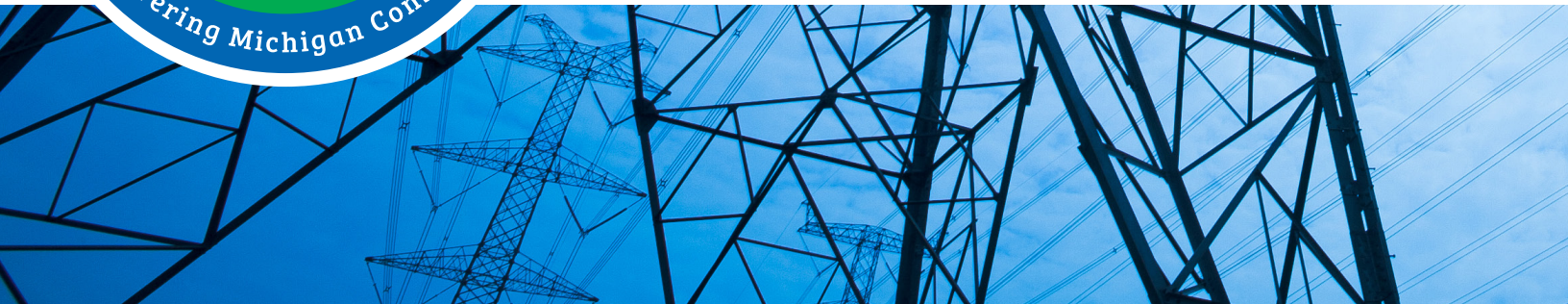


ELECTRIC UTILITY PERFORMANCE

RANKING MICHIGAN AMONGST THE STATES • 2019 EDITION



The Citizens Utility Board of Michigan (CUB of MI) was formed in 2018 to represent the interests of residential energy customers across the state of Michigan. CUB of MI educates and engages Michigan consumers in support of cost-effective investment in energy efficiency and renewable energy and against unfair rate increase requests. CUB of MI gives a voice to Michigan utility customers and helps to ensure that citizens of the state pay the lowest reasonable rate for utility services and also benefit from the environmental implications of investment in clean energy. CUB of MI is a nonpartisan, nonprofit organization whose members are individual residential customers of Michigan's energy utilities. For more information, visit www.cubofmichigan.org.

This report was prepared for Citizens Utility Board of Michigan by 5 Lakes Energy. 5 Lakes Energy is a Michigan-based policy consulting firm dedicated to advancing policies and programs that promote clean energy and sound water policy for a resilient environment. For more information, visit <https://5lakesenergy.com/>.

Contents

- Executive Summary 3
- Introduction and Background 5
- Overall Rankings 5
 - Reliability 5
 - Affordability 6
 - Environmental Impacts 6
- Reliability 8
 - Average Minutes of Outage per Customer per Year (SAIDI) 9
 - Outages per customer per year (SAIFI) 13
 - Average minutes to restore power to a customer (CAIDI) 17
- Affordability 21
 - Residential Energy Affordability 21
 - Residential Average Monthly Bill 24
 - Electricity Rates 27
 - Residential Sector Electricity Rates 27
 - Commercial Sector Electricity Rates 30
 - Industrial Sector Electricity Rates 33
 - All Sector Electricity Rates 36
- Environmental Impacts 39
 - Pollution 39
 - Carbon Dioxide Emissions 40
 - Sulfur Dioxide Emissions 44
 - Nitrogen Oxides Emissions 48
 - Renewable Generation 52
- Michigan Electric Utility Performance 62
 - Reliability 62
 - Average Minutes of Outage per Customer per Year (SAIDI) 62
 - Outages per customer per year (SAIFI) 65
 - Average minutes to restore power to a customer (CAIDI) 68
 - Affordability 71
 - Residential Household Average Monthly Electricity Bill 71
 - Residential Sector Electricity Rates 73
 - Commercial Sector Electricity Rates 75
 - Industrial Sector Electricity Rates 77
 - All Sectors Electricity Rates 79

Executive Summary

Michigan's electric utilities perform well below average compared to utilities in the rest of the country on three important metrics, according to an analysis completed for the Citizens Utility Board of Michigan.

Focusing on reliability, affordability and environmental impacts, this study finds that Michigan continues to fall behind other states on these key energy issues. These findings may be particularly important for policymakers and stakeholders that hope to improve Michigan's economic competitiveness.

Reliability: In an age of information technology when any interruption in service can paralyze economic activity, reliable power is critical.

In terms of the average time to restore power to a customer after an outage, Michigan ranked 4th worst in the nation in 2017, the most recent year in which full data is available, according to data gathered by the U.S. Department of Energy's Energy Information Administration (EIA). When extreme weather days are excluded, Michigan falls to 2nd worst in the nation.

In other words, even after accounting for the fact that Michigan is far less exposed to natural disasters than many other states (for example, Hurricane Sandy, which caused mass disruptions for New York and New Jersey utilities), Michigan utility customers spend more time waiting for the power to come back on than customers in all but a handful of other states. In addition, annual data over the past several years shows that this poor performance has been consistent.

Looking only at the number of outages per customer (not taking into account how long those outages last) and still excluding major event days, Michigan is actually slightly above average. However, even with fewer outages, Michigan customers still spend more time in the dark than customers in most states, suggesting that Michigan utilities are particularly bad at restoring power once there is an outage.

It is important to note that electricity outages typically occur at the distribution system—the local electric wires that connect neighborhoods to substations—as opposed to the generation system (i.e., power plants, nuclear reactors or renewable sources like wind turbines or solar panels) or the transmission level (high-voltage electricity lines that carry power from the power plants and other sources to the distribution system). Generation and transmission only account for about 1% of outages, both nationally and in Michigan. So, while power plants and transmission lines are often owned and/or planned by non-utility entities, the distribution system in Michigan and most other states is almost entirely the utility's responsibility.

Affordability: Energy costs can pose a heavy burden for businesses and residents, harming the state's economic competitiveness and worsening poverty. Michiganders pay the 16th-highest residential bills for energy out of the 50 states and DC, and the highest in the Midwest. As a percentage of median household income, Michigan is 17th-highest. That finding is based on how much the typical household pays for a kilowatt-hour of electricity, as well as non-electricity energy expenditures such as natural gas or propane for home heating.

Michigan's electricity is particularly expensive for residential customers. For a typical residential household, Michigan's average cost per kWh of 15.4 cents is 12th-highest in the country. Commercial

customers are not spared, however – they pay 11.0 cents/kWh, or 14th-highest. The one group that does enjoy relatively low rates is industrial customers, who pay 7.19 cents/kWh, 24th-highest.

Environmental impacts: The production of energy can create excessive pollution that harms residents' health, livelihoods and ability to enjoy the state's natural beauty.

EIA data show that Michigan power plants emit higher than average amounts of carbon dioxide, which contributes to climate change, sulfur dioxide, which leads to asthma attacks and cardiopulmonary disease, and nitrous oxide, which creates breathing problems and air filled with particulate matter. In 2017, Michigan had the 20th-worst CO₂ emissions for each kWh of electricity generated in the state, the 10th-worst sulfur dioxide emissions per kWh and the 21st-worst nitrous oxide emissions per kWh.

One reason for Michigan's relatively dirty energy supply is that it ranks 19th-lowest in the country in terms of percentage of power generated by renewable resources, like wind and solar.

Introduction and Background

Reliability, affordability and management of environmental impacts are commonly considered to be the primary performance criteria for electric utilities. This paper provides a scorecard measuring the aggregate performance of Michigan's electric utilities on these criteria in comparison to the aggregate performance of the other 49 states and the District of Columbia. While aspects of electric utility performance are affected by location, climate and the composition of the state's economy, these rankings also reflect the historical effectiveness of the state's utility regulatory policy.

The following tables show Michigan's rank for each metric. For each metric reported, states are ranked in order from worst performance to best; a high rank (low number) implies worse performance than a low rank. The Energy Information Administration (EIA) of the US Department of Energy has released reliability, price, emissions, and generation data for 2017. All time-series tables show states or utilities ranked based on their performance in the most recent reported year and color gradients are occasionally used to display year-to-year improvements or declines. In the stacked bar charts below, the first colored segment shows SAIDI, SAIFI, and CAIDI without Major Event Days, while the second colored segment shows the *additional* portion of SAIDI, SAIFI, and CAIDI attributable to Major Event Days, so that the sum of these two segments (and combined length of the two segments) equals SAIDI, SAIFI, or CAIDI with Major Event Days.¹ These charts are sorted largest-smallest for each respective metric with Major Event Days.

Overall Rankings

Reliability

Metric	Michigan Rank 2017 (Worst-Best)
Annual minutes of outage per customer (SAIDI) with Major Event Days (MED)	6
Annual minutes of outage per customer (SAIDI) without Major Event Days (MED)	8
Annual outages per customer (SAIFI) with MED	22
Annual outages per customer (SAIFI) without MED	28
Average restoration time per outage (CAIDI) with MED	4
Average restoration time per outage (CAIDI) without MED	2

¹ Any metric including Major Event Days is at least as large as the same metric reported without Major Event Days. The two metrics could be equal for a given state or utility that attributes no outage occurrences to Major Events.

Affordability

Metric	Michigan Rank 2017 (Worst-Best)
Residential Average Monthly Bill	41
Electricity and Non-Electricity Energy Expenditures per Household	16
Non-Electricity Energy Expenditures per Household	11
Electricity Expenditures per Household	41
Energy Expenditures as a % of Median Household Income	17
	Michigan Rank 2017 (Worst-Best)
Price - All Sectors	14
Price - Residential	12
Price - Commercial	14
Price - Industrial	24

Environmental Impacts

Metric	Michigan Rank 2017 (Worst-Best)
Metric Tons CO2 Emissions per million kWh Generated	20
Metric Tons SO2 Emissions per million kWh Generated	10
Metric Tons NOX Emissions per million kWh Generated	21
Total CO2 Emissions from Electricity Generation	11
Total SO2 Emissions from Electricity Generation	6
Total NOX Emissions from Electricity Generation	10
Total Renewable Generation	32
Total Renewable Generation without Hydroelectric	39
Renewable Generation as % of Total Generation	19

Renewable Generation as % of Total Generation without Hydroelectric	27
Renewable Generation as % of Total Sales	21
Renewable Generation as % of Total Sales without Hydroelectric	28

Reliability

Electricity is one of the essentials of modern life, so reliability of electricity supply is an important attribute of utility performance. Much of the public discussion about electric utility reliability focuses on what utility regulators and utilities call Resource Adequacy. Resource Adequacy ensures that there is sufficient power generation capacity to satisfy utility customer peak demand. However, loss of electricity supply due to generation or transmission problems accounts for only about 1% of outage minutes nationally and in Michigan. Instead, breakdowns in the electricity distribution system cause the vast majority of power outages that utility customers experience on a regular basis. These may occur because storms break power lines, animals touch pairs of power lines and cause a “short,” because equipment fails or many other proximate causes.

The electric power industry, led by the Institute of Electrical and Electronics Engineers (IEEE) has determined that the best overall measure of an electric utility’s reliability is the average number of minutes of outage per year per customer, calculated by a method referred to as the System Average Interruption Duration Index (SAIDI). Important elements of SAIDI are the average number of outages per customer per year and the average duration of each customer outage. Outages per customer per year are computed by a method referred to as the System Average Interruption Frequency Index (SAIFI) while the average duration of each customer outage is computed by a method referred to as Customer Average Interruption Duration Index (CAIDI). CAIDI measures the average time for the utility to restore power to a customer after an outage starts.

Beginning in 2013, the EIA began collecting annual reports of SAIDI, SAIFI, and CAIDI from utilities and publishing those data in annual compilations, which may be downloaded from <http://www.eia.gov/electricity/data/eia861/>. The latest available reliability data from EIA are for calendar year 2017. The EIA collects SAIDI and SAIFI metrics with and without Major Event Days (MED). Major Event Days are a statistical classification, defined by the IEEE, of large outage events such as ice storms, wind storms, and hurricanes, that can materially affect annual reliability statistics. While reliability metrics that include Major Event Days can fluctuate greatly year-to-year, they provide a more accurate representation of customer experience than metrics excluding Major Event Days. For this reason, reliability data are presented with and without Major Event Days.

We computed SAIDI, SAIFI and CAIDI with and without Major Event Days by state using an average of the reporting utilities within each state, weighted by the number of customers served by each utility.²

The following table shows Michigan’s 2017 performance on each of these standard reliability metrics, with and without Major Event Days. In addition, Michigan’s rank from worst to best (1=worst, 51= best) amongst the states, including the District of Columbia, is shown in parenthesis for each metric.

² SAIFI values over 500 were considered data entry errors. Four SAIFI with MED and three SAIFI without MED observations from 2013 were greater than 500 and were subsequently removed from the dataset prior to calculating weighted SAIFI with MED and weighted SAIFI without MED: BARC Electric Coop (VA), Gibson Electric Members Coop (TN and FL), and Pioneer Electric Coop (AL).

2017 Metric	With Major Event Days	Without Major Event Days
Annual minutes outage per customer (SAIDI)	779 minutes (6 th worst)	179 minutes (8 th worst)
Annual outages per customer (SAIFI)	1.41 outages (22 nd worst)	0.99 outages (28 th worst)
Average restoration time per outage (CAIDI)	551 minutes (4 th worst)	181 minutes (2 nd worst)

Michigan’s overall poor performance in annual minutes of outage per customer (SAIDI) reflects average performance on the frequency of outages (SAIFI) and very poor performance on restoration following an outage (CAIDI), whether the outage is on a Major Event Day or not.

More detailed analysis of the reliability of Michigan’s electric utilities compared to that of other states follows.

Average Minutes of Outage per Customer per Year (SAIDI)

As can be seen in the following Figure 2 and Figure 3, in 2017 Michigan ranked 6th worst amongst the states in overall average number of minutes of outage per customer (SAIDI with Major Event Days) over the year and 8th worst in number of minutes of outage per customer (SAIDI without Major Event Days) over the year. The states that ranked worse than Michigan in minutes of outage including Major Event Days but better than Michigan in minutes of outage excluding Major Event Days were mostly those that experienced hurricane-related damage or Nor’easter-related damage in 2017. Michigan also experienced a major wind storm in 2017.

Annual data from 2013-2017 in Figure 2 and Figure 3 shows that Michigan’s poor performance in SAIDI without Major Event Days has been consistent, while SAIDI with Major Event Days steadily improved from 2013 to 2016 but relapsed to 2013 levels in 2017. In these tables, the trend graphs in the right-most column use a uniform scale so that rows representing states can be visually compared. Names of Michigan’s neighboring states are shown in bold to facilitate comparison within the region.

Figure 1: System Average Interruption Duration Index including and excluding Major Event Days in each State in 2017.

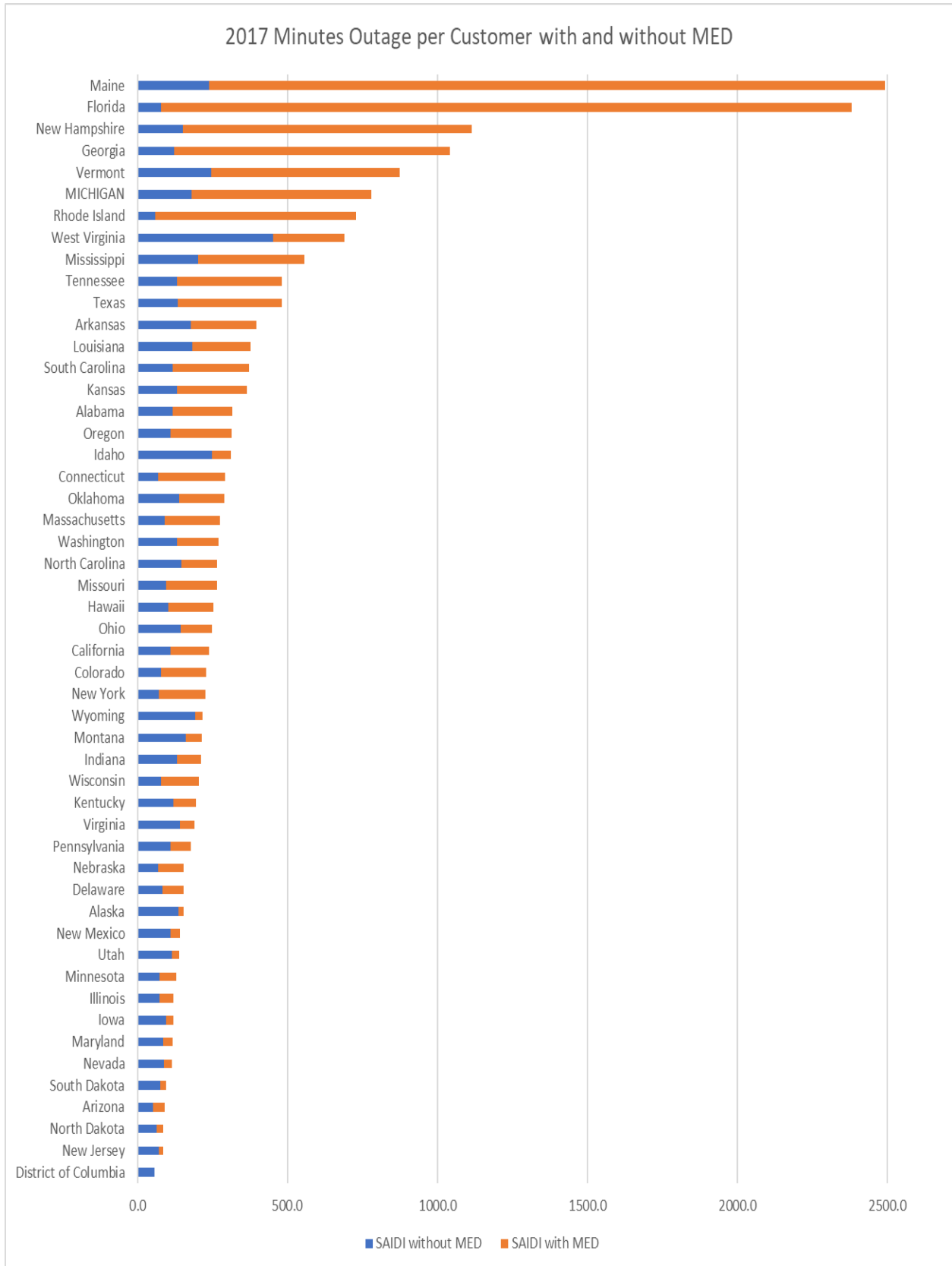


Figure 2: Annual System Average Interruption Duration Index including Major Event Days in each State 2013-2017.

SAIDI with MED							
State	2013	2014	2015	2016	2017		Trend
Maine	16	474	102	535	2,493		
Florida	92	92	85	337	2,381		
New Hampshire	189	725	105	192	1,113		
Georgia	138	235	241	420	1,042		
Vermont	7	741	204	352	874		
MICHIGAN	785	551	350	268	779		
Rhode Island	783	54	342	169	728		
West Virginia	542	663	815	743	691		
Mississippi	178	184	297	282	557		
Tennessee	129	185	219	208	482		
Texas	182	188	269	211	481		
Arkansas	251	212	303	397	395		
Louisiana	247	196	312	378	378		
South Carolina	111	755	224	1,647	373		
Kansas	244	139	265	168	365		
Alabama	230	197	209	174	316		
Oregon	167	277	200	285	313		
Idaho	255	240	459	201	311		
Connecticut	79	86	104	174	291		
Oklahoma	611	109	824	317	290		
Massachusetts	427	124	91	145	275		
Washington	155	305	550	224	271		
North Carolina	228	440	210	823	265		
Missouri	304	126	167	204	264		
Hawaii	145	262	266	126	252		
Ohio	217	170	172	173	248		
California	98	103	118	117	240		
Colorado	127	83	109	164	228		
New York	86	67	87	107	227		
Wyoming	369	193	187	193	216		
Montana	161	139	287	154	215		
Indiana	226	235	242	250	211		
Wisconsin	143	139	105	136	204		
Kentucky	227	283	200	192	194		
Virginia	449	176	201	237	190		
Pennsylvania	139	400	157	126	177		
Nebraska	128	120	87	90	154		
Delaware	158	169	190	149	154		
Alaska	358	253	597	195	153		
New Mexico	149	82	122	136	141		
Utah	190	187	200	190	138		
Minnesota	359	120	154	302	129		
Illinois	184	195	169	135	120		
Iowa	122	164	97	117	119		
Maryland	112	236	124	120	116		
Nevada	66	73	107	96	114		
South Dakota	1,100	107	126	216	95		
Arizona	74	84	90	86	91		
North Dakota	113	81	104	120	87		
New Jersey	166	112	261	137	86		
District of Columbia	124	96	112	115	58		

Figure 3: Annual System Average Interruption Duration Index excluding Major Event Days in each State 2013-2017.

SAIDI without MED							
State	2013	2014	2015	2016	2017		Trend
West Virginia	418	450	458	439	452		
Idaho	172	183	263	170	247		
Vermont	2	212	204	270	247		
Maine	4	83	87	264	238		
Mississippi	117	147	187	180	201		
Wyoming	169	178	166	150	191		
Louisiana	98	111	152	179	184		
MICHIGAN	199	179	178	193	179		
Arkansas	207	203	213	208	178		
Montana	139	124	141	128	162		
New Hampshire	123	122	94	141	151		
North Carolina	111	118	127	146	146		
Ohio	112	129	141	128	143		
Virginia	135	141	146	163	140		
Oklahoma	109	101	177	149	138		
Alaska	222	195	162	181	137		
Texas	105	112	137	129	133		
Tennessee	94	105	121	157	133		
Washington	97	114	110	111	132		
Kansas	111	106	127	132	131		
Indiana	107	115	120	126	131		
Georgia	87	90	106	122	121		
Kentucky	146	158	116	137	120		
South Carolina	97	97	119	120	118		
Alabama	114	122	122	115	116		
Utah	176	148	156	106	115		
Oregon	82	106	101	101	111		
New Mexico	98	75	99	101	111		
California	84	86	93	99	109		
Pennsylvania	99	100	99	101	109		
Hawaii	116	117	117	96	104		
Missouri	88	90	93	83	96		
Iowa	77	93	86	92	95		
Massachusetts	83	82	74	113	91		
Nevada	51	60	55	74	88		
Maryland	111	85	109	105	86		
Delaware	129	114	115	103	83		
Florida	80	84	77	82	78		
Colorado	82	78	82	82	78		
Wisconsin	75	71	69	77	78		
South Dakota	171	100	103	80	76		
Illinois	84	92	89	81	73		
Minnesota	87	74	78	88	73		
New York	43	46	77	83	72		
New Jersey	123	79	65	86	71		
Nebraska	54	66	52	54	70		
Connecticut	55	86	70	92	68		
North Dakota	88	78	81	98	64		
Rhode Island	57	54	64	69	59		
District of Columbia	124	82	112	115	58		
Arizona	55	52	55	58	51		

Outages per customer per year (SAIFI)

Minutes of outage per customer per year (SAIDI) can be understood as the product of the number of outages per customer per year (SAIFI) and the average time to restore power after an outage (CAIDI).

Figure 5 and Figure 6 show Michigan's number of outages per customer per year compared to other states, with and without Major Event Days. In 2017, Michigan performed near the median in outages per customer (SAIFI with Major Event Days), ranking 22nd worst (30th best) amongst all states. When Major Event Days are excluded, Michigan's rank improves to 24th best (28th worst) overall.

Annual data from 2013-2017 in Figure 5 and Figure 6 show that Michigan's SAIFI with Major Event Days for 2016 is a significant improvement over 2014 and 2015 but worsened from 2016 to 2017. When Major Event Days are excluded, Michigan's performance has been fairly consistent for the last three years, although worse, on average, than 2013-2014.

Figure 4: System Average Interruption Frequency Index including and excluding Major Event Days for each State in 2017.

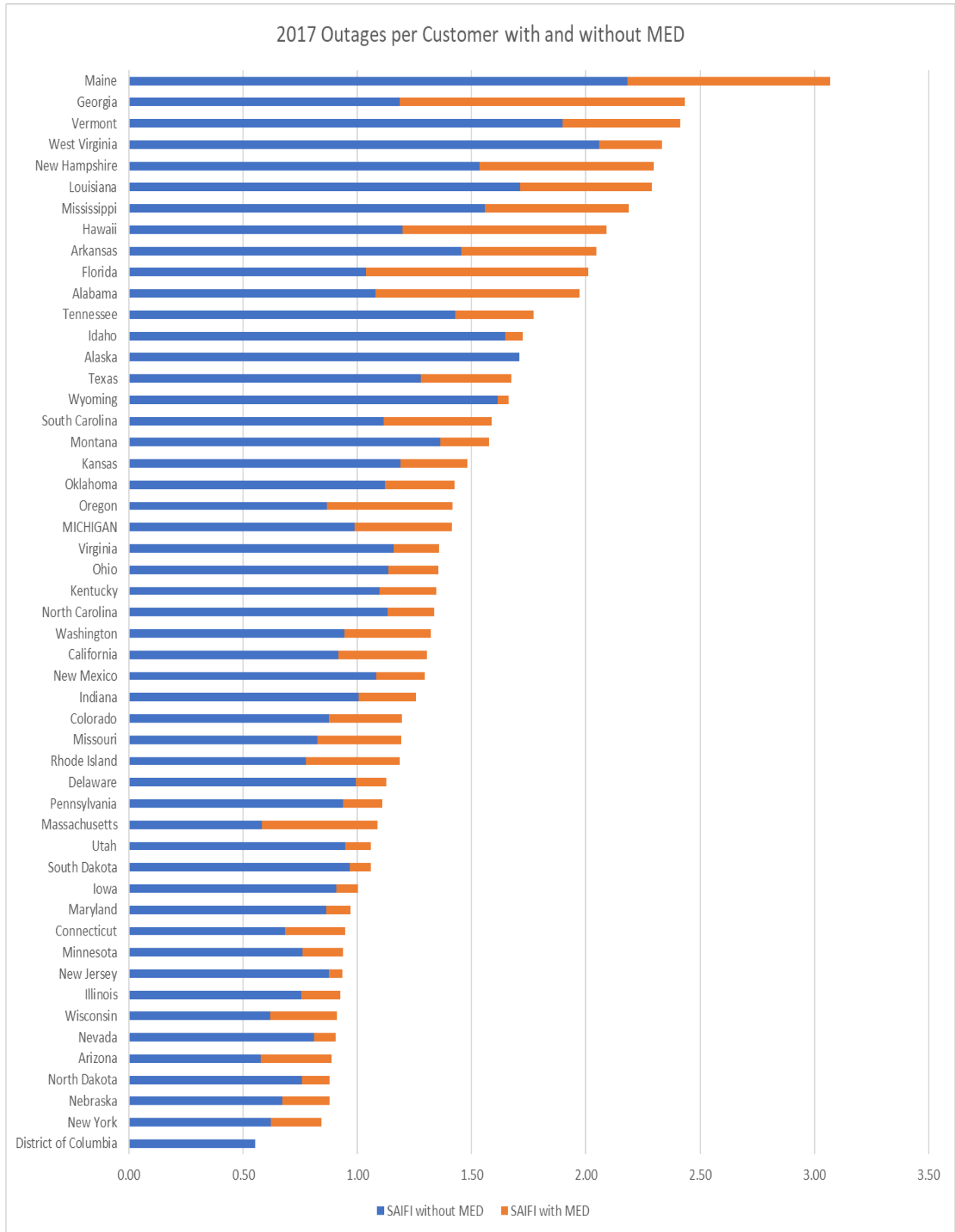


Figure 5: Annual System Average Interruption Frequency Index including Major Event Days in each State 2013-2017.

SAIFI with MED						
State	2013	2014	2015	2016	2017	Trend
Maine	2.89	10.92	1.87	2.69	3.07	
Georgia	1.34	1.50	1.53	1.51	2.43	
Vermont	2.22	2.20	1.67	1.86	2.41	
West Virginia	2.29	2.37	2.42	2.35	2.33	
New Hampshire	2.17	2.26	1.38	1.54	2.30	
Louisiana	2.45	2.35	2.27	2.12	2.29	
Mississippi	1.45	1.51	1.85	1.93	2.19	
Hawaii	2.13	2.31	2.99	1.89	2.09	
Arkansas	1.78	1.78	1.98	2.03	2.05	
Florida	1.12	1.18	1.12	1.37	2.01	
Alabama	3.15	3.20	1.71	1.57	1.97	
Tennessee	2.98	1.75	1.98	2.05	1.77	
Idaho	1.64	1.28	1.75	1.38	1.72	
Alaska	6.12	2.38	2.56	2.30	1.71	
Texas	1.54	1.43	2.05	1.60	1.67	
Wyoming	1.79	1.47	1.46	1.49	1.66	
South Carolina	1.80	1.82	1.44	2.39	1.59	
Montana	1.36	1.13	1.75	1.26	1.58	
Kansas	1.57	1.35	2.26	1.41	1.48	
Oklahoma	1.82	1.05	1.67	1.58	1.43	
Oregon	0.79	1.29	1.21	1.31	1.41	
MICHIGAN	1.52	2.55	2.22	1.15	1.41	
Virginia	2.89	1.37	1.41	1.53	1.36	
Ohio	1.18	1.22	1.21	1.18	1.35	
Kentucky	1.81	1.91	1.34	1.46	1.35	
North Carolina	2.20	1.49	1.34	1.79	1.33	
Washington	1.05	1.54	1.70	1.17	1.32	
California	0.87	0.93	0.92	1.03	1.30	
New Mexico	1.06	0.85	3.38	1.75	1.29	
Indiana	1.20	1.28	1.26	1.30	1.26	
Colorado	1.08	0.90	1.01	1.14	1.19	
Missouri	1.12	1.09	1.06	1.04	1.19	
Rhode Island	1.26	0.76	1.23	1.21	1.19	
Delaware	1.46	1.42	1.52	1.35	1.13	
Pennsylvania	0.97	1.22	0.99	1.07	1.11	
Massachusetts	1.13	0.96	0.79	0.99	1.09	
Utah	1.65	1.36	1.43	1.31	1.06	
South Dakota	1.84	0.92	0.97	1.16	1.06	
Iowa	0.97	1.20	0.96	1.05	1.00	
Maryland	4.15	1.26	1.09	1.09	0.97	
Connecticut	0.69	0.74	0.70	1.06	0.95	
Minnesota	1.65	1.44	0.97	1.21	0.94	
New Jersey	1.34	0.95	0.99	1.15	0.93	
Illinois	1.11	1.13	1.11	1.02	0.93	
Wisconsin	0.77	0.83	1.32	0.97	0.91	
Nevada	0.72	0.74	0.73	0.84	0.90	
Arizona	0.83	0.85	2.92	0.84	0.89	
North Dakota	0.87	0.88	1.08	0.96	0.88	
Nebraska	0.99	1.28	0.71	0.67	0.88	
New York	0.65	0.69	0.67	0.78	0.84	
District of Columbia	0.88	0.69	0.69	0.82	0.55	

Figure 6: Annual System Average Interruption Frequency Index excluding Major Event Days in each State 2013-2017.

State	SAIFI without MED					Trend
	2013	2014	2015	2016	2017	
Maine	1.98	2.46	1.82	2.17	2.18	
West Virginia	1.71	2.13	2.15	2.10	2.06	
Vermont	1.95	1.50	1.75	1.84	1.90	
Alaska	2.31	2.03	1.83	1.93	1.83	
Louisiana	1.44	1.53	1.80	1.77	1.71	
Idaho	1.39	1.14	1.43	1.21	1.65	
Wyoming	1.56	1.47	1.42	1.36	1.62	
Mississippi	1.23	1.29	1.59	1.72	1.56	
New Hampshire	1.30	1.58	1.35	1.38	1.53	
Arkansas	1.57	1.55	1.75	1.68	1.45	
Tennessee	2.77	1.46	1.69	1.88	1.43	
Montana	1.27	1.13	1.45	1.14	1.36	
Texas	1.20	1.16	1.44	1.26	1.28	
Hawaii	1.60	1.84	1.71	1.34	1.20	
Kansas	1.25	1.20	1.75	1.23	1.19	
Georgia	1.16	1.14	1.26	1.34	1.18	
Virginia	1.20	1.21	1.23	1.33	1.16	
Ohio	0.95	1.10	1.14	1.06	1.13	
North Carolina	1.89	1.03	1.11	1.13	1.13	
Oklahoma	1.03	1.00	1.11	1.26	1.12	
South Carolina	1.72	1.11	1.15	1.21	1.11	
Kentucky	1.45	1.50	1.13	1.26	1.10	
New Mexico	0.94	0.82	1.56	1.39	1.08	
Alabama	2.88	2.92	1.24	1.16	1.08	
Florida	1.03	1.11	1.05	1.07	1.04	
Indiana	0.96	1.02	1.02	1.03	1.00	
Delaware	1.28	1.18	1.29	1.16	0.99	
MICHIGAN	0.92	0.89	0.96	1.01	0.99	
South Dakota	1.06	0.69	0.85	0.90	0.97	
Utah	1.29	1.19	1.26	0.97	0.95	
Washington	0.81	0.98	0.84	0.79	0.94	
Pennsylvania	0.90	0.92	0.89	0.96	0.94	
California	0.82	0.85	0.83	0.93	0.92	
Iowa	0.85	0.99	0.92	0.94	0.91	
New Jersey	1.22	0.87	0.83	0.98	0.87	
Colorado	1.00	0.88	0.90	0.91	0.87	
Oregon	0.65	0.87	0.71	0.78	0.87	
Maryland	4.37	1.00	1.04	1.02	0.86	
Missouri	0.82	0.93	0.92	0.77	0.83	
Nevada	0.57	0.67	0.56	0.73	0.81	
Rhode Island	0.72	0.76	0.94	0.97	0.78	
Minnesota	1.30	1.27	0.81	0.86	0.76	
North Dakota	0.94	1.03	0.92	0.97	0.76	
Illinois	0.85	0.95	0.94	0.83	0.75	
Connecticut	0.59	0.74	0.65	0.91	0.68	
Nebraska	0.52	0.69	0.55	0.54	0.67	
New York	0.59	0.61	0.64	0.70	0.62	
Wisconsin	0.66	0.67	1.07	0.70	0.62	
Massachusetts	0.89	0.83	0.74	0.91	0.58	
Arizona	0.63	0.59	1.28	0.61	0.58	
District of Columbia	0.88	0.64	0.69	0.82	0.55	

Average minutes to restore power to a customer (CAIDI)

Michigan's poor performance on annual outage minutes per customer (SAIDI) and middling or better performance on the number of outages per customer per year (SAIFI) reflects that Michigan's power restoration following an outage (CAIDI) is quite poor. Figure 8 shows that, including Major Event Days, Michigan ranked 4th worst amongst the states in average power restoration time following a customer outage (CAIDI). Figure 9 shows that excluding Major Event Days, Michigan's performance is even worse, ranking 2nd worst amongst all states in average power restoration time following an outage.

Annual data from 2013-2017 in Figure 8 and Figure 9 show modest annual improvements, if any. Michigan utilities performed poorly on CAIDI in 2013, both with and without Major Event Days, and slightly improved CAIDI, but not relative rank, each year until 2016. But, CAIDI with Major Event Days spiked in 2017.

Figure 7: Customer Average Interruption Duration Index including and excluding Major Event Days for each State in 2017.

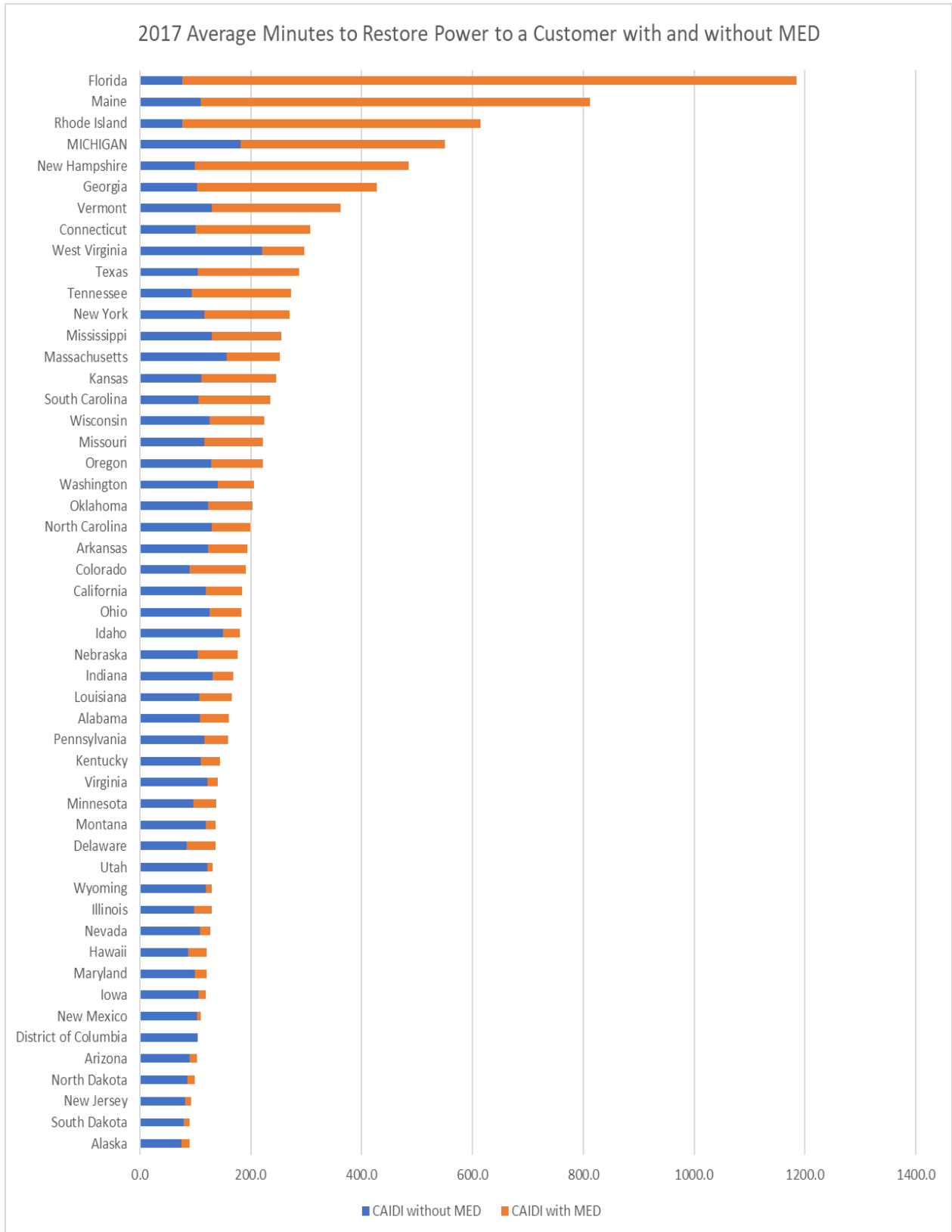


Figure 8: Annual Customer Average Interruption Duration Index including Major Event Days in each State 2013-2017.

CAIDI with MED							
State	2013	2014	2015	2016	2017		Trend
Florida	82	78	76	246	1,185		
Maine	6	43	54	199	813		
Rhode Island	622	71	278	140	615		
MICHIGAN	515	216	157	234	551		
New Hampshire	87	320	76	125	485		
Georgia	103	157	157	279	428		
Vermont	3	338	122	189	362		
Connecticut	115	116	148	164	308		
West Virginia	236	280	337	316	296		
Texas	118	131	132	132	287		
Tennessee	43	106	111	102	272		
New York	132	97	129	137	269		
Mississippi	123	122	161	146	255		
Massachusetts	378	130	116	146	252		
Kansas	156	103	117	119	246		
South Carolina	62	416	156	690	235		
Wisconsin	186	168	80	140	224		
Missouri	271	115	157	195	222		
Oregon	212	215	166	217	221		
Washington	147	198	323	192	205		
Oklahoma	335	104	494	200	203		
North Carolina	104	296	157	460	199		
Arkansas	141	119	153	195	193		
Colorado	118	92	108	143	191		
California	113	111	128	114	184		
Ohio	185	139	143	146	184		
Idaho	155	188	262	145	180		
Nebraska	129	94	123	134	176		
Indiana	188	184	192	192	168		
Louisiana	101	83	138	179	165		
Alabama	73	61	122	111	160		
Pennsylvania	142	328	158	118	159		
Kentucky	126	148	149	132	144		
Virginia	156	128	143	154	140		
Minnesota	217	83	159	250	137		
Montana	118	123	164	122	137		
Delaware	108	119	125	110	137		
Utah	115	138	140	145	130		
Wyoming	206	131	128	129	130		
Illinois	166	173	152	132	129		
Nevada	91	99	146	115	126		
Hawaii	68	114	89	67	121		
Maryland	27	188	114	110	120		
Iowa	126	136	100	112	118		
New Mexico	140	97	36	78	109		
District of Columbia	141	139	164	140	104		
Arizona	89	100	31	102	103		
North Dakota	131	92	97	125	99		
New Jersey	123	118	263	119	92		
South Dakota	599	117	129	186	90		
Alaska	59	106	234	85	89		

Figure 9: Annual Customer Average Interruption Duration Index excluding Major Event Days in each State 2013-2017.

CAIDI without MED							Trend
State	2013	2014	2015	2016	2017		
West Virginia	244	211	213	209	220		
MICHIGAN	216	201	185	191	181		
Massachusetts	93	99	100	124	157		
Idaho	124	160	184	140	150		
Washington	120	117	131	140	140		
Indiana	111	113	118	122	130		
Vermont	1	141	117	147	130		
Mississippi	94	114	118	105	129		
North Carolina	59	114	114	129	129		
Oregon	126	122	142	130	128		
Ohio	118	117	124	121	126		
Wisconsin	114	106	64	110	126		
Oklahoma	105	101	159	119	123		
Arkansas	132	131	122	124	123		
Utah	137	124	123	109	121		
Virginia	113	117	119	122	121		
California	103	101	112	106	119		
Montana	109	110	98	113	119		
Wyoming	109	121	117	111	118		
Missouri	107	97	100	108	116		
New York	73	76	120	119	116		
Pennsylvania	110	109	111	106	116		
Kansas	89	88	73	107	110		
Kentucky	101	105	103	109	110		
Maine	2	34	48	122	109		
Nevada	89	90	99	100	108		
Alabama	39	42	98	99	108		
Louisiana	68	73	84	101	107		
South Carolina	56	87	103	99	106		
Iowa	90	94	93	98	105		
Texas	88	96	95	102	104		
District of Columbia	141	128	164	140	104		
Nebraska	104	96	95	100	104		
Georgia	75	78	84	91	102		
New Mexico	105	91	63	73	102		
Connecticut	94	116	108	102	100		
Maryland	25	85	104	103	99		
New Hampshire	94	77	69	102	98		
Illinois	99	97	94	97	97		
Minnesota	67	59	96	103	96		
Tennessee	34	72	72	84	93		
Arizona	87	88	43	96	89		
Colorado	82	88	91	90	89		
Hawaii	72	63	68	72	87		
North Dakota	93	75	88	102	85		
Delaware	101	96	89	89	84		
New Jersey	101	91	78	87	82		
South Dakota	161	145	121	90	78		
Rhode Island	80	71	69	71	76		
Florida	77	76	74	76	75		
Alaska	96	96	89	94	75		

Affordability

Residential Energy Affordability

The cost of electricity can be critically important to residential households who must balance their spending on electricity against spending on other essentials of modern life. Electricity costs can also have a huge impact on the operating margins of competitive industries.

The affordability of electricity is a nuanced matter. For households, climate and the availability of alternative heating fuels can affect the amount of electricity they consume. Expenditures on electricity and other heating fuels must be considered in context of income, so it is important to compare total household energy expenses to total household energy expenses as a share of household income.

Commercial and industrial users of electricity are less affected by climate and heating fuels, so the technologies of commerce and production can be more consistent from place to place. However, different types of businesses have very different energy requirements and often are clustered in different states for reasons having little to do with energy costs. Thus, total commercial and industrial energy cost is not a good basis for comparison; rates comparison is more useful and is addressed later in this report.

Below, we first examine household energy expenditures, then look at electricity rates for residential, commercial and industrial customers.

The prices of electricity and heating fuels are far from the only determining factor for overall energy affordability. For example, whereas households in warmer climates may consume more electricity than households in colder climates on an annual basis to run air conditioning units, those same households will not spend as much on natural gas, propane or other heating fuels during the winter. Energy expenditures are measured by the EIA in the State Energy Data System (SEDS) database at <https://www.eia.gov/state/seds/>. The following graph shows residential electricity and non-electricity energy expenditures per household by state.

As shown in Figure 10, Michigan had the 41st highest electricity expenditure per household, the 11th highest non-electricity, non-transportation expenditures per household, and the 16th highest total non-transportation energy expenditures per household in 2017. These rankings reflect that Michigan has relatively greater need for heating than many states and makes extensive use of natural gas and other heating fuels, rather than electricity, for heating. Electricity expenditures were \$1,169 per household per year and non-electricity non-transportation energy expenditures were \$774 per household per year for a total of \$1,943 per household per year.

Figure 11 shows that total household non-transportation energy expenditures as a percent of median household income in Michigan ranked 17th highest in the country, at 3.4%.

2017 Metric	Value	Michigan's Rank
Household Electricity Expenditure	\$1,169 per year	41 st highest
Household Non-electric Energy Expenditure	\$774 per year	11 th highest
Household Total Energy Expenditure	\$1,943 per year	16 th highest
Household Energy Share of Median Household Income	3.4%	17 th highest

Figure 10: Average non-transportation energy expenditures per household in each State in 2017.

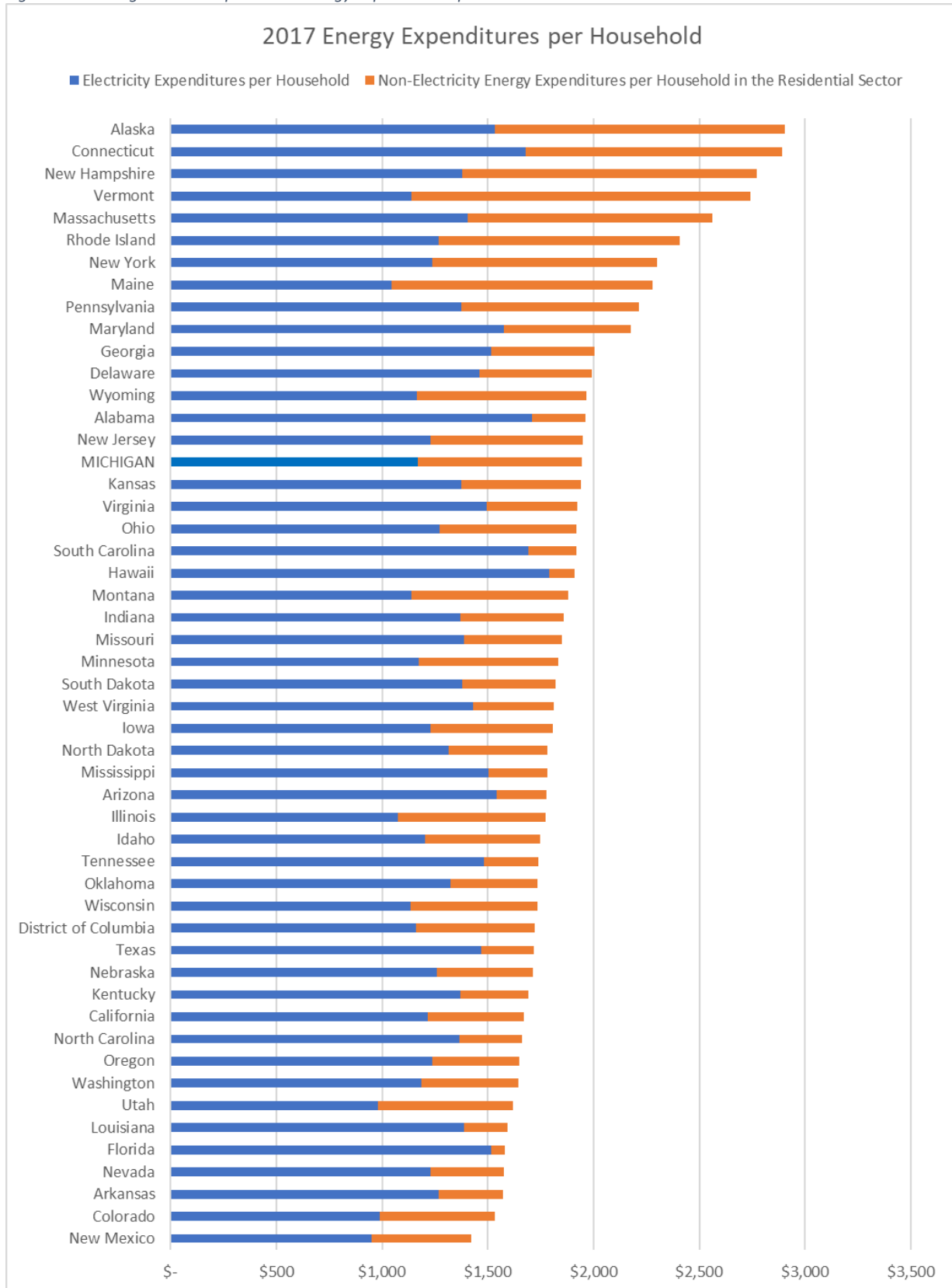
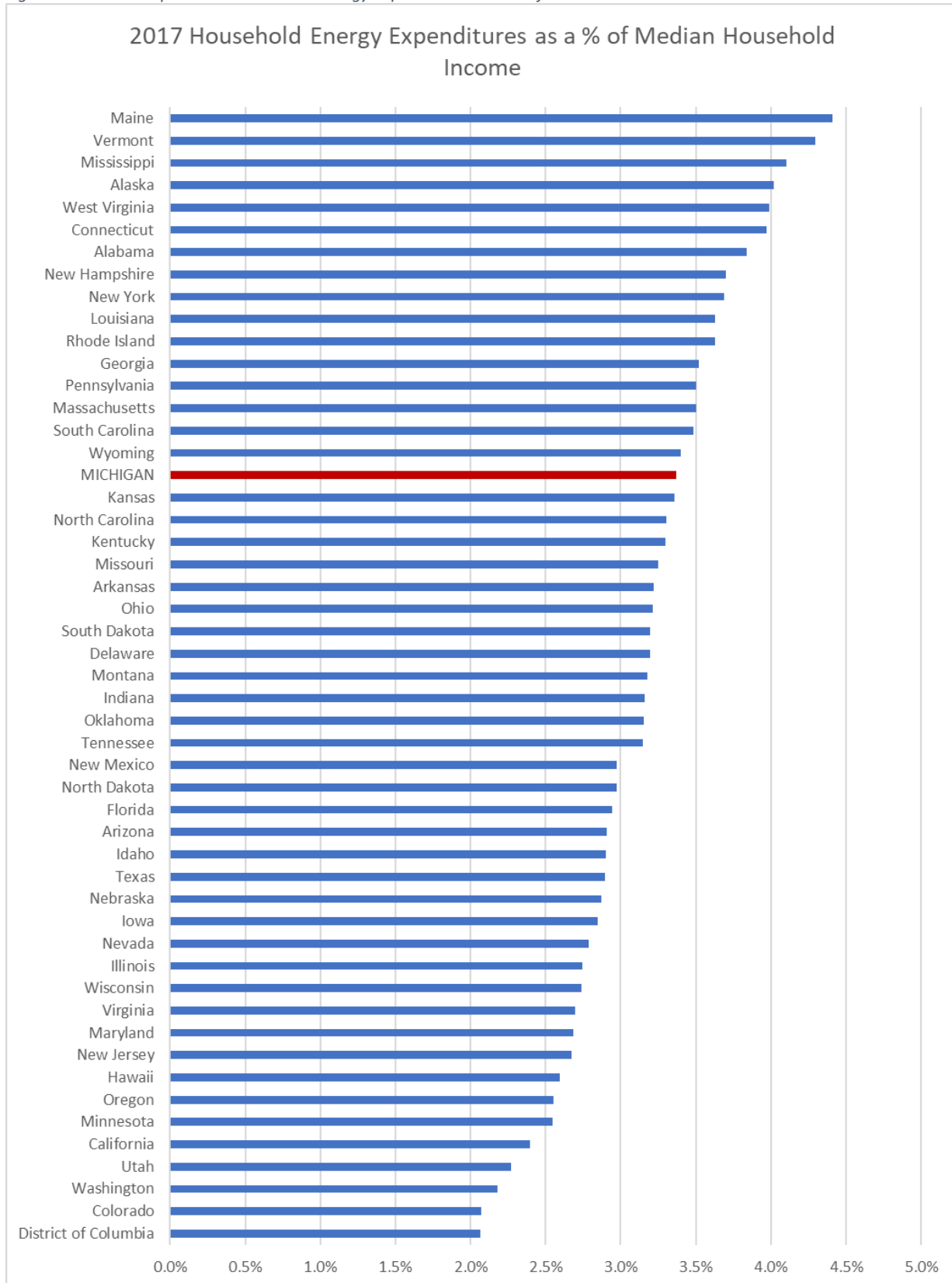


Figure 11: Non-transportation household energy expenditures as a % of median household income in each State in 2017.



Residential Average Monthly Bill

Figure 12 shows that in 2017, Michigan residential customers paid the 11th lowest average monthly electricity bill. However, electricity expenditures are only one component of household energy expenditures and thus when analyzed in isolation to other household energy expenditures, do not accurately reflect overall energy affordability.

Annual data in Figure 13 show that Michigan's average residential household's electricity bill has grown by 3.36% annually from 2007-2017, the 6th fastest growth rate overall. During that time, Michigan was outpaced by only West Virginia, Kansas, Idaho, South Dakota and Wyoming.

Figure 12: Average Monthly Electricity Bill for a Residential Household in 2017.

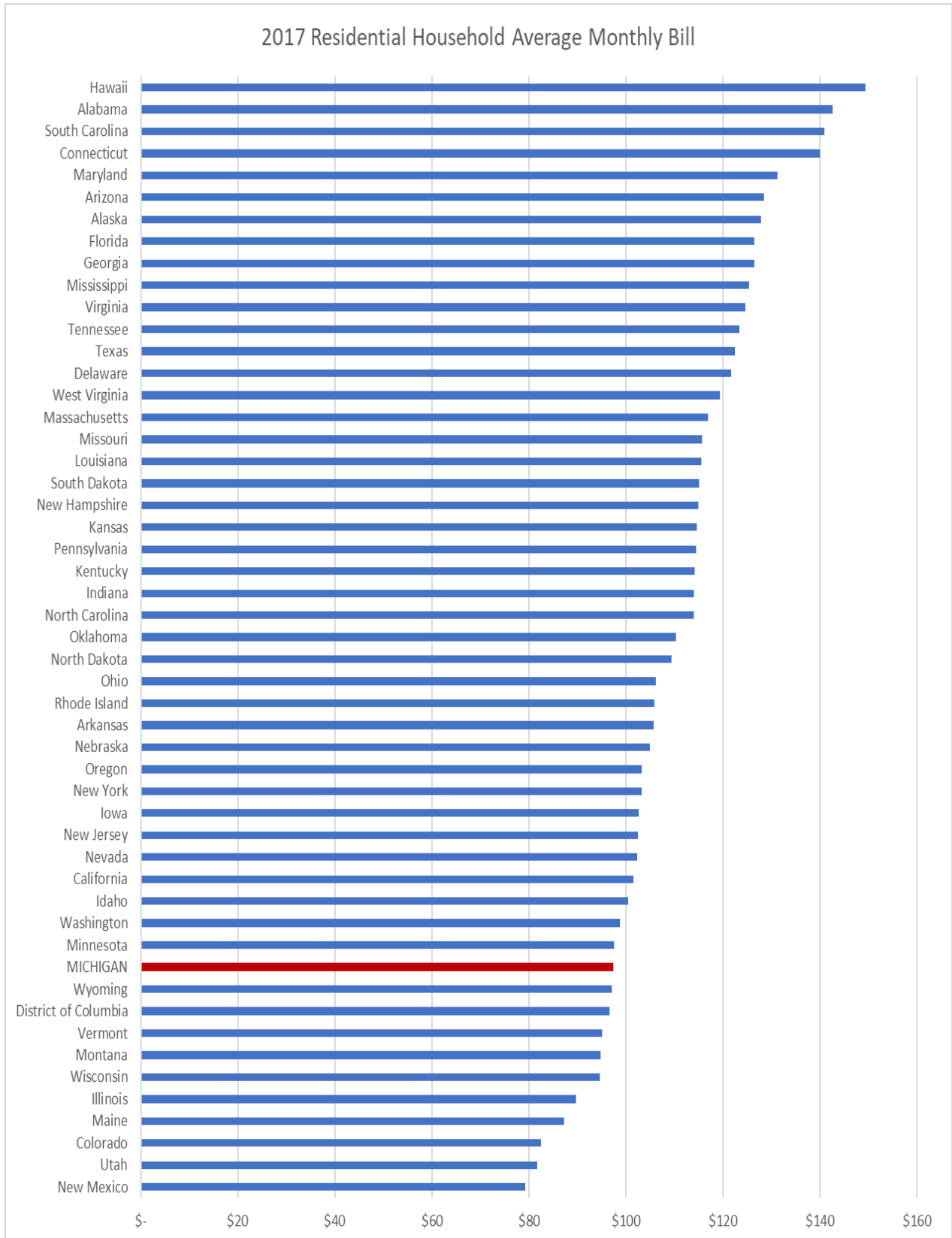


Figure 13: Annual average electricity bill for residential households in each state 2007-2017.

Residential Household Average Monthly Bill													
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend	CAGR
Hawaii	\$ 158.02	\$ 203.94	\$ 149.25	\$ 168.86	\$ 202.72	\$ 203.15	\$ 190.36	\$ 187.59	\$ 152.12	\$ 138.73	\$ 149.33		-0.56%
Alabama	\$ 121.70	\$ 132.16	\$ 131.42	\$ 147.69	\$ 142.41	\$ 135.26	\$ 136.36	\$ 145.25	\$ 142.48	\$ 145.55	\$ 142.55		1.59%
South Carolina	\$ 111.20	\$ 118.40	\$ 123.47	\$ 137.59	\$ 135.01	\$ 131.64	\$ 134.86	\$ 147.74	\$ 144.04	\$ 146.09	\$ 140.80		2.39%
Connecticut	\$ 145.95	\$ 142.78	\$ 147.26	\$ 144.33	\$ 134.07	\$ 126.75	\$ 132.07	\$ 144.10	\$ 153.13	\$ 142.19	\$ 139.97		-0.42%
Maryland	\$ 129.15	\$ 143.69	\$ 153.73	\$ 156.90	\$ 137.17	\$ 129.00	\$ 136.63	\$ 139.68	\$ 139.91	\$ 141.53	\$ 131.16		0.15%
Arizona	\$ 110.31	\$ 112.47	\$ 115.42	\$ 116.09	\$ 118.62	\$ 119.84	\$ 122.85	\$ 120.51	\$ 124.67	\$ 125.19	\$ 128.40		1.53%
Alaska	\$ 100.76	\$ 109.30	\$ 112.13	\$ 104.29	\$ 114.42	\$ 116.89	\$ 114.56	\$ 115.79	\$ 119.64	\$ 119.84	\$ 127.83		2.41%
Florida	\$ 130.47	\$ 130.52	\$ 140.33	\$ 136.61	\$ 130.10	\$ 123.45	\$ 121.53	\$ 129.86	\$ 132.16	\$ 123.37	\$ 126.44		-0.31%
Georgia	\$ 106.48	\$ 113.96	\$ 114.64	\$ 127.41	\$ 131.15	\$ 122.73	\$ 124.67	\$ 134.14	\$ 129.46	\$ 130.87	\$ 126.38		1.73%
Mississippi	\$ 118.00	\$ 127.95	\$ 124.00	\$ 132.76	\$ 130.90	\$ 122.49	\$ 131.49	\$ 141.22	\$ 137.24	\$ 125.91	\$ 125.38		0.61%
Virginia	\$ 105.55	\$ 112.75	\$ 124.06	\$ 129.43	\$ 125.86	\$ 123.72	\$ 125.36	\$ 130.04	\$ 130.58	\$ 127.14	\$ 124.54		1.67%
Tennessee	\$ 105.42	\$ 116.02	\$ 116.17	\$ 128.58	\$ 132.26	\$ 122.98	\$ 124.25	\$ 132.76	\$ 128.51	\$ 128.89	\$ 123.30		1.58%
Texas	\$ 140.17	\$ 147.20	\$ 141.12	\$ 138.99	\$ 139.81	\$ 128.27	\$ 133.33	\$ 137.39	\$ 136.00	\$ 127.10	\$ 122.47		-1.34%
Delaware	\$ 126.40	\$ 131.23	\$ 129.07	\$ 138.24	\$ 132.83	\$ 127.92	\$ 122.25	\$ 126.26	\$ 131.18	\$ 127.03	\$ 121.73		-0.38%
West Virginia	\$ 76.63	\$ 80.15	\$ 88.16	\$ 105.05	\$ 105.89	\$ 106.15	\$ 106.44	\$ 108.14	\$ 111.59	\$ 126.10	\$ 119.30		4.53%
Massachusetts	\$ 103.09	\$ 108.55	\$ 102.87	\$ 97.35	\$ 92.92	\$ 93.53	\$ 100.97	\$ 106.94	\$ 119.26	\$ 113.77	\$ 116.86		1.26%
Missouri	\$ 86.22	\$ 87.83	\$ 90.66	\$ 104.66	\$ 108.39	\$ 107.80	\$ 115.21	\$ 116.47	\$ 115.80	\$ 116.63	\$ 115.60		2.98%
Louisiana	\$ 119.62	\$ 128.76	\$ 103.19	\$ 123.96	\$ 120.84	\$ 104.99	\$ 119.98	\$ 123.61	\$ 120.02	\$ 115.79	\$ 115.54		-0.35%
South Dakota	\$ 79.98	\$ 83.56	\$ 86.88	\$ 93.40	\$ 96.78	\$ 98.68	\$ 108.21	\$ 109.45	\$ 108.68	\$ 112.53	\$ 115.06		3.70%
New Hampshire	\$ 94.06	\$ 96.66	\$ 102.16	\$ 102.11	\$ 102.28	\$ 98.80	\$ 102.66	\$ 108.57	\$ 114.90	\$ 110.95	\$ 114.95		2.03%
Kansas	\$ 75.40	\$ 79.68	\$ 86.37	\$ 98.73	\$ 104.70	\$ 106.19	\$ 107.85	\$ 112.95	\$ 110.58	\$ 117.34	\$ 114.65		4.28%
Pennsylvania	\$ 95.65	\$ 97.75	\$ 98.09	\$ 111.51	\$ 115.33	\$ 106.78	\$ 109.66	\$ 113.72	\$ 116.62	\$ 116.67	\$ 114.48		1.81%
Kentucky	\$ 89.35	\$ 94.64	\$ 96.26	\$ 107.77	\$ 108.16	\$ 106.54	\$ 112.95	\$ 119.66	\$ 114.72	\$ 117.65	\$ 114.15		2.48%
Indiana	\$ 87.44	\$ 91.94	\$ 94.30	\$ 101.79	\$ 103.54	\$ 104.93	\$ 110.44	\$ 115.56	\$ 111.51	\$ 114.96	\$ 114.04		2.69%
North Carolina	\$ 107.38	\$ 106.61	\$ 112.30	\$ 125.20	\$ 118.09	\$ 117.45	\$ 120.52	\$ 126.09	\$ 125.51	\$ 121.44	\$ 113.98		0.60%
Oklahoma	\$ 94.45	\$ 101.39	\$ 93.13	\$ 108.61	\$ 115.61	\$ 107.60	\$ 110.47	\$ 114.17	\$ 110.87	\$ 111.49	\$ 110.27		1.56%
North Dakota	\$ 78.73	\$ 83.68	\$ 87.17	\$ 91.16	\$ 98.46	\$ 98.85	\$ 109.85	\$ 113.39	\$ 104.96	\$ 106.28	\$ 109.38		3.34%
Ohio	\$ 88.60	\$ 91.50	\$ 93.65	\$ 105.28	\$ 104.86	\$ 105.23	\$ 107.07	\$ 112.62	\$ 112.25	\$ 111.15	\$ 106.13		1.82%
Rhode Island	\$ 85.36	\$ 102.88	\$ 88.36	\$ 96.08	\$ 86.44	\$ 86.04	\$ 91.48	\$ 100.09	\$ 114.50	\$ 109.02	\$ 105.76		2.17%
Arkansas	\$ 97.58	\$ 102.69	\$ 98.38	\$ 107.28	\$ 106.27	\$ 104.14	\$ 108.64	\$ 108.63	\$ 110.22	\$ 107.44	\$ 105.64		0.80%
Nebraska	\$ 78.04	\$ 80.46	\$ 85.49	\$ 93.97	\$ 95.92	\$ 100.46	\$ 106.65	\$ 106.33	\$ 101.96	\$ 105.47	\$ 104.96		3.01%
Oregon	\$ 82.60	\$ 87.16	\$ 88.23	\$ 85.52	\$ 94.51	\$ 93.80	\$ 96.58	\$ 97.29	\$ 96.24	\$ 96.71	\$ 103.26		2.26%
New York	\$ 104.31	\$ 108.48	\$ 101.73	\$ 114.40	\$ 111.59	\$ 106.14	\$ 113.16	\$ 118.63	\$ 111.32	\$ 104.58	\$ 103.22		-0.10%
Iowa	\$ 83.65	\$ 83.94	\$ 86.25	\$ 95.19	\$ 93.94	\$ 94.50	\$ 100.30	\$ 99.49	\$ 98.53	\$ 103.17	\$ 102.55		2.06%
New Jersey	\$ 103.28	\$ 111.44	\$ 110.29	\$ 121.13	\$ 115.03	\$ 109.10	\$ 108.10	\$ 105.65	\$ 110.04	\$ 108.58	\$ 102.38		-0.09%
Nevada	\$ 116.49	\$ 113.68	\$ 120.66	\$ 113.03	\$ 104.10	\$ 110.58	\$ 109.94	\$ 115.64	\$ 116.47	\$ 105.48	\$ 102.29		-1.29%
California	\$ 83.60	\$ 81.10	\$ 85.45	\$ 82.85	\$ 83.70	\$ 87.91	\$ 91.03	\$ 91.26	\$ 94.59	\$ 95.20	\$ 101.49		1.96%
Idaho	\$ 68.56	\$ 76.01	\$ 84.27	\$ 81.46	\$ 82.50	\$ 87.52	\$ 98.35	\$ 95.50	\$ 95.01	\$ 94.90	\$ 100.38		3.89%
Washington	\$ 77.92	\$ 81.89	\$ 83.70	\$ 82.75	\$ 88.41	\$ 88.46	\$ 90.55	\$ 87.14	\$ 87.64	\$ 90.56	\$ 98.78		2.40%
Minnesota	\$ 76.40	\$ 79.55	\$ 80.48	\$ 86.19	\$ 89.14	\$ 90.06	\$ 96.51	\$ 97.26	\$ 92.32	\$ 96.79	\$ 97.58		2.48%
MICHIGAN	\$ 70.02	\$ 71.58	\$ 74.69	\$ 84.82	\$ 90.63	\$ 95.50	\$ 96.95	\$ 94.52	\$ 93.61	\$ 101.64	\$ 97.41		3.36%
Wyoming	\$ 67.53	\$ 73.56	\$ 76.12	\$ 77.43	\$ 82.28	\$ 85.35	\$ 90.85	\$ 90.60	\$ 91.19	\$ 94.66	\$ 97.10		3.70%
District of Columbia	\$ 86.19	\$ 93.97	\$ 97.98	\$ 108.93	\$ 100.30	\$ 88.51	\$ 90.51	\$ 91.90	\$ 109.21	\$ 98.79	\$ 96.52		1.14%
Vermont	\$ 83.77	\$ 84.06	\$ 85.83	\$ 89.71	\$ 93.19	\$ 96.09	\$ 97.50	\$ 99.34	\$ 95.33	\$ 95.31	\$ 95.02		1.27%
Montana	\$ 72.28	\$ 76.95	\$ 76.54	\$ 77.37	\$ 84.97	\$ 84.88	\$ 88.85	\$ 86.93	\$ 89.03	\$ 88.95	\$ 94.75		2.74%
Wisconsin	\$ 78.75	\$ 81.71	\$ 82.28	\$ 90.59	\$ 92.39	\$ 92.79	\$ 95.21	\$ 94.88	\$ 94.26	\$ 96.08	\$ 94.67		1.86%
Illinois	\$ 80.01	\$ 84.63	\$ 82.04	\$ 92.03	\$ 90.79	\$ 87.20	\$ 80.19	\$ 88.78	\$ 89.91	\$ 91.83	\$ 89.63		1.14%
Maine	\$ 87.53	\$ 84.67	\$ 81.53	\$ 81.83	\$ 80.09	\$ 77.77	\$ 79.13	\$ 83.91	\$ 86.75	\$ 86.48	\$ 87.21		-0.04%
Colorado	\$ 65.72	\$ 68.80	\$ 68.69	\$ 78.22	\$ 80.12	\$ 80.94	\$ 84.91	\$ 83.73	\$ 83.42	\$ 83.85	\$ 82.47		2.30%
Utah	\$ 65.39	\$ 65.36	\$ 66.16	\$ 68.43	\$ 70.61	\$ 78.70	\$ 82.79	\$ 79.49	\$ 80.92	\$ 82.57	\$ 81.65		2.25%
New Mexico	\$ 58.41	\$ 63.24	\$ 64.30	\$ 69.35	\$ 73.57	\$ 74.62	\$ 76.56	\$ 77.79	\$ 79.23	\$ 75.96	\$ 79.16		3.09%

Electricity Rates

Electricity bills often have many components – fixed monthly charges, charges based on the customer’s peak rate of power usage in the billing month or previous year and a charge per kWh of electricity are common billing determinants. The ways in which utilities assign costs to these various components of the bill vary greatly amongst utilities, amongst classes of customers and across states. Customers, however, are getting value from kWh of electric energy so dividing the total bill by the kWh used is generally the best way to compare utility costs.

The Energy Information Administration of the US Department of Energy collects monthly data from each utility in each state on the amounts of electricity sold and revenue from electricity by customer class. Customer classes include residential, commercial, industrial, transportation and other with almost all electricity delivered in most states going to the first three classes. EIA makes these data available through an Electric Data Browser on its web site, at <http://www.eia.gov/electricity/data/browser/>. Calendar year 2017 is the most recent complete year available and is used here for comparison of the cost of electricity in the various states, reported in cents per kWh.

Michigan’s electricity rates are summarized in the following table.

2017 Metric	Value	Michigan’s Rank
Residential electricity cost per kWh	15.40 cents	12 th highest
Commercial electricity cost per kWh	11.00 cents	14 th highest
Industrial electricity cost per kWh	7.19 cents	24 th highest
All sectors electricity cost per kWh	11.28 cents	14 th highest

Residential Sector Electricity Rates

Although affordability is the most important measure of household energy costs, residential electricity rates are also worth comparing across states.

As shown in Figure 14, Michigan’s 15.40 cents per kilowatt-hour price of electricity for the residential sector is high relative to other states, with Michigan ranking 12th highest. Figure 15 shows that Michigan’s electricity price for residential customers has increased nearly every year for the past ten years with an average compound annual growth rate of 4.20%. Only Kansas, West Virginia, Missouri and Idaho have experienced faster growth in residential electricity rates over this period.

Figure 14: Average cost per kilowatt-hour of electricity delivered to residential customers in each State in 2017.

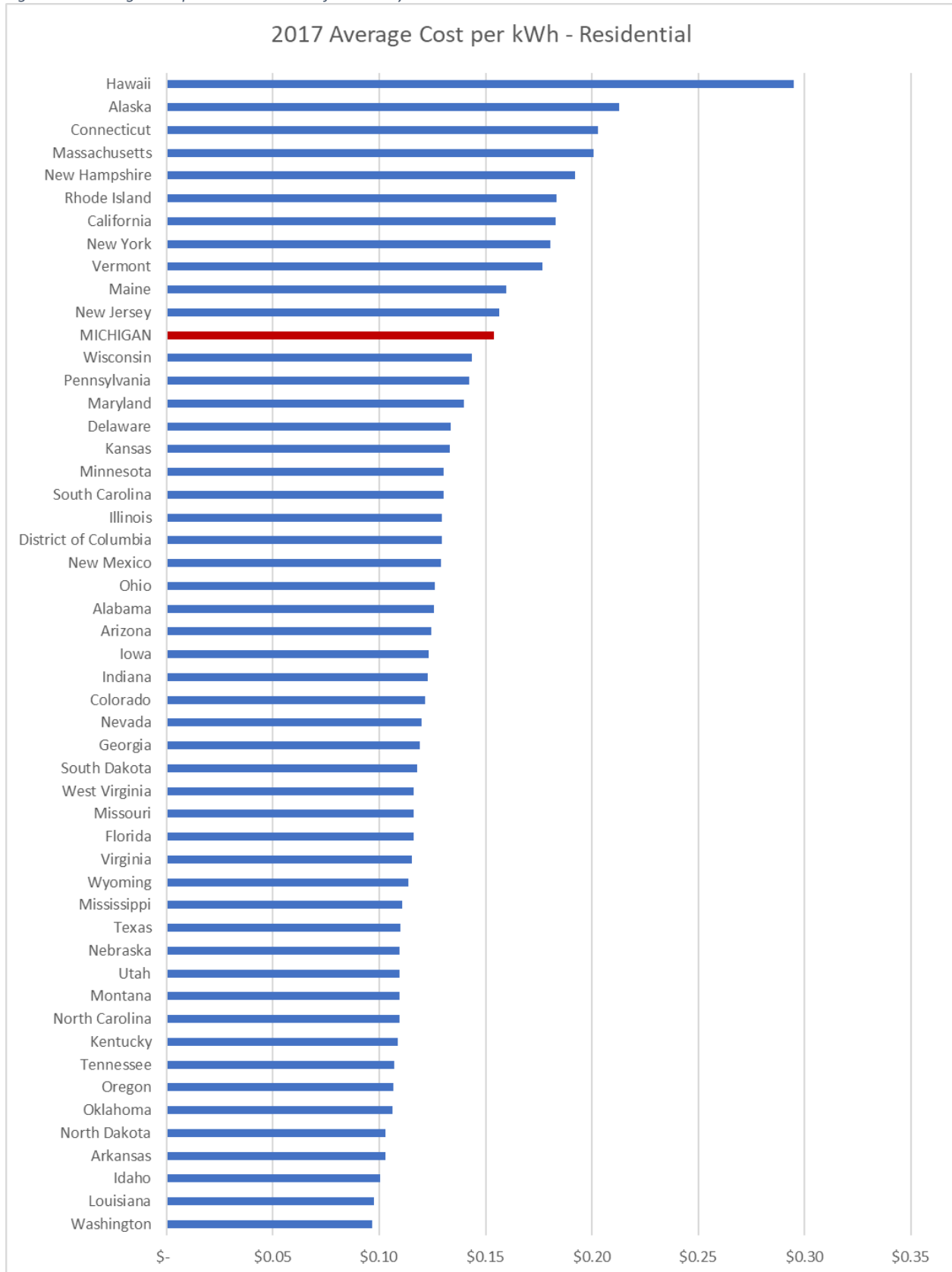


Figure 15: Annual average cost per kilowatt-hour delivered to residential customers in each State 2007-2017.

Average Price - Residential Sector (cents/kWh)													
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend	CAGR
Hawaii	24.1	32.5	24.2	28.1	34.7	37.3	37.0	37.0	29.6	27.5	29.5		2.03%
Alaska	15.2	16.6	17.1	16.3	17.6	17.9	18.1	19.1	19.8	20.3	21.3		3.43%
Connecticut	19.1	19.5	20.3	19.3	18.1	17.3	17.6	19.8	20.9	20.0	20.3		0.60%
Massachusetts	16.2	17.6	16.9	14.6	14.7	14.9	15.8	17.4	19.8	19.0	20.1		2.14%
New Hampshire	14.9	15.7	16.4	16.3	16.5	16.1	16.3	17.5	18.5	18.4	19.2		2.58%
Rhode Island	14.1	17.5	15.6	15.9	14.3	14.4	15.2	17.2	19.3	18.6	18.3		2.69%
California	14.4	13.8	14.7	14.8	14.8	15.3	16.2	16.3	17.0	17.4	18.3		2.42%
New York	17.1	18.3	17.5	18.7	18.3	17.6	18.8	20.1	18.5	17.6	18.0		0.53%
Vermont	14.2	14.5	14.9	15.6	16.3	17.0	17.1	17.5	17.1	17.4	17.7		2.25%
Maine	16.5	16.2	15.6	15.7	15.4	14.7	14.4	15.3	15.6	15.8	16.0		-0.34%
New Jersey	14.1	15.7	16.3	16.6	16.2	15.8	15.7	15.8	15.8	15.7	15.7		1.02%
MICHIGAN	10.2	10.8	11.6	12.5	13.3	14.1	14.6	14.5	14.4	15.2	15.4		4.20%
Wisconsin	10.9	11.5	11.9	12.7	13.0	13.2	13.6	13.7	14.1	14.1	14.4		2.82%
Pennsylvania	11.0	11.4	11.7	12.7	13.3	12.8	12.8	13.3	13.6	13.9	14.2		2.65%
Maryland	11.9	13.8	15.0	14.3	13.3	12.8	13.3	13.6	13.8	14.2	14.0		1.62%
Delaware	13.2	13.9	14.1	13.8	13.7	13.6	13.0	13.3	13.4	13.4	13.4		0.14%
Kansas	8.2	8.9	9.5	10.0	10.7	11.2	11.6	12.2	12.3	13.1	13.3		4.98%
Minnesota	9.2	9.7	10.0	10.6	11.0	11.4	11.8	12.0	12.1	12.7	13.0		3.57%
South Carolina	9.2	9.9	10.4	10.5	11.1	11.8	12.0	12.5	12.6	12.7	13.0		3.55%
Illinois	10.1	11.1	11.3	11.5	11.8	11.4	10.6	11.9	12.5	12.5	13.0		2.50%
District of Columbia	11.2	12.8	13.7	14.0	13.4	12.3	12.6	12.7	13.0	12.3	12.9		1.47%
New Mexico	9.1	10.0	10.0	10.5	11.0	11.4	11.7	12.3	12.5	12.0	12.9		3.51%
Ohio	9.6	10.1	10.7	11.3	11.4	11.8	12.0	12.5	12.8	12.5	12.6		2.81%
Alabama	9.3	10.4	10.7	10.7	11.1	11.4	11.3	11.5	11.7	12.0	12.6		3.02%
Arizona	9.7	10.3	10.7	11.0	11.1	11.3	11.7	11.9	12.1	12.2	12.4		2.56%
Iowa	9.5	9.5	10.0	10.4	10.5	10.8	11.0	11.2	11.6	11.9	12.3		2.70%
Indiana	8.3	8.9	9.5	9.6	10.1	10.5	11.0	11.5	11.6	11.8	12.3		4.05%
Colorado	9.3	10.1	10.0	11.0	11.3	11.5	11.9	12.2	12.1	12.1	12.2		2.78%
Nevada	11.8	11.9	12.9	12.4	11.6	11.8	11.9	12.9	12.8	11.4	12.0		0.14%
Georgia	9.1	9.9	10.1	10.1	11.1	11.2	11.5	11.7	11.5	11.5	11.9		2.72%
South Dakota	8.1	8.3	8.5	9.0	9.4	10.1	10.3	10.5	11.1	11.5	11.8		3.85%
West Virginia	6.7	7.1	7.9	8.8	9.4	9.9	9.5	9.3	10.1	11.4	11.6		5.62%
Missouri	7.7	8.0	8.5	9.1	9.8	10.2	10.6	10.6	11.2	11.2	11.6		4.22%
Florida	11.2	11.7	12.4	11.4	11.5	11.4	11.3	11.9	11.6	11.0	11.6		0.34%
Virginia	8.7	9.6	10.6	10.5	10.6	11.1	10.8	11.1	11.4	11.4	11.6		2.83%
Wyoming	7.8	8.2	8.6	8.8	9.1	9.9	10.2	10.5	11.0	11.1	11.4		3.91%
Mississippi	9.4	10.4	10.2	9.9	10.2	10.3	10.8	11.3	11.3	10.5	11.1		1.70%
Texas	12.3	13.0	12.4	11.6	11.1	11.0	11.4	11.9	11.6	11.0	11.0		-1.13%
Nebraska	7.6	7.9	8.5	8.9	9.3	10.0	10.3	10.4	10.6	10.8	11.0		3.75%
Utah	8.2	8.3	8.5	8.7	9.0	9.9	10.4	10.7	10.9	11.0	11.0		3.00%
Montana	8.8	9.1	8.9	9.2	9.8	10.1	10.3	10.2	10.9	10.9	11.0		2.24%
North Carolina	9.4	9.5	10.0	10.1	10.3	10.9	11.0	11.1	11.3	11.0	10.9		1.53%
Kentucky	7.3	7.9	8.4	8.6	9.2	9.4	9.8	10.2	10.2	10.5	10.9		3.99%
Tennessee	7.8	8.9	9.3	9.2	10.0	10.1	10.0	10.3	10.3	10.4	10.7		3.18%
Oregon	8.2	8.5	8.7	8.9	9.5	9.8	9.9	10.5	10.7	10.7	10.7		2.67%
Oklahoma	8.6	9.1	8.5	9.1	9.5	9.5	9.7	10.0	10.1	10.2	10.6		2.15%
North Dakota	7.3	7.5	7.6	8.1	8.6	9.1	9.1	9.2	9.6	10.2	10.3		3.49%
Arkansas	8.7	9.3	9.1	8.9	9.0	9.3	9.6	9.5	9.8	9.9	10.3		1.65%
Idaho	6.4	7.0	7.8	8.0	7.9	8.7	9.3	9.7	9.9	10.0	10.0		4.67%
Louisiana	9.4	10.3	8.1	9.0	9.0	8.4	9.4	9.6	9.3	9.3	9.7		0.39%
Washington	7.3	7.5	7.7	8.0	8.3	8.5	8.7	8.7	9.1	9.5	9.7		2.90%

Commercial Sector Electricity Rates

As shown in Figure 16, Michigan's 11.00 cents per kilowatt-hour price of electricity for the commercial sector is high relative to other states, with Michigan ranking 14th highest. Figure 17 shows that Michigan's electricity price for commercial customers has increased every year until 2013 and then declined modestly before climbing again in 2017. The average compound annual growth rate of Michigan's commercial electricity cost from 2007-2017 was 2.29%, which was approximately the median of the states.

Figure 16: Average cost per kilowatt-hour of electricity delivered to commercial customers in each State in 2017.

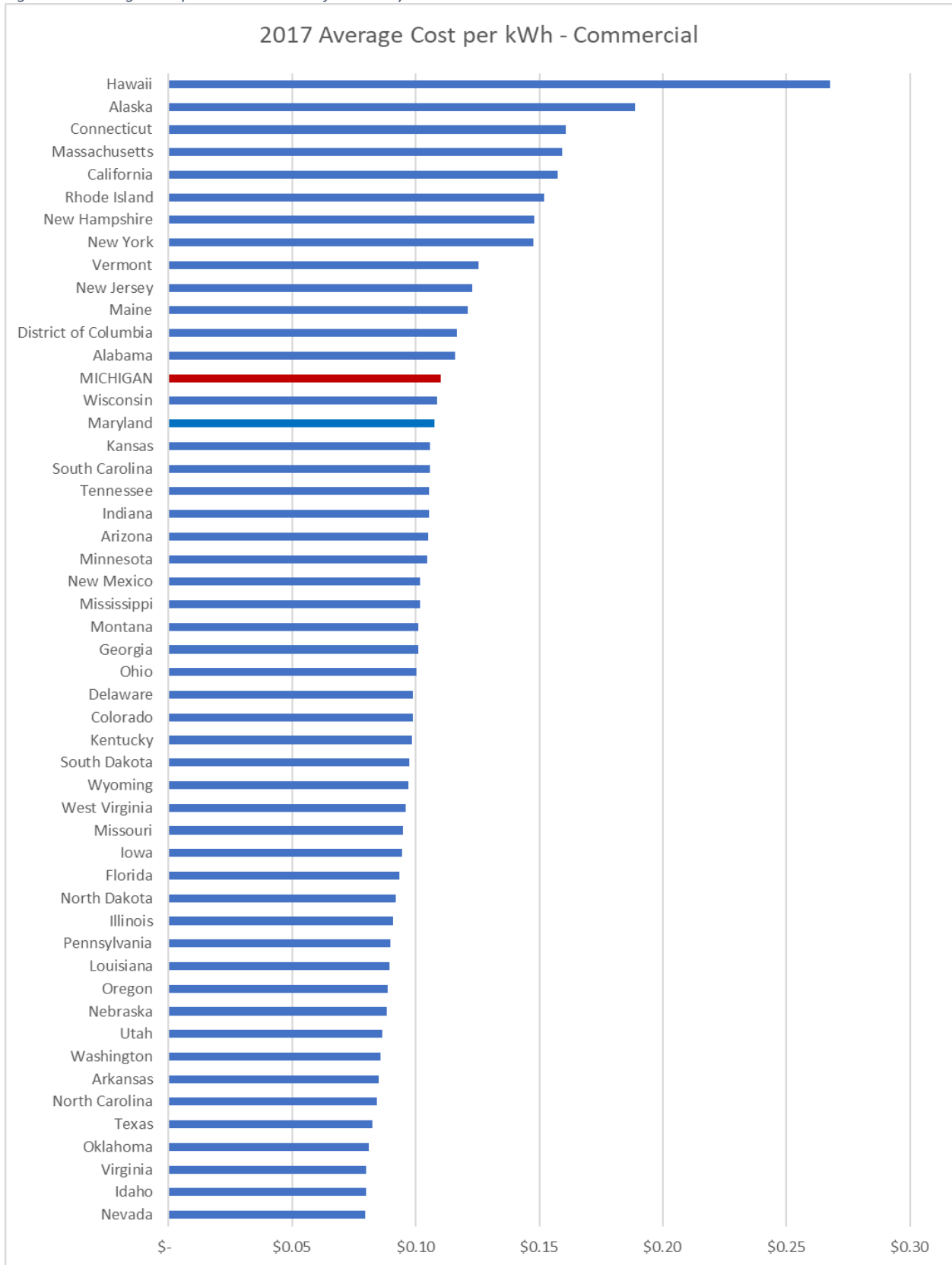


Figure 17: Annual average cost per kilowatt-hour of electricity delivered to commercial customers in each State 2007-2017.

Average Price - Commercial Sector (cents/kWh)													
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend	CAGR
Hawaii	21.9	29.7	21.9	25.9	32.4	34.9	34.1	34.2	26.9	24.6	26.8		2.02%
Alaska	12.2	13.6	14.5	14.0	15.1	14.9	15.6	17.1	17.4	17.6	18.9		4.48%
Connecticut	15.4	17.1	16.9	16.5	15.6	14.7	14.6	15.6	16.0	15.8	16.1		0.43%
Massachusetts	15.2	16.1	15.4	14.5	14.3	13.8	14.2	14.7	15.8	15.6	15.9		0.48%
California	12.8	12.5	13.3	13.1	13.1	13.4	14.2	15.6	15.7	15.1	15.8		2.09%
Rhode Island	12.7	15.4	13.7	13.1	12.4	11.9	12.9	14.6	15.8	14.9	15.2		1.84%
New Hampshire	13.9	14.3	14.4	14.3	14.0	13.4	13.5	14.3	15.0	14.4	14.8		0.63%
New York	15.9	16.8	15.5	16.3	15.8	15.1	15.4	16.1	15.3	14.5	14.8		-0.76%
Vermont	12.3	12.5	12.9	13.4	14.0	14.3	14.7	14.6	14.5	14.5	12.5		0.20%
New Jersey	13.0	14.0	13.8	13.9	13.5	12.8	12.8	13.2	12.8	12.3	12.3		-0.56%
Maine	12.9	13.0	12.6	12.5	12.3	11.5	11.7	12.7	12.5	12.1	12.1		-0.65%
District of Columbia	12.0	13.3	13.3	13.4	12.9	12.0	11.9	12.2	12.0	11.7	11.7		-0.30%
Alabama	8.7	9.9	10.1	10.2	10.5	10.6	10.5	10.8	10.8	11.1	11.6		2.92%
MICHIGAN	8.8	9.2	9.2	9.8	10.3	10.9	11.1	10.9	10.6	10.6	11.0		2.29%
Wisconsin	8.7	9.3	9.6	10.0	10.4	10.5	10.8	10.8	10.9	10.8	10.9		2.24%
Maryland	11.6	12.8	12.0	11.8	11.3	10.4	10.7	11.2	11.0	11.0	10.8		-0.74%
Kansas	6.8	7.4	7.9	8.3	8.8	9.2	9.7	10.1	10.1	10.5	10.6		4.48%
South Carolina	7.7	8.4	8.7	8.9	9.3	9.6	9.9	10.3	10.2	10.3	10.6		3.17%
Tennessee	8.1	9.2	9.6	9.7	10.3	10.3	10.0	10.4	10.2	10.2	10.6		2.69%
Indiana	7.3	7.8	8.3	8.4	8.8	9.1	9.6	10.0	9.8	10.0	10.5		3.76%
Arizona	8.3	8.9	9.4	9.5	9.5	9.5	9.9	10.1	10.4	10.4	10.5		2.42%
Minnesota	7.5	7.9	7.9	8.4	8.6	8.8	9.4	9.9	9.4	9.9	10.5		3.43%
New Mexico	7.7	8.7	8.4	8.6	9.1	9.3	9.7	10.3	10.3	9.8	10.2		2.90%
Mississippi	8.9	10.0	9.5	9.3	9.5	9.3	10.1	10.8	10.6	9.6	10.2		1.32%
Montana	8.1	8.5	8.3	8.6	9.1	9.1	9.5	9.6	10.2	10.2	10.1		2.25%
Georgia	8.1	9.1	8.9	9.1	9.9	9.6	10.0	10.4	9.9	9.8	10.1		2.26%
Ohio	8.7	9.2	9.7	9.7	9.6	9.5	9.4	9.8	10.1	10.0	10.1		1.49%
Delaware	11.2	12.1	12.0	11.4	10.6	10.1	10.2	10.5	10.3	10.1	9.9		-1.25%
Colorado	7.6	8.6	8.2	9.1	9.4	9.4	9.9	10.1	9.9	9.6	9.9		2.64%
Kentucky	6.8	7.3	7.6	7.9	8.5	8.7	8.6	9.4	9.4	9.6	9.9		3.84%
South Dakota	6.6	7.0	7.1	7.6	7.8	8.1	8.5	8.9	9.2	9.6	9.7		3.95%
Wyoming	6.3	6.7	7.3	7.4	7.7	8.2	8.6	8.9	9.1	9.4	9.7		4.49%
West Virginia	5.9	6.1	6.8	7.7	8.1	8.4	8.2	8.0	8.6	9.4	9.6		5.06%
Missouri	6.3	6.6	7.0	7.5	8.0	8.2	8.8	8.9	9.2	9.3	9.5		4.09%
Iowa	7.1	7.2	7.6	7.9	7.9	8.0	8.4	8.7	8.9	9.2	9.5		2.90%
Florida	9.8	10.1	10.8	9.8	9.9	9.7	9.4	9.9	9.5	8.9	9.4		-0.42%
North Dakota	6.6	6.8	6.8	7.2	7.6	8.0	8.4	8.8	8.8	9.2	9.2		3.40%
Illinois	8.6	9.3	9.1	8.9	8.6	8.0	8.1	9.3	9.0	9.0	9.1		0.59%
Pennsylvania	9.2	9.4	9.6	10.1	10.0	9.4	9.3	9.7	9.6	9.2	9.0		-0.24%
Louisiana	9.1	10.1	7.7	8.5	8.4	7.8	9.0	9.1	8.7	8.6	9.0		-0.20%
Oregon	7.2	7.3	7.5	7.6	8.2	8.3	8.7	8.8	8.8	8.9	8.9		2.10%
Nebraska	6.4	6.7	7.3	7.6	8.0	8.4	8.6	8.7	8.7	8.8	8.9		3.31%
Utah	6.5	6.7	7.0	7.2	7.4	8.1	8.3	8.5	8.6	8.8	8.7		2.84%
Washington	6.6	6.8	7.0	7.4	7.5	7.7	7.8	8.0	8.2	8.4	8.6		2.72%
Arkansas	6.9	7.6	7.6	7.3	7.5	7.7	8.1	8.1	8.3	8.2	8.5		2.10%
North Carolina	7.4	7.6	8.0	8.2	8.1	8.7	8.8	8.8	8.7	8.6	8.4		1.28%
Texas	9.9	10.8	9.7	9.2	8.8	8.2	8.0	8.2	8.2	8.3	8.3		-1.76%
Oklahoma	7.3	7.9	6.8	7.5	7.6	7.3	7.8	8.1	7.7	7.7	8.1		1.02%
Virginia	6.4	7.3	8.1	7.7	8.0	8.1	8.0	8.2	8.2	7.9	8.0		2.30%
Idaho	5.1	5.7	6.5	6.6	6.4	6.9	7.4	7.8	7.8	7.8	8.0		4.50%
Nevada	10.1	10.1	10.6	9.8	9.1	8.8	9.0	9.5	9.3	7.9	8.0		-2.34%

Industrial Sector Electricity Rates

As shown in Figure 18, Michigan's 7.19 cents per kilowatt-hour price of electricity for the industrial sector is just above the median relative to other states, with Michigan ranking 24th highest. Figure 19 shows that Michigan's electricity price for industrial customers has been relatively stable, increasing every year until 2013 and then declining until 2017. The average compound annual growth rate of Michigan's industrial electricity cost from 2007-2017 was 1.06%, which was slightly above the median of the states.

Figure 18: Average cost per kilowatt-hour of electricity delivered to industrial customers in each State in 2017.

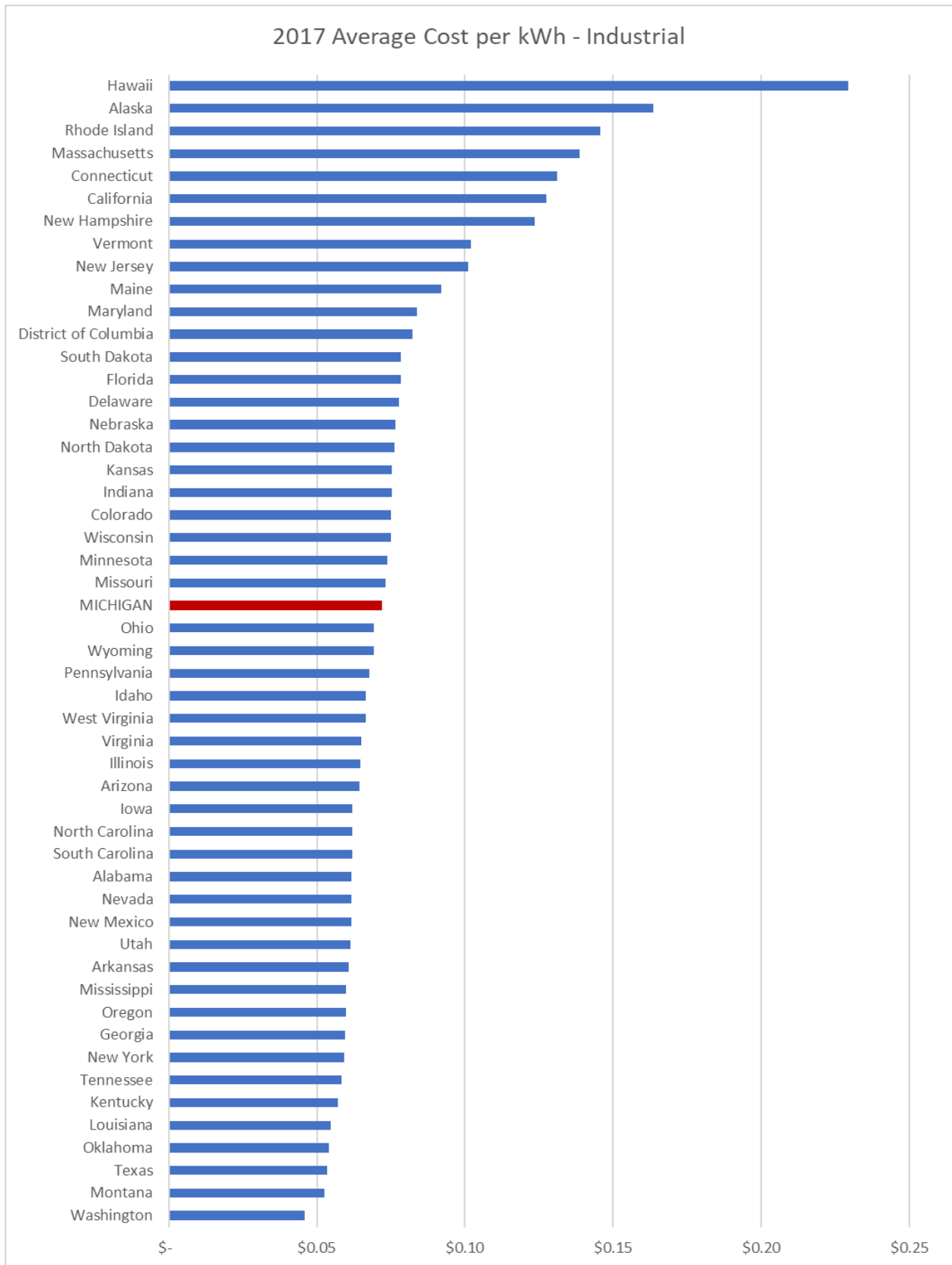


Figure 19: Annual average cost per kilowatt-hour of electricity delivered to industrial customers in each State 2007-2017.

Average Price - Industrial Sector (cents/kWh)													
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend	CAGR
Hawaii	18.4	26.1	18.1	21.9	28.4	30.8	29.9	30.2	23.1	20.7	22.9		2.23%
Alaska	12.6	14.2	13.2	14.1	15.7	16.8	15.8	15.7	14.5	15.2	16.3		2.61%
Rhode Island	12.0	14.2	12.2	11.8	11.3	10.7	11.8	12.9	13.8	13.5	14.6		1.93%
Massachusetts	13.0	14.1	14.1	13.7	13.4	12.6	13.2	12.7	13.5	13.4	13.9		0.63%
Connecticut	12.9	14.9	15.0	14.5	13.2	12.7	12.6	12.9	13.0	12.8	13.1		0.14%
California	10.0	10.1	10.4	9.8	10.1	10.5	11.4	12.3	12.2	11.9	12.7		2.46%
New Hampshire	12.3	13.1	13.7	12.8	12.3	11.8	11.4	11.9	12.7	12.3	12.3		0.06%
Vermont	8.9	9.2	9.2	9.5	9.8	10.0	10.8	10.2	10.3	10.2	10.2		1.36%
New Jersey	10.1	12.5	11.9	11.8	11.4	10.5	10.8	11.4	10.6	10.2	10.1		0.04%
Maine	14.1	11.6	10.0	9.2	8.9	8.0	8.3	9.0	9.1	9.0	9.2		-4.19%
Maryland	9.4	10.4	10.0	9.6	8.8	8.1	8.4	9.0	8.5	7.9	8.4		-1.16%
District of Columbia	9.3	10.7	8.4	7.7	6.9	5.5	5.5	8.4	8.8	8.8	8.2		-1.24%
South Dakota	5.1	5.3	5.7	6.1	6.2	6.6	7.0	7.0	7.4	7.6	7.8		4.41%
Florida	7.8	8.3	9.3	8.9	8.6	8.0	7.6	7.9	8.2	7.7	7.8		0.09%
Delaware	8.9	10.5	9.5	9.6	8.9	8.4	8.4	8.6	8.3	8.1	7.8		-1.37%
Nebraska	4.8	5.2	5.8	6.0	6.4	7.0	7.4	7.5	7.6	7.7	7.7		4.83%
North Dakota	5.2	5.6	5.3	5.8	6.2	6.6	7.1	7.6	8.1	8.0	7.6		3.83%
Kansas	5.1	5.7	6.1	6.2	6.7	7.1	7.4	7.8	7.6	7.5	7.5		3.93%
Indiana	4.9	5.5	5.8	5.9	6.2	6.3	6.7	7.0	6.9	7.0	7.5		4.43%
Colorado	6.0	6.7	6.4	6.9	7.1	7.0	7.3	7.5	7.4	7.4	7.5		2.31%
Wisconsin	6.2	6.5	6.7	6.9	7.3	7.3	7.4	7.5	7.6	7.5	7.5		1.97%
Minnesota	5.7	5.9	6.3	6.3	6.5	6.5	7.0	6.7	7.0	7.4	7.4		2.62%
Missouri	4.8	4.9	5.4	5.5	5.9	5.9	6.3	6.4	6.4	7.1	7.3		4.41%
MICHIGAN	6.5	6.7	7.0	7.1	7.3	7.6	7.7	7.7	7.0	6.9	7.2		1.06%
Ohio	5.8	6.2	6.7	6.4	6.1	6.2	6.2	6.8	7.0	7.0	6.9		1.85%
Wyoming	4.1	4.5	4.8	5.0	5.4	6.0	6.4	6.6	6.8	6.9	6.9		5.37%
Pennsylvania	6.9	7.0	7.2	7.7	7.7	7.2	7.0	7.4	7.2	6.9	6.8		-0.15%
Idaho	3.9	4.5	5.2	5.2	5.1	5.5	6.1	6.4	6.6	6.6	6.7		5.58%
West Virginia	4.0	4.2	5.2	5.9	6.2	6.3	6.2	5.9	6.1	6.6	6.6		5.33%
Virginia	5.1	5.8	6.9	6.7	6.5	6.7	6.6	6.9	7.0	6.6	6.5		2.53%
Illinois	6.6	7.3	7.0	6.8	6.4	5.8	5.9	6.9	6.7	6.5	6.5		-0.21%
Arizona	6.1	6.6	6.7	6.6	6.6	6.5	6.7	6.5	6.3	6.1	6.5		0.64%
Iowa	4.7	4.8	5.3	5.4	5.2	5.3	5.6	5.7	5.9	6.1	6.2		2.74%
North Carolina	5.5	5.5	6.0	6.2	6.0	6.4	6.5	6.5	6.5	6.3	6.2		1.26%
South Carolina	4.8	5.4	5.8	5.7	5.9	6.0	6.0	6.3	6.1	6.1	6.2		2.51%
Alabama	5.3	6.1	6.0	6.0	6.3	6.2	6.0	6.2	6.0	6.0	6.2		1.57%
Nevada	8.3	8.0	8.0	7.4	6.7	6.5	6.5	7.1	6.8	5.9	6.2		-2.93%
New Mexico	5.6	6.4	5.7	6.0	6.1	5.8	6.4	6.6	6.3	5.8	6.2		0.94%
Utah	4.5	4.6	4.8	4.9	5.1	5.6	5.9	6.1	6.2	6.3	6.1		3.09%
Arkansas	5.3	5.9	5.8	5.4	5.6	5.8	6.0	6.0	6.2	6.1	6.1		1.46%
Mississippi	5.8	6.6	6.6	6.3	6.5	6.2	6.3	6.6	6.6	5.8	6.0		0.41%
Oregon	5.1	5.3	5.4	5.4	5.5	5.6	5.8	6.0	6.0	6.1	6.0		1.68%
Georgia	5.5	6.7	6.1	6.2	6.6	6.0	6.3	6.6	5.9	5.8	6.0		0.75%
New York	8.7	9.4	8.4	8.8	7.8	6.7	6.6	6.6	6.3	6.0	5.9		-3.79%
Tennessee	5.2	6.3	6.8	6.6	7.2	7.1	6.3	6.4	6.2	5.7	5.8		1.17%
Kentucky	4.5	4.8	4.9	5.1	5.3	5.4	5.7	5.7	5.5	5.7	5.7		2.50%
Louisiana	6.8	7.9	5.3	5.8	5.7	4.8	5.9	6.1	5.4	5.1	5.5		-2.09%
Oklahoma	5.4	5.9	4.8	5.4	5.5	5.1	5.5	5.9	5.4	5.0	5.4		0.02%
Texas	7.8	8.8	6.7	6.4	6.2	5.6	5.8	6.2	5.6	5.3	5.4		-3.69%
Montana	5.2	5.9	5.5	5.6	5.3	5.1	5.4	5.5	5.3	5.1	5.3		0.17%
Washington	4.6	4.5	4.4	4.1	4.1	4.1	4.2	4.3	4.4	4.4	4.6		0.07%

All Sectors Electricity Rates

Michigan's average price of electricity across all sectors ranked 14th highest amongst all states in 2017, with an average price of 11.28 cents per kilowatt- hour, as shown in Figure 20. Figure 21 shows that Michigan's average price of electricity for all sectors combined increased substantially from 2007-2013 and has since been relatively stable but peaked in 2017. The average compound annual growth rate of Michigan's combined electricity cost from 2007-2017 was 2.83%, which was exceeded by only 15 states. Of the states with higher average electricity prices than Michigan, only Alaska also experienced higher increases in rates than Michigan.

Figure 20: Average cost per kilowatt-hour of electricity delivered to all customers in each State in 2017.

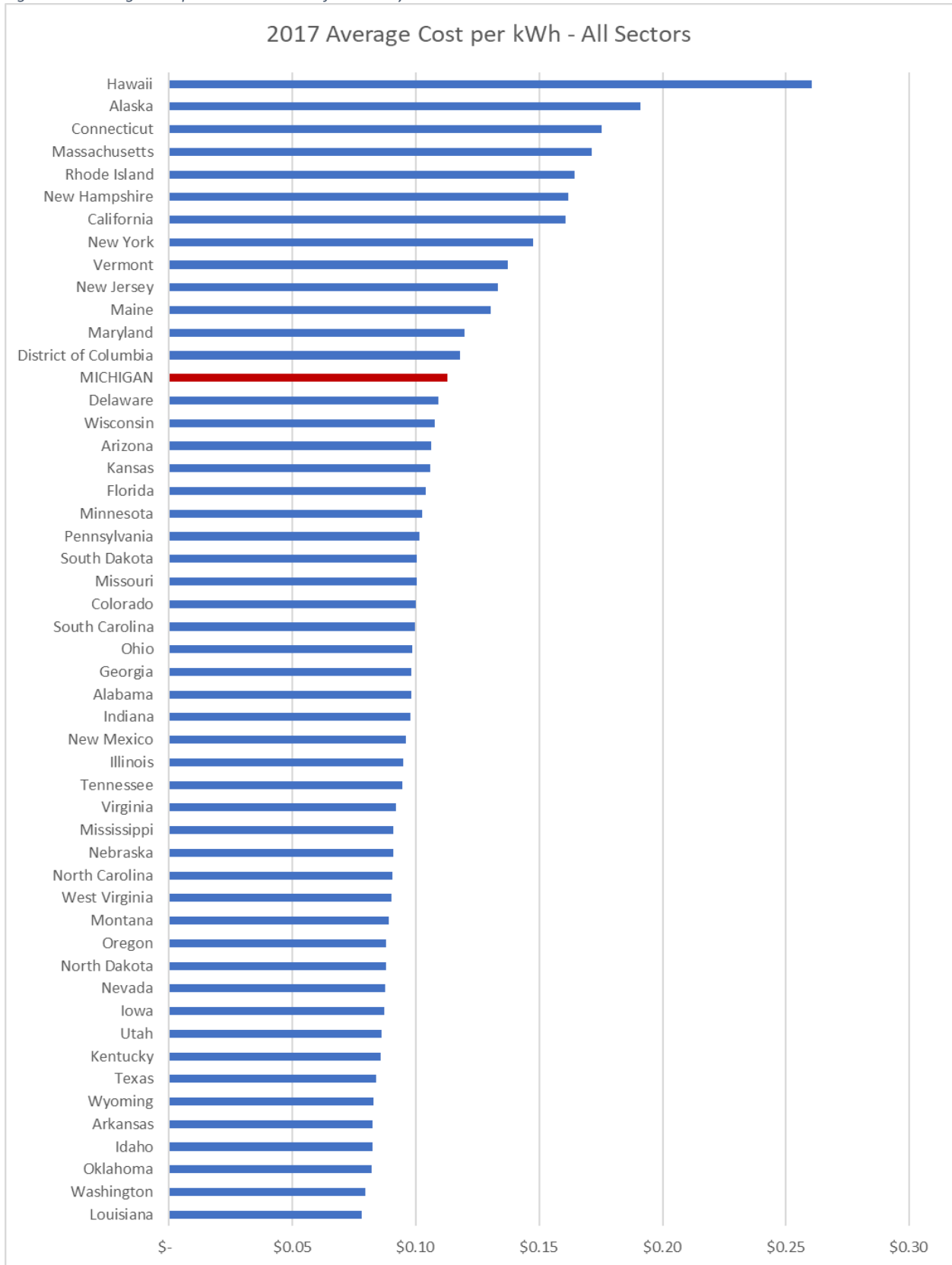


Figure 21: Annual average cost per kilowatt-hour of electricity delivered to all customers in each State 2007-2017.

Average Price - All Sectors (cents/kWh)													
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend	CAGR
Hawaii	21.3	29.2	21.2	25.1	31.6	34.0	33.3	33.4	26.2	23.9	26.1		2.04%
Alaska	13.3	14.7	15.1	14.8	16.1	16.3	16.5	17.5	17.6	17.9	19.1		3.70%
Connecticut	16.5	17.8	18.1	17.4	16.4	15.5	15.7	17.1	17.8	17.2	17.6		0.65%
Massachusetts	15.2	16.2	15.5	14.3	14.1	13.8	14.5	15.4	16.9	16.5	17.1		1.22%
Rhode Island	13.1	16.0	14.2	14.1	13.0	12.7	13.7	15.4	17.0	16.3	16.4		2.27%
New Hampshire	14.0	14.6	15.1	14.8	14.7	14.2	14.3	15.2	16.0	15.7	16.2		1.47%
California	12.8	12.5	13.2	13.0	13.1	13.5	14.3	15.2	15.4	15.2	16.1		2.29%
New York	15.2	16.5	15.4	16.4	15.9	15.2	15.4	16.3	15.3	14.5	14.7		-0.32%
Vermont	12.0	12.3	12.8	13.2	13.8	14.2	14.6	14.6	14.4	14.5	13.7		1.33%
New Jersey	13.0	14.4	14.5	14.7	14.3	13.7	13.7	14.0	13.7	13.4	13.3		0.24%
Maine	14.6	13.8	13.1	12.8	12.6	11.8	11.9	12.7	12.8	12.8	13.0		-1.13%
Maryland	11.5	13.0	13.1	12.7	11.9	11.3	11.7	12.1	12.1	12.2	12.0		0.41%
District of Columbia	11.8	13.2	13.2	13.4	12.8	11.9	11.9	12.1	12.1	11.7	11.8		0.01%
MICHIGAN	8.5	8.9	9.4	9.9	10.4	11.0	11.2	11.0	10.8	11.1	11.3		2.83%
Delaware	11.4	12.4	12.2	12.0	11.5	11.1	10.9	11.2	11.2	11.1	10.9		-0.39%
Wisconsin	8.5	9.0	9.4	9.8	10.2	10.3	10.5	10.6	10.7	10.7	10.8		2.41%
Arizona	8.5	9.1	9.6	9.7	9.7	9.8	10.1	10.2	10.3	10.3	10.6		2.22%
Kansas	6.8	7.5	8.0	8.4	8.9	9.3	9.7	10.2	10.1	10.5	10.6		4.48%
Florida	10.3	10.7	11.5	10.6	10.6	10.4	10.2	10.8	10.5	9.9	10.4		0.09%
Minnesota	7.4	7.8	8.1	8.4	8.7	8.9	9.4	9.5	9.5	10.0	10.3		3.28%
Pennsylvania	9.1	9.3	9.6	10.3	10.5	9.9	9.8	10.3	10.3	10.2	10.1		1.10%
South Dakota	6.9	7.1	7.4	7.8	8.1	8.5	8.9	9.1	9.5	9.8	10.1		3.85%
Missouri	6.6	6.8	7.4	7.8	8.3	8.5	9.0	9.1	9.4	9.7	10.0		4.34%
Colorado	7.8	8.6	8.3	9.2	9.4	9.4	9.9	10.1	9.9	9.8	10.0		2.56%
South Carolina	7.2	7.9	8.4	8.5	8.8	9.1	9.2	9.7	9.6	9.8	10.0		3.34%
Ohio	7.9	8.4	9.0	9.1	9.0	9.1	9.2	9.7	10.0	9.8	9.8		2.21%
Georgia	7.9	8.8	8.8	8.9	9.6	9.4	9.7	10.0	9.6	9.6	9.8		2.26%
Alabama	7.6	8.6	8.8	8.9	9.1	9.2	9.0	9.3	9.3	9.6	9.8		2.65%
Indiana	6.5	7.1	7.6	7.7	8.0	8.3	8.7	9.1	9.0	9.2	9.8		4.16%
New Mexico	7.4	8.4	8.1	8.4	8.7	8.8	9.3	9.7	9.6	9.1	9.6		2.57%
Illinois	8.5	9.2	9.2	9.1	9.0	8.4	8.3	9.4	9.4	9.4	9.5		1.16%
Tennessee	7.1	8.2	8.7	8.6	9.3	9.3	9.1	9.4	9.3	9.2	9.5		2.94%
Virginia	7.1	8.0	8.9	8.7	8.8	9.1	9.0	9.2	9.3	9.1	9.2		2.57%
Mississippi	8.0	9.0	8.9	8.6	8.8	8.6	9.1	9.6	9.5	8.7	9.1		1.25%
Nebraska	6.3	6.6	7.2	7.5	7.9	8.4	8.7	8.8	8.9	9.1	9.1		3.76%
North Carolina	7.8	8.0	8.5	8.7	8.7	9.2	9.2	9.3	9.4	9.2	9.0		1.45%
West Virginia	5.3	5.6	6.7	7.5	7.9	8.1	7.9	7.7	8.1	9.0	9.0		5.36%
Montana	7.1	7.7	7.6	7.8	8.2	8.3	8.6	8.6	8.9	8.8	8.9		2.27%
Oregon	7.0	7.2	7.5	7.6	8.0	8.2	8.4	8.7	8.8	8.8	8.8		2.30%
North Dakota	6.4	6.7	6.6	7.1	7.5	7.8	8.2	8.4	8.8	8.9	8.8		3.18%
Nevada	10.0	9.9	10.4	9.7	9.0	9.0	9.0	9.7	9.5	8.4	8.8		-1.31%
Iowa	6.8	6.9	7.4	7.7	7.6	7.7	8.1	8.2	8.4	8.6	8.7		2.48%
Utah	6.4	6.5	6.8	6.9	7.1	7.8	8.2	8.4	8.5	8.7	8.6		2.98%
Kentucky	5.8	6.3	6.5	6.7	7.2	7.3	7.7	8.2	8.1	8.4	8.6		3.91%
Texas	10.1	11.0	9.9	9.3	9.0	8.6	8.7	8.9	8.7	8.4	8.4		-1.86%
Wyoming	5.3	5.7	6.1	6.2	6.6	7.2	7.6	7.8	8.0	8.2	8.3		4.58%
Arkansas	7.0	7.6	7.6	7.3	7.4	7.6	7.9	7.9	8.2	8.1	8.3		1.73%
Idaho	5.1	5.7	6.5	6.5	6.4	6.9	7.6	7.9	8.1	8.1	8.3		5.00%
Oklahoma	7.3	7.8	6.9	7.6	7.8	7.5	7.9	8.2	7.9	7.8	8.2		1.18%
Washington	6.4	6.6	6.6	6.7	6.8	6.9	7.1	7.1	7.4	7.7	7.9		2.23%
Louisiana	8.4	9.4	7.1	7.8	7.7	6.9	8.0	8.1	7.7	7.5	7.8		-0.74%

Environmental Impacts

There are many dimensions to environmental impact, but this report will focus on two broad categories important for determining the degree to which the production of energy is friendly to the environment and human health: first, power plant emissions of air pollutants, and second, the amount of electricity generated by non-emitting renewable sources.

Pollution

Power generation can affect many aspects of the environment in multiple ways, but the most ubiquitous form is the emission of pollutants into the atmosphere. Power plants produce many different pollutants, but the largest quantities and arguably greatest effects are from:

- carbon dioxide (CO₂), which is the principal gas causing climate change and can reduce cognitive function;
- sulfur dioxide (SO₂), which causes asthma attacks, cardiopulmonary diseases, acid rain and is a chemical precursor to formation of small particles that when breathed cause a number of respiratory and other problems, miscarriages and birth defects;
- and nitrogen oxides (NO_x), which cause respiratory problems including wheezing, asthma and other breathing difficulties and is a chemical precursor to formation of small particles and ozone in the air that also cause numerous health problems.

Electric utilities report emissions of key pollutants from each power plant to the Environmental Protection Agency, which compiles this information and makes it available to the Energy Information Administration. Calendar year 2017 is the most recent complete compilation currently available and can be obtained from <https://www.eia.gov/electricity/data/emissions/>. Although effects on the environment and human health are determined by the quantity of pollution released and, in the cases of sulfur dioxide and nitrogen oxides, by location relative to human population and natural resources. However, as a measure of overall utility performance, it is most appropriate to consider emissions per unit of power generated. The following table summarizes Michigan's contributions to total pollution and pollution per GWh generated. Pollution quantities are in metric tons (approximately 2200 pounds per metric ton), pollution rates are in metric tons per gigawatt-hour (million kilowatt-hours) of electricity generated, and Michigan's relative rank amongst the states is shown parenthetically after each of the pollution metrics.

2017 Metric	Total Pollution	Pollution per GWh
Carbon Dioxide (Metric Tons)	58,413,899 (10 th highest)	520.1 (20 th highest)
Sulfur Dioxide (Metric Tons)	75,914 (6 th highest)	0.68 (10 th highest)
Nitrogen Oxides (Metric Tons)	50,353 (7 th highest)	0.45 (21 st highest)

Carbon Dioxide Emissions

As shown in Figure 22, Michigan ranked 20th worst amongst the states in carbon dioxide pollution per gigawatt-hour in 2017 with 520.1 metric tons emitted for every gigawatt-hour generated. This is only modestly above the median of the states.

Figure 23 shows that Michigan's carbon dioxide emissions per gigawatt-hour have significantly and steadily declined since 2007, similar to relative declines in most states so that Michigan's relative ranking has not changed. Figure 24 shows that, because Michigan is a larger state, its annual carbon dioxide emissions of 58,413,899 metric tons ranked 10th worst amongst states in 2017.

Figure 22: Carbon dioxide emissions in metric tons per gigawatt-hour electricity generation in each State in 2017.

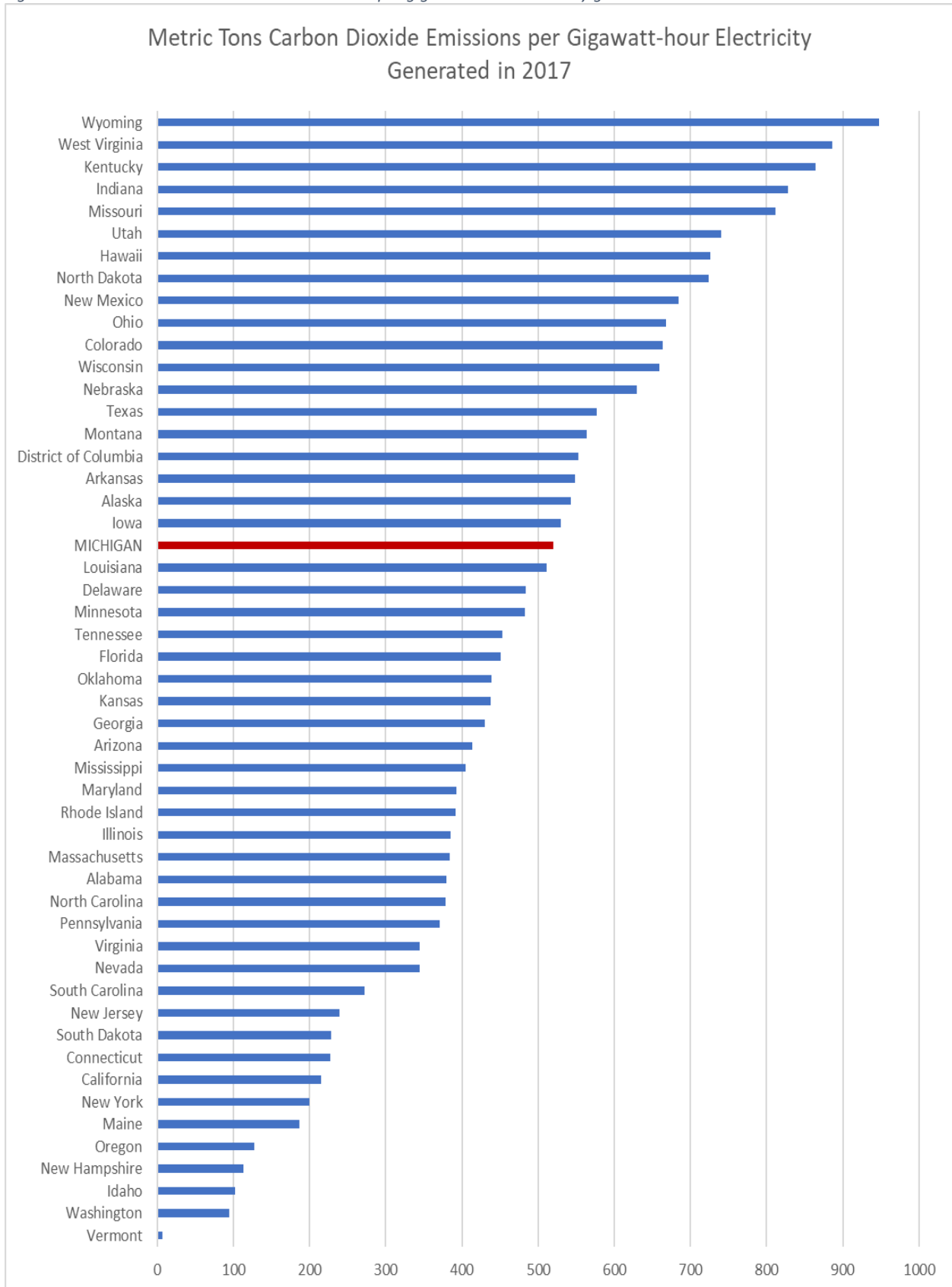


Figure 24: Annual carbon dioxide emissions in metric tons from electricity generation in each State 2007-2017.

Total CO2 Emissions from Electricity Generation (metric tons)												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
Texas	257,769,490	252,710,224	242,864,409	251,409,188	267,464,092	253,689,271	257,464,594	254,487,638	243,386,106	236,457,110	261,060,935	
Florida	128,821,854	121,052,472	114,853,697	123,811,228	114,441,236	111,236,493	108,826,746	113,145,692	111,863,160	110,388,178	107,438,358	
Indiana	123,288,064	124,660,268	111,112,991	116,282,506	109,608,059	99,773,102	99,950,588	104,635,599	89,045,157	85,392,620	81,929,468	
Ohio	131,970,371	129,060,820	115,065,819	121,963,840	112,319,677	95,522,904	102,465,700	98,650,334	83,722,399	81,618,408	79,917,221	
Pennsylvania	129,296,769	123,997,106	116,621,094	122,829,611	117,430,264	109,996,697	108,729,048	102,021,683	90,972,612	85,041,303	79,252,227	
Illinois	106,299,016	106,430,304	98,974,783	103,127,834	100,731,240	94,410,749	97,812,108	96,624,058	84,274,845	72,225,575	70,669,824	
Missouri	78,409,747	77,649,675	74,715,725	78,814,666	81,427,821	75,544,686	78,344,459	75,735,094	67,995,334	62,730,955	68,644,800	
West Virginia	87,267,453	84,610,180	65,927,761	74,283,350	72,203,110	67,203,074	68,861,856	73,605,609	66,269,845	68,472,932	64,987,884	
Kentucky	93,364,663	94,028,274	86,155,115	93,159,570	92,693,590	85,682,772	85,303,874	85,795,039	76,427,297	72,432,678	63,251,716	
MICHIGAN	80,228,027	77,467,593	73,588,661	74,479,744	69,301,421	67,876,595	67,192,653	64,263,795	67,119,277	58,643,813	58,413,899	
Georgia	96,436,398	89,749,835	77,022,270	82,591,913	71,368,349	59,035,062	56,812,143	62,515,953	59,273,980	60,155,547	54,813,068	
Alabama	88,397,243	83,134,457	69,238,676	79,374,763	76,413,476	69,106,650	66,986,027	67,634,537	64,441,792	57,776,234	53,192,098	
Louisiana	54,836,301	54,735,872	53,225,974	58,706,086	62,680,433	60,182,144	58,273,713	57,136,509	56,298,932	53,161,910	49,960,621	
North Carolina	79,416,549	75,343,792	64,845,048	73,240,828	62,797,414	57,923,827	56,939,516	58,578,033	53,824,140	52,492,299	48,704,747	
California	63,139,829	62,548,568	59,427,649	55,405,832	47,907,869	59,369,012	57,323,347	57,506,565	55,481,281	47,007,640	44,432,943	
Wyoming	46,481,436	46,837,114	44,683,966	45,702,951	45,197,424	47,463,359	50,686,615	47,336,758	47,475,543	44,171,630	44,272,504	
Arizona	56,455,374	58,890,027	53,523,638	55,683,398	53,535,742	52,349,639	55,342,134	53,684,080	50,201,162	44,530,763	43,739,251	
Wisconsin	49,591,389	49,592,680	44,233,260	47,238,443	46,257,128	41,196,428	47,686,076	43,759,905	45,194,700	40,913,887	42,893,438	
Tennessee	61,600,024	58,671,418	43,457,828	48,196,067	45,472,087	41,740,957	38,117,748	41,405,218	37,977,033	39,926,975	35,792,402	
Colorado	43,571,299	41,659,472	38,988,708	40,498,764	39,509,434	39,925,777	39,387,317	38,473,611	37,413,300	36,074,666	35,719,640	
Arkansas	30,316,395	30,653,294	30,427,300	34,018,317	35,925,947	36,233,904	37,345,580	37,288,600	28,587,194	31,725,866	33,321,788	
Oklahoma	52,068,934	53,399,735	51,986,033	49,535,558	51,363,938	49,186,422	46,267,826	44,062,605	41,626,050	37,105,622	32,329,303	
Virginia	47,218,350	41,401,745	36,160,554	39,719,081	32,636,730	29,223,189	34,686,454	33,733,804	34,897,976	36,566,152	31,195,217	
Iowa	44,578,702	46,137,372	42,977,893	47,211,320	43,878,873	41,266,985	39,174,823	39,312,084	35,042,903	30,215,540	30,661,460	
North Dakota	32,280,878	32,887,026	32,608,448	31,063,899	29,854,996	30,934,049	30,274,035	30,419,692	31,245,513	29,907,862	30,042,551	
Minnesota	38,320,642	36,821,407	33,688,934	32,946,107	32,618,199	28,493,816	29,255,384	32,677,491	30,307,101	29,643,872	28,344,484	
Utah	38,905,860	39,380,599	36,517,504	35,519,267	33,942,547	32,484,028	35,698,707	35,204,487	33,688,196	28,244,970	27,697,636	
New York	53,749,295	47,156,701	38,130,088	41,583,758	37,255,875	35,668,748	33,456,396	34,072,093	32,730,725	31,295,191	25,583,555	
South Carolina	42,570,508	42,542,764	38,121,415	41,364,022	38,720,130	34,237,555	28,809,424	33,082,757	29,848,999	28,001,045	25,362,138	
Mississippi	28,004,522	25,920,293	23,480,603	26,845,306	23,325,979	24,284,840	22,633,396	24,037,348	25,170,683	26,272,253	24,151,234	
New Mexico	31,954,967	30,898,791	33,502,278	29,378,703	31,164,190	29,162,551	28,534,704	24,712,461	24,849,830	23,193,276	22,999,708	
Nebraska	20,995,154	22,459,515	23,899,471	24,460,746	27,250,887	26,467,486	28,042,902	26,348,032	25,325,783	23,013,711	22,290,489	
Kansas	39,577,414	37,314,713	36,207,066	36,320,932	35,119,242	31,692,844	33,125,351	31,793,540	27,341,044	25,762,154	22,276,995	
New Jersey	20,771,382	20,097,110	16,085,557	19,160,136	16,916,854	16,120,331	15,788,845	18,363,585	19,427,201	21,108,016	18,135,687	
Montana	20,346,569	20,355,210	17,548,159	20,369,529	17,028,546	16,024,096	16,950,683	17,677,641	18,135,505	16,469,969	15,911,335	
Maryland	31,511,350	29,155,266	25,659,043	26,369,386	23,625,407	20,696,656	18,949,736	20,701,175	18,314,105	18,577,966	13,379,147	
Nevada	16,908,951	18,143,624	18,294,514	17,020,408	14,748,277	14,929,193	15,690,455	16,221,708	14,752,014	14,541,813	13,167,199	
Massachusetts	25,759,579	22,263,172	19,683,325	20,291,010	16,404,480	14,346,389	14,735,029	12,917,109	13,421,709	12,721,825	12,384,069	
Washington	12,827,173	13,686,152	13,525,800	13,983,610	8,228,901	6,989,976	12,542,551	12,484,332	11,586,243	10,228,942	11,007,713	
Oregon	10,662,883	10,820,524	9,406,039	10,093,990	6,721,391	7,365,189	9,499,795	8,369,747	8,986,600	8,206,857	7,990,903	
Connecticut	10,463,410	9,450,744	8,046,088	9,201,364	8,196,023	8,987,089	8,726,388	8,452,346	9,049,007	8,578,640	7,874,203	
Hawaii	9,026,311	9,047,871	8,661,378	8,286,666	8,100,019	7,624,794	7,428,187	7,447,999	7,356,049	7,256,900	7,124,347	
Delaware	7,299,066	6,596,953	4,143,250	4,187,304	3,928,280	4,981,052	4,721,744	4,276,415	4,090,991	4,363,423	3,630,183	
Alaska	4,343,034	4,376,066	4,240,355	4,125,052	4,346,700	4,304,761	3,768,237	3,557,651	3,676,457	3,466,309	3,531,514	
Rhode Island	2,961,323	2,987,521	3,181,021	3,217,071	3,595,046	3,403,402	2,837,800	2,565,962	2,873,636	2,670,029	2,980,923	
South Dakota	3,068,692	4,038,331	3,510,593	3,611,180	2,911,400	3,268,899	3,227,772	3,093,416	1,941,252	2,675,908	2,502,496	
Maine	5,607,730	5,313,540	4,714,269	4,948,153	4,351,148	3,722,435	3,675,406	3,402,910	2,955,775	2,557,331	2,097,632	
New Hampshire	6,911,897	6,782,300	5,507,060	5,551,486	5,126,974	4,294,558	3,447,455	3,457,841	3,653,432	2,526,361	1,976,251	
Idaho	1,284,119	1,016,667	1,024,183	1,213,214	824,805	1,171,935	1,941,753	1,491,553	1,865,710	1,828,906	1,771,091	
District of Columbia	86,026	69,856	35,752	190,742	175,076	66,115	48,726	48,396	35,601	47,554	36,975	
Vermont	10,074	7,098	6,583	8,016	24,004	12,292	14,632	13,785	11,084	11,526	15,342	

Sulfur Dioxide Emissions

As shown in Figure 25, Michigan ranked 10th worst amongst the states in sulfur dioxide pollution per gigawatt-hour in 2017 with 0.68 metric tons emitted for every gigawatt-hour generated. This emissions rate is significantly higher than in most states.

Figure 26 shows that Michigan's sulfur dioxide emissions per gigawatt-hour have significantly and steadily declined since 2007, similar to relative declines in many states. However, enough states have improved faster than Michigan so that Michigan's relative ranking has not improved. Figure 27 shows that, because Michigan is a larger state, its annual sulfur dioxide emissions of 75,914 metric tons ranked 6th worst amongst states in 2017.

Figure 25: Sulfur dioxide emissions in metric tons per gigawatt-hour electricity generated in each State in 2017.

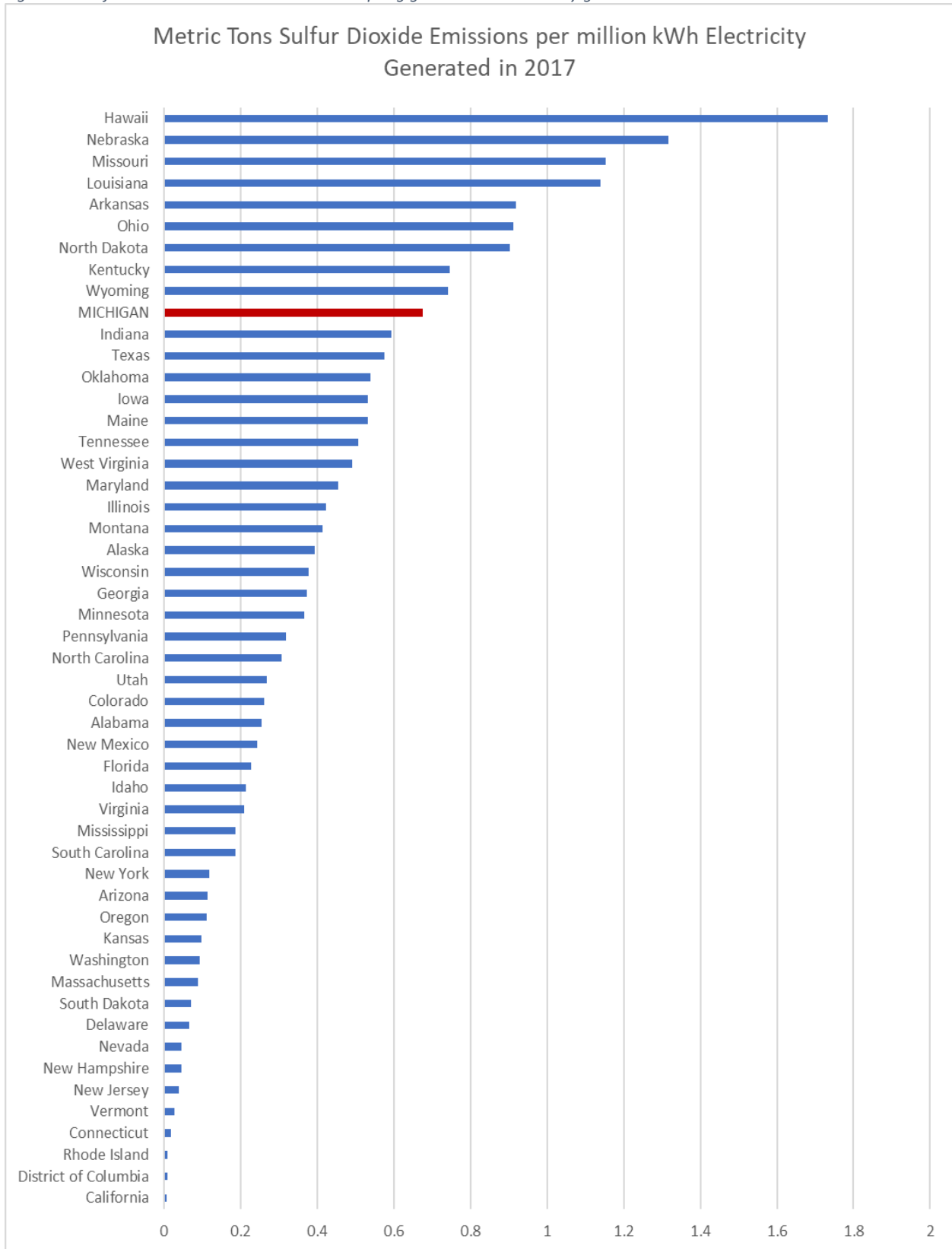


Figure 26: Annual sulfur dioxide emissions in metric tons per gigawatt-hour electricity generated in each State 2007-2017

Sulfur Dioxide Emissions (metric tons) per Gigawatt-hour Generated												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
Hawaii	1.91	1.87	2.02	1.55	1.57	1.39	1.77	1.66	1.94	1.79	1.73	
Nebraska	1.94	2.15	2.06	1.77	1.88	1.69	1.64	1.47	1.48	1.29	1.32	
Missouri	2.83	2.78	2.67	2.52	2.00	1.48	1.56	1.55	1.37	1.18	1.15	
Louisiana	1.14	1.00	1.07	1.22	1.12	1.04	1.09	0.84	0.64	0.54	1.14	
Arkansas	1.50	1.42	1.31	1.21	1.31	1.29	1.34	1.32	0.97	0.90	0.92	
Ohio	6.17	4.72	4.59	4.25	4.54	2.73	2.29	2.40	1.76	1.10	0.91	
North Dakota	4.01	3.78	3.53	3.33	2.44	2.19	1.47	1.31	1.15	1.14	0.90	
Kentucky	3.58	3.24	2.56	2.53	2.30	1.90	1.93	2.04	1.46	0.90	0.75	
Wyoming	1.82	1.78	1.65	1.40	1.63	0.88	0.86	0.83	0.82	0.75	0.74	
MICHIGAN	2.96	3.02	2.85	2.28	2.16	1.99	2.04	1.47	1.21	0.82	0.68	
Indiana	5.07	4.28	3.29	3.08	2.84	2.26	2.25	2.34	1.51	0.82	0.59	
Texas	1.15	1.13	1.05	1.04	0.93	0.81	0.80	0.72	0.55	0.51	0.58	
Oklahoma	1.43	1.29	1.22	1.17	1.21	0.95	0.99	1.02	0.80	0.63	0.54	
Iowa	2.72	2.89	1.78	1.88	1.80	1.69	1.71	1.21	0.77	0.58	0.53	
Maine	1.32	1.53	2.01	0.73	0.77	0.55	0.86	0.76	0.91	0.61	0.53	
Tennessee	2.59	2.43	1.57	1.67	1.70	1.14	0.98	1.02	1.04	0.61	0.51	
West Virginia	3.76	3.14	2.36	1.30	1.24	1.13	1.12	1.15	0.84	0.55	0.49	
Maryland	5.31	4.76	4.50	1.03	1.17	1.07	1.05	0.99	0.86	0.66	0.46	
Illinois	1.51	1.73	1.23	1.15	1.04	0.87	0.91	0.84	0.71	0.52	0.42	
Montana	0.84	0.75	0.85	0.74	0.60	0.54	0.55	0.43	0.45	0.41	0.41	
Alaska	0.63	0.52	0.55	0.45	0.40	0.39	0.59	0.58	0.60	0.50	0.39	
Wisconsin	2.80	2.72	2.33	2.25	2.02	1.53	1.49	1.21	0.82	0.43	0.38	
Georgia	4.70	3.93	2.29	1.92	1.90	1.22	0.93	0.77	0.52	0.39	0.37	
Minnesota	1.63	1.57	1.23	1.05	0.99	0.63	0.63	0.62	0.48	0.41	0.37	
Pennsylvania	3.93	3.51	2.66	1.69	1.38	1.08	1.11	1.22	0.94	0.46	0.32	
North Carolina	2.81	1.88	1.07	1.02	0.77	0.63	0.51	0.45	0.41	0.36	0.31	
Utah	0.55	0.48	0.68	0.60	0.55	0.51	0.51	0.49	0.37	0.29	0.27	
Colorado	1.09	1.03	0.85	0.88	0.83	0.74	0.69	0.48	0.41	0.33	0.26	
Alabama	3.12	2.49	1.99	1.43	1.25	0.97	0.87	0.93	0.77	0.35	0.25	
New Mexico	0.67	0.55	0.44	0.41	0.42	0.41	0.45	0.34	0.32	0.23	0.24	
Florida	1.43	1.23	1.01	0.70	0.51	0.46	0.48	0.50	0.32	0.25	0.23	
Idaho	0.59	0.53	0.35	0.55	0.29	0.34	0.39	0.35	0.27	0.24	0.21	
Virginia	2.52	1.96	1.68	1.64	1.29	0.79	0.80	0.81	0.36	0.29	0.21	
Mississippi	1.49	1.44	0.93	1.08	0.94	0.79	1.51	1.66	0.51	0.19	0.19	
South Carolina	1.67	1.55	1.05	1.02	0.85	0.67	0.45	0.41	0.27	0.24	0.19	
New York	0.85	0.59	0.44	0.45	0.38	0.23	0.21	0.21	0.16	0.14	0.12	
Arizona	0.45	0.37	0.29	0.30	0.27	0.18	0.19	0.18	0.14	0.11	0.11	
Oregon	0.29	0.20	0.21	0.29	0.23	0.22	0.27	0.16	0.15	0.13	0.11	
Kansas	2.10	1.87	1.00	0.86	0.79	0.67	0.56	0.58	0.28	0.14	0.10	
Washington	0.09	0.09	0.12	0.14	0.16	0.17	0.11	0.11	0.11	0.10	0.09	
Massachusetts	1.09	1.04	0.86	0.82	0.58	0.42	0.34	0.20	0.15	0.11	0.09	
South Dakota	1.45	1.80	1.36	1.19	0.85	1.01	1.38	1.14	0.45	0.07	0.07	
Delaware	3.94	4.25	3.24	2.34	1.28	0.28	0.26	0.10	0.10	0.05	0.07	
Nevada	0.24	0.24	0.19	0.20	0.15	0.12	0.19	0.26	0.12	0.06	0.05	
New Hampshire	1.68	1.48	1.52	1.52	1.12	0.11	0.17	0.14	0.10	0.05	0.04	
New Jersey	0.74	0.55	0.19	0.21	0.08	0.06	0.04	0.04	0.04	0.04	0.04	
Vermont	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	
Connecticut	0.16	0.13	0.06	0.06	0.03	0.20	0.09	0.05	0.03	0.02	0.02	
Rhode Island	0.10	0.01	0.02	0.01	0.01	0.00	0.18	0.01	0.01	0.01	0.01	
District of Columbia	2.30	3.57	8.00	3.99	3.27	-	-	-	-	0.07	0.01	
California	0.11	0.02	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	

Figure 27: Annual sulfur dioxide emissions in metric tons from electricity generation in each State 2007-2017.

Total SO2 Emissions from Electricity Generation (metric tons)												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
Texas	468,201	456,631	418,812	430,123	404,706	349,801	348,118	316,796	247,204	233,185	260,966	
Louisiana	105,086	92,639	97,719	125,805	117,904	107,877	111,206	87,300	69,367	57,675	111,439	
Ohio	957,943	724,847	624,089	610,245	615,752	354,795	314,681	322,153	213,937	130,825	108,965	
Missouri	257,766	253,211	235,573	232,804	189,516	135,891	142,871	135,932	114,418	93,149	97,642	
Illinois	302,135	344,637	237,489	231,534	207,202	172,478	185,024	170,133	138,639	97,581	77,808	
MICHIGAN	353,356	347,514	288,419	253,812	235,343	214,979	215,080	157,408	136,634	92,489	75,914	
Pennsylvania	888,595	779,604	584,624	387,433	313,135	240,386	251,154	269,973	200,733	99,539	68,188	
Indiana	661,894	554,815	383,580	384,961	346,798	259,601	248,314	269,711	156,720	83,121	58,759	
Arkansas	81,906	78,446	75,326	74,060	80,361	83,857	80,569	81,218	53,994	54,278	55,805	
Kentucky	348,033	316,710	232,401	248,767	225,925	171,011	173,076	185,856	122,282	72,289	54,654	
Florida	322,483	270,924	219,347	159,795	113,046	101,213	106,865	114,854	76,734	58,895	54,315	
Georgia	681,923	535,658	294,594	264,774	236,889	148,902	112,245	97,402	66,988	52,680	47,608	
Nebraska	62,883	69,512	69,984	64,875	68,014	57,785	60,677	58,054	58,937	47,240	46,594	
Tennessee	246,776	220,660	124,970	137,764	138,272	88,296	78,204	81,064	78,524	48,493	40,129	
Oklahoma	104,337	98,216	91,731	84,805	89,917	74,390	72,953	71,265	60,943	49,789	39,804	
North Carolina	365,242	235,774	126,172	130,673	91,297	73,568	64,672	58,199	52,185	47,267	39,347	
North Dakota	125,277	123,801	120,594	115,641	85,755	79,101	51,575	47,823	42,886	43,146	37,489	
West Virginia	353,352	286,289	167,273	105,270	97,955	82,753	85,172	92,899	60,879	41,540	36,111	
Alabama	448,864	363,916	284,909	217,903	195,481	147,865	131,148	139,203	116,838	49,210	35,673	
Wyoming	83,279	82,782	76,030	67,422	77,571	43,557	44,986	41,462	40,089	35,156	34,641	
Iowa	135,643	153,508	92,180	107,935	101,233	95,888	96,960	68,558	43,505	31,392	30,874	
Wisconsin	177,253	172,489	139,466	144,871	127,664	97,602	98,255	73,704	54,238	28,005	24,609	
Minnesota	88,947	85,964	64,770	56,597	52,459	33,235	32,318	35,623	27,246	24,215	21,574	
Virginia	197,290	142,379	117,634	119,828	86,338	55,685	61,762	62,180	30,606	26,653	18,929	
South Carolina	173,186	156,402	105,134	105,821	87,413	64,666	43,245	39,606	26,116	23,097	17,406	
Hawaii	21,982	21,284	22,280	16,747	16,872	14,583	18,198	16,922	19,633	17,782	17,014	
Maryland	266,695	225,523	197,131	45,090	48,756	40,462	37,681	37,528	31,174	24,685	15,540	
New York	123,470	83,440	58,872	61,722	51,898	30,818	28,076	28,919	21,720	18,372	15,168	
Colorado	58,837	54,883	43,184	44,876	42,529	38,869	36,296	25,814	21,712	17,813	14,105	
Arizona	51,393	43,959	32,883	33,371	29,710	19,419	21,507	20,495	16,023	11,740	12,122	
Montana	24,334	22,196	22,793	22,033	17,982	14,977	15,300	13,087	13,244	11,303	11,696	
Mississippi	74,720	69,216	45,406	59,043	48,347	42,940	79,577	91,709	33,113	12,161	11,183	
Washington	9,920	10,384	12,643	14,174	17,973	20,084	12,028	12,440	11,546	10,981	10,846	
Utah	25,111	22,338	29,616	25,495	22,571	20,027	21,471	21,453	15,568	11,212	10,014	
New Mexico	24,192	20,177	17,506	15,032	16,167	15,023	16,087	10,942	10,546	7,493	8,205	
Oregon	16,142	11,869	11,922	15,862	13,511	13,462	15,882	9,732	8,739	7,996	7,040	
Maine	21,242	26,230	32,926	12,419	12,281	8,231	12,130	10,044	10,720	7,000	5,989	
Kansas	105,043	87,001	46,772	41,048	35,728	29,889	27,236	28,623	12,645	6,476	5,047	
Idaho	6,721	6,296	4,622	6,642	4,725	5,288	5,955	5,245	4,218	3,761	3,710	
Massachusetts	51,127	44,031	33,432	34,938	21,922	14,894	11,141	6,076	4,699	3,361	2,866	
New Jersey	46,393	34,991	11,791	13,954	4,929	3,902	2,905	3,061	3,326	2,818	2,863	
Alaska	4,290	3,525	3,710	3,015	2,728	2,704	3,810	3,532	3,777	3,165	2,560	
Nevada	7,773	8,503	7,186	7,161	4,790	4,264	6,743	9,279	4,852	2,444	1,781	
California	22,820	3,840	2,949	2,522	2,741	5,505	1,888	2,792	1,243	2,449	1,358	
New Hampshire	39,094	33,778	30,702	33,808	22,542	2,054	3,384	2,818	2,061	883	782	
South Dakota	8,922	12,759	11,140	11,912	10,208	11,634	13,923	12,568	4,360	753	776	
Connecticut	5,259	3,872	1,862	2,032	880	7,257	3,183	1,703	1,309	570	672	
Delaware	33,667	31,980	15,699	13,152	8,441	2,427	2,032	749	743	465	495	
Rhode Island	695	101	155	49	72	28	1,152	88	100	86	79	
Vermont	32	36	38	38	85	47	65	62	60	50	59	
District of Columbia	173	258	284	797	656	-	-	-	-	5	1	

Nitrogen Oxides Emissions

As shown in Figure 28, Michigan ranked 21st worst amongst the states in nitrogen oxides pollution per gigawatt-hour in 2017 with 0.45 metric tons emitted for every gigawatt-hour generated. This is only modestly above the median of the states.

Figure 29 shows that Michigan's nitrogen oxides emissions per gigawatt-hour have significantly and steadily declined since 2007, similar to relative declines in most states so that Michigan's relative ranking has not changed. Figure 30 shows that, because Michigan is a larger state, its annual nitrogen oxides emissions of 50,353 metric tons ranked 7th worst amongst states in 2017.

Figure 28: Average nitrogen oxides emissions in metric tons per gigawatt-hour electricity generated in each State in 2017.

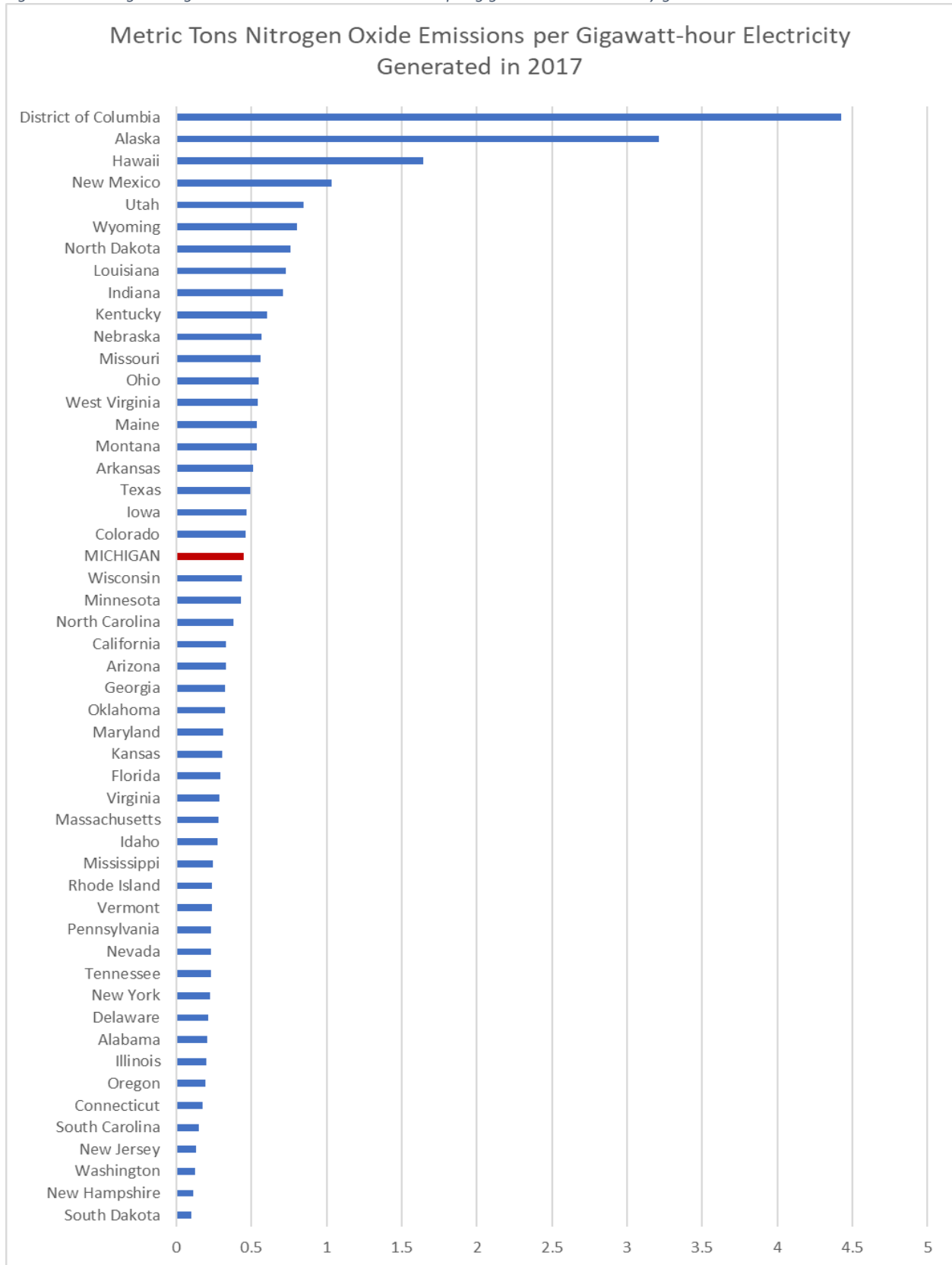


Figure 29: Annual emissions of nitrogen oxides in metric tons per gigawatt-hour in each State 2007-2017.

Nitrogen Oxides Emissions (metric tons) per Gigawatt-hour Generated												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
District of Columbia	2.43	2.49	3.66	1.84	1.85	2.86	2.03	1.97	4.22	4.46	4.42	
Alaska	2.52	2.17	2.51	2.37	2.51	2.45	2.46	2.38	3.06	3.32	3.21	
Hawaii	2.00	1.90	2.04	1.93	1.87	1.81	2.10	1.77	1.72	1.64	1.64	
New Mexico	1.83	1.73	1.54	1.54	1.50	1.51	1.49	1.29	1.30	1.08	1.03	
Utah	1.55	1.40	1.57	1.61	1.42	1.25	1.33	1.20	1.13	0.87	0.85	
Wyoming	1.69	1.57	1.43	1.28	1.29	0.99	0.96	0.90	0.92	0.84	0.80	
North Dakota	2.12	1.94	1.73	1.50	1.37	1.27	1.26	1.21	1.13	0.94	0.76	
Louisiana	0.95	0.80	0.76	0.73	0.74	0.72	0.73	0.67	0.65	0.62	0.73	
Indiana	1.49	1.47	0.95	0.96	0.98	0.94	1.00	1.00	0.93	0.88	0.71	
Kentucky	1.65	1.49	0.82	0.86	0.87	0.83	0.88	0.89	0.74	0.68	0.60	
Nebraska	1.21	1.27	1.30	1.09	1.15	0.84	0.77	0.62	0.59	0.55	0.57	
Missouri	1.09	0.91	0.58	0.61	0.64	0.72	0.77	0.80	0.53	0.68	0.56	
Ohio	1.46	1.45	0.81	0.85	0.90	0.70	0.67	0.71	0.62	0.55	0.55	
West Virginia	1.48	1.01	0.49	0.61	0.70	0.66	0.72	0.82	0.78	0.63	0.54	
Maine	0.63	0.63	0.76	0.49	0.50	0.44	0.62	0.59	0.69	0.53	0.54	
Montana	1.38	0.94	0.77	0.71	0.58	0.58	0.71	0.62	0.64	0.58	0.54	
Arkansas	0.75	0.74	0.65	0.66	0.67	0.59	0.69	0.69	0.52	0.51	0.51	
Texas	0.61	0.53	0.50	0.49	0.49	0.45	0.47	0.43	0.38	0.37	0.49	
Iowa	1.17	1.35	0.87	0.87	0.78	0.73	0.71	0.67	0.54	0.49	0.47	
Colorado	1.24	1.17	1.07	1.09	0.99	0.86	0.85	0.75	0.67	0.53	0.46	
MICHIGAN	0.98	1.00	0.90	0.80	0.75	0.75	0.73	0.66	0.54	0.47	0.45	
Wisconsin	1.11	1.05	0.81	0.76	0.73	0.62	0.61	0.59	0.50	0.43	0.43	
Minnesota	1.55	1.27	0.94	0.82	0.78	0.68	0.65	0.61	0.49	0.43	0.43	
North Carolina	0.47	0.48	0.37	0.45	0.42	0.46	0.45	0.43	0.40	0.37	0.38	
California	0.42	0.40	0.41	0.39	0.41	0.42	0.39	0.37	0.37	0.35	0.33	
Arizona	0.69	0.61	0.55	0.51	0.49	0.41	0.45	0.43	0.38	0.33	0.33	
Georgia	0.86	0.87	0.57	0.58	0.60	0.41	0.42	0.42	0.37	0.32	0.33	
Oklahoma	1.07	1.04	0.97	0.98	1.03	0.81	0.70	0.58	0.39	0.34	0.32	
Maryland	1.09	0.87	0.53	0.57	0.61	0.58	0.56	0.49	0.40	0.35	0.31	
Kansas	1.28	1.06	0.98	0.96	0.90	0.73	0.58	0.53	0.41	0.36	0.31	
Florida	0.90	0.77	0.53	0.44	0.37	0.38	0.36	0.36	0.32	0.30	0.29	
Virginia	0.81	0.77	0.56	0.67	0.66	0.51	0.47	0.48	0.41	0.34	0.29	
Massachusetts	0.42	0.45	0.43	0.40	0.37	0.39	0.42	0.40	0.36	0.32	0.28	
Idaho	0.32	0.27	0.15	0.34	0.17	0.28	0.45	1.21	0.79	0.30	0.28	
Mississippi	0.98	0.87	0.56	0.56	0.51	0.43	0.42	0.39	0.23	0.24	0.24	
Rhode Island	0.42	0.44	0.37	0.38	0.30	0.27	0.16	0.15	0.14	0.14	0.24	
Vermont	0.08	0.06	0.09	0.10	0.10	0.09	0.10	0.10	0.31	0.30	0.24	
Pennsylvania	0.81	0.81	0.55	0.59	0.65	0.59	0.60	0.58	0.48	0.40	0.23	
Nevada	0.89	0.62	0.44	0.43	0.38	0.34	0.37	0.40	0.25	0.25	0.23	
Tennessee	1.03	0.91	0.38	0.40	0.36	0.33	0.26	0.27	0.28	0.27	0.23	
New York	0.41	0.37	0.33	0.32	0.31	0.30	0.30	0.29	0.25	0.24	0.22	
Delaware	1.51	1.52	1.20	0.86	0.64	0.33	0.30	0.33	0.28	0.22	0.21	
Alabama	0.84	0.76	0.37	0.44	0.41	0.34	0.34	0.38	0.34	0.25	0.21	
Illinois	0.60	0.61	0.40	0.41	0.37	0.31	0.28	0.26	0.22	0.19	0.20	
Oregon	0.32	0.24	0.22	0.27	0.16	0.14	0.21	0.19	0.26	0.20	0.19	
Connecticut	0.26	0.25	0.21	0.21	0.18	0.33	0.23	0.23	0.18	0.16	0.17	
South Carolina	0.45	0.43	0.24	0.29	0.29	0.23	0.18	0.20	0.18	0.16	0.15	
New Jersey	0.34	0.32	0.23	0.23	0.20	0.21	0.21	0.20	0.16	0.15	0.13	
Washington	0.18	0.16	0.18	0.20	0.13	0.10	0.14	0.13	0.13	0.12	0.12	
New Hampshire	0.28	0.27	0.27	0.28	0.26	0.21	0.23	0.18	0.14	0.11	0.11	
South Dakota	1.60	1.87	1.37	1.17	0.78	0.93	1.03	0.88	0.31	0.09	0.10	

Figure 30: Annual emissions of nitrogen oxides in metric tons from electricity generated in each State 2007-2017.

Total NOX Emissions from Electricity Generation (metric tons)												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
Texas	247,391	214,990	199,086	203,537	214,297	193,567	204,222	187,101	172,159	165,928	223,464	
Louisiana	87,517	74,034	69,175	75,394	77,683	74,954	74,649	69,667	70,532	66,405	70,973	
Indiana	194,872	190,611	110,914	120,437	119,803	107,337	110,057	115,415	97,256	89,320	70,277	
Florida	202,849	170,217	115,829	100,791	82,935	83,920	79,567	82,273	76,172	70,470	69,633	
California	88,568	82,493	83,201	79,589	81,366	83,968	77,905	73,880	72,756	69,143	68,540	
Ohio	227,035	222,086	110,211	122,434	121,496	90,986	92,523	95,541	76,070	64,932	65,394	
MICHIGAN	117,456	115,128	91,266	88,864	81,979	80,818	77,340	69,996	61,410	52,456	50,353	
Pennsylvania	183,409	180,872	120,366	135,887	147,475	132,776	137,029	128,269	103,635	87,052	49,481	
North Carolina	60,636	59,587	44,247	57,407	50,015	53,192	56,614	55,053	51,247	47,827	49,201	
Missouri	99,657	82,881	51,561	56,116	60,751	66,433	70,760	70,508	44,148	53,659	47,345	
Kentucky	160,819	145,815	73,900	84,856	85,102	74,928	79,108	80,970	61,674	54,616	44,110	
Georgia	125,027	118,859	73,879	79,274	75,152	50,103	50,317	52,917	48,158	42,842	41,507	
West Virginia	138,991	91,766	34,677	49,153	55,244	48,157	54,639	66,219	56,723	47,510	39,942	
Wyoming	77,121	72,875	65,999	61,363	61,629	49,167	50,455	44,974	45,124	39,067	37,425	
Illinois	119,902	121,493	77,894	82,559	73,047	60,950	57,303	52,524	41,963	35,745	36,072	
Arizona	78,719	73,401	61,622	57,244	52,782	45,718	51,073	48,288	43,079	36,372	35,046	
New Mexico	65,846	63,891	61,165	55,818	57,192	55,454	53,356	41,658	42,414	35,498	34,740	
Utah	70,112	65,069	68,448	68,088	57,787	49,172	56,517	52,561	47,401	33,066	31,758	
North Dakota	66,161	63,480	58,995	52,011	48,193	45,950	43,957	44,188	41,815	35,596	31,530	
Arkansas	41,004	40,499	37,075	40,490	41,347	38,243	41,639	42,682	28,688	30,619	30,995	
Alabama	120,885	110,734	52,587	66,190	64,716	51,222	51,484	56,502	51,256	35,214	29,157	
New York	60,419	51,371	44,093	44,052	42,631	40,269	40,446	40,085	35,306	32,161	28,499	
Wisconsin	70,402	66,703	48,535	48,766	46,025	39,312	40,021	35,854	33,509	28,172	28,201	
Iowa	58,231	71,469	45,095	49,963	44,201	41,639	40,461	38,038	30,613	26,384	27,103	
Virginia	63,849	55,885	39,357	48,812	43,720	35,778	36,017	36,886	34,469	31,660	25,991	
Minnesota	84,349	69,423	49,208	44,268	41,421	35,837	33,363	34,629	27,751	25,360	25,267	
Colorado	66,628	62,683	54,296	55,063	51,062	44,994	44,824	40,220	34,876	28,907	24,885	
Oklahoma	77,858	79,049	72,664	71,029	76,729	63,455	51,491	40,556	29,381	26,973	23,894	
Alaska	17,205	14,733	16,855	16,028	17,268	17,008	15,971	14,390	19,243	21,060	20,868	
Nebraska	39,181	41,149	44,103	40,030	41,342	28,760	28,585	24,530	23,365	20,065	20,157	
Tennessee	98,331	82,347	30,011	32,911	29,203	25,299	21,033	21,691	20,959	21,754	18,059	
Hawaii	23,063	21,618	22,440	20,892	20,037	18,927	21,558	18,105	17,399	16,288	16,113	
Kansas	64,355	49,330	45,814	45,946	40,995	32,565	27,988	26,324	18,730	17,248	15,701	
Montana	40,023	27,722	20,534	21,197	17,369	16,029	19,768	18,631	18,801	16,103	15,154	
Washington	19,322	17,662	18,293	20,614	14,629	11,897	16,085	15,301	13,931	13,415	14,384	
Mississippi	48,848	42,082	27,458	30,607	26,293	23,460	22,214	21,765	14,621	14,890	14,367	
South Carolina	46,497	43,637	24,280	29,832	30,245	22,267	17,267	19,585	17,569	15,394	13,851	
Oregon	17,448	14,368	12,605	14,666	9,295	8,754	12,349	11,556	14,939	12,108	12,182	
Maryland	54,520	41,313	23,400	24,897	25,315	21,748	19,952	18,713	14,530	13,105	10,677	
New Jersey	21,269	20,205	13,919	14,986	13,140	13,599	13,622	13,933	11,754	11,696	9,752	
Massachusetts	19,951	18,928	16,661	17,308	14,062	13,873	13,748	12,552	11,414	10,314	8,963	
Nevada	29,037	21,612	16,661	15,267	11,989	12,002	13,309	14,502	9,882	9,962	8,741	
Maine	10,185	10,740	12,397	8,413	7,962	6,618	8,720	7,878	8,132	6,069	6,067	
Connecticut	8,475	7,457	6,483	7,092	6,139	11,750	8,197	7,613	6,902	6,014	5,983	
Idaho	3,695	3,197	2,013	4,134	2,897	4,348	6,802	18,353	12,455	4,708	4,823	
New Hampshire	6,632	6,234	5,488	6,267	5,163	3,978	4,586	3,527	2,882	2,185	1,972	
Rhode Island	2,956	3,257	2,855	2,919	2,659	2,277	995	933	948	912	1,808	
Delaware	12,854	11,449	5,814	4,814	4,189	2,840	2,346	2,574	2,195	1,954	1,584	
South Dakota	9,810	13,220	11,264	11,717	9,408	10,613	10,368	9,650	2,973	1,077	1,078	
Vermont	457	419	627	665	661	610	718	670	612	581	504	
District of Columbia	183	180	130	367	371	205	134	133	227	341	296	

Renewable Generation

Michigan ranked 19th worst in renewable generation relative to total electricity generation in 2017. Renewables accounted for 8.4% of total electricity generation in Michigan in 2017. Michigan's rank falls to 27th when conventional hydroelectric is removed from renewable generation.

For renewable generation relative to electricity sales, Michigan ranks 21st worst. When hydroelectric is removed, Michigan ranks 28th worst.

In terms of magnitude of total renewable generation, Michigan ranks 20th best with hydroelectric and 13th best without hydroelectric.

Figure 31: Annual renewable generation, including hydropower, in each State in 2017 as a percent of total electricity generation in that State.

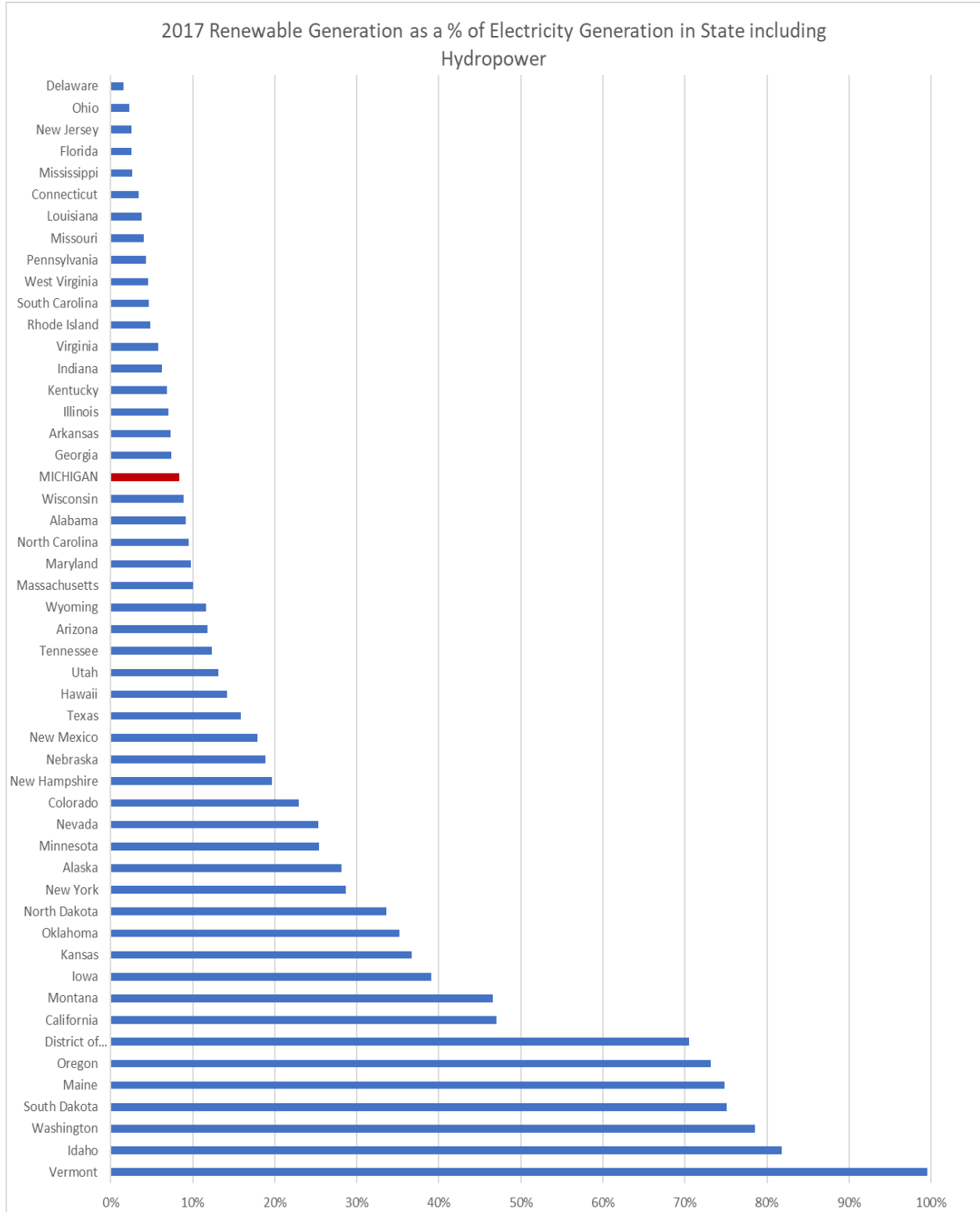


Figure 33: Annual renewable generation, excluding hydropower, in each State in 2017 as a percent of total electricity generation in that State.

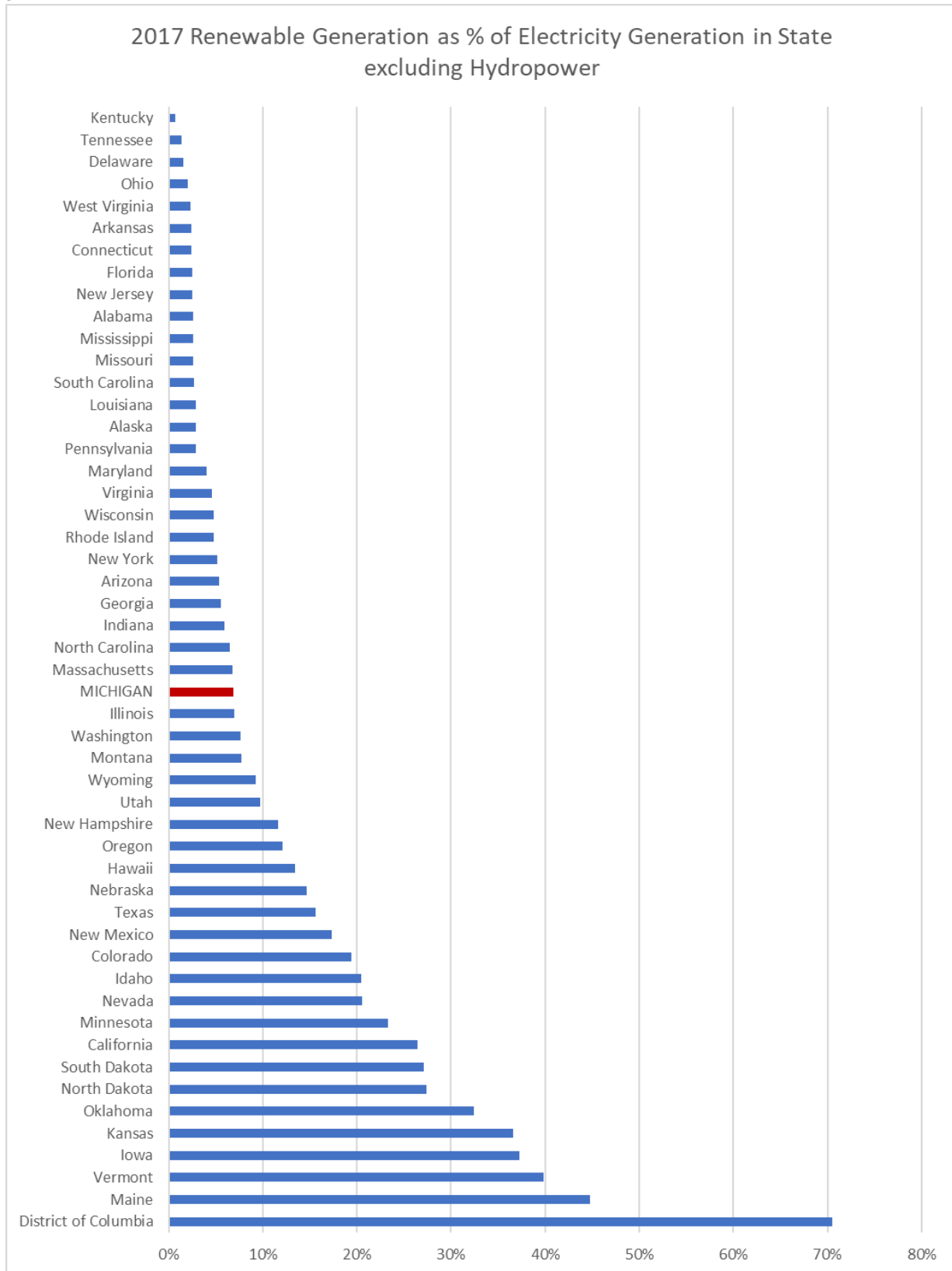


Figure 34: Annual renewable generation, excluding hydropower, in each State 2007-2017 as a percent of total generation in that State.

Renewable Generation as a % of Total Generation excluding Hydropower												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
Kentucky	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	
Tennessee	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
Delaware	1%	2%	3%	2%	2%	2%	1%	2%	2%	1%	2%	
Ohio	0%	0%	0%	0%	1%	1%	1%	2%	2%	2%	2%	
West Virginia	0%	0%	1%	1%	1%	2%	2%	2%	2%	2%	2%	
Arkansas	3%	3%	3%	3%	3%	3%	3%	2%	3%	2%	2%	
Connecticut	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
Florida	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
New Jersey	1%	1%	2%	1%	1%	2%	2%	2%	2%	2%	2%	
Alabama	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	
Mississippi	3%	3%	3%	3%	3%	3%	3%	3%	2%	2%	3%	
Missouri	0%	0%	1%	1%	1%	1%	1%	1%	1%	2%	3%	
South Carolina	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	3%	
Louisiana	3%	3%	3%	2%	2%	2%	3%	3%	3%	3%	3%	
Alaska	0%	0%	0%	0%	0%	1%	3%	4%	3%	3%	3%	
Pennsylvania	1%	1%	2%	2%	2%	2%	3%	3%	3%	3%	3%	
Maryland	1%	1%	1%	1%	2%	2%	3%	3%	3%	3%	4%	
Virginia	3%	4%	3%	3%	3%	3%	4%	5%	5%	4%	5%	
Wisconsin	2%	3%	4%	4%	4%	5%	5%	5%	5%	5%	5%	
Rhode Island	2%	2%	2%	2%	1%	1%	1%	4%	3%	4%	5%	
New York	2%	2%	3%	4%	4%	4%	4%	5%	5%	5%	5%	
Arizona	0%	0%	0%	0%	0%	2%	2%	3%	4%	4%	5%	
Georgia	2%	2%	2%	2%	3%	3%	3%	3%	4%	4%	5%	
Indiana	0%	0%	1%	3%	3%	3%	4%	3%	5%	5%	6%	
North Carolina	1%	2%	2%	2%	2%	2%	2%	3%	3%	5%	7%	
Massachusetts	3%	3%	3%	3%	3%	4%	4%	6%	6%	6%	7%	
MICHIGAN	2%	2%	3%	3%	3%	3%	5%	6%	6%	6%	7%	
Illinois	1%	2%	2%	3%	3%	4%	5%	5%	6%	6%	7%	
Washington	3%	4%	5%	6%	7%	7%	8%	8%	8%	9%	8%	
Montana	2%	2%	3%	3%	4%	5%	6%	7%	7%	8%	8%	
Wyoming	2%	2%	5%	7%	10%	9%	8%	9%	8%	9%	9%	
Utah	0%	1%	1%	2%	2%	3%	2%	3%	3%	6%	10%	
New Hampshire	5%	5%	6%	6%	5%	7%	9%	10%	10%	11%	12%	
Oregon	4%	6%	8%	9%	9%	12%	14%	15%	14%	14%	12%	
Hawaii	7%	7%	6%	7%	8%	9%	11%	12%	12%	14%	13%	
Nebraska	1%	1%	1%	1%	3%	4%	5%	7%	8%	11%	15%	
Texas	3%	4%	5%	7%	7%	8%	9%	10%	10%	13%	16%	
New Mexico	4%	4%	4%	5%	6%	7%	7%	9%	8%	13%	17%	
Colorado	2%	6%	6%	7%	10%	12%	14%	14%	15%	19%	19%	
Idaho	6%	6%	7%	8%	11%	16%	21%	23%	19%	21%	20%	
Nevada	4%	4%	5%	7%	8%	8%	10%	11%	13%	17%	21%	
Minnesota	7%	11%	13%	12%	16%	19%	19%	20%	20%	20%	23%	
California	12%	12%	12%	12%	14%	15%	18%	21%	23%	25%	26%	
South Dakota	2%	2%	5%	14%	22%	21%	27%	21%	26%	32%	27%	
North Dakota	2%	5%	9%	12%	15%	15%	16%	17%	18%	22%	27%	
Oklahoma	3%	3%	4%	6%	8%	11%	16%	17%	19%	26%	32%	
Kansas	2%	4%	6%	7%	8%	12%	20%	22%	24%	30%	37%	
Iowa	6%	8%	15%	16%	19%	25%	28%	29%	32%	37%	37%	
Vermont	8%	6%	6%	7%	6%	7%	11%	11%	42%	43%	40%	
Maine	26%	24%	24%	24%	28%	31%	35%	34%	38%	39%	45%	
District of Columl	0%	0%	0%	0%	0%	0%	0%	0%	58%	69%	71%	

Figure 35: Annual renewable generation, including hydropower, in each State in 2017 as a percent of total electricity sales in that State.

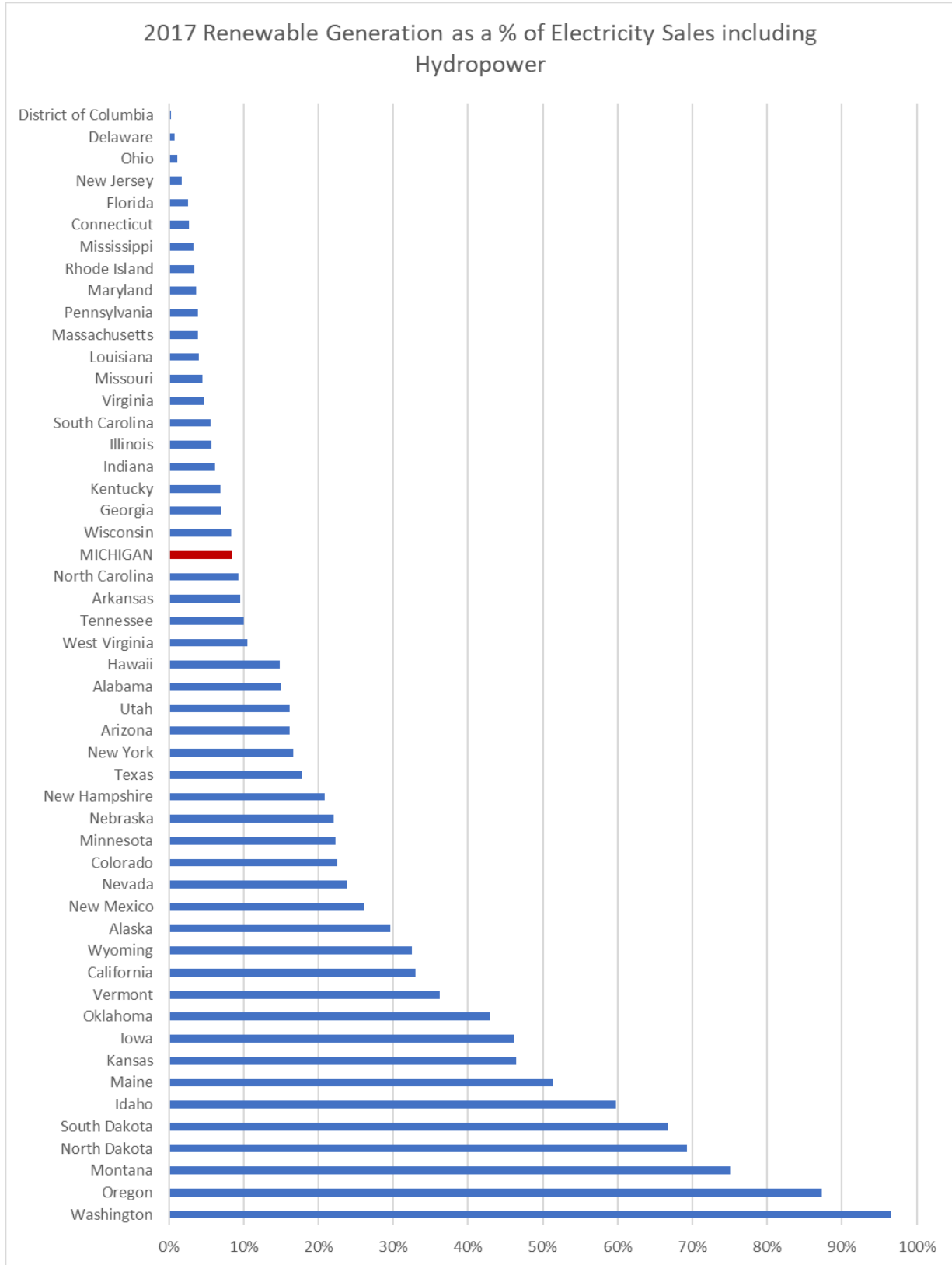


Figure 36: Annual renewable generation, including hydropower, in each State 2007-2017 as a percent of total electricity sales in that State.

Renewable Generation as a % of Total Electricity Sales including Hydropower												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
District of Columbia	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	---
Delaware	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	---
Ohio	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	---
New Jersey	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	---
Florida	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	---
Connecticut	2%	3%	3%	2%	3%	2%	2%	3%	2%	2%	3%	---
Mississippi	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	---
Rhode Island	2%	2%	2%	1%	1%	1%	1%	2%	2%	2%	3%	---
Maryland	2%	3%	3%	2%	4%	3%	3%	3%	3%	3%	4%	---
Pennsylvania	3%	3%	4%	4%	3%	3%	3%	4%	3%	3%	4%	---
Massachusetts	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	---
Louisiana	5%	5%	5%	4%	4%	4%	4%	4%	4%	4%	4%	---
Missouri	1%	3%	3%	3%	3%	2%	3%	2%	3%	3%	4%	---
Virginia	3%	3%	4%	3%	3%	3%	4%	4%	5%	5%	5%	---
South Carolina	4%	4%	5%	5%	5%	5%	7%	6%	6%	6%	6%	---
Illinois	1%	2%	2%	2%	3%	4%	4%	5%	5%	5%	6%	---
Indiana	1%	1%	2%	3%	4%	4%	4%	4%	5%	6%	6%	---
Kentucky	2%	3%	4%	3%	4%	3%	4%	5%	5%	5%	7%	---
Georgia	4%	4%	5%	5%	4%	4%	6%	5%	6%	6%	7%	---
Wisconsin	4%	5%	6%	7%	7%	7%	7%	8%	8%	8%	8%	---
MICHIGAN	3%	4%	4%	4%	4%	4%	6%	7%	8%	8%	9%	---
North Carolina	4%	4%	6%	5%	5%	5%	8%	6%	7%	8%	9%	---
Arkansas	10%	13%	13%	11%	10%	8%	9%	9%	11%	11%	10%	---
Tennessee	6%	6%	12%	9%	11%	9%	14%	10%	11%	8%	10%	---
West Virginia	4%	5%	8%	7%	8%	9%	10%	8%	9%	10%	11%	---
Hawaii	8%	8%	8%	8%	10%	11%	13%	14%	14%	15%	15%	---
Alabama	9%	11%	19%	12%	13%	12%	18%	14%	15%	12%	15%	---
Utah	3%	3%	5%	5%	8%	6%	5%	6%	6%	11%	16%	---
Arizona	9%	10%	9%	10%	13%	11%	11%	13%	14%	15%	16%	---
New York	14%	15%	16%	14%	15%	14%	14%	14%	14%	15%	17%	---
Texas	3%	5%	6%	8%	9%	9%	10%	11%	12%	15%	18%	---
New Hampshire	19%	24%	23%	19%	19%	18%	19%	21%	21%	20%	21%	---
Nebraska	2%	2%	3%	6%	9%	8%	10%	13%	17%	16%	22%	---
Minnesota	7%	10%	12%	11%	13%	16%	15%	17%	19%	20%	22%	---
Colorado	6%	10%	10%	10%	14%	14%	16%	18%	17%	22%	22%	---
Nevada	9%	9%	12%	13%	13%	15%	17%	17%	19%	22%	24%	---
New Mexico	8%	9%	9%	9%	11%	12%	12%	13%	12%	20%	26%	---
Alaska	21%	19%	21%	23%	22%	25%	26%	28%	29%	31%	30%	---
Wyoming	10%	11%	19%	25%	34%	31%	30%	31%	27%	32%	32%	---
California	18%	17%	19%	21%	25%	20%	21%	20%	20%	27%	33%	---
Vermont	19%	33%	35%	33%	33%	29%	36%	35%	36%	35%	36%	---
Oklahoma	9%	11%	12%	12%	12%	16%	23%	22%	28%	37%	43%	---
Iowa	9%	11%	20%	23%	26%	33%	35%	37%	40%	44%	46%	---
Kansas	3%	4%	8%	9%	9%	13%	24%	27%	28%	35%	46%	---
Maine	34%	37%	36%	35%	37%	37%	36%	34%	43%	44%	51%	---
Idaho	40%	42%	50%	45%	66%	57%	48%	54%	51%	53%	60%	---
South Dakota	29%	29%	44%	58%	79%	71%	55%	63%	61%	70%	67%	---
North Dakota	16%	24%	35%	47%	57%	53%	46%	48%	47%	54%	69%	---
Montana	55%	59%	60%	64%	84%	76%	68%	81%	70%	73%	75%	---
Oregon	71%	72%	75%	74%	98%	97%	84%	90%	80%	87%	87%	---
Washington	93%	92%	82%	81%	104%	103%	92%	94%	90%	97%	97%	---

Figure 37: Annual renewable generation, excluding hydropower, in each State in 2017 as a percent of total electricity sales in that State.

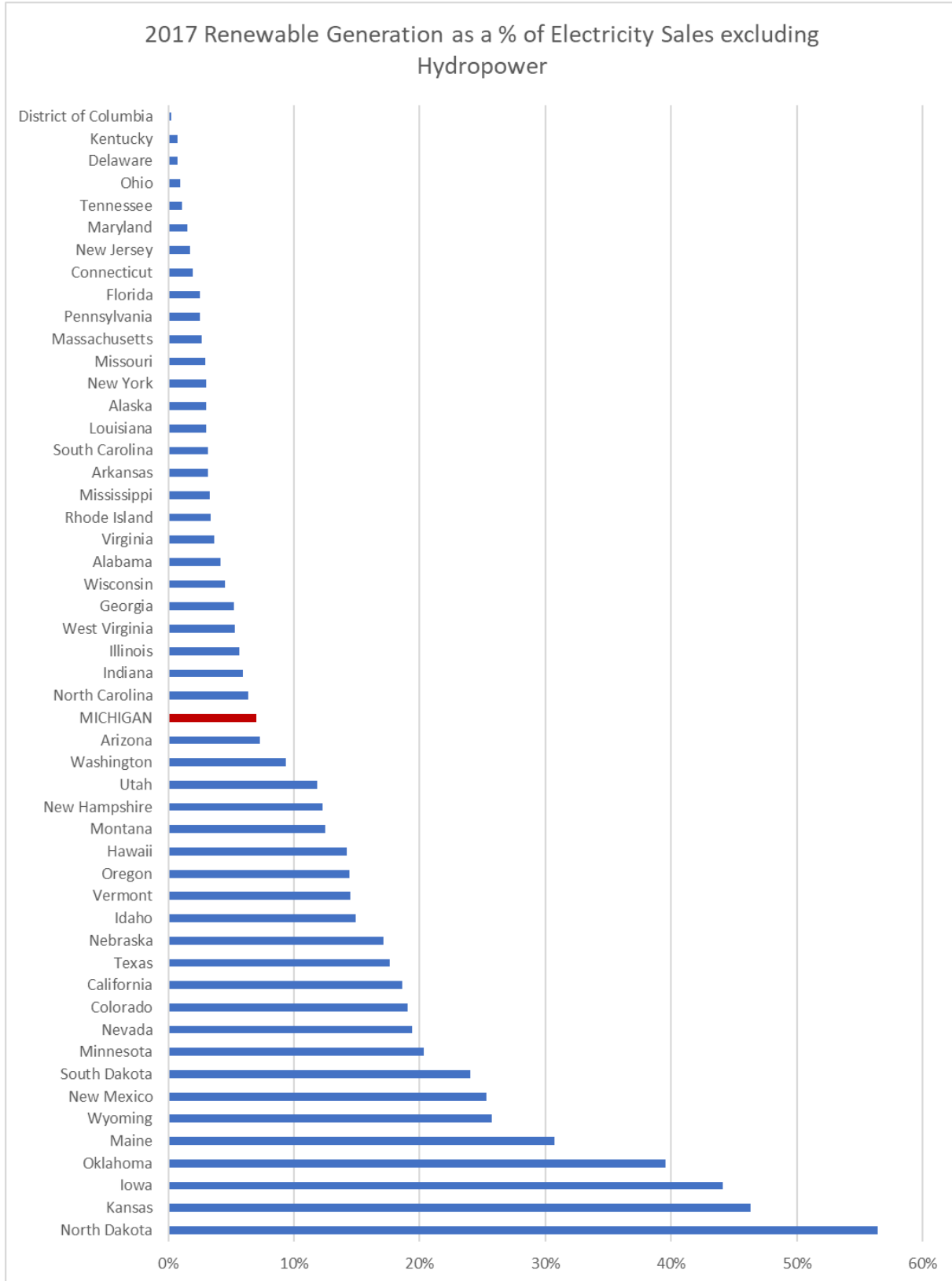


Figure 38: Annual renewable generation, excluding hydropower, in each State 2007-2017 as a percent of total electricity sales in that State.

Renewable Generation as a % of Total Electricity Sales excluding Hydropower												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
District of Columbia	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Kentucky	1%	0%	0%	0%	0%	0%	0%	1%	1%	1%	1%	
Delaware	0%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
Ohio	0%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%	
Tennessee	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
Maryland	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	
New Jersey	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	2%	
Connecticut	2%	2%	2%	2%	1%	1%	1%	2%	2%	2%	2%	
Florida	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	
Pennsylvania	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	
Massachusetts	2%	2%	2%	2%	1%	2%	2%	2%	2%	2%	3%	
Missouri	0%	0%	1%	1%	1%	2%	1%	1%	1%	2%	3%	
New York	1%	2%	2%	2%	2%	2%	3%	3%	3%	3%	3%	
Alaska	0%	0%	0%	0%	0%	1%	3%	3%	3%	3%	3%	
Louisiana	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
South Carolina	2%	2%	2%	2%	3%	3%	3%	3%	3%	3%	3%	
Arkansas	3%	3%	4%	3%	3%	4%	3%	3%	3%	3%	3%	
Mississippi	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	
Rhode Island	2%	2%	2%	1%	1%	1%	1%	2%	2%	2%	3%	
Virginia	2%	2%	2%	2%	2%	2%	3%	3%	4%	4%	4%	
Alabama	4%	4%	4%	3%	3%	3%	3%	3%	4%	4%	4%	
Wisconsin	2%	3%	4%	4%	4%	5%	5%	5%	5%	4%	5%	
Georgia	2%	2%	2%	2%	2%	3%	3%	3%	4%	4%	5%	
West Virginia	0%	1%	2%	3%	4%	4%	4%	4%	4%	4%	5%	
Illinois	1%	1%	2%	2%	3%	4%	4%	4%	5%	5%	6%	
Indiana	0%	0%	2%	3%	3%	3%	4%	4%	5%	5%	6%	
North Carolina	1%	1%	1%	2%	2%	2%	2%	2%	3%	4%	6%	
MICHIGAN	2%	2%	3%	3%	3%	3%	5%	6%	7%	6%	7%	
Arizona	0%	0%	0%	0%	1%	2%	4%	5%	5%	6%	7%	
Washington	4%	6%	5%	7%	8%	9%	9%	10%	10%	11%	9%	
Utah	1%	1%	2%	3%	3%	4%	3%	4%	4%	8%	12%	
New Hampshire	9%	10%	10%	9%	8%	9%	10%	12%	13%	13%	12%	
Montana	3%	4%	5%	6%	8%	8%	11%	12%	12%	13%	13%	
Hawaii	7%	7%	7%	7%	9%	10%	12%	13%	13%	14%	14%	
Oregon	4%	7%	9%	10%	11%	15%	17%	18%	16%	17%	14%	
Vermont	8%	7%	8%	9%	8%	8%	13%	14%	15%	15%	14%	
Idaho	3%	3%	4%	4%	8%	11%	13%	15%	13%	14%	15%	
Nebraska	1%	1%	2%	2%	4%	4%	6%	9%	11%	13%	17%	
Texas	3%	5%	6%	8%	9%	9%	10%	11%	12%	15%	18%	
California	9%	9%	9%	9%	10%	11%	12%	14%	16%	17%	19%	
Colorado	3%	6%	6%	7%	10%	12%	14%	15%	14%	18%	19%	
Nevada	3%	4%	5%	6%	7%	8%	10%	11%	13%	18%	19%	
Minnesota	6%	9%	11%	10%	12%	15%	14%	17%	17%	18%	20%	
South Dakota	1%	1%	4%	12%	23%	20%	22%	19%	21%	31%	24%	
New Mexico	6%	8%	7%	8%	10%	11%	11%	12%	12%	19%	25%	
Wyoming	5%	6%	13%	19%	26%	26%	26%	26%	22%	27%	26%	
Maine	18%	17%	18%	18%	20%	20%	21%	19%	25%	26%	31%	
Oklahoma	4%	5%	5%	7%	10%	14%	19%	20%	23%	33%	40%	
Iowa	6%	9%	17%	21%	24%	31%	34%	35%	38%	42%	44%	
Kansas	3%	4%	7%	9%	9%	13%	24%	27%	28%	35%	46%	
North Dakota	5%	14%	24%	32%	38%	36%	34%	34%	36%	44%	56%	

Figure 39: Total annual renewable generation, including hydropower, in each State 2007-2017.

Total Renewable Generation (MWh)												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
District of Colum	-	-	-	-	-	-	-	-	30,999	52,771	47,167	---
Delaware	48,116	163,375	125,611	138,197	157,836	131,051	106,532	131,080	129,936	124,394	118,065	-----
Rhode Island	159,121	163,384	149,336	143,779	137,728	106,161	57,176	230,378	238,804	248,099	368,341	-----
Connecticut	1,093,101	1,289,691	1,268,276	1,130,327	1,227,151	978,666	1,054,018	1,202,806	1,107,374	1,117,475	1,177,147	-----
Hawaii	845,690	861,140	817,484	817,391	974,061	1,039,396	1,205,276	1,299,833	1,339,620	1,438,055	1,387,585	-----
Mississippi	1,493,365	1,391,326	1,424,279	1,504,270	1,506,077	1,509,190	1,448,387	1,507,949	1,506,532	1,524,200	1,562,971	-----
Alaska	1,302,453	1,176,551	1,337,282	1,452,052	1,360,478	1,615,002	1,632,800	1,753,207	1,783,515	1,871,470	1,828,919	-----
New Jersey	864,487	931,063	991,912	868,173	979,919	1,291,470	1,465,392	1,552,830	1,604,663	1,847,976	1,890,854	-----
Vermont	1,110,154	1,918,242	1,914,870	1,829,226	1,857,429	1,616,489	2,030,450	1,962,874	1,977,498	1,905,225	2,132,448	-----
Ohio	845,579	1,009,811	1,161,156	1,129,113	1,319,347	2,152,784	2,558,497	2,503,801	2,514,506	2,533,315	2,698,009	-----
Massachusetts	2,037,706	2,411,189	2,430,334	2,270,073	2,355,335	2,189,417	2,439,930	2,632,028	2,660,088	2,742,072	3,218,991	-----
Maryland	2,255,677	2,586,563	2,439,548	2,241,061	3,368,864	2,554,691	2,668,184	2,604,397	2,690,987	2,673,640	3,330,176	-----
West Virginia	1,421,985	1,639,557	2,387,528	2,306,533	2,565,048	2,728,003	3,129,291	2,697,972	2,766,255	3,070,401	3,340,833	-----
Missouri	1,233,635	2,292,799	2,391,498	2,526,944	2,425,549	2,012,848	2,377,304	1,952,783	2,773,896	2,561,679	3,414,285	-----
New Hampshire	2,388,501	2,808,208	2,878,428	2,709,801	2,696,034	2,628,556	3,122,601	3,333,751	3,318,049	3,267,078	3,435,173	-----
Louisiana	3,806,525	3,774,048	3,600,310	3,576,570	3,486,550	3,109,987	3,831,164	3,869,642	3,703,779	3,979,296	3,675,524	-----
South Carolina	3,551,946	2,938,941	4,079,976	4,249,508	3,683,349	3,563,745	5,386,273	5,011,621	4,857,959	4,607,399	4,314,279	-----
Arkansas	4,860,497	6,173,130	5,778,257	5,282,905	4,625,491	3,858,842	4,255,554	4,169,993	5,011,079	4,965,956	4,410,867	-----
Utah	733,737	969,946	1,321,793	1,476,479	2,191,150	1,847,510	1,436,736	1,889,121	1,941,197	3,204,663	4,921,669	-----
Kentucky	2,134,210	2,377,090	3,681,175	3,020,120	3,405,543	2,694,661	3,601,895	3,591,556	3,844,607	3,954,557	5,020,593	-----
Virginia	3,813,835	3,709,453	3,896,149	3,719,831	3,406,030	3,402,218	4,159,611	4,806,991	5,302,586	5,584,116	5,238,455	-----
Wyoming	1,484,305	1,797,817	3,192,777	4,270,680	5,835,598	5,262,577	5,144,162	5,274,467	4,624,969	5,362,826	5,444,279	-----
Wisconsin	2,845,601	3,370,077	3,734,283	4,585,808	4,911,921	4,753,441	5,170,853	5,734,164	5,502,399	5,782,990	5,779,514	-----
New Mexico	1,677,211	1,973,960	1,851,345	2,071,802	2,436,491	2,796,670	2,691,887	2,911,101	2,833,619	4,537,260	6,011,012	-----
Florida	4,457,263	4,509,026	4,548,534	4,664,198	4,852,185	4,674,309	4,912,960	5,284,496	5,387,722	5,041,672	6,103,925	-----
Indiana	681,183	948,174	2,209,306	3,699,378	4,029,778	3,979,872	4,274,864	4,359,860	5,498,889	5,984,370	6,146,548	-----
Nebraska	625,468	621,569	882,519	1,807,009	2,733,533	2,603,815	2,992,954	3,958,905	4,936,396	4,756,593	6,685,762	-----
South Dakota	3,067,301	3,139,908	4,859,207	6,610,551	9,276,464	8,334,822	6,750,308	7,834,507	7,347,998	8,520,149	8,215,878	-----
Maine	7,945,148	8,515,390	8,149,923	7,962,664	8,473,672	8,397,883	8,453,819	8,114,963	7,809,182	7,454,962	8,430,592	-----
Pennsylvania	4,782,178	5,352,635	6,034,794	6,577,377	7,316,206	6,701,038	8,278,660	8,721,580	8,424,230	8,317,002	9,221,652	-----
Georgia	5,651,609	4,926,588	6,084,852	6,502,265	5,894,577	5,514,837	7,552,768	7,346,956	7,846,583	8,827,016	9,414,357	-----
MICHIGAN	3,686,736	3,955,520	3,995,111	4,083,005	4,319,633	4,992,265	6,933,433	8,274,374	8,782,182	8,764,458	9,427,651	-----
Nevada	3,299,849	3,289,453	4,269,007	4,443,943	4,627,927	5,409,046	6,372,104	6,456,172	7,367,464	8,665,807	9,669,486	-----
Tennessee	5,910,128	6,611,383	11,162,430	9,125,344	10,595,416	9,132,118	13,553,472	10,041,649	10,707,051	7,823,792	9,774,478	-----
North Carolina	4,656,378	4,955,855	7,064,661	6,839,691	6,238,880	6,431,858	9,855,383	8,031,915	8,704,955	10,400,457	12,215,248	-----
Colorado	3,054,362	5,323,778	5,131,697	5,132,797	7,449,271	7,689,290	8,749,255	9,517,187	9,427,367	12,024,189	12,332,239	-----
Arizona	6,639,310	7,399,559	6,629,666	6,941,067	9,703,479	8,414,586	8,647,302	9,958,627	10,670,993	11,689,548	12,515,033	-----
Alabama	7,936,734	9,493,462	15,585,230	11,081,240	11,700,260	10,211,777	15,774,756	12,245,893	13,151,088	10,351,310	12,843,671	-----
Illinois	1,438,479	3,173,527	3,666,132	5,256,702	7,005,756	8,483,867	10,405,630	10,831,681	11,447,947	11,312,090	12,919,102	-----
Montana	9,971,057	10,703,653	10,421,506	10,441,819	13,861,049	12,545,216	11,398,021	13,469,554	11,873,736	12,242,870	13,136,099	-----
North Dakota	1,939,672	2,959,175	4,484,353	6,150,146	7,825,494	7,757,282	7,376,860	8,736,424	8,603,466	10,089,533	13,943,336	-----
Idaho	9,674,539	10,110,913	11,301,580	10,168,254	15,296,973	13,454,907	11,625,504	12,479,329	11,703,685	12,245,056	14,224,267	-----
Minnesota	4,586,460	6,577,943	7,545,745	7,480,043	9,152,260	10,575,702	10,382,399	12,005,328	12,436,710	13,044,114	14,924,082	-----
Kansas	1,163,039	1,769,986	2,876,065	3,472,565	3,793,477	5,263,052	9,505,716	10,920,292	11,081,207	14,202,353	18,689,734	-----
Iowa	3,870,122	5,070,147	8,559,766	10,308,651	11,795,121	14,949,617	16,476,159	17,451,605	19,090,920	21,240,654	22,621,279	-----
Oklahoma	5,194,860	6,361,977	6,481,846	6,968,743	7,426,173	9,666,237	13,684,482	13,703,661	17,032,522	23,010,355	25,966,370	-----
New York	28,027,638	30,041,788	32,082,114	30,286,245	32,892,776	29,844,916	30,861,400	32,533,527	32,333,071	33,211,534	36,749,689	-----
Oregon	35,815,731	37,228,122	37,305,940	35,299,140	47,804,639	46,617,424	41,732,582	44,175,468	39,204,182	42,931,682	45,869,624	-----
Texas	11,932,049	18,678,561	22,133,133	28,966,660	32,746,187	34,601,171	38,239,599	42,481,612	47,630,759	61,286,294	71,889,182	-----
Washington	82,559,749	82,575,196	77,977,375	74,905,347	99,832,044	97,678,705	86,976,852	88,571,311	82,472,293	88,395,945	91,007,020	-----
California	52,173,008	48,911,747	53,427,698	58,880,591	69,779,892	56,804,216	59,332,232	58,448,097	59,203,470	78,654,385	96,906,966	-----

Figure 40. Total annual renewable generation, excluding hydropower, in each State 2007-2017.

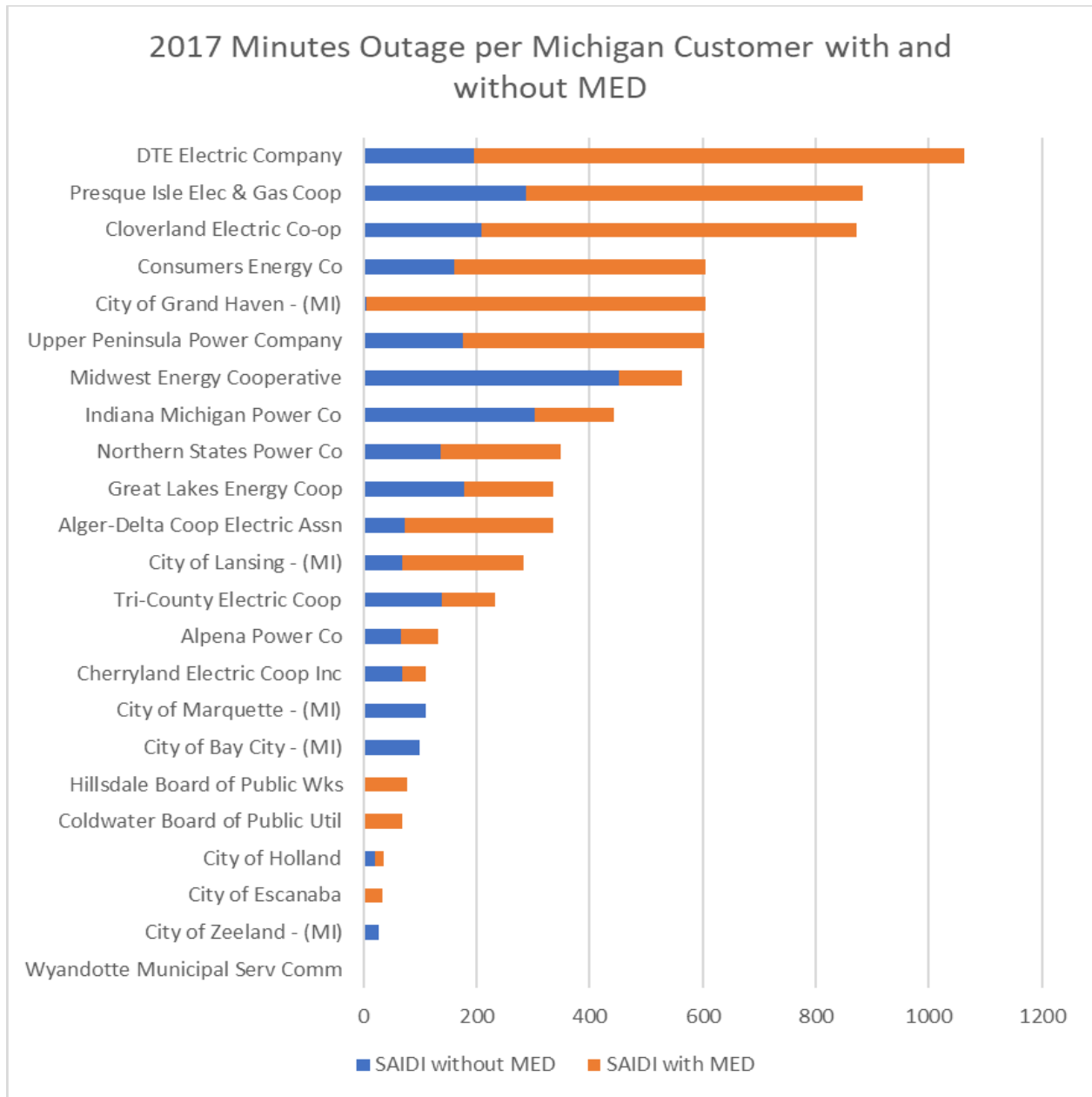
Renewable Generation excluding Hydropower (MWh)												
State	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend
District of Colum	-	-	-	-	-	-	-	-	30,999	52,771	47,167	---
Delaware	48,116	163,375	125,611	138,197	157,836	131,051	106,532	131,080	129,936	124,394	118,065	---
Alaska	11,230	4,750	13,538	18,911	15,733	39,957	197,321	214,469	214,586	212,318	185,249	---
Rhode Island	154,757	158,407	144,600	140,073	130,317	101,895	52,729	226,414	235,656	245,971	365,969	---
Kentucky	465,623	459,620	363,534	439,874	436,231	332,879	326,681	447,989	441,126	476,627	514,575	---
Connecticut	729,840	733,514	758,730	739,660	659,709	666,525	652,090	768,846	804,907	893,330	844,960	---
Vermont	463,549	425,338	429,045	482,339	432,696	465,168	744,538	787,553	838,000	827,708	852,080	---
Tennessee	970,527	965,310	950,468	987,549	1,019,777	836,458	1,110,189	1,140,999	1,125,811	1,049,731	1,083,344	---
Hawaii	753,347	776,797	704,835	746,968	880,920	924,815	1,126,981	1,205,750	1,218,450	1,347,206	1,321,510	---
Maryland	603,461	612,485	550,779	573,665	821,741	898,152	941,164	988,874	1,067,797	1,281,453	1,364,717	---
Arkansas	1,623,744	1,512,833	1,585,551	1,623,943	1,667,646	1,660,370	1,600,813	1,530,217	1,441,884	1,395,970	1,467,558	---
Mississippi	1,493,365	1,391,326	1,424,279	1,504,270	1,506,077	1,509,190	1,448,387	1,507,949	1,506,532	1,524,200	1,562,971	---
West Virginia	167,588	391,520	741,601	939,172	1,111,939	1,296,563	1,390,515	1,455,998	1,381,212	1,432,154	1,682,341	---
New Jersey	843,578	905,290	959,831	850,054	955,512	1,280,715	1,447,118	1,535,534	1,595,122	1,838,498	1,877,221	---
New Hampshire	1,123,272	1,174,984	1,197,936	1,232,218	1,091,223	1,381,286	1,695,403	1,952,389	2,047,827	2,121,692	2,021,771	---
Massachusetts	1,240,224	1,255,378	1,229,258	1,273,734	1,206,573	1,276,935	1,448,426	1,729,951	1,832,904	2,029,556	2,181,500	---
Montana	606,721	704,096	915,566	1,027,157	1,265,168	1,261,751	1,759,762	1,986,803	1,986,007	2,160,341	2,189,638	---
Missouri	29,309	246,026	574,805	987,597	1,240,405	1,298,579	1,240,877	1,255,447	1,178,876	1,293,206	2,232,705	---
Ohio	435,143	623,376	633,410	700,089	935,692	1,738,623	2,009,259	2,025,793	2,057,837	2,032,995	2,420,660	---
South Carolina	1,996,034	1,815,826	1,747,971	1,873,064	2,129,168	2,143,473	2,225,999	2,442,495	2,293,599	2,381,325	2,479,240	---
Louisiana	2,979,883	2,709,675	2,363,959	2,467,776	2,442,531	2,430,043	2,786,603	2,779,604	2,704,743	2,876,273	2,769,287	---
South Dakota	150,018	146,801	426,756	1,371,750	2,668,300	2,353,857	2,687,699	2,336,293	2,497,513	3,714,623	2,960,358	---
Wisconsin	1,329,518	1,753,935	2,340,295	2,473,956	2,765,011	3,223,178	3,191,981	3,262,391	3,161,718	2,987,732	3,122,061	---
Idaho	652,849	748,412	867,316	1,014,010	1,892,174	2,514,502	3,152,053	3,477,118	2,947,063	3,211,784	3,553,858	---
Alabama	3,800,620	3,357,314	3,049,857	2,376,986	2,816,662	2,776,554	2,875,578	2,779,021	3,289,284	3,366,507	3,606,348	---
Utah	194,955	301,862	486,536	780,967	960,985	1,099,724	931,740	1,256,298	1,172,424	2,445,121	3,627,954	---
Virginia	2,565,571	2,698,460	2,417,519	2,219,649	2,195,641	2,358,444	2,905,942	3,851,803	4,144,158	4,112,654	4,122,100	---
Wyoming	754,881	962,542	2,226,205	3,246,793	4,611,868	4,369,107	4,433,284	4,405,757	3,756,708	4,389,338	4,320,655	---
Maine	4,206,980	4,057,985	3,938,244	4,152,283	4,494,694	4,665,279	4,893,364	4,491,715	4,448,655	4,455,274	5,041,815	---
Nebraska	278,024	275,113	448,829	493,153	1,116,305	1,346,761	1,869,039	2,801,124	3,251,416	3,900,185	5,196,704	---
Arizona	41,639	113,657	202,321	318,907	529,387	1,697,652	2,732,644	3,840,366	4,135,271	4,521,785	5,683,142	---
New Mexico	1,409,233	1,661,672	1,580,382	1,854,792	2,241,725	2,573,851	2,600,049	2,812,720	2,734,146	4,389,288	5,817,763	---
Indiana	231,247	511,394	1,705,836	3,245,666	3,620,999	3,546,367	3,887,936	3,988,707	5,117,653	5,558,105	5,840,468	---
Florida	4,302,817	4,302,868	4,340,332	4,486,724	4,670,143	4,523,798	4,658,746	5,073,108	5,143,428	4,867,121	5,885,626	---
Pennsylvania	2,546,196	2,803,777	3,351,928	4,245,176	4,098,990	4,459,118	5,753,987	6,080,423	5,820,526	5,942,483	6,098,336	---
New York	2,775,083	3,318,657	4,467,008	4,814,548	4,895,789	5,192,425	5,888,111	6,446,625	6,318,551	6,323,300	6,604,757	---
Georgia	3,415,421	2,781,970	2,825,169	3,180,563	3,189,520	3,278,537	3,839,178	4,282,609	4,863,020	5,454,339	7,004,608	---
Oregon	2,228,292	3,423,098	4,272,427	4,756,880	5,489,818	7,207,246	8,634,915	8,913,532	7,950,331	8,382,316	7,575,686	---
MICHIGAN	2,416,747	2,591,142	2,623,185	2,832,452	2,962,325	3,785,439	5,514,384	6,674,352	7,282,959	7,200,103	7,748,694	---
Nevada	1,296,658	1,538,833	1,808,412	2,286,647	2,437,344	2,968,631	3,690,161	4,067,172	5,103,328	6,876,588	7,856,786	---
North Carolina	1,672,219	1,922,213	1,893,404	2,083,142	2,345,484	2,703,920	2,954,850	3,275,831	3,962,951	5,983,271	8,397,231	---
Washington	3,730,554	4,938,438	5,044,671	6,616,964	8,014,342	8,214,350	8,821,765	9,108,167	9,067,377	10,050,136	8,824,165	---
Colorado	1,324,829	3,284,451	3,245,973	3,554,533	5,366,650	6,192,081	7,536,383	7,747,386	7,807,206	10,121,618	10,435,011	---
North Dakota	634,279	1,706,385	3,009,102	4,108,028	5,245,452	5,280,052	5,524,439	6,205,064	6,509,298	8,177,528	11,361,229	---
Illinois	1,284,752	3,034,978	3,529,752	5,138,159	6,865,294	8,372,659	10,285,335	10,699,383	11,323,487	11,179,256	12,793,971	---
Minnesota	3,932,638	5,850,882	6,736,657	6,639,633	8,406,112	10,014,680	9,871,287	11,456,840	11,587,656	11,835,612	13,666,380	---
Kansas	1,152,538	1,759,412	2,863,267	3,459,351	3,778,732	5,252,653	9,491,198	10,904,078	11,062,244	14,171,815	18,660,516	---
Iowa	2,907,776	4,251,100	7,588,601	9,360,483	10,869,769	14,183,426	15,727,037	16,573,000	18,130,775	20,323,865	21,587,339	---
Oklahoma	2,128,998	2,550,704	2,929,273	4,159,955	5,919,232	8,520,723	11,506,404	12,275,188	14,368,621	20,436,931	23,930,170	---
California	24,845,257	24,783,937	25,539,662	25,449,721	27,222,425	29,966,846	35,577,632	41,916,757	45,394,972	49,712,264	54,543,825	---
Texas	10,287,612	17,639,094	21,104,476	27,704,828	32,183,133	34,016,697	37,759,557	42,095,714	46,674,349	59,944,289	70,827,185	---

Michigan Electric Utility Performance

The following section displays reliability and affordability metrics for individual Michigan utilities.

Reliability

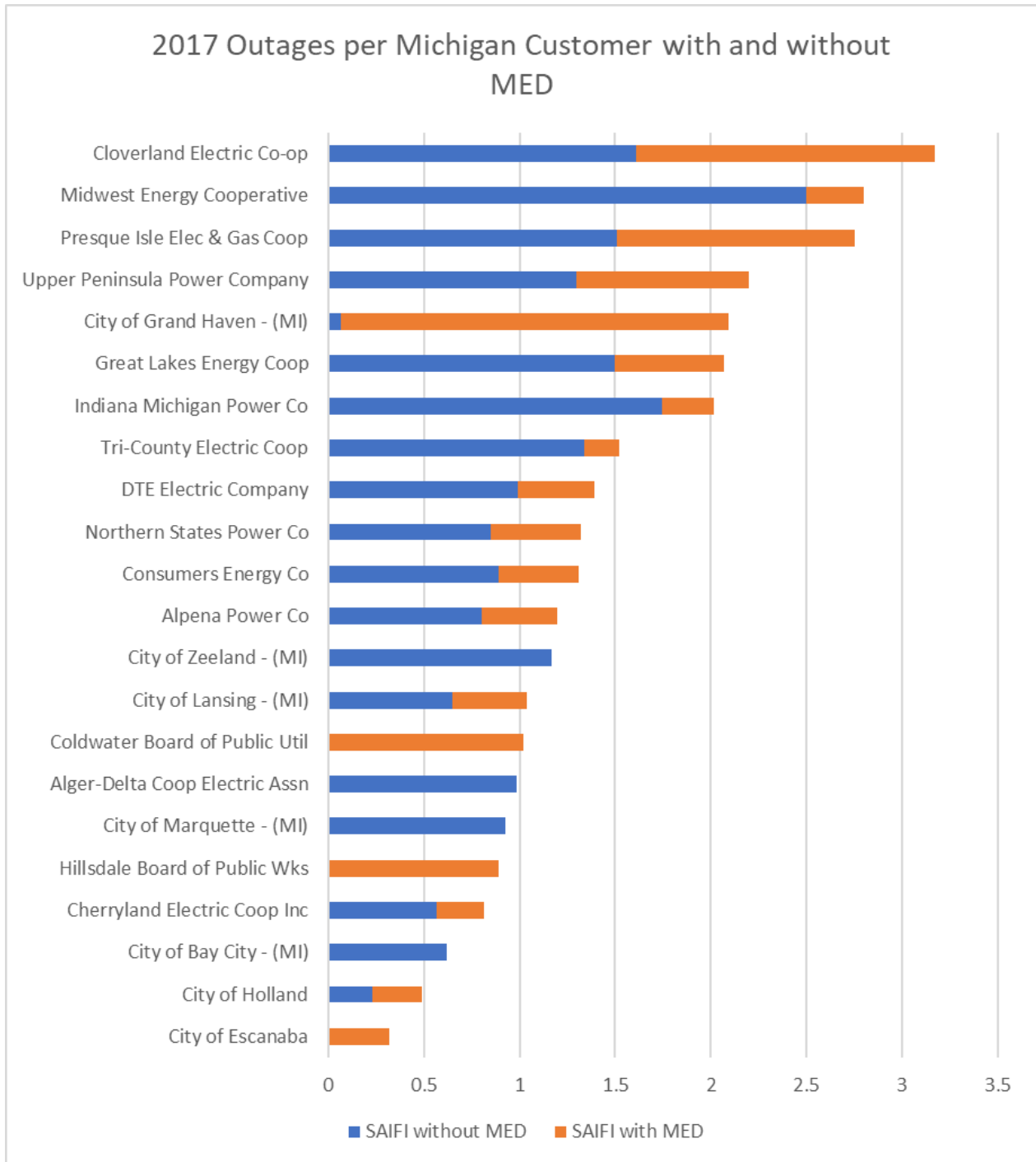
Average Minutes of Outage per Customer per Year (SAIDI)



SAIDI with MED						
Utility	2013	2014	2015	2016	2017	Trend
DTE Electric Company	583	793	277	238	1063	
Presque Isle Elec & Gas Coop	317	196	1367	442	883	
Cloverland Electric Co-op	350	608	879	436	871	
Consumers Energy Co	1109	377	441	284	606	
City of Grand Haven - (MI)		67	52	155	605	
Upper Peninsula Power Company	297	281	161	457	603	
Midwest Energy Cooperative	1069	587	107	371	563	
Indiana Michigan Power Co	1188	1079	526	561	442	
Northern States Power Co			157	436	348	
Great Lakes Energy Coop	340	250	912	256	335	
Alger-Delta Coop Electric Assn	53	751	108	82	335	
City of Lansing - (MI)		166	139	305	283	
Tri-County Electric Coop	1057	724	281	519	232	
Alpena Power Co		146	229	91	131	
Cherryland Electric Coop Inc	83	75	78	74	109	
City of Marquette - (MI)		86	30	34	109	
City of Bay City - (MI)				55	99	
Hillsdale Board of Public Wks				66	76	
Coldwater Board of Public Util	37	61	33	82	69	
City of Holland	55	39	28	50	35	
City of Escanaba		89	538	27	33	
City of Zeeland - (MI)			40	6	27	
Wyandotte Municipal Serv Comm	25	55	24	19	1	
Wisconsin Electric Power Co	215	217	163	222		
Wisconsin Public Service Corp	164	126	145	42		
Wolverine Power Supply Coop		37	54			

SAIDI without MED						
Utility	2013	2014	2015	2016	2017	Trend
Midwest Energy Cooperative	462	291	107	371	452	
Indiana Michigan Power Co	268	287	311	373	304	
Presque Isle Elec & Gas Coop	180	196	227	275	288	
Cloverland Electric Co-op	284	254	210	352	208	
DTE Electric Company	180	189	187	180	196	
Great Lakes Energy Coop	177	136	175	160	178	
Upper Peninsula Power Company	248	248	122	165	176	
Consumers Energy Co	218	168	177	207	161	
Tri-County Electric Coop	259	243	179	179	139	
Northern States Power Co			157	283	135	
City of Marquette - (MI)	50	86	21	34	109	
City of Bay City - (MI)				55	99	
Alger-Delta Coop Electric Assn	52	476	107	75	73	
Cherryland Electric Coop Inc	83	75	78	74	69	
City of Lansing - (MI)		81	43	113	68	
Alpena Power Co		64	97	91	66	
City of Zeeland - (MI)			40	6	27	
City of Holland	35	28	18	19	21	
City of Grand Haven - (MI)	275	0	0	155	6	
Hillsdale Board of Public Wks				0	0	
Wisconsin Electric Power Co	63	128	159	138		
Wisconsin Public Service Corp	74	45	115	38		
City of Escanaba	45	89				

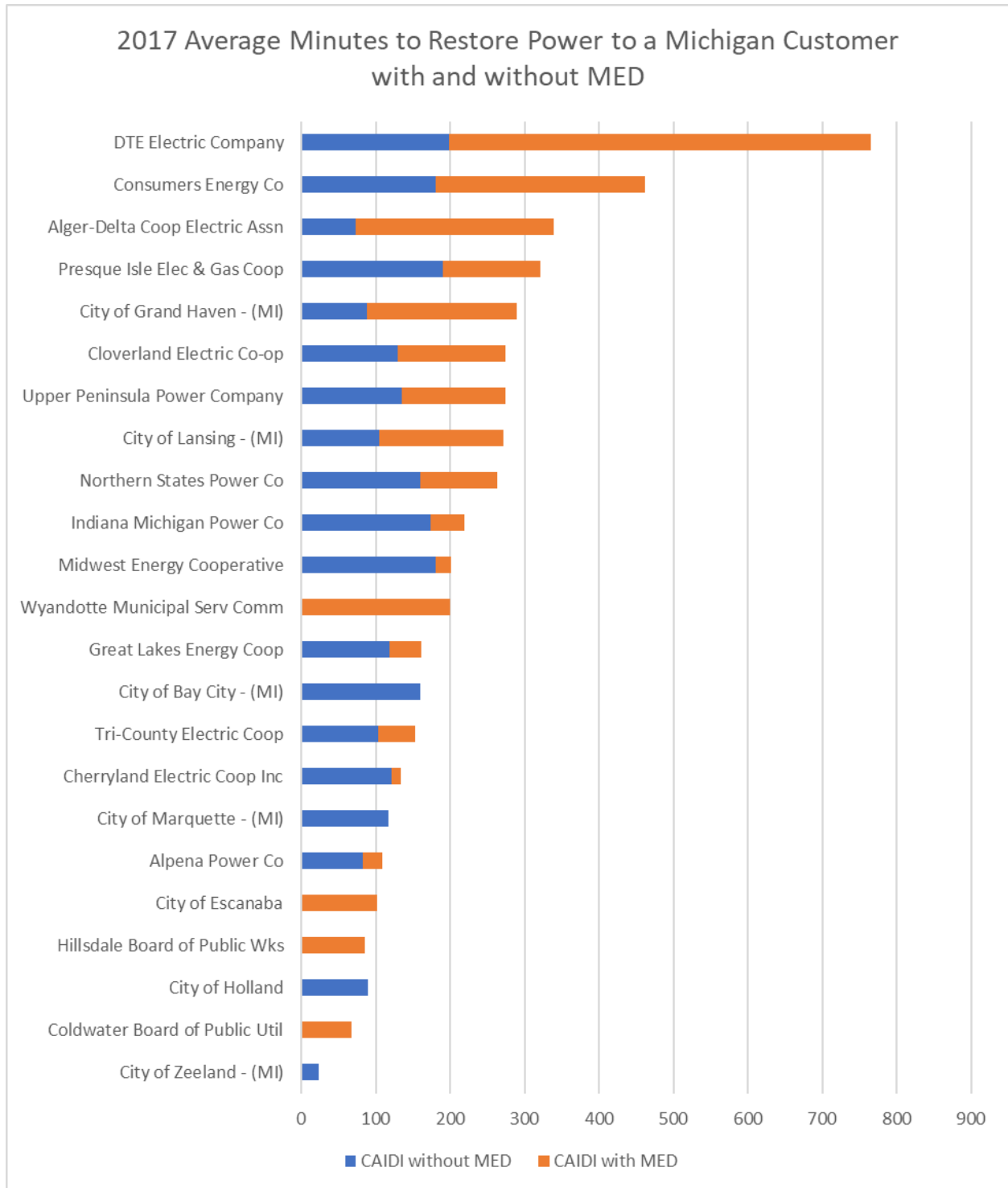
Outages per customer per year (SAIFI)



SAIFI with MED						
Utility	2013	2014	2015	2016	2017	Trend
Cloverland Electric Co-op	1.9	2.8	2.1	2.4	3.2	_____
Midwest Energy Cooperative	3.0	2.2	1.0	1.9	2.8	_____
Presque Isle Elec & Gas Coop	1.4	1.3	2.3	1.8	2.8	_____
Upper Peninsula Power Company	2.0	1.9	1.3	2.1	2.2	_____
City of Grand Haven - (MI)		0.8	0.4	2.1	2.1	_____
Great Lakes Energy Coop	1.9	1.5	2.3	1.8	2.1	_____
Indiana Michigan Power Co	1.8	1.7	1.7	1.9	2.0	_____
Tri-County Electric Coop	2.1	2.5	1.7	1.8	1.5	_____
DTE Electric Company	1.1	1.2	1.0	1.0	1.4	_____
Northern States Power Co			1.0	2.3	1.3	_____
Consumers Energy Co	2.0	1.1	1.2	1.2	1.3	_____
Alpena Power Co		1.0	1.5	1.2	1.2	_____
City of Zeeland - (MI)			1.0	0.5	1.2	_____
City of Lansing - (MI)		0.9	1.1	1.7	1.0	_____
Coldwater Board of Public Util	0.6	0.9	0.7	1.7	1.0	_____
Alger-Delta Coop Electric Assn	0.3	1.7	1.1	0.4	1.0	_____
City of Marquette - (MI)		1.2	0.4	0.5	0.9	_____
Hillsdale Board of Public Wks				2.4	0.9	_____
Cherryland Electric Coop Inc	0.6	0.6	0.7	0.7	0.8	_____
City of Bay City - (MI)				0.5	0.6	_____
City of Holland	0.6	0.6	0.4	0.5	0.5	_____
City of Escanaba	1.0	0.6	1.0	0.2	0.3	_____
Wyandotte Municipal Serv Comm	0.3	0.4	0.0	0.2	0.0	_____
Wisconsin Electric Power Co	1.1	1.3	1.2	0.9		_____
Wisconsin Public Service Corp	1.0	0.8	1.0	0.3		_____
Wolverine Power Supply Coop		31.0	25.4			■ ■

SAIFI without MED						
Utility	2013	2014	2015	2016	2017	Trend
Midwest Energy Cooperative	2.0	1.9	1.0	1.9	2.5	
Indiana Michigan Power Co	1.3	1.3	1.5	1.7	1.7	
Cloverland Electric Co-op	1.7	2.0	1.7	2.3	1.6	
Presque Isle Elec & Gas Coop	1.0	1.3	1.3	1.4	1.5	
Great Lakes Energy Coop	1.5	1.2	1.4	1.5	1.5	
Tri-County Electric Coop	1.6	2.2	1.5	1.5	1.3	
Upper Peninsula Power Company	2.0	1.8	1.1	1.3	1.3	
City of Zeeland - (MI)			1.0	0.5	1.2	
DTE Electric Company	0.7	0.8	0.9	0.9	1.0	
Alger-Delta Coop Electric Assn		1.4	1.1	0.4	1.0	
City of Marquette - (MI)	0.7	1.2	0.3	0.5	0.9	
Consumers Energy Co	1.0	0.9	1.0	1.0	0.9	
Northern States Power Co			1.0	2.1	0.9	
Alpena Power Co		0.6	1.1	1.2	0.8	
City of Lansing - (MI)		0.8	0.5	1.0	0.7	
City of Bay City - (MI)				0.5	0.6	
Cherryland Electric Coop Inc	0.6	0.6	0.7	0.7	0.6	
City of Holland	0.5	0.5	0.3	0.2	0.2	
City of Grand Haven - (MI)	1.7	0.0	0.0	2.1	0.1	
Hillsdale Board of Public Wks				0.0	0.0	
Wisconsin Electric Power Co	0.6	1.0	1.2	0.8		
Wisconsin Public Service Corp	1.0	0.6	0.8	0.3		
City of Escanaba		0.6				

Average minutes to restore power to a customer (CAIDI)

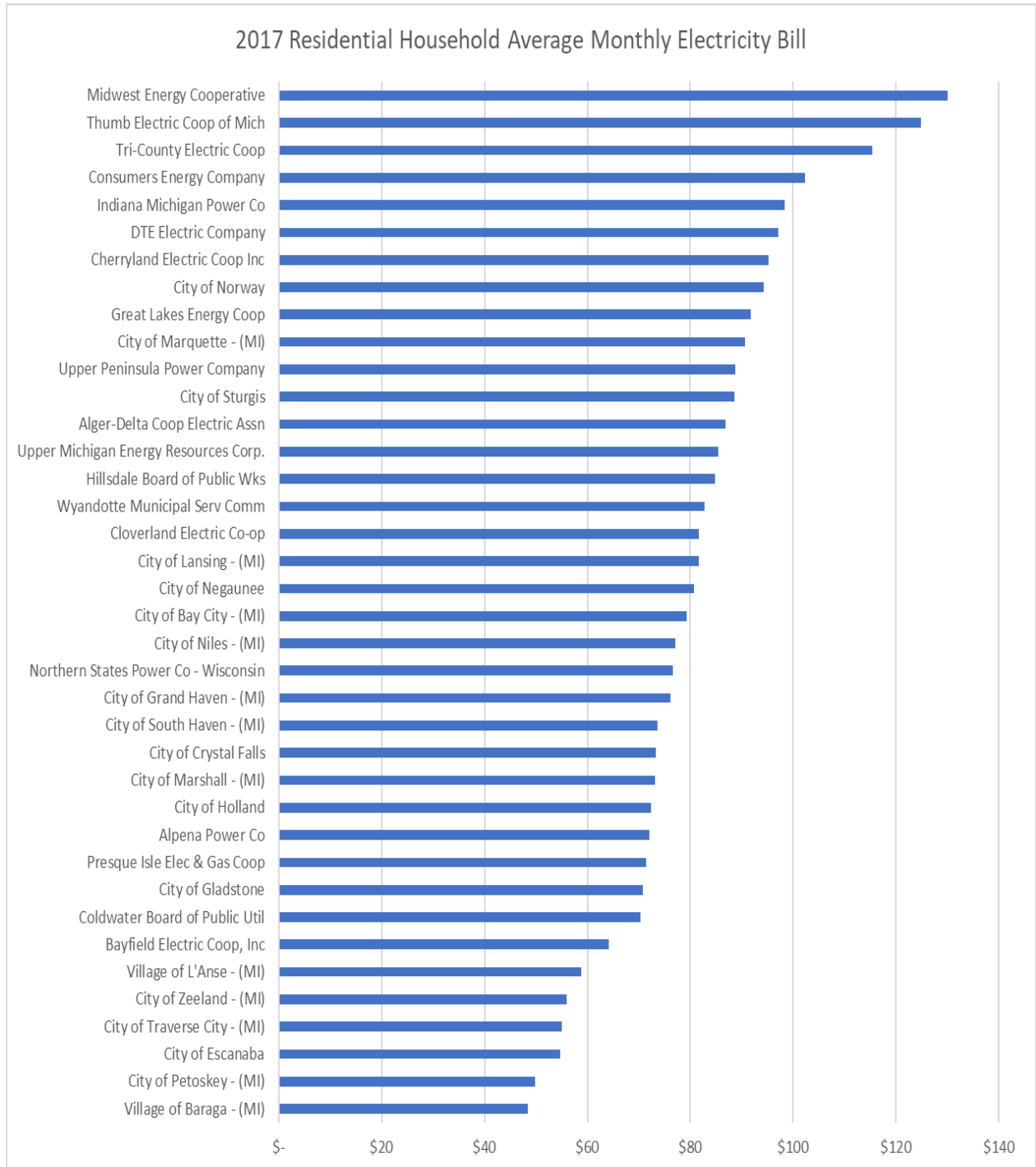


CAIDI with MED						
Utility	2013	2014	2015	2016	2017	Trend
DTE Electric Company	530	650	277	241	765	
Consumers Energy Co	555	342	373	247	462	
Alger-Delta Coop Electric Assn	191	449	99	204	339	
Presque Isle Elec & Gas Coop	230	148	595	244	321	
City of Grand Haven - (MI)		84	119	75	289	
Cloverland Electric Co-op	182	214	424	179	275	
Upper Peninsula Power Company	149	152	124	218	274	
City of Lansing - (MI)		187	129	183	272	
Northern States Power Co			157	186	264	
Indiana Michigan Power Co	655	640	302	294	219	
Midwest Energy Cooperative	356	263	108	199	201	
Wyandotte Municipal Serv Comm	89	138	800	96	199	
Great Lakes Energy Coop	184	169	402	141	162	
City of Bay City - (MI)				106	160	
Tri-County Electric Coop	513	286	167	290	153	
Cherryland Electric Coop Inc	146	121	107	110	134	
City of Marquette - (MI)		70	75	67	118	
Alpena Power Co		146	153	76	109	
City of Escanaba		139	566	144	102	
Hillsdale Board of Public Wks				27	86	
City of Holland	97	68	71	108	71	
Coldwater Board of Public Util	66	66	46	49	67	
City of Zeeland - (MI)			38	11	23	
Wisconsin Electric Power Co	203	164	131	234		
Wisconsin Public Service Corp	164	154	146	146		
Wolverine Power Supply Coop		1	2			

CAIDI without MED						
Utility	2013	2014	2015	2016	2017	Trend
DTE Electric Company	244	249	205	197	198	
Presque Isle Elec & Gas Coop	172	148	172	191	191	
Midwest Energy Cooperative	231	156	108	199	181	
Consumers Energy Co	218	184	180	206	181	
Indiana Michigan Power Co	207	221	212	217	174	
City of Bay City - (MI)				106	160	
Northern States Power Co			157	134	159	
Upper Peninsula Power Company	124	139	111	127	135	
Cloverland Electric Co-op	163	126	126	157	129	
Cherryland Electric Coop Inc	146	121	107	110	121	
Great Lakes Energy Coop	120	114	130	110	119	
City of Marquette - (MI)	74	70	71	67	118	
City of Lansing - (MI)		98	89	108	105	
Tri-County Electric Coop	162	109	120	123	104	
City of Holland	75	57	57	79	89	
City of Grand Haven - (MI)	163	0	0	75	89	
Alpena Power Co		107	88	76	82	
Alger-Delta Coop Electric Assn		331	99	188	74	
City of Zeeland - (MI)			38	11	23	
Wisconsin Electric Power Co	113	128	131	179		
Wisconsin Public Service Corp	74	76	147	141		
Hillsdale Board of Public Wks				0		
City of Escanaba		139				

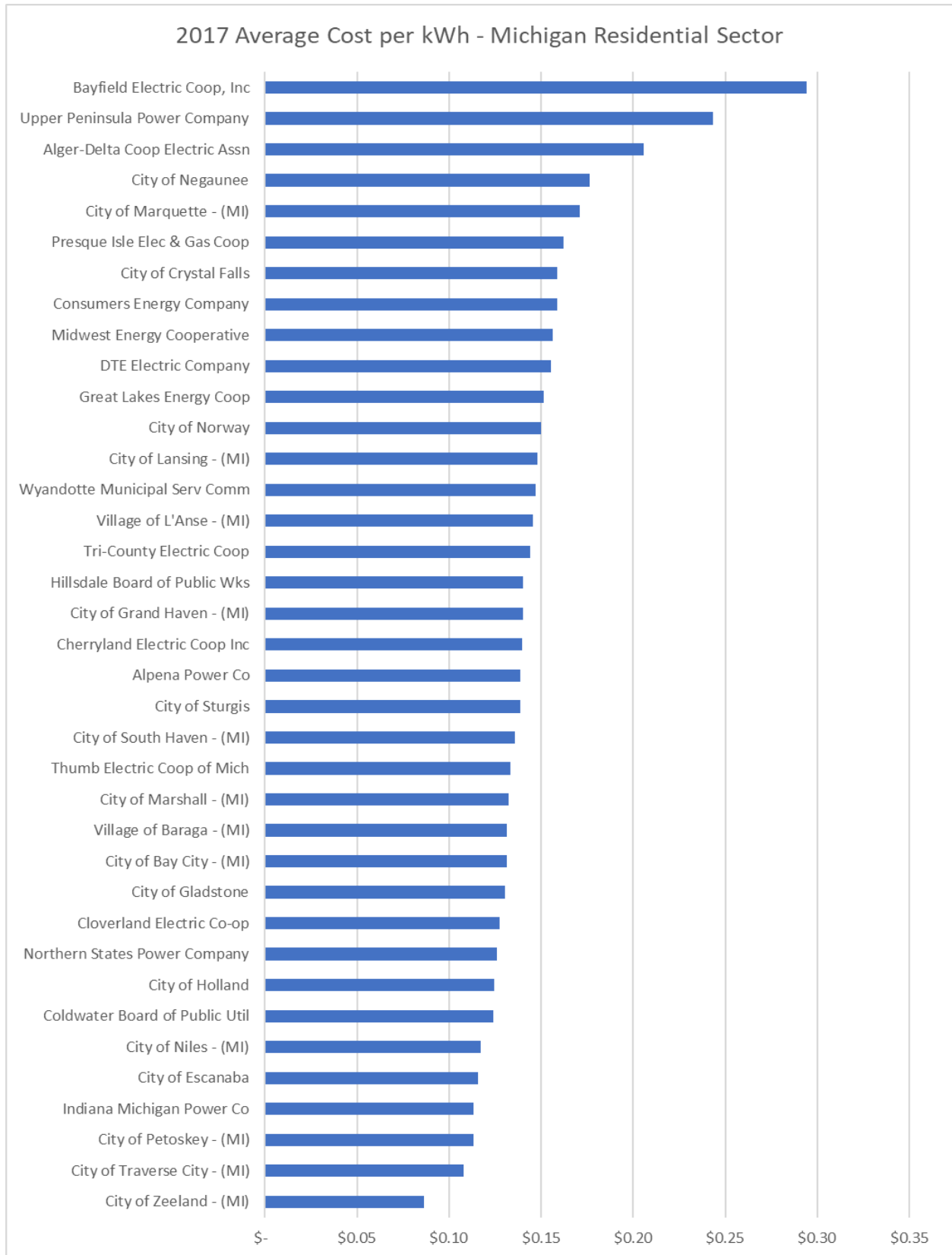
Affordability

Residential Household Average Monthly Electricity Bill



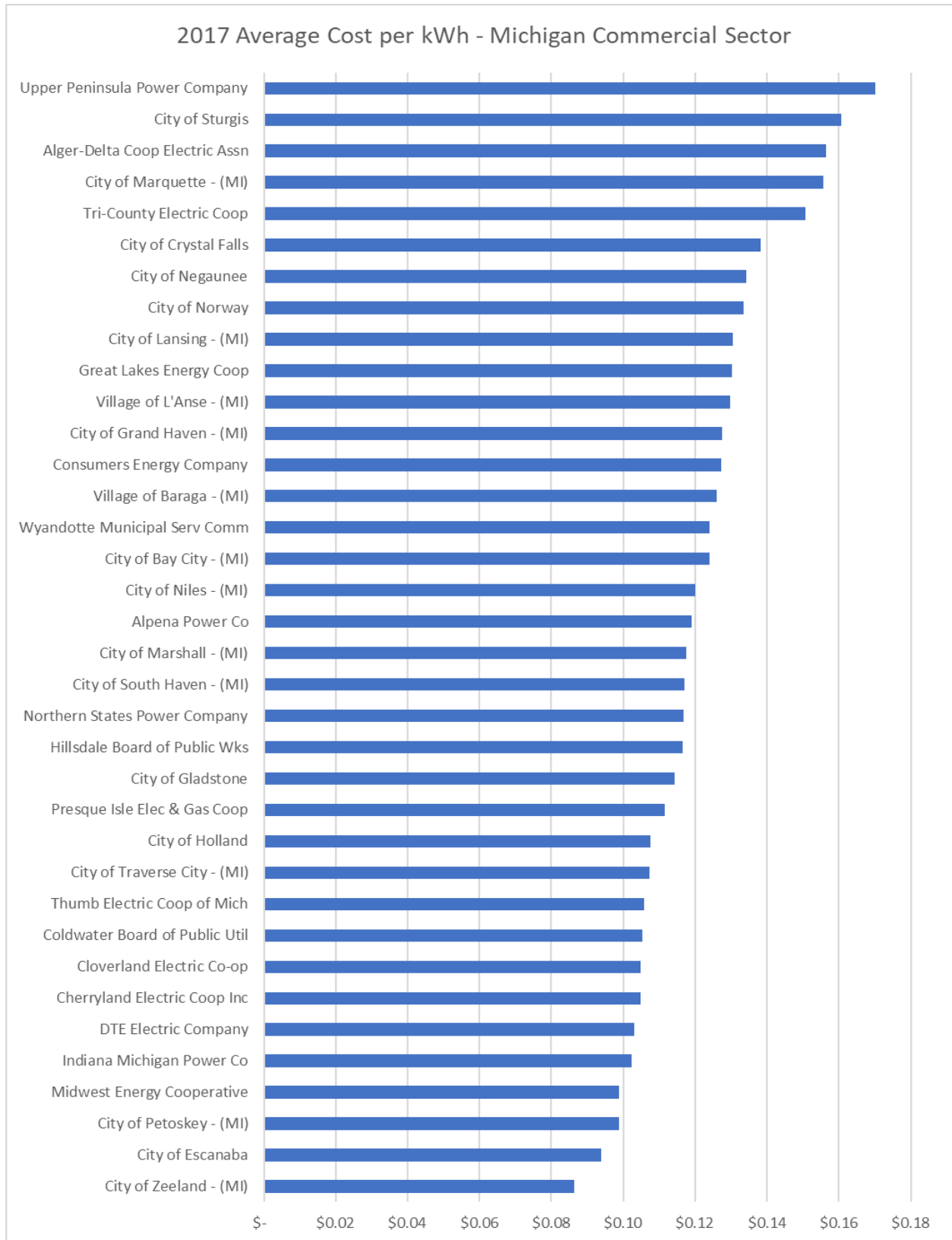
Residential Household Average Monthly Bill													
Utility	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Trend	CAGR
Midwest Energy Cooperative	\$ 97.70	\$ 101.29	\$ 106.20	\$ 114.61	\$ 120.31	\$ 124.53	\$ 127.73	\$ 133.65	\$ 134.94	\$ 137.47	\$ 130.14		3%
Thumb Electric Coop of Mich	\$ 99.38	\$ 98.66	\$ 102.09	\$ 111.04	\$ 114.56	\$ 107.27	\$ 110.41	\$ 115.83	\$ 116.12	\$ 117.75	\$ 124.94		2%
Tri-County Electric Coop	\$ 90.23	\$ 89.47	\$ 95.00	\$ 99.25	\$ 103.57	\$ 110.53	\$ 114.55	\$ 116.75	\$ 113.16	\$ 114.53	\$ 115.41		2%
Consumers Energy Company	\$ 71.88	\$ 75.01	\$ 77.11	\$ 89.16	\$ 91.70	\$ 93.80	\$ 97.47	\$ 99.23	\$ 96.68	\$ 103.59	\$ 102.30		4%
Indiana Michigan Power Co	\$ 59.89	\$ 61.94	\$ 63.39	\$ 73.76	\$ 81.46	\$ 89.83	\$ 92.59	\$ 93.68	\$ 95.32	\$ 100.14	\$ 98.41		5%
DTE Electric Company	\$ 71.18	\$ 71.31	\$ 75.63	\$ 85.68	\$ 94.49	\$ 101.86	\$ 101.17	\$ 93.35	\$ 93.25	\$ 104.97	\$ 97.16		3%
Cherryland Electric Coop Inc	\$ 73.63	\$ 71.04	\$ 75.92	\$ 80.38	\$ 87.39	\$ 95.24	\$ 95.30	\$ 96.16	\$ 94.26	\$ 95.60	\$ 95.18		3%
City of Norway	\$ 86.72	\$ 88.11	\$ 82.96	\$ 97.42	\$ 96.79	\$ 102.40	\$ 101.69	\$ 106.21	\$ 108.02	\$ 95.63	\$ 94.29		1%
Great Lakes Energy Coop	\$ 69.24	\$ 73.29	\$ 73.85	\$ 77.04	\$ 81.42	\$ 86.96	\$ 90.91	\$ 94.95	\$ 92.32	\$ 91.63	\$ 91.73		3%
City of Marquette - (MI)	\$ 48.19	\$ 51.82	\$ 53.89	\$ 54.32	\$ 57.02	\$ 61.11	\$ 62.32	\$ 68.22	\$ 68.58	\$ 77.04	\$ 90.69		7%
Upper Peninsula Power Company	\$ 74.25	\$ 74.92	\$ 77.75	\$ 83.17	\$ 89.01	\$ 91.66	\$ 99.78	\$ 109.35	\$ 113.99	\$ 101.83	\$ 88.79		2%
City of Sturgis	\$ 62.70	\$ 66.03	\$ 64.25	\$ 74.94	\$ 80.35	\$ 80.93	\$ 80.81	\$ 84.83	\$ 85.50	\$ 86.04	\$ 88.59		4%
Alger-Delta Coop Electric Assn	\$ 70.96	\$ 73.46	\$ 74.39	\$ 80.78	\$ 82.11	\$ 86.11	\$ 86.89	\$ 89.26	\$ 87.53	\$ 86.89	\$ 86.89		2%
Upper Michigan Energy Resources Corp.											\$ 85.53		
Hillsdale Board of Public Wks	\$ 62.67	\$ 62.43	\$ 67.13	\$ 67.04	\$ 71.22	\$ 70.16	\$ 75.64	\$ 77.48	\$ 76.07	\$ 74.19	\$ 84.75		3%
Wyandotte Municipal Serv Comm	\$ 53.55	\$ 54.51	\$ 52.02	\$ 55.35	\$ 78.25	\$ 86.14	\$ 84.86	\$ 85.62	\$ 83.95	\$ 87.04	\$ 82.71		4%
Cloverland Electric Co-op	\$ 65.94	\$ 66.90	\$ 70.49	\$ 72.56	\$ 75.95	\$ 73.33	\$ 73.62	\$ 81.68	\$ 79.72	\$ 80.46	\$ 81.75		2%
City of Lansing - (MI)	\$ 46.19	\$ 48.94	\$ 50.46	\$ 62.13	\$ 69.88	\$ 76.45	\$ 75.68	\$ 75.43	\$ 82.62	\$ 83.74	\$ 81.71		6%
City of Negaunee	\$ 65.71	\$ 63.62	\$ 80.24	\$ 82.18	\$ 87.13	\$ 74.26	\$ 76.43	\$ 77.65	\$ 80.04	\$ 82.18	\$ 80.65		2%
City of Bay City - (MI)	\$ 56.00	\$ 55.65	\$ 57.99	\$ 62.69	\$ 62.21	\$ 64.44	\$ 67.19	\$ 70.97	\$ 72.06	\$ 77.53	\$ 79.23		4%
City of Niles - (MI)	\$ 55.63	\$ 59.46	\$ 62.13	\$ 64.80	\$ 66.10	\$ 69.78	\$ 69.17	\$ 69.84	\$ 76.86	\$ 78.30	\$ 77.15		3%
Northern States Power Co - Wisconsin	\$ 53.78	\$ 54.70	\$ 55.38	\$ 56.05	\$ 60.48	\$ 63.40	\$ 67.43	\$ 75.86	\$ 72.72	\$ 72.62	\$ 76.62		4%
City of Grand Haven - (MI)	\$ 59.87	\$ 60.38	\$ 61.16	\$ 70.43	\$ 72.03	\$ 76.98	\$ 76.07	\$ 75.23	\$ 84.71	\$ 82.89	\$ 76.21		2%
City of South Haven - (MI)	\$ 43.61	\$ 48.26	\$ 47.18	\$ 55.74	\$ 56.16	\$ 57.57	\$ 66.69	\$ 61.95	\$ 63.93	\$ 72.08	\$ 73.68		5%
City of Crystal Falls	\$ 48.81	\$ 51.18	\$ 56.57	\$ 69.66	\$ 71.56	\$ 72.04	\$ 73.13	\$ 73.69	\$ 73.41	\$ 73.04	\$ 73.27		4%
City of Marshall - (MI)	\$ 66.74	\$ 68.31	\$ 72.39	\$ 77.28	\$ 73.81	\$ 73.72	\$ 77.43	\$ 81.65	\$ 71.41	\$ 71.64	\$ 73.12		1%
City of Holland	\$ 50.71	\$ 56.57	\$ 55.33	\$ 62.92	\$ 62.97	\$ 66.78	\$ 66.53	\$ 67.03	\$ 68.96	\$ 73.05	\$ 72.41		4%
Alpena Power Co	\$ 56.80	\$ 62.92	\$ 66.60	\$ 74.06	\$ 74.98	\$ 73.67	\$ 74.29	\$ 71.65	\$ 72.65	\$ 70.87	\$ 71.99		2%
Presque Isle Elec & Gas Coop	\$ 54.52	\$ 55.59	\$ 57.40	\$ 61.26	\$ 66.10	\$ 68.16	\$ 74.27	\$ 74.46	\$ 72.17	\$ 70.72	\$ 71.39		3%
City of Gladstone	\$ 61.13	\$ 65.41	\$ 73.17	\$ 75.89	\$ 84.68	\$ 86.16	\$ 75.34	\$ 74.26	\$ 66.82	\$ 63.90	\$ 70.86		1%
Coldwater Board of Public Util	\$ 66.34	\$ 67.68	\$ 71.10	\$ 73.13	\$ 71.76	\$ 75.72	\$ 74.98	\$ 73.56	\$ 68.43	\$ 70.73	\$ 70.36		1%
Bayfield Electric Coop, Inc	\$ 47.62	\$ 48.02	\$ 55.56	\$ 53.48	\$ 59.70	\$ 60.95	\$ 60.61	\$ 58.08	\$ 59.90	\$ 59.87	\$ 64.10		3%
Village of L'Anse - (MI)	\$ 51.20	\$ 53.73	\$ 50.17	\$ 52.34	\$ 52.38	\$ 56.33	\$ 59.98	\$ 58.59	\$ 61.37	\$ 58.06	\$ 58.77		1%
City of Zeeland - (MI)	\$ 50.53	\$ 51.45	\$ 48.73	\$ 56.65	\$ 58.77	\$ 60.80	\$ 60.53	\$ 62.40	\$ 61.33	\$ 59.67	\$ 56.04		1%
City of Traverse City - (MI)	\$ 47.95	\$ 48.02	\$ 47.33	\$ 49.63	\$ 52.71	\$ 52.51	\$ 52.62	\$ 62.60	\$ 57.16	\$ 55.56	\$ 54.98		1%
City of Escanaba	\$ 49.07	\$ 47.37	\$ 48.99	\$ 52.39	\$ 56.04	\$ 55.02	\$ 52.05	\$ 52.65	\$ 53.43	\$ 55.30	\$ 54.67		1%
City of Petoskey - (MI)	\$ 39.81	\$ 34.16	\$ 33.84	\$ 44.56	\$ 44.10	\$ 46.30	\$ 49.32	\$ 50.47	\$ 54.13	\$ 51.93	\$ 49.86		2%
Village of Baraga - (MI)	\$ 40.12	\$ 44.54	\$ 49.19	\$ 49.47	\$ 48.29	\$ 50.54	\$ 49.66	\$ 49.78	\$ 48.24	\$ 84.62	\$ 48.44		2%
Wisconsin Electric Power Co	\$ 63.49	\$ 58.52	\$ 68.92	\$ 81.97	\$ 88.68	\$ 90.40	\$ 93.89	\$ 93.44	\$ 87.81	\$ 87.26			
Wisconsin Public Service Corp	\$ 59.09	\$ 71.42	\$ 68.36	\$ 66.36	\$ 69.41	\$ 69.16	\$ 68.83	\$ 69.99	\$ 71.52	\$ 77.02			
MidAmerican Energy Co													
City of Detroit - (MI)	\$ 18.63	\$ 20.83	\$ 27.91	\$ 29.91	\$ 34.26	\$ 33.05	\$ 33.90	\$ 16.60					
City of Charlevoix	\$ 43.73	\$ 44.33	\$ 51.56	\$ 48.17	\$ 50.12								
Village of Chelsea	\$ 59.88	\$ 61.97	\$ 58.44	\$ 59.66	\$ 62.44								
Village of Clinton - (MI)	\$ 68.73	\$ 72.96	\$ 77.09	\$ 76.11	\$ 72.03								
City of Croswell	\$ 45.01	\$ 43.20	\$ 44.91	\$ 48.72	\$ 50.13								
Village of Daggett	\$ 48.89	\$ 44.18	\$ 62.83	\$ 78.74	\$ 72.82								
City of Dowagiac	\$ 55.89	\$ 76.94	\$ 80.50	\$ 79.20	\$ 79.18								
City of Eaton Rapids	\$ 77.78	\$ 82.52	\$ 80.68	\$ 70.34	\$ 80.24								
City of Harbor Springs - (MI)	\$ 49.67	\$ 50.52	\$ 46.61	\$ 47.96	\$ 54.31								
City of Hart Hydro	\$ 56.15	\$ 56.82	\$ 57.26	\$ 60.47	\$ 66.11								
City of Lowell	\$ 69.46	\$ 62.29	\$ 64.81	\$ 66.45	\$ 73.24								
Newberry Water & Light Board	\$ 106.87	\$ 102.96	\$ 102.96	\$ 102.94	\$ 57.44								
Ononagon County R E A	\$ 68.64	\$ 73.80	\$ 75.16	\$ 77.21	\$ 75.16								
Village of Paw Paw	\$ 56.96	\$ 57.36	\$ 63.51	\$ 63.51	\$ 59.28								
City of Portland	\$ 64.39	\$ 65.94	\$ 68.59	\$ 70.29	\$ 73.66								
City of Sebewaing - (MI)	\$ 51.73	\$ 58.27	\$ 55.33	\$ 57.91	\$ 59.23								
City of St Louis	\$ 62.40	\$ 58.54	\$ 66.49	\$ 76.04	\$ 78.17								
City of Stephenson - (MI)	\$ 55.92	\$ 59.52	\$ 64.68	\$ 60.66	\$ 66.94								
Village of Union City	\$ 70.64	\$ 74.10	\$ 74.62	\$ 79.00	\$ 77.70								
City of Wakefield - (MI)	\$ 39.22	\$ 49.34	\$ 55.64	\$ 47.76	\$ 44.39								
Edison Sault Electric Co	\$ 61.98	\$ 64.19	\$ 69.27										

Residential Sector Electricity Rates



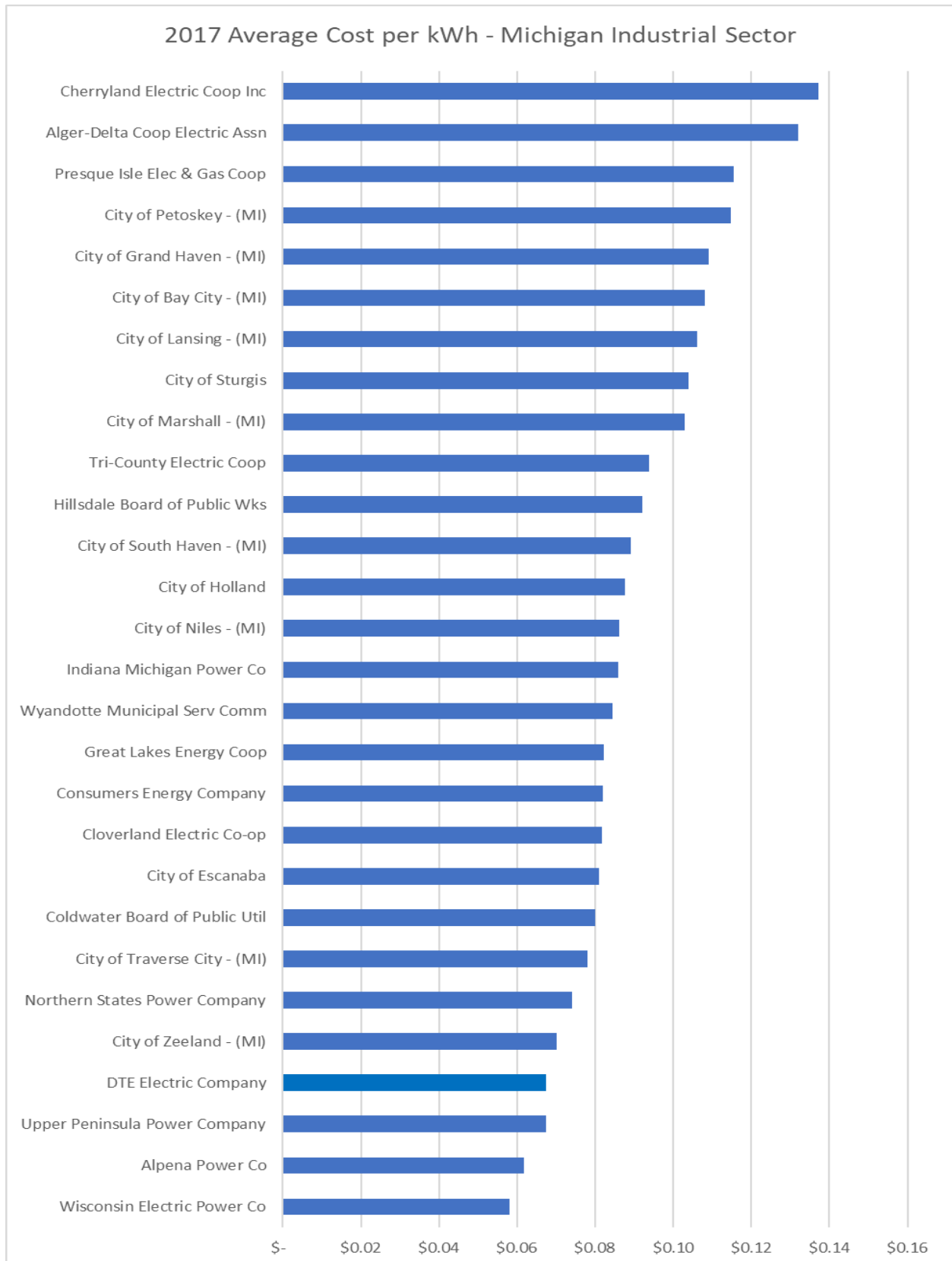
Average Price - Residential Sector (\$/kWh)											
Utility	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bayfield Electric Coop, Inc	\$0.179	\$0.198	\$0.200	\$0.230	\$0.250	\$0.283	\$0.287	\$0.286	\$0.307	\$0.294	\$0.294
Upper Peninsula Power Company	\$0.148	\$0.154	\$0.159	\$0.171	\$0.183	\$0.194	\$0.205	\$0.225	\$0.229	\$0.235	\$0.243
Alger-Delta Coop Electric Assn	\$0.167	\$0.178	\$0.183	\$0.201	\$0.203	\$0.213	\$0.206	\$0.208	\$0.209	\$0.207	\$0.206
City of Negaunee	\$0.116	\$0.120	\$0.152	\$0.173	\$0.181	\$0.157	\$0.159	\$0.160	\$0.171	\$0.176	\$0.176
City of Marquette - (MI)	\$0.079	\$0.084	\$0.089	\$0.093	\$0.093	\$0.100	\$0.104	\$0.111	\$0.119	\$0.138	\$0.171
Presque Isle Elec & Gas Coop	\$0.126	\$0.130	\$0.131	\$0.137	\$0.145	\$0.156	\$0.164	\$0.160	\$0.160	\$0.160	\$0.162
City of Crystal Falls	\$0.103	\$0.108	\$0.118	\$0.149	\$0.149	\$0.154	\$0.153	\$0.152	\$0.158	\$0.155	\$0.159
Consumers Energy Company	\$0.105	\$0.111	\$0.117	\$0.129	\$0.134	\$0.137	\$0.144	\$0.149	\$0.146	\$0.154	\$0.159
Midwest Energy Cooperative	\$0.099	\$0.104	\$0.113	\$0.118	\$0.140	\$0.149	\$0.148	\$0.151	\$0.160	\$0.162	\$0.156
DTE Electric Company	\$0.105	\$0.108	\$0.120	\$0.126	\$0.137	\$0.150	\$0.154	\$0.146	\$0.145	\$0.156	\$0.155
Great Lakes Energy Coop	\$0.121	\$0.129	\$0.129	\$0.133	\$0.138	\$0.149	\$0.151	\$0.153	\$0.152	\$0.150	\$0.151
City of Norway	\$0.116	\$0.119	\$0.119	\$0.128	\$0.128	\$0.136	\$0.134	\$0.138	\$0.144	\$0.149	\$0.150
City of Lansing - (MI)	\$0.076	\$0.081	\$0.088	\$0.105	\$0.117	\$0.128	\$0.132	\$0.136	\$0.148	\$0.147	\$0.148
Wyandotte Municipal Serv Comm	\$0.091	\$0.090	\$0.093	\$0.093	\$0.128	\$0.142	\$0.149	\$0.146	\$0.145	\$0.146	\$0.147
Village of L'Anse - (MI)	\$0.112	\$0.122	\$0.126	\$0.121	\$0.123	\$0.130	\$0.135	\$0.137	\$0.146	\$0.139	\$0.145
Tri-County Electric Coop	\$0.114	\$0.114	\$0.122	\$0.123	\$0.126	\$0.135	\$0.138	\$0.140	\$0.139	\$0.139	\$0.144
Hillsdale Board of Public Wks	\$0.103	\$0.103	\$0.113	\$0.116	\$0.113	\$0.115	\$0.124	\$0.130	\$0.126	\$0.117	\$0.140
City of Grand Haven - (MI)	\$0.102	\$0.107	\$0.112	\$0.121	\$0.125	\$0.134	\$0.135	\$0.136	\$0.154	\$0.147	\$0.140
Cherryland Electric Coop Inc	\$0.112	\$0.108	\$0.115	\$0.118	\$0.125	\$0.137	\$0.136	\$0.135	\$0.136	\$0.138	\$0.139
Alpena Power Co	\$0.104	\$0.117	\$0.127	\$0.137	\$0.141	\$0.138	\$0.140	\$0.136	\$0.138	\$0.133	\$0.139
City of Sturgis	\$0.090	\$0.095	\$0.097	\$0.106	\$0.119	\$0.120	\$0.124	\$0.115	\$0.128	\$0.128	\$0.139
City of South Haven - (MI)	\$0.084	\$0.096	\$0.098	\$0.108	\$0.109	\$0.109	\$0.116	\$0.108	\$0.114	\$0.125	\$0.136
Thumb Electric Coop of Mich	\$0.109	\$0.108	\$0.112	\$0.120	\$0.120	\$0.113	\$0.112	\$0.115	\$0.120	\$0.122	\$0.133
City of Marshall - (MI)	\$0.115	\$0.121	\$0.130	\$0.132	\$0.124	\$0.128	\$0.138	\$0.146	\$0.136	\$0.130	\$0.132
Village of Baraga - (MI)	\$0.099	\$0.109	\$0.122	\$0.126	\$0.123	\$0.124	\$0.132	\$0.127	\$0.126	\$0.214	\$0.131
City of Bay City - (MI)	\$0.093	\$0.093	\$0.100	\$0.100	\$0.104	\$0.105	\$0.108	\$0.117	\$0.117	\$0.124	\$0.131
City of Gladstone	\$0.113	\$0.123	\$0.130	\$0.134	\$0.148	\$0.149	\$0.125	\$0.133	\$0.121	\$0.117	\$0.130
Cloverland Electric Co-op	\$0.104	\$0.114	\$0.114	\$0.110	\$0.114	\$0.114	\$0.110	\$0.117	\$0.118	\$0.126	\$0.128
Northern States Power Company	\$0.095	\$0.093	\$0.096	\$0.096	\$0.101	\$0.109	\$0.110	\$0.121	\$0.123	\$0.123	\$0.126
City of Holland	\$0.089	\$0.091	\$0.094	\$0.098	\$0.099	\$0.103	\$0.106	\$0.110	\$0.111	\$0.117	\$0.124
Coldwater Board of Public Util	\$0.111	\$0.114	\$0.124	\$0.120	\$0.117	\$0.121	\$0.123	\$0.127	\$0.116	\$0.117	\$0.124
City of Niles - (MI)	\$0.080	\$0.089	\$0.096	\$0.096	\$0.098	\$0.105	\$0.101	\$0.106	\$0.114	\$0.116	\$0.117
City of Escanaba	\$0.101	\$0.100	\$0.104	\$0.108	\$0.112	\$0.110	\$0.105	\$0.107	\$0.111	\$0.114	\$0.116
Indiana Michigan Power Co	\$0.062	\$0.064	\$0.068	\$0.076	\$0.086	\$0.097	\$0.100	\$0.100	\$0.107	\$0.110	\$0.113
City of Petoskey - (MI)	\$0.081	\$0.094	\$0.087	\$0.091	\$0.097	\$0.104	\$0.111	\$0.112	\$0.120	\$0.115	\$0.113
City of Traverse City - (MI)	\$0.091	\$0.094	\$0.093	\$0.094	\$0.098	\$0.096	\$0.099	\$0.118	\$0.113	\$0.108	\$0.108
City of Zeeland - (MI)	\$0.071	\$0.076	\$0.075	\$0.082	\$0.085	\$0.087	\$0.089	\$0.094	\$0.091	\$0.086	\$0.086
Wisconsin Electric Power Co	\$0.109	\$0.101	\$0.120	\$0.145	\$0.157	\$0.163	\$0.165	\$0.164	\$0.160	\$0.160	
Wisconsin Public Service Corp	\$0.083	\$0.105	\$0.101	\$0.097	\$0.100	\$0.101	\$0.100	\$0.100	\$0.106	\$0.111	
City of Charlevoix	\$0.088	\$0.109	\$0.128	\$0.109	\$0.101						
City of Croswell	\$0.078	\$0.077	\$0.081	\$0.087	\$0.088						
City of Detroit - (MI)	\$0.089	\$0.093	\$0.098	\$0.105	\$0.107	\$0.107	\$0.105	\$0.101			
City of Dowagiac	\$0.080	\$0.114	\$0.125	\$0.116	\$0.115						
City of Eaton Rapids	\$0.092	\$0.086	\$0.095	\$0.116	\$0.108						
City of Harbor Springs - (MI)	\$0.095	\$0.099	\$0.091	\$0.092	\$0.091						
City of Hart Hydro	\$0.091	\$0.092	\$0.092	\$0.094	\$0.103						
City of Lowell	\$0.094	\$0.095	\$0.097	\$0.098	\$0.107						
City of Portland	\$0.100	\$0.104	\$0.106	\$0.106	\$0.111						
City of Sebawaing - (MI)	\$0.088	\$0.093	\$0.094	\$0.097	\$0.100						
City of St Louis	\$0.093	\$0.095	\$0.102	\$0.120	\$0.123						
City of Stephenson - (MI)	\$0.093	\$0.098	\$0.106	\$0.103	\$0.113						
City of Wakefield - (MI)	\$0.080	\$0.085	\$0.089	\$0.077	\$0.077						
Edison Sault Electric Co	\$0.083	\$0.085	\$0.091								
Newberry Water & Light Board	\$0.109	\$0.110	\$0.110	\$0.110	\$0.103						
Ontonagon County R E A	\$0.183	\$0.205	\$0.207	\$0.215	\$0.207						
Village of Chelsea	\$0.093	\$0.097	\$0.096	\$0.089	\$0.094						
Village of Clinton - (MI)	\$0.123	\$0.136	\$0.149	\$0.137	\$0.127						
Village of Daggett	\$0.080	\$0.073	\$0.099	\$0.107	\$0.095						
Village of Paw Paw	\$0.100	\$0.103	\$0.116	\$0.116	\$0.093						
Village of Union City	\$0.111	\$0.116	\$0.121	\$0.120	\$0.113						

Commercial Sector Electricity Rates



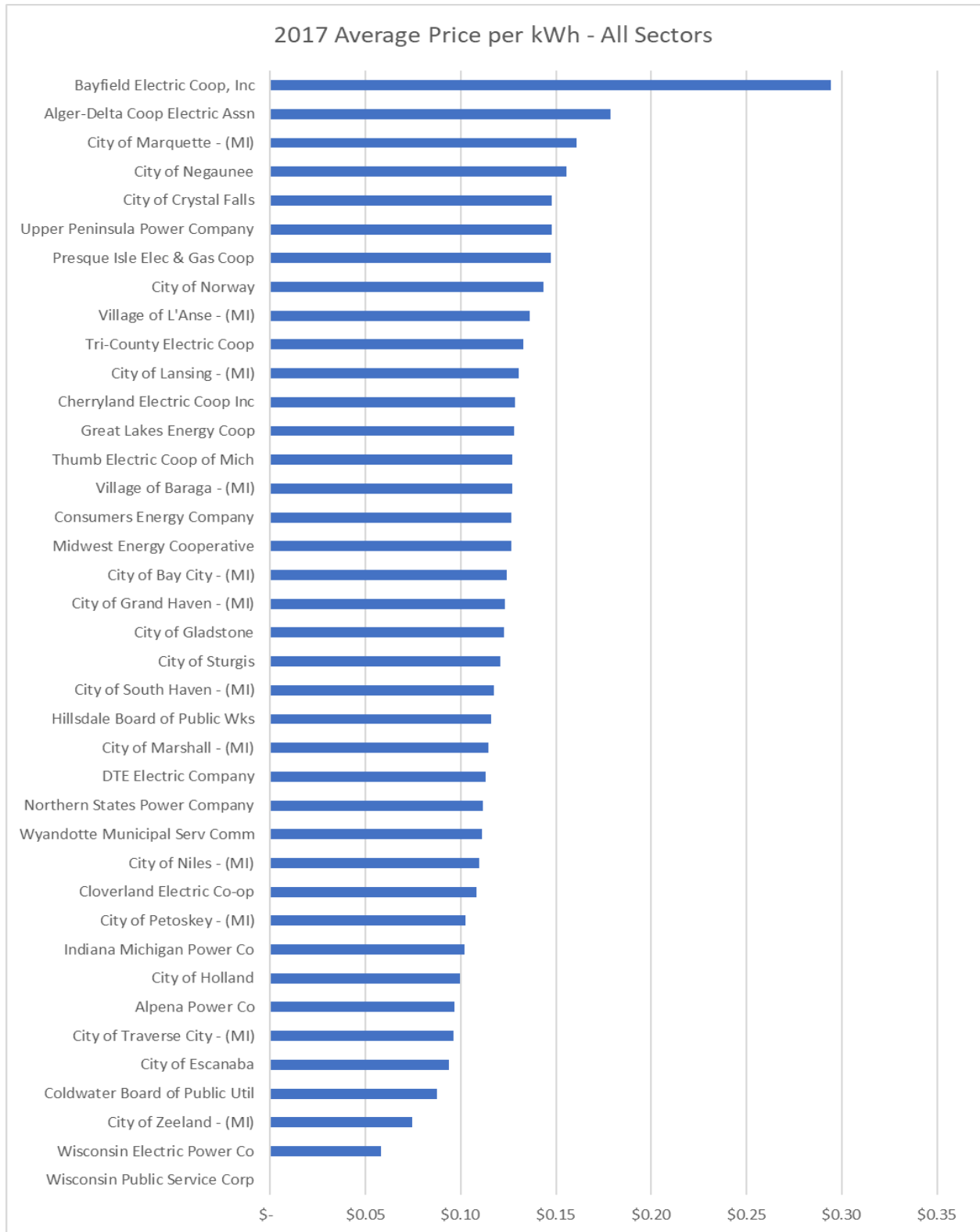
Average Price - Commercial Sector (\$/kWh)											
Utility	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Upper Peninsula Power Company	\$0.124	\$0.130	\$0.136	\$0.141	\$0.146	\$0.147	\$0.157	\$0.169	\$0.165	\$0.158	\$0.170
City of Sturgis	\$0.113	\$0.117	\$0.119	\$0.134	\$0.145	\$0.141	\$0.147	\$0.144	\$0.153	\$0.154	\$0.161
Alger-Delta Coop Electric Assn	\$0.136	\$0.133	\$0.151	\$0.162	\$0.153	\$0.156	\$0.156	\$0.148	\$0.158	\$0.154	\$0.156
City of Marquette - (MI)	\$0.067	\$0.072	\$0.077	\$0.082	\$0.083	\$0.090	\$0.095	\$0.101	\$0.108	\$0.126	\$0.156
Tri-County Electric Coop	\$0.129	\$0.130	\$0.135	\$0.136	\$0.141	\$0.148	\$0.149	\$0.156	\$0.152	\$0.150	\$0.151
City of Crystal Falls	\$0.093	\$0.094	\$0.101	\$0.122	\$0.132	\$0.128	\$0.126	\$0.135	\$0.135	\$0.136	\$0.138
City of Negaunee	\$0.137	\$0.135	\$0.150	\$0.125	\$0.117	\$0.118	\$0.116	\$0.122	\$0.132	\$0.133	\$0.134
City of Norway	\$0.087	\$0.116	\$0.111	\$0.129	\$0.124	\$0.130	\$0.123	\$0.124	\$0.143	\$0.143	\$0.134
City of Lansing - (MI)	\$0.069	\$0.075	\$0.079	\$0.092	\$0.103	\$0.113	\$0.116	\$0.117	\$0.128	\$0.128	\$0.130
Great Lakes Energy Coop	\$0.106	\$0.111	\$0.110	\$0.112	\$0.113	\$0.119	\$0.128	\$0.130	\$0.130	\$0.129	\$0.130
Village of L'Anse - (MI)	\$0.096	\$0.111	\$0.114	\$0.111	\$0.113	\$0.123	\$0.128	\$0.127	\$0.132	\$0.122	\$0.130
City of Grand Haven - (MI)	\$0.093	\$0.097	\$0.118	\$0.136	\$0.150	\$0.146	\$0.153	\$0.153	\$0.136	\$0.134	\$0.128
Consumers Energy Company	\$0.090	\$0.096	\$0.099	\$0.110	\$0.112	\$0.116	\$0.122	\$0.126	\$0.123	\$0.123	\$0.127
Village of Baraga - (MI)	\$0.107	\$0.106	\$0.116	\$0.132	\$0.131	\$0.131	\$0.132	\$0.121	\$0.122	\$0.192	\$0.126
Wyandotte Municipal Serv Comm	\$0.105	\$0.105	\$0.108	\$0.108	\$0.159	\$0.154	\$0.155	\$0.157	\$0.124	\$0.123	\$0.124
City of Bay City - (MI)	\$0.088	\$0.090	\$0.095	\$0.095	\$0.097	\$0.098	\$0.102	\$0.111	\$0.112	\$0.114	\$0.124
City of Niles - (MI)	\$0.083	\$0.093	\$0.099	\$0.098	\$0.098	\$0.103	\$0.107	\$0.107	\$0.117	\$0.122	\$0.120
Alpena Power Co	\$0.091	\$0.102	\$0.112	\$0.117	\$0.121	\$0.123	\$0.124	\$0.119	\$0.119	\$0.113	\$0.119
City of Marshall - (MI)	\$0.121	\$0.128	\$0.141	\$0.141	\$0.124	\$0.119	\$0.118	\$0.133	\$0.119	\$0.113	\$0.118
City of South Haven - (MI)	\$0.097	\$0.092	\$0.098	\$0.099	\$0.097	\$0.103	\$0.106	\$0.095	\$0.101	\$0.109	\$0.117
Northern States Power Company	\$0.086	\$0.085	\$0.085	\$0.086	\$0.090	\$0.096	\$0.098	\$0.110	\$0.114	\$0.112	\$0.117
Hillsdale Board of Public Wks	\$0.090	\$0.087	\$0.097	\$0.100	\$0.096	\$0.097	\$0.110	\$0.116	\$0.113	\$0.101	\$0.117
City of Gladstone	\$0.097	\$0.109	\$0.116	\$0.117	\$0.118	\$0.102	\$0.123	\$0.137	\$0.105	\$0.102	\$0.114
Presque Isle Elec & Gas Coop	\$0.097	\$0.099	\$0.101	\$0.104	\$0.108	\$0.111	\$0.114	\$0.111	\$0.110	\$0.109	\$0.111
City of Holland	\$0.078	\$0.081	\$0.082	\$0.083	\$0.085	\$0.087	\$0.092	\$0.095	\$0.101	\$0.105	\$0.108
City of Traverse City - (MI)	\$0.090	\$0.092	\$0.092	\$0.092	\$0.098	\$0.100	\$0.102	\$0.119	\$0.112	\$0.106	\$0.107
Thumb Electric Coop of Mich	\$0.096	\$0.102	\$0.103	\$0.110	\$0.109	\$0.098	\$0.097	\$0.095	\$0.084	\$0.084	\$0.106
Coldwater Board of Public Util	\$0.127	\$0.110	\$0.118	\$0.115	\$0.113	\$0.117	\$0.119	\$0.124	\$0.103	\$0.096	\$0.105
Cloverland Electric Co-op	\$0.090	\$0.095	\$0.103	\$0.101	\$0.105	\$0.106	\$0.101	\$0.106	\$0.104	\$0.111	\$0.105
Cherryland Electric Coop Inc	\$0.090	\$0.087	\$0.092	\$0.094	\$0.098	\$0.102	\$0.105	\$0.106	\$0.101	\$0.103	\$0.105
DTE Electric Company	\$0.087	\$0.089	\$0.089	\$0.093	\$0.103	\$0.114	\$0.113	\$0.105	\$0.099	\$0.100	\$0.103
Indiana Michigan Power Co	\$0.067	\$0.069	\$0.073	\$0.079	\$0.087	\$0.092	\$0.093	\$0.092	\$0.096	\$0.098	\$0.102
Midwest Energy Cooperative	\$0.080	\$0.088	\$0.090	\$0.094	\$0.084	\$0.086	\$0.091	\$0.094	\$0.088	\$0.097	\$0.099
City of Petoskey - (MI)	\$0.081	\$0.083	\$0.080	\$0.084	\$0.090	\$0.097	\$0.103	\$0.098	\$0.105	\$0.101	\$0.099
City of Escanaba	\$0.093	\$0.092	\$0.095	\$0.100	\$0.104	\$0.096	\$0.089	\$0.090	\$0.092	\$0.096	\$0.094
City of Zeeland - (MI)	\$0.075	\$0.078	\$0.078	\$0.084	\$0.087	\$0.089	\$0.093	\$0.096	\$0.092	\$0.086	\$0.086
Wisconsin Electric Power Co	\$0.093	\$0.086	\$0.105	\$0.126	\$0.137	\$0.141	\$0.144	\$0.147	\$0.144	\$0.145	
Wisconsin Public Service Corp	\$0.086	\$0.105	\$0.102	\$0.099	\$0.101	\$0.102	\$0.101	\$0.101	\$0.108	\$0.113	
City of Charlevoix	\$0.092	\$0.079	\$0.080	\$0.078	\$0.099						
City of Croswell	\$0.103	\$0.100	\$0.094	\$0.096	\$0.099						
City of Detroit - (MI)	\$0.094	\$0.100	\$0.096	\$0.099	\$0.089	\$0.087	\$0.089	\$0.079			
City of Dowagiac	\$0.086	\$0.118	\$0.132	\$0.122	\$0.124						
City of Eaton Rapids	\$0.088	\$0.096	\$0.100	\$0.105	\$0.097						
City of Harbor Springs - (MI)	\$0.098	\$0.104	\$0.097	\$0.098	\$0.098						
City of Hart Hydro	\$0.091	\$0.091	\$0.093	\$0.095	\$0.103						
City of Lowell	\$0.084	\$0.093	\$0.094	\$0.099	\$0.112						
City of Portland	\$0.103	\$0.104	\$0.108	\$0.107	\$0.106						
City of Sebawaing - (MI)	\$0.090	\$0.109	\$0.093	\$0.110	\$0.111						
City of St Louis	\$0.080	\$0.098	\$0.098	\$0.116	\$0.110						
City of Stephenson - (MI)	\$0.096	\$0.105	\$0.112	\$0.119	\$0.118						
City of Wakefield - (MI)	\$0.076	\$0.075	\$0.115	\$0.086	\$0.088						
Edison Sault Electric Co	\$0.074	\$0.075	\$0.080								
Newberry Water & Light Board	\$0.114	\$0.115	\$0.115	\$0.103	\$0.108						
Ontonagon County R E A	\$0.170	\$0.178	\$0.168	\$0.167	\$0.175						
Village of Chelsea	\$0.090	\$0.088	\$0.087	\$0.082	\$0.084						
Village of Clinton - (MI)	\$0.111	\$0.122	\$0.133	\$0.122	\$0.112						
Village of Daggett	\$0.064	\$0.072	\$0.094	\$0.106	\$0.100						
Village of Paw Paw	\$0.078	\$0.079	\$0.091	\$0.091	\$0.066						
Village of Union City	\$0.117	\$0.121	\$0.127	\$0.127	\$0.120						

Industrial Sector Electricity Rates



Average Price - Industrial Sector (\$/kWh)											
Utility	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Cherryland Electric Coop Inc							\$0.131	\$0.134	\$0.130	\$0.129	\$0.137
Alger-Delta Coop Electric Assn							\$0.137	\$0.143	\$0.136	\$0.133	\$0.132
Presque Isle Elec & Gas Coop	\$0.094	\$0.097	\$0.101	\$0.104	\$0.107	\$0.117	\$0.120	\$0.116	\$0.114	\$0.112	\$0.115
City of Petoskey - (M)	\$0.089	\$0.094	\$0.088	\$0.102	\$0.102	\$0.111	\$0.116	\$0.112	\$0.115	\$0.114	\$0.115
City of Grand Haven - (M)	\$0.074	\$0.082	\$0.090	\$0.091	\$0.092	\$0.094	\$0.096	\$0.096	\$0.113	\$0.112	\$0.109
City of Bay City - (M)	\$0.062	\$0.067	\$0.073	\$0.071	\$0.081	\$0.087	\$0.091	\$0.098	\$0.095	\$0.100	\$0.108
City of Lansing - (M)	\$0.054	\$0.059	\$0.068	\$0.075	\$0.084	\$0.095	\$0.097	\$0.098	\$0.106	\$0.104	\$0.106
City of Sturgis	\$0.071	\$0.074	\$0.076	\$0.084	\$0.091	\$0.090	\$0.092	\$0.097	\$0.099	\$0.100	\$0.104
City of Marshall - (M)	\$0.081	\$0.087	\$0.097	\$0.097	\$0.099	\$0.090	\$0.099	\$0.118	\$0.104	\$0.101	\$0.103
Tri-County Electric Coop	\$0.083	\$0.083	\$0.091	\$0.088	\$0.098	\$0.101	\$0.097	\$0.098	\$0.097	\$0.096	\$0.094
Hillsdale Board of Public Wks	\$0.072	\$0.072	\$0.084	\$0.086	\$0.087	\$0.087	\$0.098	\$0.101	\$0.097	\$0.088	\$0.092
City of South Haven - (M)	\$0.053	\$0.075	\$0.078	\$0.078	\$0.071	\$0.075	\$0.078	\$0.067	\$0.073	\$0.080	\$0.089
City of Holland	\$0.068	\$0.069	\$0.071	\$0.072	\$0.074	\$0.075	\$0.076	\$0.080	\$0.082	\$0.086	\$0.088
City of Niles - (M)	\$0.061	\$0.066	\$0.075	\$0.075	\$0.075	\$0.076	\$0.080	\$0.079	\$0.077	\$0.083	\$0.086
Indiana Michigan Power Co	\$0.051	\$0.055	\$0.058	\$0.063	\$0.071	\$0.077	\$0.078	\$0.077	\$0.080	\$0.084	\$0.086
Wyandotte Municipal Serv Comm	\$0.068	\$0.069	\$0.073	\$0.068	\$0.100	\$0.106	\$0.097	\$0.099	\$0.094	\$0.094	\$0.085
Great Lakes Energy Coop	\$0.064	\$0.068	\$0.069	\$0.070	\$0.073	\$0.077	\$0.084	\$0.086	\$0.084	\$0.082	\$0.082
Consumers Energy Company	\$0.075	\$0.078	\$0.076	\$0.082	\$0.081	\$0.083	\$0.090	\$0.088	\$0.080	\$0.077	\$0.082
Cloverland Electric Co-op	\$0.070	\$0.075	\$0.077	\$0.073	\$0.079	\$0.078	\$0.072	\$0.079	\$0.081	\$0.088	\$0.082
City of Escanaba	\$0.081	\$0.080	\$0.082	\$0.087	\$0.090	\$0.085	\$0.080	\$0.080	\$0.083	\$0.086	\$0.081
Coldwater Board of Public Util	\$0.074	\$0.079	\$0.097	\$0.091	\$0.087	\$0.084	\$0.081	\$0.083	\$0.073	\$0.073	\$0.080
City of Traverse City - (M)	\$0.065	\$0.066	\$0.070	\$0.068	\$0.075	\$0.076	\$0.079	\$0.096	\$0.082	\$0.080	\$0.078
Northern States Power Company	\$0.065	\$0.063	\$0.067	\$0.066	\$0.069	\$0.069	\$0.070	\$0.076	\$0.073	\$0.069	\$0.074
City of Zeeland - (M)	\$0.060	\$0.064	\$0.063	\$0.068	\$0.071	\$0.072	\$0.076	\$0.078	\$0.075	\$0.070	\$0.070
DTE Electric Company	\$0.062	\$0.065	\$0.069	\$0.064	\$0.071	\$0.078	\$0.078	\$0.075	\$0.067	\$0.065	\$0.067
Upper Peninsula Power Company	\$0.068	\$0.070	\$0.058	\$0.061	\$0.058	\$0.053	\$0.057	\$0.075	\$0.058	\$0.091	\$0.067
Alpena Power Co	\$0.060	\$0.065	\$0.061	\$0.062	\$0.054	\$0.063	\$0.064	\$0.067	\$0.061	\$0.059	\$0.062
Wisconsin Electric Power Co	\$0.044	\$0.035	\$0.047	\$0.056	\$0.050	\$0.062	\$0.068	\$0.081	\$0.061	\$0.058	\$0.058
Wisconsin Public Service Corp	\$0.051	\$0.061	\$0.060	\$0.054	\$0.058	\$0.059	\$0.057	\$0.059	\$0.067	\$0.056	
City of Charlevoix	\$0.063	\$0.073	\$0.077	\$0.072	\$0.086						
City of Croswell	\$0.053	\$0.068	\$0.065	\$0.074	\$0.076						
City of Dowagiac	\$0.068	\$0.098	\$0.102	\$0.087	\$0.094						
City of Eaton Rapids	\$0.069	\$0.071	\$0.080	\$0.086	\$0.076						
City of Gladstone	\$0.080	\$0.088	\$0.098	\$0.098							
City of Harbor Springs - (M)	\$0.130	\$0.125	\$0.098	\$0.106	\$0.112						
City of Hart Hydro	\$0.081	\$0.085	\$0.089	\$0.083	\$0.089						
City of Lowell		\$0.071	\$0.081	\$0.073	\$0.082						
City of Norway		\$0.075	\$0.093	\$0.101	\$0.099	\$0.106					
City of Portland	\$0.083	\$0.085	\$0.087	\$0.085	\$0.091						
City of Sebewaing - (M)	\$0.070	\$0.073	\$0.075	\$0.077	\$0.080						
City of St Louis	\$0.069	\$0.080	\$0.098	\$0.094	\$0.091						
City of Stephenson - (M)	\$0.115	\$0.087	\$0.100	\$0.109	\$0.102						
City of Wakefield - (M)	\$0.052	\$0.052	\$0.067								
Edison Sault Electric Co	\$0.061	\$0.063	\$0.070								
Newberry Water & Light Board	\$0.156	\$0.135	\$0.135	\$0.139	\$0.096						
Ontonagon County REA	\$0.166	\$0.181	\$0.171	\$0.183	\$0.174						
Village of Chelsea	\$0.069	\$0.075	\$0.073	\$0.071	\$0.074						
Village of Clinton - (M)	\$0.090	\$0.101	\$0.118	\$0.104	\$0.110						
Village of Paw Paw	\$0.077	\$0.079	\$0.088	\$0.082	\$0.055						

All Sectors Electricity Rates



Utility	Average Price - All Sectors (\$/kWh)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bayfield Electric Coop, Inc	\$ 0.179	\$ 0.198	\$ 0.200	\$ 0.230	\$ 0.250	\$ 0.283	\$ 0.287	\$ 0.286	\$ 0.307	\$ 0.294	\$ 0.294
Alger-Delta Coop Electric Assn	\$ 0.161	\$ 0.168	\$ 0.177	\$ 0.193	\$ 0.191	\$ 0.197	\$ 0.187	\$ 0.186	\$ 0.186	\$ 0.183	\$ 0.178
City of Marquette - (MI)	\$ 0.071	\$ 0.076	\$ 0.081	\$ 0.085	\$ 0.087	\$ 0.094	\$ 0.098	\$ 0.105	\$ 0.112	\$ 0.130	\$ 0.161
City of Negaunee	\$ 0.124	\$ 0.126	\$ 0.151	\$ 0.150	\$ 0.150	\$ 0.138	\$ 0.138	\$ 0.142	\$ 0.152	\$ 0.155	\$ 0.156
City of Crystal Falls	\$ 0.098	\$ 0.100	\$ 0.109	\$ 0.135	\$ 0.140	\$ 0.140	\$ 0.139	\$ 0.143	\$ 0.146	\$ 0.145	\$ 0.148
Upper Peninsula Power Company	\$ 0.110	\$ 0.114	\$ 0.113	\$ 0.123	\$ 0.127	\$ 0.125	\$ 0.131	\$ 0.152	\$ 0.141	\$ 0.160	\$ 0.148
Presque Isle Elec & Gas Coop	\$ 0.116	\$ 0.120	\$ 0.122	\$ 0.127	\$ 0.134	\$ 0.143	\$ 0.150	\$ 0.146	\$ 0.145	\$ 0.144	\$ 0.147
City of Norway	\$ 0.103	\$ 0.108	\$ 0.113	\$ 0.124	\$ 0.122	\$ 0.129	\$ 0.129	\$ 0.133	\$ 0.144	\$ 0.147	\$ 0.143
Village of L'Anse - (MI)	\$ 0.102	\$ 0.115	\$ 0.119	\$ 0.115	\$ 0.117	\$ 0.126	\$ 0.131	\$ 0.131	\$ 0.138	\$ 0.129	\$ 0.136
Tri-County Electric Coop	\$ 0.109	\$ 0.109	\$ 0.117	\$ 0.117	\$ 0.120	\$ 0.129	\$ 0.130	\$ 0.132	\$ 0.130	\$ 0.130	\$ 0.133
City of Lansing - (MI)	\$ 0.068	\$ 0.074	\$ 0.079	\$ 0.092	\$ 0.103	\$ 0.114	\$ 0.117	\$ 0.119	\$ 0.129	\$ 0.128	\$ 0.131
Cherryland Electric Coop Inc	\$ 0.105	\$ 0.101	\$ 0.108	\$ 0.111	\$ 0.117	\$ 0.126	\$ 0.126	\$ 0.126	\$ 0.125	\$ 0.127	\$ 0.129
Great Lakes Energy Coop	\$ 0.105	\$ 0.111	\$ 0.112	\$ 0.115	\$ 0.119	\$ 0.126	\$ 0.128	\$ 0.131	\$ 0.129	\$ 0.127	\$ 0.128
Thumb Electric Coop of Mich	\$ 0.107	\$ 0.107	\$ 0.111	\$ 0.118	\$ 0.118	\$ 0.110	\$ 0.109	\$ 0.111	\$ 0.112	\$ 0.113	\$ 0.127
Village of Baraga - (MI)	\$ 0.105	\$ 0.107	\$ 0.117	\$ 0.131	\$ 0.130	\$ 0.130	\$ 0.132	\$ 0.122	\$ 0.122	\$ 0.196	\$ 0.127
Consumers Energy Company	\$ 0.091	\$ 0.096	\$ 0.099	\$ 0.110	\$ 0.112	\$ 0.115	\$ 0.122	\$ 0.123	\$ 0.121	\$ 0.123	\$ 0.127
Midwest Energy Cooperative	\$ 0.092	\$ 0.098	\$ 0.103	\$ 0.107	\$ 0.112	\$ 0.116	\$ 0.120	\$ 0.123	\$ 0.124	\$ 0.128	\$ 0.126
City of Bay City - (MI)	\$ 0.085	\$ 0.087	\$ 0.093	\$ 0.094	\$ 0.097	\$ 0.099	\$ 0.103	\$ 0.111	\$ 0.111	\$ 0.116	\$ 0.124
City of Grand Haven - (MI)	\$ 0.087	\$ 0.094	\$ 0.106	\$ 0.115	\$ 0.121	\$ 0.122	\$ 0.125	\$ 0.124	\$ 0.131	\$ 0.128	\$ 0.123
City of Gladstone	\$ 0.103	\$ 0.113	\$ 0.121	\$ 0.123	\$ 0.134	\$ 0.127	\$ 0.124	\$ 0.135	\$ 0.114	\$ 0.110	\$ 0.123
City of Sturgis	\$ 0.081	\$ 0.085	\$ 0.088	\$ 0.098	\$ 0.107	\$ 0.105	\$ 0.108	\$ 0.109	\$ 0.114	\$ 0.115	\$ 0.121
City of South Haven - (MI)	\$ 0.081	\$ 0.090	\$ 0.095	\$ 0.099	\$ 0.097	\$ 0.101	\$ 0.105	\$ 0.095	\$ 0.100	\$ 0.109	\$ 0.118
Hillsdale Board of Public Wks	\$ 0.087	\$ 0.086	\$ 0.098	\$ 0.101	\$ 0.100	\$ 0.100	\$ 0.112	\$ 0.116	\$ 0.113	\$ 0.101	\$ 0.116
City of Marshall - (MI)	\$ 0.099	\$ 0.106	\$ 0.118	\$ 0.118	\$ 0.113	\$ 0.110	\$ 0.115	\$ 0.129	\$ 0.117	\$ 0.112	\$ 0.115
DTE Electric Company	\$ 0.084	\$ 0.088	\$ 0.095	\$ 0.098	\$ 0.109	\$ 0.119	\$ 0.119	\$ 0.112	\$ 0.108	\$ 0.113	\$ 0.113
Northern States Power Company	\$ 0.085	\$ 0.084	\$ 0.085	\$ 0.086	\$ 0.090	\$ 0.095	\$ 0.097	\$ 0.107	\$ 0.109	\$ 0.107	\$ 0.112
Wyandotte Municipal Serv Comm	\$ 0.078	\$ 0.079	\$ 0.082	\$ 0.078	\$ 0.112	\$ 0.119	\$ 0.115	\$ 0.116	\$ 0.115	\$ 0.116	\$ 0.111
City of Niles - (MI)	\$ 0.076	\$ 0.084	\$ 0.091	\$ 0.091	\$ 0.092	\$ 0.096	\$ 0.097	\$ 0.098	\$ 0.104	\$ 0.109	\$ 0.110
Cloverland Electric Co-op	\$ 0.096	\$ 0.104	\$ 0.107	\$ 0.096	\$ 0.102	\$ 0.102	\$ 0.097	\$ 0.104	\$ 0.107	\$ 0.113	\$ 0.108
City of Petoskey - (MI)	\$ 0.082	\$ 0.086	\$ 0.082	\$ 0.086	\$ 0.092	\$ 0.099	\$ 0.105	\$ 0.102	\$ 0.109	\$ 0.105	\$ 0.103
Indiana Michigan Power Co	\$ 0.060	\$ 0.063	\$ 0.067	\$ 0.073	\$ 0.082	\$ 0.090	\$ 0.092	\$ 0.091	\$ 0.096	\$ 0.099	\$ 0.102
City of Holland	\$ 0.075	\$ 0.077	\$ 0.079	\$ 0.081	\$ 0.082	\$ 0.084	\$ 0.086	\$ 0.089	\$ 0.093	\$ 0.097	\$ 0.099
Alpena Power Co	\$ 0.083	\$ 0.091	\$ 0.095	\$ 0.100	\$ 0.103	\$ 0.101	\$ 0.102	\$ 0.099	\$ 0.098	\$ 0.094	\$ 0.097
City of Traverse City - (MI)	\$ 0.080	\$ 0.083	\$ 0.084	\$ 0.084	\$ 0.090	\$ 0.091	\$ 0.093	\$ 0.110	\$ 0.101	\$ 0.097	\$ 0.096
City of Escanaba	\$ 0.090	\$ 0.089	\$ 0.092	\$ 0.097	\$ 0.100	\$ 0.095	\$ 0.089	\$ 0.090	\$ 0.093	\$ 0.096	\$ 0.094
Coldwater Board of Public Util	\$ 0.083	\$ 0.088	\$ 0.104	\$ 0.099	\$ 0.096	\$ 0.093	\$ 0.090	\$ 0.093	\$ 0.082	\$ 0.081	\$ 0.088
City of Zeeland - (MI)	\$ 0.064	\$ 0.067	\$ 0.067	\$ 0.072	\$ 0.075	\$ 0.077	\$ 0.080	\$ 0.083	\$ 0.079	\$ 0.074	\$ 0.075
Wisconsin Electric Power Co	\$ 0.050	\$ 0.042	\$ 0.057	\$ 0.065	\$ 0.069	\$ 0.073	\$ 0.084	\$ 0.138	\$ 0.073	\$ 0.070	\$ 0.058
Wisconsin Public Service Corp	\$ 0.062	\$ 0.075	\$ 0.075	\$ 0.069	\$ 0.072	\$ 0.073	\$ 0.072	\$ 0.074	\$ 0.083	\$ 0.076	
City of Charlevoix	\$ 0.083	\$ 0.086	\$ 0.093	\$ 0.085	\$ 0.097						
City of Crosswell	\$ 0.068	\$ 0.076	\$ 0.075	\$ 0.082	\$ 0.085						
City of Detroit - (MI)	\$ 0.094	\$ 0.100	\$ 0.096	\$ 0.096	\$ 0.099	\$ 0.089	\$ 0.087	\$ 0.089	\$ 0.080		
City of Dowagiac	\$ 0.074	\$ 0.106	\$ 0.115	\$ 0.102	\$ 0.106						
City of Eaton Rapids	\$ 0.078	\$ 0.079	\$ 0.088	\$ 0.097	\$ 0.087						
City of Harbor Springs - (MI)	\$ 0.096	\$ 0.101	\$ 0.094	\$ 0.095	\$ 0.094						
City of Hart Hydro	\$ 0.088	\$ 0.089	\$ 0.091	\$ 0.090	\$ 0.097						
City of Lowell	\$ 0.086	\$ 0.088	\$ 0.091	\$ 0.092	\$ 0.100						
City of Portland	\$ 0.096	\$ 0.099	\$ 0.102	\$ 0.101	\$ 0.104						
City of Sebewaing - (MI)	\$ 0.076	\$ 0.079	\$ 0.080	\$ 0.084	\$ 0.087						
City of St Louis	\$ 0.081	\$ 0.093	\$ 0.099	\$ 0.113	\$ 0.110						
City of Stephenson - (MI)	\$ 0.095	\$ 0.102	\$ 0.109	\$ 0.112	\$ 0.115						
City of Wakefield - (MI)	\$ 0.075	\$ 0.078	\$ 0.098	\$ 0.081	\$ 0.081						
Edison Sault Electric Co	\$ 0.072	\$ 0.074	\$ 0.080								
Newberry Water & Light Board	\$ 0.112	\$ 0.112	\$ 0.112	\$ 0.111	\$ 0.102						
Ontonagon County R E A	\$ 0.180	\$ 0.200	\$ 0.200	\$ 0.208	\$ 0.201						
Village of Chelsea	\$ 0.082	\$ 0.086	\$ 0.085	\$ 0.080	\$ 0.083						
Village of Clinton - (MI)	\$ 0.108	\$ 0.120	\$ 0.134	\$ 0.122	\$ 0.118						
Village of Daggett	\$ 0.075	\$ 0.072	\$ 0.098	\$ 0.106	\$ 0.096						
Village of Paw Paw	\$ 0.083	\$ 0.085	\$ 0.097	\$ 0.096	\$ 0.071						
Village of Union City	\$ 0.113	\$ 0.118	\$ 0.123	\$ 0.123	\$ 0.115						