Table 8.1 Puerto Rico- Sales of Electricity to Ultimate Customers:
Total by End-Use Sector, 2010 - September 2020 (Thousand Megawatthours)

Period	Residential	Commercial	Industrial	Transportation	All Sectors
Annual Totals					
2010	6,975	9,041	2,968	0	18,984
2011	6,587	8,832	2,832	0	18,251
2012	6,771	8,879	2,500	0	18,150
2013	6,320	8,969	2,504	0	17,793
2014	6,218	8,761	2,376	0	17,356
2015	6,314	8,586	2,355	0	17,255
2016	6,524	8,569	2,251	0	17,344
2017	5,045	6,820	1,747	0	13,611
2018	6,103	8,203	2,128	0	16,434
2019	6,205	7,905	2,048	0	16,158
Year 2018					
January	389	559	142	0	1,089
February	393	760	175	0	1,328
March	450	531	98	0	1,080
April	466	784	273	0	1,524
May	566	802	165	0	1,533
June	507	592	208	0	1,308
July	578	681	145	0	1,404
August	577	689	209	0	1,475
Sept	527	722	186	0	1,436
October	698	847	191	0	1,736
November	457	593	172	0	1,222
December	494	642	162	0	1,299
Year 2019					
January	447	573	154	0	1,174
February	367	487	146	0	1,000
March	448	651	180	0	1,279
April	465	681	165	0	1,311
May	512	655	189	0	1,356
June	568	693	171	0	1,431
July	618	688	181	0	1,487
August	594	719	175	0	1,488
Sept	586	713	166	0	1,464
October	587	713	196	0	1,496
November	504	678	162	0	1,343
December	509	655	165	0	1,329
Year 2020					
January	475	601	137	0	1,213
February	373	540	120	0	1,033
March	488	691	184	0	1,364
April	510	476	138	0	1,124
May	651	500	160	0	1,312
June	642	623	173	0	1,438
July	704	692	172	0	1,567
August	650	642	177	0	1,469
Sept	679	644	167	0	1,490
Year to Date					
2018	4,454	6,120	1,603	0	12,177
2019	4,605	5,860	1,526	0	11,991
2020	5,172	5,410	1,428	0	12,010
Rolling 12 Months Ending in September					
2019	6,254	7,943	2,051	0	16,247
2020	6,772	7,455	1,951	0	16,178

Sources: U.S. Energy Information Administration, Form EIA-861M (formerly EIA-826), Monthly Electric Industry Power Report
Form EIA-826, Monthly Electric Sales and Revenue Report with State Distributions Report,
Form EIA-861, Annual Electric Power Industry Report

Table 8.2 Puerto Rico- Revenue from Sales of Electricity to Ultimate Customers:
Total by End-Use Sector, 2010 - September 2020 (Million Dollars)

Period	Residential	Commercial	Industrial	Transportation	All Sectors
Annual Totals					
2010	1,521	2,103	564	0	4,188
2011	1,748	2,483	663	0	4,894
2012	1,690	2,605	647	0	4,942
2013	1,633	2,474	570	0	4,678
2014	1,636	2,394	551	0	4,581
2015	1,282	1,850	417	0	3,549
2016	1,170	1,677	356	0	3,203
2017	1,123	1,549	344	0	3,016
2018	1,265	1,893	405	0	3,564
2019	1,330	1,811	420	0	3,560
Year 2018					
January	86	159	32	0	277
February	76	171	32	0	279
March	110	149	22	0	281
April	84	161	54	0	300
May	104	165	23	0	292
June	108	133	40	0	281
July	122	166	29	0	317
August	114	149	39	0	302
Sept	109	162	34	0	306
October	137	181	36	0	353
November	102	142	34	0	278
December	112	154	31	0	298
Year 2019					
January	85	134	30	0	250
February	80	109	29	0	218
March	98	156	37	0	291
April	106	177	36	0	319
May	127	132	41	0	300
June	116	157	36	0	308
July	122	140	32	0	295
August	132	174	37	0	343
Sept	113	150	31	0	295
October	126	162	39	0	328
November	107	154	33	0	294
December	118	165	37	0	320
Year 2020					
January	122	180	36	0	338
February	99	161	32	0	292
March	87	143	34	0	264
April	85	79	22	0	186
May	151	118	37	0	307
June	109	119	29	0	257
July	141	145	33	0	319
August	103	124	27	0	255
Sept	116	121	28	0	266
Year to Date					
2018	914	1,415	304	0	2,634
2019	979	1,329	310	0	2,619
2020	1,015	1,190	278	0	2,483
Rolling 12 Months Ending in September					
2019	1,330	1,807	411	0	3,548
2020	1,365	1,671	388	0	3,425

Sources: U.S. Energy Information Administration, Form EIA-861M (formerly EIA-826), Monthly Electric Industry Power Report.
Form EIA-826, Monthly Electric Sales and Revenue Report with State Distributions Report,
Form EIA-861, Annual Electric Power Industry Report

Table 8.3 Puerto Rico- Number of Ultimate Customers Served by Sector:
Total by End-Use Sector, 2010 - September 2020

Period	Residential	Commercial	Industrial	Transportation	All Sectors
Annual Totals					
2010	1,339,703	133,029	790	0	1,473,522
2011	1,341,708	132,738	750	0	1,475,196
2012	1,349,750	131,264	721	0	1,481,735
2013	1,340,989	131,034	694	0	1,472,717
2014	1,328,546	129,122	662	0	1,458,330
2015	1,326,631	127,365	647	0	1,454,643
2016	1,332,152	127,179	633	0	1,459,964
2017	1,337,756	127,065	618	0	1,465,439
2018	1,346,102	126,527	602	0	1,473,231
2019	1,341,424	124,912	588	0	1,466,924
Year 2018					
January	1,343,369	126,955	605	0	1,470,929
February	1,342,510	126,695	606	0	1,469,811
March	1,343,914	126,640	607	0	1,471,161
April	1,344,684	126,489	606	0	1,471,779
May	1,344,960	126,396	604	0	1,471,960
June	1,344,798	126,278	604	0	1,471,680
July	1,345,450	126,221	601	0	1,472,272
August	1,346,380	126,283	598	0	1,473,261
Sept	1,347,298	126,375	599	0	1,474,272
October	1,348,855	126,492	597	0	1,475,944
November	1,349,924	126,702	595	0	1,477,221
December	1,351,082	126,800	596	0	1,478,478
Year 2019					
January	1,343,649	125,945	594	0	1,470,188
February	1,344,627	125,872	593	0	1,471,092
March	1,345,398	125,610	595	0	1,471,603
April	1,344,357	125,225	590	0	1,470,172
May	1,343,442	125,067	589	0	1,469,098
June	1,341,453	124,798	588	0	1,466,839
July	1,341,100	124,692	588	0	1,466,380
August	1,339,811	124,550	587	0	1,464,948
Sept	1,338,804	124,409	584	0	1,463,797
October	1,338,280	124,254	583	0	1,463,117
November	1,338,174	124,157	582	0	1,462,913
December	1,337,987	124,366	581	0	1,462,934
Year 2020					
January	1,340,652	124,815	588	0	1,466,055
February	1,340,005	124,751	586	0	1,465,342
March	1,339,508	124,615	584	0	1,464,707
April	1,339,991	124,604	585	0	1,465,180
May	1,340,943	124,631	585	0	1,466,159
June	1,341,826	124,641	586	0	1,467,053
July	1,343,139	124,665	587	0	1,468,391
August	1,345,267	124,772	588	0	1,470,627
Sept	1,347,448	124,977	587	0	1,473,012
Rolling 12 Months Ending in September					
2019	1,344,375	125,514	591	0	1,470,480
2020	1,341,102	124,604	585	0	1,466,291

Sources. U S. Energy Information Administration, Form EIA-861M (formerly EIA-826), Monthly Electric Industry Power Report.
Form EIA-826, Monthly Electric Sales and Revenue Report with State Distributions Report;
Form EIA-861, Annual Electric Power Industry Report

Table 8.4 Puerto Rico- Average Price of Electricity to Ultimate Customers:
Total by End-Use Sector, 2010 - September 2020 (Cents per Kilowatthour)

Period	Residential	Commercial	Industrial	Transportation	All Sectors
Annual Totals					
2010	21 80	23 26	19 01	--	22 06
2011	26 54	28.11	23.39	--	26 82
2012	24 96	29 34	25 89	--	27 23
2013	25 84	27 59	22.77	--	26.29
2014	26 31	27 33	23 18	--	26 39
2015	20.31	21.55	17.71	--	20.57
2016	17 93	19 57	15 83	--	18 47
2017	22 26	22 72	19 70	--	22 16
2018	20.73	23.08	19.04	--	21 68
2019	21.43	22.90	20.51	--	22.03
Year 2018					
January	22.11	28 53	22 32	--	25 43
February	19.32	22 48	18.45	--	21 02
March	24.40	27.97	22.42	--	25.98
April	18.09	20.56	19.86	--	19 68
May	18 38	20 61	13 77	--	19 05
June	21 24	22.46	19 23	--	21 47
July	21.17	24.32	19 78	--	22.56
August	19 81	21.63	18 51	--	20 48
Sept	20.75	22 50	18 18	--	21 30
October	19 59	21.36	18 69	--	20 35
November	22.31	24 00	19 55	--	22 74
December	22 77	24.05	19 33	--	22 97
Year 2019					
January	19 07	23 38	19 78	--	21 27
February	21 85	22 35	20 14	--	21.84
March	21 84	24 03	20 33	--	22 74
April	22.89	25.94	21.91	--	24.35
May	24 71	20 19	21 60	--	22 09
June	20 37	22.60	21.26	--	21.56
July	19 72	20 39	17 90	--	19 80
August	22.22	24 21	21.16	--	23.06
Sept	19 36	21 02	18 93	--	20 12
October	21 50	22 80	19 96	--	21 92
November	21.15	22 74	20.65	--	21.89
December	23 13	25 19	22 62	--	24 09
Year 2020					
January	25 72	29 96	26 04	--	27 86
February	26.63	29.78	26.48	--	28.26
March	17.80	20.68	18.38	--	19.34
April	16 75	16 58	15 81	--	16 56
May	23 26	23 63	23 21	--	23 39
June	16.99	19.03	16.89	--	17.86
July	20.06	20.93	19.14	--	20.35
August	15 91	19 32	15 40	--	17 34
Sept	17.12	18.83	16.78	--	17.82
Year to Date					
2018	20.52	23.13	18.99	--	21.63
2019	21 26	22 68	20 34	--	21 84
2020	19.63	21 99	19 45	--	20 67
Rolling 12 Months Ending in September					
2019	21 27	22 75	20 04	--	21.84
2020	20.17	22.42	19.87	--	21.17

Sources U S Energy Information Administration, Form EIA-861M (formerly EIA-826), Monthly Electric Industry Power Report
Form EIA-826, Monthly Electric Sales and Revenue Report with State Distributions Report,
Form EIA-861, Annual Electric Power Industry Report

Table 8.5. Net Summer Capacity (MW) of Existing Utility Scale Units by Technology for Puerto Rico, 2007-September 2020

Period	Coal	Hydroelectric Conventional	Natural Gas	Other	Petroleum	Solar	Wind	Total
Annual Totals								
2007	454	98	1,346	0	3,049	0	0	4,947
2008	454	98	1,346	0	3,480	0	0	5,378
2009	454	98	1,346	0	3,600	0	0	5,498
2010	454	98	1,346	0	3,600	0	0	5,498
2011	454	98	1,346	0	3,600	5	0	5,503
2012	454	98	1,346	0	3,600	23	98	5,619
2013	454	98	1,346	0	3,600	26	98	5,622
2014	454	98	1,346	0	3,600	38	99	5,635
2015	454	98	1,346	9	3,604	70	99	5,680
2016	454	98	1,346	33	3,604	145	99	5,779
2017	454	98	1,346	35	3,605	145	99	5,782
2018	454	98	1,346	35	3,607	145	99	5,784
2019	454	98	1,346	35	3,607	149	99	5,788
Year 2020								
January	454	98	1,346	33	3,607	145	99	5,781
February	454	98	1,346	33	3,607	155	99	5,791
March	454	98	1,346	33	3,607	155	99	5,791
April	454	98	1,346	33	3,607	155	99	5,791
May	454	98	1,346	33	3,607	155	99	5,791
June	454	98	1,346	33	3,607	155	99	5,791
July	454	98	1,346	33	3,607	155	99	5,791
August	454	98	1,346	33	3,607	155	99	5,791
Sept	454	98	1,346	33	3,607	155	99	5,791

Capacity from facilities with a total generator nameplate capacity less than 1 MW are excluded from this report
Sources U S Energy Information Administration, Form EIA-860, 'Annual Electric Generator Report' and Form EIA-860M, 'Monthly Update to the Annual Electric Generator Report '

Appendices

Table A.1.A. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Total (All Sectors) by Census Division and State, September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**25**	**16**	**0**	**2**	**0**	**0**	**18**
Connecticut	0	35	0	1	0	0	58
Maine	25	16	0	15	0	0	21
Massachusetts	0	32	0	4	0	0	38
New Hampshire	0	31	0	0	0	0	36
Rhode Island	0	104	0	7	0	0	0
Vermont	0	148	0	0	0	0	33
Middle Atlantic	**5**	**18**	**0**	**1**	**29**	**0**	**4**
New Jersey	0	57	0	2	0	0	0
New York	0	19	0	1	0	0	3
Pennsylvania	5	26	0	0	45	0	22
East North Central	**1**	**7**	**20**	**1**	**9**	**0**	**10**
Illinois	4	14	0	7	0	0	73
Indiana	0	4	0	2	18	0	66
Michigan	2	6	0	2	0	0	16
Ohio	1	10	34	2	24	0	56
Wisconsin	0	62	0	3	0	0	12
West North Central	**1**	**13**	**0**	**6**	**0**	**0**	**7**
Iowa	0	26	0	5	0	0	23
Kansas	0	16	0	30	0	0	0
Minnesota	3	42	0	12	0	0	20
Missouri	0	12	0	7	0	0	26
Nebraska	5	122	0	35	0	0	18
North Dakota	0	9	0	36	0	0	12
South Dakota	0	216	0	42	0	0	7
South Atlantic	**1**	**3**	**10**	**1**	**0**	**0**	**12**
Delaware	0	50	0	4	0	0	0
District of Columbia	0	0	0	27	0	0	0
Florida	0	6	0	1	0	0	83
Georgia	0	28	98	3	0	0	17
Maryland	0	6	0	1	0	0	0
North Carolina	0	14	0	2	0	0	15
South Carolina	0	12	0	2	0	0	24
Virginia	0	4	0	2	0	0	28
West Virginia	2	0	0	12	0	0	29
East South Central	**0**	**4**	**0**	**1**	**0**	**0**	**8**
Alabama	0	64	0	2	0	0	11
Kentucky	0	0	0	5	0	0	12
Mississippi	0	8	0	1	0	0	0
Tennessee	0	1	0	3	0	0	13
West South Central	**0**	**8**	**0**	**1**	**3**	**0**	**12**
Arkansas	0	10	0	8	0	0	18
Louisiana	0	52	0	2	7	0	33
Oklahoma	0	3	0	2	0	0	20
Texas	0	9	0	1	3	0	27
Mountain	**1**	**13**	**0**	**1**	**5**	**0**	**4**
Arizona	0	2	0	1	0	0	3
Colorado	0	69	0	2	0	0	16
Idaho	115	0	0	16	0	0	7
Montana	7	17	0	40	0	0	7
Nevada	0	0	0	1	0	0	2
New Mexico	0	38	0	4	0	0	50
Utah	0	2	0	2	0	0	22
Wyoming	3	1	0	8	5	0	20
Pacific Contiguous	**0**	**11**	**0**	**1**	**1**	**0**	**2**
California	0	9	0	1	1	0	7
Oregon	0	74	0	4	0	0	3
Washington	0	27	0	6	0	0	1
Pacific Noncontiguous	**12**	**1**	**0**	**34**	**0**	**0**	**15**
Alaska	28	3	0	34	0	0	16
Hawaii	0	1	0	0	0	0	49
U.S Total	**0**	**1**	**8**	**0**	**4**	**0**	**3**

Displayed values of zero may represent small values that round to zero The Excel version of this table provides additional precision which may be accessed by selecting individual cells

Table A.1.A. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Total (All Sectors) by Census Division and State, September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**5**	**6**	**0**	**0**	**2**
Connecticut	0	0	0	12	16	0	0	1
Maine	0	0	0	48	8	0	0	8
Massachusetts	0	0	0	6	6	0	1	3
New Hampshire	0	0	0	0	26	0	0	3
Rhode Island	0	0	0	20	13	0	0	7
Vermont	0	0	0	16	21	0	0	22
Middle Atlantic	**0**	**0**	**0**	**5**	**4**	**0**	**1**	**0**
New Jersey	0	0	0	6	4	0	0	1
New York	0	0	0	8	5	0	2	1
Pennsylvania	0	0	0	17	7	0	0	1
East North Central	**0**	**0**	**0**	**7**	**3**	**0**	**2**	**1**
Illinois	0	0	0	20	4	0	0	1
Indiana	0	0	0	11	6	0	0	1
Michigan	0	0	0	14	6	0	15	1
Ohio	0	0	0	17	5	0	0	1
Wisconsin	0	0	0	27	9	0	22	1
West North Central	**0**	**0**	**0**	**5**	**2**	**0**	**7**	**1**
Iowa	0	0	0	50	3	0	0	2
Kansas	0	0	0	17	2	0	0	1
Minnesota	0	0	0	5	5	0	6	3
Missouri	0	0	0	19	5	0	0	1
Nebraska	0	0	0	32	4	0	0	3
North Dakota	0	0	0	0	4	0	31	2
South Dakota	0	0	0	160	6	0	0	5
South Atlantic	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**
Delaware	0	0	0	28	18	0	0	4
District of Columbia	0	0	0	65	15	0	0	19
Florida	0	0	0	1	2	0	0	0
Georgia	0	0	0	2	3	0	4	1
Maryland	0	0	0	8	10	0	0	1
North Carolina	0	0	0	2	2	0	0	1
South Carolina	0	0	0	3	4	0	0	1
Virginia	0	0	0	5	6	0	0	1
West Virginia	0	0	0	0	14	0	0	2
East South Central	**0**	**0**	**0**	**4**	**3**	**0**	**11**	**1**
Alabama	0	0	0	9	5	0	0	1
Kentucky	0	0	0	25	17	0	0	1
Mississippi	0	0	0	3	4	0	0	1
Tennessee	0	0	0	10	8	0	78	1
West South Central	**0**	**0**	**0**	**1**	**1**	**0**	**3**	**1**
Arkansas	0	0	0	3	6	0	0	2
Louisiana	0	0	0	6	6	0	0	1
Oklahoma	0	0	0	26	2	0	0	2
Texas	0	0	0	1	1	0	5	1
Mountain	**0**	**4**	**0**	**1**	**2**	**0**	**3**	**1**
Arizona	0	0	0	2	3	0	0	0
Colorado	0	0	0	5	2	0	0	1
Idaho	0	20	0	8	9	0	0	6
Montana	0	0	0	39	11	0	0	4
Nevada	0	4	0	2	2	0	0	1
New Mexico	0	0	0	5	3	0	0	1
Utah	0	11	0	4	4	0	33	1
Wyoming	0	0	0	0	9	0	0	3
Pacific Contiguous	**0**	**2**	**0**	**1**	**2**	**0**	**2**	**1**
California	0	2	0	1	1	0	2	1
Oregon	0	15	0	6	6	0	0	2
Washington	0	0	0	34	7	0	0	1
Pacific Noncontiguous	**0**	**57**	**0**	**6**	**11**	**0**	**0**	**5**
Alaska	0	0	0	0	42	0	0	15
Hawaii	0	57	0	6	11	0	0	2
U.S Total	**0**	**2**	**0**	**1**	**1**	**0**	**0**	**0**

Displayed values of zero may represent small values that round to zero. The Excel version of this table provides additional precision which may be accessed by selecting individual cells

Table A.1 B. Relative Standard Error (Percent) for Net Generation by Fuel Type.

Total (All Sectors) by Census Division and State, Year-to-Date through September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**25**	**16**	**0**	**2**	**0**	**0**	**18**
Connecticut	0	35	0	1	0	0	58
Maine	25	16	0	15	0	0	21
Massachusetts	0	32	0	4	0	0	38
New Hampshire	0	31	0	0	0	0	36
Rhode Island	0	104	0	7	0	0	0
Vermont	0	148	0	0	0	0	33
Middle Atlantic	**5**	**18**	**0**	**1**	**29**	**0**	**4**
New Jersey	0	57	0	2	0	0	0
New York	0	19	0	1	0	0	3
Pennsylvania	5	26	0	0	45	0	22
East North Central	**1**	**7**	**20**	**1**	**9**	**0**	**10**
Illinois	4	14	0	7	0	0	73
Indiana	0	4	0	2	18	0	66
Michigan	2	6	0	2	0	0	16
Ohio	1	10	34	2	24	0	56
Wisconsin	0	62	0	3	0	0	12
West North Central	**1**	**13**	**0**	**6**	**0**	**0**	**7**
Iowa	0	26	0	5	0	0	23
Kansas	0	16	0	30	0	0	0
Minnesota	3	42	0	12	0	0	20
Missouri	0	12	0	7	0	0	26
Nebraska	5	122	0	35	0	0	18
North Dakota	0	9	0	36	0	0	12
South Dakota	0	216	0	42	0	0	7
South Atlantic	**1**	**3**	**10**	**1**	**0**	**0**	**12**
Delaware	0	50	0	4	0	0	0
District of Columbia	0	0	0	27	0	0	0
Florida	0	6	0	1	0	0	83
Georgia	0	28	98	3	0	0	17
Maryland	0	6	0	1	0	0	0
North Carolina	0	14	0	2	0	0	15
South Carolina	0	12	0	2	0	0	24
Virginia	0	4	0	2	0	0	28
West Virginia	2	0	0	12	0	0	29
East South Central	**0**	**4**	**0**	**1**	**0**	**0**	**8**
Alabama	0	64	0	2	0	0	11
Kentucky	0	0	0	5	0	0	12
Mississippi	0	8	0	1	0	0	0
Tennessee	0	1	0	3	0	0	13
West South Central	**0**	**8**	**0**	**1**	**3**	**0**	**12**
Arkansas	0	10	0	8	0	0	18
Louisiana	0	52	0	2	7	0	33
Oklahoma	0	3	0	2	0	0	20
Texas	0	9	0	1	3	0	27
Mountain	**1**	**13**	**0**	**1**	**5**	**0**	**4**
Arizona	0	2	0	1	0	0	3
Colorado	0	69	0	2	0	0	16
Idaho	115	0	0	16	0	0	7
Montana	7	17	0	40	0	0	7
Nevada	0	0	0	1	0	0	2
New Mexico	0	38	0	4	0	0	50
Utah	0	2	0	2	0	0	22
Wyoming	3	1	0	8	5	0	20
Pacific Contiguous	**0**	**11**	**0**	**1**	**1**	**0**	**2**
California	0	9	0	1	1	0	7
Oregon	0	74	0	4	0	0	3
Washington	0	27	0	6	0	0	1
Pacific Noncontiguous	**12**	**1**	**0**	**34**	**0**	**0**	**15**
Alaska	28	3	0	34	0	0	16
Hawaii	0	1	0	0	0	0	49
U.S. Total	**0**	**1**	**8**	**0**	**4**	**0**	**3**

Displayed values of zero may represent small values that round to zero The Excel version of this table provides additional precision which may be accessed by selecting individual cells

Table A 1.B. Relative Standard Error (Percent) for Net Generation by Fuel Type

Total (All Sectors) by Census Division and State, Year-to-Date through September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	0	0	0	5	6	0	0	2
Connecticut	0	0	0	12	16	0	0	1
Maine	0	0	0	48	8	0	0	8
Massachusetts	0	0	0	6	6	0	1	3
New Hampshire	0	0	0	0	26	0	0	3
Rhode Island	0	0	0	20	13	0	0	7
Vermont	0	0	0	16	21	0	0	22
Middle Atlantic	0	0	0	5	4	0	1	0
New Jersey	0	0	0	6	4	0	0	1
New York	0	0	0	8	5	0	2	1
Pennsylvania	0	0	0	17	7	0	0	1
East North Central	0	0	0	7	3	0	2	1
Illinois	0	0	0	20	4	0	0	1
Indiana	0	0	0	11	6	0	0	1
Michigan	0	0	0	14	6	0	15	1
Ohio	0	0	0	17	5	0	0	1
Wisconsin	0	0	0	27	9	0	22	1
West North Central	0	0	0	5	2	0	7	1
Iowa	0	0	0	50	3	0	0	2
Kansas	0	0	0	17	2	0	0	1
Minnesota	0	0	0	5	5	0	6	3
Missouri	0	0	0	19	5	0	0	1
Nebraska	0	0	0	32	4	0	0	3
North Dakota	0	0	0	0	4	0	31	2
South Dakota	0	0	0	160	6	0	0	5
South Atlantic	0	0	0	1	1	0	0	0
Delaware	0	0	0	28	18	0	0	4
District of Columbia	0	0	0	65	15	0	0	19
Florida	0	0	0	1	2	0	0	0
Georgia	0	0	0	2	3	0	4	1
Maryland	0	0	0	8	10	0	0	1
North Carolina	0	0	0	2	2	0	0	1
South Carolina	0	0	0	3	4	0	0	1
Virginia	0	0	0	5	6	0	0	1
West Virginia	0	0	0	0	14	0	0	2
East South Central	0	0	0	4	3	0	11	1
Alabama	0	0	0	9	5	0	0	1
Kentucky	0	0	0	25	17	0	0	1
Mississippi	0	0	0	3	4	0	0	1
Tennessee	0	0	0	10	8	0	78	1
West South Central	0	0	0	1	1	0	3	1
Arkansas	0	0	0	3	6	0	0	2
Louisiana	0	0	0	6	6	0	0	1
Oklahoma	0	0	0	26	2	0	0	2
Texas	0	0	0	1	1	0	5	1
Mountain	0	4	0	1	2	0	3	1
Arizona	0	0	0	2	3	0	0	0
Colorado	0	0	0	5	2	0	0	1
Idaho	0	20	0	8	9	0	0	6
Montana	0	0	0	39	11	0	0	4
Nevada	0	4	0	2	2	0	0	1
New Mexico	0	0	0	5	3	0	0	1
Utah	0	11	0	4	4	0	33	1
Wyoming	0	0	0	0	9	0	0	3
Pacific Contiguous	0	2	0	1	2	0	2	1
California	0	2	0	1	1	0	2	1
Oregon	0	15	0	6	6	0	0	2
Washington	0	0	0	34	7	0	0	1
Pacific Noncontiguous	0	57	0	6	11	0	0	5
Alaska	0	0	0	0	42	0	0	15
Hawaii	0	57	0	6	11	0	0	2
U S Total	0	2	0	1	1	0	0	0

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Table A.1.C. Relative Standard Error (Percent) for Small Scale Solar Generation and Capacity by Sector, Census Division and State, September 2020

Census Region and State	Residential	Commercial	Industrial	Transportation	Total
New England	**0**	**0**	**1**		**0**
Connecticut	0	0	0		0
Maine	1	2	0		1
Massachusetts	0	0	1		0
New Hampshire	0	1	0		0
Rhode Island	0	0	0		0
Vermont	2	8	28		3
Middle Atlantic	**0**	**0**	**1**		**0**
New Jersey	0	0	1		0
New York	0	0	1		0
Pennsylvania	0	1	0		0
East North Central	**2**	**2**	**1**	.	**1**
Illinois	2	3	0		2
Indiana	4	2	6		2
Michigan	3	11	5		4
Ohio	4	4	0		2
Wisconsin	8	12	1		6
West North Central	**1**	**1**	**2**	.	**1**
Iowa	2	1	11		1
Kansas	4	3	0		3
Minnesota	2	3	2		2
Missouri	1	1	3		1
Nebraska	6	13	15		5
North Dakota	0	0	0		0
South Dakota	0	0	0		0
South Atlantic	**1**	**1**	**2**		**1**
Delaware	4	3	24		3
District of Columbia	0	0	0		0
Florida	2	3	2		2
Georgia	102	26	0		60
Maryland	1	1	2		1
North Carolina	4	2	0		3
South Carolina	3	4	0		3
Virginia	5	3	2		4
West Virginia	5	0	0		3
East South Central	**5**	**3**	**0**	.	**3**
Alabama	0	0	0		0
Kentucky	5	4	0		4
Mississippi	12	7	0		7
Tennessee	0	0	0		0
West South Central	**2**	**5**	**11**		**2**
Arkansas	9	12	12		6
Louisiana	2	5	36		2
Oklahoma	11	12	0		9
Texas	3	6	57		3
Mountain	**0**	**0**	**1**		**0**
Arizona	0	0	0		0
Colorado	1	1	13		1
Idaho	1	3	0		1
Montana	3	2	0		2
Nevada	0	0	0		0
New Mexico	1	1	25		1
Utah	0	1	0		0
Wyoming	4	11	28		4
Pacific Contiguous	**0**	**0**	**0**		**0**
California	0	0	0		0
Oregon	1	1	3		0
Washington	1	2	14		1
Pacific Noncontiguous	**0**	**0**	**0**	.	**0**
Alaska	1	2	0		1
Hawaii	0	0	0		0
U.S. Total	**0**	**0**	**0**	.	**0**

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Table A.2.A. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Electric Utilities by Census Division and State, September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**0**	**27**	**0**	**71**	**0**	**0**	**38**
Connecticut	0	33	0	0	0	0	512
Maine	0	0	0	0	0	0	563
Massachusetts	0	49	0	132	0	0	84
New Hampshire	0	44	0	0	0	0	63
Rhode Island	0	0	0	0	0	0	0
Vermont	0	149	0	0	0	0	55
Middle Atlantic	**0**	**19**	**0**	**4**	**0**	**0**	**1**
New Jersey	0	0	0	115	0	0	0
New York	0	19	0	4	0	0	1
Pennsylvania	0	0	0	0	0	0	0
East North Central	**1**	**10**	**0**	**3**	**0**	**0**	**11**
Illinois	0	49	0	10	0	0	64
Indiana	1	5	0	5	0	0	66
Michigan	2	6	0	9	0	0	17
Ohio	5	40	0	4	0	0	69
Wisconsin	0	67	0	4	0	0	13
West North Central	**1**	**13**	**0**	**7**	**0**	**0**	**7**
Iowa	0	26	0	5	0	0	23
Kansas	0	16	0	34	0	0	0
Minnesota	3	45	0	13	0	0	24
Missouri	0	12	0	10	0	0	26
Nebraska	5	122	0	35	0	0	18
North Dakota	0	9	0	37	0	0	12
South Dakota	0	217	0	42	0	0	7
South Atlantic	**0**	**4**	**0**	**1**	**0**	**0**	**12**
Delaware	0	0	0	0	0	0	0
Florida	0	5	0	1	0	0	83
Georgia	0	34	0	3	0	0	17
Maryland	0	7	0	0	0	0	0
North Carolina	0	13	0	2	0	0	15
South Carolina	0	15	0	2	0	0	24
Virginia	0	6	0	3	0	0	27
West Virginia	0	0	0	0	0	0	45
East South Central	**0**	**1**	**0**	**1**	**0**	**0**	**8**
Alabama	0	56	0	5	0	0	11
Kentucky	0	0	0	5	0	0	12
Mississippi	0	11	0	1	0	0	0
Tennessee	0	1	0	3	0	0	13
West South Central	**0**	**7**	**0**	**2**	**0**	**0**	**13**
Arkansas	0	6	0	9	0	0	18
Louisiana	0	52	0	2	0	0	0
Oklahoma	0	3	0	4	0	0	20
Texas	0	5	0	4	0	0	28
Mountain	**1**	**13**	**0**	**1**	**0**	**0**	**4**
Arizona	0	2	0	1	0	0	3
Colorado	0	70	0	2	0	0	17
Idaho	0	0	0	13	0	0	7
Montana	0	987	0	49	0	0	7
Nevada	0	0	0	1	0	0	0
New Mexico	0	38	0	5	0	0	50
Utah	0	2	0	2	0	0	22
Wyoming	3	1	0	15	0	0	20
Pacific Contiguous	**0**	**12**	**0**	**2**	**0**	**0**	**2**
California	0	13	0	1	0	0	6
Oregon	0	74	0	8	0	0	3
Washington	0	26	0	8	0	0	1
Pacific Noncontiguous	**43**	**1**	**0**	**35**	**0**	**0**	**17**
Alaska	43	3	0	35	0	0	17
Hawaii	0	1	0	0	0	0	0
U.S. Total	**0**	**1**	**0**	**1**	**0**	**0**	**2**

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Table A.2.A. Relative Standard Error (Percent) for Net Generation by Fuel Type

Electric Utilities by Census Division and State, September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**18**	**22**	**0**	**0**	**24**
Connecticut	0	0	0	0	0	0	0	30
Maine	0	0	0	0	0	0	0	563
Massachusetts	0	0	0	23	32	0	0	42
New Hampshire	0	0	0	0	0	0	0	59
Rhode Island	0	0	0	0	0	0	0	0
Vermont	0	0	0	29	29	0	0	34
Middle Atlantic	**0**	**0**	**0**	**23**	**23**	**0**	**0**	**1**
New Jersey	0	0	0	23	23	0	0	43
New York	0	0	0	0	0	0	0	1
Pennsylvania	0	0	0	0	0	0	0	0
East North Central	**0**	**0**	**0**	**11**	**8**	**0**	**24**	**1**
Illinois	0	0	0	43	16	0	0	5
Indiana	0	0	0	16	8	0	0	1
Michigan	0	0	0	14	10	0	0	1
Ohio	0	0	0	76	114	0	0	3
Wisconsin	0	0	0	84	17	0	26	1
West North Central	**0**	**0**	**0**	**35**	**3**	**0**	**8**	**1**
Iowa	0	0	0	70	3	0	0	2
Kansas	0	0	0	160	8	0	0	2
Minnesota	0	0	0	120	11	0	0	3
Missouri	0	0	0	47	26	0	0	1
Nebraska	0	0	0	91	30	0	0	4
North Dakota	0	0	0	0	8	0	31	2
South Dakota	0	0	0	0	25	0	0	7
South Atlantic	**0**	**0**	**0**	**1**	**3**	**0**	**0**	**0**
Delaware	0	0	0	83	83	0	0	12
Florida	0	0	0	0	0	0	0	0
Georgia	0	0	0	7	7	0	0	1
Maryland	0	0	0	72	72	0	0	1
North Carolina	0	0	0	7	7	0	0	1
South Carolina	0	0	0	85	19	0	0	1
Virginia	0	0	0	6	19	0	0	2
West Virginia	0	0	0	0	0	0	0	1
East South Central	**0**	**0**	**0**	**22**	**14**	**0**	**0**	**1**
Alabama	0	0	0	42	42	0	0	1
Kentucky	0	0	0	25	14	0	0	1
Mississippi	0	0	0	0	0	0	0	1
Tennessee	0	0	0	182	182	0	0	1
West South Central	**0**	**0**	**0**	**23**	**9**	**0**	**0**	**1**
Arkansas	0	0	0	169	169	0	0	3
Louisiana	0	0	0	166	166	0	0	1
Oklahoma	0	0	0	26	9	0	0	3
Texas	0	0	0	59	34	0	0	2
Mountain	**0**	**18**	**0**	**6**	**4**	**0**	**21**	**1**
Arizona	0	0	0	7	7	0	0	0
Colorado	0	0	0	83	2	0	0	1
Idaho	0	0	0	0	47	0	0	6
Montana	0	0	0	0	42	0	0	6
Nevada	0	0	0	6	6	0	0	1
New Mexico	0	0	0	12	12	0	0	2
Utah	0	18	0	0	18	0	33	1
Wyoming	0	0	0	0	15	0	0	3
Pacific Contiguous	**0**	**0**	**0**	**10**	**6**	**0**	**0**	**1**
California	0	0	0	10	4	0	0	2
Oregon	0	0	0	89	11	0	0	3
Washington	0	0	0	0	10	0	0	1
Pacific Noncontiguous	**0**	**0**	**0**	**20**	**28**	**0**	**0**	**8**
Alaska	0	0	0	0	68	0	0	16
Hawaii	0	0	0	20	14	0	0	1
U.S. Total	**0**	**3**	**0**	**1**	**2**	**0**	**5**	**0**

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Table A.2.B. Relative Standard Error (Percent) for Net Generation by Fuel Type.

Electric Utilities by Census Division and State, Year-to-Date through September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**0**	**27**	**0**	**71**	**0**	**0**	**38**
Connecticut	0	33	0	0	0	0	512
Maine	0	0	0	0	0	0	563
Massachusetts	0	49	0	132	0	0	84
New Hampshire	0	44	0	0	0	0	63
Rhode Island	0	0	0	0	0	0	0
Vermont	0	149	0	0	0	0	55
Middle Atlantic	**0**	**19**	**0**	**4**	**0**	**0**	**1**
New Jersey	0	0	0	115	0	0	0
New York	0	19	0	4	0	0	1
Pennsylvania	0	0	0	0	0	0	0
East North Central	**1**	**10**	**0**	**3**	**0**	**0**	**11**
Illinois	0	49	0	10	0	0	64
Indiana	1	5	0	5	0	0	66
Michigan	2	6	0	9	0	0	17
Ohio	5	40	0	4	0	0	69
Wisconsin	0	67	0	4	0	0	13
West North Central	**1**	**13**	**0**	**7**	**0**	**0**	**7**
Iowa	0	26	0	5	0	0	23
Kansas	0	16	0	34	0	0	0
Minnesota	3	45	0	13	0	0	24
Missouri	0	12	0	10	0	0	26
Nebraska	5	122	0	35	0	0	18
North Dakota	0	9	0	37	0	0	12
South Dakota	0	217	0	42	0	0	7
South Atlantic	**0**	**4**	**0**	**1**	**0**	**0**	**12**
Delaware	0	0	0	0	0	0	0
Florida	0	5	0	1	0	0	83
Georgia	0	34	0	3	0	0	17
Maryland	0	7	0	0	0	0	0
North Carolina	0	13	0	2	0	0	15
South Carolina	0	15	0	2	0	0	24
Virginia	0	6	0	3	0	0	27
West Virginia	0	0	0	0	0	0	45
East South Central	**0**	**1**	**0**	**1**	**0**	**0**	**8**
Alabama	0	56	0	5	0	0	11
Kentucky	0	0	0	5	0	0	12
Mississippi	0	11	0	1	0	0	0
Tennessee	0	1	0	3	0	0	13
West South Central	**0**	**7**	**0**	**2**	**0**	**0**	**13**
Arkansas	0	6	0	9	0	0	18
Louisiana	0	52	0	2	0	0	0
Oklahoma	0	3	0	4	0	0	20
Texas	0	5	0	4	0	0	28
Mountain	**1**	**13**	**0**	**1**	**0**	**0**	**4**
Arizona	0	2	0	1	0	0	3
Colorado	0	70	0	2	0	0	17
Idaho	0	0	0	13	0	0	7
Montana	0	987	0	49	0	0	7
Nevada	0	0	0	1	0	0	0
New Mexico	0	38	0	5	0	0	50
Utah	0	2	0	2	0	0	22
Wyoming	3	1	0	15	0	0	20
Pacific Contiguous	**0**	**12**	**0**	**2**	**0**	**0**	**2**
California	0	13	0	1	0	0	6
Oregon	0	74	0	8	0	0	3
Washington	0	26	0	8	0	0	1
Pacific Noncontiguous	**43**	**1**	**0**	**35**	**0**	**0**	**17**
Alaska	43	3	0	35	0	0	17
Hawaii	0	1	0	0	0	0	0
U.S. Total	**0**	**1**	**0**	**1**	**0**	**0**	**2**

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Table A 2.B. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Electric Utilities by Census Division and State, Year-to-Date through September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	0	0	0	18	22	0	0	24
Connecticut	0	0	0	0	0	0	0	30
Maine	0	0	0	0	0	0	0	563
Massachusetts	0	0	0	23	32	0	0	42
New Hampshire	0	0	0	0	0	0	0	59
Rhode Island	0	0	0	0	0	0	0	0
Vermont	0	0	0	29	29	0	0	34
Middle Atlantic	0	0	0	23	23	0	0	1
New Jersey	0	0	0	23	23	0	0	43
New York	0	0	0	0	0	0	0	1
Pennsylvania	0	0	0	0	0	0	0	0
East North Central	0	0	0	11	8	0	24	1
Illinois	0	0	0	43	16	0	0	5
Indiana	0	0	0	16	8	0	0	1
Michigan	0	0	0	14	10	0	0	1
Ohio	0	0	0	76	114	0	0	3
Wisconsin	0	0	0	84	17	0	26	1
West North Central	0	0	0	35	3	0	8	1
Iowa	0	0	0	70	3	0	0	2
Kansas	0	0	0	160	8	0	0	2
Minnesota	0	0	0	120	11	0	0	3
Missouri	0	0	0	47	26	0	0	1
Nebraska	0	0	0	91	30	0	0	4
North Dakota	0	0	0	0	8	0	31	2
South Dakota	0	0	0	0	25	0	0	7
South Atlantic	0	0	0	1	3	0	0	0
Delaware	0	0	0	83	83	0	0	12
Florida	0	0	0	0	0	0	0	0
Georgia	0	0	0	7	7	0	0	1
Maryland	0	0	0	72	72	0	0	1
North Carolina	0	0	0	7	7	0	0	1
South Carolina	0	0	0	85	19	0	0	1
Virginia	0	0	0	6	19	0	0	2
West Virginia	0	0	0	0	0	0	0	1
East South Central	0	0	0	22	14	0	0	1
Alabama	0	0	0	42	42	0	0	1
Kentucky	0	0	0	25	14	0	0	1
Mississippi	0	0	0	0	0	0	0	1
Tennessee	0	0	0	182	182	0	0	1
West South Central	0	0	0	23	9	0	0	1
Arkansas	0	0	0	169	169	0	0	3
Louisiana	0	0	0	166	166	0	0	1
Oklahoma	0	0	0	26	9	0	0	3
Texas	0	0	0	59	34	0	0	2
Mountain	0	18	0	6	4	0	21	1
Arizona	0	0	0	7	7	0	0	0
Colorado	0	0	0	83	2	0	0	1
Idaho	0	0	0	0	47	0	0	6
Montana	0	0	0	0	42	0	0	6
Nevada	0	0	0	6	6	0	0	1
New Mexico	0	0	0	12	12	0	0	2
Utah	0	18	0	0	18	0	33	1
Wyoming	0	0	0	0	15	0	0	3
Pacific Contiguous	0	0	0	10	6	0	0	1
California	0	0	0	10	4	0	0	2
Oregon	0	0	0	89	11	0	0	3
Washington	0	0	0	0	10	0	0	1
Pacific Noncontiguous	0	0	0	20	28	0	0	8
Alaska	0	0	0	0	68	0	0	16
Hawaii	0	0	0	20	14	0	0	1
U.S. Total	0	3	0	1	2	0	5	0

Displayed values of zero may represent small values that round to zero The Excel version of this table provides additional precision which may be accessed by selecting individual cells

Table A.3.A. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Independent Power Producers by Census Division and State, September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**0**	**25**	**0**	**2**	**0**	**0**	**18**
Connecticut	0	47	0	1	0	0	58
Maine	0	14	0	19	0	0	22
Massachusetts	0	61	0	4	0	0	43
New Hampshire	0	575	0	0	0	0	39
Rhode Island	0	105	0	7	0	0	0
Vermont	0	0	0	0	0	0	40
Middle Atlantic	**5**	**31**	**0**	**1**	**0**	**0**	**17**
New Jersey	0	58	0	2	0	0	0
New York	0	42	0	2	0	0	17
Pennsylvania	5	36	0	0	0	0	22
East North Central	**2**	**8**	**34**	**2**	**8**	**0**	**39**
Illinois	5	12	0	8	0	0	124
Indiana	0	0	0	1	0	0	0
Michigan	0	0	0	1	0	0	55
Ohio	0	11	34	2	32	0	92
Wisconsin	0	0	0	0	0	0	53
West North Central	**0**	**102**	**0**	**14**	**0**	**0**	**38**
Iowa	0	63	0	0	0	0	0
Kansas	0	0	0	0	0	0	0
Minnesota	0	251	0	25	0	0	45
Missouri	0	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0	0
South Atlantic	**7**	**6**	**0**	**2**	**0**	**0**	**27**
Delaware	0	53	0	5	0	0	0
Florida	0	45	0	7	0	0	0
Georgia	0	178	0	10	0	0	315
Maryland	0	7	0	1	0	0	0
North Carolina	0	88	0	7	0	0	92
South Carolina	0	0	0	21	0	0	143
Virginia	0	6	0	2	0	0	78
West Virginia	9	0	0	20	0	0	56
East South Central	**0**	**87**	**0**	**0**	**0**	**0**	**398**
Alabama	0	119	0	0	0	0	0
Kentucky	0	0	0	0	0	0	398
Mississippi	0	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0	0
West South Central	**0**	**53**	**0**	**1**	**0**	**0**	**31**
Arkansas	0	0	0	0	0	0	58
Louisiana	0	0	0	10	0	0	33
Oklahoma	0	0	0	0	0	0	0
Texas	0	59	0	1	0	0	0
Mountain	**6**	**6**	**0**	**3**	**0**	**0**	**17**
Arizona	0	0	0	0	0	0	0
Colorado	0	0	0	8	0	0	42
Idaho	0	0	0	41	0	0	23
Montana	7	9	0	31	0	0	52
Nevada	0	0	0	0	0	0	45
New Mexico	0	0	0	4	0	0	0
Utah	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0
Pacific Contiguous	**0**	**21**	**0**	**1**	**0**	**0**	**28**
California	0	0	0	1	0	0	38
Oregon	0	0	0	1	0	0	40
Washington	0	78	0	10	0	0	34
Pacific Noncontiguous	**6**	**0**	**0**	**0**	**0**	**0**	**0**
Alaska	38	70	0	0	0	0	0
Hawaii	0	0	0	0	0	0	0
U.S Total	**1**	**2**	**24**	**0**	**5**	**0**	**12**

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Table A.3.A. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Independent Power Producers by Census Division and State, September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**5**	**7**	**0**	**1**	**2**
Connecticut	0	0	0	13	16	0	0	1
Maine	0	0	0	48	11	0	0	10
Massachusetts	0	0	0	6	6	0	1	3
New Hampshire	0	0	0	0	27	0	0	3
Rhode Island	0	0	0	20	14	0	0	7
Vermont	0	0	0	19	29	0	0	27
Middle Atlantic	**0**	**0**	**0**	**5**	**4**	**0**	**0**	**1**
New Jersey	0	0	0	6	5	0	0	1
New York	0	0	0	8	5	0	0	1
Pennsylvania	0	0	0	17	7	0	0	1
East North Central	**0**	**0**	**0**	**9**	**3**	**0**	**16**	**1**
Illinois	0	0	0	21	4	0	0	1
Indiana	0	0	0	15	7	0	0	2
Michigan	0	0	0	27	8	0	24	2
Ohio	0	0	0	18	5	0	0	1
Wisconsin	0	0	0	30	9	0	0	1
West North Central	**0**	**0**	**0**	**5**	**2**	**0**	**0**	**2**
Iowa	0	0	0	68	6	0	0	6
Kansas	0	0	0	17	2	0	0	2
Minnesota	0	0	0	5	5	0	0	6
Missouri	0	0	0	20	6	0	0	4
Nebraska	0	0	0	34	4	0	0	4
North Dakota	0	0	0	0	5	0	0	5
South Dakota	0	0	0	160	6	0	0	6
South Atlantic	**0**	**0**	**0**	**1**	**2**	**0**	**0**	**1**
Delaware	0	0	0	30	19	0	0	4
District of Columbia	0	0	0	65	65	0	0	65
Florida	0	0	0	4	3	0	0	4
Georgia	0	0	0	2	2	0	0	7
Maryland	0	0	0	8	10	0	0	1
North Carolina	0	0	0	2	2	0	0	3
South Carolina	0	0	0	3	7	0	0	7
Virginia	0	0	0	7	7	0	0	2
West Virginia	0	0	0	0	14	0	0	8
East South Central	**0**	**0**	**0**	**4**	**5**	**0**	**0**	**0**
Alabama	0	0	0	9	9	0	0	0
Kentucky	0	0	0	164	40	0	0	19
Mississippi	0	0	0	3	3	0	0	0
Tennessee	0	0	0	10	12	0	0	12
West South Central	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**1**
Arkansas	0	0	0	3	5	0	0	1
Louisiana	0	0	0	0	11	0	0	11
Oklahoma	0	0	0	0	2	0	0	1
Texas	0	0	0	1	1	0	0	1
Mountain	**0**	**5**	**0**	**1**	**2**	**0**	**0**	**1**
Arizona	0	0	0	2	3	0	0	1
Colorado	0	0	0	5	3	0	0	3
Idaho	0	20	0	8	10	0	0	14
Montana	0	0	0	39	11	0	0	6
Nevada	0	5	0	2	2	0	0	2
New Mexico	0	0	0	5	3	0	0	2
Utah	0	13	0	4	4	0	0	4
Wyoming	0	0	0	0	13	0	0	10
Pacific Contiguous	**0**	**2**	**0**	**1**	**2**	**0**	**0**	**1**
California	0	2	0	1	1	0	0	1
Oregon	0	15	0	6	7	0	0	3
Washington	0	0	0	34	11	0	0	4
Pacific Noncontiguous	**0**	**57**	**0**	**6**	**14**	**0**	**0**	**5**
Alaska	0	0	0	0	89	0	0	35
Hawaii	0	57	0	6	14	0	0	4
U.S. Total	**0**	**3**	**0**	**1**	**1**	**0**	**0**	**0**

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Table A.3.B. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Independent Power Producers by Census Division and State, Year-to-Date through September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**0**	**25**	**0**	**2**	**0**	**0**	**18**
Connecticut	0	47	0	1	0	0	58
Maine	0	14	0	19	0	0	22
Massachusetts	0	61	0	4	0	0	43
New Hampshire	0	575	0	0	0	0	39
Rhode Island	0	105	0	7	0	0	0
Vermont	0	0	0	0	0	0	40
Middle Atlantic	**5**	**31**	**0**	**1**	**0**	**0**	**17**
New Jersey	0	58	0	2	0	0	0
New York	0	42	0	2	0	0	17
Pennsylvania	5	36	0	0	0	0	22
East North Central	**2**	**8**	**34**	**2**	**8**	**0**	**39**
Illinois	5	12	0	8	0	0	124
Indiana	0	0	0	1	0	0	0
Michigan	0	0	0	1	0	0	55
Ohio	0	11	34	2	32	0	92
Wisconsin	0	0	0	0	0	0	53
West North Central	**0**	**102**	**0**	**14**	**0**	**0**	**38**
Iowa	0	63	0	0	0	0	0
Kansas	0	0	0	0	0	0	0
Minnesota	0	251	0	25	0	0	45
Missouri	0	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0	0
South Atlantic	**7**	**6**	**0**	**2**	**0**	**0**	**27**
Delaware	0	53	0	5	0	0	0
Florida	0	45	0	7	0	0	0
Georgia	0	178	0	10	0	0	315
Maryland	0	7	0	1	0	0	0
North Carolina	0	88	0	7	0	0	92
South Carolina	0	0	0	21	0	0	143
Virginia	0	6	0	2	0	0	78
West Virginia	9	0	0	20	0	0	56
East South Central	**0**	**87**	**0**	**0**	**0**	**0**	**398**
Alabama	0	119	0	0	0	0	0
Kentucky	0	0	0	0	0	0	398
Mississippi	0	0	0	0	0	0	0
Tennessee	0	0	0	0	0	0	0
West South Central	**0**	**53**	**0**	**1**	**0**	**0**	**31**
Arkansas	0	0	0	0	0	0	58
Louisiana	0	0	0	10	0	0	33
Oklahoma	0	0	0	0	0	0	0
Texas	0	59	0	1	0	0	0
Mountain	**6**	**6**	**0**	**3**	**0**	**0**	**17**
Arizona	0	0	0	0	0	0	0
Colorado	0	0	0	8	0	0	42
Idaho	0	0	0	41	0	0	23
Montana	7	9	0	31	0	0	52
Nevada	0	0	0	0	0	0	45
New Mexico	0	0	0	4	0	0	0
Utah	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0
Pacific Contiguous	**0**	**21**	**0**	**1**	**0**	**0**	**28**
California	0	0	0	1	0	0	38
Oregon	0	0	0	1	0	0	40
Washington	0	78	0	10	0	0	34
Pacific Noncontiguous	**6**	**0**	**0**	**0**	**0**	**0**	**0**
Alaska	38	70	0	0	0	0	0
Hawaii	0	0	0	0	0	0	0
U.S. Total	**1**	**2**	**24**	**0**	**5**	**0**	**12**

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Table A.3 B. Relative Standard Error (Percent) for Net Generation by Fuel Type:

Independent Power Producers by Census Division and State, Year-to-Date through September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**5**	**7**	**0**	**1**	**2**
Connecticut	0	0	0	13	16	0	0	1
Maine	0	0	0	48	11	0	0	10
Massachusetts	0	0	0	6	6	0	1	3
New Hampshire	0	0	0	0	27	0	0	3
Rhode Island	0	0	0	20	14	0	0	7
Vermont	0	0	0	19	29	0	0	27
Middle Atlantic	**0**	**0**	**0**	**5**	**4**	**0**	**0**	**1**
New Jersey	0	0	0	6	5	0	0	1
New York	0	0	0	8	5	0	0	1
Pennsylvania	0	0	0	17	7	0	0	1
East North Central	**0**	**0**	**0**	**9**	**3**	**0**	**16**	**1**
Illinois	0	0	0	21	4	0	0	1
Indiana	0	0	0	15	7	0	0	2
Michigan	0	0	0	27	8	0	24	2
Ohio	0	0	0	18	5	0	0	1
Wisconsin	0	0	0	30	9	0	0	1
West North Central	**0**	**0**	**0**	**5**	**2**	**0**	**0**	**2**
Iowa	0	0	0	68	6	0	0	6
Kansas	0	0	0	17	2	0	0	2
Minnesota	0	0	0	5	5	0	0	6
Missouri	0	0	0	20	6	0	0	4
Nebraska	0	0	0	34	4	0	0	4
North Dakota	0	0	0	0	5	0	0	5
South Dakota	0	0	0	160	6	0	0	6
South Atlantic	**0**	**0**	**0**	**1**	**2**	**0**	**0**	**1**
Delaware	0	0	0	30	19	0	0	4
District of Columbia	0	0	0	65	65	0	0	65
Florida	0	0	0	4	3	0	0	4
Georgia	0	0	0	2	2	0	0	7
Maryland	0	0	0	8	10	0	0	1
North Carolina	0	0	0	2	2	0	0	3
South Carolina	0	0	0	3	7	0	0	7
Virginia	0	0	0	7	7	0	0	2
West Virginia	0	0	0	0	14	0	0	8
East South Central	**0**	**0**	**0**	**4**	**5**	**0**	**0**	**0**
Alabama	0	0	0	9	9	0	0	0
Kentucky	0	0	0	164	40	0	0	19
Mississippi	0	0	0	3	3	0	0	0
Tennessee	0	0	0	10	12	0	0	12
West South Central	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**1**
Arkansas	0	0	0	3	5	0	0	1
Louisiana	0	0	0	0	11	0	0	11
Oklahoma	0	0	0	0	2	0	0	1
Texas	0	0	0	1	1	0	0	1
Mountain	**0**	**5**	**0**	**1**	**2**	**0**	**0**	**1**
Arizona	0	0	0	2	3	0	0	1
Colorado	0	0	0	5	3	0	0	3
Idaho	0	20	0	8	10	0	0	14
Montana	0	0	0	39	11	0	0	6
Nevada	0	5	0	2	2	0	0	2
New Mexico	0	0	0	5	3	0	0	2
Utah	0	13	0	4	4	0	0	4
Wyoming	0	0	0	0	13	0	0	10
Pacific Contiguous	**0**	**2**	**0**	**1**	**2**	**0**	**0**	**1**
California	0	2	0	1	1	0	0	1
Oregon	0	15	0	6	7	0	0	3
Washington	0	0	0	34	11	0	0	4
Pacific Noncontiguous	**0**	**57**	**0**	**6**	**14**	**0**	**0**	**5**
Alaska	0	0	0	0	89	0	0	35
Hawaii	0	57	0	6	14	0	0	4
U.S. Total	**0**	**3**	**0**	**1**	**1**	**0**	**0**	**0**

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Table A.4.A. Relative Standard Error for Net Generation by Fuel Type:
Commercial Sector by Census Division and State, September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**0**	**27**	**0**	**13**	**0**	**0**	**0**
Connecticut	0	0	0	19	0	0	0
Maine	0	0	0	0	0	0	0
Massachusetts	0	54	0	20	0	0	0
New Hampshire	0	4	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0
Middle Atlantic	**0**	**42**	**0**	**13**	**0**	**0**	**0**
New Jersey	0	204	0	25	0	0	0
New York	0	94	0	17	0	0	0
Pennsylvania	0	0	0	12	0	0	0
East North Central	**0**	**61**	**0**	**6**	**0**	**0**	**0**
Illinois	0	51	0	28	0	0	0
Indiana	0	0	0	0	0	0	0
Michigan	0	246	0	5	0	0	0
Ohio	0	0	0	4	0	0	0
Wisconsin	0	221	0	7	0	0	0
West North Central	**0**	**37**	**0**	**2**	**0**	**0**	**0**
Iowa	0	0	0	7	0	0	0
Minnesota	0	50	0	0	0	0	0
Missouri	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0
North Dakota	0	0	0	0	0	0	0
South Dakota	0	1,063	0	0	0	0	0
South Atlantic	**0**	**3**	**0**	**8**	**0**	**0**	**0**
District of Columbia	0	0	0	27	0	0	0
Florida	0	0	0	0	0	0	0
Georgia	0	48	0	0	0	0	0
Maryland	0	423	0	4	0	0	0
North Carolina	0	264	0	72	0	0	0
South Carolina	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0
East South Central	**0**	**0**	**0**	**23**	**0**	**0**	**0**
Mississippi	0	0	0	0	0	0	0
Tennessee	0	0	0	23	0	0	0
West South Central	**0**	**0**	**0**	**22**	**0**	**0**	**0**
Arkansas	0	0	0	138	0	0	0
Louisiana	0	0	0	28	0	0	0
Oklahoma	0	0	0	0	0	0	0
Texas	0	0	0	27	0	0	0
Mountain	**0**	**1,667**	**0**	**7**	**0**	**0**	**0**
Arizona	0	1,667	0	2	0	0	0
Colorado	0	0	0	0	0	0	0
Idaho	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0
New Mexico	0	0	0	25	0	0	0
Utah	0	0	0	6	0	0	0
Pacific Contiguous	**0**	**67**	**0**	**3**	**0**	**0**	**594**
California	0	22	0	3	0	0	594
Oregon	0	725	0	19	0	0	0
Washington	0	0	0	0	0	0	0
Pacific Noncontiguous	**34**	**11**	**0**	**0**	**0**	**0**	**55**
Alaska	34	130	0	0	0	0	55
Hawaii	0	0	0	0	0	0	0
U.S. Total	**15**	**6**	**0**	**4**	**0**	**0**	**42**

Displayed values of zero may represent small values that round to zero. The Excel version of this table provides additional precision which may be accessed by selecting individual cells

Table A.4.A. Relative Standard Error for Net Generation by Fuel Type:

Commercial Sector by Census Division and State, September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**58**	**9**	**0**	**0**	**11**
Connecticut	0	0	0	89	89	0	0	19
Maine	0	0	0	0	0	0	0	0
Massachusetts	0	0	0	77	25	0	0	19
New Hampshire	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	0
Middle Atlantic	**0**	**0**	**0**	**16**	**5**	**0**	**4**	**7**
New Jersey	0	0	0	17	8	0	0	9
New York	0	0	0	56	7	0	8	11
Pennsylvania	0	0	0	79	8	0	0	5
East North Central	**0**	**0**	**0**	**56**	**23**	**0**	**0**	**6**
Illinois	0	0	0	121	182	0	0	26
Indiana	0	0	0	144	14	0	0	1
Michigan	0	0	0	181	9	0	0	5
Ohio	0	0	0	98	34	0	0	5
Wisconsin	0	0	0	117	40	0	0	17
West North Central	**0**	**0**	**0**	**0**	**24**	**0**	**42**	**7**
Iowa	0	0	0	0	24	0	0	5
Kansas	0	0	0	0	146	0	0	146
Minnesota	0	0	0	0	56	0	42	18
Missouri	0	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0	0
North Dakota	0	0	0	0	498	0	0	498
South Dakota	0	0	0	0	0	0	0	1,063
South Atlantic	**0**	**0**	**0**	**18**	**7**	**0**	**0**	**5**
Delaware	0	0	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0	0	20
Florida	0	0	0	68	27	0	0	18
Georgia	0	0	0	117	117	0	0	94
Maryland	0	0	0	52	29	0	0	4
North Carolina	0	0	0	21	21	0	0	29
South Carolina	0	0	0	0	0	0	0	0
Virginia	0	0	0	166	5	0	0	2
East South Central	**0**	**0**	**0**	**93**	**93**	**0**	**0**	**22**
Mississippi	0	0	0	0	0	0	0	0
Tennessee	0	0	0	93	93	0	0	22
West South Central	**0**	**0**	**0**	**21**	**16**	**0**	**0**	**21**
Arkansas	0	0	0	0	0	0	0	85
Louisiana	0	0	0	0	0	0	0	28
Oklahoma	0	0	0	0	0	0	0	0
Texas	0	0	0	115	26	0	0	26
Mountain	**0**	**0**	**0**	**22**	**4**	**0**	**0**	**4**
Arizona	0	0	0	59	59	0	0	6
Colorado	0	0	0	46	46	0	0	25
Idaho	0	0	0	0	35	0	0	15
Nevada	0	0	0	27	3	0	0	3
New Mexico	0	0	0	0	340	0	0	26
Utah	0	0	0	0	0	0	0	5
Pacific Contiguous	**0**	**0**	**0**	**17**	**7**	**0**	**0**	**3**
California	0	0	0	17	7	0	0	3
Oregon	0	0	0	0	38	0	0	19
Washington	0	0	0	0	64	0	0	62
Pacific Noncontiguous	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**
Alaska	0	0	0	0	0	0	0	27
Hawaii	0	0	0	0	0	0	0	0
U.S. Total	**0**	**0**	**0**	**8**	**3**	**0**	**2**	**3**

Displayed values of zero may represent small values that round to zero The Excel version of this table provides additional precision which may be accessed by selecting individual cells

Table A.4.B. Relative Standard Error for Net Generation by Fuel Type:

Commercial Sector by Census Division and State, Year-to-Date through September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**0**	**27**	**0**	**13**	**0**	**0**	**0**
Connecticut	0	0	0	19	0	0	0
Maine	0	0	0	0	0	0	0
Massachusetts	0	54	0	20	0	0	0
New Hampshire	0	4	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0
Middle Atlantic	**0**	**42**	**0**	**13**	**0**	**0**	**0**
New Jersey	0	204	0	25	0	0	0
New York	0	94	0	17	0	0	0
Pennsylvania	0	0	0	12	0	0	0
East North Central	**0**	**61**	**0**	**6**	**0**	**0**	**0**
Illinois	0	51	0	28	0	0	0
Indiana	0	0	0	0	0	0	0
Michigan	0	246	0	5	0	0	0
Ohio	0	0	0	4	0	0	0
Wisconsin	0	221	0	7	0	0	0
West North Central	**0**	**37**	**0**	**2**	**0**	**0**	**0**
Iowa	0	0	0	7	0	0	0
Minnesota	0	50	0	0	0	0	0
Missouri	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0
North Dakota	0	0	0	0	0	0	0
South Dakota	0	1,063	0	0	0	0	0
South Atlantic	**0**	**3**	**0**	**8**	**0**	**0**	**0**
District of Columbia	0	0	0	27	0	0	0
Florida	0	0	0	0	0	0	0
Georgia	0	48	0	0	0	0	0
Maryland	0	423	0	4	0	0	0
North Carolina	0	264	0	72	0	0	0
South Carolina	0	0	0	0	0	0	0
Virginia	0	0	0	0	0	0	0
East South Central	**0**	**0**	**0**	**23**	**0**	**0**	**0**
Mississippi	0	0	0	0	0	0	0
Tennessee	0	0	0	23	0	0	0
West South Central	**0**	**0**	**0**	**22**	**0**	**0**	**0**
Arkansas	0	0	0	138	0	0	0
Louisiana	0	0	0	28	0	0	0
Oklahoma	0	0	0	0	0	0	0
Texas	0	0	0	27	0	0	0
Mountain	**0**	**1,667**	**0**	**7**	**0**	**0**	**0**
Arizona	0	1,667	0	2	0	0	0
Colorado	0	0	0	0	0	0	0
Idaho	0	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0
New Mexico	0	0	0	25	0	0	0
Utah	0	0	0	6	0	0	0
Pacific Contiguous	**0**	**67**	**0**	**3**	**0**	**0**	**594**
California	0	22	0	3	0	0	594
Oregon	0	725	0	19	0	0	0
Washington	0	0	0	0	0	0	0
Pacific Noncontiguous	**34**	**11**	**0**	**0**	**0**	**0**	**55**
Alaska	34	130	0	0	0	0	55
Hawaii	0	0	0	0	0	0	0
U.S. Total	**15**	**6**	**0**	**4**	**0**	**0**	**42**

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Table A.4.B. Relative Standard Error for Net Generation by Fuel Type:

Commercial Sector by Census Division and State, Year-to-Date through September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**58**	**9**	**0**	**0**	**11**
Connecticut	0	0	0	89	89	0	0	19
Maine	0	0	0	0	0	0	0	0
Massachusetts	0	0	0	77	25	0	0	19
New Hampshire	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0	0
Vermont	0	0	0	0	0	0	0	0
Middle Atlantic	**0**	**0**	**0**	**16**	**5**	**0**	**4**	**7**
New Jersey	0	0	0	17	8	0	0	9
New York	0	0	0	56	7	0	8	11
Pennsylvania	0	0	0	79	8	0	0	5
East North Central	**0**	**0**	**0**	**56**	**23**	**0**	**0**	**6**
Illinois	0	0	0	121	182	0	0	26
Indiana	0	0	0	144	14	0	0	1
Michigan	0	0	0	181	9	0	0	5
Ohio	0	0	0	98	34	0	0	5
Wisconsin	0	0	0	117	40	0	0	17
West North Central	**0**	**0**	**0**	**0**	**24**	**0**	**42**	**7**
Iowa	0	0	0	0	24	0	0	5
Kansas	0	0	0	0	146	0	0	146
Minnesota	0	0	0	0	56	0	42	18
Missouri	0	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0	0
North Dakota	0	0	0	0	498	0	0	498
South Dakota	0	0	0	0	0	0	0	1,063
South Atlantic	**0**	**0**	**0**	**18**	**7**	**0**	**0**	**5**
Delaware	0	0	0	0	0	0	0	0
District of Columbia	0	0	0	0	0	0	0	20
Florida	0	0	0	68	27	0	0	18
Georgia	0	0	0	117	117	0	0	94
Maryland	0	0	0	52	29	0	0	4
North Carolina	0	0	0	21	21	0	0	29
South Carolina	0	0	0	0	0	0	0	0
Virginia	0	0	0	166	5	0	0	2
East South Central	**0**	**0**	**0**	**93**	**93**	**0**	**0**	**22**
Mississippi	0	0	0	0	0	0	0	0
Tennessee	0	0	0	93	93	0	0	22
West South Central	**0**	**0**	**0**	**21**	**16**	**0**	**0**	**21**
Arkansas	0	0	0	0	0	0	0	85
Louisiana	0	0	0	0	0	0	0	28
Oklahoma	0	0	0	0	0	0	0	0
Texas	0	0	0	115	26	0	0	26
Mountain	**0**	**0**	**0**	**22**	**4**	**0**	**0**	**4**
Arizona	0	0	0	59	59	0	0	6
Colorado	0	0	0	46	46	0	0	25
Idaho	0	0	0	0	35	0	0	15
Nevada	0	0	0	27	3	0	0	3
New Mexico	0	0	0	0	340	0	0	26
Utah	0	0	0	0	0	0	0	5
Pacific Contiguous	**0**	**0**	**0**	**17**	**7**	**0**	**0**	**3**
California	0	0	0	17	7	0	0	3
Oregon	0	0	0	0	38	0	0	19
Washington	0	0	0	0	64	0	0	62
Pacific Noncontiguous	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**11**
Alaska	0	0	0	0	0	0	0	27
Hawaii	0	0	0	0	0	0	0	0
U.S. Total	**0**	**0**	**0**	**8**	**3**	**0**	**2**	**3**

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Table A.5.A. Relative Standard Error for Net Generation by Fuel Type:
Industrial Sector by Census Division and State, September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**104**	**45**	**0**	**11**	**0**	**0**	**111**
Connecticut	0	0	0	15	0	0	0
Maine	104	44	0	25	0	0	111
Massachusetts	0	0	0	12	0	0	0
New Hampshire	0	0	0	0	0	0	0
Rhode Island	0	953	0	37	0	0	0
Middle Atlantic	**0**	**28**	**0**	**8**	**29**	**0**	**87**
New Jersey	0	0	0	10	0	0	0
New York	0	13	0	8	0	0	87
Pennsylvania	0	47	0	12	45	0	0
East North Central	**5**	**19**	**0**	**6**	**14**	**0**	**26**
Illinois	5	0	0	16	0	0	0
Indiana	0	0	0	10	18	0	0
Michigan	0	30	0	10	0	0	132
Ohio	0	0	0	16	0	0	0
Wisconsin	20	81	0	9	0	0	26
West North Central	**5**	**0**	**0**	**6**	**0**	**0**	**0**
Iowa	2	0	0	9	0	0	0
Kansas	0	0	0	13	0	0	0
Minnesota	48	0	0	0	0	0	0
Missouri	0	0	0	0	0	0	0
Nebraska	13	0	0	0	0	0	0
North Dakota	49	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0	0
South Atlantic	**11**	**25**	**98**	**8**	**0**	**0**	**49**
Delaware	0	0	0	0	0	0	0
Florida	14	36	0	18	0	0	0
Georgia	24	43	98	36	0	0	138
Maryland	0	0	0	0	0	0	0
North Carolina	7	55	0	49	0	0	538
South Carolina	0	0	0	23	0	0	0
Virginia	0	882	0	9	0	0	0
West Virginia	0	0	0	0	0	0	51
East South Central	**0**	**77**	**0**	**10**	**0**	**0**	**0**
Alabama	0	95	0	21	0	0	0
Kentucky	0	0	0	11	0	0	0
Mississippi	0	0	0	30	0	0	0
Tennessee	0	0	0	8	0	0	0
West South Central	**0**	**74**	**0**	**2**	**5**	**0**	**0**
Arkansas	0	990	0	47	0	0	0
Louisiana	0	0	0	3	7	0	0
Oklahoma	0	0	0	0	0	0	0
Texas	0	16	0	2	7	0	0
Mountain	**20**	**0**	**0**	**2**	**5**	**0**	**0**
Colorado	0	0	0	0	0	0	0
Idaho	115	0	0	16	0	0	0
Montana	151	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0
Utah	0	0	0	0	0	0	0
Wyoming	20	0	0	4	5	0	0
Pacific Contiguous	**0**	**33**	**0**	**1**	**1**	**0**	**0**
California	0	0	0	1	1	0	0
Oregon	0	0	0	28	0	0	0
Washington	0	51	0	3	0	0	0
Pacific Noncontiguous	**0**	**3**	**0**	**0**	**0**	**0**	**58**
Alaska	0	12	0	0	0	0	0
Hawaii	0	0	0	0	0	0	58
U.S. Total	**3**	**7**	**24**	**2**	**5**	**0**	**33**

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Table A.5.A. Relative Standard Error for Net Generation by Fuel Type:

Industrial Sector by Census Division and State, September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**65**	**9**	**0**	**0**	**8**
Connecticut	0	0	0	620	620	0	0	15
Maine	0	0	0	0	9	0	0	10
Massachusetts	0	0	0	66	136	0	0	13
New Hampshire	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0	37
Middle Atlantic	**0**	**0**	**0**	**44**	**10**	**0**	**0**	**7**
New Jersey	0	0	0	75	75	0	0	6
New York	0	0	0	84	32	0	0	10
Pennsylvania	0	0	0	72	9	0	0	11
East North Central	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**4**
Illinois	0	0	0	0	0	0	0	5
Indiana	0	0	0	0	33	0	0	8
Michigan	0	0	0	0	14	0	0	7
Ohio	0	0	0	0	21	0	0	10
Wisconsin	0	0	0	0	13	0	0	7
West North Central	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
Iowa	0	0	0	0	0	0	0	2
Kansas	0	0	0	0	0	0	0	13
Minnesota	0	0	0	0	0	0	0	6
Missouri	0	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0	13
North Dakota	0	0	0	0	0	0	0	32
South Dakota	0	0	0	0	0	0	0	0
South Atlantic	**0**	**0**	**0**	**91**	**3**	**0**	**1**	**3**
Delaware	0	0	0	0	84	0	0	1
Florida	0	0	0	118	8	0	0	7
Georgia	0	0	0	0	6	0	4	7
Maryland	0	0	0	0	0	0	0	0
North Carolina	0	0	0	0	6	0	0	7
South Carolina	0	0	0	133	3	0	0	4
Virginia	0	0	0	0	0	0	0	4
West Virginia	0	0	0	0	0	0	0	20
East South Central	**0**	**0**	**0**	**88**	**4**	**0**	**78**	**4**
Alabama	0	0	0	0	5	0	0	7
Kentucky	0	0	0	0	24	0	0	14
Mississippi	0	0	0	0	5	0	0	9
Tennessee	0	0	0	88	10	0	78	5
West South Central	**0**	**0**	**0**	**0**	**5**	**0**	**4**	**2**
Arkansas	0	0	0	0	9	0	0	11
Louisiana	0	0	0	0	7	0	0	2
Oklahoma	0	0	0	0	0	0	0	0
Texas	0	0	0	0	13	0	6	2
Mountain	**0**	**0**	**0**	**84**	**1**	**0**	**0**	**2**
Colorado	0	0	0	0	0	0	0	0
Idaho	0	0	0	133	2	0	0	6
Montana	0	0	0	0	0	0	0	37
Nevada	0	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0	0
Utah	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	4
Pacific Contiguous	**0**	**0**	**0**	**27**	**8**	**0**	**3**	**1**
California	0	0	0	27	12	0	3	1
Oregon	0	0	0	0	17	0	0	15
Washington	0	0	0	0	11	0	0	6
Pacific Noncontiguous	**0**	**0**	**0**	**0**	**368**	**0**	**0**	**12**
Alaska	0	0	0	0	368	0	0	8
Hawaii	0	0	0	0	0	0	0	17
U.S. Total	**0**	**0**	**0**	**20**	**3**	**0**	**1**	**1**

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Table A.5.B. Relative Standard Error for Net Generation by Fuel Type:

Industrial Sector by Census Division and State, Year-to-Date through September 2020

Census Region and State	Coal	Petroleum Liquids	Petroleum Coke	Natural Gas	Other Gases	Nuclear	Hydroelectric Conventional
New England	**104**	**45**	**0**	**11**	**0**	**0**	**111**
Connecticut	0	0	0	15	0	0	0
Maine	104	44	0	25	0	0	111
Massachusetts	0	0	0	12	0	0	0
New Hampshire	0	0	0	0	0	0	0
Rhode Island	0	953	0	37	0	0	0
Middle Atlantic	**0**	**28**	**0**	**8**	**29**	**0**	**87**
New Jersey	0	0	0	10	0	0	0
New York	0	13	0	8	0	0	87
Pennsylvania	0	47	0	12	45	0	0
East North Central	**5**	**19**	**0**	**6**	**14**	**0**	**26**
Illinois	5	0	0	16	0	0	0
Indiana	0	0	0	10	18	0	0
Michigan	0	30	0	10	0	0	132
Ohio	0	0	0	16	0	0	0
Wisconsin	20	81	0	9	0	0	26
West North Central	**5**	**0**	**0**	**6**	**0**	**0**	**0**
Iowa	2	0	0	9	0	0	0
Kansas	0	0	0	13	0	0	0
Minnesota	48	0	0	0	0	0	0
Missouri	0	0	0	0	0	0	0
Nebraska	13	0	0	0	0	0	0
North Dakota	49	0	0	0	0	0	0
South Dakota	0	0	0	0	0	0	0
South Atlantic	**11**	**25**	**98**	**8**	**0**	**0**	**49**
Delaware	0	0	0	0	0	0	0
Florida	14	36	0	18	0	0	0
Georgia	24	43	98	36	0	0	138
Maryland	0	0	0	0	0	0	0
North Carolina	7	55	0	49	0	0	538
South Carolina	0	0	0	23	0	0	0
Virginia	0	882	0	9	0	0	0
West Virginia	0	0	0	0	0	0	51
East South Central	**0**	**77**	**0**	**10**	**0**	**0**	**0**
Alabama	0	95	0	21	0	0	0
Kentucky	0	0	0	11	0	0	0
Mississippi	0	0	0	30	0	0	0
Tennessee	0	0	0	8	0	0	0
West South Central	**0**	**74**	**0**	**2**	**5**	**0**	**0**
Arkansas	0	990	0	47	0	0	0
Louisiana	0	0	0	3	7	0	0
Oklahoma	0	0	0	0	0	0	0
Texas	0	16	0	2	7	0	0
Mountain	**20**	**0**	**0**	**2**	**5**	**0**	**0**
Colorado	0	0	0	0	0	0	0
Idaho	115	0	0	16	0	0	0
Montana	151	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0
Utah	0	0	0	0	0	0	0
Wyoming	20	0	0	4	5	0	0
Pacific Contiguous	**0**	**33**	**0**	**1**	**1**	**0**	**0**
California	0	0	0	1	1	0	0
Oregon	0	0	0	28	0	0	0
Washington	0	51	0	3	0	0	0
Pacific Noncontiguous	**0**	**3**	**0**	**0**	**0**	**0**	**58**
Alaska	0	12	0	0	0	0	0
Hawaii	0	0	0	0	0	0	58
U.S. Total	**3**	**7**	**24**	**2**	**5**	**0**	**33**

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Table A.5.B. Relative Standard Error for Net Generation by Fuel Type:

Industrial Sector by Census Division and State, Year-to-Date through September 2020 (Continued)

Census Region and State	Wind	Geothermal	Biomass	Solar Thermal and Photovoltaic	Other Renewables	Hydroelectric Pumped Storage	Other Energy Sources	All Energy Sources
New England	**0**	**0**	**0**	**65**	**9**	**0**	**0**	**8**
Connecticut	0	0	0	620	620	0	0	15
Maine	0	0	0	0	9	0	0	10
Massachusetts	0	0	0	66	136	0	0	13
New Hampshire	0	0	0	0	0	0	0	0
Rhode Island	0	0	0	0	0	0	0	37
Middle Atlantic	**0**	**0**	**0**	**44**	**10**	**0**	**0**	**7**
New Jersey	0	0	0	75	75	0	0	6
New York	0	0	0	84	32	0	0	10
Pennsylvania	0	0	0	72	9	0	0	11
East North Central	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**4**
Illinois	0	0	0	0	0	0	0	5
Indiana	0	0	0	0	33	0	0	8
Michigan	0	0	0	0	14	0	0	7
Ohio	0	0	0	0	21	0	0	10
Wisconsin	0	0	0	0	13	0	0	7
West North Central	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**
Iowa	0	0	0	0	0	0	0	2
Kansas	0	0	0	0	0	0	0	13
Minnesota	0	0	0	0	0	0	0	6
Missouri	0	0	0	0	0	0	0	0
Nebraska	0	0	0	0	0	0	0	13
North Dakota	0	0	0	0	0	0	0	32
South Dakota	0	0	0	0	0	0	0	0
South Atlantic	**0**	**0**	**0**	**91**	**3**	**0**	**1**	**3**
Delaware	0	0	0	0	84	0	0	1
Florida	0	0	0	118	8	0	0	7
Georgia	0	0	0	0	6	0	4	7
Maryland	0	0	0	0	0	0	0	0
North Carolina	0	0	0	0	6	0	0	7
South Carolina	0	0	0	133	3	0	0	4
Virginia	0	0	0	0	0	0	0	4
West Virginia	0	0	0	0	0	0	0	20
East South Central	**0**	**0**	**0**	**88**	**4**	**0**	**78**	**4**
Alabama	0	0	0	0	5	0	0	7
Kentucky	0	0	0	0	24	0	0	14
Mississippi	0	0	0	0	5	0	0	9
Tennessee	0	0	0	88	10	0	78	5
West South Central	**0**	**0**	**0**	**0**	**5**	**0**	**4**	**2**
Arkansas	0	0	0	0	9	0	0	11
Louisiana	0	0	0	0	7	0	0	2
Oklahoma	0	0	0	0	0	0	0	0
Texas	0	0	0	0	13	0	6	2
Mountain	**0**	**0**	**0**	**84**	**1**	**0**	**0**	**2**
Colorado	0	0	0	0	0	0	0	0
Idaho	0	0	0	133	2	0	0	6
Montana	0	0	0	0	0	0	0	37
Nevada	0	0	0	0	0	0	0	0
New Mexico	0	0	0	0	0	0	0	0
Utah	0	0	0	0	0	0	0	0
Wyoming	0	0	0	0	0	0	0	4
Pacific Contiguous	**0**	**0**	**0**	**27**	**8**	**0**	**3**	**1**
California	0	0	0	27	12	0	3	1
Oregon	0	0	0	0	17	0	0	15
Washington	0	0	0	0	11	0	0	6
Pacific Noncontiguous	**0**	**0**	**0**	**0**	**368**	**0**	**0**	**12**
Alaska	0	0	0	0	368	0	0	8
Hawaii	0	0	0	0	0	0	0	17
U.S. Total	**0**	**0**	**0**	**20**	**3**	**0**	**1**	**1**

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Table A.6.A. Relative Standard Error for Sales of Electricity to Ultimate Customers by End-Use Sector, Census Division, and State, September 2020

Census Region and State	Residential	Commercial	Industrial	Transportation	Total
New England	**1**	**0**	**3**	**0**	**1**
Connecticut	1	1	8	0	1
Maine	1	1	2	0	1
Massachusetts	1	1	6	0	1
New Hampshire	1	1	3	0	1
Rhode Island	0	0	0	0	0
Vermont	5	5	9	0	3
Middle Atlantic	**0**	**0**	**0**	**0**	**0**
New Jersey	0	0	2	0	0
New York	0	0	2	0	0
Pennsylvania	0	0	0	0	0
East North Central	**1**	**1**	**1**	**0**	**1**
Illinois	1	1	1	0	0
Indiana	2	2	3	0	1
Michigan	1	2	5	0	2
Ohio	1	1	1	0	1
Wisconsin	1	4	8	0	3
West North Central	**1**	**2**	**4**	**0**	**2**
Iowa	2	8	8	0	4
Kansas	4	2	10	0	3
Minnesota	2	5	11	0	4
Missouri	2	2	7	0	2
Nebraska	2	8	12	0	5
North Dakota	2	5	11	0	6
South Dakota	3	9	17	0	6
South Atlantic	**1**	**0**	**2**	**0**	**1**
Delaware	1	2	17	0	2
District of Columbia	0	0	0	0	0
Florida	1	1	8	0	1
Georgia	2	1	5	0	2
Maryland	1	0	3	0	0
North Carolina	2	1	5	0	1
South Carolina	3	1	4	0	2
Virginia	2	1	7	0	1
West Virginia	1	1	0	0	0
East South Central	**1**	**1**	**2**	**0**	**1**
Alabama	3	2	4	0	2
Kentucky	2	3	4	0	2
Mississippi	3	2	7	0	3
Tennessee	1	2	5	0	1
West South Central	**1**	**1**	**2**	**0**	**1**
Arkansas	3	2	6	0	2
Louisiana	2	1	2	0	1
Oklahoma	3	2	6	0	2
Texas	2	1	2	0	1
Mountain	**1**	**2**	**2**	**0**	**1**
Arizona	1	2	4	0	1
Colorado	2	5	7	0	3
Idaho	1	5	5	0	2
Montana	2	8	8	0	4
Nevada	1	2	1	0	1
New Mexico	3	8	8	0	4
Utah	2	5	3	0	2
Wyoming	3	8	7	0	5
Pacific Contiguous	**0**	**1**	**3**	**0**	**1**
California	0	1	2	0	1
Oregon	1	4	12	0	4
Washington	1	5	12	0	4
Pacific Noncontiguous	**1**	**5**	**7**	**0**	**3**
Alaska	3	11	24	0	8
Hawaii	0	0	0	0	0
U.S. Total	**0**	**0**	**1**	**0**	**0**

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Table A.6.B. Relative Standard Error for Sales of Electricity to Ultimate Customers

by End-Use Sector, Census Division, and State, Year-to-Date through September 2020

Census Region and State	Residential	Commercial	Industrial	Transportation	Total
New England	**0**	**0**	**2**	**0**	**0**
Connecticut	0	1	3	0	1
Maine	0	1	2	0	0
Massachusetts	0	1	5	0	1
New Hampshire	0	1	2	0	1
Rhode Island	0	0	0	0	0
Vermont	2	5	6	0	2
Middle Atlantic	**0**	**0**	**0**	**0**	**0**
New Jersey	0	0	1	0	0
New York	0	0	1	0	0
Pennsylvania	0	0	0	0	0
East North Central	**0**	**1**	**1**	**0**	**0**
Illinois	0	1	1	0	0
Indiana	1	2	2	0	1
Michigan	0	2	3	0	1
Ohio	0	1	1	0	0
Wisconsin	0	3	6	0	2
West North Central	**0**	**2**	**3**	**0**	**1**
Iowa	1	6	5	0	3
Kansas	1	1	7	0	2
Minnesota	1	4	7	0	3
Missouri	1	2	5	0	1
Nebraska	1	6	8	0	3
North Dakota	1	4	7	0	4
South Dakota	1	7	12	0	4
South Atlantic	**0**	**0**	**2**	**0**	**0**
Delaware	1	2	5	0	1
District of Columbia	0	0	0	0	0
Florida	0	0	5	0	0
Georgia	1	1	4	0	1
Maryland	0	0	2	0	0
North Carolina	1	1	3	0	1
South Carolina	1	1	3	0	1
Virginia	0	0	4	0	1
West Virginia	0	1	0	0	0
East South Central	**0**	**1**	**2**	**0**	**1**
Alabama	1	1	3	0	1
Kentucky	1	3	2	0	1
Mississippi	1	1	5	0	2
Tennessee	1	2	4	0	1
West South Central	**1**	**1**	**1**	**0**	**1**
Arkansas	1	1	4	0	2
Louisiana	1	1	1	0	1
Oklahoma	1	1	4	0	1
Texas	2	1	2	0	1
Mountain	**0**	**1**	**2**	**0**	**1**
Arizona	0	2	3	0	1
Colorado	1	4	6	0	2
Idaho	1	4	3	0	2
Montana	1	6	5	0	3
Nevada	0	1	1	0	1
New Mexico	1	6	6	0	3
Utah	1	4	2	0	2
Wyoming	1	7	4	0	3
Pacific Contiguous	**0**	**1**	**2**	**0**	**1**
California	0	1	2	0	0
Oregon	1	3	8	0	3
Washington	0	4	7	0	2
Pacific Noncontiguous	**0**	**4**	**4**	**0**	**2**
Alaska	1	9	15	0	5
Hawaii	0	0	0	0	0
U.S. Total	**0**	**0**	**1**	**0**	**0**

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Table A.7.A. Relative Standard Error for Revenue from Sales of Electricity to Ultimate Customers by End-Use Sector, Census Division, and State, September 2020

Census Region and State	Residential	Commercial	Industrial	Transportation	Total
New England	**0**	**0**	**3**	**0**	**0**
Connecticut	0	1	8	0	1
Maine	1	1	2	0	0
Massachusetts	1	1	3	0	0
New Hampshire	1	1	2	0	0
Rhode Island	0	0	0	0	0
Vermont	3	4	6	0	2
Middle Atlantic	**0**	**0**	**0**	**0**	**0**
New Jersey	0	0	2	0	0
New York	0	0	1	0	0
Pennsylvania	0	0	0	0	0
East North Central	**0**	**0**	**1**	**0**	**0**
Illinois	1	1	1	0	0
Indiana	2	2	2	0	1
Michigan	1	1	5	0	1
Ohio	1	1	1	0	0
Wisconsin	1	3	8	0	2
West North Central	**1**	**2**	**4**	**0**	**1**
Iowa	2	5	7	0	3
Kansas	4	3	9	0	2
Minnesota	2	3	10	0	3
Missouri	2	2	6	0	1
Nebraska	2	6	13	0	4
North Dakota	2	4	9	0	4
South Dakota	3	7	16	0	4
South Atlantic	**1**	**1**	**2**	**0**	**1**
Delaware	2	2	11	0	1
District of Columbia	0	0	0	0	0
Florida	1	1	7	0	1
Georgia	2	2	5	0	2
Maryland	1	0	1	0	0
North Carolina	2	2	4	0	1
South Carolina	3	2	4	0	2
Virginia	2	1	6	0	1
West Virginia	1	1	0	0	0
East South Central	**1**	**1**	**2**	**0**	**1**
Alabama	2	2	4	0	2
Kentucky	2	2	4	0	2
Mississippi	4	3	8	0	3
Tennessee	1	2	5	0	1
West South Central	**1**	**1**	**2**	**0**	**1**
Arkansas	3	3	5	0	2
Louisiana	2	2	2	0	1
Oklahoma	3	3	7	0	2
Texas	2	1	3	0	1
Mountain	**1**	**2**	**3**	**0**	**1**
Arizona	1	3	6	0	1
Colorado	3	6	9	0	3
Idaho	2	4	4	0	2
Montana	3	5	12	0	4
Nevada	1	3	1	0	1
New Mexico	5	9	11	0	5
Utah	4	7	4	0	3
Wyoming	3	7	7	0	4
Pacific Contiguous	**0**	**1**	**2**	**0**	**0**
California	0	1	1	0	0
Oregon	1	3	11	0	3
Washington	1	3	10	0	2
Pacific Noncontiguous	**1**	**3**	**4**	**0**	**2**
Alaska	3	8	18	0	5
Hawaii	0	0	0	0	0
U.S. Total	**0**	**0**	**1**	**0**	**0**

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Table A.7.B. Relative Standard Error for Revenue from Sales of Electricity to Ultimate Customers

by End-Use Sector, Census Division, and State, Year-to-Date through September 2020

Census Region and State	Residential	Commercial	Industrial	Transportation	Total
New England	0	0	5	0	1
Connecticut	0	1	9	0	1
Maine	0	1	7	0	1
Massachusetts	0	1	7	0	1
New Hampshire	0	1	13	0	2
Rhode Island	0	0	0	0	0
Vermont	1	4	4	0	2
Middle Atlantic	0	0	0	0	0
New Jersey	0	0	1	0	0
New York	0	1	1	0	0
Pennsylvania	0	0	0	0	0
East North Central	0	0	1	0	0
Illinois	0	1	1	0	0
Indiana	1	2	1	0	1
Michigan	0	1	4	0	1
Ohio	0	1	1	0	0
Wisconsin	1	2	6	0	2
West North Central	0	1	3	0	1
Iowa	1	4	6	0	2
Kansas	1	2	6	0	1
Minnesota	1	3	8	0	2
Missouri	1	2	4	0	1
Nebraska	1	5	9	0	3
North Dakota	1	3	7	0	3
South Dakota	2	6	12	0	3
South Atlantic	0	0	2	0	0
Delaware	1	2	6	0	1
District of Columbia	0	0	0	0	0
Florida	1	1	5	0	0
Georgia	1	1	4	0	1
Maryland	0	0	1	0	0
North Carolina	1	1	3	0	1
South Carolina	1	1	3	0	1
Virginia	1	1	4	0	1
West Virginia	0	1	0	0	0
East South Central	1	1	2	0	1
Alabama	1	1	3	0	1
Kentucky	1	3	2	0	1
Mississippi	2	2	6	0	2
Tennessee	1	2	4	0	1
West South Central	1	1	2	0	1
Arkansas	1	2	4	0	1
Louisiana	1	1	2	0	1
Oklahoma	1	2	5	0	1
Texas	2	1	2	0	1
Mountain	0	1	2	0	1
Arizona	0	2	5	0	1
Colorado	1	4	7	0	2
Idaho	1	3	3	0	1
Montana	1	4	8	0	3
Nevada	0	2	1	0	1
New Mexico	2	6	10	0	3
Utah	2	5	3	0	2
Wyoming	2	6	5	0	3
Pacific Contiguous	0	1	2	0	0
California	0	1	1	0	0
Oregon	1	3	9	0	2
Washington	1	2	8	0	2
Pacific Noncontiguous	1	2	3	0	1
Alaska	2	6	13	0	3
Hawaii	0	0	0	0	0
U S. Total	0	0	1	0	0

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Table A.8.A. Relative Standard Error for Average Price of Electricity to Ultimate Customers
by End-Use Sector, Census Division, and State, September 2020

Census Region and State	Residential	Commercial	Industrial	Transportation	Total
New England	**0**	**0**	**2**	**0**	**0**
Connecticut	0	0	8	0	1
Maine	0	0	1	0	0
Massachusetts	1	0	3	0	1
New Hampshire	1	0	1	0	0
Rhode Island	0	0	0	0	0
Vermont	3	2	4	0	2
Middle Atlantic	**0**	**0**	**0**	**0**	**0**
New Jersey	0	0	1	0	0
New York	0	0	1	0	0
Pennsylvania	0	0	0	0	0
East North Central	**0**	**0**	**0**	**0**	**0**
Illinois	0	0	0	0	0
Indiana	1	1	1	0	1
Michigan	0	1	1	0	1
Ohio	0	0	0	0	0
Wisconsin	1	1	2	0	1
West North Central	**1**	**1**	**1**	**0**	**1**
Iowa	1	3	2	0	1
Kansas	2	2	4	0	2
Minnesota	1	2	2	0	2
Missouri	1	1	3	0	1
Nebraska	1	2	3	0	2
North Dakota	1	1	2	0	2
South Dakota	2	3	4	0	2
South Atlantic	**1**	**0**	**1**	**0**	**0**
Delaware	1	1	8	0	1
District of Columbia	0	0	0	0	0
Florida	1	1	3	0	0
Georgia	2	1	2	0	1
Maryland	0	0	2	0	0
North Carolina	1	1	2	0	1
South Carolina	2	1	2	0	1
Virginia	1	1	3	0	1
West Virginia	0	0	0	0	0
East South Central	**1**	**1**	**1**	**0**	**1**
Alabama	2	1	1	0	1
Kentucky	1	1	1	0	1
Mississippi	2	2	3	0	2
Tennessee	1	1	2	0	1
West South Central	**1**	**1**	**1**	**0**	**1**
Arkansas	2	2	2	0	1
Louisiana	1	1	1	0	1
Oklahoma	2	2	3	0	1
Texas	1	1	1	0	1
Mountain	**1**	**1**	**1**	**0**	**1**
Arizona	1	1	1	0	1
Colorado	3	2	3	0	2
Idaho	1	1	1	0	1
Montana	2	3	4	0	1
Nevada	1	1	0	0	0
New Mexico	4	3	4	0	2
Utah	3	3	1	0	2
Wyoming	2	2	2	0	1
Pacific Contiguous	**0**	**1**	**2**	**0**	**1**
California	0	0	1	0	0
Oregon	1	1	3	0	2
Washington	1	2	1	0	1
Pacific Noncontiguous	**1**	**3**	**3**	**0**	**2**
Alaska	2	6	9	0	4
Hawaii	0	0	0	0	0
U.S. Total	**0**	**0**	**0**	**0**	**0**

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Table A 8.B. Relative Standard Error for Average Price of Electricity to Ultimate Customers

by End-Use Sector, Census Division, and State, Year-to-Date through September 2020

Census Region and State	Residential	Commercial	Industrial	Transportation	Total
New England	**0**	**0**	5	**0**	1
Connecticut	0	1	10	0	1
Maine	0	1	7	0	1
Massachusetts	0	1	8	0	1
New Hampshire	0	1	13	0	2
Rhode Island	0	0	0	0	0
Vermont	2	6	6	0	3
Middle Atlantic	**0**	**0**	**0**	**0**	**0**
New Jersey	0	0	1	0	0
New York	0	1	1	0	0
Pennsylvania	0	0	0	0	0
East North Central	**0**	**1**	**1**	**0**	**0**
Illinois	0	1	1	0	0
Indiana	1	3	2	0	1
Michigan	0	2	4	0	1
Ohio	0	0	1	0	0
Wisconsin	1	3	8	0	2
West North Central	**0**	**2**	**4**	**0**	**1**
Iowa	1	7	7	0	3
Kansas	1	2	8	0	2
Minnesota	1	4	9	0	3
Missouri	1	3	6	0	1
Nebraska	1	7	11	0	4
North Dakota	1	4	9	0	4
South Dakota	1	9	15	0	4
South Atlantic	**0**	**0**	**2**	**0**	**0**
Delaware	1	2	6	0	1
District of Columbia	0	0	0	0	0
Florida	1	1	7	0	1
Georgia	1	1	5	0	1
Maryland	0	0	2	0	0
North Carolina	1	1	4	0	1
South Carolina	1	1	4	0	1
Virginia	1	1	5	0	1
West Virginia	0	1	0	0	0
East South Central	**1**	**2**	**2**	**0**	**1**
Alabama	1	2	3	0	1
Kentucky	1	4	3	0	1
Mississippi	2	2	7	0	2
Tennessee	1	3	5	0	1
West South Central	**1**	**1**	**2**	**0**	**1**
Arkansas	1	2	5	0	2
Louisiana	1	1	2	0	1
Oklahoma	1	2	6	0	2
Texas	2	1	2	0	1
Mountain	**0**	**2**	**2**	**0**	**1**
Arizona	0	2	5	0	1
Colorado	1	5	8	0	3
Idaho	1	4	4	0	2
Montana	1	7	7	0	3
Nevada	0	2	2	0	1
New Mexico	2	8	11	0	4
Utah	1	6	4	0	2
Wyoming	1	8	6	0	4
Pacific Contiguous	**0**	**1**	**3**	**0**	**1**
California	0	1	2	0	0
Oregon	1	4	10	0	3
Washington	1	4	9	0	3
Pacific Noncontiguous	**1**	**4**	**5**	**0**	**2**
Alaska	2	9	18	0	5
Hawaii	0	0	0	0	0
U.S Total	**0**	**0**	1	**0**	**0**

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Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	1	01/09/2020 11 07 PM	01/09/2020 11 18 PM	0 Hours 11 Minutes	Entergy Transmission Control Center South	SPP RE	Arkansas	Electrical System Separation (Islanding) where part or parts of power gnd remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system System Operations	Unknown	Unknown
2020	1	01/09/2020 11 07 PM	01/09/2020 11 19 PM	0 Hours, 12 Minutes	Entergy - Transmission Operations Engineering	SPP RE	Arkansas Yell County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Severe Weather/Transmission Interruption	0	0
2020	1	01/11/2020 2 25 AM	01/11/2020 7 56 AM	5 Hours 31 Minutes	Entergy Transmission Operations Engineering	SPP RE	Arkansas Cross County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Severe Weather/Transmission Interruption	22	7541
2020	1	01/11/2020 3 30 AM	01/11/2020 5 30 PM	14 Hours 0 Minutes	Entergy Corp	SPP RE	Arkansas Texas	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	68138
2020	1	01/11/2020 12 50 PM	01/12/2020 1 33 PM	24 Hours 43 Minutes	Southern Company	SERC	Alabama Georgia Mississippi	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	219	30715
2020	1	01/11/2020 1 20 PM		Hours Minutes	Tennessee Valley Authority	SERC	Tennessee	Electrical System Separation (Islanding) where part or parts of power gnd remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system Severe Weather	4	Unknown
2020	1	01/11/2020 11 02 PM	01/12/2020 2 01 AM	2 Hours, 59 Minutes	Duke Energy Carolinas	SERC	North Carolina South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	Unknown	66475
2020	1	01/17/2020 5 28 AM	01/17/2020 10 13 AM	4 Hours 45 Minutes	Pacific Gas & Electric Co	WECC	California Humboldt County,	Electrical System Separation (Islanding) where part or parts of power gnd remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system Severe Weather/Transmission Interruption	87	67864
2020	1	01/24/2020 4 34 AM		Hours, Minutes	California Department of Water Resources	WECC	California	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	0	0
2020	1	01/30/2020 3 01 AM	01/30/2020 4 36 AM	1 Hours 35 Minutes	Western Area Power Administration - Upper Great Plains Region	MRO	North Dakota Burleigh County	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	75	0
2020	2	02/06/2020 1 30 PM	02/07/2020 8 08 PM	30 Hours 38 Minutes	Duke Energy Carolinas	SERC	North Carolina South Carolina	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather/Transmission Interruption	Unknown	89500
2020	2	02/06/2020 2 29 PM	02/07/2020 12 44 PM	22 Hours 15 Minutes	Duke Energy Progress	SERC	North Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather/Distribution Interruption	Unknown	284256
2020	2	02/07/2020 8 48 AM		Hours Minutes	Dominion Energy VA	SERC	Virginia North Carolina	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	87000
2020	2	02/07/2020 11 00 AM		Hours Minutes	Exelon Corporation/PECO	RF	Pennsylvania	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather/Distribution Interruption	Unknown	52000
2020	2	02/07/2020 2 42 PM	02/10/2020 9 25 AM	66 Hours 43 Minutes	Niagara Mohawk Power Corporation (dba National Grid)	NPCC	New York	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	7500
2020	2	02/07/2020 4 25 PM	02/08/2020 12 00 PM	19 Hours, 35 Minutes	ISO New England	NPCC	Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	Unknown	123359
2020	2	02/09/2020 9 30 AM	02/09/2020 9 40 PM	12 Hours 10 Minutes	Pacific Gas & Electric Co	WECC	California, Alameda County Contra Costa County El Dorado County Nevada County, Placer County, Sierra County Santa Clara County, Napa County Marin County Santa Cruz County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	500	145000
2020	2	02/11/2020 7 13 AM	02/11/2020 4 00 PM	8 Hours 47 Minutes	Portland General Electric Co	WECC	Oregon Clackamas County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	Unknown	0
2020	2	02/17/2020 4 00 AM		Hours, Minutes	Pacific Gas & Electric Co	WECC	Northern and Central California	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	91	70000

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	3	03/01/2020 8:00 AM		Hours, Minutes	Somerset Operating Company	NPCC	Western NY	Fuel supply emergencies that could impact electric power system adequacy or reliability - Fuel Supply Deficiency	675	Unknown
2020	3	03/01/2020 11 27 AM	03/01/2020 9 47 PM	10 Hours 20 Minutes	Entergy - Transmission Operations Engineering	SERC	Mississippi Rankin County	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	19	3136
2020	3	03/12/2020 1:03 AM	03/12/2020 3 00 AM	1 Hours 57 Minutes	PECO Energy Co	RF	Pennsylvania	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	40	15864
2020	3	03/16/2020 12:01 PM	03/16/2020 1 10 PM	1 Hours 9 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	165	110800
2020	3	03/18/2020 7 09 AM		Hours Minutes	Pacificorp	WECC	Utah	Loss of electric service to more than 50,000 customers for 1 hour or more Natural Disaster	237	73000
2020	3	03/24/2020 2 55 AM	03/24/2020 6 50 AM	3 Hours 55 Minutes	ISO New England	NPCC	Connecticut Massachusetts Maine New Hampshire Rhode Island Vermont	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	Unknown	51026
2020	3	03/26/2020 9 29 PM	03/26/2020 9 47 PM	0 Hours 18 Minutes	FirstEnergy Corp	RF	Ohio	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	19	11964
2020	3	03/29/2020 8 27 PM	03/29/2020 11 04 PM	2 Hours 37 Minutes	Entergy Transmission Operations Engineering	SERC	Mississippi Panola County	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	4	1558
2020	3	03/31/2020 11 45 AM	03/31/2020 8 00 PM	8 Hours 15 Minutes	Southern Company	SERC	Alabama Georgia	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	412	57744
2020	4	04/02/2020 1 37 PM	04/02/2020 2 43 PM	1 Hours 6 Minutes	Nebraska Public Power Distrct	MRO	Nebraska, York County	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	5	Unknown
2020	4	04/05/2020 3 46 PM	04/05/2020 5 35 PM	1 Hours 49 Minutes	Pacific Gas & Electric Co	WECC	California Stanislaus County	Electrical System Separation (islanding) where part or parts of power grid remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system -Severe Weather	7	6814
2020	4	04/07/2020 11 39 PM	04/07/2020 11 46 PM	0 Hours 7 Minutes	Bonneville Power Administration	WECC	Washington	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2020	4	04/08/2020 1 21 AM	04/08/2020 3 56 AM	2 Hours 35 Minutes	Ohio Edison Co	WECC	Ohio	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	82509
2020	4	04/08/2020 9 57 PM	04/09/2020 8 59 AM	11 Hours, 2 Minutes	Duke Energy Midwest	RF	Ohio Kentucky	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	78314
2020	4	04/08/2020 10 03 PM	04/09/2020 7 36 AM	9 Hours, 33 Minutes	Duke Energy Midwest	RF	Indiana	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	Unknown	93000
2020	4	04/09/2020 7 25 PM	04/10/2020 3 30 AM	8 Hours 5 Minutes	CenterPoint Energy	TRE	Texas Harris County,	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	Unknown	95000
2020	4	04/09/2020 7 40 PM	04/11/2020 10 00 PM	50 Hours 20 Minutes	ISO New England	NPCC	Maine	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	340000
2020	4	04/11/2020 11 24 AM	04/11/2020 11 42 AM	0 Hours 18 Minutes	Pacificorp	WECC	Wyoming	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2020	4	04/12/2020 5:00 PM	04/14/2020 1 25 AM	32 Hours, 25 Minutes	Southern Company	SERC	Mississippi Alabama Georgia	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	448	62828
2020	4	04/12/2020 6 13 PM	04/13/2020 3 23 PM	21 Hours 10 Minutes	American Electric Power - (SPP Reliability Region)	TRE	Texas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	63289

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	4	04/12/2020 8 30 PM	04/14/2020 9 00 AM	36 Hours 30 Minutes	Arkansas Electric Coop Corp	SPP RE	Arkansas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	51000
2020	4	04/12/2020 8 45 PM		Hours Minutes	Entergy Corp	SPP RE	Arkansas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	95318
2020	4	04/12/2020 9 28 PM	04/15/2020 12 00 PM	62 Hours 32 Minutes	American Electric Power (RFC Reliability Region)	RF	Virginia West Virginia	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	104000
2020	4	04/13/2020 12 45 AM	04/13/2020 3 00 AM	2 Hours, 15 Minutes	Tennessee Valley Authority	SERC	Tennessee Hamilton County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	120000
2020	4	04/13/2020 3 30 AM	04/14/2020 6 18 PM	38 Hours 48 Minutes	Duke Energy Carolinas	SERC	North Carolina South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	216400
2020	4	04/13/2020 7 31 AM	04/13/2020 2 00 PM	6 Hours 29 Minutes	Duke Energy Progress	SERC	North Carolina South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	Unknown
2020	4	04/13/2020 8 08 AM		Hours, Minutes	Dominion Energy South Carolina	SERC	South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	72233
2020	4	04/13/2020 10 25 AM	04/13/2020 6 55 PM	8 Hours 30 Minutes	Dominion Energy VA	SERC	North Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	95000
2020	4	04/13/2020 1 05 PM	04/14/2020 4 00 PM	26 Hours, 55 Minutes	ISO New England	NPCC	Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	68476
2020	4	04/20/2020 12 59 AM	04/20/2020 8 40 AM	7 Hours 41 Minutes	Southern Company	SERC	Alabama Mississippi Georgia Florida	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	552	77341
2020	4	04/23/2020 4 30 AM	04/23/2020 7 00 AM	2 Hours, 30 Minutes	Entergy Corp	SERC	Mississippi Arkansas Louisiana	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	55184
2020	4	04/23/2020 8 00 AM	04/23/2020 11 40 PM	15 Hours 40 Minutes	Southern Company	SERC	Alabama Georgia Mississippi Florida	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	375	52163
2020	4	04/24/2020 9 00 PM	04/24/2020 9 33 PM	0 Hours 33 Minutes	Pacific Gas & Electric Co	WECC	California Placer County Nevada County	Electrical System Separation (Islanding) where part or parts of power gnd remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system System Operations	5	945
2020	4	04/26/2020 1 38 AM		Hours Minutes	Florida Power & Light	FRCC	Florida	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	49999
2020	4	04/28/2020 8 01 PM	04/28/2020 11 21 PM	3 Hours 20 Minutes	Entergy - Transmission Operations Engineering	TRE	Texas Jefferson County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	14	1
2020	4	04/29/2020 5 55 AM	04/29/2020 7 00 PM	13 Hours 5 Minutes	CenterPoint Energy Houston Electric LLC	TRE	Texas Harris County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	146660
2020	4	04/29/2020 6 00 AM	04/29/2020 12 31 PM	6 Hours, 31 Minutes	Entergy Corp	SERC	Louisiana	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	77933
2020	4	04/30/2020 3 00 PM		Hours, Minutes	Exelon Corporation/PECO	RF	Pennsylvania Bucks County, Chester County Delaware County Montgomery County Philadelphia County York County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	78007
2020	5	05/04/2020 11 59 AM	05/07/2020 8 00 PM	80 Hours 1 Minutes	Tennessee Valley Authority	SERC	Tennessee Davidson County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	500	130000
2020	5	05/13/2020 5 12 AM	05/13/2020 2 07 PM	8 Hours, 55 Minutes	Bonneville Power Administration	WECC	Washington	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2020	5	05/15/2020 5 55 PM	05/17/2020 6 00 PM	48 Hours 5 Minutes	Niagara Mohawk Power Corporation (dba National Grid)	NPCC	New York Saratoga County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	52
2020	5	05/22/2020 4 35 PM	05/23/2020 3 29 PM	22 Hours, 54 Minutes	Duke Energy Carolinas	SERC	North Carolina South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	108190
2020	5	05/24/2020 4 45 PM		Hours, Minutes	Oklahoma Gas & Electric Co	SPP RE	Central Oklahoma	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	54000
2020	5	05/25/2020 10 58 AM	05/25/2020 1 00 PM	2 Hours, 2 Minutes	LCRA Transmission Services Corporation	TRE	Texas Kerr County,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	8	3745
2020	5	05/27/2020 5 15 PM	05/29/2020 6 30 AM	37 Hours 15 Minutes	CenterPoint Energy Houston Electric LLC	TRE	Texas Harris County,	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	382000

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	5	05/27/2020 5 20 PM		Hours Minutes	CenterPoint Energy	TRE	Texas	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	273269
2020	5	05/29/2020 5 01 PM	05/29/2020 6 57 PM	1 Hours, 56 Minutes	FirstEnergy Corp	RF	Pennsylvania Warren County	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2020	6	06/03/2020 12 30 PM	06/03/2020 6 00 PM	5 Hours, 30 Minutes	Exelon Corporation/PECO	RF	Pennsylvania Bucks County Chester County Delaware County Montgomery County, Philadelphia County York County	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	Unknown	708000
2020	6	06/03/2020 1 00 PM	06/06/2020 4 30 PM	75 Hours 30 Minutes	Public Service Electric & Gas	RF	New Jersey	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	80	87000
2020	6	06/03/2020 1 36 PM	06/03/2020 4 30 PM	2 Hours 54 Minutes	Jersey Central Power & Lt Co	RF	New Jersey	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	Unknown	78079
2020	6	06/09/2020 11 21 AM	06/09/2020 12 01 PM	0 Hours 40 Minutes	Bonneville Power Administration	WECC	Washington	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2020	6	06/10/2020 12 22 PM	06/10/2020 5 00 PM	4 Hours, 38 Minutes	Consumers Energy Co	RF	Michigan Gratiot County, Lake County, Missaukee County, Benzie County Leelanau County, Manistee County Wexford County Montcalm County Kent County Ottawa County Van Buren County, St Joseph County, Arenac County, Saginaw County Calhoun County Branch County,	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	270000
2020	6	06/10/2020 5 24 PM	06/11/2020 6 00 PM	24 Hours 36 Minutes	American Electric Power - (RFC Reliability Region)	RF	Ohio Indiana Kentucky West Virginia	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	85822
2020	6	06/10/2020 7 30 PM		Hours Minutes	Detroit Edison Co	RF	Michigan Oakland County, Macomb County Wayne County Sanilac County Tuscola County Huron County Lapeer County Livingston County Monroe County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	237000
2020	6	06/27/2020 4 00 PM	06/28/2020 2 27 AM	10 Hours 27 Minutes	Southern Company	SERC	Alabama Georgia	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	33480	78109
2020	6	06/29/2020 2 32 PM	06/29/2020 4 35 PM	2 Hours 3 Minutes	Entergy Transmission Operations Engineering	SPP RE	Arkansas Garland County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2020	7	07/01/2020 7 26 PM	07/01/2020 7 44 PM	0 Hours 18 Minutes	FirstEnergy Corp	RF	Pennsylvania	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	32	2013
2020	7	07/02/2020 8 30 PM		Hours Minutes	California Department of Water Resources	WECC	California Butte County	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	0	0
2020	7	07/07/2020 11 38 AM	07/07/2020 6 24 PM	6 Hours 46 Minutes	Los Angeles Department of Water & Power	WECC	California Los Angeles County,	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2020	7	07/07/2020 1 09 PM	07/08/2020 8 17 AM	19 Hours 8 Minutes	Public Service Company of Colorado	WECC	Colorado	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2020	7	07/07/2020 7 17 PM	07/07/2020 11 49 PM	4 Hours 32 Minutes	American Electric Power - (RFC Reliability Region)	RF	West Virginia Wyoming County	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Severe Weather/Transmission Interruption	Unknown	Unknown
2020	7	07/08/2020 6 45 PM		Hours, Minutes	California Department of Water Resources	WECC	California	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	0	0

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	7	07/11/2020 4 55 AM		Hours Minutes	California Department of Water Resources	WECC	California	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	0	0
2020	7	07/11/2020 9 30 PM		Hours, Minutes	Southwest Power Pool Inc	SPP RE	Oklahoma	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	Unknown	94700
2020	7	07/11/2020 11 30 PM	07/12/2020 6 30 AM	7 Hours, 0 Minutes	Oklahoma Gas & Electric Co	SPP RE	Oklahoma Arkansas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	68000
2020	7	07/12/2020 4 30 AM	07/13/2020 5 00 AM	24 Hours, 30 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Collin County, Dallas County Denton County Rockwall County Tarrant County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	48000
2020	7	07/19/2020 10 30 AM		Hours Minutes	Somerset Operating Company	NPCC	New York Niagara County	Fuel supply emergencies that could impact electric power system adequacy or reliability - Fuel Supply Deficiency	675	
2020	7	07/19/2020 2 30 PM	07/21/2020 6 48 PM	52 Hours, 18 Minutes	Detroit Edison Co	RF	Michigan	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	158500
2020	7	07/22/2020 11 30 AM	07/22/2020 2 19 PM	2 Hours, 49 Minutes	FirstEnergy Corp	RF	West Virginia Tucker County,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2020	7	07/25/2020 7 58 PM	07/27/2020 7 00 PM	47 Hours 2 Minutes	American Electric Power Texas	TRE	Texas Nueces County, Kleberg County, Cameron County, Willacy County, Hidalgo County, Starr County, Kenedy County,	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	201208
2020	7	07/25/2020 9 00 PM	07/26/2020 4 00 PM	19 Hours 0 Minutes	Magic Valley Electric Cooperative Inc	TRE	Texas Hidalgo County, Cameron County, Starr County Kenedy County, Willacy County Brooks County Jim Hogg County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	125	84000
2020	7	07/30/2020 5 54 PM	07/30/2020 8 18 PM	2 Hours 24 Minutes	Western Area Power Administration Upper Great Plains Region	MRO	Nebraska Scotts Bluff County,	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2020	8	08/01/2020 11 14 AM	08/10/2020 9 26 PM	226 Hours 12 Minutes	American Electric Power Texas	TRE	Texas Cameron County Willacy County Hidalgo County Starr County	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	Unknown	Unknown
2020	8	08/02/2020 7 43 PM	08/02/2020 10 27 PM	2 Hours 44 Minutes	MidAmerican Energy Co	SERC	Illinois Rock Island County,	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2020	8	08/03/2020 11 15 PM	08/06/2020 7 00 AM	55 Hours 45 Minutes	Duke Energy Progress	SERC	North Carolina South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	340000
2020	8	08/04/2020 4 41 AM	08/05/2020 4 26 PM	35 Hours 45 Minutes	Dominion Energy VA	SERC	Virginia	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	508000
2020	8	08/04/2020 6 01 AM	08/06/2020 3 30 PM	57 Hours 29 Minutes	North Carolina El Member Corp	SERC	North Carolina Brunswick County Columbus County, Pender County Duplin County Onslow County Jones County Craven County, Jones County, Beaufort County Bertie County Chowan County Gates County Perquimans County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	311	125987
2020	8	08/04/2020 9 00 AM	08/05/2020 6 00 PM	33 Hours, 0 Minutes	Delmarva Power & Light Company	RF	Delaware	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	100000
2020	8	08/04/2020 10 30 AM		Hours Minutes	Atlantic City Electric Co	RF	New Jersey	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	70000
2020	8	08/04/2020 11 20 AM	08/07/2020 10 55 AM	71 Hours 35 Minutes	Public Service Electric & Gas	RF	New Jersey	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	60	75000
2020	8	08/04/2020 12 00 PM		Hours, Minutes	Exelon Corporation/PECO	RF	Pennsylvania Bucks County, Chester County, Delaware County Montgomery County Philadelphia County, York County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	137103
2020	8	08/04/2020 12 00 PM	08/07/2020 6 00 AM	66 Hours 0 Minutes	Orange and Rockland Utilities Inc	NPCC	New York Rockland County, Orange County Sullivan County, New Jersey Bergen County Passaic County Sussex County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	160000
2020	8	08/04/2020 12 18 PM	08/08/2020 5 31 PM	101 Hours 13 Minutes	Jersey Central Power & Lt Co	RF	New Jersey	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	788000
2020	8	08/04/2020 1 00 PM	08/04/2020 11 59 PM	10 Hours 59 Minutes	Long Island Power Authority	NPCC	New York Nassau County Suffolk County, Queens County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	3907	420000
2020	8	08/04/2020 1 31 PM		Hours, Minutes	Consolidated Edison of New York, Inc	NPCC	New York Bronx County Richmond County, Queens County, Kings County, Westchester County, New York County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	271119

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	8	08/04/2020 2 00 PM	08/08/2020 12 00 PM	94 Hours, 0 Minutes	Central Hudson Gas & Elec Corp	NPCC	New York Dutchess County Orange County Ulster County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	116818
2020	8	08/04/2020 2 35 PM		Hours, Minutes	Avangrid/NYSEG	NPCC	New York	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	76120
2020	8	08/04/2020 2 35 PM	08/10/2020 11 00 AM	140 Hours 25 Minutes	New York State Electric & Gas	NPCC	New York Broome County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	76120
2020	8	08/04/2020 3 15 PM	08/07/2020 10 27 AM	67 Hours 12 Minutes	ISO New England	NPCC	Connecticut Massachusetts New Hampshire Maine Rhode Island Vermont	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	2000	1188247
2020	8	08/05/2020 5 58 PM	08/05/2020 8 53 PM	2 Hours 55 Minutes	Entergy - Transmission Operations Engineering	TRE	Texas Orange County,	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	89	19785
2020	8	08/07/2020 5 13 AM		Hours, Minutes	Consolidated Edison of New York Inc	NPCC	New York Queens County New York County,	Uncontrolled loss of 300 Megawatts or more of firm system loads for 15 minutes or more from a single incident Severe Weather	500	187068
2020	8	08/10/2020 10 00 AM		Hours, Minutes	MidAmerican Energy Co	MRO	Iowa Dallas County Polk County Warren County Madison County, Johnson County Scott County Illinois Rock Island County Henry County, Mercer County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	950	300000
2020	8	08/10/2020 11 00 AM	08/10/2020 4 00 PM	5 Hours, 0 Minutes	Central Iowa Power Cooperative	MRO	Iowa Webster County, Greene County, Dallas County, Hamilton County, Boone County Polk County, Hardin County Story County Jasper County Grundy County, Marshall County, Tama County, Poweshiek County Benton County Iowa County Linn County, Johnson County Jones County, Cedar County Muscatine County Jackson County Clinton County, Scott County	Uncontrolled loss of 200 Megawatts or more of firm system loads for 15 minutes or more from a single incident for entities with previous year's peak demand less than or equal to 3 000 Megawatts Severe Weather	550	Unknown
2020	8	08/10/2020 12 38 PM		Hours, Minutes	Alliant Energy	MRO	Iowa	Uncontrolled loss of 300 Megawatts or more of firm system loads for 15 minutes or more from a single incident Severe Weather	1400	250000
2020	8	08/10/2020 2 30 PM		Hours, Minutes	ComEd	SERC	Illinois Cook County Will County, DuPage County Lake County Kane County Grundy County, LaSalle County, DeKalb County McHenry County, Lee County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	856000
2020	8	08/10/2020 4 00 PM	08/13/2020 3 00 PM	71 Hours 0 Minutes	Ameren Illinois Company	SERC	Illinois Missouri	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	135000
2020	8	08/10/2020 10 39 PM	08/13/2020 3 48 PM	65 Hours 9 Minutes	Northern Indiana Pub Serv Co	RF	Indiana	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	95300
2020	8	08/13/2020 1 51 PM	08/13/2020 4 27 PM	2 Hours, 36 Minutes	El Paso Electric	TRE	Texas El Paso County	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy System Operations	218	57060
2020	8	08/14/2020 4 39 PM	08/14/2020 5 42 PM	1 Hours 3 Minutes	Entergy Transmission Operations Engineering	SERC	Louisiana St Charles Parish,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	101	12671
2020	8	08/14/2020 5 15 PM	08/15/2020 9 00 PM	27 Hours, 45 Minutes	California ISO	WECC	California	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy Severe Weather	1120	Unknown
2020	8	08/14/2020 6 36 PM	08/14/2020 8 42 PM	2 Hours 6 Minutes	Pacific Gas & Electric Co	WECC	California	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy System Operations	560	220000
2020	8	08/14/2020 6 45 PM	08/14/2020 9 12 PM	2 Hours 27 Minutes	Southern California Edison Co	WECC	California Kern County Kings County Los Angeles County, Orange County, Riverside County San Bernardino County Santa Barbara County, Tulare County Ventura County	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy System Operations	1419	132000
2020	8	08/14/2020 8 00 PM	08/16/2020 5 00 PM	45 Hours 0 Minutes	Northern States Power Co	MRO	Minnesota Anoka County, Hennepin County Ramsey County Washington County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	60000
2020	8	08/15/2020 2 53 PM	08/15/2020 8 00 PM	5 Hours 7 Minutes	California ISO	WECC	California	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy Severe Weather	795	Unknown
2020	8	08/15/2020 3 00 PM	08/15/2020 7 45 PM	4 Hours, 45 Minutes	Southern California Edison Co	WECC	California Inyo County Kern County Los Angeles County Orange County Riverside County San Bernardino County Tulare County Ventura County,	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy System Operations	200	70000

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	8	08/15/2020 6 25 PM	08/15/2020 7 44 PM	1 Hours 19 Minutes	Pacific Gas & Electric Co	WECC	California	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy System Operations	459	220000
2020	8	08/16/2020 3 44 AM	08/17/2020 2 18 PM	34 Hours 34 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	409	124266
2020	8	08/16/2020 5 30 PM	08/16/2020 7 10 PM	1 Hours 40 Minutes	California ISO	WECC	California	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	712	Unknown
2020	8	08/16/2020 8 00 PM	08/18/2020 9 00 PM	49 Hours, 0 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Collin County Dallas County Denton County, Tarrant County Ellis County Kaufman County Johnson County, Anderson County Angelina County Grayson County, Smith County Wichita County,	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	Unknown	300000
2020	8	08/17/2020 8 21 AM	08/17/2020 9 01 AM	0 Hours 40 Minutes	Pacific Gas & Electric Co	WECC	California Yuba County	Electrical System Separation (Islanding) where part or parts of power gnd remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system Severe Weather	2	2
2020	8	08/17/2020 3 05 PM	08/17/2020 9 24 PM	6 Hours, 19 Minutes	California ISO	WECC	California	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	829	Unknown
2020	8	08/18/2020 1 30 PM	08/18/2020 8 30 PM	7 Hours, 0 Minutes	California ISO	WECC	California	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	917	Unknown
2020	8	08/18/2020 2 00 PM	08/18/2020 9 00 PM	7 Hours 0 Minutes	NV Energy	WECC	Nevada	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	7800	1400000
2020	8	08/18/2020 2 30 PM		Hours Minutes	Arizona Public Service Co	WECC	Arizona	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	0	Unknown
2020	8	08/18/2020 2 44 PM	08/18/2020 3 14 PM	0 Hours 30 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Culberson County, Reeves County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	205	238
2020	8	08/19/2020 1 27 AM	08/19/2020 3 03 AM	1 Hours 36 Minutes	FirstEnergy Corp	RF	Ohio Trumbull County	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	22	16107
2020	8	08/19/2020 12 00 PM	08/19/2020 9 00 PM	9 Hours, 0 Minutes	City of Redding	WECC	California	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System - Severe Weather	Unknown	Unknown
2020	8	08/19/2020 2 00 PM	08/19/2020 9 00 PM	7 Hours 0 Minutes	NV Energy	WECC	Nevada	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System - Severe Weather	7500	1400000
2020	8	08/19/2020 2 00 PM	08/19/2020 9 00 PM	7 Hours 0 Minutes	Salt River Project	WECC	Arizona Maricopa County	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	1200	0
2020	8	08/20/2020 3 29 PM	08/20/2020 3 39 PM	0 Hours 10 Minutes	Nebraska Public Power District	MRO	Nebraska Custer County,	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	60	Unknown
2020	8	08/23/2020 10 30 AM		Hours Minutes	Southwestern Public Service	TRE	Texas panhandle SE NM	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	Unknown	Unknown
2020	8	08/27/2020 1 15 AM		Hours Minutes	Entergy Corp	TRE	Texas Louisiana	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	615992
2020	8	08/27/2020 3 14 AM		Hours Minutes	Cleco Power LLC	SERC	Louisiana Calcasieu Parish, Beauregard Parish, Iberia Parish Acadia Parish, Evangeline Parish Rapides Parish, St Landry Parish, Vernon Parish	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	Unknown	Unknown
2020	8	08/27/2020 5 00 AM	09/03/2020 12 00 PM	175 Hours 0 Minutes	Louisiana Generating LLC	SERC	Louisiana	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	200	50000
2020	8	08/27/2020 7 00 AM	08/30/2020 7 00 PM	84 Hours 0 Minutes	City of Alexandria	SERC	Louisiana Rapides Parish	Complete operational failure or shut down of the transmission and/or distribution of electrical system -Severe Weather	48	Unknown
2020	8	08/27/2020 7 40 AM	08/31/2020 3 33 AM	91 Hours, 53 Minutes	American Electric Power - (SPP Reliability Region)	SERC	Louisiana Texas	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	Unknown	47927

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	8	08/27/2020 7 40 AM	08/31/2020 7 40 AM	96 Hours, 0 Minutes	Southwest Power Pool Inc	SERC	Louisiana Texas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	130000
2020	8	08/27/2020 12 02 PM	08/27/2020 10 54 PM	10 Hours 52 Minutes	MISO	TRE	Texas	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy -Severe Weather	573	Unknown
2020	8	08/27/2020 12 06 PM		Hours Minutes	Entergy Transmission Control Center - North	TRE	Texas	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy -Severe Weather	350	Unknown
2020	8	08/27/2020 12 06 PM	08/27/2020 10 49 PM	10 Hours, 43 Minutes	Entergy Transmission Operations Engineering	TRE	Texas	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy -Severe Weather	581	Unknown
2020	8	08/27/2020 12 44 PM	08/27/2020 11 00 PM	10 Hours 16 Minutes	Entergy Services Inc	TRE	Texas	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	Unknown	Unknown
2020	8	08/27/2020 1 24 PM		Hours Minutes	Entergy Transmission Control Center South	TRE	Texas Montgomery County Liberty County	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy -Severe Weather	208	Unknown
2020	8	08/27/2020 5 11 PM	08/28/2020 10 00 AM	16 Hours, 49 Minutes	ISO New England	NPCC	Connecticut Massachusetts New Hampshire Maine Rhode Island Vermont	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	100	60687
2020	8	08/28/2020 4 27 PM	08/28/2020 7 26 PM	2 Hours 59 Minutes	Bonneville Power Administration	WECC	Washington Oregon	Total generation loss within one minute of greater than or equal to 2 000 Megawatts in the Eastern or Western Interconnection or greater than or equal to 1,400 Megawatts in the ERCOT Interconnection Severe Weather	0	0
2020	9	09/03/2020 1 46 PM	09/03/2020 10 47 PM	9 Hours 1 Minutes	Snohomish County PUD No 1	WECC	Washington	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	Unknown	Unknown
2020	9	09/05/2020 5 20 PM	09/05/2020 8 37 PM	3 Hours 17 Minutes	California ISO	WECC	California	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	986	Unknown
2020	9	09/05/2020 5 25 PM	09/05/2020 8 55 PM	3 Hours 30 Minutes	Imperial Irrigation District	WECC	California Imperial County	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy -Severe Weather	100	20000
2020	9	09/06/2020 4 00 PM	09/06/2020 9 00 PM	5 Hours 0 Minutes	NV Energy	WECC	Nevada	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather	8180	1400000
2020	9	09/06/2020 4 30 PM	09/06/2020 9 05 PM	4 Hours 35 Minutes	California ISO	WECC	California	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System System Operations	1071	Unknown
2020	9	09/06/2020 5 00 PM	09/07/2020 3 00 AM	10 Hours 0 Minutes	Los Angeles Department of Water & Power	WECC	California Los Angeles County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	72000
2020	9	09/06/2020 5 36 PM	09/06/2020 7 27 PM	1 Hours 51 Minutes	Bonneville Power Administration	WECC	Washington Oregon California	Total generation loss within one minute of greater than or equal to 2,000 Megawatts in the Eastern or Western Interconnection or greater than or equal to 1,400 Megawatts in the ERCOT Interconnection - System Operations	0	0
2020	9	09/07/2020 9 13 AM	09/08/2020 6 00 AM	20 Hours, 47 Minutes	Public Utility District No 1 of Okanogan County	WECC	Washington	Complete operational failure or shut down of the transmission and/or distribution of electrical system Natural Disaster	80	21000
2020	9	09/07/2020 6 00 PM	09/08/2020 6 00 PM	24 Hours 0 Minutes	Puget Sound Energy	WECC	Washington Kitsap County King County Pierce County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	Unknown	71500
2020	9	09/07/2020 7 05 PM	09/08/2020 10 00 PM	26 Hours 55 Minutes	Portland General Electric Co	WECC	Oregon Multnomah County Washington County Clackamas County Marion County Yamhill County, Polk County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	2859	103000
2020	9	09/07/2020 10 40 PM	09/09/2020 5 24 PM	42 Hours 44 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50 000 customers for 1 hour or more -Transmission Interruption	610	172000
2020	9	09/09/2020 11 22 AM	09/09/2020 1 04 PM	1 Hours 42 Minutes	Idaho Power Company	WECC	Idaho	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Natural Disaster	0	0
2020	9	09/15/2020 10 00 PM	09/20/2020 3 00 PM	113 Hours 0 Minutes	Southern Company	SERC	Alabama Florida Georgia Mississippi	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather/Transmission Interruption	236	34096
2020	9	09/16/2020 3 00 AM	09/21/2020 8 00 AM	125 Hours 0 Minutes	PowerSouth Energy Cooperative	SERC	Alabama Baldwin County,	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	0	77600

Table B 1 Major Disturbances and Unusual Occurrences, Year-to-Date 2020

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2020	9	09/22/2020 10 02 AM	09/22/2020 12 58 PM	2 Hours 56 Minutes	Pacific Gas & Electric Co	WECC	California	Electrical System Separation (Islanding) where part or parts of power grid remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system -System Operations	8	4350
2020	9	09/27/2020 6 27 PM	09/28/2020 3 17 PM	20 Hours, 50 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50,000 customers for 1 hour or more Natural Disaster	337	102267
2020	9	09/30/2020 5 55 AM	09/30/2020 11 30 PM	17 Hours 35 Minutes	ISO New England	NPCC	Connecticut Maine Rhode Island Massachusetts New Hampshire Vermont	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	Unknown	155000

Note Customers affected are estimates and are preliminary Source Form OE 417 "Electric Emergency Incident and Disturbance Report"

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	1	01/06/2019 1:00 AM	01/06/2019 12 00 PM	11 Hours, 0 Minutes	Puget Sound Energy	WECC	Washington King County Thurston County Pierce County	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		230000
2019	1	01/06/2019 3:00 AM	01/09/2019 7 00 AM	76 Hours 0 Minutes	Peak Reliability	WECC	Washington	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	230	230000
2019	1	01/06/2019 5 56 PM	01/06/2019 9 52 PM	3 Hours, 56 Minutes	Sacramento Municipal Util Dist	WECC	California Sacramento County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	300	90382
2019	1	01/10/2019 12 19 PM	01/10/2019 12 48 PM	0 Hours 29 Minutes	Western Area Power Administration Upper Great Plains Region	WECC	Montana Valley County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -System Operations	11	2
2019	1	01/12/2019 11 30 AM		Hours Minutes	Southwest Power Pool Inc	SERC	Missouri Nebraska	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		116600
2019	1	01/12/2019 11 30 AM	01/13/2019 10 00 PM	34 Hours 30 Minutes	Kansas City Power & Light Co	SPP RE	Missouri Jackson County Kansas Johnson County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		112530
2019	1	01/13/2019 5 30 AM	01/15/2019 5 00 PM	59 Hours 30 Minutes	Duke Energy Carolinas	SERC	North Carolina South Carolina	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	133200	
2019	1	01/16/2019 5 26 PM	01/17/2019 12 19 PM	18 Hours 53 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	190	126700
2019	1	01/18/2019 9 54 PM	01/19/2019 12 19 AM	2 Hours 25 Minutes	Nebraska Public Power District	MRO	Nebraska	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	8	
2019	1	01/23/2019 7 26 AM	01/23/2019 5 05 PM	9 Hours 39 Minutes	Western Area Power Administration	WECC	Colorado Larimer County,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) System Operations	0	0
2019	1	01/29/2019 6 34 PM	01/29/2019 6 36 PM	0 Hours 2 Minutes	Entergy Transmission Control Center North	SERC	Louisiana Washington Parish	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption		
2019	1	01/30/2019 4 23 AM	02/02/2019 9 00 AM	76 Hours, 37 Minutes	Prairie Power Inc	SERC	Illinois Scott County	Fuel supply emergencies that could impact electric power system adequacy or reliability - Fuel Supply Deficiency		
2019	1	01/30/2019 7 00 AM	01/30/2019 8 08 AM	1 Hours 8 Minutes	Prairie Power Inc	SERC	Illinois Pike County	Fuel supply emergencies that could impact electric power system adequacy or reliability - Severe Weather		
2019	1	01/30/2019 9 30 AM	01/31/2019 6 00 PM	32 Hours 30 Minutes	Detroit Edison Co	RF	Michigan	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather		
2019	2	02/05/2019 6 17 PM	02/05/2019 8 26 PM	2 Hours 9 Minutes	Pacific Gas & Electric Co	WECC	California	Electrical System Separation (islanding) where part or parts of power grid remain(s) operational in an otherwise blacked out area or within the partial failure of an integrated electrical system. Severe Weather	42	33200
2019	2	02/07/2019 7 39 AM	02/07/2019 7 40 AM	0 Hours 1 Minutes	Entergy Transmission Control Center North	SERC	Arkansas	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Severe Weather/Transmission Interruption	3	3370
2019	2	02/07/2019 8 55 AM	02/09/2019 4 30 PM	55 Hours 35 Minutes	Consumers Energy Co	RF	Michigan	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		233000
2019	2	02/08/2019 6 30 PM		Hours Minutes	Puget Sound Energy	WECC	Washington	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		50940
2019	2	02/13/2019 2 48 AM	02/15/2019 12 28 AM	45 Hours 40 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	182	121000
2019	2	02/23/2019 2 05 PM		Hours Minutes	American Electric Power - (RFC Reliability Region)	SERC	Virginia	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Severe Weather/Transmission Interruption		

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	2	02/24/2019 11 21 AM	02/26/2019 5 29 PM	54 Hours 8 Minutes	American Electric Power - (RFC Reliability Region)	RF	Ohio Virginia West Virginia	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		118781
2019	2	02/24/2019 12 31 PM	02/24/2019 2 57 PM	2 Hours 26 Minutes	Ohio Edison Co	RF	Ohio	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		157274
2019	2	02/24/2019 2 33 PM	02/24/2019 6 03 PM	3 Hours 30 Minutes	Monongahela Power Co	RF	Pennsylvania	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		94048
2019	2	02/24/2019 6 00 PM	02/25/2019 10 00 PM	28 Hours 0 Minutes	Duquesne Light Co	RF	Pennsylvania	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather		132000
2019	2	02/24/2019 6 47 PM	02/25/2019 1 55 PM	19 Hours 8 Minutes	West Penn Power Company	RF	Pennsylvania	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		137216
2019	2	02/24/2019 8 02 PM	02/25/2019 2 30 PM	18 Hours 28 Minutes	Consumers Energy Co	RF	Michigan	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		115000
2019	2	02/25/2019 7 45 AM	02/25/2019 6 40 PM	10 Hours 55 Minutes	ISO New England	NPCC	Massachusetts	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2019	2	02/25/2019 1 35 PM	02/26/2019 2 50 AM	13 Hours 15 Minutes	ISO New England	NPCC	Connecticut Massachusetts, New Hampshire, Maine Vermont, Rhode Island	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		72332
2019	2	02/27/2019 11 25 AM	02/27/2019 5 39 PM	6 Hours, 14 Minutes	MidAmerican Energy Co	MRO	Iowa	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	3	03/13/2019 5 50 AM	03/13/2019 10 30 AM	4 Hours 40 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Midland County Ector County Tarrant County Dallas County Wichita County Brown County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		154124
2019	3	03/13/2019 11 29 AM	03/14/2019 9 11 PM	33 Hours, 42 Minutes	Public Service Company of Colorado	WECC	Colorado Jefferson County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	58	58379
2019	3	03/13/2019 3 00 PM	03/14/2019 12 00 AM	9 Hours 0 Minutes	Southwest Power Pool Inc	TRE	Texas Kansas Oklahoma	Loss of electric service to more than 50 000 customers for 1 hour or more. Severe Weather/Transmission Interruption		66000
2019	3	03/13/2019 3 51 PM	03/16/2019 6 00 PM	74 Hours 9 Minutes	Southwestern Public Service	TRE	Texas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather/Transmission Interruption	50	54290
2019	4	04/03/2019 5 15 AM	04/03/2019 12 39 PM	7 Hours 24 Minutes	California Department of Water Resources	WECC	California Fresno County	Fuel supply emergencies that could impact electric power system adequacy or reliability - Fuel Supply Deficiency	0	0
2019	4	04/04/2019 10 13 AM	04/04/2019 12 08 PM	1 Hours 55 Minutes	Bonneville Power Administration	WECC	Montana	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2019	4	04/07/2019 1 46 PM	04/08/2019 5 50 PM	28 Hours 4 Minutes	CenterPoint Energy	TRE	Texas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	537	231956
2019	4	04/11/2019 7 48 PM	04/11/2019 8 00 PM	0 Hours 12 Minutes	Bonneville Power Administration	WECC	Oregon Washington	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2019	4	04/12/2019 11 20 AM	04/12/2019 12 46 PM	1 Hours 26 Minutes	Xcel Energy	MRO	Minnesota Martin County,	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	4	04/13/2019 6 15 PM	04/13/2019 11 15 PM	5 Hours, 0 Minutes	Entergy Corp	SERC	Mississippi Arkansas Texas Louisiana	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		60467
2019	4	04/15/2019 4 35 AM	04/15/2019 2 40 PM	10 Hours 5 Minutes	Dominion Virginia Power	SERC	Virginia	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		75290
2019	4	04/18/2019 7 55 PM	04/19/2019 5 29 PM	21 Hours, 34 Minutes	Southern Company	SERC	Alabama Mississippi Georgia Florida	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	116	34695

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	4	04/18/2019 8:08 PM	04/19/2019 11 00 AM	14 Hours 52 Minutes	Public Service Company of Colorado	WECC	Colorado Clear Creek County	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2019	4	04/25/2019 6:03 PM	04/25/2019 6 32 PM	0 Hours, 29 Minutes	Salt River Project	WECC	Arizona Maricopa County,	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy Generation Inadequacy	150	51366
2019	4	04/26/2019 1:00 AM	04/26/2019 1 27 PM	12 Hours 27 Minutes	FirstEnergy Corp	RF	Pennsylvania	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	7	5830
2019	4	04/26/2019 3 16 PM	04/26/2019 3 17 PM	0 Hours, 1 Minutes	ISO New England	NPCC	Massachusetts Hampden County[13]	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Severe Weather/Transmission Interruption	0	0
2019	4	04/26/2019 5 46 PM	04/27/2019 11 49 AM	18 Hours 3 Minutes	Duke Energy Carolinas	SERC	North Carolina South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		54071
2019	4	04/28/2019 10 43 AM	04/29/2019 2 06 AM	15 Hours 23 Minutes	FirstEnergy Corp	RF	Ohio	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	5	05/08/2019 9 22 AM	05/08/2019 9 56 AM	0 Hours 34 Minutes	PJM Interconnection	RF	Pennsylvania Mercer County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	29	1
2019	5	05/08/2019 3 50 PM	05/13/2019 12 00 AM	104 Hours 10 Minutes	Southwest Power Pool Inc	SPP RE	Louisiana Texas	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather/Distribution Interruption		65844
2019	5	05/09/2019 5 55 PM	05/11/2019 8 50 PM	50 Hours 55 Minutes	CenterPoint Energy	TRE	Texas Harris County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	691	238015
2019	5	05/09/2019 7 06 PM	05/10/2019 2 57 AM	7 Hours 51 Minutes	CenterPoint Energy Houston Electric LLC	TRE	Texas Harris County,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Severe Weather/Transmission Interruption	0	0
2019	5	05/10/2019 2 00 AM	05/10/2019 12 15 PM	10 Hours 15 Minutes	Entergy Corp	TRE	Texas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		61008
2019	5	05/18/2019 3 45 PM	05/20/2019 4 00 AM	36 Hours 15 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Ector County Midland County, Tarrant County Dallas County Stephens County Anderson County, McLennan County Ellis County Hunt County Young County, Bell County Limestone County, Collin County Rockwall County Henderson County Parker County Falls County Freestone County Kaufman County Grayson County Smith County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		68000
2019	5	05/23/2019 1 11 AM	05/23/2019 12 00 PM	10 Hours 49 Minutes	Northern Indiana Pub Serv Co	RF	Indiana	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Severe Weather/Transmission Interruption	0	0
2019	5	05/23/2019 4 55 PM	05/23/2019 11 40 PM	6 Hours, 45 Minutes	Dominion Energy VA	SERC	Virginia	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		100000
2019	5	05/24/2019 9 47 PM	05/24/2019 11 58 PM	2 Hours, 11 Minutes	Pacific Gas & Electric Co	WECC	California	Electrical System Separation (Islanding) where part or parts of power grid remain(s) operational in an otherwise blocked out area or within the partial failure of an integrated electrical system Severe Weather	20	10961
2019	5	05/27/2019 10:07 PM	05/28/2019 3 00 AM	4 Hours 53 Minutes	Dayton Power & Light Co	RF	Ohio Montgomery County Darke County Mercer County Miami County, Greene County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather/Transmission Interruption	347	70000

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	6	06/02/2019 6 19 PM	06/02/2019 8 43 PM	2 Hours, 24 Minutes	Pacific Gas & Electric Co	WECC	California	Electrical System Separation (Islanding) where part or parts of power grid remain(s) operational in an otherwise blocked out area or within the partial failure of an integrated electrical system Severe Weather/Transmission Interruption		
2019	6	06/06/2019 6 09 PM	06/06/2019 6 35 PM	0 Hours, 26 Minutes	CPS Energy	TRE	Texas Bexar County,	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		55017
2019	6	06/07/2019 2 43 PM	06/07/2019 4 20 PM	1 Hours, 37 Minutes	American Electric Power - Texas	TRE	Texas Pecos County,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	8	1
2019	6	06/08/2019 3 50 PM	06/08/2019 7 40 PM	3 Hours 50 Minutes	Southwestern Public Service	TRE	Texas Potter County	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	6	06/09/2019 2 45 PM	06/13/2019 10 30 PM	103 Hours 45 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Collin County Dallas County Denton County Palo Pinto County Tarrant County Ellis County, Williamson County	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather		558000
2019	6	06/12/2019 2 56 PM	06/12/2019 3 50 PM	0 Hours 54 Minutes	Imperial Irrigation Distrct	WECC	California Imperial County, Riverside County,	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy Generation Inadequacy	982	30907
2019	6	06/16/2019 2 00 AM	06/17/2019 11 59 PM	45 Hours 59 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Dallas County, Tarrant County, Collin County Denton County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		340000
2019	6	06/16/2019 3 25 AM		Hours Minutes	American Electric Power (SPP Reliability Region)	SPP RE	Oklahoma	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Severe Weather/Transmission Interruption		
2019	6	06/19/2019 10 30 PM	06/20/2019 7 00 PM	20 Hours 30 Minutes	Entergy Corp	SPP RE	Arkansas	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		82045
2019	6	06/20/2019 4 11 PM	06/21/2019 12 45 PM	20 Hours, 34 Minutes	Dominion Energy VA	SERC	Virginia	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		60000
2019	6	06/21/2019 7 15 PM		Hours Minutes	Tennessee Valley Authority	SERC	Kentucky Tennessee	Electrical System Separation (islanding) where part or parts of power grid remain(s) operational in an otherwise blocked out area or within the partial failure of an integrated electrical system -Severe Weather		50000
2019	6	06/22/2019 8 46 PM	06/23/2019 12 30 AM	3 Hours, 44 Minutes	Southern Company	SERC	Alabama Georgia	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	115	34637
2019	6	06/23/2019 5 13 AM	06/23/2019 10 58 AM	5 Hours 45 Minutes	Entergy Transmission Operations Engineering	SPP RE	Arkansas	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	47	16199
2019	6	06/23/2019 10 00 PM	06/25/2019 11 00 PM	49 Hours 0 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Dallas County, Denton County, Ellis County, Collin County Ellis County Hood County, Johnson County Kaufman County,	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		265000
2019	6	06/24/2019 5 30 AM	06/24/2019 8 45 AM	3 Hours 15 Minutes	Entergy Corp	SPP RE	Arkansas	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		56451
2019	6	06/26/2019 1 58 PM	06/26/2019 2 03 PM	0 Hours, 5 Minutes	Montana Dakota Utilities Co	MRO	North Dakota Williams County	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	53	0
2019	6	06/28/2019 2 25 PM		Hours Minutes	Bonneville Power Administration	WECC	Idaho Nez Perce County,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	6	06/30/2019 3 15 PM	06/30/2019 4 15 PM	1 Hours 0 Minutes	Long Island Power Authority	NPCC	New York Nassau County Suffolk County,	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	3189	52498

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	6	06/30/2019 3 30 PM	06/30/2019 8 30 PM	5 Hours 0 Minutes	ComEd	SERC	Illinois Cook County DeKalb County, DuPage County Grundy County, Iroquois County, Ford County, Lake County Kendall County Kankakee County, Kane County, Ogle County,	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		100000
2019	7	07/10/2019 12 10 PM	07/12/2019 12 30 PM	48 Hours 20 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Collin County Dallas County Denton County, Hood County Johnson County, Tarrant County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		57000
2019	7	07/11/2019 11 08 AM	07/11/2019 11 13 AM	0 Hours 5 Minutes	Southwestern Public Service	TRE	Texas Lynn County,	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	26	2043
2019	7	07/13/2019 7 15 AM	07/14/2019 5 00 PM	33 Hours 45 Minutes	Entergy Corp	SERC	Louisiana	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather		55730
2019	7	07/13/2019 6 47 PM	07/13/2019 11 37 PM	4 Hours 50 Minutes	NYISO	NPCC	New York New York County,	Uncontrolled loss of 300 Megawatts or more of firm system loads for 15 minutes or more from a single incident Transmission Interruption	452	72669
2019	7	07/13/2019 11 55 PM	07/14/2019 1 00 PM	13 Hours, 5 Minutes	Cleco Power LLC	SERC	Louisiana Acadia Parish Avoyelles Parish Catahoula Parish Evangeline Parish, Grant Parish Iberia Parish, LaSalle Parish Natchitoches Parish Rapides Parish, Sabine Parish, St Landry Parish, St Martin Parish St Mary Parish, St Tammany Parish Allen Parish, Beauregard Parish Calcasieu Parish, Vermilion Parish De Soto Parish Jefferson Davis Parish, Red River Parish Tangipahoa Parish, V	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		63000
2019	7	07/19/2019 7 00 PM	07/21/2019 8 00 PM	49 Hours 0 Minutes	Detroit Edison Co	RF	Michigan	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		400000
2019	7	07/20/2019 3 00 AM	07/22/2019 7 00 AM	52 Hours 0 Minutes	Consumers Energy Co	RF	Michigan Kent County Newaygo County, Mecosta County, Montcalm County, Isabella County, Ionia County, Allegan County, Barry County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		160000
2019	7	07/20/2019 11 55 AM	07/23/2019 12 00 AM	60 Hours 5 Minutes	WEC Energy Group (WEPCO WPSC, UMERC WEP MIUP)	RF	Wisconsin Michigan	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	200	50000
2019	7	07/21/2019 11 00 PM	07/22/2019 8 54 PM	21 Hours 54 Minutes	Consolidated Edison Co NY Inc	NPCC	New York Kings County, New York County Queens County Bronx County Westchester County, Richmond County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	60	45000
2019	7	07/22/2019 4 00 PM	07/24/2019 11 00 PM	55 Hours 0 Minutes	PECO Energy Co	RF	Pennsylvania Bucks County, Delaware County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		165000
2019	7	07/22/2019 5 50 PM	07/25/2019 1 15 PM	67 Hours 25 Minutes	Public Service Electric & Gas	RF	New Jersey Gloucester County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	49	95600
2019	7	07/23/2019 3 39 PM	07/23/2019 7 00 PM	3 Hours 21 Minutes	ISO New England	NPCC	Massachusetts	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather	54	54535
2019	7	07/23/2019 11 55 PM	07/23/2019 11 56 PM	0 Hours 1 Minutes	Nebraska Public Power District	MRO	Nebraska	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	7	07/23/2019 11 55 PM	07/24/2019 5 22 AM	5 Hours 27 Minutes	Western Area Power Administration Upper Great Plains Region	MRO	Nebraska Scotts Bluff County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	7	07/30/2019 8 45 AM	07/30/2019 9 45 AM	1 Hours, 0 Minutes	City of Alexandria	SERC	Louisiana	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Severe Weather/Transmission Interruption		13720
2019	8	08/02/2019 1 49 AM	08/02/2019 1 55 AM	0 Hours 6 Minutes	Northern States Power Co	MRO	Minnesota Chisago County	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	8	08/05/2019 5 23 PM	08/06/2019 12 02 AM	6 Hours 39 Minutes	Bonneville Power Administration	WECC	Oregon Umatilla County	Unexpected Transmission loss within its area, contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	66	
2019	8	08/08/2019 4 16 PM	08/08/2019 10 41 PM	6 Hours 25 Minutes	American Electric Power (RFC Reliability Region)	RF	Ohio	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Severe Weather/Transmission Interruption		5600
2019	8	08/13/2019 10 00 AM	08/13/2019 11 00 AM	1 Hours, 0 Minutes	Rio Bravo Rocklin	WECC	California Placer County	Uncontrolled loss of 300 Megawatts or more of firm system loads for 15 minutes or more from a single incident Vandalism	0	0
2019	8	08/13/2019 3 10 PM	08/13/2019 5 30 PM	2 Hours 20 Minutes	ERCOT	TRE	Texas Williamson County,	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather		
2019	8	08/15/2019 8 30 AM		Hours, Minutes	Upstate New York Power Producers	NPCC	New York Tompkins County,	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	150	
2019	8	08/15/2019 3 11 PM	08/15/2019 6 00 PM	2 Hours 49 Minutes	ERCOT	TRE	Texas	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather		
2019	8	08/15/2019 11 03 PM	08/16/2019 12 37 AM	1 Hours 34 Minutes	Pacific Gas & Electric Co	WECC	California Mann County,	Loss of electric service to more than 50,000 customers for 1 hour or more Distribution Interruption	80	61318
2019	8	08/18/2019 3 59 PM	08/18/2019 11 00 PM	7 Hours, 1 Minutes	Southwest Power Pool Inc	SPP RE	Louisiana Texas	Firm load shedding of 100 Megawatts or more implemented under emergency operational policy Transmission Interruption	271	86373
2019	8	08/18/2019 4 30 PM	08/18/2019 10 00 PM	5 Hours 30 Minutes	East Texas Electric Coop Inc	TRE	Texas	Loss of electric service to more than 50 000 customers for 1 hour or more Transmission Interruption/Distribution Interruption	259	61000
2019	8	08/18/2019 4 47 PM	08/18/2019 11 00 PM	6 Hours, 13 Minutes	American Electric Power (SPP Reliability Region)	TRE	Texas	Uncontrolled loss of 300 Megawatts or more of firm system loads for 15 minutes or more from a single incident Distribution Interruption	752	86373
2019	8	08/26/2019 9 09 AM	08/26/2019 1 34 PM	4 Hours 25 Minutes	Great River Energy	MRO	North Dakota	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	8	08/26/2019 7 00 PM	08/27/2019 3 00 AM	8 Hours, 0 Minutes	Southwest Power Pool Inc	SPP RE	Oklahoma	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather/Transmission Interruption		95000
2019	8	08/26/2019 7 00 PM	08/29/2019 1 00 PM	66 Hours 0 Minutes	Oklahoma Gas & Electric Co	SPP RE	Oklahoma	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		103779
2019	9	09/04/2019 2 30 PM	09/06/2019 6 00 PM	51 Hours 30 Minutes	ERCOT	TRE	Texas	Public appeal to reduce the use of electricity for purposes of maintaining the continuity of the Bulk Electric System Severe Weather		
2019	9	09/05/2019 4 15 AM	09/05/2019 3 17 PM	11 Hours, 2 Minutes	Dominion Energy South Carolina	SERC	South Carolina	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		172278
2019	9	09/05/2019 10 00 PM	09/06/2019 12 00 PM	14 Hours 0 Minutes	North Carolina EI Member Corp	SERC	North Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather	3	2000
2019	9	09/05/2019 10 36 PM	09/06/2019 4 00 PM	17 Hours 24 Minutes	Duke Energy Progress	SERC	North Carolina South Carolina	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		116000
2019	9	09/06/2019 8 20 AM		Hours, Minutes	Dominion Energy VA	SERC	North Carolina	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		77000
2019	9	09/10/2019 9 22 PM	09/10/2019 9 23 PM	0 Hours 1 Minutes	Pacificorp	WECC	Wyoming Sweetwater County	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	885	0
2019	9	09/11/2019 10 35 PM	09/11/2019 11 59 PM	1 Hours 24 Minutes	Consumers Energy Co	RF	Michigan Ionia County Kent County Barry County, Montcalm County, Allegan County, Ottawa County, Newaygo County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		54000
2019	9	09/19/2019 5 55 AM	09/19/2019 2 30 PM	8 Hours 35 Minutes	Tucson Electric Power	WECC	Arizona Pima County,	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	0	0

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	9	09/25/2019 3 47 AM	09/25/2019 3 40 PM	11 Hours, 53 Minutes	Pacific Gas & Electric Co	WECC	California Napa County, Nevada County, Placer County Plumas County, Sonoma County Butte County Yuba County,	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	25	69524
2019	9	09/29/2019 7 38 AM		Hours Minutes	Pacific Gas & Electric Co	WECC	California Alameda County,	Loss of electric service to more than 50,000 customers for 1 hour or more Distribution Interruption		50072
2019	10	10/04/2019 5 15 AM		Hours, Minutes	California Department of Water Resources	WECC	California	Fuel supply emergencies that could impact electric power system adequacy or reliability - Fuel Supply Deficiency	0	0
2019	10	10/06/2019 5 15 AM		Hours, Minutes	California Department of Water Resources	WECC	California	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	0	0
2019	10	10/06/2019 2 50 PM	10/06/2019 3 00 PM	0 Hours, 10 Minutes	American Electric Power Texas	TRE	Texas Hidalgo County Cameron County,	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption		
2019	10	10/09/2019 12 27 AM		Hours Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather/Transmission Interruption	2400	737808
2019	10	10/12/2019 3 00 PM	10/12/2019 4 21 PM	1 Hours, 21 Minutes	American Electric Power - Texas	TRE	Texas	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2019	10	10/15/2019 3 19 AM	10/15/2019 6 38 AM	3 Hours, 19 Minutes	FirstEnergy Corp	RF	Ohio	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	10	10/17/2019 12 45 AM	10/19/2019 9 30 AM	56 Hours, 45 Minutes	ISO New England	NPCC	Connecticut Rhode Island Massachusetts Vermont New Hampshire Maine	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		101683
2019	10	10/19/2019 5 57 AM	10/19/2019 1 58 PM	8 Hours 1 Minutes	Western Area Power Administration - Upper Great Plains Region	MRO	South Dakota Codington County, Nebraska Scotts Bluff County	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	10	10/20/2019 10 15 PM	10/25/2019 2 00 AM	99 Hours 45 Minutes	Oncor Electric Delivery Company LLC	TRE	Texas Cass County Cameron County Collin County, Dallas County, Ellis County Erath County Hunt County, Kaufman County Lamar County, Panola County, Rains County Rockwall County, Rusk County Tarrant County, Van Zandt County Wood County	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		400000
2019	10	10/23/2019 2 36 PM		Hours Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather/Transmission Interruption		50000
2019	10	10/24/2019 5 15 AM		Hours Minutes	California Department of Water Resources	WECC	California	Fuel supply emergencies that could impact electric power system adequacy or reliability Fuel Supply Deficiency	0	0
2019	10	10/24/2019 5 02 PM	10/24/2019 5 09 PM	0 Hours 7 Minutes	FirstEnergy Corp	RF	Ohio Lorain County,	Unexpected Transmission loss within its area, contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	10	10/26/2019 5 15 AM	10/26/2019 5 31 PM	12 Hours 16 Minutes	Entergy Corp	SERC	Louisiana	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		82124
2019	10	10/26/2019 6 00 PM		Hours, Minutes	Tennessee Valley Authority	SERC	Tennessee	Loss of electric service to more than 50 000 customers for 1 hour or more -Severe Weather		70000
2019	10	10/26/2019 6 20 PM	10/31/2019 1 27 AM	103 Hours 7 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather/Transmission Interruption	3190	972000
2019	10	10/30/2019 6 32 AM	11/01/2019 1 29 PM	54 Hours 57 Minutes	Southern California Edison Co	WECC	California Los Angeles County Orange County, Riverside County, San Bernardino County Ventura County Kern County,	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather/Distribution Interruption	285	114402
2019	10	10/31/2019 10 00 PM		Hours, Minutes	Exelon Corporation/PECO	RF	Pennsylvania	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather/Distribution Interruption		53943
2019	11	11/01/2019 1 00 AM	11/03/2019 1 00 PM	60 Hours, 0 Minutes	Niagara Mohawk Power Corporation (dba National Grid)	NPCC	New York	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		8000

Table B 2 Major Disturbances and Unusual Occurrences, 2019

Year	Month	Event Date and Time	Restoration Date and Time	Duration	Utility/Power Pool	NERC Region	Area Affected	Type of Disturbance	Loss (megawatts)	Number of Customers Affected
2019	11	11/01/2019 1 15 AM	11/02/2019 9 30 PM	44 Hours 15 Minutes	ISO New England	NPCC	Connecticut Maine Massachusetts Rhode Island New Hampshire Vermont	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather		80066
2019	11	11/01/2019 2 41 AM		Hours, Minutes	New York State Electric & Gas	NPCC	New York Broome County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather		66325
2019	11	11/03/2019 10 17 PM	11/04/2019 11 10 AM	12 Hours 53 Minutes	Northern States Power Co	MRO	Minnesota Sherburne County	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	0	0
2019	11	11/05/2019 8 56 AM	11/05/2019 11 51 AM	2 Hours, 55 Minutes	JEA	FRCC	Florida Duval County	Unexpected Transmission loss within its area contrary to design, of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	1500	
2019	11	11/08/2019 5 50 AM	11/08/2019 6 10 AM	0 Hours 20 Minutes	Pacificorp	WECC	Utah California Oregon Wyoming	Electrical System Separation (Islanding) where part or parts of power gnd remain(s) operational in an otherwise blocked out area or within the partial failure of an integrated electrical system System Operations	72	
2019	11	11/20/2019 9 49 AM	11/20/2019 3 20 PM	5 Hours 31 Minutes	Pacific Gas & Electric Co	WECC	California Colusa County Lake County Mendocino County Napa County, Solano County Sonoma County Yolo County Shasta County Tehama County	Loss of electric service to more than 50,000 customers for 1 hour or more Severe Weather/Transmission Interruption	178	54000
2019	11	11/26/2019 6 07 PM	11/27/2019 12 27 PM	18 Hours 20 Minutes	Pacific Gas & Electric Co	WECC	California	Loss of electric service to more than 50 000 customers for 1 hour or more Severe Weather	300	93000
2019	11	11/27/2019 12 00 PM	11/30/2019 2 00 AM	62 Hours 0 Minutes	Detroit Edison Co	RF	Michigan Tuscola County Sanilac County, Huron County St Clair County Macomb County Oakland County Wayne County, Livingston County, Washtenaw County, Monroe County,	Loss of electric service to more than 50,000 customers for 1 hour or more -Severe Weather	30	107000
2019	12	12/11/2019 1 27 PM	12/11/2019 1 51 PM	0 Hours, 24 Minutes	Western Area Power Administration Upper Great Plains Region	MRO	North Dakota Burleigh County,	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) Transmission Interruption	18	1
2019	12	12/16/2019 11 55 PM	12/17/2019 1 47 AM	1 Hours 52 Minutes	American Electric Power Texas	TRE	Texas	Unexpected Transmission loss within its area contrary to design of three or more Bulk Electric System Facilities caused by a common disturbance (excluding successful automatic reclosing) -Transmission Interruption	0	0
2019	12	12/31/2019 11 03 AM	01/01/2020 10 59 AM	23 Hours 56 Minutes	American Electric Power Texas	TRE	Texas Nueces County	Electrical System Separation (Islanding) where part or parts of power gnd remain(s) operational in an otherwise blocked out area or within the partial failure of an integrated electrical system - Transmission Interruption	25	0

Note Customers affected are estimates and are preliminary Source Form OE-417 "Electric Emergency Incident and Disturbance Report

Appendix C

Technical notes

This appendix describes how the U. S. Energy Information Administration (EIA) collects, estimates, and reports electric power data in the EPM.

Data quality

The EPM is prepared by the Office of Energy Production, Conversion & Delivery (EPCD), Energy Information Administration (EIA), U.S. Department of Energy. Quality statistics begin with the collection of the correct data. To assure this, ERUS performs routine reviews of the data collected and the forms on which it is collected. Additionally, to assure that the data are collected from the correct parties, ERUS routinely reviews the frames for each data collection.

Automatic, computerized verification of keyed input, review by subject matter specialists, and follow-up with nonrespondents assure quality statistics. To ensure the quality standards established by the EIA, formulas that use the past history of data values in the database have been designed and implemented to check data input for errors automatically. Data values that fall outside the ranges prescribed in the formulas are verified by telephoning respondents to resolve any discrepancies. All survey nonrespondents are identified and contacted.

Reliability of data

There are two types of errors possible in an estimate based on a sample survey: sampling and non-sampling. Sampling errors occur because observations are made only on a sample, not on the entire population. Non-sampling errors can be attributed to many sources in the collection and processing of data. The accuracy of survey results is determined by the joint effects of sampling and non-sampling errors. Monthly sample survey data have both sampling and non-sampling error. Annual survey data are collected by a census and are not subject to sampling error.

Non-sampling errors can be attributed to many sources: (1) inability to obtain complete information about all cases in the sample (i.e., nonresponse); (2) response errors; (3) definitional difficulties; (4) differences in the interpretation of questions; (5) mistakes in recording or coding the data obtained; and (6) other errors of collection, response, coverage, and estimation for missing data. Note that for the cutoff sampling and model-based regression (ratio) estimation that we use, data 'missing' due to nonresponse, and data 'missing' due to being out-of-sample are treated in the same manner. Therefore missing data may be considered to result in sampling error, and variance estimates reflect all missing data.

Although no direct measurement of the biases due to non-sampling errors can be obtained, precautionary steps were taken in all phases of the frame development and data collection, processing, and tabulation processes, in an effort to minimize their influence. See the Data Processing and Data System Editing section for each EIA form for an in-depth discussion of how the sampling and non-sampling errors are handled in each case.

Relative Standard Error: The relative standard error (RSE) statistic, usually given as a percentage, describes the magnitude of sampling error that might reasonably be incurred. The RSE is the square

root of the estimated variance, divided by the variable of interest. The variable of interest may be the ratio of two variables, or a single variable.

The sampling error may be less than the non-sampling error. In fact, large RSE estimates found in preliminary work with these data have often indicated non-sampling errors, which were then identified and corrected. Non-sampling errors may be attributed to many sources, including the response errors, definitional difficulties, differences in the interpretation of questions, mistakes in recording or coding data obtained, and other errors of collection, response, or coverage. These non-sampling errors also occur in complete censuses.

Using the Central Limit Theorem, which applies to sums and means such as are applicable here, there is approximately a 68 percent chance that the true total or mean is within one RSE of the estimated total or mean. Note that reported RSEs are always estimates themselves, and are usually, as here, reported as percentages. As an example, suppose that a net generation from coal value is estimated to be 1,507 million kilowatthours with an estimated RSE of 4.9 percent. This means that, ignoring any non-sampling error, there is approximately a 68 percent chance that the true million kilowatthour value is within approximately 4.9 percent of 1,507 million kilowatthours (that is, between 1,433 and 1,581 million kilowatthours). Also under the Central Limit Theorem, there is approximately a 95 percent chance that the true mean or total is within 2 RSEs of the estimated mean or total.

Note that there are times when a model may not apply, such as in the case of a substantial reclassification of sales, when the relationship between the variable of interest and the regressor data does not hold. In such a case, the new information may represent only itself, and such numbers are added to model results when estimating totals. Further, there are times when sample data may be known to be in error, or are not reported. Such cases are treated as if they were never part of the model-based sample, and values are imputed. Experiments were done to see if nonresponse should be treated differently, but it was decided to treat those cases the same as out-of-sample cases.

Relative Standard Error With Respect to a Superpopulation: The RSESP statistic is similar to the RSE (described above). Like the RSE, it is a statistic designed to estimate the variability of data and is usually given as a percentage. However, where the RSE is only designed to estimate the magnitude of sampling error, the RSESP more fully reflects the impact of variability from sampling and non-sampling errors. This is a more complete measure than RSE in that it can measure statistical variability in a complete census in addition to a sample 21,24. In addition to being a measure of data variability, the RSESP can also be useful in comparing different models that are applied to the same set of data22. This capability is used to test different regression models for imputation and prediction. This testing may include considerations such as comparing different regressors, the comparative reliability of different monthly samples, or the use of different geographical strata or groupings for a given model. For testing purposes, ERUS typically uses recent historical data that have been finalized. Typically, time-series graphics showing two or more models or samples are generated showing the RSESP values over time. In selecting models, consideration is given to total survey error as well as any apparent differences in robustness.

Imputation: For monthly data, if the reported values appeared to be in error and the data issue could not be resolved with the respondent, or if the facility was a nonrespondent, a regression methodology is used to impute for the facility. The same procedure is used to estimate ("predict") data for facilities not in the monthly sample. The regression methodology relies on other data to make estimates for erroneous or missing responses.

Estimation for missing monthly data is accomplished by relating the observed data each month to one or more other data elements (regressors) for which we generally have an annual census. Each year, when new annual regressor data are available, recent monthly relationships are updated, causing slight revisions to estimated monthly results. These revisions are made as soon as the annual data are released.

The basic technique employed is described in the paper "Model-Based Sampling and Inference16," on the EIA website. Additional references can be found on the InterStat website (http://interstat.statjournals.net/). The basis for the current methodology involves a 'borrowing of strength' technique for small domains.

Data revision procedure

ERUS has adopted the following policy with respect to the revision and correction of recurrent data in energy publications:

- Annual survey data are disseminated either as preliminary or final when first appearing in a data product. Data initially released as preliminary will be so noted in the data product. These data are typically released as final by the next dissemination of the same product; however, if final data are available at an earlier interval they may be released in another product.
- All monthly survey data are first disseminated as preliminary. These data are revised after the prior year's data are finalized and are disseminated as revised preliminary. No revisions are made to the published data before this or subsequent to these data being finalized unless significant errors are discovered.
- After data are disseminated as final, further revisions will be considered if they make a difference of 1 percent or greater at the national level. Revisions for differences that do not meet the 1 percent or greater threshold will be determined by the Office Director. In either case, the proposed revision will be subject to the EIA revision policy concerning how it affects other EIA products.
- The magnitudes of changes due to revisions experienced in the past will be included periodically in the data products, so that the reader can assess the accuracy of the data.

Data sources for Electric Power Monthly

Data published in the EPM are compiled from the following sources:

- Form EIA-923, "Power Plant Operations Report,"
- Form EIA 826, "Monthly Electric Utility Sales and Revenues with State Distributions Report,"
- Form EIA 860, "Annual Electric Generator Report,"
- Form EIA-860M, "Monthly Update to the Annual Electric Generator Report," and

- Form EIA 861, "Annual Electric Power Industry Report."

For access to these forms and their instructions, please see:
http://www.eia.gov/cneaf/electricity/page/forms.html.

In addition to the above-named forms, the historical data published in the EPM for periods prior to 2008 are compiled from the following sources:

- FERC Form 423, "Monthly Report of Cost and Quality of Fuels for Electric Plants,"
- Form EIA-423, "Monthly Cost and Quality of Fuels for Electric Plants Report,"
- Form EIA-759, "Monthly Power Plant Report,"
- Form EIA-860A, "Annual Electric Generator Report–Utility,"
- Form EIA-860B, "Annual Electric Generator Report–Nonutility,"
- Form EIA-900, "Monthly Nonutility Power Report,"
- Form EIA-906, "Power Plant Report," and
- Form EIA-920, "Combined Heat and Power Plant Report."

See Appendix A of the historical Electric Power Annual reports to find descriptions of forms that are no longer in use. The publications can be found from the top of the current EPA under previous issues: http://www.eia.gov/electricity/annual.

Rounding rules for data: To round a number to n digits (decimal places), add one unit to the nth digit if the (n+1) digit is 5 or larger and keep the nth digit unchanged if the (n+1) digit is less than 5. The symbol for a number rounded to zero is (*).

Percent difference: The following formula is used to calculate percent differences:

$$\text{Percent Difference} = \left(\frac{x(t_2) - x(t_1)}{|x(t_1)|} \right) x\ 100,$$

where $x(t_1)$ and $x(t_2)$ denote the quantity at year t_1 and subsequent year t_2.

Meanings of symbols appearing in tables: The following symbols have the meaning described below:

P Indicates a preliminary value.

NM Data value is not meaningful, either (1) when compared to the same value for the previous time period, or (2) when a data value is not meaningful due to having a high Relative Standard Error (RSE).

Form EIA-826

The Form EIA 826, "Monthly Electric Utility Sales and Revenues with State Distributions Report," is a monthly collection of data from a sample of approximately 500 of the largest electric utilities (primarily investor owned and publicly owned) as well as a census of energy service providers with sales to ultimate consumers in deregulated States. Form EIA-861, with approximately 3,300 respondents, serves as a frame from which the Form 826 sample is drawn. Based on this sample, a model is used to estimate for the entire universe of U.S. electric utilities.

Instrument and design history: The collection of electric power sales data and related information began in the early 1940's and was established as FPC Form 5 by FPC Order 141 in 1947. In 1980, the report was revised with only selected income items remaining and became the FERC Form 5. The Form EIA 826, "Electric Utility Company Monthly Statement," replaced the FERC Form 5 in January 1983. In January 1987, the "Electric Utility Company Monthly Statement" was changed to the "Monthly Electric Utility Sales and Revenue Report with State Distributions." The title was changed again in January 2002 to "Monthly Electric Utility Sales and Revenues with State Distributions Report" to become consistent with other EIA report titles. The Form EIA 826 was revised in January 1990, and some data elements were eliminated.

In 1993, EIA for the first time used a model sample for the Form EIA 826. A stratified random sample, employing auxiliary data, was used for each of the four previous years. The sample for the Form EIA 826 was designed to obtain estimates of electricity sales and average price of electricity to ultimate consumers at the State level by end use sector.

Starting with data for January 2001, the restructuring of the electric power industry was taken into account by forming three schedules on the Form EIA-826. Schedule 1, Part A is for full service utilities that operate as in the past. Schedule 1, Part B is for electric service providers only, and Schedule 1, Part C is for those utilities providing distribution service for those on Schedule 1, Part B. In addition, Schedule 1 Part D is for those energy providers to ultimate consumers or power marketers that provide bundled service. Also, the Form EIA-826 frame was modified to include all investor-owned electric utilities and a sample of companies from other ownership classes. A new method of estimation was implemented at this same time. (See EPM April 2001, p.1.)

With the November 2004 issue of the EPM, EIA published for the first time preliminary electricity sales data for the Transportation Sector. These data are for electricity delivered to and consumed by local, regional, and metropolitan transportation systems. The data being published for the first time in the October EPM included July 2004 data as well as year-to-date. EIA's efforts to develop these new data have identified anomalies in several States and the District of Columbia. Some of these anomalies are caused by issues such as: 1) Some respondents have classified themselves as outside the realm of the survey. The Form EIA-826 collects data from those respondents providing electricity and other services to the ultimate end users. EIA has experienced specific situations where, although the respondents' customers are the ultimate end users, particular end users qualify under wholesale rate schedules. 2) The Form EIA-826 is a cutoff sample and not intended to be a census.

Beginning with 2008 data and some annual 2007 data, the Form EIA-923 replaced Forms EIA-906, EIA-920, EIA-423, and FERC 423. In addition, several sections of the discontinued Form EIA-767 have been included in either the Form EIA-860 or Form EIA-923. See the following link for a detailed explanation. http://www.eia.gov/cneaf/electricity/2008forms/consolidate.html

The legislative authority to collect these data is defined in the Federal Energy Administration Act of 1974 (Public Law 93-275, Sec. 13(b), 5(a), 5(b), 52).

Data processing and data system editing: Monthly Form EIA-826 submission is available via an Internet Data Collection (IDC) system. The completed data are due to EIA by the last calendar day of the month following the reporting month. Nonrespondents are contacted to obtain the data. The data are edited and additional checks are completed. Following verification, imputation is run, and tables and text of the aggregated data are produced for inclusion in the EPM.

Imputation: Regression prediction, or imputation, is done for entities not in the monthly sample and for any nonrespondents. Regressor data for Schedule 1, Part A is the average monthly sales or revenue from the most recent finalized data from survey Form EIA-861. Beginning with January 2008 data and the finalized 2007 data, the regressor data for Schedule 1 Parts B and C is the prior month's data.

Formulas and methodologies: The Form EIA 826 data are collected by end-use sector (residential, commercial, industrial, and transportation) and State. Form EIA 861 data are used as the frame from which the sample is selected and in some instances also as regressor data. Updates are made to the frame to reflect mergers that affect data processing.

With the revised definitions for the commercial and industrial sectors to include all data previously reported as 'other' data except transportation, and a separate transportation sector, all responses that would formerly have been reported under the "other" sector are now to be reported under one of the sectors that currently exist. This means there is probably a lower correlation, in general, between, say, commercial Form EIA-826 data for 2004 and commercial Form EIA-861 data for 2003 than there was between commercial Form EIA-826 data for 2003 and commercial Form EIA-861 data for 2002 or earlier years, although commercial and industrial definitions have always been somewhat nebulous due to power companies not having complete information on all customers.

Data submitted for January 2004 represent the first time respondents were to provide data specifically for the transportation end-use sector.

During 2003 transportation data were collected annually through Form EIA-861. Beginning in 2004 the transportation data were collected on a monthly basis via Form EIA-826. In order to develop an estimate of the monthly transportation data for 2003, values for both sales of electricity to ultimate customers and revenue from sales of electricity to ultimate customers were estimated using the 2004 monthly profile for the sales and revenues from the data collected via Form EIA-826. All monthly non-transportation data for 2003 (i.e. street lighting, etc.), which were previously reported in the "other" end-use sector on the Form EIA-826 have been prorated into the Commercial and Industrial end-use sectors based on the 2003 Form EIA-861 profile.

A monthly distribution factor was developed for the monthly data collected in 2004 (for the months of January through November). The transportation sales and revenues for January 2004 were assumed to be equivalent to the transportation sales and revenues for November 2004. The monthly distribution factors for January through November were applied to the annual values for transportation sales and revenues collected via Form EIA-861 to develop corresponding 2003 monthly values. The eleven month estimated totals from January through November 2003 were subtracted from the annual values obtained from Form EIA-861 in order to obtain the December 2003 values.

Data from the Form EIA-826 are used to determine estimates by sector at the State, Census division, and national level. State level sales and revenues estimates are first calculated. Then the ratio of revenue divided by sales is calculated to estimate the price of electricity to ultimate consumers at the State level. The estimates are accumulated separately to produce the Census division and U.S. level estimates[1].

Some electric utilities provide service in more than one State. To facilitate the estimation, the State service area is actually used as the sampling unit. For each State served by each utility, there is a utility State part, or "State service area." This approach allows for an explicit calculation of estimates for sales, revenue, and average price of electricity to ultimate consumers by end use sector at State, Census division, and national level. Estimation procedures include imputation to account for nonresponse. Non-sampling error must also be considered. The non-sampling error is not estimated directly, although attempts are made to minimize the non-sampling error.

Average price of electricity to ultimate consumers represents the cost per unit of electricity sold and is calculated by dividing electric revenue from ultimate consumers by the corresponding sales of electricity. The average price of electricity to ultimate consumers is calculated for all consumers and for each end-use sector.

The electric revenue used to calculate the average price of electricity to ultimate consumers is the operating revenue reported by the electric utility. Operating revenue includes energy charges, demand charges, consumer service charges, environmental surcharges, fuel adjustments, and other miscellaneous charges. Electric utility operating revenues also include State and Federal income taxes and taxes other than income taxes paid by the utility.

The average price of electricity to ultimate consumers reported in this publication by sector represents a weighted average of consumer revenue and sales within sectors and across sectors for all consumers, and does not reflect the per kWh rate charged by the electric utility to the individual consumers. Electric utilities typically employ a number of rate schedules within a single sector. These alternative rate schedules reflect the varying consumption levels and patterns of consumers and their associated impact on the costs to the electric utility for providing electrical service.

Adjusting monthly data to annual data: As a final adjustment based on our most complete data, use is made of final Form EIA-861 data, when available. The annual totals for Form EIA-826 data by State and end-use sector are compared to the corresponding Form EIA-861 values for sales and revenue. The ratio of these two values in each case is then used to adjust each corresponding monthly value.

Sensitive data: Most of the data collected on the Form EIA-826 are not considered business sensitive. However, revenue, sales, and customer data collected from energy service providers (Schedule 1, Part B), which do not also provide energy delivery, are considered business sensitive and must adhere to EIA's "Policy on the Disclosure of Individually Identifiable Energy Information in the Possession of the EIA" (45Federal Register 59812 (1980)).

Form EIA-860

The Form EIA 860, "Annual Electric Generator Report," is a mandatory annual census of all existing and planned electric generating facilities in the United States with a total generator nameplate capacity of 1 or more megawatts. The survey is used to collect data on existing power plants and 10 year plans for constructing new plants, as well as generating unit additions, modifications, and retirements in existing plants. Data on the survey are collected at the generator level. Certain power plant environmental-related data are collected at the boiler level. These data include environmental equipment design parameters, boiler air emission standards, and boiler emission controls The Form EIA-860 is made available in January to collect data related to the previous year.

Instrument and design history: The Form EIA-860 was originally implemented in January 1985 to collect data as of year-end 1984. It was preceded by several Federal Power Commission (FPC) forms including the FPC Form 4, Form 12 and 12E, Form 67, and Form EIA-411. In January 1999, the Form EIA-860 was renamed the Form EIA-860A, "Annual Electric Generator Report – Utility" and was implemented to collect data from electric utilities as of January 1, 1999.

In 1989, the Form EIA-867, "Annual Nonutility Power Producer Report," was initiated to collect plant data on unregulated entities with a total generator nameplate capacity of 5 or more megawatts. In 1992, the reporting threshold of the Form EIA-867 was lowered to include all facilities with a combined nameplate capacity of 1 or more megawatts. Previously, data were collected every 3 years from facilities with a nameplate capacity between 1 and 5 megawatts. In 1998, the Form EIA-867, was renamed Form EIA-860B, "Annual Electric Generator Report – Nonutility." The Form EIA-860B was a mandatory survey of all existing and planned nonutility electric generating facilities in the United States with a total generator nameplate capacity of 1 or more megawatts.

Beginning with data collected for the year 2001, the infrastructure data collected on the Form EIA-860A and the Form EIA-860B were combined into the new Form EIA-860 and the monthly and annual versions of the Form EIA-906.

Starting with 2007, design parameters data formerly collected on Form EIA-767 were collected on Form EIA-860. These include design parameters associated with certain steam-electric plants' boilers, cooling systems, flue gas particulate collectors, flue gas desulfurization units, and stacks and flues.

The Federal Energy Administration Act of 1974 (Public Law 93-275) defines the legislative authority to collect these data.

Estimation of form eia-860 data: EIA received forms from all 18,151 existing generators in the 2010 Form EIA-860 frame, so no imputation was required.

Prime Movers: The Form EIA-860 sometimes represents a generator's prime mover by using the abbreviations in the table below.

Prime Mover Code	Prime Mover Description
BA	Energy Storage, Battery
CE	Energy Storage, Compressed Air
CP	Energy Storage, Concentrated Solar Power
FW	Energy Storage, Flywheel
PS	Energy Storage, Reversible Hydraulic Turbine (Pumped Storage)
ES	Energy Storage, Other
ST	Steam Turbine, including nuclear, geothermal and solar steam (does not include combinedcycle)
GT	Combustion (Gas) Turbine (including jet engine design)
IC	Internal Combustion Engine (diesel, piston, reciprocating)
CA	Combined Cycle Steam Part
CT	Combined Cycle Combustion Turbine Part
CS	Combined Cycle Single Shaft
CC	Combined Cycle Total Unit
HA	Hydrokinetic, Axial Flow Turbine
HB	Hydrokinetic, Wave Buoy
HK	Hydrokinetic, Other
HY	Hydroelectric Turbine (including turbines associated with delivery of water bypipeline)
BT	Turbines Used in a Binary Cycle (including those used for geothermal applications)
PV	Photovoltaic
WT	Wind Turbine, Onshore
WS	Wind Turbine, Offshore
FC	Fuel Cell
OT	Other

Energy Sources: The Form EIA-860 sometimes represents the energy sources associated with generators by using the abbreviations and/or groupings in the table below.

Energy Source Grouping	Energy Source Code	Energy Source Description
Coal	ANT	Anthracite Coal
	BIT	Bituminous Coal
	LIG	Lignite Coal
	SUB	Subbituminous Coal
	SGC	Coal-Derived Synthesis Gas
	WC	Waste/Other Coal (including anthracite culm, bituminous gob, fine coal, lignite waste, waste coal)
Petroleum Products	DFO	Distillate Fuel Oil (including diesel, No. 1, No. 2, and No. 4 fuel oils)
	JF	Jet Fuel
	KER	Kerosene
	PC	Petroleum Coke
	PG	Gaseous Propane
	RFO	Residual Fuel Oil (including No. 5, and No. 6 fuel oils, and bunker C fuel oil)
	SG	Synthesis Gas from Petroleum Coke
	WO	Waste/Other Oil (including crude oil, liquid butane, liquid propane, naphtha, oil waste, re-refined motor oil, sludge oil, tar oil, or other petroleum-based liquid wastes)
Natural Gas and Other Gases	BFG	Blast Furnace Gas
	NG	Natural Gas
	OG	Other Gas
Nuclear	NUC	Nuclear (including Uranium, Plutonium, and Thorium)
Hydroelectric Conventional	WAT (Prime Mover = HY)	Water at a Conventional Hydroelectric Turbine, and water used in Wave Buoy Hydrokinetic Technology, Current Hydrokinetic Technology, and Tidal Hydrokinetic Technology
Hydroelectric Pumped Storage	WAT (Prime Mover = PS)	Pumping Energy for Reversible (Pumped Storage) Hydroelectric Turbine
Wood and Wood-Derived Fuels	WDS	Wood/Wood Waste Solids (including paper pellets, railroad ties, utility poles, wood chips, bark, and wood waste solids)
	WDL	Wood Waste Liquids (excluding Black Liquor but including red liquor, sludge wood, spent sulfite liquor, and other wood-based liquids)
	BLQ	Black Liquor
Other Biomass	AB	Agricultural By-Products
	MSW	Municipal Solid Waste
	OBG	Other Biomass Gas (including digester gas, methane, and other biomass gases)
	OBL	Other Biomass Liquids
	OBS	Other Biomass Solids
Other Renewable Energy Sources	LFG	Landfill Gas
	SLW	Sludge Waste
	SUN	Solar (including solar thermal)
	WND	Wind
	GEO	Geothermal
Other Energy Sources	PUR	Purchased Steam
	WH	Waste heat not directly attributed to a fuel source
	TDF	Tire-Derived Fuels
	MWH	Electricity used for energy storage

OTH	Other

Sensitive data: The tested heat rate data collected on the Form EIA-860 are considered business sensitive.

Form EIA-860M

The Form EIA 860M, "Monthly Update to the Annual Electric Generator Report," is a mandatory monthly survey that collects data on the status of proposed new generators or changes to existing generators for plants that report on Form EIA-860.

The Form EIA-860M has a rolling frame based upon planned changes to capacity as reported on the previous Form EIA-860. Respondents are added to the frame 12 months prior to the expected effective date for all new units or expected retirement date for existing units. For all other types of capacity changes (including retirements, uprates, derates, repowering, or other modifications), respondents are added 1 month prior to the anticipated modification change date. Respondents are removed from the frame at the completion of the changes or if the change date is moved back so that the plant no longer qualifies to be in the frame. Typically, 150 to 200 utilities per month are required to report for 175 to 250 plants (including 250 to 400 generating units) on this form. The unit characteristics of interest are changes to the previously reported planned operating month and year, prime mover type, capacity, and energy sources.

Instrument and design history: The data collected on Form EIA-860M was originally collected via phone calls at the end of each month. During 2005, the Form EIA-860M was introduced as a mandatory form using the Internet Data Collection (IDC) system.

The legislative authority to collect these data is defined in the Federal Energy Administration Act of 1974 (Public Law 93-275, Sec. 13(b), 5(a), 5(b), 52).

Data processing and data system editing: Approximately 150 to 200 utilities are requested to provide data each month on the Form EIA 860M. These data are collected via the IDC system and automatically checked for certain errors. Most of the quality assurance issues are addressed by the respondents as part of the automatic edit check process. In some cases, respondents are subsequently contacted about their explanatory overrides to the edit checks.

Sensitive data: Data collected on the Form EIA-860M are not considered to be sensitive.

Form EIA-861

The Form EIA 861, "Annual Electric Power Industry Report," is a mandatory census of electric power industry participants in the United States. The survey is used to collect information on power sales and revenue data from approximately 3,300 respondents. About 3,200 are electric utilities and the remainder are nontraditional utilities such as energy service providers or the unregulated subsidiaries of electric utilities and power marketers.

Instrument and design history: The Form EIA 861 was implemented in January 1985 for collection of data as of year end 1984. The Federal Energy Administration Act of 1974 (Public Law 93 275) defines the legislative authority to collect these data.

Data processing and data system editing: The Form EIA 861 is made available to the respondents in January of each year to collect data as of the end of the preceding calendar year. The data are edited when entered into the interactive on line system. Internal edit checks are per-formed to verify that current data total across and between schedules, and are comparable to data reported the previous year. Edit checks are also performed to compare data reported on the Form EIA 861 and similar data reported on the Form EIA 826. Respondents are telephoned to obtain clarification of reported data and to obtain missing data.

Data for the Form EIA 861 are collected at the owner level from all electric utilities including energy service providers in the United States, its territories, and Puerto Rico. Form EIA 861 data in this report are for the United States only.

Average price of electricity to ultimate consumers represents the cost per unit of electricity sold and is calculated by dividing electric revenue from ultimate consumers by the corresponding sales of electricity. The average price of electricity to ultimate consumers is calculated for all consumers and for each end-use sector.

The electric revenue used to calculate the average price of electricity to ultimate consumers is the operating revenue reported by the electric power industry participant. Operating revenue includes energy charges, demand charges, consumer service charges, environmental surcharges, fuel adjustments, and other miscellaneous charges. Electric power industry participant operating revenues also include State and Federal income taxes and other taxes paid by the utility.

The average price of electricity to ultimate consumers reported in this publication by sector represents a weighted average of consumer revenue and sales, and does not equal the per kWh rate charged by the electric power industry participant to the individual consumers. Electric utilities typically employ a number of rate schedules within a single sector. These alternative rate schedules reflect the varying consumption levels and patterns of consumers and their associated impact on the costs to the electric power industry participant for providing electrical service.

Sensitive data: Data collected on the Form EIA-861 are not considered to be sensitive.

Form EIA-923

Form EIA-923, "Power Plant Operations Report," is a monthly collection of data on receipts and cost of fossil fuels, fuel stocks, generation, consumption of fuel for generation, and environmental data (e.g. emission controls and cooling systems). Data are collected from a monthly sample of approximately 1,900 plants, which includes a census of nuclear and pumped-storage hydroelectric plants. In addition approximately 4,050 plants, representing all other generators 1 MW or greater, are collected annually. In addition to electric power generating plants, respondents include fuel storage terminals without

generating capacity that receive shipments of fossil fuels for eventual use in electric power generation. The monthly data are due by the last day of the month following the reporting period.

Receipts of fossil fuels, fuel cost and quality information, and fuel stocks at the end of the reporting period are all reported at the plant level. Plants that burn organic fuels and have a steam turbine capacity of at least 10 megawatts report consumption at the boiler level and generation at the generator level. For all other plants, consumption is reported at the prime-mover level. For these plants, generation is reported either at the prime-mover level or, for noncombustible sources (e.g. wind, nuclear), at the prime-mover and energy source level. The source and disposition of electricity is reported annually for nonutilities at the plant level as is revenue from sales for resale. Environmental data are collected annually from facilities that have a steam turbine capacity of at least 10 megawatts.

Instrument and design history:

Receipts and cost and quality of fossil fuels
On July 7, 1972, the Federal Power Commission (FPC) issued Order Number 453 enacting the New Code of Federal Regulations, Section 141.61, legally creating the FPC Form 423. Originally, the form was used to collect data only on fossil steam plants, but was amended in 1974 to include data on internal-combustion and combustion-turbine units. The FERC Form 423 replaced the FPC Form 423 in January 1983. The FERC Form 423 eliminated peaking units, for which data were previously collected on the FPC Form 423. In addition, the generator nameplate capacity threshold was changed from 25 megawatts to 50 megawatts. This reduction in coverage eliminated approximately 50 utilities and 250 plants. All historical FPC Form 423 data in this publication were revised to reflect the new generator-nameplate- capacity threshold of 50 or more megawatts reported on the FERC Form 423. In January 1991, the collection of data on the FERC Form 423 was extended to include combined cycle units. Historical data have not been revised to include these units. Starting with the January 1993 data, the FERC began to collect the data directly from the respondents.

The Form EIA-423 was originally implemented in January 2002 to collect monthly cost and quality data for fossil fuel receipts from owners or operators of nonutility electricity generating plants. Due to the restructuring of the electric power industry, many plants which had historically submitted this information for utility plants on the FERC Form 423 (see above) were being transferred to the nonutility sector. As a result, a large percentage of fossil fuel receipts were no longer being reported. The Form EIA-423 was implemented to fill this void and to capture the data associated with existing non-regulated power producers. Its design closely followed that of the FERC Form 423.

Both the Form EIA-423 and FERC Form 423 were superseded by Schedule 2 of the Form EIA-923 in January of 2008. At the time, the Form EIA-923 maintained the 50-megawatt threshold for these data. In January 2013, the threshold was changed to 200 megawatts for plants primarily fueled by natural gas, petroleum coke, distillate fuel oil, and residual fuel oil. The requirement to report self- produced and minor fuels, i.e., blast furnace gas, other manufactured gases, kerosene, jet fuel, propane, and waste oils was eliminated. The threshold for coal plants remained at 50 megawatts.

Not all data are collected monthly on the Form EIA-923. Beginning with 2008 data, a sample of the respondents report monthly, with the remainder reporting annually. Until January 2013, monthly fuel receipts values for the annual surveys were imputed via regression. Prior to 2008, Schedule 2 annual data were not collected or imputed.

Generation, consumption, and stocks

The Bureau of Census and the U.S. Geological Survey collected, compiled, and published data on the electric power industry prior to 1936. After 1936, the Federal Power Commission (FPC) assumed all data collection and publication responsibilities for the electric power industry and implemented the Form FPC-4. The Federal Power Act, Section 311 and 312, and FPC Order 141 defined the legislative authority to collect power production data. The Form EIA-759 replaced the Form FPC-4 in January 1982.

In 1996, the Form EIA-900 was initiated to collect sales for resale data from unregulated entities14. In 1998, the form was modified to collect sales for resale, gross generation, and sales to end user data. In 1999, the form was modified to collect net generation, consumption, and ending stock data15. In 2000, the form was modified to include the production of useful thermal output data.

In January 2001, Form EIA-906 superseded Forms EIA-759 and EIA-900. In January 2004, Form EIA-920 superseded Form EIA-906 for those plants defined as combined heat and power plants; all other plants that generate electricity continue to report on Form EIA-906. The Federal Energy Administration Act of 1974 (Public Law 93-275) defines the legislative authority to collect these data.

Forms EIA-906 and EIA-920 were superseded by survey Form EIA-923 beginning in January 2008 with the collection of annual 2007 data and monthly 2008 data.

Data processing and data system editing: Respondents are encouraged to enter data directly into a computerized database via the Internet Data Collection (IDC) system. A variety of automated quality control mechanisms are run during this process, such as range checks and comparisons with historical data. These edit checks are performed as the data are provided, and many problems that are encountered are resolved during the reporting process. Those plants that are unable to use the electronic reporting medium provide the data in hard copy, typically via fax. These data are manually entered into the computerized database. The data are subjected to the same edits as those that are electronically submitted.

If the reported data appear to be in error and the data issue cannot be resolved by follow up contact with the respondent, or if a facility is a nonrespondent, a regression methodology is used to impute for the facility. Beginning in January 2013, imputation is not performed for fuel receipts data reported on Schedule 2.

Imputation: For select survey data elements collected monthly, regression prediction, or imputation, is done for missing data, including non-sampled units and any non-respondents. For data collected annually, imputation is performed for non-respondents. For gross generation and total fuel

consumption, multiple regression is used for imputation (see discussion, above). Only approximately 0.02 percent of the national total generation for 2010 is imputed, although this will vary by State and energy source.

When gross generation is reported and net generation is not available, net generation is estimated by using a fixed ratio to gross generation by prime-mover type and installed environmental equipment. These ratios are:

Net Generation = (Factor) x Gross Generation

Prime Movers:
Combined Cycle Steam - 0.97
Combined Cycle Single Shaft - 0.97
Combined Cycle Combustion Turbine - 0.97
Compressed Air - 0.97
Fuel Cell - 0.99
Gas Turbine - 0.98
Hydroelectric Turbine - 0.99
Hydroelectric Pumped Storage - 0.99
Internal Combustion Engine - 0.98
Other - 0.97
Photovoltaic - 0.99
Steam Turbine - 0.97
Wind Turbine - 0.99

Environmental Equipment:
Flue Gas Desulfurization - 0.97
Flue Gas Particulate 0.99
All Others - 0.97

For stocks, a linear combination of the prior month's ending stocks value and the current month's consumption and receipts values are used.

Receipts of fossil fuels: Receipts data, including cost and quality of fuels, are collected at the plant level from selected electric generating plants and fossil-fuel storage terminals in the United States. These plants include independent power producers, electric utilities, and commercial and industrial combined heat and power producers. All plants with a total fossil-fueled nameplate capacity of 50 megawatts or more (excluding storage terminals, which do not produce electricity) were required to report receipts of fossil fuels. In January 2013, the threshold was changed to 200 megawatts for plants primarily fueled by natural gas, petroleum coke, distillate fuel oil, and residual fuel oil. The requirement to report self-produced and minor fuels, i.e., blast furnace gas, other manufactured gases, kerosene, jet fuel, propane, and waste oils was eliminated. The threshold for coal plants remained at 50 megawatts. The data on cost and quality of fuel shipments are used to produce aggregates and weighted averages for each fuel type at the state, Census division, and U.S. levels.

For coal, units for receipts are in tons and units for average heat contents (A) are in million Btu per ton. For petroleum, units for receipts are in barrels and units for average heat contents (A) are in million Btu per barrel.

For gas, units for receipts are in thousand cubic feet (Mcf) and units for average heat contents (A) are in million Btu per thousand cubic foot.

Power production, fuel stocks, and fuel consumption data: The Bureau of Census and the U.S. Geological Survey collected, compiled, and published data on the electric power industry prior to 1936. After 1936, the Federal Power Commission (FPC) assumed all data collection and publication responsibilities for the electric power industry and implemented the Form FPC-4. The Federal Power Act, Section 311 and 312, and FPC Order 141 defined the legislative authority to collect power production data. The Form EIA-759 replaced the Form FPC-4 in January 1982.

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In January 2004, Form EIA-920 superseded Form EIA-906 for those plants defined as combined heat and power plants; all other plants that generate electricity continue to report on Form EIA-906.

In January 2008, Form EIA-923 superseded both the Forms EIA-906 and EIA-920 for the collection of these data.

Methodology to estimate biogenic and non-biogenic municipal solid waste[2]: Municipal solid waste (MSW) consumption for generation of electric power is split into its biogenic and non-biogenic components beginning with 2001 data by the following methodology (see Table 1):

The tonnage of MSW consumed is reported on the Form EIA-923. The composition of MSW and categorization of the components were obtained from the U.S. Environmental Protection Agency (USEPA). For data years 2001 through 2009, the MSW composition was based on the USEPA annual publication, *Municipal Solid Waste in the United States: Facts and Figures*. The compositions developed for the 2009 data year were carried forward for the 2010 through 2018 data years. The most updated composition and categorization of MSW (for the 2019 data year) were also derived from a USEPA publication: *Advancing Sustainable Materials Management: Facts and Figures Report: 2015 Data Tables*. The updated composition values were applied in the October EPM 2019 on the preliminary 2019 values and will be applied going forward in future data years until EIA revises the MSW composition ratios again. The Btu contents of the components of MSW were obtained from various sources.

The numbers in Tables 1 and 2 illustrate two interrelated trends in the composition of the MSW stream. First, the heat content (per unit weight) of the waste stream has been steadily increasing

over time due to higher concentrations of non-biogenic materials. Second, the shares of energy contributed to the waste stream by biogenic and non-biogenic components have been changing over time with the percentage of biogenic materials falling and the share of non-biogenic materials rising.

The potential quantities of combustible MSW discards (which include all MSW material available for combustion with energy recovery, discards to landfill, and other disposal) were multiplied by their respective Btu contents. The EPA-based categories of MSW were then classified into renewable and non-renewable groupings. From this, EIA calculated how much of the energy potentially consumed from MSW was attributed to biogenic components and how much was attributed to non-biogenic components (see Tables 1 and 2, below). [3]

These values are used to allocate net generation published in the Electric Power Monthly generation tables. The tons of biogenic and non-biogenic components were estimated with the assumption that glass and metals were removed prior to combustion. The average Btu/ton for the biogenic and non-

biogenic components is estimated by dividing the total Btu consumption by the total tons. Published net generation attributed to biogenic MSW and non-biogenic MSW is classified under Other Renewables and Other, respectively.

Table 1. Btu consumption for biogenic and non-biogenic municipal solid waste (percent)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	...	2018	2019
Biogenic	57	56	55	55	56	57	55	54	51	51	51	45
Non-biogenic	43	44	45	45	44	43	46	46	49	49	49	55

Table 2. Tonnage consumption for biogenic and non-biogenic municipal solid waste (percent)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	...	2018	2019
Biogenic	77	77	76	76	75	67	65	65	64	64	64	61
Non-biogenic	23	23	24	24	25	34	35	35	36	36	36	39

Useful thermal output: With the implementation of the Form EIA-923, "Power Plant Operations Report," in 2008, combined heat and power (CHP) plants are required to report total fuel consumed and electric power generation. Beginning with the January 2008 data, EIA will estimate the allocation of the total fuel consumed at CHP plants between electric power generation and useful thermal output.

First, an efficiency factor is determined for each plant and prime mover type. Based on data for electric power generation and useful thermal output collected in 2003 (on Form EIA-906, "Power Plant Report") efficiency was calculated for each prime mover type at a plant. The efficiency factor is the total output in Btu, including electric power and useful thermal output (UTO), divided by the total input in Btu. Electric power is converted to Btu at 3,412 Btu per kilowatthour.

Second, to calculate the amount of fuel for electric power, the gross generation in Btu is multiplied by the efficiency factor. The fuel for UTO is the difference between the total fuel reported and the fuel for electric power generation. UTO is calculated by multiplying the fuel for UTO by the efficiency factor.

In addition, if the total fuel reported is less than the estimated fuel for electric power generation, then the fuel for electric power generation is equal to the total fuel consumed, and the UTO will be zero.

Conversion of petroleum coke to liquid petroleum: The quantity conversion is 5 barrels (of 42 U.S. gallons each) per short ton (2,000 pounds).

Conversion of propane gas to liquid petroleum: The quantity conversion is 1.53 Mcf (thousand cubic feet) per barrel (or 42 U.S. gallons each).

Conversion of synthesis gas from coal to coal: The quantity conversion is 98 Mcf (thousand cubic feet) per short ton (2,000 pounds).

Conversion of synthesis gas from petroleum coke to petroleum coke: The quantity conversion is 107.42 Mcf (thousand cubic feet) per short ton (2,000 pounds).

Issues within historical data series:

Receipts and cost and quality of fossil fuels
Values for receipts of natural gas for 2001 forward do not include blast furnace gas or other gas.

Historical data collected on FERC Form 423 and published by EIA have been reviewed for consistency between volumes and prices and for their consistency over time. However, these data were collected by FERC for regulatory rather than statistical and publication purposes. EIA did not attempt to resolve any late filing issues in the FERC Form 423 data. In 2003, EIA introduced a procedure to estimate for late or non-responding entities due to report on the FERC Form 423. Due to the introduction of this procedure, 2003 and later data cannot be directly compared to previous years' data. In January 2013, this estimation procedure was dropped.

Prior to 2008, regulated plants reported receipts data on the FERC Form 423. These plants, along with unregulated plants, now report receipts data on Schedule 2 of Form EIA-923. Because FERC issued waivers to the FERC Form 423 filing requirements to some plants who met certain criteria, and because not all types of generators were required to report (only steam turbines and combined-cycle units reported), a significant number of plants either did not submit fossil fuel receipts data or submitted only a portion of their fossil fuel receipts. Since Form EIA-923 does not have exemptions based on generator type or reporting waivers, receipts data from 2008 and later cannot be directly compared to previous years' data for the regulated sector. Furthermore, there may be a notable increase in fuel receipts beginning with January 2008 data.

Starting with the revised data for 2008, tables for total receipts begin to reflect estimation for all plants with capacity over 1 megawatt, to be consistent with other electric power data. Previous receipts data published have been a legacy of their original collection as information for a regulatory agency, not as a survey to provide more meaningful estimates of totals for statistical purposes. Totals appeared to become smaller as more electric production came from unregulated plants, until the Form EIA-423 was created to help fill that gap. As a further improvement, estimation of all receipts for the universe normally depicted in the EPM (i.e., 1 megawatt and above), with associated relative standard errors, provides a more complete assessment of the market.

Generation and consumption
Beginning in 2008, a new method of allocating fuel consumption between electric power generation and useful thermal output (UTO) was implemented. This new methodology evenly distributes a combined heat and power (CHP) plant's losses between the two output products (electric power and UTO). In the historical data, UTO was consistently assumed to be 80 percent efficient and all other losses at the plant were allocated to electric power. This change causes the fuel for electric power to be decreased while the fuel for UTO is increased as both are given the same efficiency. This results in the appearance of an increase in efficiency of production of electric power between periods.

Sensitive data: Most of the data collected on the Form EIA-923 are not considered business sensitive. However, the cost of fuel delivered to nonutilities, commodity cost of fossil fuels, and reported fuel stocks at the end of the reporting period are considered business sensitive and must adhere to EIA's "Policy on the Disclosure of Individually Identifiable Energy Information in the Possession of the EIA" (45Federal Register 59812 (1980)).

Average Capacity Factors

This section describes the methodology for calculating capacity factors by fuel and technology type for operating electric power plants. Capacity factor is a measure (expressed as a percent) of how often an electric generator operates over a specific period of time, using a ratio of the actual output to the maximum possible output over that time period.

The capacity factor calculation only includes operating electric generators in the Electric Power Sector (sectors 1, 2 and 3) using the net generation reported on the Form EIA-923 and the net summer capacity reported on the Form EIA-860. The capacity factor for a particular fuel/technology type is given by:

$$CapacityFactor = \left(\frac{\Upsilon_{x,m} \sum Generation_{x,m}}{\sum_{x,m} Capacity_{x,m} * AvailableTime_{x,m}} \right)$$

Where x represents generators of that fuel/technology combination and m represents the period of time (month or year). Generation and capacity are specific to a generator, and the generator is categorized by its primary fuel type as reported on the EIA-860. All generation from that generator is included, regardless of other fuels consumed. Available time is also specific to the generator in order to account for differing online and retirement dates. Therefore, these published capacity factors will differ from a simple calculation using annual generation and capacity totals from the appropriate tables in this publication.

NERC classification

The Florida Reliability Coordinating Council (FRCC) separated itself from the Southeastern Electric Reliability Council (SERC) in the mid-1990s. In 1998, several utilities realigned from Southwest Power Pool (SPP) to SERC. Name changes altered both the Mid-Continent Area Power Pool (MAPP) to the Midwest Reliability Organization (MRO) and the Western Systems Coordinating Council (WSCC) to the Western Energy Coordinating Council (WECC). The MRO membership boundaries have altered over time, but WECC membership boundaries have not. The utilities in the associated regional entity identified as the Alaska System Coordination Council (ASCC) dropped their formal participation in NERC. Both the States of Alaska and Hawaii are not contiguous with the other continental States and have no electrical interconnections. At the close of calendar year 2005, the following reliability regional councils were dissolved: East Central Area Reliability Coordinating Agreement (ECAR), Mid-Atlantic Area Council (MAAC), and Mid-America Interconnected Network (MAIN).

On January 1, 2006, the ReliabilityFirst Corporation (RFC) came into existence as a new regional reliability council. Individual utility membership in the former ECAR, MAAC, and MAIN councils mostly shifted to RFC. However, adjustments in membership as utilities joined or left various reliability councils impacted MRO, SERC, and SPP. The Texas Regional Entity (TRE) was formed from a delegation of authority from NERC to handle the regional responsibilities of the Electric Reliability Council of Texas (ERCOT). The revised delegation agreements covering all the regions were approved by the Federal Energy Regulatory Commission on March 21, 2008. Reliability Councils that are unchanged include: Florida Reliability Coordinating Council (FRCC), Northeast Power Coordinating Council (NPCC), and the Western Energy Coordinating Council (WECC

The new NERC Regional Council names are as follows:

- Florida Reliability Coordinating Council (FRCC),
- Midwest Reliability Organization (MRO),
- Northeast Power Coordinating Council (NPCC),
- ReliabilityFirst Corporation (RFC),
- Southeastern Electric Reliability Council (SERC),
- Southwest Power Pool (SPP),
- Texas Regional Entity (TRE), and
- Western Energy Coordinating Council (WECC).

Business classification

Nonutility power producers consist of corporations, persons, agencies, authorities, or other legal entities that own or operate facilities for electric generation but are not electric utilities. This includes qualifying cogenerators, small power producer, and independent power producers. Furthermore, nonutility power producers do not have a designated franchised service area. In addition to entities whose primary business is the production and sale of electric power, entities with other primary business classifications can and do sell electric power. These can consist of manufacturing, agricultural, forestry, transportation, finance, service and administrative industries, based on the Office of Management and Budget's Standard Industrial Classification (SIC) Manual. In 1997, the SIC Manual name was changed to North American Industry Classification System (NAICS). The following is a list of the main classifications and the category of primary business activity within each classification.

Agriculture, Forestry, and Fishing

111 Agriculture production-crops
112 Agriculture production, livestock and animal specialties
113 Forestry
114 Fishing, hunting, and trapping
115 Agricultural services

Mining

211 Oil and gas extraction
2121 Coal mining
2122 Metal mining

2123 Mining and quarrying of nonmetallic minerals except fuels

Construction

23

Manufacturing

311 Food and kindred products
3122 Tobacco products
314 Textile and mill products
315 Apparel and other finished products made from fabrics and similar materials
316 Leather and leather products
321 Lumber and wood products, except furniture
322 Paper and allied products (other than 322122 or 32213)
322122 Paper mills, except building paper
32213 Paperboard mills
323 Printing and publishing
324 Petroleum refining and related industries (other than 32411)
32411 Petroleum refining
325 Chemicals and allied products (other than 325188, 325211, 32512, or 325311)
32512 Industrial organic chemicals
325188 Industrial Inorganic Chemicals
325211 Plastics materials and resins
325311 Nitrogenous fertilizers
326 Rubber and miscellaneous plastic products
327 Stone, clay, glass, and concrete products (other than 32731)
32731 Cement, hydraulic
331 Primary metal industries (other than 331111 or 331312)
331111 Blast furnaces and steel mills
331312 Primary aluminum
332 Fabricated metal products, except machinery and transportation equipment
333 Industrial and commercial equipment and components except computer equipment
3345 Measuring, analyzing, and controlling instruments, photographic, medical, and optical goods, watches and clocks
335 Electronic and other electrical equipment and components except computer equipment
336 Transportation equipment
337 Furniture and fixtures
339 Miscellaneous manufacturing industries

Transportation and Public Utilities

22 Electric, gas, and sanitary services
2212 Natural gas transmission
2213 Water supply
22131 Irrigation systems
22132 Sewerage systems
481 Transportation by air
482 Railroad transportation
483 Water transportation
484 Motor freight transportation and warehousing
485 Local and suburban transit and interurban highway passenger transport
486 Pipelines, except natural gas
487 Transportation services
491 United States Postal Service
513 Communications
562212 Refuse systems

Wholesale Trade

421 to 422

Retail Trade

441 to 454

Finance, Insurance, and Real Estate

521 to 533

Services

512 Motion pictures
514 Business services
514199 Miscellaneous services
541 Legal services
561 Engineering, accounting, research, management, and related services
611 Education services
622 Health services
624 Social services
712 Museums, art galleries, and botanical and zoological gardens
713 Amusement and recreation services
721 Hotels
811 Miscellaneous repair services
8111 Automotive repair, services, and parking
812 Personal services
813 Membership organizations
814 Private households

Public Administration

92

Multiple Survey Programs- Small Scale PV Solar Estimation of Generation

Monthly generation from small scale PV solar resources is an estimation of the generation produced from PV solar resources and not the results of a data collection effort for generation directly, with the exception of "Third Party Owned" or (TPO) solar installations which has direct data collection. TPO data however is not comprehensive. TPOs do not operate in every state, TPO collected data is not a large portion of the estimated amount, and the data has been collected for limited period of time. The generation estimate is based on data collected for PV solar capacity.

Capacity of PV solar resources is collected directly from respondents. These data are collected on several EIA forms and from several types of respondents. Monthly data for net-metered PV solar capacity is reported on the Form EIA-826. Form EIA-826 is a cutoff sample drawn from the annual survey Form EIA-861 which collects this data from all respondents. Using data from both of these surveys we have a regression model to impute for the non-sampled monthly capacity.

The survey instruments collect solar net metering capacity from reporting utilities by state and customer class. There are four customer classes: residential, commercial, industrial and transportation. However, the estimation process included only the residential, commercial and industrial customers.[1] Data for these customer classes were further classified by U.S. Census Regions, to ensure adequate number of customer observations in for each estimation group.

Estimation Model: The total PV capacity reported by utilities in the annual EIA-861 survey is the single primary input (regressor) to the monthly estimation of PV capacity by state. The model tested for each Census Region was of the form:

$$y_{i_{2015,m}} = \beta_1 x_i \quad + w_i^{-1/2} e_i \text{, where}$$

$x_{i_{2013}}$ is the ith utility's 2013 (or the last published year) solar PV capacity

$y_{i_{2015,m}}$ is the ith utility's month m, 2015 (or the current year) reported solar PV capacity

w_i is the weight factor, which is the inverse of x_{2013}

β_1 is effectively the growth rate of reported month m solar PV capacity

e_i is the error term

The model checks for outliers and removes them from the regression equation inputs. The model calculates RSEs by sector, state, census region, and US total. Once we have imputed for all of the

monthly net-metered PV solar capacity we add to total net metered capacity, the PV solar capacity collected on the Form EIA-861 for distributed and dispersed resources that are not net metered.

We use a second model to estimate the generation using this capacity as an input. The original methodology was developed for the "Annual Energy Outlook" based on our "NEMS" modelled projections several years ago. The original method underwent a calibration project designed to develop PV production levels for the NEMS projections consistent with simulations of a National Renewable Energy Laboratory model called PVWatts, which is itself embedded in PC software under the umbrella of the NREL's System Advisor Model (SAM).

The PVWatts simulations require, panel azimuth orientations and tilts, something that the NEMS projections do not include. Call the combinations of azimuths and tilts "orientations." The orientation and solar insolation (specific to a location) have a direct effect on the PV production level. The calibration project selected the 100 largest population Metropolitan Statistical Areas (MSAs) and relied on weights derived from orientation data from California Solar Initiative dataset to develop typical outputs for each of the 100 MSAs. It then was expanded from an annual estimate to a monthly estimate. A listing of the MSAs are included in Appendix 1.

Using Form EIA-861 data for service territories, which lists the counties that each electric distribution company (EDC) provides service, and NREL solar insolation data by county a simple average of insolation values by EDC is calculated.

Using the estimation model, we produce by utility, by state and by sector an estimate of generation. All the utilities'' capacity and generation estimates are summed by state and sector and a KWh/KW rate by state and sector is calculated.

Capacity from the Form EIA-860 that is net metered is subtracted from the total capacity by state and sector as well as the capacity reported on the EIA-826 from TPOs, resulting in a new "net" capacity amount. This capacity amount is multiplied by the KWh/KW rate to produce the non-TPO generation estimate and then it is added to the TPO reported sales to ultimate customers from the EIA-826 to obtain a final estimate for generation and a blended KWh/KW rate is calculated. The estimate for generation is aggregated by US census regions and US totals. The RSEs for capacity are checked for level of error and if they pass, the summary data by state, U.S. census region and U.S. total are reported in the EPM.

Appendix 2 contains a flow diagram of the data inputs, data quality control checks and data analysis required to perform this estimation.

Appendix 1- MSAs

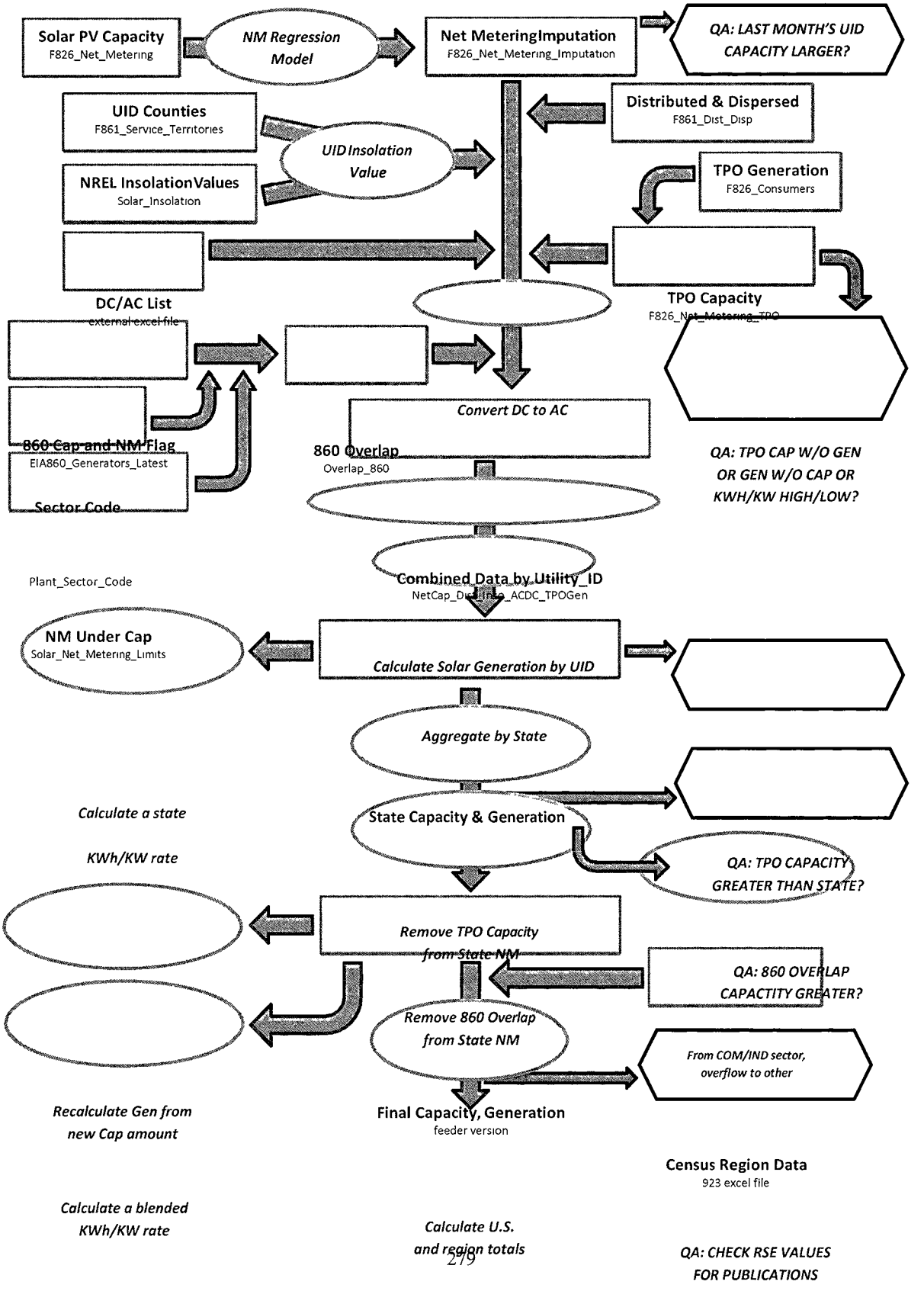
TMY3 (1991-2005) Weather Stations by MSA

Site	Weather Location	MSA
1	USA NY New York Central Park Obs.	New York-Newark-Jersey City, NY-NJ-PA MSA
2	USA CA Los Angeles Intl Airport	Los Angeles-Long Beach-Anaheim, CA MSA
3	USA IL Chicago Midway Airport	Chicago-Naperville-Elgin, IL-IN-WI MSA
4	USA TX Dallas-fort Worth Intl Airport	Dallas-Fort Worth-Arlington, TX MSA
5	USA TX Houston Bush Intercontinental	Houston-The Woodlands-Sugar Land, TX MSA
6	USA PA Philadelphia Int'l Airport	Philadelphia-Camden-Wilmington, PA-NJ-DE-MD MSA
7	USA VA Washington Dc Reagan Airport	Washington-Arlington-Alexandria, DC-VA-MD-WV MSA
8	USA FL Miami Intl Airport	Miami-Fort Lauderdale-West Palm Beach, FL MSA
9	USA GA Atlanta Hartsfield Intl Airport	Atlanta-Sandy Springs-Roswell, GA MSA
10	USA MA Boston Logan Int'l Airport	Boston-Cambridge-Newton, MA-NH MSA
11	USA CA San Francisco Intl Airport	San Francisco–Oakland–Hayward, CA MSA
12	USA AZ Phoenix Sky Harbor Intl Airport	Phoenix-Mesa-Scottsdale, AZ MSA
13	USA CA Riverside Municipal Airport	Riverside-San Bernardino-Ontario, CA MSA
14	USA MI Detroit City Airport	Detroit-Warren-Dearborn, MI MSA
15	USA WA Seattle Seattle-Tacoma Intl Airport	Seattle-Tacoma-Bellevue, WA MSA
16	USA MN Minneapolis-St. Paul Int'l Arp	Minneapolis-St. Paul-Bloomington, MN-WI MSA
17	USA CA San Diego Lindbergh Field	San Diego-Carlsbad, CA MSA
18	USA FL Tampa Int'l Airport	Tampa-St. Petersburg-Clearwater, FL MSA
19	USA MO St Louis Lambert Int'l Airport	St. Louis, MO-IL MSA
20	USA MD Baltimore-Washington Int'l Airport	Baltimore-Columbia-Towson, MD MSA
21	USA CO Denver Centennial [Golden - NREL]	Denver-Aurora-Lakewood, CO MSA
22	USA PA Pittsburgh Allegheny Co Airport	Pittsburgh, PA MSA
23	USA NC Charlotte Douglas Intl Airport	Charlotte-Concord-Gastonia, NC-SC MSA
24	USA OR Portland Hillsboro	Portland-Vancouver-Hillsboro, OR-WA MSA
25	USA TX San Antonio Intl Airport	San Antonio-New Braunfels, TX MSA
26	USA FL Orlando Intl Airport	Orlando-Kissimmee-Sanford, FL MSA
27	USA CA Sacramento Executive Airport	Sacramento–Roseville–Arden-Arcade, CA MSA
28	USA OH Cincinnati Municipal Airport	Cincinnati, OH-KY-IN MSA
29	USA OH Cleveland Hopkins Intl Airport	Cleveland-Elyria, OH MSA
30	USA MO Kansas City Int'l Airport	Kansas City, MO-KS MSA
31	USA NV Las Vegas McCarran Intl Airport	Las Vegas-Henderson-Paradise, NV MSA
32	USA OH Columbus Port Columbus Intl A	Columbus, OH MSA
33	USA IN Indianapolis Intl Airport	Indianapolis-Carmel-Anderson, IN MSA
34	USA CA San Jose Intl Airport	San Jose-Sunnyvale-Santa Clara, CA MSA
35	USA TX Austin Mueller Municipal Airport	Austin-Round Rock, TX MSA
36	USA TN Nashville Int'l Airport	Nashville-Davidson–Murfreesboro–Franklin, TN MSA

37	USA VA Norfolk Int'l Airport	Virginia Beach-Norfolk-Newport News, VA-NC MSA
38	USA RI Providence T F Green State	Providence-Warwick, RI-MA MSA
39	USA WI Milwaukee Mitchell Intl Airport	Milwaukee-Waukesha-West Allis, WI MSA
40	USA FL Jacksonville Craig	Jacksonville, FL MSA
41	USA TN Memphis Int'l Airport	Memphis, TN-MS-AR MSA
42	USA OK Oklahoma City Will Rogers	Oklahoma City, OK MSA
43	USA KY Louisville Bowman Field	Louisville/Jefferson County, KY-IN MSA
44	USA VA Richmond Int'l Airport	Richmond, VA MSA
45	USA LA New Orleans Alvin Callender	New Orleans-Metairie, LA MSA
46	USA CT Hartford Bradley Intl Airport	Hartford-West Hartford-East Hartford, CT MSA
47	USA NC Raleigh Durham Int'l	Raleigh, NC MSA
48	USA UT Salt Lake City Int'l Airport	Salt Lake City, UT MSA
49	USA AL Birmingham Municipal Airport	Birmingham-Hoover, AL MSA
50	USA NY Buffalo Niagara Intl Airport	Buffalo-Cheektowaga-Niagara Falls, NY MSA
51	USA NY Rochester Greater Rochester	Rochester, NY MSA
52	USA MI Grand Rapids Kent County Int'l Airport	Grand Rapids-Wyoming, MI MSA
53	USA AZ Tucson Int'l Airport	Tucson, AZ MSA
54	USA HI Honolulu Intl Airport	Urban Honolulu, HI MSA
55	USA OK Tulsa Int'l Airport	Tulsa, OK MSA
56	USA CA Fresno Yosemite Intl Airport	Fresno, CA MSA
57	USA CT Bridgeport Sikorsky Memorial	Bridgeport-Stamford-Norwalk, CT MSA
58	USA MA Worchester Regional Airport	Worcester, MA-CT MSA
59	USA NM Albuquerque Intl Airport	Albuquerque, NM MSA
60	USA NE Omaha Eppley Airfield	Omaha-Council Bluffs, NE-IA MSA
61	USA NY Albany County Airport	Albany-Schenectady-Troy, NY MSA
62	USA CA Bakersfield Meadows Field	Bakersfield, CA MSA
63	USA CT New Haven Tweed Airport	New Haven-Milford, CT MSA
64	USA TN Knoxville McGhee Tyson Airport	Knoxville, TN MSA
65	USA SC Greenville Downtown Airport	Greenville-Anderson-Mauldin, SC MSA
66	USA CA Oxnard Airport	Oxnard-Thousand Oaks-Ventura, CA MSA
67	USA TX El Paso Int'l Airport	El Paso, TX MSA
68	USA PA Allentown Lehigh Valley Intl	Allentown-Bethlehem-Easton, PA-NJ MSA
69	USA LA Baton Rouge Ryan Airport	Baton Rouge, LA MSA
70	USA TX McCallen Miller Intl Airport	McAllen-Edinburg-Mission, TX MSA
71	USA OH Dayton Int'l Airport	Dayton, OH MSA
72	USA SC Columbia Metro Airport	Columbia, SC MSA
73	USA NC Greensboro Piedmont Triad Int'l Airport	Greensboro-High Point, NC MSA
74	USA FL Sarasota Bradenton	North Port-Sarasota-Bradenton, FL MSA
75	USA AR Little Rock Adams Field	Little Rock-North Little Rock-Conway, AR MSA
76	USA SC Charleston Intl Airport	Charleston-North Charleston, SC MSA
77	USA OH Akron Akron-canton Reg. Airport	Akron, OH MSA
78	USA CA Stockton Metropolitan Airport	Stockton-Lodi, CA MSA

79	USA CO Colorado Springs Muni Airport	Colorado Springs, CO MSA
80	USA NY Syracuse Hancock Int'l Airport	Syracuse, NY MSA
81	USA FL Fort Myers Page Field	Cape Coral-Fort Myers, FL MSA
82	USA NC Winston-Salem Reynolds Airport	Winston-Salem, NC MSA
83	USA ID Boise Air Terminal	Boise City, ID MSA
84	USA KS Wichita Mid-continent Airport	Wichita, KS MSA
85	USA WI Madison Dane Co Regional Airport	Madison, WI MSA
86	USA MA Worchester Regional Airport	Springfield, MA MSA
87	USA FL Lakeland Linder Regional Airport	Lakeland-Winter Haven, FL MSA
88	USA UT Ogden Hinkley Airport	Ogden-Clearfield, UT MSA
89	USA OH Toledo Express Airport	Toledo, OH MSA
90	USA FL Daytona Beach Intl Airport	Deltona-Daytona Beach-Ormond Beach, FL MSA
91	USA IA Des Moines Intl Airport	Des Moines-West Des Moines, IA MSA
92	USA GA Augusta Bush Field	Augusta-Richmond County, GA-SC MSA
93	USA MS Jackson Int'l Airport	Jackson, MS MSA
94	USA UT Provo Muni	Provo-Orem, UT MSA
95	USA PA Wilkes-Barre Scranton Intl Airport	Scranton–Wilkes-Barre–Hazleton, PA MSA
96	USA PA Harrisburg Capital City Airport	Harrisburg-Carlisle, PA MSA
97	USA OH Youngstown Regional Airport	Youngstown-Warren-Boardman, OH-PA MSA
98	USA FL Melbourne Regional Airport	Palm Bay-Melbourne-Titusville, FL MSA
99	USA TN Chattanooga Lovell Field Airport	Chattanooga, TN-GA MSA
100	USA WA Spokane Int'l Airport	Spokane-Spokane Valley, WA MSA

Appendix 2 – Flow diagram of data sources and analysis



[1] The basic technique employed is described in the paper "Model-Based Sampling and Inference," on the EIA website. Additional references can be found on the InterStat website (http://interstat.statjournals.net/). See the following sources: Knaub, J.R., Jr. (1999a), "Using Prediction-Oriented Software for Survey Estimation," InterStat, October 1999, http://interstat.statjournals.net/; Knaub, J.R. Jr. (1999b), "Model-Based Sampling, Inference and Imputation," EIA web site: http://www.eia.gov/cneaf/electricity/forms/newsppr.pdf; Knaub, J.R., Jr. (2005), "Classical Ratio Estimator," InterStat, October 2005, http://interstat.statjournals.net/; Knaub, J.R., Jr. (2007a), "Cutoff Sampling and Inference," InterStat, April 2007, http://interstat.statjournals.net/; Knaub, J.R., Jr. (2008), "Cutoff Sampling." Definition in Encyclopedia of Survey Research Methods, Editor: Paul J. Lavrakas, Sage, to appear; Knaub, J.R., Jr. (2000), "Using Prediction-Oriented Software for Survey Estimation - Part II: Ratios of Totals," InterStat, June 2000, http://interstat.statjournals.net/; Knaub, J.R., Jr. (2001), "Using Prediction-Oriented Software for Survey Estimation - Part III: Full-Scale Study of Variance and Bias," InterStat, June 2001, http://interstat.statjournals.net/.

[2] See the following sources: Bahillo, A. et al. Journal of Energy Resources Technology, "NOx and N2O Emissions during Fluidized Bed Combustion of Leather Wastes." Volume 128, Issue 2, June 2006. pp. 99-103; U.S. Energy Information Administration. *Renewable Energy Annual 2004*. "Average Heat Content of Selected Biomass Fuels." Washington, DC, 2005; Penn State Agricultural College Agricultural and Biological Engineering and Council for Solid Waste Solutions. Garth, J. and Kowal, P. Resource Recovery, Turning Waste into Energy, University Park, PA, 1993; Utah State University Recycling Center Frequently Asked Questions. Published at http://www.usu.edu/recycle/faq.htm. Accessed December 2006.

[3] Biogenic components include newsprint, paper, containers and packaging, leather, textiles, yard trimmings, food wastes, and wood. Non-biogenic components include plastics, rubber and other miscellaneous non-biogenic waste.

Table C.1 Average Heat Content of Fossil-Fuel Receipts, September 2020

Census Division and State	Coal (Million Btu per Ton)	Petroleum Liquids (Million Btu per Barrel)	Petroleum Coke (Million Btu per Ton)	Natural Gas (Million Btu per Thousand Cubic Feet)
New England	20 60	6 22	--	1 03
Connecticut	--	--	--	1 03
Maine	20 60	6 25	-	1 04
Massachusetts	--	5 81	--	1 03
New Hampshire	--	--	--	1 03
Rhode Island	--	--	--	1 03
Vermont	-	-	--	-
Middle Atlantic	19 35	6 07	--	1 03
New Jersey	25 52	--	--	1 03
New York	-	--	-	1 03
Pennsylvania	19 12	6 07	--	1 04
East North Central	20 35	5 84	26 97	1 05
Illinois	17 89	5 80	--	1 01
Indiana	22 47	5 77	--	1 06
Michigan	18 88	5 88	26 93	1 06
Ohio	25 10	5 81	-	1 06
Wisconsin	17 95	5 88	28 14	1 03
West North Central	16 62	5 75	27 02	1 07
Iowa	17 60	5 71	27 02	1 12
Kansas	17 10	5 74	--	1 01
Minnesota	17 69	5 86	--	1 12
Missouri	17 71	5 77	--	1 03
Nebraska	17 14	--	--	1 05
North Dakota	13 22	5 76	--	1 00
South Dakota	16 54	-	-	
South Atlantic	23 97	5 84	28 10	1 03
Delaware	--	5 83	--	1 04
District of Columbia	--	-	-	-
Florida	23 44	5 88	28 10	1 03
Georgia	20 11	6 15	--	1 03
Maryland	24 68	5 81	-	1 04
North Carolina	25 25	5 81	--	1 03
South Carolina	24 60	5 79	--	1 03
Virginia	25 47	5 88	--	1 05
West Virginia	25 22	5 79	-	1 06
East South Central	20 53	5 79	--	1 03
Alabama	18 62	--	-	1 03
Kentucky	22 33	5 81	--	1 05
Mississippi	13 88	--	--	1 03
Tennessee	22 80	5 77	--	1 00
West South Central	16 12	5 84	28 38	1 02
Arkansas	17 56	5 90	--	1 03
Louisiana	16 96	--	28 38	1 03
Oklahoma	17 22	-	--	1 03
Texas	15 66	5 74	--	1 02
Mountain	18 88	5 79	-	1 04
Arizona	18 32	5 75	--	1 03
Colorado	18 68	--	--	1 10
Idaho	--	--	--	1 00
Montana	17 20	5 92	-	1 04
Nevada	18 09	5 84	--	1 04
New Mexico	18 50	5 66	--	1 01
Utah	21 91	5 86		1 04
Wyoming	17 74	5 81	--	1 04
Pacific Contiguous	17 77	6 00	--	1 04
California	23 03	-		1 03
Oregon	--	--	--	1 05
Washington	17 27	6 00	--	1 09
Pacific Noncontiguous	17 32	6 06	-	1 00
Alaska	13 89	5 60	--	1 00
Hawaii	19 12	6 06	--	--
U S Total	19 06	6 00	27 65	1 03

'Coal' includes anthracite, bituminous, subbituminous, lignite, waste coal, synthetic coal, and coal-derived synthesis gas
'Petroleum Liquids' include distillate fuel oil, residual fuel oil, jet fuel, kerosene, propane, and waste oil
'Petroleum Coke' includes petroleum coke and synthesis gas derived from petroleum coke
'Natural Gas' includes a small amount of supplemental gaseous fuels
Notes See Glossary for definitions Values are preliminary Data represents weighted values
Source U S Energy Information Administration, Form EIA-923, Power Plant Operations Report

Table C.2. Comparison of Preliminary Monthly Data Versus Final Monthly Data at the U S. Level, 2017 through 2019

	Mean Absolute Value of Percent Change Total (All Sectors)		
Item	2017	2018	2019
Net Generation			
Coal	0 17%	0 42%	0 12%
Petroleum Liquids	3 41%	2 56%	1 55%
Petroleum Coke	5 79%	5 97%	5 53%
Natural Gas	1 94%	1 10%	1 23%
Other Gases	11 64%	10 59%	7 56%
Hydroelectric	2 01%	2 37%	6 37%
Nuclear	0 00%	0 00%	0 00%
Other	1 33%	1 67%	1 51%
Total	**0.56%**	**0 29%**	**0 44%**
Consumption of Fossil Fuels for Electricity Generation			
Coal	0.13%	0 17%	0 16%
Petroleum Liquids	3 39%	5 23%	2 23%
Petroleum Coke	4 95%	10 63%	5 48%
Natural Gas	1 09%	0 79%	1 14%
Fuel Stocks for Electric Power Sector			
Coal	0 18%	0 35%	0 34%
Petroleum Liquids	2 10%	1 07%	0 32%
Petroleum Coke	14 42%	2 29%	1 78%
Retail Sales			
Residential	0 31%	0 34%	0 36%
Commercial	0 28%	0 37%	0 46%
Industrial	4 00%	5 02%	5 27%
Transportation	0 12%	0 95%	0 81%
Total	**1.12%**	**1 53%**	**1.65%**
Revenue			
Residential	0 26%	0 21%	0 18%
Commercial	0 28%	0 49%	0 57%
Industrial	3 52%	4 76%	5 02%
Transportation	0 21%	1 63%	1 45%
Total	**0.57%**	**1 04%**	**1 12%**
Average Retail Price			
Residential	0 21%	0 16%	0 18%
Commercial	0 20%	0 16%	0 13%
Industrial	0 51%	0 38%	0 30%
Transportation	0 20%	0 80%	0 64%
Total	**0 53%**	**0 48%**	**0 52%**
Receipt of Fossil Fuels			
Coal	1 30%	0 33%	0 93%
Petroleum Liquids	3 18%	11 02%	2 66%
Petroleum Coke	0 00%	0 00%	0 00%
Natural Gas	19 49%	8 23%	8 25%
Cost of Fossil Fuels			
Coal	0 83%	0 24%	0 13%
Petroleum Liquids	0 34%	1 04%	0 29%
Petroleum Coke	0 00%	0 00%	0 00%
Natural Gas	0 47%	0 54%	0 20%

Coal includes anthracite, bituminous, subbituminous, lignite, waste coal, and synthetic coal Coal stocks exclude waste coal
Petroleum Liquids include distillate fuel oil, residual fuel oil, jet fuel, kerosene, and waste oil
Natural gas includes a small amount of supplemental gaseous fuels that cannot be identified separately Excludes blast furnace gas and other gases
Hydroelectric includes conventional hydroelectric and hydroelectric pumped storage facilities
Other generation includes geothermal, wood, waste, wind, and solar, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies
Fuel Stocks are end-of-month values
See technical notes (http //www eia gov/cneaf/electricity/epm/appenc pdf) for additional information on the Commercial, Industrial and Transportation sectors
Cost of Fossil Fuels represent weighted values
Notes Mean absolute value of percent change is the unweighted average of the absolute percent cahnges
Sources U S Energy Information Administration, Form EIA-923 'Power Plant Operations Report', Form EIA-423, 'Monthly Cost and Quality of Fuels for Electric Plants Report', Form EIA-826, 'Monthly Electric Sales and Revenue With State Distributions Report', Form EIA-906, 'Power Plant Report,' Form EIA-920 'Combined Heat and Power Plant Report',
and Federal Energy Regulatory Commission, FERC Form 423, 'Monthly Report of Cost and Quality of Fuels for Electric Plants '

Table C.3. Comparison of Preliminary Annual Data Versus Final Annual Data at the U S Level, 2017 through 2019

	2017			2018			2019		
Item	Preliminary Annual Data	Final Annual Data	Percent Change	Preliminary Annual Data	Final Annual Data	Percent Change	Preliminary Annual Data	Final Annual Data	Percent Change
Net Generation (Thousand MWh)									
Coal	1,207,901	1,205,835	-0 17%	1,146,393	1,149,487	0 27%	966,148	964,957	-0 12%
Petroleum Liquids	12,583	12,414	-1 34%	15,742	16,245	3 19%	11,576	11,619	0 38%
Petroleum Coke	8,508	8,976	5 50%	8,830	8,981	1 71%	6,991	6,819	-2 46%
Natural Gas	1,272,864	1,296,442	1 85%	1,468,013	1,469,133	0 08%	1,581,815	1,585,717	0 25%
Other Gases	14,159	12,469	-11 94%	12,191	13,463	10 43%	13,634	12,591	-7 65%
Hydroelectric	293,550	293,838	0 10%	285,819	286,619	0 28%	268,447	282,613	5 28%
Nuclear	804,950	804,950	0 00%	807,078	807,084	0 00%	809,409	809,409	0 00%
Other	400,289	399,346	-0 24%	433,744	427,265	-1 49%	460,030	453,157	-1 49%
Total	**4,014,804**	**4,034,271**	**0 48%**	**4,177,810**	**4,178,277**	**0.01%**	**4,118,051**	**4,126,882**	**0 21%**
Consumption of Fossil Fuels for Electricity Generation									
Coal (1,000 tons)	663,479	663,911	0.07%	635,833	636,213	0 06%	538,465	537,616	-0 16%
Petroleum Liquids (1,000 barrels)	21,935	21,696	-1 09%	27,245	28,614	5 02%	20,430	20,836	1 99%
Petroleum Coke (1,000 tons)	3,349	3,490	4 21%	3,311	3,623	9 40%	2,806	2,724	-2 94%
Natural Gas (1,000 Mcf)	9,440,777	9,508,062	0 71%	10,855,155	10,833,043	-0 20%	11,550,825	11,600,558	0 43%
Fuel Stocks for Electric Power Sector									
Coal (1,000 tons)	137,155	137,687	0 39%	102,786	102,793	0 01%	128,497	128,180	-0 25%
Petroleum Liquids (1,000 barrels)	28,723	28,089	-2 21%	25,082	25,977	3 57%	25,976	25,960	-0 06%
Petroleum Coke (1,000 tons)	1,113	864	-22.42%	541	539	-0 27%	443	471	6 35%
Retail Sales (Million kWh)									
Residential	1,378,819	1,378,648	-0 01%	1,464,373	1,469,093	0 32%	1,435,147	1,440,289	0 36%
Commercial	1,349,208	1,352,888	0 27%	1,376,741	1,381,755	0 36%	1,354,545	1,360,877	0 47%
Industrial	946,443	984,298	4 00%	953,076	1,000,673	4 99%	952,149	1,002,353	5 27%
Transportation	7,524	7,523	-0 02%	7,738	7,665	-0 94%	7,697	7,632	-0 84%
Total	**3,681,995**	**3,723,356**	**1 12%**	**3,801,928**	**3,859,185**	**1.51%**	**3,749,538**	**3,811,150**	**1.64%**
Revenue (Million Dollars)									
Residential	177,860	177,661	-0 11%	188,742	189,033	0 15%	187,102	187,436	0 18%
Commercial	144,108	144,242	0 09%	146,696	147,425	0 50%	144,452	145,280	0 57%
Industrial	65,394	67,691	3 51%	66,090	69,218	4 73%	65,033	68,285	5.00%
Transportation	727	728	0 15%	756	744	-1 65%	749	737	-1 54%
Total	**388,089**	**390,322**	**0 58%**	**402,283**	**406,420**	**1 03%**	**397,337**	**401,738**	**1.11%**
Average Retail Price (Cents/kWh)									
Residential	12 90	12 89	-0 10%	12 89	12 87	-0 17%	13 04	13 01	-0 18%
Commercial	10 68	10 66	-0 18%	10 66	10 67	0 13%	10 66	10 68	0 10%
Industrial	6 91	6 88	-0 47%	6 93	6 92	-0 25%	6 83	6 81	-0 26%
Transportation	9 67	9 68	0 17%	9 77	9 70	-0 71%	9 73	9 66	-0 70%
Total	**10.54**	**10 48**	**-0 54%**	**10 58**	**10 53**	**-0 47%**	**10 60**	**10 54**	**-0.53%**
Receipt of Fossil Fuels									
Coal (1,000 tons)	634,118	642,364	1 30%	594,683	596,215	0 26%	555,022	560,153	0 92%
Petroleum Liquids (1,000 barrels)	15,619	16,127	3 25%	19,717	22,290	13 05%	14,319	14,711	2 74%
Petroleum Coke (1,000 tons)	3,309	3,309	0 00%	3,010	3,010	0 00%	1,969	1,969	0 00%
Natural Gas (1,000 Mcf)	8,050,520	9,628,733	19 60%	10,039,232	10,885,764	8 43%	10,786,472	11,693,486	8 41%
Cost of Fossil Fuels (Dollars per Million Btu)									
Coal (1,000 tons)	2 08	2 06	-0 87%	2 06	2 06	-0 22%	2 02	2 02	-0 21%
Petroleum Liquids (1,000 barrels)	11 82	11 86	0 36%	14 24	14 40	1 16%	13 58	13 62	0 29%
Petroleum Coke (1,000 tons)	2 13	2.13	0 00%	2 54	2 54	0 00%	1 91	1 91	0 00%
Natural Gas (1,000 Mcf)	3 39	3 37	-0 55%	3 55	3 55	0 03%	2 89	2 88	-0 17%

Coal includes anthracite, bituminous, subbituminous, lignite, waste coal, and synthetic coal Coal stocks exclude waste coal
Petroleum Liquids include distillate fuel oil, residual fuel oil, jet fuel, kerosene, and waste oil
Natural gas includes a small amount of supplemental gaseous fuels that cannot be identified separately Excludes blast furnace gas and other gases
Hydroelectric includes conventional hydroelectric and hydroelectric pumped storage facilities
Other generation includes geothermal, wood, waste, wind, and solar, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies
Fuel Stocks are end-of-year values
See technical notes (http //www eia gov/cneaf/electricity/epm/appenc pdf) for additional information on the Commercial, Industrial and Transportation sectors
Cost of Fossil Fuels represent weighted values
Notes The average revenue per kilowatthour is calculated by dividing revenue by sales Totals may not equal sum of components because of independent rounding
Percent changes refer to the difference between the preliminary data published in the Electric Power Monthly (EPM) and the final data published in the EPM Values for 2019 are Final
Sources U S Energy Information Administration, Form EIA-923 'Power Plant Operations Report', Form EIA-423, 'Monthly Cost and Quality of Fuels for Electric Plants Report', Form EIA-826, 'Monthly Electric Sales and Revenue With State Distributions Report', Form EIA-906, 'Power Plant Report,' Form EIA-920 'Combined Heat and Power Plant Report', and Federal Energy Regulatory Commission, FERC Form 423, 'Monthly Report of Cost and Quality of Fuels for Electric Plants '

Table C.4. Unit of Measure Equivalents for Electricity

Unit	Equivalent
Kilowatt (kW)	1,000 (One Thousand) Watts
Megawatt (MW)	1,000,000 (One Million) Watts
Gigawatt (GW)	1,000,000,000 (One Billion) Watts
Terawatt (TW)	1,000,000,000,000 (One Trillion) Watts
Gigawatt	1,000,000 (One Million) Kilowatts
Thousand Gigawatts	1,000,000,000 (One Billion) Kilowatts
Kilowatthours (kWh)	1,000 (One Thousand) Watthours
Megawatthours (MWh)	1,000,000 (One Million) Watthours
Gigawatthours (GWh)	1,000,000,000 (One Billion) Watthours
Terawatthours (TWh)	1,000,000,000,000 (One Trillion) Watthours
Gigawatthours	1,000,000 (One Million) Kilowatthours
Thousand Gigawatthours	1,000,000,000(One Billion Kilowatthours

Source: U.S. Energy Information Administration

Glossary

Anthracite: The highest rank of coal; used primarily for residential and commercial space heating. It is a hard, brittle, and black lustrous coal, often referred to as hard coal, containing a high percentage of fixed carbon and a low percentage of volatile matter. The moisture content of fresh-mined anthracite generally is less than 15 percent. The heat content of anthracite ranges from 22 to 28 million Btu per ton on a moist, mineral-matter-free basis. The heat content of anthracite coal consumed in the United States averages 25 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter). Note: Since the 1980's, anthracite refuse or mine waste has been used for steam electric power generation. This fuel typically has a heat content of 15 million Btu per ton or less.

Ash: Impurities consisting of silica, iron, aluminum, and other noncombustible matter that are contained in coal. Ash increases the weight of coal, adds to the cost of handling, and can affect its burning characteristics. Ash content is measured as a percent by weight of coal on a "received" or a "dry" (moisture-free, usually part of a laboratory analysis) basis.

Ash content: The amount of ash contained in the fuel (except gas) in terms of percent by weight.

Average Price of Electricity to Ultimate Consumers (formerly known as Average Revenue per Kilowatthour): The average revenue per kilowatthour of electricity sold by sector (residential, commercial, industrial, or other) and geographic area (State, Census division, and national), is calculated by dividing the total monthly revenue by the corresponding total monthly sales for each sector and geographic area.

Barrel: A unit of volume equal to 42 U.S. gallons.

Biomass: Organic non-fossil material of biological origin constituting a renewable energy resource.

Bituminous coal: A dense coal, usually black, sometimes dark brown, often with well-defined bands of bright and dull material, used primarily as fuel in steam-electric power generation, with substantial quantities also used for heat and power applications in manufacturing and to make coke. Bituminous coal is the most abundant coal in active U.S. mining regions. Its moisture content usually is less than 20 percent. The heat content of bituminous coal ranges from 21 to 30 million Btu per ton on a moist, mineral-matter-free basis. The heat content of bituminous coal consumed in the United States averages 24 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter).

British thermal unit: The quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39 degrees Fahrenheit).

Btu: The abbreviation for British thermal unit(s).

Capacity: See Generator Capacity and Generator Name Plate Capacity (Installed).

Census Divisions: Any of nine geographic areas of the United States as defined by the U.S. Department of Commerce, Bureau of the Census. The divisions, each consisting of several States, are defined as follows:

1) *New England:* Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont;
2) *Middle Atlantic:* New Jersey, New York, and Pennsylvania;
3) *East North Central:* Illinois, Indiana, Michigan, Ohio, and Wisconsin;
4) *West North Central:* Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota;
5) *South Atlantic:* Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia;
6) *East South Central:* Alabama, Kentucky, Mississippi, and Tennessee;
7) *West South Central:* Arkansas, Louisiana, Oklahoma, and Texas;
8) *Mountain:* Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming;
9) *Pacific:* Alaska, California, Hawaii, Oregon, and Washington.

Note: Each division is a sub-area within a broader Census Region. In some cases, the Pacific division is subdivided into the Pacific Contiguous area (California, Oregon, and Washington) and the Pacific Noncontiguous area (Alaska and Hawaii).

Coal: A readily combustible black or brownish-black rock whose composition, including inherent moisture, consists of more than 50 percent by weight and more than 70 percent by volume of carbonaceous material. It is formed from plant remains that have been compacted, hardened, chemically altered, and metamorphosed by heat and pressure over geologic time.

Coal synfuel: Coal-based solid fuel that has been processed by a coal synfuel plant; and coal-based fuels such as briquettes, pellets, or extrusions, which are formed from fresh or recycled coal and binding materials.

Coke (petroleum): A residue high in carbon content and low in hydrogen that is the final product of thermal decomposition in the condensation process in cracking. This product is reported as marketable coke or catalyst coke. The conversion is 5 barrels (of 42 U.S. gallons each) per short ton. Coke from petroleum has a heating value of 6.024 million Btu per barrel.

Combined cycle: An electric generating technology in which electricity is produced from otherwise lost waste heat exiting from one or more gas (combustion) turbine-generators. The exiting heat from the combustion turbine(s) is routed to a conventional boiler or to a heat recovery steam generator for utilization by a steam turbine in the production of additional electricity.

Combined heat and power (CHP): Includes plants designed to produce both heat and electricity from a single heat source. *Note:* This term is being used in place of the term "cogenerator" that was used by EIA in the past. CHP better describes the facilities because some of the plants included do not produce heat and power in a sequential fashion and, as a result, do not meet the legal definition of cogeneration specified in the Public Utility Regulatory Policies Act (PURPA).

Commercial sector: An energy-consuming sector that consists of service-providing facilities and equipment of: businesses; Federal, State, and local governments; and other private and public organizations, such as religious, social, or fraternal groups. The commercial sector includes institutional living quarters. It also includes sewage treatment facilities. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a wide variety of other equipment. *Note:* This sector includes generators that produce electricity and/or useful thermal output primarily to support the activities of the above-mentioned commercial establishments.

Consumption (fuel): The use of energy as a source of heat or power or as a raw material input to a manufacturing process.

Cost: The amount paid to acquire resources, such as plant and equipment, fuel, or labor services.

Demand (electric): The rate at which electric energy is delivered to or by a system, part of a system, or piece of equipment, at a given instant or averaged over any designated period of time.

Diesel: A distillate fuel oil that is used in diesel engines such as those used for transportation and for electric power generation.

Distillate fuel oil: *A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation.*

1) *No. 1 Distillate:* A light petroleum distillate that can be used as either a diesel fuel (see No. 1 Diesel Fuel) or a fuel oil. See No. 1 Fuel Oil.

- *No. 1 Diesel fuel:* A light distillate fuel oil that has distillation temperatures of 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM Specification D 975. It is used in high-speed diesel engines, such as those in city buses and similar vehicles. See No. 1 Distillate above.
- *No. 1 Fuel oil:* A light distillate fuel oil that has distillation temperatures of 400 degrees Fahrenheit at the 10-percent recovery point and 550 degrees Fahrenheit at the 90-percent point and meets the specifications defined in ASTM Specification D 396. It is used primarily as fuel for portable outdoor stoves and portable outdoor heaters. See No. 1 Distillate above.

2) *No. 2 Distillate:* A petroleum distillate that can be used as either a diesel fuel (see No. 2 Diesel Fuel definition below) or a fuel oil. See No. 2 Fuel oil below.

- *No. 2 Diesel fuel:* A fuel that has distillation temperatures of 500 degrees Fahrenheit at the 10-percent recovery point and 640 degrees Fahrenheit at the 90-percent recovery point and meets the specifications defined in ASTM Specification D 396. It is used in atomizing type burners for domestic heating or for moderate capacity commercial/industrial burner units. See No. 2 Distillate above.

3) *No. 4 Fuel:* A distillate fuel oil made by blending distillate fuel oil and residual fuel oil stocks. It conforms with ASTM Specification D 396 or Federal Specification VV-F-815C and is used extensively in industrial plants and in commercial burner installations that are not equipped with preheating facilities. It also includes No. 4 diesel fuel used for low- and medium-speed diesel engines and conforms to ASTM Specification D 975.

- *No. 4 Diesel fuel and No. 4 Fuel oil:* See No. 4 Fuel above.

Electric industry restructuring: The process of replacing a monopolistic system of electric utility suppliers with competing sellers, allowing individual ultimate customers to choose their supplier but still receive delivery over the power lines of the local utility. It includes the reconfiguration of vertically integrated electric utilities.

Electric plant (physical): A facility containing prime movers, electric generators, and auxiliary equipment for converting mechanical, chemical, and/or fission energy into electric energy.

Electric power sector: An energy-consuming sector that consists of electricity-only and combined-heat-and-power (CHP) plants whose primary business is to sell electricity, or electricity and heat, to the public-- i. e., North American Industry Classification System 22 plants.

Electric utility: A corporation, person, agency, authority, or other legal entity or instrumentality aligned with distribution facilities for delivery of electric energy for use primarily by the public. Included are investor-owned electric utilities, municipal and State utilities, Federal electric utilities, and rural electric cooperatives. A few entities that are tariff based and corporately aligned with companies that own distribution facilities are also included. Note: Due to the issuance of FERC Order 888 that required traditional electric utilities to functionally unbundle their generation, transmission, and distribution operations, "electric utility" currently has inconsistent interpretations from State to State.

Electricity: A form of energy characterized by the presence and motion of elementary charged particles generated by friction, induction, or chemical change.

Electricity generation: The process of producing electric energy or the amount of electric energy produced by transforming other forms of energy, commonly expressed in kilowatthours (kWh) or megawatthours (MWh).

Electricity generators: The facilities that produce only electricity, commonly expressed in kilowatthours (kWh) or megawatthours (MWh).

Energy: The capacity for doing work as measured by the capability of doing work (potential energy) or the conversion of this capability to motion (kinetic energy). Energy has several forms, some of which are easily convertible and can be changed to another form useful for work. Most of the world's convertible energy comes from fossil fuels that are burned to produce heat that is then used as a transfer medium to mechanical or other means in order to accomplish tasks. Electrical energy is usually measured in kilowatthours, while heat energy is usually measured in British thermal units.

Energy conservation features: This includes building shell conservation features, HVAC conservation features, lighting conservation features, any conservation features, and other conservation features incorporated by the building. However, this category does not include any demand-side management (DSM) program participation by the building. Any DSM program participation is included in the DSM Programs.

Energy efficiency: Refers to programs that are aimed at reducing the energy used by specific end-use devices and systems, typically without affecting the services provided. These programs reduce overall electricity consumption (reported in megawatthours), often without explicit consideration for the timing of program-induced savings. Such savings are generally achieved by substituting technically more advanced equipment to produce the same level of end-use services (e.g. lighting, heating, motor drive) with less electricity. Examples include high-efficiency appliances, efficient lighting programs, high-efficiency heating, ventilating and air conditioning (HVAC) systems or control modifications, efficient building design, advanced electric motor drives, and heat recovery systems.

Energy service provider: An energy entity that provides service to an ultimate consumer.

Energy source: Any substance or natural phenomenon that can be consumed or transformed to supply heat or power. Examples include petroleum, coal, natural gas, nuclear, biomass, electricity, wind, sunlight, geothermal, water movement, and hydrogen in fuel cells.

Energy-only service: Sales services for ultimate consumers for which the company provided only the energy consumed, where another entity provides delivery services.

Fossil fuel: An energy source formed in the earths crust from decayed organic material. The common fossil fuels are petroleum, coal, and natural gas.

Franchised service area: A specified geographical area in which a utility has been granted the exclusive right to serve customers. A franchise allows an entity to use city streets, alleys and other public lands in order to provide, distribute, and sell services to the community.

Fuel: Any material substance that can be consumed to supply heat or power. Included are petroleum, coal, and natural gas (the fossil fuels), and other consumable materials, such as uranium, biomass, and hydrogen.

Gas: A fuel burned under boilers and by internal combustion engines for electric generation. These include natural, manufactured and waste gas.

Gas turbine plant: An electric generating facility in which the prime mover is a gas (combustion) turbine. A gas turbine typically consists of an air compressor and one or more combustion chambers where either liquid or gaseous fuel is burned. The resulting hot gases are passed through the turbine where they expand to drive both an electric generator and the compressor.

Generating unit: Any combination of physically connected generators, reactors, boilers, combustion turbines, or other prime movers operated together to produce electric power.

Generator: A machine that converts mechanical energy into electrical energy.

Generator capacity: The maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, adjusted for ambient conditions.

Generator nameplate capacity (installed): The maximum rated output of a generator, prime mover, or other electric power production equipment under specific conditions designated by the manufacturer. Installed generator nameplate capacity is commonly expressed in megawatts (MW) and is usually indicated on a nameplate physically attached to the generator.

Geothermal: Pertaining to heat within the Earth.

Geothermal energy: Hot water or steam extracted from geothermal reservoirs in the earth's crust. Water or steam extracted from geothermal reservoirs can be used for geothermal heat pumps, water heating, or electricity generation.

Gigawatt (GW): One billion watts.

Gigawatthour (GWh): One billion watthours.

Gross generation: The total amount of electric energy produced by generating units and measured at the generating terminal in kilowatthours (kWh) or megawatthours (MWh).

Heat content: The amount or number of British thermal units (Btu) produced by the combustion of fuel, measured in Btu/unit of measure.

Hydroelectric power: The production of electricity from the kinetic energy of falling water.

Hydroelectric power generation: Electricity generated by an electric power plant whose turbines are driven by falling water. It includes electric utility and industrial generation of hydroelectricity, unless otherwise specified. Generation is reported on a net basis, i.e., on the amount of electric energy generated after the electric energy consumed by station auxiliaries and the losses in the transformers that are considered integral parts of the station are deducted.

Hydroelectric pumped storage: Hydroelectricity that is generated during peak loads by using water previously pumped into an elevated storage reservoir during off-peak periods when excess generating capacity is available to do so. When additional generating capacity is needed, the water can be released from the reservoir through a conduit to turbine generators located in a power plant at a lower level.

Hydrogen: A colorless, odorless, highly flammable gaseous element. It is the lightest of all gases and the most abundant element in the universe, occurring chiefly in combination with oxygen in water and also in acids, bases, alcohols, petroleum, and other hydrocarbons.

Independent power producer: A corporation, person, agency, authority, or other legal entity or instrumentality that owns or operates facilities for the generation of electricity for use primarily by the public, and that is not an electric utility.

Industrial sector: An energy-consuming sector that consists of all facilities and equipment used for producing, processing, or assembling goods. The industrial sector encompasses the following types of activity: manufacturing (NAICS codes 31-33); agriculture, forestry, and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); natural gas distribution (NAICS code 2212); and construction (NAICS code 23). Overall energy use in this sector is largely for process heat and cooling and powering machinery, with lesser amounts used for facility heating, air conditioning, and lighting. Fossil fuels are also used as raw material inputs to manufactured products. Note: This sector includes generators that produce electricity and/or useful thermal output primarily to support the above-mentioned industrial activities.

Interdepartmental service (electric): Interdepartmental service includes amounts charged by the electric department at tariff or other specified rates for electricity supplied by it to other utility departments.

Internal combustion plant: A plant in which the prime mover is an internal combustion engine. An internal combustion engine has one or more cylinders in which the process of combustion takes place, converting energy released from the rapid burning of a fuel-air mixture into mechanical energy. Diesel or gas-fired engines are the principal types used in electric plants. The plant is usually operated during periods of high demand for electricity.

Investor-owned utility (IOU): A privately-owned electric utility whose stock is publicly traded. It is rate regulated and authorized to achieve an allowed rate of return.

Jet fuel: A refined petroleum product used in jet aircraft engines. It includes kerosene-type jet fuel and naphtha-type jet fuel.

Kerosene: A light petroleum distillate that is used in space heaters, cook stoves, and water heaters and is suitable for use as a light source when burned in wick-fed lamps. Kerosene has a maximum distillation temperature of 400 degrees Fahrenheit at the 10-percent recovery point, a final boiling point of 572 degrees Fahrenheit, and a minimum flash point of 100 degrees Fahrenheit. Included are No. 1-K and No. 2-K, the two grades recognized by ASTM Specification D 3699 as well as all other grades of kerosene called range or stove oil, which have properties similar to those of No. 1 fuel oil.

Kilowatt (kW): One thousand watts.

Kilowatthour (kWh): One thousand watthours.

Light oil: Lighter fuel oils distilled off during the refining process. Virtually all petroleum used in internal combustion and gas-turbine engines is light oil.

Lignite: The lowest rank of coal, often referred to as brown coal, used almost exclusively as fuel for steam-electric power generation. It is brownish-black and has a high inherent moisture content, sometimes as high as 45 percent. The heat content of lignite ranges from 9 to 17 million Btu per ton on a moist, mineral-matter-free basis. The heat content of lignite consumed in the United States averages 13 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter).

Manufactured gas: A gas obtained by destructive distillation of coal, or by thermal decomposition of oil, or by the reaction of steam passing through a bed of heated coal or coke. Examples are coal gases, coke oven gases, producer gas, blast furnace gas, blue (water) gas, and carbureted water gas

Mcf: One thousand cubic feet.

Megawatt (MW): One million watts of electricity.

Megawatthour (MWh): One million watthours.

Municipal utility: A nonprofit utility, owned by a local municipality and operated as a department thereof, governed by a city council or an independently elected or appointed board; primarily involved in the distribution and/or sale of electric power to ultimate consumers.

Natural gas: A gaseous mixture of hydrocarbon compounds, the primary one being methane. Note: The Energy Information Administration measures wet natural gas and its two sources of production, associated/dissolved natural gas and nonassociated natural gas, and dry natural gas, which is produced from wet natural gas.

1) *Wet natural gas:* A mixture of hydrocarbon compounds and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in porous rock formations at reservoir conditions. The principal hydrocarbons normally contained in the mixture are methane, ethane, propane, butane, and pentane. Typical nonhydrocarbon gases that may be present in reservoir natural gas are water vapor, carbon dioxide, hydrogen sulfide, nitrogen and trace amounts of helium. Under reservoir conditions, natural gas and its associated liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil and are not distinguishable at the time as separate substances. Note: The Securities and Exchange Commission and the Financial Accounting Standards Board refer to this product as natural gas.

   - Associated-dissolved natural gas: Natural gas that occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with crude oil (dissolved gas).
   - Nonassociated natural gas: Natural gas that is not in contact with significant quantities of crude oil in the reservoir.

2) *Dry natural gas:* Natural gas which remains after: 1) the liquefiable hydrocarbon portion has been removed from the gas stream (i.e., gas after lease, field, and/or plant separation); and 2) any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable. Note: Dry natural gas is also known as consumer-grade natural gas. The parameters for measurement are cubic feet at 60 degrees Fahrenheit and 14.73 pounds per square inch absolute.

Net generation: The amount of gross generation less the electrical energy consumed at the generating station(s) for station service or auxiliaries. Note: Electricity required for pumping at pumped-storage plants is regarded as electricity for station service and is deducted from gross generation.

Net summer capacity: The maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, as demonstrated by a multi-hour test, at the time of summer peak demand (period of May 1 through October 31). This output reflects a reduction in capacity due to electricity use for station service or auxiliaries.

Net winter capacity: The maximum output, commonly expressed in megawatts (MW), that generating equipment can supply to system load, as demonstrated by a multi-hour test, at the time of peak winter demand (period of November 1 though April 30). This output reflects a reduction in capacity due to electricity use for station service or auxiliaries.

North American Electric Reliability Council (NERC): A council formed in 1968 by the electric utility industry to promote the reliability and adequacy of bulk power supply in the electric utility systems of North America. The NERC Regions are:

1) Texas Regional Entity (TRE),
2) Florida Reliability Coordinating Council (FRCC),
3) Midwest Reliability Organization (MRO),
4) Northeast Power Coordinating Council (NPCC),
5) ReliabilityFirst Corporation (RFC),
6) Southeastern Electric Reliability Council (SERC),
7) Southwest Power Pool (SPP), and the
8) Western Energy Coordinating Council (WECC).

North American Industry Classification System (NAICS): A set of codes that describes the possible purposes of a facility.

Nuclear electric power: Electricity generated by an electric power plant whose turbines are driven by steam produced by the heat from the fission of nuclear fuel in a reactor.

Other customers: Includes public street and highway lighting, other sales to public authorities, sales to railroads and railways, sales for irrigation, and interdepartmental sales.

Other generation: Electricity originating from these sources: manufactured, supplemental gaseous fuel, propane, and waste gasses, excluding natural gas; biomass; geothermal; wind; solar thermal; photovoltaic; synthetic fuel; purchased steam; and waste oil energy sources.

Percent change: The relative change in a quantity over a specified time period. It is calculated as follows: the current value has the previous value subtracted from it; this new number is divided by the absolute value of the previous value; then this new number is multiplied by 100.

Petroleum: A broadly defined class of liquid hydrocarbon mixtures. Included are crude oil, lease condensate, unfinished oils, refined products obtained from the processing of crude oil, and natural gas plant liquids. Note: Volumes of finished petroleum products include nonhydrocarbon compounds, such as additives and detergents, after they have been blended into the products.

Petroleum coke: See Coke (petroleum).

Photovoltaic energy: Direct-current electricity generated from sunlight through solid-state semiconductor devices that have no moving parts.

Plant: A term commonly used either as a synonym for an industrial establishment or a generation facility or to refer to a particular process within an establishment.

Power: The rate at which energy is transferred. Electrical energy is usually measured in watts. Also used for a measurement of capacity.

Power production plant: All the land and land rights, structures and improvements, boiler or reactor vessel equipment, engines and engine-driven generator, turbo generator units, accessory electric equipment, and miscellaneous power plant equipment are grouped together for each individual facility.

Production (electric): Act or process of producing electric energy from other forms of energy; also, the amount of electric energy expressed in watthours (Wh).

Propane: A normally gaseous straight-chain hydrocarbon, (C3H8). It is a colorless paraffinic gas that boils at a temperature of -43.67 degrees Fahrenheit. It is extracted from natural gas or refinery gas streams. It includes all products covered by Gas Processors Association Specifications for commercial propane and HD-5 propane and ASTM Specification D 1835.

Public street and highway lighting service: Includes electricity supplied and services rendered for the purpose of lighting streets, highways, parks and other public places; or for traffic or other signal system service, for municipalities, or other divisions or agencies of State or Federal governments.

Railroad and railway electric service: Electricity supplied to railroads and interurban and street railways, for general railroad use, including the propulsion of cars or locomotives, where such electricity is supplied under separate and distinct rate schedules.

Receipts: Purchases of fuel.

Relative standard error: The standard deviation of a distribution divided by the arithmetic mean, sometimes multiplied by 100. It is used for the purpose of comparing the variabilities of frequency distributions but is sensitive to errors in the means.

Residential: An energy-consuming sector that consists of living quarters for private households. Common uses of energy associated with this sector include space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances. The residential sector excludes institutional living quarters.

Residual fuel oil: A general classification for the heavier oils, known as No. 5 and No. 6 fuel oils, that remain after the distillate fuel oils and lighter hydrocarbons are distilled away in refinery operations. It conforms to ASTM Specifications D 396 and D 975 and Federal Specification VV-F-815C. No. 5, a residual fuel oil of medium viscosity, is also known as Navy Special and is defined in Military Specification MIL-F-859E, including Amendment 2 (NATO Symbol F-770). It is used in steam-powered vessels in government

service and inshore power plants. No. 6 fuel oil includes Bunker C fuel oil and is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes.

Retail: Sales covering electrical energy supplied for residential, commercial, and industrial end-use purposes. Other small classes, such as agriculture and street lighting, also are included in this category.

Revenues: The total amount of money received by a firm from sales of its products and/or services, gains from the sales or exchange of assets, interest and dividends earned on investments, and other increases in the owner's equity except those arising from capital adjustments.

Sales: The transfer of title to an energy commodity from a seller to a buyer for a price or the quantity transferred during a specified period.

Service classifications (sectors): Consumers grouped by similar characteristics in order to be identified for the purpose of setting a common rate for electric service. Usually classified into groups identified as residential, commercial, industrial and other.

Service to public authorities: Public authority service includes electricity supplied and services rendered to municipalities or divisions or agencies of State and Federal governments, under special contracts or agreements or service classifications applicable only to public authorities.

Solar energy: The radiant energy of the sun that can be converted into other forms of energy, such as heat or electricity. Electricity produced from solar energy heats a medium that powers an electricity-generating device.

State power authority: A nonprofit utility owned and operated by a state government agency, primarily involved in the generation, marketing, and/or transmission of wholesale electric power.

Steam-electric power plant (conventional): A plant in which the prime mover is a steam turbine. The steam used to drive the turbine is produced in a boiler where fossil fuels are burned.

Stocks of fuel: A supply of fuel accumulated for future use. This includes coal and fuel oil stocks at the plant site, in coal cars, tanks, or barges at the plant site, or in separate storage sites.

Subbituminous coal: A coal whose properties range from those of lignite to those of bituminous coal and used primarily as fuel for steam-electric power generation. It may be dull, dark brown to black, soft and crumbly, at the lower end of the range, to bright, jet black, hard, and relatively strong, at the upper end. Subbituminous coal contains 20 to 30 percent inherent moisture by weight. The heat content of subbituminous coal ranges from 17 to 24 million Btu per ton on a moist, mineral-matter-free basis. The heat content of subbituminous coal consumed in the United States averages 17 to 18 million Btu per ton, on the as-received basis (i.e., containing both inherent moisture and mineral matter).

Sulfur: A yellowish nonmetallic element, sometimes known as "brimstone." It is present at various levels of concentration in many fossil fuels whose combustion releases sulfur compounds that are considered harmful to the environment. Some of the most commonly used fossil fuels are categorized according to their sulfur content, with lower sulfur fuels usually selling at a higher price. Note: No. 2 Distillate fuel is

currently reported as having either a 0.05 percent or lower sulfur level for on-highway vehicle use or a greater than 0.05 percent sulfur level for off-highway use, home heating oil, and commercial and industrial uses. Residual fuel, regardless of use, is classified as having either no more than 1 percent sulfur or greater than 1 percent sulfur. Coal is also classified as being low-sulfur at concentrations of 1 percent or less or high-sulfur at concentrations greater than 1 percent.

Sulfur content: The amount of sulfur contained in the fuel (except gas) in terms of percent by weight.

Supplemental gaseous fuel supplies: Synthetic natural gas, propane-air, coke oven gas, refinery gas, biomass gas, air injected for Btu stabilization, and manufactured gas commingled and distributed with natural gas.

Synthetic fuel: A gaseous, liquid, or solid fuel that does not occur naturally. Synfuels can be made from coal (coal gasification or coal liquefaction), petroleum products, oil shale, tar sands, or plant products. Among the synfuels are various fuel gases, including but not restricted to substitute natural gas, liquid fuels for engines (e.g., gasoline, diesel fuel, and alcohol fuels) and burner fuels (e.g., fuel heating oils).

Terrawatt: One trillion watts.

Terrawatthour: One trillion kilowatthours.

Ton: A unit of weight equal to 2,000 pounds.

Turbine: A machine for generating rotary mechanical power from the energy of a stream of fluid (such as water, steam, or hot gas). Turbines convert the kinetic energy of fluids to mechanical energy through the principles of impulse and reaction, or a mixture of the two.

Ultimate consumer: A consumer that purchases electricity for its own use and not for resale.

Useful thermal output: The thermal energy made available in a combined heat or power system for use in any industrial or commercial process, heating or cooling application, or delivered to other end users, i.e., total thermal energy made available for processes and applications other than electrical generation.

Waste coal: As a fuel for electric power generation, waste coal includes anthracite refuse or mine waste, waste from anthracite preparation plants, and coal recovered from previously mined sites.

Waste gases: As a fuel for electric power generation, waste gasses are those gasses that are produced from gasses recovered from a solid-waste or wastewater treatment facility, or the gaseous by-products of oil-refining processes.

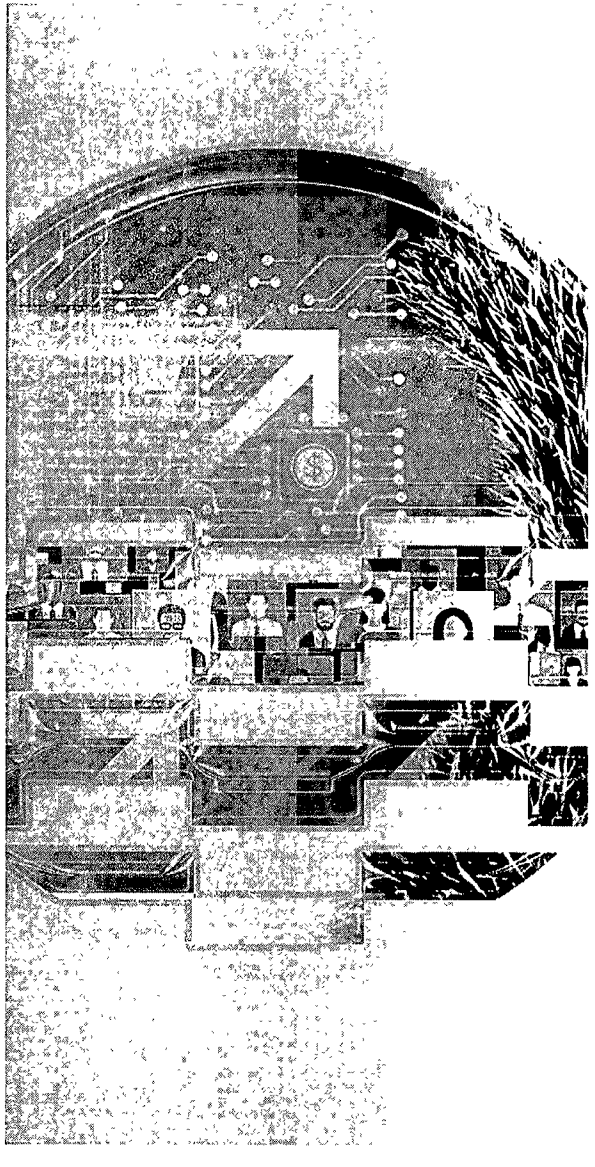
Waste oil: As a fuel for electric power generation, waste oil includes recycled motor oil, and waste oil from transformers.

Watt (W): The unit of electrical power equal to one ampere under a pressure of one volt. A Watt is equal to 1/746 horsepower.

Watthour (Wh): The electrical energy unit of measure equal to one watt of power supplied to, or taken from, an electric circuit steadily for one hour.

Wind energy: The kinetic energy of wind converted into mechanical energy by wind turbines (i.e., blades rotating from the hub) that drive generators to produce electricity.

Year-to -date: The cumulative sum of each month's value starting with January and ending with the current month of the data.



ANALYST DAY 2020

Sustainability in Everything We Do

Building the Premier Utility

LEO DENAULT – CHAIRMAN AND CHIEF EXECUTIVE OFFICER

September 24, 2020

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This presentation includes the non-GAAP financial measures of adjusted EPS; adjusted ROE; parent debt to total debt, excluding securitization debt; FFO to debt, excluding securitization debt; FFO to debt, excluding securitization debt, return of unprotected excess ADIT, and severance and retention payments associated with exit of EWC; and net liquidity, including storm escrows when describing Entergy's results of operations and financial performance. We have prepared reconciliations of these financial measures to the most directly comparable GAAP measure, which can be found in this presentation. This presentation should be considered together with the Entergy earnings release to which this teleconference relates, which is posted on the company's website at www.entergy.com and which contains further information on non-GAAP financial measures.