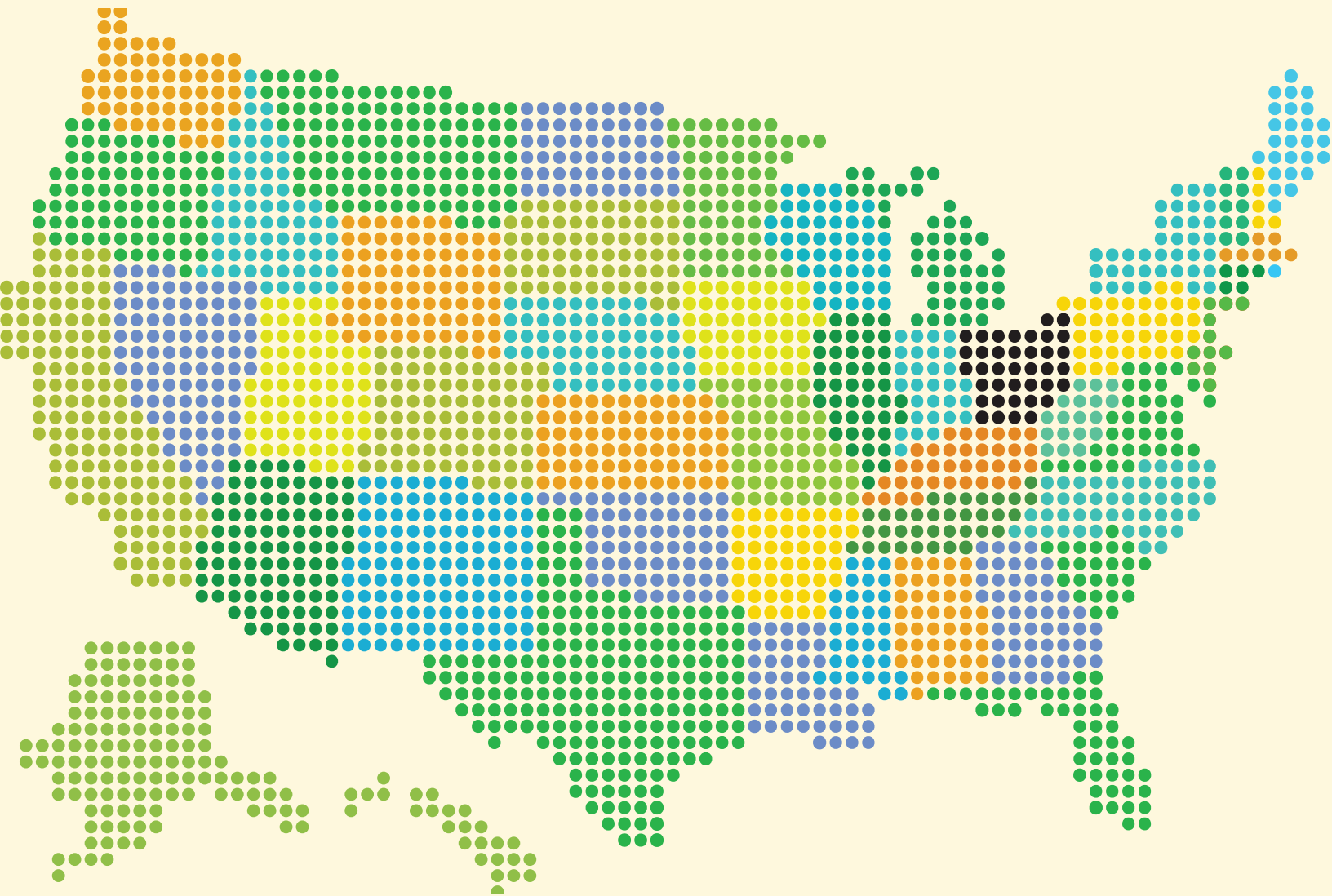


# Electric Utility Performance

## Ranking Ohio Among the States



A report of the  
Citizens Utility Board of Ohio,  
Fall 2020



CUB wishes to thank Douglas Jester and 5 Lakes Energy LLC for their work in developing the Electric Utility Performance report.



The Citizens Utility Board of Ohio is a nonprofit, nonpartisan consumer watchdog that advocates for residential and small-business utility customers.

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# Electric Utility Performance: Ranking Ohio Among the States

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# Introduction

This “Electric Utility Performance” scorecard compares the performance of utilities in 50 states and the District of Columbia in fulfilling their core functions and meeting their obligations to consumers. Using publicly available data from the Energy Information Administration (EIA), it ranks states on three key performance criteria: affordability, reliability and environmental impact.

For Ohio consumers, already reeling from news of a federal investigation linking higher electricity bills to utility-engineered political corruption, the discouraging results of this report may represent another reason why policies related to keeping the lights on have often aroused feelings of gloom. The EIA data shows that the Buckeye state scores poorly on affordability, reliability and environmental impact. In fact, weighting the three criteria equally, Ohio is 47th in the country in overall electric utility performance.

While aspects of utility performance are affected by location, climate, energy-usage characteristics, and the make-up of the state’s economy, the scorecard provides a gauge of the effectiveness of each state’s regulatory policies. In that regard, it serves as a stark admonition that current Ohio policies are clearly failing consumers and radical change is needed to advance the public interest.

Given that electricity qualifies as a basic human need, this scorecard is not just a statistical ranking of a single industry, but a measure of Ohio’s fundamental fitness. Without affordable, accessible, environmentally sustainable and reliable electricity, Ohio’s economy cannot achieve its full productive potential. In lower-income communities, the disproportionate burden of higher-than-average bills becomes another factor fueling systemic inequities. And the environmental repercussions from fossil fuel generation—which already include a variety of respiratory ailments and shorter life expectancies—assume even greater magnitude in the face of a changing climate, where carbon emissions exacerbate concerns about the the state’s ability to cope with floods, droughts and other shifts in weather patterns that threaten everything from its agriculture to storm-water management.

While the status quo is clearly not working, it’s not too late in the game for Ohio to take the lead. We hope this scorecard serves as an impetus for legislators to pass policies that maximize consumer and environmental value.

At a minimum this should include repealing HB 6, expanding energy efficiency programs, and investing in decarbonization strategies that lower peak demand and minimize grid costs, including offering creative power-pricing options such as hourly pricing and time-of-use rates. It also means transitioning to an equitable economy that brings clean energy, good-paying jobs and lower energy bills to all communities—including those that need it the most.

Table 1 shows Ohio’s rank for each metric. For each metric reported, states are ranked in order from best performance to worst; a high number implies a worse performance than a low number. As of May 2020, the Energy

**Table 1: 2018 Ohio Summary of Rankings**  
(50 states + District of Columbia; ranked best-to-worst)

Metric	Ohio Rank	
<b>AFFORDABILITY</b>	Average Annual Household Electricity Expenditure	24
	Total Household Energy Expenditure	34
	Total Household Electricity Expenditure as % of living wage	29
	Residential Electricity Price	30
	All Sector Electricity Price	28
<b>RELIABILITY</b>	SAIDI with Major Event Days (MED)	26
	SAIDI without Major Event Days	39
	SAIFI with Major Event Days	30
	SAIFI without Major Event Days	34
	CAIDI with Major Event Days	29
	CAIDI without Major Event Days	40
<b>ENVIRONMENTAL</b>	Carbon Dioxide Emission Intensity	40
	Total Carbon Dioxide Emissions	48
	Sulfur Dioxide Emission Intensity	45
	Total Sulfur Dioxide Emissions	49
	Nitrogen Oxide Emission Intensity	36
	Total Nitrogen Oxide Emissions	47
	Generation from Renewable Sources	42
	Renewable Generation as a % of Total Sales	49
	Generation from Carbon-free and Renewable Sources	22
Carbon-free and Renewable Generation as a % of Total Sales	45	
Electricity Usage Intensity	31	

Information Administration (EIA) of the U.S. Department of Energy has released reliability, price, emissions, and generation data for 2018. All time-series tables display states or utilities ranked based on their performance in the most recent reported year.

In many graphs and tables, Ohio is also compared against its “peer group” of states in the Midwest (Illinois, Indiana, Iowa, Michigan, Minnesota and Wisconsin) plus Pennsylvania and West Virginia. Comparing Ohio to a group of states that have similar weather, population dynamics, industrial activity and market conditions provides some context for the environmental, affordability and reliability statistics.

Table 2 shows how Ohio compares to other states on affordability, reliability, and environmental impact and then on an overall performance score that weights each criteria equally. To illustrate, Ohio’s rankings on the five affordability metrics are 24, 34, 29, 30, and 28. These totals are summed (145) and then divided by five for an overall affordability average of 29. The overall score sums the affordability, reliability, and environmental impact scores and divides by three to generate the overall average.

**Table 2: 2018 Overall Rankings (ranked best-to-worst)**

State	Affordability	Reliability	Environmental	Overall
Oregon	10.6	15.5	12.5	12.9
Washington	5.2	27.3	11.4	14.6
South Dakota	24.4	8.7	12.8	15.3
Nevada	17.0	12.2	17.4	15.5
Colorado	12.0	10.3	28.5	17.0
Idaho	7.6	28.2	15.4	17.0
Illinois	17.8	11.2	24.4	17.8
Montana	8.8	21.7	24.4	18.3
New Mexico	11.2	21.3	23.8	18.8
North Dakota	16.4	11.2	31.0	19.5
California	22.2	21.5	16.0	19.9
Utah	4.4	21.5	33.8	19.9
Arizona	32.6	5.5	21.6	19.9
District of Columbia	24.8	9.2	27.1	20.4
Iowa	19.2	15.7	26.4	20.4
Minnesota	23.2	13.5	26.8	21.2
Nebraska	15.8	15.5	32.8	21.4
Wyoming	9.6	18.2	37.5	21.8
Oklahoma	18.0	27.8	20.5	22.1
Wisconsin	22.6	13.5	32.8	23.0
Kansas	34.0	19.3	16.9	23.4
New Jersey	27.2	26.2	19.0	24.1
Delaware	33.8	13.2	27.3	24.7
New York	34.0	26.8	15.7	25.5
Texas	27.6	20.8	28.5	25.7
Tennessee	31.2	26.7	19.8	25.9
Florida	29.6	18.8	30.4	26.3
Rhode Island	37.2	26.2	24.5	29.3
Missouri	30.8	17.2	40.2	29.4
Arkansas	16.4	40.0	31.8	29.4
Louisiana	16.4	35.8	37.5	29.9
Alabama	38.0	30.7	21.5	30.0
Georgia	33.8	29.5	27.9	30.4
South Carolina	37.4	37.0	17.5	30.6
New Hampshire	37.4	40.2	15.1	30.9
Connecticut	48.4	25.8	18.7	31.0
Maryland	40.8	26.8	25.9	31.2
Mississippi	31.4	35.5	27.5	31.5
Pennsylvania	32.4	35.0	27.1	31.5
Vermont	30.0	47.8	17.3	31.7
Maine	28.8	46.3	21.4	32.2
Massachusetts	39.4	33.3	24.5	32.4
North Carolina	27.2	45.3	24.9	32.5
Michigan	27.2	38.5	33.3	33.0
Virginia	32.4	41.7	25.7	33.3
Kentucky	22.8	37.5	40.5	33.6
<b>Ohio</b>	<b>29.0</b>	<b>33.0</b>	<b>41.3</b>	<b>34.4</b>
Indiana	29.2	33.7	41.8	34.9
Alaska	42.6	32.3	31.7	35.6
Hawaii	50.0	27.2	33.4	36.8
West Virginia	27.2	48.5	40.3	38.7

# Affordability Metrics: Ohio vs. Other States

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 kilowatt-hour (kWh) are common billing determinants. The ways in which utilities assign costs to these various components of the bill vary amongst utilities, amongst classes of customers and across states.

The Energy Information Administration (EIA) of the U.S. 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 and transportation, with almost all electricity delivered in most states going to the first three classes. EIA makes this data available through an Electric Data Browser on its website, at <http://www.eia.gov/electricity/data/browser/>. 2018 is the most recent complete calendar year available and is used here for comparison of the cost of electricity in the various states, reported in cents per kWh.

## EXPENDITURES

As one of the essentials of life, the cost of electricity is an existential matter for consumers. It can force lower-income households to choose between keeping the refrigerator running and buying the food that would go in it. And for industry, it is instrumental to staying competitive and promoting job growth.

The affordability of electricity is a nuanced calculation. For households, climate and the availability of alternative heating fuels can affect the amount of electricity they consume. And expenditures on electricity must be considered in context of income. Comparison of total household energy expenses and total household electricity expenses as a share of living wage are important measures of affordability.

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; a rates comparison is more useful.

Below, we first examine household energy expenditures, then look at electricity rates for all sectors: 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/>.

Figure 2 shows, despite its higher than average electricity rates, Ohio had the 24th lowest electricity expenditure per household. Although electricity expenditure is average, non-electricity expenditure is higher than average, bringing Ohio’s average total energy expenditure per household to 34th lowest (18th highest). This can be seen in Figure 4, showing electricity and non-electricity expenditures on the same graph, sorted by total expenditure. Ohio residents pay more than Illinois, Wisconsin, Minnesota, Iowa, West Virginia and Indiana, but less than Michigan and Pennsylvania residents. At 2.1%, Ohio had the 17th highest average residential household electricity expenditure growth rate (also known as compound annual growth rate, or CAGR) over the last 10 years, placing it in the middle of its peer group of states (as seen in Figure 3).

According to Table 3 and Figure 5, total household energy expenditures in Ohio account for 3.0% of the average Ohio living wage, making Ohio the 29th lowest state in the country.

**Table 3: 2018 Household Energy Expenditure in Ohio**

Metric	Value	Rank
Average Household Electricity Expenditure	\$1,378 per year	24 <sup>th</sup> lowest
Average Total Household Energy Expenditure	\$2,088	34 <sup>th</sup> lowest
Total Household Electricity Expenditure as a Percentage of Living Wage	3.0%	29 <sup>th</sup> lowest



Figure 1: Summary of Residential Expenditures (ranked best-to-worst)

State	Residential Electricity Sales per Customer (kWh)	Residential Electricity Price (\$/kWh)	Residential Average Monthly Bill
Utah	8,903	\$0.10	\$77
New Mexico	7,672	\$0.13	\$81
Colorado	8,288	\$0.12	\$84
Montana	10,201	\$0.11	\$93
Washington	11,485	\$0.10	\$93
Wyoming	10,088	\$0.11	\$95
Illinois	8,928	\$0.13	\$95
Idaho	11,334	\$0.10	\$96
Maine	6,863	\$0.17	\$96
Wisconsin	8,311	\$0.14	\$97
Oregon	10,816	\$0.11	\$99
Vermont	6,715	\$0.18	\$101
District of Columbia	9,440	\$0.13	\$101
California	6,556	\$0.19	\$103
Minnesota	9,436	\$0.13	\$103
Michigan	8,047	\$0.15	\$104
New Jersey	8,276	\$0.15	\$106
Iowa	10,709	\$0.12	\$109
Nebraska	12,251	\$0.11	\$109
New York	7,253	\$0.19	\$112
Nevada	11,363	\$0.12	\$112
Arkansas	13,872	\$0.10	\$113
North Dakota	13,417	\$0.10	\$115
<b>OHIO</b>	<b>10,967</b>	<b>\$0.13</b>	<b>\$115</b>
Oklahoma	13,664	\$0.10	\$117
Pennsylvania	10,370	\$0.14	\$120
Rhode Island	7,068	\$0.21	\$121
South Dakota	12,541	\$0.12	\$121
New Hampshire	7,453	\$0.20	\$122
Delaware	11,724	\$0.13	\$122
Louisiana	15,379	\$0.10	\$123
Indiana	12,075	\$0.12	\$123
Kentucky	13,995	\$0.11	\$124
Kansas	11,206	\$0.13	\$125
North Carolina	13,542	\$0.11	\$125
Alaska	6,869	\$0.22	\$126
West Virginia	13,596	\$0.11	\$127
Missouri	13,416	\$0.11	\$127
Florida	13,321	\$0.12	\$128
Georgia	13,709	\$0.11	\$131
Massachusetts	7,286	\$0.22	\$131
Arizona	12,342	\$0.13	\$131
Texas	14,106	\$0.11	\$132
Maryland	12,064	\$0.13	\$134
Virginia	13,977	\$0.12	\$137
Tennessee	15,394	\$0.11	\$137
Mississippi	14,966	\$0.11	\$139
South Carolina	13,908	\$0.12	\$144
Alabama	14,838	\$0.12	\$151
Connecticut	8,686	\$0.21	\$153
Hawaii	6,213	\$0.32	\$168



Figure 2: 2018 Average Annual Household Electricity Expenditure

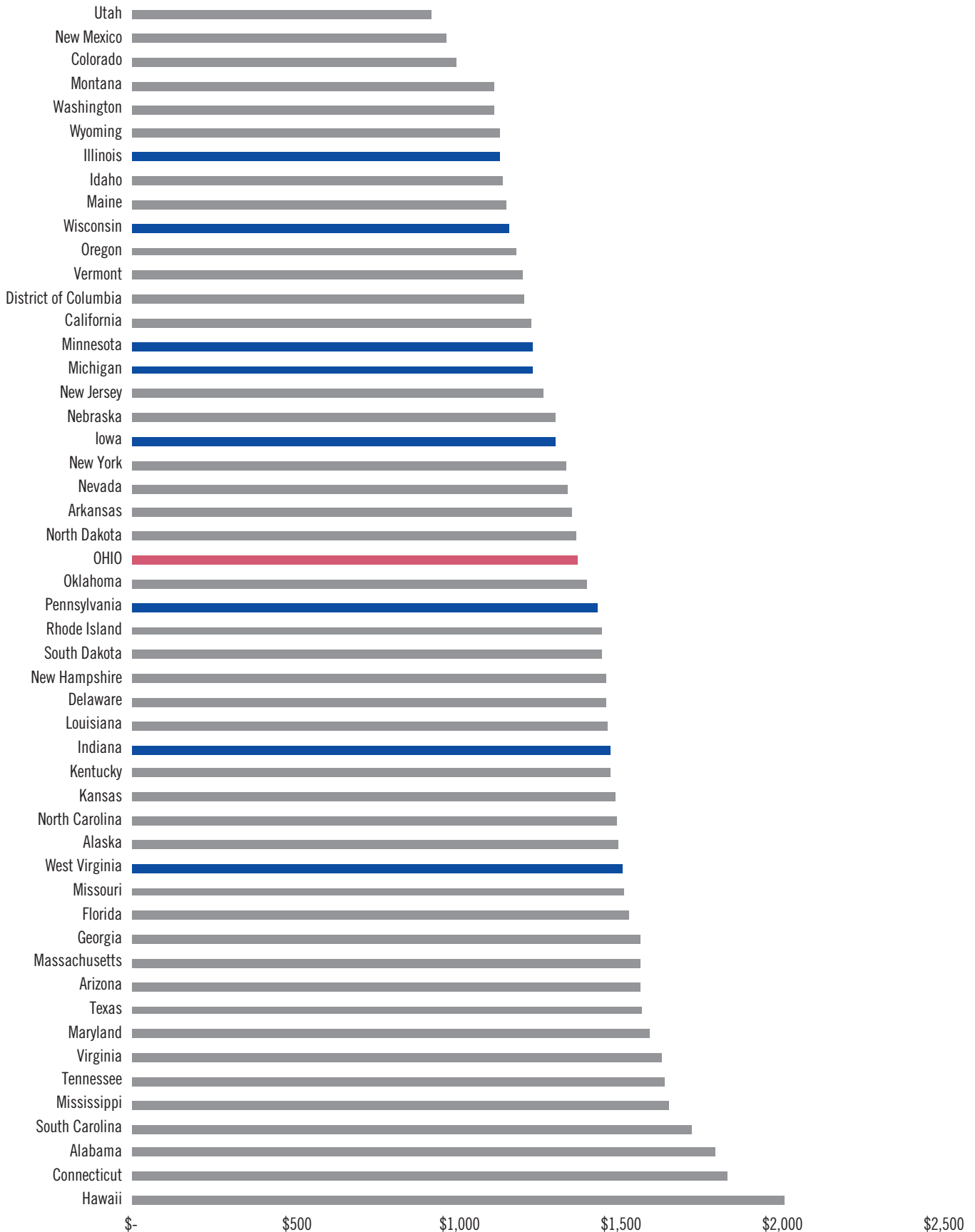


Figure 3: Average Annual Household Electricity Expenditure

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Utah	\$794	\$821	\$847	\$944	\$994	\$954	\$971	\$991	\$980	\$927	2%
New Mexico	\$772	\$832	\$883	\$895	\$919	\$934	\$951	\$912	\$950	\$973	2%
Colorado	\$824	\$939	\$961	\$971	\$1,019	\$1,005	\$1,001	\$1,006	\$990	\$1,007	2%
Montana	\$918	\$928	\$1,020	\$1,019	\$1,066	\$1,043	\$1,068	\$1,067	\$1,137	\$1,118	2%
Washington	\$1,004	\$993	\$1,061	\$1,062	\$1,087	\$1,046	\$1,052	\$1,087	\$1,185	\$1,120	1%
Wyoming	\$913	\$929	\$987	\$1,024	\$1,090	\$1,087	\$1,094	\$1,136	\$1,165	\$1,139	2%
Illinois	\$985	\$1,104	\$1,090	\$1,046	\$962	\$1,065	\$1,079	\$1,102	\$1,076	\$1,140	1%
Idaho	\$1,011	\$977	\$990	\$1,050	\$1,180	\$1,146	\$1,140	\$1,139	\$1,205	\$1,150	1%
Maine	\$978	\$982	\$961	\$933	\$950	\$1,007	\$1,041	\$1,038	\$1,046	\$1,156	2%
Wisconsin	\$987	\$1,087	\$1,109	\$1,114	\$1,143	\$1,139	\$1,131	\$1,153	\$1,136	\$1,165	2%
Oregon	\$1,059	\$1,026	\$1,134	\$1,126	\$1,159	\$1,168	\$1,155	\$1,161	\$1,239	\$1,188	1%
Vermont	\$1,030	\$1,077	\$1,118	\$1,153	\$1,170	\$1,192	\$1,144	\$1,144	\$1,140	\$1,210	2%
District of Columbia	\$1,176	\$1,307	\$1,204	\$1,062	\$1,086	\$1,103	\$1,311	\$1,185	\$1,158	\$1,212	0%
California	\$1,025	\$994	\$1,004	\$1,055	\$1,092	\$1,095	\$1,135	\$1,142	\$1,218	\$1,235	2%
Minnesota	\$966	\$1,034	\$1,070	\$1,081	\$1,158	\$1,167	\$1,108	\$1,161	\$1,171	\$1,240	3%
Michigan	\$896	\$1,018	\$1,088	\$1,146	\$1,163	\$1,134	\$1,123	\$1,220	\$1,169	\$1,243	3%
New Jersey	\$1,323	\$1,454	\$1,380	\$1,309	\$1,297	\$1,268	\$1,320	\$1,303	\$1,229	\$1,275	0
Nebraska	\$1,026	\$1,128	\$1,151	\$1,206	\$1,280	\$1,276	\$1,223	\$1,266	\$1,259	\$1,311	2%
Iowa	\$1,035	\$1,142	\$1,127	\$1,134	\$1,204	\$1,194	\$1,182	\$1,238	\$1,231	\$1,311	2%
New York	\$1,221	\$1,373	\$1,339	\$1,274	\$1,358	\$1,424	\$1,336	\$1,255	\$1,239	\$1,343	1%
Nevada	\$1,448	\$1,356	\$1,249	\$1,327	\$1,319	\$1,388	\$1,398	\$1,266	\$1,228	\$1,346	-1%
Arkansas	\$1,181	\$1,287	\$1,275	\$1,250	\$1,304	\$1,304	\$1,323	\$1,289	\$1,268	\$1,360	1%
North Dakota	\$1,046	\$1,094	\$1,182	\$1,186	\$1,318	\$1,361	\$1,259	\$1,275	\$1,313	\$1,375	3%
<b>OHIO</b>	<b>\$1,124</b>	<b>\$1,263</b>	<b>\$1,258</b>	<b>\$1,263</b>	<b>\$1,285</b>	<b>\$1,351</b>	<b>\$1,347</b>	<b>\$1,334</b>	<b>\$1,274</b>	<b>\$1,378</b>	<b>2%</b>
Oklahoma	\$1,118	\$1,303	\$1,387	\$1,291	\$1,326	\$1,370	\$1,330	\$1,338	\$1,323	\$1,407	2%
Pennsylvania	\$1,177	\$1,338	\$1,384	\$1,281	\$1,316	\$1,365	\$1,399	\$1,400	\$1,374	\$1,440	2%
Rhode Island	\$1,060	\$1,153	\$1,037	\$1,033	\$1,098	\$1,201	\$1,374	\$1,308	\$1,269	\$1,453	3%
South Dakota	\$1,043	\$1,121	\$1,161	\$1,184	\$1,299	\$1,313	\$1,304	\$1,350	\$1,381	\$1,454	3%
New Hampshire	\$1,226	\$1,225	\$1,227	\$1,186	\$1,232	\$1,303	\$1,379	\$1,331	\$1,379	\$1,467	2%
Delaware	\$1,549	\$1,659	\$1,594	\$1,535	\$1,467	\$1,515	\$1,574	\$1,524	\$1,461	\$1,469	-1%
Louisiana	\$1,238	\$1,488	\$1,450	\$1,260	\$1,440	\$1,483	\$1,440	\$1,390	\$1,386	\$1,474	2%
Indiana	\$1,132	\$1,222	\$1,242	\$1,259	\$1,325	\$1,387	\$1,338	\$1,380	\$1,368	\$1,481	3%
Kentucky	\$1,155	\$1,293	\$1,298	\$1,279	\$1,355	\$1,436	\$1,377	\$1,412	\$1,370	\$1,483	3%
Kansas	\$1,036	\$1,185	\$1,256	\$1,274	\$1,294	\$1,355	\$1,327	\$1,408	\$1,376	\$1,496	4%
North Carolina	\$1,348	\$1,502	\$1,417	\$1,409	\$1,446	\$1,513	\$1,506	\$1,457	\$1,368	\$1,502	1%
Alaska	\$1,346	\$1,251	\$1,373	\$1,403	\$1,375	\$1,390	\$1,436	\$1,438	\$1,534	\$1,507	1%
West Virginia	\$1,058	\$1,261	\$1,271	\$1,274	\$1,277	\$1,298	\$1,339	\$1,513	\$1,432	\$1,520	4%
Missouri	\$1,088	\$1,256	\$1,301	\$1,294	\$1,382	\$1,398	\$1,390	\$1,400	\$1,387	\$1,521	3%
Florida	\$1,684	\$1,639	\$1,561	\$1,481	\$1,458	\$1,558	\$1,586	\$1,480	\$1,517	\$1,537	-1%
Georgia	\$1,376	\$1,529	\$1,574	\$1,473	\$1,496	\$1,610	\$1,554	\$1,570	\$1,517	\$1,573	1%
Massachusetts	\$1,234	\$1,168	\$1,115	\$1,122	\$1,212	\$1,283	\$1,431	\$1,365	\$1,402	\$1,574	2%
Arizona	\$1,385	\$1,393	\$1,423	\$1,438	\$1,474	\$1,446	\$1,496	\$1,502	\$1,541	\$1,576	1%
Texas	\$1,693	\$1,668	\$1,678	\$1,539	\$1,600	\$1,649	\$1,632	\$1,525	\$1,470	\$1,580	-1%
Maryland	\$1,845	\$1,883	\$1,646	\$1,548	\$1,640	\$1,676	\$1,679	\$1,698	\$1,574	\$1,604	-1%
Virginia	\$1,489	\$1,553	\$1,510	\$1,485	\$1,504	\$1,560	\$1,567	\$1,526	\$1,494	\$1,639	1%
Tennessee	\$1,394	\$1,543	\$1,587	\$1,476	\$1,491	\$1,593	\$1,542	\$1,547	\$1,480	\$1,648	2%
Mississippi	\$1,488	\$1,593	\$1,571	\$1,470	\$1,578	\$1,695	\$1,647	\$1,511	\$1,505	\$1,664	1%
South Carolina	\$1,482	\$1,651	\$1,620	\$1,580	\$1,618	\$1,773	\$1,729	\$1,753	\$1,690	\$1,730	2%
Alabama	\$1,577	\$1,772	\$1,709	\$1,623	\$1,636	\$1,743	\$1,710	\$1,747	\$1,711	\$1,807	1%
Connecticut	\$1,767	\$1,732	\$1,609	\$1,521	\$1,585	\$1,729	\$1,838	\$1,706	\$1,680	\$1,841	0%
Hawaii	\$1,791	\$2,026	\$2,433	\$2,438	\$2,284	\$2,251	\$1,825	\$1,665	\$1,792	\$2,018	1%

Figure 4: 2018 Energy Expenditures per Household

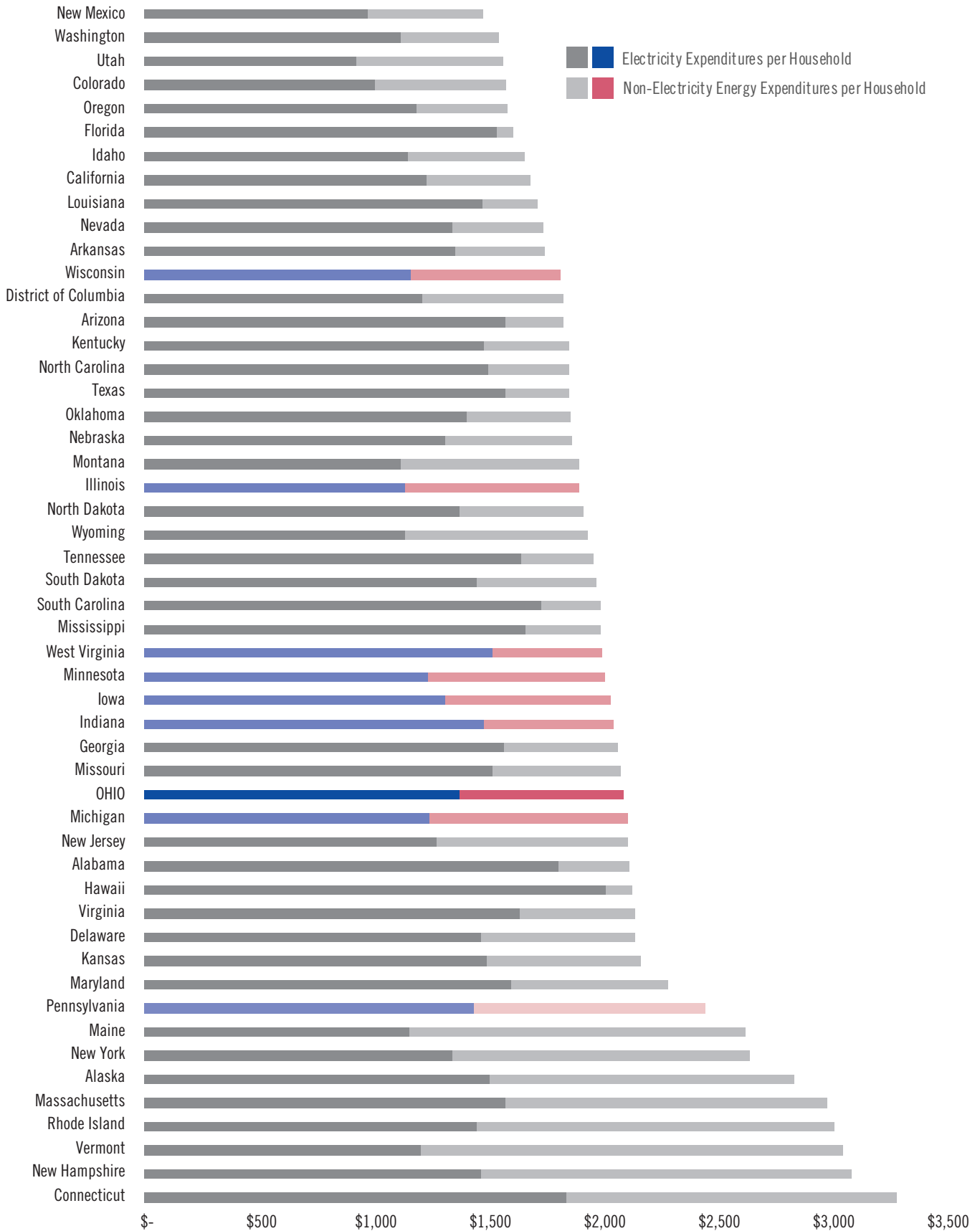
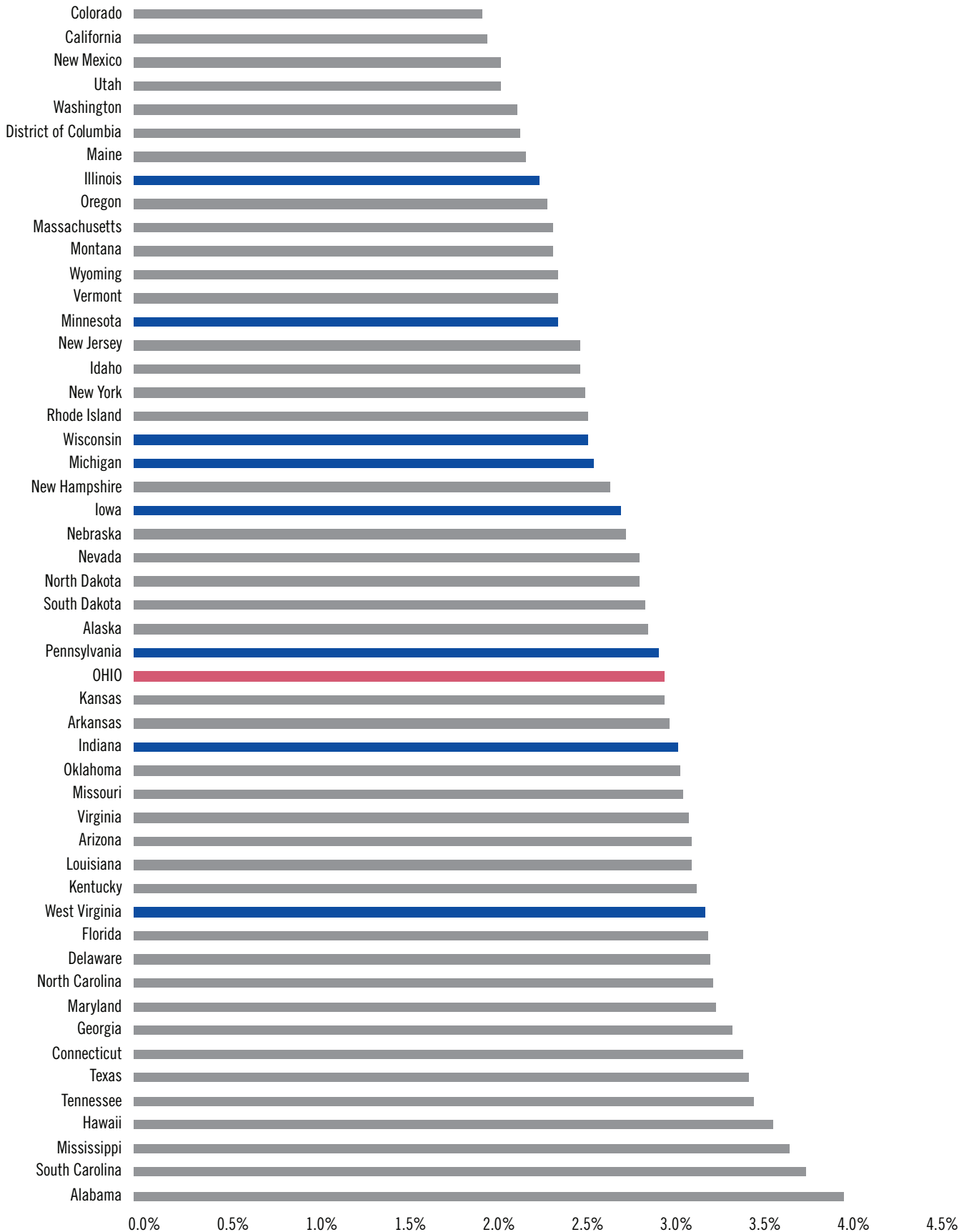
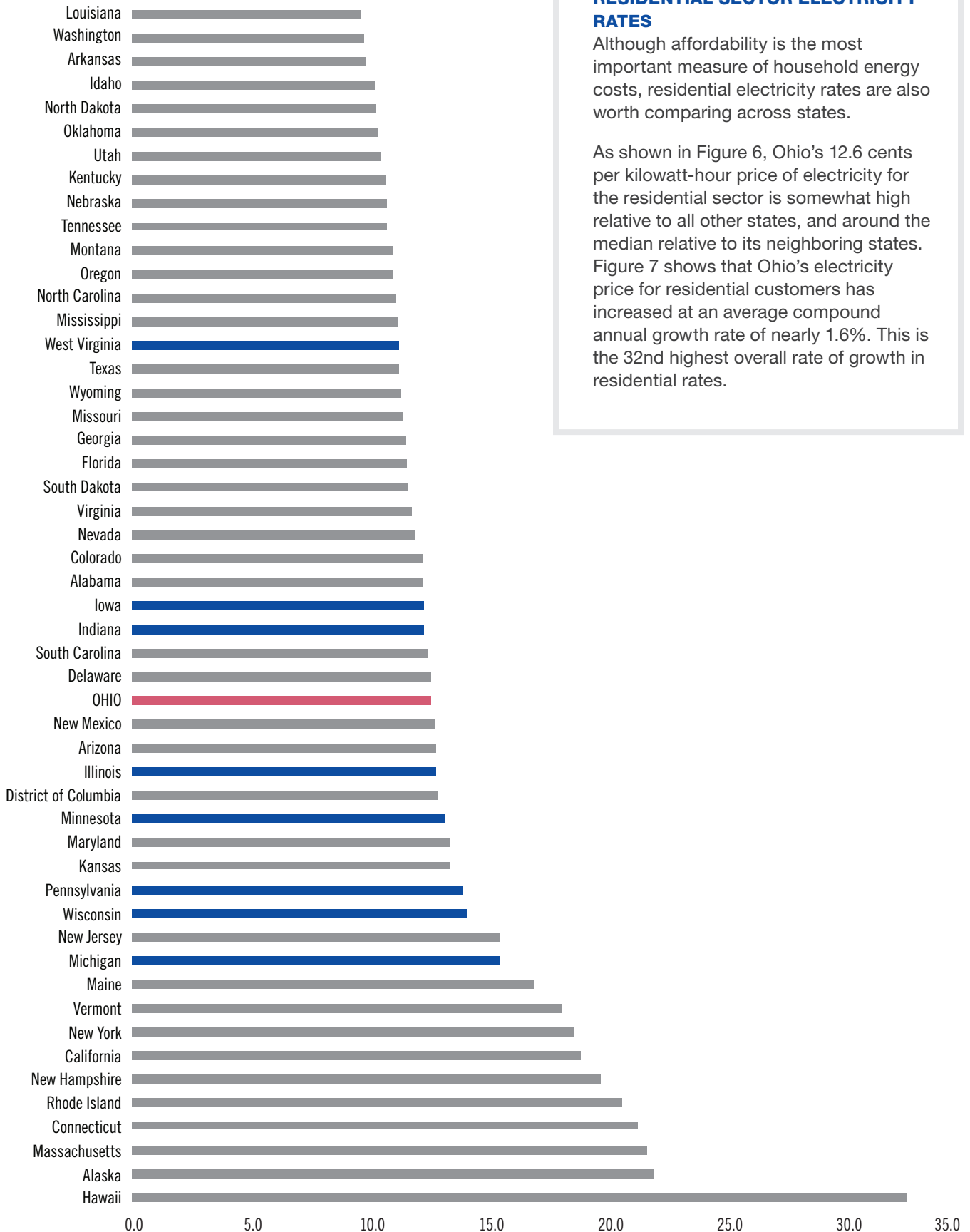


Figure 5: Electricity Expenditure as Percentage of Living Wage



**Figure 6: 2018 Residential Electricity Price**

*Cents/kWh*



**RESIDENTIAL SECTOR ELECTRICITY RATES**

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

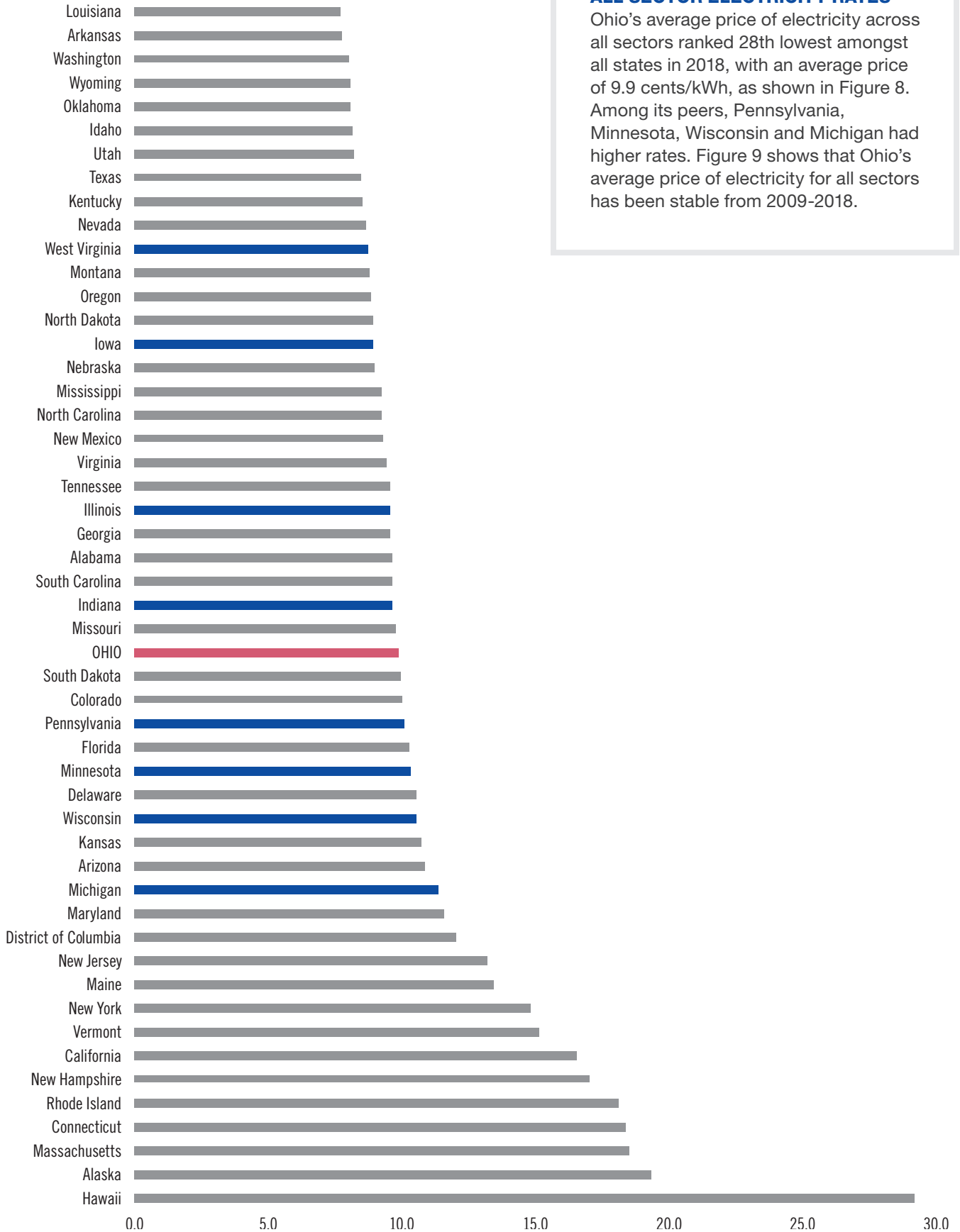
As shown in Figure 6, Ohio’s 12.6 cents per kilowatt-hour price of electricity for the residential sector is somewhat high relative to all other states, and around the median relative to its neighboring states. Figure 7 shows that Ohio’s electricity price for residential customers has increased at an average compound annual growth rate of nearly 1.6%. This is the 32nd highest overall rate of growth in residential rates.

**Figure 7: Residential Electricity Price***Average Price of Electricity: Residential Sector (Cents/kWh)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Louisiana	8.1	9.0	9.0	8.4	9.4	9.6	9.3	9.3	9.7	9.6	2%
Washington	7.7	8.0	8.3	8.5	8.7	8.7	9.1	9.5	9.7	9.8	2%
Arkansas	9.1	8.9	9.0	9.3	9.6	9.5	9.8	9.9	10.3	9.8	1%
Idaho	7.8	8.0	7.9	8.7	9.3	9.7	9.9	10.0	10.0	10.2	3%
North Dakota	7.6	8.1	8.6	9.1	9.1	9.2	9.6	10.2	10.3	10.3	3%
Oklahoma	8.5	9.1	9.5	9.5	9.7	10.0	10.1	10.2	10.6	10.3	2%
Utah	8.5	8.7	9.0	9.9	10.4	10.7	10.9	11.0	11.0	10.4	2%
Kentucky	8.4	8.6	9.2	9.4	9.8	10.2	10.2	10.5	10.9	10.6	2%
Nebraska	8.5	8.9	9.3	10.0	10.3	10.4	10.6	10.8	11.0	10.7	2%
Tennessee	9.3	9.2	10.0	10.1	10.0	10.3	10.3	10.4	10.7	10.7	1%
Montana	8.9	9.2	9.8	10.1	10.3	10.2	10.9	10.9	11.0	11.0	2%
Oregon	8.7	8.9	9.5	9.8	9.9	10.5	10.7	10.7	10.7	11.0	2%
North Carolina	10.0	10.1	10.3	10.9	11.0	11.1	11.3	11.0	10.9	11.1	1%
Mississippi	10.2	9.9	10.2	10.3	10.8	11.3	11.3	10.5	11.1	11.1	1%
West Virginia	7.9	8.8	9.4	9.9	9.5	9.3	10.1	11.4	11.6	11.2	4%
Texas	12.4	11.6	11.1	11.0	11.4	11.9	11.6	11.0	11.0	11.2	-1%
Wyoming	8.6	8.8	9.1	9.9	10.2	10.5	11.0	11.1	11.4	11.3	3%
Missouri	8.5	9.1	9.8	10.2	10.6	10.6	11.2	11.2	11.6	11.3	3%
Georgia	10.1	10.1	11.1	11.2	11.5	11.7	11.5	11.5	11.9	11.5	1%
Florida	12.4	11.4	11.5	11.4	11.3	11.9	11.6	11.0	11.6	11.5	-1%
South Dakota	8.5	9.0	9.4	10.1	10.3	10.5	11.1	11.5	11.8	11.6	3%
Virginia	10.6	10.5	10.6	11.1	10.8	11.1	11.4	11.4	11.6	11.7	1%
Nevada	12.9	12.4	11.6	11.8	11.9	12.9	12.8	11.4	12.0	11.9	-1%
Colorado	10.0	11.0	11.3	11.5	11.9	12.2	12.1	12.1	12.2	12.2	2%
Alabama	10.7	10.7	11.1	11.4	11.3	11.5	11.7	12.0	12.6	12.2	1%
Iowa	10.0	10.4	10.5	10.8	11.0	11.2	11.6	11.9	12.3	12.2	2%
Indiana	9.5	9.6	10.1	10.5	11.0	11.5	11.6	11.8	12.3	12.3	3%
South Carolina	10.4	10.5	11.1	11.8	12.0	12.5	12.6	12.7	13.0	12.4	2%
Delaware	14.1	13.8	13.7	13.6	13.0	13.3	13.4	13.4	13.4	12.5	-1%
<b>OHIO</b>	<b>10.7</b>	<b>11.3</b>	<b>11.4</b>	<b>11.8</b>	<b>12.0</b>	<b>12.5</b>	<b>12.8</b>	<b>12.5</b>	<b>12.6</b>	<b>12.6</b>	<b>2%</b>
New Mexico	10.0	10.5	11.0	11.4	11.7	12.3	12.5	12.0	12.9	12.7	2%
Arizona	10.7	11.0	11.1	11.3	11.7	11.9	12.1	12.2	12.4	12.8	2%
Illinois	11.3	11.5	11.8	11.4	10.6	11.9	12.5	12.5	13.0	12.8	1%
District of Columbia	13.7	14.0	13.4	12.3	12.6	12.7	13.0	12.3	12.9	12.8	-1%
Minnesota	10.0	10.6	11.0	11.4	11.8	12.0	12.1	12.7	13.0	13.1	3%
Maryland	15.0	14.3	13.3	12.8	13.3	13.6	13.8	14.2	14.0	13.3	-1%
Kansas	9.5	10.0	10.7	11.2	11.6	12.2	12.3	13.1	13.3	13.4	3%
Pennsylvania	11.7	12.7	13.3	12.8	12.8	13.3	13.6	13.9	14.2	13.9	2%
Wisconsin	11.9	12.7	13.0	13.2	13.6	13.7	14.1	14.1	14.4	14.0	2%
New Jersey	16.3	16.6	16.2	15.8	15.7	15.8	15.8	15.7	15.7	15.4	-1%
Michigan	11.6	12.5	13.3	14.1	14.6	14.5	14.4	15.2	15.4	15.5	3%
Maine	15.6	15.7	15.4	14.7	14.4	15.3	15.6	15.8	16.0	16.8	1%
Vermont	14.9	15.6	16.3	17.0	17.1	17.5	17.1	17.4	17.7	18.0	2%
New York	17.5	18.7	18.3	17.6	18.8	20.1	18.5	17.6	18.0	18.5	1%
California	14.7	14.8	14.8	15.3	16.2	16.3	17.0	17.4	18.3	18.8	2%
New Hampshire	16.4	16.3	16.5	16.1	16.3	17.5	18.5	18.4	19.2	19.7	2%
Rhode Island	15.6	15.9	14.3	14.4	15.2	17.2	19.3	18.6	18.3	20.6	3%
Connecticut	20.3	19.3	18.1	17.3	17.6	19.8	20.9	20.0	20.3	21.2	0%
Massachusetts	16.9	14.6	14.7	14.9	15.8	17.4	19.8	19.0	20.1	21.6	3%
Alaska	17.1	16.3	17.6	17.9	18.1	19.1	19.8	20.3	21.3	21.9	2%
Hawaii	24.2	28.1	34.7	37.3	37.0	37.0	29.6	27.5	29.5	32.5	3%

**Figure 8: 2018 All Sector Electricity Price**

*Cents/kWh*



**ALL SECTOR ELECTRICITY RATES**  
 Ohio's average price of electricity across all sectors ranked 28th lowest amongst all states in 2018, with an average price of 9.9 cents/kWh, as shown in Figure 8. Among its peers, Pennsylvania, Minnesota, Wisconsin and Michigan had higher rates. Figure 9 shows that Ohio's average price of electricity for all sectors has been stable from 2009-2018.



**Figure 9: All Sector Electricity Price**  
*Average Price of Electricity: All Sectors (Cents/kWh)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Louisiana	7.1	7.8	7.7	6.9	8.0	8.1	7.7	7.5	7.8	7.7	1%
Arkansas	7.6	7.3	7.4	7.6	7.9	7.9	8.2	8.1	8.3	7.8	0%
Washington	6.6	6.7	6.8	6.9	7.1	7.1	7.4	7.7	7.9	8.0	2%
Wyoming	6.1	6.2	6.6	7.2	7.6	7.8	8.0	8.2	8.3	8.1	3%
Oklahoma	6.9	7.6	7.8	7.5	7.9	8.2	7.9	7.8	8.2	8.1	2%
Idaho	6.5	6.5	6.4	6.9	7.6	7.9	8.1	8.1	8.3	8.2	2%
Utah	6.8	6.9	7.1	7.8	8.2	8.4	8.5	8.7	8.6	8.2	2%
Texas	9.9	9.3	9.0	8.6	8.7	8.9	8.7	8.4	8.4	8.5	-1%
Kentucky	6.5	6.7	7.2	7.3	7.7	8.2	8.1	8.4	8.6	8.5	3%
Nevada	10.4	9.7	9.0	9.0	9.0	9.7	9.5	8.4	8.8	8.7	-2%
West Virginia	6.7	7.5	7.9	8.1	7.9	7.7	8.1	9.0	9.0	8.7	3%
Montana	7.6	7.8	8.2	8.3	8.6	8.6	8.9	8.8	8.9	8.8	2%
Oregon	7.5	7.6	8.0	8.2	8.4	8.7	8.8	8.8	8.8	8.9	2%
North Dakota	6.6	7.1	7.5	7.8	8.2	8.4	8.8	8.9	8.8	8.9	3%
Iowa	7.4	7.7	7.6	7.7	8.1	8.2	8.4	8.6	8.7	8.9	2%
Nebraska	7.2	7.5	7.9	8.4	8.7	8.8	8.9	9.1	9.1	9.0	2%
Mississippi	8.9	8.6	8.8	8.6	9.1	9.6	9.5	8.7	9.1	9.2	0%
North Carolina	8.5	8.7	8.6	9.2	9.2	9.3	9.4	9.2	9.0	9.3	1%
New Mexico	8.1	8.4	8.7	8.8	9.3	9.7	9.6	9.1	9.6	9.4	1%
Virginia	8.9	8.7	8.8	9.1	9.0	9.2	9.3	9.1	9.2	9.5	1%
Tennessee	8.7	8.6	9.3	9.3	9.1	9.4	9.3	9.2	9.5	9.6	1%
Illinois	9.2	9.1	9.0	8.4	8.3	9.4	9.4	9.4	9.5	9.6	0%
Georgia	8.8	8.9	9.6	9.4	9.7	10.0	9.6	9.6	9.8	9.6	1%
Alabama	8.8	8.9	9.1	9.2	9.0	9.3	9.3	9.6	9.8	9.6	1%
South Carolina	8.4	8.5	8.8	9.1	9.2	9.7	9.6	9.8	10.0	9.7	1%
Indiana	7.6	7.7	8.0	8.3	8.7	9.1	9.0	9.2	9.8	9.8	2%
Missouri	7.4	7.8	8.3	8.5	9.0	9.1	9.4	9.7	10.0	9.9	3%
<b>OHIO</b>	<b>9.0</b>	<b>9.1</b>	<b>9.0</b>	<b>9.1</b>	<b>9.2</b>	<b>9.7</b>	<b>10.0</b>	<b>9.8</b>	<b>9.8</b>	<b>9.9</b>	<b>1%</b>
South Dakota	7.4	7.8	8.1	8.5	8.9	9.1	9.5	9.8	10.1	10.0	3%
Colorado	8.3	9.2	9.4	9.4	9.9	10.1	9.9	9.8	10.0	10.0	2%
Pennsylvania	9.6	10.3	10.5	9.9	9.8	10.3	10.3	10.2	10.1	10.1	1%
Florida	11.5	10.6	10.6	10.4	10.2	10.8	10.5	9.9	10.4	10.3	-1%
Minnesota	8.1	8.4	8.7	8.9	9.4	9.5	9.5	10.0	10.3	10.4	2%
Delaware	12.2	12.0	11.5	11.1	10.9	11.2	11.2	11.1	10.9	10.6	-1%
Wisconsin	9.4	9.8	10.2	10.3	10.5	10.6	10.7	10.7	10.8	10.6	1%
Kansas	8.0	8.4	8.9	9.3	9.7	10.2	10.1	10.5	10.6	10.7	3%
Arizona	9.6	9.7	9.7	9.8	10.1	10.2	10.3	10.3	10.6	10.9	1%
Michigan	9.4	9.9	10.4	11.0	11.2	11.0	10.8	11.1	11.3	11.4	2%
Maryland	13.1	12.7	11.9	11.3	11.7	12.1	12.1	12.2	12.0	11.6	-1%
District of Columbia	13.2	13.4	12.8	11.9	11.9	12.1	12.1	11.7	11.8	12.0	-1%
New Jersey	14.5	14.7	14.3	13.7	13.7	14.0	13.7	13.4	13.3	13.2	-1%
Maine	13.1	12.8	12.6	11.8	11.9	12.7	12.8	12.8	13.0	13.4	0%
New York	15.4	16.4	15.9	15.2	15.4	16.3	15.3	14.5	14.7	14.8	0
Vermont	12.8	13.2	13.8	14.2	14.6	14.6	14.4	14.5	14.6	15.1	2%
California	13.2	13.0	13.1	13.5	14.3	15.2	15.4	15.2	16.1	16.6	2%
New Hampshire	15.1	14.8	14.7	14.2	14.3	15.2	16.0	15.7	16.2	17.0	1%
Rhode Island	14.2	14.1	13.0	12.7	13.7	15.4	17.0	16.3	16.4	18.1	2%
Connecticut	18.1	17.4	16.4	15.5	15.7	17.1	17.8	17.2	17.6	18.4	0%
Massachusetts	15.5	14.3	14.1	13.8	14.5	15.4	16.9	16.5	17.1	18.5	2%
Alaska	15.1	14.8	16.1	16.3	16.5	17.5	17.6	17.9	19.1	19.4	3%
Hawaii	21.2	25.1	31.6	34.0	33.3	33.4	26.2	23.9	26.1	29.2	3%

# Reliability Metrics: Ohio vs. Other States

Electricity is one of the essentials of life, impacting both comfort and public safety, so reliability of electricity supply is an important attribute of utility performance. Much of the public discussion about electric utility reliability focuses on what regulators and utilities call “Resource Adequacy.” This ensures there is sufficient power generation capacity to satisfy each utility’s peak customer demand. However, power outages that utility customers experience on a regular basis are not caused by insufficient generation capacity or long-distance transmission—which together account for only about 1% of outage minutes nationally—but by breakdowns in the electricity delivery system. These outages have many different causes, including powerlines that are damaged in storms; animals that touch pairs of lines and cause a “short;” and equipment failures.

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 outages 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 2018. The EIA collects SAIDI and SAIFI metrics with and without Major Event Days (MED). Major Event Days are a statistical classification, defined by the Institute of Electrical and Electronics Engineers, of large outage events such as ice storms, windstorms 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.<sup>1</sup>

Table 4 shows Ohio’s 2018 performance on each of these standard reliability metrics, with and without Major Event Days. In addition, Ohio’s rank from best to worst (1=best, 51=worst) among states and the District of Columbia is shown in parenthesis for each metric.

**Table 4: 2018 Standard Reliability in Ohio**

<b>2018 Metric</b>	<b>With Major Event Days</b>	<b>Without Major Event Days</b>
Annual minutes of outages per customer (SAIDI)	242 minutes (26 <sup>th</sup> best)	151 minutes (39 <sup>th</sup> best)
Annual outages per customer (SAIFI)	1.41 outages (30 <sup>th</sup> best)	1.17 outages (34 <sup>th</sup> best)
Average restoration time per outage (CAIDI)	169 minutes (29 <sup>th</sup> best)	124 minutes (40 <sup>th</sup> best)

Ohio’s performance on several reliability measures ranks among the worst performing states. More detailed analysis of the reliability of Ohio’s electric utilities compared to that of other states follows.

<sup>1</sup> SAIFI values over 500 were considered data entry errors.

**Figure 10: 2018 SAIDI with MED**

*Average Minutes of Outage per Customer per Year (SAIDI) with Major Event Days*



**SAIDI—AVERAGE MINUTES OF OUTAGE PER CUSTOMER PER YEAR**

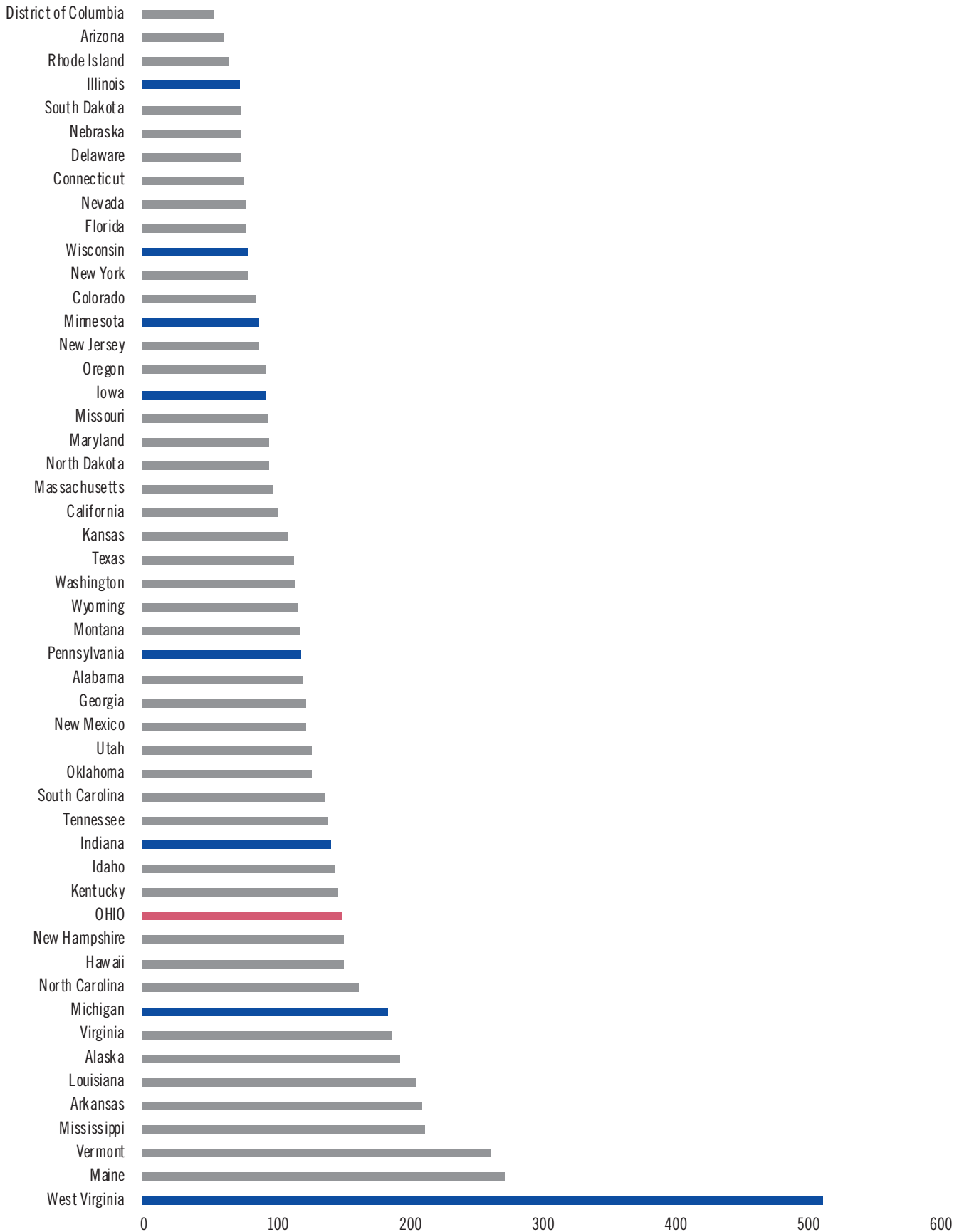
As can be seen in Figure 10 and Figure 11, in 2018 Ohio ranked 26th best amongst the states in overall average number of minutes of outage per customer (SAIDI with Major Event Days) over the year and 39th best (or 13th worst) in number of minutes of outage per customer (SAIDI without Major Event Days) over the year.

Annual data from 2013-2018 in Figure 12 and Figure 13 show that Ohio’s performance in SAIDI with Major Event Days has remained average, while SAIDI without Major Event Days has remained average to high relative to other states over the last six years.

Ohio’s neighboring states are highlighted to facilitate comparison within the region. Compared to its peer states, Ohio was in the middle of the pack for average minutes of outage with Major Event Days per year, but it had the third highest without Major Event Days.

**Figure 11: 2018 SAIDI without MED**

*Average Minutes of Outage per Customer per Year (SAIDI) without Major Event Days*



**Figure 12: SAIDI with MED***Average Minutes of Outage per Customer per Year (SAIDI) with Major Event Days*

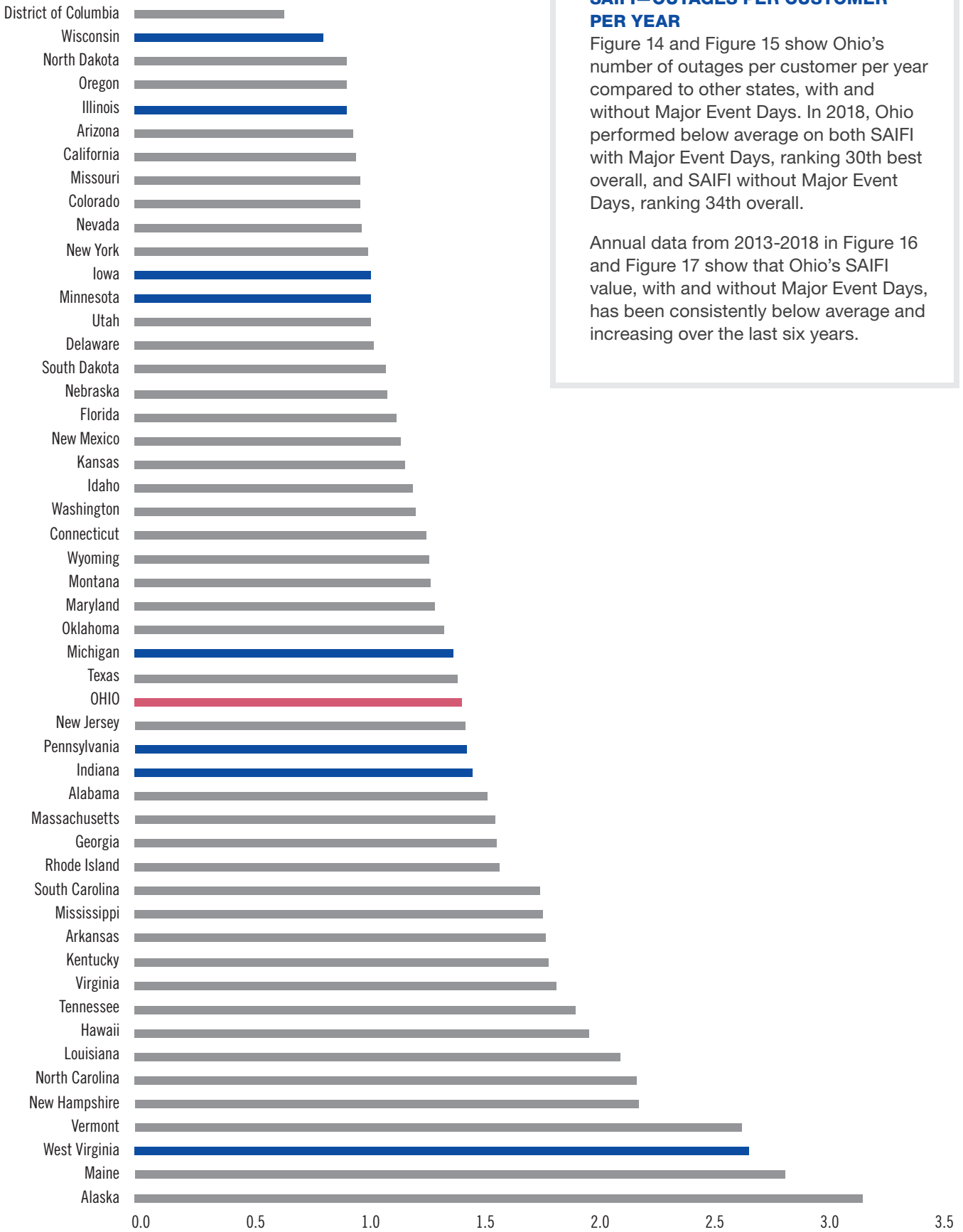
State	2013	2014	2015	2016	2017	2018
South Dakota	1100	107	126	216	95	92
North Dakota	113	81	104	120	87	94
District of Columbia	124	96	112	115	58	109
Oregon	167	277	200	285	313	113
Colorado	127	83	109	164	228	113
Arizona	74	84	90	86	91	115
Wisconsin	143	139	105	136	204	123
Utah	190	187	200	190	139	125
Nevada	66	74	107	96	114	126
Iowa	122	164	97	117	119	127
Minnesota	359	120	154	302	129	127
Wyoming	369	193	187	193	216	135
Delaware	158	169	190	149	154	136
New Mexico	149	82	122	136	141	138
Montana	161	139	287	154	215	143
Illinois	184	195	169	135	120	143
Missouri	304	126	167	204	264	150
Kansas	244	139	265	168	365	155
Texas	182	188	269	211	481	167
Idaho	255	240	459	201	311	174
Oklahoma	611	109	824	317	290	176
Nebraska	128	120	87	90	154	188
Hawaii	145	262	266	126	252	191
California	98	103	118	117	233	195
Tennessee	129	185	219	208	482	200
<b>OHIO</b>	<b>217</b>	<b>170</b>	<b>172</b>	<b>173</b>	<b>248</b>	<b>242</b>
Mississippi	178	184	297	282	557	268
Washington	155	303	550	224	271	270
Louisiana	253	196	312	378	378	276
Indiana	226	234	242	250	211	286
Alabama	230	197	209	174	316	308
Florida	82	92	85	337	2381	310
Arkansas	251	212	303	397	395	323
Alaska	358	253	597	195	153	335
Maryland	112	236	124	120	116	337
Georgia	138	235	241	420	1042	373
New York	86	67	87	107	227	406
Kentucky	227	283	200	192	194	406
Michigan	785	551	350	268	779	443
South Carolina	111	755	224	1647	373	470
Virginia	449	176	201	237	190	507
New Hampshire	189	725	105	192	1113	509
New Jersey	166	112	261	137	86	510
Pennsylvania	139	400	157	126	177	518
Rhode Island	783	54	342	169	728	595
Connecticut	79	86	104	174	291	656
Maine	16	474	102	535	2493	665
West Virginia	542	663	815	743	691	740
Massachusetts	427	124	91	145	275	813
Vermont	7	741	204	352	874	898
North Carolina	228	440	210	823	265	1762

**Figure 13: SAIDI without MED***Average Minutes of Outage per Customer per Year (SAIDI) without Major Event Days*

State	2013	2014	2015	2016	2017	2018
District of Columbia	124	82	112	115	58	53
Arizona	55	52	55	58	51	61
Rhode Island	57	54	64	69	59	65
Illinois	84	92	89	81	73	73
South Dakota	171	100	103	80	76	74
Nebraska	54	66	52	54	70	74
Delaware	129	114	115	103	83	74
Connecticut	55	86	70	92	68	76
Nevada	51	61	55	74	88	77
Florida	74	84	77	82	78	77
Wisconsin	75	71	69	77	78	79
New York	43	46	77	83	72	79
Colorado	82	78	82	82	78	85
Minnesota	87	75	78	88	73	87
New Jersey	123	79	65	86	71	88
Oregon	82	106	101	101	111	93
Iowa	77	93	86	92	95	93
Missouri	88	90	93	83	96	94
Maryland	111	85	109	105	86	95
North Dakota	88	78	81	98	64	95
Massachusetts	83	82	74	113	91	99
California	84	86	93	99	103	102
Kansas	111	106	127	132	131	109
Texas	105	112	137	129	133	114
Washington	97	115	110	111	132	115
Wyoming	169	178	166	150	191	118
Montana	139	124	141	128	162	118
Pennsylvania	99	100	99	101	109	119
Alabama	114	122	122	115	116	121
Georgia	87	90	106	122	121	123
New Mexico	98	75	99	101	111	123
Utah	176	148	156	106	115	127
Oklahoma	109	101	177	149	138	127
South Carolina	97	97	119	120	118	137
Tennessee	92	105	121	157	133	139
Indiana	107	115	120	126	131	142
Idaho	172	183	263	170	247	145
Kentucky	146	158	116	137	120	147
<b>OHIO</b>	<b>112</b>	<b>130</b>	<b>141</b>	<b>128</b>	<b>143</b>	<b>151</b>
New Hampshire	123	122	94	141	151	152
Hawaii	116	117	117	96	104	152
North Carolina	111	118	127	146	146	162
Michigan	199	179	178	193	179	185
Virginia	135	141	146	163	140	188
Alaska	222	195	162	181	137	193
Louisiana	98	111	152	179	184	206
Arkansas	207	203	213	208	178	210
Mississippi	117	147	187	180	201	212
Vermont	2	212	204	270	247	262
Maine	4	83	87	264	238	273
West Virginia	418	450	458	439	452	513

**Figure 14: 2018 SAIFI with MED**

*Outages per Customer per Year (SAIFI) with Major Event Days*



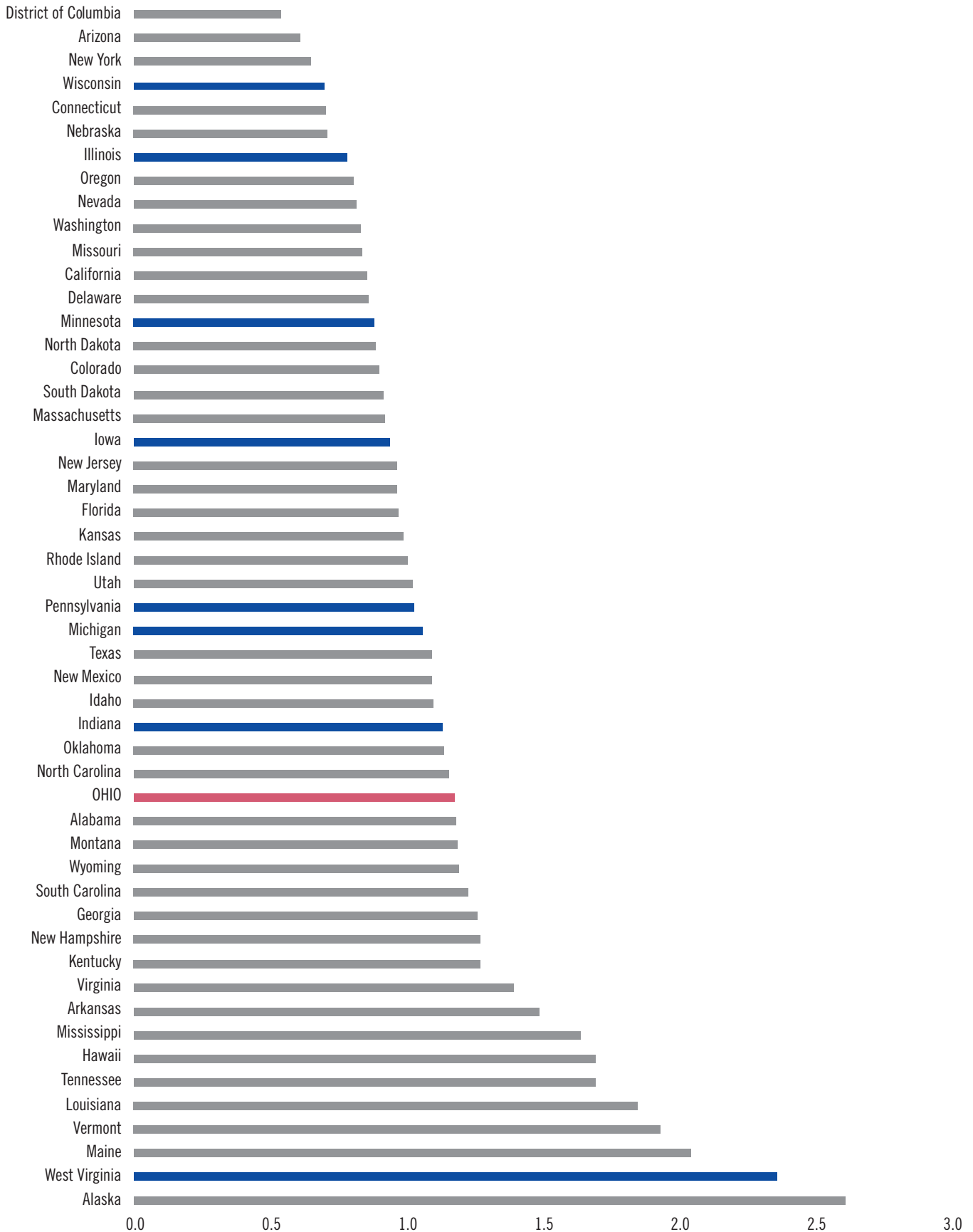
**SAIFI—OUTAGES PER CUSTOMER PER YEAR**

Figure 14 and Figure 15 show Ohio’s number of outages per customer per year compared to other states, with and without Major Event Days. In 2018, Ohio performed below average on both SAIFI with Major Event Days, ranking 30th best overall, and SAIFI without Major Event Days, ranking 34th overall.

Annual data from 2013-2018 in Figure 16 and Figure 17 show that Ohio’s SAIFI value, with and without Major Event Days, has been consistently below average and increasing over the last six years.



**Figure 15: 2018 SAIFI without MED**  
*Outages per Customer per Year (SAIFI) without Major Event Days*



**Figure 16: SAIFI with MED***Outages per Customer per Year (SAIFI) with Major Event Days*

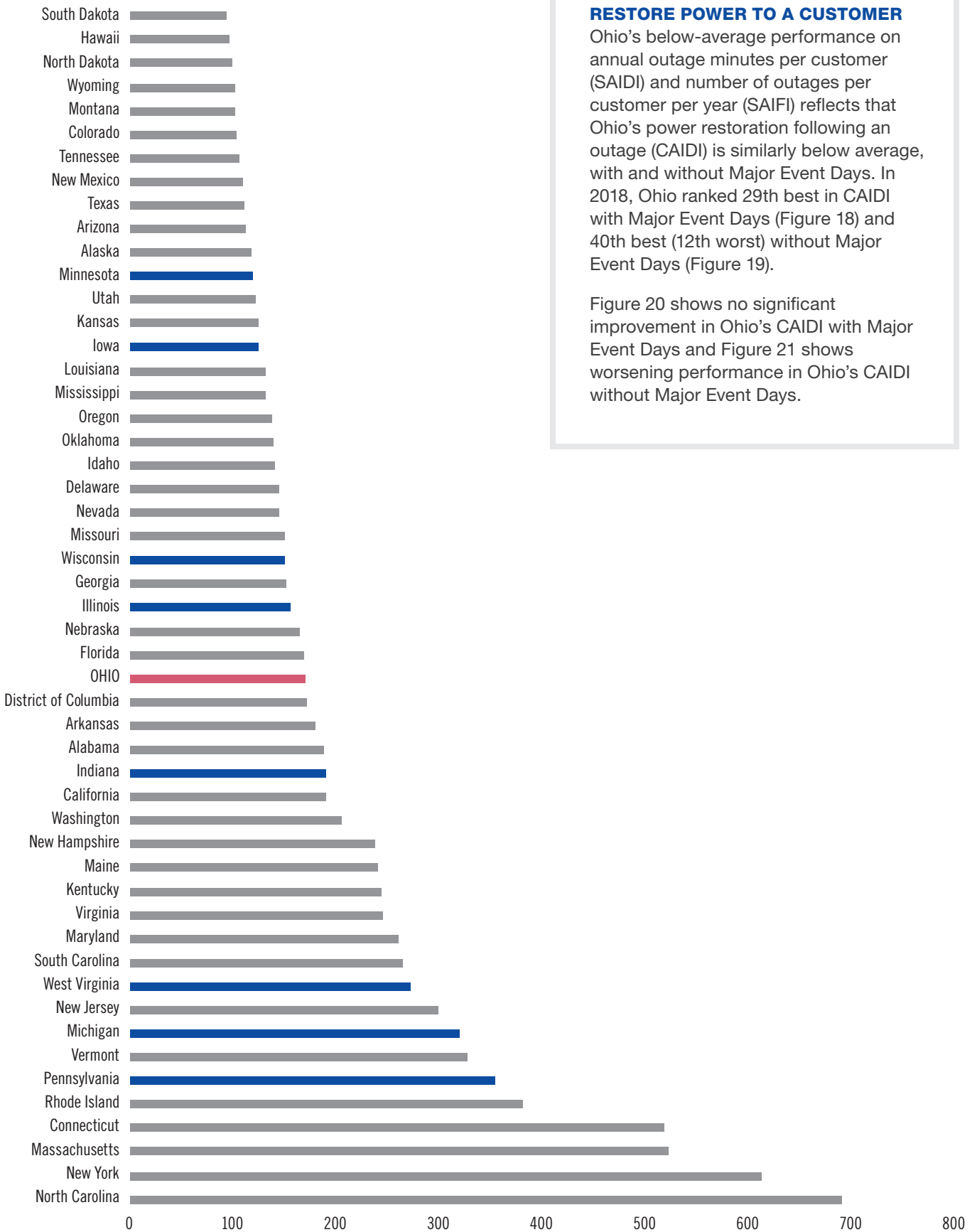
State	2013	2014	2015	2016	2017	2018
District of Columbia	0.9	0.7	0.7	0.8	0.6	0.6
Wisconsin	0.8	0.8	1.3	1.0	0.9	0.8
North Dakota	0.9	0.9	1.1	1.0	0.9	0.9
Oregon	0.8	1.3	1.2	1.3	1.4	0.9
Illinois	1.1	1.1	1.1	1.0	0.9	0.9
Arizona	0.8	0.8	2.9	0.8	0.9	0.9
California	0.9	0.9	0.9	1.0	1.3	1.0
Missouri	1.1	1.1	1.1	1.0	1.2	1.0
Colorado	1.1	0.9	1.0	1.1	1.2	1.0
Nevada	0.7	0.7	0.7	0.8	0.9	1.0
New York	0.7	0.7	0.7	0.8	0.8	1.0
Iowa	1.0	1.2	1.0	1.0	1.0	1.0
Minnesota	1.7	1.4	1.0	1.2	0.9	1.0
Utah	1.6	1.4	1.4	1.3	1.1	1.0
Delaware	1.5	1.4	1.5	1.4	1.1	1.0
South Dakota	1.8	0.9	1.0	1.2	1.1	1.1
Nebraska	1.0	1.3	0.7	0.7	0.9	1.1
Florida	1.1	1.2	1.1	1.4	2.0	1.1
New Mexico	1.1	0.8	3.4	1.8	1.3	1.1
Kansas	1.6	1.3	2.3	1.4	1.5	1.2
Idaho	1.6	1.3	1.7	1.4	1.7	1.2
Washington	1.1	1.5	1.7	1.2	1.3	1.2
Connecticut	0.7	0.7	0.7	1.1	0.9	1.3
Wyoming	1.8	1.5	1.5	1.5	1.7	1.3
Montana	1.4	1.1	1.8	1.3	1.6	1.3
Maryland	4.1	1.3	1.1	1.1	1.0	1.3
Oklahoma	1.8	1.0	1.7	1.6	1.4	1.3
Michigan	1.5	2.6	2.2	1.1	1.4	1.4
Texas	1.5	1.4	2.0	1.6	1.7	1.4
<b>OHIO</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.2</b>	<b>1.4</b>	<b>1.4</b>
New Jersey	1.3	1.0	1.0	1.2	0.9	1.4
Pennsylvania	1.0	1.2	1.0	1.1	1.1	1.4
Indiana	1.2	1.3	1.3	1.3	1.3	1.5
Alabama	3.2	3.2	1.7	1.6	2.0	1.5
Massachusetts	1.1	1.0	0.8	1.0	1.1	1.6
Georgia	1.3	1.5	1.5	1.5	2.4	1.6
Rhode Island	1.3	0.8	1.2	1.2	1.2	1.6
South Carolina	1.8	1.8	1.4	2.4	1.6	1.7
Mississippi	1.5	1.5	1.8	1.9	2.2	1.8
Arkansas	1.8	1.8	2.0	2.0	2.0	1.8
Kentucky	1.8	1.9	1.3	1.5	1.3	1.8
Virginia	2.9	1.4	1.4	1.5	1.4	1.8
Tennessee	3.0	1.7	2.0	2.0	1.8	1.9
Hawaii	2.1	2.3	3.0	1.9	2.1	2.0
Louisiana	2.4	2.4	2.3	2.1	2.3	2.1
North Carolina	2.2	1.5	1.3	1.8	1.3	2.2
New Hampshire	2.2	2.3	1.4	1.5	2.3	2.2
Vermont	2.2	2.2	1.7	1.9	2.4	2.6
West Virginia	2.3	2.4	2.4	2.4	2.3	2.6
Maine	2.9	10.9	1.9	2.7	3.1	2.8
Alaska	6.1	2.4	2.6	2.3	1.7	3.1

**Figure 17: SAIFI without MED***Outages per Customer per Year (SAIFI) without Major Event Days*

State	2013	2014	2015	2016	2017	2018
District of Columbia	0.9	0.6	0.7	0.8	0.6	0.5
Arizona	0.6	0.6	1.3	0.6	0.6	0.6
New York	0.6	0.6	0.6	0.7	0.6	0.6
Wisconsin	0.7	0.7	1.1	0.7	0.6	0.7
Connecticut	0.6	0.7	0.6	0.9	0.7	0.7
Nebraska	0.5	0.7	0.5	0.5	0.7	0.7
Illinois	0.9	0.9	0.9	0.8	0.8	0.8
Oregon	0.6	0.9	0.7	0.8	0.9	0.8
Nevada	0.6	0.6	0.6	0.7	0.8	0.8
Washington	0.8	1.0	0.8	0.8	0.9	0.8
Missouri	0.8	0.9	0.9	0.8	0.8	0.8
California	0.8	0.8	0.8	0.9	0.9	0.9
Delaware	1.3	1.2	1.3	1.2	1.0	0.9
Minnesota	1.3	1.3	0.8	0.9	0.8	0.9
North Dakota	0.9	1.0	0.9	1.0	0.8	0.9
Colorado	1.0	0.9	0.9	0.9	0.9	0.9
South Dakota	1.1	0.7	0.9	0.9	1.0	0.9
Massachusetts	0.9	0.8	0.7	0.9	0.6	0.9
Iowa	0.9	1.0	0.9	0.9	0.9	0.9
New Jersey	1.2	0.9	0.8	1.0	0.9	1.0
Maryland	4.4	1.0	1.0	1.0	0.9	1.0
Florida	1.0	1.1	1.1	1.1	1.0	1.0
Kansas	1.2	1.2	1.7	1.2	1.2	1.0
Rhode Island	0.7	0.8	0.9	1.0	0.8	1.0
Utah	1.3	1.2	1.3	1.0	0.9	1.0
Pennsylvania	0.9	0.9	0.9	1.0	0.9	1.0
Michigan	0.9	0.9	1.0	1.0	1.0	1.1
Texas	1.2	1.2	1.4	1.3	1.3	1.1
New Mexico	0.9	0.8	1.6	1.4	1.1	1.1
Idaho	1.4	1.1	1.4	1.2	1.6	1.1
Indiana	1.0	1.0	1.0	1.0	1.0	1.1
Oklahoma	1.0	1.0	1.1	1.3	1.1	1.1
North Carolina	1.9	1.0	1.1	1.1	1.1	1.2
<b>OHIO</b>	<b>1.0</b>	<b>1.1</b>	<b>1.1</b>	<b>1.1</b>	<b>1.1</b>	<b>1.2</b>
Alabama	2.9	2.9	1.2	1.2	1.1	1.2
Montana	1.3	1.1	1.4	1.1	1.4	1.2
Wyoming	1.6	1.5	1.4	1.4	1.6	1.2
South Carolina	1.7	1.1	1.2	1.2	1.1	1.2
Georgia	1.2	1.1	1.3	1.3	1.2	1.3
New Hampshire	1.3	1.6	1.4	1.4	1.5	1.3
Kentucky	1.4	1.5	1.1	1.3	1.1	1.3
Virginia	1.2	1.2	1.2	1.3	1.2	1.4
Arkansas	1.6	1.6	1.8	1.7	1.5	1.5
Mississippi	1.2	1.3	1.6	1.7	1.6	1.6
Hawaii	1.6	1.8	1.7	1.3	1.2	1.7
Tennessee	2.8	1.5	1.7	1.9	1.4	1.7
Louisiana	1.4	1.5	1.8	1.8	1.7	1.8
Vermont	1.9	1.5	1.8	1.8	1.9	1.9
Maine	2.0	2.5	1.8	2.2	2.2	2.0
West Virginia	1.7	2.1	2.2	2.1	2.1	2.4
Alaska	2.3	2.0	1.8	1.9	1.8	2.6

**Figure 18: 2018 CAIDI with MED**

*Average Minutes to Restore Power to Customer (CAIDI) with Major Event Days*



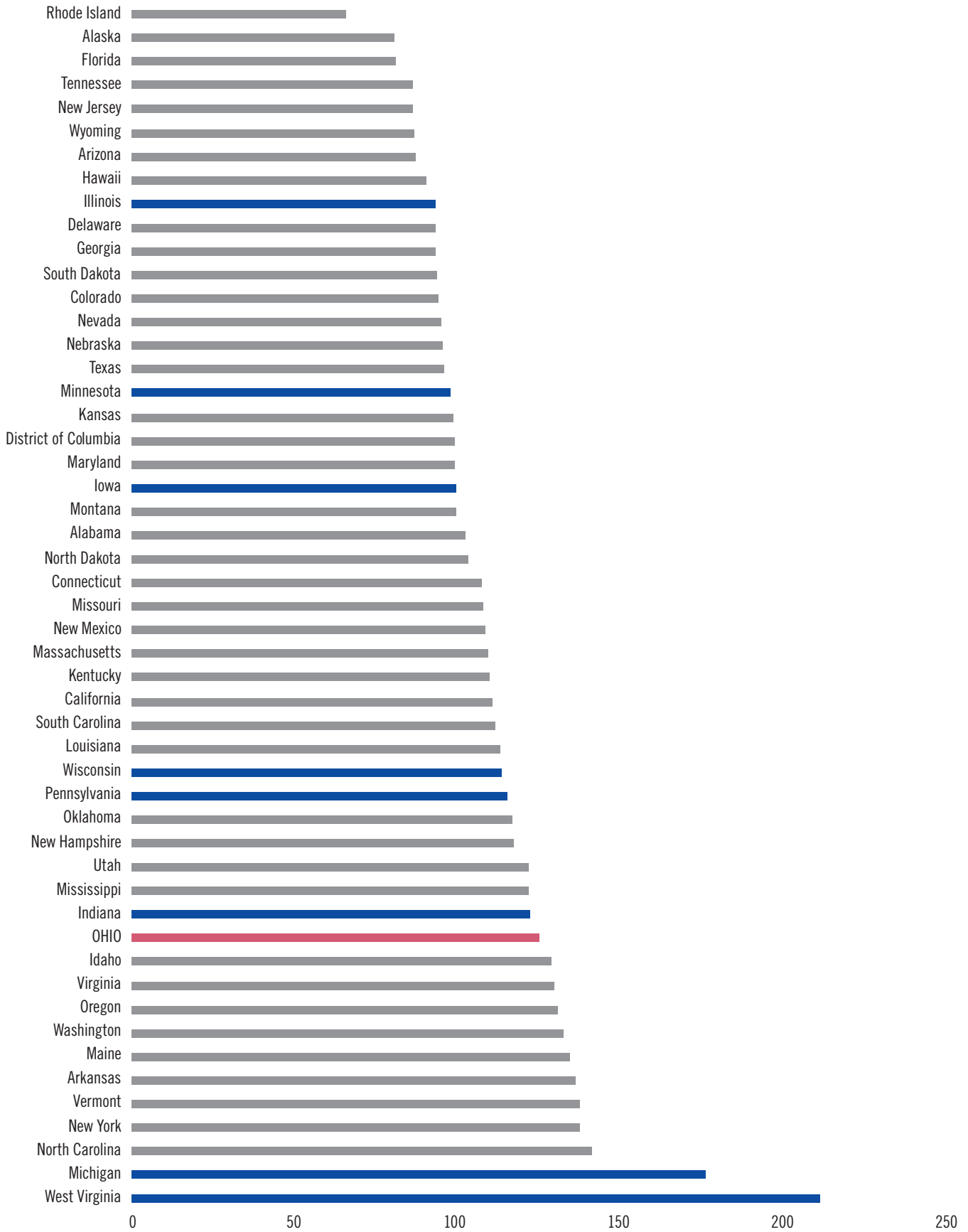
**CAIDI—AVERAGE MINUTES TO RESTORE POWER TO A CUSTOMER**

Ohio’s below-average performance on annual outage minutes per customer (SAIDI) and number of outages per customer per year (SAIFI) reflects that Ohio’s power restoration following an outage (CAIDI) is similarly below average, with and without Major Event Days. In 2018, Ohio ranked 29th best in CAIDI with Major Event Days (Figure 18) and 40th best (12th worst) without Major Event Days (Figure 19).

Figure 20 shows no significant improvement in Ohio’s CAIDI with Major Event Days and Figure 21 shows worsening performance in Ohio’s CAIDI without Major Event Days.

**Figure 19: 2018 CAIDI without MED**

*Average Minutes to Restore Power to Customer (CAIDI) without Major Event Days*



**Figure 20: CAIDI with MED***Average Minutes to Restore Power to Customer (CAIDI) with Major Event Days*

State	2013	2014	2015	2016	2017	2018
South Dakota	566	167	635	243	94	93
Hawaii	79	91	89	74	115	95
North Dakota	146	112	101	109	94	99
Wyoming	186	132	125	124	110	101
Montana	121	120	172	117	125	102
Colorado	270	87	104	128	138	104
Tennessee	85	177	108	109	255	106
New Mexico	142	89	113	86	96	109
Texas	120	120	166	122	236	110
Arizona	87	103	289	99	98	111
Alaska	151	111	207	83	104	117
Minnesota	320	115	162	201	151	118
Utah	133	136	142	149	126	120
Kansas	162	104	163	116	209	124
Iowa	130	137	98	110	117	124
Louisiana	91	71	146	178	161	131
Mississippi	105	85	147	135	210	131
Oregon	237	208	195	271	245	137
Oklahoma	443	221	869	205	189	138
Idaho	137	128	178	138	150	139
Delaware	110	127	128	115	145	143
Nevada	110	94	122	104	125	144
Missouri	265	130	156	183	215	149
Wisconsin	200	170	102	151	200	150
Georgia	102	135	137	245	442	150
Illinois	237	181	152	151	128	155
Nebraska	168	198	204	218	161	163
Florida	78	81	77	254	1157	167
<b>OHIO</b>	<b>184</b>	<b>138</b>	<b>137</b>	<b>141</b>	<b>184</b>	<b>169</b>
District of Columbia	141	139	164	140	104	170
Arkansas	160	150	158	198	189	179
Alabama	163	132	120	109	158	187
Indiana	192	283	289	319	161	188
California	116	110	125	115	173	189
Washington	143	189	300	175	191	204
New Hampshire	95	376	95	125	475	237
Maine	5	114	43	194	861	240
Kentucky	107	127	123	123	133	242
Virginia	256	123	138	148	137	244
Maryland	94	187	114	110	115	259
South Carolina	110	295	205	1183	217	264
West Virginia	232	279	321	300	280	270
New Jersey	125	115	183	109	87	297
Michigan	511	450	296	234	559	319
Vermont	3	333	117	183	347	325
Pennsylvania	140	294	157	117	153	352
Rhode Island	622	71	278	140	615	379
Connecticut	115	117	149	169	298	515
Massachusetts	371	125	111	145	248	519
New York	147	138	155	145	229	609
North Carolina	171	509	202	364	189	687

**Figure 21: CAIDI without MED***Average Minutes to Restore Power to Customer (CAIDI) without Major Event Days*

State	2013	2014	2015	2016	2017	2018
Rhode Island	80	71	69	71	76	65
Alaska	100	106	95	88	81	80
Florida	78	91	75	79	79	80
Tennessee	70	150	80	93	104	85
New Jersey	102	85	74	82	77	86
Wyoming	101	120	116	96	102	86
Arizona	122	91	83	95	98	86
Hawaii	80	67	70	78	86	90
Illinois	147	99	103	120	95	92
Delaware	101	100	90	94	88	93
Georgia	75	76	80	86	95	93
South Dakota	157	331	577	105	83	93
Colorado	219	83	90	88	88	93
Nevada	90	89	93	94	99	94
Nebraska	123	137	149	174	98	95
Texas	80	89	111	97	97	95
Minnesota	112	88	97	103	98	97
Kansas	89	89	96	104	99	98
District of Columbia	141	128	164	140	104	98
Maryland	93	86	104	103	100	98
Iowa	99	96	92	98	104	99
Montana	111	107	97	107	114	99
Alabama	97	107	96	98	108	101
North Dakota	92	79	94	92	77	103
Connecticut	105	117	107	108	100	107
Missouri	112	121	128	106	115	107
New Mexico	103	88	107	89	98	107
Massachusetts	93	100	102	124	501	109
Kentucky	94	95	90	103	101	109
California	106	102	112	109	111	110
South Carolina	100	89	132	132	102	111
Louisiana	79	82	87	101	107	112
Wisconsin	123	106	79	112	121	113
Pennsylvania	109	108	108	104	116	114
Oklahoma	116	225	301	121	125	116
New Hampshire	114	89	87	102	103	116
Utah	138	124	128	110	120	121
Mississippi	88	98	111	105	109	121
Indiana	108	207	118	154	123	121
<b>OHIO</b>	<b>114</b>	<b>119</b>	<b>121</b>	<b>119</b>	<b>122</b>	<b>124</b>
Idaho	113	116	135	137	140	128
Virginia	106	109	113	118	117	129
Oregon	125	124	142	136	141	130
Washington	119	120	127	133	138	132
Maine	2	29	39	119	110	133
Arkansas	128	159	122	123	121	135
Vermont	1	139	117	149	129	137
New York	105	120	148	129	134	137
North Carolina	109	320	164	127	127	140
Michigan	222	207	185	192	181	175
West Virginia	234	204	204	201	211	210



# Environmental Metrics: Ohio vs. Other States

Power generation can affect many aspects of the environment in multiple ways, but the most significant is through pollution. Power plants produce many different pollutants, but the largest quantities and arguably greatest effects are from:

- Carbon dioxide (CO<sub>2</sub>), which is the principal gas causing climate change and can reduce cognitive function;
- Sulfur dioxide (SO<sub>2</sub>), which causes asthma attacks, cardiopulmonary diseases, acid rain, and is a chemical precursor to the formation of small particles that when breathed cause respiratory problems, miscarriages and birth defects;
- Nitrogen oxides (NO<sub>x</sub>), which cause respiratory problems, including wheezing, asthma and other breathing difficulties, and is a chemical precursor to the formation of small particles and ozone in the air that also cause numerous health problems.

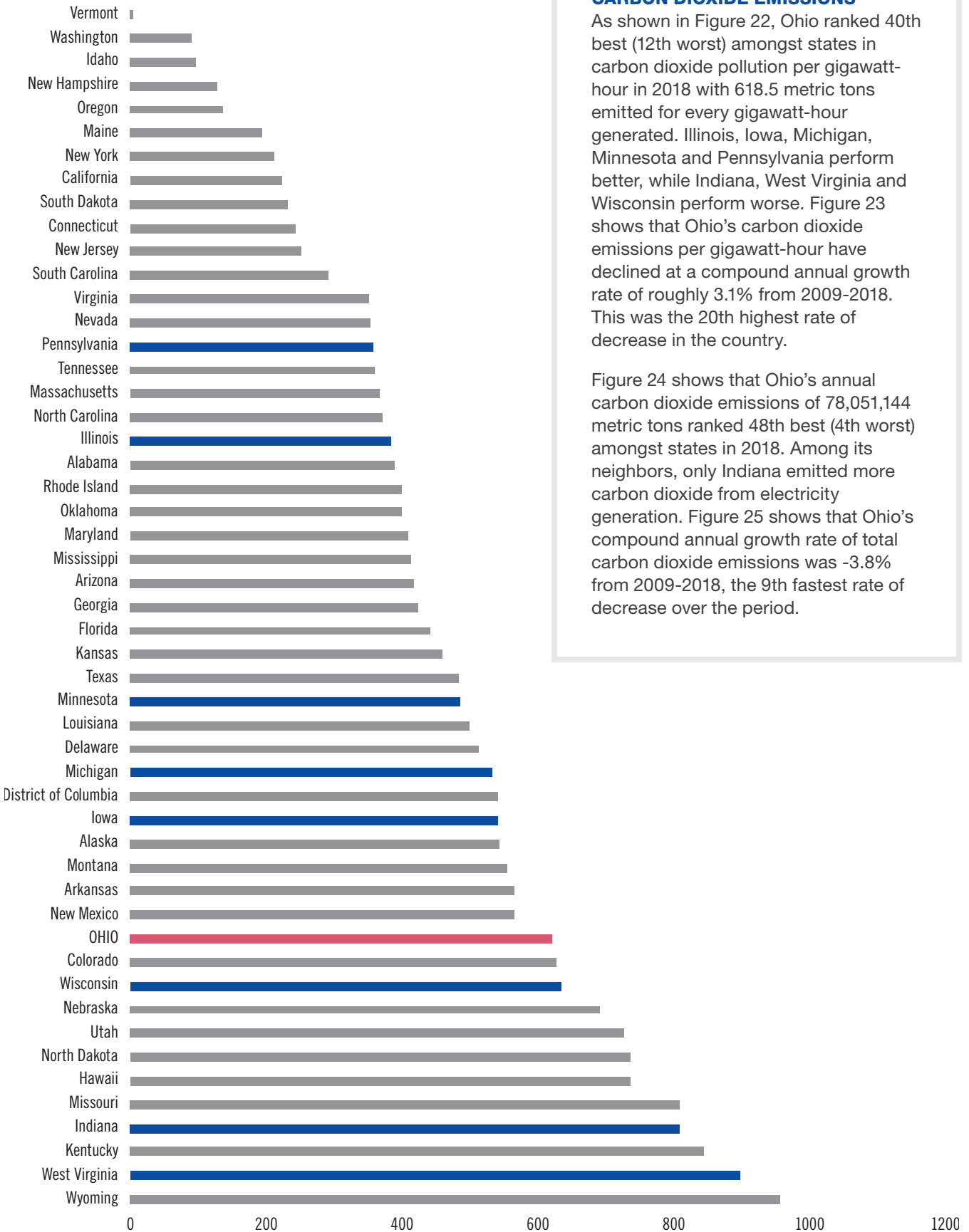
Electric utilities report emissions of key pollutants from each power plant to the Environmental Protection Agency (EPA), which compiles this information and makes it available to the Energy Information Administration. 2018 is the most recent complete compilation available and can be obtained from <https://www.eia.gov/electricity/data/emissions/>.

Environmental and human health impacts 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. Table 5 summarizes Ohio's 2018 contributions to total pollution and pollution per megawatt-hour (MWh) generated. Pollution quantities are in metric tons (approximately 2,200 pounds per metric ton), pollution rates are in metric tons per gigawatt-hour (million kilowatt-hours) of electricity generated, and Ohio's relative rank amongst the states is shown parenthetically after each of the pollution metrics, with lower rankings signifying better performance.

**Table 5: Ohio's 2018 Contributions to Total Pollution and Pollution Per Megawatt-hour (MWh) Generated**

Metric	Total Pollution (metric tons)	Pollution Intensity (metric tons/GWh)
Carbon Dioxide	78,051,144 (48 <sup>th</sup> lowest)	618.5 (40 <sup>th</sup> lowest)
Sulfur Dioxide	105,516 (49 <sup>th</sup> lowest)	0.84 (45 <sup>th</sup> lowest)
Nitrogen Oxides	60,606 (47 <sup>th</sup> lowest)	0.48 (36 <sup>th</sup> lowest)

**Figure 22: 2018 Carbon Dioxide Emission Intensity**  
*Electric Sector Carbon Dioxide Emission Intensity (Metric Tons/Gigawatt-hour)*



**CARBON DIOXIDE EMISSIONS**

As shown in Figure 22, Ohio ranked 40th best (12th worst) amongst states in carbon dioxide pollution per gigawatt-hour in 2018 with 618.5 metric tons emitted for every gigawatt-hour generated. Illinois, Iowa, Michigan, Minnesota and Pennsylvania perform better, while Indiana, West Virginia and Wisconsin perform worse. Figure 23 shows that Ohio’s carbon dioxide emissions per gigawatt-hour have declined at a compound annual growth rate of roughly 3.1% from 2009-2018. This was the 20th highest rate of decrease in the country.

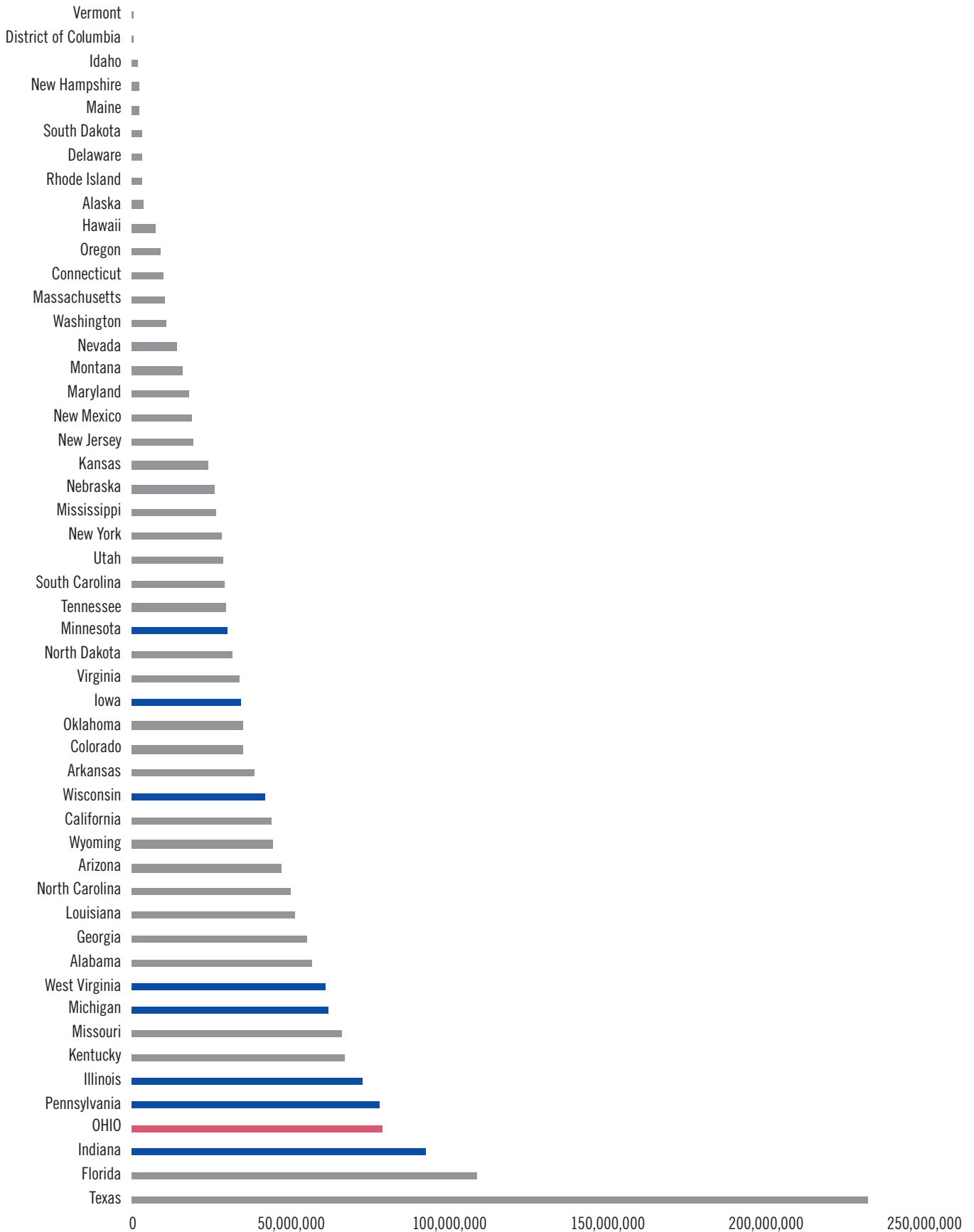
Figure 24 shows that Ohio’s annual carbon dioxide emissions of 78,051,144 metric tons ranked 48th best (4th worst) amongst states in 2018. Among its neighbors, only Indiana emitted more carbon dioxide from electricity generation. Figure 25 shows that Ohio’s compound annual growth rate of total carbon dioxide emissions was -3.8% from 2009-2018, the 9th fastest rate of decrease over the period.

**Figure 23: Carbon Dioxide Emission Intensity***Electric Sector Carbon Dioxide Emission Intensity (Metric Tons/Gigawatt-hour)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Vermont	1	1	4	2	2	2	6	6	7	5	18%
Washington	129	135	71	60	110	107	106	90	95	91	-3%
Idaho	78	101	50	76	128	98	119	117	102	97	2%
New Hampshire	273	250	256	223	174	177	183	131	113	128	-7%
Oregon	166	183	113	121	159	139	155	136	127	137	-2%
Maine	288	291	272	247	262	257	252	222	186	195	-4%
New York	286	304	271	263	246	248	236	233	200	211	-3%
California	290	271	239	298	287	289	282	239	216	223	-3%
South Dakota	428	359	243	285	319	281	202	232	229	231	-6%
Connecticut	258	276	243	249	245	251	241	235	228	243	-1%
New Jersey	260	292	261	247	244	270	260	272	240	252	0
South Carolina	381	397	376	354	302	341	309	289	272	291	-3%
Virginia	516	544	490	413	451	437	413	395	345	351	-4%
Nevada	485	484	462	424	431	451	378	365	345	353	-3%
Pennsylvania	531	535	517	492	479	462	424	395	371	358	-4%
Tennessee	545	585	561	537	479	521	505	503	453	359	-4%
Massachusetts	505	474	431	403	448	415	418	398	385	367	-3%
North Carolina	548	569	530	496	452	457	419	401	379	370	-4%
Illinois	511	512	505	478	482	478	435	386	385	384	-3%
Alabama	483	522	489	452	445	453	423	406	380	387	-2%
Rhode Island	413	416	412	410	454	408	414	407	391	400	0
Oklahoma	693	686	688	631	628	628	547	472	438	400	-5%
Maryland	586	605	565	547	529	547	504	500	392	407	-4%
Mississippi	482	493	452	445	429	436	389	418	404	412	-2%
Arizona	478	498	495	472	488	478	444	409	413	418	-1%
Georgia	598	600	572	483	470	497	460	451	430	424	-3%
Florida	527	540	516	503	489	492	471	463	451	441	-2%
Kansas	776	758	774	713	683	639	601	541	437	459	-5%
Texas	611	611	614	590	594	582	541	521	530	482	-2%
Minnesota	642	614	614	540	570	573	532	498	482	484	-3%
Louisiana	585	571	594	582	571	548	522	496	511	497	-2%
Delaware	856	744	596	577	608	555	524	500	484	512	-5%
Michigan	727	668	635	628	637	602	594	523	520	530	-3%
District of Columbia	1,007	954	872	921	740	716	662	622	553	540	-6%
Iowa	829	821	778	728	691	691	618	556	529	540	-4%
Alaska	633	610	633	620	580	589	585	547	544	543	-2%
Montana	657	684	565	576	612	584	619	593	564	554	-2%
Arkansas	530	558	586	557	619	605	515	525	548	564	1%
New Mexico	844	810	816	796	795	765	760	705	685	564	-4%
<b>OHIO</b>	<b>846</b>	<b>849</b>	<b>828</b>	<b>736</b>	<b>746</b>	<b>734</b>	<b>687</b>	<b>686</b>	<b>668</b>	<b>619</b>	<b>-3%</b>
Colorado	771	798	768	760	744	714	714	663	663	627	-2%
Wisconsin	738	734	731	646	723	717	681	630	659	634	-2%
Nebraska	703	668	755	774	756	668	635	630	630	690	0
Utah	839	841	831	824	840	804	803	741	740	725	-1%
North Dakota	954	894	851	856	864	834	841	790	724	734	-3%
Hawaii	787	765	755	728	723	730	727	729	726	735	-1%
Missouri	846	854	858	823	855	862	813	798	811	806	0
Indiana	952	929	897	870	905	907	856	839	828	807	-2%
Kentucky	951	949	942	953	951	944	915	902	864	841	-1%
West Virginia	931	919	914	915	908	908	917	902	886	895	0
Wyoming	971	950	949	957	966	953	970	947	947	954	0

**Figure 24: 2018 Carbon Dioxide Emissions**

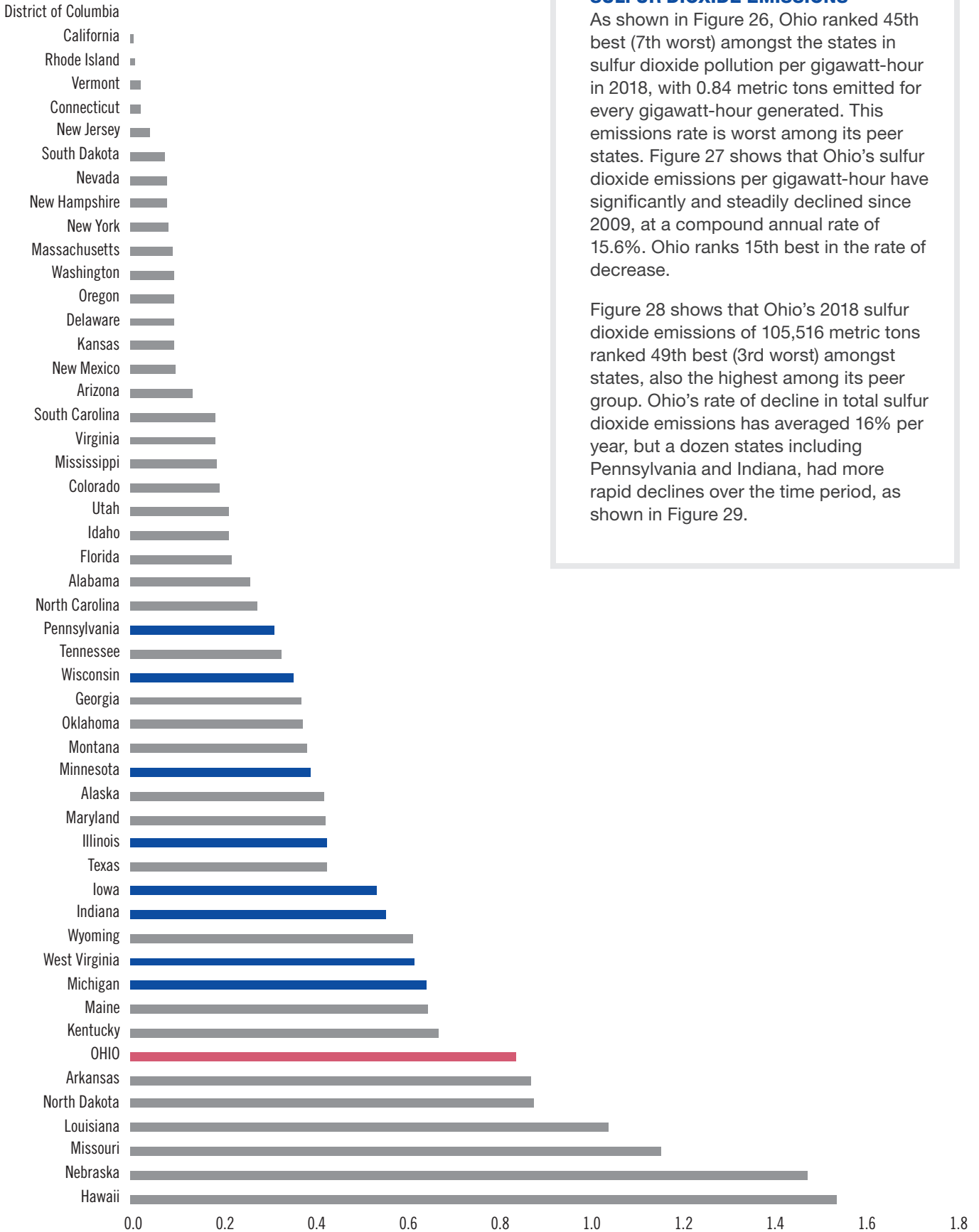
*Total Carbon Dioxide Emissions from Electricity Generation (Metric Tons)*



**Figure 25: Carbon Dioxide Emissions**  
*Total Carbon Dioxide Emissions from Electricity Generation (Metric Tons)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Vermont	6,583	8,016	24,004	12,292	14,632	13,785	11,084	11,526	15,342	9,976	4%
District of Columbia	35,752	190,742	175,076	66,115	48,726	48,396	35,601	47,554	36,975	42,828	2%
Idaho	1,024,183	1,213,214	824,805	1,171,935	1,941,753	1,491,553	1,865,710	1,828,906	1,771,092	1,766,482	6%
New Hampshire	5,507,060	5,551,486	5,126,974	4,294,558	3,447,455	3,457,841	3,653,432	2,526,361	1,976,254	2,190,563	-9%
Maine	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	2,201,608	-7%
South Dakota	3,510,593	3,611,180	2,911,400	3,268,899	3,227,772	3,093,416	1,941,252	2,675,908	2,502,497	2,920,518	-2%
Delaware	4,143,250	4,187,304	3,928,280	4,981,052	4,721,744	4,276,415	4,090,991	4,363,423	3,630,182	3,193,173	-3%
Rhode Island	3,181,021	3,217,071	3,595,046	3,403,402	2,837,800	2,565,962	2,873,636	2,670,029	2,980,924	3,347,859	1%
Alaska	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	3,389,551	-2%
Hawaii	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	7,197,225	-2%
Oregon	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	8,799,510	-1%
Connecticut	8,046,088	9,201,364	8,196,023	8,987,089	8,726,388	8,452,346	9,049,007	8,578,640	7,874,197	9,591,484	2%
Massachusetts	19,683,325	20,291,010	16,404,480	14,346,389	14,735,029	12,917,109	13,421,709	12,721,825	12,384,070	9,975,911	-7%
Washington	13,525,800	13,983,610	8,228,901	6,989,976	12,542,551	12,484,332	11,586,243	10,228,942	11,007,712	10,660,849	-2%
Nevada	18,294,514	17,020,408	14,748,277	14,929,193	15,690,455	16,221,708	14,752,014	14,541,813	13,167,197	14,004,743	-3%
Montana	17,548,159	20,369,529	17,028,546	16,024,096	16,950,683	17,677,641	18,135,505	16,469,969	15,911,336	15,613,538	-1%
Maryland	25,659,043	26,369,386	23,625,407	20,696,656	18,949,736	20,701,175	18,314,105	18,577,966	13,379,146	17,839,320	-4%
New Mexico	33,502,278	29,378,703	31,164,190	29,162,551	28,534,704	24,712,461	24,849,830	23,193,276	22,999,709	18,442,013	-6%
New Jersey	16,085,557	19,160,136	16,916,854	16,120,331	15,788,845	18,363,585	19,427,201	21,108,016	18,135,688	18,911,748	2%
Kansas	36,207,066	36,320,932	35,119,242	31,692,844	33,125,351	31,793,540	27,341,044	25,762,154	22,237,999	23,747,639	-4%
Nebraska	23,899,471	24,460,746	27,250,887	26,467,486	28,042,902	26,348,032	25,325,783	23,013,711	22,290,487	25,524,651	1%
Mississippi	23,480,603	26,845,306	23,325,979	24,284,840	22,633,396	24,037,348	25,170,683	26,272,253	24,151,238	26,156,997	1%
New York	38,130,088	41,583,758	37,255,875	35,668,748	33,456,396	34,072,093	32,730,725	31,295,191	25,583,556	27,936,389	-3%
Utah	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	28,544,033	-2%
South Carolina	38,121,415	41,364,022	38,720,130	34,237,555	28,809,424	33,082,757	29,848,999	28,001,045	25,362,253	28,874,166	-3%
Tennessee	43,457,828	48,196,067	45,472,087	41,740,957	38,117,748	41,405,218	37,977,033	39,926,975	35,792,400	29,302,917	-4%
Minnesota	33,688,934	32,946,107	32,618,199	28,493,816	29,255,384	32,677,491	30,307,101	29,643,872	28,344,485	29,805,125	-1%
North Dakota	32,608,448	31,063,899	29,854,996	30,934,049	30,274,035	30,419,692	31,245,513	29,907,862	30,042,550	31,281,838	0
Virginia	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	33,503,951	-1%
Iowa	42,977,893	47,211,320	43,878,873	41,266,985	39,174,823	39,312,084	35,042,903	30,215,540	30,661,462	34,252,879	-2%
Oklahoma	51,986,033	49,535,558	51,363,938	49,186,422	46,267,826	44,062,605	41,626,050	37,105,622	32,329,300	34,476,191	-4%
Colorado	38,988,708	40,498,764	39,509,434	39,925,777	39,387,317	38,473,611	37,413,300	36,074,666	35,719,638	34,712,894	-1%
Arkansas	30,427,300	34,018,317	35,925,947	36,233,904	37,345,580	37,288,600	28,587,194	31,725,866	33,321,791	38,349,453	2%
Wisconsin	44,233,260	47,238,443	46,257,128	41,196,428	47,686,076	43,759,905	45,194,700	40,913,887	42,893,441	41,779,198	-1%
California	59,427,649	55,405,832	47,907,869	59,369,012	57,323,347	57,506,565	55,481,281	47,007,640	44,432,947	43,578,868	-3%
Wyoming	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	44,013,946	0
Arizona	53,523,638	55,683,398	53,535,742	52,349,639	55,342,134	53,684,080	50,201,162	44,530,763	43,739,254	46,756,562	-1%
North Carolina	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	49,642,412	-3%
Louisiana	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	50,770,268	0
Georgia	77,022,270	82,591,913	71,368,349	59,035,062	56,812,143	62,515,953	59,273,980	60,155,547	54,811,036	54,803,366	-3%
Alabama	69,238,676	79,374,763	76,413,476	69,106,650	66,986,027	67,634,537	64,441,792	57,776,234	53,192,095	56,139,763	-2%
West Virginia	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	60,203,463	-1%
Michigan	73,588,661	74,479,744	69,301,421	67,876,595	67,192,653	64,263,795	67,119,277	58,643,813	58,413,900	61,435,300	-2%
Missouri	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	65,623,292	-1%
Kentucky	86,155,115	93,159,570	92,693,590	85,682,772	85,303,874	85,795,039	76,427,297	72,432,678	63,251,719	66,267,246	-3%
Illinois	98,974,783	103,127,834	100,731,240	94,410,749	97,812,108	96,624,058	84,274,845	72,225,575	70,669,827	72,260,778	-3%
Pennsylvania	116,621,094	122,829,611	117,430,264	109,996,697	108,729,048	102,021,683	90,972,612	85,041,303	79,252,230	77,030,723	-4%
<b>OHIO</b>	<b>115,065,819</b>	<b>121,963,840</b>	<b>112,319,677</b>	<b>95,522,904</b>	<b>102,465,700</b>	<b>98,650,334</b>	<b>83,722,399</b>	<b>81,618,408</b>	<b>79,917,231</b>	<b>78,051,144</b>	<b>-4%</b>
Indiana	111,112,991	116,282,506	109,608,059	99,773,102	99,950,588	104,635,599	89,045,157	85,392,620	81,929,466	91,553,528	-2%
Florida	114,853,697	123,811,228	114,441,236	111,236,493	108,826,746	113,145,692	111,863,160	110,388,178	107,438,351	107,791,933	-1%
Texas	242,864,409	251,409,188	267,464,092	253,689,271	257,464,594	254,487,638	243,386,106	236,457,110	239,991,190	230,076,308	-1%

**Figure 26: 2018 Sulfur Dioxide Emission Intensity**  
*Electric Sector Sulfur Dioxide Emission Intensity (Metric Tons/Gigawatt-hour)*



**SULFUR DIOXIDE EMISSIONS**

As shown in Figure 26, Ohio ranked 45th best (7th worst) amongst the states in sulfur dioxide pollution per gigawatt-hour in 2018, with 0.84 metric tons emitted for every gigawatt-hour generated. This emissions rate is worst among its peer states. Figure 27 shows that Ohio’s sulfur dioxide emissions per gigawatt-hour have significantly and steadily declined since 2009, at a compound annual rate of 15.6%. Ohio ranks 15th best in the rate of decrease.

Figure 28 shows that Ohio’s 2018 sulfur dioxide emissions of 105,516 metric tons ranked 49th best (3rd worst) amongst states, also the highest among its peer group. Ohio’s rate of decline in total sulfur dioxide emissions has averaged 16% per year, but a dozen states including Pennsylvania and Indiana, had more rapid declines over the time period, as shown in Figure 29.

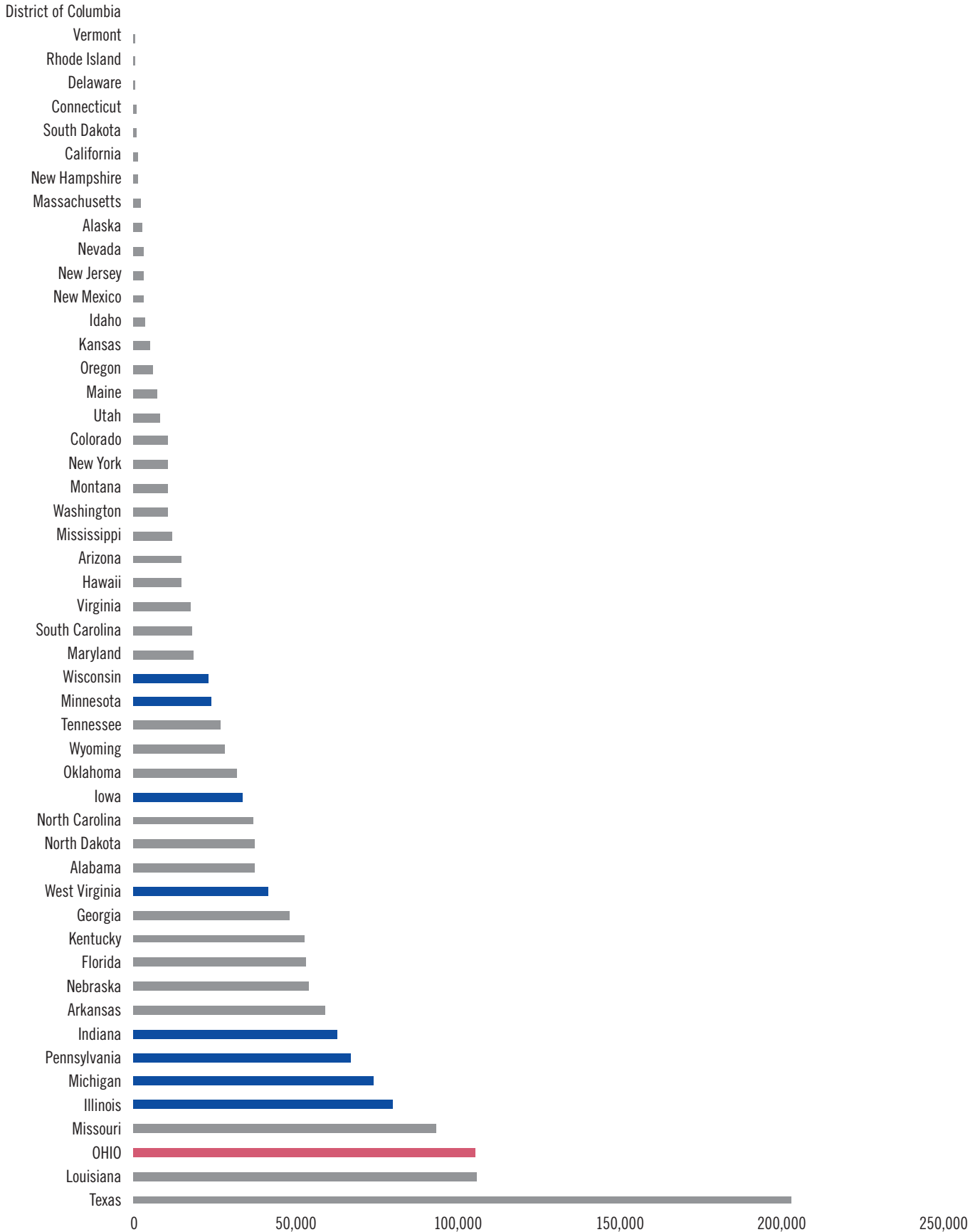
**Figure 27: Sulfur Dioxide Emission Intensity***Electric Sector Sulfur Dioxide Emission Intensity (Metric Tons/Gigawatt-hour)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
District of Columbia	8.0	4.0	3.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-100%
California	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-7%
Rhode Island	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	-10%
Vermont	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15%
Connecticut	0.1	0.1	0.0	0.2	0.1	0.1	0.0	0.0	0.0	0.0	-9%
New Jersey	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	-14%
South Dakota	1.4	1.2	0.9	1.0	1.4	1.1	0.5	0.1	0.1	0.1	-25%
Nevada	0.2	0.2	0.1	0.1	0.2	0.3	0.1	0.1	0.0	0.1	-9%
New Hampshire	1.5	1.5	1.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1	-26%
New York	0.4	0.5	0.4	0.2	0.2	0.2	0.2	0.1	0.1	0.1	-16%
Massachusetts	0.9	0.8	0.6	0.4	0.3	0.2	0.1	0.1	0.1	0.1	-20%
Washington	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	-3%
Oregon	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.1	0.1	0.1	-8%
Delaware	3.2	2.3	1.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	-30%
Kansas	1.0	0.9	0.8	0.7	0.6	0.6	0.3	0.1	0.1	0.1	-21%
New Mexico	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.2	0.2	0.1	-14%
Arizona	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	-8%
South Carolina	1.1	1.0	0.8	0.7	0.5	0.4	0.3	0.2	0.2	0.2	-16%
Virginia	1.7	1.6	1.3	0.8	0.8	0.8	0.4	0.3	0.2	0.2	-20%
Mississippi	0.9	1.1	0.9	0.8	1.5	1.7	0.5	0.2	0.2	0.2	-15%
Colorado	0.9	0.9	0.8	0.7	0.7	0.5	0.4	0.3	0.3	0.2	-14%
Utah	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.3	0.3	0.2	-11%
Idaho	0.4	0.6	0.3	0.3	0.4	0.3	0.3	0.2	0.2	0.2	-5%
Florida	1.0	0.7	0.5	0.5	0.5	0.5	0.3	0.2	0.2	0.2	-14%
Alabama	2.0	1.4	1.3	1.0	0.9	0.9	0.8	0.3	0.3	0.3	-18%
North Carolina	1.1	1.0	0.8	0.6	0.5	0.5	0.4	0.4	0.3	0.3	-13%
Pennsylvania	2.7	1.7	1.4	1.1	1.1	1.2	0.9	0.5	0.3	0.3	-19%
Tennessee	1.6	1.7	1.7	1.1	1.0	1.0	1.0	0.6	0.5	0.3	-15%
Wisconsin	2.3	2.3	2.0	1.5	1.5	1.2	0.8	0.4	0.4	0.4	-17%
Georgia	2.3	1.9	1.9	1.2	0.9	0.8	0.5	0.4	0.4	0.4	-17%
Oklahoma	1.2	1.2	1.2	1.0	1.0	1.0	0.8	0.6	0.5	0.4	-11%
Montana	0.9	0.7	0.6	0.5	0.6	0.4	0.5	0.4	0.4	0.4	-8%
Minnesota	1.2	1.1	1.0	0.6	0.6	0.6	0.5	0.4	0.4	0.4	-11%
Alaska	0.6	0.4	0.4	0.4	0.6	0.6	0.6	0.5	0.4	0.4	-3%
Maryland	4.5	1.0	1.2	1.1	1.1	1.0	0.9	0.7	0.5	0.4	-21%
Illinois	1.2	1.1	1.0	0.9	0.9	0.8	0.7	0.5	0.4	0.4	-10%
Texas	1.1	1.0	0.9	0.8	0.8	0.7	0.5	0.5	0.6	0.4	-9%
Iowa	1.8	1.9	1.8	1.7	1.7	1.2	0.8	0.6	0.5	0.5	-11%
Indiana	3.3	3.1	2.8	2.3	2.2	2.3	1.5	0.8	0.6	0.6	-16%
Wyoming	1.7	1.4	1.6	0.9	0.9	0.8	0.8	0.8	0.7	0.6	-9%
West Virginia	2.4	1.3	1.2	1.1	1.1	1.1	0.8	0.5	0.5	0.6	-13%
Michigan	2.8	2.3	2.2	2.0	2.0	1.5	1.2	0.8	0.7	0.6	-14%
Maine	2.0	0.7	0.8	0.5	0.9	0.8	0.9	0.6	0.5	0.6	-11%
Kentucky	2.6	2.5	2.3	1.9	1.9	2.0	1.5	0.9	0.7	0.7	-13%
<b>OHIO</b>	<b>4.6</b>	<b>4.2</b>	<b>4.5</b>	<b>2.7</b>	<b>2.3</b>	<b>2.4</b>	<b>1.8</b>	<b>1.1</b>	<b>0.9</b>	<b>0.8</b>	<b>-16%</b>
Arkansas	1.3	1.2	1.3	1.3	1.3	1.3	1.0	0.9	0.9	0.9	-4%
North Dakota	3.5	3.3	2.4	2.2	1.5	1.3	1.2	1.1	0.9	0.9	-13%
Louisiana	1.1	1.2	1.1	1.0	1.1	0.8	0.6	0.5	1.1	1.0	0
Missouri	2.7	2.5	2.0	1.5	1.6	1.5	1.4	1.2	1.2	1.2	-8%
Nebraska	2.1	1.8	1.9	1.7	1.6	1.5	1.5	1.3	1.3	1.5	-3%
Hawaii	2.0	1.5	1.6	1.4	1.8	1.7	1.9	1.8	1.7	1.5	-3%



**Figure 28: 2018 Sulfur Dioxide Emissions**

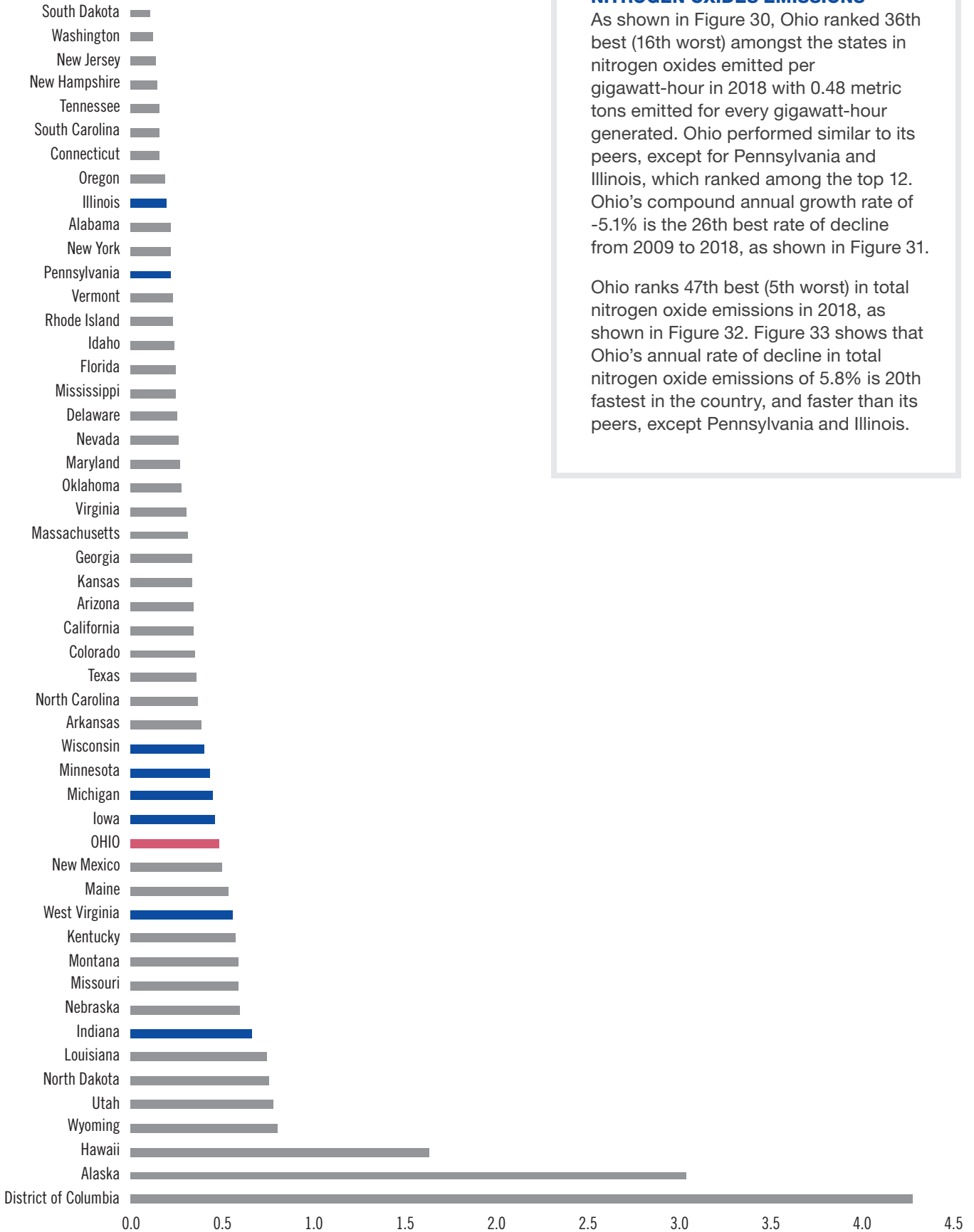
*Total Sulfur Dioxide Emissions from Electricity Generation (Metric Tons)*



**Figure 29: Sulfur Dioxide Emissions***Total Sulfur Dioxide Emissions from Electricity Generation (Metric Tons)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
District of Columbia	284	797	656	0	0	0	0	5	0	0	-100%
Vermont	38	38	85	47	65	62	60	50	60	47	2%
Rhode Island	155	49	72	28	1,152	88	100	86	78	62	-9%
Delaware	15,699	13,152	8,441	2,427	2,032	749	743	465	494	589	-28%
Connecticut	1,862	2,032	880	7,257	3,183	1,703	1,309	570	670	883	-7%
South Dakota	11,140	11,912	10,208	11,634	13,923	12,568	4,360	753	774	919	-22%
California	2,949	2,522	2,741	5,505	1,888	2,792	1,243	2,449	1,323	1,319	-8%
New Hampshire	30,702	33,808	22,542	2,054	3,384	2,818	2,061	883	778	1,348	-27%
Massachusetts	33,432	34,938	21,922	14,894	11,141	6,076	4,699	3,361	2,862	2,511	-23%
Alaska	3,710	3,015	2,728	2,704	3,810	3,532	3,777	3,165	2,559	2,615	-3%
Nevada	7,186	7,161	4,790	4,264	6,743	9,279	4,852	2,444	1,778	3,040	-8%
New Jersey	11,791	13,954	4,929	3,902	2,905	3,061	3,326	2,818	2,858	3,070	-13%
New Mexico	17,506	15,032	16,167	15,023	16,087	10,942	10,546	7,493	8,203	3,181	-16%
Idaho	4,622	6,642	4,725	5,288	5,955	5,245	4,218	3,761	3,710	3,870	-2%
Kansas	46,772	41,048	35,728	29,889	27,236	28,623	12,645	6,476	5,044	4,944	-20%
Oregon	11,922	15,862	13,511	13,462	15,882	9,732	8,739	7,996	7,037	6,039	-7%
Maine	32,926	12,419	12,281	8,231	12,130	10,044	10,720	7,000	5,990	7,305	-14%
Utah	29,616	25,495	22,571	20,027	21,471	21,453	15,568	11,212	10,012	8,335	-12%
Colorado	43,184	44,876	42,529	38,869	36,296	25,814	21,712	17,813	14,098	10,648	-13%
New York	58,872	61,722	51,898	30,818	28,076	28,919	21,720	18,372	15,154	10,745	-16%
Montana	22,793	22,033	17,982	14,977	15,300	13,087	13,244	11,303	11,694	10,810	-7%
Washington	12,643	14,174	17,973	20,084	12,028	12,440	11,546	10,981	10,846	10,844	-2%
Mississippi	45,406	59,043	48,347	42,940	79,577	91,709	33,113	12,161	11,174	11,917	-13%
Arizona	32,883	33,371	29,710	19,419	21,507	20,495	16,023	11,740	12,117	14,989	-8%
Hawaii	22,280	16,747	16,872	14,583	18,198	16,922	19,633	17,782	17,011	15,011	-4%
Virginia	117,634	119,828	86,338	55,685	61,762	62,180	30,606	26,653	18,916	17,512	-17%
South Carolina	105,134	105,821	87,413	64,666	43,245	39,606	26,116	23,097	17,398	18,072	-16%
Maryland	197,131	45,090	48,756	40,462	37,681	37,528	31,174	24,685	15,540	18,458	-21%
Wisconsin	139,466	144,871	127,664	97,602	98,255	73,704	54,238	28,005	24,602	23,291	-16%
Minnesota	64,770	56,597	52,459	33,235	32,318	35,623	27,246	24,215	21,564	23,994	-9%
Tennessee	124,970	137,764	138,272	88,296	78,204	81,064	78,524	48,493	40,128	26,656	-14%
Wyoming	76,030	67,422	77,571	43,557	44,986	41,462	40,089	35,156	34,640	28,346	-9%
Oklahoma	91,731	84,805	89,917	74,390	72,953	71,265	60,943	49,789	39,799	32,176	-10%
Iowa	92,180	107,935	101,233	95,888	96,960	68,558	43,505	31,392	30,862	33,772	-10%
North Carolina	126,172	130,673	91,297	73,568	64,672	58,199	52,185	47,267	39,336	36,958	-12%
North Dakota	120,594	115,641	85,755	79,101	51,575	47,823	42,886	43,146	37,484	37,333	-11%
Alabama	284,909	217,903	195,481	147,865	131,148	139,203	116,838	49,210	35,674	37,406	-18%
West Virginia	167,273	105,270	97,955	82,753	85,172	92,899	60,879	41,540	36,114	41,532	-13%
Georgia	294,594	264,774	236,889	148,902	112,245	97,402	66,988	52,680	47,604	48,010	-17%
Kentucky	232,401	248,767	225,925	171,011	173,076	185,856	122,282	72,289	54,652	52,859	-14%
Florida	219,347	159,795	113,046	101,213	106,865	114,854	76,734	58,895	54,300	53,498	-13%
Nebraska	69,984	64,875	68,014	57,785	60,677	58,054	58,937	47,240	46,593	54,403	-2%
Arkansas	75,326	74,060	80,361	83,857	80,569	81,218	53,994	54,278	55,803	59,185	-2%
Indiana	383,580	384,961	346,798	259,601	248,314	269,711	156,720	83,121	58,751	62,803	-17%
Pennsylvania	584,624	387,433	313,135	240,386	251,154	269,973	200,733	99,539	68,181	67,113	-19%
Michigan	288,419	253,812	235,343	214,979	215,080	157,408	136,634	92,489	75,905	74,319	-13%
Illinois	237,489	231,534	207,202	172,478	185,024	170,133	138,639	97,581	77,794	80,047	-10%
Missouri	235,573	232,804	189,516	135,891	142,871	135,932	114,418	93,149	97,634	93,747	-9%
<b>OHIO</b>	<b>624,089</b>	<b>610,245</b>	<b>615,752</b>	<b>354,795</b>	<b>314,681</b>	<b>322,153</b>	<b>213,937</b>	<b>130,825</b>	<b>108,956</b>	<b>105,516</b>	<b>-16%</b>
Louisiana	97,719	125,805	117,904	107,877	111,206	87,300	69,367	57,675	111,441	106,037	1%
Texas	418,812	430,123	404,706	349,801	348,118	316,796	247,204	233,185	260,854	203,343	-7%

**Figure 30: 2018 Nitrogen Oxide Emission Intensity**  
*Electric Sector Nitrogen Oxide Emission Intensity (Metric Tons/Gigawatt-hour)*



**NITROGEN OXIDES EMISSIONS**

As shown in Figure 30, Ohio ranked 36th best (16th worst) amongst the states in nitrogen oxides emitted per gigawatt-hour in 2018 with 0.48 metric tons emitted for every gigawatt-hour generated. Ohio performed similar to its peers, except for Pennsylvania and Illinois, which ranked among the top 12. Ohio’s compound annual growth rate of -5.1% is the 26th best rate of decline from 2009 to 2018, as shown in Figure 31.

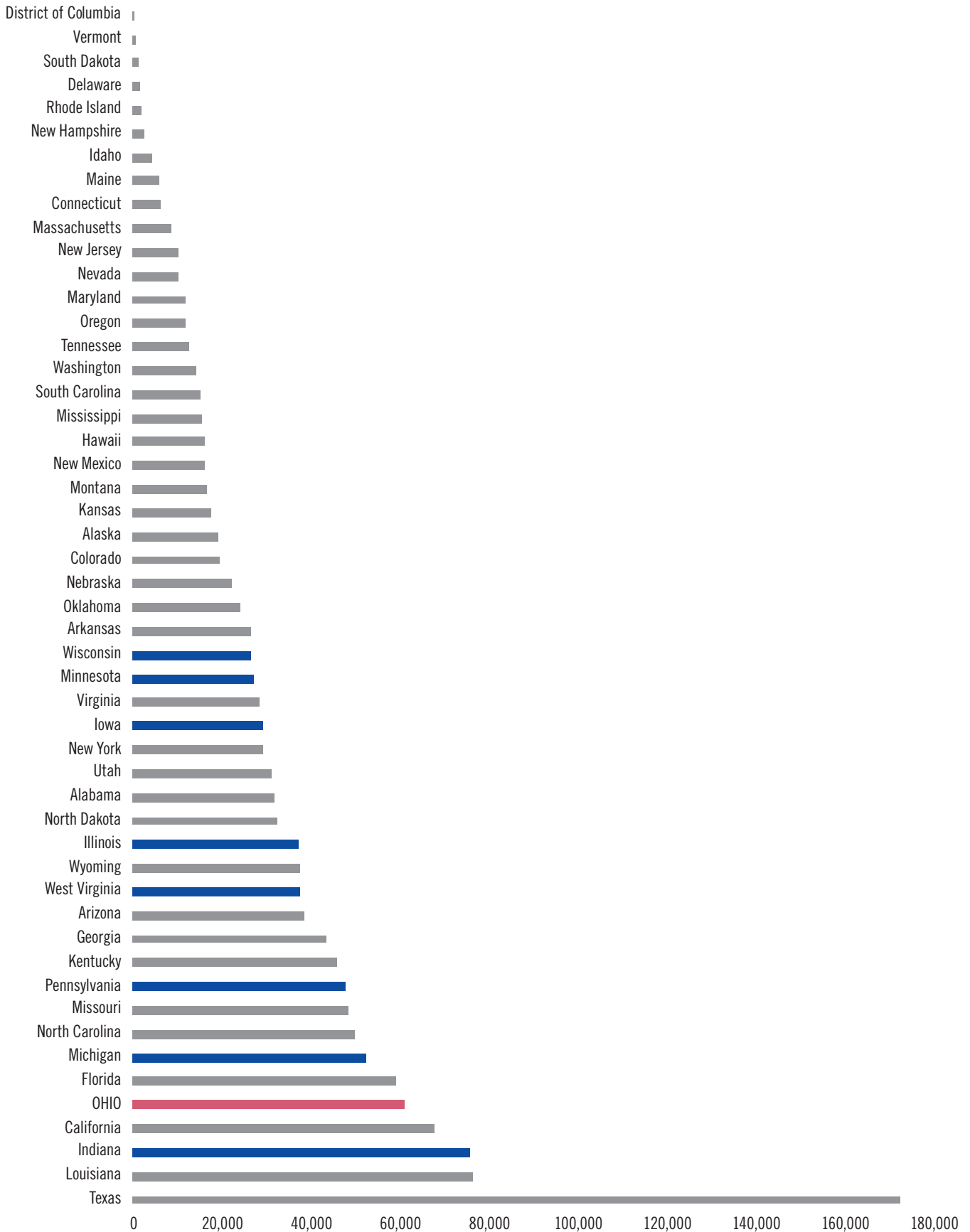
Ohio ranks 47th best (5th worst) in total nitrogen oxide emissions in 2018, as shown in Figure 32. Figure 33 shows that Ohio’s annual rate of decline in total nitrogen oxide emissions of 5.8% is 20th fastest in the country, and faster than its peers, except Pennsylvania and Illinois.

**Figure 31: Nitrogen Oxide Emission Intensity***Electric Sector Nitrogen Oxide Emission Intensity (Metric Tons/Gigawatt-hour)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
South Dakota	1.4	1.2	0.8	0.9	1.0	0.9	0.3	0.1	0.1	0.1	-23%
Washington	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-4%
New Jersey	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	-5%
New Hampshire	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	-6%
Tennessee	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	-9%
South Carolina	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.2	-4%
Connecticut	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	-3%
Oregon	0.2	0.3	0.2	0.1	0.2	0.2	0.3	0.2	0.2	0.2	-2%
Illinois	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	-7%
Alabama	0.4	0.4	0.4	0.3	0.3	0.4	0.3	0.2	0.2	0.2	-5%
New York	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	-4%
Pennsylvania	0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.4	0.2	0.2	-9%
Vermont	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.2	0.2	10%
Rhode Island	0.4	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.2	0.2	-5%
Idaho	0.2	0.3	0.2	0.3	0.4	1.2	0.8	0.3	0.3	0.2	4%
Florida	0.5	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.2	-8%
Mississippi	0.6	0.6	0.5	0.4	0.4	0.4	0.2	0.2	0.2	0.2	-8%
Delaware	1.2	0.9	0.6	0.3	0.3	0.3	0.3	0.2	0.2	0.3	-14%
Nevada	0.4	0.4	0.4	0.3	0.4	0.4	0.3	0.3	0.2	0.3	-5%
Maryland	0.5	0.6	0.6	0.6	0.6	0.5	0.4	0.4	0.3	0.3	-7%
Oklahoma	1.0	1.0	1.0	0.8	0.7	0.6	0.4	0.3	0.3	0.3	-12%
Virginia	0.6	0.7	0.7	0.5	0.5	0.5	0.4	0.3	0.3	0.3	-6%
Massachusetts	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	-3%
Georgia	0.6	0.6	0.6	0.4	0.4	0.4	0.4	0.3	0.3	0.3	-5%
Kansas	1.0	1.0	0.9	0.7	0.6	0.5	0.4	0.4	0.3	0.3	-10%
Arizona	0.6	0.5	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.3	-5%
California	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	-2%
Colorado	1.1	1.1	1.0	0.9	0.8	0.7	0.7	0.5	0.5	0.4	-11%
Texas	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	-3%
North Carolina	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0
Arkansas	0.6	0.7	0.7	0.6	0.7	0.7	0.5	0.5	0.5	0.4	-5%
Wisconsin	0.8	0.8	0.7	0.6	0.6	0.6	0.5	0.4	0.4	0.4	-7%
Minnesota	0.9	0.8	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.4	-7%
Michigan	0.9	0.8	0.8	0.7	0.7	0.7	0.5	0.5	0.4	0.4	-7%
Iowa	0.9	0.9	0.8	0.7	0.7	0.7	0.5	0.5	0.5	0.5	-6%
<b>OHIO</b>	<b>0.8</b>	<b>0.9</b>	<b>0.9</b>	<b>0.7</b>	<b>0.7</b>	<b>0.7</b>	<b>0.6</b>	<b>0.5</b>	<b>0.5</b>	<b>0.5</b>	<b>-5%</b>
New Mexico	1.5	1.5	1.5	1.5	1.5	1.3	1.3	1.1	1.0	0.5	-11%
Maine	0.8	0.5	0.5	0.4	0.6	0.6	0.7	0.5	0.5	0.5	-4%
West Virginia	0.5	0.6	0.7	0.7	0.7	0.8	0.8	0.6	0.5	0.6	1%
Kentucky	0.8	0.9	0.9	0.8	0.9	0.9	0.7	0.7	0.6	0.6	-3%
Montana	0.8	0.7	0.6	0.6	0.7	0.6	0.6	0.6	0.5	0.6	-3%
Missouri	0.6	0.6	0.6	0.7	0.8	0.8	0.5	0.7	0.6	0.6	0%
Nebraska	1.3	1.1	1.1	0.8	0.8	0.6	0.6	0.5	0.6	0.6	-8%
Indiana	1.0	1.0	1.0	0.9	1.0	1.0	0.9	0.9	0.7	0.7	-4%
Louisiana	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0
North Dakota	1.7	1.5	1.4	1.3	1.3	1.2	1.1	0.9	0.8	0.8	-8%
Utah	1.6	1.6	1.4	1.2	1.3	1.2	1.1	0.9	0.8	0.8	-7%
Wyoming	1.4	1.3	1.3	1.0	1.0	0.9	0.9	0.8	0.8	0.8	-6%
Hawaii	2.0	1.9	1.9	1.8	2.1	1.8	1.7	1.6	1.6	1.6	-2%
Alaska	2.5	2.4	2.5	2.4	2.5	2.4	3.1	3.3	3.2	3.0	2%
District of Columbia	3.7	1.8	1.8	2.9	2.0	2.0	4.2	4.5	4.4	4.3	2%

**Figure 32: 2018 Nitrogen Oxide Emissions**

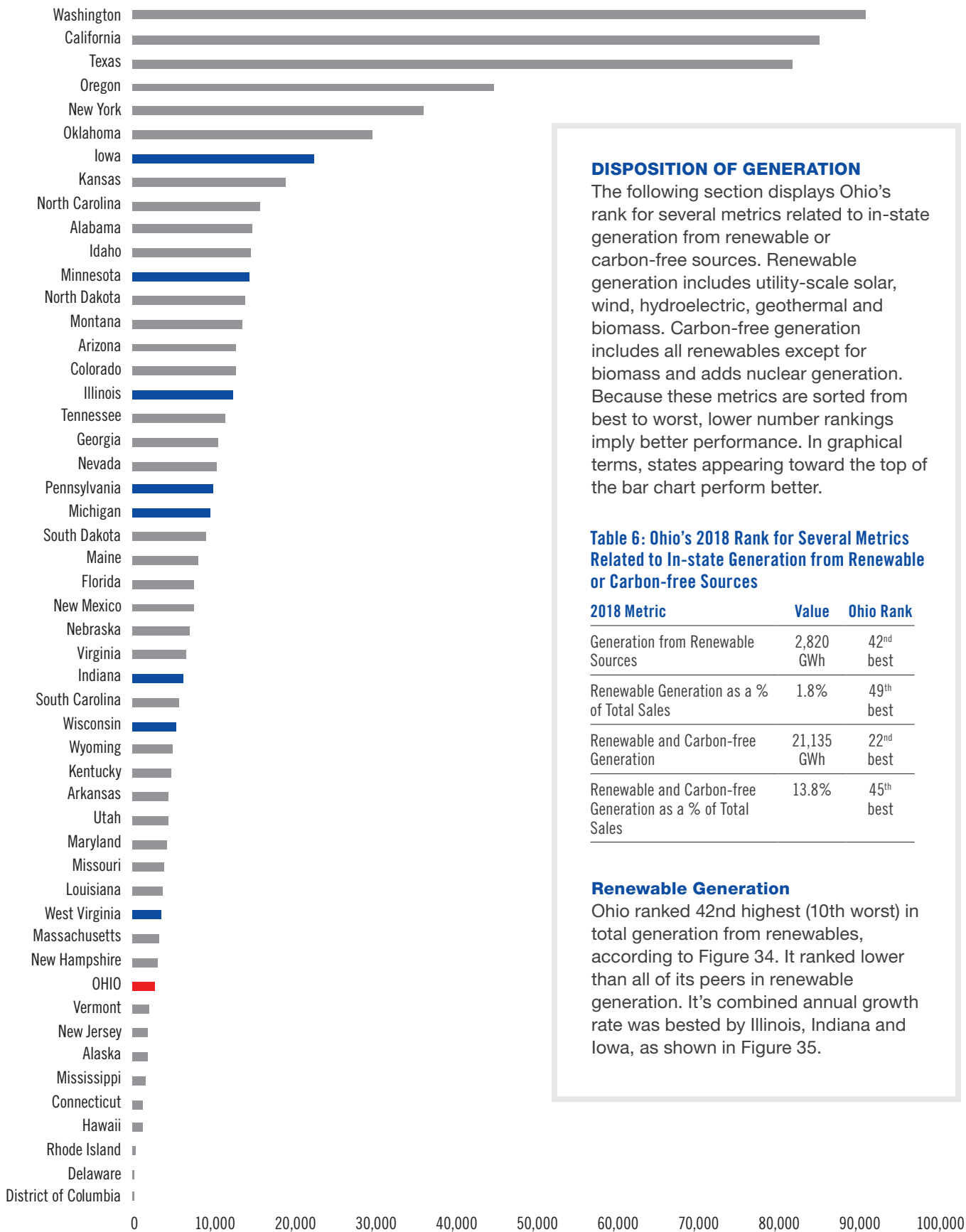
*Total Nitrogen Oxide Emissions from Electricity Generation (Metric Tons)*



**Figure 33: Nitrogen Oxide Emissions***Total Nitrogen Oxide Emissions from Electricity Generation (Metric Tons)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
District of Columbia	130	367	371	205	134	133	227	341	296	339	10%
Vermont	627	665	661	610	718	670	612	581	505	487	-2%
South Dakota	11,264	11,717	9,408	10,613	10,368	9,650	2,973	1,077	1,075	1,296	-19%
Delaware	5,814	4,814	4,189	2,840	2,346	2,574	2,195	1,954	1,581	1,573	-12%
Rhode Island	2,855	2,919	2,659	2,277	995	933	948	912	1,806	1,885	-4%
New Hampshire	5,488	6,267	5,163	3,978	4,586	3,527	2,882	2,185	1,972	2,500	-8%
Idaho	2,013	4,134	2,897	4,348	6,802	18,353	12,455	4,708	4,824	4,236	8%
Maine	12,397	8,413	7,962	6,618	8,720	7,878	8,132	6,069	6,068	5,967	-7%
Connecticut	6,483	7,092	6,139	11,750	8,197	7,613	6,902	6,014	5,982	6,044	-1%
Massachusetts	16,661	17,308	14,062	13,873	13,748	12,552	11,414	10,314	8,959	8,452	-7%
New Jersey	13,919	14,986	13,140	13,599	13,622	13,933	11,754	11,696	9,752	10,073	-3%
Nevada	16,661	15,267	11,989	12,002	13,309	14,502	9,882	9,962	8,737	10,200	-5%
Maryland	23,400	24,897	25,315	21,748	19,952	18,713	14,530	13,105	10,678	11,796	-7%
Oregon	12,605	14,666	9,295	8,754	12,349	11,556	14,939	12,108	12,179	11,810	-1%
Tennessee	30,011	32,911	29,203	25,299	21,033	21,691	20,959	21,754	18,062	12,352	-8%
Washington	18,293	20,614	14,629	11,897	16,085	15,301	13,931	13,415	14,385	14,133	-3%
South Carolina	24,280	29,832	30,245	22,267	17,267	19,585	17,569	15,394	13,851	15,220	-5%
Mississippi	27,458	30,607	26,293	23,460	22,214	21,765	14,621	14,890	14,364	15,269	-6%
Hawaii	22,440	20,892	20,037	18,927	21,558	18,105	17,399	16,288	16,114	15,937	-3%
New Mexico	61,165	55,818	57,192	55,454	53,356	41,658	42,414	35,498	34,741	16,168	-12%
Montana	20,534	21,197	17,369	16,029	19,768	18,631	18,801	16,103	15,156	16,468	-2%
Kansas	45,814	45,946	40,995	32,565	27,988	26,324	18,730	17,248	15,606	17,393	-9%
Alaska	16,855	16,028	17,268	17,008	15,971	14,390	19,243	21,060	20,871	18,954	1%
Colorado	54,296	55,063	51,062	44,994	44,824	40,220	34,876	28,907	24,882	19,425	-10%
Nebraska	44,103	40,030	41,342	28,760	28,585	24,530	23,365	20,065	20,145	21,980	-7%
Oklahoma	72,664	71,029	76,729	63,455	51,491	40,556	29,381	26,973	23,894	24,012	-10%
Arkansas	37,075	40,490	41,347	38,243	41,639	42,682	28,688	30,619	30,993	26,203	-3%
Wisconsin	48,535	48,766	46,025	39,312	40,021	35,854	33,509	28,172	28,195	26,271	-6%
Minnesota	49,208	44,268	41,421	35,837	33,363	34,629	27,751	25,360	25,264	26,748	-6%
Virginia	39,357	48,812	43,720	35,778	36,017	36,886	34,469	31,660	25,988	28,365	-3%
Iowa	45,095	49,963	44,201	41,639	40,461	38,038	30,613	26,384	27,092	28,783	-4%
New York	44,093	44,052	42,631	40,269	40,446	40,085	35,306	32,161	28,494	28,936	-4%
Utah	68,448	68,088	57,787	49,172	56,517	52,561	47,401	33,066	31,759	30,725	-8%
Alabama	52,587	66,190	64,716	51,222	51,484	56,502	51,256	35,214	29,166	31,569	-5%
North Dakota	58,995	52,011	48,193	45,950	43,957	44,188	41,815	35,596	31,527	32,026	-6%
Illinois	77,894	82,559	73,047	60,950	57,303	52,524	41,963	35,745	36,070	36,917	-7%
Wyoming	65,999	61,363	61,629	49,167	50,455	44,974	45,124	39,067	37,423	37,035	-6%
West Virginia	34,677	49,153	55,244	48,157	54,639	66,219	56,723	47,510	39,941	37,078	1%
Arizona	61,622	57,244	52,782	45,718	51,073	48,288	43,079	36,372	35,042	38,005	-5%
Georgia	73,879	79,274	75,152	50,103	50,317	52,917	48,158	42,842	41,504	42,989	-5%
Kentucky	73,900	84,856	85,102	74,928	79,108	80,970	61,674	54,616	44,110	45,281	-5%
Pennsylvania	120,366	135,887	147,475	132,776	137,029	128,269	103,635	87,052	49,474	47,261	-9%
Missouri	51,561	56,116	60,751	66,433	70,760	70,508	44,148	53,659	47,343	47,936	-1%
North Carolina	44,247	57,407	50,015	53,192	56,614	55,053	51,247	47,827	49,202	49,257	1%
Michigan	91,266	88,864	81,979	80,818	77,340	69,996	61,410	52,456	50,346	52,074	-5%
Florida	115,829	100,791	82,935	83,920	79,567	82,273	76,172	70,470	69,635	58,607	-7%
<b>OHIO</b>	<b>110,211</b>	<b>122,434</b>	<b>121,496</b>	<b>90,986</b>	<b>92,523</b>	<b>95,541</b>	<b>76,070</b>	<b>64,932</b>	<b>65,391</b>	<b>60,606</b>	<b>-6%</b>
California	83,201	79,589	81,366	83,968	77,905	73,880	72,756	69,143	68,521	67,147	-2%
Indiana	110,914	120,437	119,803	107,337	110,057	115,415	97,256	89,320	70,276	74,902	-4%
Louisiana	69,175	75,394	77,683	74,954	74,649	69,667	70,532	66,405	70,970	75,662	1%
Texas	199,086	203,537	214,297	193,567	204,222	187,101	172,159	165,928	165,551	170,839	-2%

**Figure 34: 2018 Renewable Generation**  
*Generation from Renewable Sources (GWh)*



**DISPOSITION OF GENERATION**

The following section displays Ohio’s rank for several metrics related to in-state generation from renewable or carbon-free sources. Renewable generation includes utility-scale solar, wind, hydroelectric, geothermal and biomass. Carbon-free generation includes all renewables except for biomass and adds nuclear generation. Because these metrics are sorted from best to worst, lower number rankings imply better performance. In graphical terms, states appearing toward the top of the bar chart perform better.

**Table 6: Ohio’s 2018 Rank for Several Metrics Related to In-state Generation from Renewable or Carbon-free Sources**

2018 Metric	Value	Ohio Rank
Generation from Renewable Sources	2,820 GWh	42 <sup>nd</sup> best
Renewable Generation as a % of Total Sales	1.8%	49 <sup>th</sup> best
Renewable and Carbon-free Generation	21,135 GWh	22 <sup>nd</sup> best
Renewable and Carbon-free Generation as a % of Total Sales	13.8%	45 <sup>th</sup> best

**Renewable Generation**

Ohio ranked 42nd highest (10th worst) in total generation from renewables, according to Figure 34. It ranked lower than all of its peers in renewable generation. It’s combined annual growth rate was bested by Illinois, Indiana and Iowa, as shown in Figure 35.

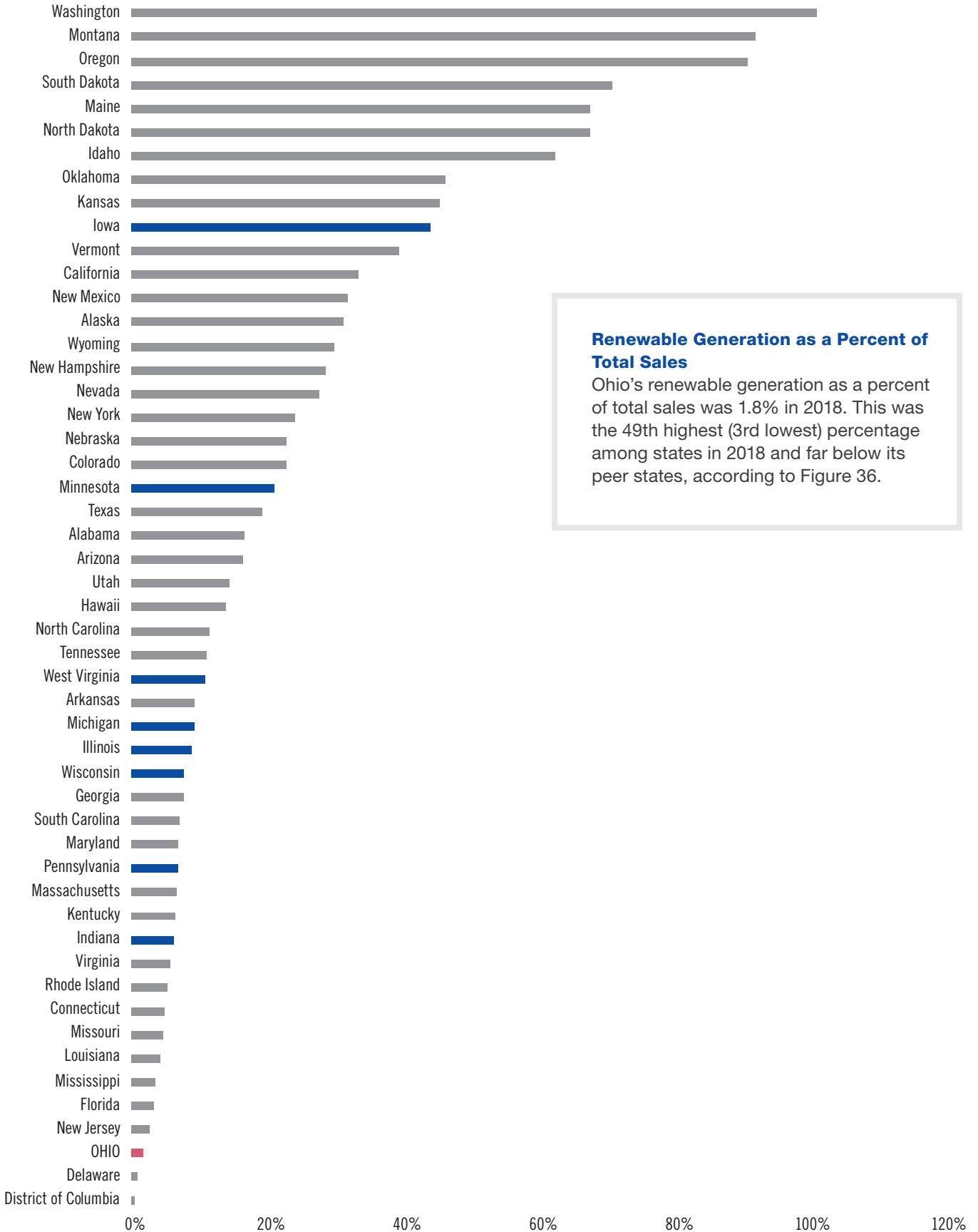
**Figure 35: Renewable Generation**  
*Generation from Renewable Sources (GWh)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Washington	77,977	74,905	99,832	97,679	86,977	88,571	82,472	88,396	91,007	90,588	2%
California	53,428	58,881	69,780	56,804	59,332	58,448	59,203	78,654	96,907	84,963	5%
Texas	22,133	28,967	32,746	34,601	38,240	42,482	47,631	61,286	71,889	81,623	14%
Oregon	37,306	35,299	47,805	46,617	41,733	44,175	39,204	42,932	45,870	44,675	2%
New York	32,082	30,286	32,893	29,845	30,861	32,534	32,333	33,212	36,750	36,068	1%
Oklahoma	6,482	6,969	7,426	9,666	13,684	13,704	17,033	23,010	25,966	29,764	16%
Iowa	8,560	10,309	11,795	14,950	16,476	17,452	19,091	21,241	22,621	22,482	10%
Kansas	2,876	3,473	3,793	5,263	9,506	10,920	11,081	14,202	18,690	19,005	21%
North Carolina	7,065	6,840	6,239	6,432	9,855	8,032	8,705	10,400	12,215	15,868	8%
Alabama	15,585	11,081	11,700	10,212	15,775	12,246	13,151	10,351	12,844	14,947	0
Idaho	11,302	10,168	15,297	13,455	11,626	12,479	11,704	12,245	14,224	14,809	3%
Minnesota	7,546	7,480	9,152	10,576	10,382	12,005	12,437	13,044	14,924	14,454	7%
North Dakota	4,484	6,150	7,825	7,757	7,377	8,736	8,603	10,090	13,943	13,914	12%
Montana	10,422	10,442	13,861	12,545	11,398	13,470	11,874	12,243	13,136	13,596	3%
Arizona	6,630	6,941	9,703	8,415	8,647	9,959	10,671	11,690	12,515	12,872	7%
Colorado	5,132	5,133	7,449	7,689	8,749	9,517	9,427	12,024	12,332	12,797	10%
Illinois	3,666	5,257	7,006	8,484	10,406	10,832	11,448	11,312	12,919	12,538	13%
Tennessee	11,162	9,125	10,595	9,132	13,553	10,042	10,707	7,824	9,774	11,484	0%
Georgia	6,085	6,502	5,895	5,515	7,553	7,347	7,847	8,827	9,414	10,691	6%
Nevada	4,269	4,444	4,628	5,409	6,372	6,456	7,367	8,666	9,669	10,428	9%
Pennsylvania	6,035	6,577	7,316	6,701	8,279	8,722	8,424	8,317	9,222	10,156	5%
Michigan	3,995	4,083	4,320	4,992	6,933	8,274	8,782	8,764	9,428	9,676	9%
South Dakota	4,859	6,611	9,276	8,335	6,750	7,835	7,348	8,520	8,216	9,103	6%
Maine	8,150	7,963	8,474	8,398	8,454	8,115	7,809	7,455	8,431	8,319	0%
Florida	4,549	4,664	4,852	4,674	4,913	5,284	5,388	5,042	6,104	7,729	5%
New Mexico	1,851	2,072	2,436	2,797	2,692	2,911	2,834	4,537	6,011	7,624	15%
Nebraska	883	1,807	2,734	2,604	2,993	3,959	4,936	4,757	6,686	7,052	23%
Virginia	3,896	3,720	3,406	3,402	4,160	4,807	5,303	5,584	5,238	6,701	6%
Indiana	2,209	3,699	4,030	3,980	4,275	4,360	5,499	5,984	6,147	6,410	11%
South Carolina	4,080	4,250	3,683	3,564	5,386	5,012	4,858	4,607	4,314	5,816	4%
Wisconsin	3,734	4,586	4,912	4,753	5,171	5,734	5,502	5,783	5,780	5,507	4%
Wyoming	3,193	4,271	5,836	5,263	5,144	5,274	4,625	5,363	5,444	5,034	5%
Kentucky	3,681	3,020	3,406	2,695	3,602	3,592	3,845	3,955	5,021	4,888	3%
Arkansas	5,778	5,283	4,625	3,859	4,256	4,170	5,011	4,966	4,411	4,578	-2%
Utah	1,322	1,476	2,191	1,848	1,437	1,889	1,941	3,205	4,922	4,471	13%
Maryland	2,440	2,241	3,369	2,555	2,668	2,604	2,691	2,674	3,330	4,319	6%
Missouri	2,391	2,527	2,426	2,013	2,377	1,953	2,774	2,562	3,414	3,887	5%
Louisiana	3,600	3,577	3,487	3,110	3,831	3,870	3,704	3,979	3,676	3,858	1%
West Virginia	2,388	2,307	2,565	2,728	3,129	2,698	2,766	3,070	3,341	3,618	4%
Massachusetts	2,430	2,270	2,355	2,189	2,440	2,632	2,660	2,742	3,219	3,502	4%
New Hampshire	2,878	2,710	2,696	2,629	3,123	3,334	3,318	3,267	3,435	3,148	1%
<b>OHIO</b>	<b>1,161</b>	<b>1,129</b>	<b>1,319</b>	<b>2,153</b>	<b>2,558</b>	<b>2,504</b>	<b>2,515</b>	<b>2,533</b>	<b>2,698</b>	<b>2,820</b>	<b>9%</b>
Vermont	1,915	1,829	1,857	1,616	2,030	1,963	1,977	1,905	2,132	2,174	1%
New Jersey	992	868	980	1,291	1,465	1,553	1,605	1,848	1,891	1,983	7%
Alaska	1,337	1,452	1,360	1,615	1,633	1,753	1,784	1,871	1,829	1,865	3%
Mississippi	1,424	1,504	1,506	1,509	1,448	1,508	1,507	1,524	1,563	1,765	2%
Connecticut	1,268	1,130	1,227	979	1,054	1,203	1,107	1,117	1,177	1,429	1%
Hawaii	817	817	974	1,039	1,205	1,300	1,340	1,438	1,388	1,299	5%
Rhode Island	149	144	138	106	57	230	239	248	368	403	10%
Delaware	126	138	158	131	107	131	130	124	118	114	-1%
District of Columbia	0	0	0	0	0	0	31	53	47	57	



**Figure 36: 2018 Renewable Generation as a Percent of Total Sales**

*Generation from Renewable Sources as a Percent of Total Sales*



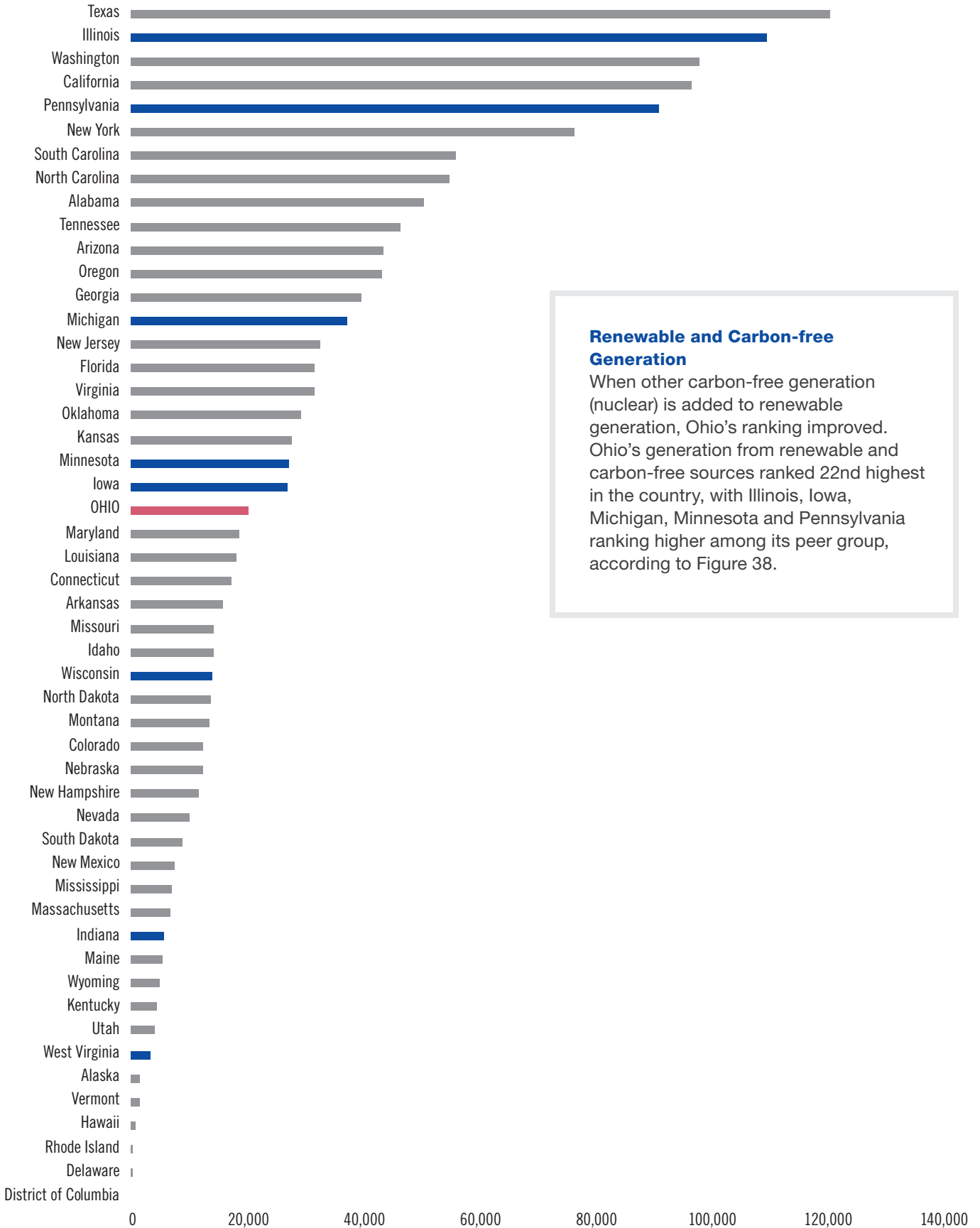
**Renewable Generation as a Percent of Total Sales**  
 Ohio's renewable generation as a percent of total sales was 1.8% in 2018. This was the 49th highest (3rd lowest) percentage among states in 2018 and far below its peer states, according to Figure 36.

**Figure 37: Renewable Generation as a Percent of Total Sales**  
*Generation from Renewable Sources as a Percent of Total Sales*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Washington	86%	83%	107%	106%	94%	96%	92%	99%	99%	101%	2%
Montana	73%	76%	101%	90%	81%	96%	84%	87%	89%	92%	2%
Oregon	78%	77%	101%	100%	88%	93%	83%	91%	92%	91%	1%
South Dakota	44%	58%	79%	71%	55%	63%	61%	70%	67%	71%	5%
Maine	72%	69%	74%	73%	71%	68%	66%	65%	75%	67%	-1%
North Dakota	35%	47%	57%	53%	46%	48%	47%	54%	69%	67%	7%
Idaho	50%	45%	66%	57%	48%	54%	51%	53%	60%	62%	2%
Oklahoma	12%	12%	12%	16%	23%	22%	28%	37%	43%	46%	15%
Kansas	8%	9%	9%	13%	24%	27%	28%	35%	46%	45%	20%
Iowa	20%	23%	26%	33%	35%	37%	40%	44%	46%	44%	8%
Vermont	35%	33%	33%	29%	36%	35%	36%	35%	39%	39%	1%
California	21%	23%	27%	22%	23%	22%	23%	31%	38%	33%	5%
New Mexico	9%	9%	11%	12%	12%	13%	12%	20%	26%	32%	14%
Alaska	21%	23%	22%	25%	26%	28%	29%	31%	30%	31%	4%
Wyoming	19%	25%	34%	31%	30%	31%	27%	32%	32%	30%	4%
New Hampshire	27%	25%	25%	24%	28%	30%	30%	30%	32%	28%	1%
Nevada	12%	13%	14%	15%	18%	18%	20%	24%	26%	28%	8%
New York	23%	21%	23%	21%	21%	22%	22%	22%	25%	24%	0%
Nebraska	3%	6%	9%	8%	10%	13%	17%	16%	22%	23%	22%
Colorado	10%	10%	14%	14%	16%	18%	17%	22%	22%	23%	8%
Minnesota	12%	11%	13%	16%	15%	17%	19%	20%	22%	21%	6%
Texas	6%	8%	9%	9%	10%	11%	12%	15%	18%	19%	12%
Alabama	19%	12%	13%	12%	18%	14%	15%	12%	15%	17%	-1%
Arizona	9%	10%	13%	11%	11%	13%	14%	15%	16%	16%	6%
Utah	5%	5%	8%	6%	5%	6%	6%	11%	16%	14%	12%
Hawaii	8%	8%	10%	11%	13%	14%	14%	15%	15%	14%	6%
North Carolina	6%	5%	5%	5%	8%	6%	7%	8%	9%	11%	8%
Tennessee	12%	9%	11%	9%	14%	10%	11%	8%	10%	11%	-1%
West Virginia	8%	7%	8%	9%	10%	8%	9%	10%	11%	11%	3%
Arkansas	13%	11%	10%	8%	9%	9%	11%	11%	10%	9%	-4%
Michigan	4%	4%	4%	5%	7%	8%	9%	8%	9%	9%	9%
Illinois	3%	4%	5%	6%	7%	8%	8%	8%	9%	9%	13%
Wisconsin	6%	7%	7%	7%	7%	8%	8%	8%	8%	8%	3%
Georgia	5%	5%	4%	4%	6%	5%	6%	6%	7%	8%	5%
South Carolina	5%	5%	5%	5%	7%	6%	6%	6%	6%	7%	3%
Maryland	4%	3%	5%	4%	4%	4%	4%	4%	6%	7%	6%
Pennsylvania	4%	4%	5%	5%	6%	6%	6%	6%	6%	7%	5%
Massachusetts	4%	4%	4%	4%	4%	5%	5%	5%	6%	7%	4%
Kentucky	4%	3%	4%	3%	4%	5%	5%	5%	7%	6%	4%
Indiana	2%	3%	4%	4%	4%	4%	5%	6%	6%	6%	11%
Virginia	4%	3%	3%	3%	4%	4%	5%	5%	5%	6%	5%
Rhode Island	2%	2%	2%	1%	1%	3%	3%	3%	5%	5%	10%
Connecticut	4%	4%	4%	3%	4%	4%	4%	4%	4%	5%	2%
Missouri	3%	3%	3%	2%	3%	2%	3%	3%	4%	5%	5%
Louisiana	5%	4%	4%	4%	4%	4%	4%	4%	4%	4%	-1%
Mississippi	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%	1%
Florida	2%	2%	2%	2%	2%	2%	2%	2%	3%	3%	5%
New Jersey	1%	1%	1%	2%	2%	2%	2%	2%	3%	3%	7%
<b>OHIO</b>	<b>1%</b>	<b>1%</b>	<b>1%</b>	<b>1%</b>	<b>2%</b>	<b>2%</b>	<b>2%</b>	<b>2%</b>	<b>2%</b>	<b>2%</b>	<b>9%</b>
Delaware	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	-1%
District of Columbia							0%	0%	0%	0%	2%

**Figure 38: 2018 Renewable and Carbon-free Generation**

*Generation from Carbon-free Sources (GWh)*



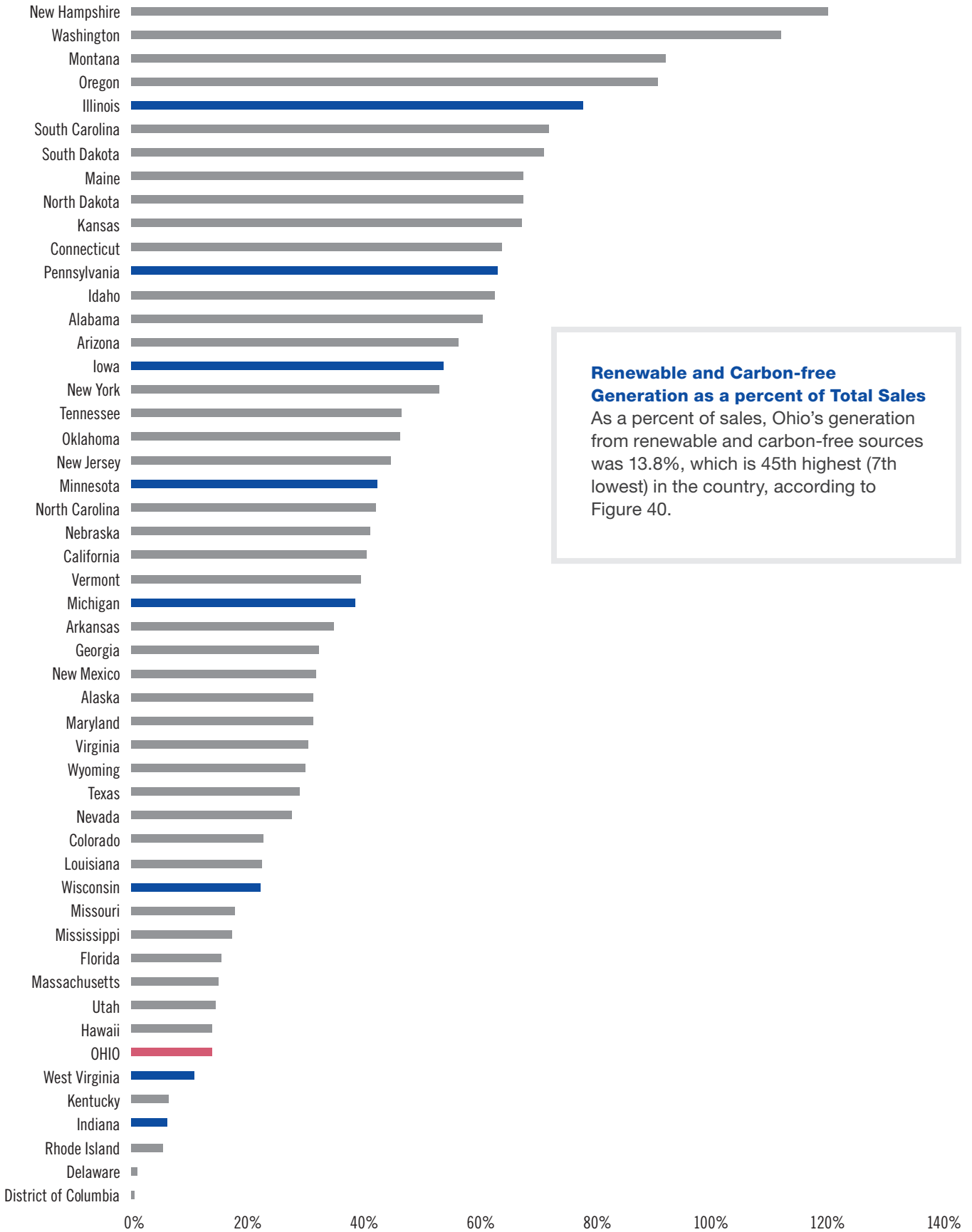
**Renewable and Carbon-free Generation**  
 When other carbon-free generation (nuclear) is added to renewable generation, Ohio's ranking improved. Ohio's generation from renewable and carbon-free sources ranked 22nd highest in the country, with Illinois, Iowa, Michigan, Minnesota and Pennsylvania ranking higher among its peer group, according to Figure 38.

**Figure 39: Renewable and Carbon-free Generation**  
*Generation from Carbon-free Sources (GWh)*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Texas	62,552	68,857	70,788	71,358	74,832	79,961	85,545	101,683	108,894	121,218	7%
Illinois	98,430	100,776	102,191	104,270	106,929	108,123	108,203	109,452	109,636	110,213	1%
Washington	83,139	82,274	102,887	105,399	93,621	96,229	88,642	96,014	97,237	98,494	2%
California	78,992	85,080	100,414	69,000	70,609	68,543	71,241	91,623	109,000	97,230	2%
Pennsylvania	81,089	82,022	81,181	79,577	84,654	84,983	86,537	88,850	89,983	91,368	1%
New York	73,366	69,937	73,527	68,471	73,335	73,165	74,695	72,539	76,631	76,845	0%
South Carolina	54,482	54,365	54,457	52,566	57,412	54,992	55,725	58,057	56,259	56,241	0%
North Carolina	46,024	45,507	44,438	43,253	47,487	46,452	48,212	50,631	51,777	55,336	2%
Alabama	52,252	46,645	48,240	48,276	53,715	50,711	51,813	46,918	52,070	50,963	0%
Tennessee	37,226	35,918	36,548	33,457	41,004	36,649	34,664	36,469	40,644	46,678	2%
Arizona	37,133	37,973	40,791	40,138	39,907	42,049	42,970	43,853	44,684	43,750	2%
Oregon	36,503	34,462	47,090	45,786	40,739	43,025	38,088	41,931	44,889	43,638	2%
Georgia	34,942	36,834	35,011	36,181	36,631	35,754	36,951	38,734	38,105	40,055	1%
Michigan	23,523	31,235	34,703	30,358	33,139	36,714	35,631	37,821	39,315	37,623	5%
New Jersey	34,392	32,823	33,710	33,437	33,846	32,062	33,921	30,750	34,995	33,031	0%
Florida	29,336	24,194	22,323	18,214	26,990	28,321	28,590	29,719	30,241	31,957	1%
Virginia	29,691	28,072	26,758	29,767	30,580	31,176	29,219	31,224	31,983	31,780	1%
Oklahoma	6,251	6,617	7,112	9,303	13,341	13,365	16,696	22,648	25,668	29,435	17%
Kansas	11,645	12,974	11,054	13,491	16,616	19,419	19,649	22,390	29,281	28,110	9%
Minnesota	18,256	19,110	19,430	20,681	19,480	22,949	22,669	25,013	26,895	27,411	4%
Iowa	13,071	14,569	16,850	19,146	21,638	21,338	24,076	25,692	27,625	27,166	8%
<b>OHIO</b>	<b>15,748</b>	<b>16,259</b>	<b>15,487</b>	<b>18,523</b>	<b>17,863</b>	<b>17,970</b>	<b>19,092</b>	<b>18,629</b>	<b>19,659</b>	<b>20,428</b>	<b>3%</b>
Maryland	16,439	15,663	17,218	15,580	16,376	16,381	16,820	16,888	17,901	18,786	1%
Louisiana	18,018	19,748	17,659	16,339	17,999	18,401	16,300	18,255	16,318	18,334	0%
Connecticut	17,167	17,141	16,495	17,390	17,482	16,286	17,731	16,837	16,884	17,555	0%
Arkansas	19,363	18,682	17,152	17,692	14,600	17,118	17,408	17,017	15,665	15,933	-2%
Missouri	12,563	11,461	11,735	12,677	10,670	11,114	13,085	11,853	11,574	14,410	1%
Idaho	10,824	9,667	14,775	12,906	10,973	11,887	11,102	11,713	13,759	14,318	3%
Wisconsin	15,129	16,481	14,894	17,387	15,212	13,538	13,940	14,465	13,969	14,198	-1%
North Dakota	4,473	6,138	7,816	7,752	7,371	8,734	8,600	10,084	13,941	13,913	12%
Montana	10,327	10,345	13,861	12,545	11,393	13,457	11,852	12,223	13,115	13,574	3%
Colorado	5,075	5,073	7,388	7,631	8,665	9,391	9,347	11,862	12,166	12,633	10%
Nebraska	10,251	12,790	9,601	8,342	9,791	13,997	15,190	14,009	13,501	12,590	2%
New Hampshire	10,560	12,463	10,034	9,645	12,743	11,961	11,178	12,339	11,816	11,823	1%
Nevada	4,268	4,444	4,628	5,390	6,348	6,432	7,342	8,611	9,612	10,374	9%
South Dakota	4,853	6,611	9,276	8,335	6,750	7,835	7,348	8,520	8,216	9,103	6%
New Mexico	1,818	2,058	2,427	2,782	2,673	2,897	2,814	4,519	5,993	7,603	15%
Mississippi	10,999	9,643	10,337	7,296	10,865	10,252	11,715	5,897	7,451	7,245	-4%
Massachusetts	6,603	6,937	6,300	6,891	5,634	7,203	6,488	6,952	7,106	6,774	0%
Indiana	1,907	3,388	3,694	3,644	3,899	3,969	5,052	5,552	5,673	5,951	12%
Maine	4,510	4,310	4,686	4,620	4,608	4,721	4,656	4,667	5,727	5,657	2%
Wyoming	3,193	4,271	5,836	5,263	5,144	5,274	4,625	5,363	5,444	5,034	5%
Kentucky	3,318	2,580	2,969	2,362	3,275	3,144	3,403	3,490	4,526	4,457	3%
Utah	1,274	1,420	2,133	1,788	1,366	1,817	1,856	3,121	4,844	4,391	13%
West Virginia	2,388	2,307	2,556	2,717	3,125	2,693	2,761	3,070	3,341	3,618	4%
Alaska	1,331	1,446	1,357	1,612	1,581	1,691	1,729	1,828	1,785	1,819	3%
Vermont	6,858	6,143	6,367	6,253	6,386	6,571	1,513	1,428	1,685	1,748	-13%
Hawaii	533	534	661	758	876	966	1,019	1,079	1,095	993	6%
Rhode Island	5	7	10	6	9	24	28	43	165	192	45%
Delaware	-	3	13	26	49	55	54	56	55	55	
District of Columbia	-	-	-	-	-	-	-	-	-	-	

**Figure 40: 2018 Renewable and Carbon-free Generation as a Percent of Total Sales**

*Generation from Carbon-free Sources as a Percent of Total Sales*

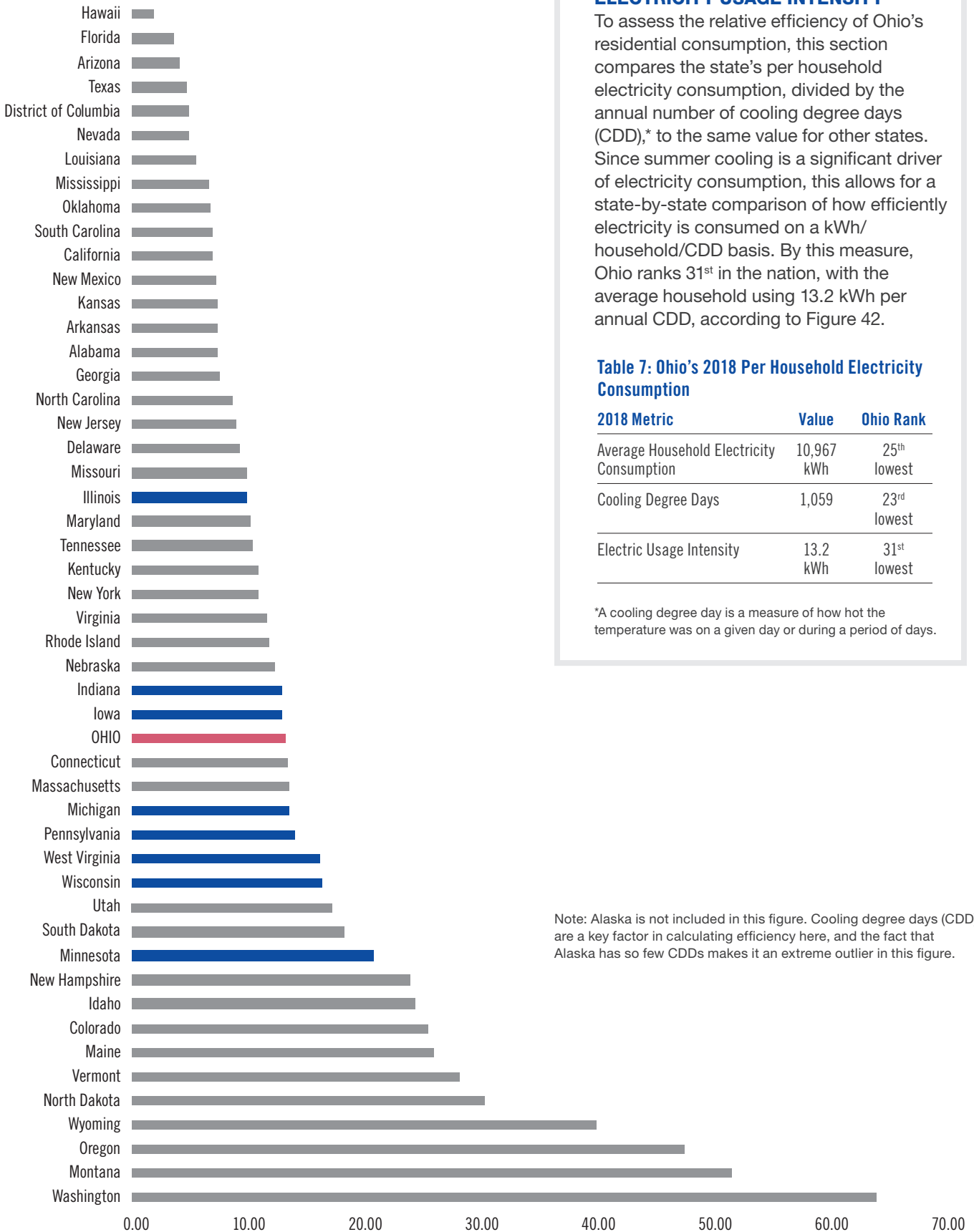


**Renewable and Carbon-free Generation as a percent of Total Sales**  
 As a percent of sales, Ohio's generation from renewable and carbon-free sources was 13.8%, which is 45th highest (7th lowest) in the country, according to Figure 40.

**Figure 41: Renewable and Carbon-free Generation as a Percent of Total Sales***Generation from Carbon-free Sources as a Percent of Total Sales*

State	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
New Hampshire	109%	125%	102%	100%	127%	123%	116%	129%	124%	120%	1%
Washington	94%	93%	112%	116%	103%	106%	101%	110%	108%	111%	2%
Montana	73%	76%	101%	90%	81%	96%	84%	87%	89%	92%	2%
Oregon	78%	77%	101%	100%	88%	93%	83%	91%	92%	91%	1%
Illinois	73%	70%	72%	73%	76%	77%	78%	78%	80%	78%	1%
South Carolina	74%	68%	70%	70%	76%	70%	71%	76%	75%	72%	0%
South Dakota	44%	58%	79%	71%	55%	63%	61%	70%	67%	71%	5%
Maine	72%	69%	74%	73%	71%	68%	66%	65%	75%	67%	-1%
North Dakota	35%	47%	57%	53%	46%	48%	47%	54%	69%	67%	7%
Kansas	30%	32%	27%	34%	42%	48%	49%	55%	73%	67%	8%
Connecticut	60%	59%	57%	61%	61%	58%	63%	61%	63%	64%	1%
Pennsylvania	58%	57%	56%	57%	59%	60%	61%	63%	65%	63%	1%
Idaho	50%	45%	66%	57%	48%	54%	51%	53%	60%	62%	2%
Alabama	67%	54%	57%	59%	64%	59%	62%	57%	64%	60%	-1%
Arizona	51%	52%	55%	54%	53%	55%	56%	56%	58%	56%	1%
Iowa	30%	32%	37%	42%	47%	46%	52%	54%	57%	53%	6%
New York	54%	50%	52%	49%	51%	51%	52%	51%	54%	53%	0%
Tennessee	40%	36%	37%	36%	43%	38%	36%	37%	43%	46%	1%
Oklahoma	12%	12%	12%	16%	23%	22%	28%	37%	43%	46%	15%
New Jersey	47%	42%	45%	46%	47%	45%	46%	42%	49%	45%	0%
Minnesota	31%	31%	31%	33%	31%	36%	37%	40%	43%	42%	3%
North Carolina	38%	35%	36%	36%	39%	37%	38%	40%	42%	42%	1%
Nebraska	36%	43%	33%	27%	32%	47%	52%	47%	45%	41%	1%
California	33%	35%	41%	29%	30%	29%	30%	38%	45%	40%	2%
Vermont	132%	118%	122%	120%	123%	126%	36%	35%	39%	39%	-11%
Michigan	26%	33%	35%	31%	35%	38%	37%	39%	41%	38%	4%
Arkansas	49%	42%	39%	41%	35%	40%	41%	40%	37%	35%	-3%
Georgia	29%	28%	28%	30%	31%	29%	31%	31%	32%	32%	1%
New Mexico	9%	9%	11%	12%	12%	13%	12%	20%	26%	32%	14%
Alaska	21%	23%	22%	25%	26%	28%	29%	31%	30%	31%	4%
Maryland	27%	25%	28%	26%	27%	27%	28%	28%	31%	31%	1%
Virginia	30%	27%	26%	30%	30%	31%	30%	31%	32%	30%	0%
Wyoming	19%	25%	34%	31%	30%	31%	27%	32%	32%	30%	4%
Texas	18%	20%	19%	20%	20%	21%	22%	26%	27%	29%	5%
Nevada	12%	13%	14%	15%	18%	18%	20%	24%	26%	28%	8%
Colorado	10%	10%	14%	14%	16%	18%	17%	22%	22%	23%	8%
Louisiana	26%	26%	23%	22%	24%	23%	21%	23%	21%	22%	-1%
Wisconsin	25%	26%	24%	28%	24%	22%	23%	23%	22%	22%	-1%
Missouri	16%	13%	14%	15%	13%	13%	16%	15%	15%	18%	1%
Mississippi	27%	22%	24%	18%	25%	24%	27%	15%	19%	17%	-4%
Florida	15%	12%	12%	10%	14%	15%	14%	15%	15%	15%	0%
Massachusetts	14%	14%	13%	15%	12%	15%	14%	15%	16%	15%	0%
Utah	5%	5%	8%	6%	5%	6%	6%	11%	16%	14%	12%
Hawaii	8%	8%	10%	11%	13%	14%	14%	15%	15%	14%	6%
<b>OHIO</b>	<b>11%</b>	<b>11%</b>	<b>10%</b>	<b>13%</b>	<b>12%</b>	<b>12%</b>	<b>13%</b>	<b>13%</b>	<b>14%</b>	<b>14%</b>	<b>2%</b>
West Virginia	8%	7%	8%	9%	10%	8%	9%	10%	11%	11%	3%
Kentucky	4%	3%	4%	3%	4%	5%	5%	5%	7%	6%	4%
Indiana	2%	3%	4%	4%	4%	4%	5%	6%	6%	6%	11%
Rhode Island	2%	2%	2%	1%	1%	3%	3%	3%	5%	5%	10%
Delaware	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	-1%
District of Columbia							0%	0%	0%	0%	

**Figure 42: Electricity Usage Intensity**  
kWh/Household/CDD



**ELECTRICITY USAGE INTENSITY**

To assess the relative efficiency of Ohio’s residential consumption, this section compares the state’s per household electricity consumption, divided by the annual number of cooling degree days (CDD),\* to the same value for other states. Since summer cooling is a significant driver of electricity consumption, this allows for a state-by-state comparison of how efficiently electricity is consumed on a kWh/household/CDD basis. By this measure, Ohio ranks 31<sup>st</sup> in the nation, with the average household using 13.2 kWh per annual CDD, according to Figure 42.

**Table 7: Ohio’s 2018 Per Household Electricity Consumption**

2018 Metric	Value	Ohio Rank
Average Household Electricity Consumption	10,967 kWh	25 <sup>th</sup> lowest
Cooling Degree Days	1,059	23 <sup>rd</sup> lowest
Electric Usage Intensity	13.2 kWh	31 <sup>st</sup> lowest

\*A cooling degree day is a measure of how hot the temperature was on a given day or during a period of days.

Note: Alaska is not included in this figure. Cooling degree days (CDD) are a key factor in calculating efficiency here, and the fact that Alaska has so few CDDs makes it an extreme outlier in this figure.

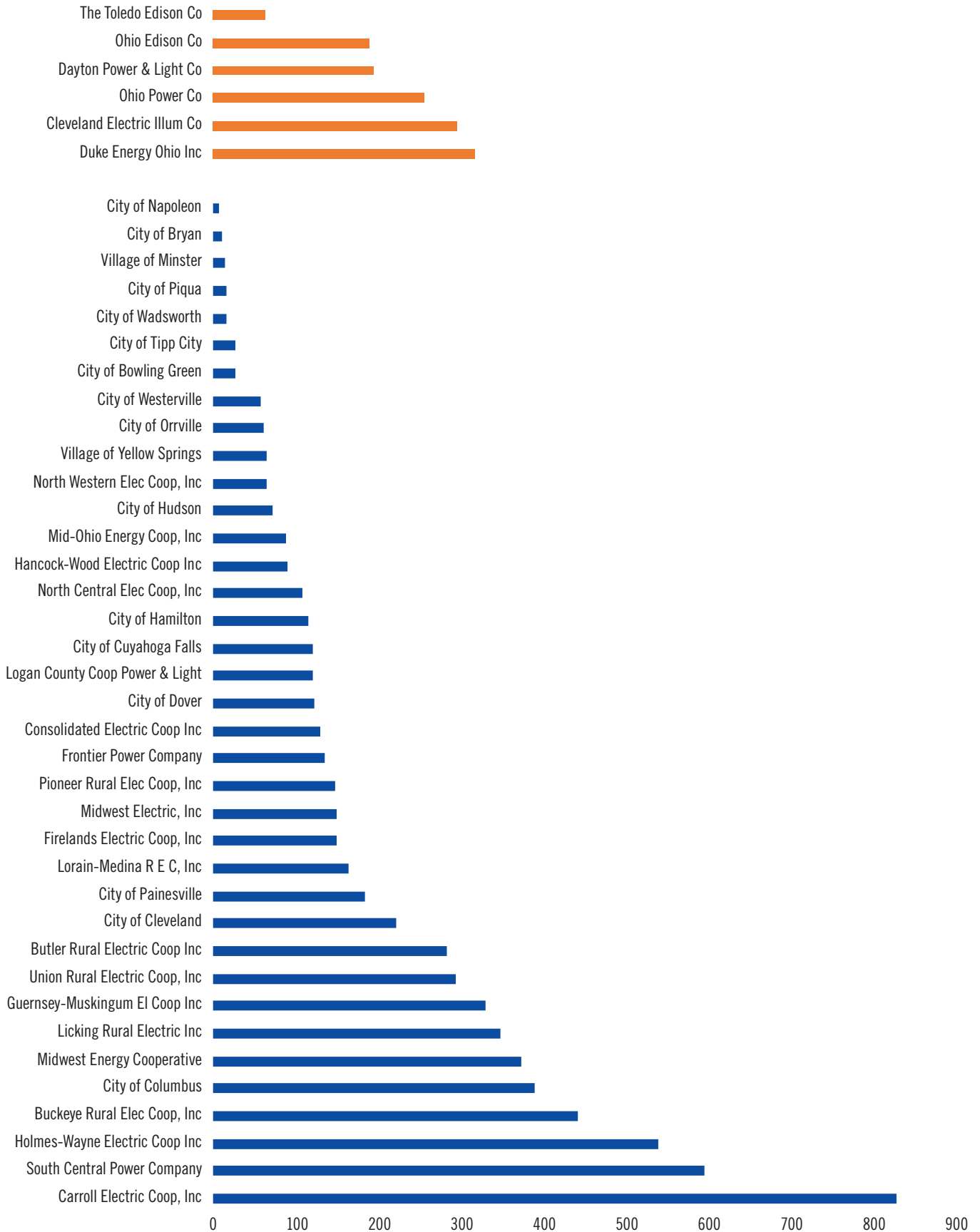
# Reliability Metrics: Ohio Utilities

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The following section displays reliability metrics for Ohio utilities. In most graphs, investor-owned utilities are shown in orange, while municipal and cooperative utilities are shown in blue.



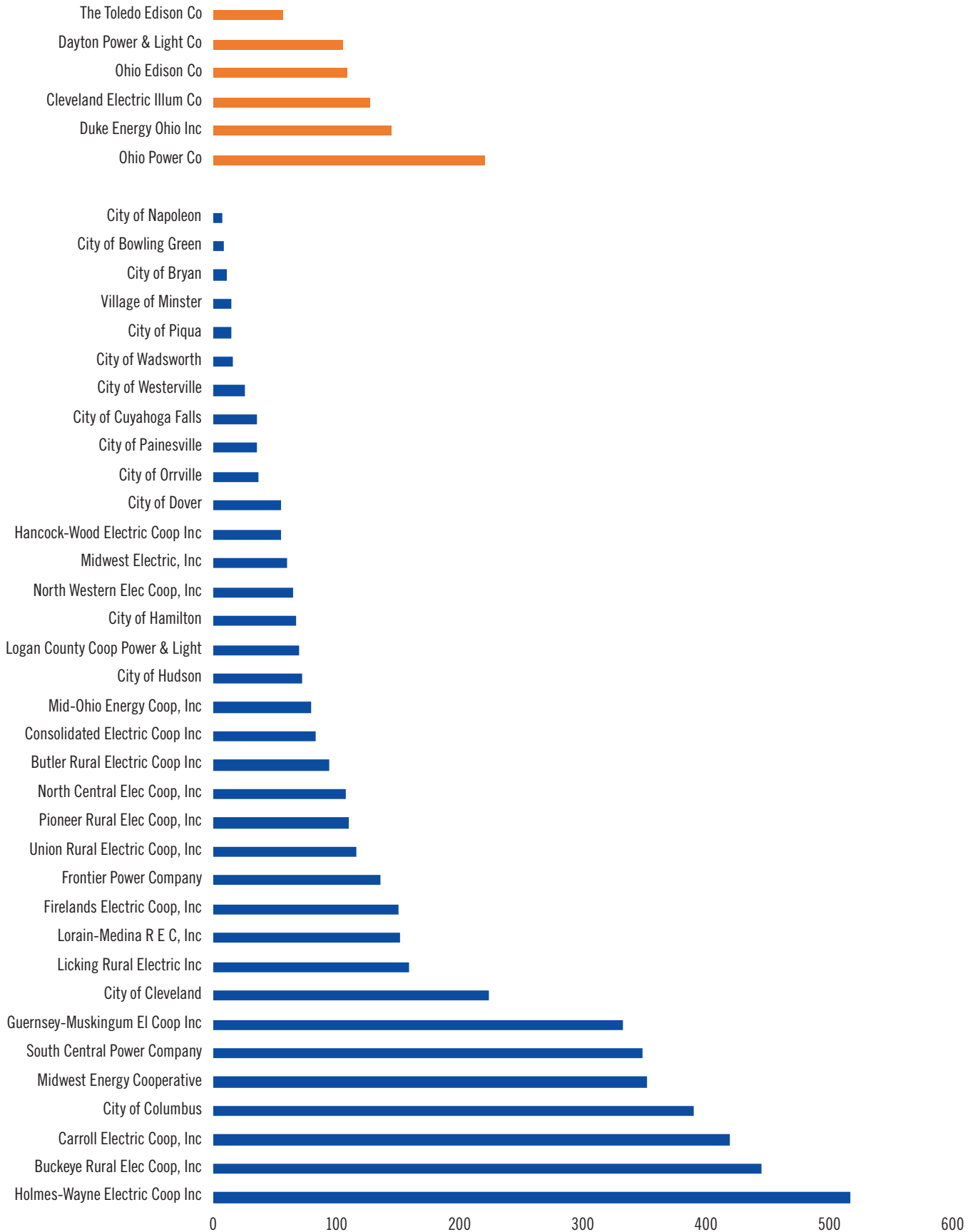
**Figure 43: 2018 Ohio Utilities SAIDI with MED**  
*Average Minutes of Outage per Customer per Year (SAIDI) with Major Event Days*



**Figure 44: Ohio Utilities SAIDI with MED***Average Minutes of Outage per Customer per Year (SAIDI) with Major Event Days*

Utility	2013	2014	2015	2016	2017	2018
The Toledo Edison Co	180	112	100	71	147	62
Ohio Edison Co	128	116	111	109	284	189
Dayton Power & Light Co	127	128	119	151	197	195
Ohio Power Co	345	213	239	190	255	256
Cleveland Electric Illum Co	237	222	146	215	282	296
Duke Energy Ohio Inc	161	145	226	253	263	317
City of Napoleon					11	7
City of Bryan			15	23	46	10
Village of Minster	7	153	58	11	35	14
City of Piqua	14	15	18	14	9	15
City of Wadsworth		29	27	37	11	16
City of Tipp City				154	65	26
City of Bowling Green	1	0	29	27	3	27
City of Westerville	68	71	47	74	66	57
City of Orrville	308	309	43	57	217	61
Village of Yellow Springs					223	64
North Western Elec Coop, Inc	150	52	266	113	157	65
City of Hudson	2	7	2	7	218	71
Mid-Ohio Energy Coop, Inc		32	47	62	44	88
Hancock-Wood Electric Coop Inc	185	108	72	89	117	90
North Central Elec Coop, Inc	304	49	44	36	84	107
City of Hamilton	273	53	59	48	87	116
City of Cuyahoga Falls	71	2	74	63	126	121
Logan County Coop Power & Light	65	50	98	59	129	121
City of Dover				5	116	122
Consolidated Electric Coop Inc	306	296	179	229	236	130
Frontier Power Company	237	237	182	224	177	135
Pioneer Rural Elec Coop, Inc	100	123	118	171	220	148
Midwest Electric, Inc	266	226	180	130	156	149
Firelands Electric Coop, Inc	33	171	141	111	533	150
Lorain-Medina R E C, Inc	91	130	105	81	178	165
City of Painesville	628	628	55	51	54	183
City of Cleveland	38	42	12	17	28	222
Butler Rural Electric Coop Inc	151	165	145	211	173	283
Union Rural Electric Coop, Inc	73	146	90	133	163	294
Guernsey-Muskingum EI Coop Inc	395	189	315	439	313	331
Licking Rural Electric Inc				127	282	347
Midwest Energy Cooperative			453	105	395	373
City of Columbus		119	107	75	297	389
Buckeye Rural Elec Coop, Inc			1,404	364	419	443
Holmes-Wayne Electric Coop Inc	502	385	253	295	345	539
South Central Power Company		379	237	272	402	595
Carroll Electric Coop, Inc	1,118	513	404	1,543	766	829

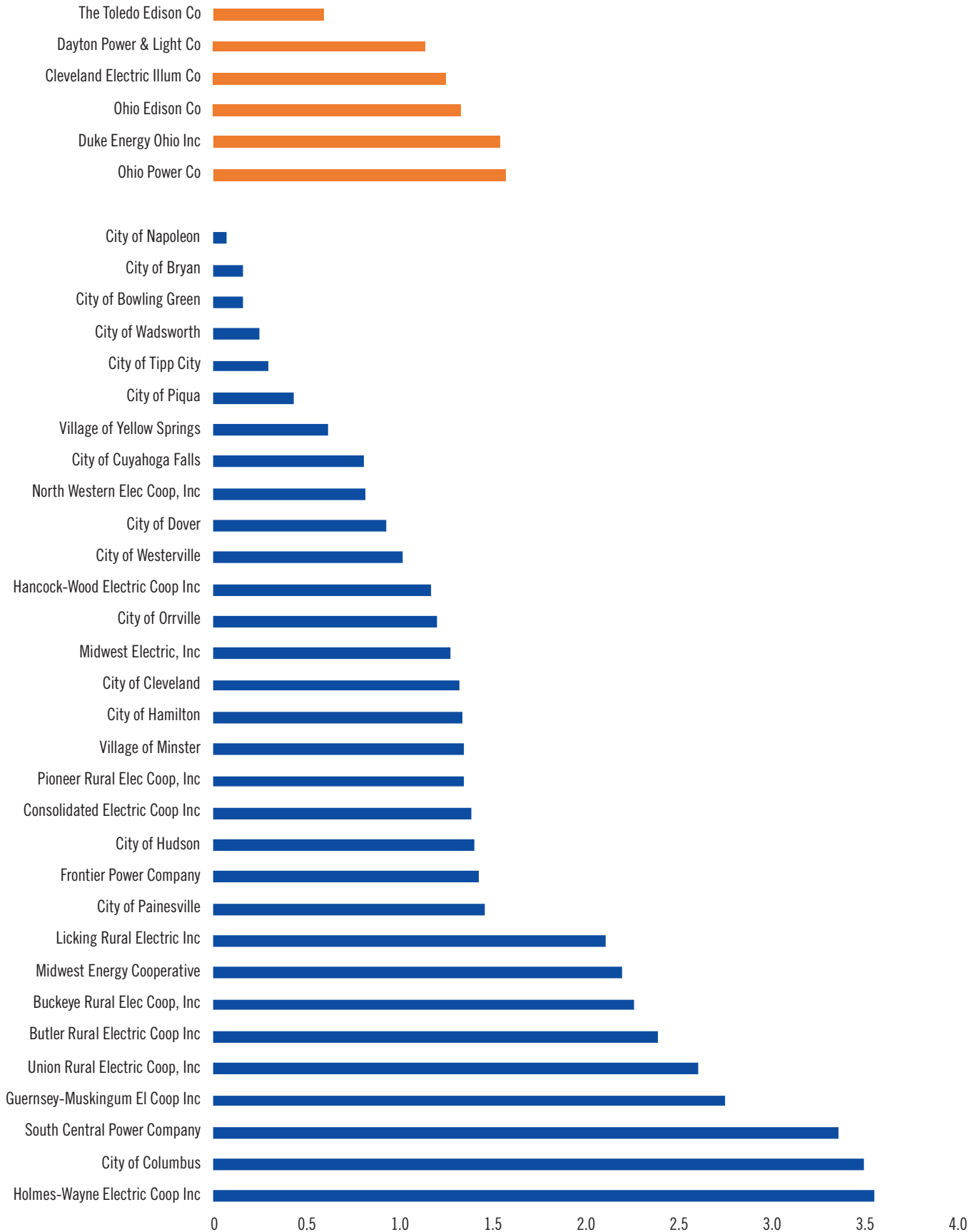
**Figure 45: 2018 Ohio Utilities SAIDI without MED**  
*Average Minutes of Outage per Customer per Year (SAIDI) without Major Event Days*



**Figure 46: Ohio Utilities SAIDI without MED***Average Minutes of Outage per Customer per Year (SAIDI) without Major Event Days*

Utility	2013	2014	2015	2016	2017	2018
The Toledo Edison Co	56	56	69	71	60	56
Dayton Power & Light Co	80	109	106	88	103	104
Ohio Edison Co	78	95	96	92	100	108
Cleveland Electric Illum Co	89	105	139	114	120	126
Duke Energy Ohio Inc	115	112	133	146	159	143
Ohio Power Co	164	192	202	175	199	218
City of Napoleon					11	7
City of Bowling Green			27	3	3	8
City of Bryan			15	23	46	10
Village of Minster	7	5	7		7	14
City of Piqua	14	15	11	7	9	15
City of Wadsworth		29	27	37	11	16
City of Westerville	47	35	47	74	66	25
City of Cuyahoga Falls	71	2	19	35	41	34
City of Painesville					54	34
City of Orrville			16	11	40	36
City of Dover				3	5	54
Hancock-Wood Electric Coop Inc	185	108	72	74	90	54
Midwest Electric, Inc	88	117	116	85	77	59
North Western Elec Coop, Inc	85	52	266	113	157	65
City of Hamilton						66
Logan County Coop Power & Light	43	50	17	40	48	69
City of Hudson			-		81	71
Mid-Ohio Energy Coop, Inc		23	34	62	44	79
Consolidated Electric Coop Inc	118	136	103	135	122	82
Butler Rural Electric Coop Inc	131	97	94	81	87	93
North Central Elec Coop, Inc	216	49	44	36	84	107
Pioneer Rural Elec Coop, Inc	76	78	69	124	118	110
Union Rural Electric Coop, Inc	73	125	90	133	62	115
Frontier Power Company	170	170	182	150	177	135
Firelands Electric Coop, Inc	17	163	141	111	481	150
Lorain-Medina R E C, Inc	85	130	105	81	68	150
Licking Rural Electric Inc				127	139	157
City of Cleveland		0				222
Guernsey-Muskingum EI Coop Inc	395	189	315	439	313	331
South Central Power Company		331	237	224	269	347
Midwest Energy Cooperative			375	105	301	350
City of Columbus	83	119	102	75	297	389
Carroll Electric Coop, Inc	371	331	288	257	520	417
Buckeye Rural Elec Coop, Inc			410	364	419	443
Holmes-Wayne Electric Coop Inc	340	365	250	286	324	515

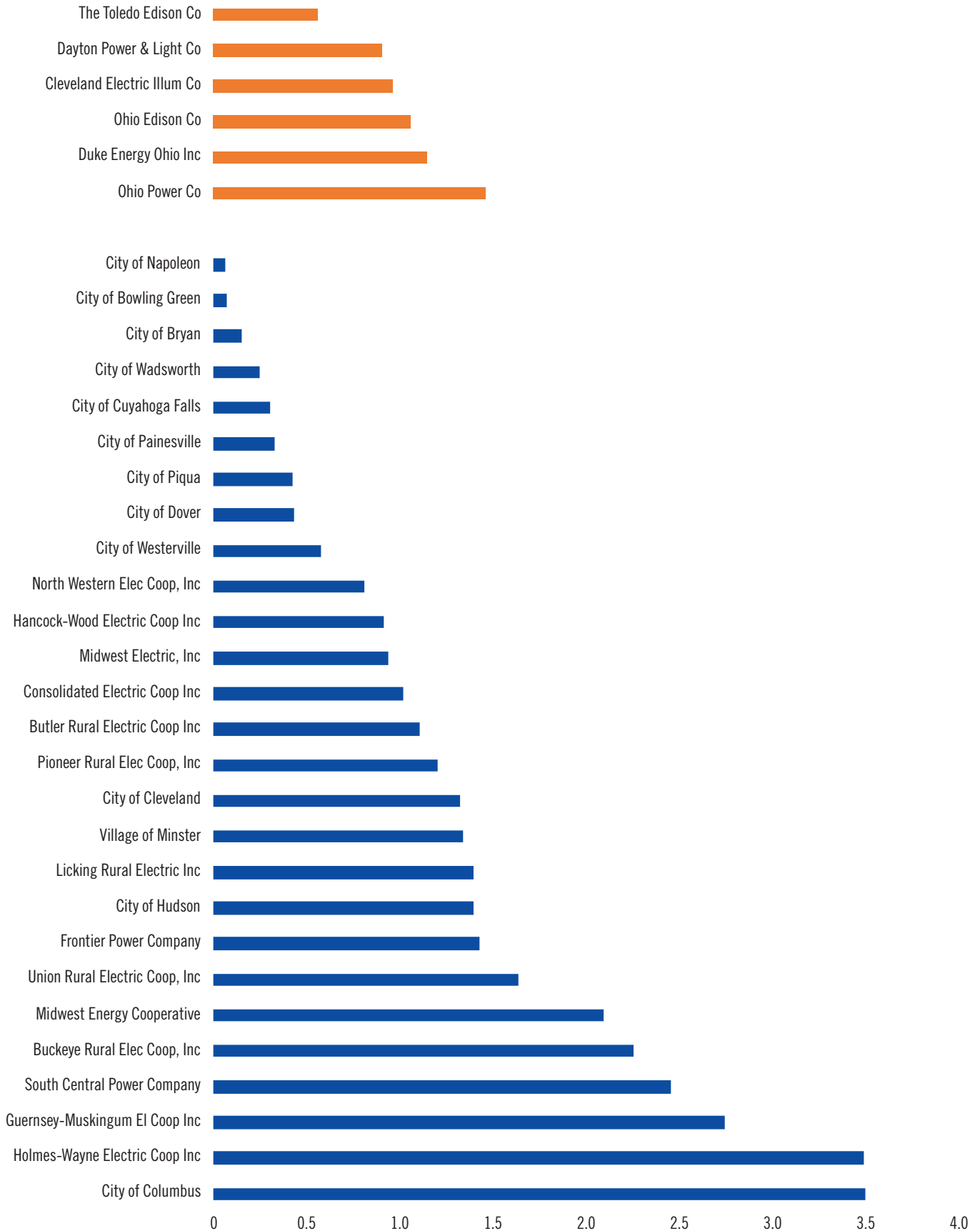
**Figure 47: 2018 Ohio Utilities SAIFI with MED**  
*Outages per Customer per Year (SAIFI) with Major Event Days*



**Figure 48: Ohio Utilities SAIFI with MED**  
*Outages per Customer per Year (SAIFI) with Major Event Days*

Utility	2013	2014	2015	2016	2017	2018
The Toledo Edison Co	0.8	0.7	0.9	0.7	0.9	0.6
Dayton Power & Light Co	0.9	1.0	1.0	0.9	1.1	1.1
Cleveland Electric Illum Co	1.2	1.5	1.2	1.3	1.3	1.3
Ohio Edison Co	1.0	1.1	1.1	1.0	1.4	1.3
Duke Energy Ohio Inc	1.3	1.3	1.4	1.5	1.5	1.5
Ohio Power Co	1.4	1.3	1.4	1.3	1.5	1.6
City of Napoleon					0.0	0.1
City of Bryan			0.6	0.4	1.0	0.2
City of Bowling Green	0.0	0.1	0.3	0.3	0.0	0.2
City of Wadsworth		0.5	0.6	1.1	1.0	0.3
City of Tipp City				0.9	0.5	0.3
City of Piqua	0.3	0.5	1.6	0.4	0.2	0.4
Village of Yellow Springs					0.8	0.6
City of Cuyahoga Falls	0.7	0.0	0.6	0.4	0.8	0.8
North Western Elec Coop, Inc	2.0	1.0	2.2	1.3	1.4	0.8
City of Dover				0.0	0.8	0.9
City of Westerville	1.7	1.0	0.8	1.2	1.0	1.0
Hancock-Wood Electric Coop Inc	1.3	1.3	1.0	1.1	1.2	1.2
City of Orrville	2.7	2.7	0.5	0.4	1.5	1.2
Midwest Electric, Inc	1.7	1.9	1.8	1.4	1.1	1.3
City of Cleveland	0.1		0.1	0.1	0.1	1.3
City of Hamilton	2.2	0.9	0.8	0.6	1.1	1.3
Village of Minster	-	2.0	0.4	1.3	1.1	1.3
Pioneer Rural Elec Coop, Inc	1.0	1.5	1.0	1.7	1.6	1.4
Consolidated Electric Coop Inc	2.6	3.6	1.8	2.3	3.1	1.4
City of Hudson	0.1	0.2	0.0	0.2	0.8	1.4
Frontier Power Company	2.2	2.2	1.8	2.0	2.1	1.4
City of Painesville	2.1	2.1	0.6	0.4	0.5	1.5
Licking Rural Electric Inc				1.0	1.9	2.1
Midwest Energy Cooperative			2.4	0.9	2.2	2.2
Buckeye Rural Elec Coop, Inc			4.2	2.1	2.0	2.3
Butler Rural Electric Coop Inc	2.2	1.7	2.1	1.7	1.7	2.4
Union Rural Electric Coop, Inc	1.0	2.4	1.3	1.7	1.4	2.6
Guernsey-Muskingum EI Coop Inc	2.0	0.2	2.4	2.6	2.4	2.8
South Central Power Company			1.5	2.1	2.6	3.4
City of Columbus		1.0	1.5	0.7	1.7	3.5
Holmes-Wayne Electric Coop Inc	2.4	2.5	1.7	2.2	2.7	3.6

**Figure 49: 2018 Ohio Utilities SAIFI without MED**  
*Outages per Customer per Year (SAIFI) without Major Event Days*



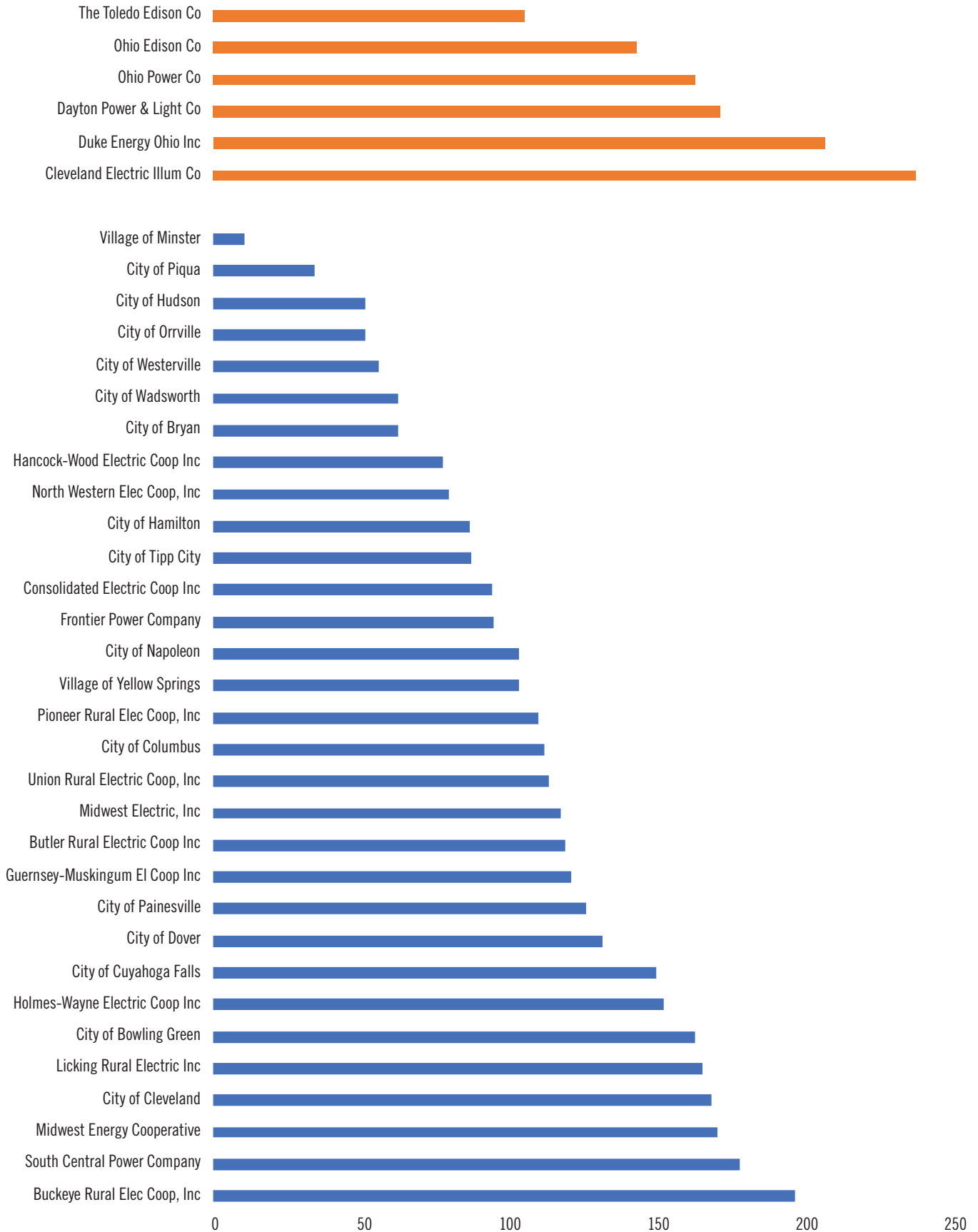
**Figure 50: Ohio Utilities SAIFI without MED***Outages per Customer per Year (SAIFI) without Major Event Days*

Utility	2013	2014	2015	2016	2017	2018
The Toledo Edison Co	0.6	0.6	0.8	0.7	0.6	0.6
Dayton Power & Light Co	0.7	0.9	0.9	0.8	0.9	0.9
Cleveland Electric Illum Co	0.9	1.0	1.2	1.1	1.1	1.0
Ohio Edison Co	0.9	1.0	1.0	0.9	1.0	1.1
Duke Energy Ohio Inc	1.0	1.2	1.2	1.1	1.3	1.2
Ohio Power Co	1.2	1.3	1.3	1.2	1.3	1.5
City of Napoleon					0.0	0.1
City of Bowling Green		0.0	0.2	0.0	0.0	0.1
City of Bryan			0.6	0.4	1.0	0.2
City of Wadsworth		0.5	0.6	1.1	1.0	0.3
City of Cuyahoga Falls	0.7	0.0	0.2	0.2	0.3	0.3
City of Painesville					0.5	0.3
City of Piqua	0.3	0.5	0.3	0.3	0.2	0.4
City of Dover				0.0	0.4	0.4
City of Westerville	1.3	0.8	0.8	1.2	1.0	0.6
North Western Elec Coop, Inc	1.0	1.0	2.2	1.3	1.4	0.8
Hancock-Wood Electric Coop Inc	1.3	1.3	1.0	1.0	0.9	0.9
Midwest Electric, Inc	0.9	1.2	1.2	1.1	0.8	0.9
Consolidated Electric Coop Inc	1.7	1.8	1.1	1.6	1.9	1.0
Butler Rural Electric Coop Inc	2.0	1.1	1.2	1.0	1.0	1.1
Pioneer Rural Elec Coop, Inc	0.9	1.1	0.7	1.4	1.1	1.2
City of Cleveland						1.3
Village of Minster	-		0.1		0.6	1.3
Licking Rural Electric Inc				1.0	1.3	1.4
City of Hudson			-		0.8	1.4
Frontier Power Company	1.8	1.8	1.8	1.8	2.1	1.4
Union Rural Electric Coop, Inc	1.0	2.1	1.3	1.7	0.8	1.6
Midwest Energy Cooperative			2.2	0.9	2.0	2.1
Buckeye Rural Elec Coop, Inc			3.2	2.1	2.0	2.3
South Central Power Company		2.7	1.5	1.9	2.0	2.5
Guernsey-Muskingum El Coop Inc	2.0	0.2	2.4	2.6	2.4	2.8
Holmes-Wayne Electric Coop Inc	1.9	2.4	1.7	2.1	2.6	3.5
City of Columbus	1.4	1.0	1.5	0.7	1.7	3.5



**Figure 51: 2018 Ohio Utilities CAIDI with MED**

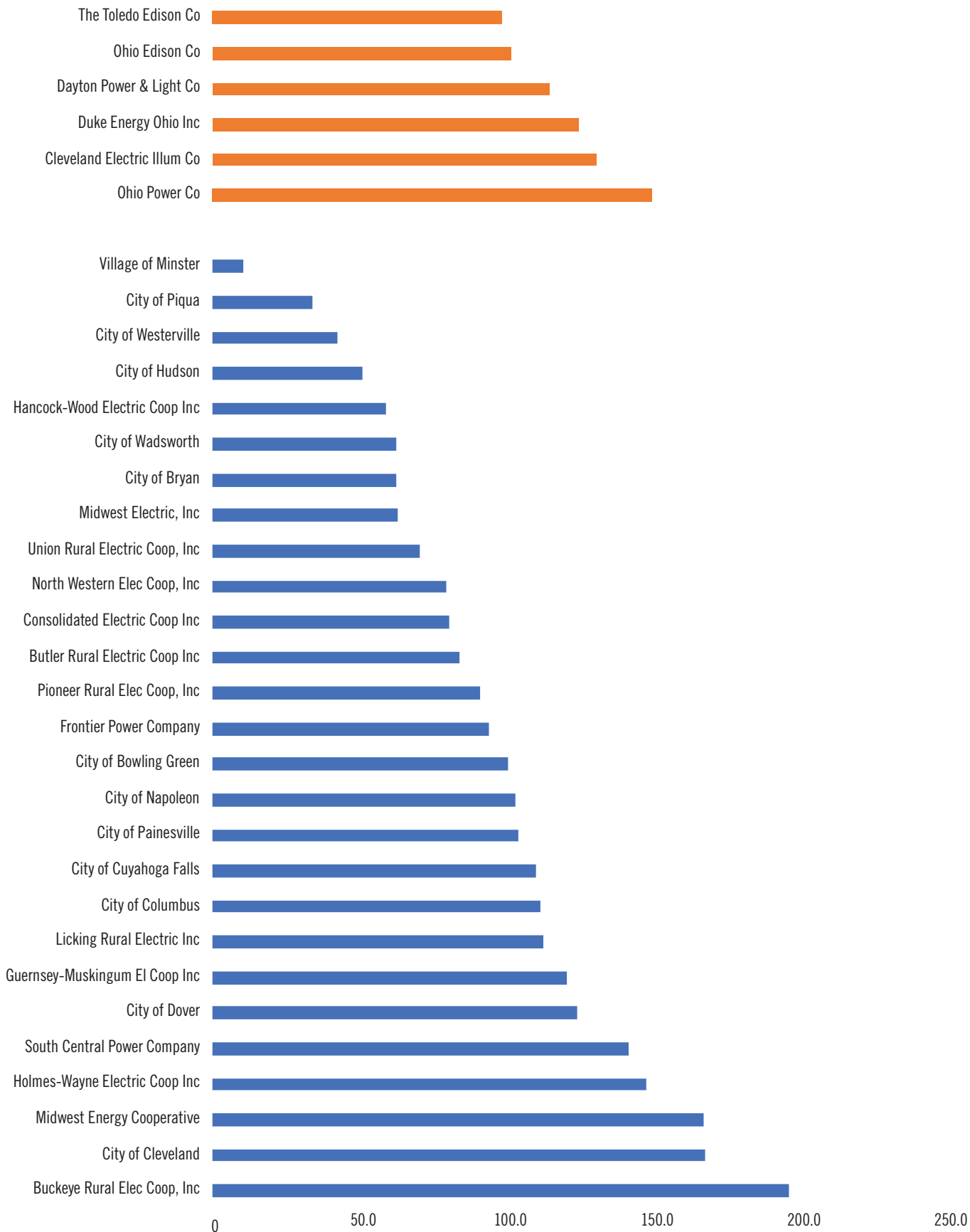
*Average Minutes to Restore Power to Customer (CAIDI) with Major Event Days*



**Figure 52: Ohio Utilities CAIDI with MED***Average Minutes to Restore Power to Customer (CAIDI) with Major Event Days*

Utility	2013	2014	2015	2016	2017	2018
The Toledo Edison Co	228	152	116	109	172	105
Ohio Edison Co	127	109	103	108	209	142
Ohio Power Co	246	159	172	147	174	162
Dayton Power & Light Co	148	132	124	164	186	171
Duke Energy Ohio Inc	122	113	164	172	179	206
Cleveland Electric Illum Co	204	152	121	161	210	237
Village of Minster		77	144	8	32	10
City of Piqua	41	32	11	37	43	34
City of Hudson	35	39	78	39	283	51
City of Orrville	115	114	88	161	142	51
City of Westerville	40	70	56	61	69	55
City of Wadsworth		60	49	34	11	62
City of Bryan			24	58	46	62
Hancock-Wood Electric Coop Inc	142	85	71	85	98	77
North Western Elec Coop, Inc	75	52	121	89	110	79
City of Hamilton	125	61	70	82	76	86
City of Tipp City				175	129	87
Consolidated Electric Coop Inc	119	82	98	101	77	94
Frontier Power Company	109	109	100	114	84	94
City of Napoleon					221	103
Village of Yellow Springs					275	103
Pioneer Rural Elec Coop, Inc	98	83	118	100	138	109
City of Columbus		120	70	110	172	111
Union Rural Electric Coop, Inc	73	61	67	80	114	113
Midwest Electric, Inc	154	122	100	93	147	117
Butler Rural Electric Coop Inc	70	96	70	125	102	118
Guernsey-Muskingum EI Coop Inc	198	1,260	131	169	132	120
City of Painesville	300	299	86	123	100	126
City of Dover				182	151	131
City of Cuyahoga Falls	105	95	130	168	159	149
Holmes-Wayne Electric Coop Inc	209	157	146	135	127	152
City of Bowling Green	40	2	97	91	129	162
Licking Rural Electric Inc				128	146	165
City of Cleveland	463		122	111	219	168
Midwest Energy Cooperative			189	120	179	169
South Central Power Company			159	129	158	177
Buckeye Rural Elec Coop, Inc			334	173	212	196

**Figure 53: 2018 Ohio Utilities CAIDI without MED**  
*Average Minutes to Restore Power to Customer (CAIDI) without Major Event Days*



**Figure 54: Ohio Utilities CAIDI without MED***Average Minutes to Restore Power to Customer (CAIDI) without Major Event Days*

Utility	2013	2014	2015	2016	2017	2018
The Toledo Edison Co	98.2	95.7	90.1	108.9	94.4	98.5
Ohio Edison Co	91.8	97.0	94.5	100.8	97.7	101.1
Dayton Power & Light Co	108.1	118.0	115.0	114.1	121.5	114.4
Duke Energy Ohio Inc	117.3	97.3	114.5	127.7	123.8	124.3
Cleveland Electric Illum Co	102.3	101.9	118.4	103.4	113.2	130.4
Ohio Power Co	142.2	151.0	152.3	141.2	151.2	149.4
Village of Minster			72.1		13.4	10.4
City of Piqua	41.4	32.3	37.4	26.1	42.9	34.0
City of Westerville	37.3	42.2	56.3	60.7	69.2	42.3
City of Hudson					104.6	50.8
Hancock-Wood Electric Coop Inc	142.2	85.0	71.3	76.2	95.7	58.6
City of Wadsworth		59.8	49.4	34.2	11.0	62.1
City of Bryan			23.5	58.1	46.5	62.3
Midwest Electric, Inc	95.5	97.3	96.9	77.2	102.7	62.9
Union Rural Electric Coop, Inc	73.2	60.1	67.2	80.4	76.8	70.1
North Western Elec Coop, Inc	85.0	52.4	121.0	89.2	110.0	79.3
Consolidated Electric Coop Inc	71.1	74.3	94.5	82.3	63.5	80.4
Butler Rural Electric Coop Inc	65.4	87.7	79.7	80.7	91.2	83.6
Pioneer Rural Elec Coop, Inc	88.0	69.5	98.1	88.4	107.3	90.6
Frontier Power Company	96.6	96.6	100.0	85.7	83.6	94.1
City of Bowling Green			136.5	81.5	128.7	100.4
City of Napoleon					220.8	102.6
City of Painesville					99.8	104.0
City of Cuyahoga Falls	104.6	94.6	96.3	157.8	118.7	109.8
City of Columbus	57.6	119.9	69.1	110.1	171.7	111.1
Licking Rural Electric Inc				127.4	109.2	112.5
Guernsey-Muskingum El Coop Inc	197.5	1,260.0	131.3	168.8	131.5	120.2
City of Dover				159.9	11.2	123.9
South Central Power Company		121.1	159.3	120.7	132.0	141.2
Holmes-Wayne Electric Coop Inc	182.4	154.2	145.5	135.6	124.4	147.4
Midwest Energy Cooperative			173.7	119.8	150.3	166.7
City of Cleveland						167.5
Buckeye Rural Elec Coop, Inc			128.1	172.6	211.7	195.8

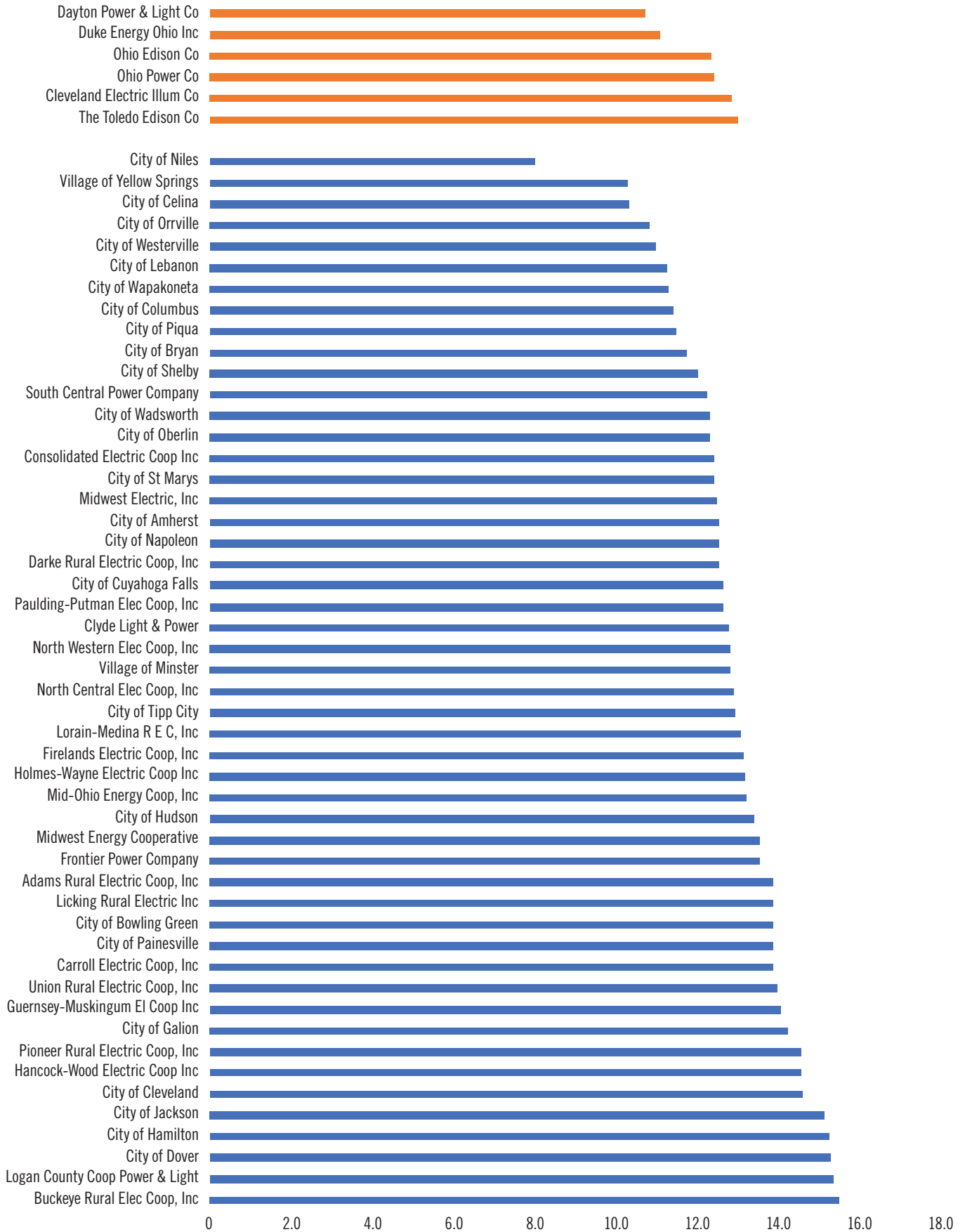
# Affordability Metrics: Ohio Utilities

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The following section displays affordability metrics for Ohio utilities. In most graphs, investor-owned utilities are shown in orange, while municipal and cooperative utilities are shown in blue.

**Figure 55: 2018 Ohio Utilities Residential Electricity Price**

*Average Price of Electricity: Residential Sector (Cents/kWh)*

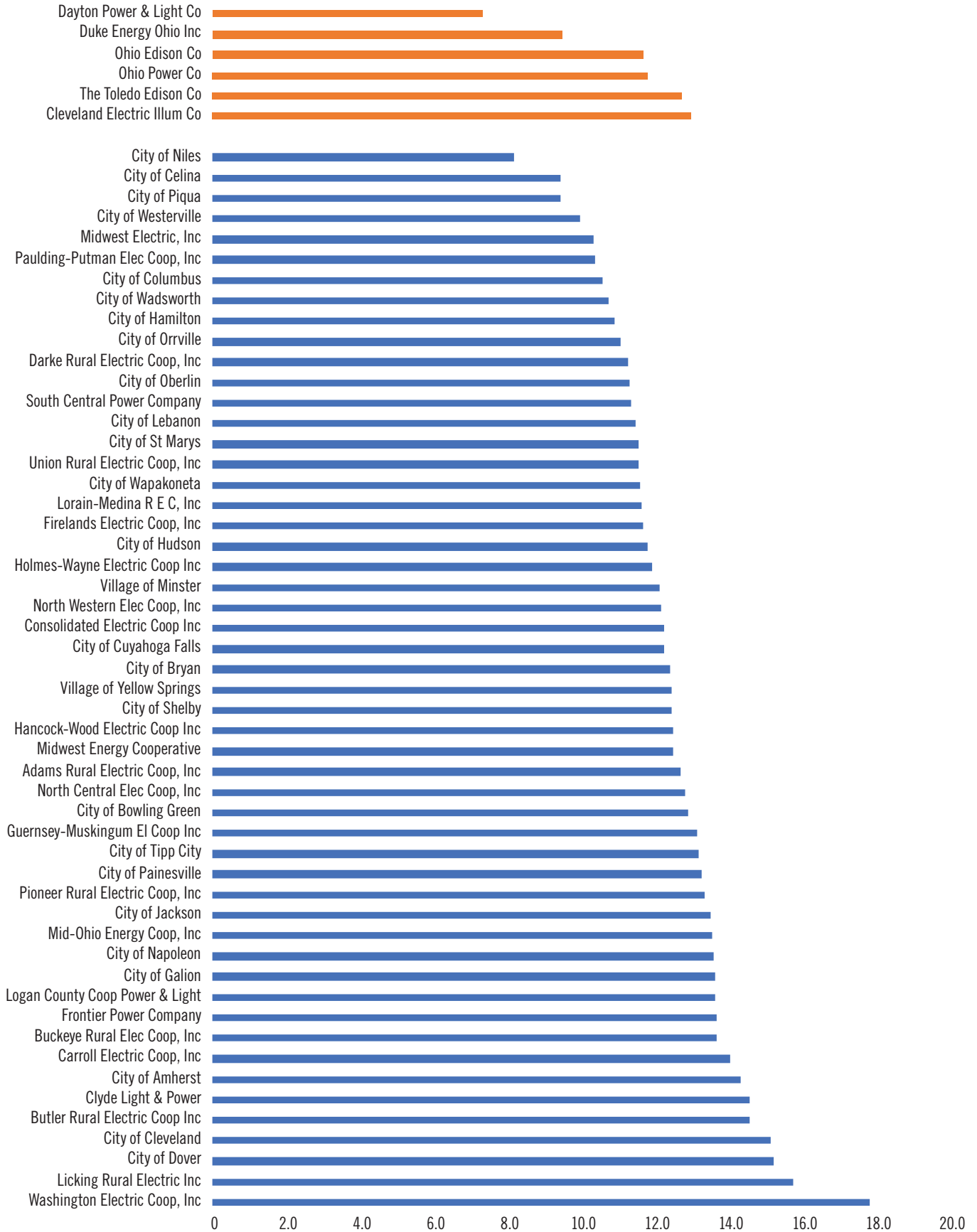


**Figure 56: Ohio Utilities Residential Electricity Price**  
*Average Price of Electricity: Residential Sector (Cents/kWh)*

Utility	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Dayton Power & Light Co	10.9	12.5	13.2	13.6	13.4	13.6	13.0	12.2	11.3	10.7	0
Duke Energy Ohio Inc	11.4	12.9	12.1	10.6	11.1	11.3	11.3	11.7	11.6	11.1	0
Ohio Edison Co	11.4	10.9	10.9	11.4	11.3	11.6	12.5	11.8	12.3	12.4	1%
Ohio Power Co	8.7	9.7	11.2	12.3	13.4	14.3	13.7	13.3	12.8	12.5	4%
Cleveland Electric Illum Co	11.5	12.1	11.6	11.6	11.6	11.9	12.8	12.0	12.7	12.9	1%
The Toledo Edison Co	12.1	11.5	11.8	11.7	11.9	12.2	13.0	12.2	12.8	13.0	1%
City of Niles	9.2	10.3	10.1	10.5	10.7	9.4	8.0	7.9		8.0	-1%
Village of Yellow Springs	10.6	11.2	13.1	10.3	9.8	9.7	9.9	10.9	9.8	10.3	0
City of Celina	9.3	9.3	9.5	9.3	9.3	9.5	9.9	10.3	11.0	10.3	1%
City of Orrville	8.0	8.2	8.5	9.1	10.1	10.1	9.4	10.7	10.9	10.9	3%
City of Westerville	9.1	9.8	10.0	10.3	10.7	11.0	11.3	11.4	11.5	11.0	2%
City of Lebanon	11.6	10.6	10.8	11.2	11.8	11.6	11.1	10.8	11.1	11.3	0
City of Wapakoneta	9.6	9.4	9.3	8.6	8.7	8.8	9.1	9.6	10.6	11.3	2%
City of Columbus	10.4	12.8	13.7	13.5	13.1	12.8	12.6	11.6	11.9	11.4	1%
City of Piqua	9.5	9.4	9.3	9.4	9.5	10.5	11.3	11.7	11.8	11.5	2%
City of Bryan	10.2	10.3	10.4	10.0	10.2	10.2	10.4	10.9	11.9	11.7	1%
City of Shelby	9.4	9.1	9.3	10.6	11.2	12.4	13.2	13.1	12.9	12.0	2%
South Central Power Company	9.7	10.2	10.5	11.5	11.8	11.9	11.8	11.9	12.4	12.3	2%
City of Wadsworth	11.2	13.2	12.2	12.9	11.6	12.0	11.8	12.2	12.5	12.3	1%
City of Oberlin	11.0	11.2	11.4	10.9	10.3	11.3	11.3	10.9	11.4	12.4	1%
Consolidated Electric Coop Inc	9.6	10.4	11.0	11.8	11.9	12.0	12.3	12.4	12.7	12.5	3%
City of St Marys	9.8	9.4	9.6	9.6	10.2	10.2	9.5	10.7	12.4	12.5	2%
Midwest Electric, Inc	9.7	10.5	11.3	12.2	12.2	12.2	12.3	12.2	12.6	12.5	3%
City of Amherst	9.4	9.6	9.3	9.5	9.5	10.1	10.1	10.9	11.0	12.5	3%
City of Napoleon	10.4	10.7	10.8	10.8	11.0	11.4	10.8	11.3	12.0	12.6	2%
Darke Rural Electric Coop, Inc	9.8	10.9	11.4	12.2	12.0	12.1	12.2	12.6	13.0	12.6	3%
City of Cuyahoga Falls	9.6	8.5	8.0	9.8	10.0	10.7	10.8	11.7	12.4	12.7	3%
Paulding-Putman Elec Coop, Inc	8.9	9.6	9.5	10.9	10.5	11.5	11.7	11.9	12.3	12.7	4%
Clyde Light & Power	12.1	11.2	10.9	10.3	10.2	10.6	10.8	11.2	11.9	12.8	1%
North Western Elec Coop, Inc	9.9	10.4	11.7	12.8	12.8	12.6	12.5	12.6	13.0	12.8	3%
Village of Minster	7.2	8.2	8.6	8.7	9.1	9.6	10.6	11.5	12.3	12.9	6%
North Central Elec Coop, Inc	10.2	10.8	11.1	11.9	12.1	12.2	12.4	12.6	13.1	12.9	2%
City of Tipp City	9.0	9.6	10.0	9.9	10.2	11.1	11.5	11.2	11.9	13.0	4%
Lorain-Medina R E C, Inc	10.3	10.7	11.2	12.1	12.3	12.3	12.5	12.6	13.2	13.1	2%
Firelands Electric Coop, Inc	10.6	11.1	11.6	12.8	12.7	12.5	12.8	13.1	13.3	13.2	2%
Holmes-Wayne Electric Coop Inc	9.8	10.5	11.2	12.2	12.4	12.5	12.3	12.4	13.3	13.2	3%
Mid-Ohio Energy Coop, Inc	10.2	11.1	11.7	12.4	12.7	13.1	13.0	13.4	13.3	13.3	3%
City of Hudson	10.9	10.9	10.7	11.0	11.4	12.0	12.7	13.6	13.4	13.4	2%
Midwest Energy Cooperative	11.3	11.6	12.2	12.6	12.9	13.1	13.3	13.9	13.5	13.6	2%
Frontier Power Company	11.1	11.6	12.0	12.8	13.0	13.4	13.5	13.5	13.8	13.6	2%
Adams Rural Electric Coop, Inc	11.7	12.5	13.0	13.9	14.0	13.7	13.9	14.4	14.6	13.9	2%
Licking Rural Electric Inc	11.3	12.2	12.6	13.5	13.6	13.7	13.5	13.6	14.5	13.9	2%
City of Bowling Green	9.2	10.3	9.8	10.8	11.5	12.4	13.0	13.4	13.7	13.9	4%
City of Painesville	10.0	10.9	11.6	11.7	11.4	12.7	12.0	12.9	12.9	13.9	3%
Carroll Electric Coop, Inc	11.0	11.7	12.3	13.3	13.3	13.1	13.2	13.7	14.2	13.9	2%
Union Rural Electric Coop, Inc	11.1	11.5	11.9	12.5	12.9	13.2	13.6	13.6	14.1	14.0	2%
Guernsey-Muskingum El Coop Inc	11.6	12.2	12.5	13.8	14.2	13.9	13.8	13.9	14.4	14.1	2%
City of Galion	9.6	9.7	9.7	9.7	10.3	9.3	11.4	12.6	12.7	14.3	4%
Pioneer Rural Electric Coop, Inc	11.3	12.1	12.4	13.2	13.4	13.1	13.1	13.7	14.4	14.6	3%
Hancock-Wood Electric Coop Inc	10.6	10.9	12.2	13.4	13.3	12.7	13.4	13.4	14.1	14.6	3%
City of Cleveland	11.1	11.4	11.4	11.4	11.9	12.7	13.2	13.4	13.8	14.6	3%
City of Jackson	13.0	11.6	12.0	12.1	12.8	13.0	12.7	13.3	14.8	15.2	2%
City of Hamilton	10.0	10.0	10.7	10.9	10.6	10.7	13.0	12.5	13.7	15.3	4%
City of Dover	10.0	10.2	10.2	10.9	11.8	12.1	12.7	13.9	15.1	15.3	4%
Logan County Coop Power & Light	11.1	11.9	12.2	13.1	13.7	13.6	13.9	14.0	15.3	15.4	3%
Buckeye Rural Elec Coop, Inc	12.6	13.1	13.9	14.6	14.5	14.6	15.1	15.6	15.8	15.5	2%

**Figure 57: 2018 Ohio Utilities Commercial Electricity Price**

*Average Price of Electricity: Commercial Sector (Cents/kWh)*



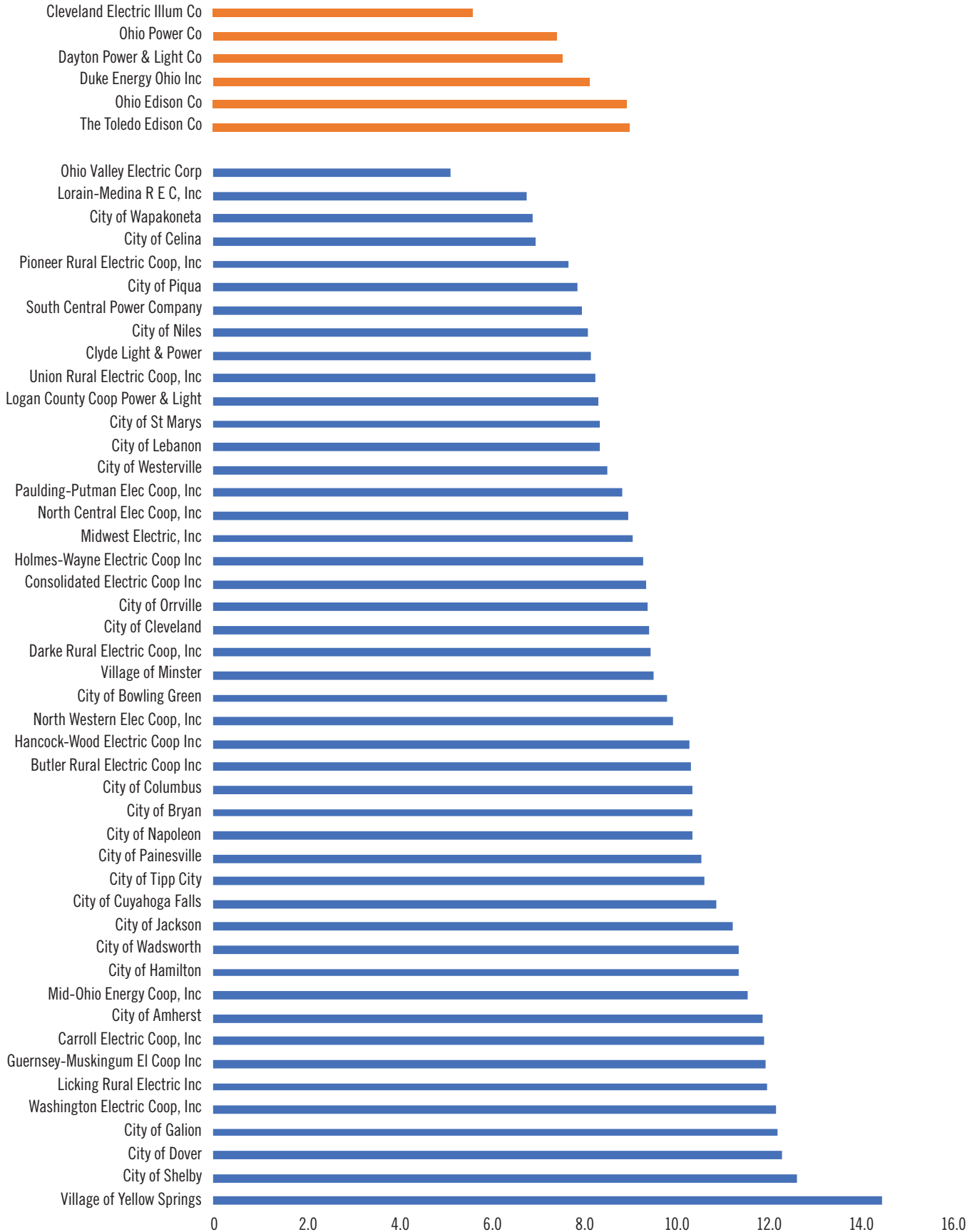


**Figure 58: Ohio Utilities Commercial Electricity Price**  
*Average Price of Electricity: Commercial Sector (Cents/kWh)*

Utility	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Dayton Power & Light Co	8.9	10.3	11.0	10.4	10.0	10.1	10.0	9.3	8.5	7.3	-2%
Duke Energy Ohio Inc	10.1	12.8	12.8	10.1	10.7	11.3	10.5	10.0	9.5	9.5	-1%
Ohio Edison Co	10.8	10.6	10.6	10.6	11.2	11.3	11.7	11.1	11.7	11.7	1%
Ohio Power Co	7.6	8.2	9.4	10.8	12.5	13.2	11.5	11.2	11.5	11.8	5%
The Toledo Edison Co	11.4	10.9	12.7	11.9	12.7	12.6	13.0	11.9	12.5	12.7	1%
Cleveland Electric Illum Co	12.3	12.6	12.6	12.0	12.5	12.7	12.7	11.9	12.7	13.0	0%
City of Niles	9.0	10.7	11.3	11.5	12.1	9.7	8.1	8.1		8.1	-1%
City of Celina	9.2	8.1	9.4	9.5	9.2	9.8	9.5	7.9	7.7	9.4	0%
City of Piqua	7.7	7.6	7.5	7.6	7.8	8.9	9.3	9.6	9.5	9.4	2%
City of Westerville	8.3	8.8	9.0	9.2	9.7	10.0	10.4	10.3	10.3	9.9	2%
Midwest Electric, Inc	8.5	8.8	9.2	9.8	10.0	10.1	10.0	9.9	10.2	10.3	2%
Paulding-Putman Elec Coop, Inc	6.3	7.8	9.9	10.2	10.9	9.6	9.6	9.8	10.0	10.4	5%
City of Columbus	11.3	13.7	13.2	13.2	12.4	12.3	11.9	10.7	11.0	10.5	-1%
City of Wadsworth	10.2	10.1	10.4	9.4	9.0	9.7	8.7	8.9	11.0	10.7	1%
City of Hamilton	10.5	10.4	11.1	11.3	11.1	12.0	11.1	10.1	10.4	10.9	0%
City of Orrville	7.9	8.1	8.6	10.3	10.2	9.6	9.7	11.0	11.3	11.1	3%
Darke Rural Electric Coop, Inc	9.1	9.8	10.4	11.0	11.2	11.2	11.0	11.1	11.3	11.3	2%
City of Oberlin	9.9	10.0	10.3	9.7	9.2	10.2	10.2	9.8	10.3	11.3	1%
South Central Power Company	9.3	9.7	10.2	10.9	11.2	11.1	11.0	11.1	11.4	11.3	2%
City of Lebanon	12.3	11.4	11.0	11.3	12.0	11.8	11.4	11.0	11.2	11.4	-1%
City of St Marys	8.7	8.3	8.4	8.8	9.3	9.4	8.5	9.9	11.3	11.5	3%
Union Rural Electric Coop, Inc	9.3	9.7	10.4	10.9	11.1	11.1	11.0	11.2	11.3	11.5	2%
City of Wapakoneta	10.4	10.2	10.1	9.4	9.4	9.5	9.8	10.3	11.3	11.6	1%
Lorain-Medina R E C, Inc	8.9	9.6	10.1	10.9	11.1	11.2	11.1	11.1	11.6	11.6	3%
Firelands Electric Coop, Inc	11.0	10.0	10.4	11.3	11.5	11.4	11.4	11.4	11.5	11.7	1%
City of Hudson	10.2	10.0	9.7	9.8	10.0	10.5	11.2	11.9	11.7	11.8	1%
Holmes-Wayne Electric Coop Inc	9.1	9.6	10.5	11.4	11.5	11.6	11.3	11.3	11.9	11.9	3%
Village of Minster	8.0	8.7	9.0	8.9	9.2	9.8	10.7	11.3	11.9	12.1	4%
North Western Elec Coop, Inc	8.8	9.1	10.4	11.4	11.4	11.7	11.9	11.7	12.1	12.1	3%
Consolidated Electric Coop Inc	10.6	11.5	12.0	12.8	13.0	13.2	13.2	11.8	12.2	12.2	1%
City of Cuyahoga Falls	9.8	9.4	8.9	10.0	10.2	11.0	11.3	11.4	12.4	12.2	2%
City of Bryan	10.9	11.9	11.2	10.7	10.8	10.8	10.2	11.5	12.4	12.4	1%
Village of Yellow Springs	9.4	10.5	8.2	9.6	9.2	9.6	9.5	7.9	11.8	12.4	3%
City of Shelby	10.3	10.5	10.3	10.7	11.7	12.8	13.6	13.4	12.6	12.4	2%
Hancock-Wood Electric Coop Inc	11.1	11.4	11.5	12.2	12.3	11.4	11.4	11.4	12.3	12.5	1%
Midwest Energy Cooperative	10.3	10.8	10.7	10.8	11.7	13.2	12.6	13.0	12.5	12.5	2%
Adams Rural Electric Coop, Inc	9.4	10.7	11.2	12.2	12.3	11.7	11.3	12.7	13.0	12.7	3%
North Central Elec Coop, Inc	9.9	10.4	10.8	11.4	11.8	11.9	12.5	14.6	14.0	12.8	3%
City of Bowling Green	8.3	9.5	9.0	9.7	10.3	10.8	11.8	12.0	12.4	12.9	4%
Guernsey-Muskingum El Coop Inc	10.7	11.2	11.5	12.7	13.2	12.9	12.6	12.6	13.3	13.1	2%
City of Tipp City	9.5	9.8	10.3	10.1	10.5	11.3	11.6	11.5	12.1	13.2	3%
City of Painesville	9.5	10.6	11.2	10.9	11.1	11.8	11.2	12.0	12.4	13.3	3%
Pioneer Rural Electric Coop, Inc	9.9	10.5	10.8	11.6	11.8	11.6	11.6	12.5	13.2	13.3	3%
City of Jackson	12.6	10.7	10.7	10.9	11.8	11.8	11.5	11.8	13.1	13.5	1%
Mid-Ohio Energy Coop, Inc	10.9	11.8	12.5	12.7	12.9	13.3	13.5	13.3	13.6	13.5	2%
City of Napoleon	10.5	10.9	11.0	11.2	11.5	12.1	11.4	11.9	12.7	13.6	3%
City of Galion	8.2	8.3	8.3	8.3	8.3	8.9	10.8	11.2	11.2	13.6	5%
Logan County Coop Power & Light	9.7	10.4	10.9	11.9	12.4	12.2	12.1	11.9	13.3	13.6	3%
Frontier Power Company	11.4	11.8	12.3	13.0	13.3	13.7	13.7	13.6	13.8	13.7	2%
Buckeye Rural Elec Coop, Inc	11.4	10.6	12.4	12.9	13.1	13.0	13.8	14.1	14.2	13.7	2%
Carroll Electric Coop, Inc	11.8	12.5	13.5	14.2	14.1	14.0	14.1	14.8	14.8	14.0	2%
City of Amherst	10.8	11.1	10.1	11.2	11.0	11.6	11.4	12.1	12.7	14.3	3%
Clyde Light & Power	13.9	12.4	12.5	11.9	11.8	12.1	12.5	12.9	13.5	14.5	0%
Butler Rural Electric Coop Inc	11.7	12.2	12.4	13.0	13.6	13.5	13.6	13.8	13.9	14.6	2%
City of Cleveland	11.4	12.2	11.9	11.9	12.2	13.1	13.6	13.5	13.9	15.1	3%
City of Dover	10.8	10.8	10.7	11.5	12.5	12.6	13.0	14.0	15.1	15.2	3%
Licking Rural Electric Inc	11.5	12.1	13.9	13.6	14.4	14.5	14.6	14.0	15.1	15.7	3%
Washington Electric Coop, Inc	13.6	14.2	15.0	15.8	15.9	15.8	15.6	16.2	17.2	17.8	3%

**Figure 59: 2018 Ohio Utilities Industrial Electricity Price**

*Average Price of Electricity: Industrial Sector (Cents/kWh)*

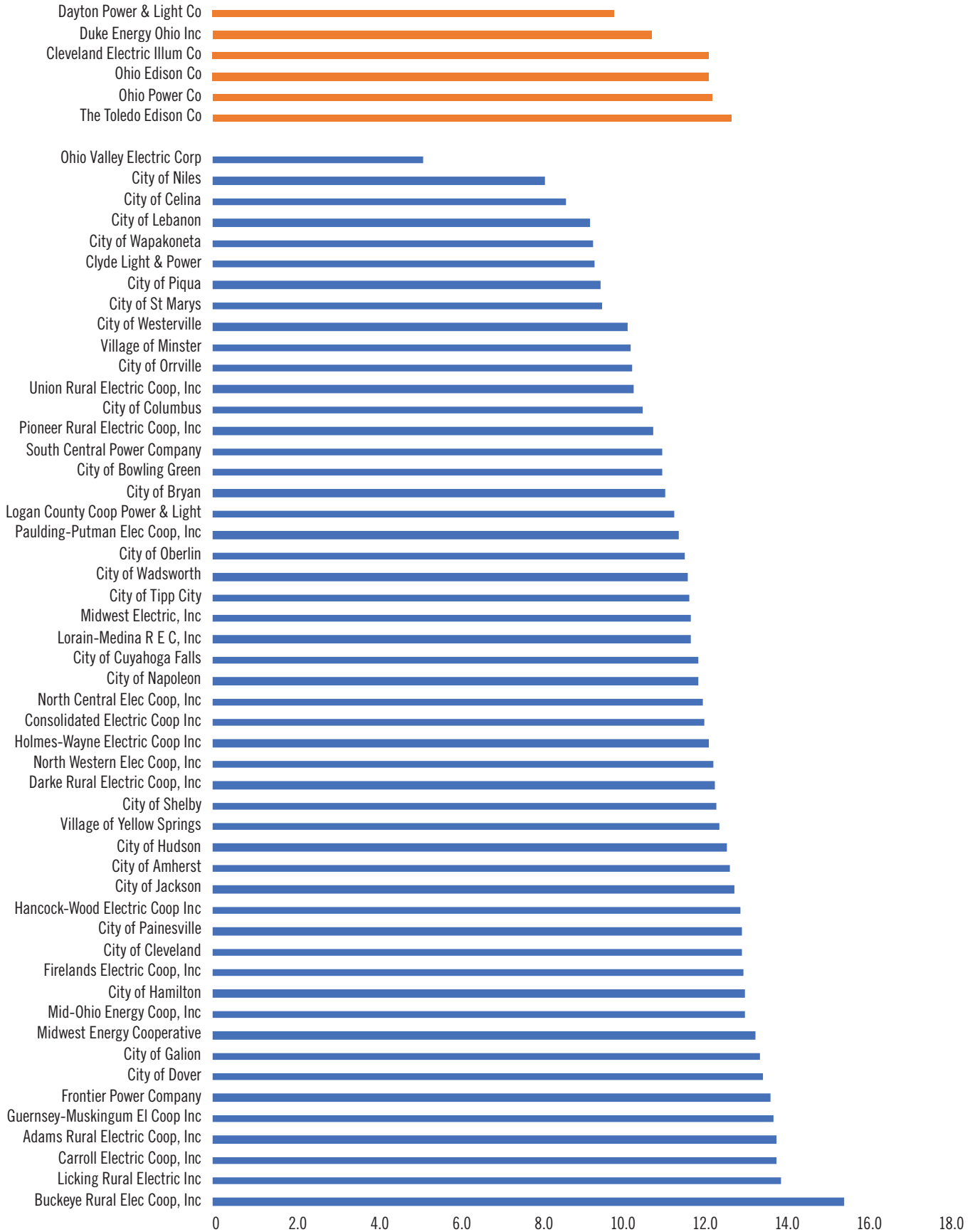


**Figure 60: Ohio Utilities Industrial Electricity Price**  
*Average Price of Electricity: Industrial Sector (Cents/kWh)*

Utility	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Cleveland Electric Illum Co	8.4	6.1	5.7	5.4	5.4	6.1	6.3	6.3	6.3	5.6	-4%
Ohio Power Co	5.2	5.2	5.4	5.7	5.5	6.3	7.0	8.6	12.3	7.4	4%
Dayton Power & Light Co	7.6	7.7	9.4	9.4	10.8	11.5	10.5	10.0	12.2	7.5	0
Duke Energy Ohio Inc	8.0	9.1	11.9	8.0	9.3	9.2	6.5	7.7	8.4	8.1	0%
Ohio Edison Co	7.4	6.5	6.3	5.8	5.9	6.4	6.7	7.2	9.1	8.9	2%
The Toledo Edison Co	6.5	4.9	3.7	4.4	4.6	5.7	5.2	4.9	8.8	9.0	3%
Ohio Valley Electric Corp	4.3	4.5	4.7	4.4	4.7	5.7	5.3	4.9	5.2	5.1	2%
Lorain-Medina R E C, Inc	6.2	6.5	6.5	6.7	6.5	6.5	6.5	6.6	6.7	6.8	1%
City of Wapakoneta	8.3	7.7	7.7	6.8	6.8	6.4	6.6	7.7	7.6	6.9	-2%
City of Celina	7.7	6.8	7.0	7.2	7.1	7.1	8.6	6.6	6.6	7.0	-1%
Pioneer Rural Electric Coop, Inc	6.5	6.5	7.1	6.8	6.9	7.1	7.2	7.1	7.4	7.7	2%
City of Piqua	6.8	6.5	6.3	6.2	6.4	7.4	7.7	8.1	8.1	7.9	1%
South Central Power Company	7.0	7.5	7.6	8.3	8.4	8.4	8.0	7.7	8.1	8.0	1%
City of Niles	8.1	9.7	10.1	9.6	9.5	9.0	8.1	8.1		8.1	0
Clyde Light & Power	8.0	7.0	6.9	6.2	6.1	6.3	6.2	6.8	7.4	8.2	0%
Union Rural Electric Coop, Inc	7.2	7.3	7.9	7.5	7.7	8.0	7.9	8.0	8.4	8.2	1%
Logan County Coop Power & Light	7.5	7.2	8.0	7.8	7.8	7.9	8.3	8.0	8.4	8.3	1%
City of St Marys	7.6	6.8	7.0	7.0	7.7	7.8	6.9	7.3	8.2	8.3	1%
City of Lebanon	9.6	8.7	8.9	9.1	9.5	9.3	8.2	8.1	8.1	8.3	-1%
City of Westerville	7.1	7.7	7.8	8.0	8.6	8.8	9.2	8.9	8.7	8.5	2%
Paulding-Putman Elec Coop, Inc	7.7	6.8	7.4	7.9	7.9	8.1	8.1	7.9	8.4	8.8	1%
North Central Elec Coop, Inc	5.7	5.7	6.3	6.6	7.4	9.5	7.1	9.1	9.5	9.0	5%
Midwest Electric, Inc	6.5	7.1	7.8	8.4	8.6	8.8	8.7	8.6	8.8	9.1	3%
Holmes-Wayne Electric Coop Inc	6.8	7.2	7.9	8.7	8.9	8.9	8.7	8.9	9.4	9.3	3%
Consolidated Electric Coop Inc	6.8	7.5	8.1	8.6	9.2	9.5	9.1	8.9	9.3	9.4	3%
City of Orrville	6.6	6.7	6.9	7.5	8.6	8.5	8.0	9.0	9.4	9.4	4%
City of Cleveland	7.6	7.8	7.8	7.7	7.5	8.3	9.0	9.0	9.1	9.4	2%
Darke Rural Electric Coop, Inc									9.7	9.4	
Village of Minster	6.2	6.5	6.6	6.7	7.3	7.9	8.2	8.4	9.0	9.5	4%
City of Bowling Green	7.7	8.3	7.8	7.6	8.0	8.7	9.2	9.5	9.5	9.8	2%
North Western Elec Coop, Inc	7.7	8.0	9.0	9.8	9.8	9.6	9.3	9.4	9.5	9.9	3%
Hancock-Wood Electric Coop Inc	6.9	8.0	8.7	9.1	9.4	9.1	9.0	8.9	9.6	10.3	4%
Butler Rural Electric Coop Inc	8.2	9.1	9.0	9.5	9.6	9.5	9.3	9.6	9.4	10.3	2%
City of Columbus	9.7	9.9	10.5	10.7	10.4	10.0	9.7	10.2	10.4	10.3	1%
City of Bryan	9.2	8.9	8.8	8.3	8.7	8.9	9.1	9.6	10.5	10.4	1%
City of Napoleon	8.7	8.7	8.8	8.9	8.9	9.3	8.5	9.0	9.7	10.4	2%
City of Painesville	7.2	8.5	9.0	8.7	8.4	9.5	9.8	9.8	10.0	10.5	4%
City of Tipp City	7.3	7.5	8.0	7.7	8.1	9.0	9.2	8.9	9.6	10.6	4%
City of Cuyahoga Falls	8.5	12.2	6.5	8.4	8.7	9.5	9.3	9.7	10.4	10.9	2%
City of Jackson	9.3	7.9	8.2	8.3	8.6	9.0	8.6	9.6	10.9	11.2	2%
City of Wadsworth	10.3	8.6	8.6	8.3	9.6	8.7	9.5	9.7	9.8	11.3	1%
City of Hamilton	7.7	7.6	8.3	8.7	8.5	9.3	7.8	10.0	10.5	11.4	4%
Mid-Ohio Energy Coop, Inc	7.8	8.4	9.0	9.6	9.9	11.5	11.2	11.5	11.4	11.5	4%
City of Amherst	8.8	9.0	9.2	9.4	9.3	9.6	9.6	10.5	10.6	11.9	3%
Carroll Electric Coop, Inc	9.6	10.2	10.7	11.6	11.6	11.5	11.6	13.3	13.2	11.9	2%
Guernsey-Muskingum EI Coop Inc	7.0	7.2	7.6	8.3	9.9	9.8	11.1	11.2	11.1	11.9	5%
Licking Rural Electric Inc	9.9	9.9	9.4	11.4	11.6	11.4	11.6	10.9	12.5	12.0	2%
Washington Electric Coop, Inc			8.1	8.8	8.7	9.7	9.3	10.1	10.7	12.2	
City of Galion	7.1	7.2	7.2	7.2	7.2	7.4	11.7	10.2	11.3	12.2	6%
City of Dover	8.6	8.8	8.8	9.1	10.0	9.8	9.7	10.9	12.0	12.3	4%
City of Shelby	8.3	7.4	8.6	9.3	10.0	11.1	11.7	11.5	11.6	12.6	4%
Village of Yellow Springs	7.2	7.8	5.2	6.9	8.1	6.8	8.4	7.9	13.8	14.5	7%

**Figure 61: 2018 Ohio Utilities All Sectors Electricity Price**

*Average Price of Electricity: All Sectors (Cents/kWh)*



**Figure 62: Ohio Utilities All Sectors Electricity Price**  
*Average Price of Electricity: All Sectors (Cents/kWh)*

Utility	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	CAGR
Dayton Power & Light Co	9.5	11.2	12.5	12.6	12.4	12.6	12.1	11.4	10.5	9.8	0%
Duke Energy Ohio Inc	10.2	12.6	12.3	10.4	10.9	11.2	10.9	11.2	11.0	10.7	0%
Cleveland Electric Illum Co	10.4	9.3	10.4	10.1	10.3	10.4	11.2	11.0	11.9	12.1	1%
Ohio Edison Co	10.1	9.8	9.6	9.6	9.7	10.0	11.2	11.2	12.0	12.1	2%
Ohio Power Co	6.7	7.2	8.4	9.5	11.2	12.6	12.4	12.7	12.6	12.2	6%
The Toledo Edison Co	9.4	8.4	7.4	7.6	7.5	8.4	8.7	9.6	12.5	12.6	3%
Ohio Valley Electric Corp	4.3	4.5	4.7	4.4	4.7	5.7	5.3	4.9	5.2	5.1	2%
City of Niles	8.8	10.3	10.5	10.6	11.0	9.5	8.1	8.0		8.1	-1%
City of Celina	8.6	8.0	8.4	8.4	8.3	8.6	9.3	8.1	8.2	8.6	0
City of Lebanon	10.4	9.4	9.6	9.8	10.2	10.1	9.1	8.9	8.9	9.2	-1%
City of Wapakoneta	9.3	9.0	8.9	8.0	8.1	7.9	8.1	8.9	9.3	9.2	0
Clyde Light & Power	9.0	7.9	7.9	7.2	7.1	7.3	7.3	7.8	8.4	9.3	0%
City of Piqua	8.0	7.8	7.6	7.6	7.7	8.7	9.2	9.6	9.6	9.4	2%
City of St Marys	8.3	7.6	7.8	7.7	8.3	8.4	7.5	8.2	9.2	9.5	1%
City of Westerville	8.4	9.0	9.1	9.4	9.9	10.1	10.5	10.4	10.4	10.1	2%
Village of Minster	6.5	7.0	7.1	7.1	7.7	8.3	8.8	9.1	9.8	10.2	5%
City of Orrville	7.4	7.5	7.8	8.6	9.4	9.2	8.8	9.9	10.2	10.2	3%
Union Rural Electric Coop, Inc	8.5	8.8	9.4	9.3	9.5	9.9	9.8	9.9	10.3	10.2	2%
City of Columbus	10.0	10.6	11.1	11.2	10.9	10.6	10.3	10.4	10.6	10.5	0%
Pioneer Rural Electric Coop, Inc	9.0	9.2	9.8	9.8	9.9	9.9	9.7	9.9	10.4	10.7	2%
South Central Power Company	9.2	9.6	9.9	10.8	11.0	11.1	10.7	10.6	11.0	10.9	2%
City of Bowling Green	8.1	8.9	8.4	8.5	9.0	9.6	10.2	10.5	10.6	10.9	3%
City of Bryan	9.6	9.6	9.6	9.0	9.3	9.5	9.6	10.2	11.2	11.0	1%
Logan County Coop Power & Light	9.3	9.5	10.1	10.1	10.4	10.3	10.6	10.4	11.2	11.2	2%
Paulding-Putman Elec Coop, Inc	8.2	8.7	9.0	10.0	10.1	10.4	10.4	10.5	10.9	11.4	3%
City of Oberlin	10.1	10.3	10.6	10.0	9.4	10.4	10.4	10.0	10.5	11.5	1%
City of Wadsworth	10.6	10.8	10.6	10.4	10.1	10.2	10.1	10.4	11.2	11.6	1%
City of Tipp City	8.3	8.7	9.1	8.9	9.2	10.0	10.3	9.9	10.6	11.6	3%
Midwest Electric, Inc	9.2	9.8	10.6	11.3	11.4	11.5	11.4	11.3	11.6	11.6	2%
Lorain-Medina R E C, Inc	9.6	10.0	10.3	11.0	11.1	11.0	11.2	11.3	11.7	11.7	2%
City of Cuyahoga Falls	9.1	10.3	7.5	9.2	9.5	10.2	10.2	10.7	11.5	11.8	3%
City of Napoleon	9.7	9.9	9.9	10.0	10.1	10.6	9.9	10.4	11.1	11.8	2%
North Central Elec Coop, Inc	8.1	8.4	9.0	9.4	10.5	11.6	10.6	12.0	12.4	12.0	4%
Consolidated Electric Coop Inc	9.1	9.9	10.4	11.1	11.4	11.6	11.8	11.7	12.1	12.0	3%
Holmes-Wayne Electric Coop Inc	9.2	9.7	10.5	11.4	11.5	11.6	11.4	11.4	12.1	12.1	3%
North Western Elec Coop, Inc	9.6	10.1	11.3	12.3	12.3	12.2	11.9	12.0	12.2	12.2	2%
Darke Rural Electric Coop, Inc	9.7	10.7	11.2	11.9	11.8	11.9	12.0	12.2	12.6	12.2	2%
City of Shelby	9.2	8.8	9.3	10.2	10.9	12.1	12.8	12.6	12.4	12.3	3%
Village of Yellow Springs	9.3	10.0	8.8	9.0	9.1	8.7	9.3	9.0	11.8	12.4	3%
City of Hudson	10.5	10.4	10.1	10.3	10.6	11.1	11.8	12.6	12.5	12.5	2%
City of Amherst	9.4	9.6	9.4	9.7	9.7	10.1	10.1	10.9	11.1	12.6	3%
City of Jackson	11.0	9.5	9.7	9.8	10.4	10.6	10.2	10.9	12.2	12.7	1%
Hancock-Wood Electric Coop Inc	9.5	10.2	11.0	11.8	11.9	11.4	11.6	11.6	12.3	12.9	3%
City of Painesville	9.1	10.3	10.8	10.7	10.6	11.7	11.2	11.9	12.1	12.9	4%
City of Cleveland	10.0	10.4	10.3	10.2	10.4	11.2	11.8	11.8	12.1	12.9	3%
Firelands Electric Coop, Inc	10.4	11.0	11.4	12.5	12.5	12.3	12.6	12.8	13.0	12.9	2%
City of Hamilton	9.6	9.5	10.2	10.6	10.3	10.6	11.2	11.2	11.9	12.9	3%
Mid-Ohio Energy Coop, Inc	9.8	10.7	11.4	12.0	12.3	12.9	12.8	13.0	13.0	13.0	3%
Midwest Energy Cooperative	11.0	11.4	11.7	11.9	12.4	13.1	13.1	13.6	13.2	13.2	2%
City of Galion	8.4	8.5	8.5	8.5	8.7	8.4	11.5	11.4	11.8	13.3	5%
City of Dover	9.2	9.4	9.4	9.9	10.8	10.7	10.9	12.1	13.2	13.4	4%
Frontier Power Company	11.2	11.6	12.1	12.8	13.1	13.5	13.5	13.5	13.8	13.6	2%
Guernsey-Muskingum EI Coop Inc	11.0	11.5	11.8	13.0	13.5	13.3	13.3	13.4	13.7	13.7	2%
Adams Rural Electric Coop, Inc	11.4	12.3	12.8	13.7	13.8	13.4	13.5	14.2	14.4	13.7	2%
Carroll Electric Coop, Inc	10.9	11.5	12.2	13.1	13.1	12.9	13.0	13.7	14.2	13.7	2%
Licking Rural Electric Inc	11.2	12.1	12.6	13.4	13.6	13.6	13.4	13.5	14.4	13.8	2%
Buckeye Rural Elec Coop, Inc	12.5	12.9	13.8	14.5	14.4	14.4	15.0	15.5	15.7	15.4	2%

# Conclusion

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Through its utility report card, CUB Ohio attempted to give policymakers a comprehensive analysis of Ohio's utility industry. The numbers give consumers a grim view of the current state of affairs. If we were to give utilities a grade, it would be a D. Clearly, there is significant room for improvement.

The House Bill 6 debacle—the biggest utility-related pay-for-play scandal in state history—coupled with the lackluster findings in this report underscore that Ohio utility customers are in dire need of a package of energy and utility reform laws that amount to a customer bill of rights.

We thought it was an important first step to categorize the state of the problem. In future publications, CUB Ohio will detail specific policy recommendations. Of course, the first step is to repeal HB 6. Beyond that, reform legislation should in general put Ohio on a path to 100 percent clean energy while protecting consumer power bills. That means:

- holding scandal-plagued utilities accountable;
- improving utility affordability;
- expanding energy efficiency and creative demand-reducing programs;
- improving the power grid through smart technology; and
- supporting innovative programs that give customers unprecedented access to their own energy-usage data along with technology that can help them automate their savings.

Of course, a necessity of all energy legislation is that it have equity at its heart: Often communities of color are most battered by pollution and the burden of energy bills. All legislation should be designed to bring the benefits of the clean energy economy—clean air, clean jobs and lower energy bills—to the communities that need them the most, including low-income neighborhoods and those communities abandoned by the fossil fuel industry.

The findings in this report may be bleak, but from CUB Ohio's point of view, they present an opportunity. The state can become a leader in consumer advocacy, energy savings and ushering in the clean energy economy. We must seize that opportunity.



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