eiadata/10.05/renewable200101-200112.txt
Saving data for 200201 to 200212 to path
Plot_Data/eiadata/10.05/renewable200201-200212.txt
Saving data for 200301 to 200312 to path
Plot_Data/eiadata/10.05/renewable200301-200312.txt
Saving data for 200401 to 200412 to path
Plot_Data/eiadata/10.05/renewable200401-200412.txt
Saving data for 200501 to 200512 to path
Plot_Data/eiadata/10.05/renewable200501-200512.txt
Saving data for 200601 to 200612 to path
Plot_Data/eiadata/10.05/renewable200601-200612.txt
Saving data for 200701 to 200712 to path
Plot_Data/eiadata/10.05/renewable200701-200712.txt
Saving data for 200801 to 200812 to path
Plot_Data/eiadata/10.05/renewable200801-200812.txt
Saving data for 200901 to 200912 to path
Plot_Data/eiadata/10.05/renewable200901-200912.txt
Saving data for 201001 to 201012 to path
Plot_Data/eiadata/10.05/renewable201001-201012.txt
Saving data for 201101 to 201112 to path
Plot_Data/eiadata/10.05/renewable201101-201112.txt
Saving data for 201201 to 201212 to path
Plot_Data/eiadata/10.05/renewable201201-201212.txt
Saving data for 201301 to 201312 to path
Plot_Data/eiadata/10.05/renewable201301-201312.txt
Saving data for 201401 to 201412 to path
Plot_Data/eiadata/10.05/renewable201401-201412.txt
Saving data for 201501 to 201512 to path
Plot_Data/eiadata/10.05/renewable201501-201512.txt
Saving data for 201601 to 201612 to path
Plot_Data/eiadata/10.05/renewable201601-201612.txt
Saving data for 201701 to 201712 to path
```

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Plot_Data/eiadata/10.05/renewable201701-201712.txt
Saving data for 201801 to 201812 to path
Plot_Data/eiadata/10.05/renewable201801-201812.txt
Saving data for 201901 to 201901 to path
Plot_Data/eiadata/10.05/renewable201901-201901.txt
Saving data for 197301 to 197312 to path
Plot_Data/eiadata/10.06/renewable197301-197312.txt
Saving data for 197401 to 197412 to path
Plot_Data/eiadata/10.06/renewable197401-197412.txt
Saving data for 197501 to 197512 to path
Plot_Data/eiadata/10.06/renewable197501-197512.txt
Saving data for 197601 to 197612 to path
Plot_Data/eiadata/10.06/renewable197601-197612.txt
Saving data for 197701 to 197712 to path
Plot_Data/eiadata/10.06/renewable197701-197712.txt
Saving data for 197801 to 197812 to path
Plot_Data/eiadata/10.06/renewable197801-197812.txt
Saving data for 197901 to 197912 to path
Plot_Data/eiadata/10.06/renewable197901-197912.txt
Saving data for 198001 to 198012 to path
Plot_Data/eiadata/10.06/renewable198001-198012.txt
Saving data for 198101 to 198112 to path
Plot_Data/eiadata/10.06/renewable198101-198112.txt
Saving data for 198201 to 198212 to path
Plot_Data/eiadata/10.06/renewable198201-198212.txt
Saving data for 198301 to 198312 to path
Plot_Data/eiadata/10.06/renewable198301-198312.txt
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Plot_Data/eiadata/10.06/renewable198401-198412.txt
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Plot_Data/eiadata/10.06/renewable198901-198912.txt
Saving data for 199001 to 199012 to path
Plot_Data/eiadata/10.06/renewable199001-199012.txt
Saving data for 199101 to 199112 to path
Plot_Data/eiadata/10.06/renewable199101-199112.txt
Saving data for 199201 to 199212 to path
Plot_Data/eiadata/10.06/renewable199201-199212.txt
Saving data for 199301 to 199312 to path
Plot_Data/eiadata/10.06/renewable199301-199312.txt
Saving data for 199401 to 199412 to path
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Plot_Data/eiadata/10.06/renewable199401-199412.txt
Saving data for 199501 to 199512 to path
Plot_Data/eiadata/10.06/renewable199501-199512.txt
Saving data for 199601 to 199612 to path
Plot_Data/eiadata/10.06/renewable199601-199612.txt
Saving data for 199701 to 199712 to path
Plot_Data/eiadata/10.06/renewable199701-199712.txt
Saving data for 199801 to 199812 to path
Plot_Data/eiadata/10.06/renewable199801-199812.txt
Saving data for 199901 to 199912 to path
Plot_Data/eiadata/10.06/renewable199901-199912.txt
Saving data for 200001 to 200012 to path
Plot_Data/eiadata/10.06/renewable200001-200012.txt
Saving data for 200101 to 200112 to path
Plot_Data/eiadata/10.06/renewable200101-200112.txt
Saving data for 200201 to 200212 to path
Plot_Data/eiadata/10.06/renewable200201-200212.txt
Saving data for 200301 to 200312 to path
Plot_Data/eiadata/10.06/renewable200301-200312.txt
Saving data for 200401 to 200412 to path
Plot_Data/eiadata/10.06/renewable200401-200412.txt
Saving data for 200501 to 200512 to path
Plot_Data/eiadata/10.06/renewable200501-200512.txt
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Saving data for 200701 to 200712 to path
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Plot_Data/eiadata/10.06/renewable200801-200812.txt
Saving data for 200901 to 200912 to path
Plot_Data/eiadata/10.06/renewable200901-200912.txt
Saving data for 201001 to 201012 to path
Plot_Data/eiadata/10.06/renewable201001-201012.txt
Saving data for 201101 to 201112 to path
Plot_Data/eiadata/10.06/renewable201101-201112.txt
Saving data for 201201 to 201212 to path
Plot_Data/eiadata/10.06/renewable201201-201212.txt
Saving data for 201301 to 201312 to path
Plot_Data/eiadata/10.06/renewable201301-201312.txt
Saving data for 201401 to 201412 to path
Plot_Data/eiadata/10.06/renewable201401-201412.txt
Saving data for 201501 to 201512 to path
Plot_Data/eiadata/10.06/renewable201501-201512.txt
Saving data for 201601 to 201612 to path
Plot_Data/eiadata/10.06/renewable201601-201612.txt
Saving data for 201701 to 201712 to path
Plot_Data/eiadata/10.06/renewable201701-201712.txt
Saving data for 201801 to 201812 to path
```

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Plot_Data/eiadata/10.06/renewable201801-201812.txt
Saving data for 201901 to 201901 to path
Plot_Data/eiadata/10.06/renewable201901-201901.txt
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1973.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1973.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1974.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1974.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1975.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1975.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1976.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1976.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1977.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1977.csv!
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Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1978.csv!
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Saving to Plot_Data/eiadata/10.01/Jan-Dec 1980.csv
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Saving to Plot_Data/eiadata/10.01/Jan-Dec 1981.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1981.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1982.csv
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Saving to Plot_Data/eiadata/10.01/Jan-Dec 1988.csv
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Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1989.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1990.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1990.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1991.csv
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Saving to Plot_Data/eiadata/10.01/Jan-Dec 1992.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1992.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1993.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1993.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1994.csv
Successfully saved to Plot_Data/eiadata/10.01/Jan-Dec 1994.csv!
Saving to Plot_Data/eiadata/10.01/Jan-Dec 1995.csv
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Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2000.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Dec 2001.csv
Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2001.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Dec 2002.csv
Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2002.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Dec 2003.csv
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Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2004.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Dec 2005.csv
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Saving to Plot_Data/eiadata/10.06/Jan-Dec 2006.csv
Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2006.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Dec 2007.csv
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Saving to Plot_Data/eiadata/10.06/Jan-Dec 2010.csv
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Saving to Plot_Data/eiadata/10.06/Jan-Dec 2011.csv
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Saving to Plot_Data/eiadata/10.06/Jan-Dec 2013.csv
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Saving to Plot_Data/eiadata/10.06/Jan-Dec 2014.csv
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Saving to Plot_Data/eiadata/10.06/Jan-Dec 2015.csv
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Saving to Plot_Data/eiadata/10.06/Jan-Dec 2016.csv
Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2016.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Dec 2017.csv
Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2017.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Dec 2018.csv
Successfully saved to Plot_Data/eiadata/10.06/Jan-Dec 2018.csv!
Saving to Plot_Data/eiadata/10.06/Jan-Feb 2019.csv
Successfully saved to Plot_Data/eiadata/10.06/Jan-Feb 2019.csv!
```

```
[9]: renewable.MakeCSPDataForSolar()
```

```
Extracting file: nsrdb_v3_0_1_1998_2016_dni.zip to Potential/Solar
Done
Dataset Shapefile Found: nsrdb_v3_0_1_1998_2016_dni.shp. Projection is: {'init':
'epsg:4326'}
Extracting file: states_21basic.zip to Potential/States/
```

```
Done
Dataset Shapefile Found: states.shp. Projection is: {'init': 'epsg:4269'}
Reading data from CSV Files...
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2001_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2002_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2003_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2004_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2005_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2006_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2007_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2008_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2009_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2010_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2011_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2012_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2013_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2014_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2015_dni.csv
Potential/Solar/NSRDB-YearWise/nsrdb_v3_0_1_2016_dni.csv
Merging Data with Original Reference File...
Done merging original reference with 2001 data.
Done merging original reference with 2002 data.
Done merging original reference with 2003 data.
Done merging original reference with 2004 data.
Done merging original reference with 2005 data.
Done merging original reference with 2006 data.
Done merging original reference with 2007 data.
Done merging original reference with 2008 data.
Done merging original reference with 2009 data.
Done merging original reference with 2010 data.
Done merging original reference with 2011 data.
Done merging original reference with 2012 data.
Done merging original reference with 2013 data.
Done merging original reference with 2014 data.
Done merging original reference with 2015 data.
Done merging original reference with 2016 data.
Done with merging all!
Merging GeoPandas Data for DNI with State Boundaries...
Merged Final Data Successfully...
Converting Table CRS to meters (3395 EPSG)...
Modified CRS is: {'init': 'epsg:3395'}
Calculating Net Area for CSP Calculations...
Calculating for Year: 2001 in state: AZ
Calculating for Year: 2002 in state: AZ
Calculating for Year: 2003 in state: AZ
Calculating for Year: 2004 in state: AZ
Calculating for Year: 2005 in state: AZ
Calculating for Year: 2006 in state: AZ
```

Calculating for Year: 2007 in state: AZ
Calculating for Year: 2008 in state: AZ
Calculating for Year: 2009 in state: AZ
Calculating for Year: 2010 in state: AZ
Calculating for Year: 2011 in state: AZ
Calculating for Year: 2012 in state: AZ
Calculating for Year: 2013 in state: AZ
Calculating for Year: 2014 in state: AZ
Calculating for Year: 2015 in state: AZ
Calculating for Year: 2016 in state: AZ
Calculating for Year: 2001 in state: CA
Calculating for Year: 2002 in state: CA
Calculating for Year: 2003 in state: CA
Calculating for Year: 2004 in state: CA
Calculating for Year: 2005 in state: CA
Calculating for Year: 2006 in state: CA
Calculating for Year: 2007 in state: CA
Calculating for Year: 2008 in state: CA
Calculating for Year: 2009 in state: CA
Calculating for Year: 2010 in state: CA
Calculating for Year: 2011 in state: CA
Calculating for Year: 2012 in state: CA
Calculating for Year: 2013 in state: CA
Calculating for Year: 2014 in state: CA
Calculating for Year: 2015 in state: CA
Calculating for Year: 2016 in state: CA
Calculating for Year: 2001 in state: NV
Calculating for Year: 2002 in state: NV
Calculating for Year: 2003 in state: NV
Calculating for Year: 2004 in state: NV
Calculating for Year: 2005 in state: NV
Calculating for Year: 2006 in state: NV
Calculating for Year: 2007 in state: NV
Calculating for Year: 2008 in state: NV
Calculating for Year: 2009 in state: NV
Calculating for Year: 2010 in state: NV
Calculating for Year: 2011 in state: NV
Calculating for Year: 2012 in state: NV
Calculating for Year: 2013 in state: NV
Calculating for Year: 2014 in state: NV
Calculating for Year: 2015 in state: NV
Calculating for Year: 2016 in state: NV
Calculating for Year: 2001 in state: CO
Calculating for Year: 2002 in state: CO
Calculating for Year: 2003 in state: CO
Calculating for Year: 2004 in state: CO
Calculating for Year: 2005 in state: CO
Calculating for Year: 2006 in state: CO

Calculating for Year: 2007 in state: CO
Calculating for Year: 2008 in state: CO
Calculating for Year: 2009 in state: CO
Calculating for Year: 2010 in state: CO
Calculating for Year: 2011 in state: CO
Calculating for Year: 2012 in state: CO
Calculating for Year: 2013 in state: CO
Calculating for Year: 2014 in state: CO
Calculating for Year: 2015 in state: CO
Calculating for Year: 2016 in state: CO
Calculating for Year: 2001 in state: NM
Calculating for Year: 2002 in state: NM
Calculating for Year: 2003 in state: NM
Calculating for Year: 2004 in state: NM
Calculating for Year: 2005 in state: NM
Calculating for Year: 2006 in state: NM
Calculating for Year: 2007 in state: NM
Calculating for Year: 2008 in state: NM
Calculating for Year: 2009 in state: NM
Calculating for Year: 2010 in state: NM
Calculating for Year: 2011 in state: NM
Calculating for Year: 2012 in state: NM
Calculating for Year: 2013 in state: NM
Calculating for Year: 2014 in state: NM
Calculating for Year: 2015 in state: NM
Calculating for Year: 2016 in state: NM
Calculating for Year: 2001 in state: TX
Calculating for Year: 2002 in state: TX
Calculating for Year: 2003 in state: TX
Calculating for Year: 2004 in state: TX
Calculating for Year: 2005 in state: TX
Calculating for Year: 2006 in state: TX
Calculating for Year: 2007 in state: TX
Calculating for Year: 2008 in state: TX
Calculating for Year: 2009 in state: TX
Calculating for Year: 2010 in state: TX
Calculating for Year: 2011 in state: TX
Calculating for Year: 2012 in state: TX
Calculating for Year: 2013 in state: TX
Calculating for Year: 2014 in state: TX
Calculating for Year: 2015 in state: TX
Calculating for Year: 2016 in state: TX
Calculating for Year: 2001 in state: GA
Calculating for Year: 2002 in state: GA
Calculating for Year: 2003 in state: GA
Calculating for Year: 2004 in state: GA
Calculating for Year: 2005 in state: GA
Calculating for Year: 2006 in state: GA

Calculating for Year: 2007 in state: GA
Calculating for Year: 2008 in state: GA
Calculating for Year: 2009 in state: GA
Calculating for Year: 2010 in state: GA
Calculating for Year: 2011 in state: GA
Calculating for Year: 2012 in state: GA
Calculating for Year: 2013 in state: GA
Calculating for Year: 2014 in state: GA
Calculating for Year: 2015 in state: GA
Calculating for Year: 2016 in state: GA
Calculating for Year: 2001 in state: TN
Calculating for Year: 2002 in state: TN
Calculating for Year: 2003 in state: TN
Calculating for Year: 2004 in state: TN
Calculating for Year: 2005 in state: TN
Calculating for Year: 2006 in state: TN
Calculating for Year: 2007 in state: TN
Calculating for Year: 2008 in state: TN
Calculating for Year: 2009 in state: TN
Calculating for Year: 2010 in state: TN
Calculating for Year: 2011 in state: TN
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Calculating for Year: 2013 in state: TN
Calculating for Year: 2014 in state: TN
Calculating for Year: 2015 in state: TN
Calculating for Year: 2016 in state: TN
Calculating for Year: 2001 in state: NC
Calculating for Year: 2002 in state: NC
Calculating for Year: 2003 in state: NC
Calculating for Year: 2004 in state: NC
Calculating for Year: 2005 in state: NC
Calculating for Year: 2006 in state: NC
Calculating for Year: 2007 in state: NC
Calculating for Year: 2008 in state: NC
Calculating for Year: 2009 in state: NC
Calculating for Year: 2010 in state: NC
Calculating for Year: 2011 in state: NC
Calculating for Year: 2012 in state: NC
Calculating for Year: 2013 in state: NC
Calculating for Year: 2014 in state: NC
Calculating for Year: 2015 in state: NC
Calculating for Year: 2016 in state: NC
Calculating for Year: 2001 in state: FL
Calculating for Year: 2002 in state: FL
Calculating for Year: 2003 in state: FL
Calculating for Year: 2004 in state: FL
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Saving merged area data for Direct Normal Irradiance dataset...
Saving Maximum Potential to Potential/Solar/ ...
Now calculating for actual energy production!
Saving Actual Energy Production to Potential/Solar/ ...
Calculating and Saving Percentage of Potential Achieved...
Successfully calculated and saved all metrics in Potential/Solar ...

```
[10]: renewable.CalcWindPotential()
```

```
Extracting file: uswtdbSHP.zip to Potential/Wind
Done
Wind Energy Database ShapeFile...
Shape of the dataframe: (59338, 25)
Projection of dataframe: {'init': 'epsg:4269'}
US States Database ShapeFile...
Shape of the dataframe: (51, 6)
Projection of dataframe: {'init': 'epsg:4269'}
Successfully saved all data. Output files are at
'Potential/Wind/Wind_Potential_AllStates.csv',
'Potential/Wind/Wind_ActualEne_AllStates.csv' and
'Potential/Wind/Wind_Percent_AllStates.csv'
```