UTILITY PERFORMANCE REPORT

RANKING MICHIGAN AMONG THE STATES

2025 EDITION

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GLOSSARY

Terms and Abbreviations

CAGR	Compound Annual Growth Rate (average yearly change)
CAIDI	Customer Average Interruption Duration Index
CO_2	Carbon Dioxide
DOE	Department of Energy
EIA	Energy Information Administration
EPA	Environmental Protection Agency
IEEE	Institute of Electrical and Electronics Engineers
LPO	Loan Programs Office
MED	Major Event Days
MPSC	Michigan Public Service Commission
NG	Natural Gas
NO_x	Nitrogen Oxides (of multiple types)
OHF	Other Heating Fuel
RPS	Renewable Portfolio Standard
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SEDS	State Energy Data System
SMR	Small Modular (nuclear) Reactor
SO_2	Sulfur Dioxide

Units of Measurement

GWh	gigawatt hour—one million kilowatt hours
kWh	kilowatt hour—a unit of electricity measurement typical on U.S. electric bills; the average American household uses about 11,000 kWh per year
Mcf	thousand cubic feet of natural gas
Metric Ton	one million grams or 2204.6 pounds
MMBTU	one million British thermal units, equivalent to 293.07 kWh
MWh	megawatt hour—one thousand kilowatt hours
Therm	one hundred cubic feet of natural gas
TWh	terawatt hour—one billion kilowatt hours

INTRODUCTION

Report Overview

Overall, Michigan utilities' reliability performance in 2023 was worse than in 2022, among the worst in the nation and a continuation of a long-standing problem. The five-year averages for Michigan utility reliability performance metrics continue to be among the worst in the country and the worst of any Great Lakes state.

Notably, Michigan had the 2nd-highest number of outage minutes per customer of any state. This result was driven largely by outage duration rather than outage frequency: Michigan's outage frequency was slightly above the U.S. average, but the state had the longest outages in the nation. The state's poor outage statistics were driven primarily by DTE and Consumers Energy, which had some of the highest outage durations among all investor-owned utilities in the nation. A recurring theme across different versions of this report, reinforced by the latest data, is that Michigan utilities have continuously failed to improve their basic reliability performance. This weakness is often exacerbated during severe weather events, as demonstrated by examining reliability trends with and without Major Event Days (MEDs): while outage durations were fairly stable when excluding MEDs from 2021 to 2023, they swung wildly between 2021 and 2022 and between 2022 and 2023 when including MEDs. This suggests that severe weather events cause outages that overwhelm Michigan utilities' ability to respond quickly and effectively. As the climate continues to warm, Michigan's utility customers will suffer increasingly from long outages unless the utilities invest in effective outage prevention and response measures.

However, the Michigan Public Service Commission (MPSC) has shown significant concern regarding Michigan's persistent reliability challenges and has taken concrete steps to address them. Starting in 2022, the MPSC convened several technical conferences and required utilities to develop distribution investment plans focused on reliability. The Commission also ordered a *third-party audit* of DTE Electric and Consumers Energy, including both physical inspections of distribution assets and a review of management practices, and subsequently *directed the utilities* to implement corrective actions in response to the *audit's findings*. Although it is too soon for these measures to be fully reflected in the data, preliminary figures indicate that Michigan's reliability performance was significantly better in 2024 than in 2023. The observed improvement may reflect both the MPSC's actions and significantly milder weather in 2024 than in 2023, but it is too early to disentangle these two factors and their relative contributions to Michigan's improvements.

Michigan utilities also continue to charge relatively high electric rates. In particular, Michigan's residential rates are higher than those in all but 10 states and higher than residential rates in any other Midwestern state. Meanwhile, natural gas remains a comparatively inexpensive household fuel.

Owing mostly to high electric rates, energy affordability continues to be another weakness for Michigan. In 2023, Michiganders spent an average of 3.70% of their income on energy, well above the national average, even though Michigan's natural gas is cheap compared to most other states. Michigan's high electricity prices accentuate the importance of energy efficiency programs, which seek to spare utilities from expensive grid upgrades that raise electricity rates. Michigan continues to lead in energy efficiency program deployment, with some of the largest energy efficiency savings (as a percentage of state sales) in the nation. While Michigan's cost of electricity savings is close to the U.S. average, each kWh of electricity savings costs a fraction of the average retail price of electricity.

Regarding metrics related to pollution and the environment, Michigan utilities tend to rank in the bottom half of states on key measures such as emissions intensity. While Michigan's relative rankings in 2023 for emissions were similar to those in 2022, the state did improve markedly on several absolute emissions metrics, largely owing to a series of recent coal plant retirements. These retirements and the resulting shift to natural gas reduced Michigan's SO_2 emissions markedly since 2021. However, in 2023, Michigan had the 7th-highest total CO_2 emissions from the power sector and the 6th-highest NO_x emissions, despite having the 10th-largest population among the states. Moreover, although clean energy laws passed in 2023 require Michigan's utilities to generate a rapidly increasing fraction of their electricity from clean sources, the power mix did not change significantly between 2023 to 2024. However, progress continues to be made on restarting the Palisades Nuclear Plant, which would add a significant amount of clean electricity to the grid. By 2030, Michigan utilities are mandated by the 2023 laws to produce 50% of their electricity sales with renewable sources, a number that was close to 14% in 2023. So while Michigan so far has continued to rely heavily on dirty energy, the Palisades restart and the effects of Michigan's clean energy laws will likely change this trend soon.

However, pushing in the opposite direction, a recent U.S. Department of Energy order has extended the operational life of Consumers Energy's J.H. Campbell coal-fired power plant—originally slated for retirement on May 31, 2025— through November 19, 2025. The DOE's directive, driven by claims of a reliability "emergency" in the MISO region, will likely increase Michigan's emissions, but it is too recent for the effects to be observed in the data in this year's report.

Tableau

In this year's report, similar to last year's, all the figures were developed in Tableau, an industry standard data visualization software. The CUB website's Tableau platform contains a comprehensive set of figures for all the metrics contained in this report, and more, for many data years. Readers can visit the platform to perform their own analysis of the underlying utility performance data—they can interact with the figures to compare states, view historical trends for the metrics we discuss in the report, and compare utilities nationwide, not just in Michigan.

The CUB Tableau workbook has a new dashboard this year that can show how any two performance metrics correlate with each other across states and across data years.

Figure 1: Michigan Summary Table for 2023

Metric Name	Unit	Metric Value	Rank
SAIDI with MED	outage minutes per customer	1,093.621	50
SAIDI without MED	outage minutes per customer	162.285	44
SAIFI with MED	interruptions per customer	1.512	36
SAIFI without MED	interruptions per customer	0.919	27
CAIDI with MED	outage minutes per interruption	723.474	51
CAIDI without MED	outage minutes per interruption	176.662	50
Clean Generation as % of Total Generation	%	32.234	34
CO2 Emissions Intensity	kg per MWh	414.552	32
CO2 Equivalent Emissions From Lost NG	thousand metric tons	1,420.494	42
CO2 Total Emissions	thousand metric tons	50,018.469	45
NOX Emissions Intensity	g per MWh	354.795	36
NOX Total Emissions	thousand metric tons	42.808	46
Renewable Generation as % of Total Generation	%	10.904	37
SO2 Emissions Intensity	g per MWh	259.475	38
SO2 Total Emissions	thousand metric tons	31.307	42
Average Price of Electricity - Commercial Sector	$/kWh	0.134	39
Average Price of Electricity - Industrial Sector	$/kWh	0.082	31
Average Price of Electricity - Residential Sector	$/kWh	0.188	41
Efficiency Programs - Electricity Savings as % of Sales - Commercial Sector	%	2.931	1
Efficiency Programs - Electricity Savings as % of Sales - Industrial Sector	%	0.405	13
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector	%	1.455	9
Electrical Generation - all utility-scale solar as % of All Utility Scale Generation	%	1.045	31
Electrical Generation - biomass as % of All Utility Scale Generation	%	1.665	17
Electrical Generation - coal as % of All Utility Scale Generation	%	19.392	30
Electrical Generation - conventional hydroelectric as % of All Utility Scale Generation	%	1.148	13
Electrical Generation - natural gas as % of All Utility Scale Generation	%	44.513	31
Electrical Generation - nuclear as % of All Utility Scale Generation	%	23.048	14
Electrical Generation - wind as % of All Utility Scale Generation	%	6.827	22
Efficiency Programs - Cost per kWh of Electricity Savings - Commercial Sector	$/kWh	0.015	19
Efficiency Programs - Cost per kWh of Electricity Savings - Industrial Sector	$/kWh	0.022	32
Efficiency Programs - Cost per kWh of Electricity Savings - Residential Sector	$/kWh	0.063	37
Electrical Generation - geothermal as % of All Utility Scale Generation	%	Null	Null
Electrical Generation - other as % of All Utility Scale Generation	%	1.247	44
Electrical Generation - petroleum coke as % of All Utility Scale Generation	%	1.035	3
Electrical Generation - petroleum liquids as % of All Utility Scale Generation	%	0.080	30
Electricity Consumption per Household	kWh per household	7,919.968	9
Electricity Expenditures per Household	$ per household	1,492.353	15
Electricity Expenditures per Household as % of Median Income	%	2.157	25
Energy Expenditures per Household	$ per household	2,502.332	33
Energy Expenditures per Household as % of Median Income	%	3.617	36
Fossil Generation as % of Total Generation	%	66.104	34
NG - Consumption per Customer - Residential Sector	Mcf per customer	82.830	47
NG - Price - Residential Sector	$/Mcf	11.482	7
OHF - Expenditures per Household - Residential Sector	$ per household	12.952	32
OHF - Total Consumption Per Household - Residential Sector	million BTU per household	0.317	31
Utility ROE	%	7.954	21

About This Report

The rankings in Figure 1 are in order from best performance to worst. For example, a "1" ranking implies that a state's performance on the given metric is the most desirable out of the 50 states plus D.C., and a "51" ranking implies its performance is the least desirable.

In some cases, a smaller value for a given metric will mean "better" performance and thus a higher ranking. For example, when it comes to the reliability metrics, a lower numerical value is desirable because a smaller number means shorter or less frequent outages, so the lower the value reported for a state, the closer to the top of the rankings it will fall. But in other cases, a higher value will mean "better" performance on a metric. This report assumes, for example, that it is desirable for renewables to make up a higher percentage of generation, so a higher number on that metric leads to a better (i.e. lower) ranking for a state.

Because some data are released earlier than others by the Energy Information Administration (EIA) of the U.S. Department of Energy, this report displays some figures from 2024, while most data is from calendar year 2023.

This report often discusses Michigan in relation to a "peer group" consisting of Ohio, Indiana, Illinois, Wisconsin and Minnesota. These states generally have similar weather, population dynamics, industrial activity and market conditions, and this comparison introduces some context for the statistics in this report.

While the bulk of this report shows how Michigan ranks on individual utility performance metrics, Figure 2 presents a "report card" for the state's major investor-owned utilities, summarizing how each performs across several key metrics, both relative to each other and to the national average.

Figure 2: Ranking Michigan Electric Utilities on Reliability, Affordability and Efficiency in 2023

2023 Alpena Power Co Performance Summary

Metric Name	Metric Value	Michigan	US Average	IOU Rank
Number of Electric Customers - All Sectors	16,750	5,061,443	3,171,419	6
Average Price of Electricity - Residential Sector ($/kWh)	0.159	0.188	0.160	4
Average Price of Electricity - Commercial Sector ($/kWh)	0.139	0.134	0.126	5
Average Price of Electricity - Industrial Sector ($/kWh)	0.070	0.082	0.080	2
SAIDI with MED (outage minutes per customer)	36.89	1,093.62	341.74	1
SAIDI without MED (outage minutes per customer)	29.19	162.28	117.03	1
SAIFI with MED (interruptions per customer)	0.46	1.51	1.31	1
SAIFI without MED (interruptions per customer)	0.41	0.92	0.98	1
CAIDI with MED (outage minutes per interruption)	80.89	723.47	260.23	1
CAIDI without MED (outage minutes per interruption)	70.85	176.66	119.81	1
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector		1.46	0.78	

2023 Consumers Energy Co Performance Summary				
Metric Name	**Metric Value**	**Michigan**	**US Average**	**IOU Rank**
Number of Electric Customers - All Sectors	1,884,290	5,061,443	3,171,419	2
Average Price of Electricity - Residential Sector ($/kWh)	0.188	0.188	0.160	5
Average Price of Electricity - Commercial Sector ($/kWh)	0.142	0.134	0.126	6
Average Price of Electricity - Industrial Sector ($/kWh)	0.083	0.082	0.080	5
SAIDI with MED (outage minutes per customer)	913.03	1,093.62	341.74	6
SAIDI without MED (outage minutes per customer)	176.38	162.28	117.03	5
SAIFI with MED (interruptions per customer)	1.37	1.51	1.31	4
SAIFI without MED (interruptions per customer)	0.96	0.92	0.98	3
CAIDI with MED (outage minutes per interruption)	665.96	723.47	260.23	6
CAIDI without MED (outage minutes per interruption)	184.50	176.66	119.81	6
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector	1.46	1.46	0.78	4

2023 DTE Electric Company Performance Summary				
Metric Name	**Metric Value**	**Michigan**	**US Average**	**IOU Rank**
Number of Electric Customers - All Sectors	2,266,484	5,061,443	3,171,419	1
Average Price of Electricity - Residential Sector ($/kWh)	0.197	0.188	0.160	6
Average Price of Electricity - Commercial Sector ($/kWh)	0.135	0.134	0.126	4
Average Price of Electricity - Industrial Sector ($/kWh)	0.086	0.082	0.080	6
SAIDI with MED (outage minutes per customer)	1,542.30	1,093.62	341.74	7
SAIDI without MED (outage minutes per customer)	156.84	162.28	117.03	3
SAIFI with MED (interruptions per customer)	1.72	1.51	1.31	7
SAIFI without MED (interruptions per customer)	0.86	0.92	0.98	2
CAIDI with MED (outage minutes per interruption)	895.64	723.47	260.23	7
CAIDI without MED (outage minutes per interruption)	183.44	176.66	119.81	5
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector	1.75	1.46	0.78	3

2023 Indiana Michigan Power Co Performance Summary

Metric Name	Metric Value	Michigan	US Average	IOU Rank
Number of Electric Customers - All Sectors	131,626	5,061,443	3,171,419	3
Average Price of Electricity - Residential Sector ($/kWh)	0.157	0.188	0.160	3
Average Price of Electricity - Commercial Sector ($/kWh)	0.112	0.134	0.126	1
Average Price of Electricity - Industrial Sector ($/kWh)	0.111	0.082	0.080	7
SAIDI with MED (outage minutes per customer)	285.30	1,093.62	341.74	3
SAIDI without MED (outage minutes per customer)	218.50	162.28	117.03	7
SAIFI with MED (interruptions per customer)	1.35	1.51	1.31	3
SAIFI without MED (interruptions per customer)	1.24	0.92	0.98	6
CAIDI with MED (outage minutes per interruption)	210.86	723.47	260.23	3
CAIDI without MED (outage minutes per interruption)	176.49	176.66	119.81	4
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector	0.96	1.46	0.78	5

2023 Northern States Power Co Performance Summary

Metric Name	Metric Value	Michigan	US Average	IOU Rank
Number of Electric Customers - All Sectors	8,932	5,061,443	3,171,419	7
Average Price of Electricity - Residential Sector ($/kWh)	0.148	0.188	0.160	2
Average Price of Electricity - Commercial Sector ($/kWh)	0.132	0.134	0.126	3
Average Price of Electricity - Industrial Sector ($/kWh)	0.077	0.082	0.080	3
SAIDI with MED (outage minutes per customer)	245.19	1,093.62	341.74	2
SAIDI without MED (outage minutes per customer)	163.48	162.28	117.03	4
SAIFI with MED (interruptions per customer)	1.59	1.51	1.31	6
SAIFI without MED (interruptions per customer)	1.49	0.92	0.98	7
CAIDI with MED (outage minutes per interruption)	154.21	723.47	260.23	2
CAIDI without MED (outage minutes per interruption)	109.72	176.66	119.81	2
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector	2.61	1.46	0.78	2

2023 Upper Michigan Energy Resources Corp. Performance Summary				
Metric Name	**Metric Value**	**Michigan**	**US Average**	**IOU Rank**
Number of Electric Customers - All Sectors	37,244	5,061,443	3,171,419	5
Average Price of Electricity - Residential Sector ($/kWh)	0.142	0.188	0.160	1
Average Price of Electricity - Commercial Sector ($/kWh)	0.132	0.134	0.126	2
Average Price of Electricity - Industrial Sector ($/kWh)	0.060	0.082	0.080	1
SAIDI with MED (outage minutes per customer)	365.00	1,093.62	341.74	4
SAIDI without MED (outage minutes per customer)	187.00	162.28	117.03	6
SAIFI with MED (interruptions per customer)	1.32	1.51	1.31	2
SAIFI without MED (interruptions per customer)	1.01	0.92	0.98	5
CAIDI with MED (outage minutes per interruption)	276.52	723.47	260.23	5
CAIDI without MED (outage minutes per interruption)	185.15	176.66	119.81	7
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector		1.46	0.78	

2023 Upper Peninsula Power Company Performance Summary				
Metric Name	**Metric Value**	**Michigan**	**US Average**	**IOU Rank**
Number of Electric Customers - All Sectors	53,271	5,061,443	3,171,419	4
Average Price of Electricity - Residential Sector ($/kWh)	0.254	0.188	0.160	7
Average Price of Electricity - Commercial Sector ($/kWh)	0.218	0.134	0.126	7
Average Price of Electricity - Industrial Sector ($/kWh)	0.082	0.082	0.080	4
SAIDI with MED (outage minutes per customer)	425.10	1,093.62	341.74	5
SAIDI without MED (outage minutes per customer)	140.60	162.28	117.03	2
SAIFI with MED (interruptions per customer)	1.58	1.51	1.31	5
SAIFI without MED (interruptions per customer)	0.98	0.92	0.98	4
CAIDI with MED (outage minutes per interruption)	269.05	723.47	260.23	4
CAIDI without MED (outage minutes per interruption)	143.47	176.66	119.81	3
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector	5.11	1.46	0.78	1

ELECTRIC AND NATURAL GAS UTILITY RELIABILITY AND PERFORMANCE

Electric Utilities Overview

Energy is essential to modern life, and energy demand is expected to grow in the coming years following a striking increase of more than 4% in 2024, according to a *recent report* from the International Energy Agency (IEA). While most of the world's economies today primarily burn fossil fuels to satisfy this demand, electricity is increasingly coming from renewable sources, and electrification is seen as a critical pathway for decarbonizing most of society's energy needs, from heating buildings to driving cars to manufacturing and construction.

As communities and businesses depend progressively more on electricity, the reliability of the electric system will become increasingly important, and, in turn, a more reliable electric system will promote electrification. Much of the public discussion about electric utility reliability focuses on what utility regulators and utilities call "resource adequacy." Resource adequacy requires that there is sufficient power generation capacity to satisfy utility customer peak demand. However, loss of electricity supply due to generation or transmission problems accounts for only about 1% of outage minutes nationally. Power outages are instead most often caused by breakdowns in the electricity delivery system—the distribution grid. Distribution breakdowns may occur due to storms breaking power lines, wildfires, animals touching pairs of power lines and causing a "short," equipment failures and many other reasons.

The electric power industry, led by the Institute of Electrical and Electronics Engineers (IEEE), usually measures an electric utility's reliability using a method known as the System Average Interruption Duration Index (SAIDI), which expresses the utility's average number of outage minutes per customer, often calculated on an annual basis. SAIDI is influenced by two factors: the System Average Interruption Frequency Index (SAIFI) measures outages per customer, and the Customer Average Interruption Duration Index (CAIDI) measures the average time for the utility to restore power to a customer after an outage starts. Mathematically, SAIDI = SAIFI x CAIDI. While SAIDI is a useful measure for a utility's overall reliability, expressing SAIFI and CAIDI separately can help a utility understand where it can improve. A high SAIFI value may suggest a need to harden system infrastructure against outage risk, while a high CAIDI value could suggest a need to improve a utility's ability to track and resolve outages.

Beginning in 2013, the EIA began collecting annual reports of SAIDI, SAIFI, and CAIDI from utilities and publishing those data in annual compilations. These data are collected on form EIA-861 and may be downloaded *here*. The latest available reliability data from EIA are for calendar year 2023, and new data are typically released in October. The EIA collects SAIDI and SAIFI metrics with and without Major Event Days (MED). MEDs are often the result of ice storms, windstorms, wildfires and hurricanes, and can materially affect annual reliability statistics. While reliability metrics that include MED can fluctuate greatly year-to-year, they provide a more accurate representation of customer experience than metrics excluding MED. For this reason, reliability data are presented with and without MED.

When looking at the figures in this report, it is worth understanding that MED is a statistical classification, defined by the IEEE as any day on which more than 10% of utility customers are without power. The result of this hard threshold is that sometimes reliability scores without MED may, in fact, be driven by major events. If recovery from a storm lasts multiple days, the day/s toward the beginning of that recovery may be considered MED because over 10% of utility customers are without power, but the day/s towards the end of the recovery may not be considered MED because fewer than 10% of utility of utility customers are without power, even though all the days of outage were caused by the same event.

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

Michigan's performance on most reliability measures places it among the worst performing states. More detailed analysis of the reliability of Michigan's electric utilities compared to that of other states follows.

Reliability: Michigan Compared to the Nation

System Average Interruption Duration Index (SAIDI) – Average Minutes of Outage per Customer per Year

In 2023 Michigan ranked 50th, or 2nd-worst, among the states in SAIDI with MED over the year and 44th, or 8th-worst, in SAIDI without MED. In 2022, Michigan ranked 43rd and 42nd for these two metrics, respectively, suggesting that Michigan performed relatively worse than in 2022. (Figure 3, Figure 4, Figure 5)

Figure 3: 2023 System Average Interruption Duration Index (SAIDI) (outage minutes per customer)

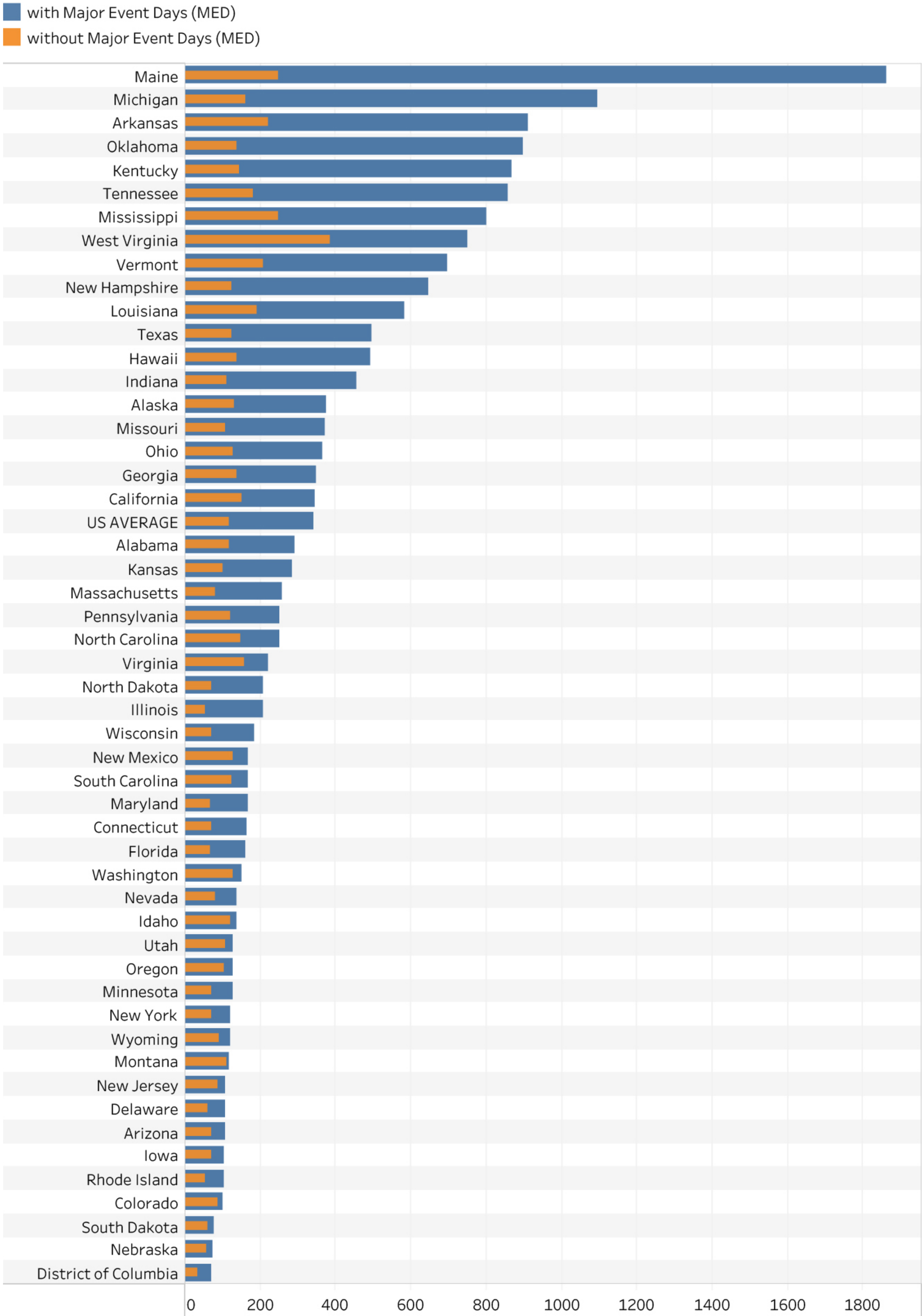


Figure 4: 2023 System Average Interruption Duration Index (SAIDI) with Major Event Days (outage minutes per customer)

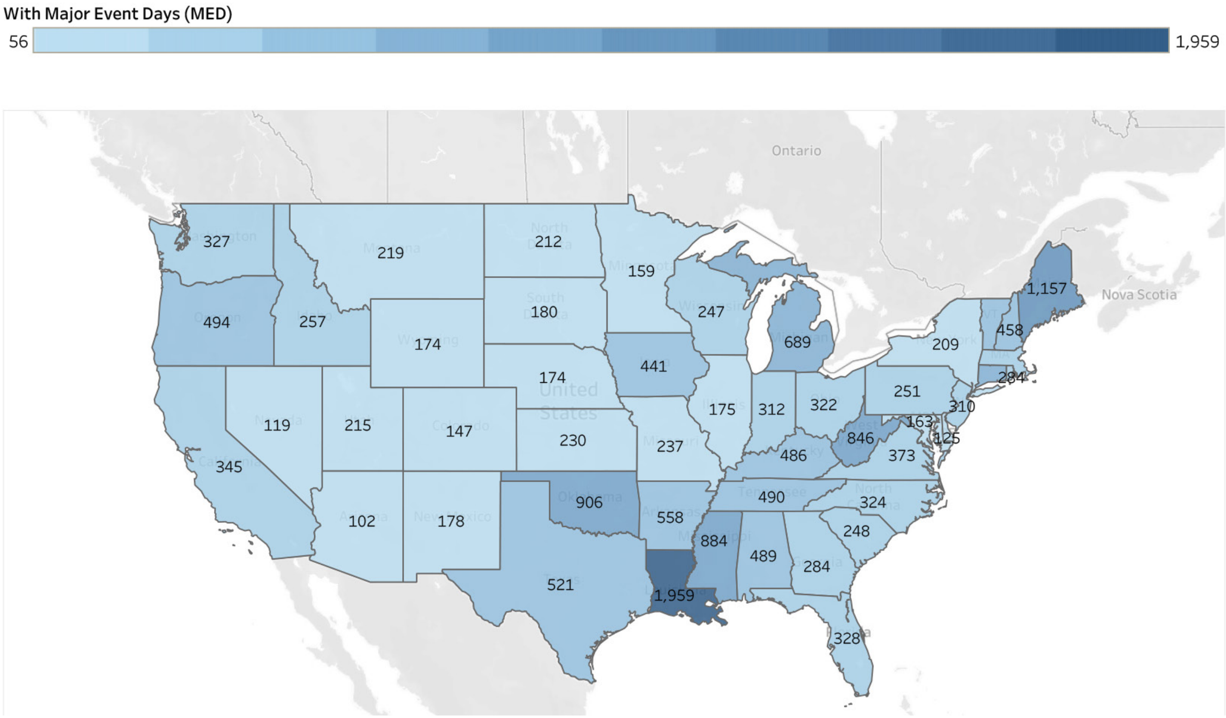
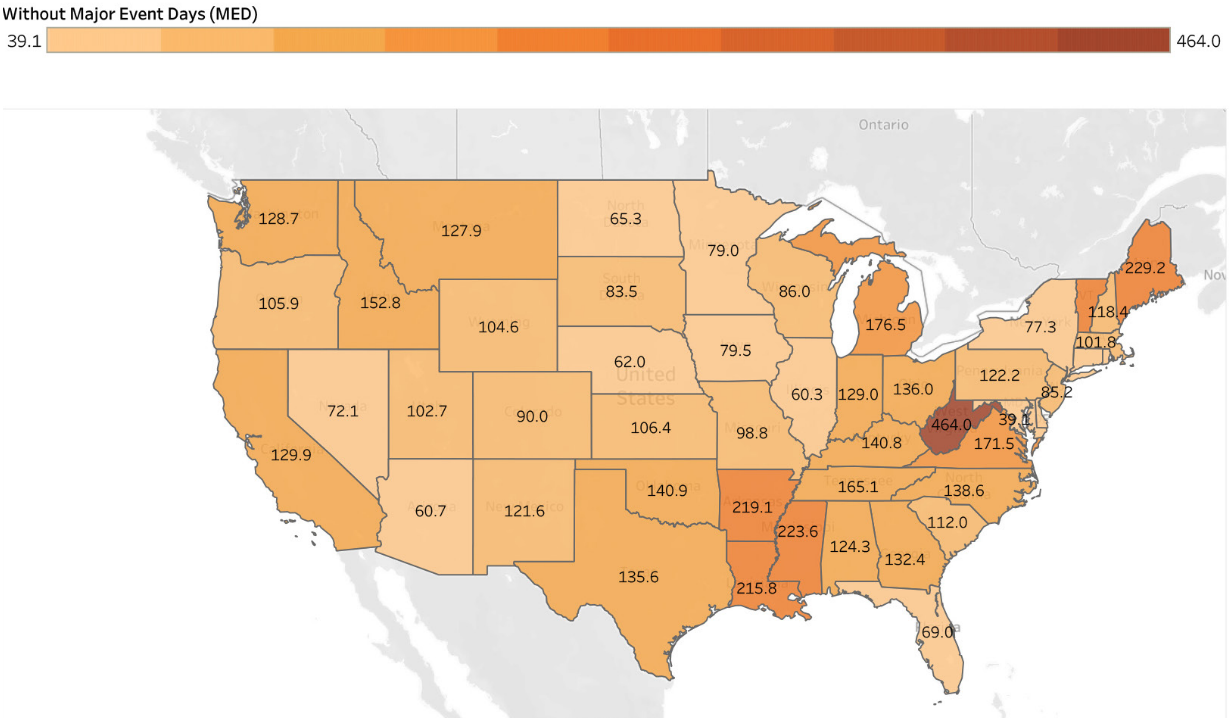


Figure 5: 2023 System Average Interruption Duration Index (SAIDI) without Major Event Days (outage minutes per customer)



SAIDI (Five-Year Average)

2023 continued Michigan's regrettable pattern of poor reliability: the five-year averages show that Michigan regularly performs badly compared to other states: Michigan ranks 46th in the nation in SAIDI with MED and 45th in SAIDI without MED over the past five years. (Figure 6, Figure 7, Figure 8)

Figure 6: Average (2019-2023) System Average Interruption Duration Index (SAIDI) (outage minutes per customer)

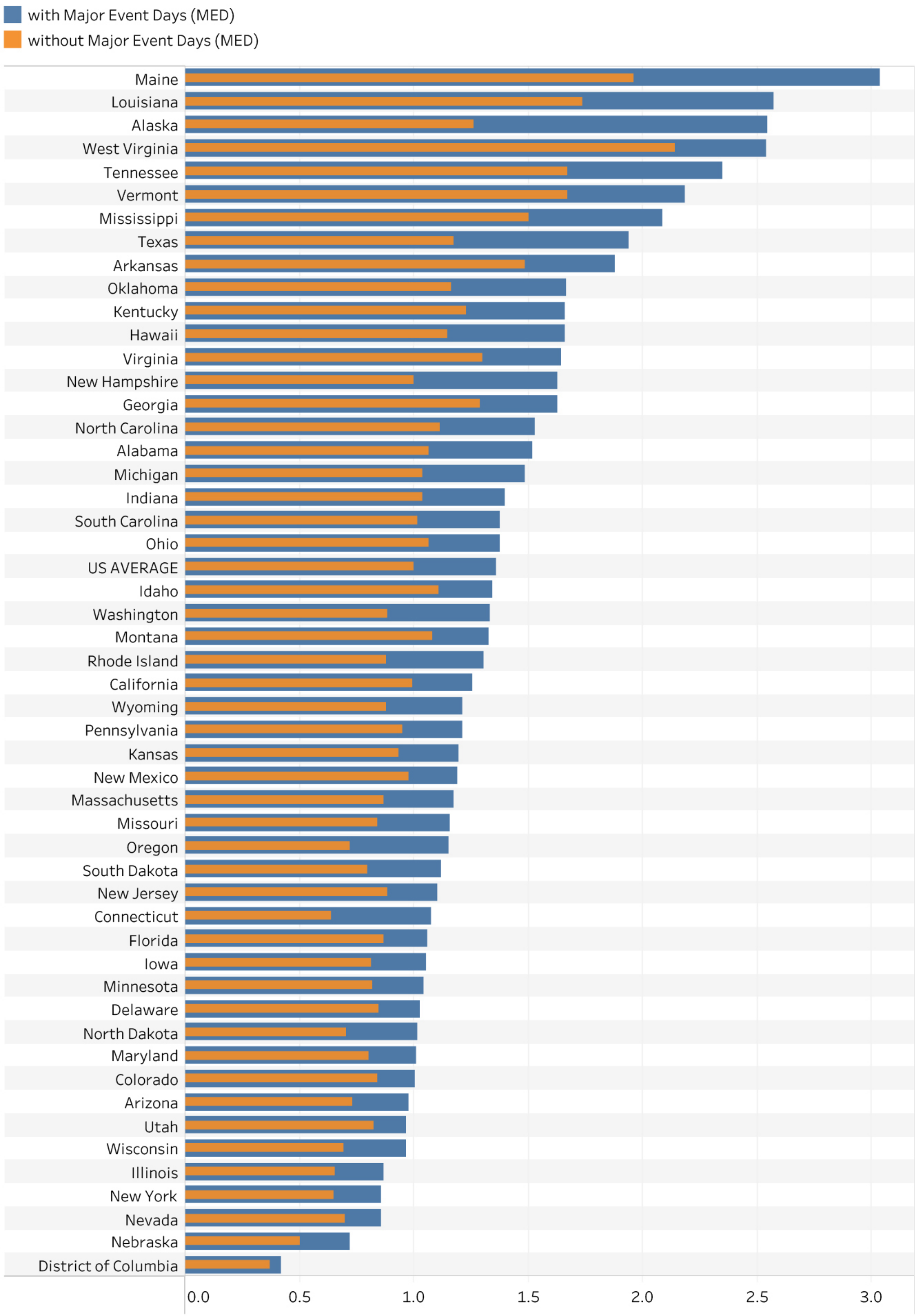


Figure 7: Average (2019-2023) System Average Interruption Duration Index (SAIDI) with Major Event Days (outage minutes per customer)

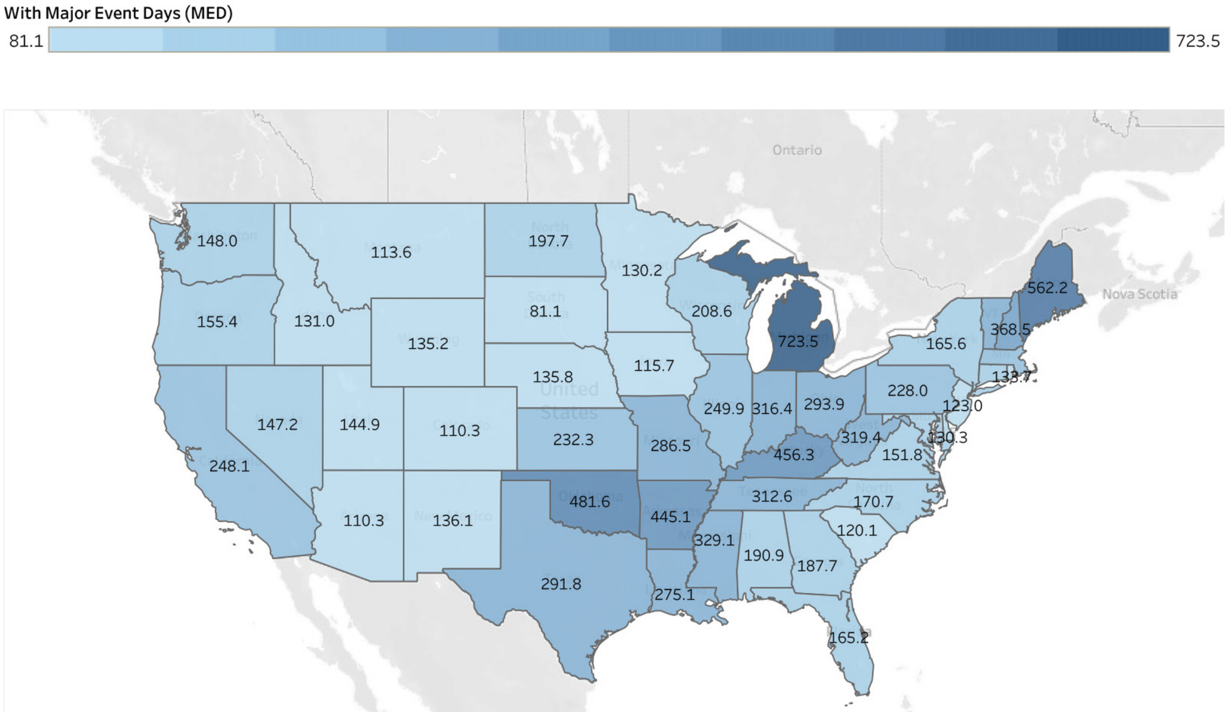
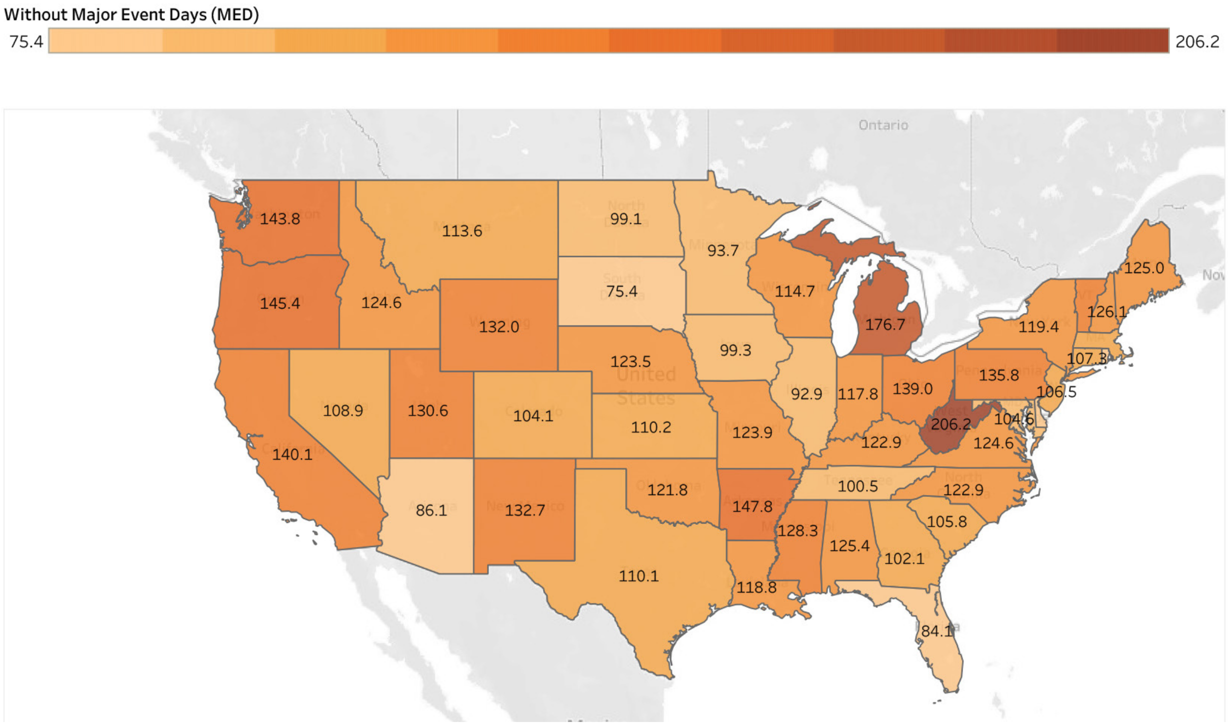


Figure 8: Average (2019-2023) System Average Interruption Duration Index (SAIDI) without Major Event Days (outage minutes per customer)



System Average Interruption Frequency Index (SAIFI) – Outages per Customer per Year

In 2023, Michigan performed slightly worse than the U.S. average in SAIFI with MED and slightly better than the U.S. average in SAIFI without MED. (Figure 9, Figure 10, Figure 11) Michigan ranked 36th among the states in SAIFI when including MED and 27th when excluding them. This suggests a slightly worse performance than in 2022, when Michigan ranked 28th and 29th for SAIFI with and without MED, respectively.

Figure 9: 2023 System Average Interruption Frequency Index (SAIFI) (interruptions per customer)

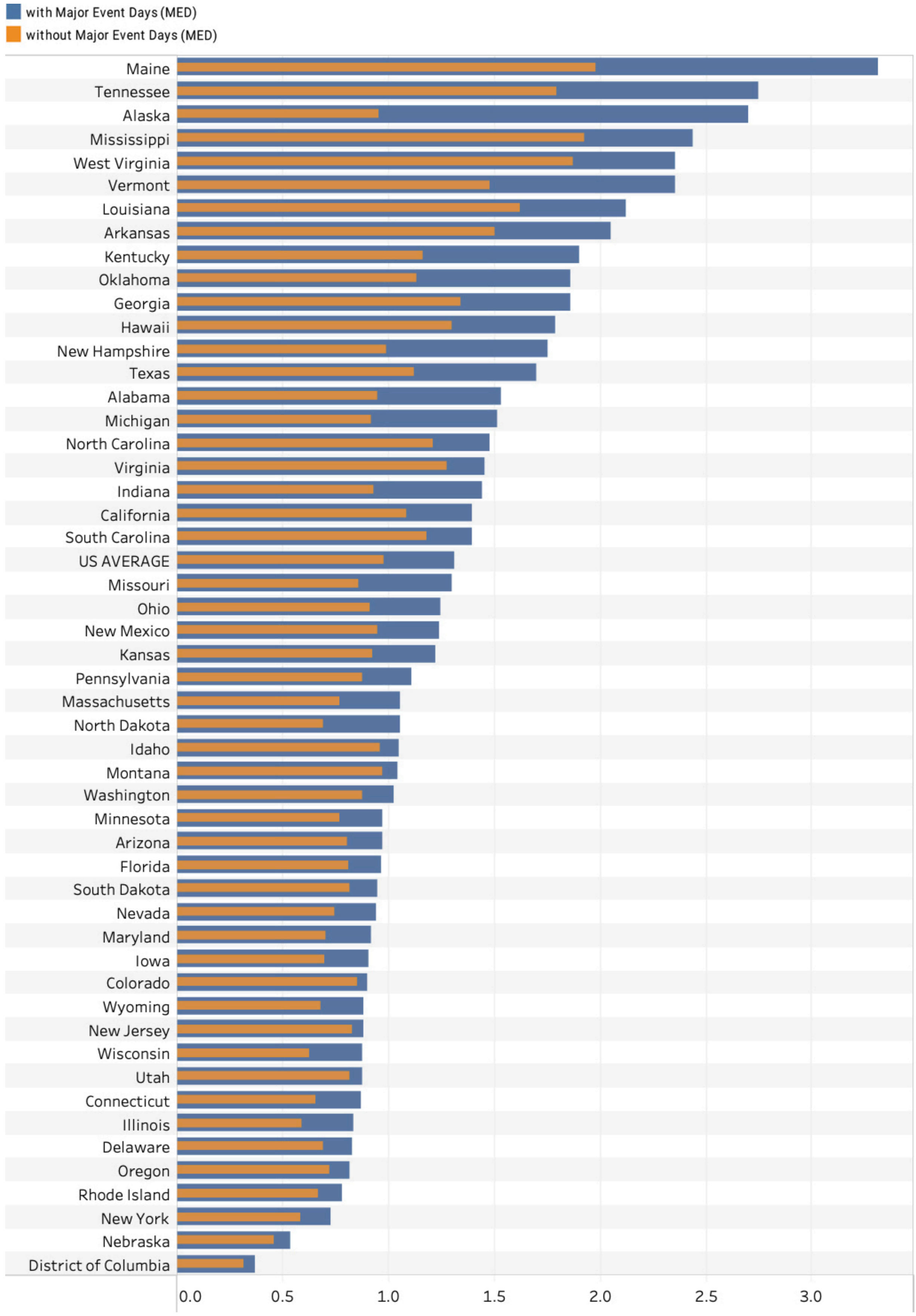


Figure 10: 2023 System Average Interruption Frequency Index (SAIFI) with Major Event Days (interruptions per customer)

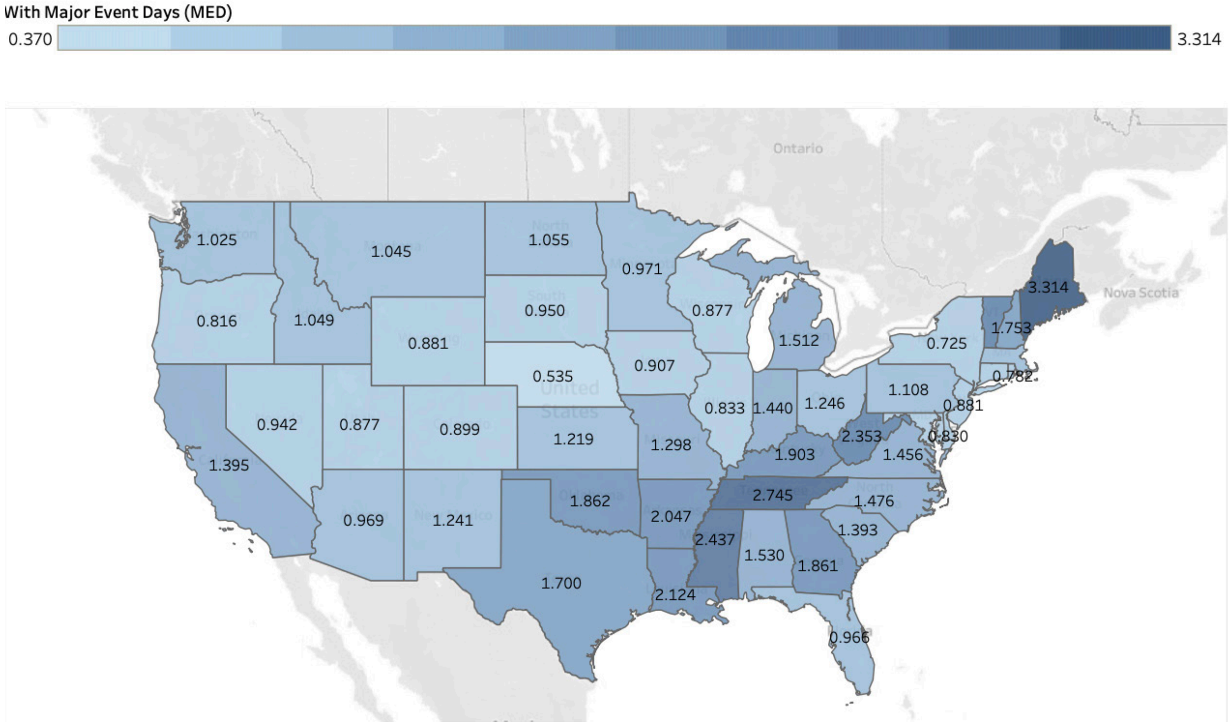
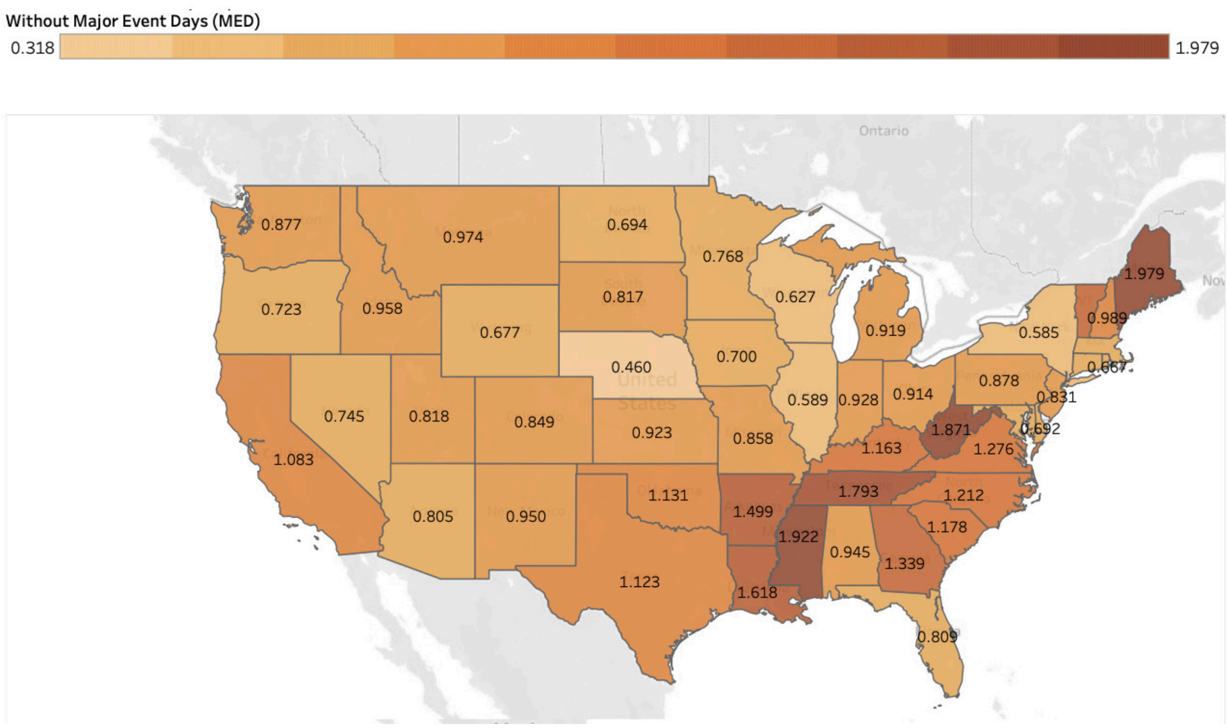


Figure 11: 2023 System Average Interruption Frequency Index (SAIFI) without Major Event Days (interruptions per customer)



SAIFI (Five-Year Average)

Michigan's number of outages per customer with or without MED is slightly above the national average for the last five years. (Figure 12, Figure 13 Figure 14)

Figure 12: Average (2019-2023) System Average Interruption Frequency Index (SAIFI) (interruptions per customer)

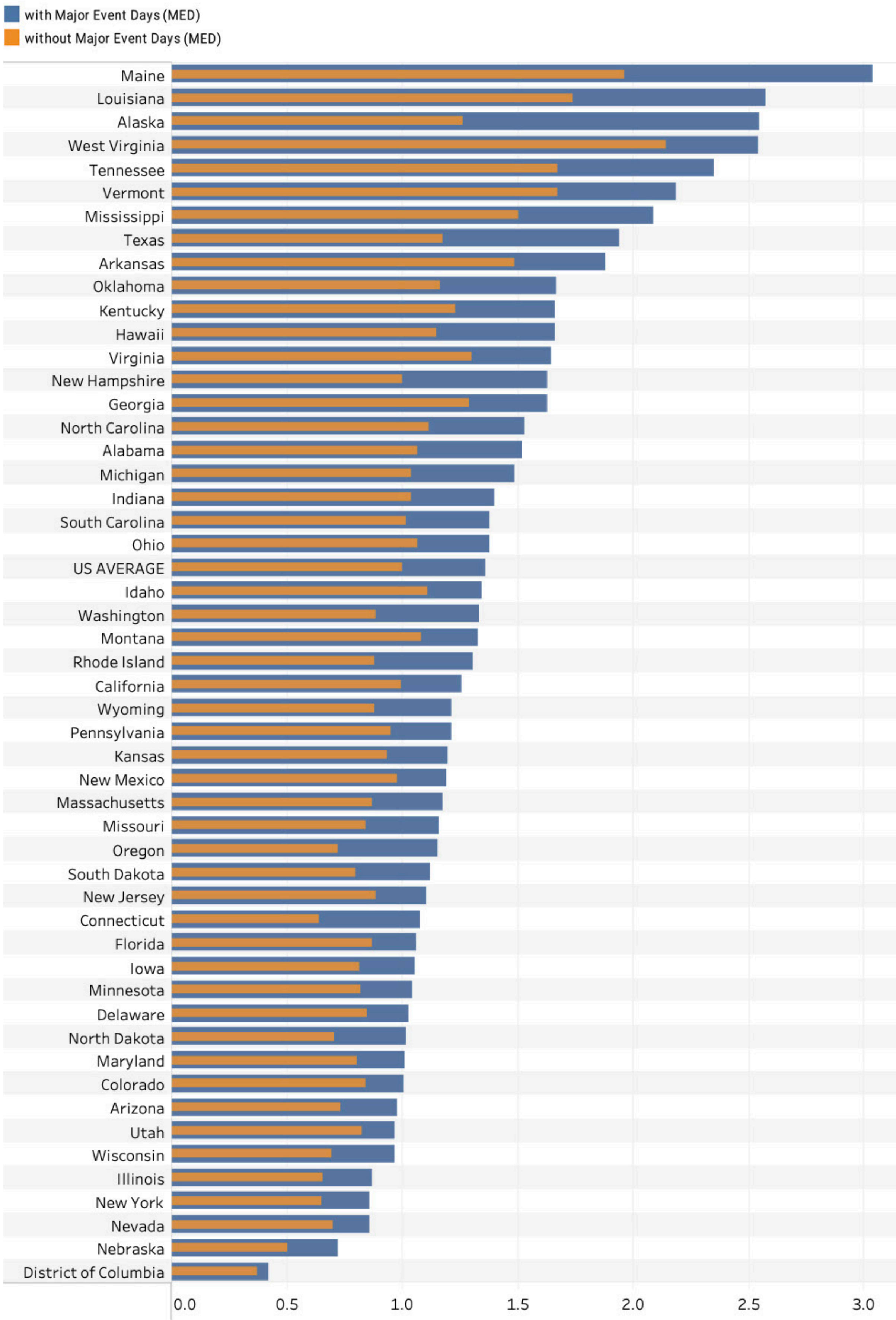


Figure 13: Average (2019-2023) System Average Interruption Frequency Index (SAIFI) with Major Event Days (interruptions per customer)

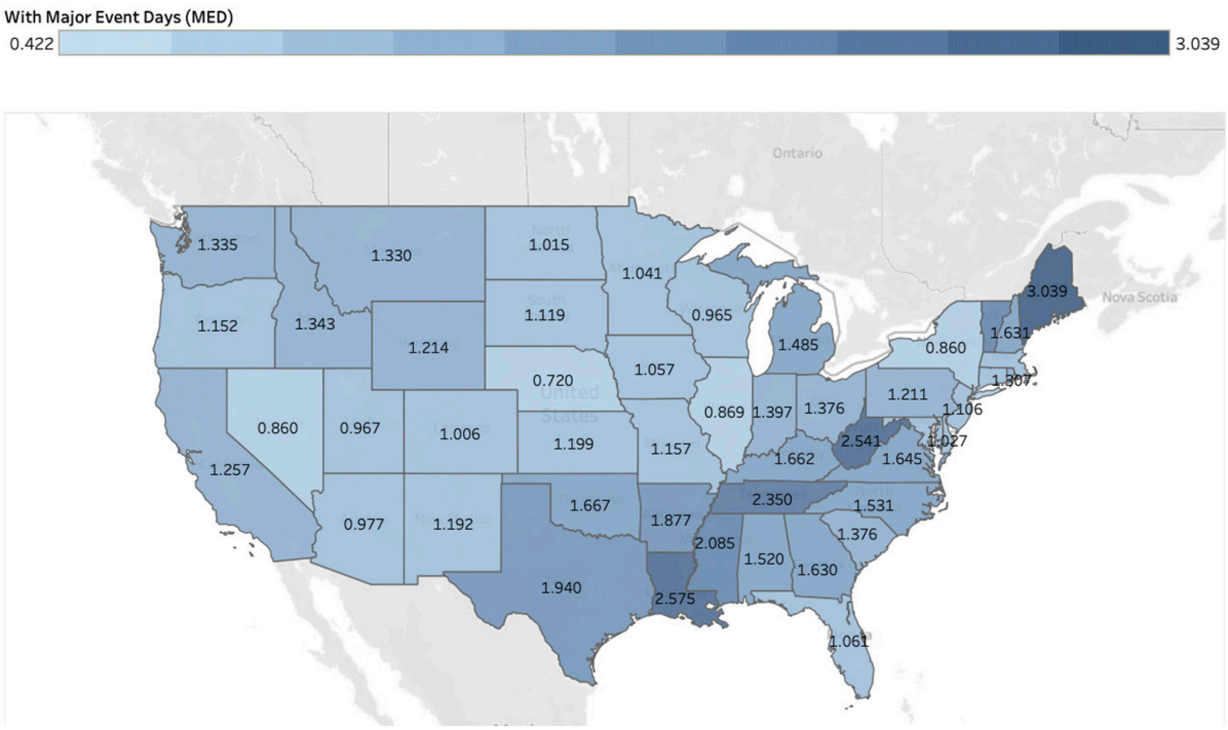
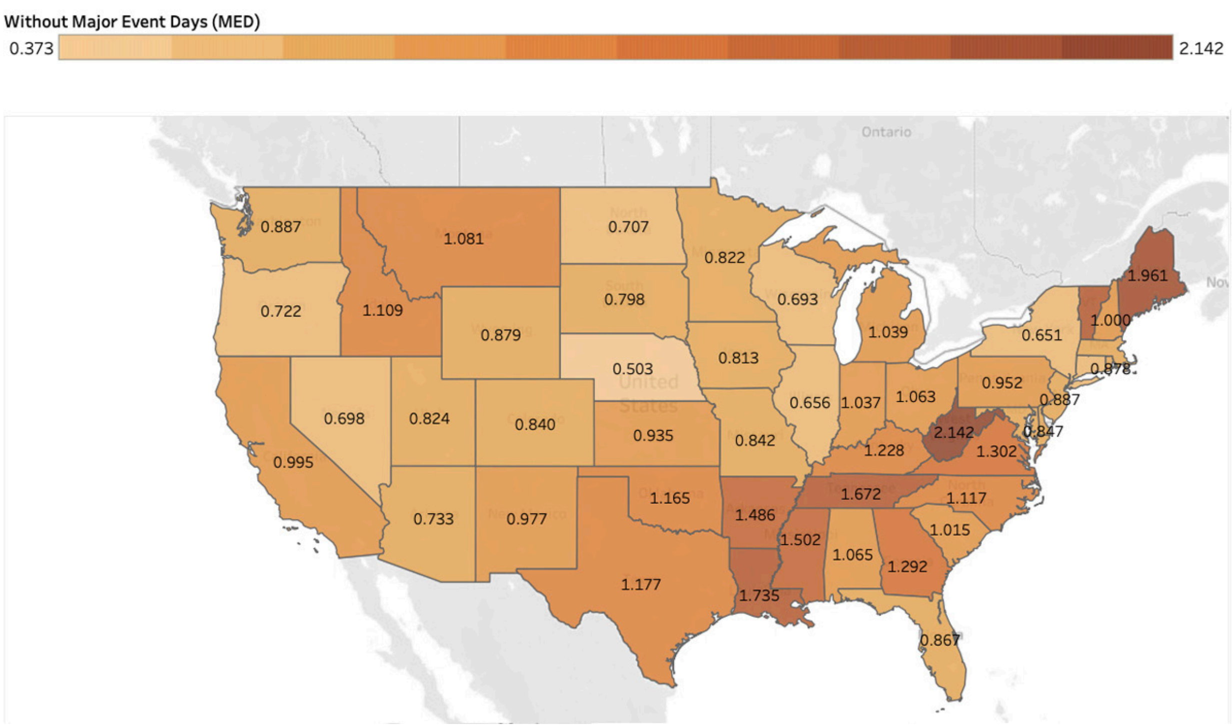


Figure 14: Average (2019-2023) System Average Interruption Frequency Index (SAIFI) without Major Event Days (interruptions per customer)



Customer Average Interruption Duration Index (CAIDI) – Average Minutes to Restore Power to a Customer

Michigan's power restoration time following an outage (CAIDI) is among the worst in the country, with and without MED. (Figure 15, Figure 16 and Figure 17) In 2023, Michigan ranked 51st (the worst, nationwide) for CAIDI with MED, and 50th, or 2nd-worst, for CAIDI without MED. Michigan's scores for CAIDI without MED were comparable between 2022 and 2023 (163.6 vs. 176.7 outage minutes per interruption), but the score for CAIDI with MED nearly doubled between 2022 and 2023 (383.2 vs. 723.5 outage minutes per interruption). In 2022, Michigan ranked 49th, or 3rd-worst, for both CAIDI metrics.

Figure 15: 2023 Customer Average Interruption Duration Index (CAIDI) (outage minutes per interruption)

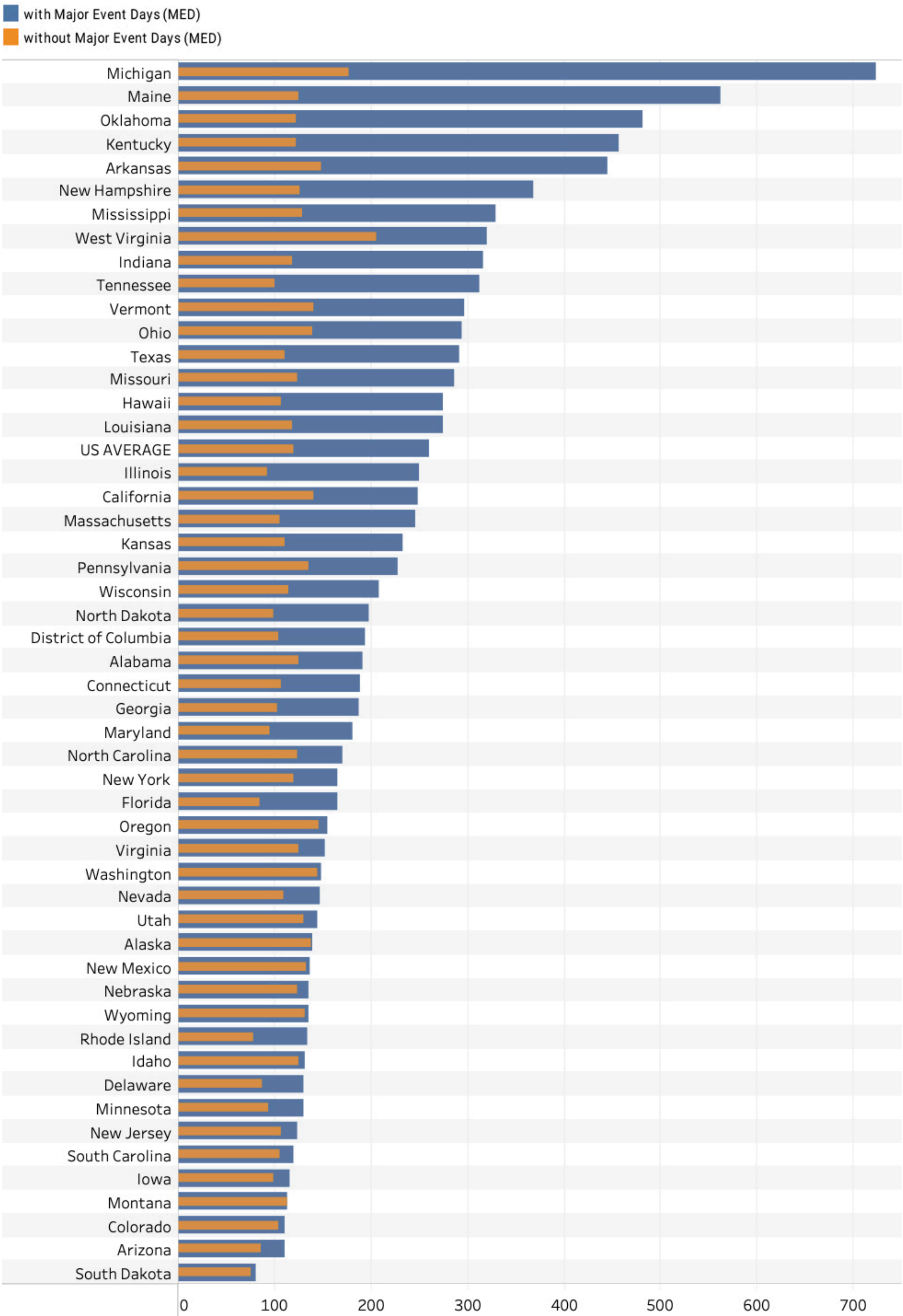


Figure 16: 2023 Customer Average Interruption Duration Index (CAIDI) with Major Event Days (outage minutes per interruption)

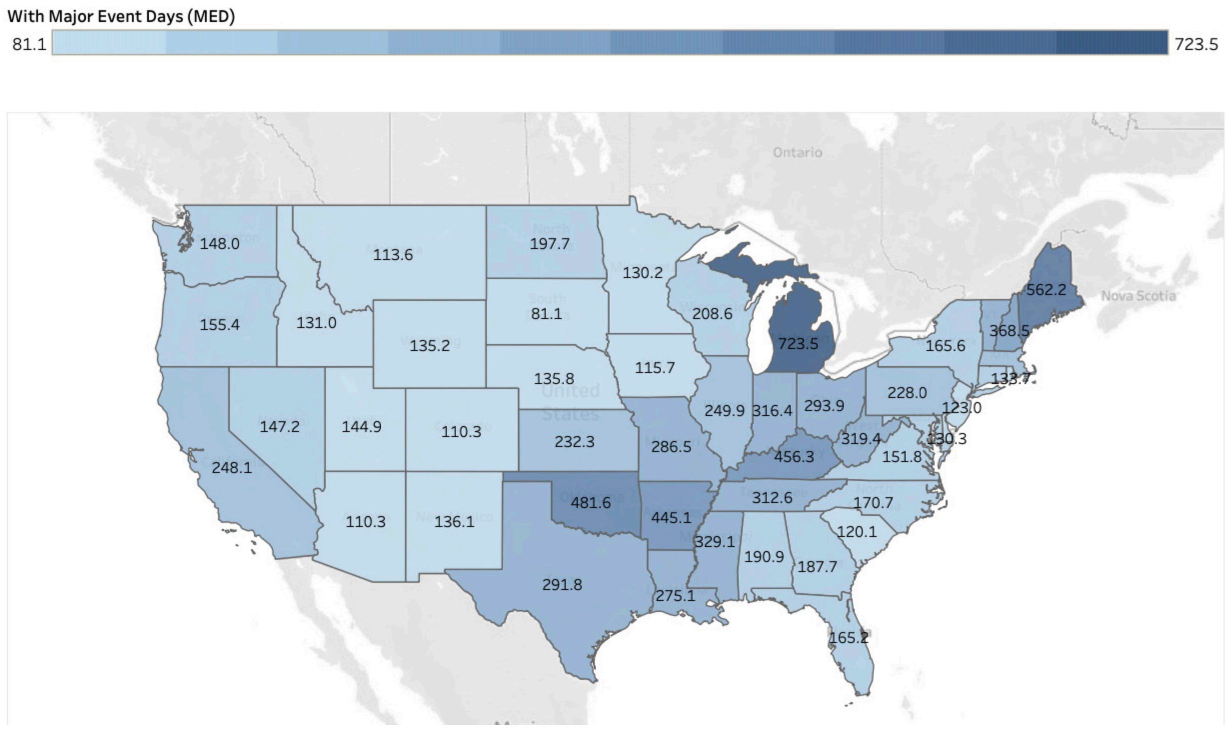
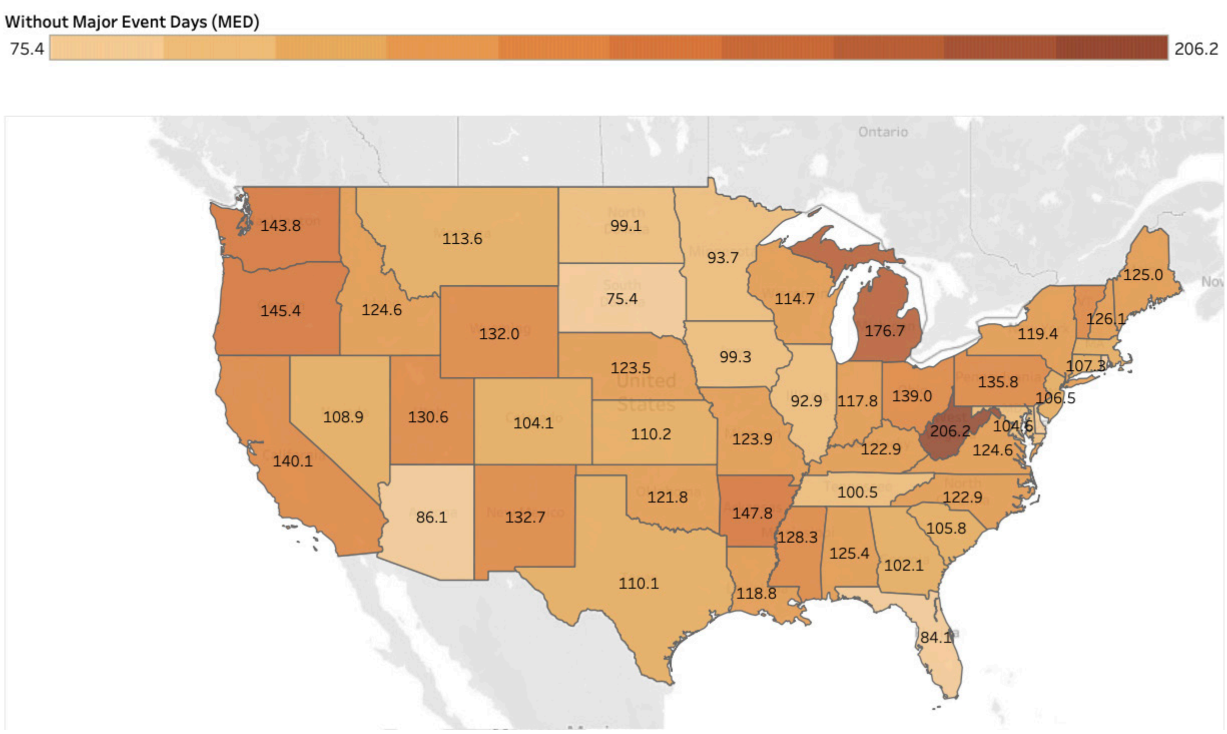


Figure 17: 2023 Customer Average Interruption Duration Index (CAIDI) without Major Event Days (outage minutes per interruption)



CAIDI (Five-Year Average)

2023 CAIDI was consistent with Michigan's poor performance over the past five years, where Michigan ranks 49th and 50th for CAIDI with and without MED, respectively. (Figure 18) This suggests that Michigan's poor overall reliability score (SAIDI) is consistently driven by outages being particularly long rather than being frequent.

Figure 18: Average (2019-2023) Customer Average Interruption Duration Index (CAIDI) (outage minutes per interruption)

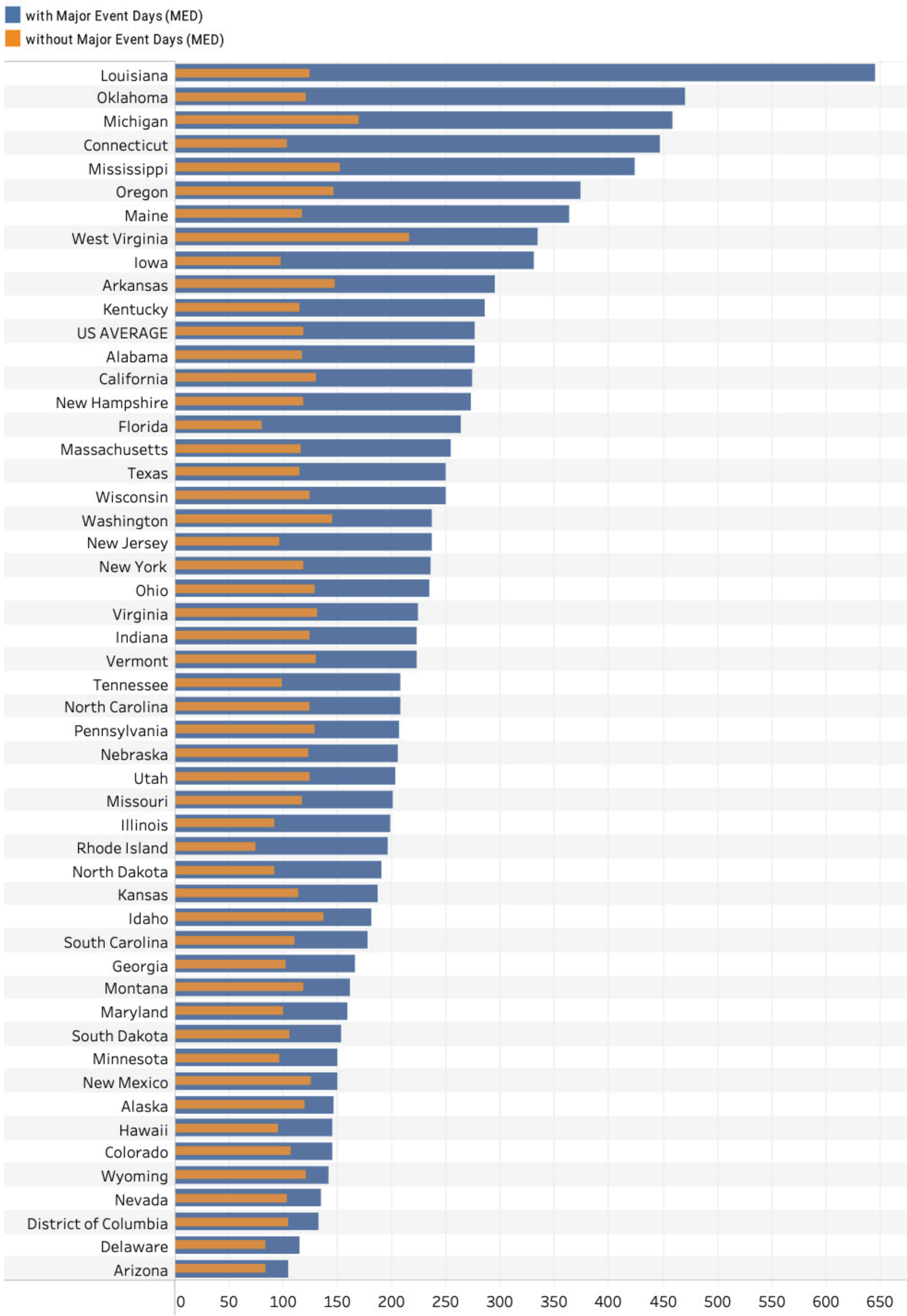


Figure 19: Average (2019-2023) Customer Average Interruption Duration Index (CAIDI) with Major Event Days (outage minutes per interruption)

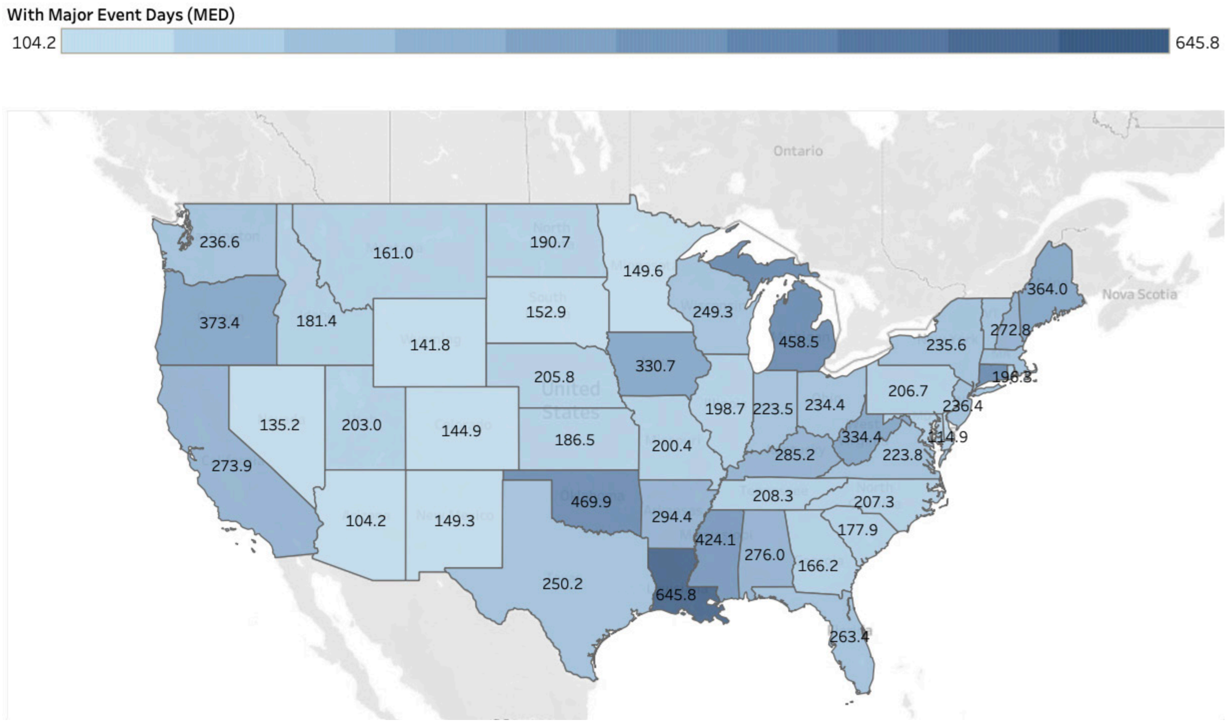
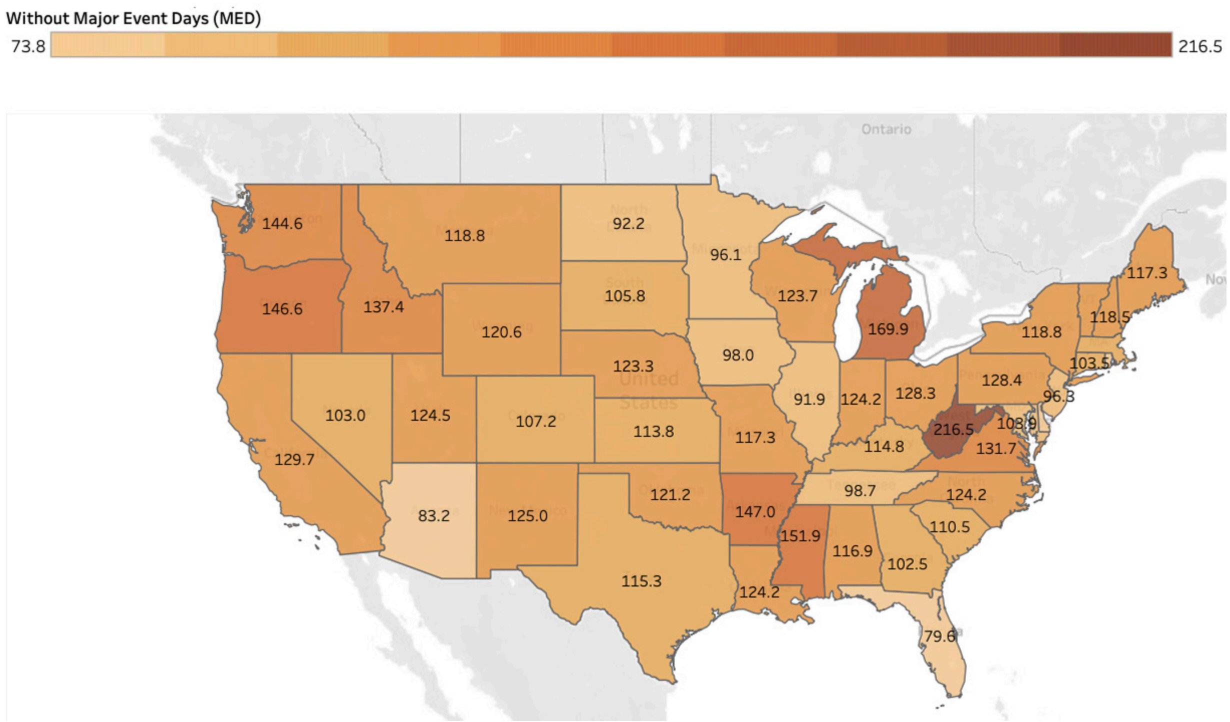


Figure 20: Average (2019-2023) Customer Average Interruption Duration Index (CAIDI) without Major Event Days (outage minutes per interruption)



Reliability: Comparing Michigan Utilities

Previous editions of this report have noted that electric co-ops are the least reliable utilities in Michigan and municipal utilities are the most reliable, with investor-owned utilities (IOUs) landing somewhere in between. The causes of these historical differences are reasonably clear: Michigan's cooperative utilities serve predominantly rural areas and include many miles of distribution lines to serve comparatively few customers. These lines are almost always above ground and are exposed to weather and tree damage. Conversely, Michigan's municipal utilities serve the discrete boundaries of cities or towns, have lower total mileage of distribution lines and may have some of these lines buried, making them less susceptible to the weather and tree damage that plague the co-ops' lines. Michigan's IOUs serve a mix of areas and are thus subject to both sets of conditions in differing measures.

This pattern broke in 2023. DTE had Michigan's highest SAIDI with MED value at 1542 outage minutes per customer, while Consumers Energy had 913, tied with Tri-County Electric Coop. (Figure 21) CAIDI rankings for 2023 were similar. (Figure 23) DTE and Consumers collectively serve more than 80% of Michigan's electric customers, so they dominate the statewide reliability statistics. In 2023, their poor performance is reflected in Michigan's ranking among the states. So while the poor reliability record of co-ops should not be ignored, reforming the practices of these two utilities would lead to the largest improvements to Michigan's statewide performance. DTE and Consumers Energy had the 4th- and 8th-highest CAIDI values with MED, respectively, among all IOUs in the nation. The CUB website's *Tableau platform* illustrates this point clearly—see the IOU National Comparison dashboard to explore these trends.

Figure 21: 2023 System Average Interruption Duration Index (SAIDI) for Michigan Utilities (outage minutes per customer)

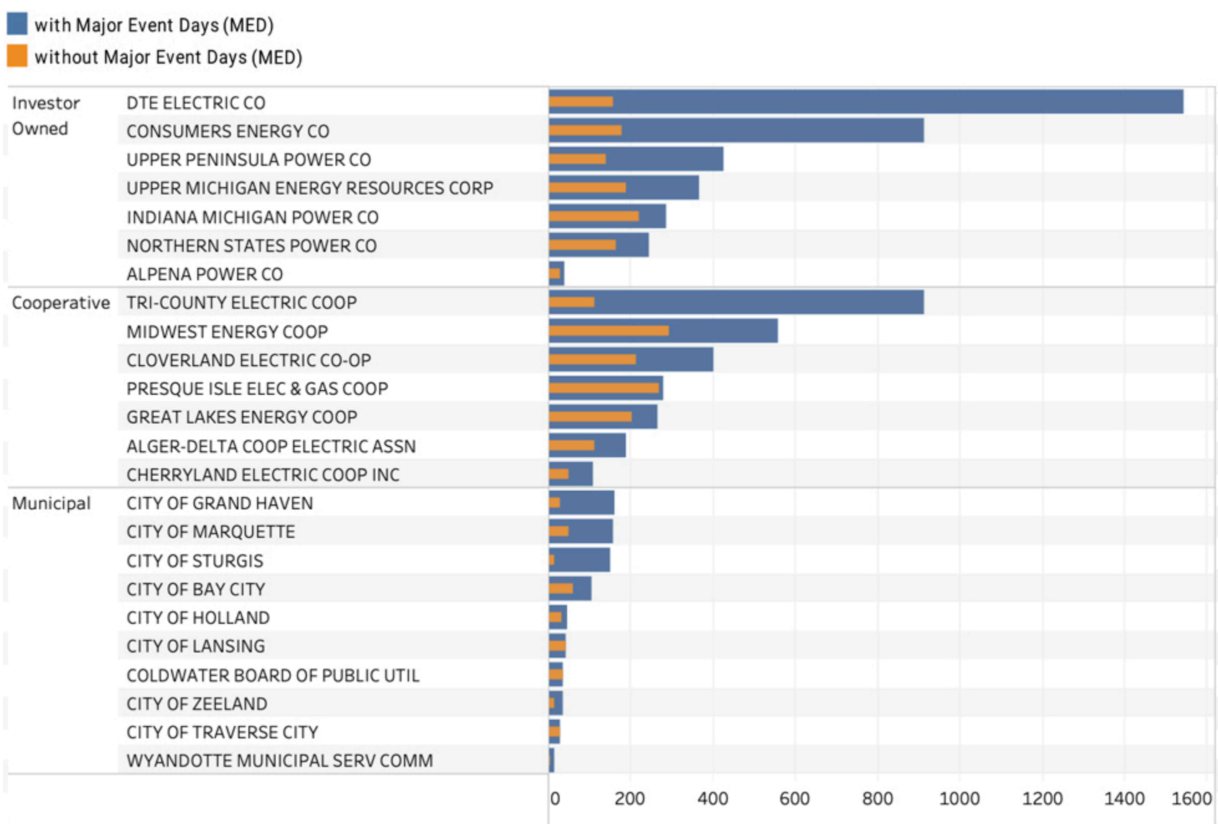


Figure 22: 2023 System Average Interruption Frequency Index (SAIFI) for Michigan Utilities (interruptions per customer)

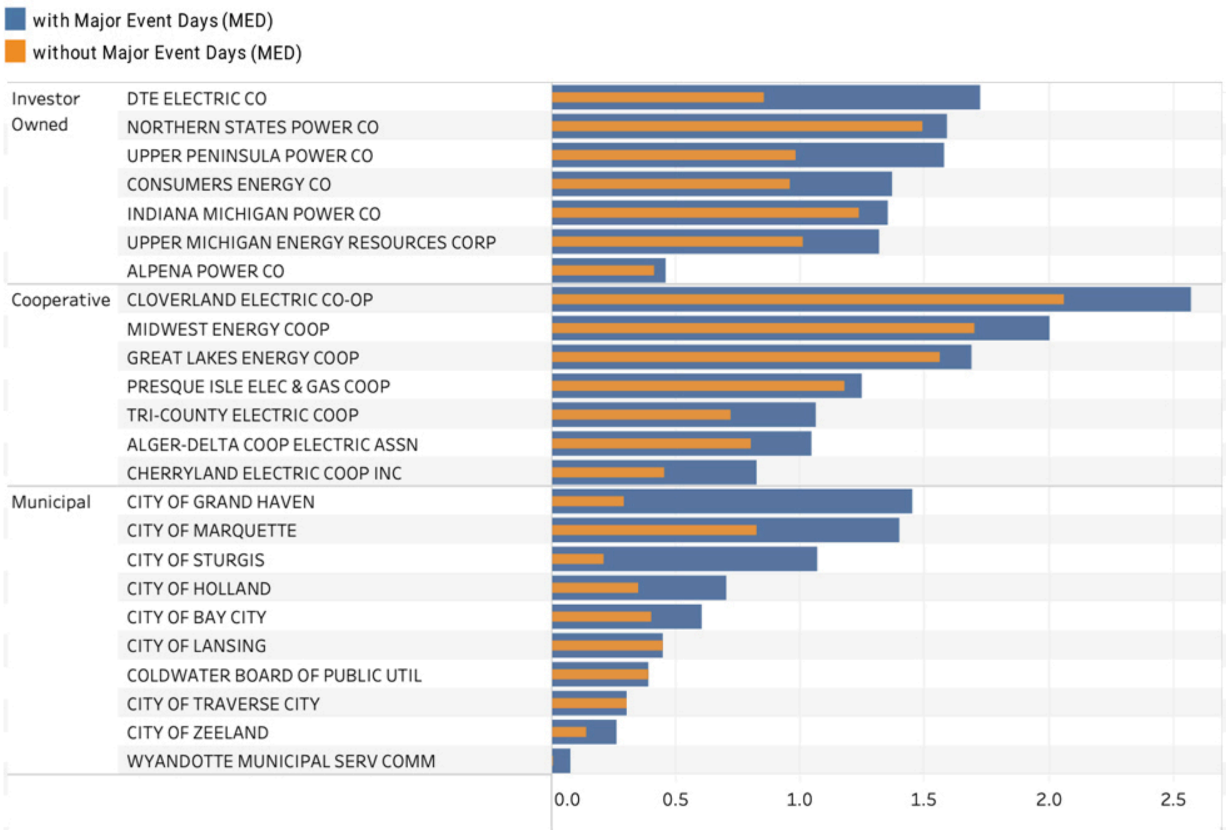
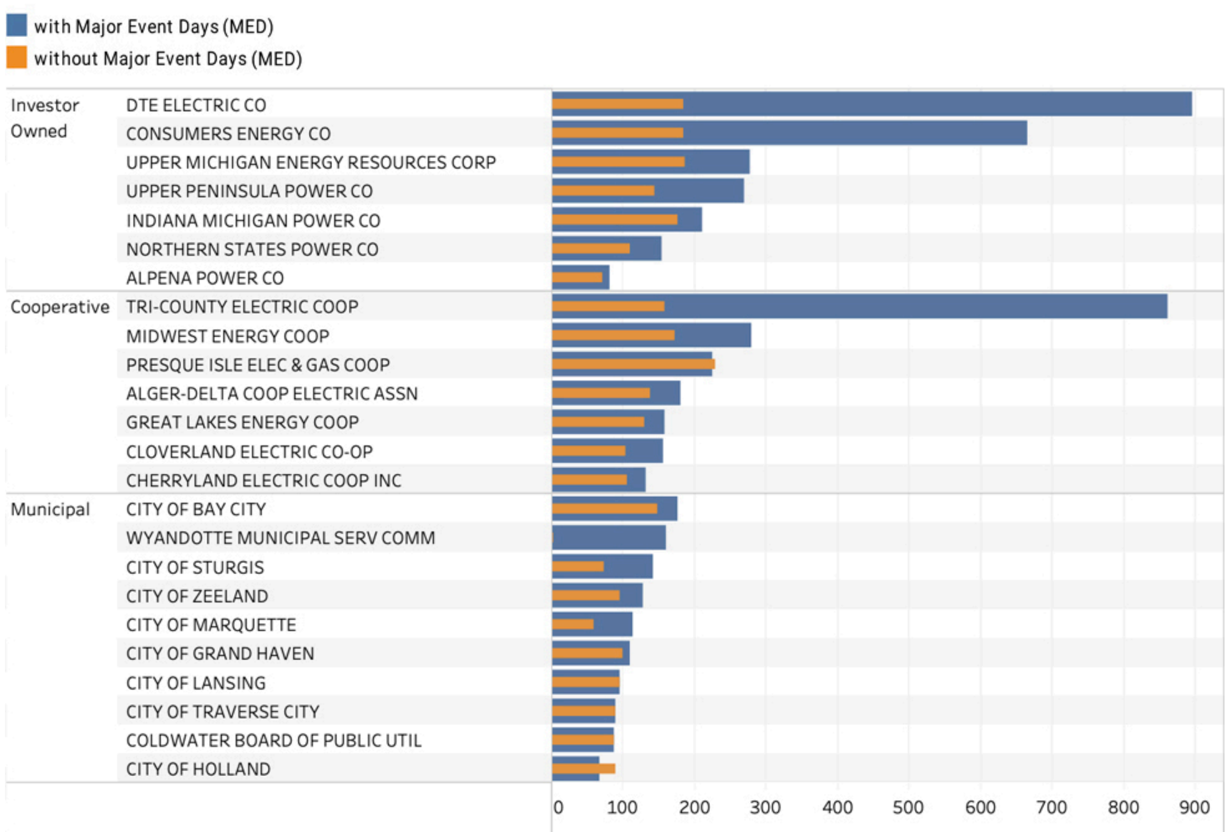


Figure 23: 2023 Customer Average Interruption Duration Index (CAIDI) for Michigan Utilities (outage minutes per interruption)



Gas Utilities

Gas utilities do not record reliability metrics like electric utilities. This dearth of reliability data may be due to our natural gas infrastructure being generally more reliable than our electricity infrastructure since natural gas lines are mostly buried and less likely to be damaged by storms, wildfires or wildlife.

Furthermore, when natural gas lines are disrupted only slightly, they continue to function. Unless a natural gas line is severed or leaking massively, the system may still be pressurized well enough to fulfill customers' needs, leading to the problem of long-term undetected leaks. These leaks are dangerous because natural gas is highly flammable if ignited and can cause asphyxiation in high concentrations. In addition, natural gas consists mainly of methane, a highly potent greenhouse gas, with a lifetime atmospheric heating capacity 25 times that of carbon dioxide. The Natural Gas Emissions section of this report quantifies the potential greenhouse effects of leaked natural gas.

Natural gas data are collected as part of form EIA-176. This form records total supply, disposition, losses and unaccounted-for gas. Losses are due to pipeline leaks, accidents, damage, thefts or blow down. Pipeline leaks tend to occur in a utility's distribution infrastructure—the numerous smaller pipes that run to homes and businesses. Unaccounted-for gas is the difference between the total supply and the total disposition (accounting for consumption, deliveries, or losses). Sources of unaccounted-for gas could be recording errors or physical losses not included in the previous list.

Unaccounted-for gas can take on positive or negative values, depending on the difference between total supply and total disposition, with a negative value implying more gas was delivered than a utility accounted for purchasing or producing.

While unaccounted-for gas is a useful statistic, it is imperfect because states that produce natural gas for export may show leaks from their production and export infrastructure as losses. This fact may skew the ratio of losses to in-state sales and absorb some of the losses that could be attributable to the states that import their natural gas.

Figure 24 shows natural gas losses and unaccounted-for gas as a percentage of sales as an indication of gas utility reliability.

In 2023, Michigan ranked 17th-best among the states for natural gas losses from leaks plus unaccounted-for gas when expressed as a percentage of total state sales, with a value of 0.8%. Notably, in 2022, Michigan ranked 11th-best, but with a value of 1.68%.

Figure 24: 2023 Unaccounted-for Natural Gas plus Losses of Gas as a Percentage of Sales (%)

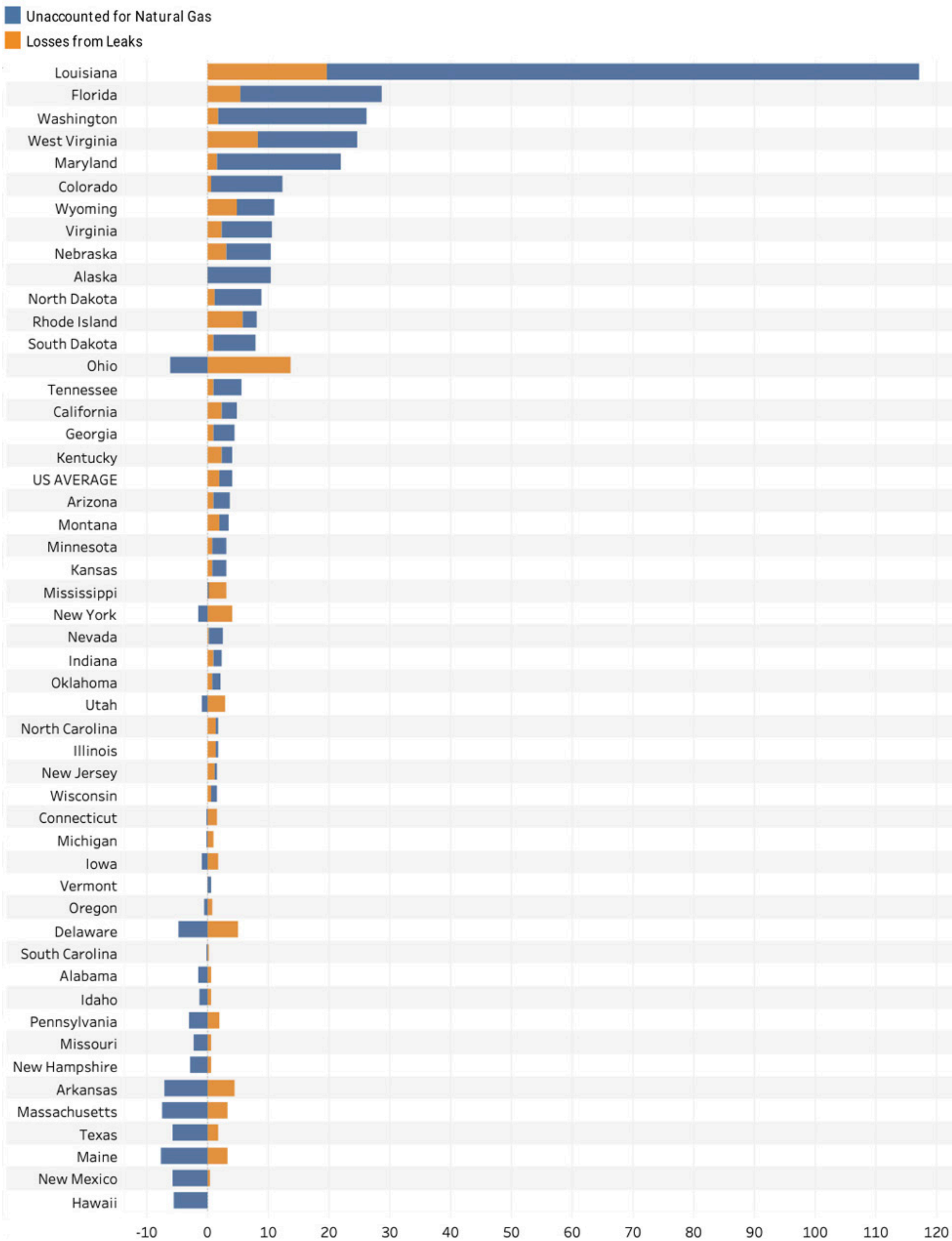
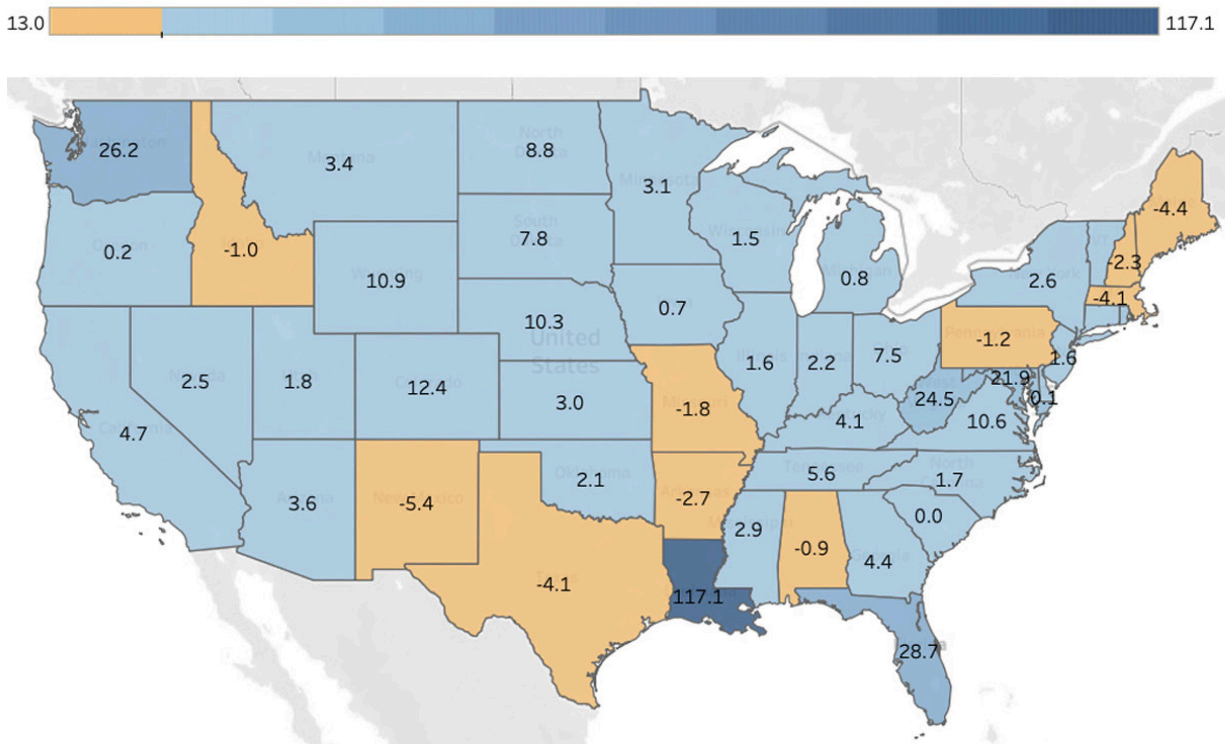


Figure 25: 2023 Unaccounted-for Natural Gas plus Losses of Gas as a Percentage of Sales



AFFORDABILITY OF ENERGY

Residential Costs

This section quantifies energy affordability through the metric of energy expenditures per household as a percentage of state median income, also known as the energy burden. For these figures, energy expenditures refer to expenditures on all forms of energy combined, which includes electricity, natural gas, and other heating fuels. Energy consumption and expenditure data are published as part of the EIA State Energy Data System (SEDS).

Previous editions of this report have defined other heating fuels to include propane, distillate fuel oil, kerosene, and wood. However, at the time of writing, SEDS lacks data on wood consumption and expenditures for 2023. The full set of 2023 estimates is expected to be released on June 27, 2025. Accordingly, for the purposes of calculating overall household energy expenditures and fuel costs, this edition excludes households heating with wood and only considers propane, distillate fuel oil, and kerosene. See *here* for more information. Check the CUB Tableau platform for the latest data and please note that Figure 26 through Figure 29 may look different on the platform after the final data updates, although the differences will likely be small, since wood-fueled household heating is uncommon in most states.

The broad trends in affordability show that some of the states with the highest energy burdens are relatively low-income southern states with high electricity bills for cooling, such as Mississippi and Alabama, as well as cold northern states with high fuel costs and use and state median incomes closer to the mean, such as Vermont and Maine (Figure 28).

In 2023, Michigan ranked 36th, or 16th-worst, on energy burden, slightly better than the ranking for 2022 (38th). Michigan's 2023 energy burden of 3.69% represents a decrease from its 2022 peak of 4.04%. In absolute terms, an average Michigan household spent $2,557 on energy in 2023, the 19th-highest in the nation, an improvement from 2022, yet still above the US mean and median. (Figure 26)

Figure 26: 2023 Energy Expenditures per Household (excluding households using wood) ($)

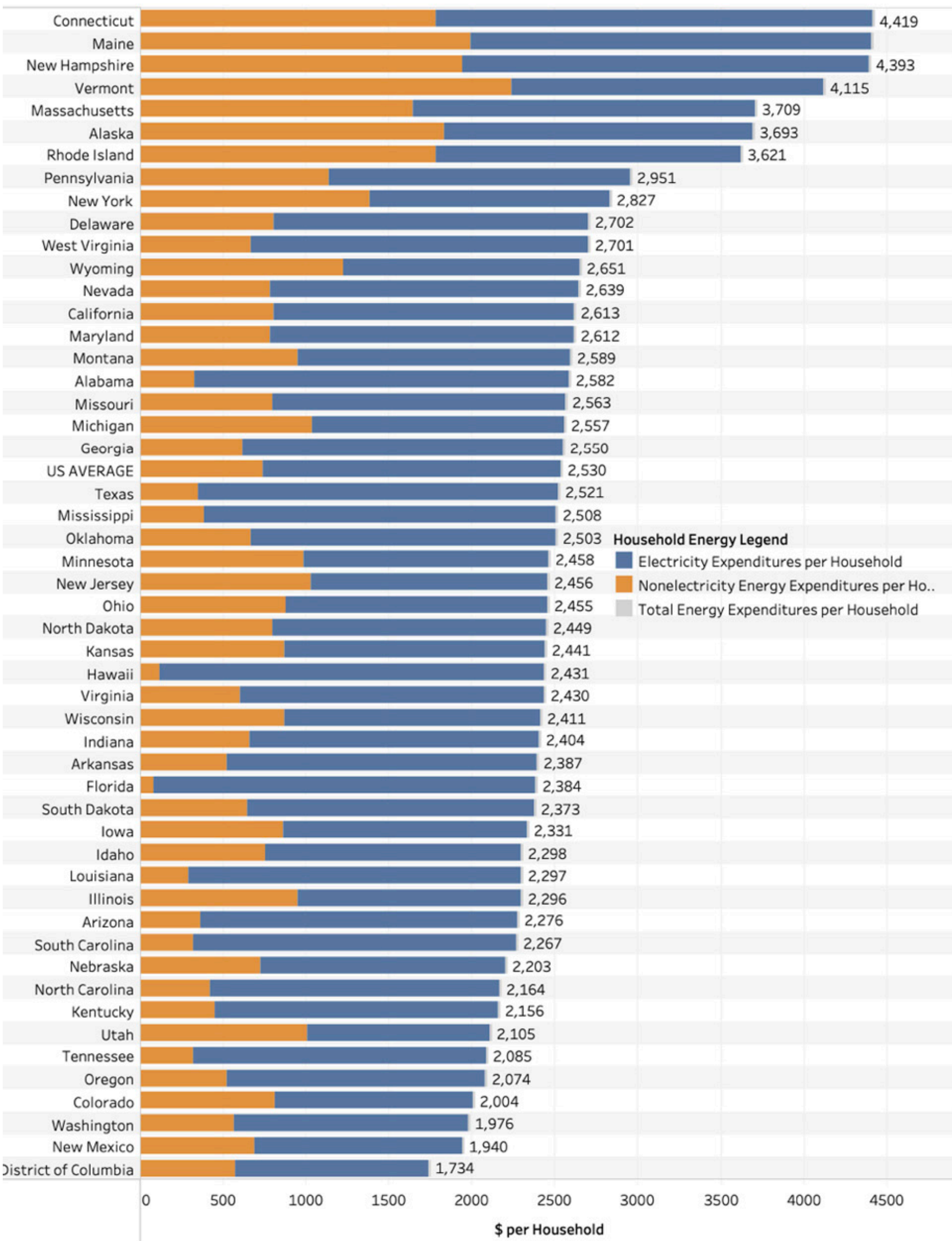


Figure 27: 2023 Energy Expenditures per Household (excluding households using wood) ($)

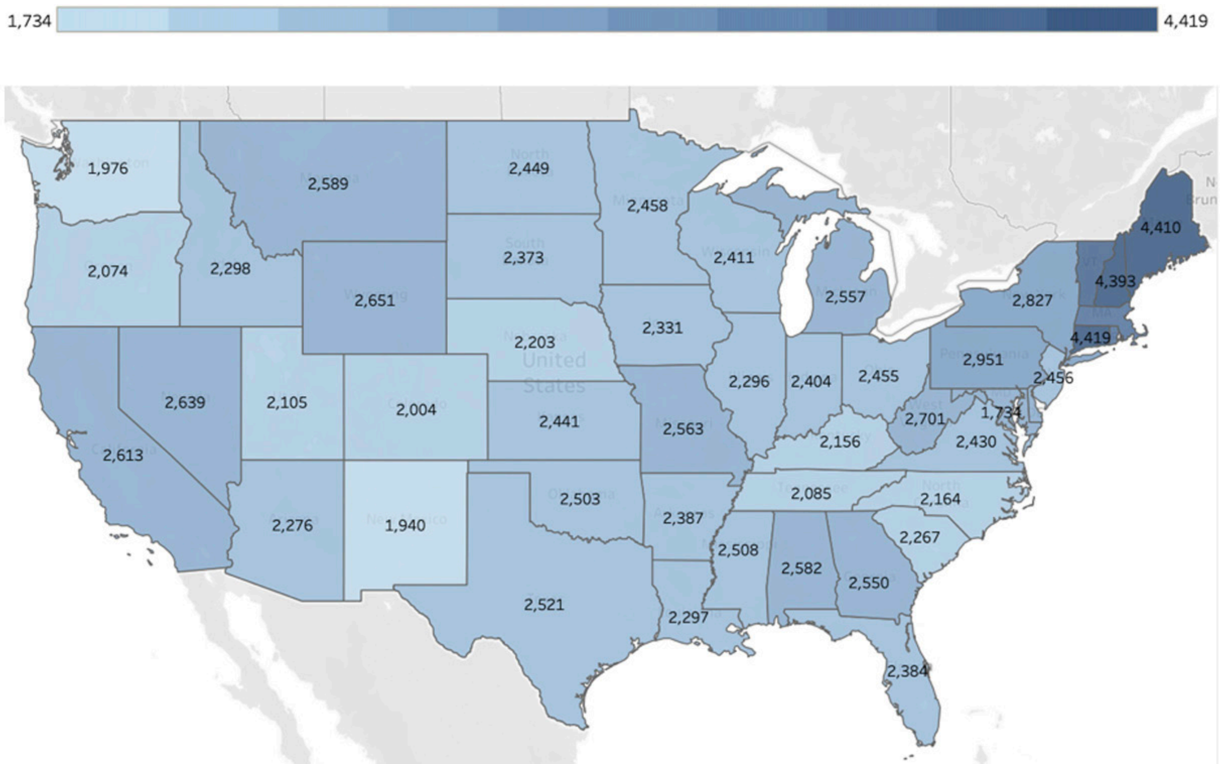


Figure 28: 2023 Energy Expenditures per Household as a percentage of Median Household Income (excluding households using wood) ($ per Household)

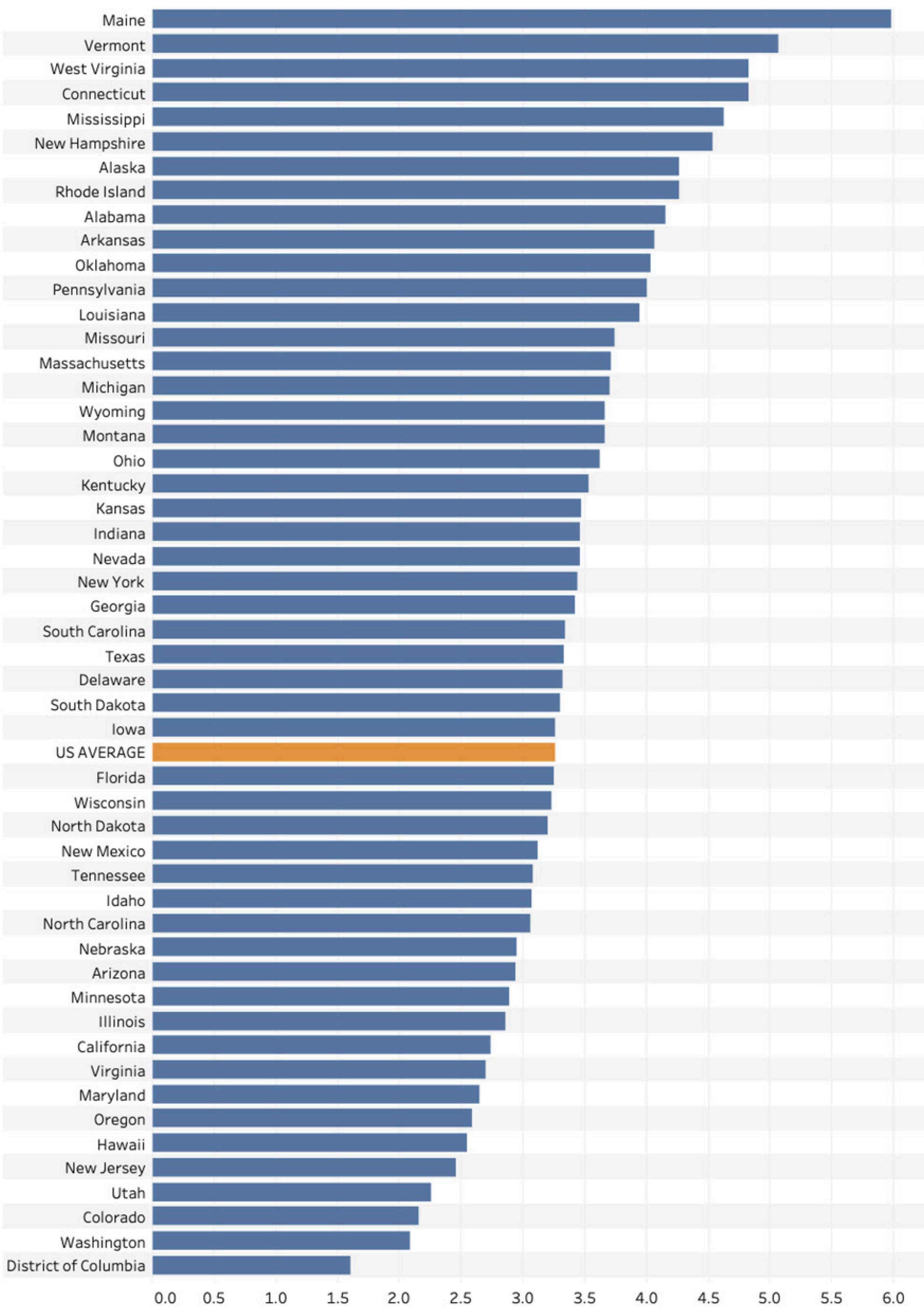
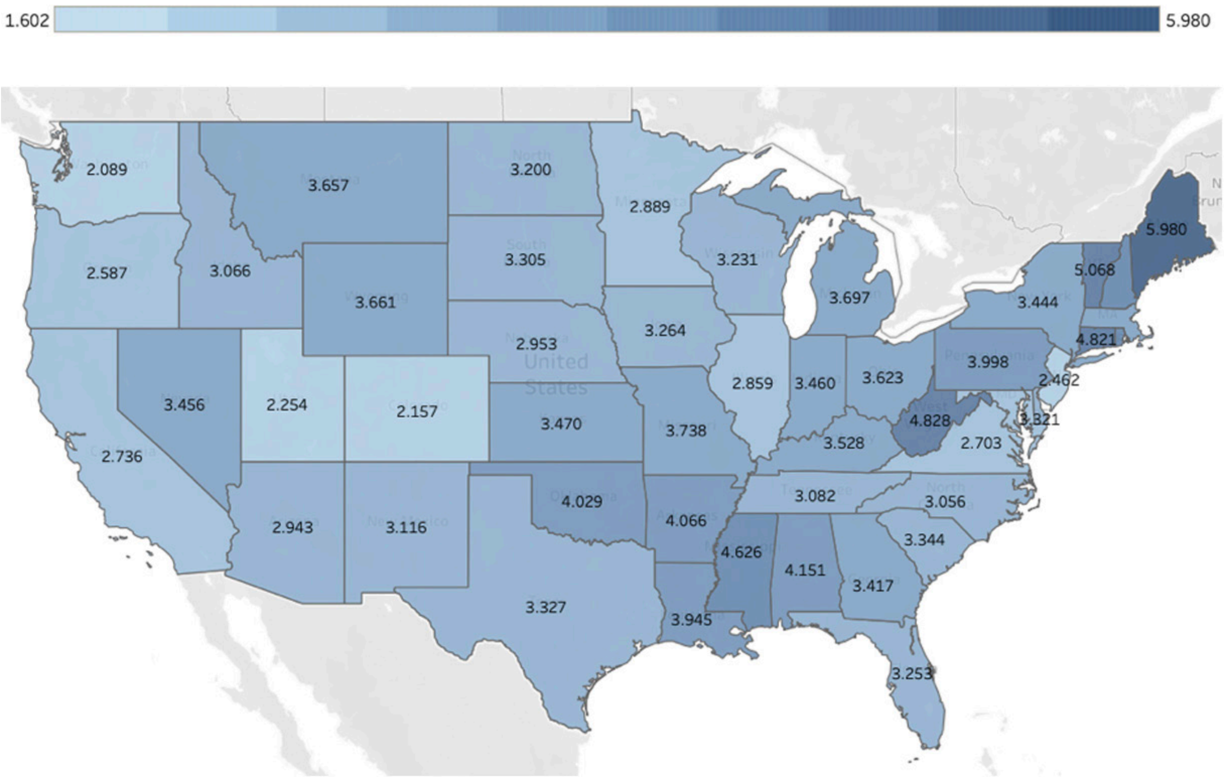


Figure 29: 2023 Household Residential Energy Expenditures as a Percentage of Median Income (excluding households using wood)



Household Electricity Costs and Expenditures

Electricity bills usually have many components: fixed monthly charges, charges based on the customer's peak rate of power usage in the billing month or previous year, a charge per kWh of electricity and others. The way utilities assign costs to these components of the bill varies across states and between utilities and classes of customers. Because, for customer purposes, each kWh is identical, dividing the total bill by the kWh used is generally the best way to compare utility costs.

The EIA collects monthly data from each utility in each state on the amount of electricity sold and the revenue from electricity by customer class. Customer classes include residential, commercial, industrial, transportation and "other," with almost all electricity delivered in most states going to the first three classes. The EIA collects these data as part of its *Form 861*.

Michigan had the 11th-highest residential electricity prices per kWh in the country in 2023, higher than any of its peers in the Midwest. (Figure 32, Figure 33). Despite these high electricity prices, due to relatively low electricity consumption in Michigan, in 2022 the state had the 13th-lowest yearly electricity expenditures per household in the country. (Figure 30, Figure 31)

Figure 30: 2023 Electricity Expenditures per Household (excluding households using wood) ($)

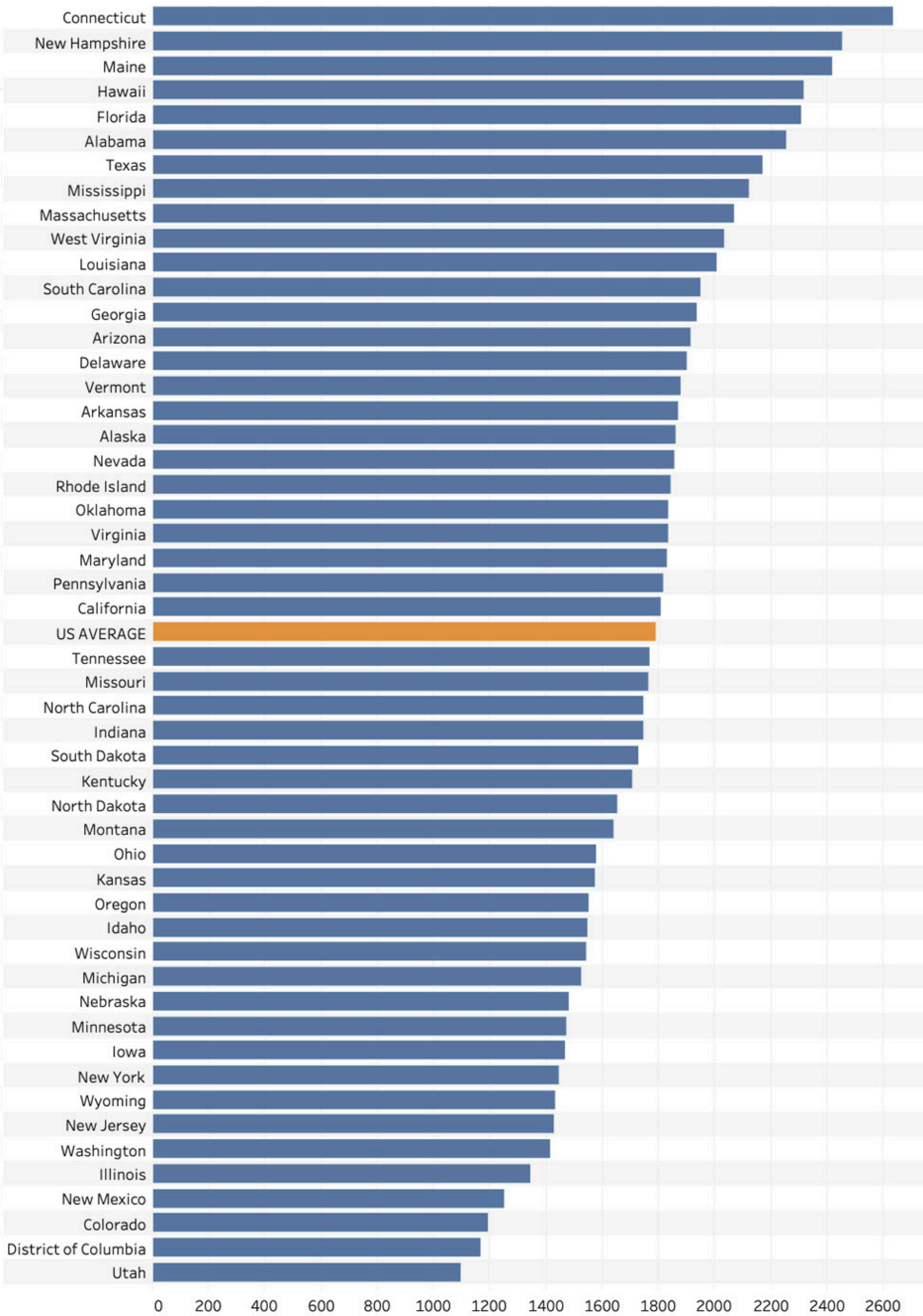


Figure 31: 2023 Electricity Expenditures per Household (excluding households using wood) ($)

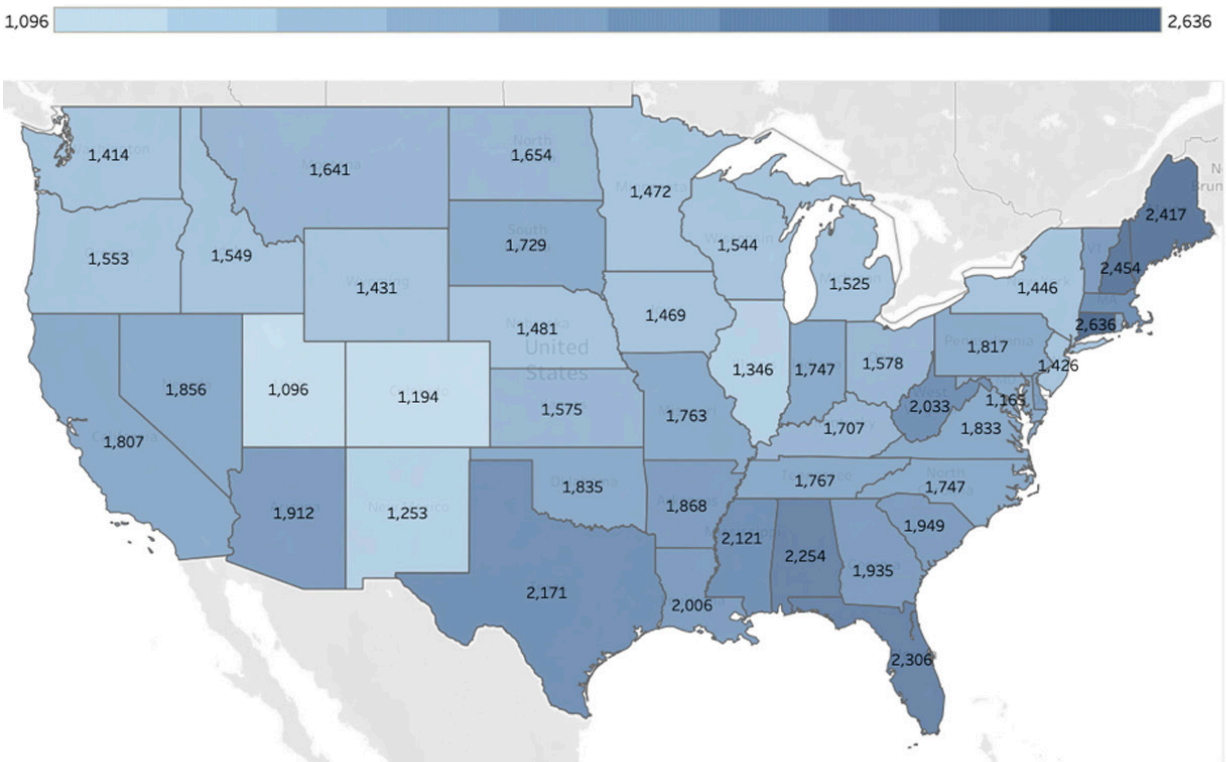


Figure 32: 2023 Price of Electricity in the Residential Sector ($/kWh)

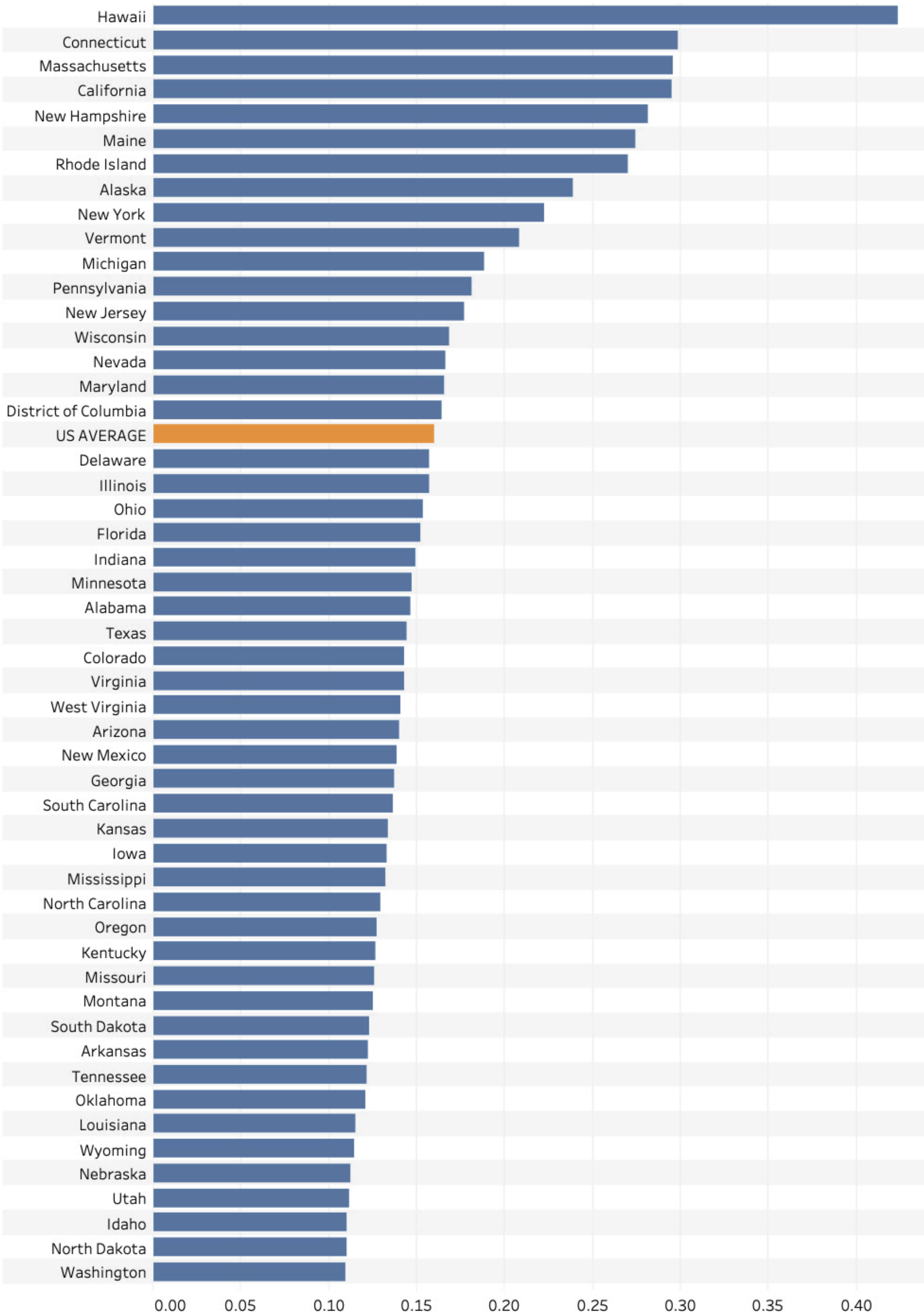


Figure 32: 2022 Cost of Electricity in the Residential Sector ($/kWh)

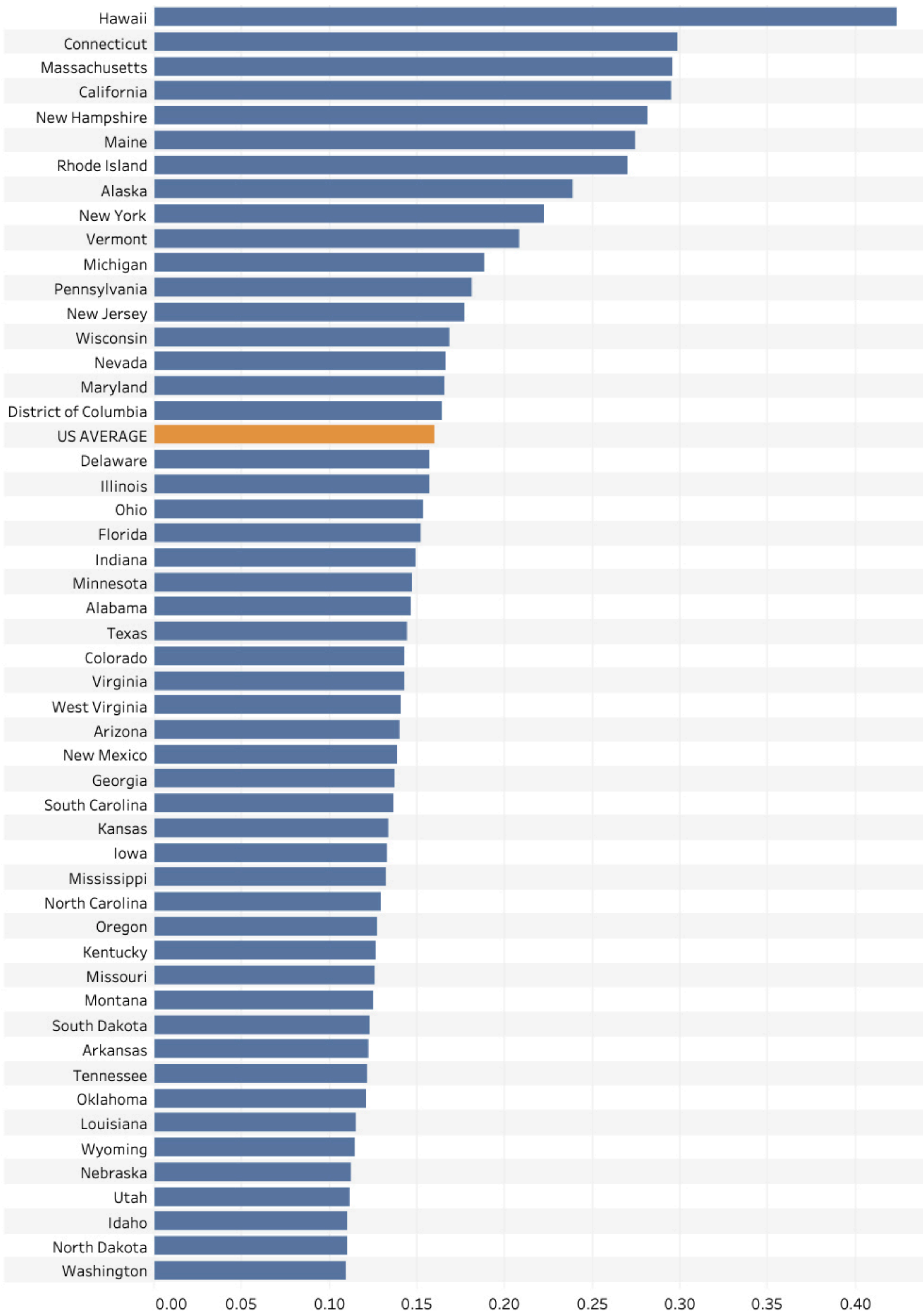
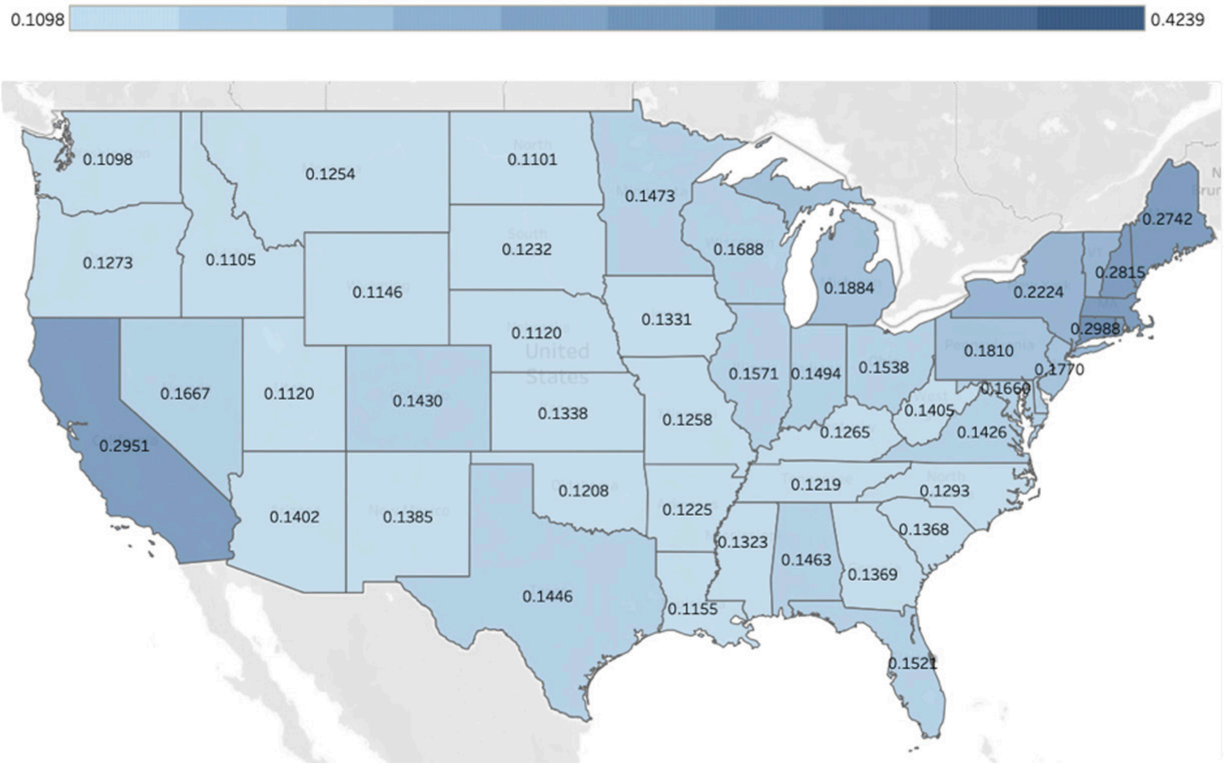


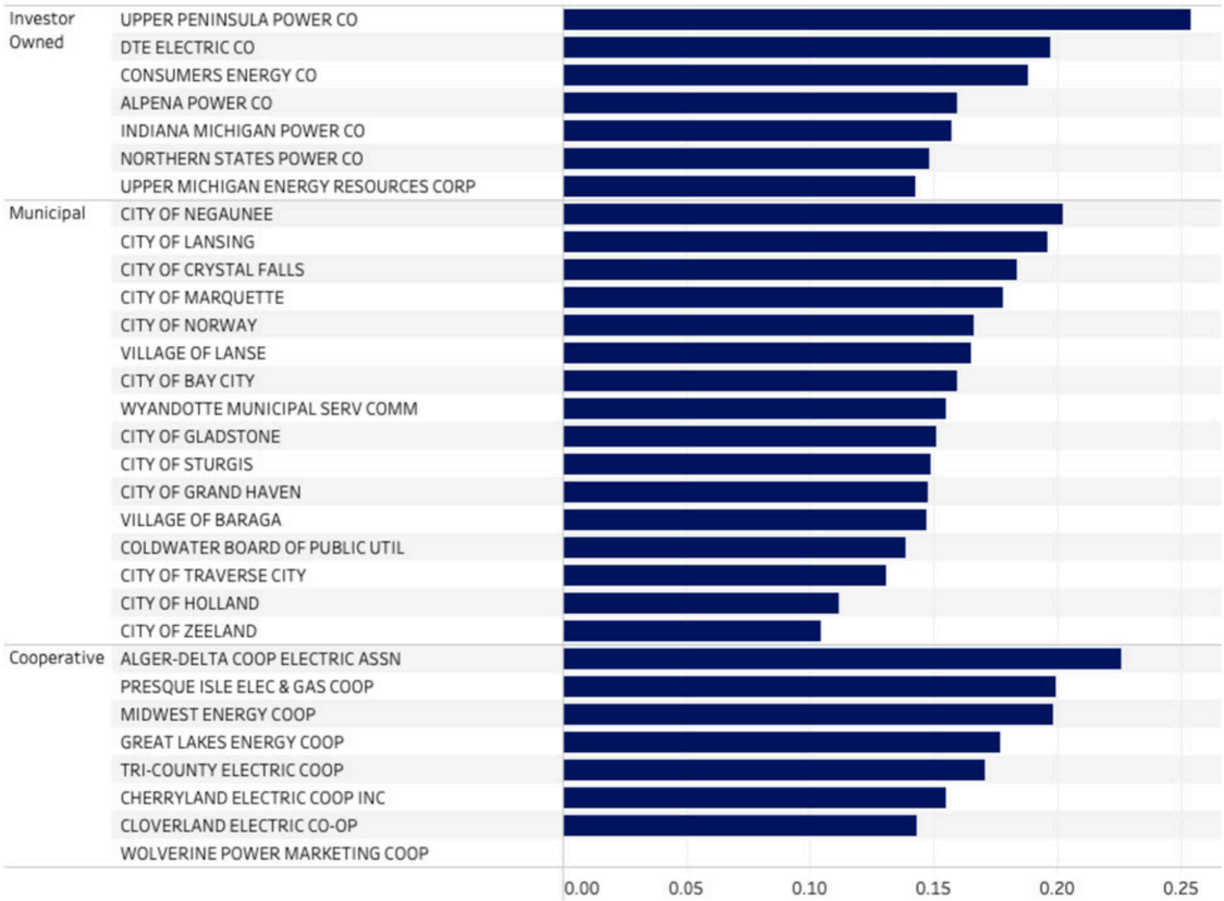
Figure 33: 2023 Price of Electricity in the Residential Sector ($/kWh)



Average Price of Electricity: Residential Sector for Michigan Utilities

Prices per kWh residential electricity vary from 10.4 cents per kWh for the City of Zeeland municipal utility to 25.4 cents per kWh for the Upper Peninsula Power Company. (Figure 34) The most obvious pattern is that the highest-priced utilities are in the Upper Peninsula. The Upper Peninsula's high electricity prices result from the high expense of distribution infrastructure in rural areas plus the relatively low amount of local generation resources. That said, most utilities in Michigan have residential electricity prices falling between 13 and 19 cents per kWh.

Figure 34: 2023 Price of Electricity in the Residential Sector for Michigan Utilities ($/kWh)



Household Natural Gas Costs and Expenditures

Although responsible for significant greenhouse gas emissions and other pollutants, natural gas remains an affordable and accessible fuel for water and space heating in cold climates. However, consumers are not insulated from price spikes or distribution disruptions, especially during harsh winters.

Different natural gas utilities measure their sales in different units, but the EIA reports natural gas sales data through Form 176 using units of thousands of cubic feet, abbreviated as Mcf. According to the EIA, burning 1 Mcf of natural gas produces roughly 10.38 therms of energy.

In previous years, this section of the report has contained figures that expressed natural gas prices in dollars per therm and in dollars per kWh, a unit generally used to measure electricity (one therm is precisely equal to 29.3 kWh). The purpose of this choice was to allow readers to compare the absolute energy costs of these disparate energy forms.

This year, the reader is encouraged to explore the CUB Tableau platform to make this comparison. The figures in this section express natural gas prices in dollars per Mcf. On Tableau, hovering over any state when viewing the price of natural gas in the Energy Costs dashboard will reveal the equivalent price per kWh of electricity, assuming that each kWh of natural gas is equivalent to one kWh of electricity. Under this assumption, readers can also look at the price figures in this section and divide by 304 to convert $/Mcf roughly into $/kWh of electricity.

This comparison shows that natural gas is usually cheaper than electricity on a "kWh for kWh" basis, which helps explain why it is a more common heating fuel in climates with high heating requirements. However, comparing one kWh of natural gas to one kWh of electricity ignores the fact that electric appliances are often more efficient than gas appliances. A useful measure to compare the economics of gas vs. electric appliances is called the "spark gap", which is defined as the ratio of electricity price to gas price. If the spark gap is greater than the energy savings of a more efficient electric appliance over its gas-powered counterpart, then it will still cost more to operate the electric appliance.

For example, heat pump appliances for space and water heating are roughly three times more efficient than gas-powered appliances, so they will be favored economically only in environments with a spark gap less than three. A comparison of Figure 32 through Figure 37 shows that this is not the case in Michigan in 2023: electricity cost customers $0.188 per kWh in the residential sector, while natural gas cost customers $0.0378 per kWh, a spark gap of 4.98.

Although the geographies of high and low prices and expenditures are different for natural gas than for electricity, the factors that relate prices to expenditures and usage follow a similar logic to electricity's. There are higher expenditures but lower prices in areas with higher use, such as colder, more northern climates where natural gas is a common heating fuel.

Michigan's average household natural gas expenditures dropped markedly between 2022 and 2023. An average Michigan household spent $1,590 on natural gas in 2022, ranking 35th in the nation, and $1,278 in 2023, ranking 24th and dropping below the U.S. average. (Figure 35, Figure 36) Michigan's household natural gas expenditures are fairly typical among neighboring states, while Michigan had the 7th-lowest price of natural gas in the nation. (Figure 37, Figure 38)

Figure 35: 2023 Natural Gas Expenditures per Household (in Dollars)

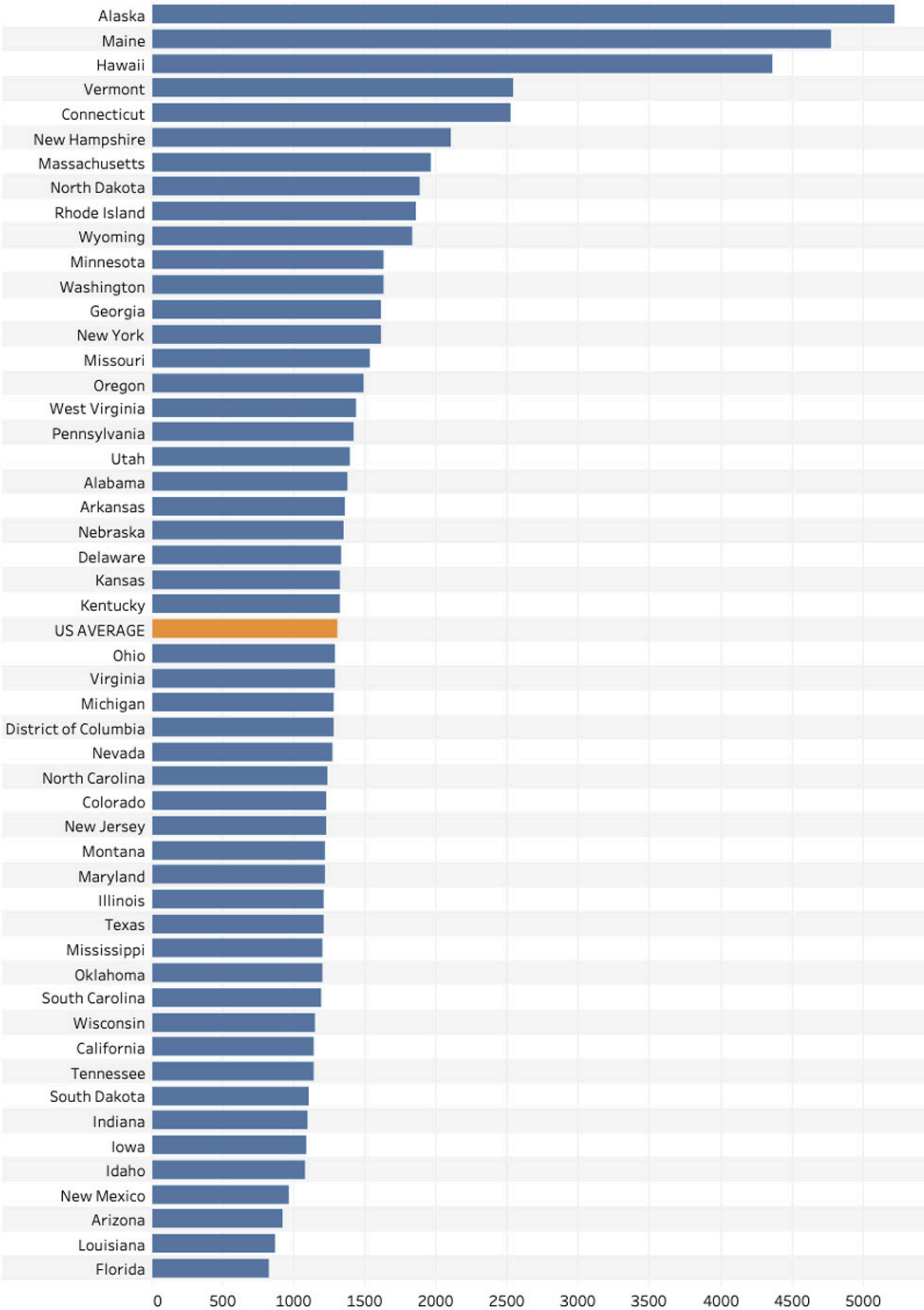


Figure 36: 2023 Natural Gas Expenditures per Household ($)

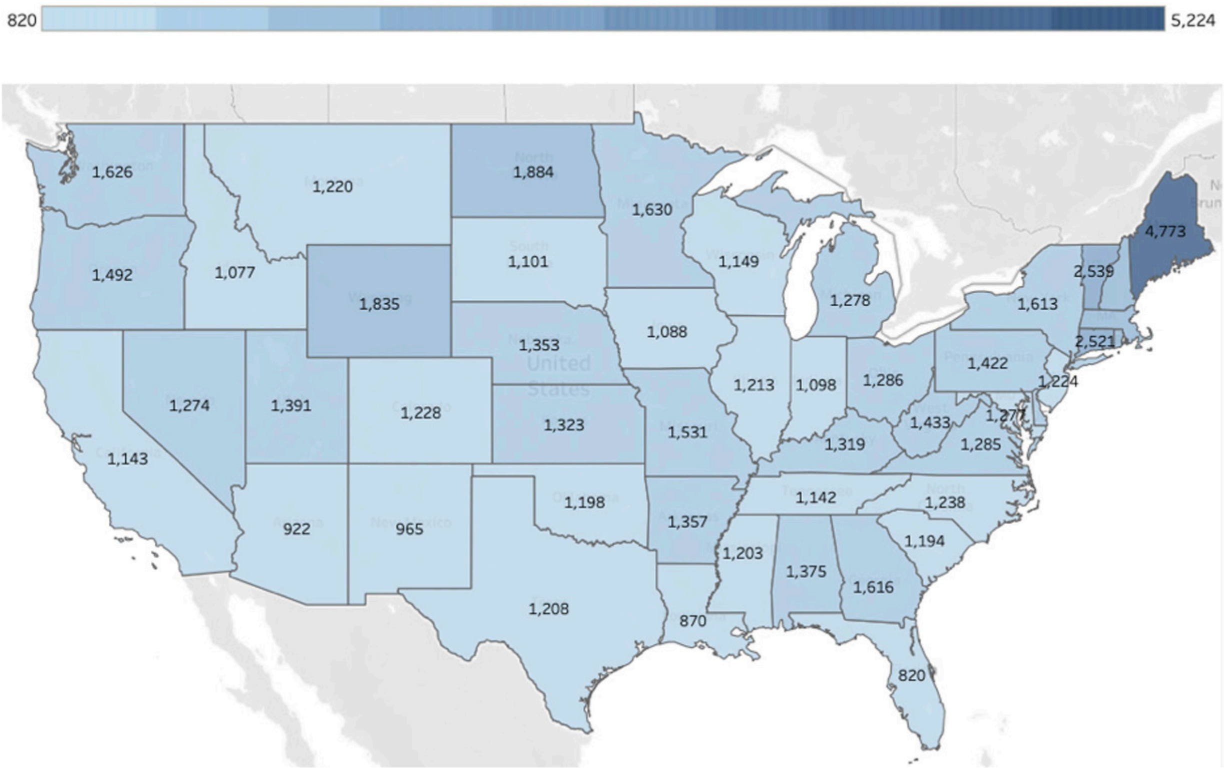


Figure 37: 2023 Natural Gas Price in the Residential Sector ($/Mcf)

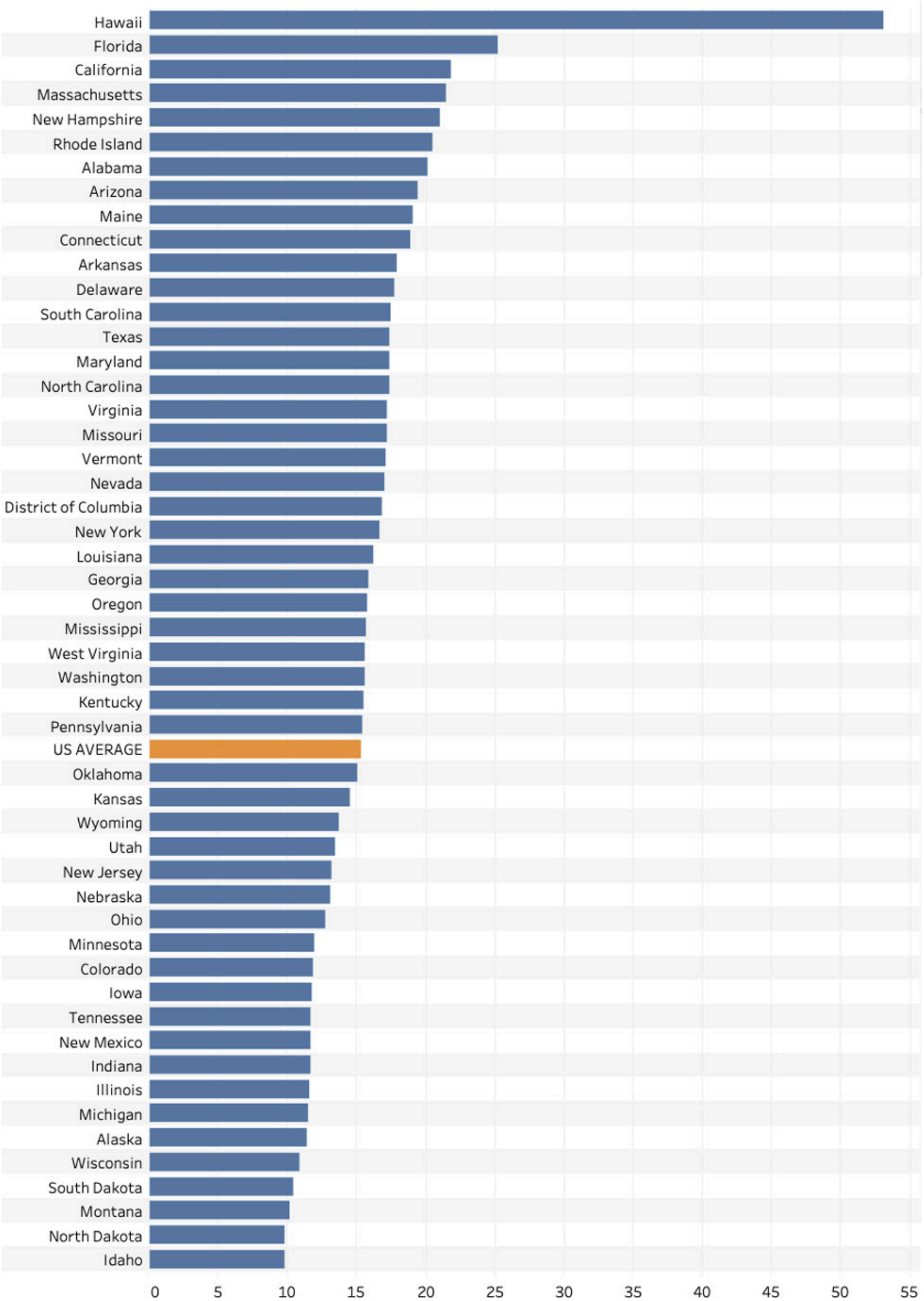
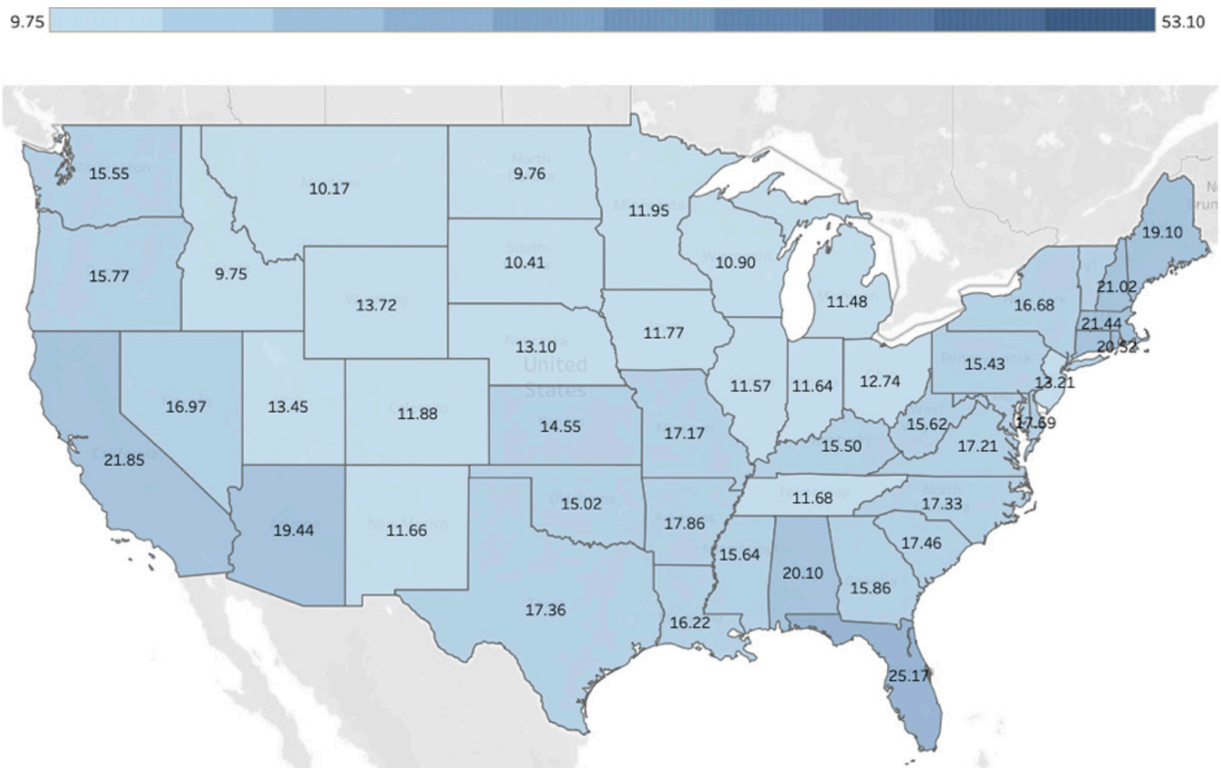


Figure 38: 2023 Natural Gas Price in the Residential Sector ($/Mcf)



Average Price of Natural Gas: Residential Sector for Michigan Utilities
While the price of natural gas for Michigan utilities increased significantly from 2021 to 2022, the price was more stable in 2023, increasing only slightly on average. The price varied between $7.5 and $12.2 per Mcf for natural gas utilities in 2023 compared to a range of $8.9-$12 per Mcf in 2022. Among all of Michigan's utilities, Consumers Energy had the highest price at $12.26 per Mcf. (Figure 39)

Figure 39: 2023 Natural Gas Cost in the Residential Sector for Michigan Utilities ($/Mcf)

Heating Fuel Sources

The type of fuel American households use for heat, both for home heating and for other heat uses such as cooking, hot water heating and clothes drying, depends on factors such as geography, average daily temperature, access to infrastructure and relative fuel costs.

As discussed previously, natural gas is historically a more affordable energy source than electricity on a "kWh for kWh" basis for producing heat. This is also true of other heating fuels in some places. However, this trend is being challenged by the increasing affordability of high-quality air-source heat pumps that can perform efficiently at progressively lower temperatures. According to Canary Media, *heat pumps outsold gas furnaces* and have widened their lead every year since 2022.

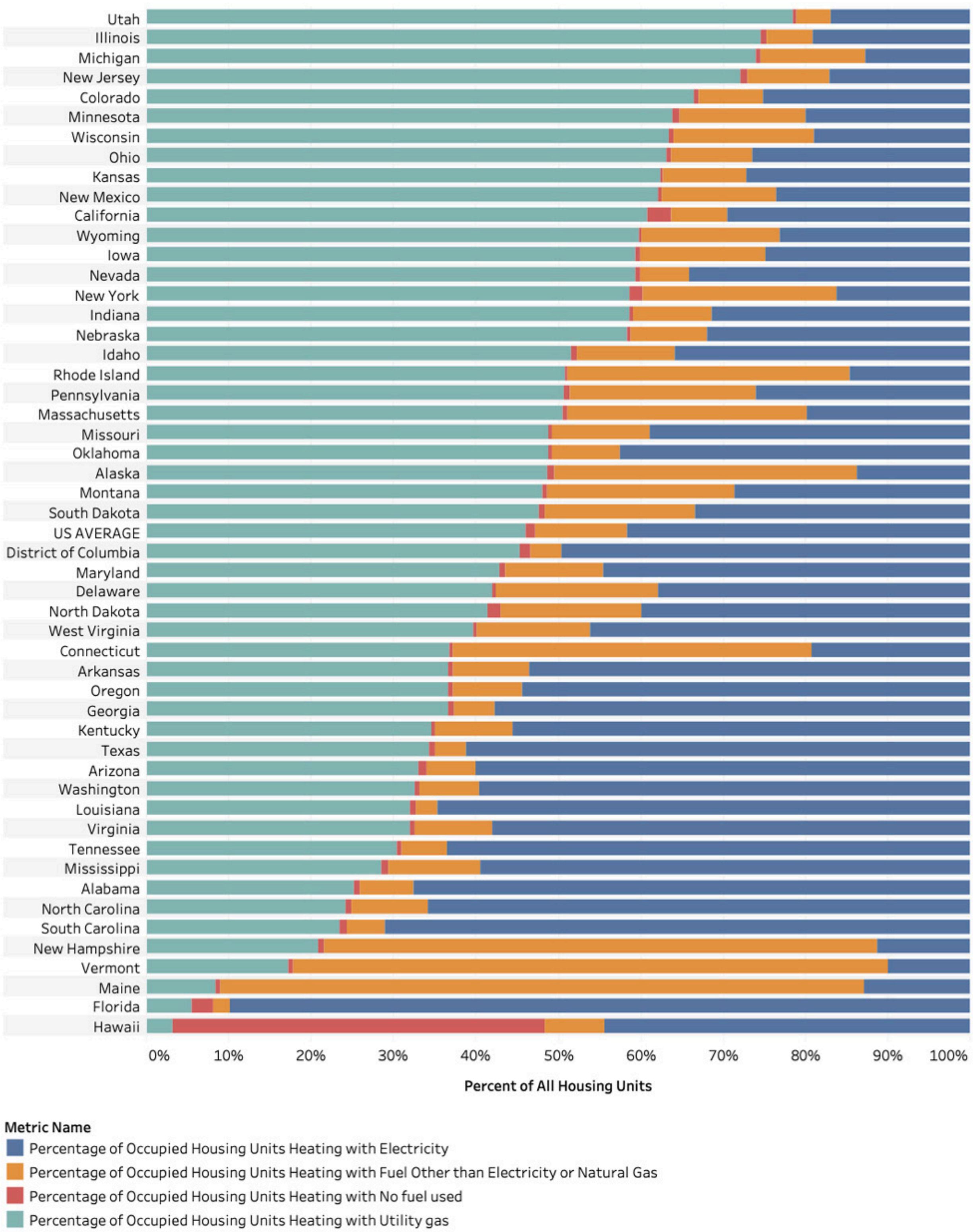
Given that energy price dynamics favor natural gas in cold climates, however, the shift towards electric heating in northern states will likely lag warmer states, where resistance electric heat or air-source heat pumps can easily provide enough heat for the coldest days there without straining the electric grid. Electrifying household appliances offers other advantages over gas appliances, namely that disconnecting the gas line avoids the maintenance costs associated with the gas utility and that electric appliances don't cause adverse health impacts from indoor air pollution. Thus, as the technology improves, the shift towards electric heating will likely occur even in cold climates.

The Northeastern U.S. shows very few homes heating with electricity but a high penetration of other heating fuels. (Figure 40) This trend is less the product of low population density, as these Northeastern states are some of the *densest*, and more the product of older housing stock and infrastructure.

Most of the data in this subsection come from the EIA, but data on which fuel sources are used for home heating come from the United States Census Bureau, specifically from American Community Survey (ACS) form *B25040*, which gathers information on the physical characteristics of occupied housing.

In 2023, 12.74% of Michigan's occupied housing units were heated with electricity, an increase from 12.28% in 2022, but still the 3rd-smallest proportion in the nation, behind only New Hampshire and Vermont. 73.99% of Michigan's households were heated with natural gas, the 3rd-highest proportion in the nation, behind Utah and Illinois. The same rankings held in 2022, with 74.31% of Michigan's households heating with gas.

Figure 40: 2023 Percentage of Households Using Heating Source by Fuel



Household Other Heating Fuels Costs and Expenditures

Beyond electricity and natural gas, Americans use a variety of other fuels as sources of heat, including propane, kerosene, fuel oil, wood and more. Given their relatively limited use compared with electricity and natural gas, this report aggregates all fuel sources other than electricity and natural gas into a category called “other heating fuels” (OHFs). The data in this section comes from EIA SEDS, and due to incomplete reporting for 2023 on wood expenditures and consumption, this report excludes households heating with wood. To view figures that include these households, please visit the CUB Tableau platform.

Residential consumers purchase OHFs in different forms and units, but when reporting consumption of these fuels, the EIA converts the energy embodied in those materials to a basic unit of energy measurement—MMBTU, or million BTU. The conversion factor from MMBTU to kWh is 293 kWh to 1 MMBTU. To get a “kWh for kWh” price comparison between OHFs and electricity, divide the price per MMBTU in any state by 293 (Figure 43).

However, as discussed in the section on residential natural gas prices, one kWh of energy produced via OHF is not equivalent to one kWh of electricity. Appliances that use OHFs are often less efficient than natural gas appliances, while electric appliances are often even more efficient. Combined with the higher cost of OHFs (at least in Michigan), this suggests that electrification programs could more economically target households currently using OHFs than households using natural gas.

In 2023, Michigan ranked 25th for household OHF expenditures and 12th for OHF prices, an improvement over the state’s rankings of 26th and 16th for these two metrics, respectively, in 2022. Among its peer states, Michigan had lower expenditures than Illinois and Minnesota, but only Indiana and Ohio had higher unit prices (Figure 41 through Figure 44).

Figure 41: 2023 Residential Other Heating Fuel Expenditures per Household (excluding households using wood) ($)

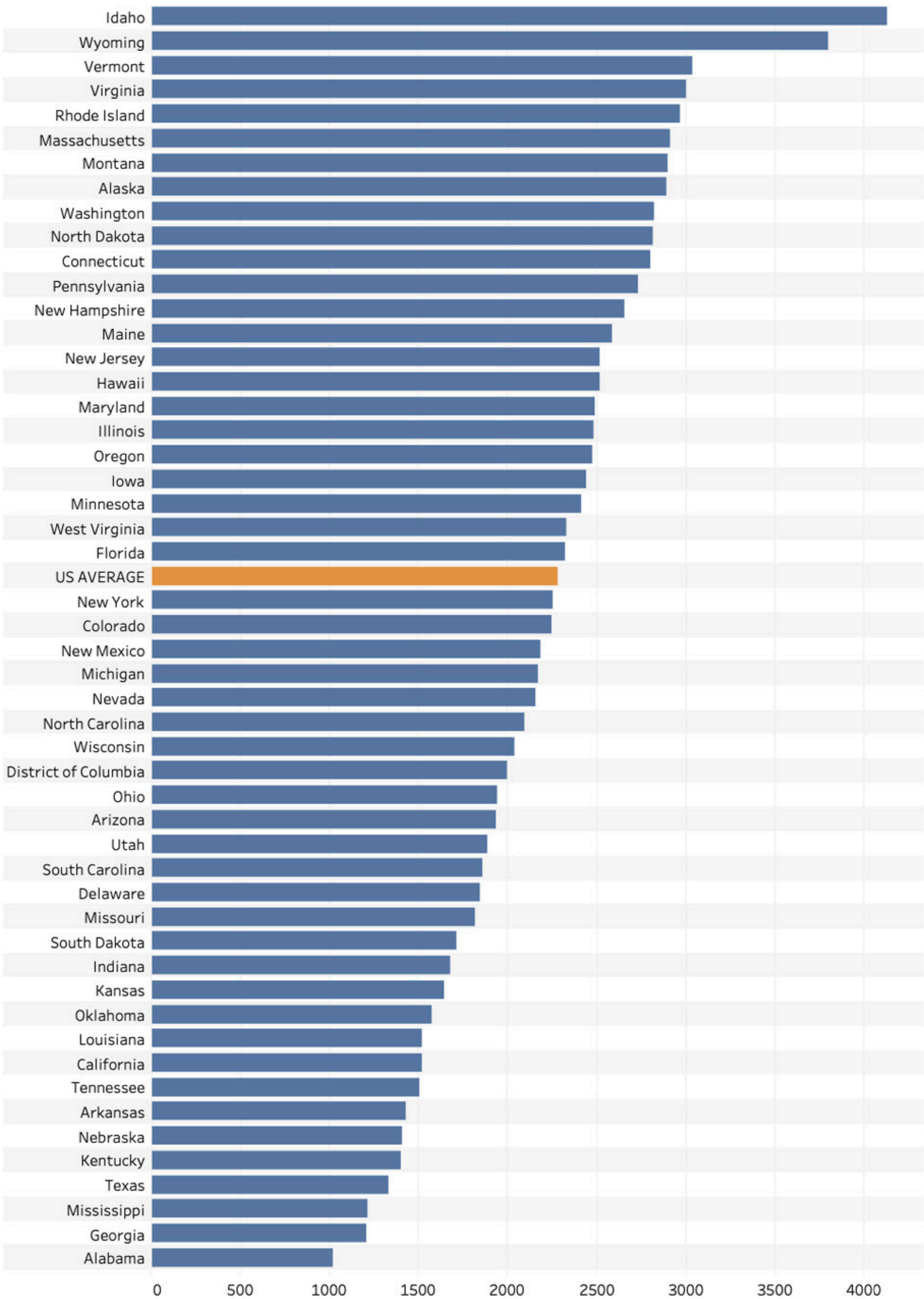


Figure 42: 2023 Residential Other Heating Fuel Expenditures per Household (excluding households using wood) ($)

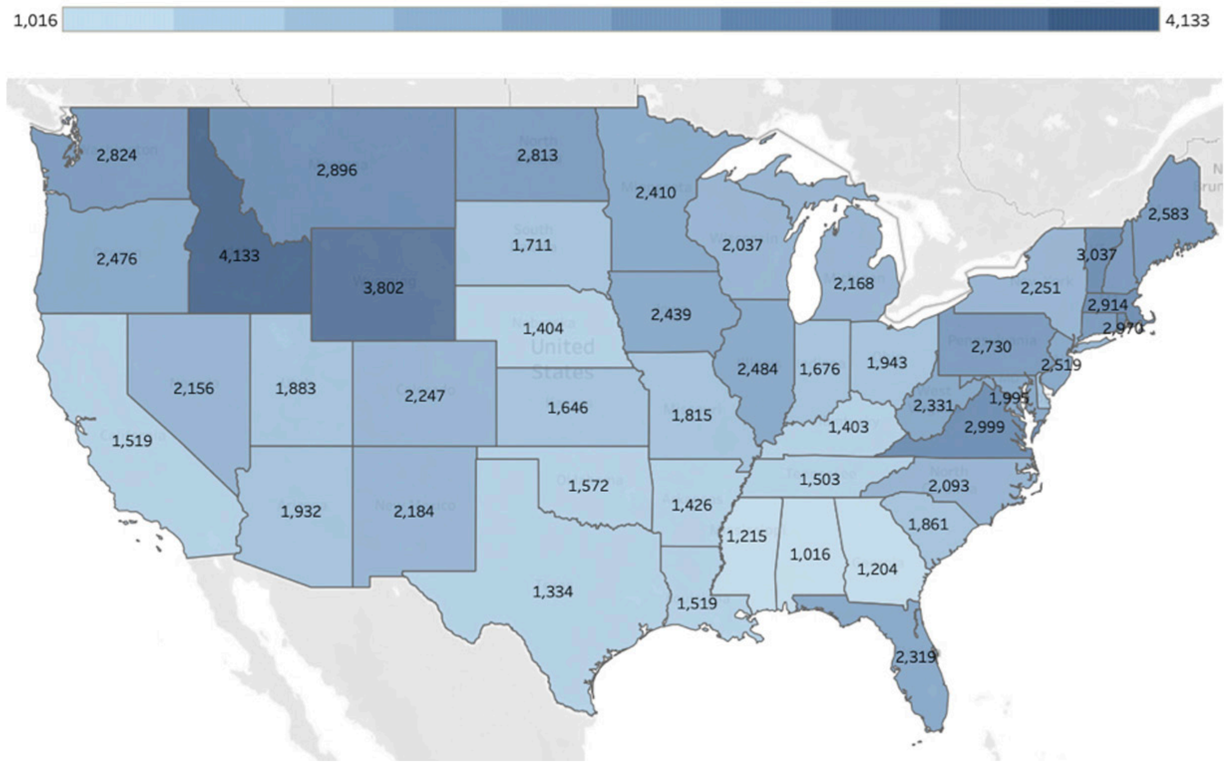


Figure 43: 2023 Price of Other Heating Fuels in the Residential Sector (excluding wood) ($/MMBTU)

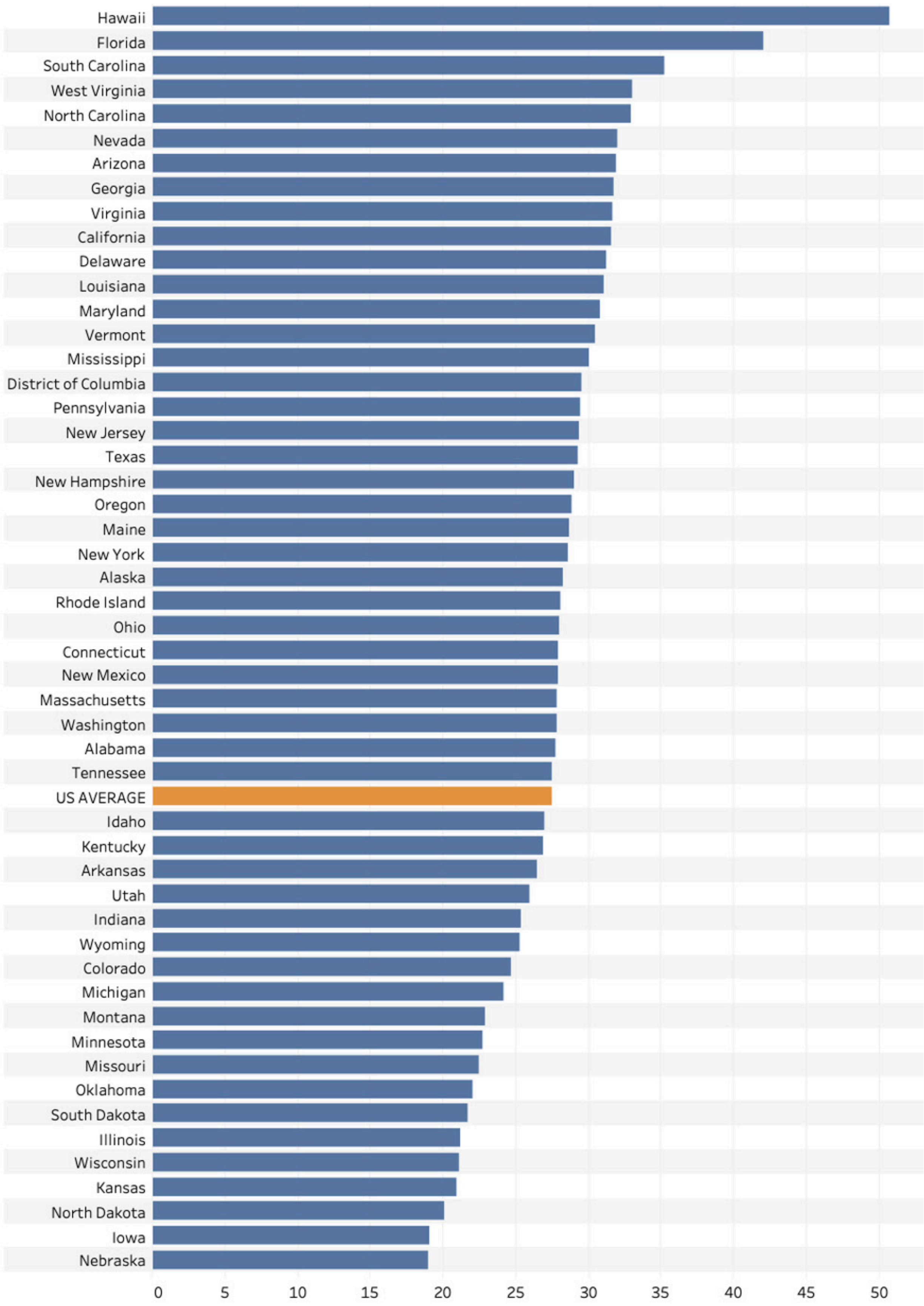
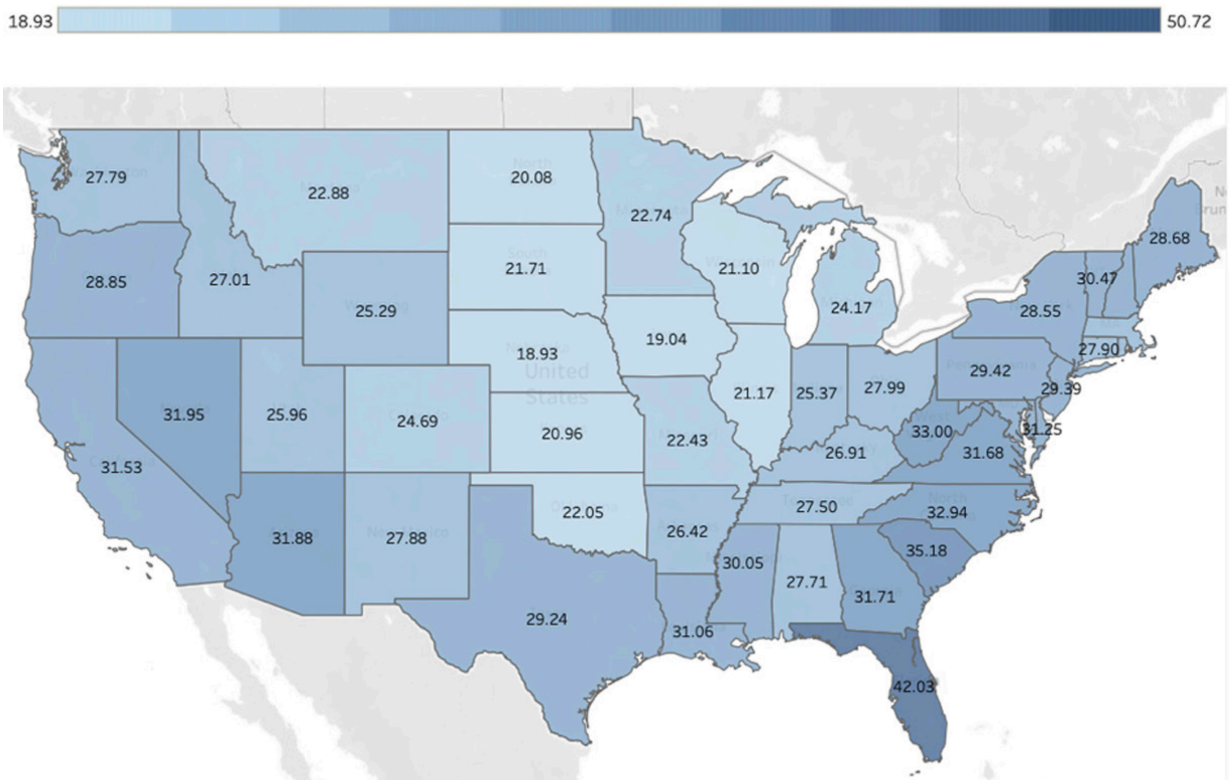


Figure 44: 2023 Price of Other Heating Fuels in the Residential Sector (excluding wood) ($/MMBTU)



Non-Residential Energy Costs

Residential, commercial and industrial customers all pay different prices for electricity and natural gas. Industrial customers generally receive the lowest rates of the customer classes because they are large users that require single hookups. Moreover, they require less distribution infrastructure because they usually connect to transmission or primary lines. The electricity prices for industrial customers can be understood in the electricity sector as driven primarily by transmission and generation costs, and in the natural gas sector as transmission and production costs. Residential and commercial customers, on the other hand, pay for transmission, generation/production, and the construction and maintenance of distribution infrastructure. How much of these costs falls on commercial customers and how much falls on residential customers is largely a matter of policy and regulation. The differences between residential and commercial energy prices are very inconsistent between states and utilities, showing a clear lack of uniformity in how distribution costs are shared between the two classes.

In Rhode Island, the commercial price of electricity is actually lower than the industrial price, and the residential sector is forced to pay for a higher share of distribution infrastructure costs. Conversely, in many southern states, including Kentucky, Tennessee, Alabama, and Mississippi, there is a large spread between commercial and industrial prices, but a very small spread between commercial and residential, suggesting that distribution system costs are shared between the two classes. Similar differences appear in natural gas prices, although which states they exist in appear uncorrelated to where they exist for electricity.

Non-Residential Electricity Costs

In 2023, Michigan's electricity price of 13.4 cents per kWh in the commercial sector was slightly above the U.S. average and ranked 39th in the nation. (Figure 45, Figure 46) Michigan's electricity price for industrial customers was 8.16 cents per kWh, also close to the U.S. average, ranking 31st among the states. (Figure 47, Figure 48) Michigan's commercial electricity price was the highest among its peer states, whereas Michigan's industrial electricity price was higher than only Ohio.

Figure 45: 2023 Price of Electricity in the Commercial Sector ($/kWh)

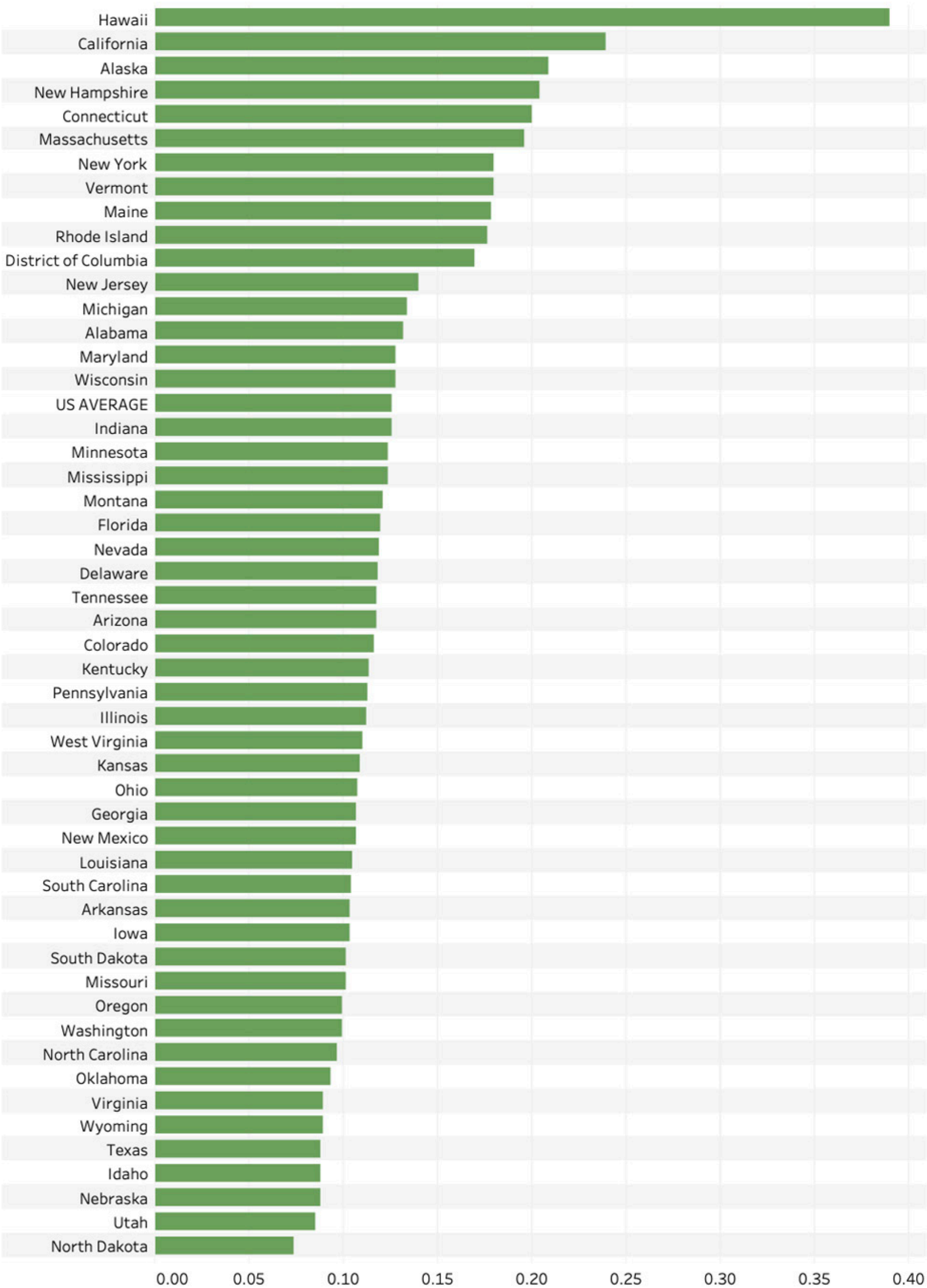


Figure 46: 2023 Price of Electricity in the Commercial Sector ($/kWh)

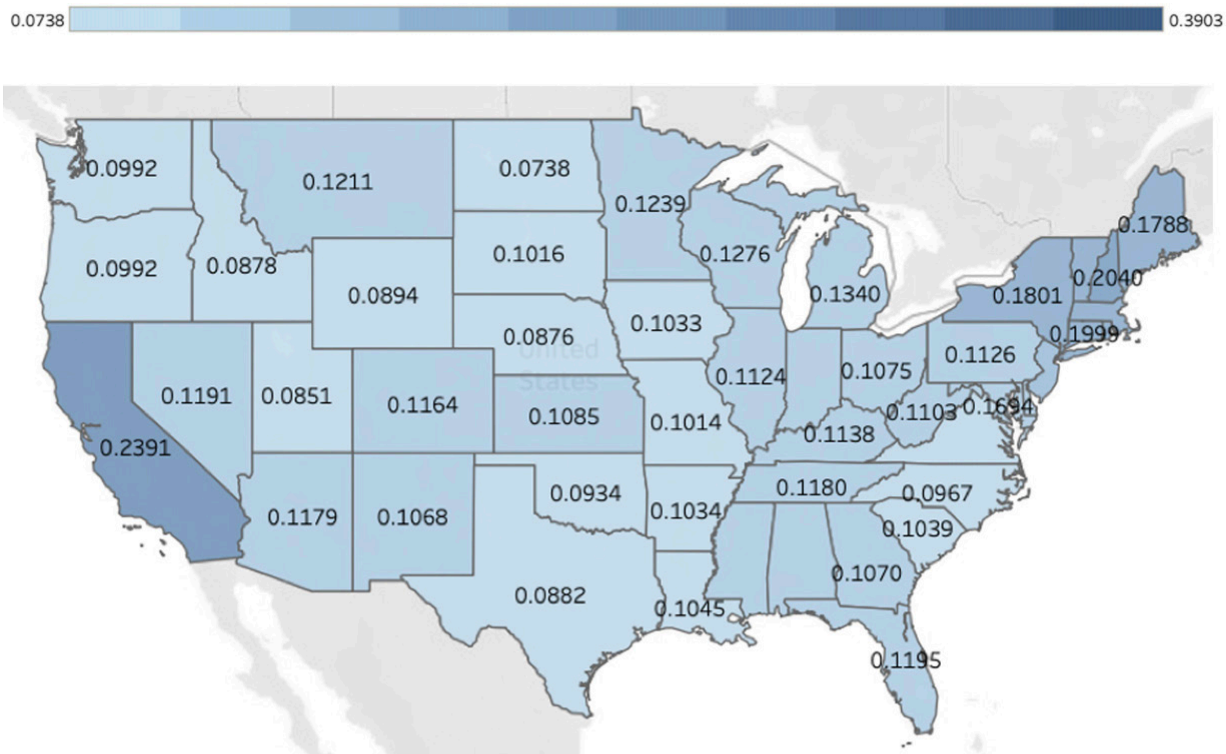


Figure 47: 2023 Price of Electricity in the Industrial Sector ($/kWh)

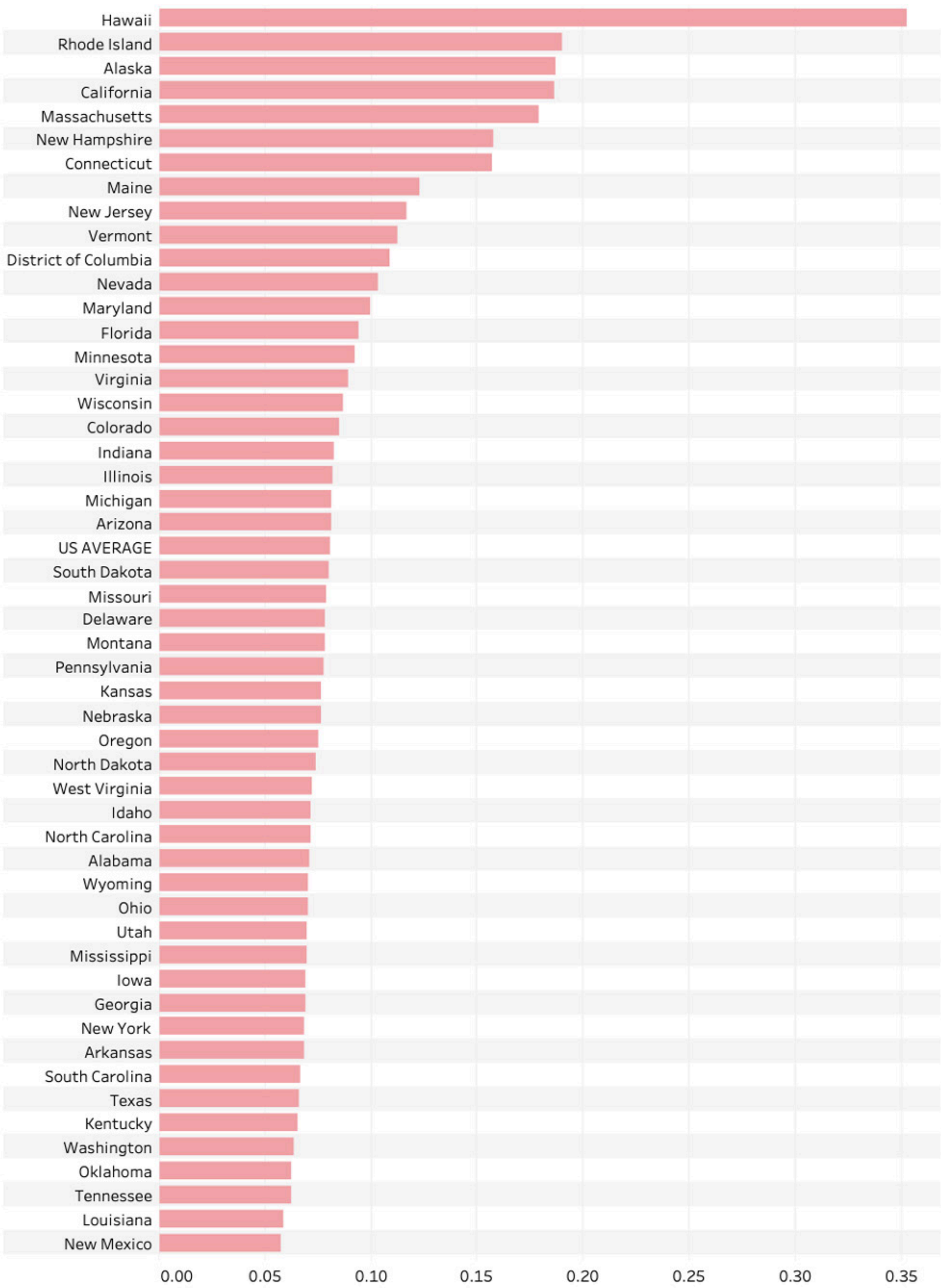
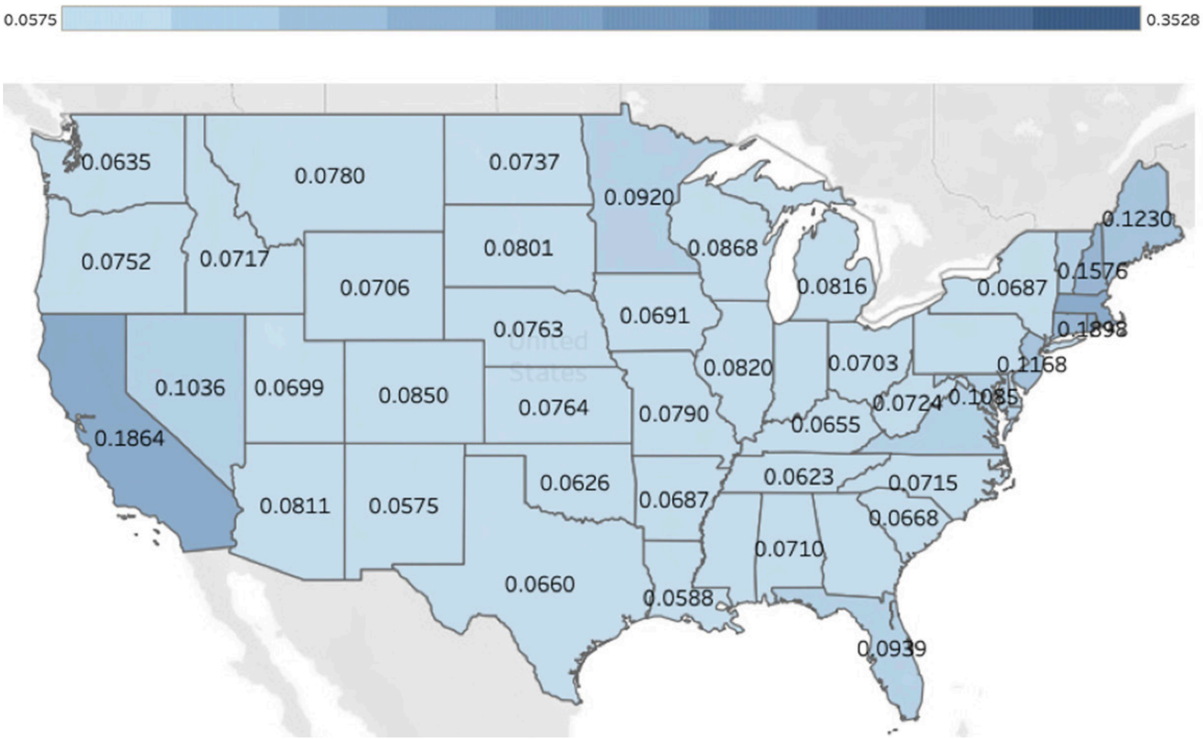


Figure 48: 2023 Price of Electricity in the Industrial Sector ($/kWh)



Non-Residential Electricity Costs for Michigan Utilities

Figure 49 and Figure 50 show the comparative electricity pricing by sector of different utilities across Michigan. It is interesting to note that, for some smaller municipal and cooperative utilities, the normal pattern of price increasing from industrial to commercial to residential is not always the case. Although they may represent real differences in cost of service among different sectors, these discrepancies are more likely to represent the political priorities of these smaller utilities that have more pricing flexibility because of their smaller scales and institutional structures.

Figure 49: 2023 Price of Electricity in the Commercial Sector for Michigan Utilities ($/kWh)

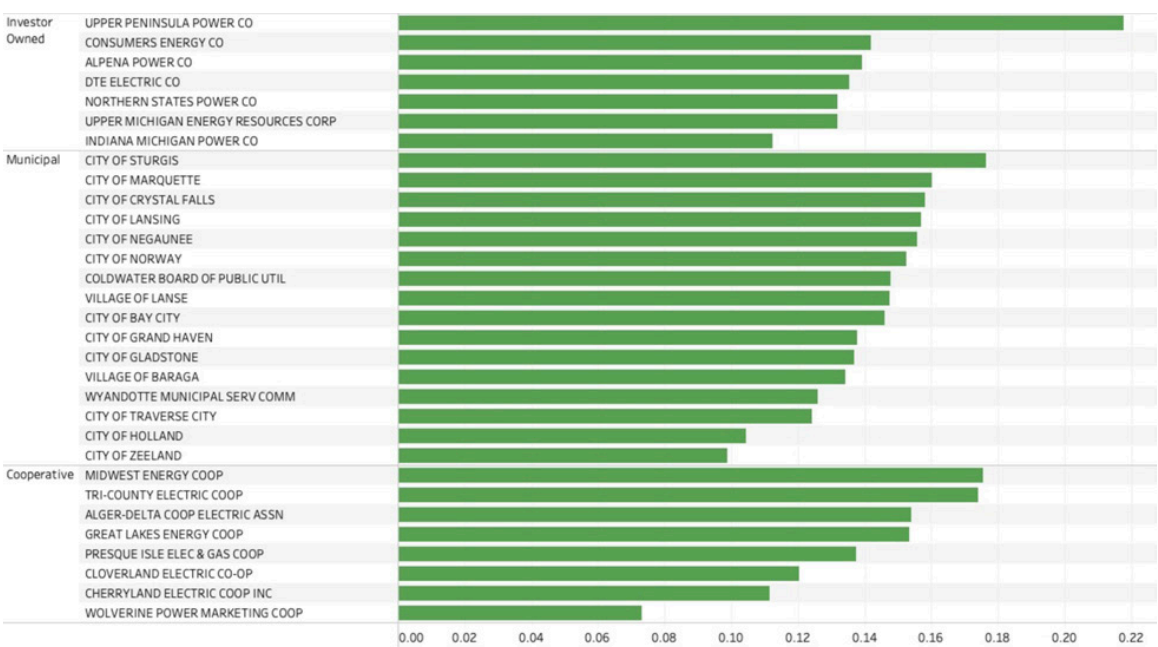
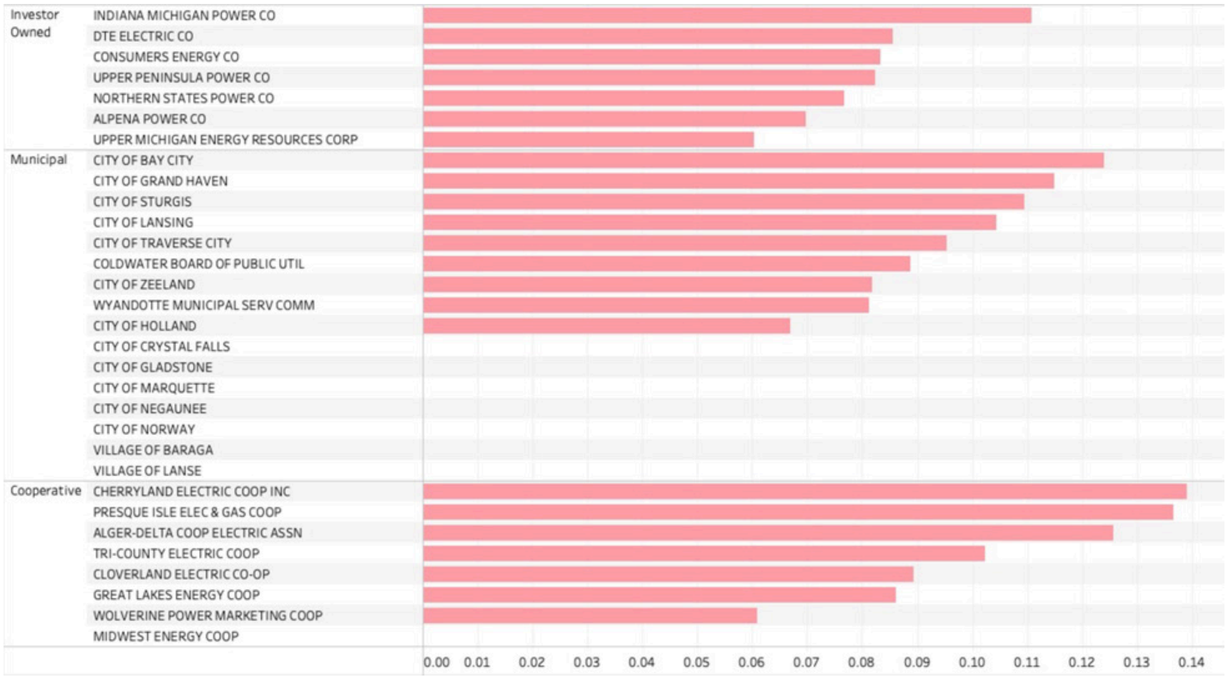


Figure 50: 2023 Price of Electricity in the Industrial Sector for Michigan Utilities ($/kWh)



Michigan Non-Residential Natural Gas Prices

In 2023, Michigan's natural gas price of $9.94 per Mcf in the commercial sector was relatively low compared to other states, ranking 11th. (Figure 51, Figure 52) Michigan's natural gas price for industrial customers was $8.50 per Mcf, ranking 33rd in the nation. (Figure 53, Figure 54) This result is notably much worse than the state's rankings for commercial and residential natural gas prices. Whereas commercial and residential sector natural gas rates are driven by space heating and go down as infrastructure costs are divided up over a higher volume sold, in the industrial sector, natural gas price is driven by factors unrelated to the demand produced by space heating—such as process heat requirements for manufacturing and feedstock use in chemical production.

Figure 51: 2023 Price of Natural Gas in the Commercial Sector ($/Mcf)

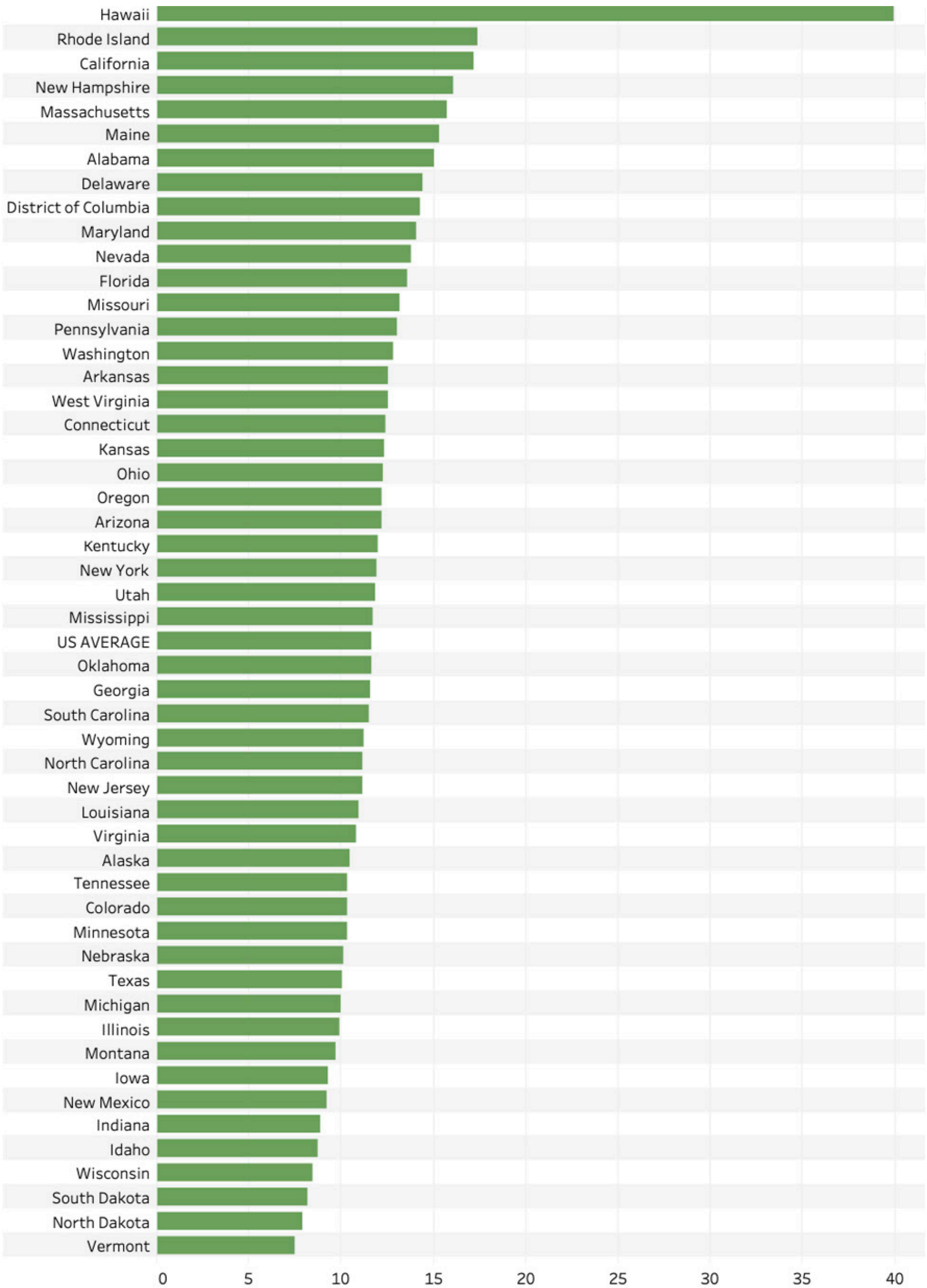


Figure 52: 2023 Price of Natural Gas in the Commercial Sector ($/Mcf)

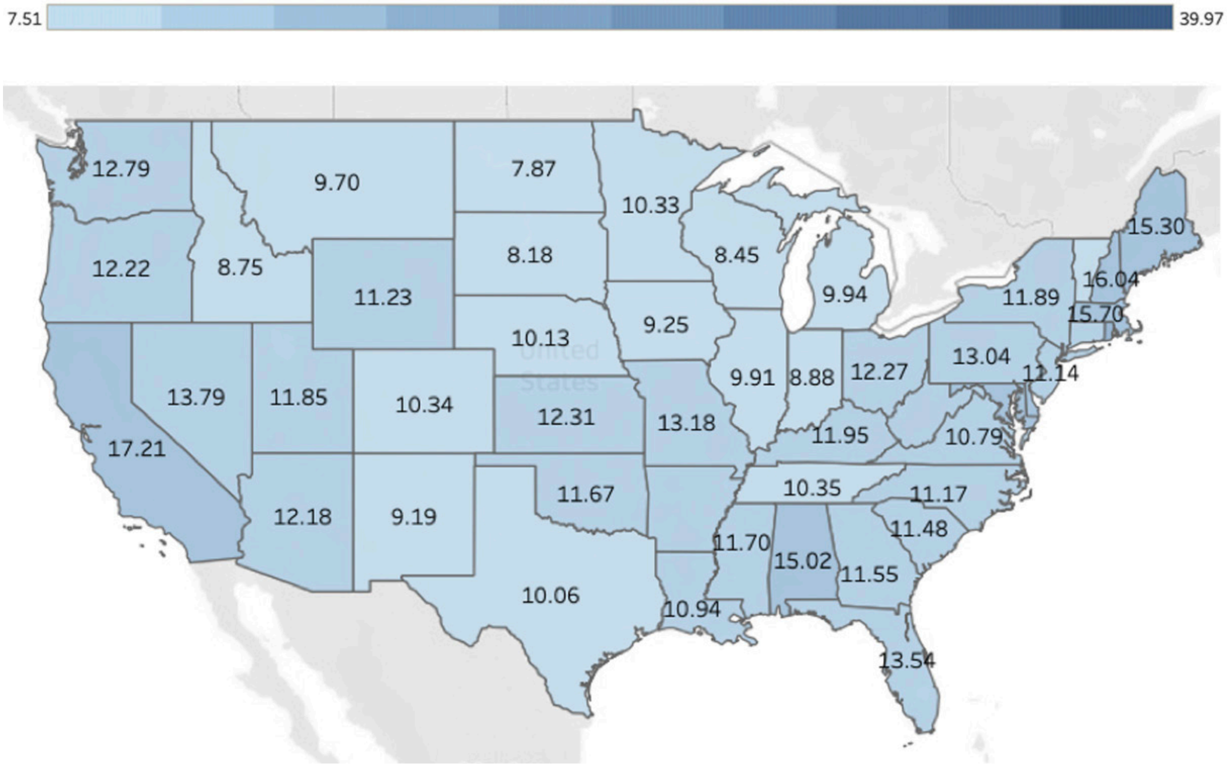


Figure 53: 2023 Price of Natural Gas in the Industrial Sector ($/Mcf)

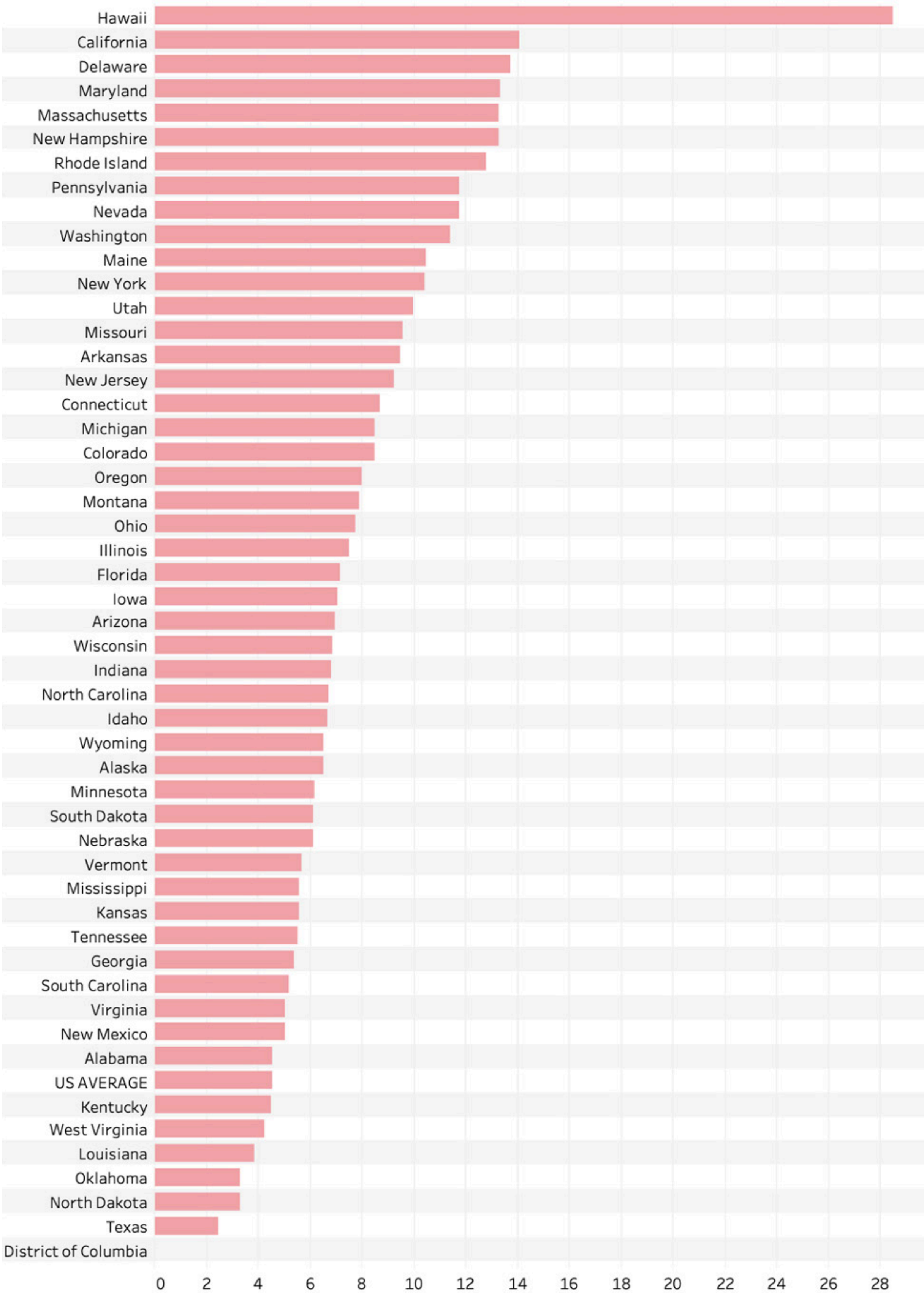
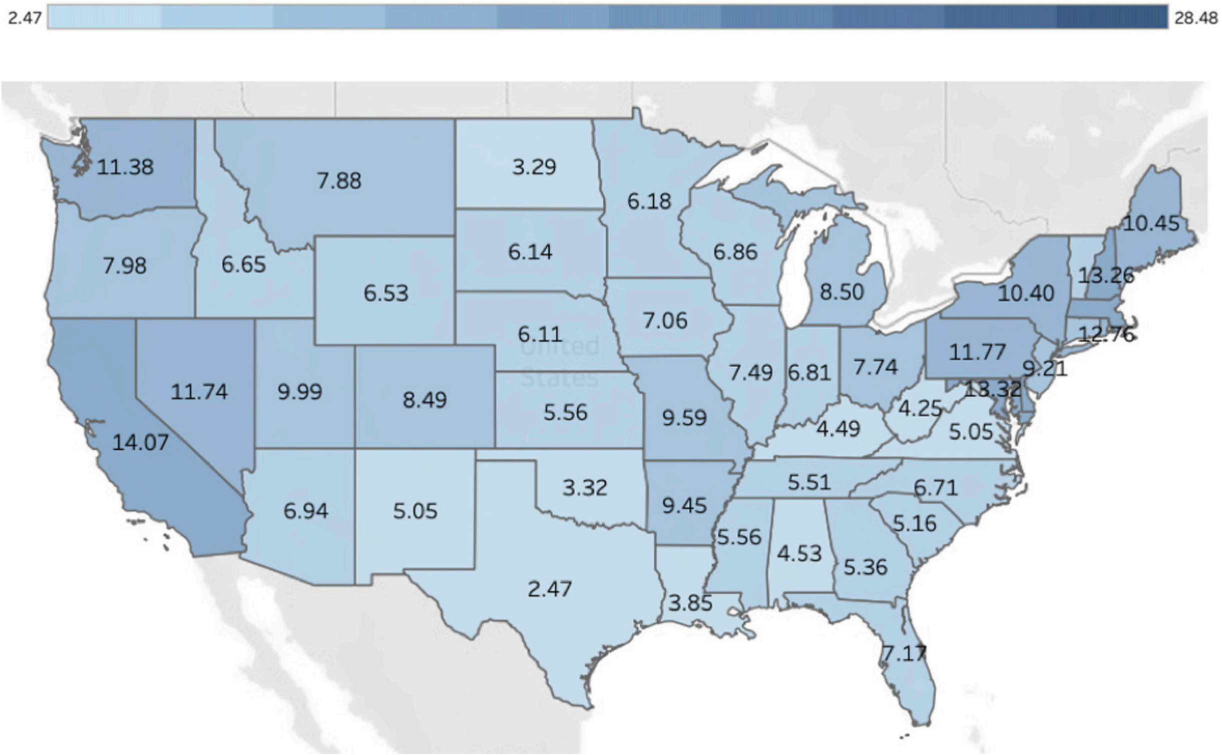


Figure 54: 2023 Price of Natural Gas in the Industrial Sector ($/Mcf)



Energy Efficiency

Electric utilities across the country are working to reduce carbon emissions and are closing their oldest and dirtiest power plants. This trend is the result of both economic pressures and state and federal legislation. To make up for the lost electricity supply, as well as increases in load resulting from electrification of buildings and transportation and new data centers, utilities are looking both to build new clean supply, and to limit demand. From the point of view of utilities and utility regulators, a kWh of unused electricity is the same as, and often cheaper than, the production of an additional kWh of generation. The practice of intentionally reducing electricity use is called demand-side management. Energy efficiency programs are a big part of demand-side management. These energy efficiency programs come in different forms, but typical programs include weatherization programs to help improve insulation and air sealing, and programs that either provide or subsidize the replacement of older, less efficient light bulbs and appliances, with newer, more efficient versions.

However, not all energy efficiency programs are equal, and not all utilities use them to their full potential. To get at the differences in program efficiency and deployment, we present two metrics that we have produced from data reported in utilities' Form 861 filings to the EIA. These metrics are "Cost per Kilowatt Hour of Energy Efficiency Savings," which is a measurement of how effectively utilities spend on energy efficiency, and "Energy Efficiency Savings as a Percentage of Sales," which measures how aggressively utilities are deploying energy efficiency programs. We report these metrics for each major economic sector—residential, commercial and industrial—at the national and Michigan utility levels.

Energy Efficiency Program Costs

In 2023, Michigan had the 37th-lowest cost residential energy efficiency programs in the country, the 19th-lowest cost programs in the commercial sector, and the 32nd-lowest cost programs in the industrial sector. (Figure 55 through Figure 60) The residential and commercial rankings are similar to those in 2022, but the industrial sector fell behind 11 other states as its program costs jumped by 37%. In 2023, these programs provided energy efficiency savings at $0.063/kWh in the residential sector, $0.015/kWh in the commercial sector, and $0.022 in the industrial sector. Michigan utilities' energy efficiency programs tend to be more expensive than those of its peer states. Even so, it's worth noting that Michigan's demand-side management is much more cost-effective than generating and delivering electricity in the state. Moreover, even at higher costs than in neighboring states, energy efficiency remains one of the lowest-cost strategies for meeting demand and deferring costly infrastructure investments. The cost-effectiveness of energy efficiency will be increasingly important as utilities seek to accommodate new load and balance expensive grid upgrades with the need to keep rates in check.

Figure 55: 2023 Cost of Energy Efficiency Savings in the Residential Sector ($/kWh)

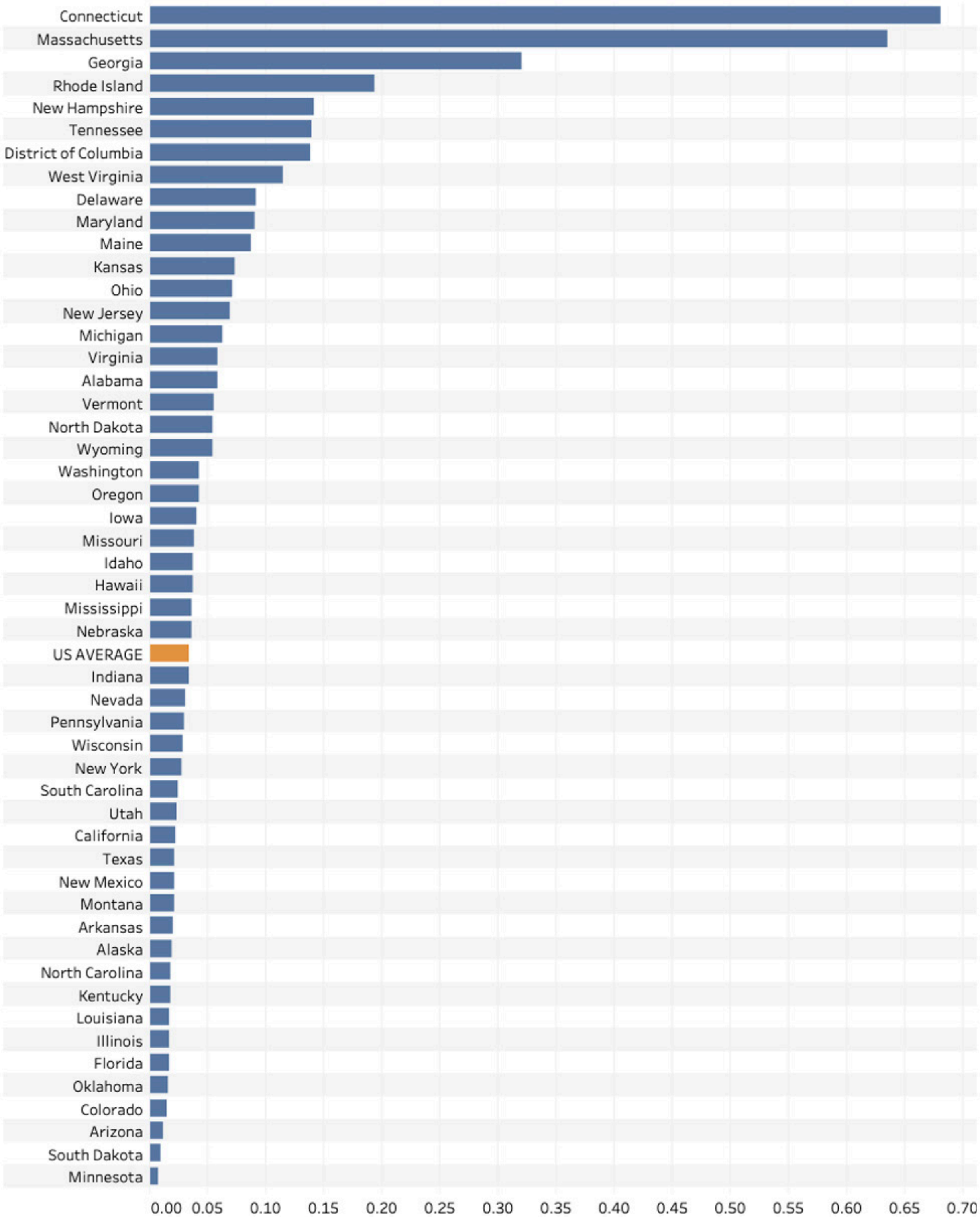


Figure 56: 2022 Cost of Energy Efficiency Savings in the Commercial Sector ($/kWh)

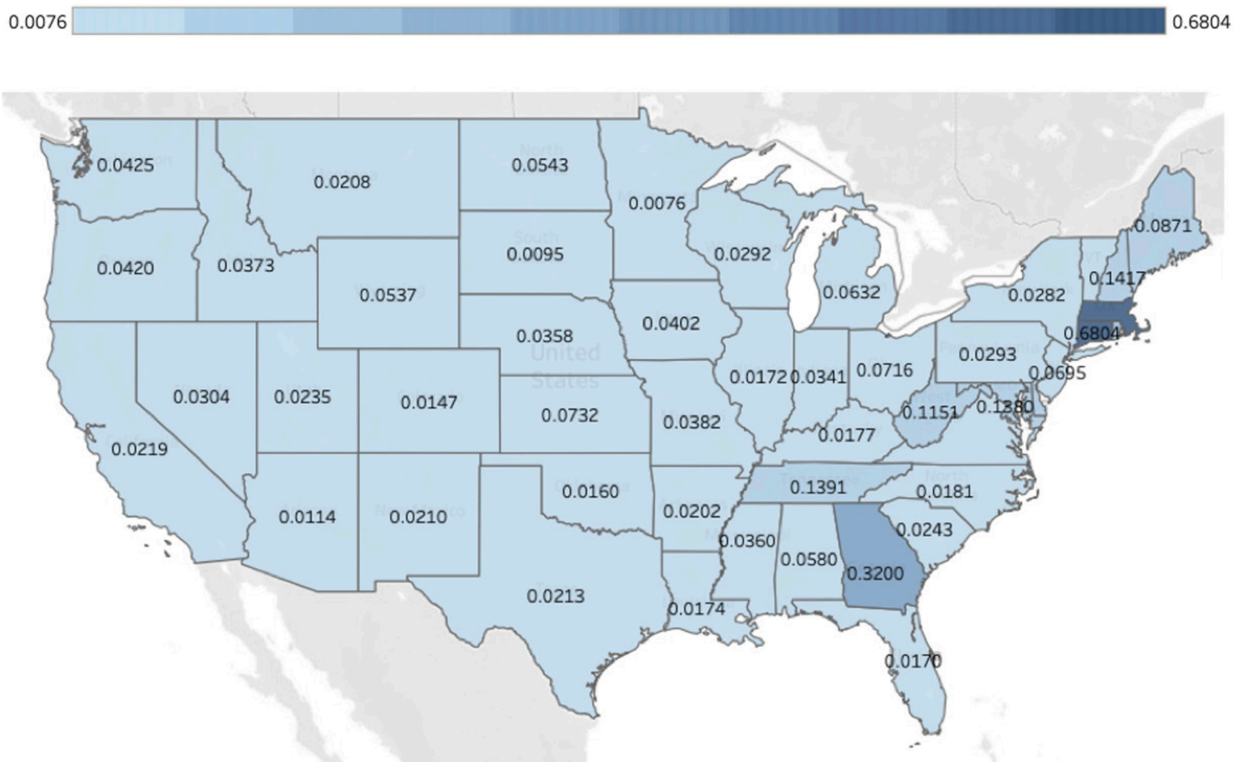


Figure 57: 2023 Cost of Energy Efficiency Savings in the Commercial Sector ($/kWh)

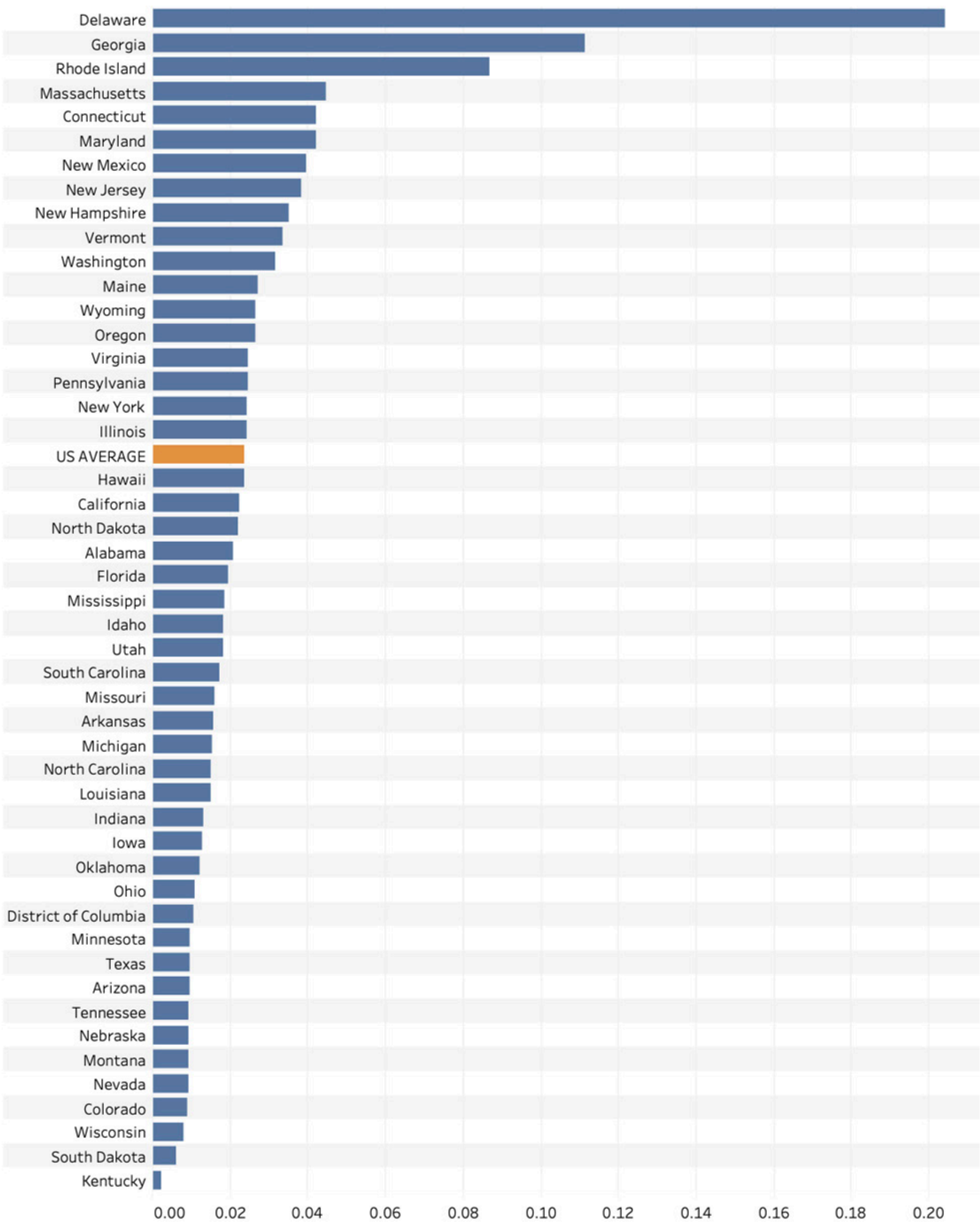


Figure 58: 2023 Cost of Energy Efficiency Savings in the Commercial Sector ($/kWh)

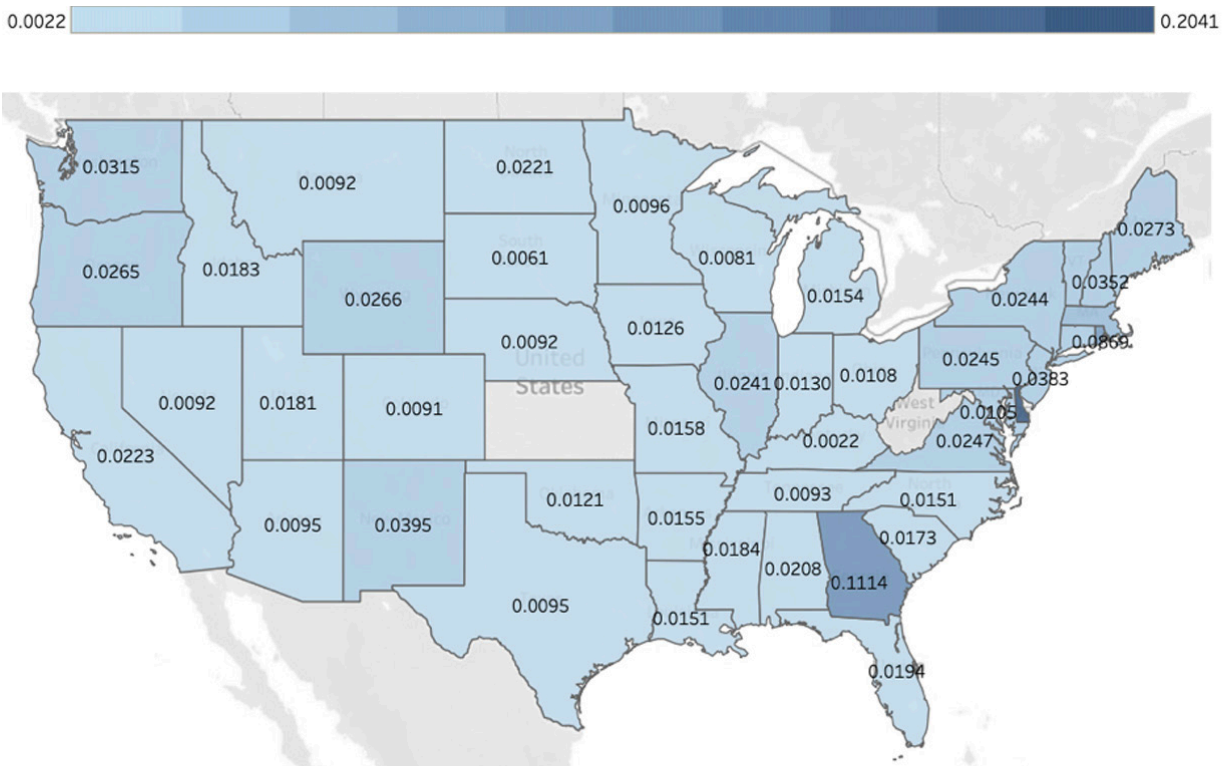


Figure 59: 2023 Cost of Energy Efficiency Savings in the Industrial Sector ($/kWh)

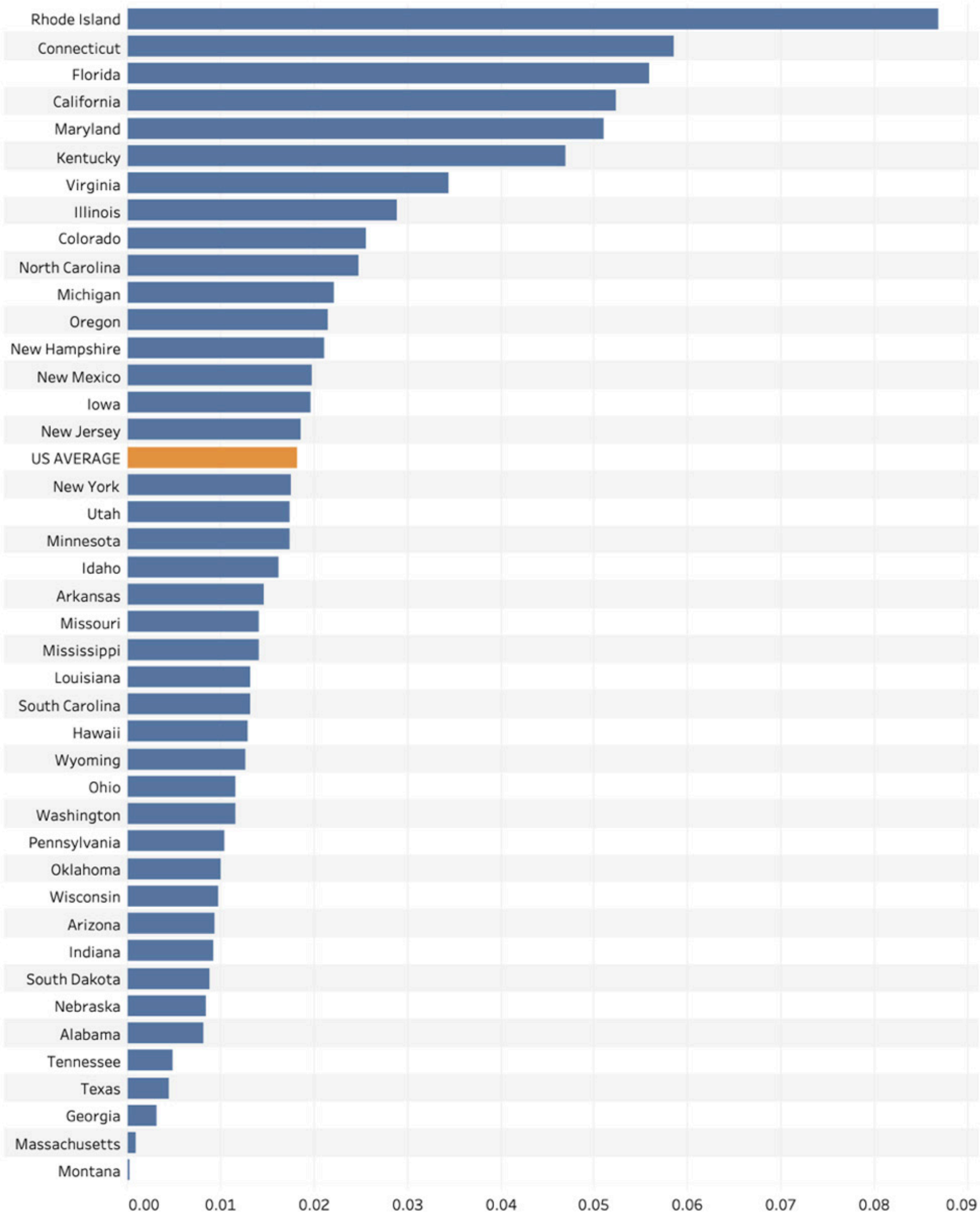
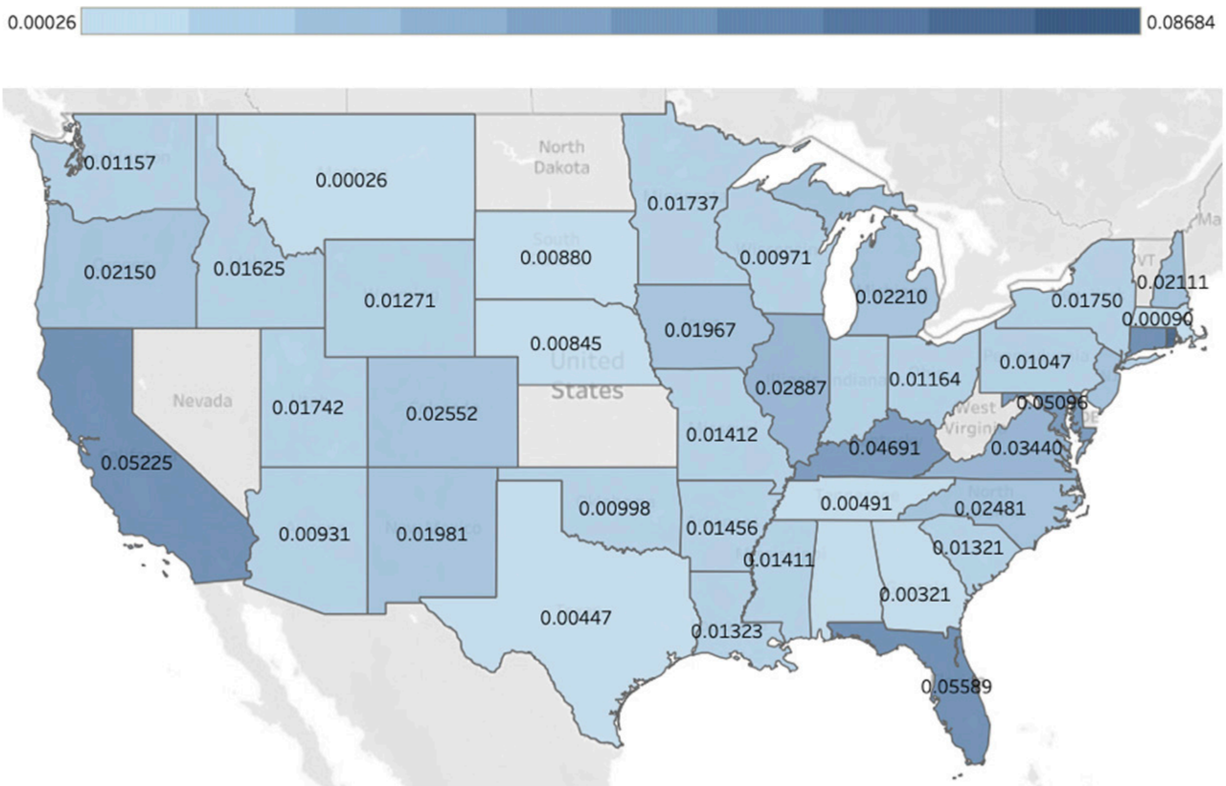


Figure 60: 2023 Cost of Energy Efficiency Savings in the Industrial Sector ($/kWh)



Energy Efficiency Program Deployment

As discussed above, Michigan's residential energy efficiency programs are fairly costly compared to those in neighboring states, especially in the residential sector.

In 2023, on the metric "Energy Efficiency Savings as a Percentage of Sales," however, Michigan utilities' residential programs ranked 9th-best in the nation at 1.46% and near the middle of states in its Midwestern peer group, with only Illinois and Minnesota performing better. At 2.93%, Michigan's electricity savings relative to sales in the commercial sector was the highest in the nation. In the industrial sector, Michigan's savings of 0.41% were the 13th-highest among the states, better than all Michigan's peer states except Wisconsin. When all three sectors are combined, Michigan ranked 2nd-best in the nation, behind only Oklahoma.

Figure 61: 2023 Energy Efficiency Savings as a Percentage of Electricity Sales in the Residential Sector (%)

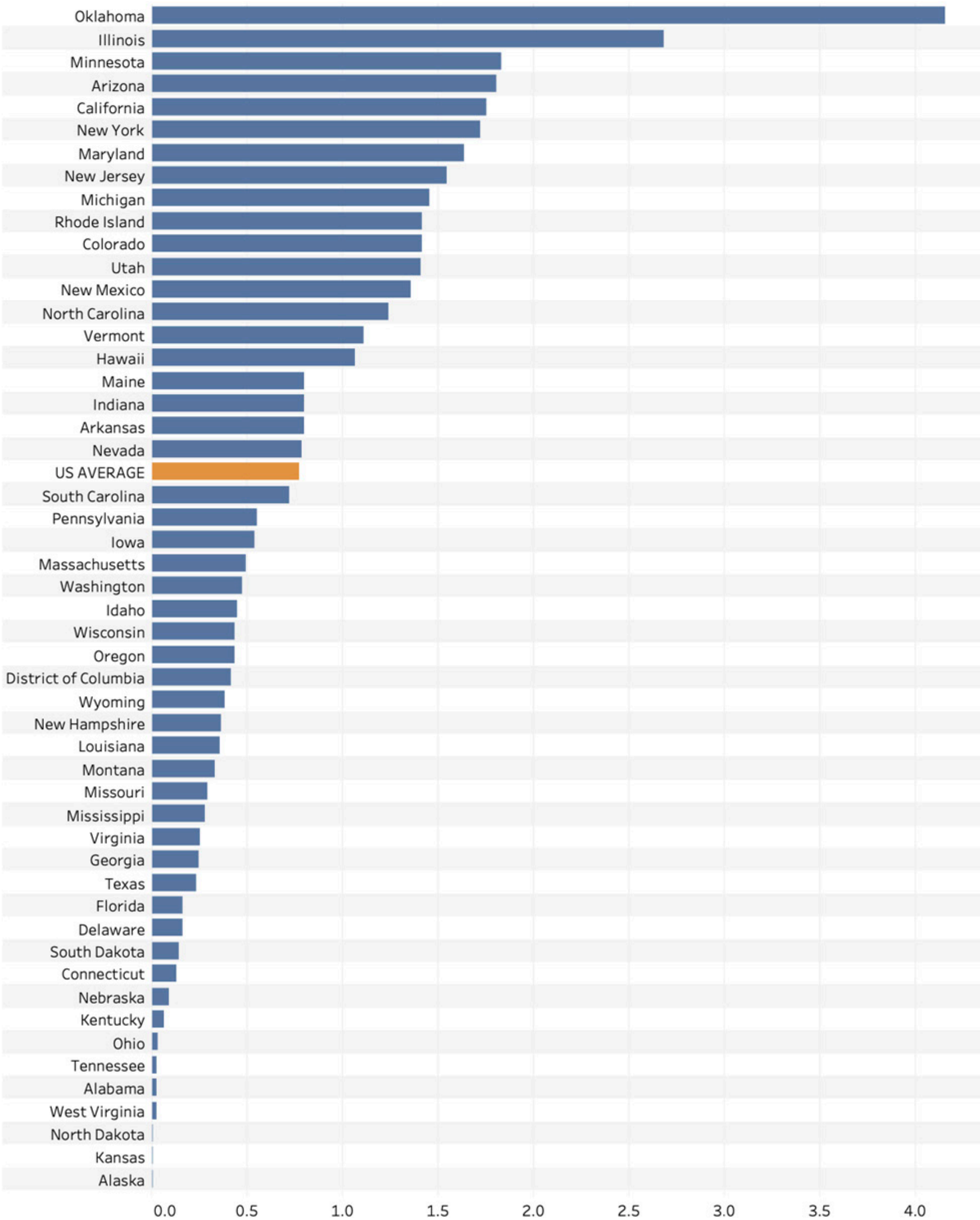


Figure 62: 2023 Energy Efficiency Savings as a Percentage of Electricity Sales in the Residential Sector

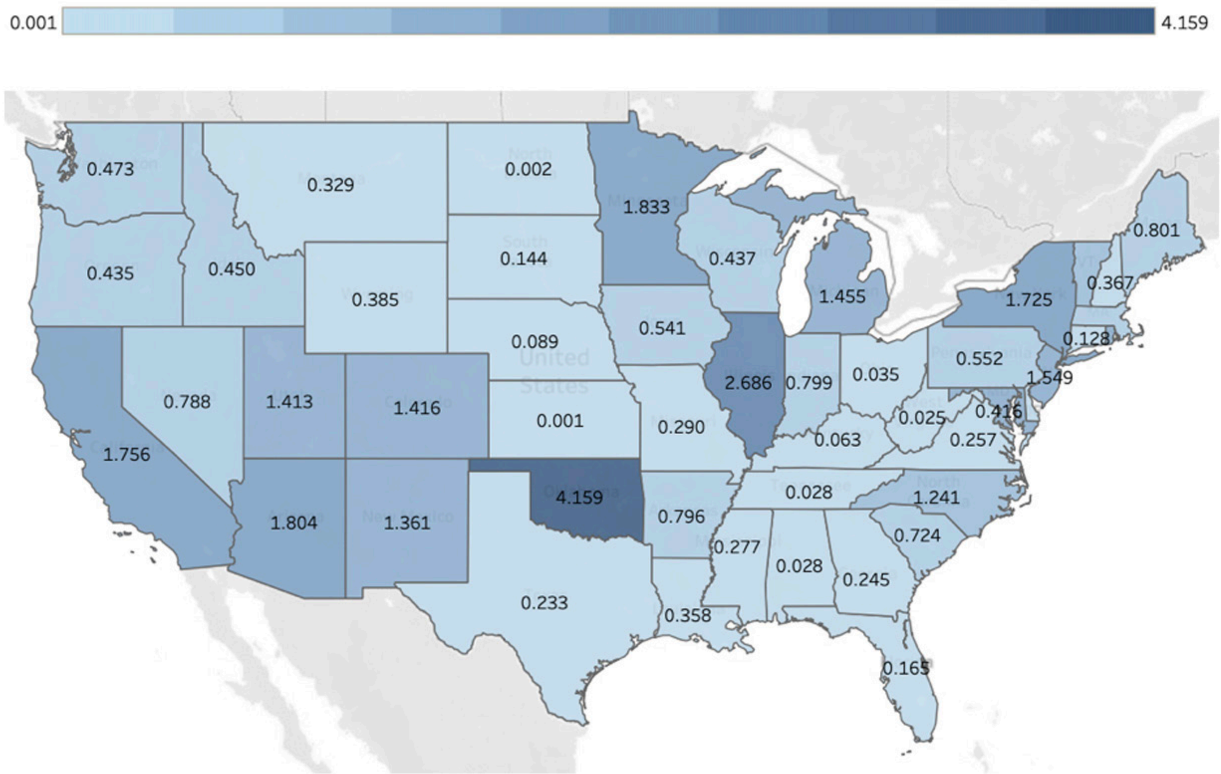


Figure 63: 2023 Energy Efficiency Savings as a Percentage of Electricity Sales in the Commercial Sector

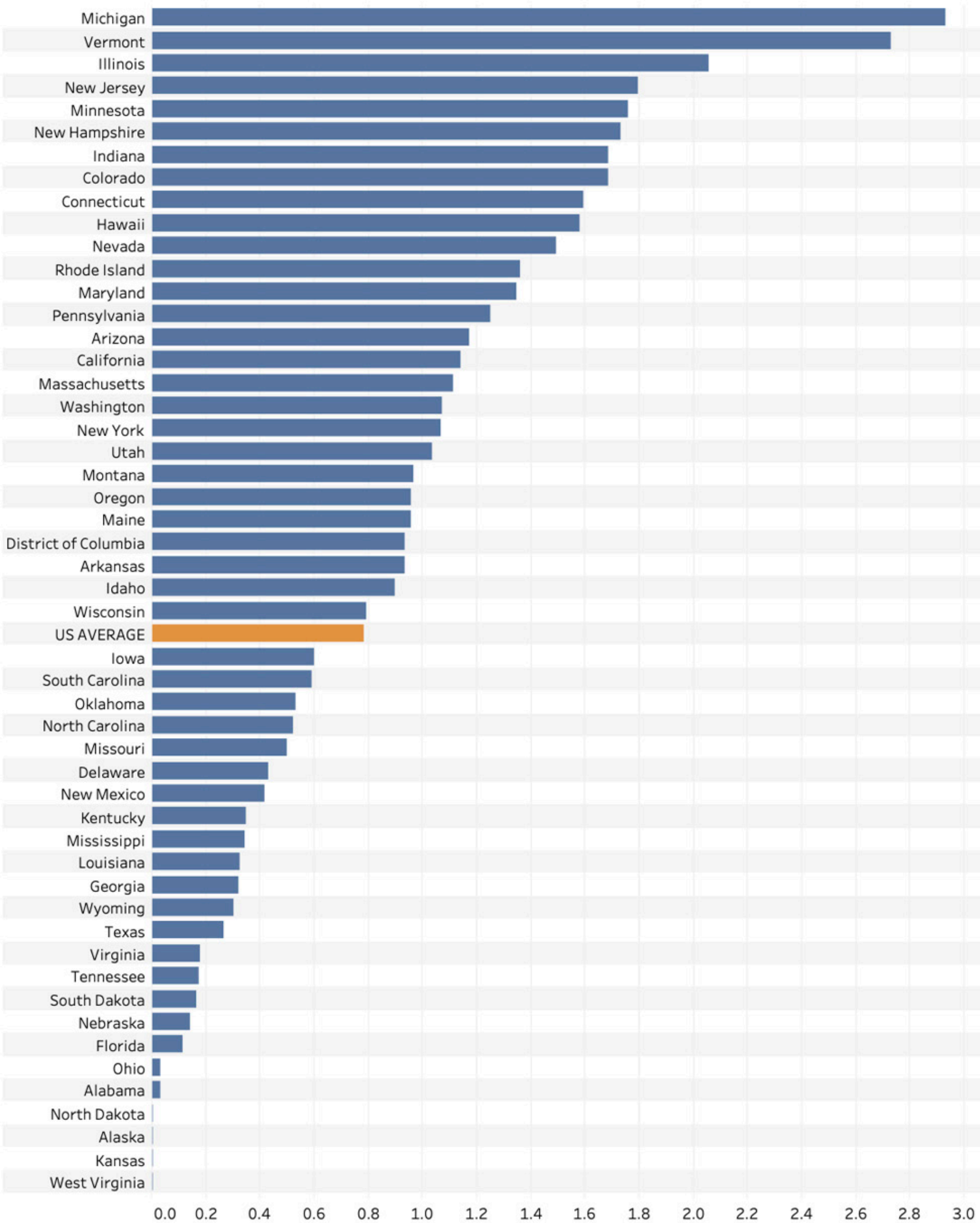


Figure 64: 2023 Energy Efficiency Savings as a Percentage of Electricity Sales in the Commercial Sector

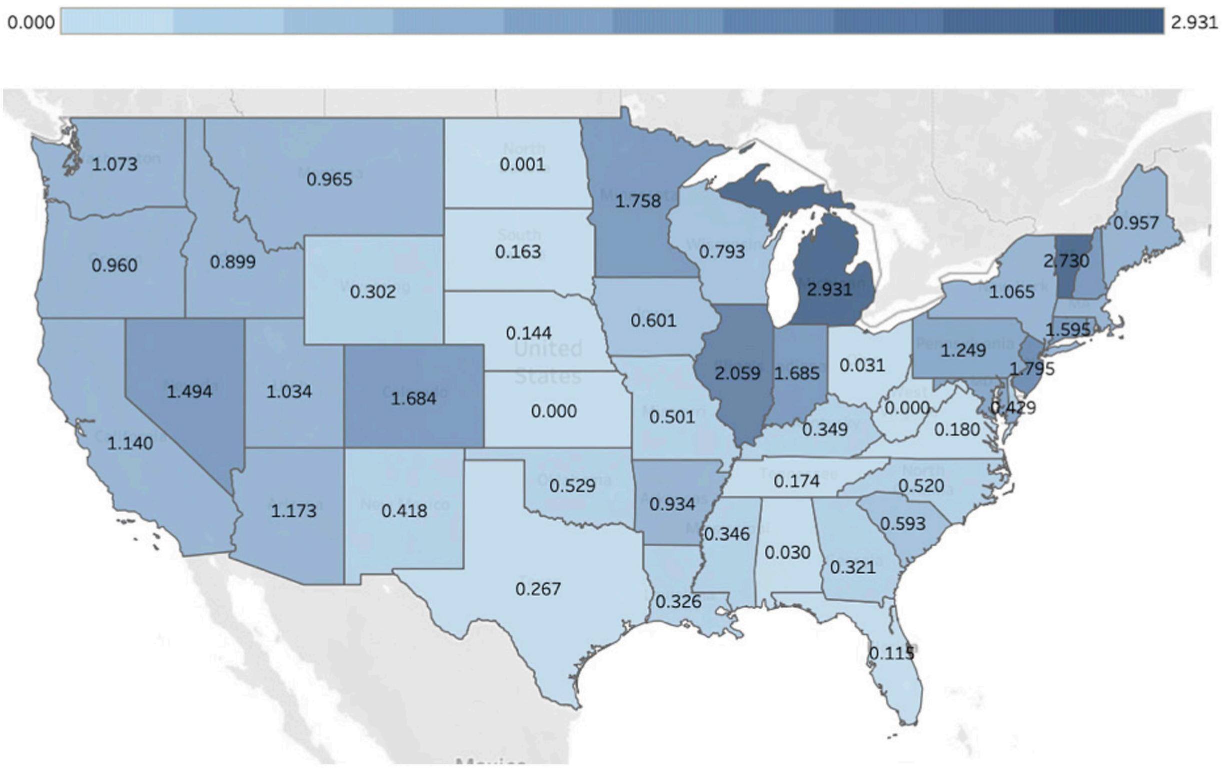


Figure 65: 2023 Energy Efficiency Savings as a Percentage of Electricity Sales in the Industrial Sector (%)

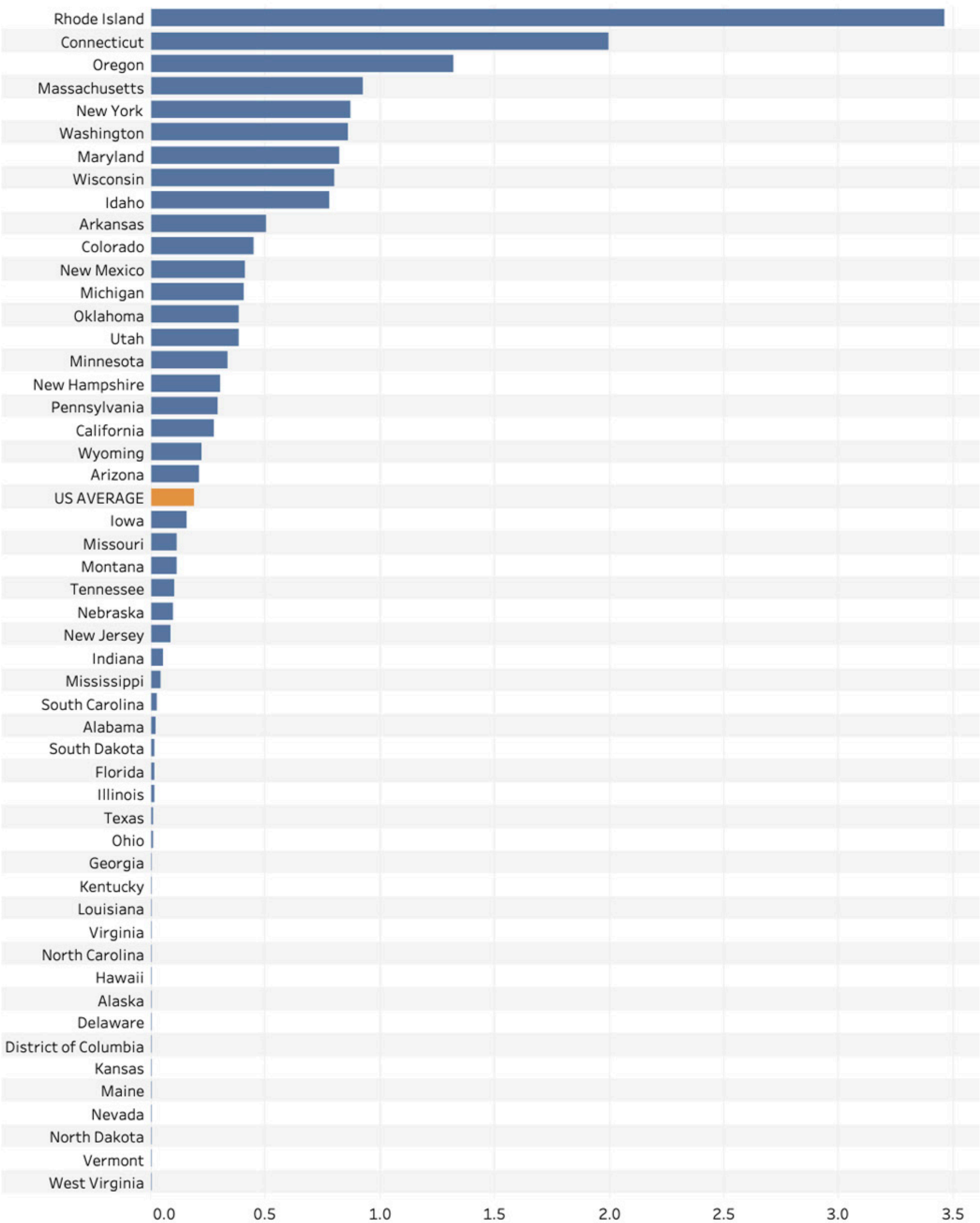
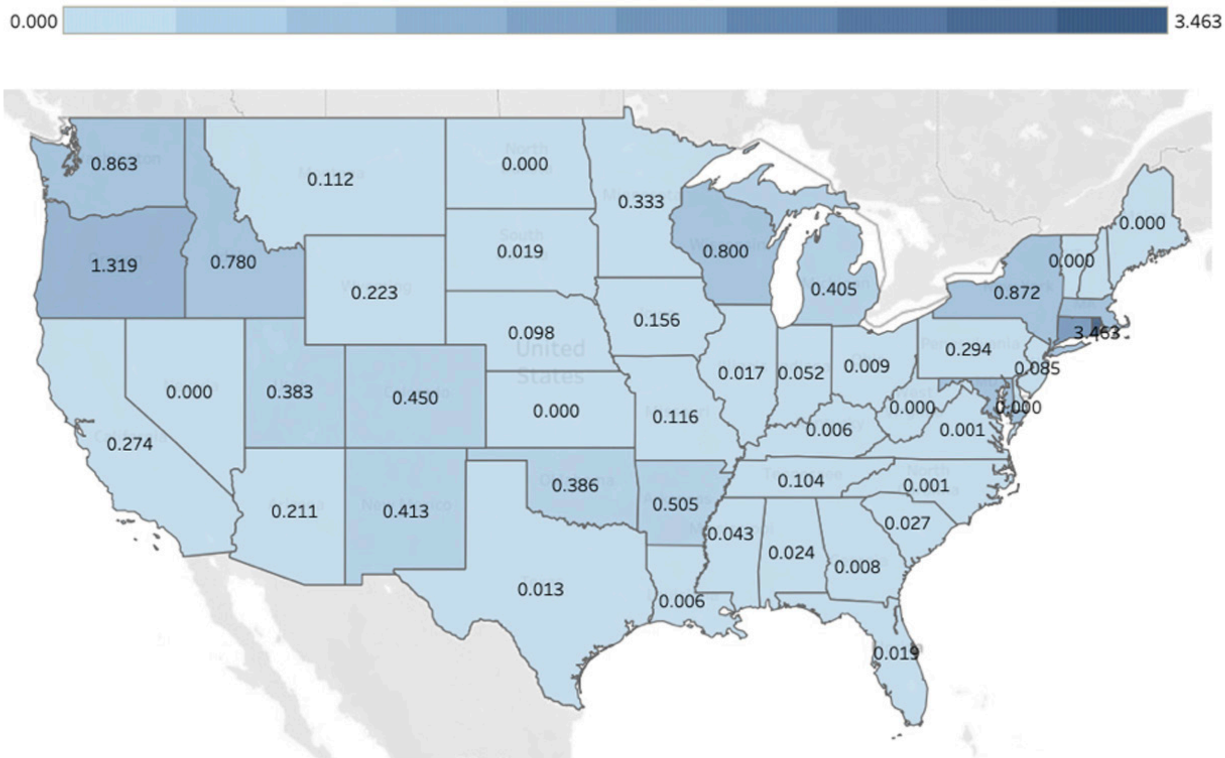


Figure 66: 2023 Energy Efficiency Savings as a Percentage of Electricity Sales in the Industrial Sector



ELECTRICITY GENERATION

Electricity is the most important form of energy in the contemporary era because of its diverse uses—it powers our electronics and lighting, cools and heats our homes and, increasingly, powers many of our vehicles. As economies transition away from fossil fuel use in buildings, transportation, and industry, and as artificial intelligence-driven demand for computing power grows, electric utilities will be expected to provide an ever larger and more reliable supply of electricity. Unfortunately, there are externalities from electricity generation that affect both our immediate health and our environment. Mitigating these externalities is crucial in preventing the worst effects of climate change.

Generation Overview

The data in this section come from the EIA's *Electricity Data Browser*. The figures in this section illustrate what proportions of electricity generation come from different sources (Figure 67 through Figure 76) Renewable sources include hydro, solar, wind, geothermal, and biomass, while clean generation includes hydro, solar, wind, geothermal, and nuclear.

In 2024, 12.2% of Michigan's electricity generation came from renewable sources, ranking 37th, or 15th-worst, but an increase from the 10.9% renewable generation in 2023. (Figure 69, Figure 70) While Michigan's substantial nuclear power industry allowed the state to generate 31.5% of its electricity from clean sources in 2024, slightly less than the 2023 figure, Michigan still ranks 36th in the country on this metric. (Figure 71, Figure 72) In 2021, Michigan ranked 27th with clean sources constituting 37.8% of total generation, very close to the national average. The drop in Michigan's clean electricity generation occurred in large part due to the May 20, 2022 closure of the 800 MW Palisades nuclear plant, one of four nuclear reactors in the state. However, the Nuclear Regulatory Commission (NRC) is preparing to oversee a first-of-a-kind effort to restart Palisades under a power purchase agreement with Wolverine Power Cooperative signed in September 2023. In September 2024, Holtec International *secured a $1.52 billion loan* from the DOE's Loan Programs Office (LPO) to support these efforts. According to *recent news*, Holtec is seeking approval from the NRC to resume operations at Palisades as early as late August 2025. Additionally, Holtec intends to *seek permits* for as much as 600 MW in new capacity from small modular reactors (SMRs) by 2030.

In 2024, Michigan's largest source of electricity generation was natural gas (44.5%), followed by nuclear (20.9%) and coal (20.5%). (Figure 67, Figure 68) While 2023 saw a marked shift away from coal to natural gas compared to 2022, the composition of electricity generation in Michigan changed little from 2023 to 2024, despite 2023 legislation requiring utilities to meet a 50% renewable energy standard by 2030. The shift away from coal between 2022 and 2023 is attributable to several coal plant retirements that occurred in late 2022 and in 2023: Consumers Energy retired two coal-fired generating units at the Karn Generating Plant, while DTE retired the Trenton Channel plant and several of the coal-fired units at its St. Clair plant. These retirements came after DTE's 2021 retirement of the River Rouge plant. DTE replaced these coal-fired units with the 1,150-megawatt natural gas-powered Blue Water Energy Center, which began operation in 2022.

Figure 67: 2024 Percentage of Electricity Generation by Generation Type (%)

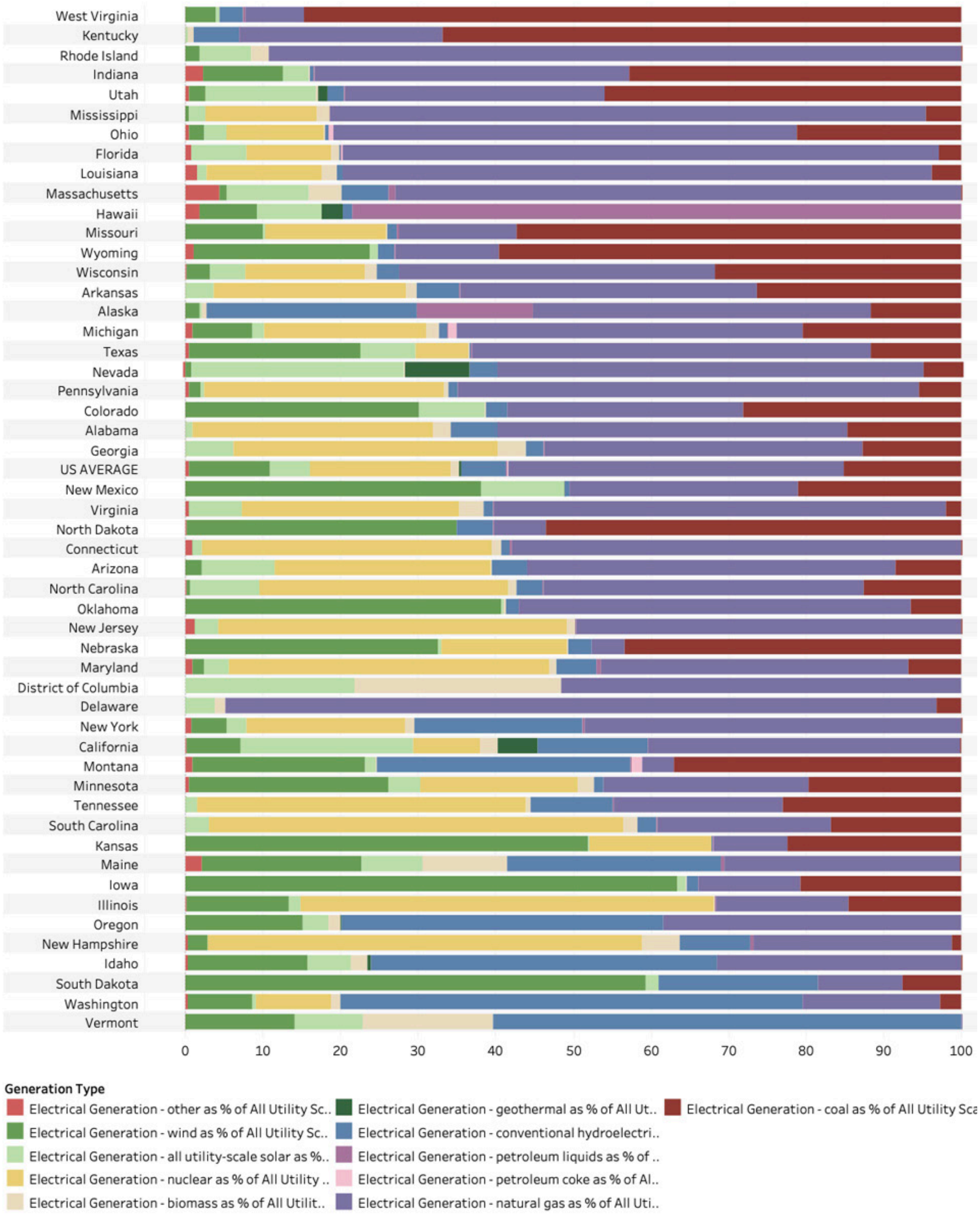


Figure 68: 2024 Dominant Generation Type by State

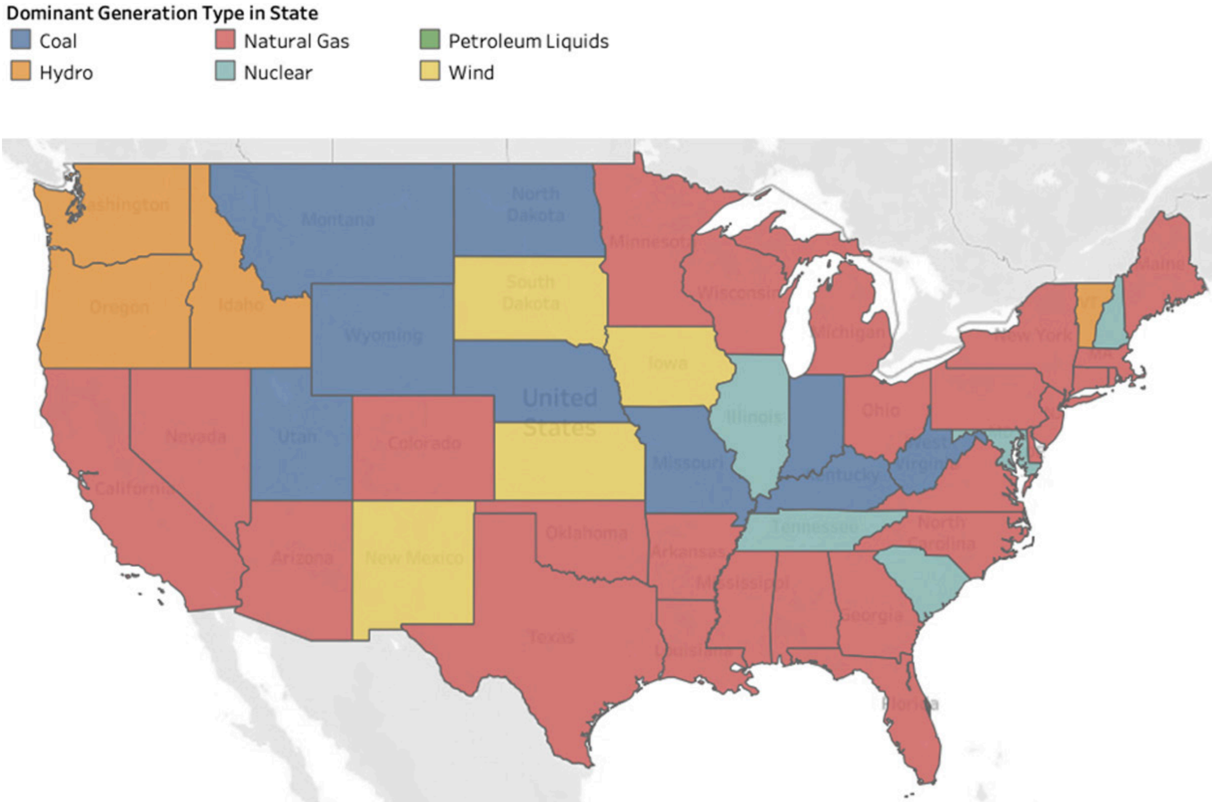


Figure 69: 2024 Renewable Generation as a Percentage of Total Generation (%)

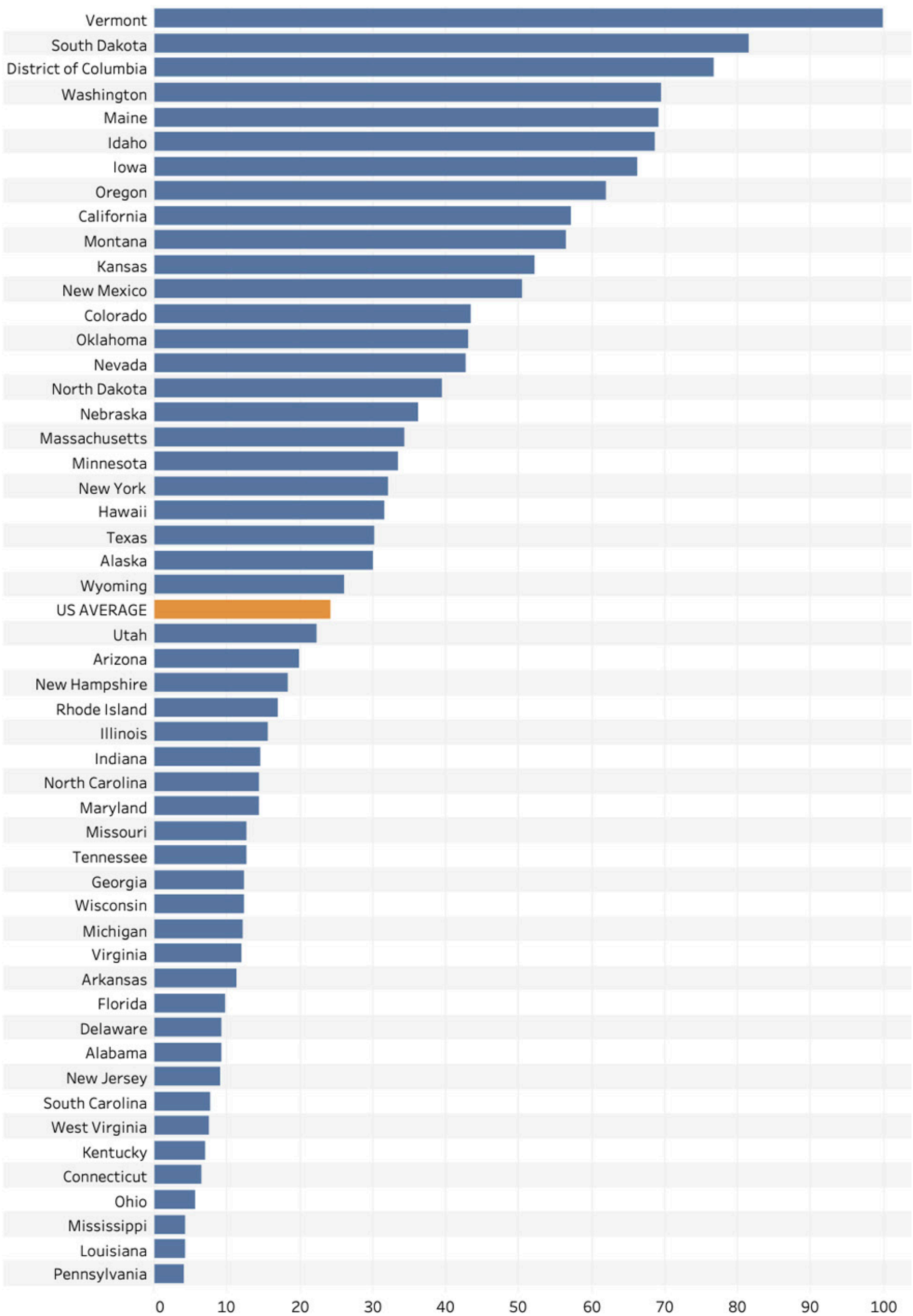


Figure 70: 2024 Renewable Generation as a Percentage of Total Generation

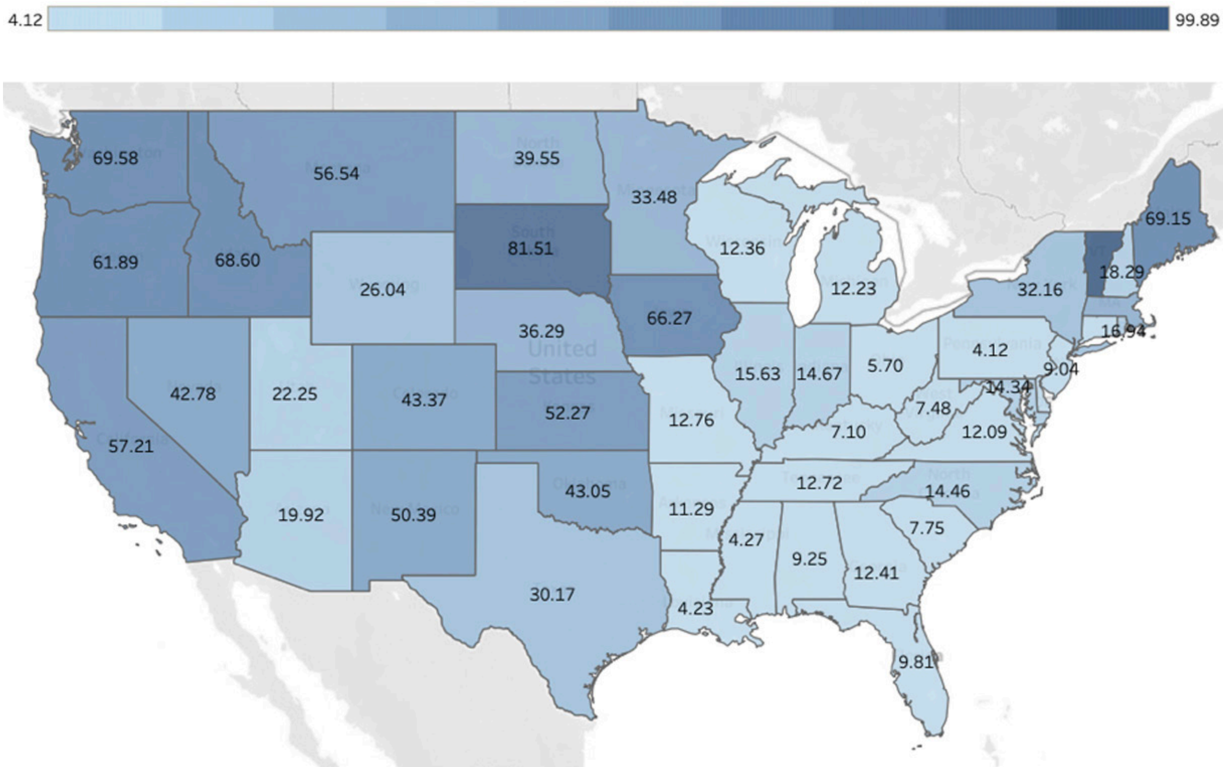


Figure 71: 2024 Clean Generation as a Percentage of Total Generation (%)

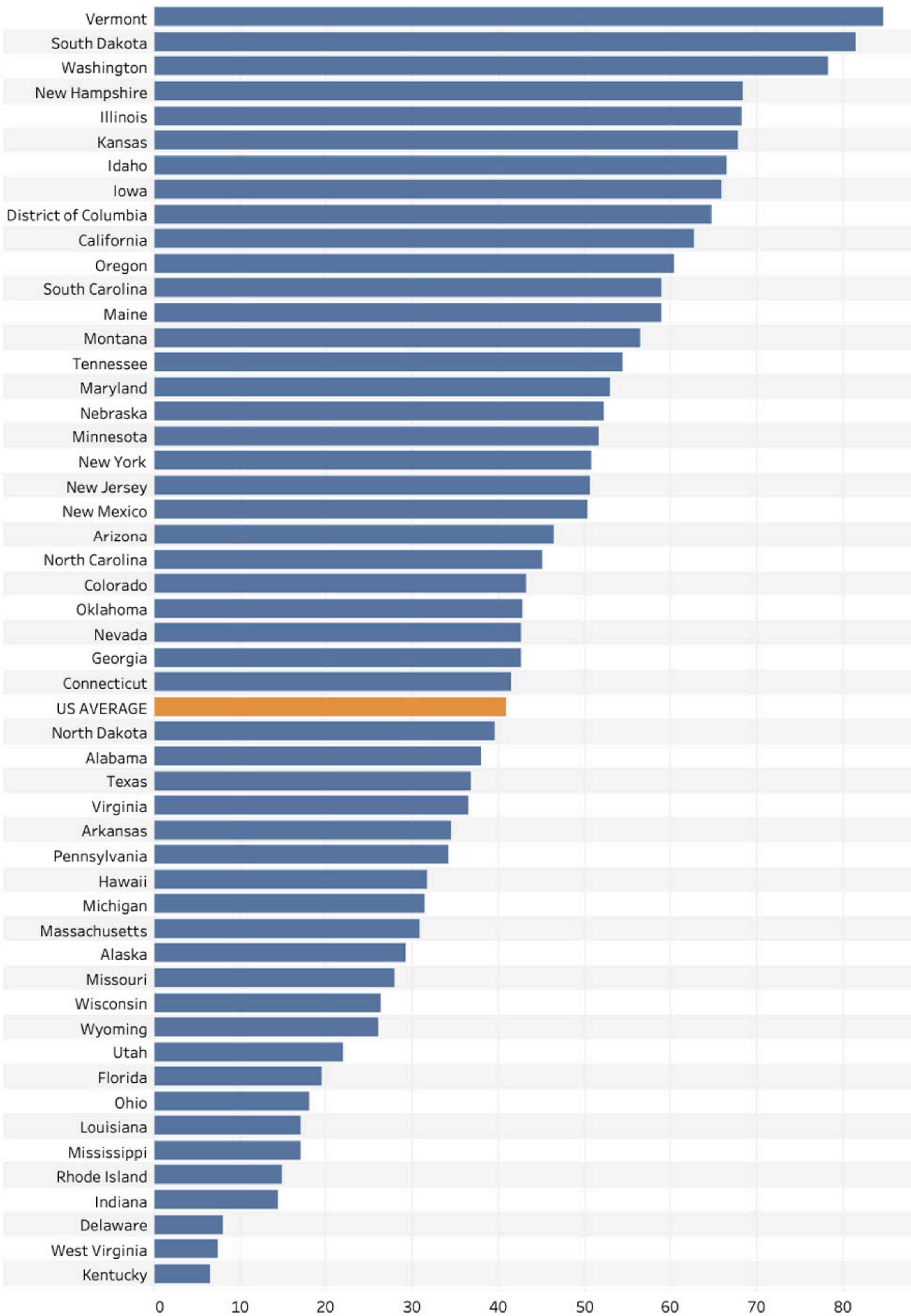


Figure 72: 2024 Clean Generation as a Percentage of Total Generation

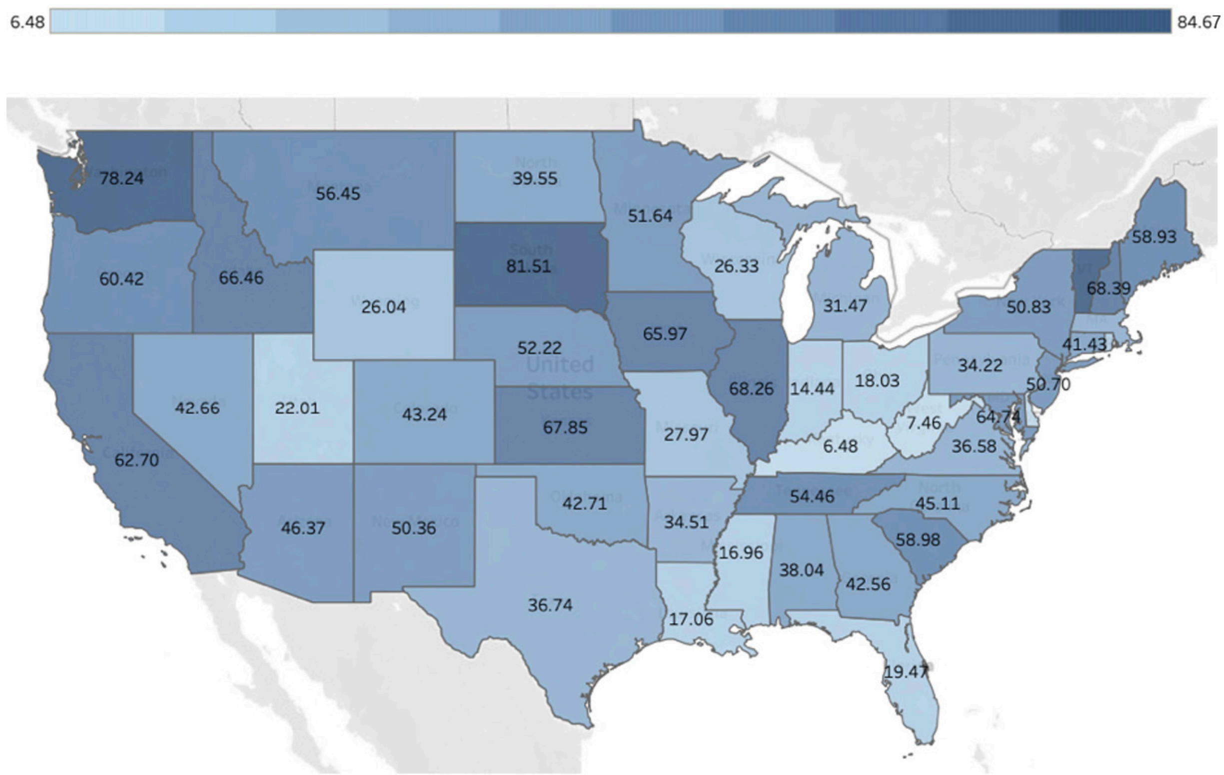


Figure 73: 2023 Renewable Generation as a Percentage of Sales (%)

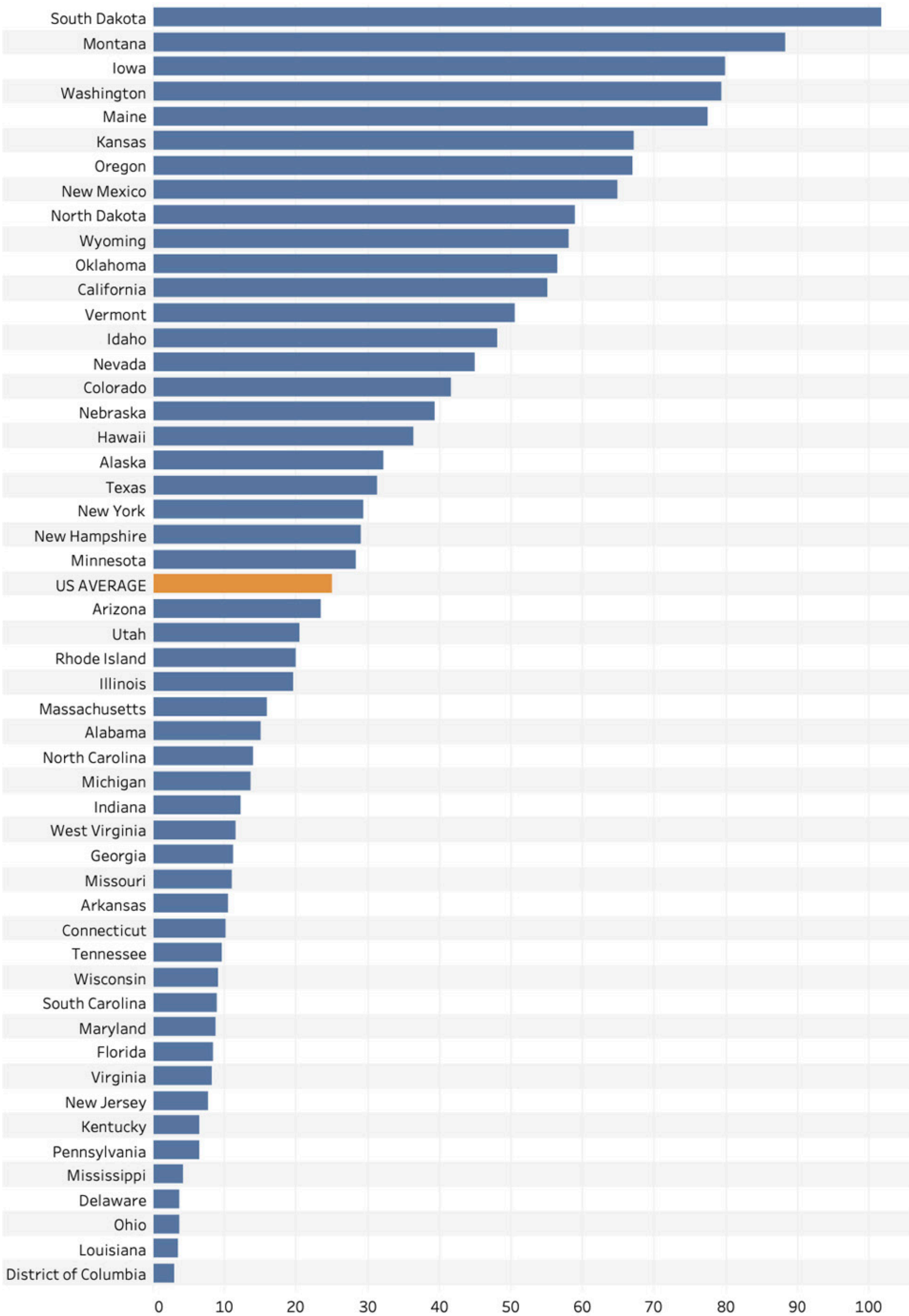


Figure 74: 2023 Renewable Generation as a Percentage of Sales (%)

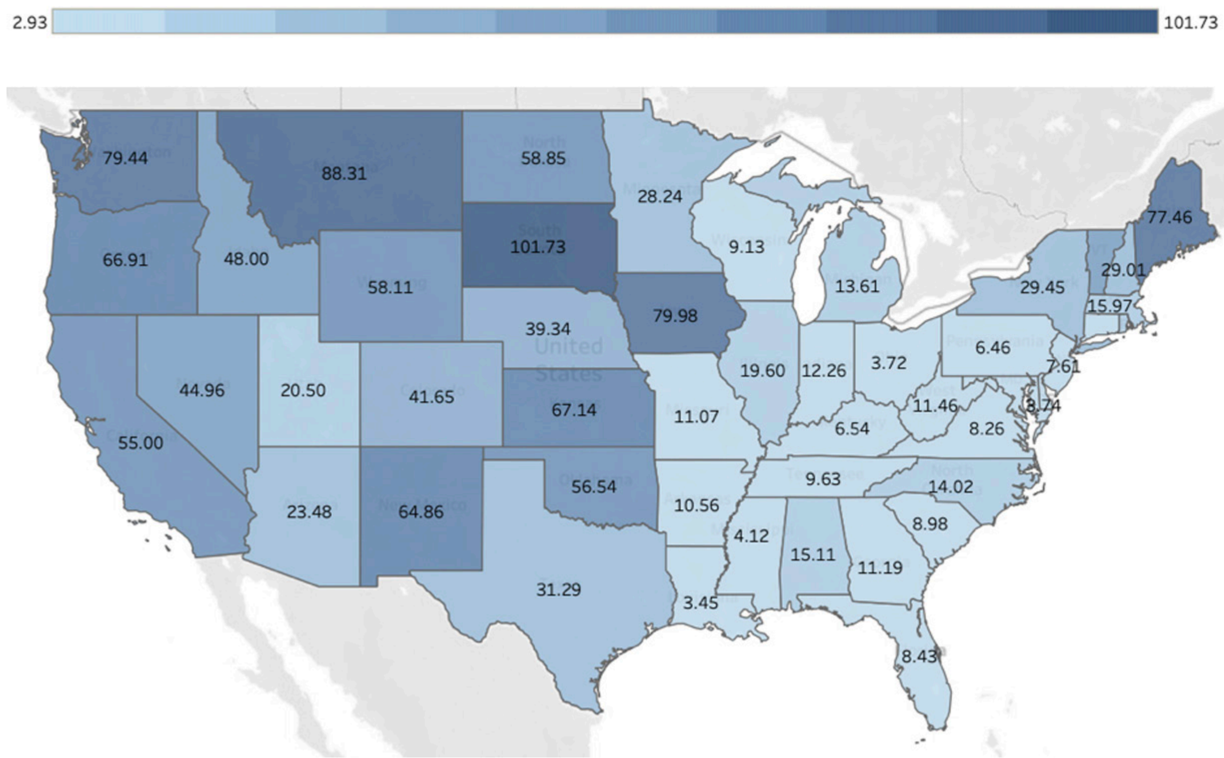


Figure 75: 2023 Clean Generation as a Percentage of Sales (%)

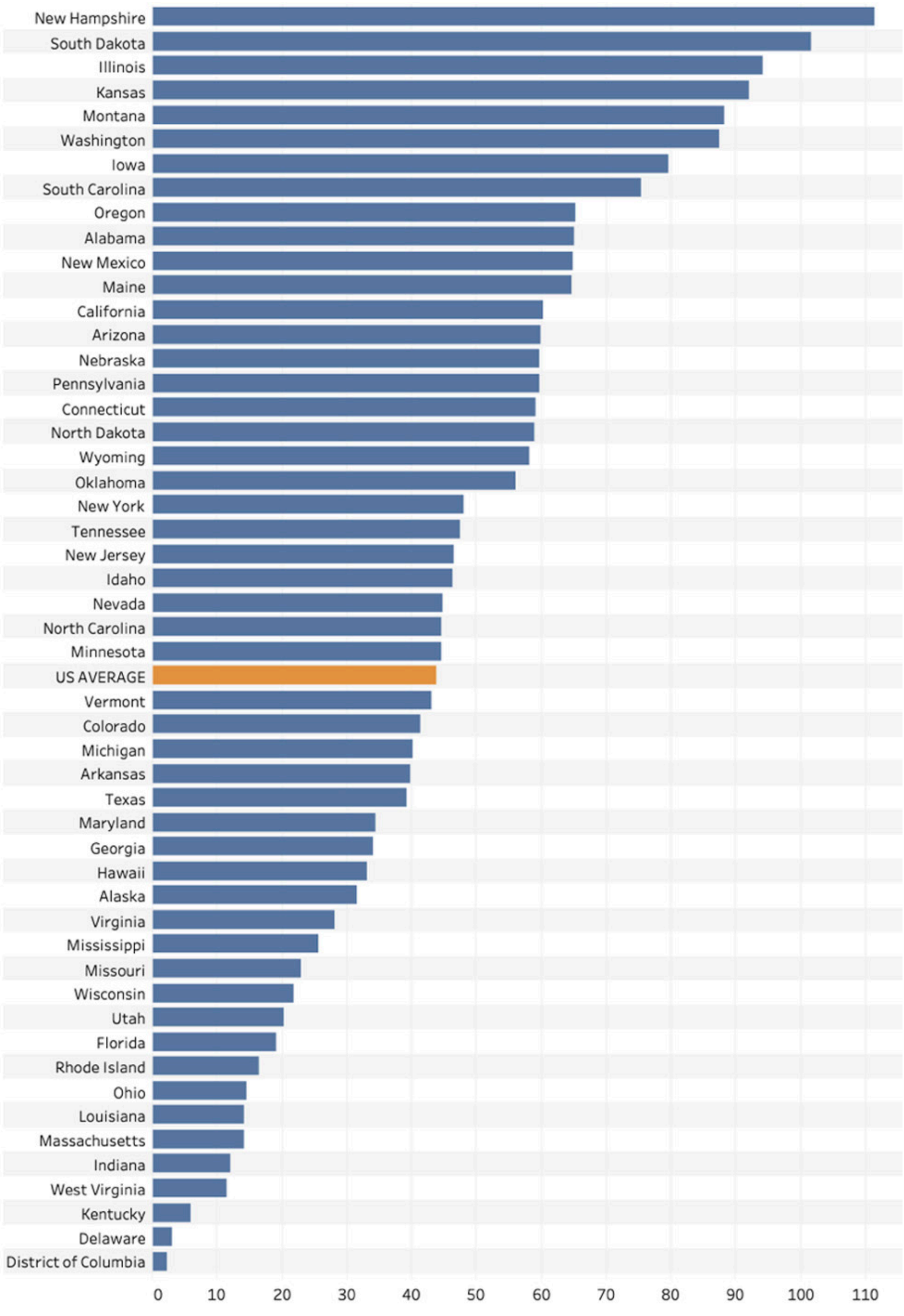
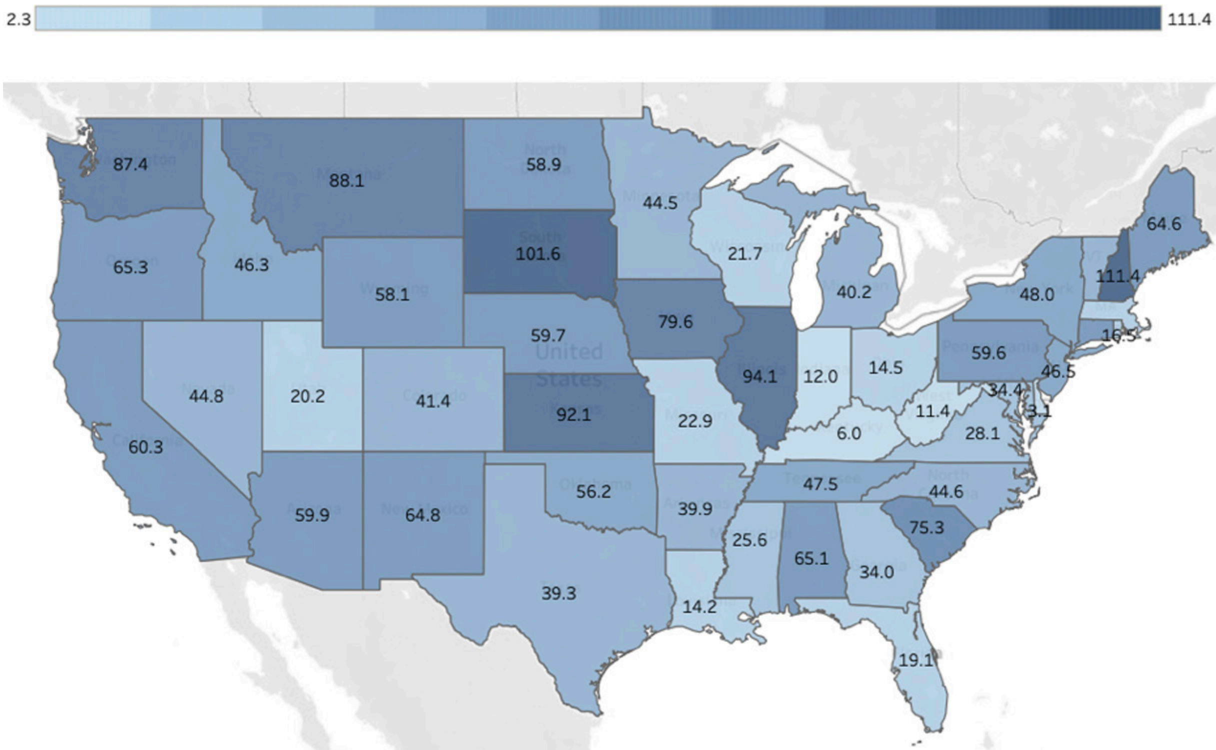


Figure 76: 2023 Clean Generation as a Percentage of Sales (%)



Emissions

Power plants emit many different pollutants, but the largest quantities and arguably the most severe effects are from:

- carbon dioxide (CO_2), the principal gas causing climate change and which has deleterious effects on cognitive function
- sulfur dioxide (SO_2), which causes asthma attacks, cardiopulmonary diseases, acid rain and is a chemical precursor to formation of small particles that when breathed cause several respiratory and other problems, miscarriages and birth defects
- nitrogen oxides (NO_x), which cause respiratory problems including wheezing, asthma and other breathing difficulties and is a chemical precursor to formation of small particles and ozone in the air that also cause numerous health problems

Electric utilities report emissions of key pollutants from each power plant to the EPA, which compiles this information and makes it available to the EIA. 2023 is the most recent complete compilation currently available and can be obtained *here*. Effects on the environment and human health can be 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. So, for example, while Texas's electricity sector produces the most emissions of all pollutants by a wide margin, its emissions intensity for all pollutants is close to the median.

Carbon Dioxide

Michigan ranked 32nd, or 20th-worst, among the states in 2023 for CO_2 emissions intensity (measured in kg of CO_2 per MWh of electricity generated). (Figure 78, Figure 79) This places it near the median of its six-state peer group, with only Illinois and Minnesota performing better. Michigan's 2023 emissions of 415 kg of CO_2 per MWh is a significant decrease from 498 kg per MWh in 2022, and the state's ranking improved by four spots nationally. Michigan's carbon dioxide emissions intensity has fallen fairly steadily since 2013, when it emitted 637 kg of CO_2 for every MWh of generation.

While Michigan's emissions intensity is slightly higher than the U.S. average, its total CO_2 emissions of 50.0 million metric tons ranked 45th, or 7th-worst among the states in 2023. (Figure 77) This is a slight improvement from 2022, when its emissions of 58.5 million metric tons earned it a rank of 46th, or 6th-worst.

Figure 77: 2023 Total CO_2 Emissions (thousands of metric tons)

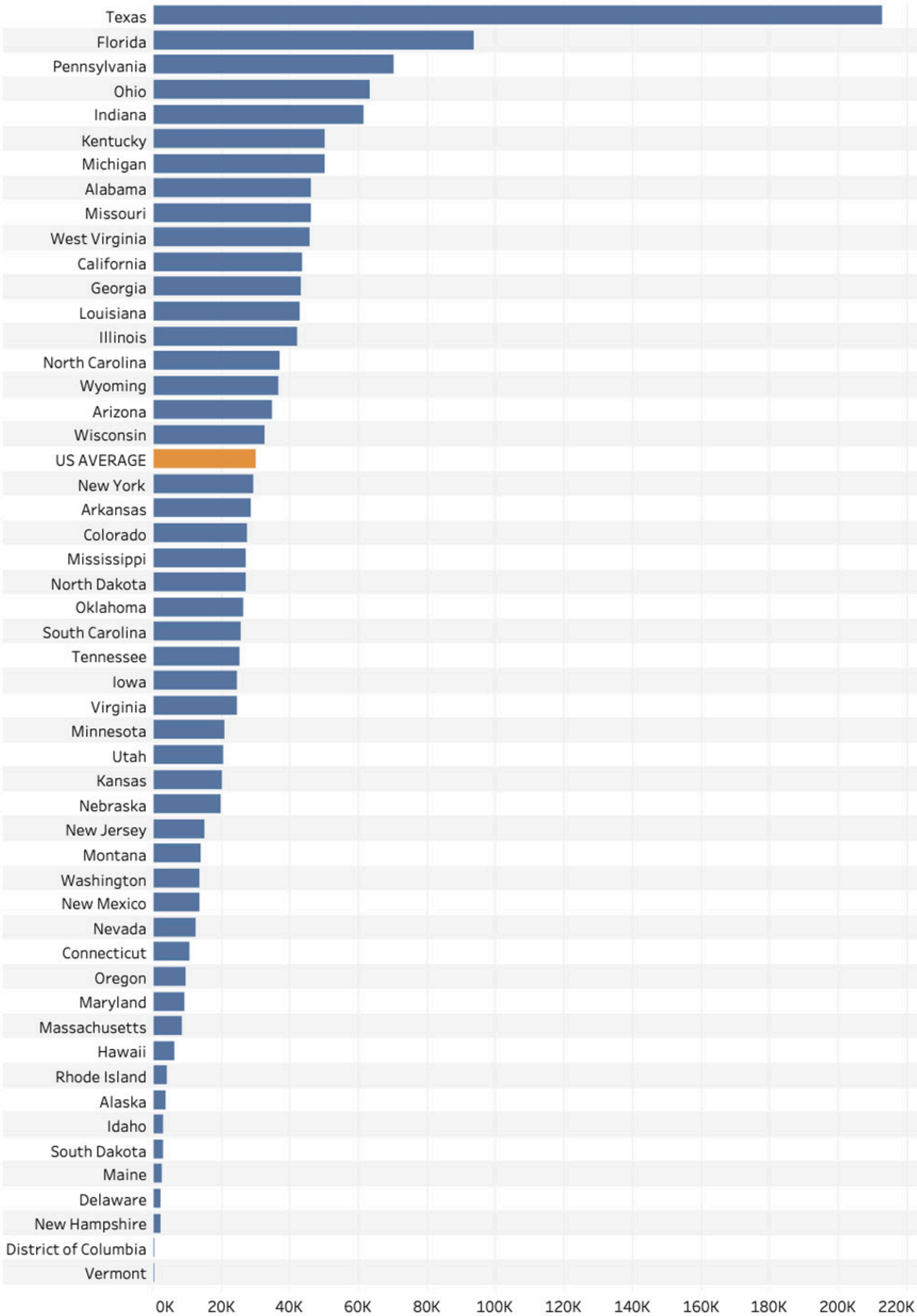


Figure 78: 2023 CO2 Emissions Intensity (kg per MWh)

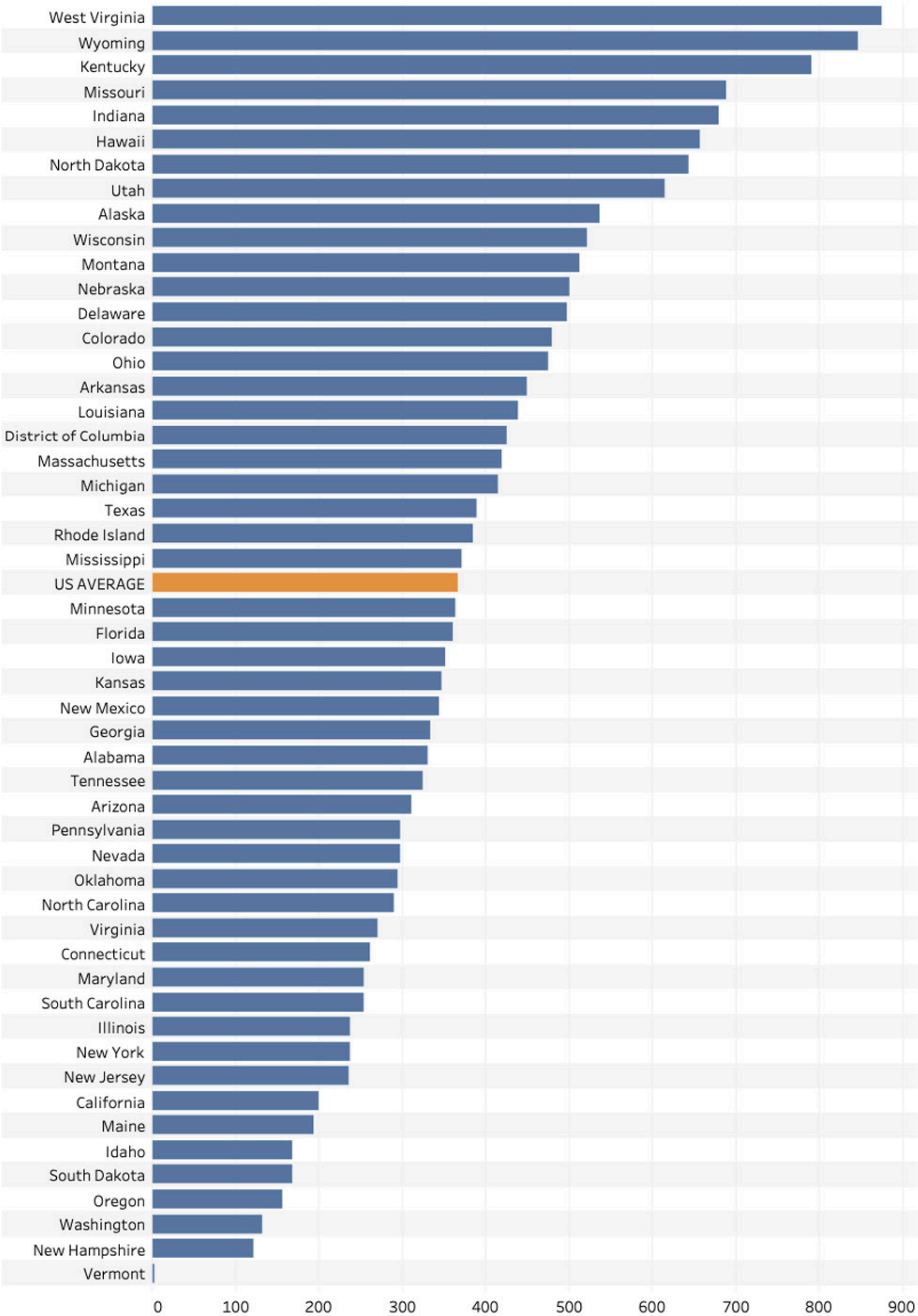
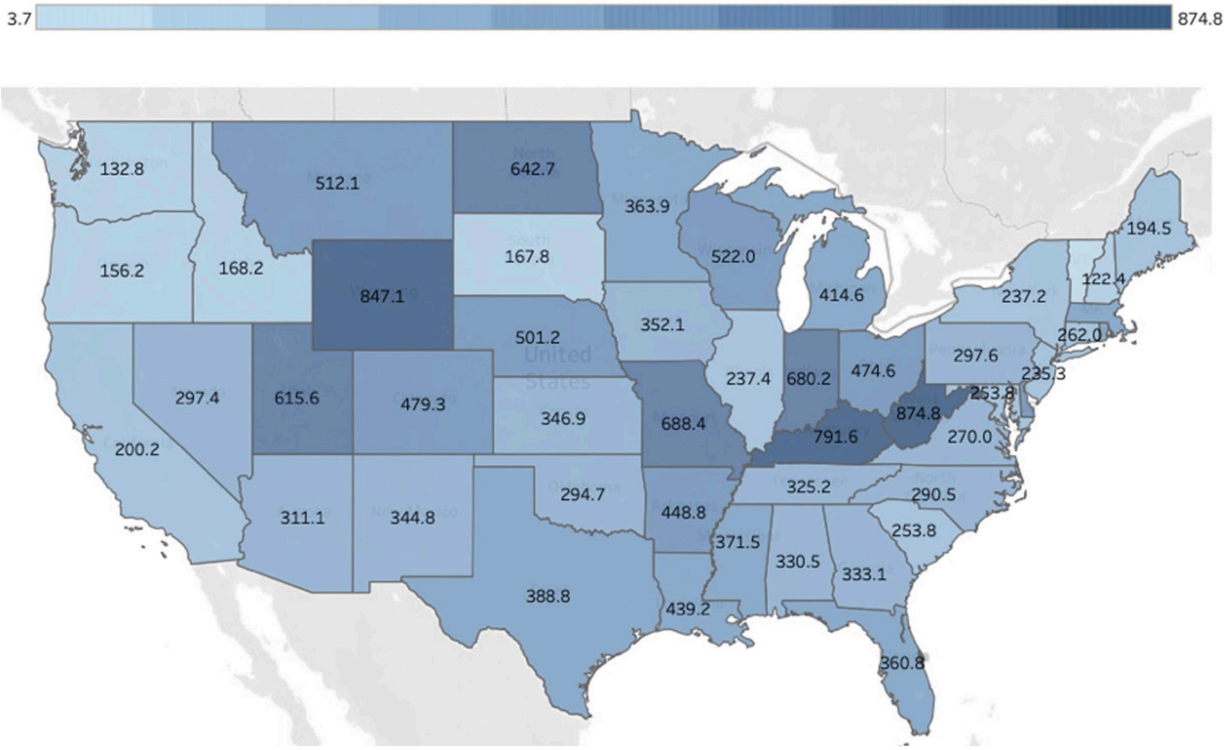


Figure 79: 2023 CO_2 Emissions Intensity (kg per MWh)



Sulfur Dioxide

Michigan ranked 38th, or 14th-worst, among the states in SO_2 pollution per MWh in 2023, with 259 g emitted for every MWh generated. (Figure 81, Figure 82) This sharp drop from the 2022 value of 415 g/MWh is likely attributable to the same shift away from coal power described in the previous section, and among peer states, only Ohio performed worse. Michigan's SO_2 emissions intensity has significantly and steadily declined since 2011, when the rate was 2,150 g per MWh.

All the same, Michigan's 2023 SO_2 emissions of 31,307 metric tons ranked 42nd, or 10th-worst, among the states, with only Ohio emitting more SO_2 among peer states. (Figure 80) In 2022, Michigan was 5th-worst among the states for total SO_2 emissions and 10th-worst for SO_2 emissions intensity.

Figure 80: 2023 Total SO_2 Emissions (thousands of metric tons)

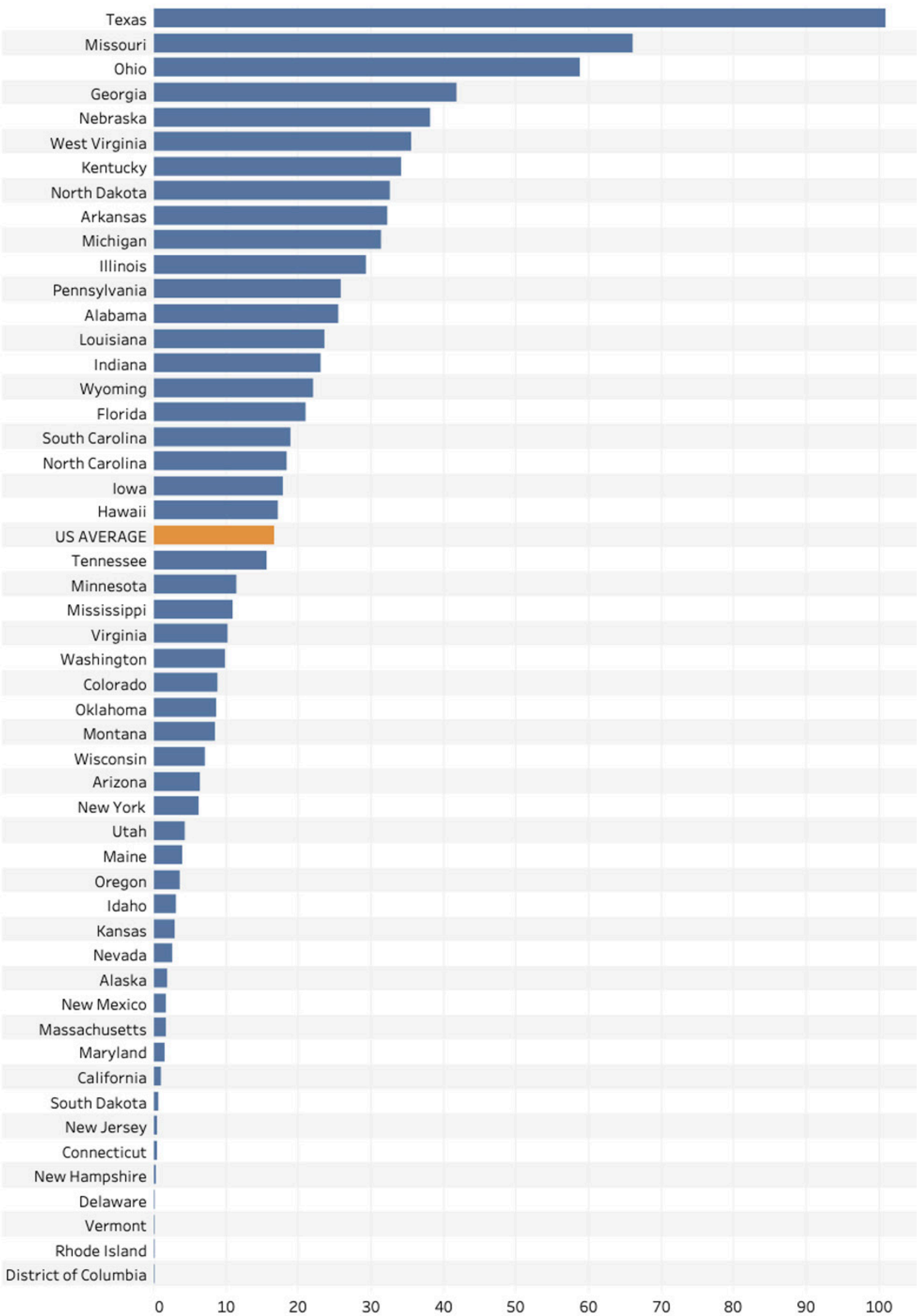


Figure 81: 2023 SO_2 Emissions Intensity (g per MWh)

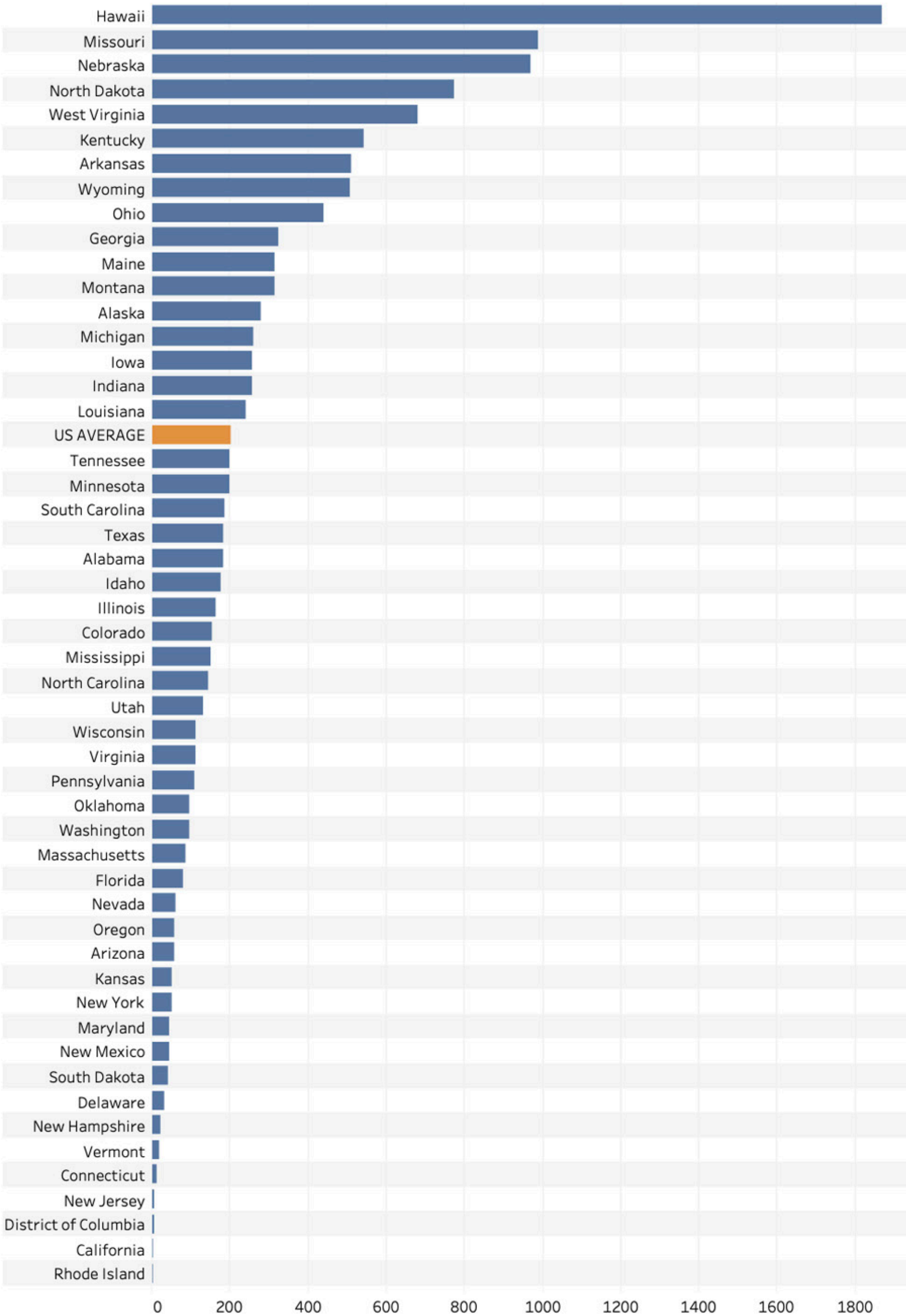
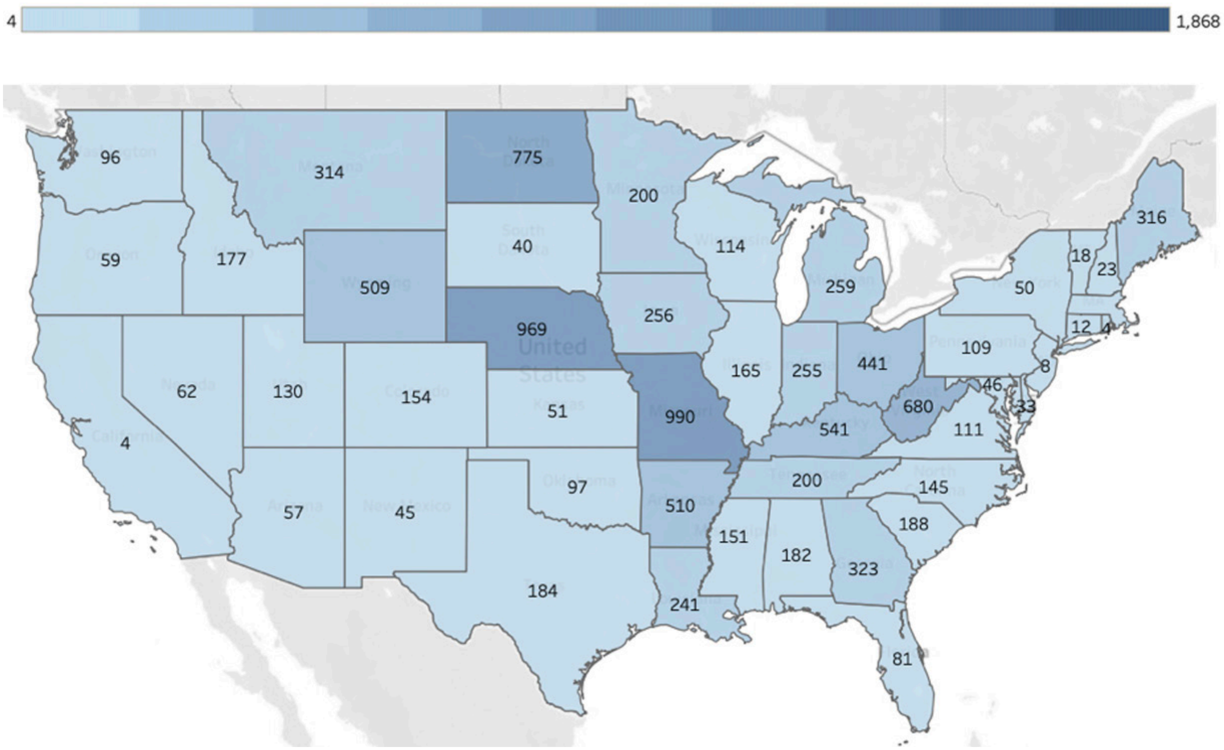


Figure 82: 2023 SO_2 Emissions Intensity (g per MWh)



Nitrogen Oxides

Michigan ranked 36th, or 16th-worst, among the states in NO_x emissions intensity in 2023 at 355 g per MWh generated, one rank better than in 2022, when the value was 415 g/MWh. (Figure 84, Figure 85) Michigan performed worse than all its peer states except for Indiana. In 2013, Michigan's NO_x intensity was 733 g/MWh.

Michigan utilities emitted 42,808 metric tons of NO_x in 2023, ranking 46th, or 6th-worst, the same ranking as in 2022, when the state emitted 48,801 metric tons. (Figure 83)

Figure 83: 2023 Total NO_x Emissions (thousand metric tons)

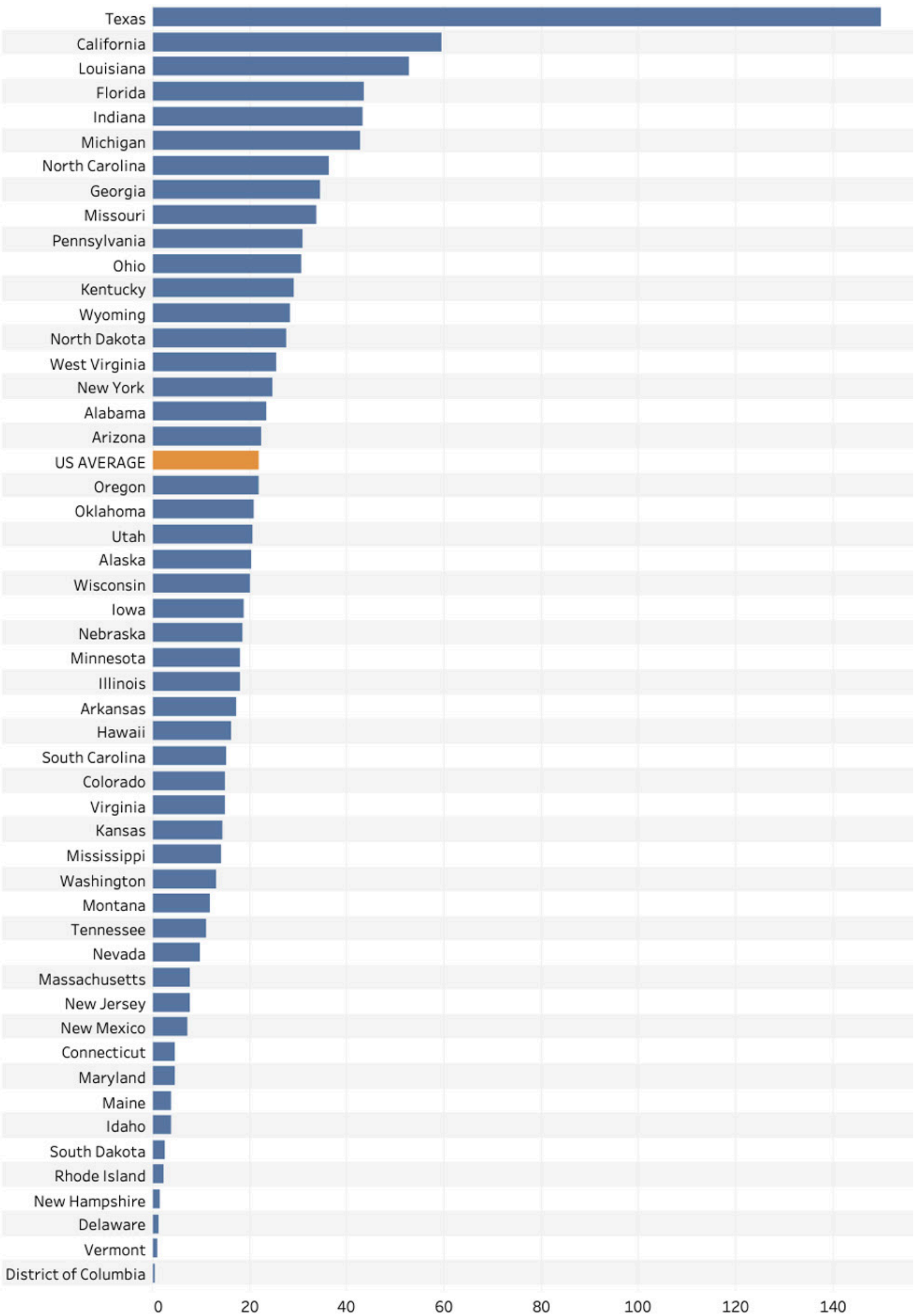


Figure 84: 2022 NO_x Emissions Intensity (g per MWh)

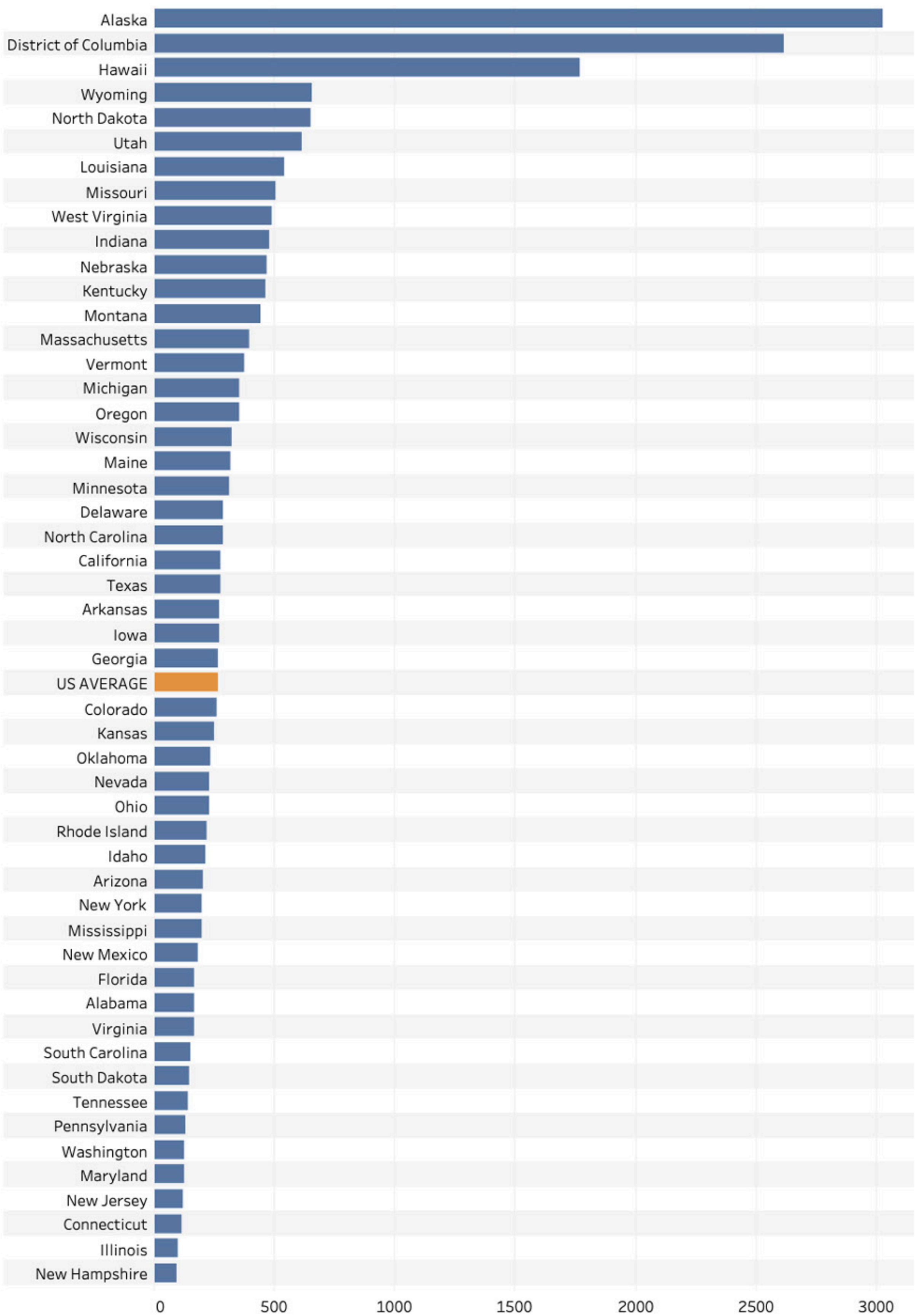
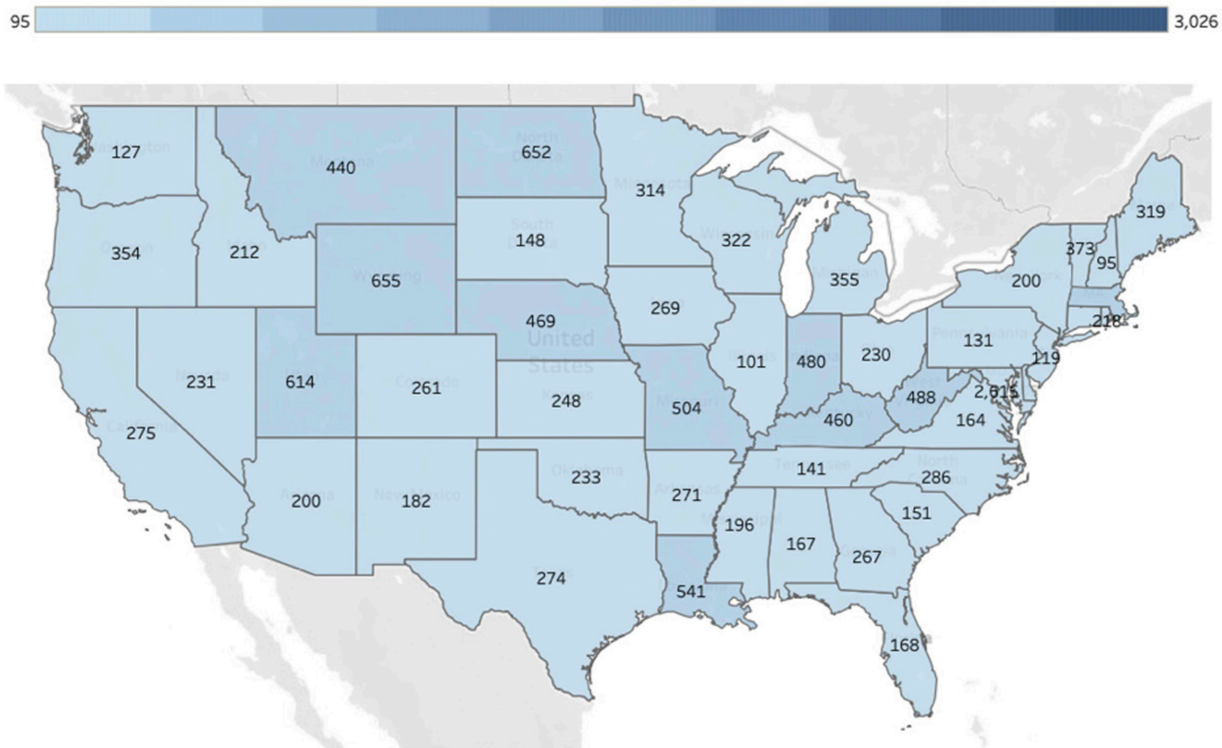


Figure 85: 2023 NO_x Emissions Intensity (g per MWh)



Water Consumption and Withdrawals from Power Generation

Water is used in large quantities by the electricity sector, both for cooling and the production of steam to turn turbines in thermoelectric plants. The EIA's Thermoelectric cooling water data contains generation and water withdrawal and consumption metrics for most of the generators and boilers at most of the plants around the country.

Many thermoelectric plants require more water to run than they consume. When power plants use water for cooling, the water passes through the plant and is rereleased in the form of uncontaminated, but warmed, water, which can be harmful to aquatic ecosystems. Some power plants are designed to recycle and recondense steam, thus minimizing their total withdrawals, but increasing the proportion of water that is lost to steam. Because, as with emissions, not all power plants use water with equal efficiency, water withdrawal and consumption intensity—gallons per megawatt-hour (MWh)—is a useful way of understanding the relative water efficiency of different states' electric sectors.

In 2023, Michigan had the 8th-highest water withdrawal intensity and the 4th-highest overall water consumption intensity in the nation for electricity production, withdrawing 66,906 gallons and consuming 23,233 gallons for each MWh generated. (Figure 86 through Figure 89) This is likely because, due to Michigan's location among the Great Lakes, there are larger numbers of large nuclear and coal plants using once-through cooling instead of cooling ponds or towers that recirculate water.

Figure 86 :2023 Weighted Average Water Withdrawal Intensity for Electricity Generation (gallons per MWh)

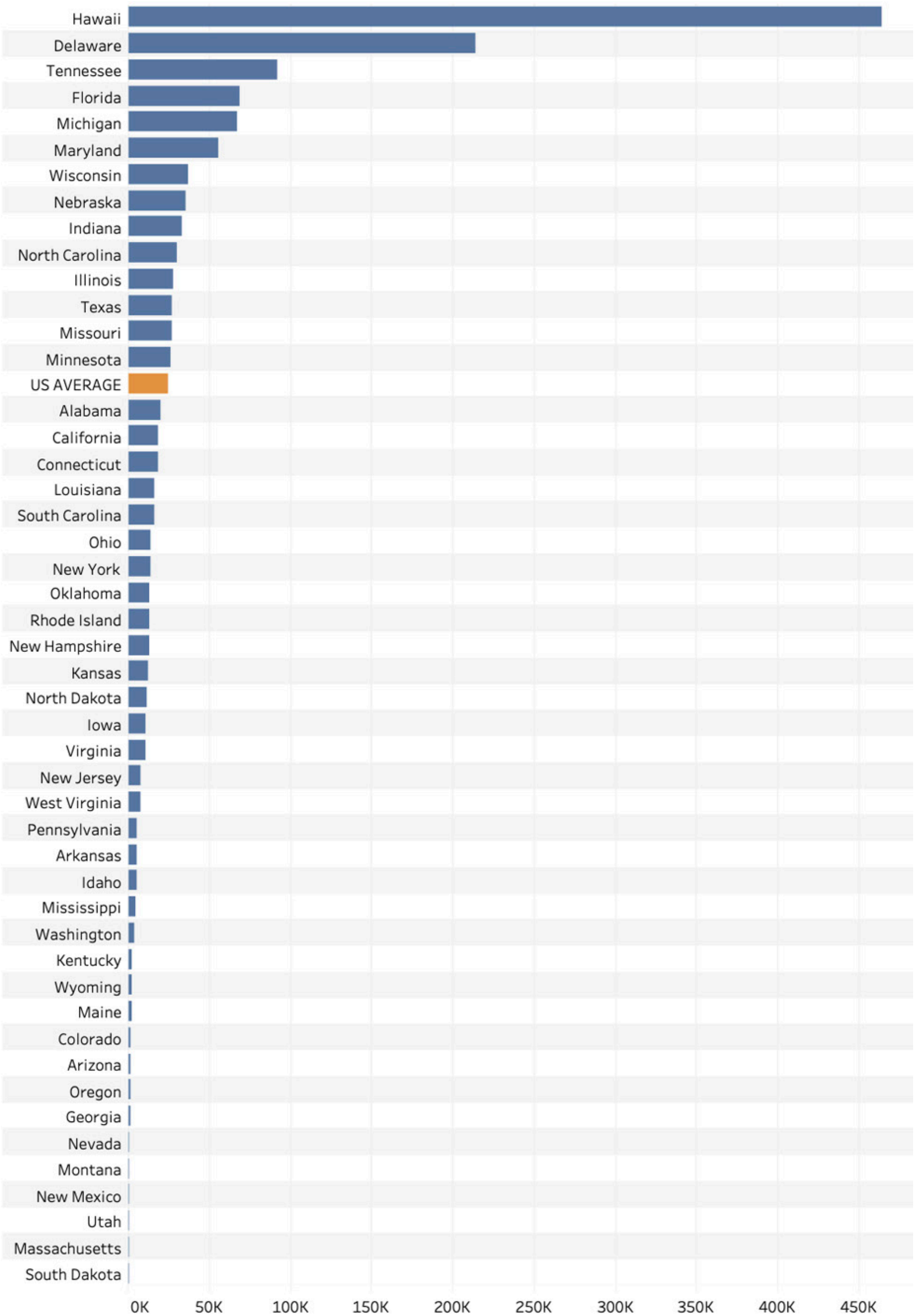


Figure 87: 2023 Weighted Average Water Withdrawal Intensity for Electricity Generation (gallons per MWh)

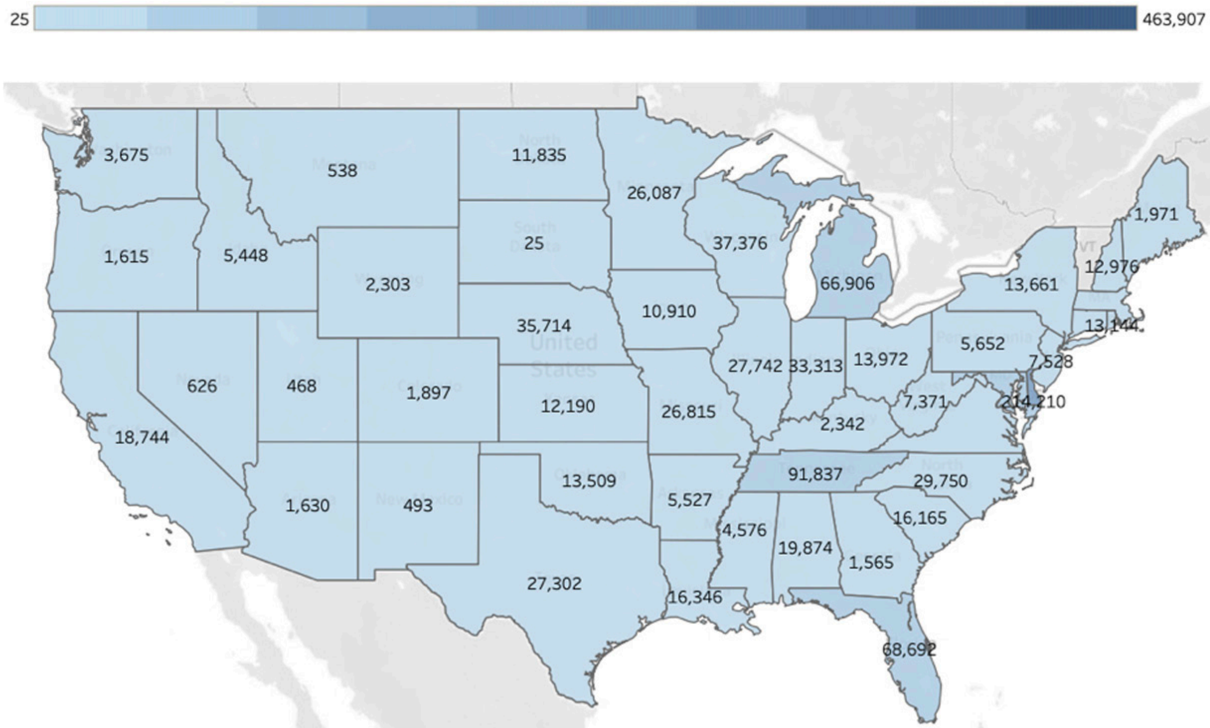


Figure 88: 2023 Weighted Average Water Consumption Intensity for Electricity Generation (gallons per MWh)

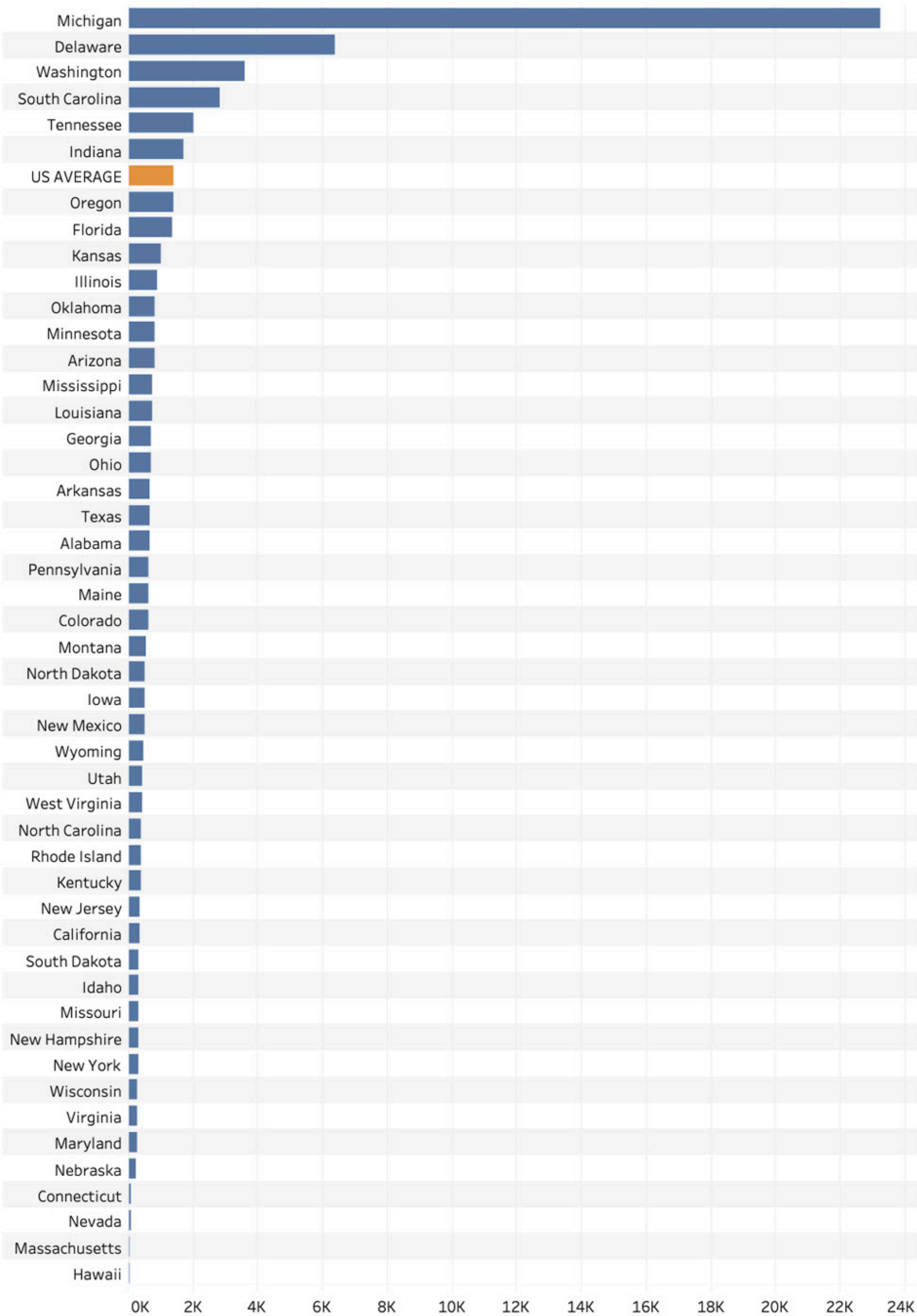
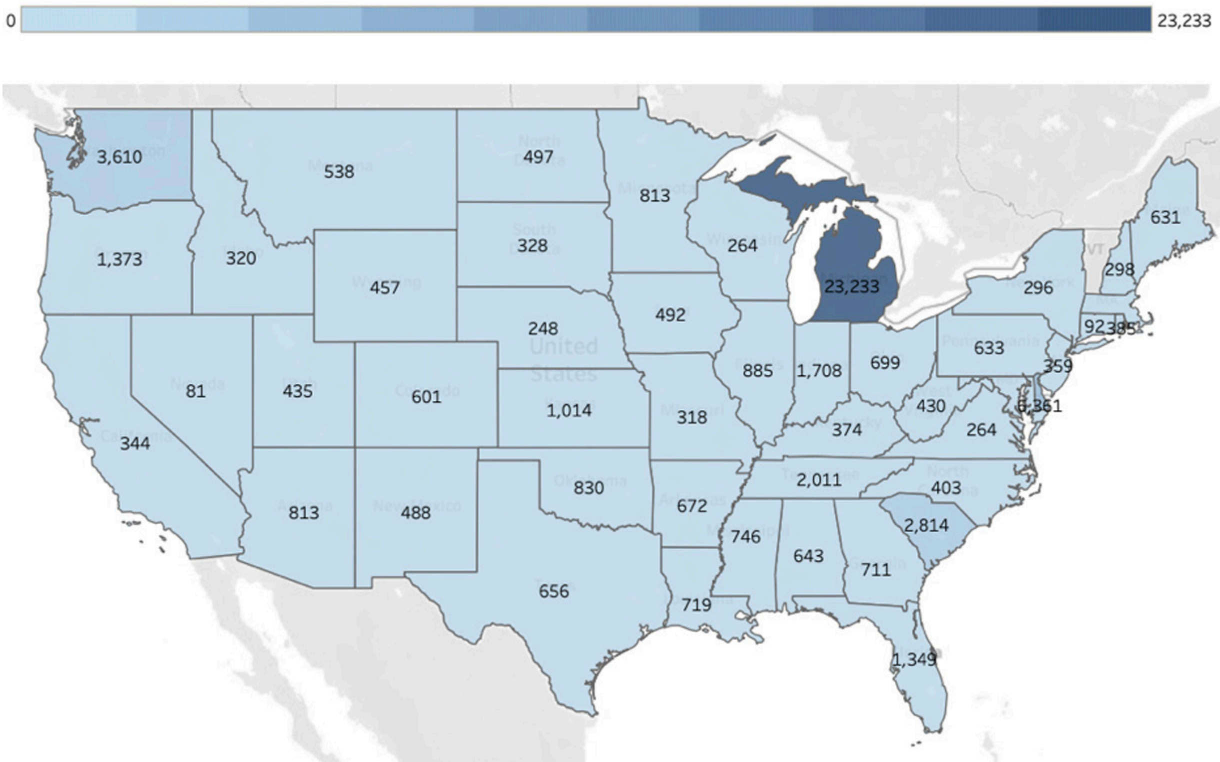


Figure 89: 2023 Weighted Average Water Consumption Intensity for Electricity Generation (gallons per MWh)



Natural Gas Emissions

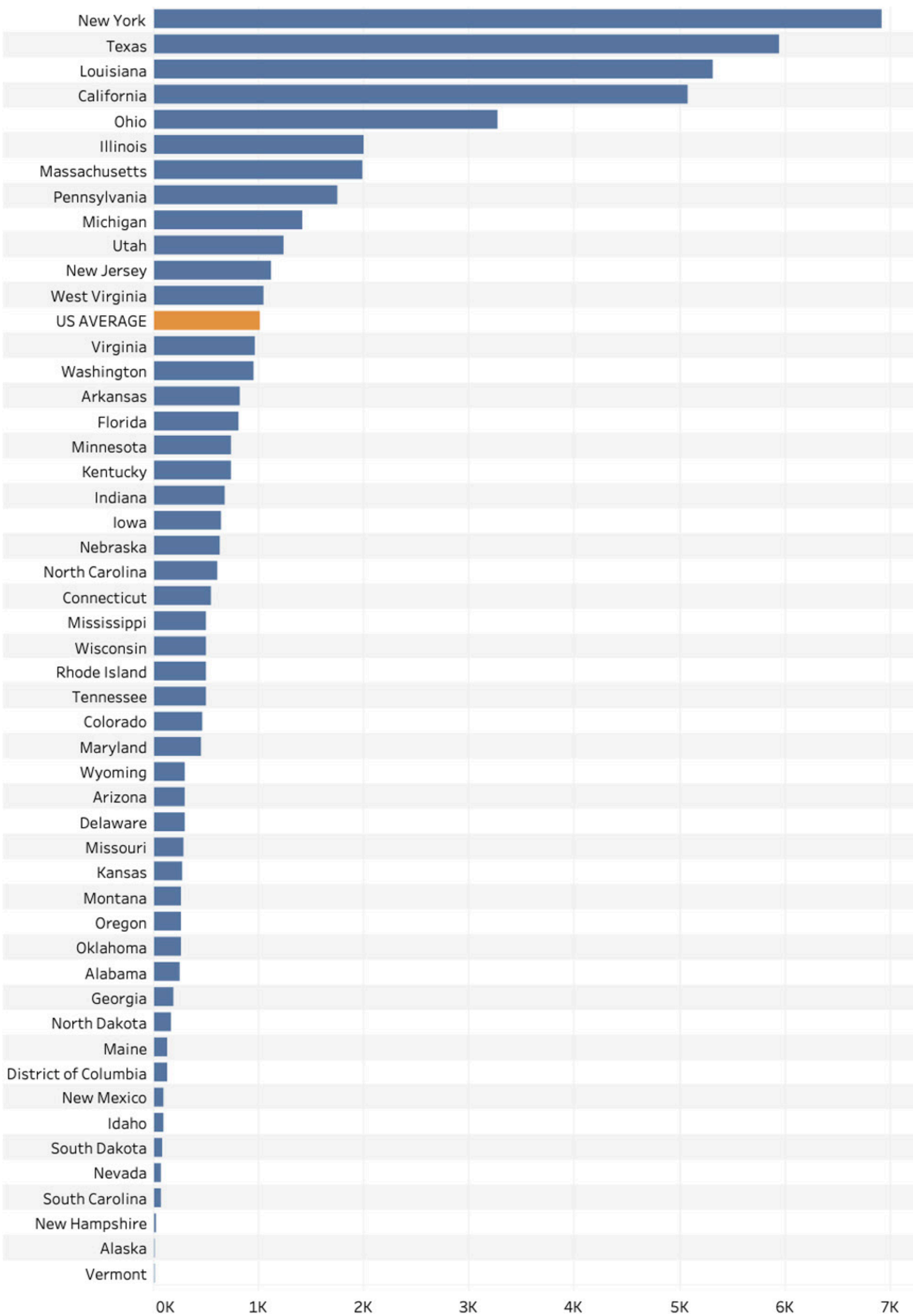
Methane, the main component of natural gas, creates emissions when burned, but is itself also a potent greenhouse gas. This section looks to fill in a gap on the potential damages done to the environment from the natural gas sector. Emissions from the burning of natural gas for electricity production are included in *Emissions from Electricity Generation* above. This section addresses the warming potential of natural gas losses by gas utilities, as reported by volume in *Gas Utility Performance*, as well as the warming potential of natural gas burned by sectors outside of the utility sector. The residential and commercial sectors burn natural gas for space and water heating, and the industrial sector burns natural gas for many other uses necessary for manufacturing.

Natural Gas Losses as CO_2 Equivalents

Emissions from natural gas losses are reported as CO_2 equivalents by taking natural gas loss volume, the same volume as reported above (Figure 24 and Figure 25), converting it to metric tons and multiplying it by the lifetime CO_2 equivalency factor for methane. The final formula for converting methane to CO_2 equivalents is thus: Metric Tons of CO_2 Equivalents = Losses in CF*Weight per CF methane (.035lb) * CO_2 Equivalency Factor (25)/lbs. per Metric Ton (2204.6 lbs).

In 2023, Michigan's CO_2 equivalents from lost natural gas were ranked 9th-worst in the nation at 1.42 million metric tons, an improvement from 7th-worst in 2022 at 2.48 million metric tons. (Figure 90) Among peer states, Illinois and Ohio had higher CO_2 equivalent emissions from lost natural gas.

Figure 90: 2023 CO_2 Equivalent Emissions from Lost Natural Gas (in Metric Tons)



Emissions from Gas Combustion Outside the Electric Sector

Burning natural gas produces multiple emission types, including CO_2, SO_2 and NO_x. There are consistent emissions factors for CO_2 and SO_2 from the burning of natural gas, but the NO_x emission factor from burning natural gas depends on the conditions under which it is burned. There is generally a higher NO_x emission factor when burning larger volumes of natural gas at higher temperatures, such as in industrial settings. To compensate for this differential, the reported NO_x emissions use one factor—100lb/million CF natural gas—for residential and commercial uses, and a higher factor—190lb/million CF natural gas— for industrial uses. Unfortunately, this provides only a rough approximation of the real NO_x emissions produced by these sectors.

The natural gas consumption data used for this subsection come from the *SEDS* database, while the emissions factors come from the *EPA*.

In Michigan, just under half of non-electric sector natural gas consumption—and therefore emissions—comes from the residential sector, with the commercial and industrial sectors contributing nearly equal amounts of the other half.

In 2023, Michigan ranked as the 44th, or 8th-worst, producer of CO_2 and SO_2 emissions from natural gas use, at 34.8 million metric tons and 174 metric tons, respectively. (Figure 91, Figure 92) Michigan was the 39th-ranked, or 13th-worst, emitter of NO_x from site use of natural gas in the country (Figure 93), at 14,461 metric tons. Relative to its peer states, Michigan is near the middle, producing lower CO_2 and SO_2 emissions than Ohio and Illinois and lower NO_x emissions than Ohio, Illinois, and Indiana.

Figure 91: 2023 CO_2 from Combusted Natural Gas in All Sectors Except Electrical (thousand metric tons)

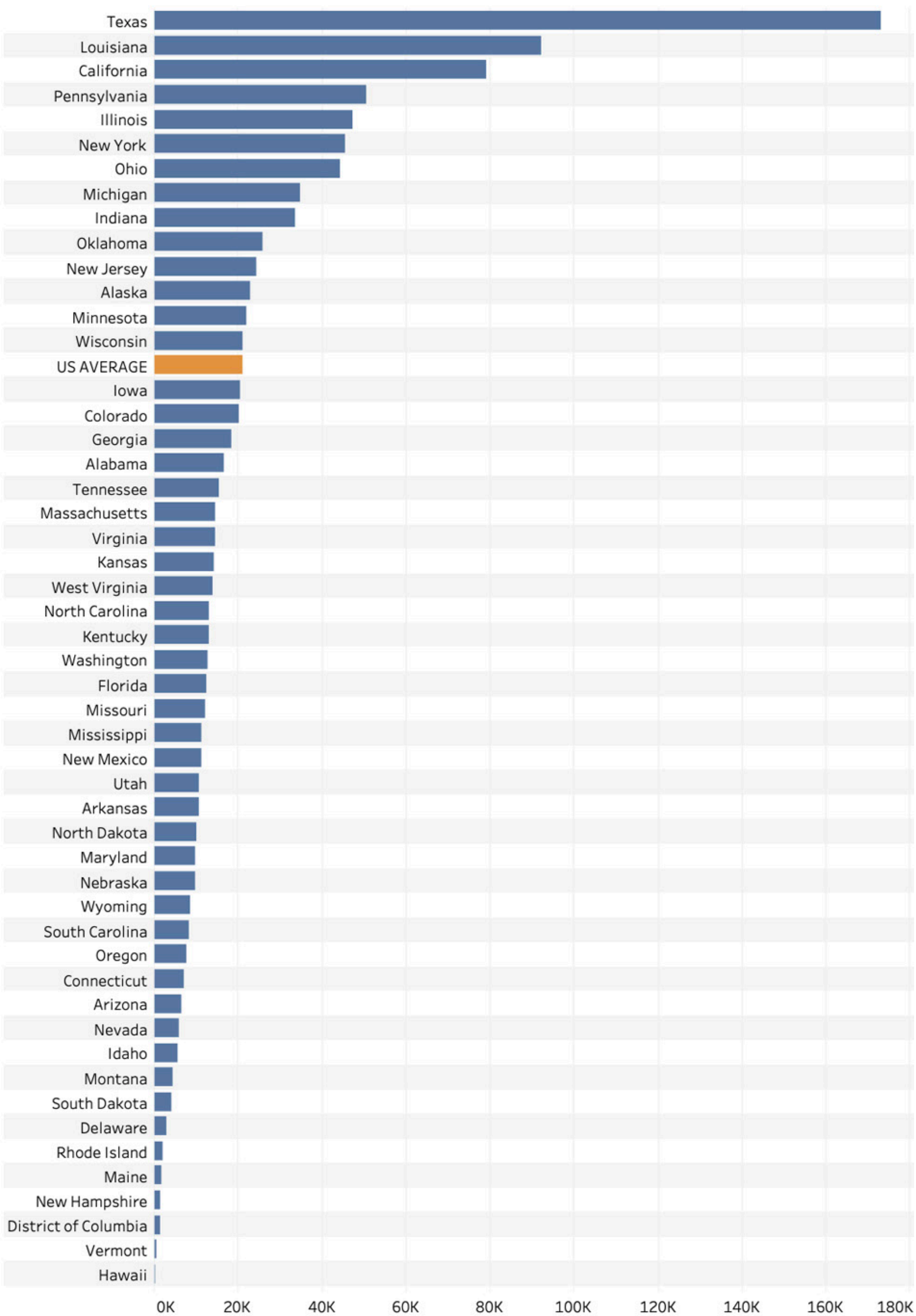


Figure 92: 2023 SO_2 from Combusted Natural Gas in All Sectors Except Electrical (thousand metric tons)

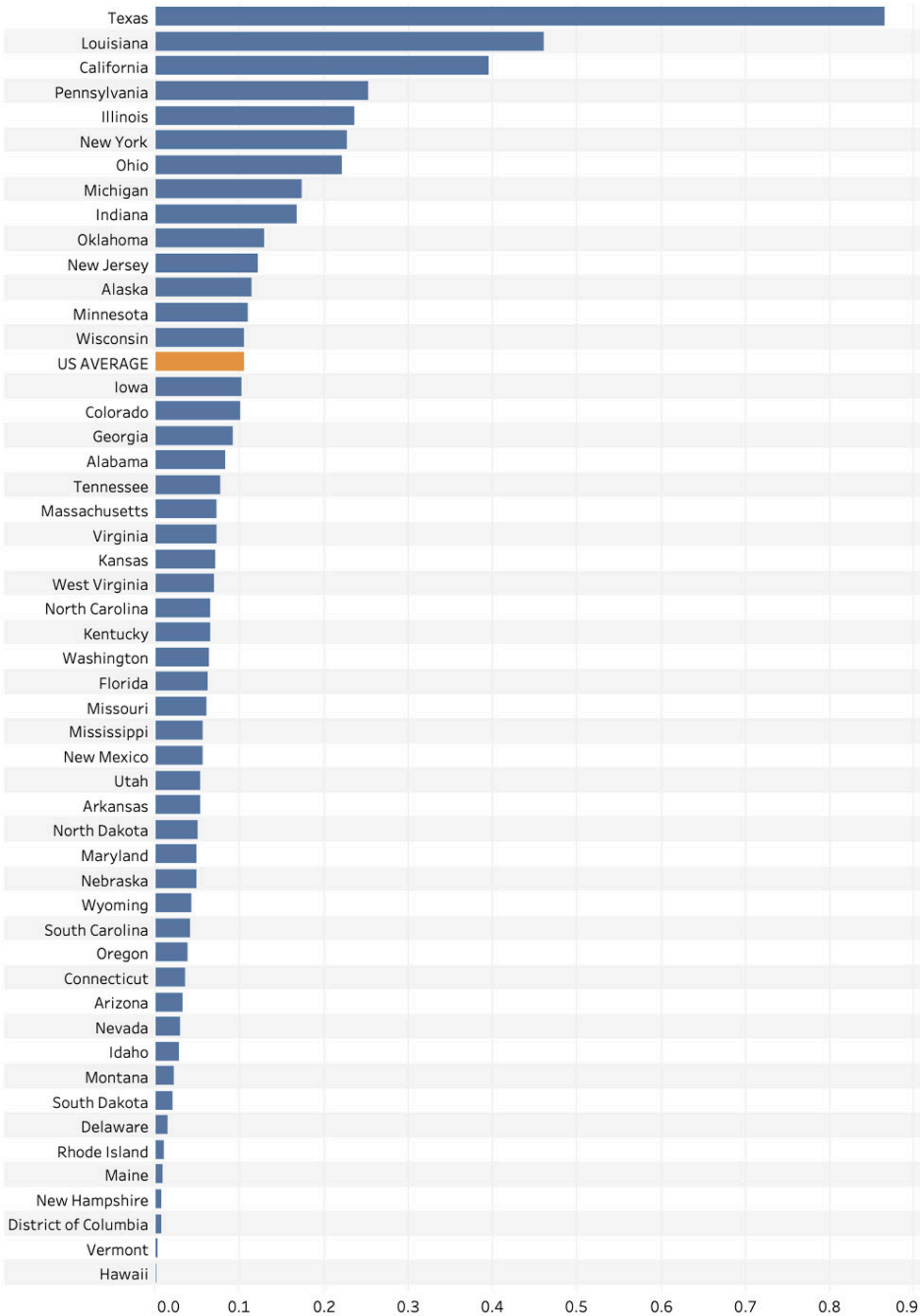
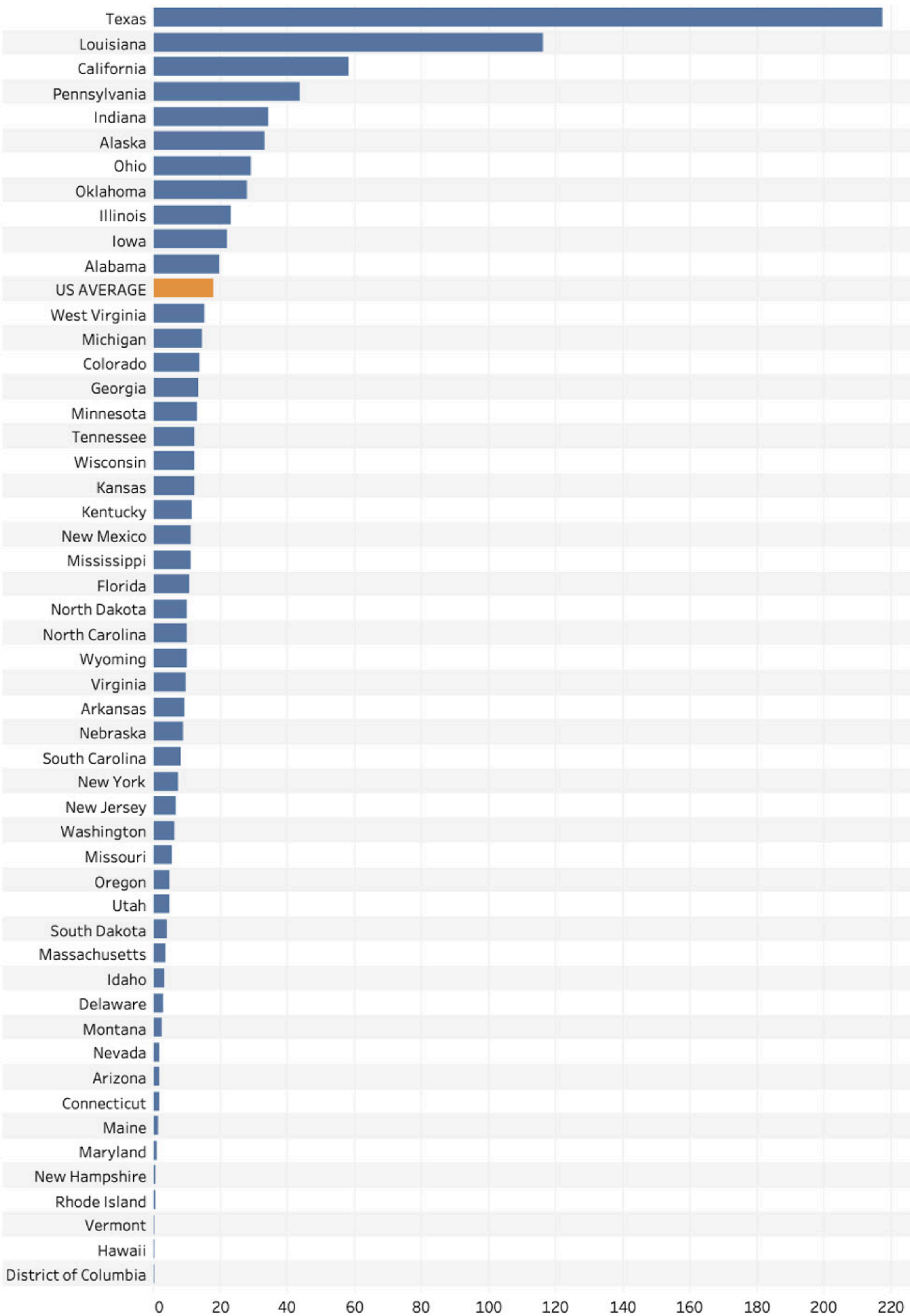


Figure 93: 2023 NO_x from Combusted Natural Gas in All Sectors Except Electrical (thousand metric tons)



RETURN ON EQUITY (ROE) FOR INVESTOR-OWNED UTILITIES

Return on equity (ROE) measures each dollar of profit generated by a utility for each dollar of equity invested by its shareholders. We include ROE in this year's report to allow readers to compare the profitability of utilities in a state to their performance on other metrics like affordability or reliability. That comparison can reveal, for example, which utilities are enjoying high profits despite their relatively unaffordable and/or unreliable service.

ROE is defined as the ratio of the annual net income of a utility to its average shareholders' equity, and the statewide ROE is a weighted average of this ratio among all such utilities in each state. This financial data is collected from FERC Form 1 for each investor-owned utility serving distribution customers. Form 1 is an annual report to FERC required of all operating electric utilities.

According to sales data found in EIA form 861, investor-owned utilities delivered 63% of electricity in the U.S. in 2023.

State regulatory agencies often have delicate relationships with the utilities they regulate. It is common for utilities to wield significant political power at the state level to influence these agencies and their rules. The statewide ROE, when considered alongside other utility performance metrics, may provide insight into the nature of those relationships.

Figure 94 shows the weighted average utility ROE for each state among utilities that report these data through FERC form 1. Figure 95 shows a map of the same results. ROE data are not available for Hawaii, Nebraska, South Dakota and Washington, D.C. Furthermore, data are not available for every IOU in each state. For example, data only for Consumers Energy, DTE, and Upper Peninsula Power Company are currently available for the state of Michigan. (Figure 96)

In a notable shift from a historical pattern, Michigan's utilities saw a significant drop in ROE in 2023. The state's weighted average utility ROE fell to 7.95%, below the national average of 8.38%. This marks a sharp reversal from 2022, when Michigan's average ROE stood at 9.96%—the 9th-highest in the country and well above the U.S. average of 8.87%. Between 2022 and 2023, DTE's ROE declined from 10.33% to 7.68%, while Consumers' fell from 9.73% to 8.27%.

Since 2013, both DTE and Consumers Energy have consistently earned annual ROEs around 10%, substantially exceeding the national average and, more often than not, exceeding their approved ROEs. Utility rates are designed by state regulators to allow utilities to earn their approved ROEs, and since 2023, the MPSC has authorized a 9.9% return for both companies. That their actual ROEs in 2023 fell significantly below this level is an historical anomaly likely driven by a combination of factors, including a spike in interest rates. The 2023 figures appear to be an outlier in an otherwise consistent pattern of Michigan utilities earning MPSC-approved returns that outpace the national average despite consistently worse-than-average reliability performance.

Figure 94: 2023 Weighted Average Utility Return on Equity by State (%)

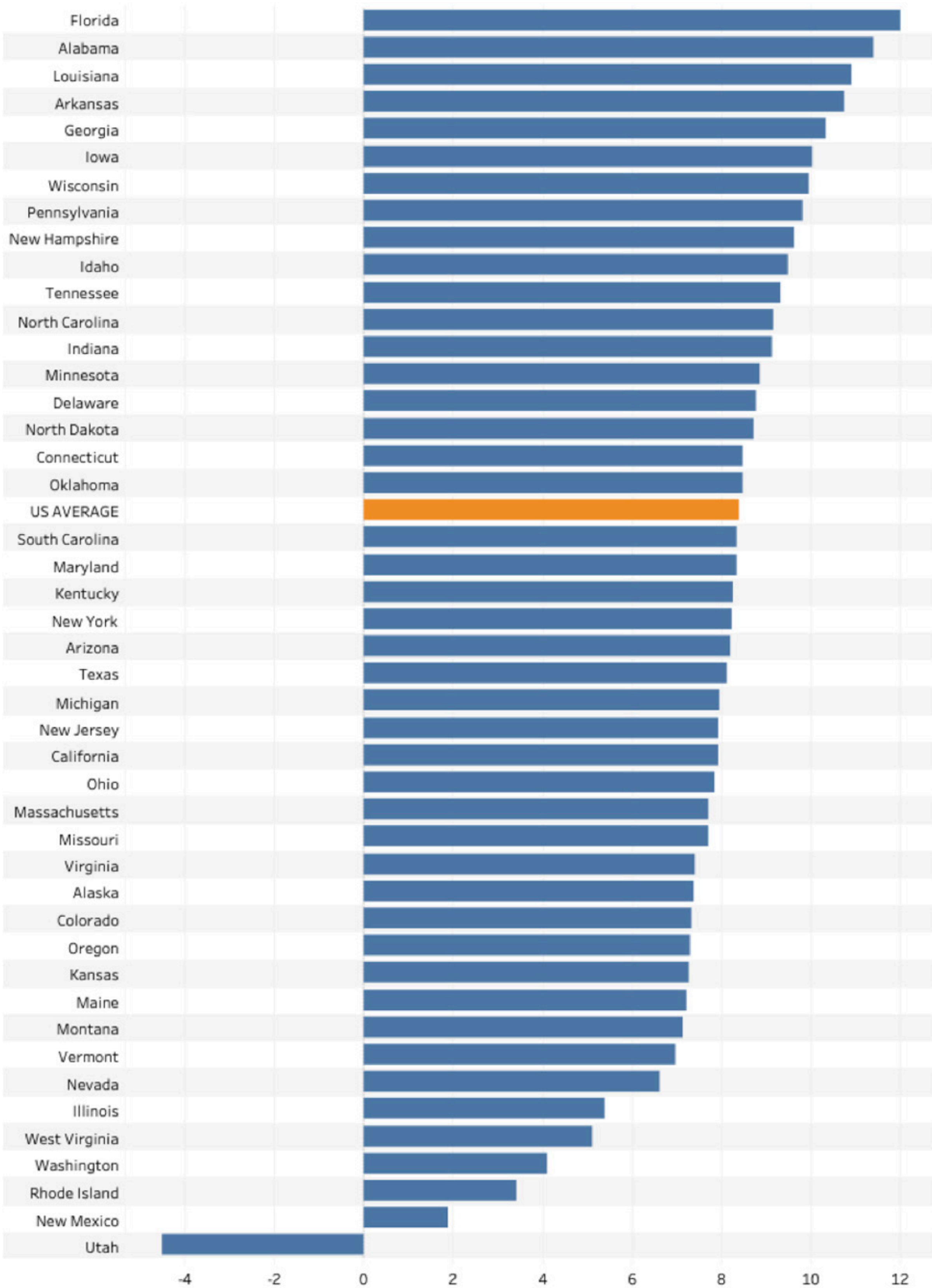


Figure 95: 2023 Weighted Average Utility Return on Equity by State (%)

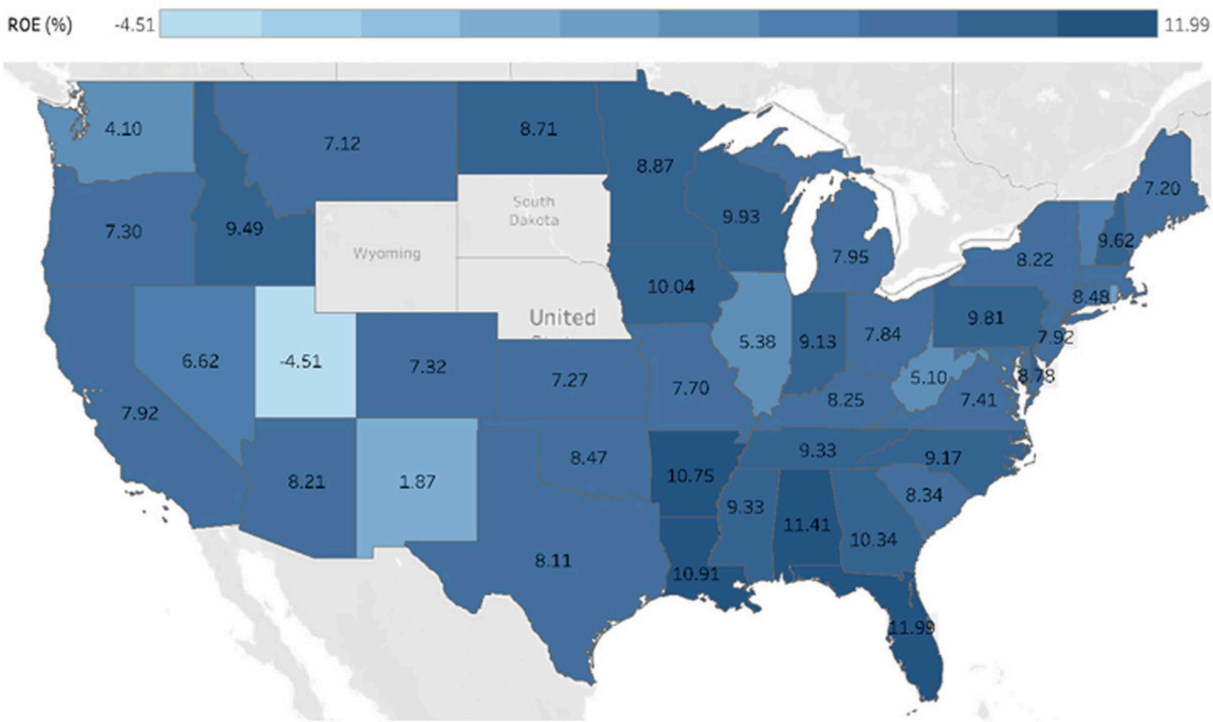


Figure 96: 2023 Weighted Average Utility Return on Equity for Michigan Utilities (%)

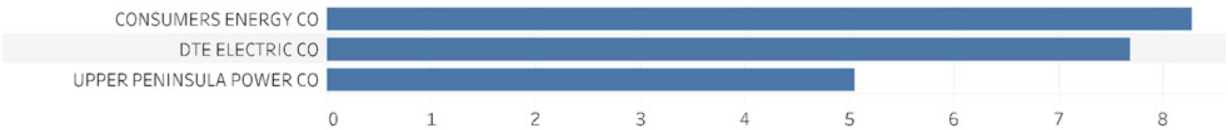
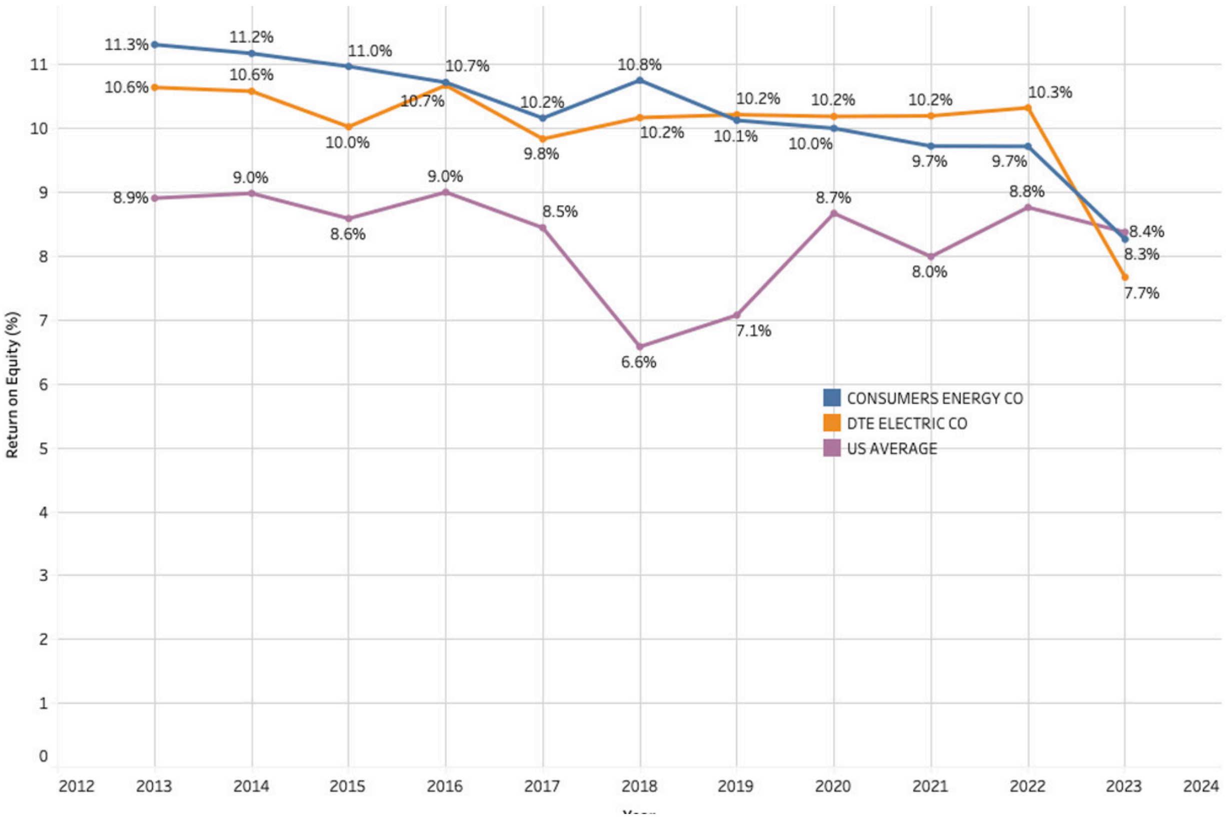


Figure 97: DTE Electric and Consumers Energy ROE compared to U.S. Average, 2013-2023 (%)



APPENDIX

Figure 98: Historical Number of Electricity Customers for Michigan Utilities (continued on next page)

		2013	2014	2015	2016	2017	2018
Behind the M..	GREENSKIES RENEWABLE ENERGY LLC						1
	SUNNOVA						
Cooperative	ALGER-DELTA COOP ELECTRIC ASSN	10,012	9,948	9,949	9,972	9,951	10,047
	BAYFIELD ELECTRIC COOP INC	66	66	64	65	65	67
	CHERRYLAND ELECTRIC COOP INC	33,641	33,925	34,274	34,700	35,145	35,628
	CLOVERLAND ELECTRIC CO-OP	42,254	42,281	42,297	42,611	42,503	42,444
	GREAT LAKES ENERGY COOP	123,000	122,833	123,199	123,874	124,622	125,447
	MIDWEST ENERGY COOP	34,127	34,201	34,285	34,452	34,578	34,707
	ONTONAGON COUNTY R E A						
	PRESQUE ISLE ELEC & GAS COOP	33,216	33,045	33,084	33,224	33,468	33,525
	THUMB ELECTRIC COOP OF MICH	12,248	12,216	12,204	12,225	12,232	12,255
	TRI-COUNTY ELECTRIC COOP	25,591	25,603	25,654	25,742	25,873	25,983
	WOLVERINE POWER MARKETING COOP	19	21	22	23	21	21
Investor Owned	ALPENA POWER CO	17,634	17,672	17,667	17,695	17,691	17,690
	CONSUMERS ENERGY CO	1,790,148	1,791,366	1,796,196	1,805,489	1,816,948	1,826,166
	DTE ELECTRIC CO	2,134,569	2,142,829	2,153,990	2,168,567	2,184,813	2,196,620
	INDIANA MICHIGAN POWER CO	127,908	127,734	127,807	127,887	128,632	129,418
	MIDAMERICAN ENERGY CO	76	87	27			
	NORTHERN STATES POWER CO	9,043	9,027	8,981	8,958		8,945
	NORTHERN STATES POWER CO WISCONSIN					8,958	
	UPPER MICHIGAN ENERGY RESOURCES CORP					36.727	36.764
	UPPER PENINSULA POWER CO	52,035	51,925	47,991	56,127	62,872	58,377
	WISCONSIN ELECTRIC POWER CO	27,561	27,550	27,582	27,658	1	1
	WISCONSIN PUBLIC SERVICE CORP	9,006	9,015	9,017	9,041		
Municipal	CITY OF BAY CITY	20,097	20,056	20,056	20,049	20,206	20,237
	CITY OF CHARLEVOIX						
	CITY OF CROSWELL						
	CITY OF CRYSTAL FALLS	1,571	1,605	1,603	1,609	1,630	1,607
	CITY OF DETROIT	229	229				
	CITY OF DOWAGIAC						
	CITY OF EATON RAPIDS						
	CITY OF ESCANABA	7,227	7,243	7,242	7,244	7,243	7,235
	CITY OF GLADSTONE	2,834	2,854	2,849	2,857	2,864	2,868
	CITY OF GRAND HAVEN	13,616	13,682	13,505	13,616	13,850	14,187
	CITY OF HARBOR SPRINGS						
	CITY OF HART HYDRO						
	CITY OF HOLLAND	27,827	28,042	28,232	28,345	28,578	28,917
	CITY OF LANSING	96,108	96,489	96,704	96,842	97,185	97,651
	CITY OF LOWELL						
	CITY OF MARQUETTE	16,793	16,813	16,842	16,941	17,163	17,092
	CITY OF MARSHALL	4,469	4,514	4,806	4,744	4,557	4,577
	CITY OF NEGAUNEE	2,255	2,269	2,216	2,214	2,215	2,220
	CITY OF NILES	7,482	7,486	7,043	7,038	7,026	7,014
	CITY OF NORWAY	2,092	2,101	2,113	2,087	2,090	2,093
	CITY OF PETOSKEY	5,326	5,334	5,331	5,345	5,373	5,401
	CITY OF PORTLAND						
	CITY OF SEBEWAING						
	CITY OF SOUTH HAVEN	8,208	8,186	8,226	8,277	8,334	8,375
	CITY OF ST LOUIS						
	CITY OF STEPHENSON						
	CITY OF STURGIS	7,057	7,067	7,028	7,057	7,080	7,107
	CITY OF TRAVERSE CITY	12,252	12,452	12,489	12,802	12,098	12,995
	CITY OF WAKEFIELD						
	CITY OF ZEELAND	6,292	6,358	6,330	6,525	6,606	6,665
	COLDWATER BOARD OF PUBLIC UTIL	6,823	6,982	7,053	6,964	7,127	7,225
	HILLSDALE BOARD OF PUBLIC WKS	6,311	6,381	6,304	6,025	6,041	6,031
	NEWBERRY WATER & LIGHT BOARD						
	VILLAGE OF BARAGA	781	868	867	879	894	781
	VILLAGE OF CHELSEA						
	VILLAGE OF CLINTON						
	VILLAGE OF DAGGETT						
	VILLAGE OF LANSE	1,200	1,202	1,205	1,204	1,184	1,183
	VILLAGE OF PAW PAW						
	VILLAGE OF UNION CITY						
	WYANDOTTE MUNICIPAL SERV COMM	12,400	12,412	12,504	12,603	12,728	12,759
Retail Power Marketer	CALPINE ENERGY SOLUTIONS LLC				36	34	35
	CMS ENERGY RESOURCE MANAGEMENT	1	1	1	1		1
	CMS ENERGY RESOURCE MANAGEMENT CORP					1	
	COMMERCE ENERGY INC	233	201	173	154	125	96
	CONSTELLATION ENERGY SERVICES INC	1,054	1,197	1,235	966	844	
	CONSTELLATION NEWENERGY INC	383	367	377	380	638	3,167
	DIRECT ENERGY BUSINESS	187	211	270	409		1,373
	DYNEGY ENERGY SERVICES LLC			1	0		
	ELIGO ENERGY LLC				7	15	17
	ENERGY HARBOR CORP						
	FIRST ENERGY SOLUTIONS CORP	682	682	366	94	71	35
	GLACIAL ENERGY HOLDINGS	408	515	509	0		
	JUST ENERGY SOLUTIONS INC						
	MIDAMERICAN ENERGY SERVICES LLC				26	27	40
	NOBLE AMERICAS ENERGY SOLUTIONS LLC	51	46	38			
	SPARTAN RENEWABLE ENERGY INC	1	1	1	1	3	4
	STRATEGIC ENERGY LLC					1,513	
	UP POWER MARKETING LLC	9	9	9	9	9	9

		Year				
		2019	2020	2021	2022	2023
Behind the M..	GREENSKIES RENEWABLE ENERGY LLC	1	1			
	SUNNOVA					8
Cooperative	ALGER-DELTA COOP ELECTRIC ASSN	10,089	10,208	10,288	10,291	10,319
	BAYFIELD ELECTRIC COOP INC	69				
	CHERRYLAND ELECTRIC COOP INC	36,075	36,487	36,915	37,421	38,006
	CLOVERLAND ELECTRIC CO-OP	42,471	42,852	43,175	43,190	43,552
	GREAT LAKES ENERGY COOP	126,250	126,956	128,202	130,291	131,726
	MIDWEST ENERGY COOP	34,748	34,919	35,168	35,342	35,527
	ONTONAGON COUNTY R E A	4,868				
	PRESQUE ISLE ELEC & GAS COOP	33,713	33,769	34,547	34,651	34,926
	THUMB ELECTRIC COOP OF MICH	12,274				
	TRI-COUNTY ELECTRIC COOP	26,105	26,349	26,610	26,829	26,994
	WOLVERINE POWER MARKETING COOP	21	20	21	21	21
Investor Owned	ALPENA POWER CO	16,511	16,554	16,624	16,683	16,750
	CONSUMERS ENERGY CO	1,836,668	1,855,672	1,870,123	1,875,019	1,884,290
	DTE ELECTRIC CO	2,209,021	2,226,500	2,244,945	2,257,415	2,266,484
	INDIANA MICHIGAN POWER CO	129,283	129,886	130,586	131,149	131,626
	MIDAMERICAN ENERGY CO					
	NORTHERN STATES POWER CO	8,942	8,913	8,930	8,939	8,932
	NORTHERN STATES POWER CO WISCONSIN					
	UPPER MICHIGAN ENERGY RESOURCES CORP	36,818	36,896	36,921	37,063	37,244
	UPPER PENINSULA POWER CO	52,889	53,159	53,233	53,418	53,271
	WISCONSIN ELECTRIC POWER CO	1				
	WISCONSIN PUBLIC SERVICE CORP					
Municipal	CITY OF BAY CITY	20,243	20,159	20,218	20,295	20,343
	CITY OF CHARLEVOIX	4,455				
	CITY OF CROSWELL	1,438				
	CITY OF CRYSTAL FALLS	1,603	1,603	1,557	1,542	1,691
	CITY OF DETROIT					
	CITY OF DOWAGIAC	2,608				
	CITY OF EATON RAPIDS	3,300				
	CITY OF ESCANABA	7,245				
	CITY OF GLADSTONE	3,168	2,934	3,122	2,877	2,883
	CITY OF GRAND HAVEN	14,403	14,642	14,720	14,846	14,955
	CITY OF HARBOR SPRINGS	3,712				
	CITY OF HART HYDRO	1,410				
	CITY OF HOLLAND	29,131	29,423	29,967	30,281	30,855
	CITY OF LANSING	98,268	99,274	99,425	99,070	99,449
	CITY OF LOWELL	2,948				
	CITY OF MARQUETTE	17,230	17,264	17,001	17,013	17,128
	CITY OF MARSHALL	4,574				
	CITY OF NEGAUNEE	2,234	2,250	2,239	2,237	2,248
	CITY OF NILES	7,085				
	CITY OF NORWAY	2,094	2,088	2,065	2,101	2,096
	CITY OF PETOSKEY	5,392				
	CITY OF PORTLAND	2,586				
	CITY OF SEBEWAING	1,282				
	CITY OF SOUTH HAVEN	8,444				
	CITY OF ST LOUIS	1,980				
	CITY OF STEPHENSON	498				
	CITY OF STURGIS	7,108	7,048	7,114	7,118	7,121
	CITY OF TRAVERSE CITY	12,599	12,812	12,468	11,979	13,139
	CITY OF WAKEFIELD	1,079				
	CITY OF ZEELAND	6,749	6,857	6,871	7,057	6,954
	COLDWATER BOARD OF PUBLIC UTIL	7,233	7,324	7,390	7,431	7,701
	HILLSDALE BOARD OF PUBLIC WKS	6,024				
	NEWBERRY WATER & LIGHT BOARD	1,415				
	VILLAGE OF BARAGA	750	738	736	771	786
	VILLAGE OF CHELSEA	3,112				
	VILLAGE OF CLINTON	1,485				
	VILLAGE OF DAGGETT	135				
	VILLAGE OF LANSE	1,176	1,132	1,216	1,158	1,133
	VILLAGE OF PAW PAW	1,759				
	VILLAGE OF UNION CITY	1,516				
	WYANDOTTE MUNICIPAL SERV COMM	12,790	12,635	12,673	12,712	12,775
Retail Power Marketer	CALPINE ENERGY SOLUTIONS LLC	35	36	37	40	40
	CMS ENERGY RESOURCE MANAGEMENT	1	1	1	1	1
	CMS ENERGY RESOURCE MANAGEMENT CORP					
	COMMERCE ENERGY INC	113	87	77	69	
	CONSTELLATION ENERGY SERVICES INC					
	CONSTELLATION NEWENERGY INC	3,117	3,116	3,262	3,347	3,223
	DIRECT ENERGY BUSINESS	1,253	1,179	1,146	1,069	1,027
	DYNEGY ENERGY SERVICES LLC					
	ELIGO ENERGY LLC	11				
	ENERGY HARBOR CORP	39	28	49	64	72
	FIRST ENERGY SOLUTIONS CORP					
	GLACIAL ENERGY HOLDINGS					
	JUST ENERGY SOLUTIONS INC					55
	MIDAMERICAN ENERGY SERVICES LLC					
	NOBLE AMERICAS ENERGY SOLUTIONS LLC					
	SPARTAN RENEWABLE ENERGY INC	4	4	3	3	3
	STRATEGIC ENERGY LLC					
	UP POWER MARKETING LLC	1	1	1	1	1