THE UNIVERSITY OF CHICAGO
THE LAW SCHOOL
Abrams Environmental
Law Clinic

September 12, 2024

Via E-Filing

Ms. Lisa Felice
Executive Secretary
Michigan Public Service Commission
7109 West Saginaw Highway
Lansing, MI 48917

RE: MPSC Case No. U-21534

Dear Ms. Felice:

Please find enclosed the Official Exhibit DAO-301 sponsored by Elizabeth Jacob; the Official Exhibits DAO-311 to DAO-318 sponsored by Toyia Watts; and the Official Exhibits DAO-321 to DAO-323 sponsored by Delores Orr (Part 10 of 10) on Behalf of Soulardarity and We Want Green, Too, along with proof of service for electronic filing in the above-referenced matter. Please do not hesitate to contact me with any questions or comments.

Sincerely,

Mark N. Templeton, *pro hac vice*
6020 S. University Avenue
Chicago, IL 60637
Phone: (773) 702-9611
Email: templeton@uchicago.edu

xc: Parties to Case No. U-21534

MPSC Case No: U-21534	
Requester: DAAO	
Question No.: DAAODE-3.10a	
Respondent: M. Hatsios	
Page: 1 of 1	

Question: Will the IT Capital investments proposed in this case expand DTE Electric's digital self-service functionality to include languages other than English? If so, please:

a. Identify each specific language in which digital self-service options will be offered.

Answer: No. Digital Self-Service options are currently offered only in English.

Attachment: None.

MPSC Case No: U-21534
Requester: DAAO
Question No.: DAAODE-3.10b
Respondent: M. Hatsios
Page: 1 of 1

Question: Will the IT Capital investments proposed in this case expand DTE Electric's digital self-service functionality to include languages other than English? If so, please:

b. Describe in detail the process and criteria used by DTE Electric to determine which languages would be included in the expanded self-service offerings.

Answer: Please see response to DAAODE-3.10a.

Attachment: None.

MPSC Case No: U-21534	
Requester: DAAO	
Question No.: DAAODE-3.10ci	
Respondent: M. Hatsios	
Page: 1 of 1	

Question: Will the IT Capital investments proposed in this case expand DTE Electric's digital self-service functionality to include languages other than English? If so, please:

c. Provide any internal analyses, studies, or other documents assessing the language access needs of DTE Electric's customer base, including but not limited to:

i. Data on the primary language spoken by customers in DTE Electric's service territory;

Answer: Please see response to DAAODE-3.10a.

Attachment: None.

MPSC Case No: U-21534	
Requester: DAAO	
Question No.: DAAODE-3.10cii	
Respondent: M. Hatsios	
Page: 1 of 1	

Question: Will the IT Capital investments proposed in this case expand DTE Electric's digital self-service functionality to include languages other than English? If so, please:

c. Provide any internal analyses, studies, or other documents assessing the language access needs of DTE Electric's customer base, including but not limited to:

ii. Surveys or other research gauging customer interest in or need for non-English self-service options;

Answer: Please see response to DAAODE-3.10a.

Attachment: None.

MPSC Case No: U-21534	
Requester: DAAO	
Question No.: DAAODE-3.10ciii	
Respondent: M. Hatsios	
Page: 1 of 1	

Question: Will the IT Capital investments proposed in this case expand DTE Electric's digital self-service functionality to include languages other than English? If so, please:

c. Provide any internal analyses, studies, or other documents assessing the language access needs of DTE Electric's customer base, including but not limited to:

iii. Benchmarking studies or comparisons to the multilingual offerings of other utilities.

Answer: Please see response to DAAODE-3.10a.

Attachment: None.

MPSC Case No: U-21534	
Requester: DAAO	
Question No.: DAAODE-3.10d	
Respondent: M. Hatsios	
Page: 1 of 1	

Question: Will the IT Capital investments proposed in this case expand DTE Electric's digital self-service functionality to include languages other than English? If so, please:

c. Provide any internal analyses, studies, or other documents assessing the language access needs of DTE Electric's customer base, including but not limited to:

d. Produce all planning documents, implementation timelines, budgets and cost estimates related to the addition of multilingual capabilities to DTE Electric's digital self-service platforms.

Answer: Please see response to DAAODE-3.10a.
.

Attachment: None.

Bridge MICHIGAN
Michigan's nonpartisan, nonprofit news source

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Michigan K-12 schools | Rural Michigan

Quality of Life

Michigan near tops in nation for outages. Utilities want to raise rates

Cleve Reid, a lineworker working in Norton Shores for Consumers Energy, surveys trees near power lines that may need trimming. (Courtesy photo)

May 28, 2024

[Mike Wilkinson](Email) (Email)

Quality of Life

SHARE THIS:

- **New data shows Michigan has more power outages lasting longer than eight hours than most other states**
- **Only two states, Texas and California, had more severe outages than Michigan in the past five years**
- **Although regulators say the performance is unacceptable, they've approved rate hikes that make electric bills some of the highest in nation**

Diana Brown Wilhelm has heard one constant complaint from constituents since she became a Midland City Council member in 2011: power outages.

"I swear, we were having them monthly if not more," Brown Wilhelm said.

That put pressure on seniors in her northeast Midland district, some of whom rely on oxygen and other medical devices. "They need power for those things to run."

It's not just Midland. By any measure, Michigan residents are affected by more — and longer-lasting — power outages than almost any other state, despite paying some of the highest rates, new data shows

The performance of Michigan's two dominant utilities — DTE Energy and Consumers Energy — again is under scrutiny, as hot weather puts a strain on the system and DTE seeks a $456 million rate increase from state regulators that would boost average residential bills $100 or more per year.

Since 2000, Michigan trailed only Texas and California in major outages — those affecting 50,000 customers or more — even though those states have far more residents and are significantly larger, according to an analysis by Climate Central, a research and communications nonprofit.

A separate Bridge Michigan analysis of county-level outage data found that, among the nation's most populous counties, Michigan residents are more likely to endure an outage of 8 hours or longer, far more than peers throughout the Great Lakes and on par with Texas.

Some counties — Cass and Berrien in southwest Michigan and Alcona northeast — had over 50 outages in which 5% of customers had an 8-hour outage or longer in the last five years.

Related:

- **Detroit gains residents for first time in decades. Check your city's change**
- **Blood lead levels continue to fall in Michigan: Look up your ZIP code**
- **Northern Michigan, after years of struggle, is gaining residents again**

Only one county, Houghton, had none, according to the data.

"The level of performance is unacceptable," Dan Scripps, chair of the Public Service Commission, a government agency that oversees utilities.

"That's maybe the thing we can all agree on — and trying to get to a better place."

The state agency responsible for overseeing utilities, the Michigan Public Service Commission, fielded 2,700 outage complaints last year, more than quadruple the annual average of 600 from 2014 to 2020.

The number of major outages has risen in each of the last three years, from 15 to 16 to 17. The previous high from 2000 to 2020 was 11.

And complaints are increasing even as Consumers Energy and DTE Energy, have spent hundreds of millions of dollars in recent years to trim and remove trees, replace poles and wires and bury some utility lines.

“There's no doubt that each county has a story, and our story is we're not happy with where we are,” said Greg Salisbury, vice president of electric distribution engineering for Consumers Energy, which serves nearly 1.9 million customers in much of the Lower Peninsula.

DTE serves 2.3 million customers in southeast Michigan and the Thumb.

“We're confident we’re on the right track, and we're going to continue to file our plans and rate cases (with the PSC) to get the funding we need to invest in the system.”

In Midland, those efforts have paid off, Brown Wilhelm said. Consumers Energy officials sent crews in to replace old equipment in the area, and the once frequent outages almost ceased.

“We had one outage last year,” Brown Wilhlem said, who credited the utility for working with her and the city to improve service.

But while many residents waited for improved reliability, some have turned to their own solutions. The sales of high-end permanent backup generators costing well over $10,000 to install are up, including in Brown Wilhelm’s district.

“We did install a lot of permanent generators in the last couple of years,” said Justin Dankert, residential service manager for the Town & Country Group of Midland. “It’s been picking up a lot.”

Bad weather to blame?

The increasing severity of storms has played a role in the rise in recent outages following bad weather that slammed the state repeatedly in 2022 and 2023.

Consumers Energy said it analyzed weather at 21 Michigan airports and found that the number of hours with damaging wind speeds rose from 2016-18 to 2019-21, leading to more outages. Related data, Salisbury said, shows Michigan has had more high-wind events than at airports just across Lake Michigan in Wisconsin.

“What we saw is there's 20% to 30% more high wind gusts hours in Michigan by comparison,” Salisbury said.

Weather is not the entire answer, said Richard Rood, a professor emeritus in climate and space sciences and engineering at the University of Michigan.

He agreed that storms have become more severe in recent years, fueled by rising temperatures. Other states, like Texas, Louisiana and Florida, have been pummeled by more severe hurricanes in recent years and more violent storms are occurring across the country, he said.

But Rood said they are more intense in many places, not just Michigan.

Ohio, Indiana, Illinois and Wisconsin all have far fewer outages, the data shows.

“It’s really hard to say Michigan is seeing more severe weather than anywhere in the Midwest,” Rood said.

For consumer advocates, the cause is rooted in how the utility companies have maintained their sprawling systems.

Delayed investments?

Amy Bandyk, executive director of the Citizens Utility Board of Michigan, laid the blame on the state's utilities past "lack of focus" on strategies like tree trimming.

"DTE and Consumers Energy are trying to play catchup now and speeding up the cycles with which they trim trees, but the damage to their performance has been done," Bandyk said in a statement.

She said Michigan had the sixth-longest outage duration in the country in 2021.

No one disputes the low reliability rankings of the state's biggest utility companies, which have an outage duration rate nearly twice the national average,

And both Consumers and DTE told Bridge about their past work and ongoing plans to improve the systems. (DTE Energy and Consumers Energy are funders of Bridge Michigan.)

Scripps, the PSC chair, said the companies are improving their systems but that more needs to be done.

Since December, the PSC has approved rate increases for DTE and Consumers that include funding to improve reliability. That puts some of the burden on customers, who will pay more for power while already having the highest residential rates in the region and among the highest in the country.

Those increases come as the average residential bill in Michigan — $92.85 a month for 500 kilowatt hours of power — is 17% higher than the Great Lakes average of $79.55 and 11% higher than the U.S. average of $82.40.

Brian Calka, DTE's vice president of distribution, said the utility's tree trimming "surge" has decreased outages 40% to 50% in some areas.

So far, the utility has implemented the program in 85% of its service area and hopes to complete the program by the end of next year, Calka said.

"We recognize through our metrics and data and very acute focus on the customers that we need to do better — and that we needed to do better back in the 2018, 2019 time period," Calka said.

"... By no means are we sitting back, and we're happy and content with the performance that we have provided our customers as it relates to reliability."

That's what has made the most recent outages more frustrating for the utilities and customers — they've occurred despite the additional work across the state.

In the Midwest, the total precipitation of worst storms — the top 1% — rose 42% from 1958 to 2016, according to Great Lakes Sciences and Assessments.

"We are shooting at a moving target," Consumer's Salisbury said, "because the (utility) assets are aging, the trees are growing, and customer demand is changing. And we have this increasingly severe weather."

Are regulators strict enough?

Michigan regulators have granted rate increases in recent years, but reduced the size of those requests.

Regulators also raised the amount the utilities must pay customers who lose power — $38 a day, up from $25 — and lowered the length of time before an outage is considered “unacceptable.”

Bandyk, the consumer advocate, has long been critical of the utilities and the Public Service Commission.

But she acknowledged “that is being stricter with the utilities, but ultimately to motivate the utilities to really change their behavior for the benefit of customers.”

One industry analyst firm, S&P Global, wrote that Michigan’s regulation system has created a “most credit supportive” environment for utility companies.

That’s not a badge of honor, CUB’s Bandyk said. She wishes the commission would require more of the utility companies it regulates and force them to dig deeper into their profits to create more reliable systems that benefit consumers.

Consumers had a net income of $876 million in 2023, for a profit margin of nearly 12%, while DTE had net income of $1.4 billion in 2023 for a profit margin of 11%. Both utilities increased profit margins in 2023.

Scripps, the PSC chair, said the regulator has demanded more of the state’s utility companies, and not just Consumers and DTE.

He said more scrutiny could follow the completion of a first-ever audit — independent of but paid for by the utilities — that is comparing Michigan to peer utilities in other states. That is scheduled to come out this summer, he said.

And he is hopeful the commission will make sure that the utilities' promises to harden the systems and trim trees will be kept. He said in the past, those efforts got diverted for other projects, like improving storm response.

But the result was the reliability of the systems did not get the necessary attention, he said. And that has led to the growing number of outages.

“At the end of the day the reliability improvements didn’t get made so we find ourselves in a deeper hole,” he said.

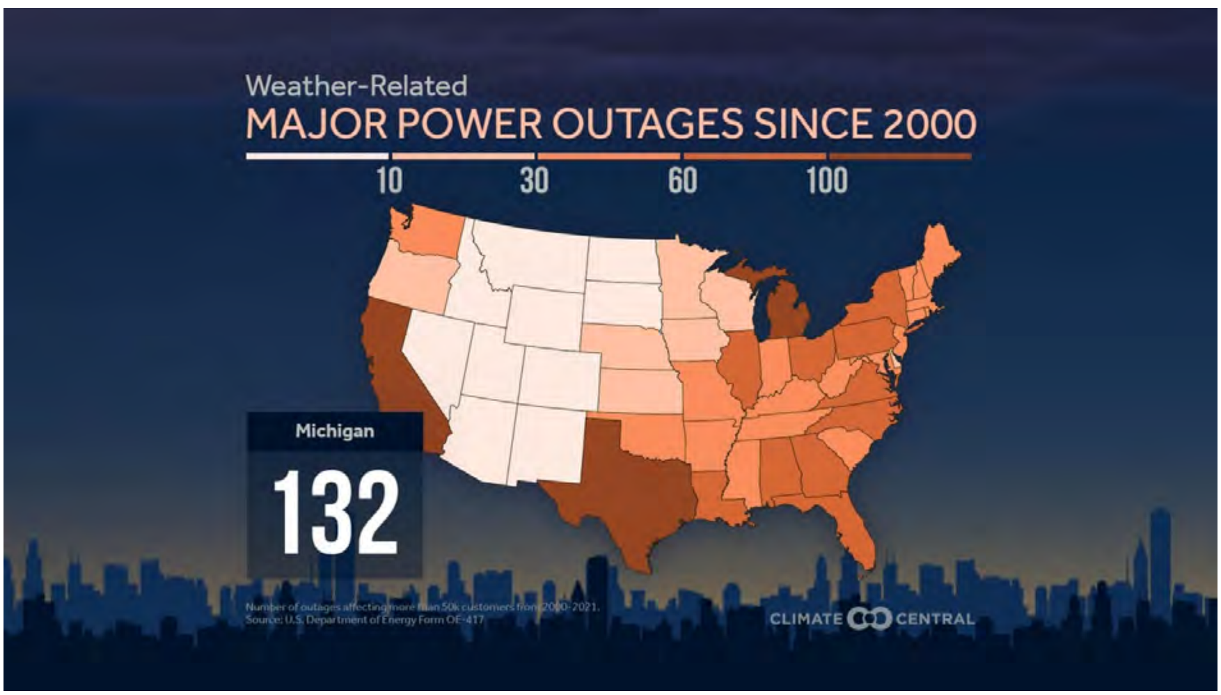
Related Articles:

Planet Detroit

Michigan ranks # 2 for power outages

Advocates say Michigan's poor performance compared to neighboring states shows a failure by state regulators to ensure that utilities adequately invest in the grid.

BY BRIAN ALLNUTT ● NEWS ● JANUARY 19, 2024



Source: Climate Central

Power failures like the one that left 150,000 Michigan homes without electricity during this past weekend's cold have increased in Michigan over recent decades, according to a new report by the nonprofit news organization Climate Central.

The report found that Michigan experienced the second-highest number of power outages, during which at least 50,000 customers or more lost power, between 2000 and 2021. Outages increased by 78% between 2011 and 2021 compared to the prior decade.

Climate Central's report says increasingly frequent severe weather stresses the nation's aging grid, contributing to increased outages nationally.

But while Michigan has been hit by many severe storms in recent years, including several that caused outages in 2023, ratepayer advocates say the state's poor performance compared to neighboring states shows a failure by state regulators to ensure that utilities adequately invest in and maintain the grid to prevent power failures.

Michigan's aging grid and "inefficient practices by utilities to maintain the grid leave Michiganders more exposed to outages from weather events" than people in other states, said Amy Bandyk, executive director of the Citizens Utility Board of Michigan.

Bandyk added that the weather isn't significantly different in other Midwestern states. Still, investor-owned utilities like DTE Energy and Consumers Energy have failed to implement best practices like frequent tree trimming to get branches out of the way of power lines, and regulators haven't held them accountable for these issues.

According to the Climate Central report, neighboring states like Ohio and Indiana experienced 79 and 59 outages between 2000 and 2021, compared to 132 in Michigan. Only Texas, with four times more land area than Michigan and three times the population, experienced more power failures during this period, with 180 outages.

A metric of utility performance that better accounts for differences in size and population between states is the time it takes power companies to restore service following an outage.

According to the Citizen's Utility Board of Michigan's 2023 Utility Performance Report, Michigan utilities' average time for restoring power after an outage was 527 minutes, compared to 185 minutes for Ohio, 211 minutes for Indiana, 307 minutes for Wisconsin, 140 minutes for Illinois and 116 minutes for Minnesota.

Nationally, Michigan is the 4th worst state for restoration time, and among state utilities, DTE Energy took the longest to restore power, according to CUB's report. On average, the company took 586 minutes to restore power or almost 10 hours.

Michigan's grid is not in great shape even on fair weather days – a 2021 report card from the American Society of Civil Engineers gave Michigan's power grid a D, indicating it was "poor, at risk" compared to a national score of C-.

However, extreme weather is making things worse. Several rounds of severe storms last summer caused outages for hundreds of thousands of residents, along with the February ice storm that cut power to 700,000 Michiganders.

State regulators raise DTE customers' rates, preserve shareholder profits

As climate change creates warmer air that can hold more water vapor, it could drive increasingly violent storms. According to the Great Lakes Integrated Sciences and Assessments program, the frequency and intensity of severe storms have increased in the Midwest, with the amount of precipitation falling in the heaviest 1% of storm events, rising by 42% between 1958 and 2016. Experts project these numbers to increase by 40% or more by the end of the century.

Climate Central suggests strategies like incentives for power users to cut back on usage during high-demand periods, smart grid technologies that allow operators to evaluate problems, hardening the grid to prevent damage and microgrids that can supply small areas with backup power from distributed energy sources or battery storage during a broader outage.

A move by the Michigan Public Service Commission to require utilities to track outages at the neighborhood level could help identify problems in low-income areas and communities of color, which have been disproportionately affected by outages, and create more accountability for these companies.

In a statement to Planet Detroit, DTE Energy said it was continuing with its "four-point plan" to improve reliability, which includes tree trimming, rebuilding older portions of the power grid, updating and hardening infrastructure, and installing smart grid technology.

The company added that it is investing in microgrid projects in Detroit and Port Austin and preparing "the grid for the energy transformation and electrification that are needed to combat climate change."

Consumers Energy spokesperson Brian Wheeler pointed to the company's "reliability roadmap," which sets goals for improving tree trimming, upgrading infrastructure, modernizing the grid, and helping disadvantaged communities benefit from the transition to renewable energy.

"Our twin goals, over time, are that no customer will be without power for more than 24 hours and that no outage will affect more than 100,000 customers," he said.

Some experts say the MPSC bears responsibility for the problem by allowing residential rates to increase while reliability suffers.

Douglas Jester, a managing partner at the consulting firm 5 Lakes Energy, said residential energy costs, in the form of distribution rates, had increased rapidly in Michigan between 2010 and 2020 compared to the national average.

"Over a 25-year period, MPSC investigations, staff reports, and utility plans and promises have been ineffectual at improving distribution reliability, but distribution rates are increasing faster than nationally," he said. "If 'insanity is doing the same thing twice and expecting a different result,' continuing to do this would be regulatory insanity,"

Bandyk said that in recent rate cases for DTE and Consumers, regulators did a better job scrutinizing grid spending by utilities. But she said that putting financial penalties in place for poor utility performance is crucial.

"Implementing those disincentives would be the next big step to create meaningful accountability and remedy the root causes of our current situation with reliability," she said.

Author

BRIAN ALLNUTT

Brian Allnutt is a senior reporter for Planet Detroit. He covers the climate crisis, utilities, air quality, environmental justice and politics. His work has appeared in The Guardian, Bloomberg CityLab, Bridge Michigan and The Detroit News. Prior to joining Planet Detroit in 2019. he ran a farm and garden store in Southwest Detroit for six years. More by Brian Allnutt

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UTILITY PERFORMANCE REPORT

RANKING MICHIGAN AMONG THE STATES

2023 EDITION

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GLOSSARY

Terms and Abbreviations

CAIDI	Customer Average Interruption Duration Index
CO_2	carbon dioxide
EIA	Energy Information Administration
EPA	Environmental Protection Agency
IEEE	Electrical and Electronics Engineers
MED	Major Event Days
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
SO_2	Sulfur dioxide
Trend CAGR	Average yearly change of the fitted trendline

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
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

The data in this year's report show Michigan utilities continuing the long-term trend of highly unreliable electric service relative to utilities across the country and those in neighboring states, especially when it comes to duration of electric outages. Michigan utilities also continue to charge relatively high electric rates, especially for residential customers. On 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.

Notably, Michigan's reliability performance in this year's report has dipped back to its typical levels after a relatively "strong" (by Michigan standards) previous year. In last year's report, we noted that "compared to the 2021 version of this report, Michigan utilities score marginally better on some measures of reliability. But that result is mostly due to other utilities in other states experiencing more power outages due to particularly severe weather events that year, as opposed to Michigan utilities improving their basic reliability performance." We noted, however, that "compared to previous years, 2020 was relatively 'good' for Michigan weather. A key takeaway is that even in a good year, Michigan utilities show a vulnerability to power outages and poor restoration performance that is likely to be magnified in 'bad' years."

But 2021, the year for most of the data in this report, was unfortunately a bad year for power outages, and key reliability metrics registered some of the worst results of the past several years for Michigan utilities. For example, the System Average Interruption Duration Index (SAIDI), which measures the average duration of outages for each customer served by a utility, (including Major Event Days) was 873.2 minutes in 2021, much higher than the five-year average of 612 minutes, which in turn was much higher than the 2020 score of 411 minutes.

The reliability measure that Michigan utilities have historically struggled the most with is the Customer Average Interruption Duration Index (CAIDI), which measures the average duration of all outages for a utility in the year. CAIDI (excluding Major Event Days) in 2021 was 172.64 minutes, very close to the five-year average of 173.4 minutes, while the score for 2020 was significantly lower than this average, at 156 minutes.

On affordability, Michigan went from the 10^{th}-highest average residential electric rate among the 50 states and D.C. last year to the 9^{th}-highest this year, as the average rate climbed from 17.53 to 17.61 cents per kilowatt-hour (kWh).

What's New for 2023

Return on Equity

A new metric for this year's report is return on equity (ROE). ROE is essentially a measure of profitability and is one of the key ratios for judging the financial performance of an enterprise. The relevance for this report is that for electric utilities, unlike for other business sectors, the ROE of a company is frequently determined by state regulatory commissions, which set the rates that utilities in states like Michigan may charge their customers. A high level of profitability as indicated by ROE, then, may be at odds with a utility's low performance on measures like reliability or affordability because regulatory commissions do not typically base their rate decisions on performance. States where utilities perform poorly on metrics related to reliability or affordability but receive relatively high ROEs illustrate the disconnect where regulatory commission decisions may be providing high profits for a utility despite its poor performance.

Tableau

Another new feature of this year's report is that a comprehensive set of figures is available via an interactive page on the CUB website. The figures were developed in Tableau, an industry standard data visualization software. The Tableau platform offers readers an opportunity to perform their own analysis of these data: they can interact with the figures to compare states on different performance metrics, view historical trends for all the metrics we discuss in this report, and compare utilities nationwide.

Figure 1: Michigan Summary Table

Metric Name	Year	Unit	Metric Value	Rank
SAIDI with MED	2021	minutes per year	873.272	46
SAIDI without MED	2021	minutes per year	177.902	45
SAIFI with MED	2021	interruptions per year	1.656	40
SAIFI without MED	2021	interruptions per year	1.030	31
CAIDI with MED	2021	minutes per interruption	527.464	48
CAIDI without MED	2021	minutes per interruption	172.646	50
Average Residential Electricity Consumption	2021	kWh	8,045.692	11
Clean Generation as % of Total Generation	2021	%	37.833	27
CO2 Emissions Intensity	2021	metric tons per GWh	476.524	33
CO2 Equivalent Emissions From Lost NG	2021	metric tons	2,484,568.573	45
CO2 From Combusted NG in All Sectors Except Electrical	2021	metric tons	35,208,128.459	44
CO2 Total Emissions	2021	metric tons	55,044,783.000	42
Industrial Sales of Electricity	2021	MWh	27,081,000.000	12
Interstate Flows	2021	millions of kWh	-10,174.000	37
NG - Commercial Consumption	2021	millions of cubic feet	161,399.000	46
NG - Commercial Price per Therm	2021	$	0.743	13
NG - Industrial Consumption	2021	millions of cubic feet	163,567.000	39
NG - Industrial Price per Therm	2021	$	0.633	29
NG - Residential Consumption	2021	millions of cubic feet	296,039.000	48
NG - Residential Price per Therm	2021	$	0.870	6
NG - Residential Sales Volume	2021	thousands of cubic feet	281,106,938.000	48
NOX Emissions Intensity	2021	metric tons per GWh	0.458	38
NOX From Combusted NG in All Sectors Except Electrical	2021	metric tons	36,017.522	43
NOX Total Emissions	2021	metric tons	52,874.000	49
OHF - Residential Price	2021	$ per million BTU	19.913	22
OHF - Residential Total Use	2021	billions of BTU	64,576.000	47
OHF Use in the Commercial Sector	2021	billions of BTU	19,003.000	43
OHF Use in the Industrial Sector	2021	billions of BTU	64,758.000	36
Percentage of Occupied Housing Units Using Electricity	2021	%	11.826	47
Percentage of Occupied Housing Units Using Utility Natural Gas	2021	%	74.848	49
Percentage of Occupied Housing Units Using Fuel Other than Electricity or Natural Gas	2021	%	12.692	31
Renewable Generation as % of Total Generation	2021	%	10.339	36
Residential Electricity Expenditures per Household	2021	$	1,410.890	24
Residential Energy Expenditures per Household	2021	$	2,227.751	41
Residential Sales of Electricity	2021	MWh	35,868,000.000	14
SO2 Emissions Intensity	2021	metric tons per GWh	0.505	42
SO2 From Combusted NG in All Sectors Except Electrical	2021	metric tons	176.041	44
SO2 Total Emissions	2021	metric tons	58,345.000	48
Total Energy Consumption per Capita	2021	millions of BTU	270.100	21
Weighted Average Water Consumption Intensity	2021	gallons per MWh	102.556	31
Weighted Average Water Withdrawal Intensity	2021	gallons per MWh	8,041.955	35
Wood Use - Residential	2021	billions of BTUs	27,222.000	49
Average Price of Electricity - All Sectors	2021	cents per kWh	12.481	43
Average Price of Electricity - Commercial Sector	2021	cents per kWh	11.688	45
Average Price of Electricity - Industrial Sector	2021	cents per kWh	6.683	33
Average Price of Electricity - Residential Sector	2021	cents per kWh	17.613	43
Distillate Fuel Oil Price - Residential Sector	2021	$ per million BTU	19.730	25.5
Distillate Fuel Oil Use - Residential Sector	2021	billions of BTU	2,923.000	34
Efficiency Programs - Cost per kWh of Savings - Commercial Sector	2021	Thousand $ per MWh	0.013	20
Efficiency Programs - Cost per kWh of Savings - Industrial Sector	2021	Thousand $ per MWh	0.014	28
Efficiency Programs - Cost per kWh of Savings - Residential Sector	2021	Thousand $ per MWh	0.045	37
Efficiency Programs - Electricity Savings as % of Sales - Commercial Sector	2021	%	2.709	2
Efficiency Programs - Electricity Savings as % of Sales - Industrial Sector	2021	%	0.520	9
Efficiency Programs - Electricity Savings as % of Sales - Residential Sector	2021	%	1.405	15
Electrical Generation - all utility-scale solar as % of All Utility Scale Generation	2021	%	0.365	34
Electrical Generation - biomass as % of All Utility Scale Generation	2021	%	2.041	15
Electrical Generation - coal as % of All Utility Scale Generation	2021	%	31.919	32
Electrical Generation - conventional hydroelectric as % of All Utility Scale Generation	2021	%	1.154	36
Electrical Generation - natural gas as % of All Utility Scale Generation	2021	%	26.285	20
Electrical Generation - nuclear as % of All Utility Scale Generation	2021	%	29.580	12
Electrical Generation - wind as % of All Utility Scale Generation	2021	%	6.630	23
Renewable Generation as % of Sales	2021	%	12.045	32
Weighted Average Utility ROE	2021	%	9.114	39

About This Report

The rankings listed in Fig. 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. For example, our report assumes that it is desirable for renewables to make up a higher percentage of generation, so a higher number on that metric leads to a higher ranking for a state. Similarly, energy efficiency representing a higher percentage of a state's electricity sales also leads to a higher ranking.

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 data from 2022, but mostly shows data from calendar year 2021.
This report 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.

See Appendix for the number of customers of each of Michigan's utilities.

RANKING MICHIGAN ELECTRIC UTILITIES ON RELIABILITY, AFFORDABILITY AND EFFICIENCY

2021 Alpena Power Co Performance Summary				
Metric	Value	Michigan	US Average	IOU Rank
Number of Electricity Customers Across All Sectors	16624	5014447		6
SAIDI with Major Event Days (Minutes)	244	873	440	1
SAIDI without Major Event Days (Minutes)	120.2	177.9	119.9	1
SAIFI with Major Event Days (# of Outages)	1.8	1.656	1.396	4
SAIFI without Major Event Days (# of Outages)	1.1	1.03	0.998	3
CAIDI with Major Event Days (Minutes)	135.4	527	315	1
CAIDI without Major Event Days (Minutes)	109.3	172.6	120.1	1
Residential Electricity Price ($)	0.13915	17.61	13.07	2
Commercial Electricity Price ($)	0.12241	11.69	9.81	5
Industrial Electricity Price ($)	0.06856	6.68	6.12	6
Residential Electricity Savings from Efficiency Programs as a % of Sales		1.405	0.846	

2021 Consumers Energy Co Performance Summary				
Metric	Value	Michigan	US Average	IOU Rank
Number of Electricity Customers Across All Sectors	1871096	5014447		2
SAIDI with Major Event Days (Minutes)	911	873	440	5
SAIDI without Major Event Days (Minutes)	227.9	177.9	119.9	5
SAIFI with Major Event Days (# of Outages)	1.601	1.656	1.396	3
SAIFI without Major Event Days (# of Outages)	1.053	1.03	0.998	2
CAIDI with Major Event Days (Minutes)	569.1	527	315	6
CAIDI without Major Event Days (Minutes)	216.4	172.6	120.1	6
Residential Electricity Price ($)	0.18126	17.61	13.07	6
Commercial Electricity Price ($)	0.13015	11.69	9.81	6
Industrial Electricity Price ($)	0.06413	6.68	6.12	4
Residential Electricity Savings from Efficiency Programs as a % of Sales	1.246	1.405	0.846	4

2021 DTE Electric Company Performance Summary

Metric	Value	Michigan	US Average	IOU Rank
Number of Electricity Customers Across All Sectors	2249459	5014447		1
SAIDI with Major Event Days (Minutes)	927.4	873	440	7
SAIDI without Major Event Days (Minutes)	135.6	177.9	119.9	2
SAIFI with Major Event Days (# of Outages)	1.581	1.656	1.396	2
SAIFI without Major Event Days (# of Outages)	0.924	1.03	0.998	1
CAIDI with Major Event Days (Minutes)	586.6	527	315	7
CAIDI without Major Event Days (Minutes)	146.8	172.6	120.1	4
Residential Electricity Price ($)	0.17856	17.61	13.07	5
Commercial Electricity Price ($)	0.10519	11.69	9.81	1
Industrial Electricity Price ($)	0.06371	6.68	6.12	3
Residential Electricity Savings from Efficiency Programs as a % of Sales	1.747	1.405	0.846	3

2021 Indiana Michigan Power Co Performance Summary

Metric	Value	Michigan	US Average	IOU Rank
Number of Electricity Customers Across All Sectors	130628	5014447		3
SAIDI with Major Event Days (Minutes)	912	873	440	6
SAIDI without Major Event Days (Minutes)	312.4	177.9	119.9	7
SAIFI with Major Event Days (# of Outages)	2.016	1.656	1.396	5
SAIFI without Major Event Days (# of Outages)	1.325	1.03	0.998	5
CAIDI with Major Event Days (Minutes)	452.4	527	315	5
CAIDI without Major Event Days (Minutes)	235.8	172.6	120.1	7
Residential Electricity Price ($)	0.16045	17.61	13.07	3
Commercial Electricity Price ($)	0.12178	11.69	9.81	4
Industrial Electricity Price ($)	0.08544	6.68	6.12	7
Residential Electricity Savings from Efficiency Programs as a % of Sales	0.883	1.405	0.846	5

2021 Northern States Power Co Performance Summary

Metric	Value	Michigan	US Average	IOU Rank
Number of Electricity Customers Across All Sectors	8930	5014447		7
SAIDI with Major Event Days (Minutes)	562	873	440	3
SAIDI without Major Event Days (Minutes)	177	177.9	119.9	4
SAIFI with Major Event Days (# of Outages)	2.112	1.656	1.396	6
SAIFI without Major Event Days (# of Outages)	1.434	1.03	0.998	6
CAIDI with Major Event Days (Minutes)	266.2	527	315	3
CAIDI without Major Event Days (Minutes)	123.4	172.6	120.1	2
Residential Electricity Price ($)	0.12502	17.61	13.07	1
Commercial Electricity Price ($)	0.11418	11.69	9.81	2
Industrial Electricity Price ($)	0.06742	6.68	6.12	5
Residential Electricity Savings from Efficiency Programs as a % of Sales	2.618	1.405	0.846	1

2021 Upper Michigan Energy Resources Corp. Performance Summary

Metric	Value	Michigan	US Average	IOU Rank
Number of Electricity Customers Across All Sectors	37004	5014447		5
SAIDI with Major Event Days (Minutes)	779	873	440	4
SAIDI without Major Event Days (Minutes)	239	177.9	119.9	6
SAIFI with Major Event Days (# of Outages)	2.15	1.656	1.396	7
SAIFI without Major Event Days (# of Outages)	1.5	1.03	0.998	7
CAIDI with Major Event Days (Minutes)	362.3	527	315	4
CAIDI without Major Event Days (Minutes)	159.3	172.6	120.1	5
Residential Electricity Price ($)	0.16172	17.61	13.07	4
Commercial Electricity Price ($)	0.11935	11.69	9.81	3
Industrial Electricity Price ($)	0.06009	6.68	6.12	2
Residential Electricity Savings from Efficiency Programs as a % of Sales		1.405	0.846	

2021 Upper Peninsula Power Company Performance Summary				
Metric	**Value**	**Michigan**	**US Average**	**IOU Rank**
Number of Electricity Customers Across All Sectors	53295	5014447		4
SAIDI with Major Event Days (Minutes)	273	873	440	2
SAIDI without Major Event Days (Minutes)	148.7	177.9	119.9	3
SAIFI with Major Event Days (# of Outages)	1.48	1.656	1.396	1
SAIFI without Major Event Days (# of Outages)	1.16	1.03	0.998	4
CAIDI with Major Event Days (Minutes)	184.7	527	315	2
CAIDI without Major Event Days (Minutes)	128.2	172.6	120.1	3
Residential Electricity Price ($)	0.2197	17.61	13.07	7
Commercial Electricity Price ($)	0.1564	11.69	9.81	7
Industrial Electricity Price ($)	0.0468	6.68	6.12	1
Residential Electricity Savings from Efficiency Programs as a % of Sales	2.207	1.405	0.846	2

ELECTRIC AND NATURAL GAS UTILITY RELIABILITY AND PERFORMANCE

Electric Utilities Overview

Electricity is essential to modern life. As the U.S. moves towards decarbonizing its economy through electrification, electric reliability 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 ensures that there is sufficient power generation capacity to satisfy utility customer peak demand. However, loss of electricity supply due to generation or transmission problems accounts for only about 1% of outage minutes nationally. Power outages that utility customers experience on a regular basis are not caused by insufficient generation capacity or long-distance transmission, but 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), has determined that the best overall measure of an electric utility's reliability is the average number of minutes of outage per year per customer, calculated by a method referred to as the System Average Interruption Duration Index (SAIDI). SAIDI is our primary metric for electric reliability, but it is the product of two other reliability metrics: the System Average Interruption Frequency Index (SAIFI), which measures outages per customer, and the Customer Average Interruption Duration Index (CAIDI), which measures the average time for the utility to restore power to a customer after an outage starts.

Beginning in 2013, the EIA began collecting annual reports of SAIDI, SAIFI, and CAIDI from utilities and publishing those data in annual compilations. These data are collected on form EIA-861 and may be downloaded here. The latest available reliability data from EIA are for calendar year 2021. The EIA collects SAIDI and SAIFI metrics with and without Major Event Days (MED). MED 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 are 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

As can be seen in Figure 2, in 2021 Michigan ranked 46th, or sixth-worst, among the states in overall average number of minutes of outage per customer (SAIDI with MED) over the year and 45th, or seventh-worst, in number of minutes of outage per customer (SAIDI without MED) over the year. Last year, Michigan ranked 34th and 42nd for these two metrics, respectively, suggesting that 2020 had relatively better performance for Michigan on SAIDI than usual.

2021 results on SAIDI, however, are closer to the overall trend than last year's results were. The five-year averages in Figure 5 show that Michigan's performance in SAIDI without MED has remained very high relative to other states over the last several years, while SAIDI with MED has ranged from high to very high relative to other states.

Figure 2: 2021 System Average Interruption Duration Index (SAIDI) in Minutes

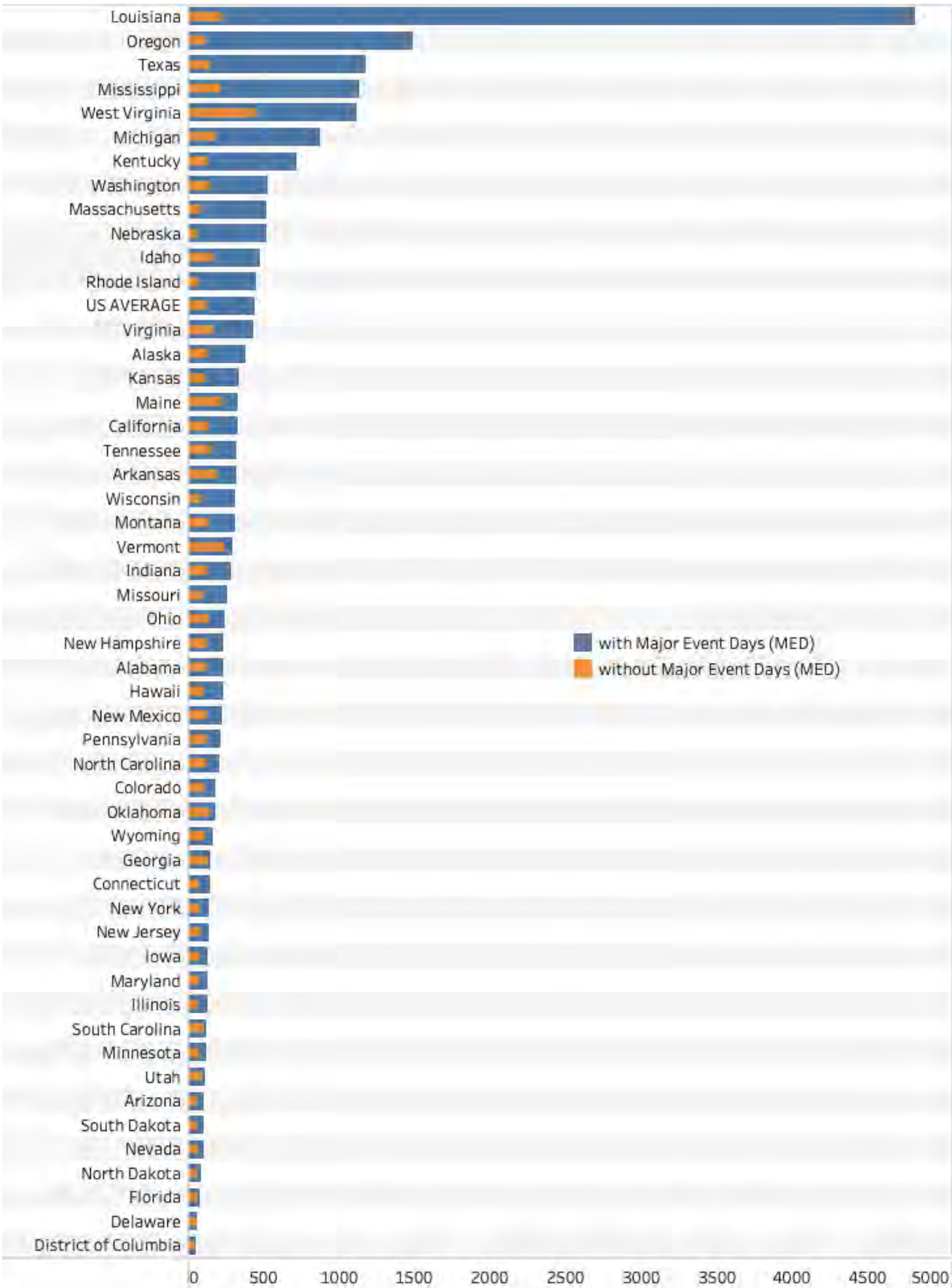


Figure 3: 2021 System Average Interruption Duration Index (SAIDI) with Major Event Days in Minutes [Map]

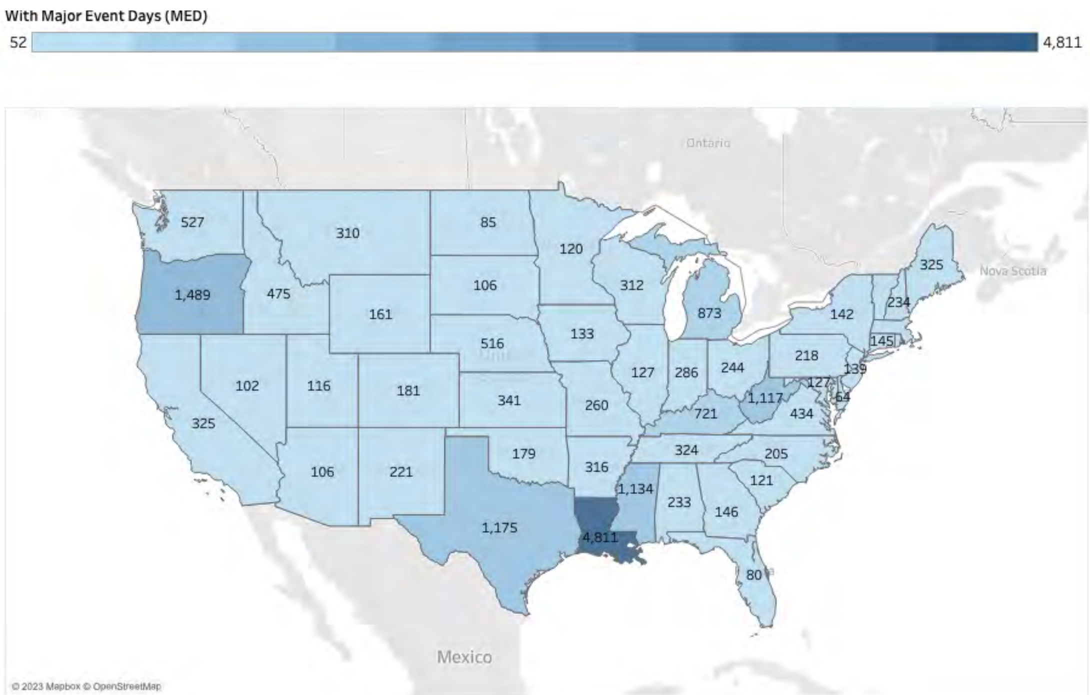
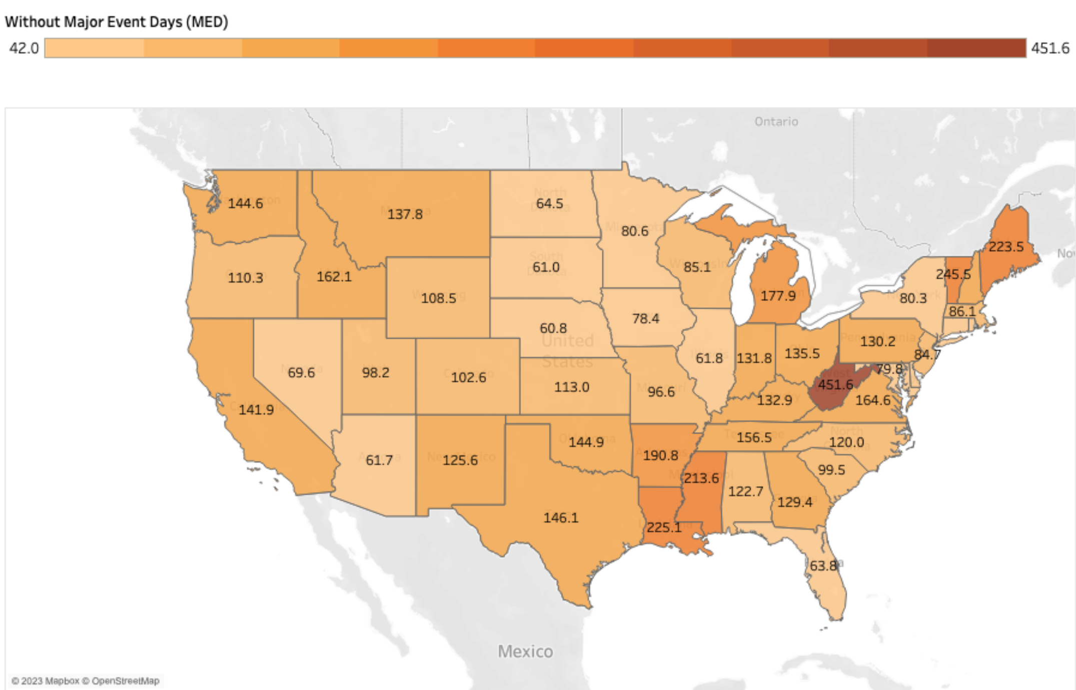


Figure 4: 2021 System Average Interruption Duration Index (SAIDI) without Major Event Days in Minutes [Map]



SAIDI (Five-Year Average)

Figure 5: Average (2017-2021) System Average Interruption Duration Index (SAIDI) in Minutes

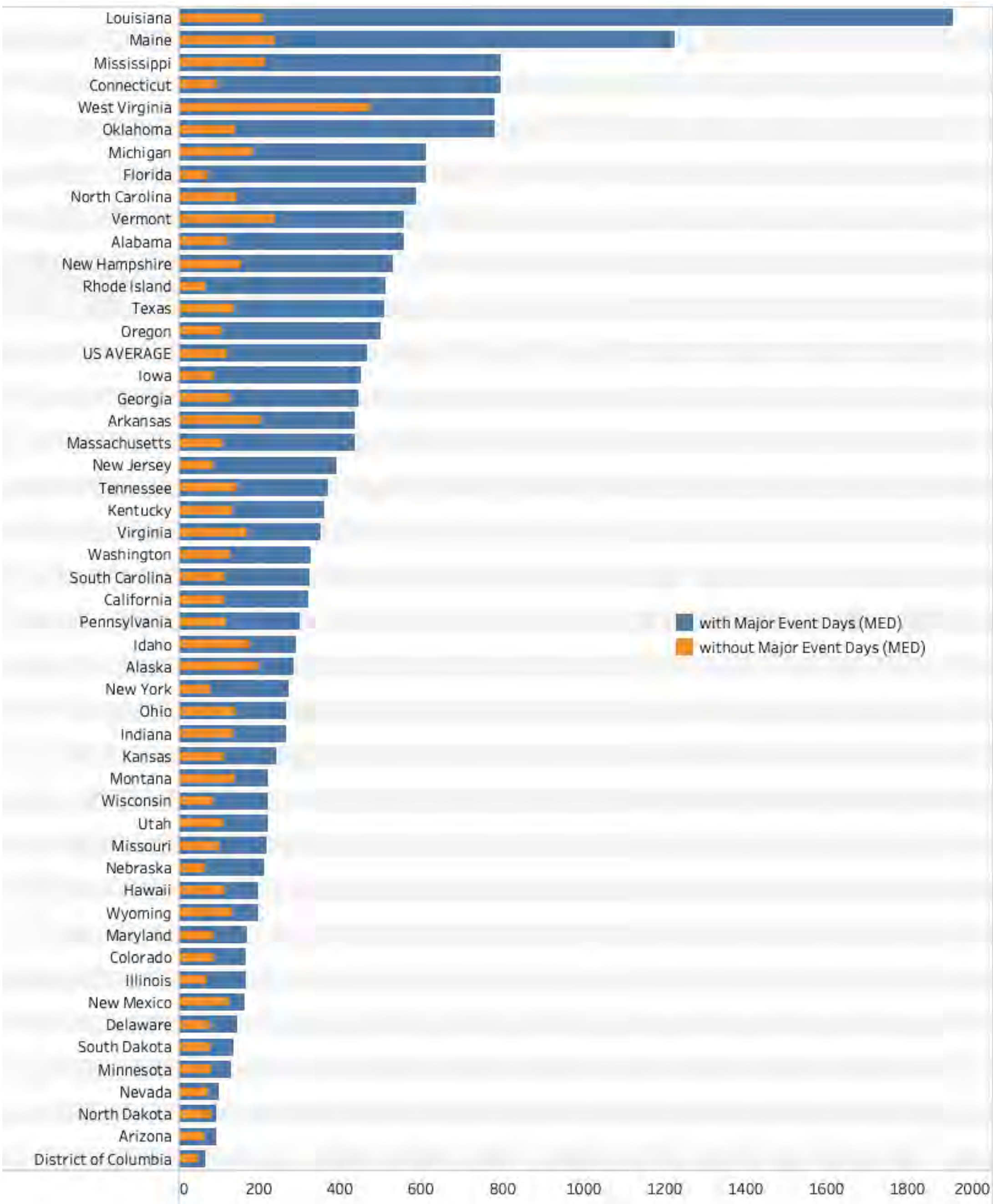


Figure 6: Average (2017-2021) System Average Interruption Duration Index (SAIDI) with Major Event Days in Minutes [Map]

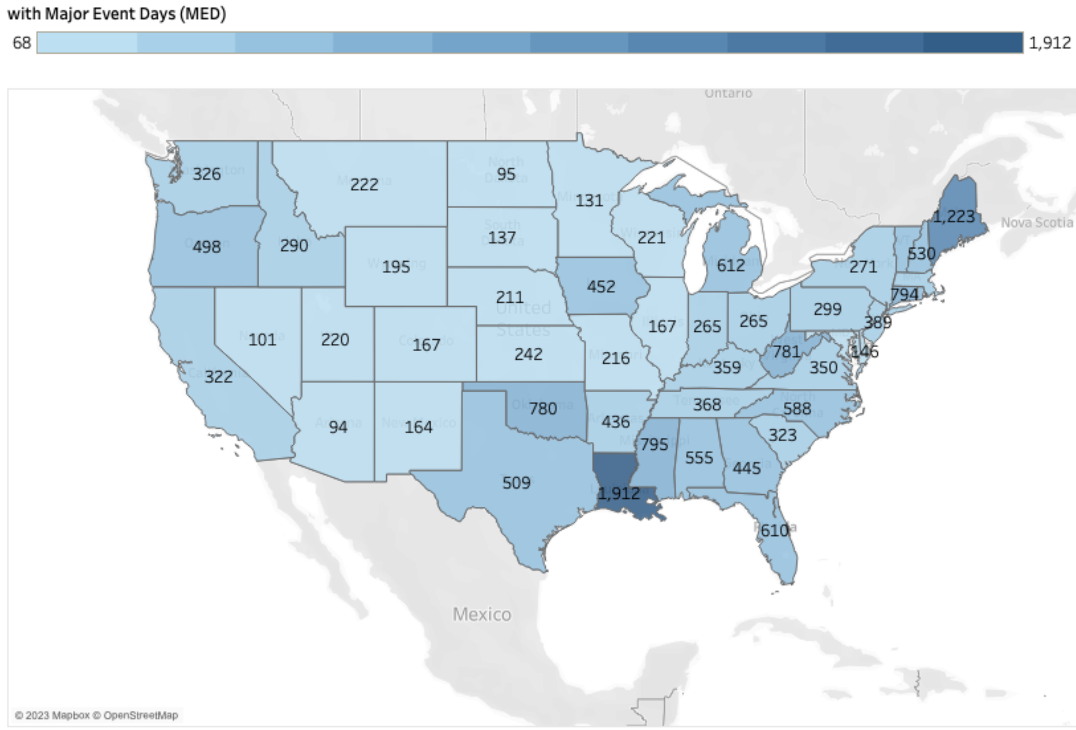
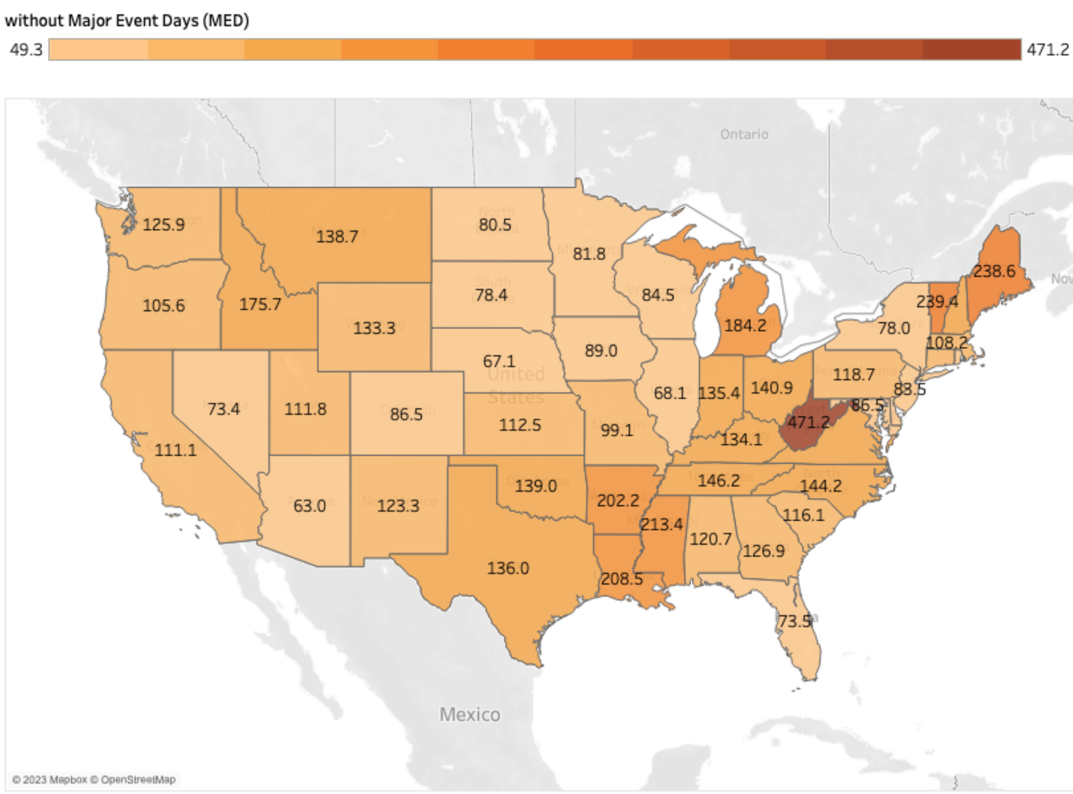


Figure 7: Average (2017-2021) System Average Interruption Duration Index (SAIDI) without Major Event Days in Minutes [Map]



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

Figure 8 shows Michigan's number of outages per customer per year compared to other states, with and without MED. In 2021, Michigan performed below average, ranking 40th overall, or 12th-worst. When MED are excluded, Michigan's ranking is 31st overall. Both rankings represent a fall from 2020, when Michigan ranked 28th and 32nd for SAIFI with and without MED, respectively.

Figure 11 shows that Michigan's number of outages per customer with or without MED is above the national average for the last five years.

Figure 8: 2021 System Average Interruption Frequency Index (SAIFI) in Interruptions per Year

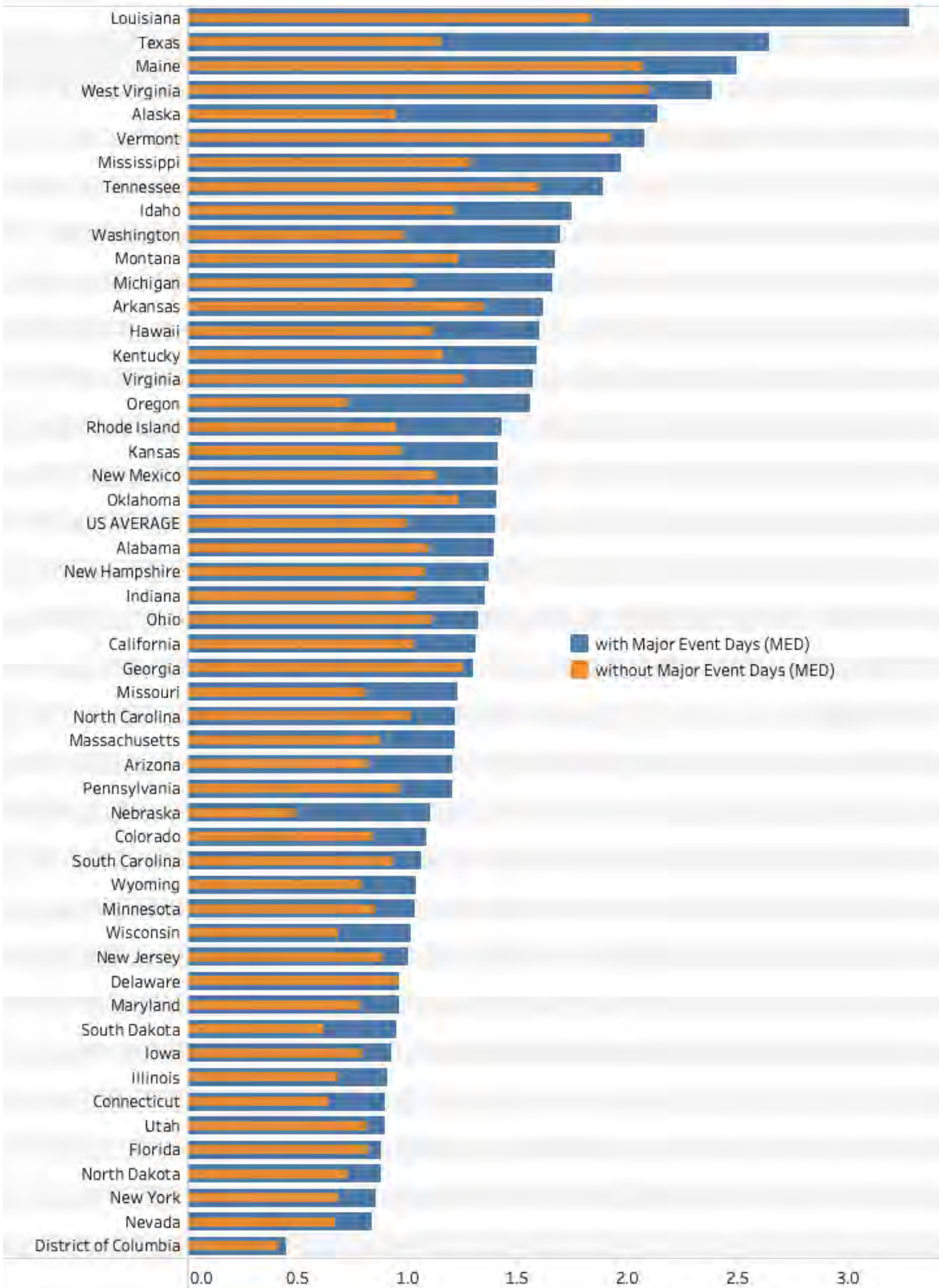


Figure 9: 2021 System Average Interruption Frequency Index (SAIFI) with Major Event Days in Interruptions per Year [Map]

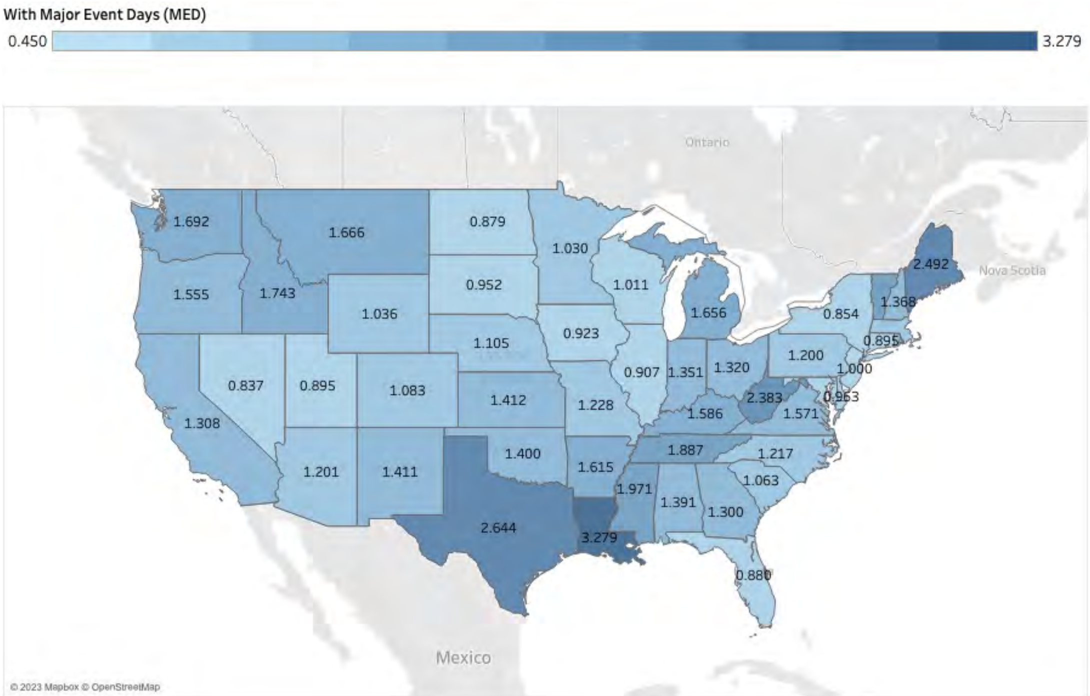
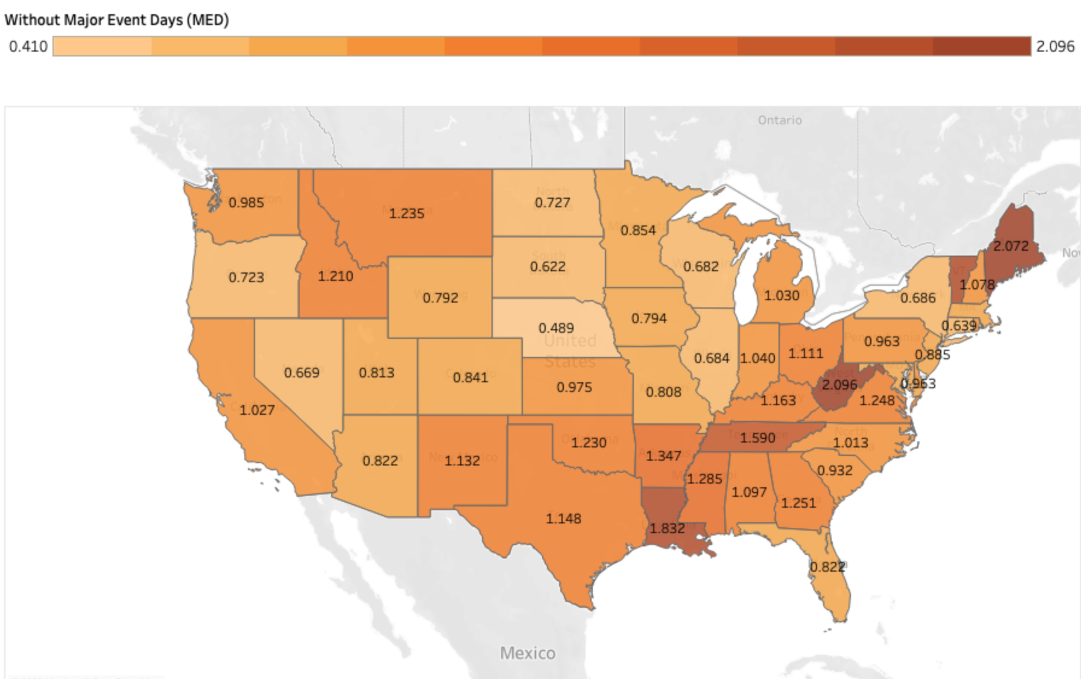


Figure 10: 2021 System Average Interruption Frequency Index (SAIFI) without Major Event Days in Interruptions per Year [Map]



SAIFI (Five-Year Average)

Figure 11: Average (2017-2021) System Average Interruption Frequency Index (SAIFI) in Interruptions per Year

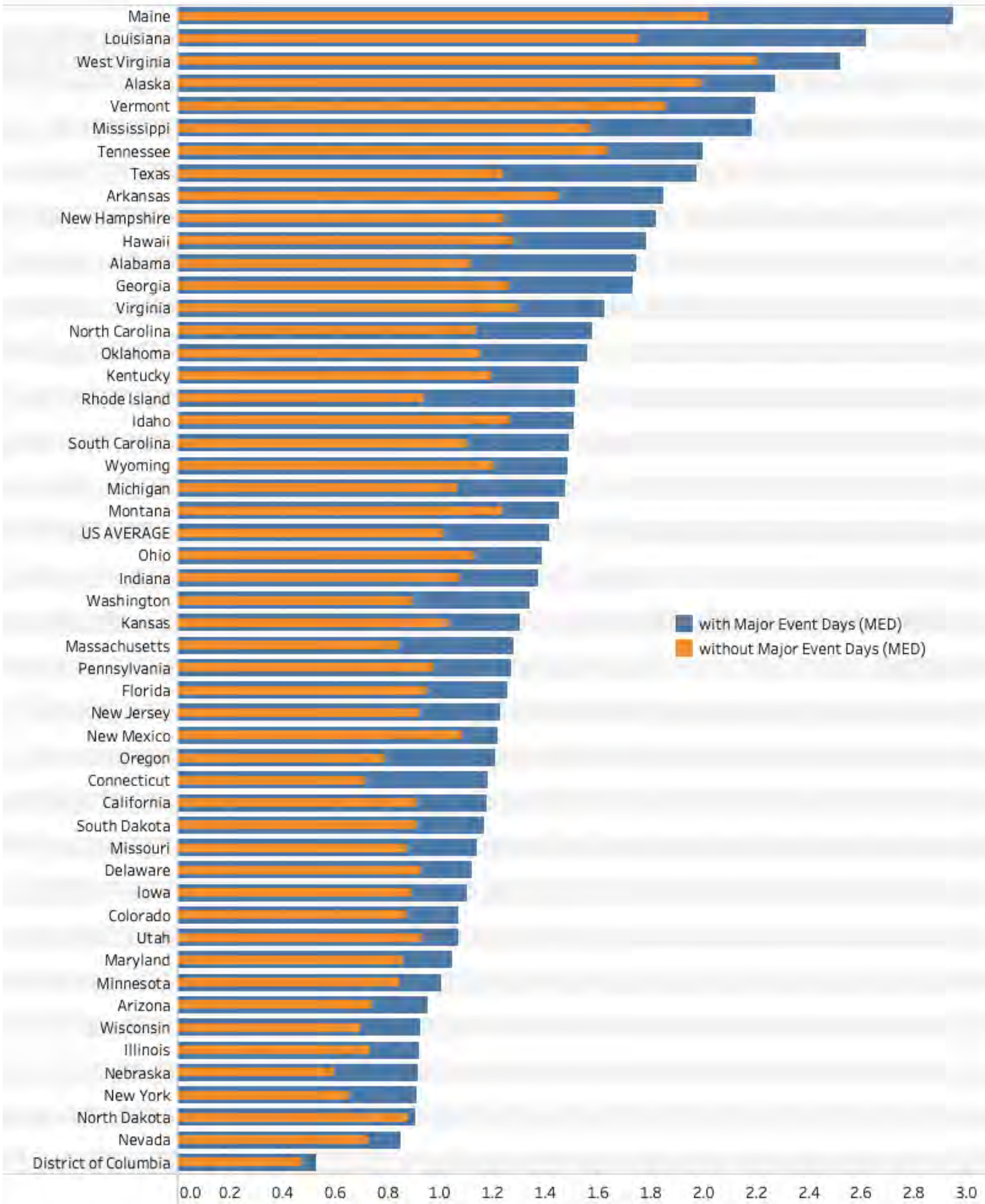


Figure 12: Average (2017-2021) System Average Interruption Frequency Index (SAIFI) with Major Event Days in Interruptions per Year [Map]

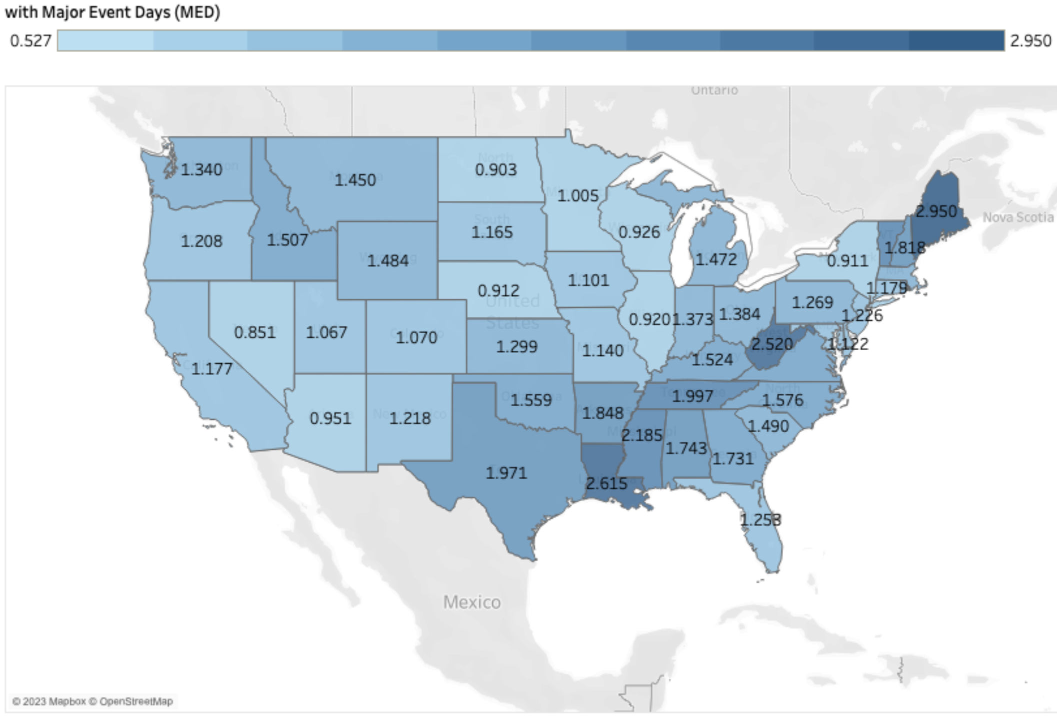
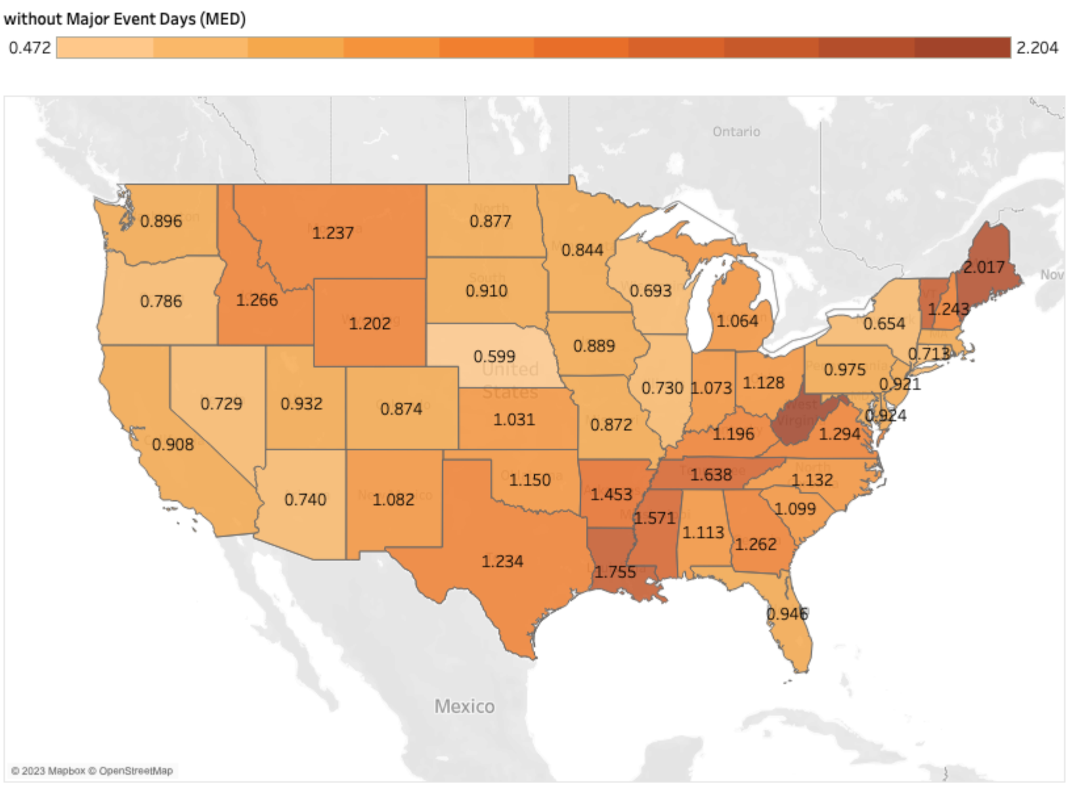


Figure 13: Average (2017-2021) System Average Interruption Frequency Index (SAIFI) without Major Event Days in Interruptions per Year [Map]



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. In 2021, Michigan ranked 48th, fourth-worst in the country, for CAIDI with MED, and 50th, second-worst, without MED. The latter is the same ranking as the previous year.

Figure 17 shows that Michigan's 2021 performance on CAIDI is in line with its poor five-year average, although its 2021 performance on CAIDI with MED is substantially worse than the state's five-year average.

Figure 14: 2021 Customer Average Interruption Duration Index (CAIDI) in Minutes

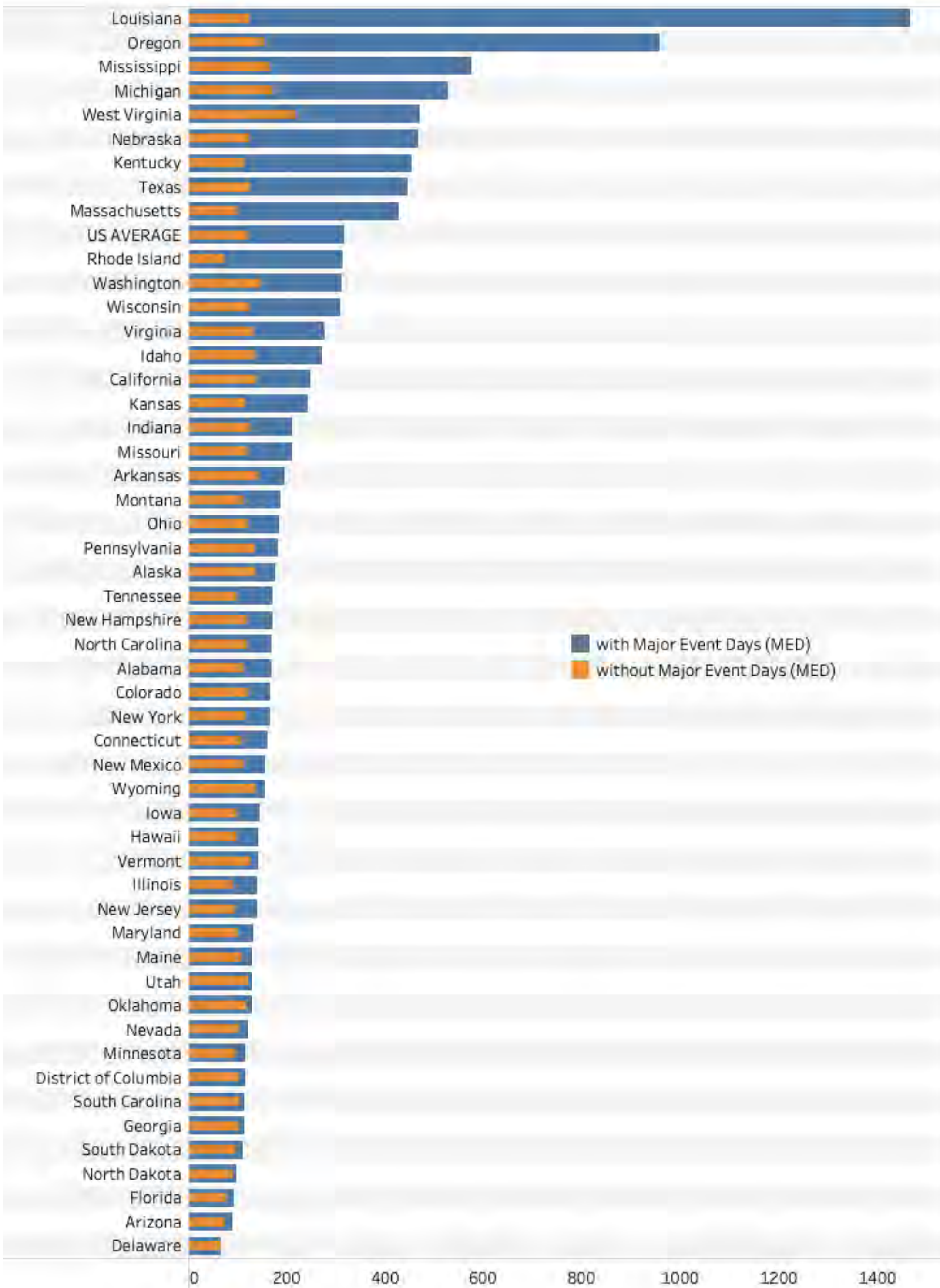


Figure 15: 2021 Customer Average Interruption Duration Index (CAIDI) with Major Event Days in Minutes [Map]

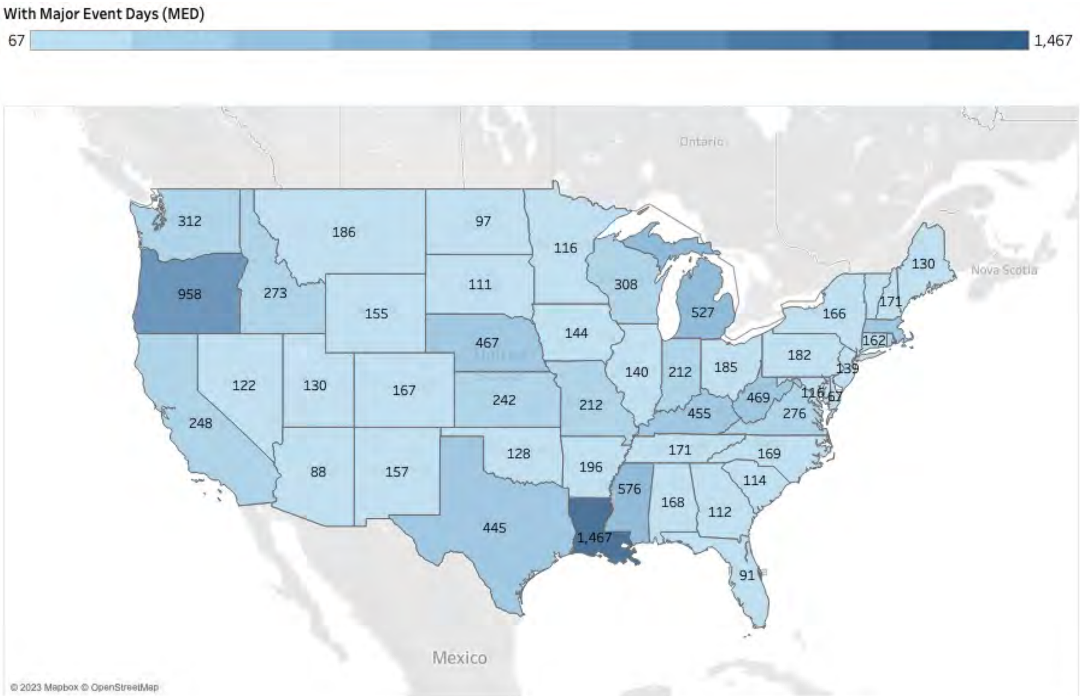
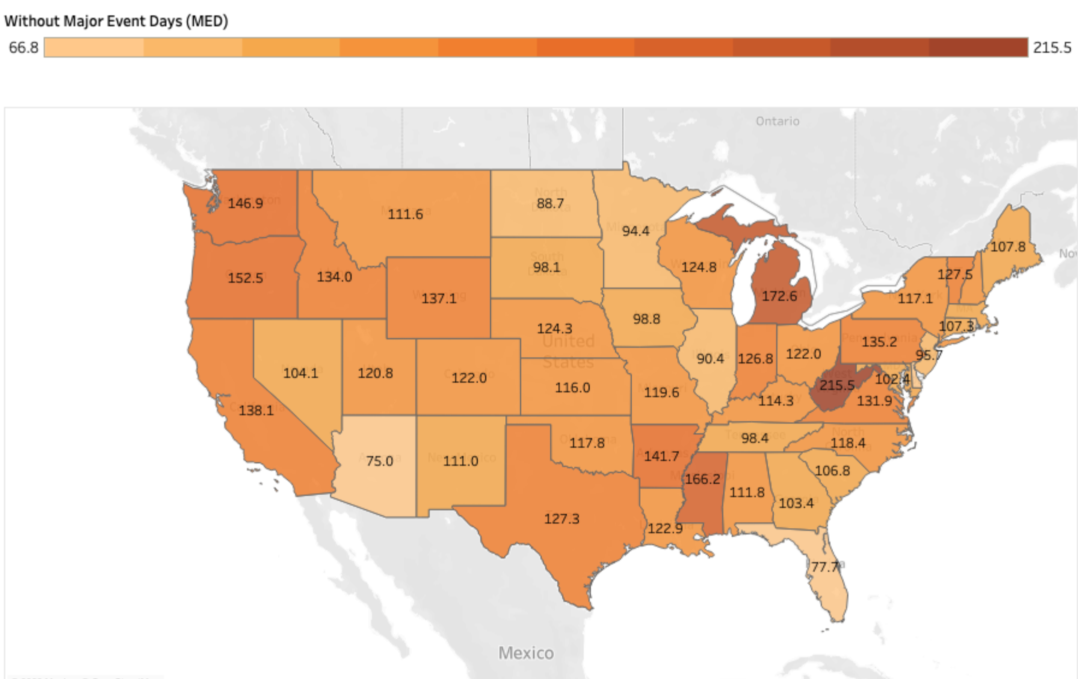


Figure 16: 2021 Customer Average Interruption Duration Index (CAIDI) without Major Event Days in Minutes [Map]



CAIDI (Five-Year Average)

Figure 17: Average (2017-2021) Customer Average Interruption Duration Index (CAIDI) in Minutes

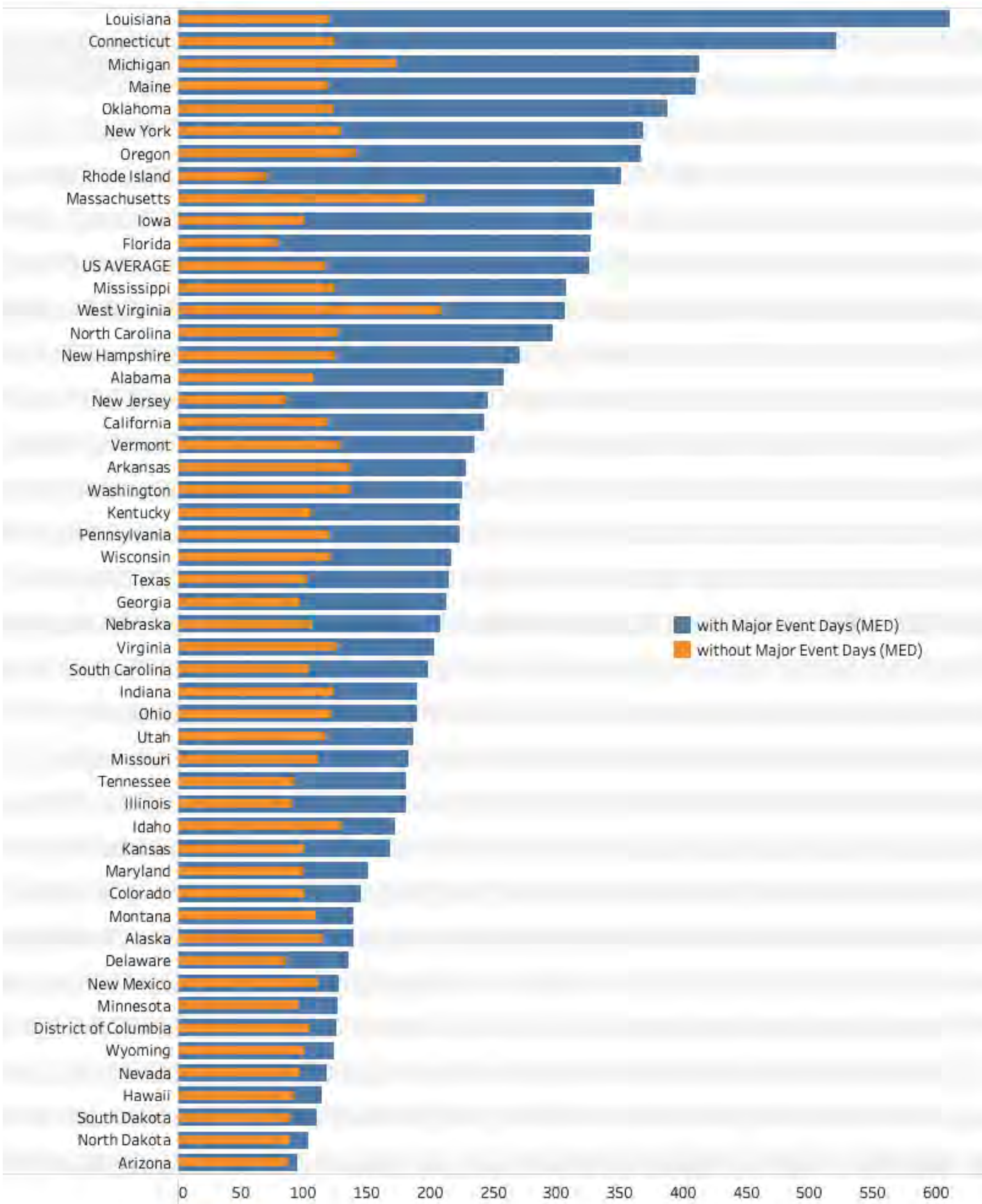


Figure 18: Average (2017-2021) Customer Average Interruption Duration Index (CAIDI) with Major Event Days in Minutes [Map]

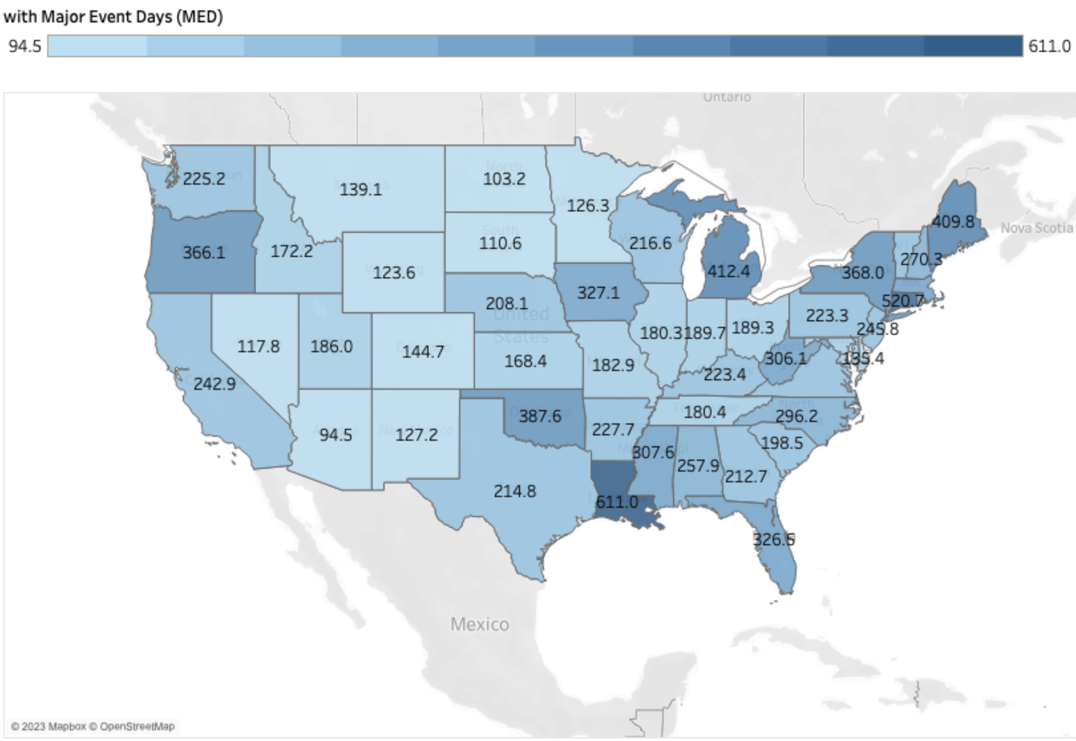
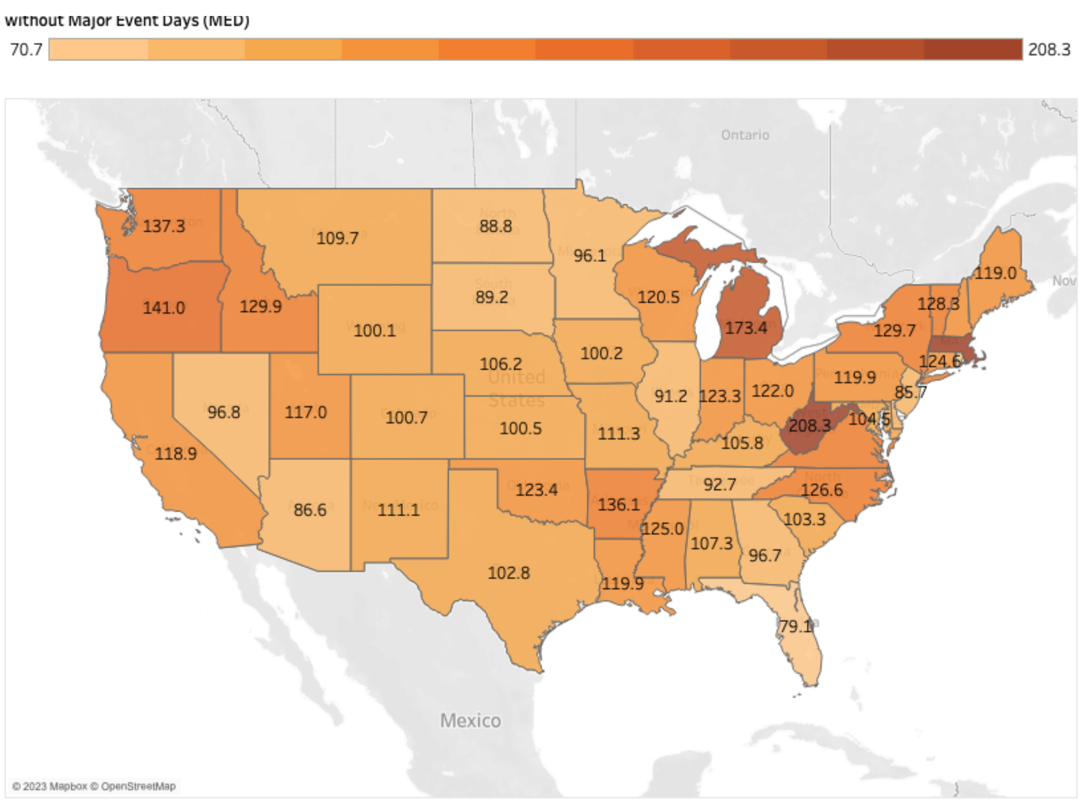


Figure 19: Average (2017-2021) Customer Average Interruption Duration Index (CAIDI) without Major Event Days in Minutes [Map]



Reliability: Comparing Michigan Utilities

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 trends 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.

Figure 20: 2021 System Average Interruption Duration Index (SAIDI) in Minutes for Michigan Utilities

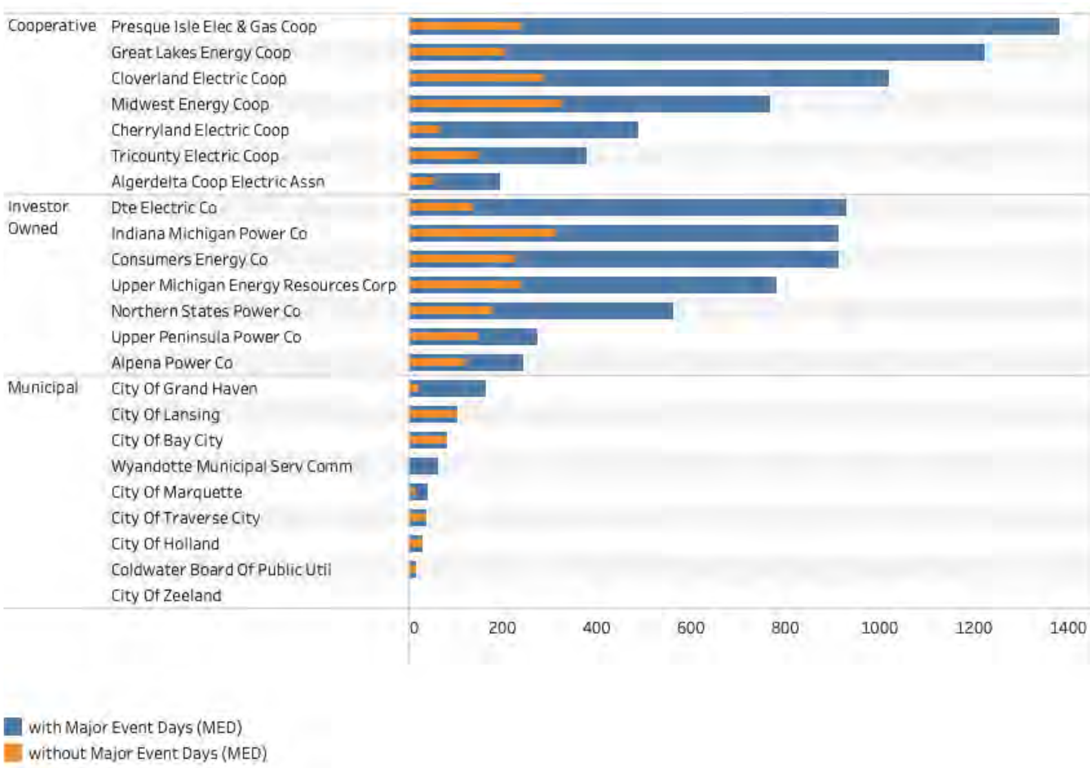


Figure 21: 2021 System Average Interruption Frequency Index (SAIFI) in Interruptions per Year for Michigan Utilities

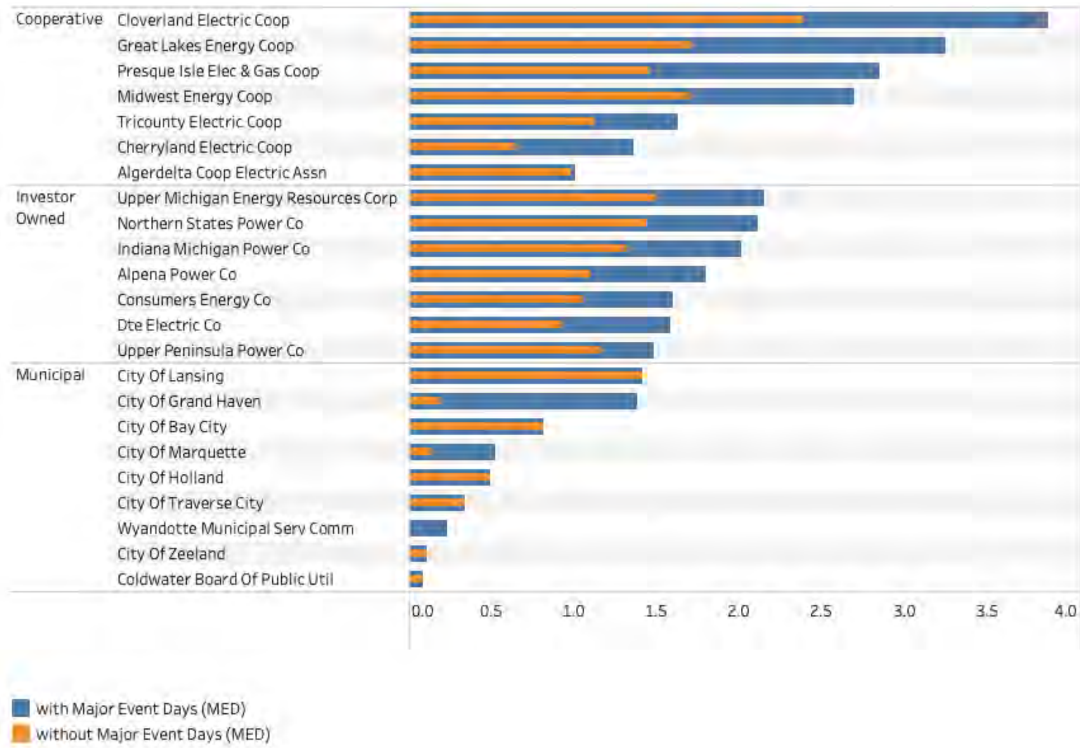
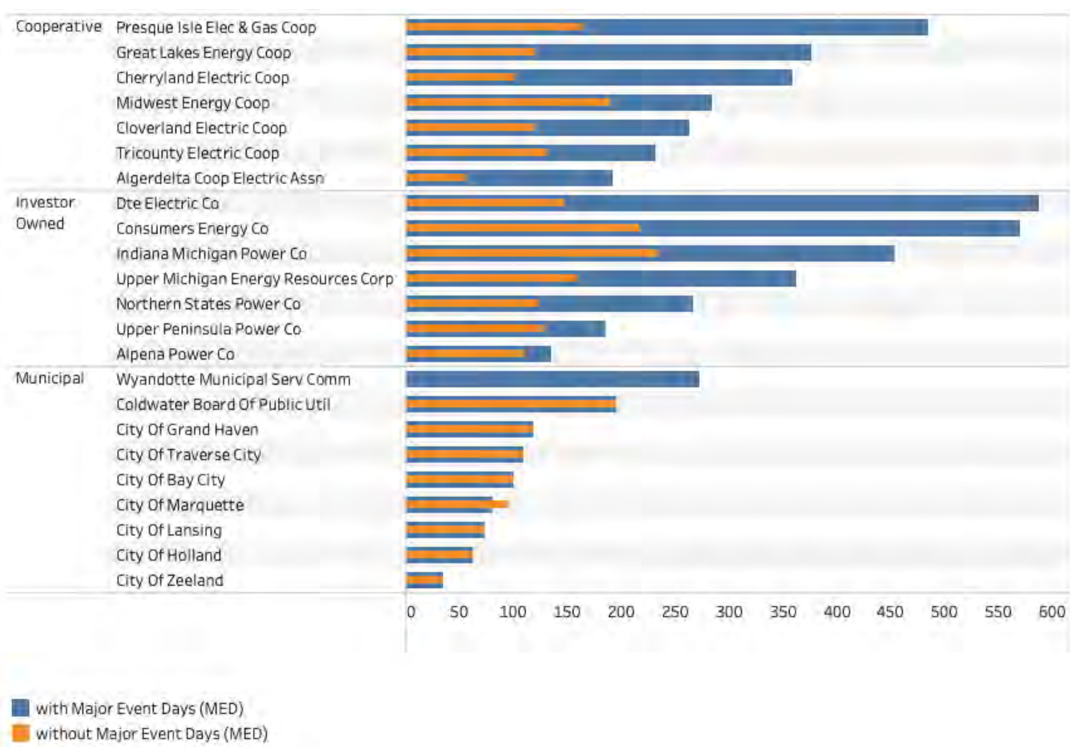


Figure 22: 2021 Customer Average Interruption Duration Index (CAIDI) in Minutes for Michigan Utilities



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 is a 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 utilities' 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.

Figure 23 shows natural gas losses as a percentage of sales as an indication of gas utility reliability. This is a useful statistic, but it is imperfect, because states that produce natural gas for export may show leaks from their production and export infrastructure as losses, thus skewing the ratio of losses to in-state sales and absorbing some of the losses that could be attributable to the states that import their natural gas.

As shown in Figure 23, Michigan ranked 29th, or 23rd-worst, for natural gas losses due to leaks and unaccounted-for gas as a percentage of total sales.

Figure 23: Unaccounted-for Natural Gas and Losses of Gas as a Percentage of Sales

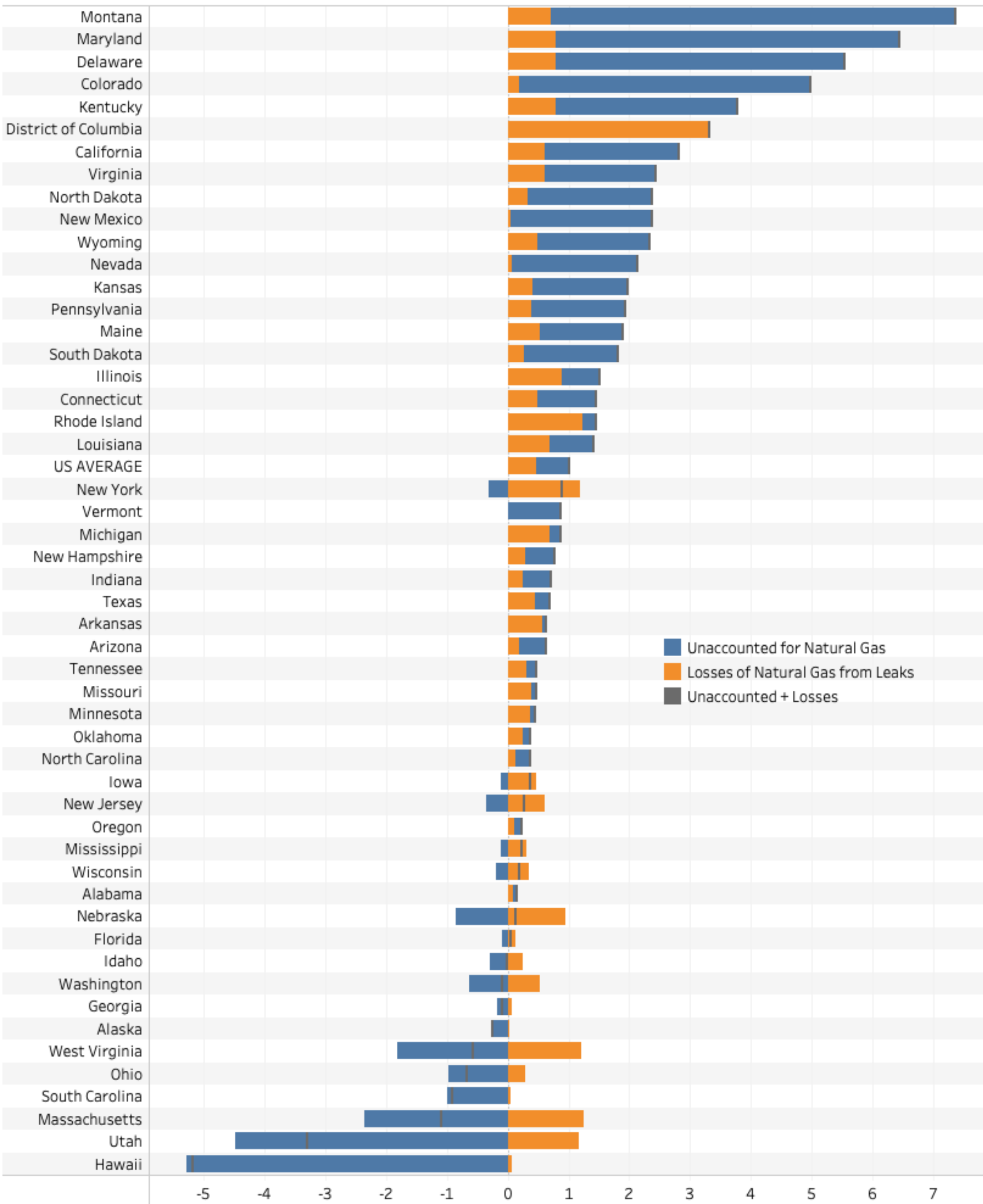
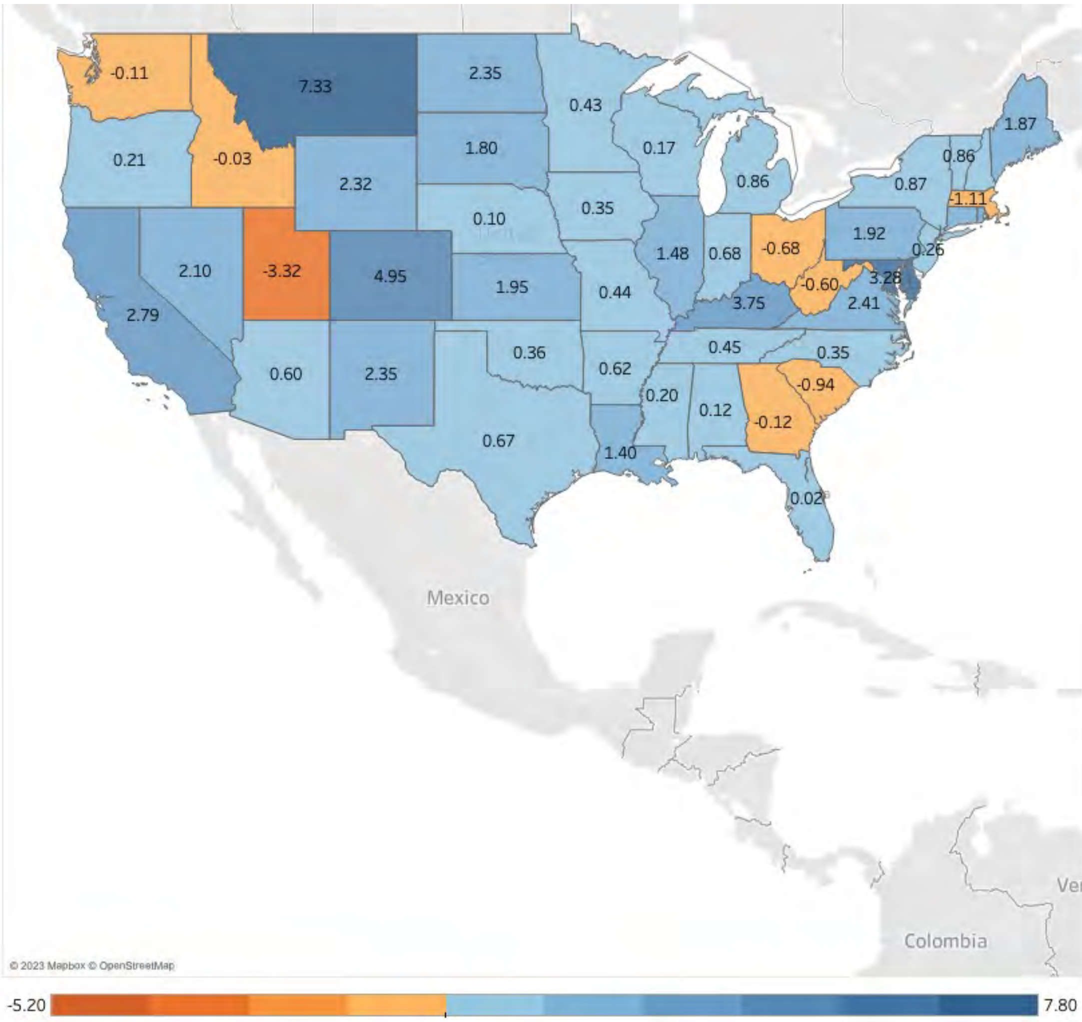


Figure 24: Unaccounted-for Natural Gas as a Percentage of Sales [Map]



AFFORDABILITY OF ENERGY

Residential Costs

This section quantifies energy affordability through the metric of energy expenditures as a percentage of state median income. For these figures, energy expenditures refer to expenditures on all forms of energy combined, which includes electricity, natural gas and other heating fuels.

The broad trends in affordability show that some of the least affordable states 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 2021, Michigan rated 41st, or 11th-worst, on household energy expenditures as a percentage of median income, three ranks worse than in last year's data. The average Michigan household spent 3.5% of its income on energy (Figure 28). In absolute terms, the average Michigan household spent about $2,228 on energy, making Michiganders' energy bills the 11th-highest in the nation (Figure 25), one rank worse than in 2020.

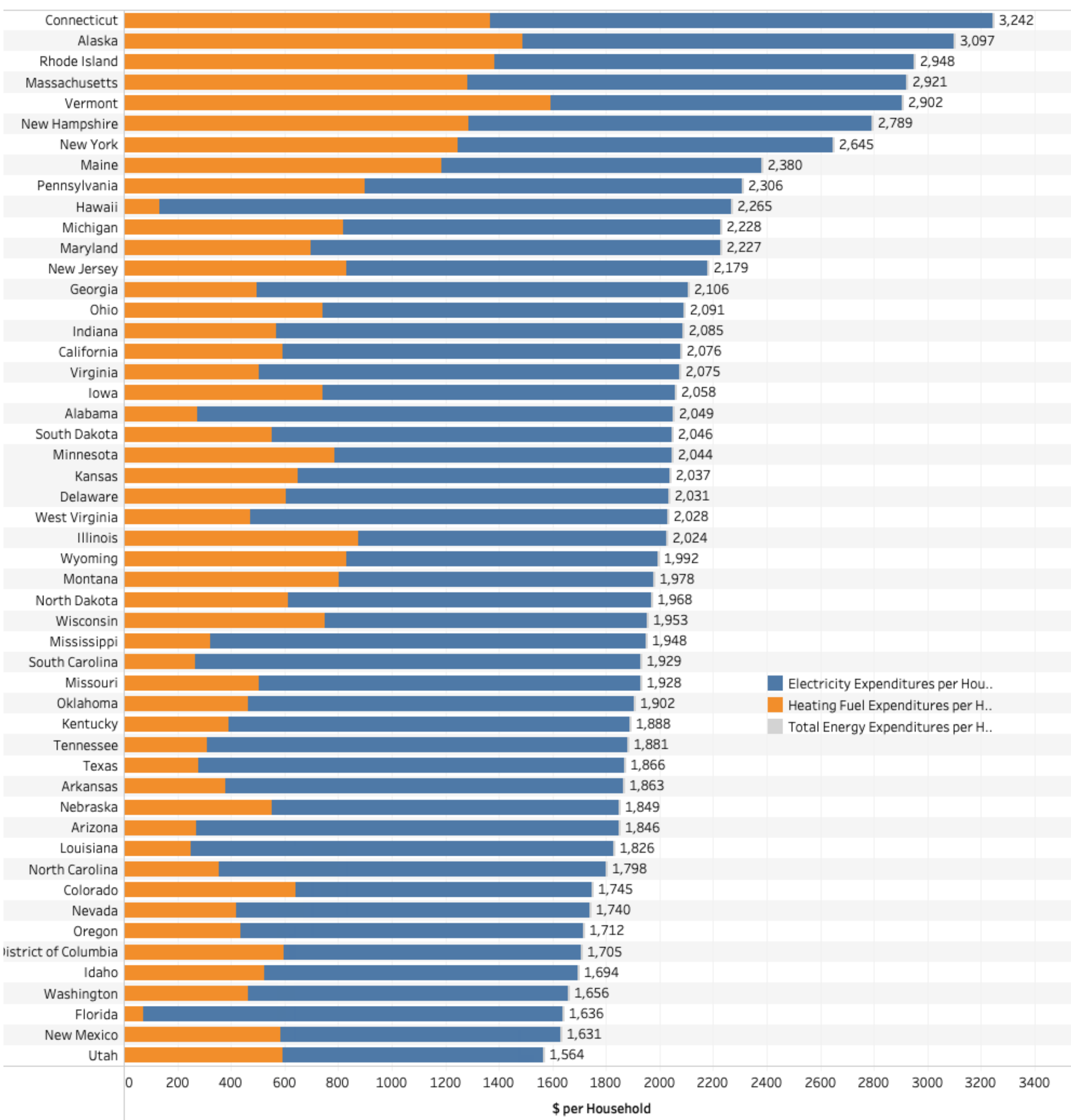


Figure 25: 2021 Residential Energy Expenditures per Household (in Dollars)

Figure 26: 2021 Residential Energy Expenditures per Household (in Dollars) [Map]

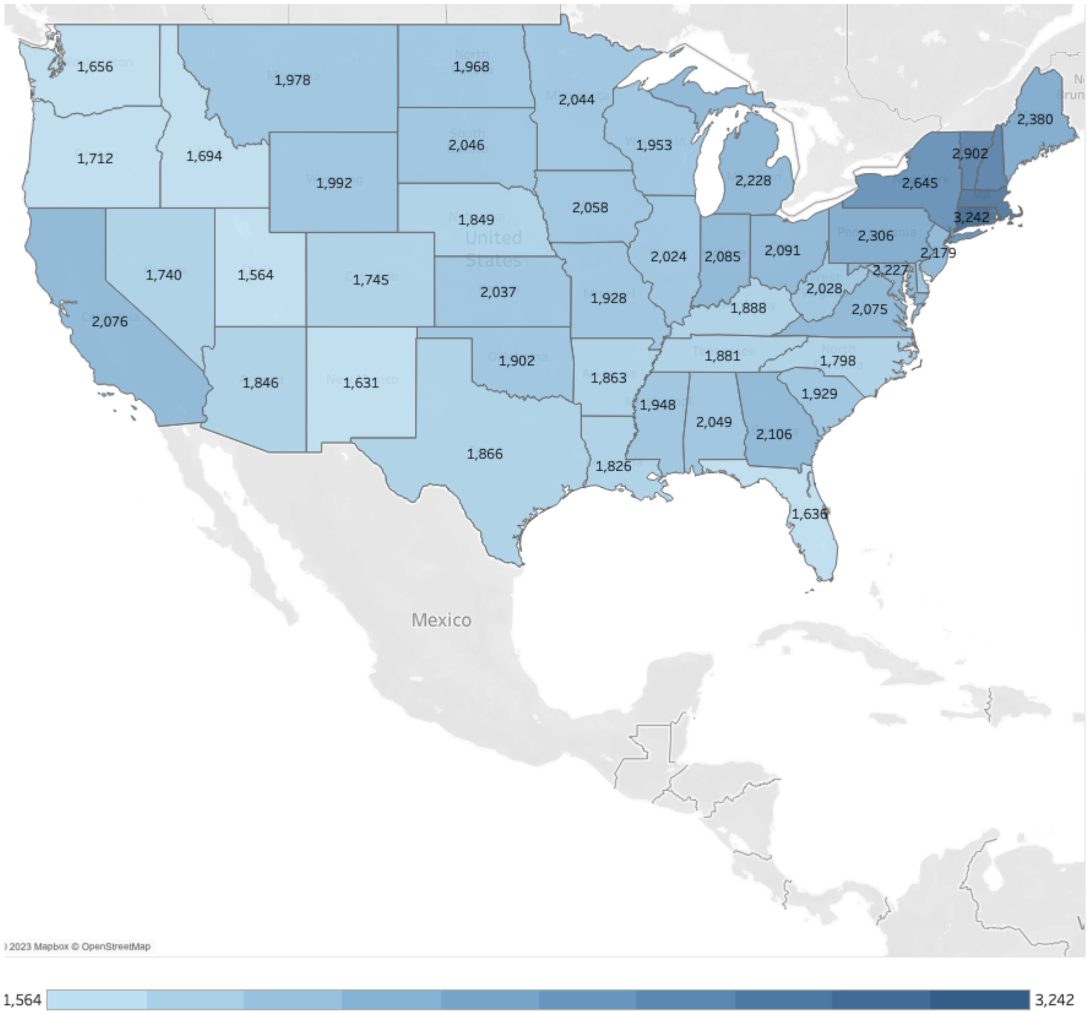


Figure 27: 2021 Household Residential Energy Expenditures as a Percentage of Median Income

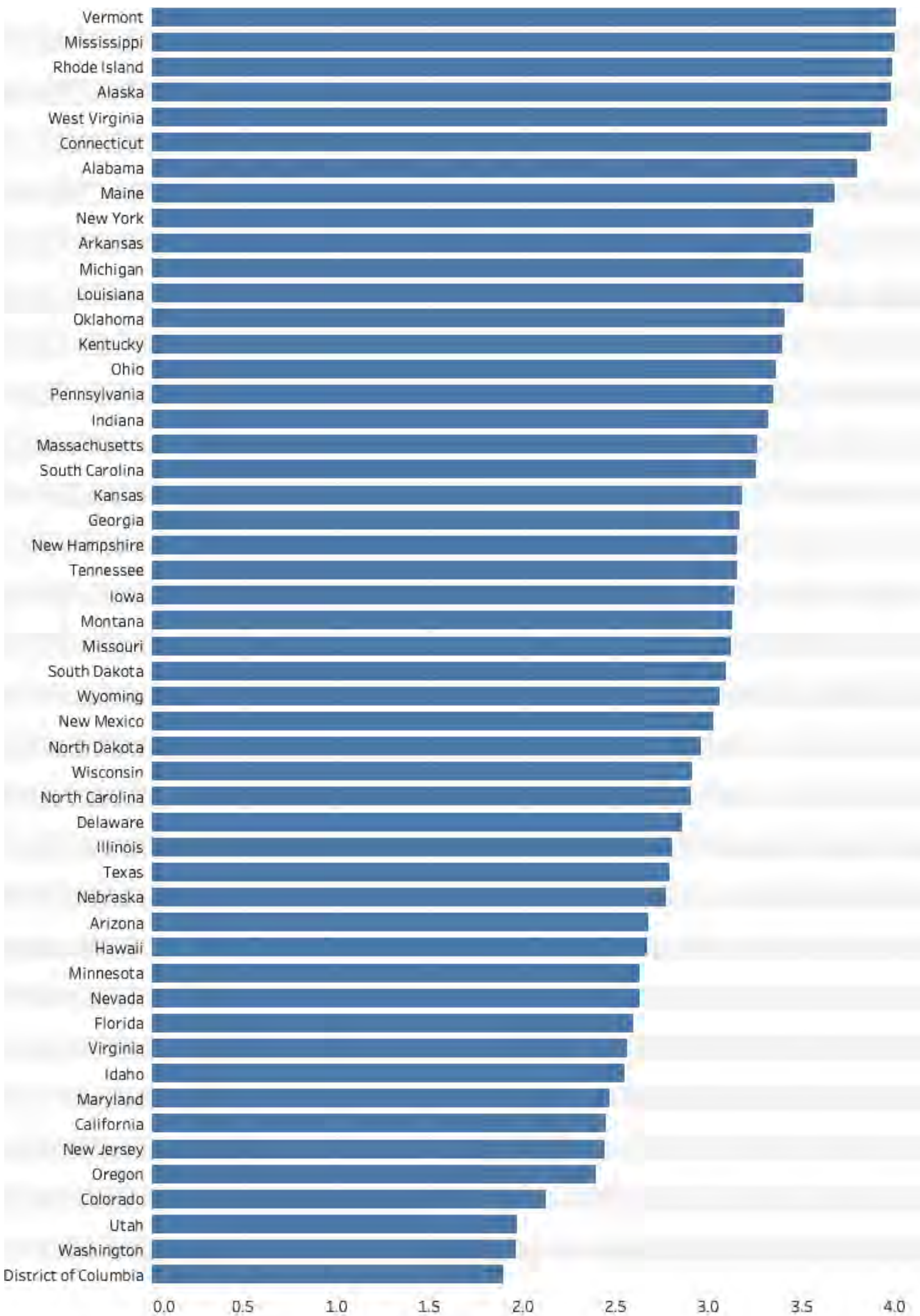
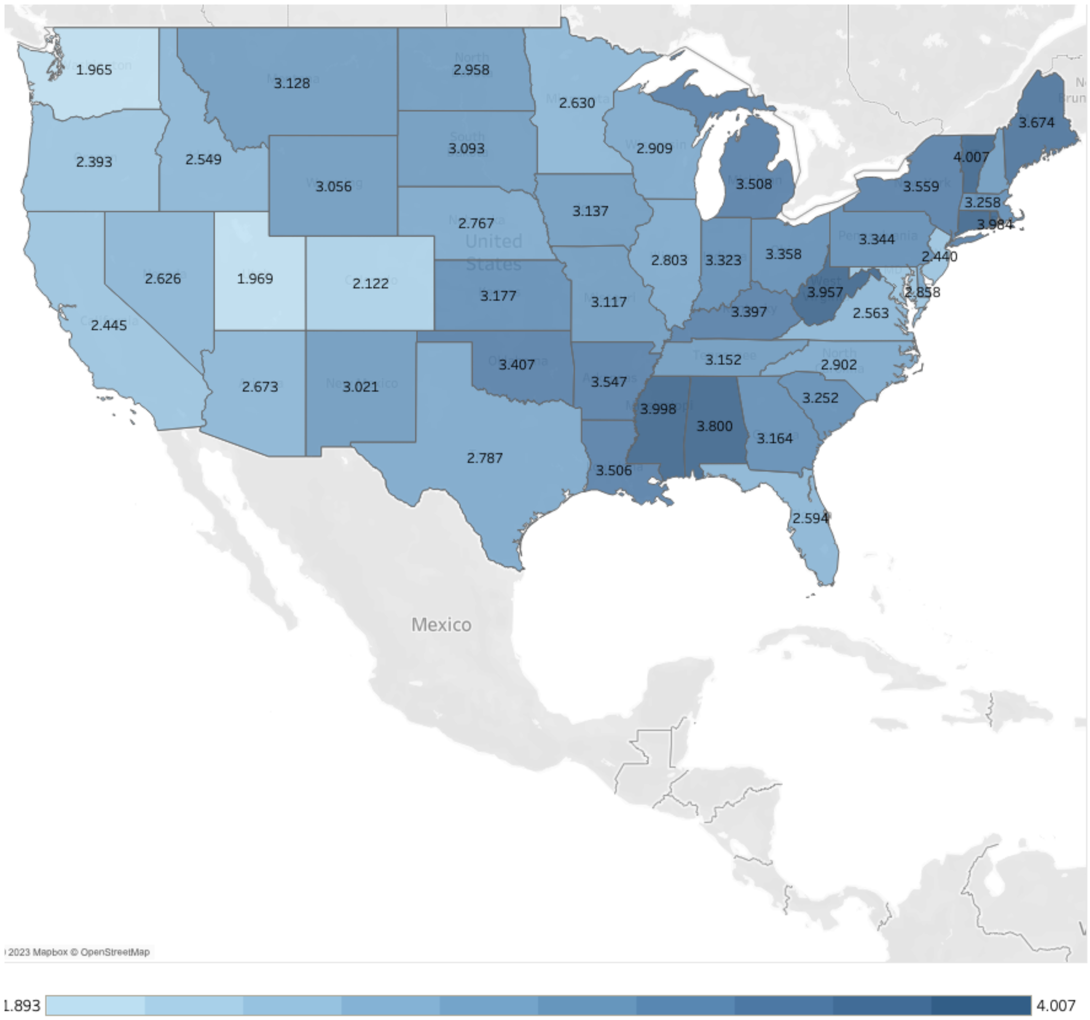


Figure 28: 2021 Household Residential Energy Expenditures as a Percentage of Median Income [Map]



Household Electricity Costs and Expenditures

Electricity bills often have many components: fixed monthly charges, charges based on the customer's peak rate of power usage in the billing month or previous year, 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 makes these data available through its Electric Data Browser.

The figures in this section show that Michigan had the 9th-highest residential electricity cost per kWh in the country in 2021, higher than any of its peers in the Midwest, as is easily visible in Figure 32. Despite these high electricity costs, in 2021 Michigan ranked 24th for yearly electricity expenditures per household in the country (Figure 29). This is due to relatively low electricity use statistics in Michigan.

Figure 29: 2021 Residential Electricity Expenditures per Household (in Dollars)

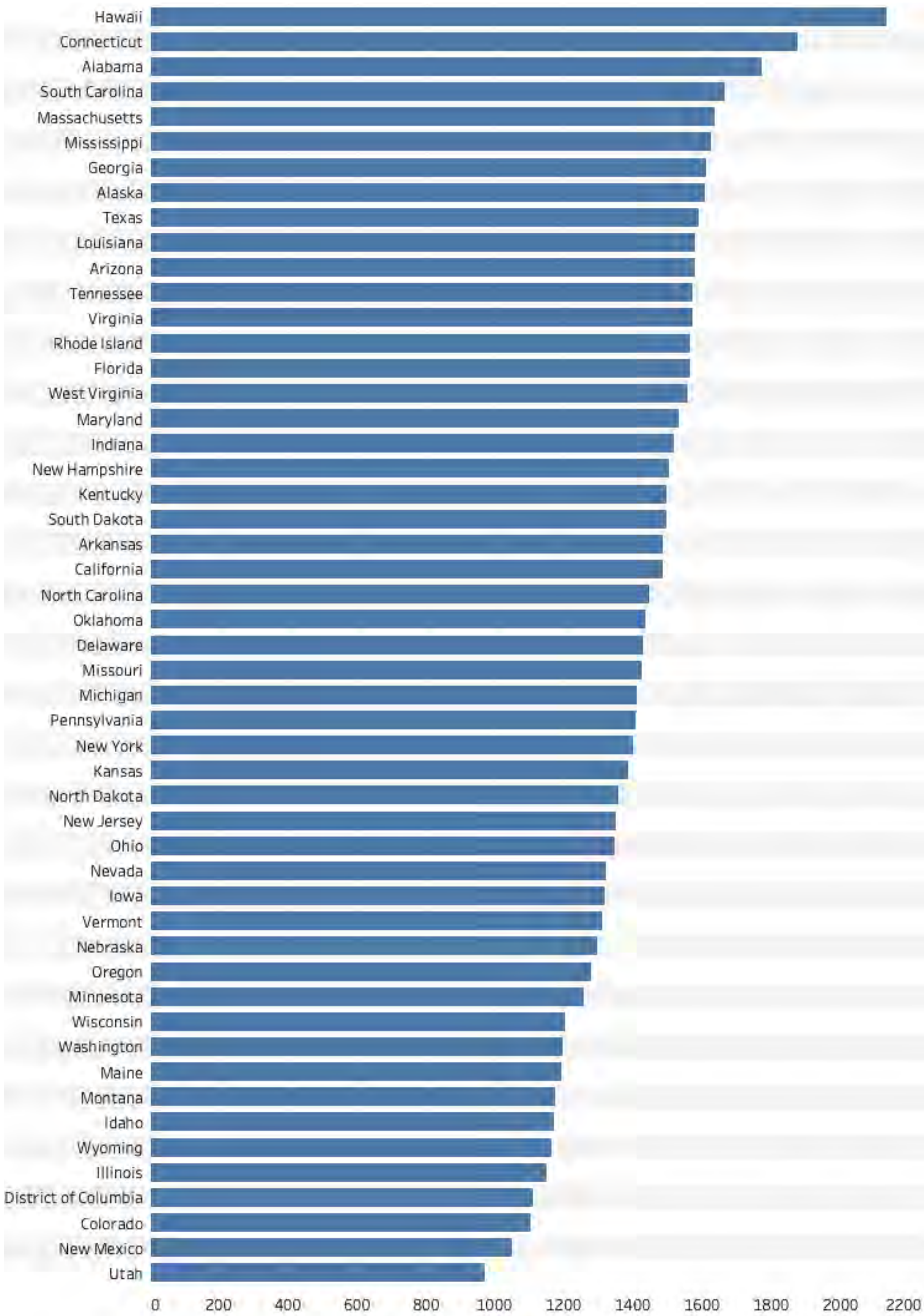


Figure 30: 2021 Residential Electricity Expenditures per Household (in Dollars) [Map]

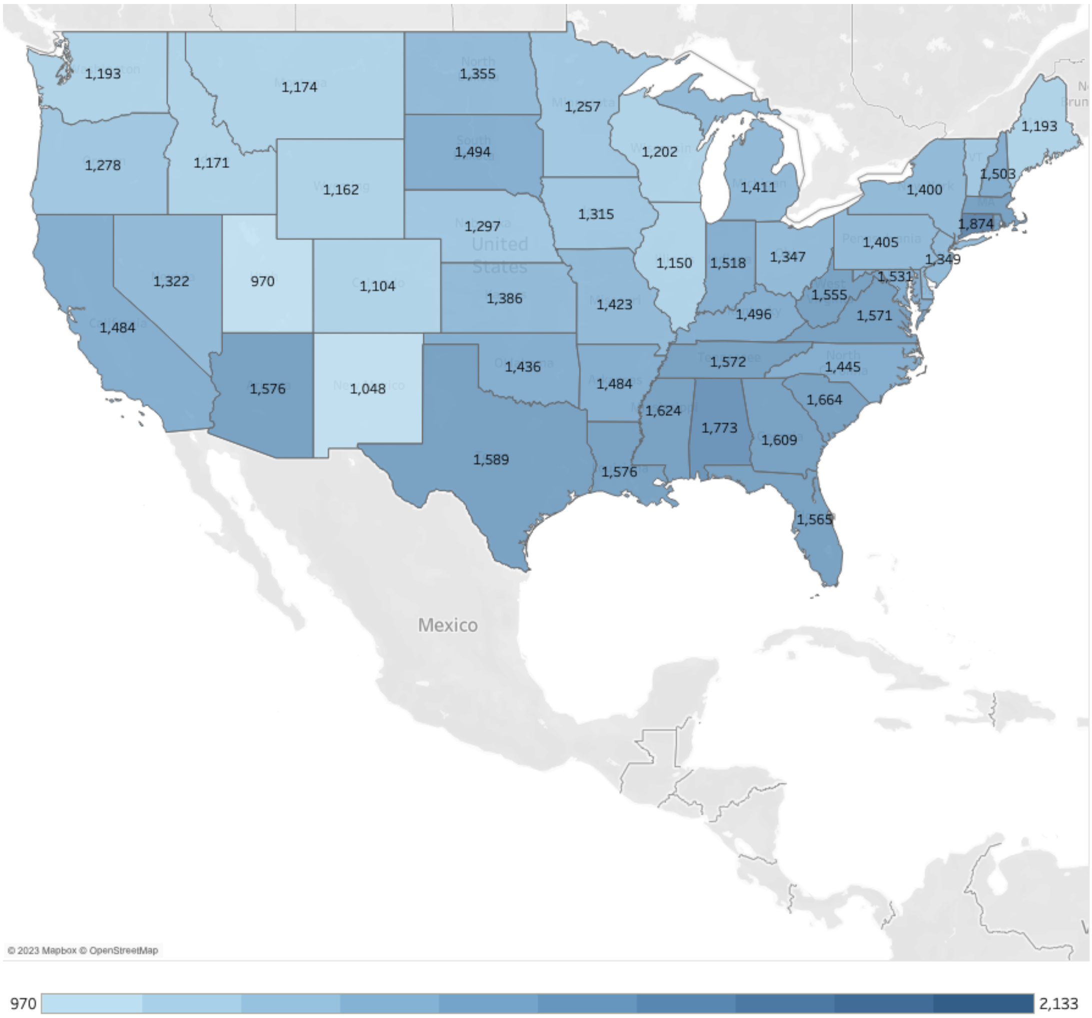


Figure 31: 2021 Cost per Kilowatt-Hour of Electricity in the Residential Sector (in Cents)

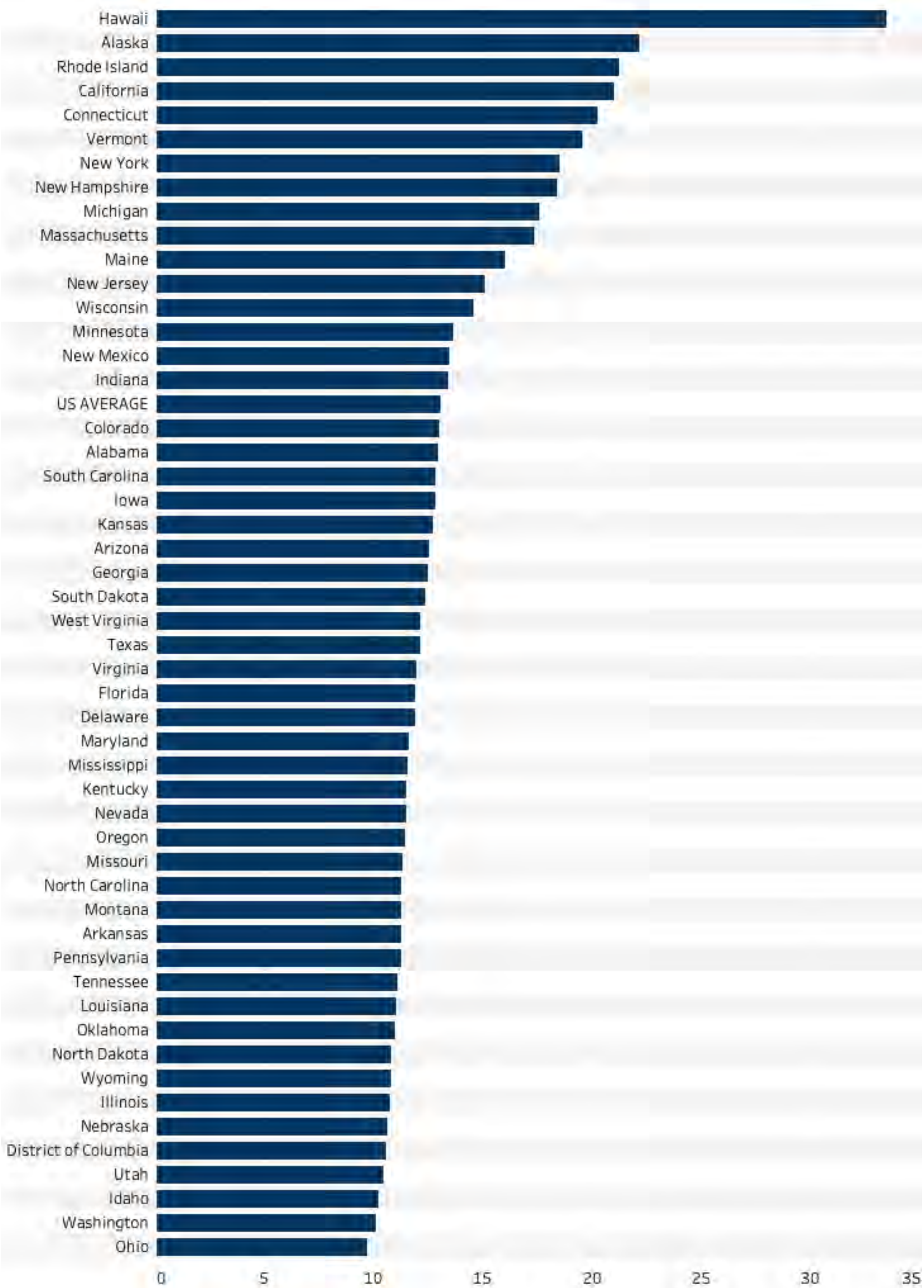
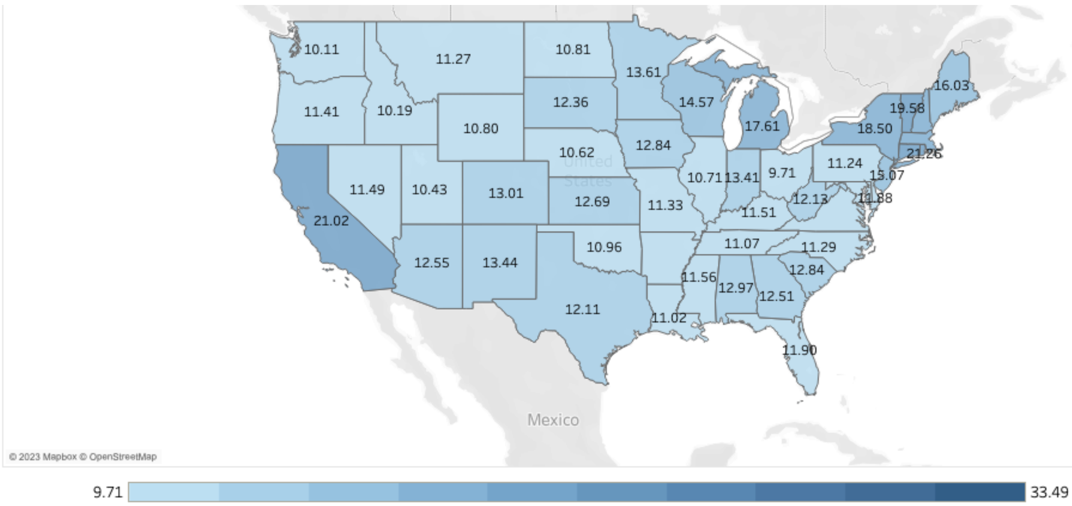


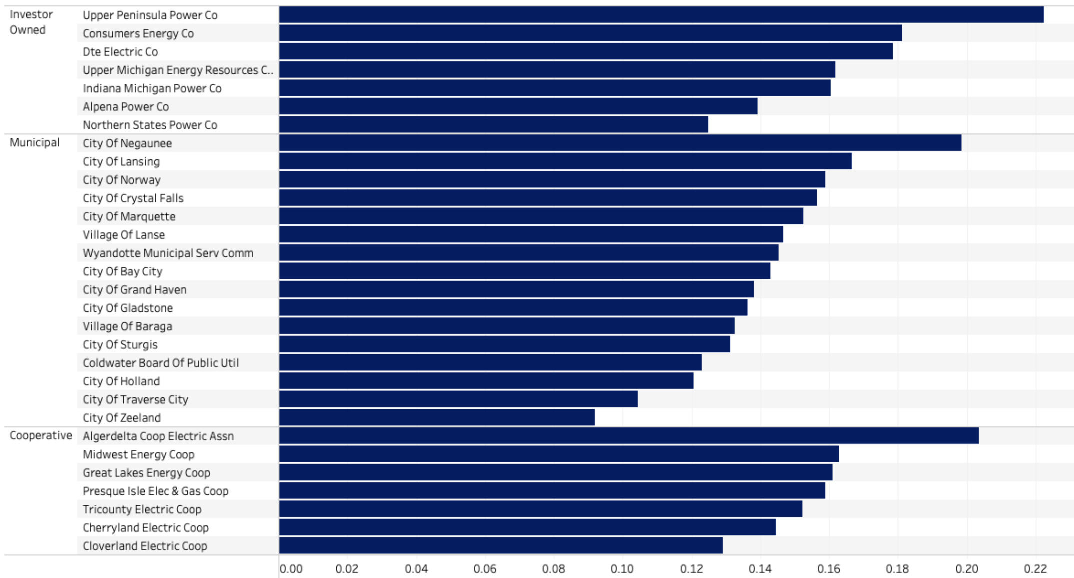
Figure 32: 2021 Cost per Kilowatt-Hour of Electricity in the Residential Sector (in Cents) [Map]



Average Price of Electricity: Residential Sector for Michigan Utilities

Figure 33 shows that the per kWh residential electricity costs vary from about nine cents per kWh for the City of Zeeland municipal utility to just over 22 cents per kWh for the Upper Peninsula Power Company. The most obvious trend in Michigan's residential electricity costs is that the highest cost utilities are in the Upper Peninsula. The Upper Peninsula's high electricity costs 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 costs falling in a range between 13 and 18 cents per kWh.

Figure 33: 2021 Cost per Kilowatt-Hour of Electricity in the Residential Sector (in Cents) for Michigan Utilities



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.

Residential consumers purchase natural gas in units called therms, which are equivalent to 100 cubic feet of natural gas. To facilitate energy cost comparisons with electricity, this section contains figures that show both therms, the unit customers see on their gas bill, and kWh, a unit generally used to measure electricity. The conversion factor from therms to kWh is 29.3 kWh to 1 therm. This allows readers to compare the absolute energy costs of these disparate energy forms. Comparing natural gas and electricity costs shows that natural gas is usually a cheaper form of energy than electricity, which helps explain why it is a more common heating fuel in climates with high heating requirements.

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

Unsurprisingly, given the trends described above, average household expenditures on natural gas in Michigan are relatively high, ranking 32nd among the 50 states and D.C. But the residential cost of natural gas per therm is relatively low in Michigan, ranking 6th in the country on that metric. Figure 35 shows that Michigan's expenditures are about average when compared to its neighboring states, with higher expenditures than Wisconsin, Indiana and Minnesota, but lower costs on a per-therm basis than its neighbors (Figure 37).

Figure 34: 2021 Residential Natural Gas Expenditures per Household (in Dollars)

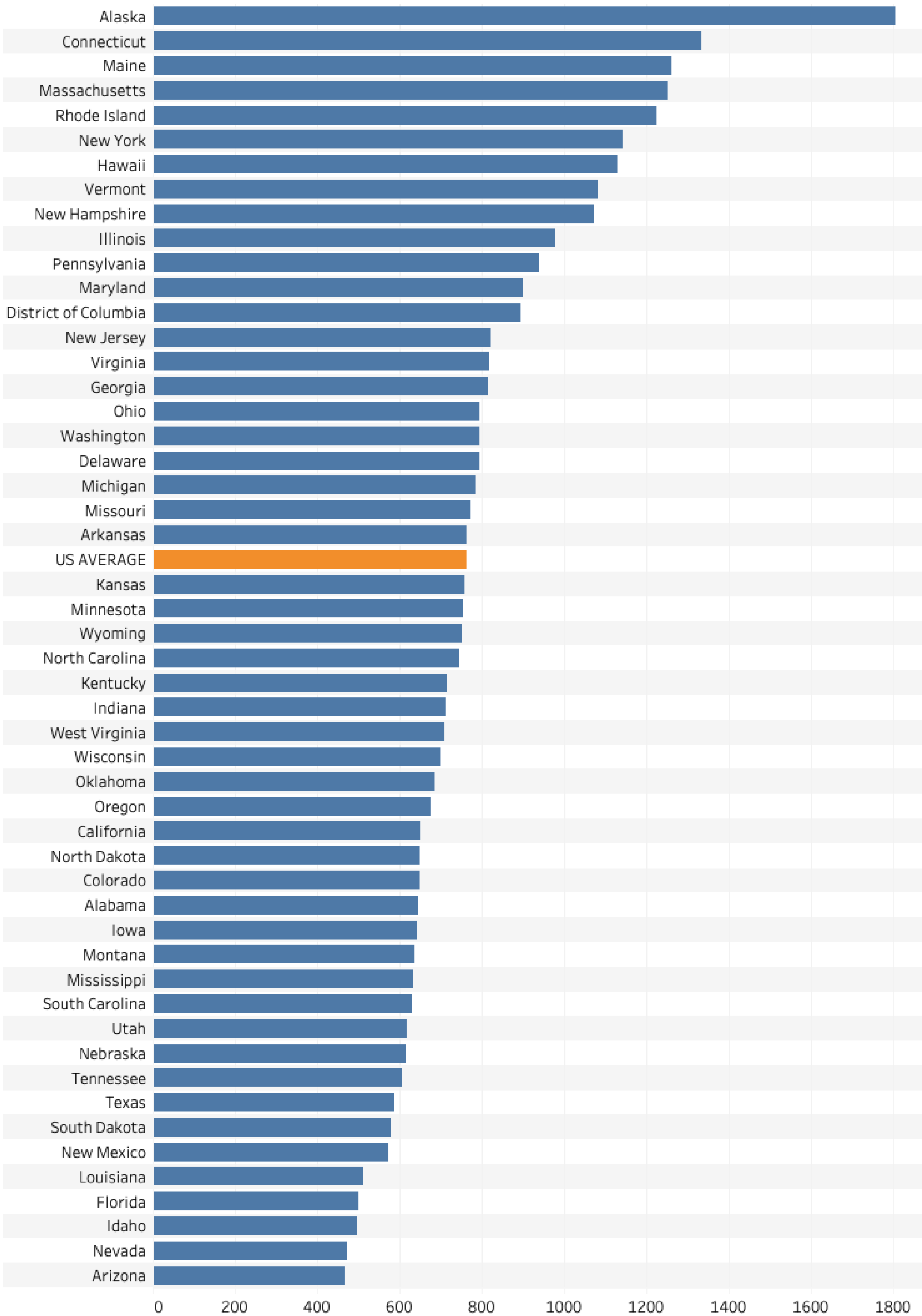


Figure 35: 2021 Residential Natural Gas Expenditures per Household (in Dollars) [Map]

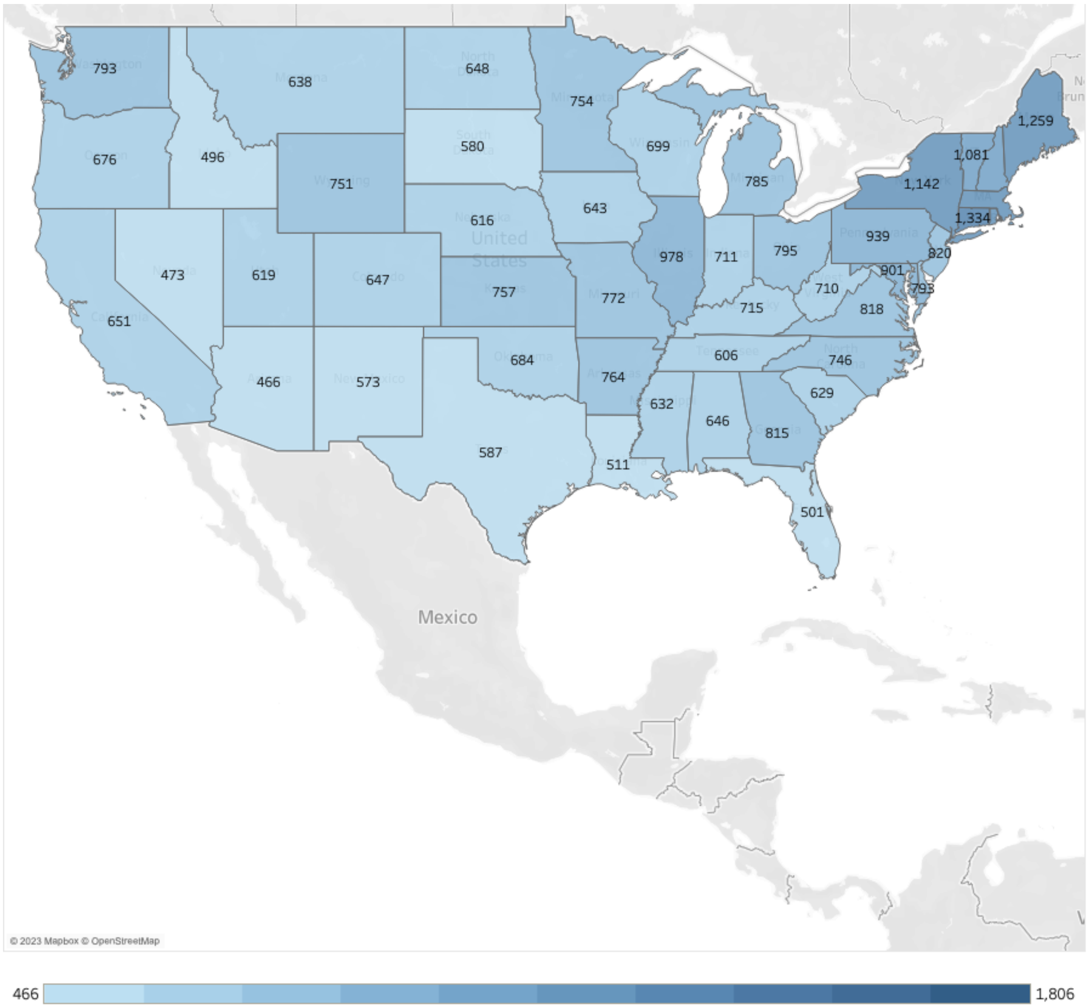


Figure 36: 2021 Natural Gas Cost per Therm in the Residential Sector (in Dollars)

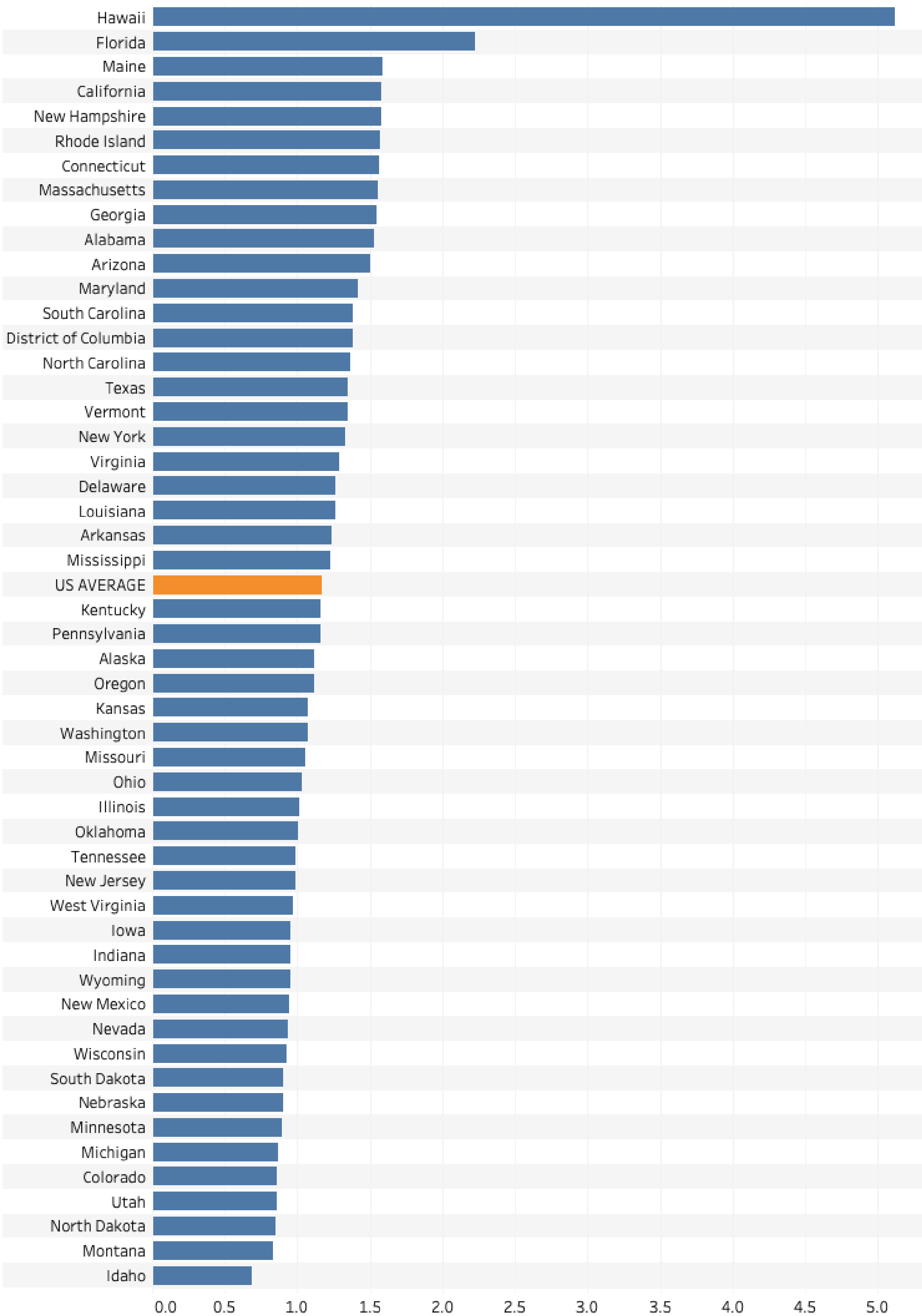


Figure 37: 2021 Natural Gas Cost per Therm in the Residential Sector (in Dollars) [Map]

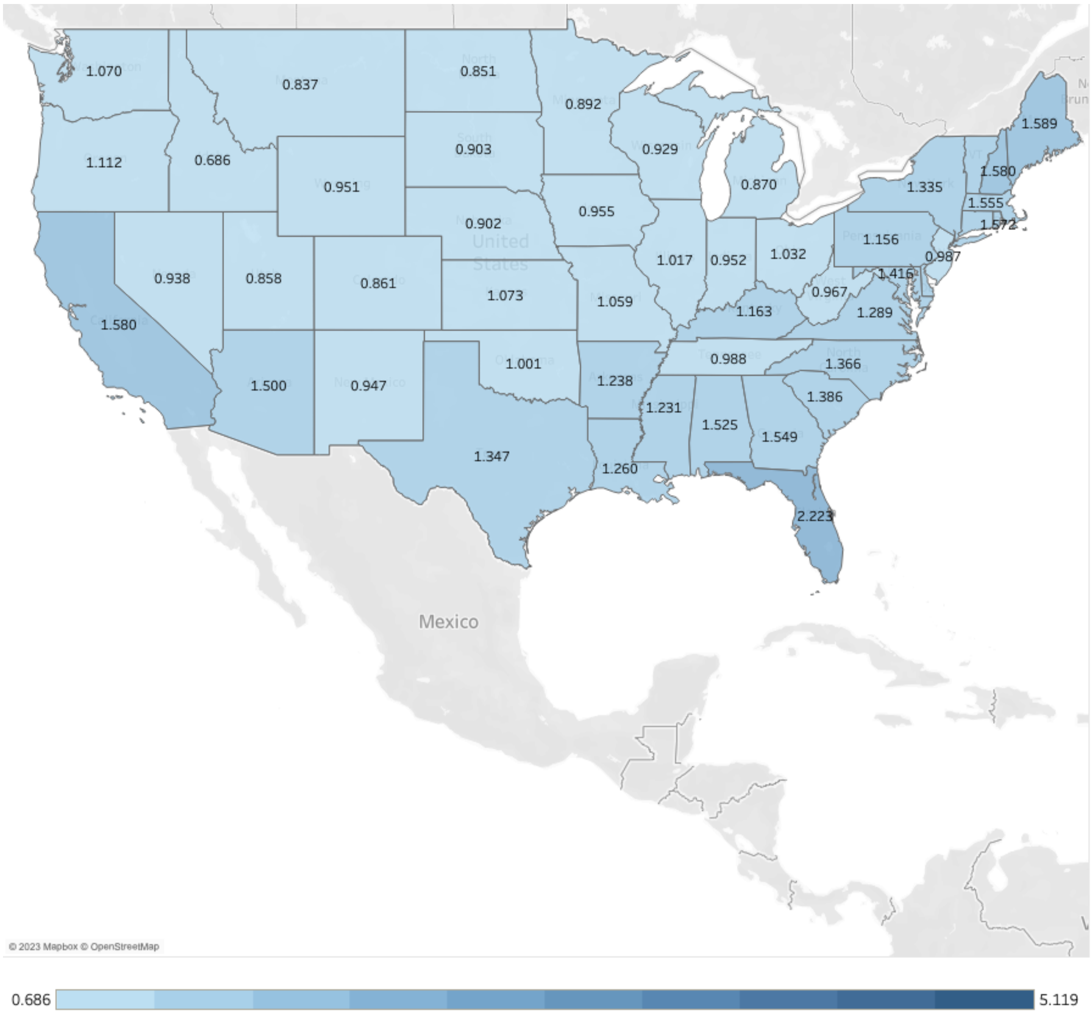


Figure 38: 2021 Natural Gas Cost per kWh in the Residential Sector (in Dollars)

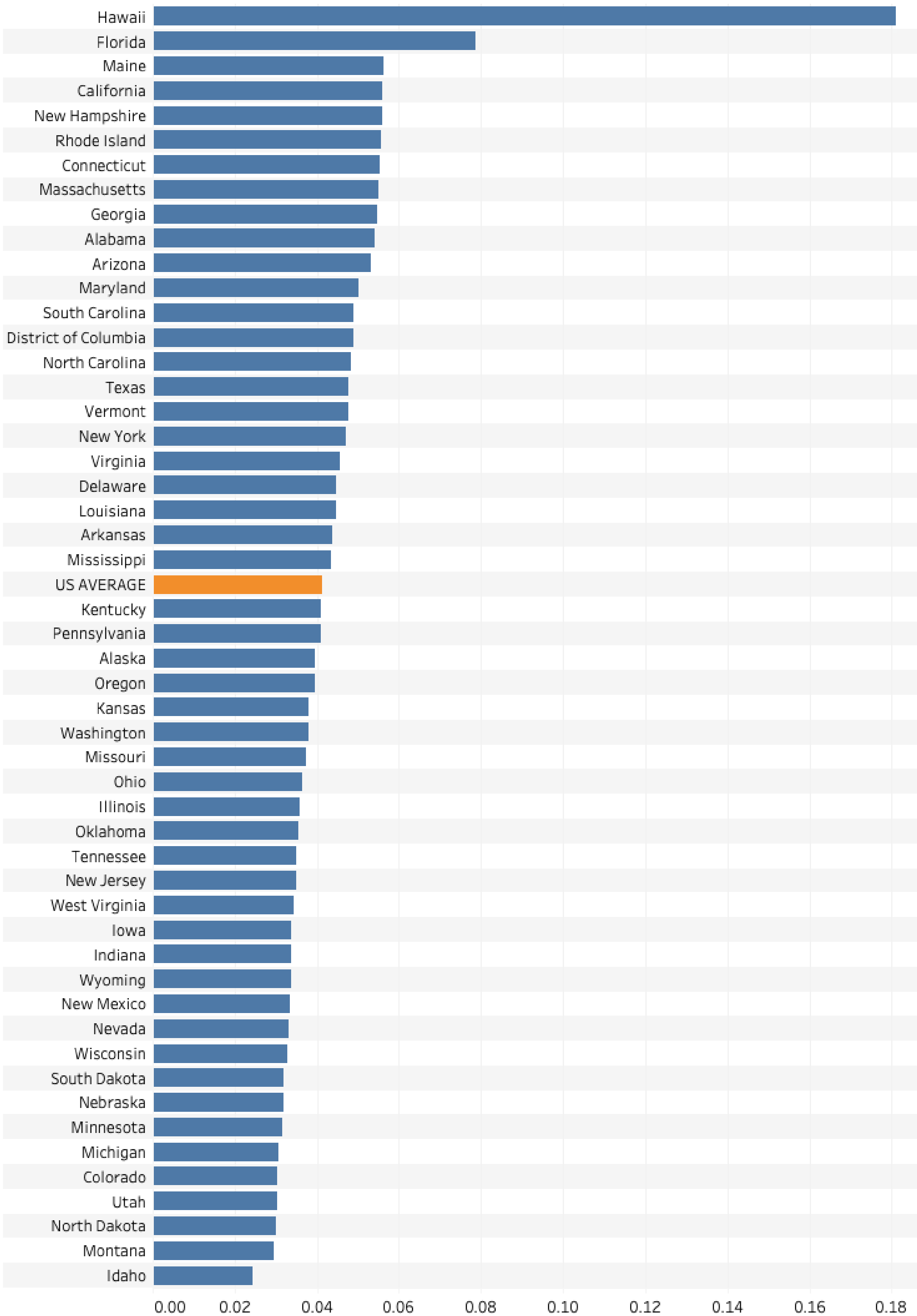
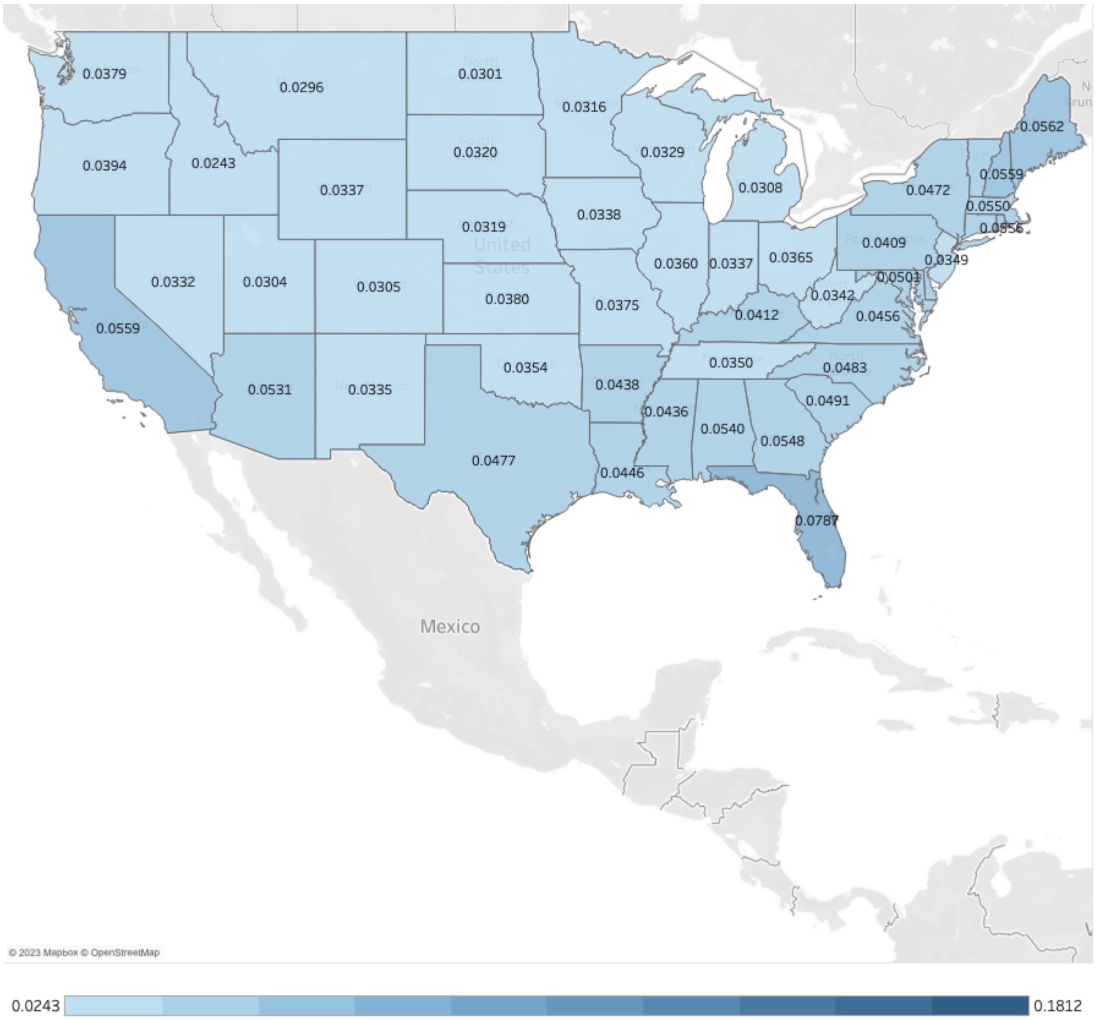


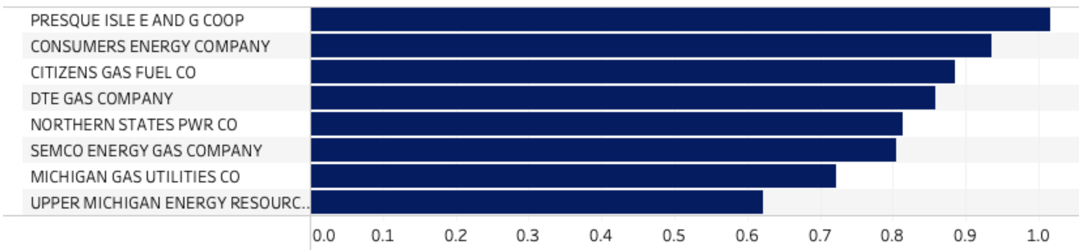
Figure 39: 2021 Natural Gas Cost per kWh in the Residential Sector (in Dollars) [Map]



Residential Natural Gas Cost for Michigan Utilities

The cost per therm of natural gas for Michigan IOUs increased significantly from 2020 to 2021. The cost per therm varied between $.62 and $.93 for Michigan's natural gas IOUs compared to range of $.51 and $.85 the year before. Among all of Michigan's natural gas utilities, Presque Isle Electric & Gas Cooperative had the highest price at $1.01 per therm.

Figure 40: 2021 Natural Gas Cost per Therm (in Dollars) for Michigan Utilities



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, is dependent on factors such as geography, average daily temperature, access to infrastructure and relative fuel costs.

In recent history natural gas, and in some places, other heating fuels, are on a cost per energy unit basis more affordable than electricity for producing heat. This trend is beginning to be upended by the increasing accessibility of high-quality, low-temperature, air-source heat pumps, but for the time being, economics support the use of direct heat sources for household heating. Thus, colder, northern states are unlikely to heat with electricity, whereas southern states are generally content to use resistance electric heat, or air-source heat pumps which can easily provide enough heat for cold days in southern states. The advantage of having only an electric hookup is the cost savings from avoiding the need for a furnace and gas or other heating fuel hookup.

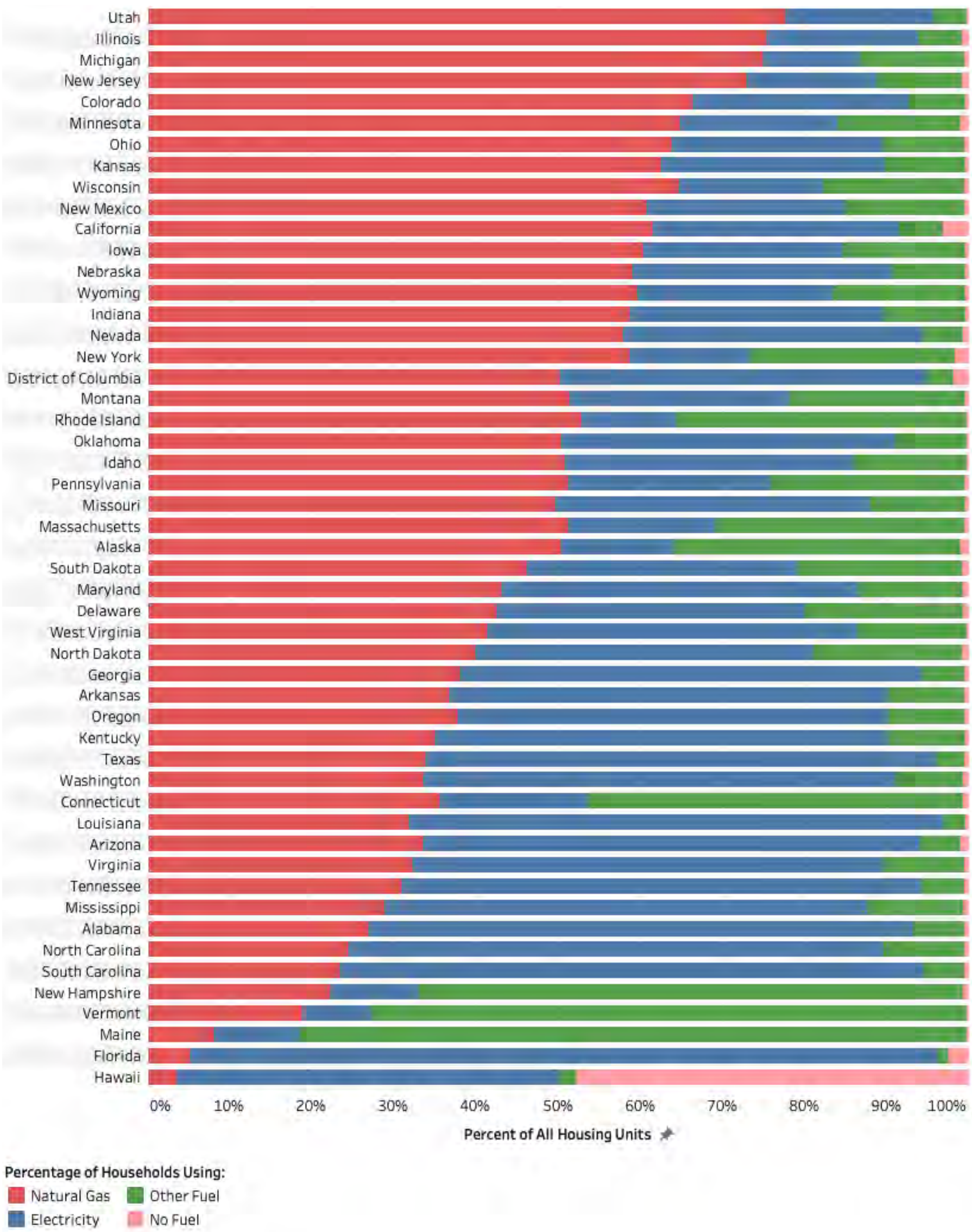
The Northeastern U.S. shows very few homes heating with electricity but a high penetration of other heating fuels (Figure 41). This trend is less the product of low-population density, as these Northeastern states are some of the densest, and more the product of older housing stock and infrastructure.

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 S2504, which gathers information on physical housing characteristics of occupied housing.

In 2021, 11.8% of Michigan's population heated their homes with electricity, an increase from 10% in 2020, making Michigan households the 47th-most likely to be heating with electricity, up from 48th last year.

In 2021, 74.8% of Michigan's population heated their homes with natural gas, making Michigan households the third-most likely to be heating with natural gas. In 2020, Michigan was also third-most likely, and 76% heated their homes with gas.

Figure 41: 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."

Residential consumers purchase each of these fuels 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. To facilitate energy cost comparisons with electricity, this section contains figures that show both MMBTU, the unit the data were reported in, and kWh, a unit generally used to measure electricity. The conversion factor from MMBTU to kWh is 293 kWh to 1 MMBTU.

Michigan ranks 32nd for yearly expenditures on other heating fuels and 22nd for per MMBTU costs. However, compared to adjacent states, Michigan has higher expenditures than Ohio and Indiana, other than Illinois, and lower costs than all except Wisconsin (Figures 43 and 45).

Figure 42: 2021 Residential Other Heating Fuels Expenditures per Household (in Dollars)

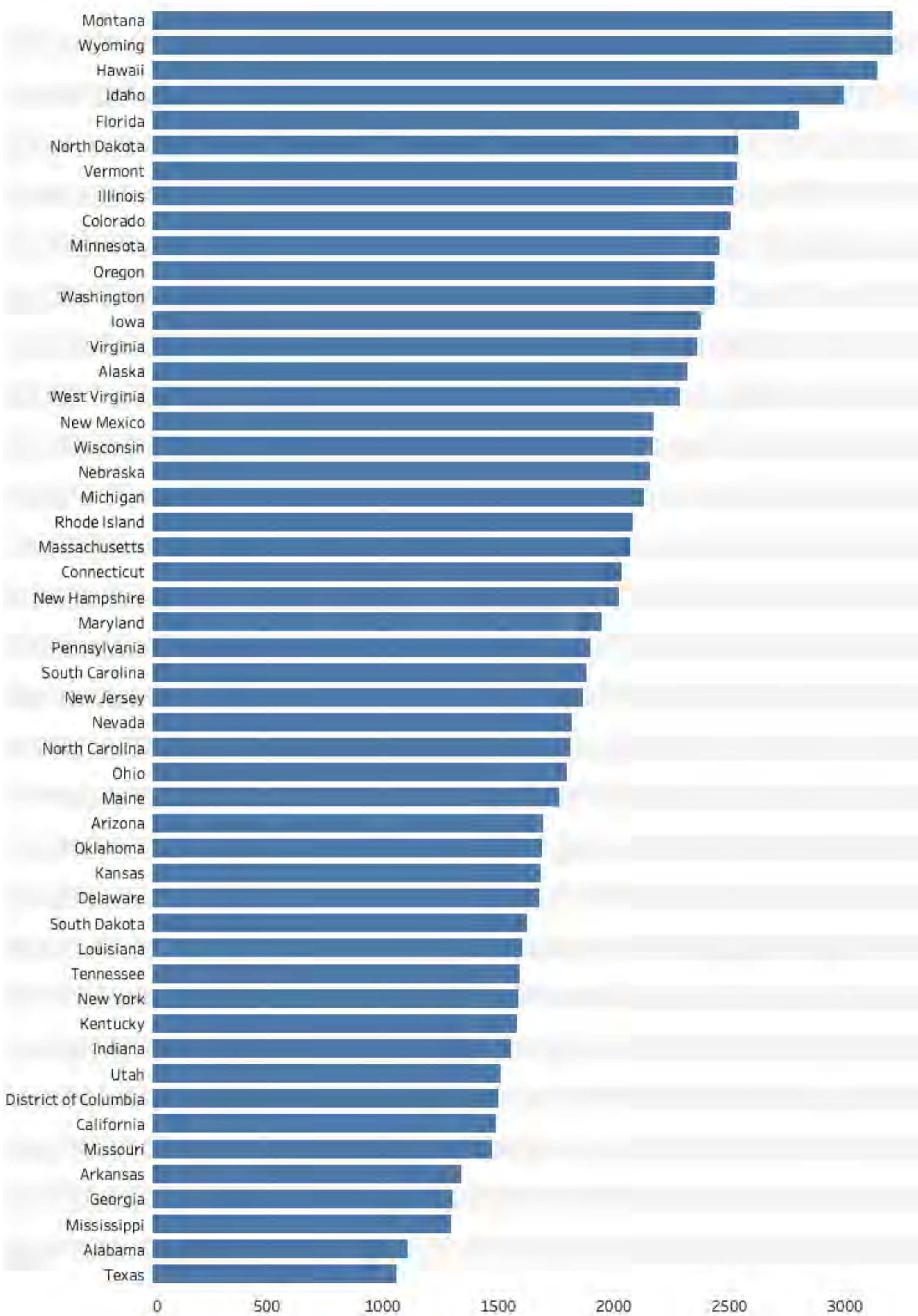


Figure 43: 2021 Residential Other Heating Fuels Expenditures per Household (in Dollars) [Map]

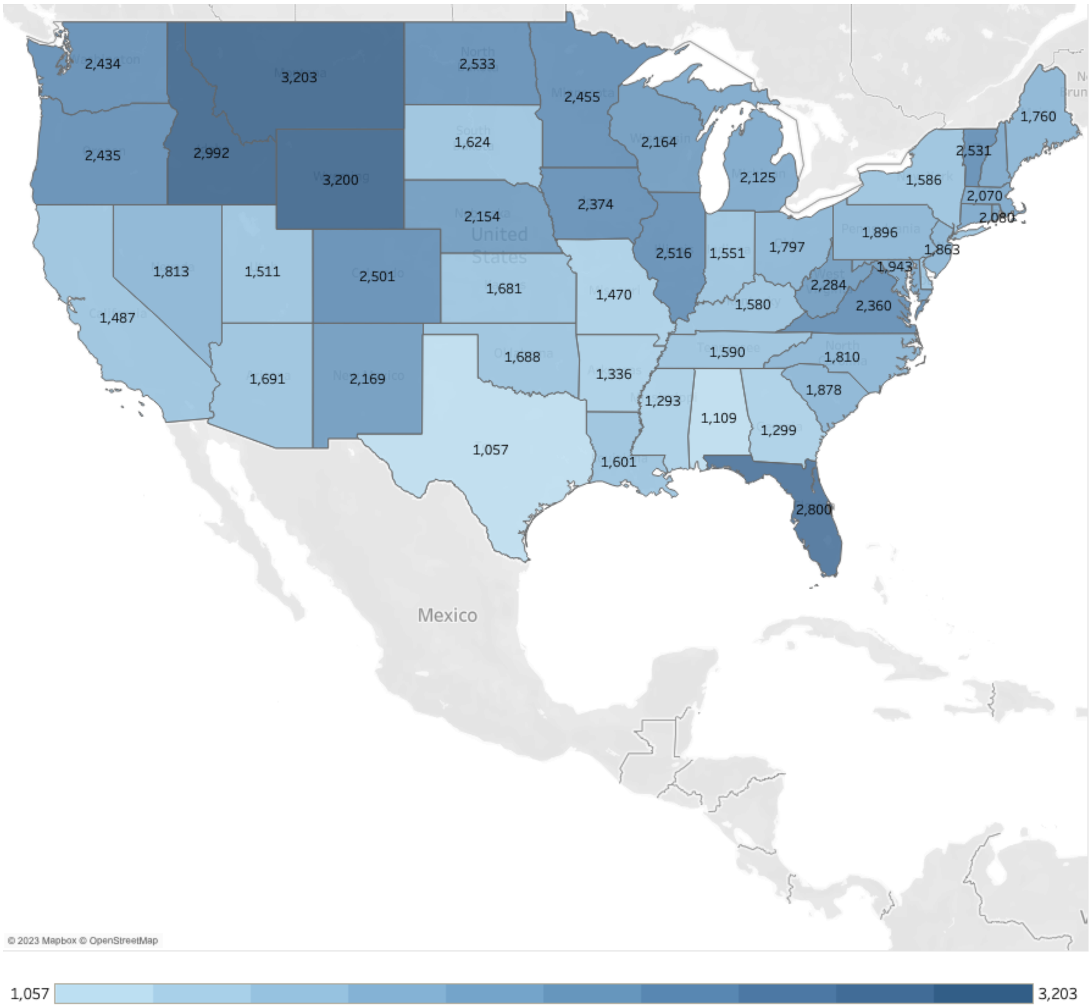


Figure 44: 2021 Cost of Other Heating Fuels in the Residential Sector (in Dollars per million BTU)

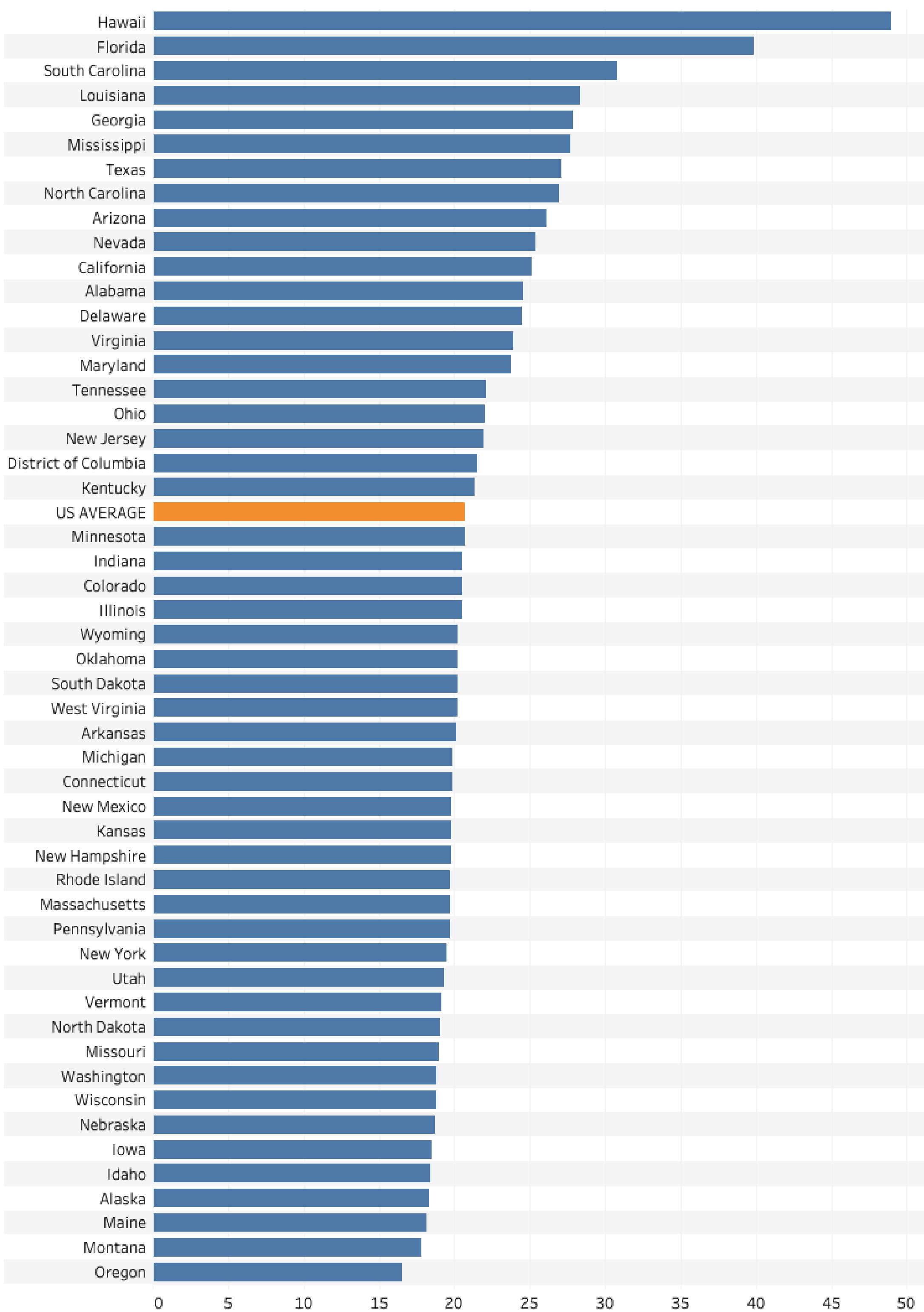
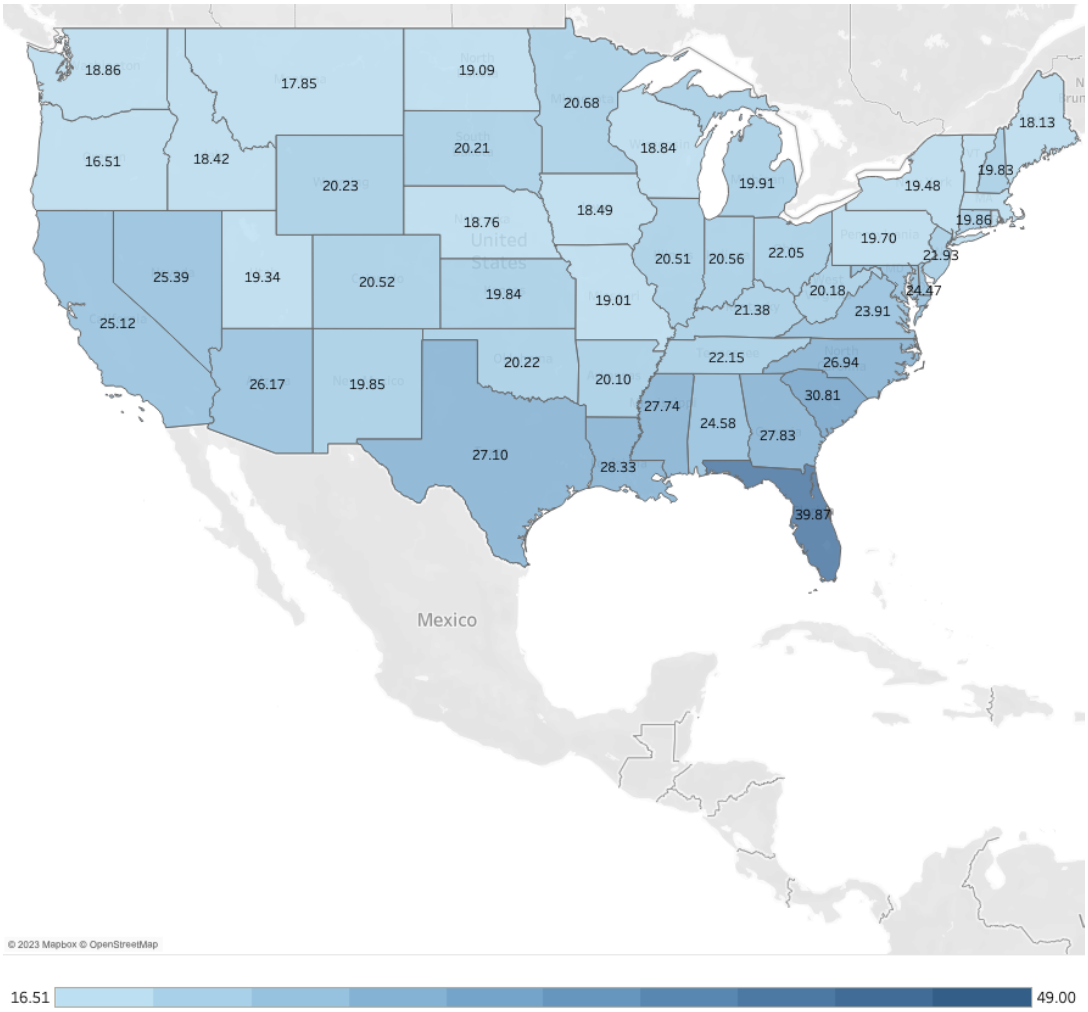


Figure 45: 2021 Cost of Other Heating Fuels in the Residential Sector (in Dollars per million BTU) [Map]



Non-Residential Costs

Residential, commercial and industrial customers all pay different costs for electricity and natural gas. Industrial customers generally receive the lowest rates of the customer classes because they are large users that require singular hookups. The energy costs for industrial customers can be understood in the electricity sector as primarily transmission and generations 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. The significantly higher residential cost for both electricity and natural gas relative to the commercial cost shows there is a clear lack of uniformity in how distribution costs are shared between residential and commercial customers.

In Rhode Island, the commercial cost of electricity is negligibly higher than the industrial, and the residential sector is forced to pay for distribution infrastructure. 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.

Similar trends exist in natural gas costs, although which states they exist in appear uncorrelated to where they exist for electricity. It is also worth noting that there are two instances—New York and Ohio—where industrial customers pay more than commercial customers.

Non-Residential Electricity Costs

In 2021, Michigan's 11.69 cents per kWh price of electricity for the commercial sector is relatively high compared to other states, ranking 45th. Michigan's electricity price for industrial customers was 6.68 cents per kWh and Michigan ranked 33rd in overall industrial sector electricity price. Figures 47 and 49 show that Michigan's commercial and industrial sector electricity prices were the highest among its peer states except for Minnesota, Wisconsin and Indiana, which, in 2021 had higher industrial electricity prices in the Midwest.

Figure 46: 2021 Cost per Kilowatt-Hour of Electricity in the Commercial Sector (in Cents)

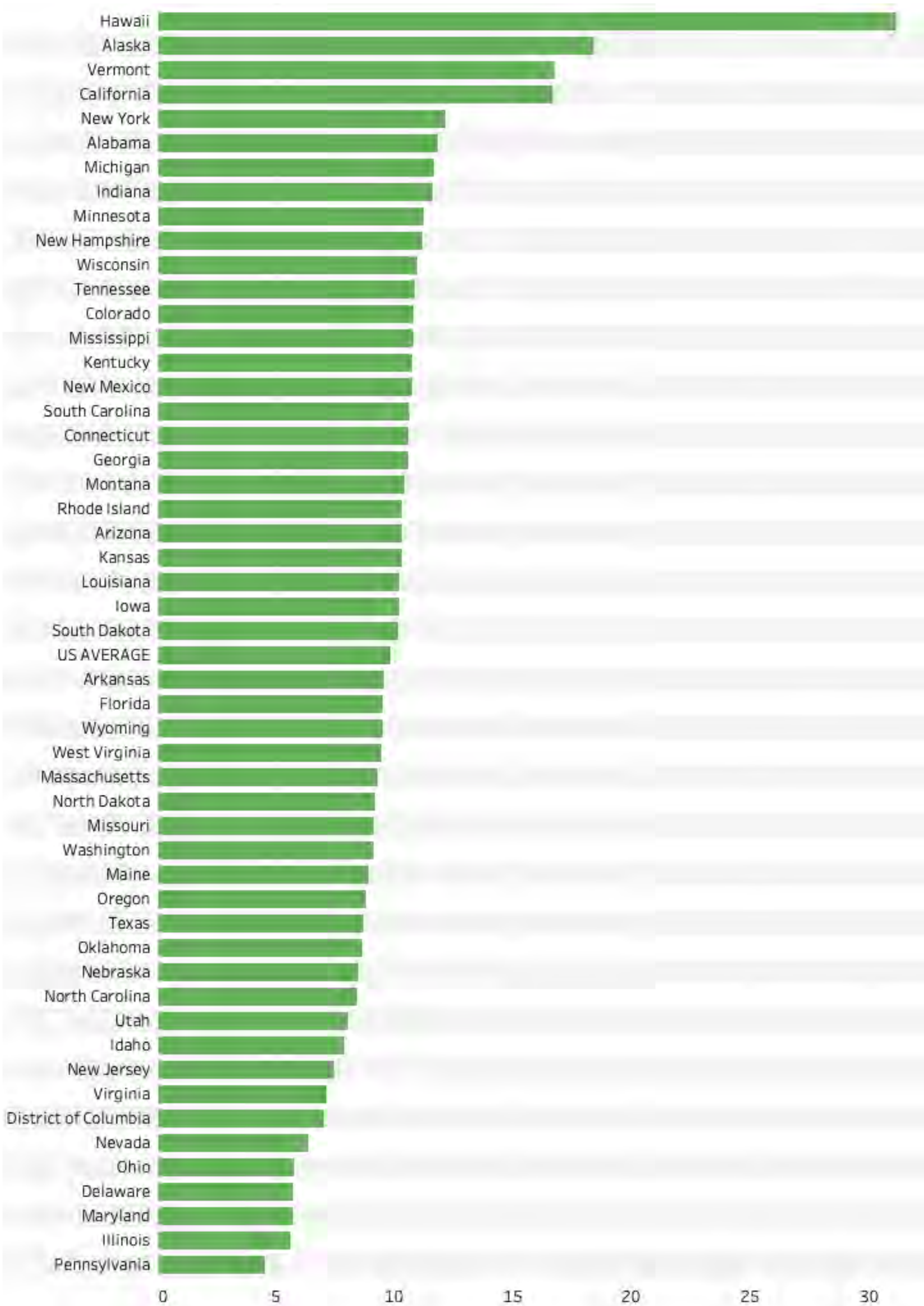


Figure 47: 2021 Cost per Kilowatt-Hour of Electricity in the Commercial Sector (in Cents) [Map]

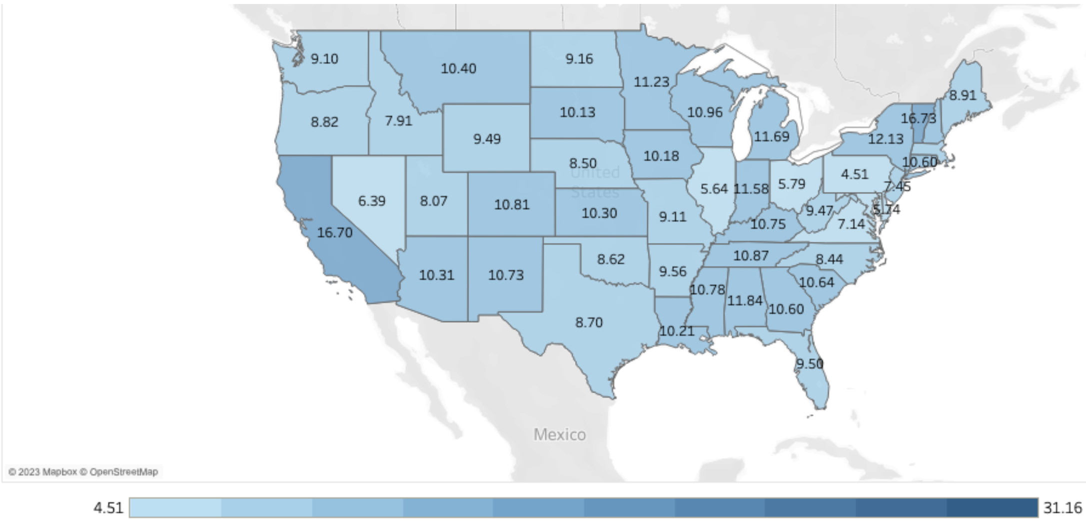


Figure 48: 2021 Cost per Kilowatt-Hour of Electricity in the Industrial Sector (in Cents)

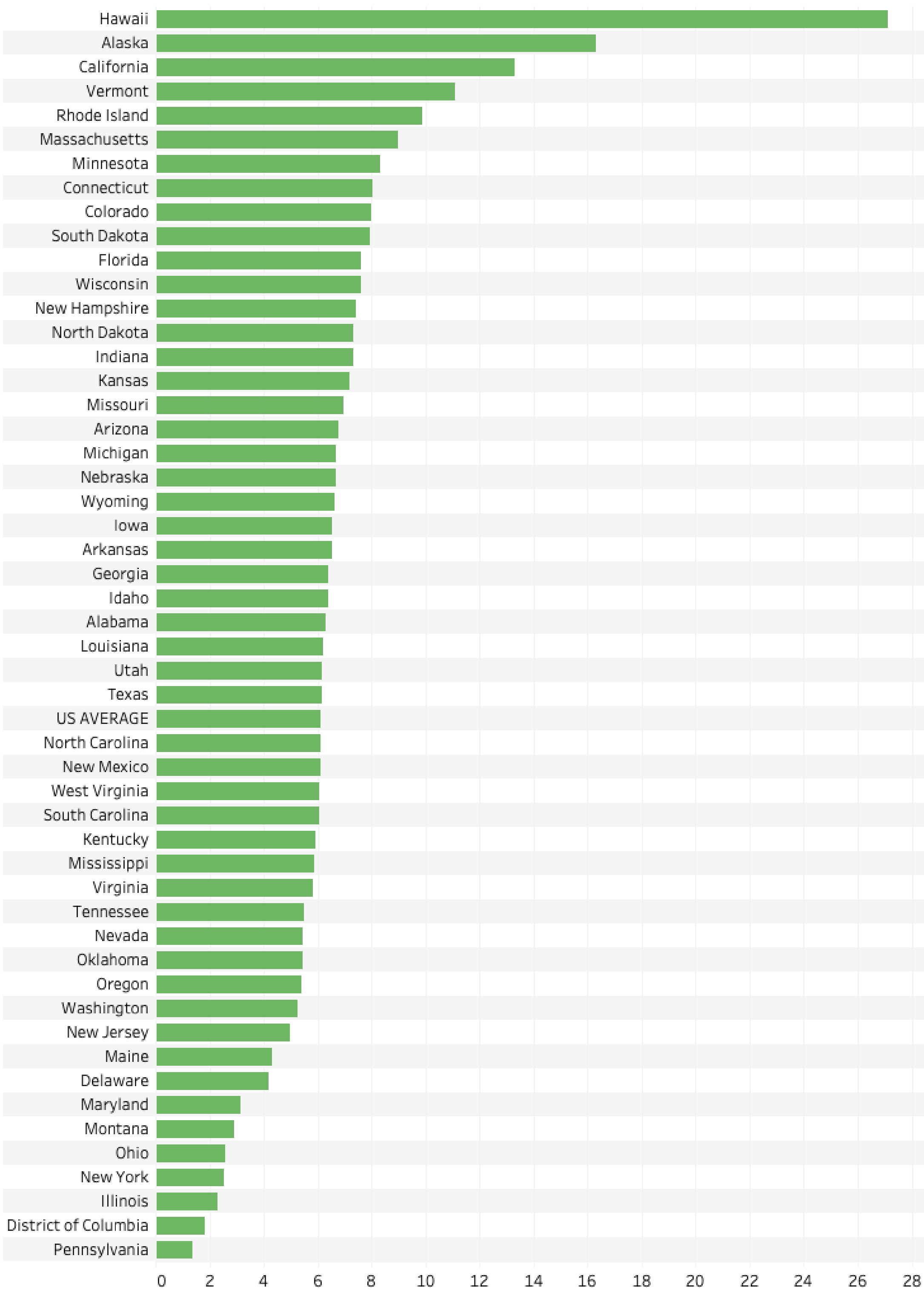
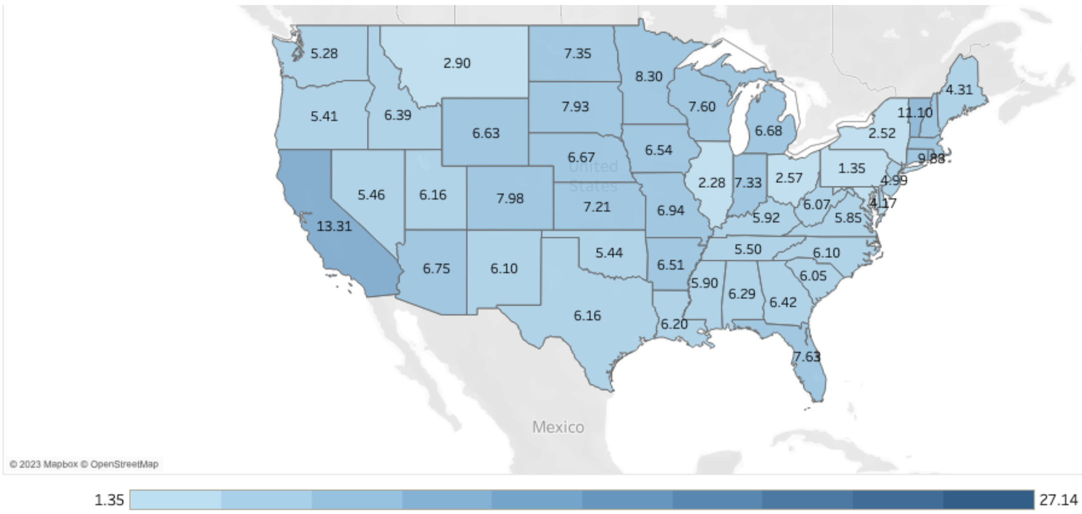


Figure 49: 2021 Cost per Kilowatt-Hour of Electricity in the Industrial Sector (in Cents) [Map]



Non-Residential Electricity Costs for Michigan Utilities

Figures 50 and 51 show the comparative 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 between 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 50: 2021 Cost per Kilowatt-Hour of Electricity in the Commercial Sector (in Cents) for Michigan Utilities

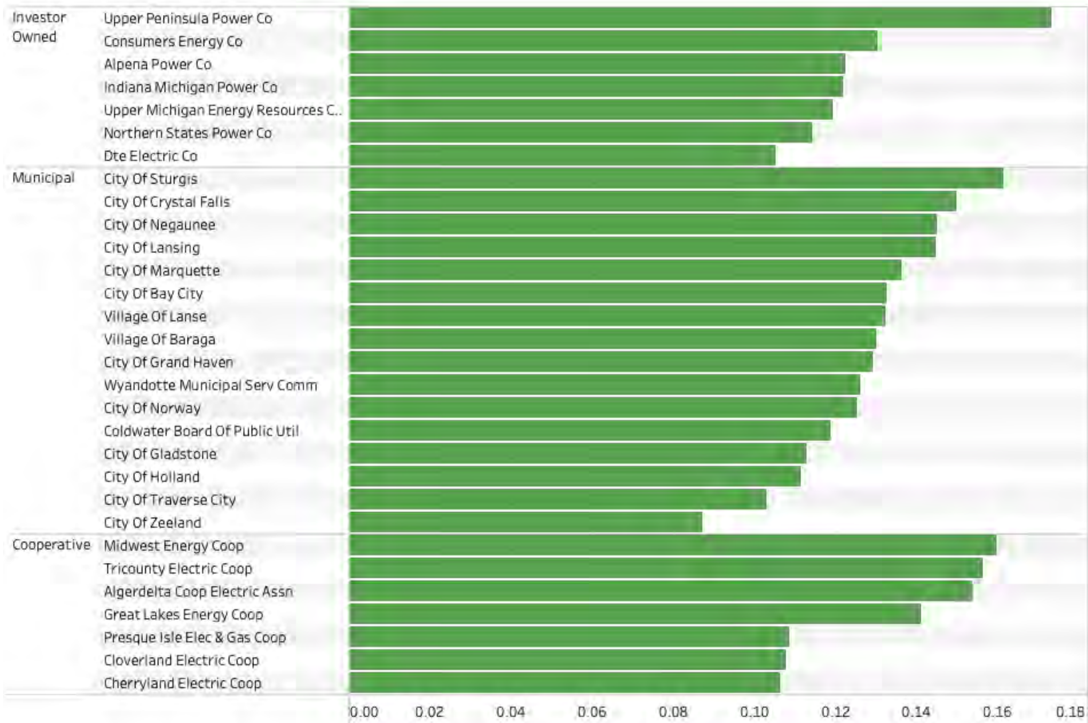
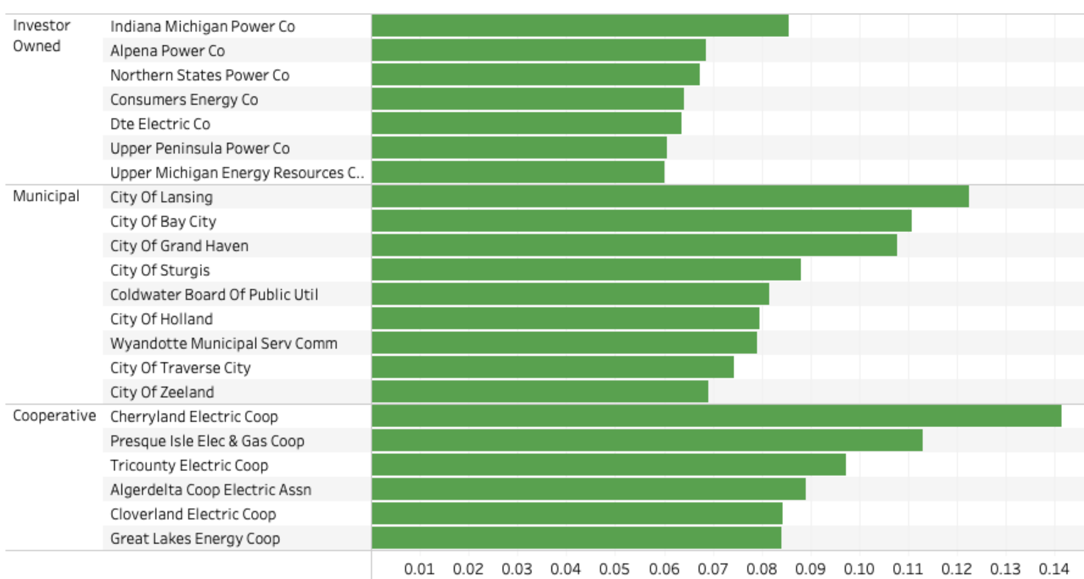


Figure 51: 2021 Cost per Kilowatt-Hour of Electricity in the Industrial Sector (in Cents) for Michigan Utilities



Michigan Non-Residential Natural Gas Costs

Michigan's 74 cents per therm price of natural gas for the commercial sector is relatively low compared to other states, ranking 13th. Michigan's natural gas price for industrial customers was 63 cents per therm and Michigan ranked 29th in overall industrial sector natural gas price. Those results are 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 number of therms sold, in the industrial sector, natural gas price is driven by other factors, unlinked to the demand produced by space heating.

Figure 52: 2021 Natural Gas Cost per Therm in the Commercial Sector (in Dollars)

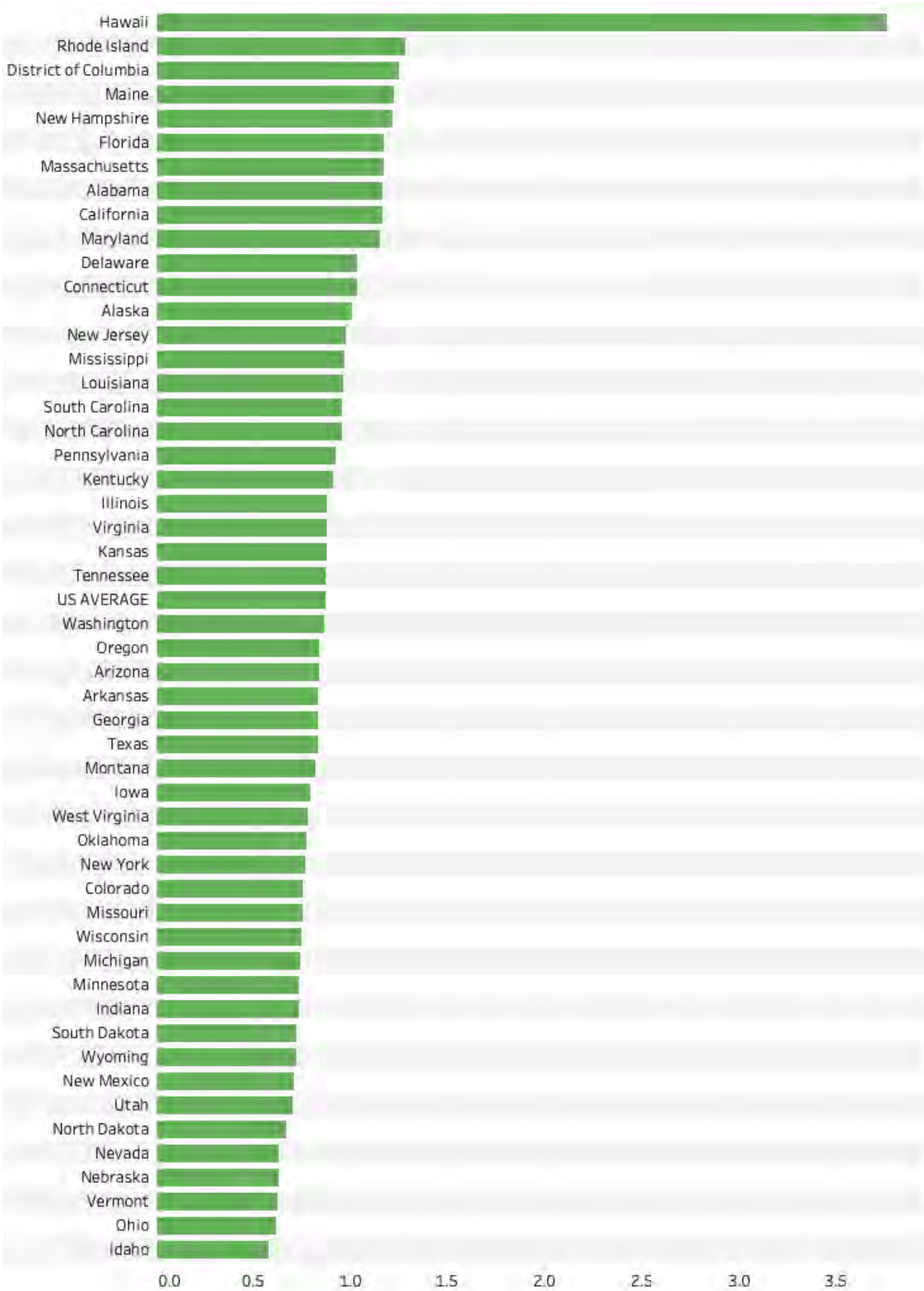


Figure 53: 2021 Natural Gas Cost per Therm in the Commercial Sector (in Dollars) [Map]

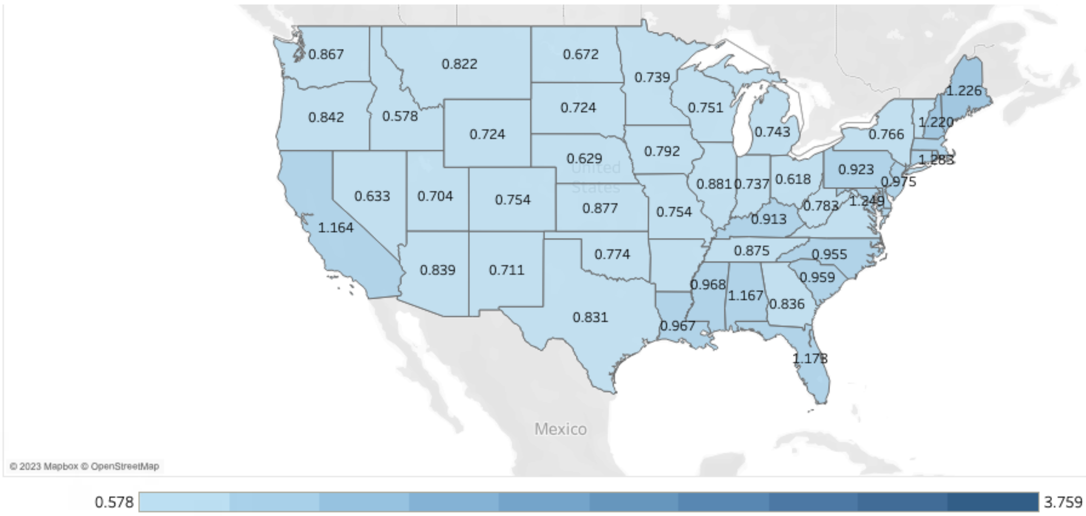


Figure 54: 2021 Natural Gas Cost per Therm in the Industrial Sector (in Dollars)

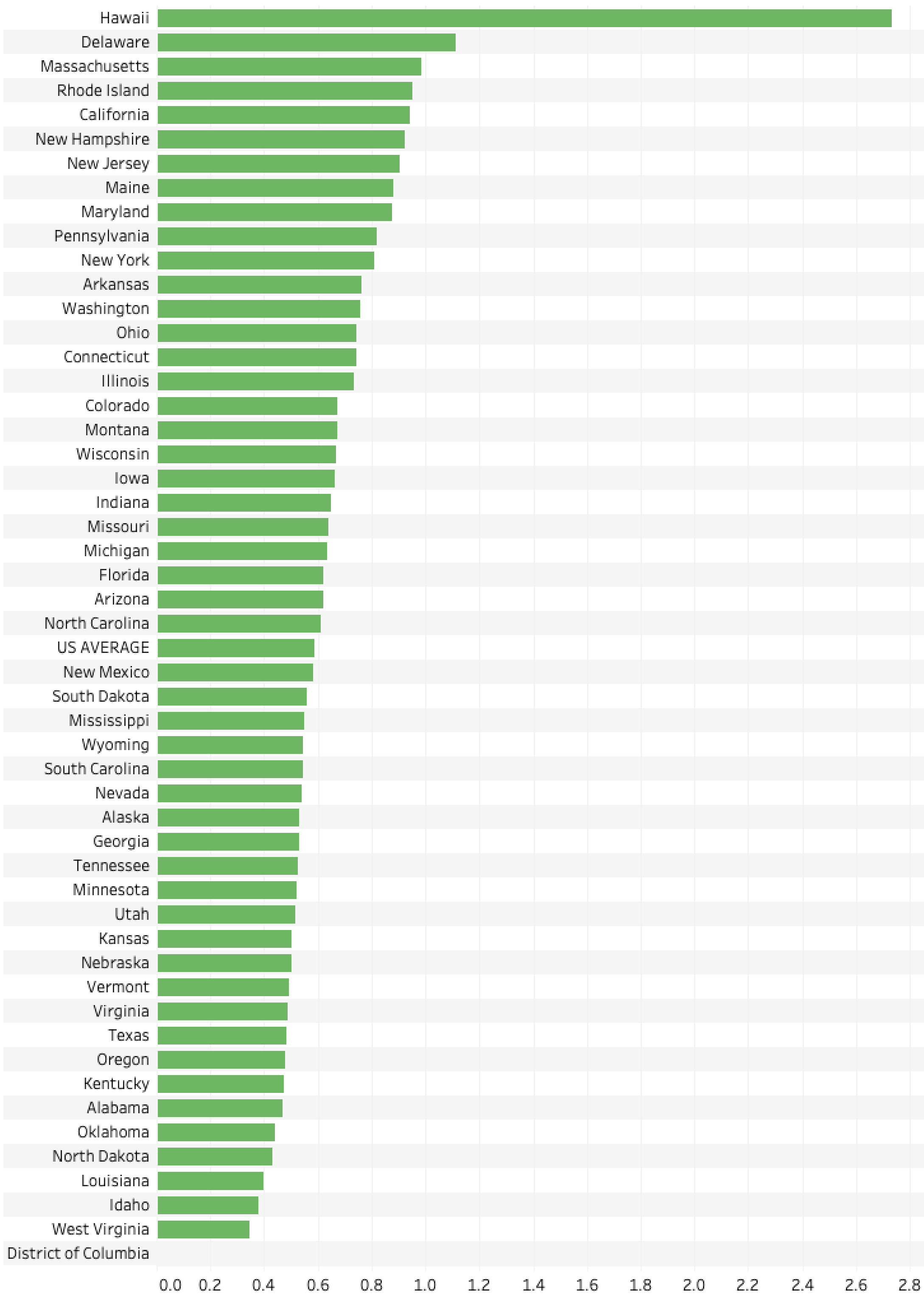
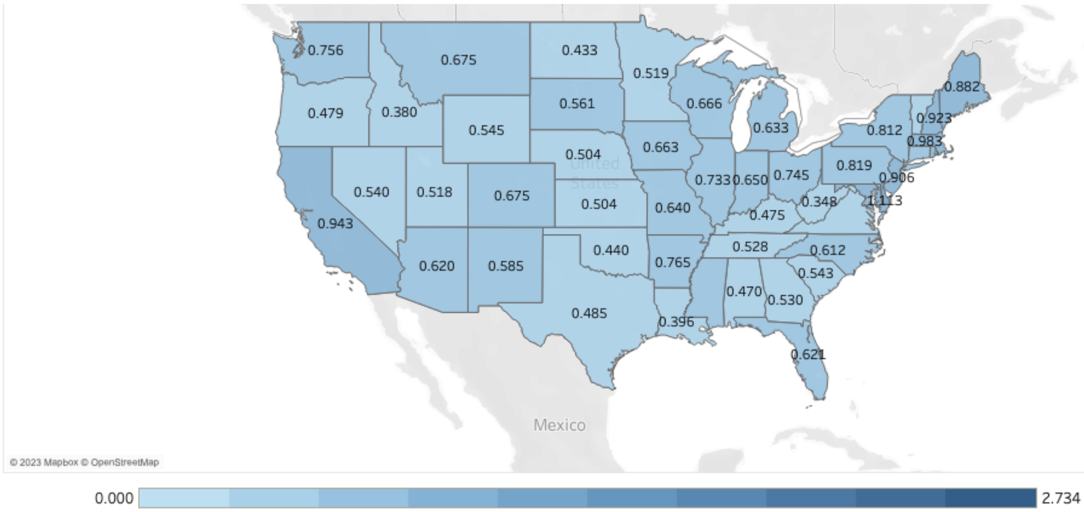


Figure 55: 2021 Natural Gas Cost per Therm in the Industrial Sector (in Dollars) [Map]



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, utilities are looking both to build new clean supply, and to control the demand side of the equation. 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 clean 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 lightbulbs 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 well utilities are spending their money 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 state and Michigan utility levels.

Energy Efficiency Program Costs

In 2021 Michigan had the 37th-lowest cost residential energy efficiency program in the country, the 20th-lowest cost program in the commercial sector and the 28th-lowest cost program in the industrial sector. These programs provide energy efficiency savings at $0.045/kWh for residential, $0.013/kWh for commercial and $0.014/kWh for industrial. Compared to its peer states, Michigan utilities' energy efficiency programs tend to be more expensive. Michigan is less than expensive than Ohio for residential programs, and less than expensive than Illinois for commercial and industrial programs.

Figure 56: Cost per Kilowatt-Hour of Energy Efficiency Savings in the Residential Sector (in Dollars)

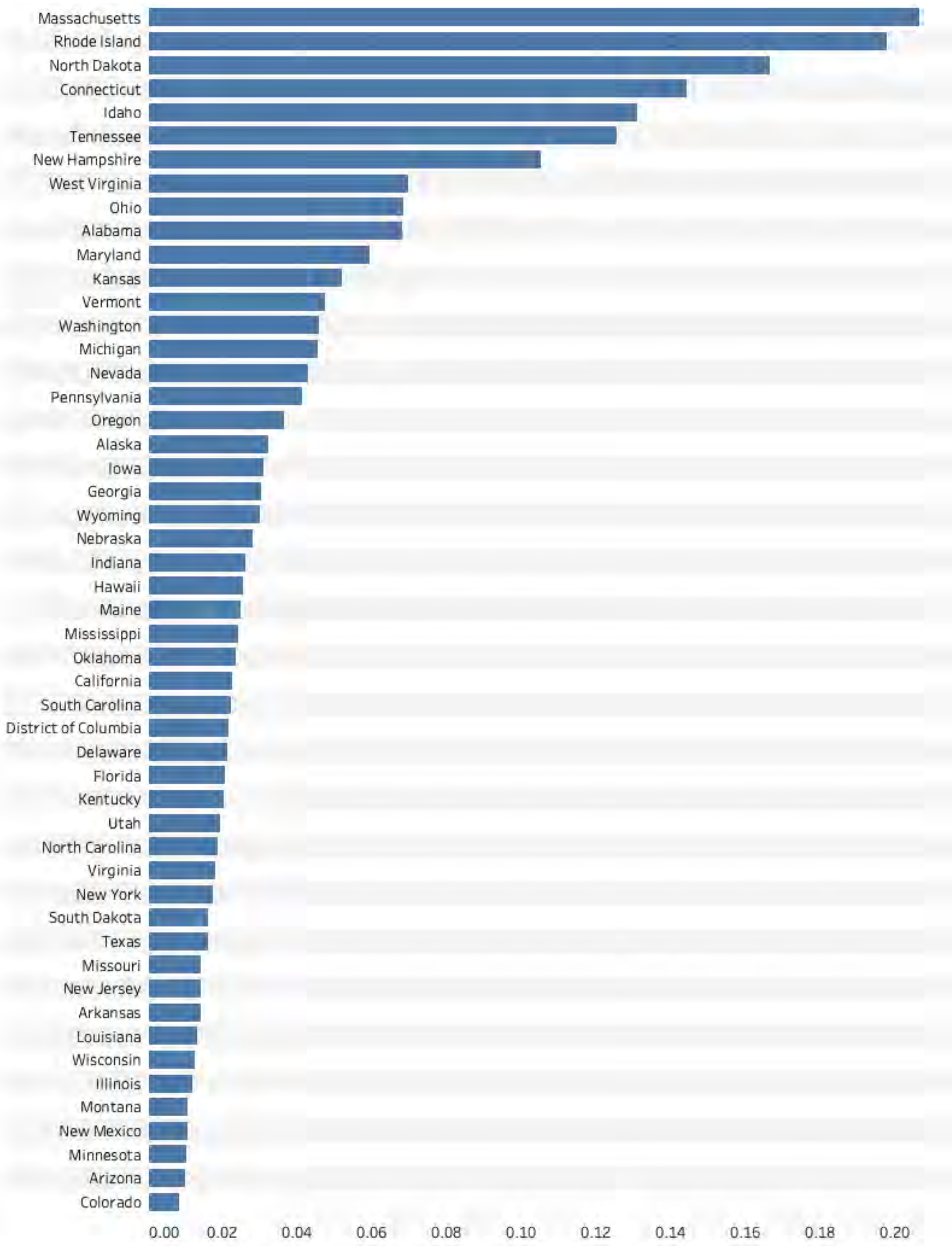


Figure 57: Cost per Kilowatt-Hour of Energy Efficiency Savings in the Residential Sector (in Dollars) [Map]

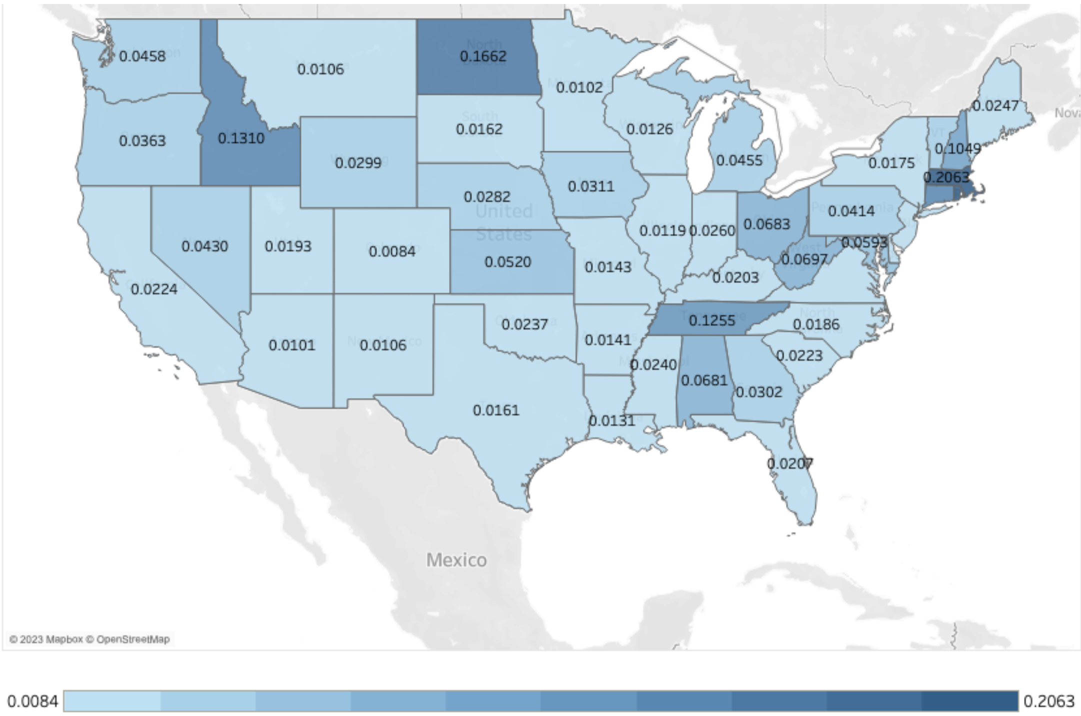


Figure 58: Cost per Kilowatt-Hour of Energy Efficiency Savings in the Commercial Sector (in Dollars)

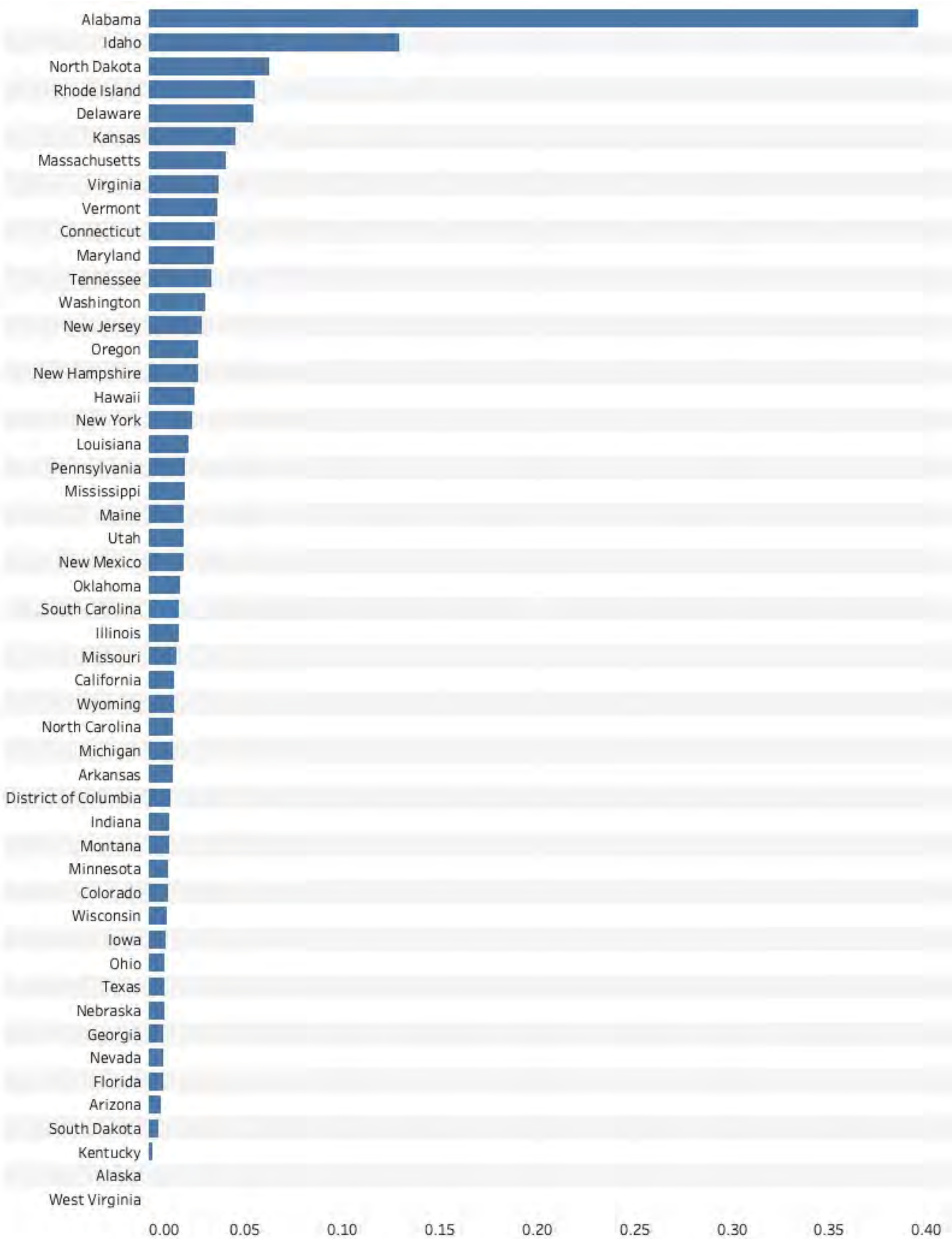


Figure 59: Cost per Kilowatt-Hour of Energy Efficiency Savings in the Commercial Sector (in Dollars) [Map]

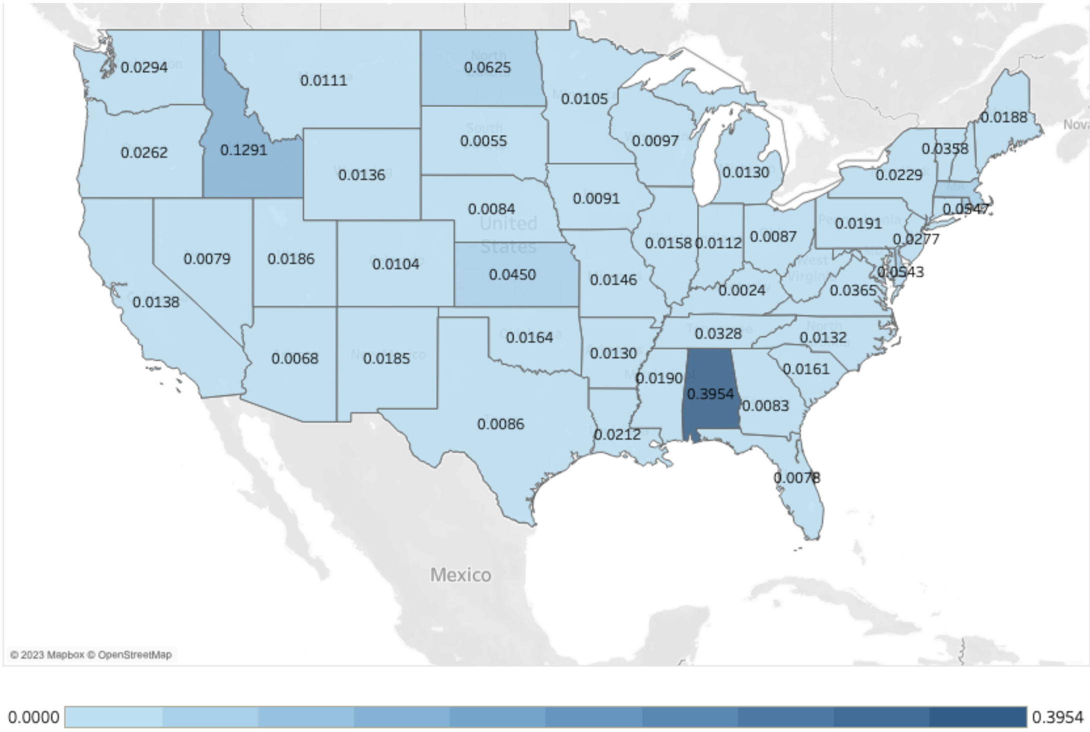


Figure 60: Cost per Kilowatt-Hour of Energy Efficiency Savings in the Industrial Sector (in Dollars)

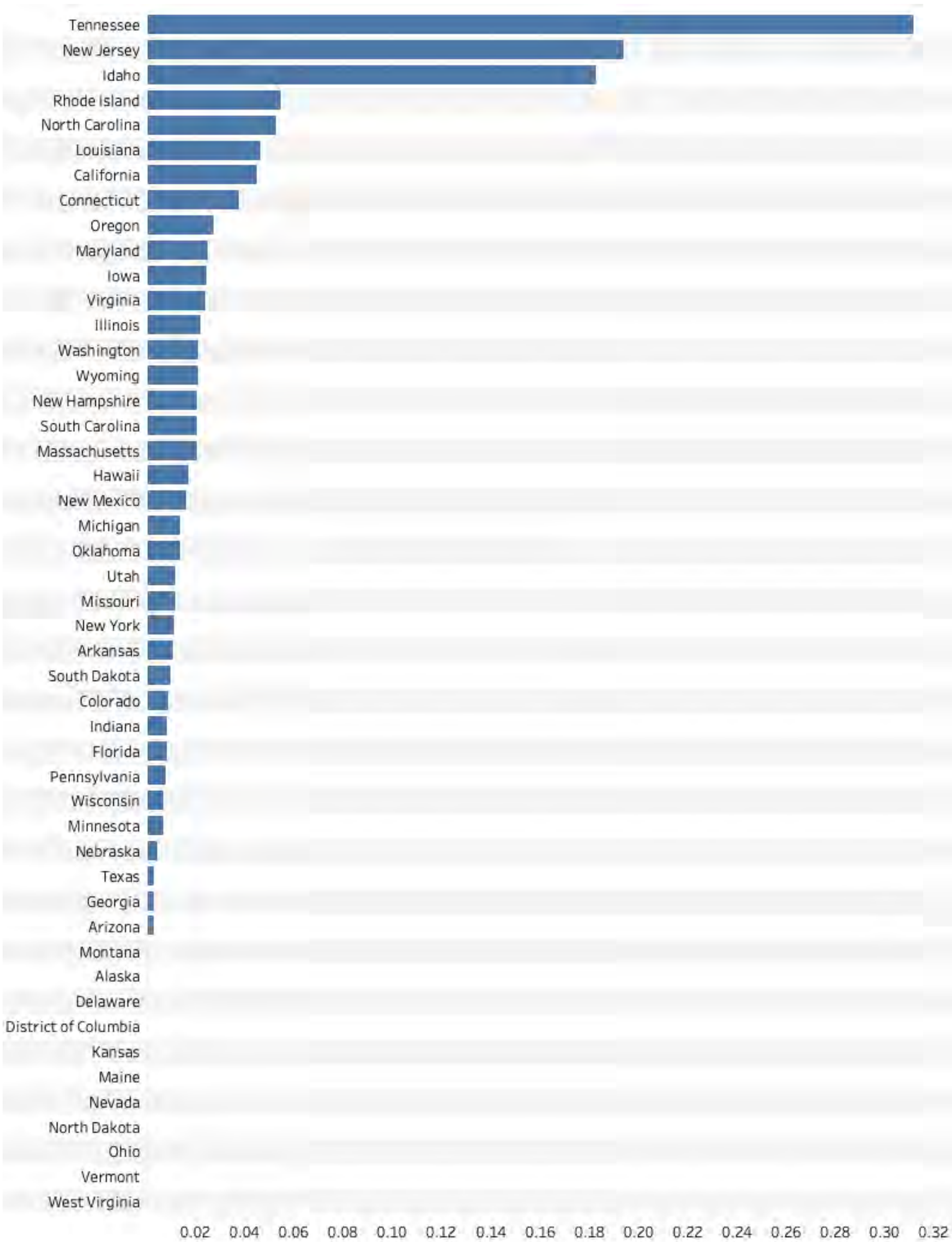
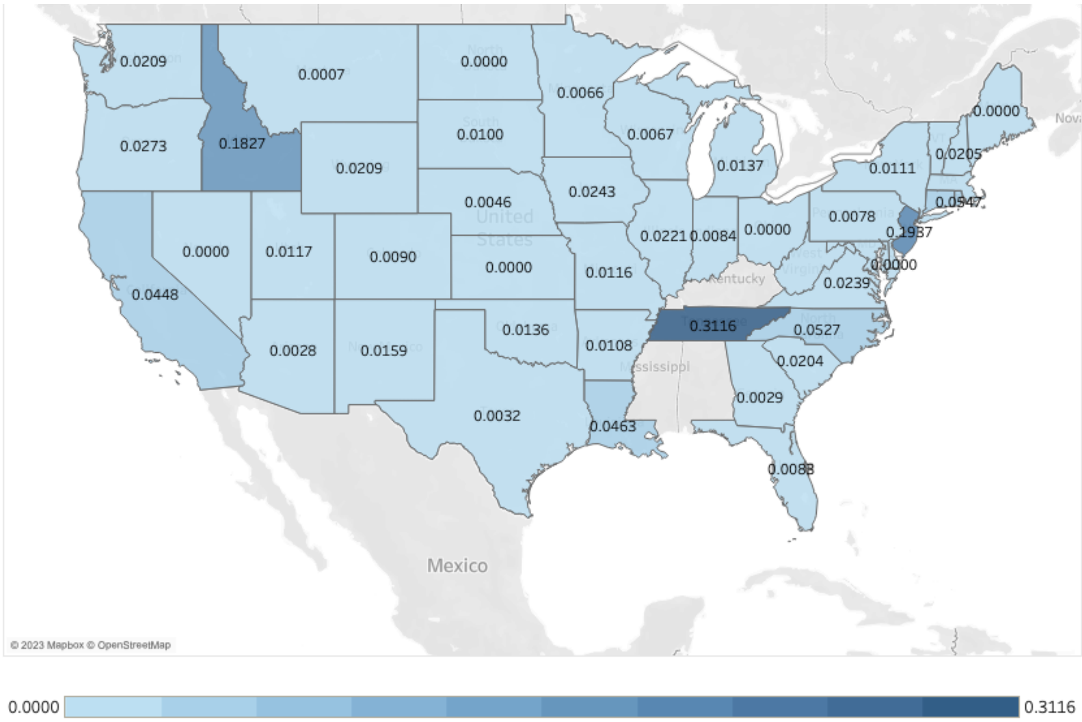


Figure 61: Cost per Kilowatt-Hour of Energy Efficiency Savings in the Industrial Sector (in Dollars) [Map]



Energy Efficiency Program Deployment

As discussed above, Michigan's residential energy efficiency programs are fairly costly compared to those in other states. On the metric "Energy Efficiency Savings as a Percentage of Sales," however, Michigan utilities' residential sector programs ranked the 15th-best among all states at 1.4%, and near the middle of states in its peer group, with Illinois and Minnesota performing better, and Ohio, Indiana and Wisconsin performing worse.

Michigan performed even better with its commercial sector programs, performing second-best among all states at 2.7%, being out-performed only by Illinois.

At .52%, Michigan's industrial sector programs ranked 9th-best among all states and better than all states in Michigan's peer group except Wisconsin.

Figure 62: 2021 Energy Efficiency Savings as a Percentage of Electricity Sales in the Residential Sector

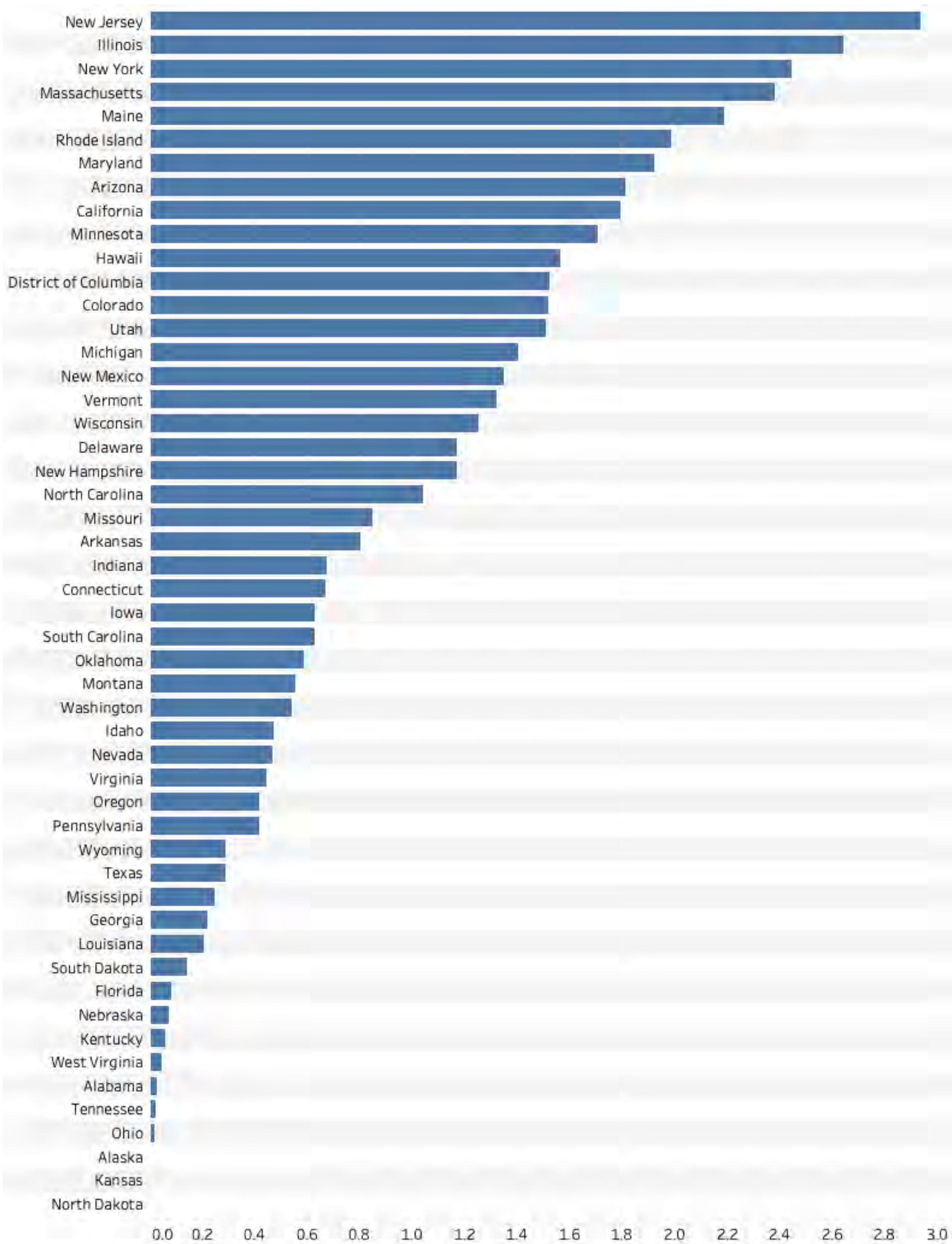


Figure 63: 2021 Energy Efficiency Savings as a Percentage of Electricity Sales in the Residential Sector [Map]

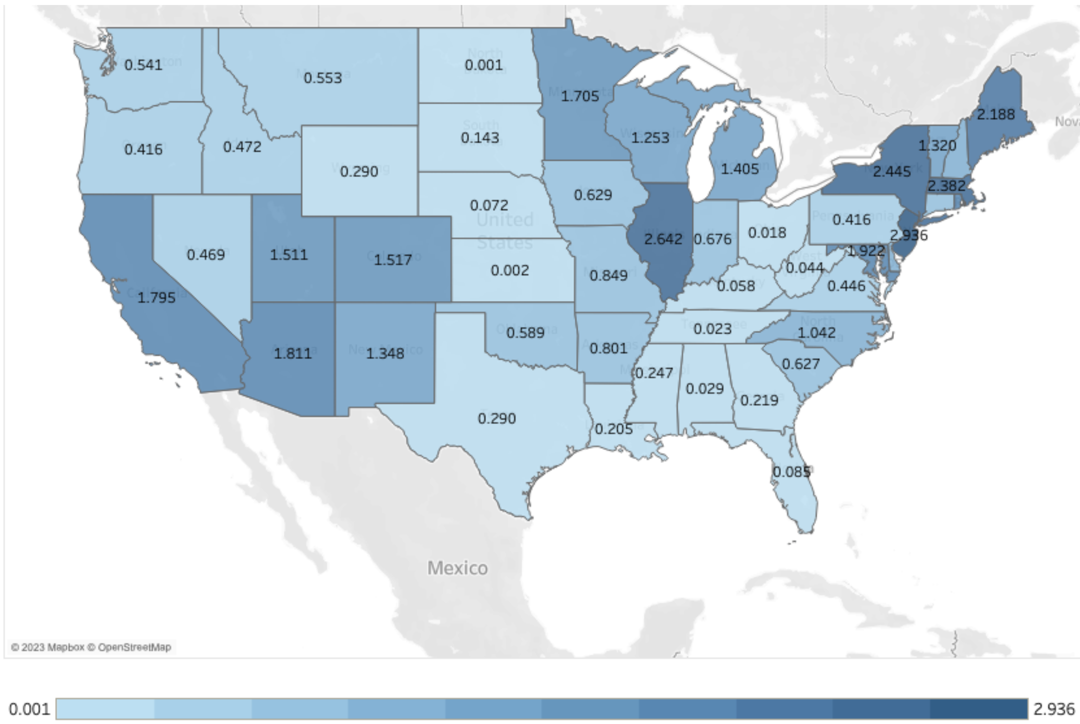


Figure 64: 2021 Energy Efficiency Savings as a Percentage of Electricity Sales in the Commercial Sector

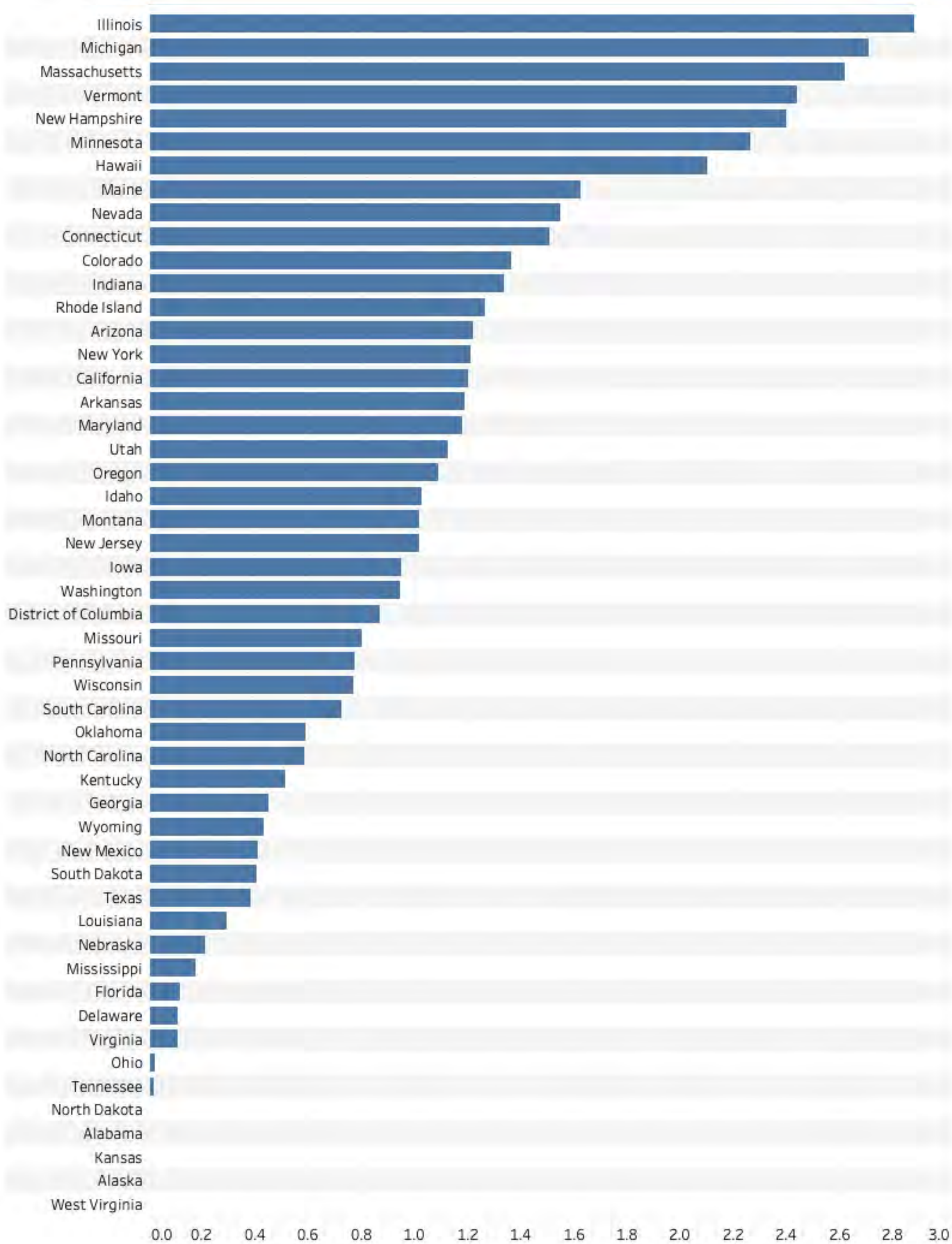


Figure 65: 2021 Energy Efficiency Savings as a Percentage of Electricity Sales in the Commercial Sector [Map]

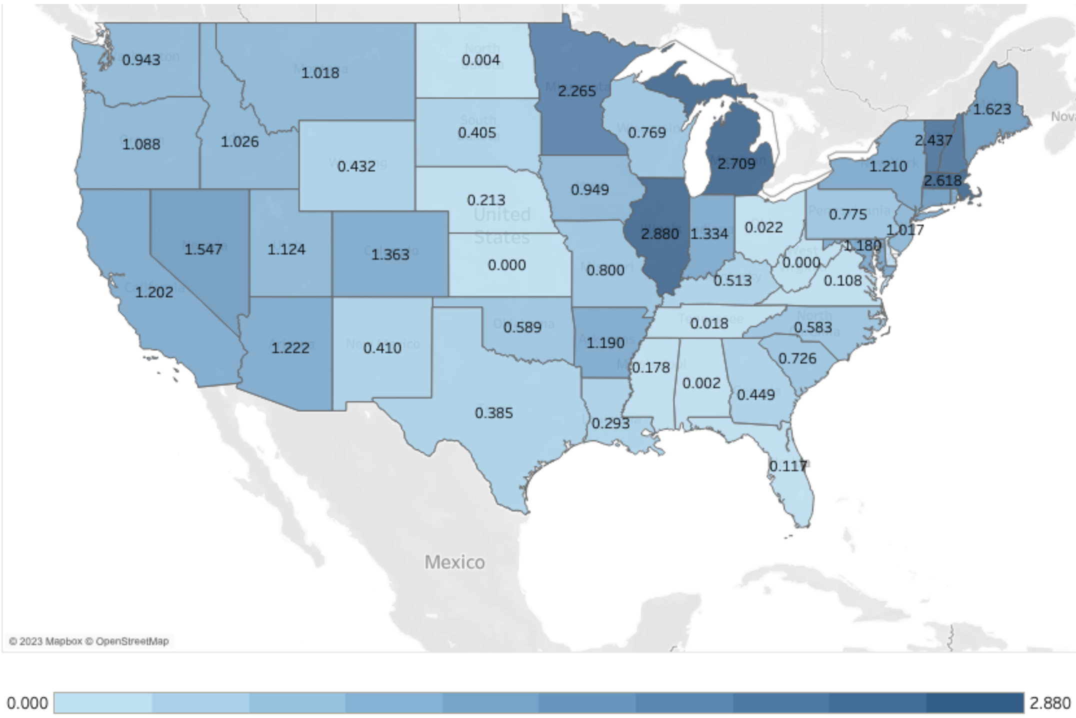


Figure 66: 2021 Energy Efficiency Savings as a Percentage of Electricity Sales in the Industrial Sector

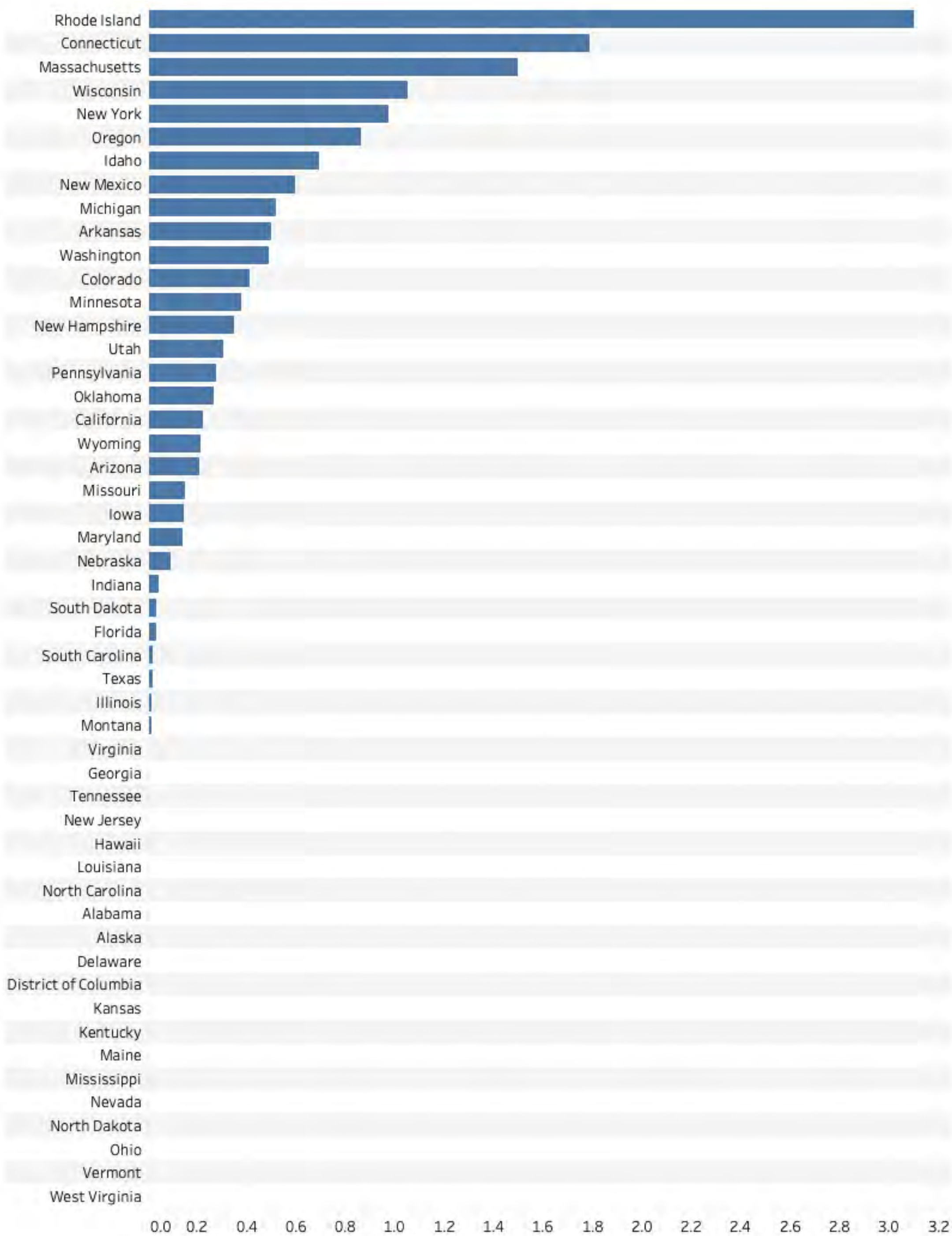
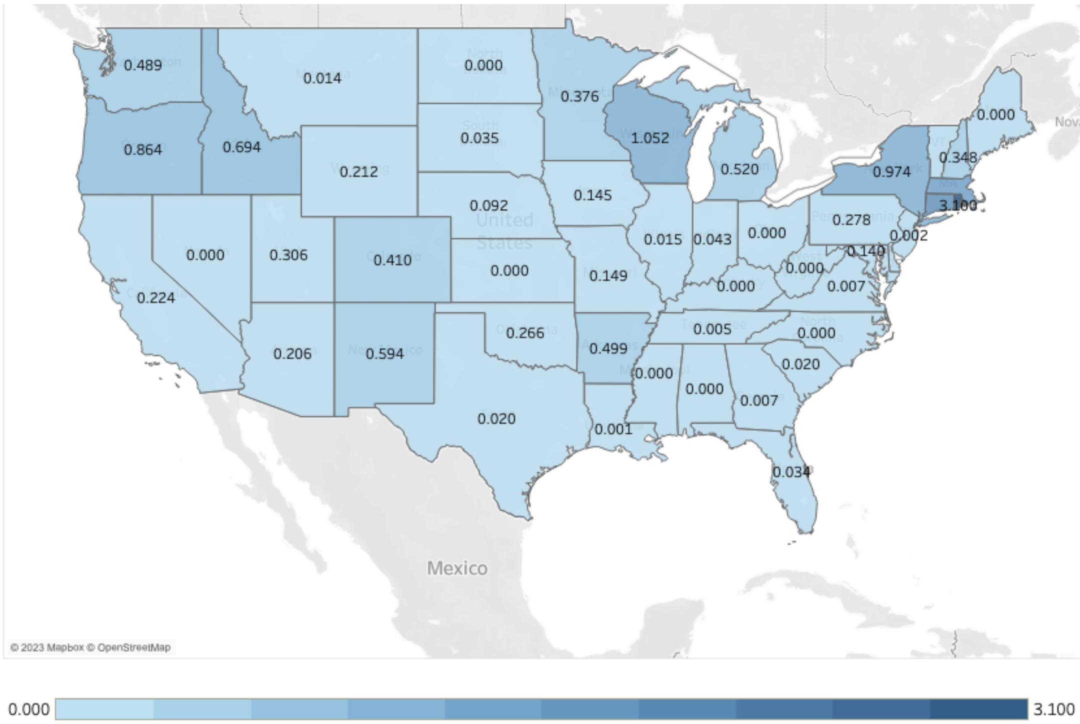


Figure 67: 2021 Energy Efficiency Savings as a Percentage of Electricity Sales in the Industrial Sector [Map]



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 our homes and, most recently, fuels many of our vehicles. Unfortunately, there are externalities from electricity generation that affect both our immediate health and our environment. The mitigation of these externalities is crucial to the prevention of the worst effects of climate change.

Generation Overview

The data in this section come from the EIA's SEDS databases.

At 12%, Michigan is in the bottom half of states for percentage of electricity generated by renewables, ranking 35th, or 17th-worst, based on 2022 data. However, because of its substantial nuclear power industry, Michigan ranks 34th in terms of percentage of electricity generated by "clean" sources at 32.2%. But in 2021, Michigan was closer to the middle of the pack in terms of the percentage of clean generation, which provided 37.8% of total generation that year. The role of nuclear in Michigan started declining dramatically in 2022, when the Palisades nuclear plant, one of four power reactors in the state, was moth-balled. This situation may reverse in future years, however, because of a potential power purchase agreement with Wolverine Power Cooperative that may allow the Palisades plant to eventually restart, current owner Holtec International announced in September 2023 (See Associated Press, "Shuttered Michigan nuclear plant moves closer to reopening under power purchase agreement," Sept. 12, 2023, https://apnews.com/article/michigan-nuclear-plant-restart-276a7d06e639d66d434e393b42b4d392). In 2022 the largest source of generation in Michigan was natural gas at 34.17%, followed by coal at 29.25% and nuclear at 22.4%, a remarkable shift from 2021 when both coal and nuclear, respectively, surpassed natural gas as sources of generation.

Power Mix by State (2022)

Figure 68: 2022 Percentage of Electricity Generation by Generation Type

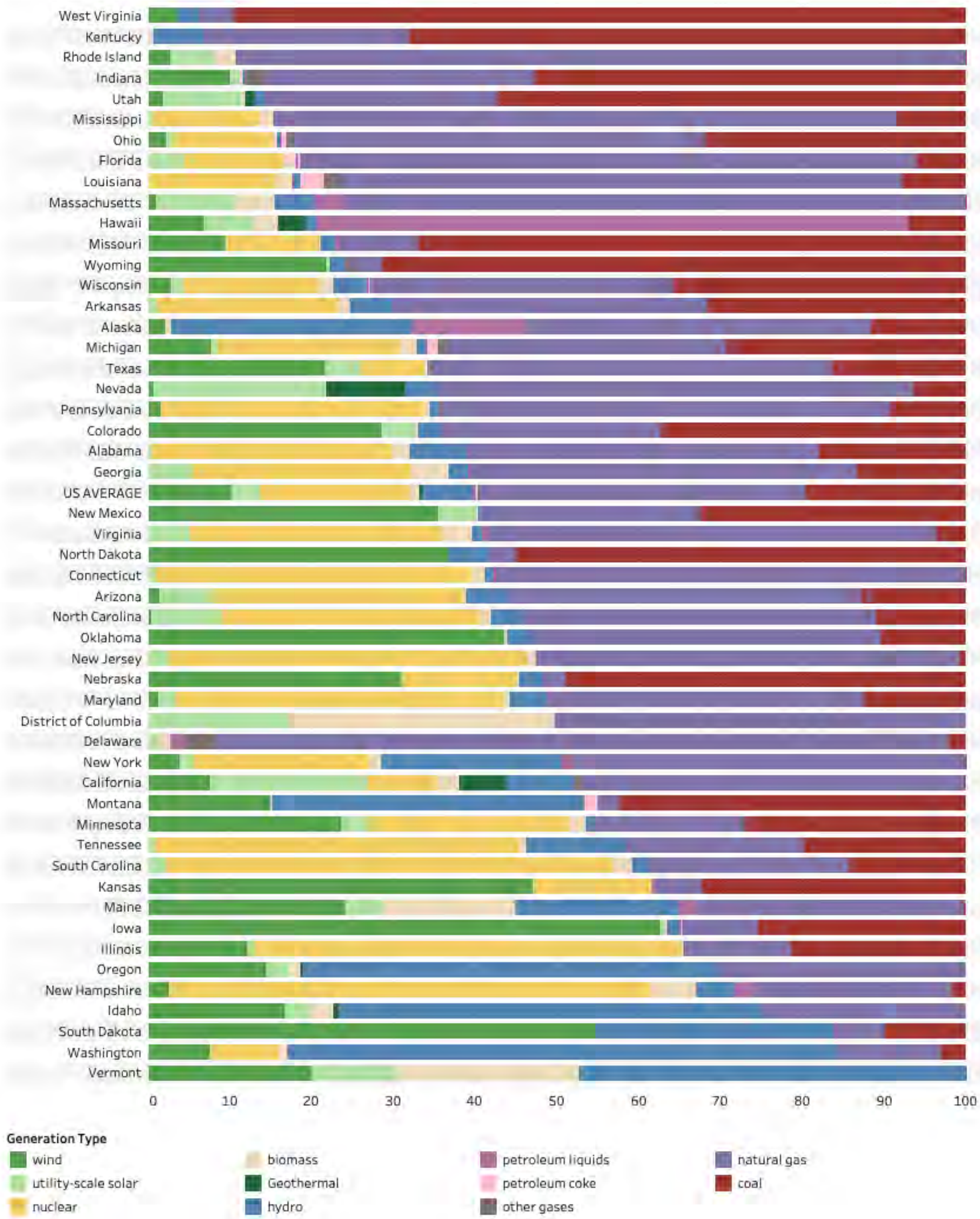


Figure 69: Dominant Generation Type by State

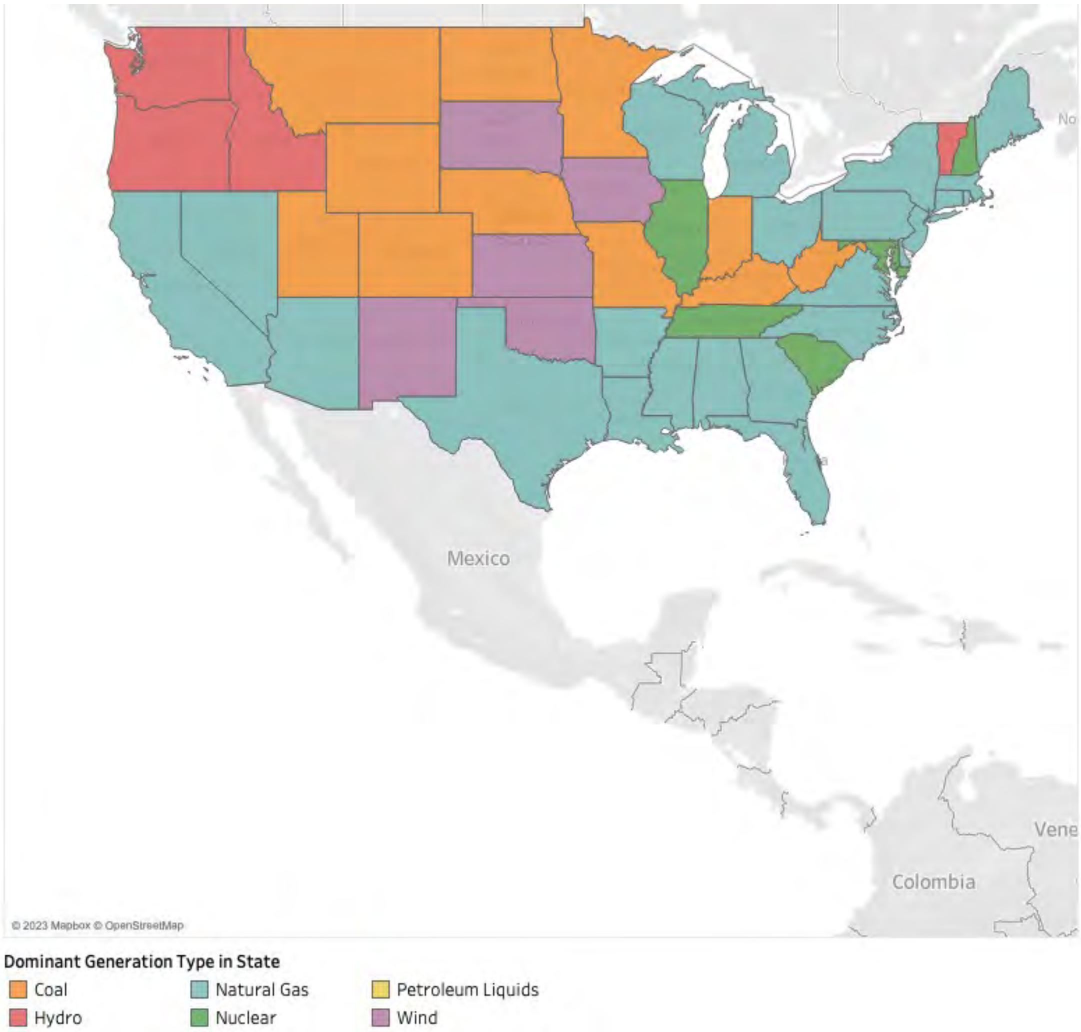


Figure 70: 2022 Renewable Generation as a Percentage of Total Generation

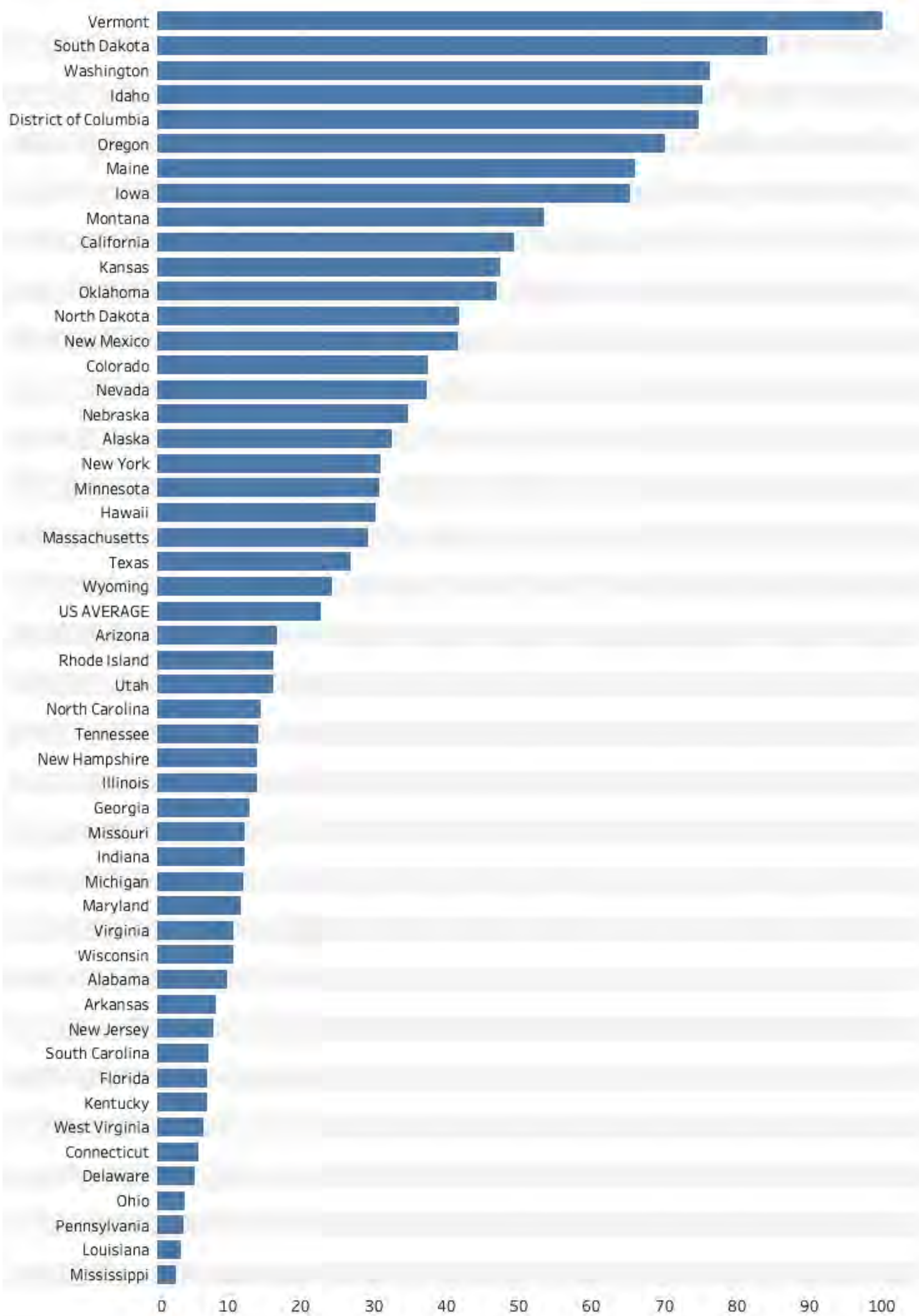


Figure 71: 2022 Renewable Generation as a Percentage of Total Generation [Map]

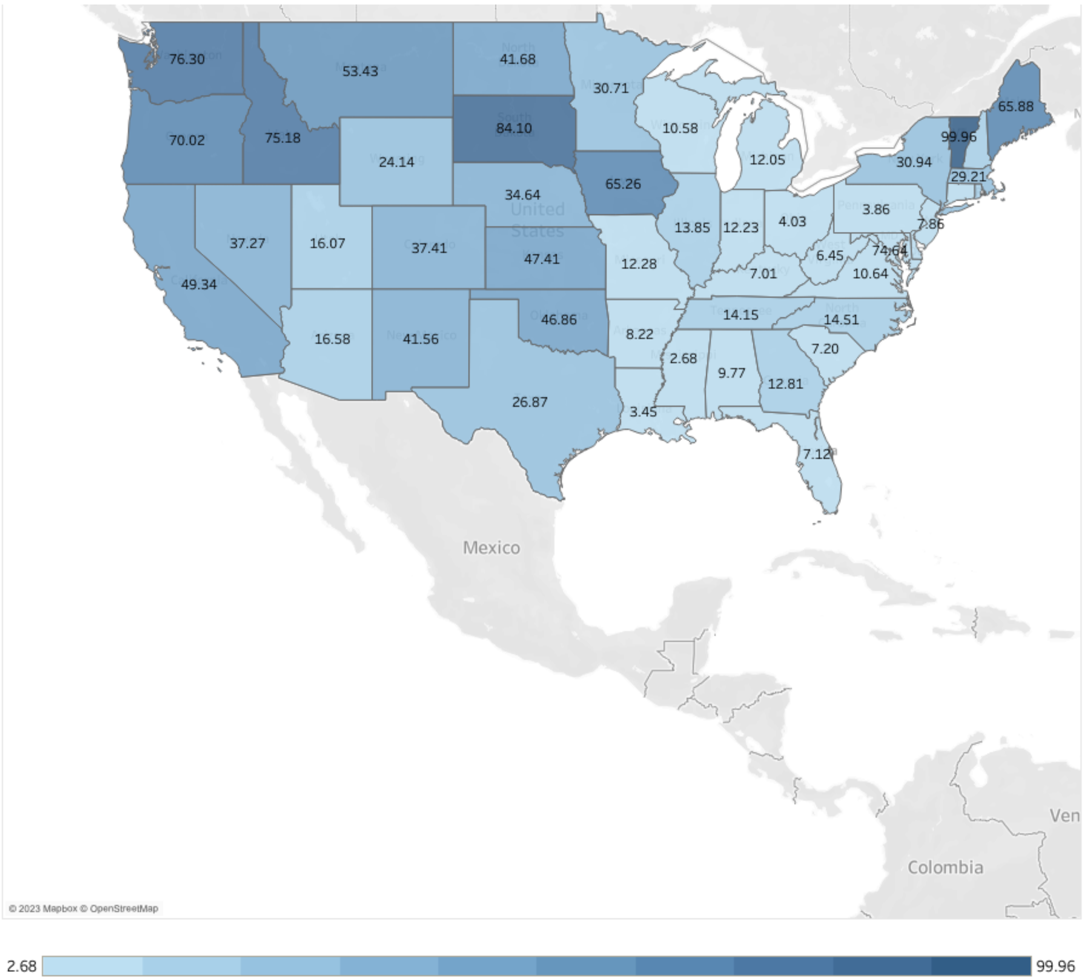


Figure 72: 2022 Clean Generation as a Percentage of Total Generation

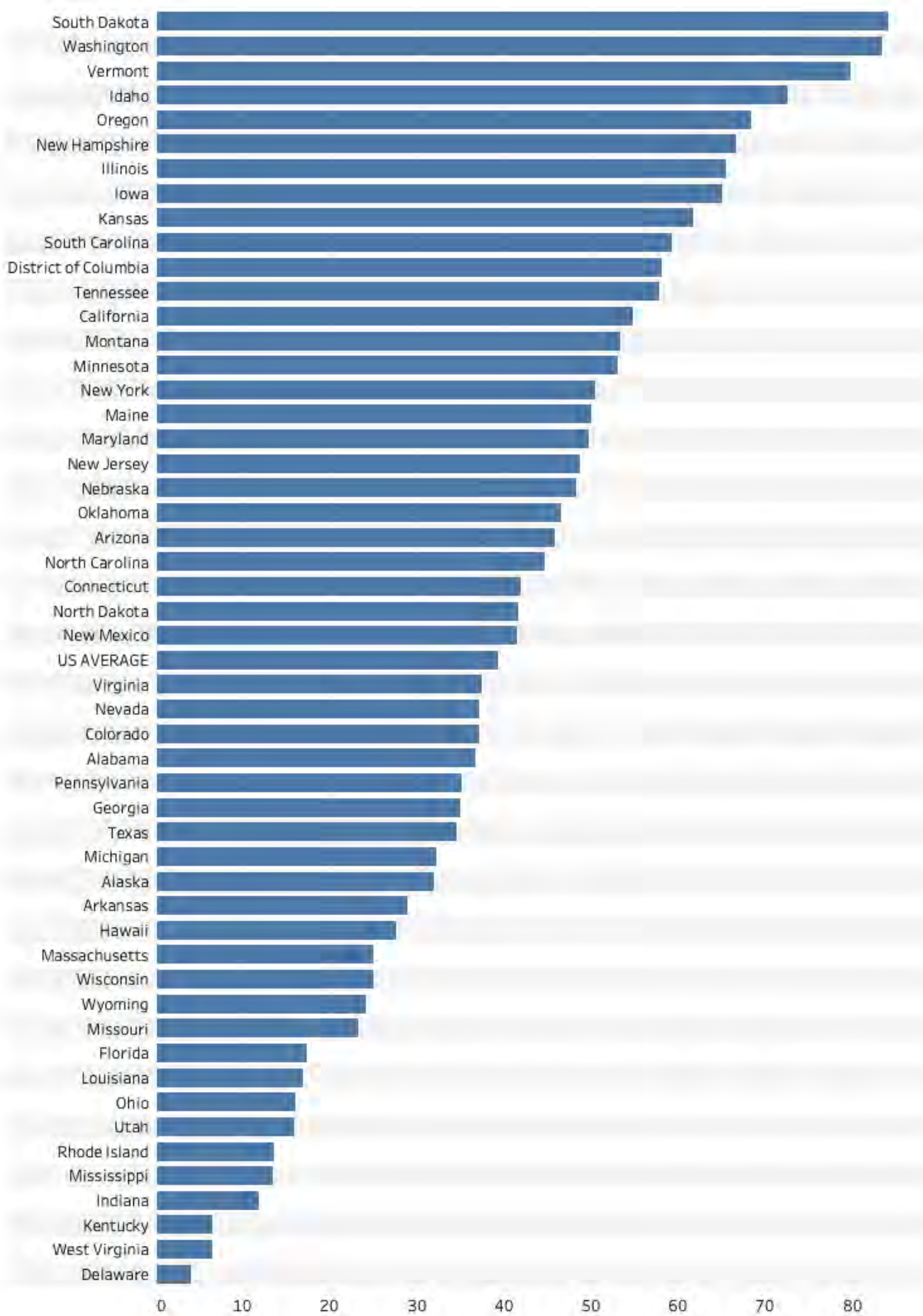


Figure 73: 2022 Clean Generation as a Percentage of Total Generation [Map]

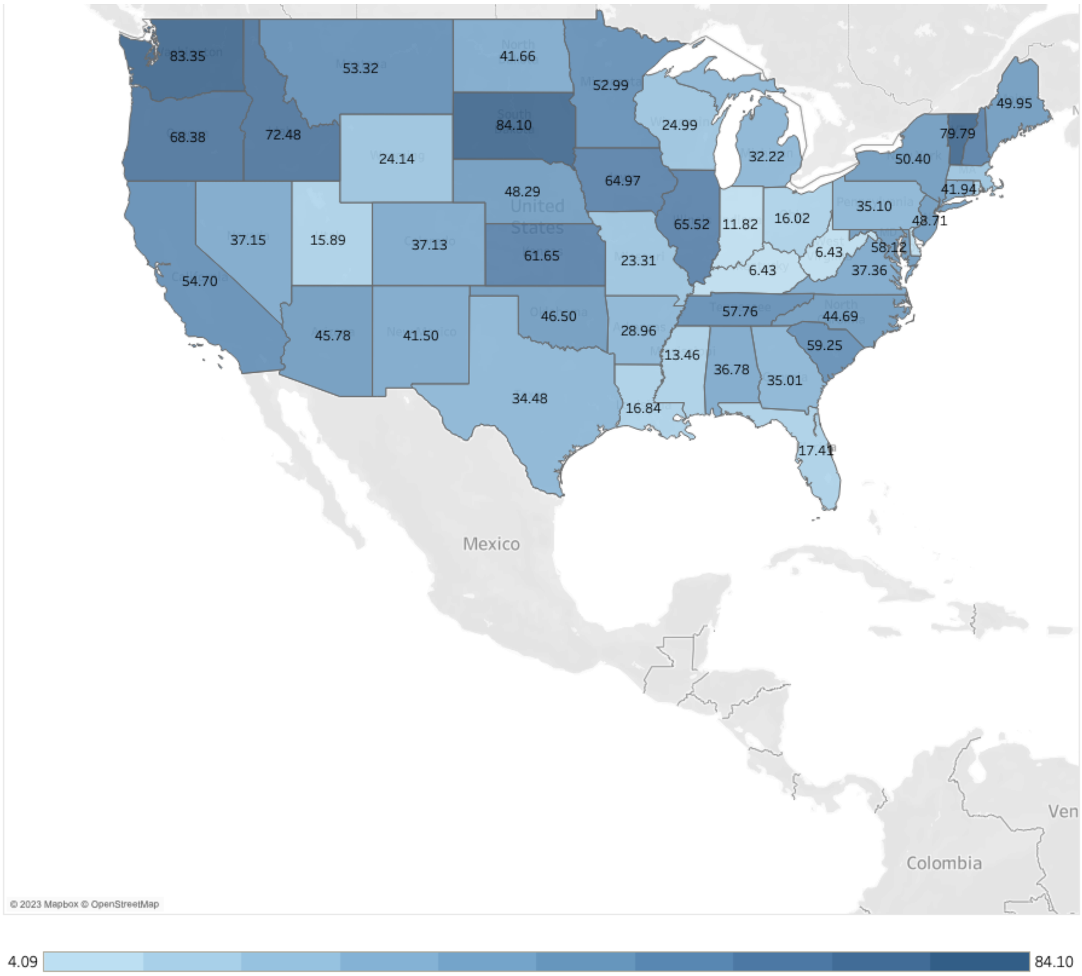


Figure 74: 2021 Renewable Generation as a Percentage of Sales

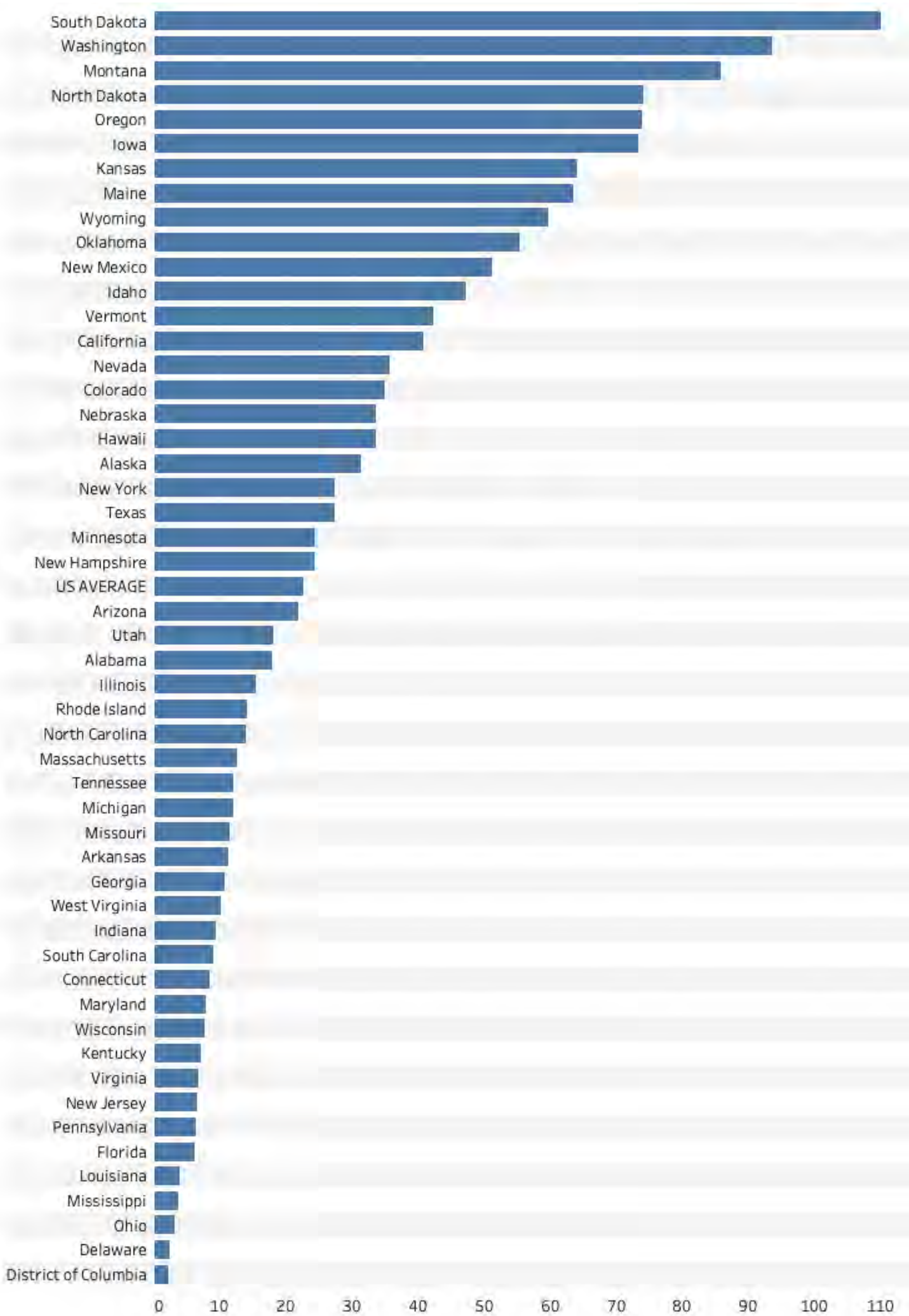


Figure 75: 2021 Renewable Generation as a Percentage of Sales [Map]

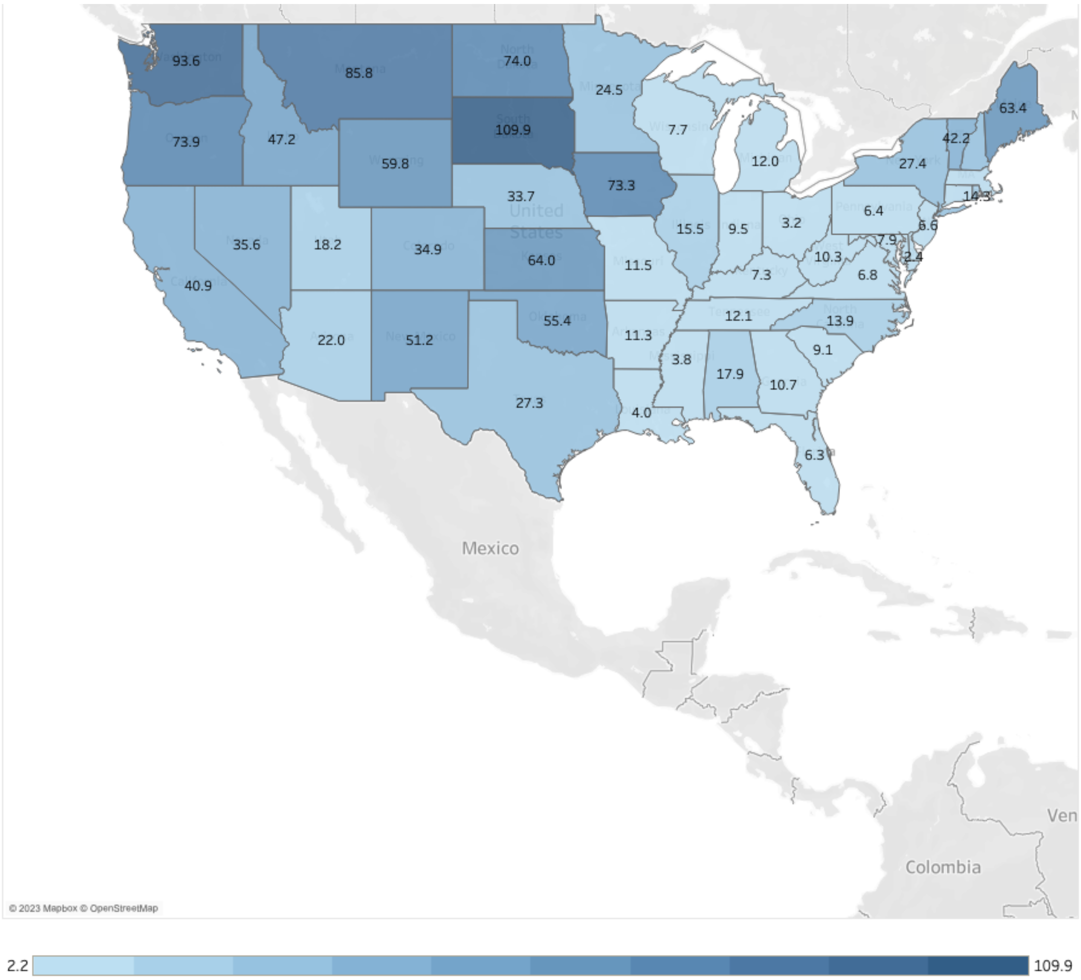


Figure 76: 2021 Clean Generation as a Percentage of Sales

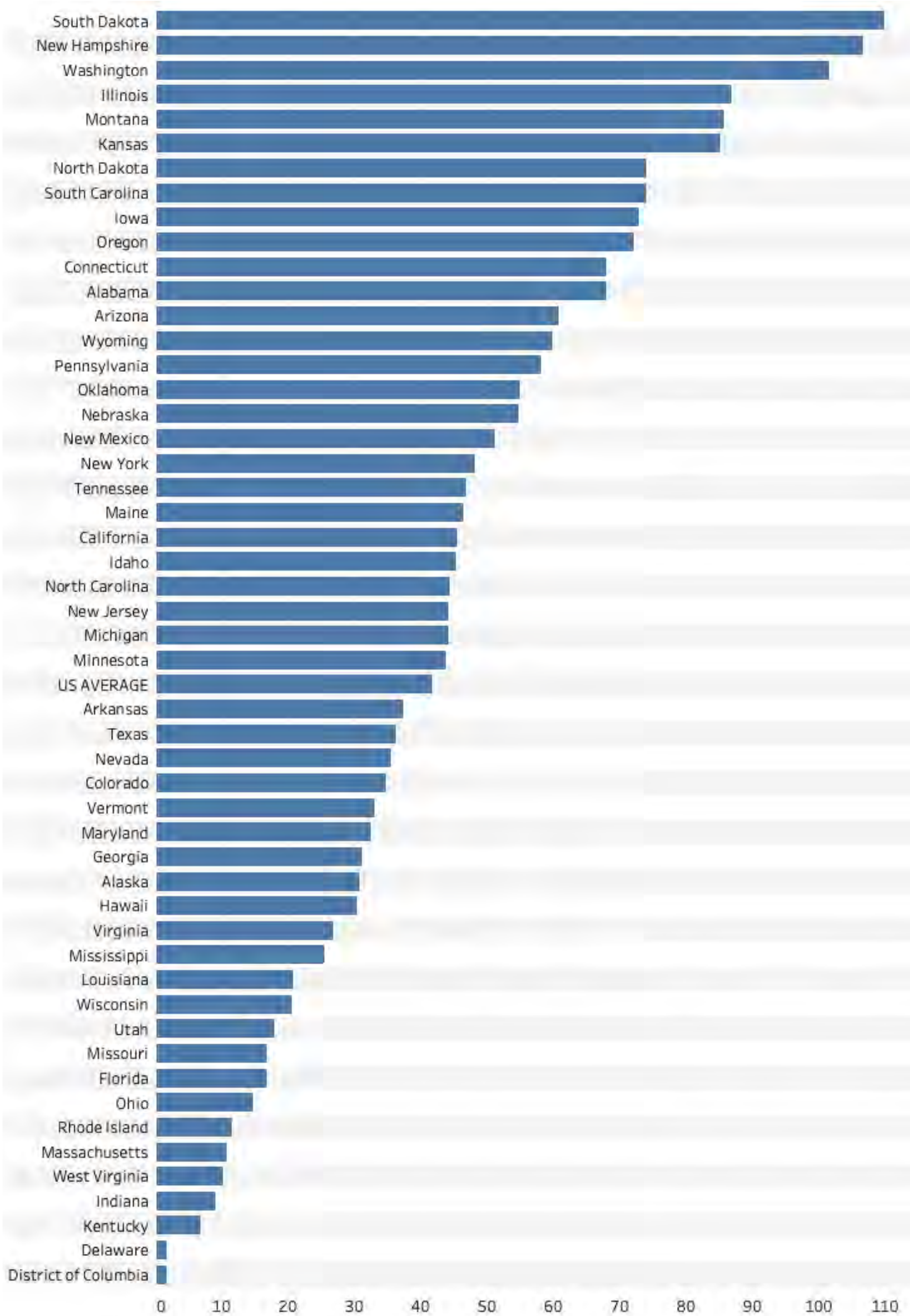
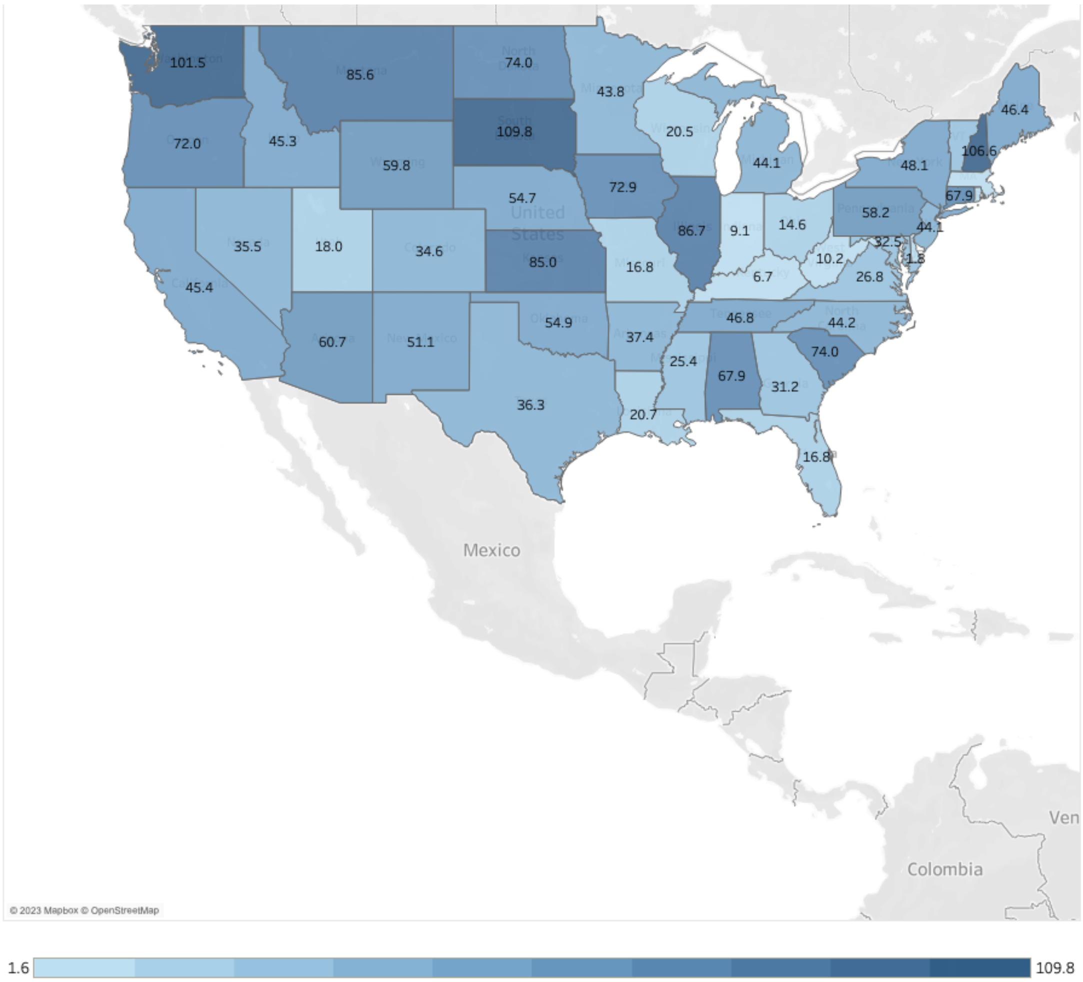


Figure 77: 2021 Clean Generation as a Percentage of Sales [Map]



Emissions

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

- Carbon dioxide (CO_2), which is the principal gas causing climate change and 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. 2022 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 around the median.

Carbon Dioxide

As shown in Figure 79, Michigan ranked 33rd, or 19th-worst, among the states in carbon dioxide pollution per gigawatt-hour (GWh) in 2021. This is around the median of its six-state peer group, with only Illinois and Minnesota performing better. The 2021 result of 476.5 metric tons per GWh is an increase from 464.5 metric tons per GWh in 2020, but the state's ranking improved by three spots. Michigan's carbon dioxide emissions intensity has fallen from 634.8 metric tons per GWh in 2011.

Figure 78 shows that Michigan's annual carbon dioxide emissions of 55.04 million metric tons ranked 42nd, or 10th-worst, among the states in 2021, an improvement from 2020, when Michigan ranked seventh-worst.

Figure 78: 2021 Total CO_2 Emissions (in Metric Tons)

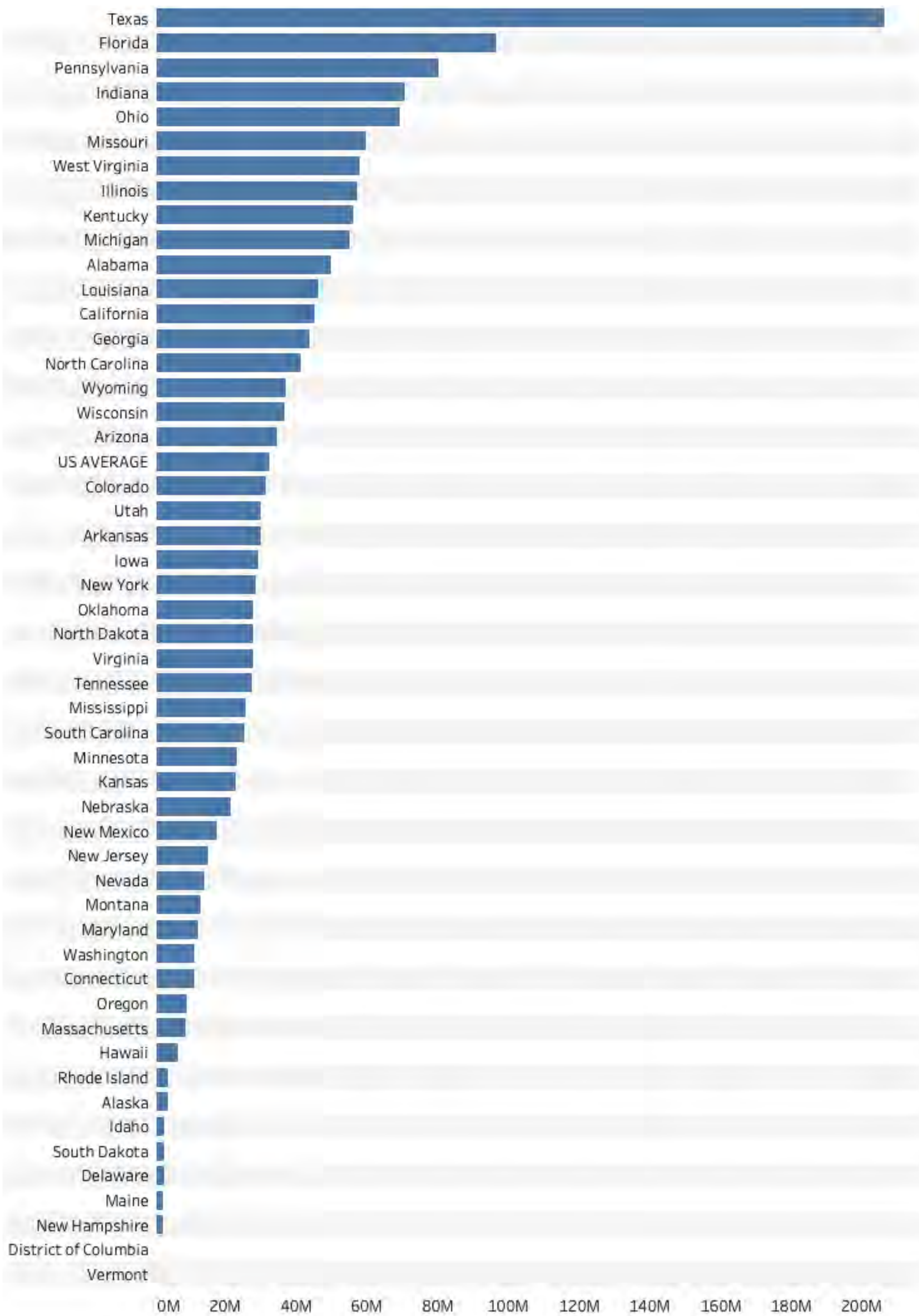


Figure 79: 2021 CO_2 Emissions Intensity (in Metric Tons per Gigawatt-Hour)

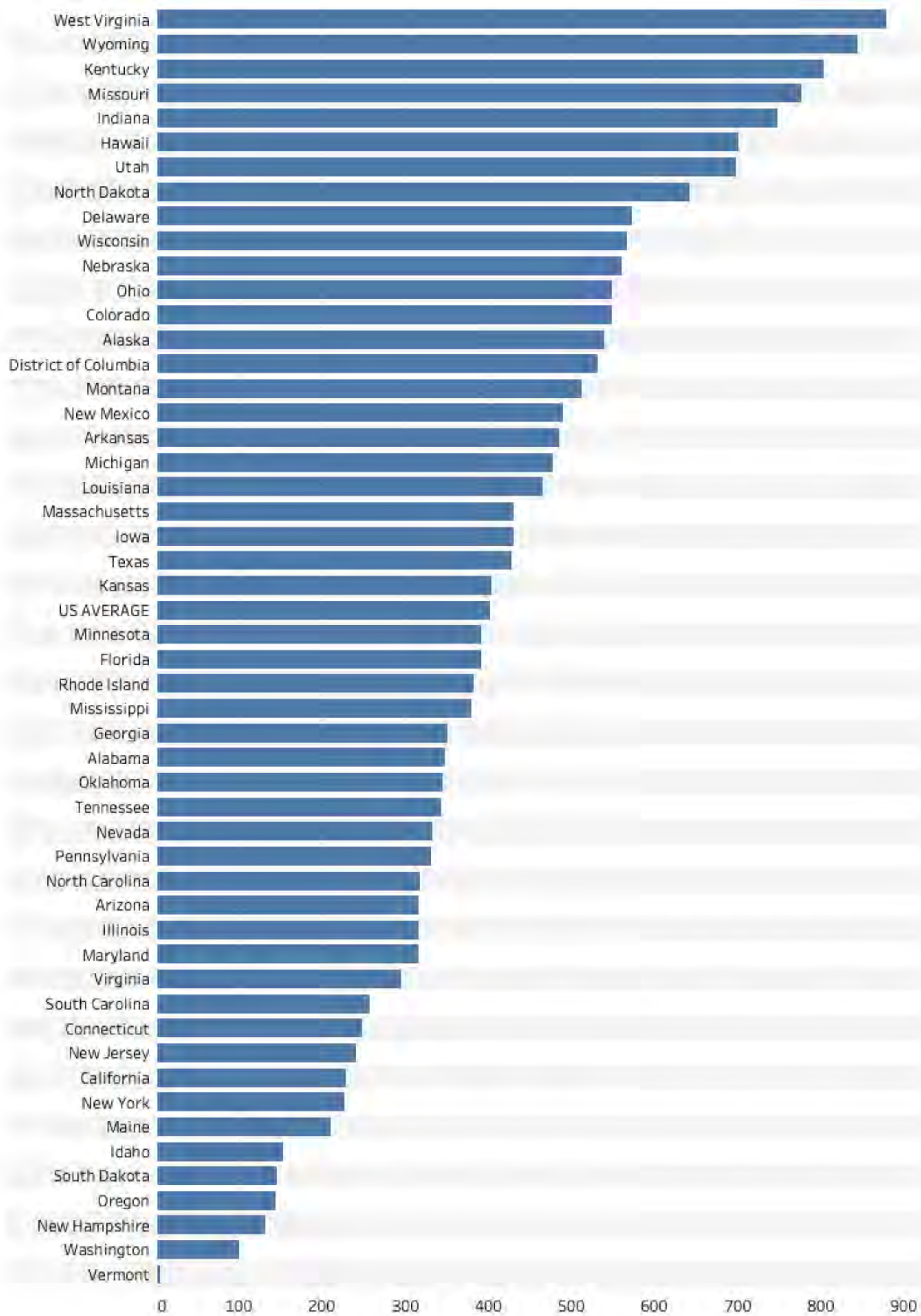
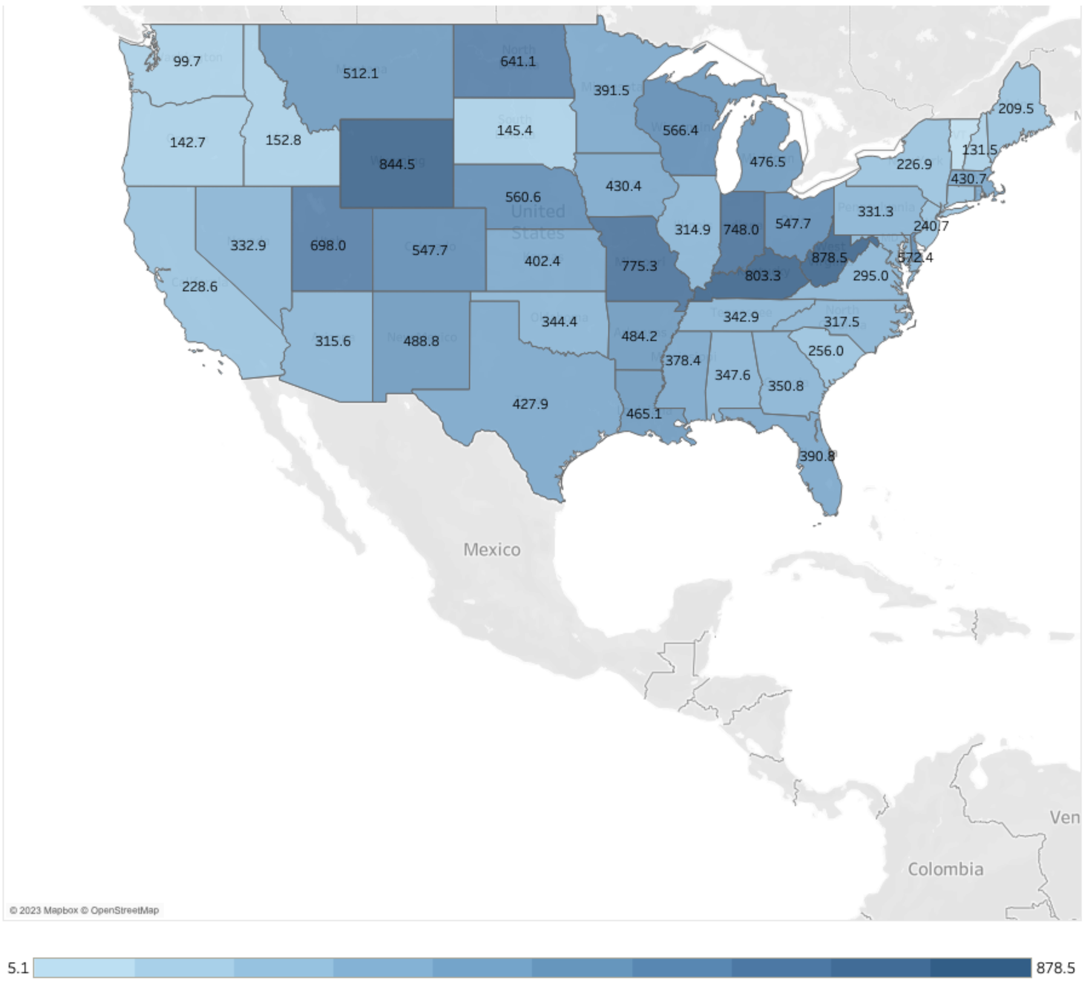


Figure 80: 2021 CO_2 Emissions Intensity (in Metric Tons per Gigawatt-Hour) [Map]



Sulfur Dioxide

As shown in Figure 82, Michigan ranked 42nd, or 10th-worst, among the states in sulfur dioxide pollution per GWh in 2021, with 0.50 metric tons emitted for every GWh generated. Compared to its peer group, Michigan was second-worst for this metric, with only Ohio performing worse. Michigan's sulfur dioxide emissions intensity has significantly and steadily declined since 2011, when the rate was 2.15 metric tons emitted for every GWh generated. However, many states have experienced larger rates of decreases over that period.

Figure 81 shows that Michigan's 2021 sulfur dioxide emissions of 58,345 metric tons ranked 48th, or fourth-worst, among the states, with only Illinois and Ohio emitting more sulfur dioxide among peer states. In 2020, Michigan was sixth-worst among the states for total sulfur dioxide emissions, and 12th-worst for sulfur dioxide emissions intensity.

Figure 81: 2021 Total SO_2 Emissions (in Metric Tons)

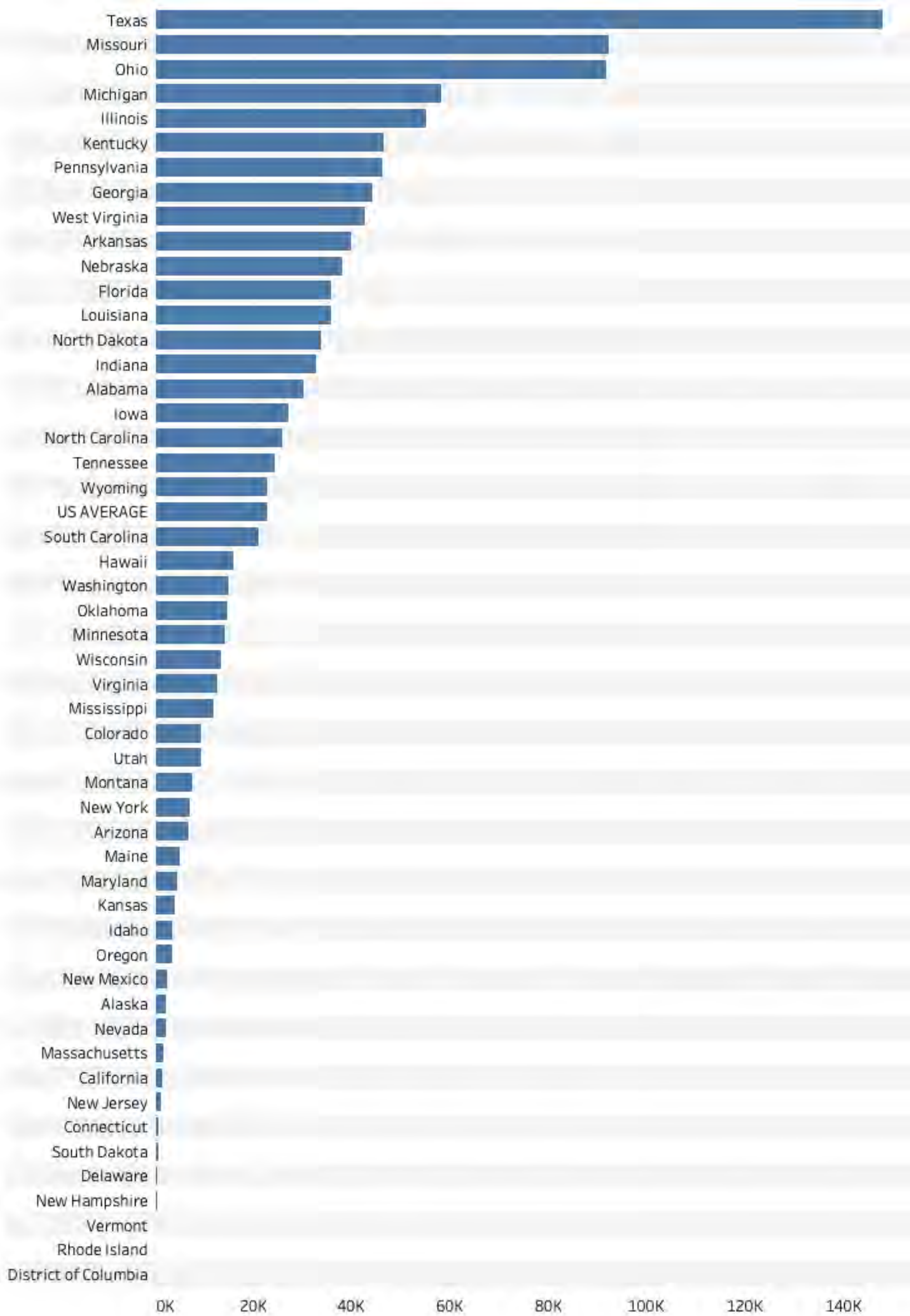


Figure 82: 2021 SO_2 Emissions Intensity (in Metric Tons per Gigawatt-Hour)

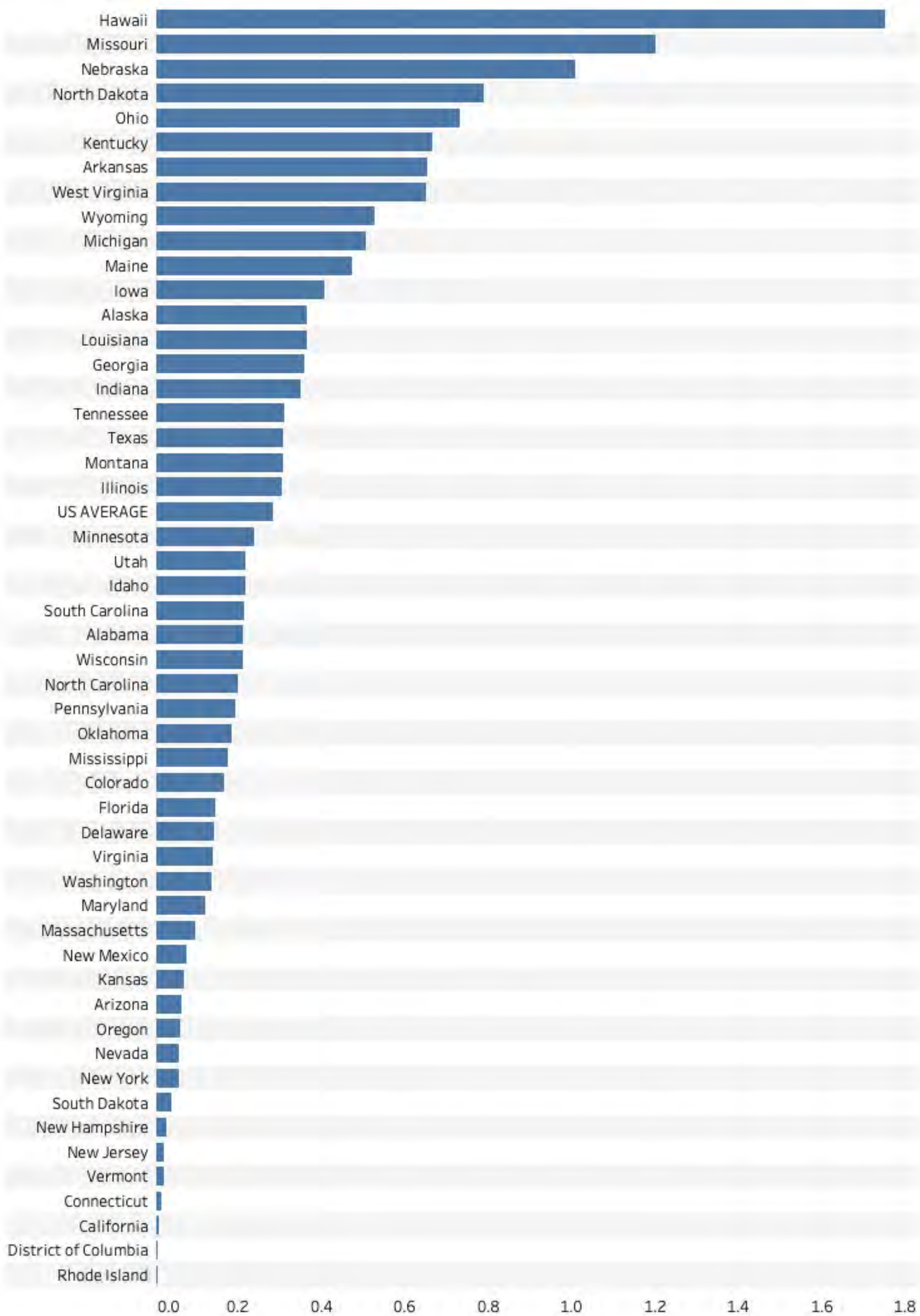
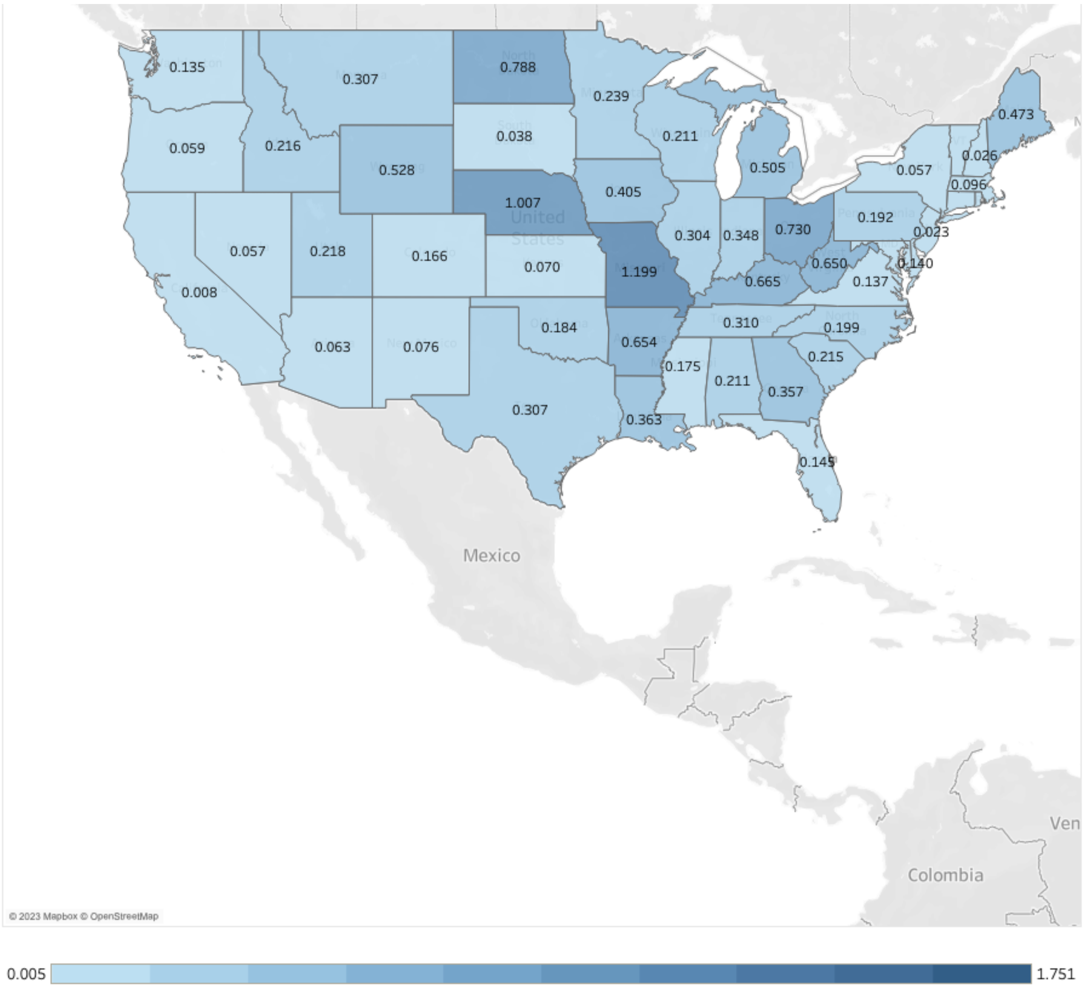


Figure 83: 2021 SO_2 Emissions Intensity (in Metric Tons per Gigawatt-Hour) [Map]



Nitrogen Oxides

As shown in Figure 85, Michigan ranked 38th, or 14th-worst, among the states in nitrogen oxides emitted per GWh in 2021, the same ranking as in 2020, with 0.45 metric tons emitted for every GWh generated. Michigan performs worse than all its peers except for Indiana. In 2011, Michigan's nitrogen oxide emissions intensity was 0.75 metric tons per GWh generated.

As shown in Figure 84, Michigan utilities emitted 52,874 metric tons of nitrogen oxides in 2021, and ranked 49th, or third-worst, in total nitrogen oxide emissions, down from sixth-worst in 2020.

Figure 84: 2021 Total NO_x Emissions (in Metric Tons)

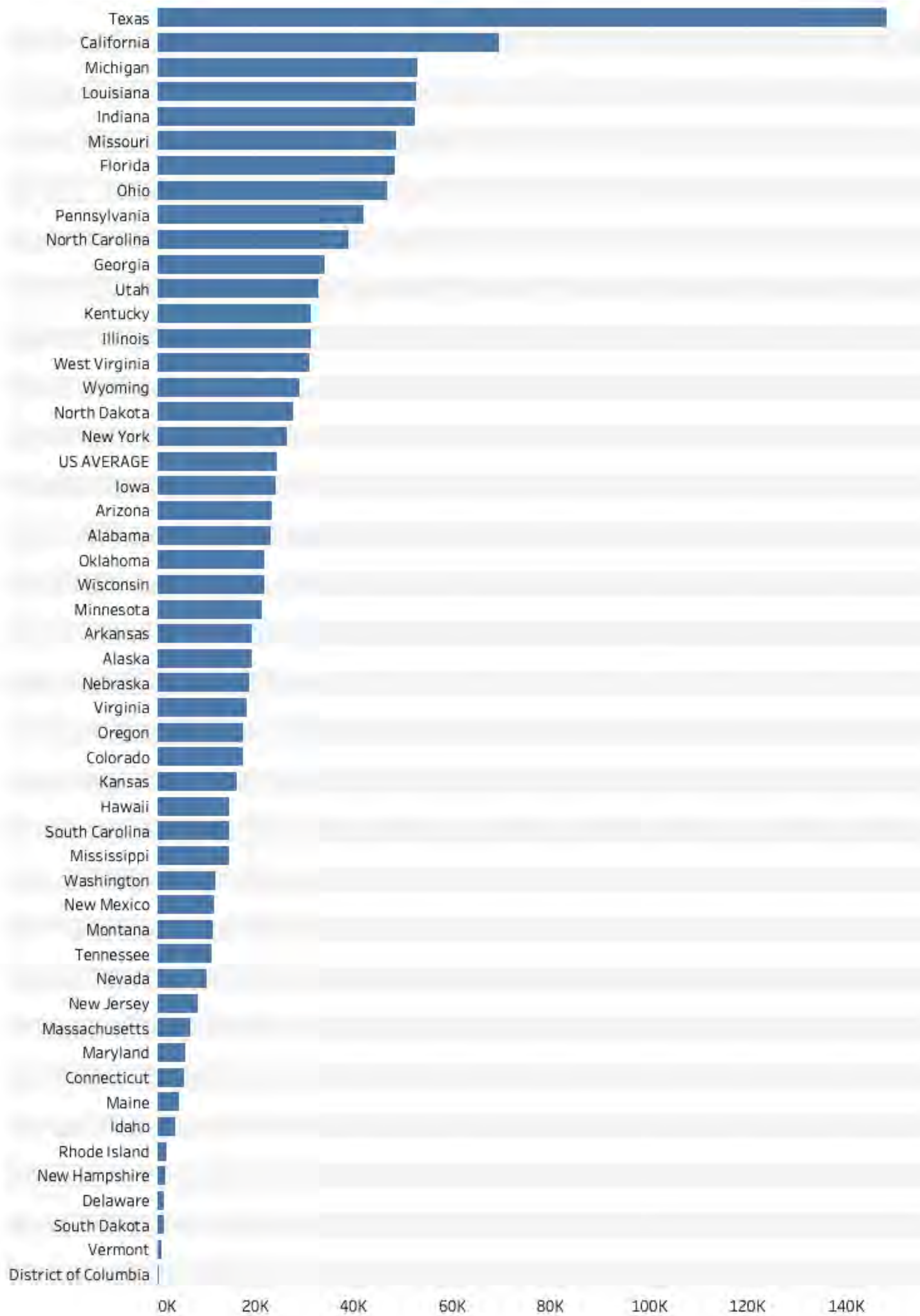


Figure 85: 2021 NO_x Emissions Intensity (in Metric Tons per Gigawatt-Hour)

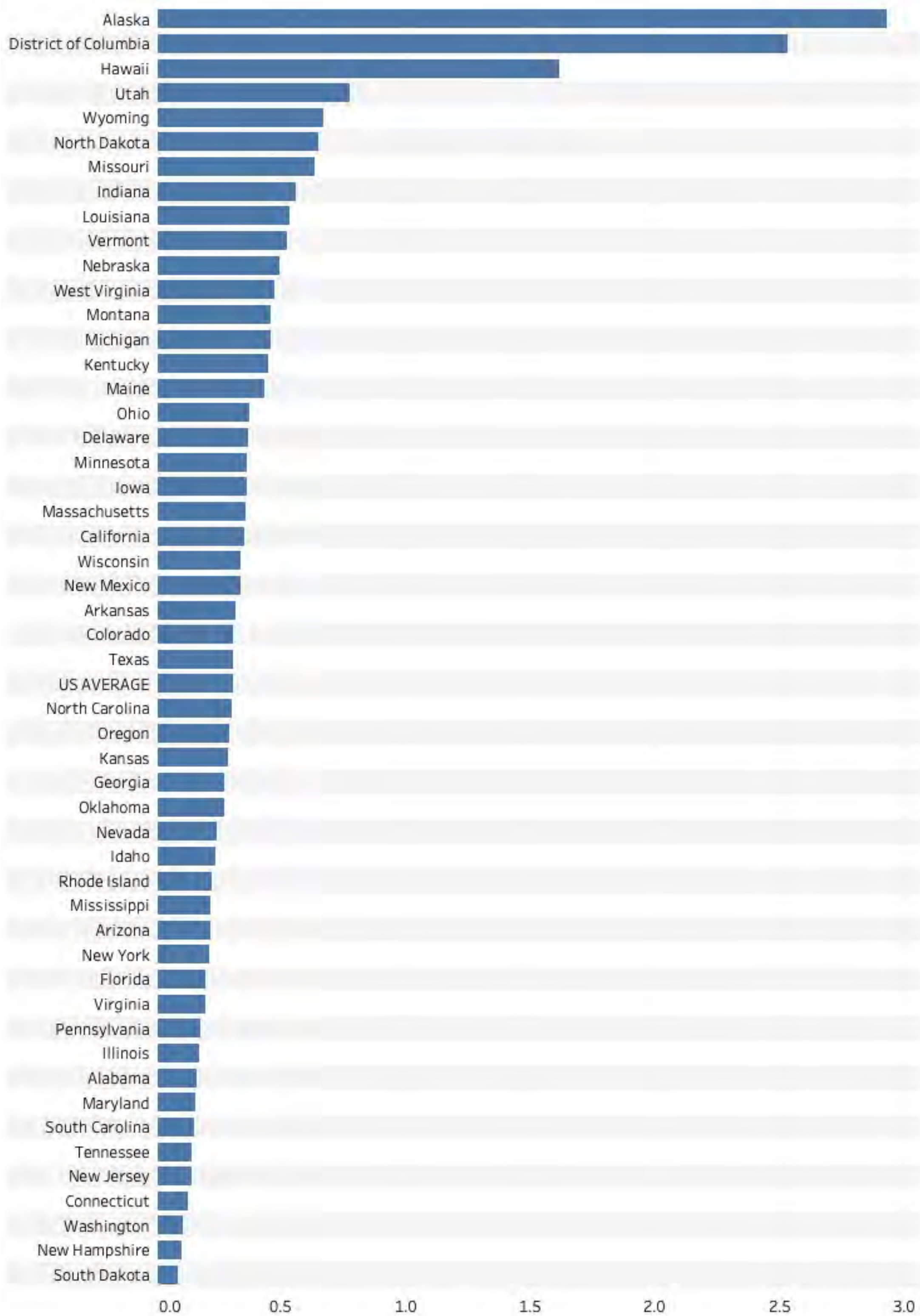
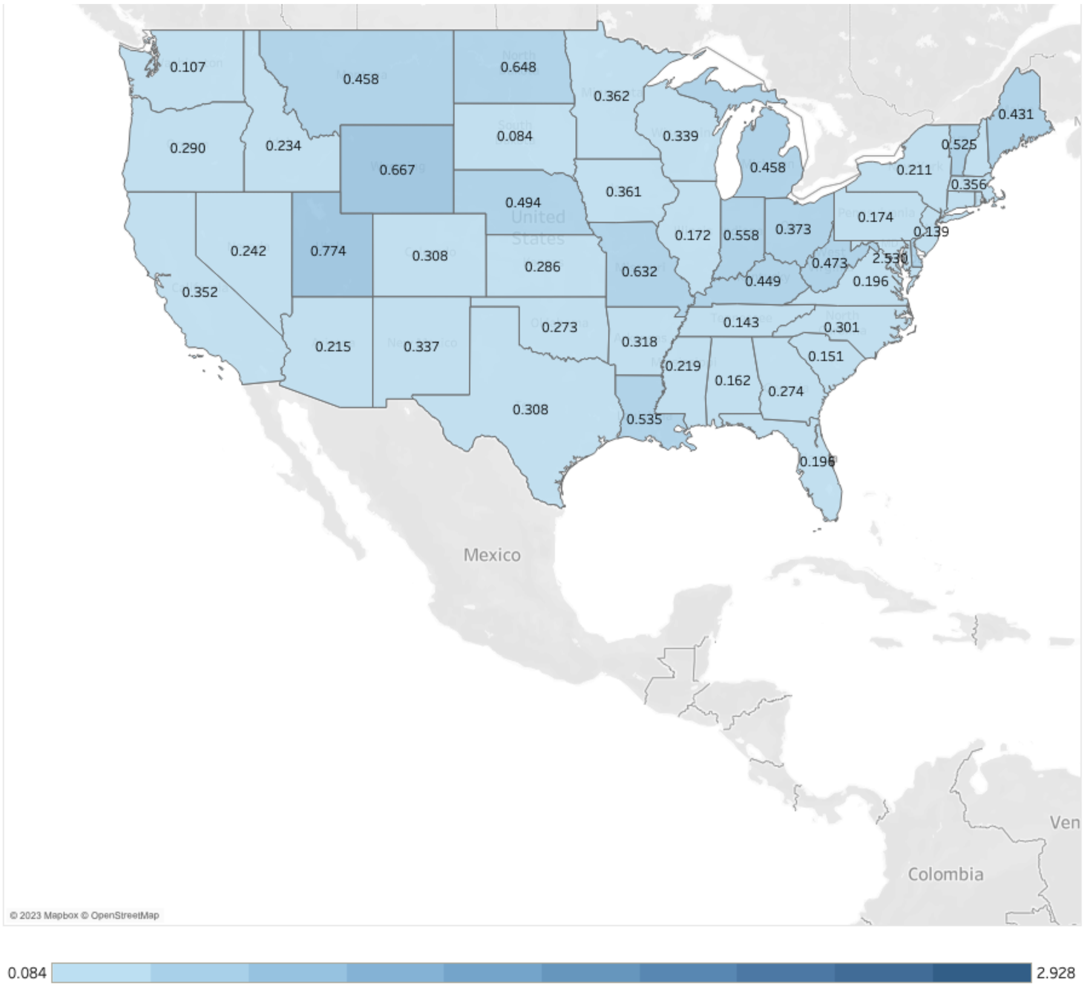


Figure 86: 2021 NO_x Emissions Intensity (in Metric Tons per Gigawatt-Hour) [Map]



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 water data browser is still in its beta form, and has only recently been made available to the public.

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 2021, Michigan ranked 35th and 31st for intensities of water withdrawal and consumption, respectively, for electric production, withdrawing 8,041.95 gallons per MWh and consuming 102.55 gallons per MWh. This makes Michigan the second-largest user in its peer group, after Wisconsin, and the fourth-largest consumer after Wisconsin and Minnesota (Figures 88 and 90). In 2020, Michigan ranked 36th for water withdrawal intensity and 18th for water consumption intensity (Figures 87 and 89).

Weighted Average Water Withdrawal Intensity

Figure 87: 2021 Weighted Average Water Withdrawal Intensity for Electricity Generation in Gallons per Megawatt-Hour

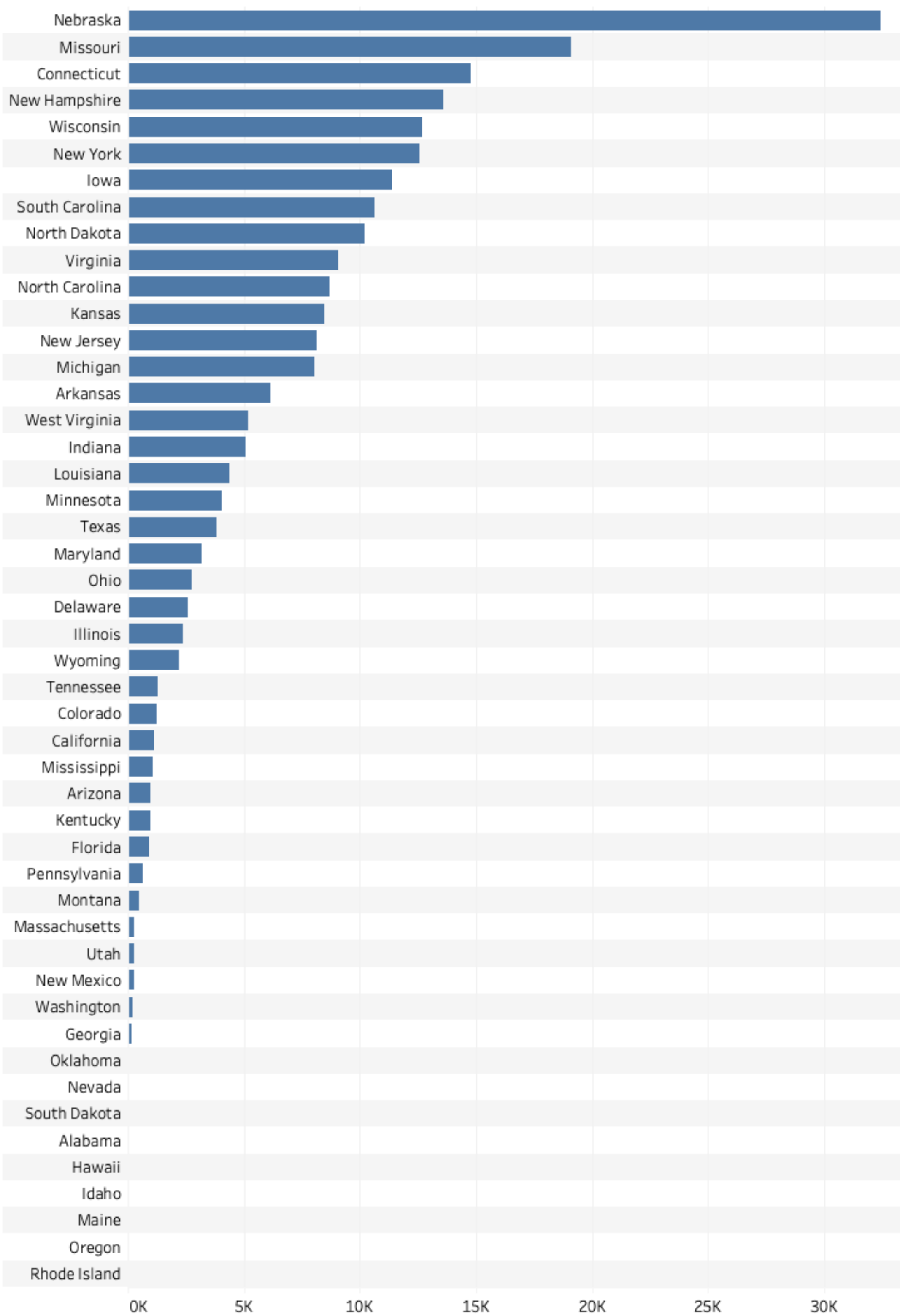


Figure 88: 2021 Weighted Average Water Withdrawal Intensity for Electricity Generation in Gallons per Megawatt-Hour

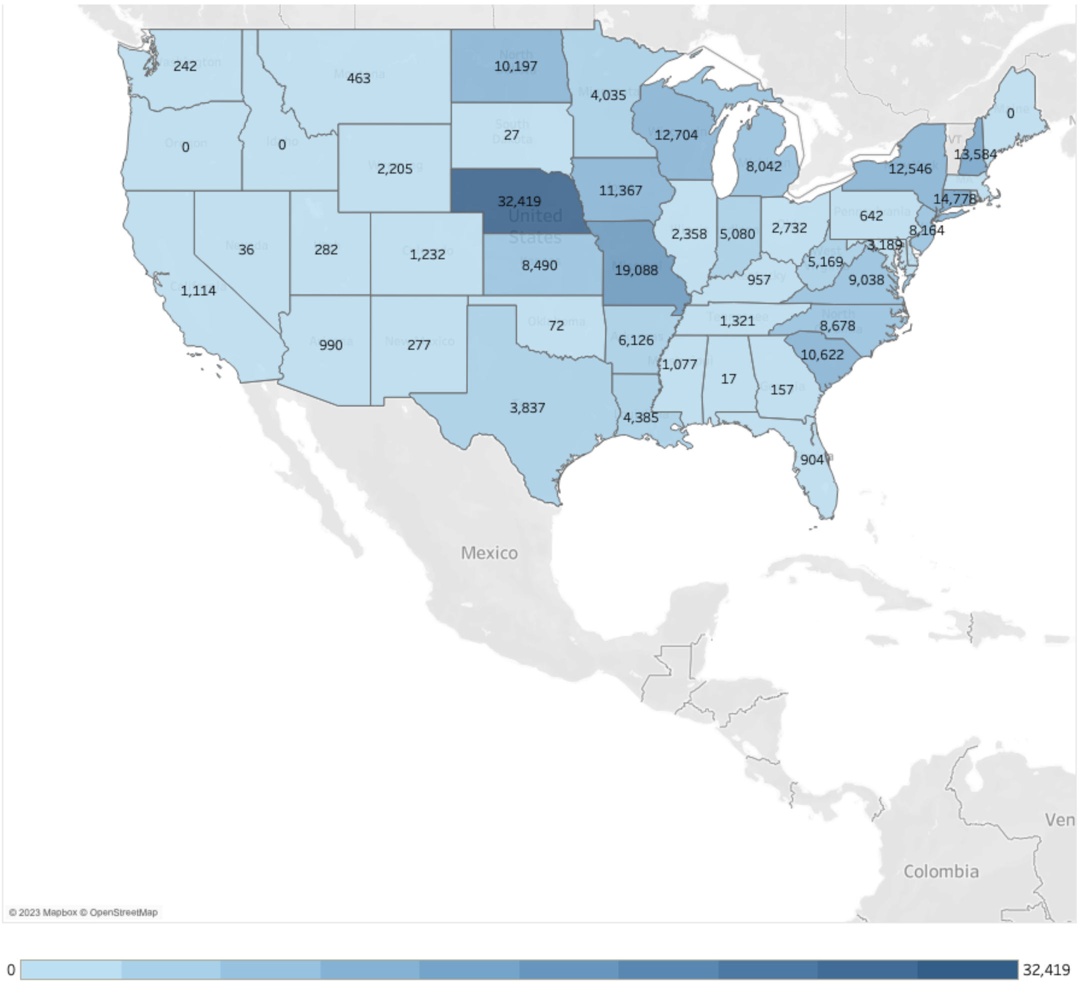


Figure 89: 2021 Weighted Average Water Consumption Intensity for Electricity Generation in Gallons per Megawatt-Hour

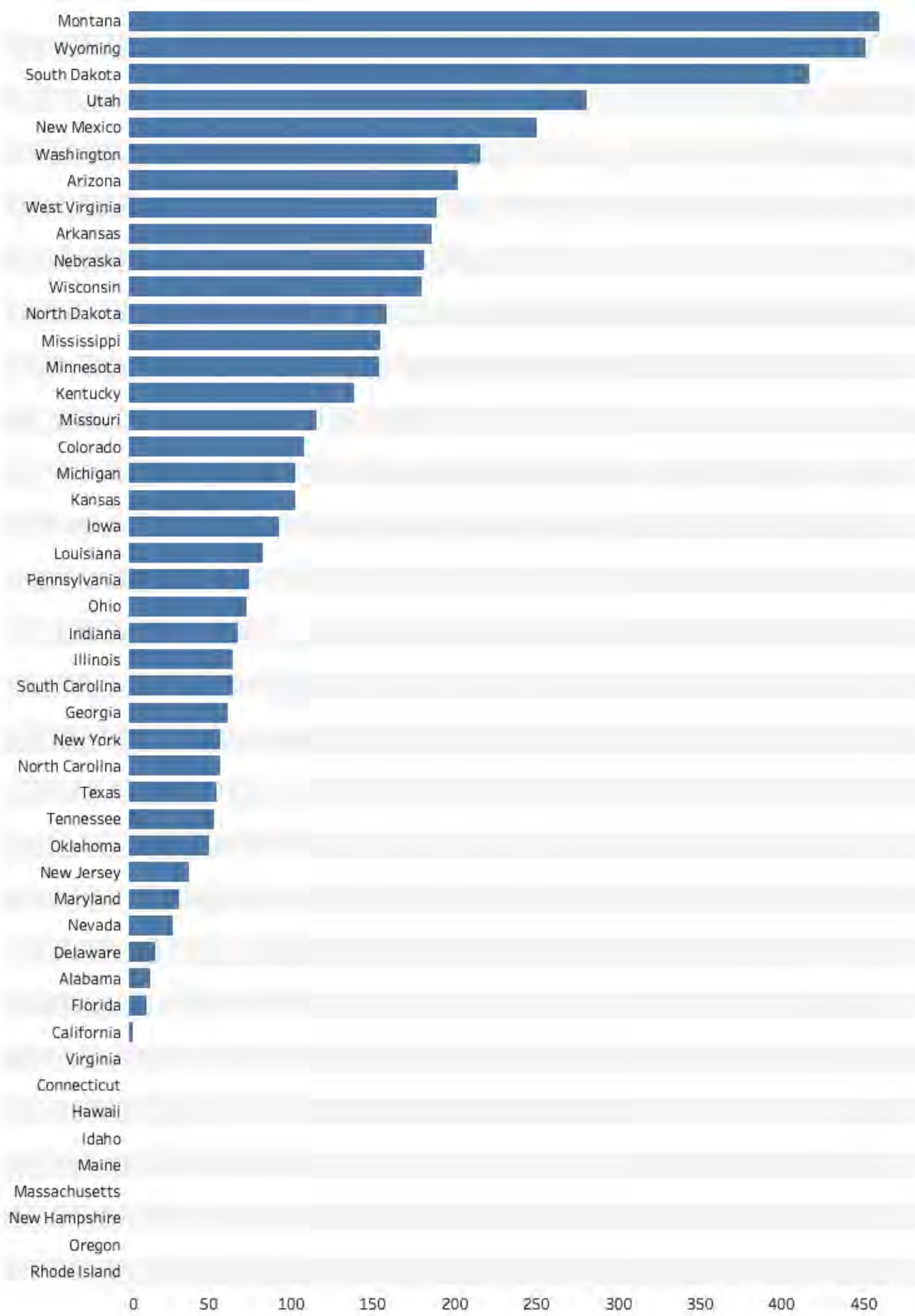
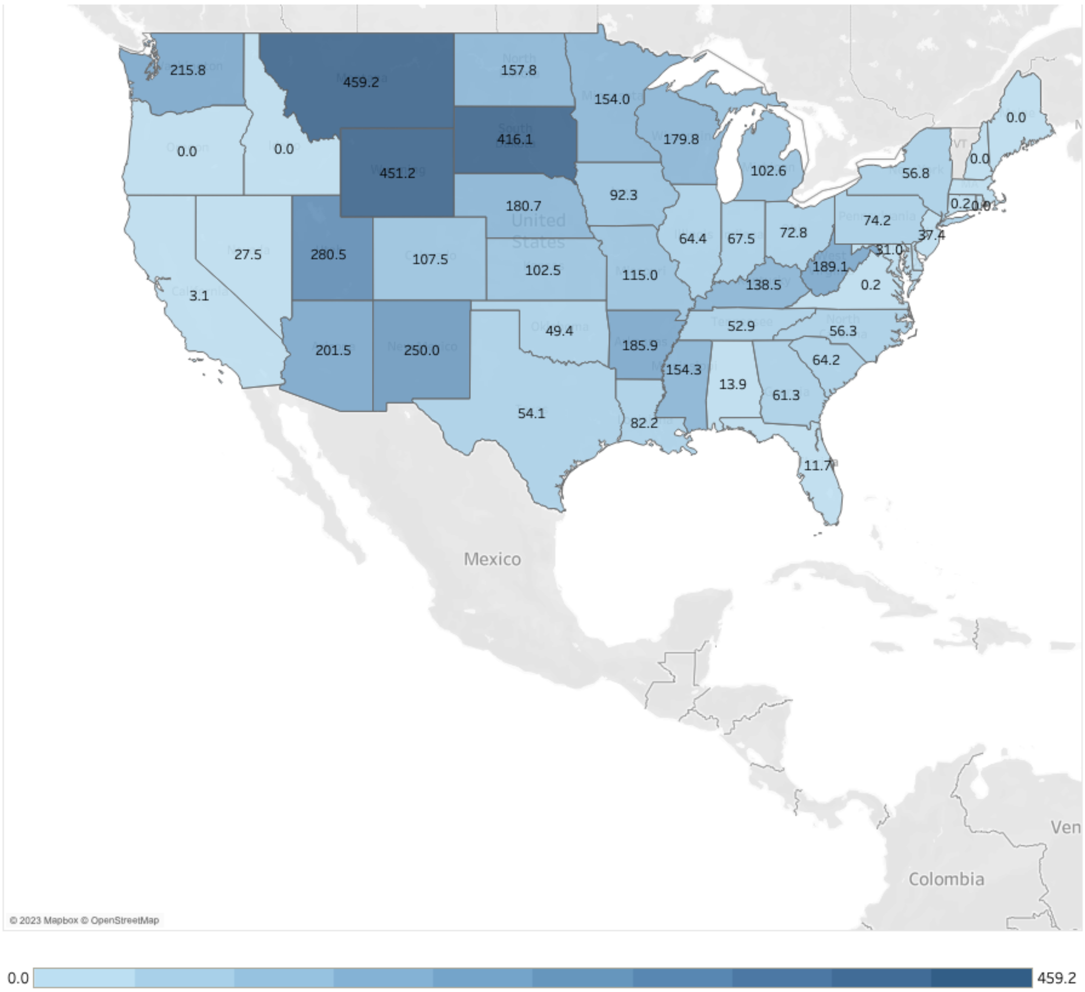


Figure 90: 2021 Weighted Average Water Consumption Intensity for Electricity Generation in Gallons per Megawatt-Hour



Natural Gas Emissions

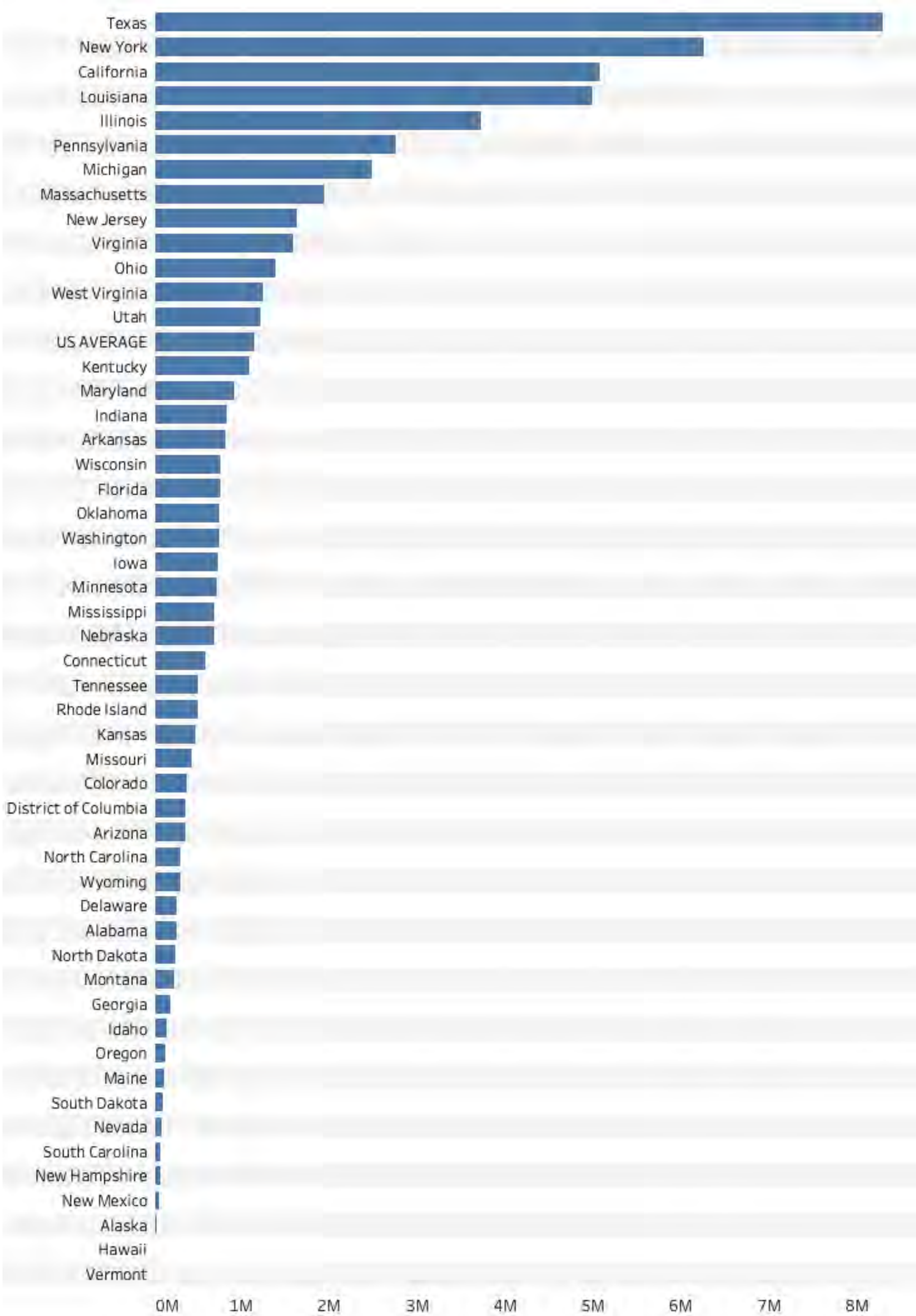
Natural gas, known also as methane, creates emissions when burned, but is itself also a potent greenhouse gas. This section looks to fill in a gap on the potential damages done to the environment from the natural gas sector. Emissions from the burning of natural gas for electricity production are reported 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 electric sector. The residential and commercial sectors burn natural gas for space and water heating, and the industrial sector burns natural gas for many other heat 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 in Figures 23 and 24, 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 2021, Michigan's CO_2 equivalents from lost natural gas were ranked 45th, or seventh-worst, in the nation at 2.48 million metric tons, which is higher than all its peer states except Illinois. Looking back to Figure 23, if we assume that a substantial portion of Consumers Energy's unaccounted-for natural gas is, in fact, leaked natural gas, the numbers in this section may not fully account for the harms of Michigan's lost natural gas.

Figure 91: 2021 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. 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 NOx 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 2021, Michigan ranked as the 44th, or eighth-worst, producer of emissions from natural gas use in terms of CO_2 and SO_2 with emissions of 35.2 million and 176 metric tons, respectively (Figures 92 and 93). Michigan was the 43rd-ranked, or ninth-worst, emitter of NO_x from site use of natural gas in the country (Figure 94). In relation to its peer states, Michigan is near the middle, producing fewer CO_2, and SO_2 emissions than Ohio and Illinois and fewer NO_x emissions than Ohio, Illinois and Indiana.

Figure 92: 2021 CO_2 from Combusted Natural Gas in All Sectors Except Electrical (in Metric Tons)

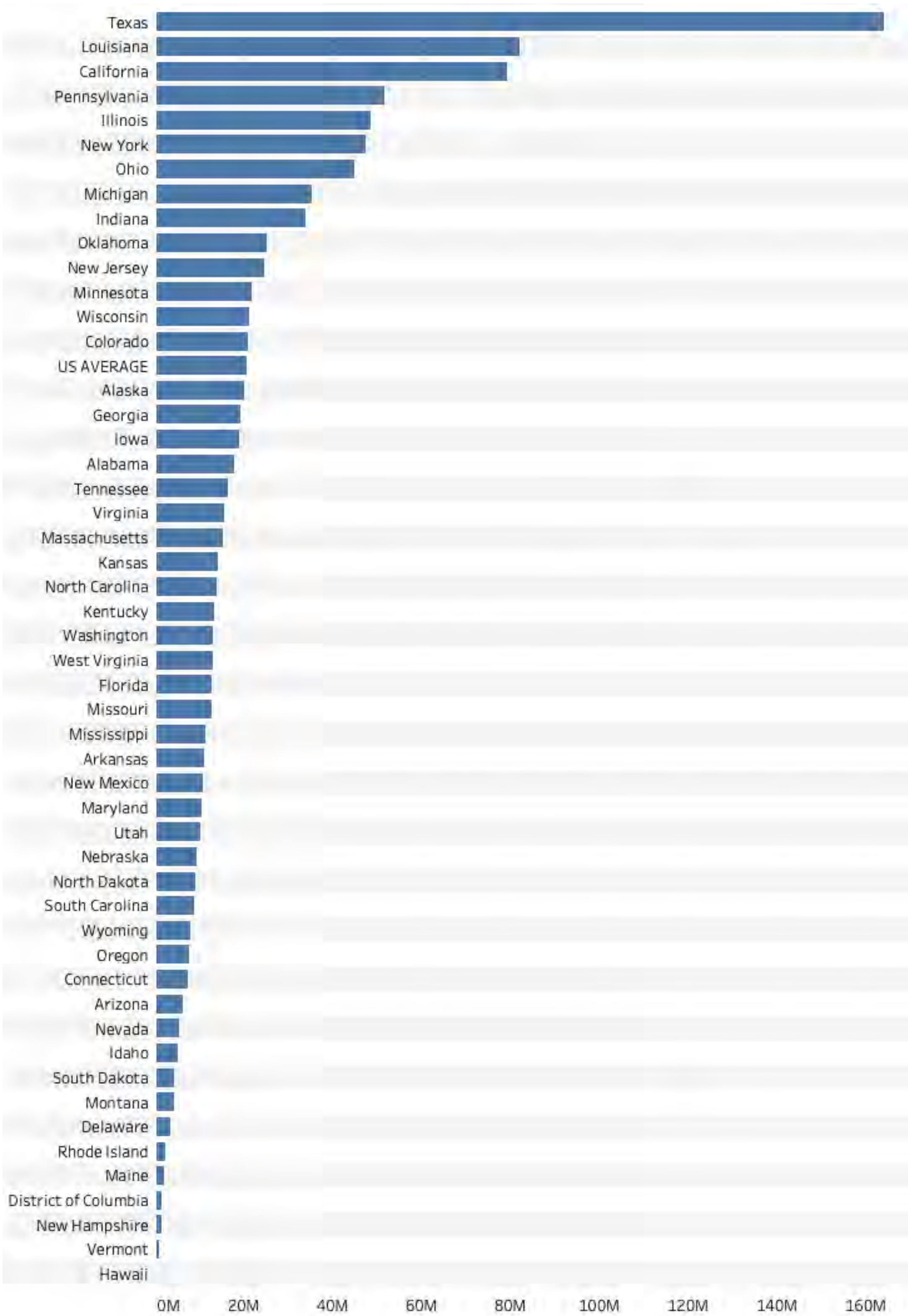


Figure 93: 2021 SO_2 from Combusted Natural Gas in All Sectors Except Electrical (in Metric Tons)

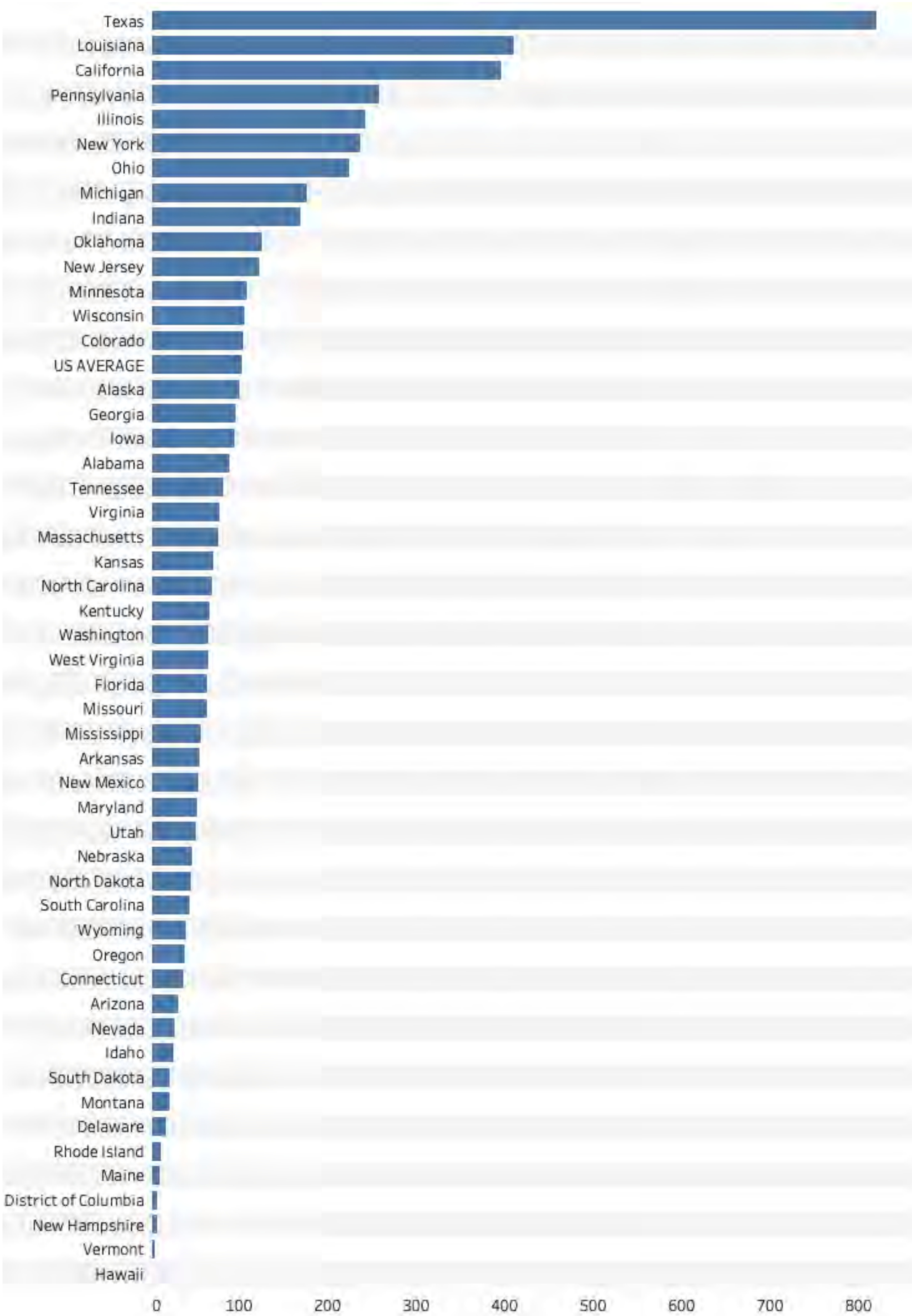
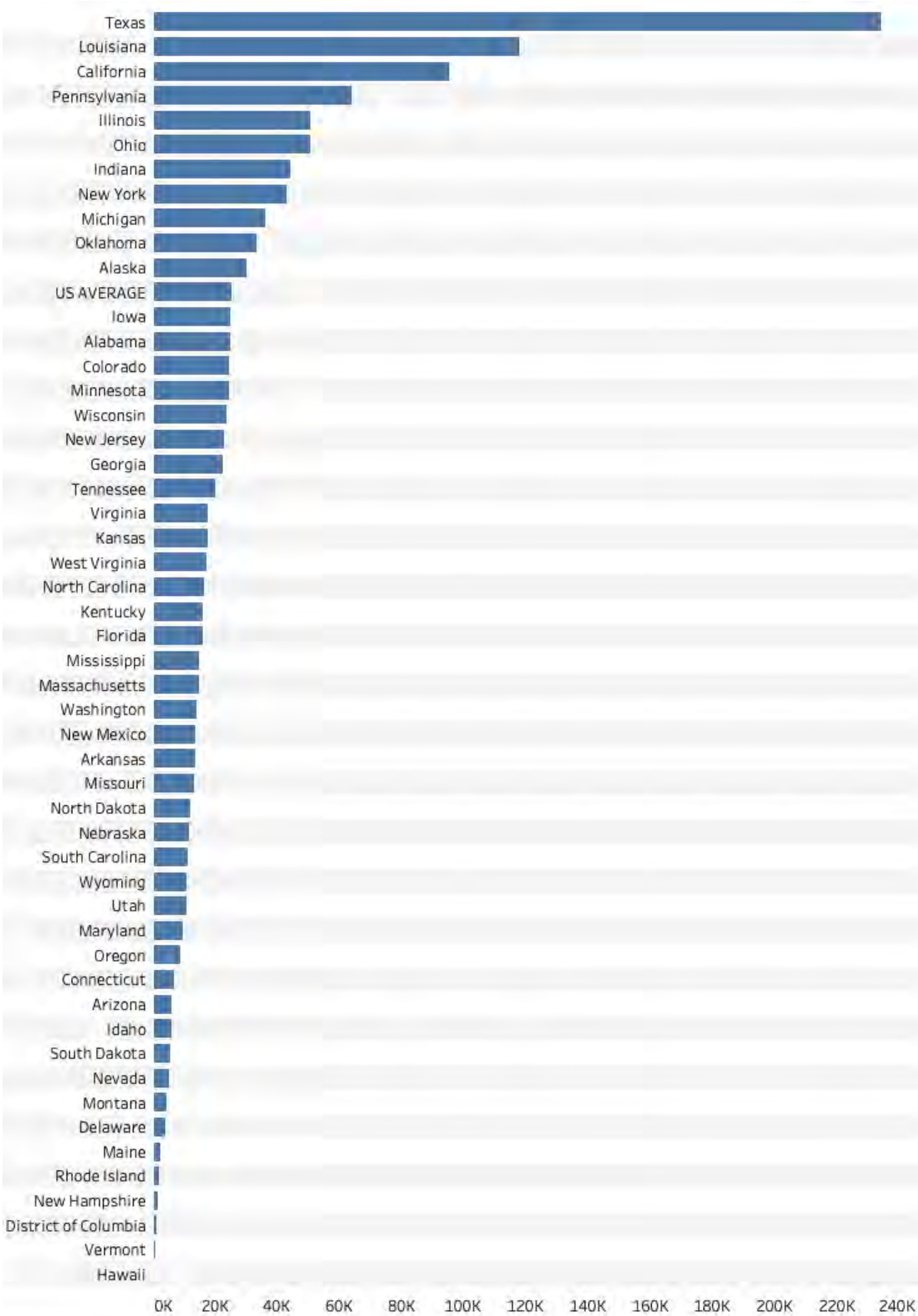


Figure 94: 2021 NO_x from Combusted Natural Gas in All Sectors Except Electrical (in Metric Tons)



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 for calendar year 2021. 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 provided 62% of electricity in the U.S. in 2021. 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 rules. The statewide ROE, when considered alongside other utility performance metrics, may provide insight into the nature of those relationships.

Figure 95 shows the weighted average utility ROE for each state among utilities that report these data through FERC form 1. Figure 96 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, only data for Consumers Energy, DTE, and Upper Peninsula Power Company are available for the state of Michigan. Figure 97 shows these results.

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

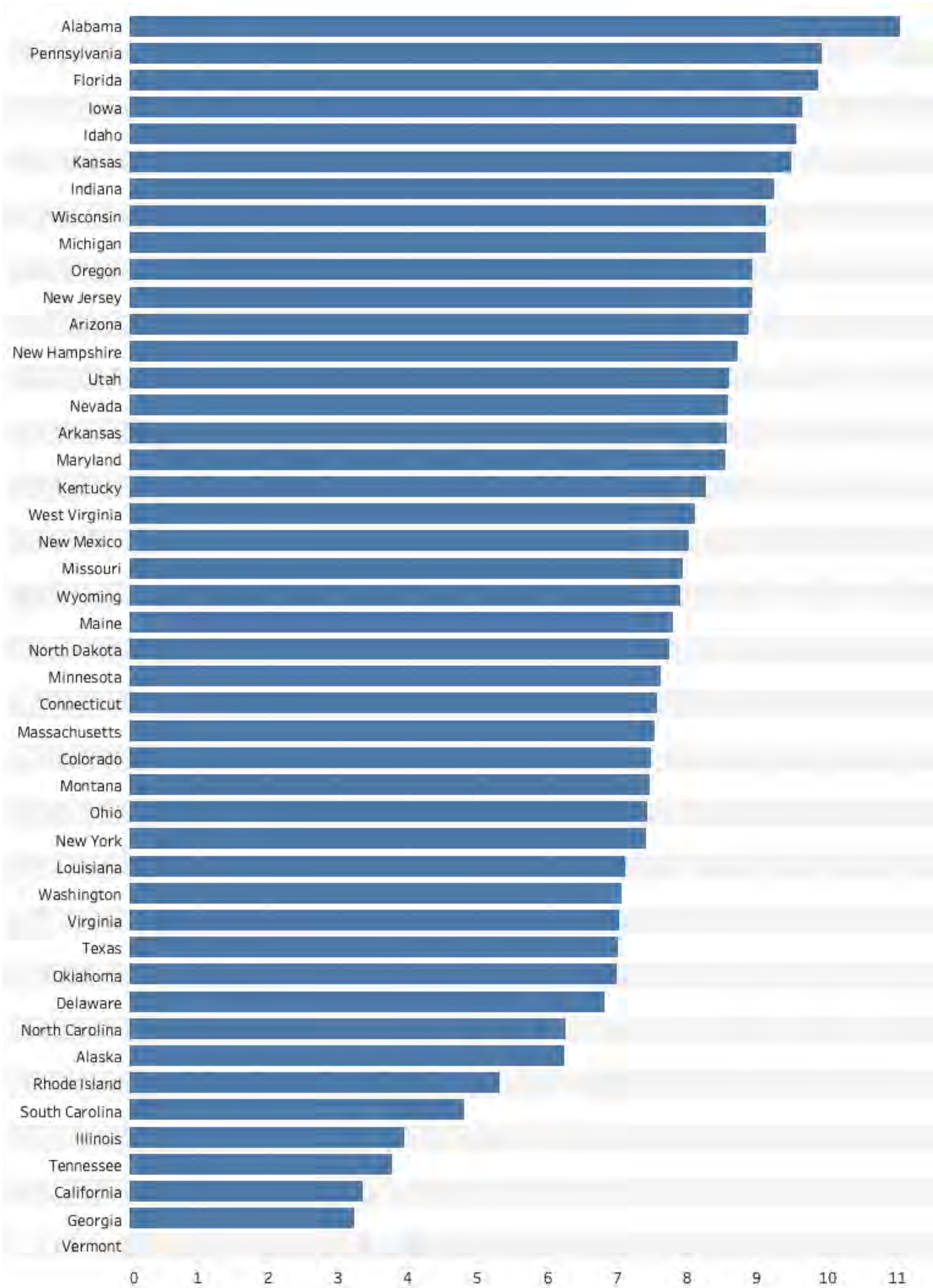


Figure 96: 2021 Weighted Average Utility Return on Equity by State (percent) [Map]

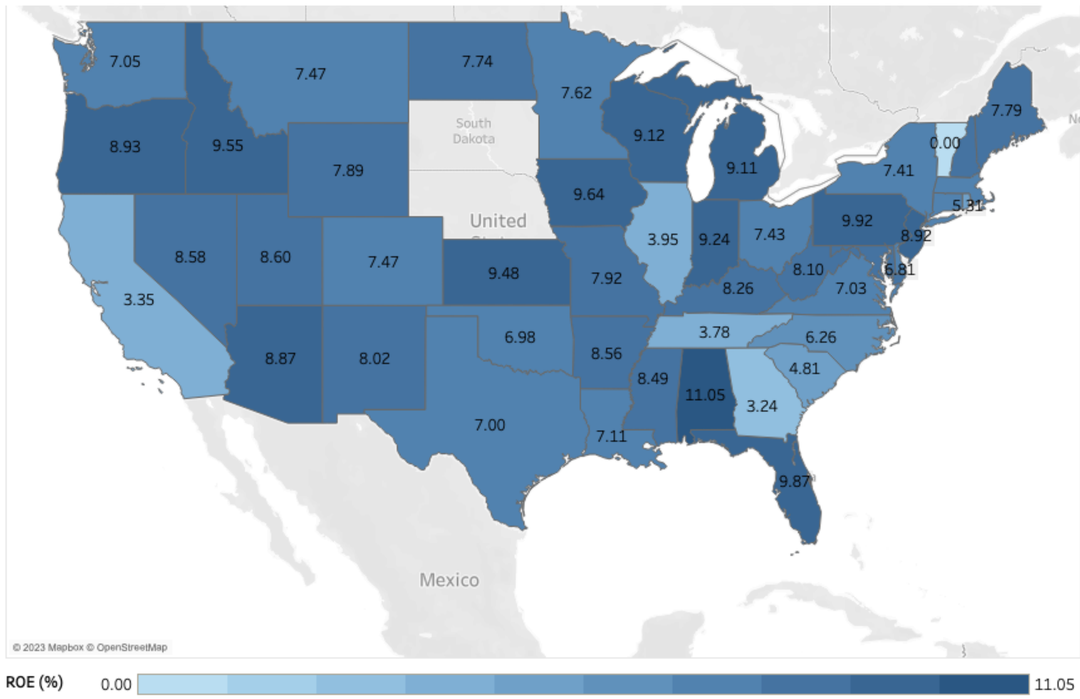
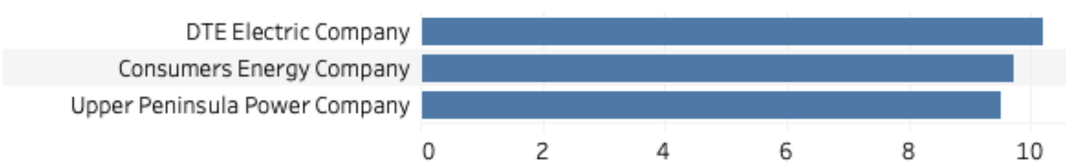


Figure 97: 2021 Weighted Average Utility Return on Equity for Michigan Utilities (percent)



APPENDIX

Figure 98: 2021 Number of Electricity Customers for Michigan Utilities

		Year								
		2013	2014	2015	2016	2017	2018	2019	2020	2021
Behind the Meter	Greenskies Renewable Energ..						1	1	1	
Cooperative	Algerdelta Coop Electric Assn	10,012	9,948	9,949	9,972	9,951	10,047	10,089	10,208	10,288
	Bayfield Electric Coop	66	66	64	65	65	67	69		
	Cherryland Electric Coop	33,641	33,925	34,274	34,700	35,145	35,628	36,075	36,487	36,915
	Cloverland Electric Coop	42,254	42,281	42,297	42,611	42,503	42,444	42,471	42,852	43,175
	Great Lakes Energy Coop	123,000	122,833	123,199	123,874	124,622	125,447	126,250	126,956	128,202
	Midwest Energy Coop	34,127	34,201	34,285	34,452	34,578	34,707	34,748	34,919	35,168
	Ontonagon County R E A							4,868		
	Presque Isle Elec & Gas Coop	33,216	33,045	33,084	33,224	33,468	33,525	33,713	33,769	34,547
	Thumb Electric Coop Of Mich	12,248	12,216	12,204	12,225	12,232	12,255	12,274		
	Tricounty Electric Coop	25,591	25,603	25,654	25,742	25,873	25,983	26,105	26,349	26,610
Investor Owned	Alpena Power Co	17,634	17,672	17,667	17,695	17,691	17,690	16,511	16,554	16,624
	Consumers Energy Co	1,791,217	1,792,421	1,797,237	1,806,511	1,817,957	1,827,159	1,837,688	1,856,654	1,871,096
	Dte Electric Co	2,140,049	2,148,142	2,159,088	2,173,258	2,189,478	2,201,184	2,213,496	2,230,890	2,249,459
	Indiana Michigan Power Co	127,908	127,734	127,807	127,887	128,632	129,418	129,312	129,924	130,628
	Northern States Power Co	9,043	9,027	8,981	8,958	8,958	8,945	8,942	8,913	8,930
	Upper Michigan Energy Reso..					36,814	36,851	36,904	36,980	37,004
	Upper Peninsula Power Co	52,035	51,925	47,991	56,189	62,934	58,437	52,943	53,213	53,295
	Wisconsin Electric Power Co	27,607	27,601	27,631	27,716	1	1	1		
	Wisconsin Public Service Corp	9,006	9,015	9,027	9,051					
Municipal	City Of Bay City	20,097	20,056	20,056	20,049	20,206	20,237	20,243	20,159	20,218
	City Of Charlevoix							4,455		
	City Of Croswell							1,438		
	City Of Crystal Falls	1,571	1,605	1,603	1,609	1,630	1,607	1,603	1,603	1,557
	City Of Detroit	229	229							
	City Of Dowagiac							2,608		
	City Of Eaton Rapids							3,300		
	City Of Escanaba	7,227	7,243	7,242	7,244	7,243	7,235	7,245		
	City Of Gladstone	2,834	2,854	2,849	2,857	2,864	2,868	3,168	2,934	3,122
	City Of Grand Haven	13,616	13,682	13,505	13,616	13,850	14,187	14,403	14,642	14,720
	City Of Harbor Springs							3,712		
	City Of Hart Hydro							1,410		
	City Of Holland	27,827	28,042	28,232	28,345	28,578	28,917	29,131	29,423	29,967
	City Of Lansing	96,108	96,489	96,704	96,842	97,185	97,651	98,268	99,274	99,425
	City Of Lowell							2,948		
	City Of Marquette	16,793	16,813	16,842	16,941	17,163	17,092	17,230	17,264	17,001
	City Of Marshall	4,469	4,514	4,806	4,744	4,557	4,577	4,574		
	City Of Negaunee	2,255	2,269	2,216	2,214	2,215	2,220	2,234	2,250	2,239
	City Of Niles	7,482	7,486	7,043	7,038	7,026	7,014	7,085		
	City Of Norway	2,092	2,101	2,113	2,087	2,090	2,093	2,094	2,088	2,065
	City Of Petoskey	5,326	5,334	5,331	5,345	5,373	5,401	5,392		
	City Of Portland							2,586		
	City Of Sebewaing							1,282		
	City Of South Haven	8,208	8,186	8,226	8,277	8,334	8,375	8,444		
	City Of St Louis							1,980		
	City Of Stephenson							498		
	City Of Sturgis	7,057	7,067	7,028	7,057	7,080	7,107	7,108	7,048	7,114
	City Of Traverse City	12,252	12,452	12,489	12,802	12,098	12,995	12,599	12,812	12,468
	City Of Wakefield							1,079		
	City Of Zeeland	6,292	6,358	6,330	6,525	6,606	6,665	6,749	6,857	6,871
	Coldwater Board Of Public Util	6,823	6,982	7,053	6,964	7,127	7,225	7,233	7,324	7,390
	Hillsdale Board Of Public Wks	6,311	6,381	6,304	6,025	6,041	6,031	6,024		
	Newberry Water & Light Board							1,415		
	Village Of Baraga	781	868	867	879	894	781	750	738	736
	Village Of Chelsea							3,112		
	Village Of Clinton							1,485		
	Village Of Daggett							135		
	Village Of Lanse	1,200	1,202	1,205	1,204	1,184	1,183	1,176	1,132	1,216
	Village Of Paw Paw							1,759		
	Village Of Union City							1,516		
	Wyandotte Municipal Serv Co..	12,400	12,412	12,504	12,603	12,728	12,759	12,790	12,635	12,673

The New York Times | https://www.nytimes.com/2021/05/03/climate/heat-climate-health-risks.html

A New, Deadly Risk for Cities in Summer: Power Failures During Heat Waves

The author of a new study said the combination of blackouts and extreme heat “may be the deadliest climate-related event we can imagine.”

By Christopher Flavelle

Published May 3, 2021   Updated July 2, 2021

WASHINGTON — The growing risk of overlapping heat waves and power failures poses a severe threat that major American cities are not prepared for, new research suggests.

Power failures have increased by more than 60 percent since 2015, even as climate change has made heat waves worse, according to the new research published in the journal Environmental Science & Technology. Using computer models to study three large U.S. cities, the authors estimated that a combined blackout and heat wave would expose at least two-thirds of residents in those cities to heat exhaustion or heat stroke.

And although each of the cities in the study has dedicated public cooling centers for people who need relief from the heat, those centers could accommodate no more than 2 percent of a given city’s population, the authors found, leaving an overwhelming majority of residents in danger.

“A widespread blackout during an intense heat wave may be the deadliest climate-related event we can imagine,” said Brian Stone Jr., a professor at the School of City & Regional Planning at Georgia Institute of Technology and the lead author of the study. Yet such a scenario is “increasingly likely,” he said.

The findings come just months after a winter storm knocked out power for millions of people in Texas, causing more than 150 deaths and demonstrating how easily severe weather can overwhelm electrical grids and other infrastructure.

But as much as winter storms and extreme cold remain a threat, the greater risk to human health as temperatures rise is from extreme heat.

Heat is already the most dangerous type of severe-weather event, by one estimate killing some 12,000 Americans each year. And climate change is making heat waves more frequent and severe.

The changing climate also seems to be making power failures more common. From 2015 to 2020, the number of blackouts annually in the United States doubled, Dr. Stone said. And those blackouts were more likely to occur during the summer, suggesting they were being driven in part by high temperatures, which increase demand on the electrical grid as people turn up their air-conditioners.

Austin, Texas, in February, when a winter storm caused more than 150 deaths and knocked out power for millions of people. Bronte Wittpenn/Austin American-Statesman, via Associated Press

Because both heat waves and blackouts are becoming more frequent, “the probability of a concurrent heat wave and blackout event is very likely rising as well,” Dr. Stone said.

So Dr. Stone, along with a team of eight other researchers — from Georgia Tech, Arizona State, the University of Michigan and the University of Guelph in Ontario, Canada — set out to gauge the human health consequences when power failures coincide with heat waves.

To do that, they picked three big cities — Atlanta, Detroit and Phoenix — and looked at recorded temperatures during some of their most severe heat waves.

Next, they used computers to model the temperatures in different neighborhoods if those heat waves were to hit at the same time that a citywide blackout disabled air-conditioners.

Crucially, the researchers wanted to know how hot the insides of homes would get under those conditions — something that Dr. Stone said had never been tried before. They collected data showing the building characteristics for every single residential structure in each city — for example, building age, construction material, level of insulation and number of floors.

The results were alarming. In Atlanta, more than 350,000 people, or about 70 percent of residents, would be exposed to indoor temperatures equal to or greater than 32 degrees Celsius (89.6 degrees Fahrenheit), the level at which the National Weather Service’s heat classification index says heat exhaustion and heat stroke are possible.

In Detroit, more than 450,000, or about 68 percent, would be exposed to that indoor temperature. In Phoenix, where a vast majority of residents rely on air-conditioning, the entire population would be at risk — almost 1.7 million people.

Even without a blackout, some residents in each city lack access to air-conditioning, exposing those residents to dangerous indoor temperatures during a heat wave. Those numbers range from 1,000 people in Phoenix to 50,000 in Detroit, based on the characteristics of their homes, the authors found.

A market in Detroit during a heat wave in July 2019. Brittany Greeson for The New York Times

That exposure is most pronounced for the lowest-income households, who are 20 percent less likely to have central air-conditioning than the highest-income households.

The authors reported that each city had designated public cooling centers for extreme heat. But they found that in each case, those centers could accommodate just 1 percent to 2 percent of the total population.

And none of the three cities requires those cooling centers to have backup power generators to run air-conditioners in case of power failures.

“Based on our findings, a concurrent heat wave and blackout event would require a far more extensive network of emergency cooling centers than is presently established in each city, with mandated backup power generation,” the authors wrote.

The New York Times asked officials in Atlanta, Detroit and Phoenix to comment on the paper’s findings, and to describe their plans for responding to a combined blackout and heat wave.

A spokeswoman for the city of Phoenix, Tamra Ingersoll, said that in a crisis situation like a heat wave overlapping with an extended power failure, many residents would leave the city on their own. Emergency response for those who remained would focus on "vulnerable populations such as the elderly, infirm or low-income individuals," she said.

Christopher Kopicko, a spokesman for the Detroit Office of Homeland Security & Emergency Management, said that only one of the city's 11 cooling centers had a backup generator. But he said Detroit had recently bought mobile generators that could be sent to cooling centers that needed them and that residents could go to any of the city's 12 police precincts, which have backup generators. He also said some of the city's largest venues had agreed to act as mass shelter sites.

The office of the Atlanta mayor, Keisha Lance Bottoms, did not comment.

The Federal Emergency Management Agency, in response to questions about whether it had plans for helping a large city deal with a combined blackout and heat wave, pointed to a 2017 plan for managing the effects of a long-term power failure.

But that document did not address how the agency would respond if a heat wave struck during such a blackout, beyond noting that "lack of power will create challenges to providing consistent heat or air conditioning and sufficient sanitation/hygiene in shelter or other mass care facilities."

Other cities across the United States are at risk of facing similar health threats from a combined heat wave and blackout, in terms of the share of their population that could very likely be in danger, the authors found.

"We find that millions are at risk," Dr. Stone said. "Not years in the future, but this summer."

Christopher Flavelle focuses on how people, governments and industries try to cope with the effects of global warming. He received a 2018 National Press Foundation award for coverage of the federal government's struggles to deal with flooding. More about Christopher Flavelle

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A version of this article appears in print on , Section A, Page 15 of the New York edition with the headline: Blackouts Are Growing Threat to U.S. Cities

The battle against Michigan power outages yields little accountability

A year after a severe ice storm left 700,000 Michigan residents without power, calls for improved reliability and accountability continue.

BY BRIAN ALLNUTT ● ACCOUNTABILITY ● MARCH 1, 2024

Ice on power lines is one reason for power outages. Credit: roibu

- **Advocates criticize utilities for inadequate reliability improvements and accountability measures.**
- **Utilities say they are working to enhance reliability through tree trimming and infrastructure upgrades.**

- **Political spending by utilities is seen as a barrier to enhancing grid reliability.**

An ice storm last February left Nick Selewski without power for five days while recovering from hip surgery, making repairing his backup generator difficult.

Selewski, a DTE Energy customer in Redford Township, was one of the 700,000 Michiganders who lost power during the storm.

A year later, Selewski doesn't think reliability has improved in Redford, where he said the power "seems to go off a lot." He lost power again in January for over four hours during another winter storm.

"My opinion is they [DTE] have to update their system," said Selewski, adding that better tree trimming could help reduce the outages that have plagued his neighborhood for years.

Utilities say they're working to address reliability by increasing tree trimming and upgrading infrastructure. But advocates say new laws and policies are needed to hold utilities accountable and protect ratepayers and, despite calls for accountability from lawmakers following the ice storm, little has happened.

And some lawmakers and advocates say that the millions of dollars utilities spend to influence the political process make it difficult to advance legislation to protect ratepayers. Several who spoke with Planet Detroit said Michigan's recently passed clean energy legislation was notable for including few consumer protections like outage credits or penalties for utilities that fail to meet reliability standards.

A recent report highlighted Michigan's long-term reliability problems, finding it was the second worst state for power outages between 2000 and 2021. Another report found that Michigan was the fourth worst state for restoration time following an outage in 2021, with DTE taking the longest to restore power among Michigan's investor-owned utilities.

In 2022, DTE and Consumers Energy showed modest improvement in reliability compared to 2021, but the average customer was without power for roughly 10 hours and 8 hours, respectively. This was well above the national average of five and a half hours.

What's standing in the way of accountability for power outages?

Michigan Attorney General Dana Nessel criticized Consumers' most recent long-term distribution plan, which details investments in the grid, in Feb. 16 comments made to the Michigan Public Service Commission.

"Consumers Energy failed to articulate the degree of customer burden for their spending, does not focus enough on reliability improvements, and includes no accountability measures should they fail in their commitments," she said.

At a Feb. 22 meeting for the "Taking Back Our Power" coalition, which supports legislation to rein in utilities' political spending, House Majority Floor Leader Abraham Aiyash (D-Hamtramck) suggested that efforts to improve reliability and add consumer protections to the renewable energy package have been undermined by utilities, which have spent heavily against candidates opposed to their interests.

Aiyash said that utilities were "the elephant in the room" during negotiations over the bill package and that legislators worked with the understanding that utilities "have to at least be neutral on the passage of bills in order to move them across the finish line."

State regulators consider incentives while advocates push for power outage credits

In the past year, one of the more significant gestures toward accountability has been a proposal from the MPSC to create financial incentives and disincentives for utilities based on reliability, potentially collecting $10 from ratepayers to create a fund for the program.

However, the proposal prompted further outrage. Cities, ratepayer advocates, and business groups have criticized it, arguing it would reward utilities for service that would still not meet Michigan's reliability standards.

Amy Bandyk, executive director of the Citizens Utility Board of Michigan, said basic utility functions like reliability shouldn't be eligible for incentives, only penalties.

In a previous statement, CUB and other groups said such benefits were "misaligned with customer interests." They would come on top of the utilities' 9.9% return on equity, higher than most electric utilities.

The groups also argued that larger penalties were needed to reflect the true cost of outages and motivate utilities to improve reliability. They said the funds from these penalties should go to the most impacted ratepayers.

"It was a little upsetting to hear that we're even entering into a conversation about incentives when the idea of compensation for impacted ratepayers is constantly being knocked down and not even being considered for discussion," Rafael Mojica, program director for the energy justice nonprofit Soulardarity, said at a Feb. 12 meeting of the MPSC Financial Incentives/Disincentives Work Group.

In a statement to Planet Detroit, DTE said that the MPSC's proposal would more likely result in penalties for Michigan utilities than rewards.

The MPSC made modest changes to outage credits last year, increasing them from $25 to $35 for each day customers are without power and making them automatic. But it takes four days for the credits to kick in during "catastrophic" conditions, when more than 10% of customers are without power, with outages applied after shorter periods under other conditions.

Roshan Krishnan, a Michigan Environmental Justice Coalition policy associate, called the rules governing these credits "byzantine."

"The duration limits are such that you have to be an extreme outlier in order to receive the credits," he said.

The group has pushed for higher credits like those included in bills introduced in 2022, which would have created a $5 hourly credit that increased with the duration of the outage, prohibited utilities from recovering the cost of credits, and created a $100 credit for customers experiencing four outages in a year and $200 for more than four. Those bills did not progress and have not been reintroduced.

CUB previously pushed for a $2 per hour outage credit, which Bandyk said would align with the losses customers experience. However, those forced to replace food in their freezers or pay for hotels may be paying much more. The MPSC said CUB's request was "not reasonable."

Some legislation to protect ratepayers was introduced last year, including HB 5221, to limit utility charges for restoring service to $25, and HB 5216, to create incentives and penalties for utilities based on safety, reliability and environmental impact.

The bill also included language about moving the state away from frequent rate hike requests.

DTE signaled in early February that it would ask for another rate increase this spring, just months after securing a $368 million rate increase that added $6.51 to the average bill.

Bandyk said HB 5216 could limit the "revolving door rate increases" that "enrich utilities while continually squeezing customers."

Rep calls political spending a 'conflict of interest'

Rep. Dylan Wegela (D-Garden City) said utility spending on politics is at the heart of Michigan's ongoing reliability problems, calling the present system "a major conflict of interest."

"The regulators of the utilities are being influenced by the companies pretty severely," he said.

According to the most recent data from the watchdog group Energy and Policy Institute, 120 of 148 Michigan state lawmakers took money from political action committees affiliated with DTE, Consumers, or both in 2023. These PACs sent a total of $329,750 to Democrats and $235,2000 to Republicans.

These donations often arrived as lawmakers were demanding accountability. For example, Rep. Helena Scott (D-Detroit) received $3,000 from DTE's PAC while leading a statewide listening tour for the newly created Michigan House Energy Reliability, Resilience, and Accountability Task Force. Other lawmakers received far more, like House Speaker Joe Tate (D-Detroit), who took in $32,500. Neither Scott nor Tate responded to a request for comment.

DTE has also donated to dark money nonprofits involved in political causes, including a $100,000 donation in 2020 to a group opposed to Michigan COVID restrictions.

Wegela introduced two bills last week, HB 5520 and HB 5521, to ban dark money contributions to PACs and political campaigns and block any political nonprofit or PAC tied to an electric or natural gas company from doing so.

"It is cheaper for them to spend money on influencing us in Lansing than it is for them to actually update the grid," Wegela said at the Feb. 22 Taking Back Our Power meeting. "They only have to spend a few million dollars to get a return on that investment…in the billions."

DTE defended its political spending in a statement to Planet Detroit.

"We owe it to our customers and employees to support candidates for public office that help us meet our purpose of providing safe, reliable, affordable and clean energy for the 3 million plus residents and businesses we serve every day," the company said.

DTE also said it would invest $9 billion over the next five years in its "four-point plan," which includes tree-trimming, rebuilding older portions of the grid, updating infrastructure and installing smart grid technology.

'It's not a coincidence that DTE spends a lot of money on Michigan politics'

On a Feb. 8 earnings call, DTE Chairman and CEO Jerry Norcia said circuits that received upgrades in the first half of 2023, experienced 33% fewer outages in the second half of the year compared to the second half of 2022.

Consumers Energy spokesperson Brian Wheeler said shareholders, not customers, paid for the company's political spending.

He added that the company was working on its "Reliability Roadmap," which includes tree-trimming, upgrading grid infrastructure, installing smart technology, and burying some sections of power lines. He said that in 2023, 9 in 10 customers who lost power had it restored in 24 hours.

Bandyk challenged Wheeler. “The revenue all comes from customers,” she said, adding that the company’s return on investment is excessive from CUB’s point of view.

Karlee Weinmann, research and communications manager for the watchdog group Energy and Policy Institute, questioned if there was the political will to advance legislation to protect ratepayers.

“It’s not a coincidence that DTE spends a lot of money on Michigan politics,” she said, “and then we end up with policy outcomes that are criticized as overly deferential to utilities.”

Author

BRIAN ALLNUTT

Brian Allnutt is a senior reporter for Planet Detroit. He covers the climate crisis, utilities, air quality, environmental justice and politics. His work has appeared in The Guardian, Bloomberg CityLab, Bridge Michigan and The Detroit News. Prior to joining Planet Detroit in 2019. he ran a farm and garden store in Southwest Detroit for six years. More by Brian Allnutt

Weather-related Power Outages Rising | Climate Central

KEY CONCEPTS

Of all major U.S. power outages reported from 2000 to 2023, 80% (1,755) were due to weather.

Most weather-related outages were caused by severe weather (58%), winter storms (23%), and tropical cyclones including hurricanes (14%).

The states with the most reported weather-related power outages (2000-2023) were Texas (210), Michigan (157), California (145), North Carolina (111), and Ohio (88).

The Southeast (360), South (352), Northeast (350), and Ohio Valley (301) experienced the most weather-related outages from 2000 to 2023.

Download the data

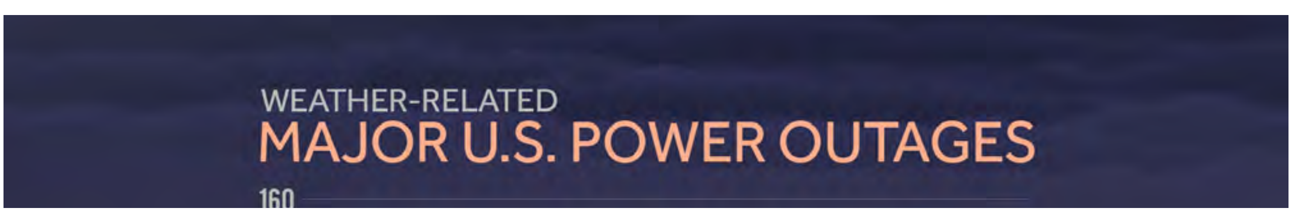
More extreme weather, more power outages

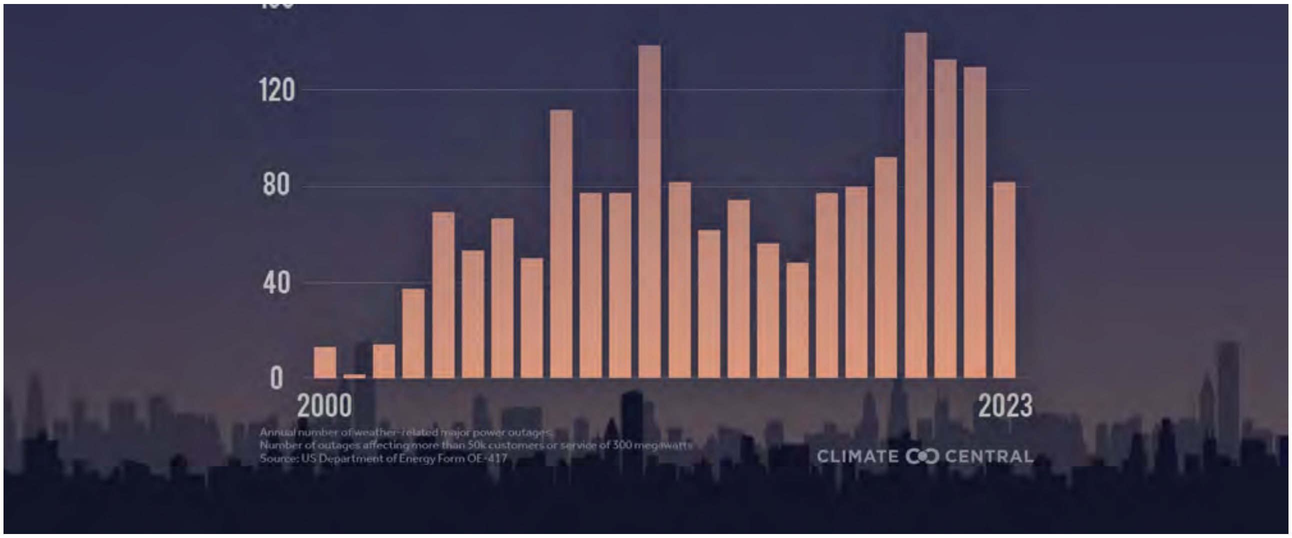
Many types of extreme weather are becoming more frequent or intense because of human-caused climate change. These events put stress on aging energy infrastructure and are among the leading causes of major power outages in the U.S.

The nation’s electrical grid wasn't built for the present-day climate. Electricity is mostly transmitted and distributed through above-ground transformers, transmission wires, and utility poles that are exposed to extreme weather such as high winds, heavy rain, ice, lightning, and extreme heat. Even in areas where power lines are buried, flooding can lead to loss of power.

Power outages affect millions of people and cost billions of dollars annually. Outages can disrupt access to clean water, food, and critical healthcare. They also have cascading effects on communications networks and transportation.

The impacts of power outages and lengthy restoration times can disproportionately burden people of color, as during the February 2021 Texas cold outbreak; the aftermath of Hurricane Maria in Puerto Rico; and power restoration in Florida after Hurricane Irma.





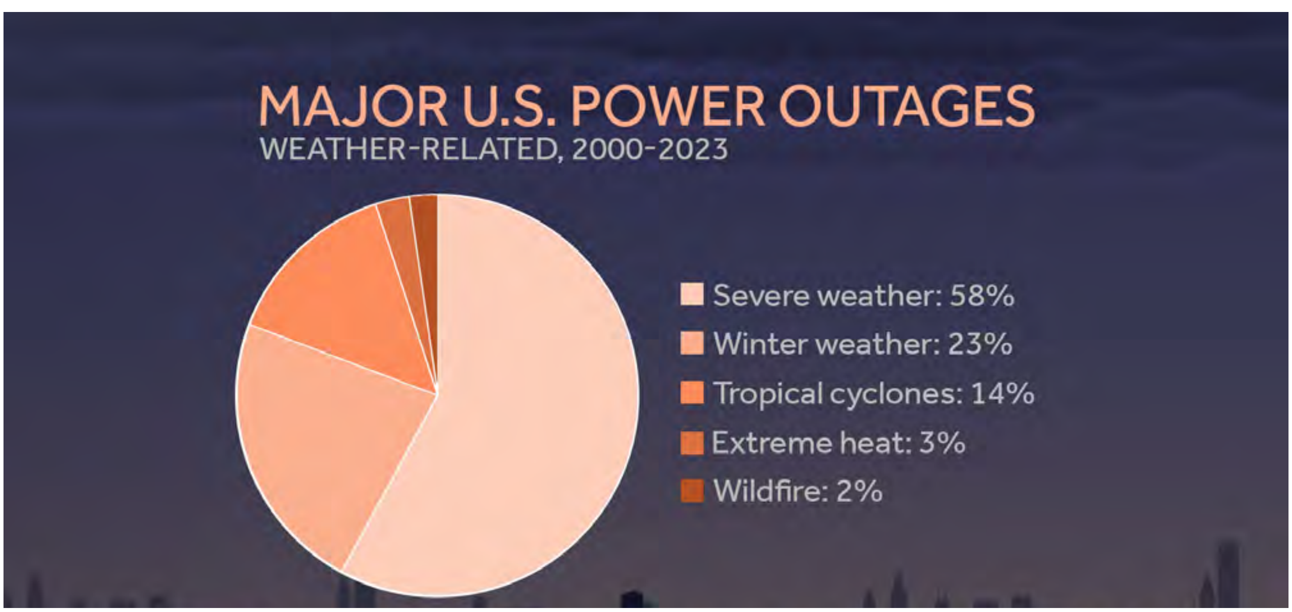
Click the downloadable graphic: Weather Power Outages 2000 to 2023

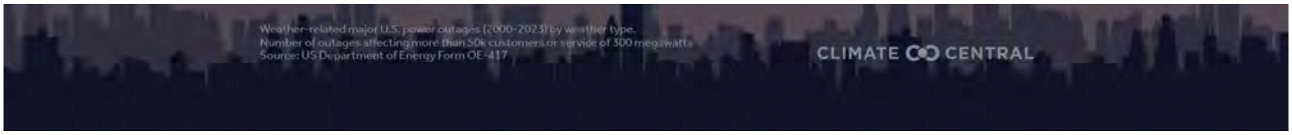
Weather-related power outages

Climate Central analyzed U.S. power outage data between 2000 and 2023, as reported by utility companies. Major outages are events that affect at least 50,000 customers (homes or businesses) or interrupt service of 300 megawatts or more.

Of all major U.S. power outages reported from 2000 to 2023, 80% (1,755) were due to weather-related events.

Weather-related power outages are on the rise. The U.S. experienced about two times more weather-related outages during the last 10 years (2014-2023) than during the first 10 years analyzed (2000-2009).





Click the downloadable graphic: Outages by Weather Type

Outages by weather type

Weather-related outages were sorted into five categories: severe weather, winter weather, tropical cyclones (including hurricanes), extreme heat, and wildfire. During the 24-year period analyzed:

Severe weather — such as high winds, rain, and thunderstorms — caused 58% of weather-related outages (1,011 events).

Winter weather — including snow, ice, and freezing rain — accounted for 23% of weather-related outages (398 events).

Tropical cyclones (including hurricanes) caused 14% of weather-related outages (249 events). Although tropical storms accounted for a smaller percentage of weather-related outages, they account for most of the longest-lasting outages through 2022.

Extreme heat was responsible for 48 outages (about 3% of weather-related outages). Heat waves bring increased electricity demand for cooling, which can overload the system. A recent study shows that widespread extreme heat has coincided with power outages in every U.S. region from 2012 to 2021. These events can expose people to dangerous temperatures and amplify health risks during heat waves.

Wildfire accounted for 39 outages (about 2% of weather-related outages). More than half of these outages were concentrated in the last five years. About one-third were public safety power shutoffs by utilities due to wildfires or to reduce risk of equipment-related ignitions during extreme fire weather days. Wildfire seasons are lengthening and intensifying across the U.S.

Outages by region

Multiple states can be impacted by a single outage because extreme weather events often affect large areas and the electrical grid is interconnected across state lines. Outages that affected multiple states and regions were counted in each state and region's total number of events, but were counted only once in the national total number of weather-related outages (1,755). Regions were defined based on NOAA’s U.S. Climate Regions.

The number of weather-related outages varies among U.S. regions — reflecting the weather each region experiences, as well as relative population density and grid vulnerability. The Southeast (360), South (352), Northeast (350), and Ohio Valley (301) experienced the most weather-related outages from 2000 to 2023.

U.S. Climate Region	Weather-related outages (2000-2023)
Southeast	360
South	352
Northeast	350
Ohio Valley	301
Upper Midwest	205
West	151
Northwest	73
Southwest	28
Northern Rockies and Plains	24

Click the downloadable graphic: Weather Outages by State

Outages by state

The states with the most reported weather-related power outages from 2000 to 2023 were: Texas (210); Michigan (157); California (145); North Carolina (111); and Ohio (88).

State	Weather-related outages (2000-2023)
Texas	210
Michigan	157
California	145
North Carolina	111
Ohio	88
Louisiana	85
Virginia	83

Georgia	83
Pennsylvania	82
Florida	77
Alabama	76

Dangers of losing power

Power outages are more than just an inconvenience. A lack of refrigeration, heating, and air conditioning can be dangerous or even deadly, especially during extended outages. Outages can also lead to a range of potential health consequences, particularly for those who rely on electricity for critical medical equipment.

Older people and individuals with disabilities or certain health conditions may be especially vulnerable during weather-related power outages. Consequences can be compounded by the precipitating events, such as flooding, wildfire, or extreme temperatures.

Longer outages amplify health risks for vulnerable populations. A 2023 study found that long-duration outages were most prevalent across the Northeast, South, and Appalachia from 2018 to 2020. Arkansas, Louisiana, and Michigan in particular experienced significantly more long-duration outages in counties with large socially- and medically-vulnerable populations.

Building a more resilient grid

Upgrading the nation's electrical infrastructure to become more resilient and reliable will be expensive and challenging. Ultimately, rapidly cutting emissions is the most meaningful action to slow the rate of warming, which can ease mounting stress on our power grid and allow more time to adapt our systems to a changing climate.

In the near-term, there are promising and innovative solutions to build electricity security now.

Microgrids are self-sufficient energy systems with a smaller, distinct geographic footprint, such as a college campus, hospital complex, or neighborhood. Their relatively small scale also makes microgrids more easily powered by renewable energy sources like solar and wind power, which has the added benefit of reducing emissions from power generation.

Smart grid technologies include sensors that allow operators to assess grid stability and provide consumers with better information about outages.

Hardening the grid refers to measures that fortify the system against damage. This can include tree trimming along power lines, replacing wooden electrical poles with steel or concrete, and burying overhead transmission lines.

Incentives can further encourage customers to cut back on usage during peak times.

LOCAL STORY ANGLES

Weather and climate disasters in your state or region

Use NOAA's Disaster Mapping tool to visualize the frequency and cost of billion-dollar weather and climate disasters at national, regional, and state levels. The U.S. Energy Information Administration's Energy Disruptions Maps help identify local risks to energy infrastructure from tropical storms, wildfire, and flooding. Local utility companies often provide current power outage maps and updates by zip code.

Tools for reporting on extreme weather events and disasters

Journalism schools and organizations provide advice for responsibly reporting on disasters, including focusing on safety, data, and cultural sensitivity. Additional resources include Climate Central's extreme weather toolkits (in English and Spanish).

Are individuals and facilities in your area prepared for power outages?

Preparedness and safety guidance for power outages are available from the Federal Emergency Management Agency and the Centers for Disease Control and Prevention.

CONTACT EXPERTS

Juan Pablo Carvallo, PhD
Research Scientist
Lawrence Berkeley National Laboratory
Relevant expertise: Energy system planning, reliability, and resilience
Contact: JPCarvallo@lbl.gov
Available for interviews in Spanish and English

Joan Casey, PhD (she/her)
Assistant Professor
University of Washington
Relevant expertise: Environmental health, vulnerable populations during power outages
Contact: jacasey@uw.edu

FIND EXPERTS

Submit a request to SciLine from the American Association for the Advancement of Science or to the Climate Data Concierge from Columbia University. These free services rapidly connect journalists to relevant scientific experts.

Browse maps of climate experts and services at regional NOAA, USDA, and Department of the Interior offices.

Explore databases such as 500 Women Scientists, BIPOC Climate and Energy Justice PhDs, and Diverse Sources to find and amplify diverse expert voices.

Reach out to your State Climate Office or the nearest Land-Grant University to connect with scientists, educators, and extension staff in your local area.

METHODOLOGY

Power outage data from 2000 to 2023 were collected from the U.S. Department of Energy's Form OE-417 reports. Major outages are events that affect at least 50,000 customers (homes or business) or interrupt service of 300 megawatts or more. For the purpose of our analysis, we consider only power outages (including blackouts and voltage losses), fuel supply emergencies, and emergency appeals for reduced electricity usages where there was a reported number of customers affected or power lost — and where outages were attributed to weather- or wildfire-related causes. We do not include reports of vandalism or cyber-attacks. Utilities may report weather-related event causes as *storms* or *severe weather*, which may refer to a broad range of conditions. Notably, these conditions may not meet meteorological criteria for severe weather. Climate Central analysts reviewed report details and relevant media coverage to appropriately assign documented weather events to individual outages. Power outages that affected multiple states and regions were counted in each state and region's total number of events, but were counted only once in the national number of events. Regions were defined based on NOAA's U.S. Climate Regions.

[redacted]

DTE

04/22/2024

H LSBWB**T013*2*P01**************AUTO**ALL FOR AADC 481
TOYIA WATTS
2475 BALDWIN ST
DETROIT MI 48214-1750

Low-Income Self-Sufficiency Plan Graduate

Account Number: [redacted]
Service Address: 2475 BALDWIN ST, DETROIT, MI 48214-1750

Dear TOYIA WATTS,

Congratulations, you have graduated from our Low-Income Self-Sufficiency Plan!

To help make your bills more manageable moving forward, we automatically enrolled you in our BudgetWise Billing program. BudgetWise Billing allows you to pay your annual energy bill in equal monthly installments to avoid the seasonal ups and downs of your bill. Your monthly payment is calculated by averaging your energy usage and bill amount at your current residence for the last 12 months.

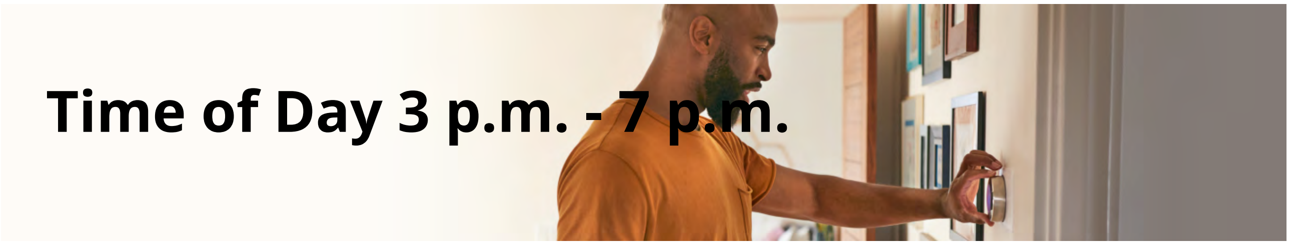
You will receive an enrollment letter in the mail providing more details, including your monthly plan amount. For more information about the program, please visit **dteenergy.com/bwb**.

If you choose to unenroll from BudgetWise Billing, please sign in to your online account at **dteenergy.com** and go to the My Payment Programs section of our website or call us at **(800) 477-4747**.

Thank you for being a valued DTE customer.

Sincerely,

Your DTE Customer Service Team



Time of Day 3 p.m. - 7 p.m.

About the Rate Rate Details

More Choice, More Control

Choose when you use your energy and gain more control over your bill with our **Time of Day 3 p.m. - 7 p.m.** rate. When you adjust your habits and do laundry and dishes or cool your home in off-peak hours, you can take advantage of a lower rate. It's good to know you don't need to make any changes: Our low off-peak rate extends 20 hours on weekdays and all weekend long.

Designed with the State of Michigan to manage the demands of an increasingly electrified world, the **Time of Day 3 p.m. - 7 p.m. rate** lets you take advantage of lower rates, so we can manage energy supply. When you have more choice and more control, everyone wins.

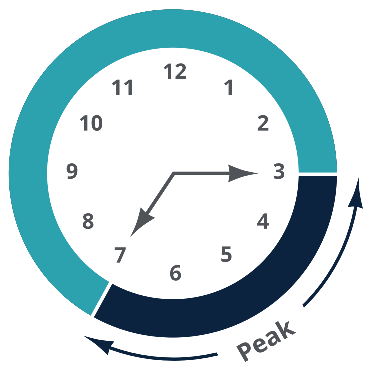
Join Today

Select This Rate

Please note: You may already be on this rate. Sign in to see your rate.

How the Time of Day 3 p.m. - 7 p.m. Rate Works

When you adjust your habits and do things like laundry, dishes or run your air conditioner in off-peak hours, you benefit from a lower electricity rate.



Off-Peak Hour Rates

20 hours each weekday
plus ALL WEEKEND:

16.73¢ PER kWh

Peak Hour Rates

3 p.m. - 7 p.m. Monday to Friday

18.09¢ PER kWh **(October-May)**

22.40¢ PER kWh **(June-September)**

Stated off-peak and peak base rates shown include three factors: (1) capacity and (2) non-capacity charges within power supply charges and (3) distribution within delivery charges. All other surcharges, including Power Supply Cost Recovery (PSCR), are not included in the stated base rate.

You're in Control of Your Energy Usage

Our newest tools work together to help you take control and maximize savings on the new Time of Day rate.

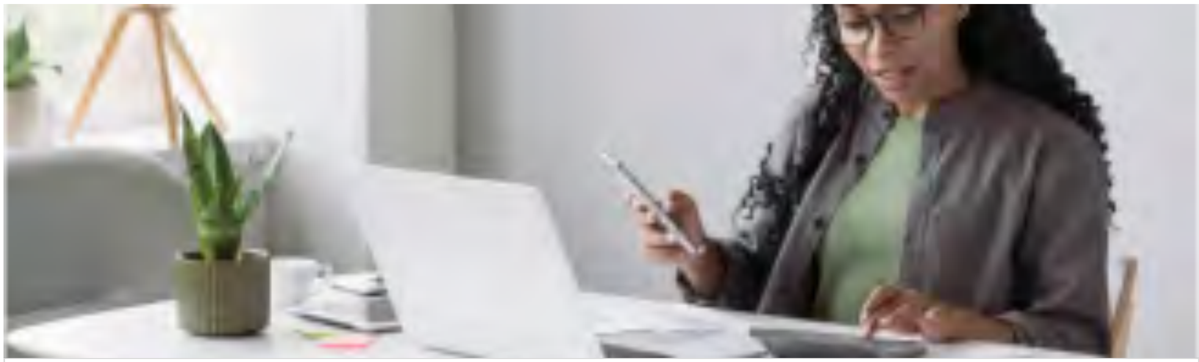
Your Energy Usage Toolbox

The new Time of Day base rate is easy to understand and manage with our suite of helpful tools and resources.

Our tools let you:

- Analyze your energy usage by the hour
- Determine if a different DTE electric rate option is better for your lifestyle
- Project your energy bill based on changes you make to your energy use habits
- See which appliances use the most energy in your home
- Learn how new appliances, light bulbs and heating habits can reduce your bill

With this information, you can adjust your habits and learn how to make the best energy choices for you.



See a Breakdown of Your Bill by Cost and Hourly Usage

The Bill Analyzer Tool provides a snapshot of your energy bill from all angles. With your **personalized dashboard**, you can quickly see your bill history, your current bill compared to one year ago and a projection of your next bill. You can even do a deep dive into your bill contributors and see a breakdown of how much energy you use for laundry, cooling, heating and lighting.

The Bill Analyzer Dashboard also provides insights, such as average weather and billing period length, to explain contributing factors affecting your electric and gas bills.

Analyze My Bill

Try On a New Rate with Your Current Bill

DTE offers a family of rates to fit every budget, lifestyle and need. **Explore Rate Types** and "try on" a different rate to find what's best for your household.

With this tool, you can see how your actual energy use would look with different rates and see a projected monthly bill.

Explore Rate Types

See How Appliances and Other Changes Impact Your Bill

Within our **Bill Simulator**, you can see how changes to your home and appliance habits and adding or replacing appliances will impact your energy usage.

See — in dollars and cents — how changes can impact your monthly bill or yearly costs.

Simulate Upgrades & Changes

Download the Free DTE Insight App for Real-Time Tracking

The DTE Insight App helps you understand, manage and control the energy that powers your home. You can **receive recaps, set budgets and track goals on your phone or tablet.** Upgrade to the premium experience with the Energy Bridge. The Energy Bridge works with your AMI smart meter to help make your home more efficient. You can also use PowerScan to see how much energy any device uses before you purchase.

The DTE Insight App works great on phones and tablets so you can easily monitor your energy use.

Learn More about the DTE Insight App

Optimize Your Energy Usage

While a lot of what we do requires electricity 24/7 — like running your fridge and freezer — other appliances cycle on and off throughout the day. To take advantage of lower rates, look to shift large appliance use to off-peak hours as much as possible.

Do Laundry on Weekends

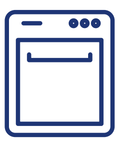
Tips

With off-peak hours all day Saturday and Sunday, weekends are a great time to catch up on laundry.

Tips: Use the cold or cool water setting for washing. Heating water accounts for up to 90% of the energy used in each wash. And fill - but don't overfill - your dryer for each load. Small loads use the same amount of energy as large ones.

Set a Thermostat Schedule

Tips



Run Dishwasher at Night

Tips

Save with Smart Strips & Plugs

Tips

Managing Your Usage

If you can, plan your appliance usage and make the most of your Time of Day 3 p.m. – 7 p.m. rate. Use this Appliance Energy Costs table to estimate how much you could save with each appliance when you choose to use them during off-peak hours before 3 p.m. or after 7 p.m. on weekdays, or any time on the weekends.

Appliance Energy Costs

Get a Free Smart Thermostat with SmartCurrents

You can **maximize savings on Time of Day Rate 3 p.m. - 7 p.m. with a free Wi-Fi-enabled ecobee Smart Thermostat Premium** (a $249 value) by enrolling in SmartCurrents.

Using your SmartCurrents thermostat year-round makes your Time of Day Rate 3 p.m. - 7 p.m. work even more effectively to manage home comfort and savings.

Your smart thermostat will help you automatically reduce some of your electricity use during SmartCurrents Peak Events.

Find out more about SmartCurrents

For more information, please see the **Time of Day 3 p.m. - 7 p.m. Terms & Conditions**.

Who We Are

For 40 years the *Eastside Community Network* (formerly Warren Conner Development Coalition) has worked tirelessly to develop programs and resources that center the needs of east side residents and amplify their voices with respect to the development of their communities.

Our Mission

Eastside Community Network develops people, places and plans for sustainable growth on Detroit's east side.

Our Vision

We envision the east side of Detroit as a community of choice where residents can live, work, play and thrive.

Our Impact Areas

We make an impact through the the following impact areas:

- Strengthening Our People

What We Do

ECN spearheads initiatives that promote social cohesion, neighborhood sustainability, community participation, and resident empowerment.

Climate Equity

Over the past decade, Eastside Community Network has built a reputation as a leader in the urban climate resilience space — focusing our efforts on policy advocacy, infrastructure development, and community education that promotes climate resiliency and equitable climate change strategies in Detroit.

Community Economic Development

We support east side small business owners and drive economic development opportunities that benefit all residents and community stakeholders, through a mix of community economic development plans, multi-sector working groups, training programs, direct services, and third-party resources.

Sustainable Housing

We support efforts to increase sustainability of neighborhood homes, through energy retrofits, flood prevention, foreclosure prevention, and access to other home improvement and financial stability resources.

Stoudamire Wellness Hub

This 17,000 square foot community hub provides holistic wellness activities and resources to east side residents through multi-sector partnerships with other community stakeholders.

Youth Development

Our youth programs focus on the holistic development of each young person — ensuring that our program participants are academically, physically, mentally, emotionally, and financially

4401 Conner St
Detroit, MI 48215
(313) 571-2800

Join our mailing list and be the first to learn about new programs, community events, and resources.

MPSC Case No: U-21534	
Requester: DAAO	
Question No.: DAAODE-3.4c	
Respondent: N. Foley	
Page: 1 of 1	

Question: Will DTE Electric seek in this case a Michigan Public Service Commission ("Commission") order approving any aspect of the outage credit recoverability proposal described by Witness Crozier at pages 31-34 of their direct testimony? If yes, please:

c. Produce documents that quantify the expected ratepayer impact of the proposal.

Answer: The Company does not forecast outage credit payments and therefore cannot provide an expected ratepayer impact.

Attachment: *None*

Co-Respondent(s): J. Kryscynski

Payment Coupon

Please indicate amount paying $ ______

MULTIPLE PAYMENT COUPONS ENCLOSED

Account Number	[redacted]
Past Due - Pay Now	$382.96
Due January 31, 2024	$422.78
Total Due:	$805.74

5383 1 AV 0.495**T023*2*P01*M01***AUTO**SCH 5-DIGIT 48214
DELORES OLIVER ORR
1378 CADILLAC BLVD
DETROIT MI 48214-3106

1/17/24
Pd. See
Reverse
Balance $332.93

Mail Payments to:
DTE Energy
P.O. Box 740786
Cincinnati OH 45274-0786

Scan code with Phone for quick and secure payment process!

For address corrections, please visit dteenergy.com or call 800 477 4747

Return upper portion with your payment 200114808421

Keep lower portion for your records

OVERDUE NOTICE

Contact Information

Gas Leak or Gas Emergency	800.947.5000
Customer Service or Power Outage	800.477.4747
Hearing-Impaired TDD Line	800.888.6886 (Mon-Fri 8am-5pm)
Web Site	dteenergy.com

Programs you are enrolled in

Senior Winter Protection
Home Protection Plan - 800.556.0011

Summary of Charges

Account Number [redacted]

Account Balance as of Dec 07, 2023	382.96
Payment Received	0.00
Balance Prior to Current Charges	382.96
Your account requires immediate attention.#To avoid collection action, pay the past-due balance now or call us at 800.477.4747.	
Total Current Charges	422.78
Account Balance as of January 09, 2024	$805.74

Our records show your Home Protection Plus plan has a past-due balance of $ 89.85 which is included in your total due. Please make this payment promptly to avoid losing your HPP coverage.

Your current charges are due on January 31, 2024. A 2% late payment charge will be applied if paid after the due date.

Your Monthly Energy Usage

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **DTE ELECTRIC COMPANY** for authority to increase its rates, amend its rate schedules and rules governing the distribution and supply of electric energy, and for miscellaneous accounting authority	Case No. U-21534 ALJ Sally Wallace

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PROOF OF SERVICE

I, Mark N. Templeton, certify that an electronic copy of the Official Exhibit DAO-301 sponsored by Elizabeth Jacob; the Official Exhibits DAO-311 to DAO-318 sponsored by Toyia Watts; and the Official Exhibits DAO-321 to DAO-323 sponsored by Delores Orr (Part 10 of 10) on Behalf of Soulardarity and We Want Green, Too was served on the following on September 12, 2024.

Name/Party	E-mail Address
Administrative Law Judge Hon. Sally Wallace	wallaces2@michigan.gov
DTE Electric Company Jon P. Christinidis Paula Johnson-Bacon John A. Janiszewski Andrea E. Hayden Breanne K. Reitzel	jon.christinidis@dteenergy.com paula.bacon@dteenergy.com john.janiszewski@dteenergy.com andrea.hayden@dteenergy.com breanne.reitzel@dteenergy.com mpscfilings@dteenergy.com
Michigan Attorney General Joel King	ag-enra-spec-lit@michigan.gov kingj38@michigan.gov
Michigan Public Service Commission Staff Monica M. Stephens Amit T. Singh Heather M.S. Durian Michael J. Orris Lori Mayabb	stephensm11@michigan.gov singha9@michigan.gov durianh@michigan.gov orrism@michigan.gov mayabbl@michigan.gov
The City of Ann Arbor, Michigan Municipal Association for Utility Issues Valerie Jackson Valerie J.M. Brader	valeriejackson@rivenoaklaw.com valerie@rivenoaklaw.com

Electrify America, LLC Jennifer A. Morante Stephen Bright	jmorante@grsm.com steve.bright@electrifyamerica.com
Michigan Environmental Council, Citizens Utility Board of Michigan, Natural Resources Defense Council, Sierra Club Christopher M. Bzdok Tracy Jane Andrews Breanna Thomas	chris@tropospherelegal.com tjandrews@tropospherelegal.com breanna@envlaw.com
Michigan Energy Innovation Business Council, Institute for Energy Innovation, Advanced Energy United, The Foundry Association of Michigan, and Energy Michigan, Inc. Laura A. Chappelle Justin K. Ooms Timothy J. Lundgren	lchappelle@potomaclaw.com jooms@potomaclaw.com tlundgren@potomaclaw.com
The Ecology Center, The Environmental Law & Policy Center, Union of Concerned Scientists, and Vote Solar Nicholas Wallace Daniel Abrams Alondra Estrada Carolyn Boyce	nwallace@elpc.org dabrams@elpc.org aestrada@elpc.org cboyce@elpc.org MPSCdocket@elpc.org
The Kroger Company Kurt J. Boehm Jody Kyler Cohn Justin Bieber Michael L. Kurtz	kboehm@bkllawfirm.com jkylercohn@bkllawfirm.com jbieber@energystrat.com
Local 223, Utility Workers Union of America (UWUA), AFL-CIO Benjamin King	bking@michworkerlaw.com
Association of Businesses Advocating Tariff Equity (ABATE) Stephen A. Campbell	scampbell@clarkhill.com
EVgo Services, LLC Nikhil Vijaykar Michael G. Oliva	nvijaykar@keyesfox.com moliva@fosterswift.com
Great Lakes Renewable Energy Association (GLREA) Don L. Keskey Brian W. Coyer	donkeskey@publiclawresourcecenter.com bwcoyer@publiclawresourcecenter.com
International Transmission Company	ckissel@dykema.com

Courtney F. Kissel Richard J. Aaron Olivia R.C.A. Flower Hannah E. Buzolits	raaron@dykema.com oflower@dykema.com hbuzolits@dykema.com
Michigan Cable Telecommunications Association Sean P. Gallagher	sgallagher@fraserlawfirm.com
PROTEC (The Michigan Coalition to Protect the Public Rights of Way) Michael J. Watza	mike.watza@kitch.com
Walmart, Inc. Melissa M. Horne	mhorne@hcc-law.com
Soulardarity and We Want Green, Too Amanda Urban Mark Templeton Jacob Schuhardt Sam Heppell Madison S. Wilson	t-9aurba@lawclinic.uchicago.edu templeton@uchicago.edu jschuhardt@uchicago.edu heppell@uchicago.edu madisonswilson@uchicago.edu aelc_mpsc@lawclinic.uchicago.edu

The statements above are true to the best of my knowledge, information, and belief.

UNIVERSITY OF CHICAGO LAW SCHOOL
ABRAMS ENVIRONMENTAL LAW CLINIC
Counsel for Soulardarity and
We Want Green, Too

Date: September 12, 2024

Sincerely,

Mark N. Templeton, *pro hac vice*
6020 S. University Avenue
Chicago, IL 60637
Phone: (773) 702-9611
Email: templeton@uchicago.edu