



# Winter Energy Appraisal

Winter Outlook 2023-2024

November 8, 2023

**MPSC Staff**



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## Glossary

|               |   |
|---------------|---|
| <b>Barrel</b> | A unit of volume equal to 42 U.S. gallons.  |
| <b>b/d</b>    | The abbreviation for barrel(s) per day, also displayed as bbl/d.  |
| <b>Bcf</b>    | The abbreviation for billion cubic feet.  |
| <b>Brent</b>  | Brent is a major trading classification of sweet light crude oil that serves as a major benchmark price for purchases of oil worldwide.   |
| <b>CDD</b>    | Cooling Degree Days - a measure of how warm a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit. Cooling degree days are used in energy analysis as an indicator of air conditioning energy requirements or use. |
| <b>EIA</b>    | Energy Information Administration - the statistical and analytical agency within the U.S. Department of Energy.   |
| <b>GWh</b>    | One billion watthours.  |
| <b>GCR</b>    | Gas Cost Recovery - the actual cost of natural gas that a local distribution company pays to purchase natural gas for your use.   |
| <b>HDD</b>    | Heating Degree Days - a measurement designed to quantify the demand for energy needed to heat a building. HDD units measure how cold a location is over a period of time relative to a base temperature, most commonly specified as 65 degrees Fahrenheit.                        |
| <b>LSE</b>    | Load serving entity - a cooperative, municipal, investor-owned utility, or an alternative electric supplier (AES) that provides electricity to its customers.   |
| <b>Mcf</b>    | One thousand cubic feet.  |
| <b>MISO</b>   | Midcontinent Independent System Operator –a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 16 states and one Canadian province.   |
| <b>mmBtu</b>  | One million British thermal units.  |
| <b>MW</b>     | One million watts of electricity.   |
| <b>OECD</b>   | Organization for Economic Cooperation and Development - an intergovernmental economic organization with 35 member countries, founded in 1961 to stimulate economic progress and world trade.  |
| <b>OPEC</b>   | Organization of the Petroleum Exporting Countries   |
| <b>PJM</b>    | PJM – an RTO that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia.  |
| <b>STEO</b>   | Short-Term Energy Outlook published monthly by EIA.   |
| <b>WTI</b>    | West Texas Intermediate (also known as Texas light sweet) – a grade of crude oil used as a benchmark in oil pricing.  |

# Preface

The Michigan Energy Appraisal is a semiannual assessment of Michigan’s energy baseline. The assessment raises the situational awareness of the state’s energy environment including recent events impacting energy supply and prices, expected conditions, and changes over the next six months. Additionally, it provides the necessary information to enable a reliable assessment of the risk posed by an energy supply disruption.

Due to data availability issues, Michigan-specific outlooks for petroleum energy sources (propane and distillates) are unavailable for this edition. However, these energy sources are still discussed in a broader context.

Although COVID-19 still poses a risk to Michigan residents, there are signs of economic recovery and a return to more historical consumption patterns for energy products.

This report is prepared by the Energy Security Section of the Michigan Public Service Commission (MPSC) with assistance from the Energy Operations, Energy Resources, and Regulated Energy Divisions of the MPSC, Department of Licensing and Regulatory Affairs (LARA), State of Michigan.

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The 2023 Winter Energy Appraisal is available on the [MPSC website](#). A major source of data and analysis used in this appraisal is the federal Energy Information Administration (EIA) at <http://www.eia.doe.gov>. The EIA collects national, state, and international data on energy usage, prices, supply, etc., and provides expert analysis on trends in energy.

Comments or questions on this appraisal are welcomed and may be directed to Alex Morese, Michigan Public Service Commission, at [moresea@michigan.gov](mailto:moresea@michigan.gov).

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## Executive Summary

Energy use in Michigan is closely tied to economic activity within the state. Motorists use gasoline to travel to and from work, companies move goods throughout the state by trucks and trains powered by diesel fuel, the industrial sector uses natural gas as a fuel for their manufacturing processes, and all sectors use electricity to light either their homes, businesses, or factories. Of note for this Energy Appraisal is the current price volatility within energy markets and the uncertainty surrounding future price projections. The EIA geographically aggregates price projections into Petroleum Administration Defense Districts (PADDs) – which means prices in individual states may eclipse the regional PADD average for a given forecast period.

The core analyses in this winter's edition of the Michigan Energy Appraisal were compiled by Staff at the Michigan Public Service Commission and projections sourced from the federal Energy Information Administration.

Some key report findings for Michigan energy sectors:

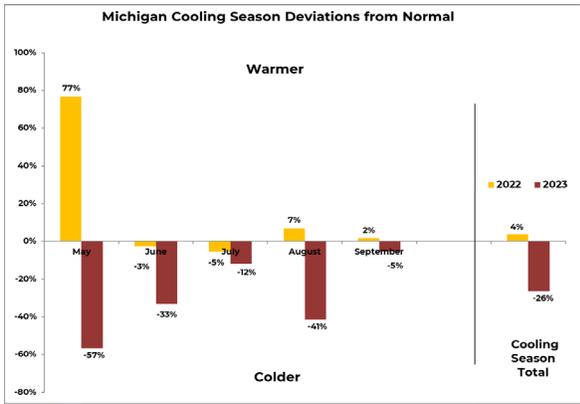
- Use of **natural gas** is expected to see a 7.6% increase in 2023, led by increased demand from the electric power generation sector outweighing declines in the residential (-5.4%), commercial (-4.3%), and industrial (-1.6%) sectors.
- Residential **propane** prices beginning in October 2023 averaged \$2.09/gallon, a decrease of 39 cents (16.6%) compared to last year.
- No. 2 **heating oil** prices started the 2023/24 heating season \$0.53/gallon (12%) lower than last year at an average of \$3.88/gallon.
- **Electricity** demand is forecast to decrease 2.7% for 2023. The largest decline is expected in the residential sector (5.7%), with the commercial sector also down (2.5%) while industrial increases (0.9%). The EIA forecasts residential retail electricity prices in the east north central U.S. to average 16.09 cents/kWh for 2023, an increase of 3.9% from 2022.
- Average Midwest **gasoline** prices are expected to average \$3.47/gallon for 2023 and \$3.56 in 2024. Michigan gasoline demand is projected to decrease 1.2% for 2023, following a decline of 0.5% in 2022.

# Data and Methodology

A vast majority of the predictive energy data (consumption, prices, and stocks) used in this appraisal’s models are from EIA forecasts drawn from their Short-Term Energy Outlook (STEO). Energy supply and demand is often dependent upon weather-related variables. Therefore, variables such as heating and cooling degree days are also heavily used in the forecasts.

Heating and cooling degree days are a commonly used metric for calculating building energy consumption. Deviations from “normal” degree day figures are helpful in understanding variations in consumption of energy commodities (see Figure 1).

**Figure 1**



Future degree day deviations cannot be known at the time the appraisal forecasts are made, so assumptions are needed. For any model using degree day deviations, the assumption is made that future weather conditions will be approximately “normal” and there will be no deviations from the historical average degree day figure calculated by the National Climatic Data Center at that given point in time during the forecast period.

Monthly data is used for all forecasts in this appraisal. However, certain variables used in the appraisal models are only reported, or predicted, on a quarterly basis from their respective source. Quarterly data leaves data gaps in the monthly time series, therefore extrapolation tools are needed. A cubic spline interpolation tool, used for curve fitting, is employed to acquire the approximate monthly data points in between the quarterly figures that were available for use in the models.

The forecast models used for the appraisal are, for the most part, derived from EIA forecast models used in their preparation of the STEO. More specifically, these forecast models are called ARIMA (Auto Regressive Integrated Moving Average) models. ARIMA models are an econometric tool used by analysts to better understand the relationship between variables, or to predict future points in a time series. The auto regressive and moving average portions of the model mean that past observations and past forecast errors are used in prediction of future observations. The integrated portion of the model means that a transformation was applied to the data for statistical purposes.

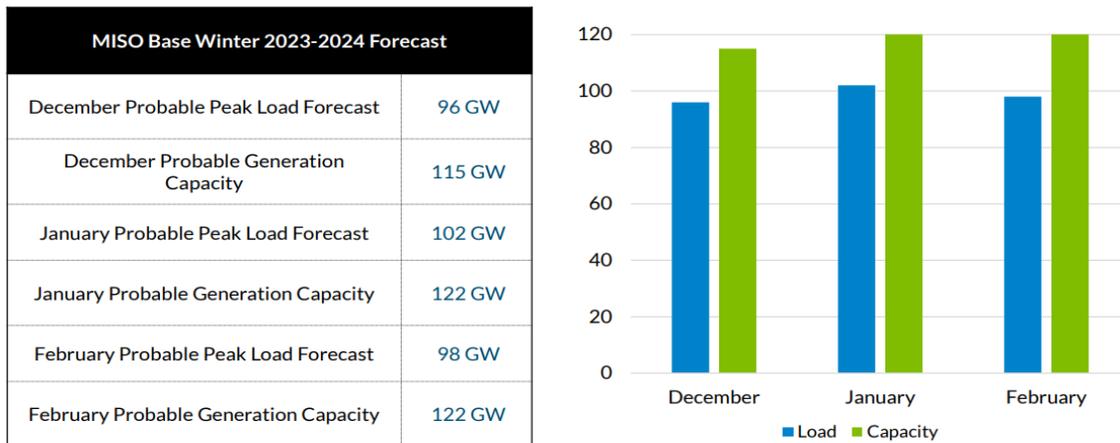
Forecast models are frequently evaluated and updated to provide as accurate information as possible so that future energy expectations can be built. However, given that the forecasting models used in this appraisal partly use predictions, extrapolated data and assumptions of normal weather, the potential does exist for the forecasted value at a given point in time to vary from actual observed values for the same point in time.

## Trending Topics

### MISO Winter Readiness and Resource Adequacy

On October 31, 2023, MISO held its seasonal readiness meeting – covering significant past weather events, upcoming weather forecasts, risk modeling, and generation fuel mixes, amongst others. Of note was MISO’s seasonal assessment of generation for the upcoming winter. According to their projections, a high load and generation outage scenario during January 2024 could cause strain on the bulk electric system – requiring load modifying resources and other operating reserves to be called upon. Otherwise, MISO stated that under typical demand and generation outage scenarios, sufficient firm resources are expected to cover peak load forecasts, as shown in Figure 2.

**Figure 2**  
**MISO: System-Wide**



### NOAA U.S. Winter Outlook

According to NOAA's 2023-2024 U.S. Winter Outlook, warmer than average temperatures are expected for the northern tier of the country – due to El Nino conditions being in place. Additionally, NOAA projects that areas of the Great Lakes Region, including a significant portion of Michigan, have a 40-50% chance of below normal precipitation amounts for this winter between December through February. More information on the Winter Outlook can be found here:

<https://www.noaa.gov/news-release/us-winter-outlook-wetter-south-warmer-north>

### Gas and Electric System Harmonization

In July 2023, the North American Energy Standards Board (NAESB) released a report exploring challenges to reliability of both electric and natural gas systems as natural gas is increasingly used in electricity generation. The report issues recommendations that the energy industry and regulators can take to improve reliability given increasing gas-electric interdependency. The issue came to the fore during Winter Storm Uri in 2021, when electric and natural gas systems across Texas failed during

freezing temperatures, leading to more than 200 deaths and tens of billions of dollars in damages, and again with Winter Storm Elliott in 2022, when power was knocked out to more than 1.5 million homes across the country amid similar stresses on the electric and natural gas systems during times of soaring energy demand. In fact, FERC and the North American Reliability Corporation (NERC) issued a series of findings and recommendations resulting from Winter Storm Elliott in a November 2023 report. At the time of report publication, Jim Robb, NERC President and Chief Executive Officer, said the following on the criticality of Winter Storm Elliott impacts, and the need for gas and electric infrastructure harmonization, “The unplanned loss of generation due to freezing and fuel issues was unprecedented, reflecting the extraordinary interconnectedness of the gas and electric systems and their combined vulnerability to extreme weather.”

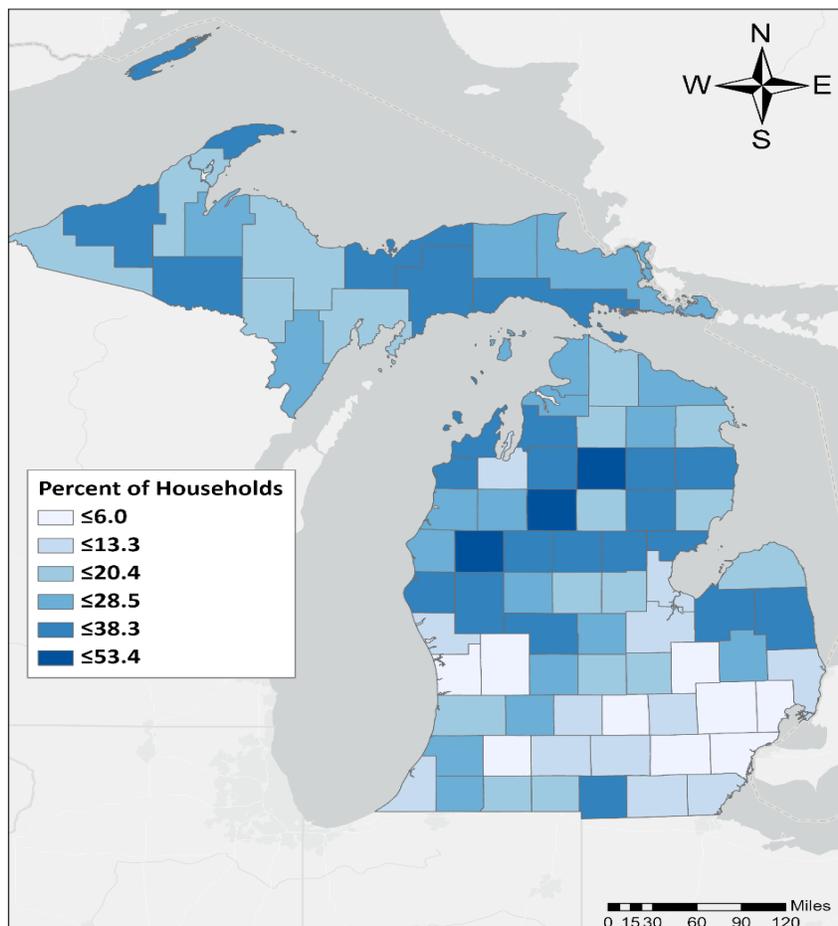
## **Propane**

### **Demand**

According to the EIA, about 5% of U.S. households heat with propane; however, in Michigan it is estimated to be a little more than 8%. Areas of the northern Lower Peninsula and the Upper Peninsula have some of the highest proportions of total households using propane for home heating – with some counties topping 50% (see Figure 3). Weather remains the largest determinant of propane use for residents. Heating degree day (HDD) forecasts by the National Oceanic and Atmospheric Association (NOAA) indicate Michigan may experience above normal temperatures throughout the 2023/24 winter heating season, totaling 5,128 HDD units, 3.6% lower than the 1981-2010 normal of 5,321 HDD units.

Another primary use for propane in the Midwest, including Michigan, is for the drying of harvested corn crops. When corn crops are planted late in the spring, or when the fall is especially wet, demand for propane from the agriculture sector may rise due to the increased need to dry down their crop for it to be stored without high risk of spoilage. As of October 15, 2023, some Midwestern states, including Michigan and Indiana, were showing corn maturity progress slightly behind the five-year average. However, major corn producing states such as Illinois, Iowa, Nebraska, Wisconsin, and Minnesota all remain closely aligned with their five-year average – an indication there may not be abnormal propane demand for grain drying this fall.

**Figure 3**  
**Michigan Propane Usage for Home Heating**

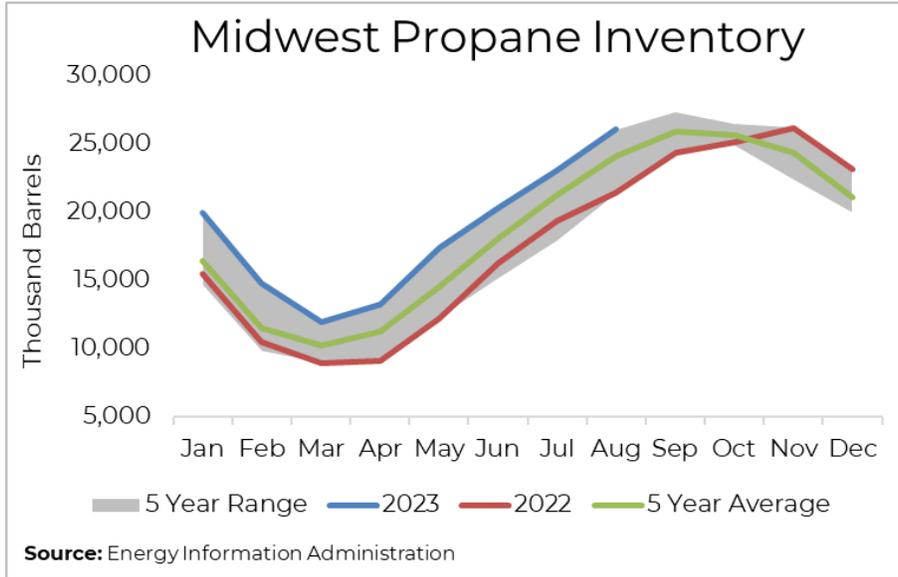


### Supply

U.S. propane production remains high – averaging 2.55 million b/d to end October as propane export demand continues to be strong. A significant portion of U.S. propane exports leave from the Gulf Coast, destined for nations such as Japan, China, South Korea, and Mexico. The average Midwest propane production for the week ending October 27, 2023 was 525,000 b/d, an increase of 4.6% from the same period last year.

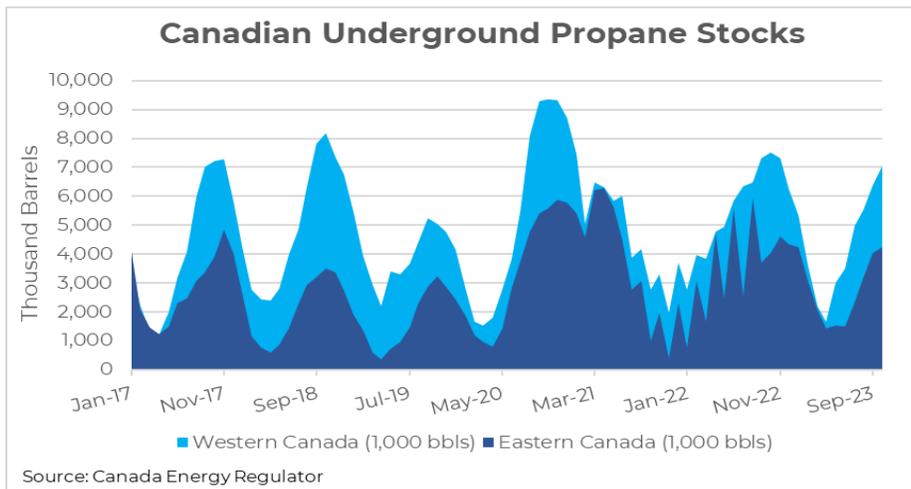
According to the EIA, U.S. inventories of propane and propylene stood at 101 million barrels as of October 27, 15% above levels seen at the same time last year. PADD 2 (Midwest) propane and propylene stocks totaled 27.2 million barrels as of October 27 (up 2.7million barrels from 2022), 6% above the five-year average for this time of year.

Figure 4



In addition to domestic propane supply, many regions of the U.S. rely on supplies from Canada that are transported by pipeline, rail, and truck. Major Canadian underground storage facilities are primarily located in western Canada (Alberta) and in eastern Canada (Ontario). According to the MPSC's 2019 [Statewide Energy Assessment](#), approximately 18.7 million barrels of underground cavern storage capacity for hydrocarbon gas liquids, such as propane, are located in Ontario near the Sarnia and Windsor areas. According to Canada Energy Regulator data, underground propane stocks to begin in October 2023 totaled 4.2 million barrels in eastern Canada, and 7 million barrels in western Canada – 16% and 5% above five-year averages for the time period, respectively (see Figure 5).

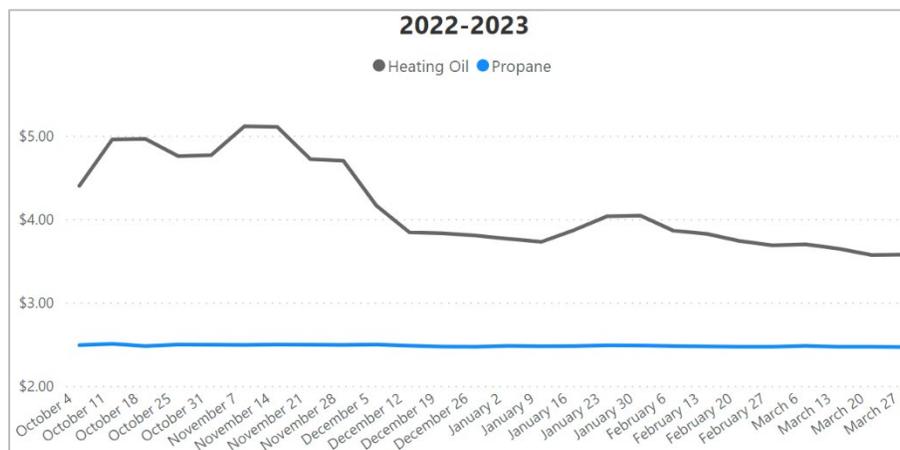
Figure 5



## Price

According to the EIA, wholesale propane prices in Michigan started this heating season at \$0.87 per gallon (24 cents lower than prior year), an indication of a more stable supply situation. The dip in heating oil prices is explained further later in this report. However, higher oil and natural gas prices, which feed into propane prices, could lead to an increase in prices paid for propane later this winter. For the week of October 30, 2023, the average residential propane price in Michigan was around \$2.12 per gallon. As seen in Figure 6, propane prices were remarkably stable throughout last heating season.

**Figure 6**  
**Michigan Residential Propane & Heating Oil Prices**



Source: [https://www.michigan.gov/mpsc/0,9535,7-395-93308\\_93325\\_93424---,00.html](https://www.michigan.gov/mpsc/0,9535,7-395-93308_93325_93424---,00.html)

## Natural Gas

### Demand

Assuming normal winter weather through the 2023/24 heating season, total natural gas sales in Michigan from all sectors are projected to increase by 7.6% in 2023 to 1.06 trillion cubic feet (Tcf). Higher total natural gas sales for 2023 are driven primarily by an increase in demand from the electric power generation sector. The electric power generation sectors' consumption of natural gas is expected to grow 33% for 2023 – a significant increase from an already sizable 22.9% rise seen in 2022. In 2022, the electric power sector represented 32% of Michigan's total natural gas consumption.

Commercial and industrial demand is expected to decline by 4.3 and 1.6 percent, respectively. Residential natural gas consumption – which is used to heat about 77% of Michigan households – is estimated to decline by 5.4% for 2023 due to a warm end to the 2022/23 heating season and forecast expectations of normal conditions to start the 2023/24 heating season. Should Michigan experience a warmer than normal winter, natural gas usage for space heating could decrease and lower demand.

Figure 7

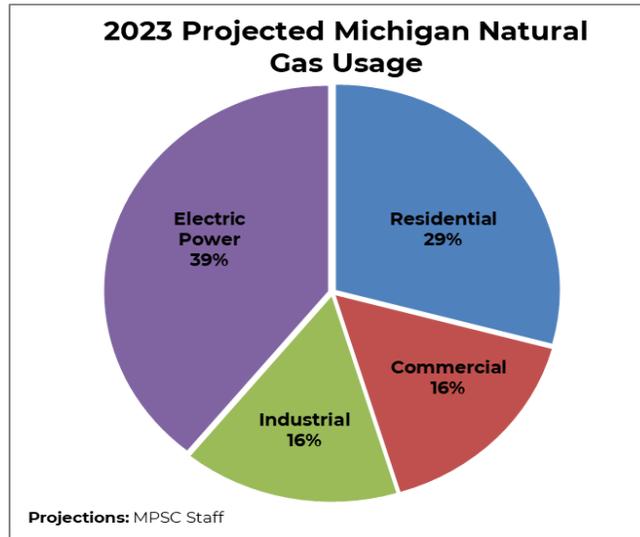


Figure 8

**Michigan Natural Gas Demand  
(Billion Cubic Feet--BCF)**

|                         |              | Total Demand | Residential Demand | Commercial Demand | Industrial Demand | Electric Power Demand |
|-------------------------|--------------|--------------|--------------------|-------------------|-------------------|-----------------------|
| <b>Historical</b>       | 2020 Total   | 901.1        | 304.2              | 160.5             | 154.1             | 282.3                 |
|                         | 2021 Total   | 871.2        | 296.0              | 161.4             | 158.6             | 255.1                 |
|                         | 2022 Total   | 989.3        | 328.7              | 179.3             | 167.9             | 313.4                 |
|                         | <hr/>        |              |                    |                   |                   |                       |
|                         | 2023 January | 123.7        | 49.9               | 26.7              | 17.3              | 29.7                  |
|                         | February     | 112.6        | 45.2               | 24.2              | 15.3              | 27.9                  |
|                         | March        | 116.9        | 43.9               | 23.9              | 16.3              | 32.8                  |
|                         | April        | 84.2         | 22.8               | 13.9              | 14.9              | 32.6                  |
|                         | May          | 65.7         | 13.7               | 8.9               | 11.4              | 31.7                  |
|                         | June         | 59.0         | 6.3                | 5.5               | 11.6              | 35.5                  |
|                         | July         | 66.2         | 5.9                | 5.1               | 10.6              | 44.7                  |
|                         | <hr/>        |              |                    |                   |                   |                       |
| <b>Projection</b>       | August       | 58.1         | 5.2                | 5.3               | 11.0              | 36.6                  |
|                         | September    | 60.5         | 7.0                | 5.5               | 11.2              | 36.7                  |
|                         | October      | 79.8         | 19.6               | 9.9               | 13.1              | 37.2                  |
|                         | November     | 102.5        | 36.9               | 17.2              | 15.0              | 33.5                  |
|                         | December     | 135.4        | 54.6               | 25.5              | 17.5              | 37.8                  |
|                         | 2023 Total   | 1,064.6      | 311.0              | 171.6             | 165.2             | 416.9                 |
| <b>2022-2023 change</b> |              | <b>7.6%</b>  | <b>-5.4%</b>       | <b>-4.3%</b>      | <b>-1.6%</b>      | <b>33.0%</b>          |
|                         | 2024 January | 155.4        | 60.2               | 30.8              | 19.5              | 44.9                  |
|                         | February     | 136.9        | 51.5               | 26.7              | 18.3              | 40.2                  |
|                         | March        | 127.9        | 44.4               | 23.1              | 17.9              | 42.5                  |
|                         | April        | 95.4         | 25.5               | 14.1              | 15.2              | 40.7                  |
|                         | May          | 75.1         | 13.5               | 8.5               | 12.5              | 40.5                  |

NOTE: Projected sales are based on historical trends.

SOURCES: Historical Data – Energy Information Administration (EIA), U.S Department of Energy.

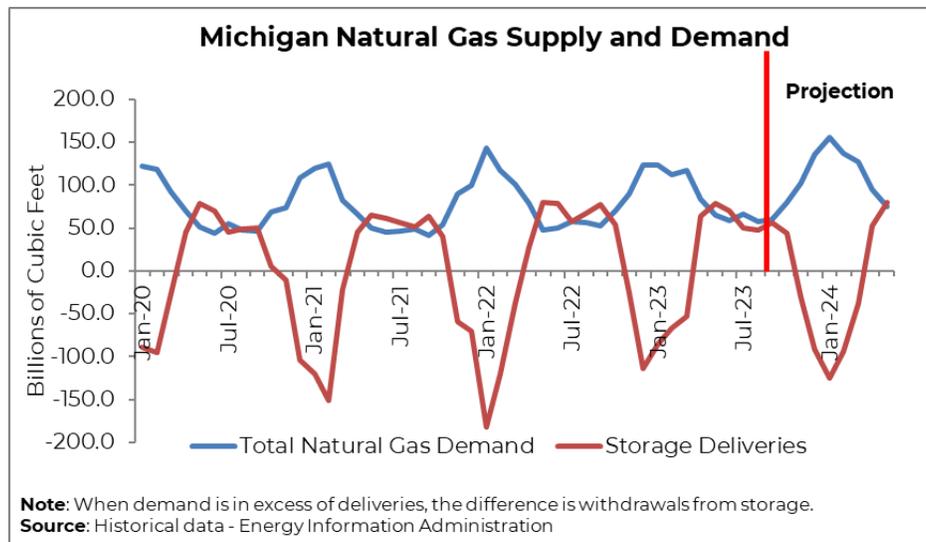
Projection by: MPSC, Energy Security Section, using primarily EIA data

(see methodology section for additional detail).

## Supply

Storage levels in Michigan are projected to be 544 Bcf to end 2023, which is 18% higher than the previous year's end. Michigan has over 10% of the nation's available underground storage capacity for natural gas, the largest of any state. Working gas storage inventories for the lower 48 states were 3,780 Bcf for the week ending October 27, 2023, 7.9% higher than the same time last year. Natural gas storage levels are normally at their lowest levels by the end of the heating season in March and are built up during the summer months. Storage injection typically begins after the end of the heating season and is sensitive to both current market prices as well as price expectations for the upcoming heating season. About 10% of Michigan's natural gas needs are supplied via its own natural gas production wells. However, this production continues to slowly decline as the wells age and production decreases or becomes uneconomical.

Figure 9



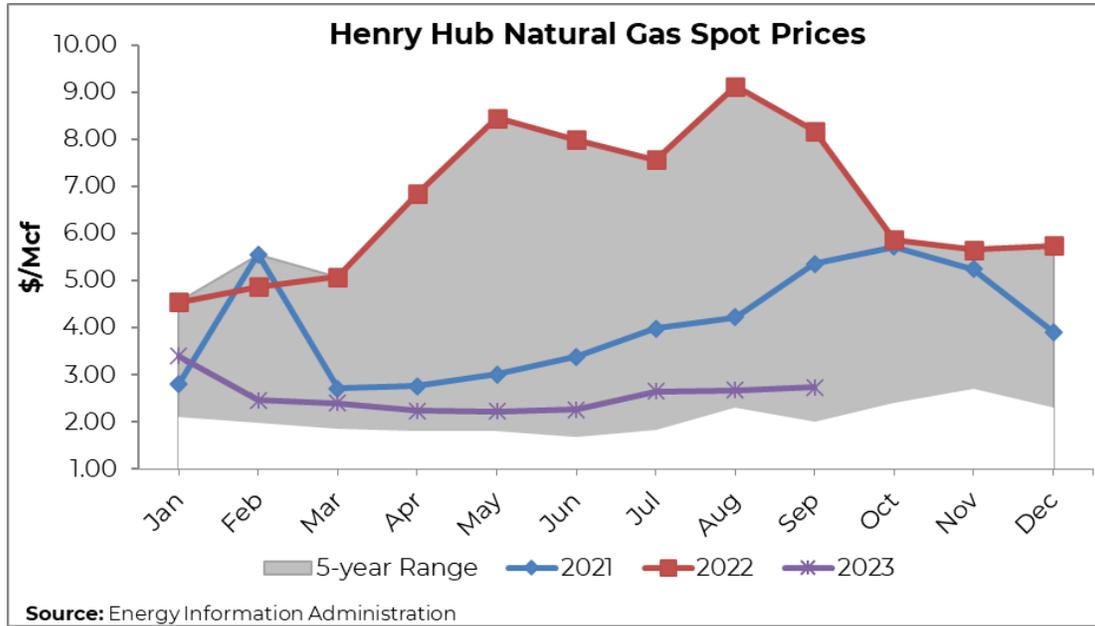
## Price

The EIA's October STEO projects Henry Hub natural gas spot prices to average \$3.15/Mcf for the 4th quarter 2023 with prices rising slightly to an average of \$3.43 thousand for the first quarter of 2024. The wholesale price for winter '23-24 natural gas, determined by futures trading on the Chicago Mercantile Exchange (CME), averaged approximately \$3.49/Mcf (thousand cubic feet) this summer for the coming winter's future strip. The EIA's projected prices reflect current and projected supply dynamics – with U.S. storage levels ending October 27, 2023, 5.7% higher than the five-year average. The LNG export markets remain strong in the U.S, with an anticipated average of 11.62 Bcf/day leaving the country in 2023. LNG exports are forecasted to rise to an average of 13.15 Bcf/day in 2024 as three new export projects begin operations. The usual seasonal demand increases, and the growing LNG exports will draw down natural gas inventories, but above average inventories should help to moderate prices throughout the upcoming winter.

The total residential bill for natural gas service is comprised of the wholesale cost of gas purchased by Michigan utilities (Gas Cost Recovery (GCR) factor), the cost of

interstate transport and delivery, and the monthly customer charge. Energy waste reduction surcharges used to implement energy efficiency programs (not included in Figure 11 below) may also impact a residential customer’s bill. The projected weighted average commodity price (GCR factor/fuel cost alone) for residential customers of regulated utilities in Michigan during the November 2023 through March 2024 winter is currently \$3.53/Mcf compared to last year’s actual average of \$5.80/Mcf.

**Figure 10**



**Figure 11**

**Residential Natural Gas Bill Breakdown**

|                                   | Cost Breakdown (per Mcf) |              |                    | Customer Charge (monthly) | Nov. 2023 - March 2024 Bill Forecast |
|-----------------------------------|--------------------------|--------------|--------------------|---------------------------|--------------------------------------|
|                                   | Commodity Charge         | Distribution | Total Average Cost |                           |                                      |
| <b>Four Largest Gas Utilities</b> | \$3.48                   | \$4.88       | \$8.37             | \$14.18                   | \$766                                |

Note: commodity charge refers to the price of fuel based on October 2023 average; November 2023 - March 2024 usage is estimated at 83.13 Mcf.

**Distillate Fuels**

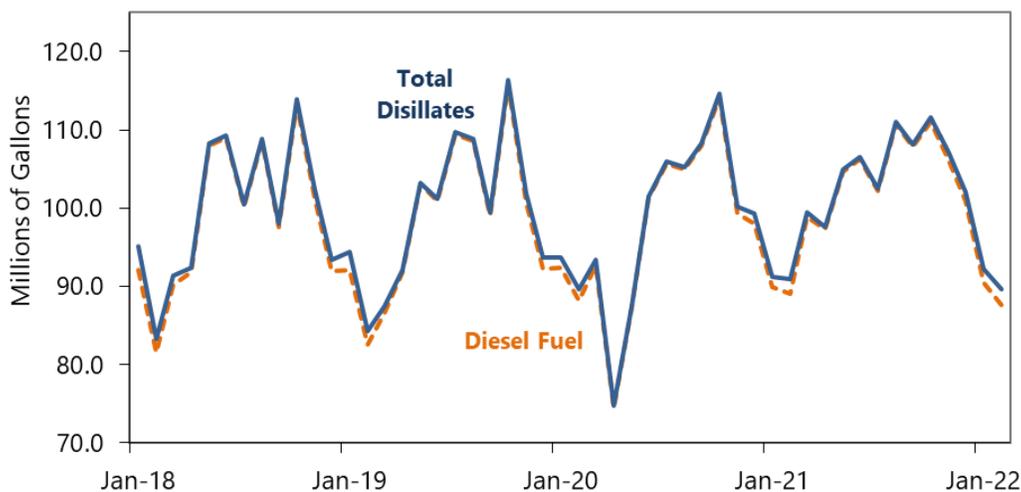
**Demand**

Ultra-low sulfur diesel fuel accounts for approximately 99% of total distillate demand, a majority being used for transportation by highway trucks, with the remainder consisting of heating oil, kerosene, and No. 1 distillate. Other users of distillates, although less prominent, include the agricultural, commercial, and industrial sectors, as well as vessel fueling.

As seen in Figure 12, total distillate sales have remained fairly consistent over the past several years in Michigan. However, distillate fuels as a primary fuel source for home heating in Michigan continues to decline. According to estimates from the U.S. Census Bureau’s American Community Survey, approximately 35,680 households heated their homes with the fuel in 2021 – compared to 76,879 households in 2010. Distillate fuel continues to be a prevalent home heating fuel source in areas of the Northeastern U.S.

**Figure 12**

**Historical Michigan Distillate Fuel Oil Sales**



Source: Historical data - Energy Information Administration

**Supply**

For the week ending October 27, 2023, national inventories of distillate oil were 111 million barrels, about 4.5 million barrels more than this same time last year but still near the bottom of the five-year range. Midwest inventories for the same week totaled 27.8 million barrels, 2.9 million barrels higher than a year ago. While national production levels of distillates remain strong, inventories near the lower five-year range are a result of increased demand and healthy export markets. For the week ending October 27, national production of distillates totaled 4.6 million b/d, while exports averaged 1.08 million b/d and demand totaled 3.68 million b/d.

**Price**

Nationally, the EIA expects retail prices for on-highway diesel fuel will average \$4.29 per gallon for 2023, a decrease of \$0.72/gallon from 2022. It is expected that distillate prices will remain relatively steady for 2024, with prices estimated to average \$4.28 per gallon. According to AAA Michigan, the average price of diesel in Michigan was \$4.28 per gallon on November 7, \$1.16 per gallon lower than the price seen at this time last year.

The average cost of No. 2 heating oil in Michigan was \$3.76 per gallon on October 30, 2023, \$1.00 per gallon lower than the cost at the same time last year. The principal price driver for heating oil is the U.S. refiner acquisition cost of crude oil, which has

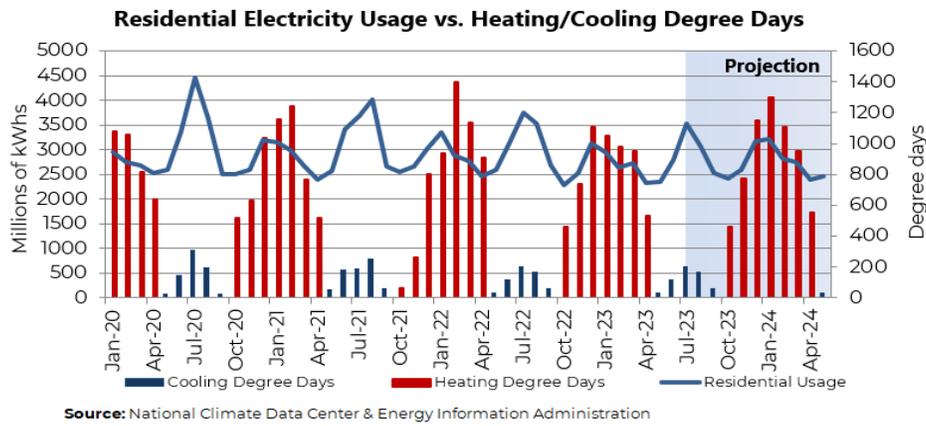
averaged about \$25 less per barrel through the first eight months of 2023 compared to the same period of 2022. Other factors affecting the price of heating oil include the seasonality of demand from weather conditions, competition in local markets, and regional operating costs.

## Electricity

### Demand

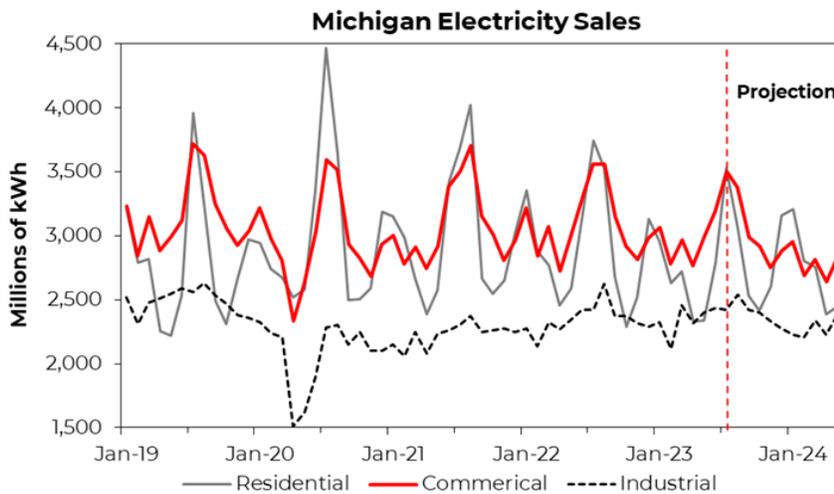
Assuming normal weather, Michigan’s total electric sales for 2023 are projected to decrease 2.7% to 97.7 terrawatt-hours (TWh) compared to 100.37 TWh in 2022 (see Figure 15). The decrease in sales is expected to come from the residential (-5.7%) and commercial (-2.5%) sectors. Industrial sector sales are expected to increase slightly by 0.9%. Two of the primary drivers of electricity consumption in the residential market are for cooling during hot weather and home heating during the winter. Summer 2023 had 26% fewer cooling degree days than historical averages – indicating a cooler than normal summer. Industrial sector usage of electricity, which is less dependent on weather fluctuations and more highly correlated to economic activity, grew by 5% in 2022 and is expected to further grow by 0.9% for 2023.

Figure 13



Source: National Climate Data Center & Energy Information Administration

Figure 14



Source: Energy Information Administration

**Figure 15**

**Michigan Electricity Sales Projection**

(Millions of kWh)

|                         |           |          | Residential  | Commercial   | Industrial  | Total        |
|-------------------------|-----------|----------|--------------|--------------|-------------|--------------|
| <b>Historical</b>       | 2020      | Total    | 35,695       | 35,491       | 24,972      | 96,158       |
|                         | 2021      | Total    | 35,764       | 36,891       | 26,745      | 99,400       |
|                         | 2022      | Total    | 35,066       | 37,129       | 28,171      | 100,366      |
|                         | 2023      | January  | 2,956        | 3,067        | 2,322       | 8,344        |
|                         |           | February | 2,633        | 2,781        | 2,112       | 7,527        |
|                         |           | March    | 2,724        | 2,970        | 2,458       | 8,152        |
|                         |           | April    | 2,334        | 2,764        | 2,318       | 7,417        |
|                         |           | May      | 2,338        | 2,995        | 2,400       | 7,733        |
|                         |           | June     | 2,791        | 3,188        | 2,438       | 8,417        |
|                         |           | July     | 3,532        | 3,505        | 2,425       | 9,461        |
| <b>Projection</b>       | August    | 3,058    | 3,376        | 2,539        | 8,973       |              |
|                         | September | 2,531    | 2,990        | 2,419        | 7,940       |              |
|                         | October   | 2,417    | 2,920        | 2,404        | 7,741       |              |
|                         | November  | 2,599    | 2,753        | 2,330        | 7,682       |              |
|                         | December  | 3,162    | 2,882        | 2,273        | 8,317       |              |
|                         | 2023      | Total    | 33,075       | 36,191       | 28,438      | 97,704       |
| <b>2022-2023 change</b> |           |          | <b>-5.7%</b> | <b>-2.5%</b> | <b>0.9%</b> | <b>-2.7%</b> |
| 2024                    | January   | 3,205    | 2,953        | 2,227        | 8,385       |              |
|                         | February  | 2,805    | 2,690        | 2,202        | 7,698       |              |
|                         | March     | 2,758    | 2,815        | 2,337        | 7,911       |              |
|                         | April     | 2,386    | 2,640        | 2,228        | 7,253       |              |
|                         | May       | 2,448    | 2,832        | 2,387        | 7,667       |              |

NOTE: Projected electricity sales are based on historical trends.

SOURCES: Historical Data – Energy Information Administration, U.S Department of Energy.

Projection: MPSC, Energy Security Section, using primarily EIA data

(see methodology section for additional detail).

**Supply**

To serve Michigan’s electrical needs, load serving entities in Michigan participate in the wholesale electricity day-ahead and real-time markets operated by their respective Regional Transmission Operators. Michigan load serving entities also participate in their respective Regional Transmission Operators resource adequacy constructs and capacity markets. Michigan is part of two separate Regional Transmission Organizations. Most of Michigan is within the Midcontinent Independent System Operator (MISO) region and the remaining southwest section of the Lower Peninsula is within PJM Interconnection.

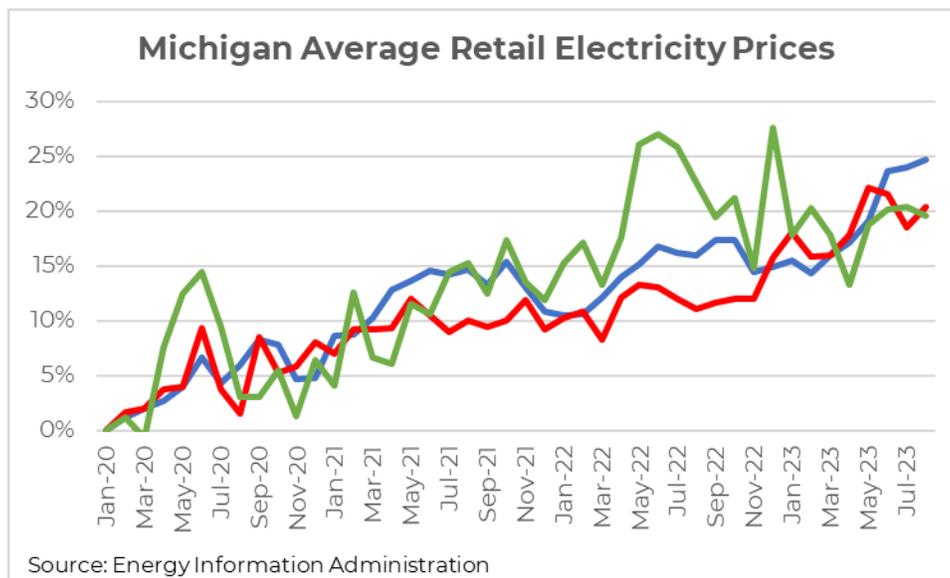
In MISO, this year’s auction for planning year 2023/2024 is the first auction using the seasonal resource adequacy construct. The amount of capacity required to serve MISO Zone 7, which includes the Lower Peninsula, for winter 2023/2024 was 16,927.7 MW. The amount of MISO Zone 7 capacity offered into the market was 21,569.9 MW with 20,677 MW of capacity clearing the auction with a price of \$2/MW-day. The

amount of capacity required to serve MISO Zone 2, which includes the Upper Peninsula, for winter 2023/2024 was 11,708.9 MW. The amount of MISO Zone 2 capacity offered into the market was 13,934.4 MW with 13,312.4 MW of capacity clearing the auction with a price of \$2/MW-day.

## Price

The EIA forecasts residential retail electricity prices in the east north central U.S. to average 16.09 cents/kWh for 2023, an increase of 3.9% from the prior year. As seen in Figure 16, retail prices (indexed to January 2020) for the residential, commercial, and industrial sectors have all steadily risen. A major driver of these prices includes generator fuel costs, but also includes transmission and distribution costs. Residential and commercial rates are typically higher as it is more expensive to distribute the electricity to them than it is to industrial customers. Variations in electricity demand, weather, and power plant availability can all impact the price consumers pay for their electricity.

**Figure 16**



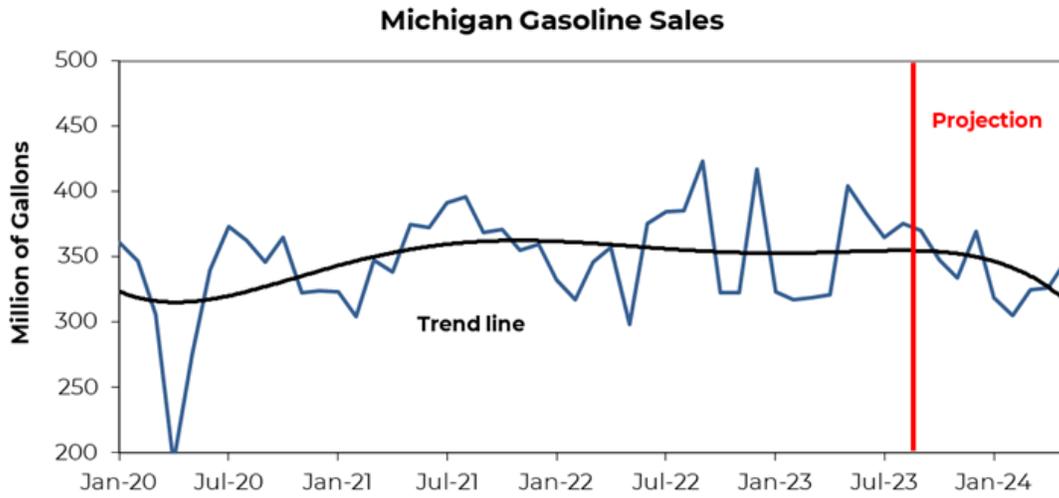
## Motor Gasoline

### Demand

Gasoline sales in Michigan are projected to decrease by 1.2% for 2023 (see Figure 17), which would come after a 0.5% decline in 2022. One determinant of gasoline demand is personal disposable income – which is only expected to grow by 3.56% between January 2023 and December 2023. Disposable income fell in 2021 and 2022 by 6.5 and 2.2%, respectively. However, U.S. vehicle miles traveled is projected to

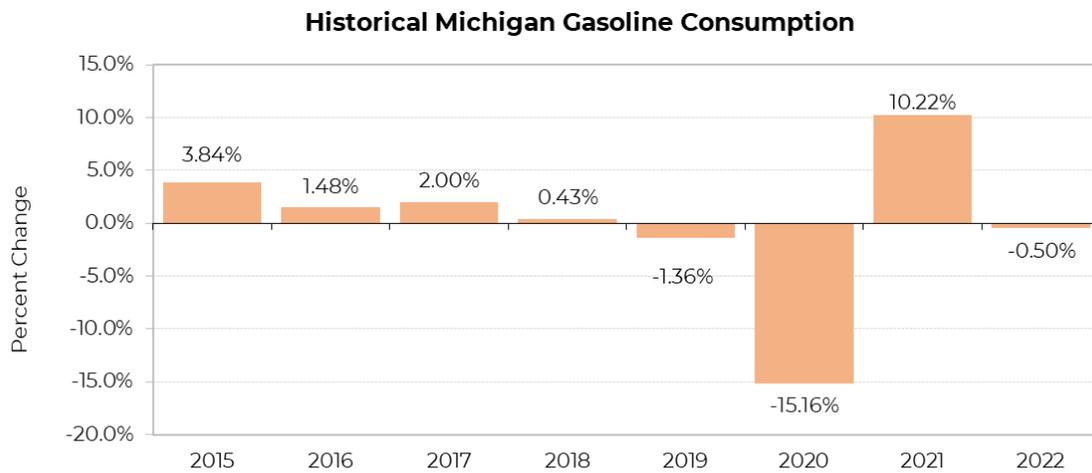
grow by 1.3% for 2023 – which may be an indication the 2023 demand decrease could be tempered.

**Figure 17**



Source: Energy Information Administration

**Figure 18**



Source: Energy Information Administration

**Figure 19****Michigan Gasoline Sales Projections**

(Millions of Gallons)

|                         |           |          | Total<br>All Grades | Historical<br>(prior year) | % Change |  |
|-------------------------|-----------|----------|---------------------|----------------------------|----------|--|
| Historical              | 2020      | Total    | 3,913.2             | 4,599.9                    | -14.9%   |  |
|                         | 2021      | Total    | 4,301.5             | 3,913.2                    | 9.9%     |  |
|                         | 2022      | Total    | 4,280.8             | 4,301.5                    | -0.5%    |  |
|                         | 2023      | January  |                     | 323.0                      | 332.2    |  |
|                         |           | February |                     | 316.9                      | 316.9    |  |
|                         |           | March    |                     | 318.5                      | 346.2    |  |
|                         |           | April    |                     | 321.2                      | 357.5    |  |
|                         |           | May      |                     | 404.5                      | 297.9    |  |
|                         |           | June     |                     | 382.8                      | 375.2    |  |
|                         |           | July     |                     | 364.6                      | 384.9    |  |
| Projection              | August    |          | 375.2               | 385.0                      |          |  |
|                         | September |          | 370.3               | 423.2                      |          |  |
|                         | October   |          | 347.7               | 322.1                      |          |  |
|                         | November  |          | 334.0               | 322.1                      |          |  |
|                         | December  |          | 369.8               | 417.4                      |          |  |
|                         | 2023      | Total    | 4,228.4             | 4,280.8                    | -1.2%    |  |
| <b>2022-2023 Change</b> |           |          | <b>-1.2%</b>        |                            |          |  |
| 2024                    | January   |          | 318.4               | 323.0                      |          |  |
|                         | February  |          | 305.3               | 316.9                      |          |  |
|                         | March     |          | 325.0               | 318.5                      |          |  |
|                         | April     |          | 326.4               | 321.2                      |          |  |
|                         | May       |          | 348.5               | 404.5                      |          |  |

NOTE: These projections are based on moderate growth in Michigan's economy and stable gas prices.

SOURCES: Historical data - Energy Information Administration, U.S. Department of Energy.

Projection -- Energy Security Section, MPSC.

**Supply**

Refinery utilization rates for the Midwest averaged 94% throughout the summer driving season. As of October 27, 2023, the PADD 2 region<sup>1</sup> held 44.2 million barrels of gasoline inventories, 600 thousand barrels less than this same time last year. On a national level, gasoline inventories are 8% higher than last year and near the middle of the five-year range for this time of year.

<sup>1</sup> PADD 2 region is comprised of Michigan, Ohio, Indiana, Kentucky, Tennessee, Illinois, Wisconsin, Missouri, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma.

## Price

According to AAA Michigan, the average price for a gallon of regular unleaded gasoline in Michigan on November 7, 2023, was \$3.43 compared to \$4.22 a year ago. The EIA expects Midwest retail regular grade gasoline prices to average \$3.47/gal for 2023 and \$3.56/gal in 2024. Lower crude oil prices relative to last year are a driving factor for the lower prices seen at the pump right now. However, the EIA projects an uptick in crude oil prices for 2024, aligning with their expectations for higher gasoline prices going forward as well. The EIA projects Brent crude oil to average \$84.09/barrel for 2023, compared to \$100.94/barrel seen in 2022, but projects an average of \$94.91/barrel in 2024.

## Petroleum

### U.S. Outlook

The EIA's October STEO revised U.S. crude oil production figures moved upwards slightly from the prior month. U.S. crude oil production averaged 11.91 million b/d in 2022 and is expected to increase to 12.92 million b/d for 2023 and up to 13.12 million b/d in 2024. The price for West Texas Intermediate (WTI) crude oil through the first half of 2023 was relatively stable – only fluctuating between \$70 and \$80/barrel but has since neared \$90/barrel as supply concerns and tensions in the Middle East have risen. In 2022, WTI reached an average high of \$114/barrel during the month of June. A major contributing factor to these elevated prices was the backwardation of crude oil markets. Backwardation in a market occurs when nearer futures contracts command a higher price than longer dated contracts. This behavior typically arises when the market is undersupplied in the near term, which then acts to drive up prices. As of the week ending October 13, 2023, the futures market for light sweet crude oil at Cushing, OK, was still in backwardation, with the prompt month at \$85.29/barrel and \$81.31/barrel for February 2024.

U.S. crude oil stocks currently reside 14.9 million barrels lower than a year ago. As of October 27, 2023, the U.S. had 421.9 million barrels in inventory (3.5% decrease relative to 2022) which stands near the bottom of the five-year range for this time of year. U.S. crude oil production remains strong, with the weekly average ending October 27, 2023, standing at 13.2 million barrels per day – up from 12 million b/d during the same week of 2022. As seen in Figure 20, the U.S. crude oil rig count tends to follow the price of oil, albeit sometimes with a lag. As the price of oil increases, producers will often increase their drilling activity to increase their production and take advantage of more favorable market conditions. Conversely, when the price of oil falls, drilling activity slows as newly drilled wells become less economical.

Figure 20

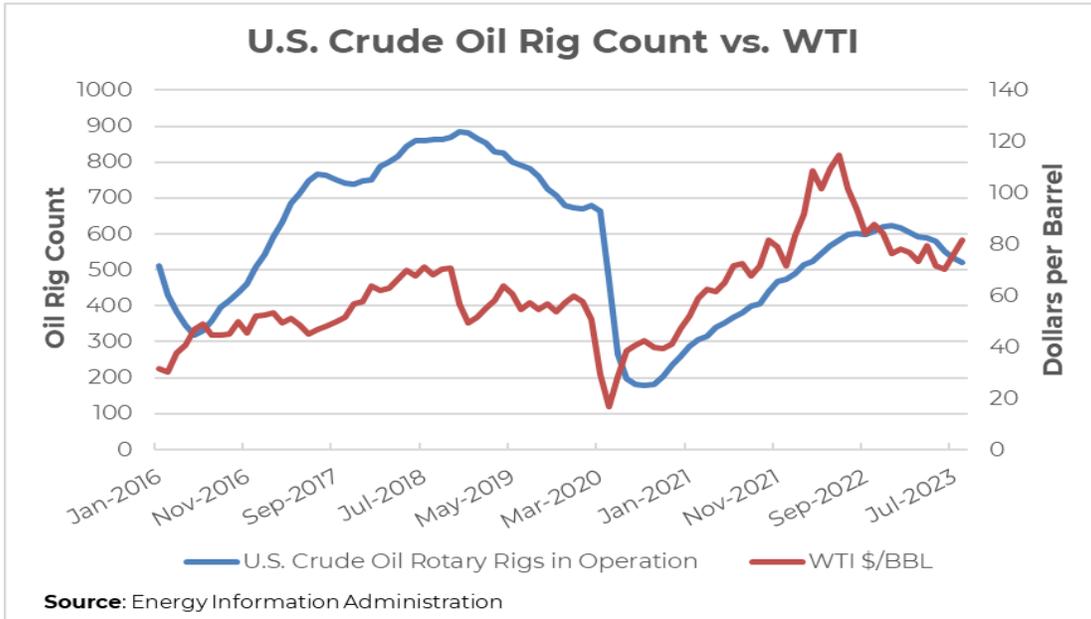
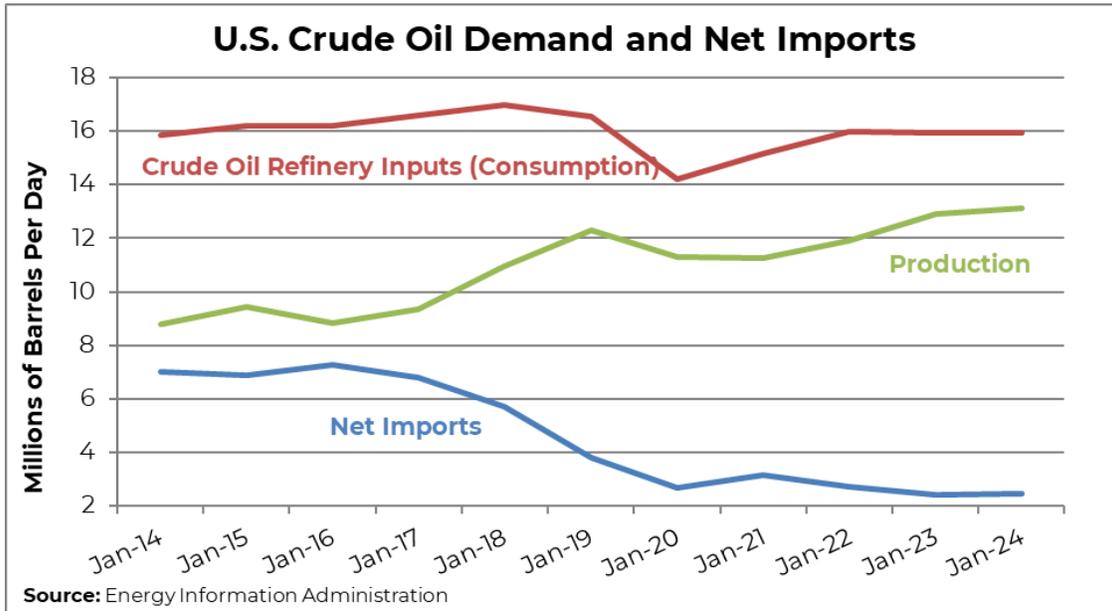


Figure 21



## World Outlook

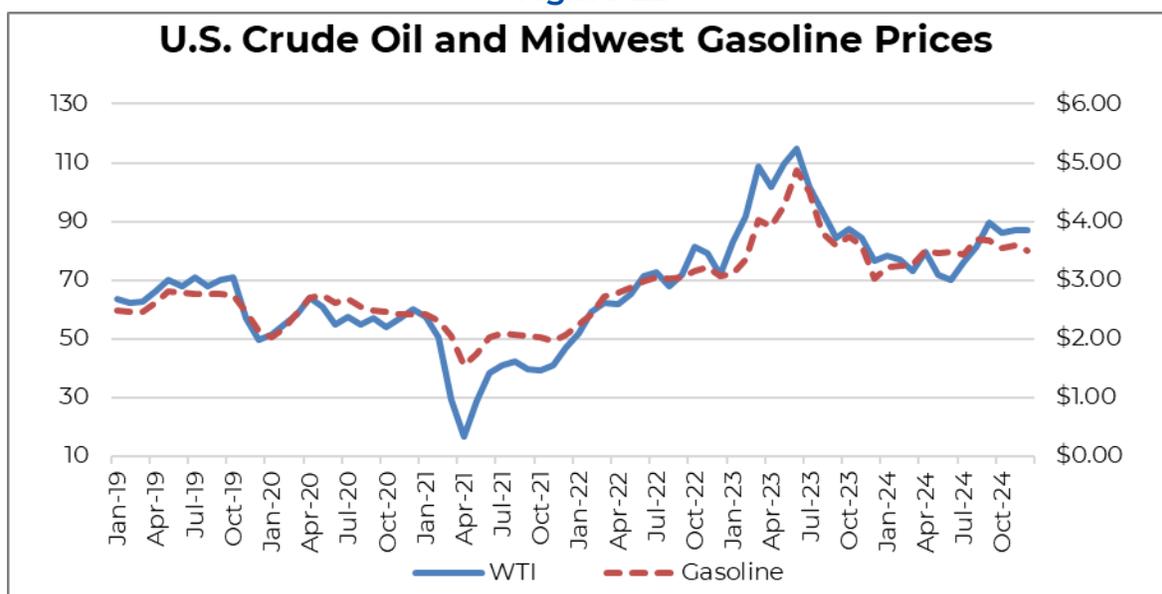
The EIA October STEO reports that global petroleum consumption will increase by 1.76 million b/d in 2023 and again rise by 1.32 million b/d in 2024. The increase for 2023 is attributed to both non-Organization for Economic Cooperation and Development (OECD) nations, as well as OECD countries. The last time global petroleum consumption declined on an annual basis was in 2020 due to the impacts of the

COVID-19 pandemic; before that a decline occurred in 2009 due to the 2007-08 Financial Crisis.

Global petroleum production and supply is expected to rise by 1.31 million b/d in 2023 and further grow 0.94 million b/d in 2024. The 2023 consumption and production projections demonstrate why oil prices are expected to rise heading into 2024. When global consumption growth outpaces supply, the result will be a decrease in global crude oil inventories and subsequent strengthening in prices. In June, the Organization of Petroleum Exporting Countries (OPEC) and non-member Russia announced they had agreed to extend oil production cuts through the end of 2024. These extended production cuts are estimated to equal 3.66 million b/d and lower the overall organizational target to 38.81 million b/d – representing approximately 38% of global petroleum consumption.

EIA projects that WTI crude oil will average \$79.59/bbl for 2023 and \$90.91/bbl in 2024. The Brent (North Sea) crude oil spot price is forecast to average \$84.09/bbl and \$94.91/bbl, respectively. WTI and Brent are light sweet crudes used as international benchmarks in spot market pricing. The price of crude oil is closely tied to that of gasoline, as seen in the graph below.

**Figure 22**



Sources: U.S. Energy Information Administration, Short-Term Energy Outlook October 2023.  
 Note: Gasoline prices are for regular unleaded, including taxes.

## Michigan Household Winter Heating Fuel Summary

The Winter Heating Fuel Summary depicts what a typical Michigan household is projected to consume and spend on their primary heating fuel during the 2023-2024 winter heating season (see Figure 23). Actual usage for any given home will depend on a number of factors, including the relative energy efficiency of the home, the home's location and size, the occupants' individual heating preferences, and the number of heating units or appliances in the home.

Residential natural gas expenditures are expected to decrease by \$102 compared to last winter, due to lower commodity prices for natural gas. Accordingly, the Winter Heating Fuel Summary assumes that current fuel prices will continue to hold steady throughout the winter, but acknowledges that these prices are often volatile, and can change rapidly as dynamic supply and demand conditions are impacted by severe weather, infrastructure failures, geopolitical instability, and other issues.

Prices for heating oil and propane have started the 2023/24 winter heating season below levels seen last year due to lower crude oil prices and slightly higher stocks at the national level. Winter expenditures for propane and heating oil are projected to decrease compared to a year ago using the first week of October average prices. The National Oceanic and Atmospheric Administration (NOAA) anticipates that temperatures this winter may be warmer, compared to historical norms. If that is the case, the result could be lower heating costs for Michigan households. Alternatively, should a significantly higher demand exist for propane connected with crop drying, this could lead to higher costs over the cost of the winter.

**Figure 23**

**Michigan Household Winter Heating Fuel Summary**  
**2023-2024 Projected Residential Heating Season Expenditures<sup>1</sup>**  
*Weather Normalized*

|                        | 10% Below | Midpoint | 10% Above |
|------------------------|-----------|----------|-----------|
| <b>Natural Gas</b>     |           |          |           |
| Consumption (Mcf)      | 75        | 83       | 91        |
| Avg. Price (\$/Mcf)    | \$7.53    | \$8.37   | \$9.21    |
| Expenditures (\$)      | \$634     | \$766    | \$911     |
| <b>Heating Oil</b>     |           |          |           |
| Consumption (gallons)  | 561       | 623      | 685       |
| Avg. Price (\$/gallon) | \$3.43    | \$3.81   | \$4.19    |
| Expenditures (\$)      | \$1,923   | \$2,374  | \$2,872   |
| <b>Propane</b>         |           |          |           |
| Consumption (gallons)  | 849       | 943      | 1037      |
| Avg. Price (\$/gallon) | \$1.89    | \$2.10   | \$2.31    |
| Expenditures (\$)      | \$1,604   | \$1,980  | \$2,396   |

<sup>1</sup> Projections assume normal weather. Consumption, pricing, and expenditure data pertain to the winter heating season, which runs from November through March. Natural Gas prices are based on the October average rates for Michigan gas utilities, including distribution, customer charge and the cost of gas. Heating oil and propane prices are based on the average residential price in Michigan for October. All prices are assumed to hold constant over the winter. Projected usage is based on EIA and MPSC data and calculations from MPSC staff.

## Conclusion

As the winter heating season begins, residents should expect energy supplies to be readily available to meet their needs. Michigan's energy systems remain robust and are well positioned to meet the evolving needs of consumers in the state. MPSC Staff will continue their work to ensure this robustness and remain watchful for ever-present risks – such as extreme weather events and fuel supply disruptions – to the state's energy systems.