

Michigan Energy Appraisal

Summer Outlook 2019



Michigan Public Service Commission

June 2019

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 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.

The scope of the analysis varies by energy source. Michigan’s electricity prices, supply and availability are largely determined by events in Michigan and the Midwest. Natural gas supplies and prices are closely tied to national trends. Petroleum product markets in Michigan are affected by international market conditions and events and regional refinery production. For the appraisal, recent historical balances between Michigan’s energy consumption and supply are analyzed, and consumption and supplies are projected. Actual and expected energy prices are reviewed to identify changes impacting consumer costs. Generally, the fall appraisal focuses on the winter heating season, and the summer appraisal focuses on summer energy use, including peak electricity supply and demand, and gasoline for the summer driving season.

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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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.

The Energy Appraisal is available at: https://www.michigan.gov/mpsc/0,4639,7-159-16370_17791-499990--,00.html

Comments or questions on this appraisal are welcomed and may be directed to Alex Morese, Michigan Agency for Energy, PO Box 30221, Lansing, Michigan 48909, phone (517) 284-8310, or email moresea@michigan.gov.

If you would like to receive the biannual Energy Appraisal via email, subscribe to the [listserv](#).

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Table of Contents

Executive Summary.....	1
Glossary	3
Data & Methodology	4
Trending Topics.....	5
Motor Gasoline	6
Petroleum	10
Electricity	14
Natural Gas	18
Distillates	21

EXECUTIVE SUMMARY

Energy Appraisal – Summer 2019

Energy use in Michigan is expected to be on an upward trajectory when compared to last year for gasoline, distillates, and natural gas.

The core projections in this summer's edition of the Michigan Energy Appraisal were compiled from analyses by Michigan Public Service Commission staff or the federal Energy Information Administration. The report's authors assume the rest of 2019 will have temperatures more in line with historical averages.

Some key report findings for Michigan energy sectors:

- For the seventh straight year, demand for **motor gasoline** is expected to rise, increasing 1.5 percent to 4.73 billion gallons in 2019. The Energy Information Administration expects Midwest gasoline prices to average \$2.65 in 2019, four cents higher than in 2018.
- An estimated 5.4 million barrels of **crude oil** were produced in 2018, up marginally from 5.3 million barrels in 2017. Jackson County remains the top crude oil producing county in the state, reaching 967 thousand barrels in 2017. Prices for Michigan sweet and sour crude oil averaged about \$58/barrel and \$53/barrel in 2018, respectively.
- Forecasts using assumptions of near normal weather conditions sees total **electricity sales** in Michigan decline about 0.9 percent compared to 2018. The largest decrease is expected in the residential sector (-2.2%), with the commercial sector (-0.6%) easing only slightly. Industrial (0.3%) sector sales are expected to modestly increase. Residential electric rates are mixed, as customers of six investor-owned utilities saw a price decrease, and three, a price increase between May 2018 and May 2019.
- Consumption of **natural gas** is expected to see a 1.4 percent increase in 2019, fueled in large part by Michigan's growing demand for natural gas in the power sector, which has increased by 11 percent annually between 2010 and 2017. Michigan's aging gas wells are expected to produce 84.9 Bcf in 2019, down 5.9 percent from last year.
- Demand for **distillates**, the vast majority of which is diesel fuel, is projected to rise 2.3 percent to 1,224 million gallons in 2019. If realized, this would mark the fourth consecutive year of distillate demand growth in Michigan, primarily due to continued economic growth.

2019 Summary Projections and Annualized Historical Trends

		2019 Forecast	1-Year Trend	3-Year Trend	5-Year Trend
Motor Gasoline	Michigan Demand (billion gallons)	4.73	1.50%	1.23%	1.85%
	Regional Demand (billion gallons)	22.61	-1.01%	-0.48%	1.06%
	Regional Production (billion gallons)	25.63	-1.58%	-0.60%	1.67%
	U.S. Retail Price (USD)	\$2.74	0.59%	8.48%	-4.00%
Crude Oil	U.S. Refinery Demand (million bbl/d)	17.05	0.47%	1.74%	1.47%
	U.S. Inventories (million bbl)	471.4	6.70%	-0.92%	5.49%
	U.S. Production (million bbl/d)	12.45	13.59%	12.13%	7.28%
	U.S. Net Imports (million bbl/d)	4.41	-23.30%	-15.31%	-8.80%
	U.S. Price to Refiners (USD/bbl)	\$61.51	-4.56%	14.77%	-7.75%
Electricity	Michigan Residential Sales (billion kWh)	34.20	-2.20%	-0.33%	0.41%
	Michigan Commercial Sales (billion kWh)	38.87	-0.60%	-0.10%	0.80%
	Michigan Industrial Sales (billion kWh)	29.88	0.30%	-1.14%	-1.63%
	Michigan Total Sales (billion kWh)	102.96	-0.90%	-0.48%	-0.07%
Natural Gas	Michigan Demand (Bcf)	963.77	1.40%	3.57%	2.94%
	Michigan Production (Bcf)	84.90	-5.90%	-5.54%	-5.72%
	Net Interstate Deliveries to Michigan (Bcf)	908.00	11.20%	8.58%	2.48%
	Henry Hub Spot Price (USD/mcf)	\$2.89	-11.62%	3.46%	-8.64%
Distillates	Michigan Demand (million gallons)	1,224.04	2.29%	2.32%	1.77%
	Regional Demand (million gallons)	9,599.00	0.91%	1.46%	0.32%
	Regional Production (million gallons)	10,134.40	2.47%	4.38%	1.84%
	U.S. Retail Price (USD)	\$3.179	-0.13%	11.23%	-3.64%

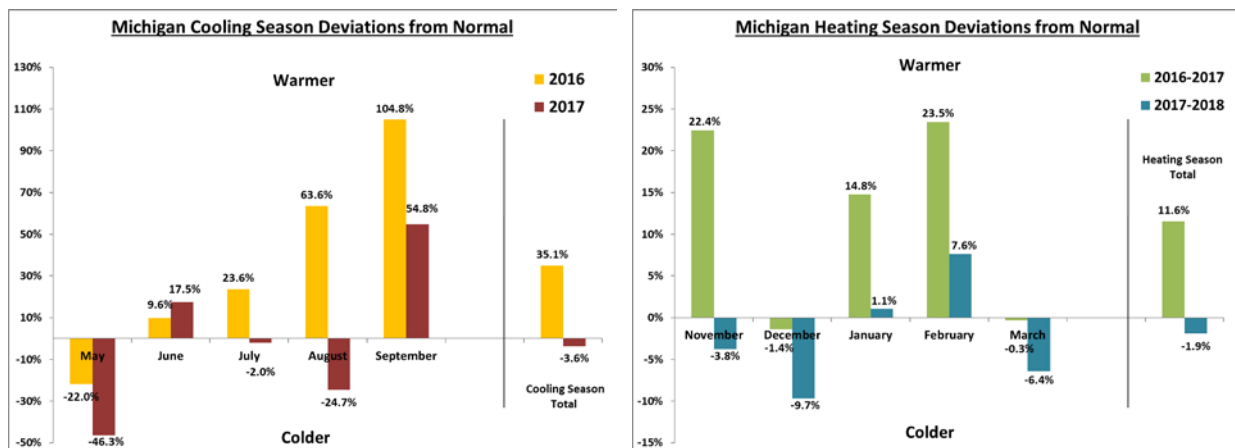
June 18, 2019
Michigan Public Service Commission
Department of Licensing and Regulatory Affairs

Glossary

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

Data & 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 charts below). 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 simply 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 in order 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

Energy Supply/Reliability – Statewide Energy Assessment

On February 4, 2019, Governor Gretchen Whitmer requested the Michigan Public Service Commission (MPSC) undertake a statewide review of the supply, engineering, and deliverability of natural gas, electric, and propane. This request was in response to the extreme cold weather event that affected much of the Midwest – including Michigan. On February 7, 2019 the MPSC issued an order in case number U-20464 to implement the Governor’s request and an initial report will be filed to the case docket on July 1, 2019. The final report will be issued by the Commission by September 13, 2019.

Electric Supply/Reliability - 2019-2020 Planning Resource Auction

Each spring, the Midcontinent Independent System Operator (MISO) holds its Planning Resource Auction (PRA), where load serving entities (LSE) in the MISO footprint acquire electric capacity to serve their customers during the upcoming planning year (June 1 – May 31) provided they have not already done so. This year, MISO Local Resource Zones 2 and 7, which cover most of Michigan’s Upper and Lower Peninsulas cleared at \$2.99 and \$24.30 per MW-day, respectively. Except for Zone 7, all other zones in the MISO footprint also cleared at \$2.99 per MW-day. According to MISO, the overall auction results reflect the industry’s ongoing shift away from coal-fired generation and increasing reliance on natural gas-fired and renewables generation. The results also indicate sufficient availability of electric capacity for the planning year and the grid’s capability to effectively and efficiently transfer resources among local resource zones.



Natural Gas Supply – Ray Compressor Station Fire

In late-January 2019, Michigan experienced a natural gas supply emergency during an extreme weather event which brought temperatures below -25° F. The morning of January 30th, immediately preceding forecasted record-breaking natural gas demand, a fire ignited at the Compressor Station of the Ray Storage Field – Consumers Energy’s largest natural gas storage facility. Consumers relies heavily on the Ray Field to provide gas to the system on peak-demand days and the incident instantly halted the ability to flow gas from the storage field into the pipeline system. This led to severe disruption in the natural gas supply and deliverability on the system, greatly impacting the ability to reliably serve natural gas customers. As an emergency response action, Consumers Energy acted to curtail some of its large-volume customers and ultimately Governor Whitmer issued broad public appeal to customers and all residents to voluntarily turn down their thermostats. The public appeal and voluntary reductions were effective at reducing demand to the natural gas system, and Consumers was able to maintain service to its customers.

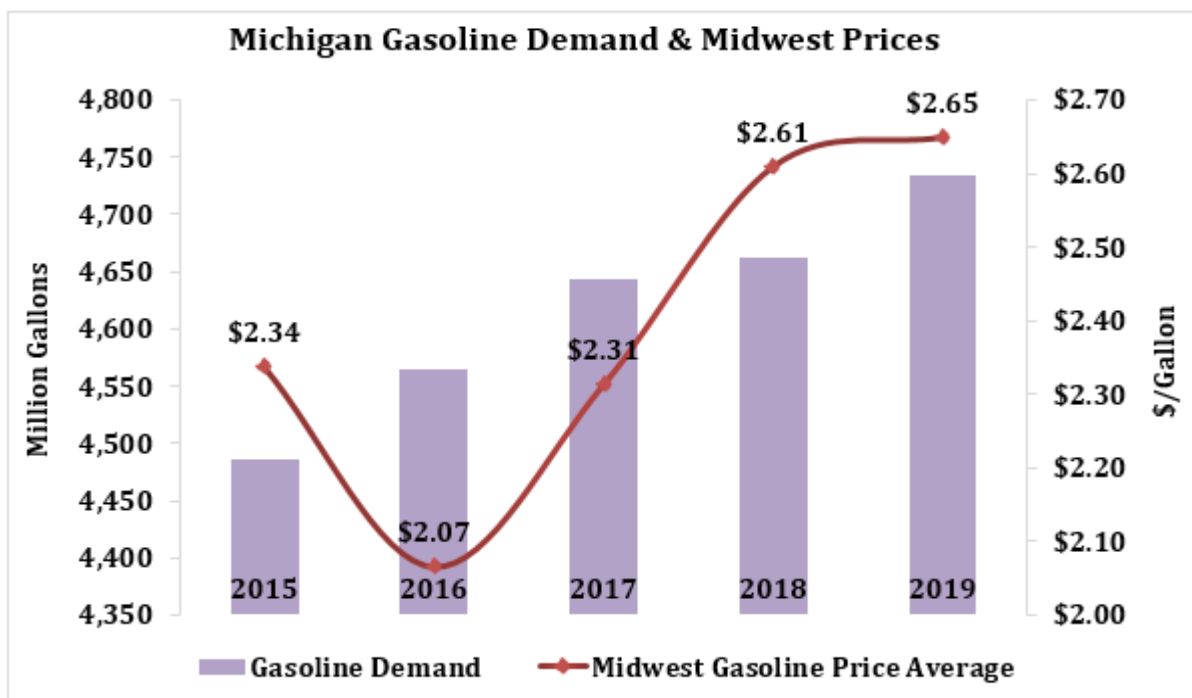
Distillate Supply/Price – International Maritime Organization (IMO) 2020 Sulfur Limits

On January 1, 2020, new IMO regulations limiting the sulfur content in marine fuels that ocean going vessels use is decreasing from 3.5 percent to 0.5 percent by weight. This change in sulfur limits has wide ranging implications for the shipping and refining industries, as well as other users of distillate fuel oils. As the demand for low sulfur distillates (diesel and fuel oils) increases from the more stringent sulfur regulations, prices for other refined petroleum products (gasoline and jet fuel) are expected to increase as well.

Motor Gasoline

Demand

Gasoline demand in Michigan is projected to be 4.73 billion gallons for 2019, an increase of 1.5 percent from a year ago. This will be the seventh straight year of gasoline consumption growth if summer demand patterns continue as expected. Gasoline consumption last declined in 2012 as persistently high fuel costs began to alter consumer driving habits. Prices have since moderated, leading to increased demand since 2013. The estimated all vehicle real-world fuel economy for the 2018 model year was 25.4 miles per gallon, an improvement from the 24.9 miles per gallon average in 2017.¹ While vehicle fuel efficiencies are at an all-time high, a decade's long improvement in statewide economic conditions, paired with relatively low gasoline prices, have helped to give gasoline sales a boost.²



Source: Energy Information Administration

Supply

For the week ending June 7, 2019, 700 thousand barrels per day of gasoline were imported into the U.S. compared to 906 thousand barrels per day for the same week in 2018. More than three quarters of the imported gasoline is destined for the East Coast because of capacity constraints on product pipelines serving the region from the Gulf Coast and the high cost of coastal shipments between U.S. ports. National gasoline inventories are currently near the middle of the five-year range for this time of year. For the week ending June 7, U.S. total gasoline inventories stood at 235 million barrels (22.3 days of supply), down 2 million barrels from the same date last year. Regional inventories were at 48.3 million barrels, about 4.2 million barrels lower than last year. Lower year-over-year inventory levels are reflected in EIA's forecast of slightly higher Midwest gasoline prices for this summer compared to last year.

¹ EPA Automotive Trends Report: <https://www.epa.gov/automotive-trends/explore-automotive-trends-data>

² Bureau of Labor Statistics: <https://data.bls.gov/timeseries/LASST260000000000003>

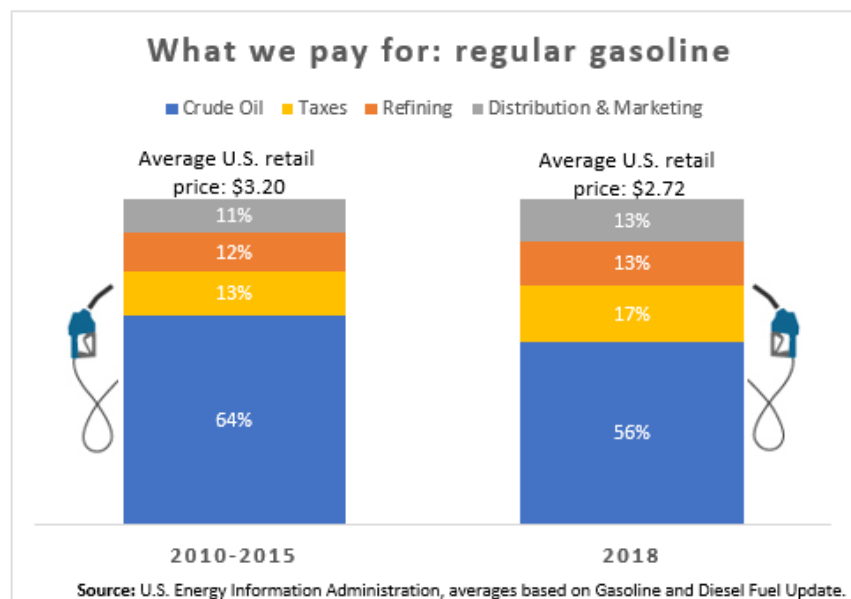
Based on the most recent available data, the U.S. refinery utilization rate for the week ending May 31, 2019 was 91.8 percent, 3.6 percentage points lower than the comparable week of last year. As refineries begin to finish maintenance and gear up for summer driving demand, this rate is likely to increase.

Price

According to AAA, the average price for a gallon of regular unleaded gasoline in Michigan on June 17, 2019 was \$2.62, compared to \$3.02 a year ago. Consumers have enjoyed relatively low gasoline prices over the past few years stemming from low oil prices. However, with continued OPEC production curtailments and geopolitical risks in Iran and Venezuela, crude oil prices are likely to continue strengthening, adding to the cost consumers may have to pay at the pump this summer.

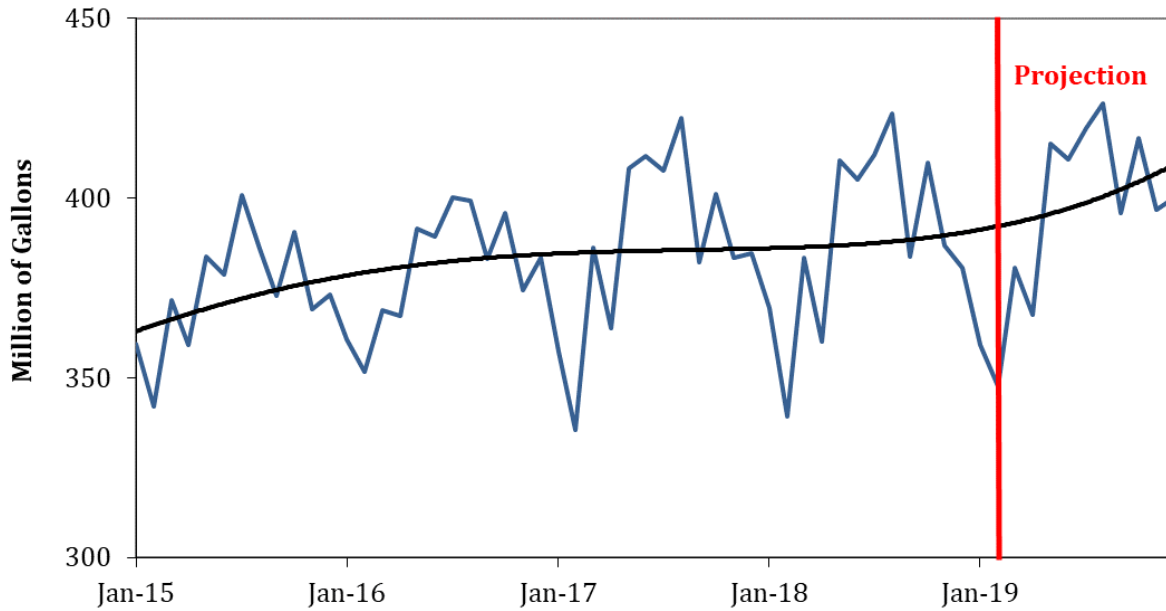
The U.S. price of regular gasoline averaged \$2.73/gallon in 2018, 31 cents higher than in 2017, but still far below the average price of \$3.63/gallon in 2012. Prices remained relatively stable for the majority of 2018, peaking at \$2.90/gallon in May as drivers hit the road for summer travel, and only falling to \$2.36/gallon in December as the price of crude oil dipped.

The EIA projects Midwest regular-grade gasoline prices to average \$2.83/gallon during the summer driving season (April-September), compared to \$2.75/gallon last summer. Midwest regular-grade gasoline prices are forecasted to average \$2.65/gallon for all of 2019, and if realized, the average annual household expenditure on gasoline would increase by about \$96 compared to 2018, according to staff calculations. Unforeseen refinery outages, political unrest, adverse weather conditions, or any other disruptions to supply may also have the potential to increase national product prices in the short term.



Passage of House Bill 4738, Public Act 176 of 2015, amended the Motor Fuel Tax Act to increase motor fuel taxes. Effective January 1, 2017, tax on gasoline increased from 19 cents per gallon to 26.3 cents per gallon. Gasoline tax rates will be adjusted annually based on consumer inflation (U.S. Consumer Price Index), with increases capped to 5% per year, effective January 1, 2022.

Michigan Gasoline Sales

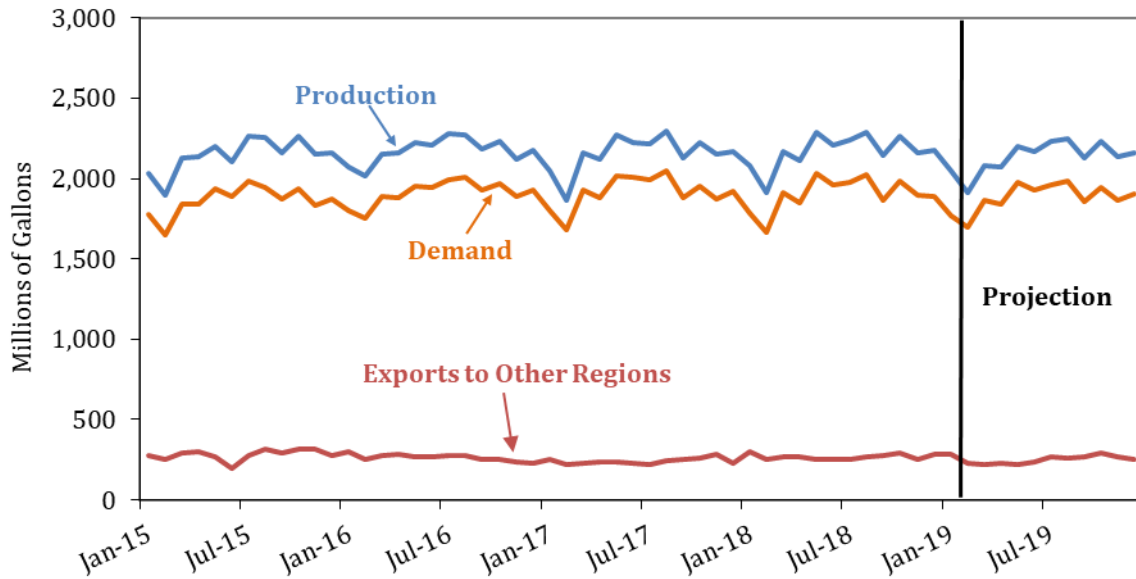


Michigan Gasoline Sales Projection (Millions of Gallons)

			Total All Grades	Historical (prior year)	% Change
Historical	2016	Total	4,565	4,486	1.8%
	2017	Total	4,643	4,565	1.7%
	2018	Total	4,663	4,643	0.4%
Projection	2019	January	359	369	-2.8%
		February	348	339	2.5%
		March	380	383	-0.7%
		April	368	360	2.1%
		May	415	410	1.2%
		June	411	405	1.4%
		July	419	412	1.8%
		August	426	423	0.6%
		September	396	384	3.2%
		October	417	410	1.6%
		November	397	387	2.6%
		December	400	381	5.0%
	2019	Total	4,735	4,663	1.5%

SOURCE: Historical data - Energy Information Administration, U.S. Department of Energy.
PROJECTIONS: Energy Security Section, MPSC

Regional Gasoline Supply and Demand



Regional Gasoline Supply and Demand

(Millions of Gallons)

			Production	Inventories	Demand
Historical	2016	Monthly Average	2,175	91.5	1,912
	2017	Monthly Average	2,156	95.6	1,915
	2018	Monthly Average	2,170	93.7	1,904
Projection	2019	January	2,050	91.2	1,767
		February	1,912	78.1	1,695
		March	2,081	70.7	1,868
		April	2,070	70.8	1,844
		May	2,204	75.8	1,978
		June	2,166	74.4	1,928
		July	2,233	78.8	1,965
		August	2,250	75.4	1,989
		September	2,129	78.3	1,861
		October	2,236	74.9	1,946
		November	2,136	75.4	1,865
		December	2,164	78.5	1,905
	2019	Monthly Average	2,136	76.9	1,884
2018-2019 Change			-1.6%	-17.9%	-1.0%

NOTES: *Production projections are based on refinery utilizations and recent trends. The region is comprised of Illinois, Indiana, Kentucky, Michigan, Tennessee, and Ohio.

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

Projections: Energy Security Section, MPSC

Petroleum

Michigan/Midwest Outlook

Michigan consumed an estimated 170.6 million barrels of petroleum products in 2017, the majority of which were motor fuels, such as gasoline and diesel fuel, refined from crude oil. Michigan produces some crude oil in-state, about 5.4 million barrels in 2018. Lead crude oil producing counties include Jackson in southern Michigan and Manistee and Otsego in the northern Lower Peninsula. Despite in-state production, most of the petroleum consumed in Michigan is imported from neighboring states and Western Canada. This supply arrives via interstate pipeline as both unrefined crude oil and refined petroleum products. The crude is transported to and refined in Southeast Michigan at the Marathon Refinery, which processes

Top Ten Michigan Crude Oil Producing Counties, 2017

	County	Barrels
1	JACKSON	967,007
2	MANISTEE	495,116
3	OTSEGO	495,095
4	GRAND TRAVERSE	305,319
5	BAY	265,984
6	CRAWFORD	256,824
7	GLADWIN	212,506
8	MISSAUKEE	198,531
9	WASHTENAW	182,880
10	OGEMAW	143,788

approximately 132,000 barrels of crude oil per day (b/d) into gasoline, diesel fuel, petroleum coke, and asphalt. Refineries in neighboring states such as Illinois and Ohio meet the remainder of Michigan's petroleum needs; their products are imported via pipeline, rail, and truck.

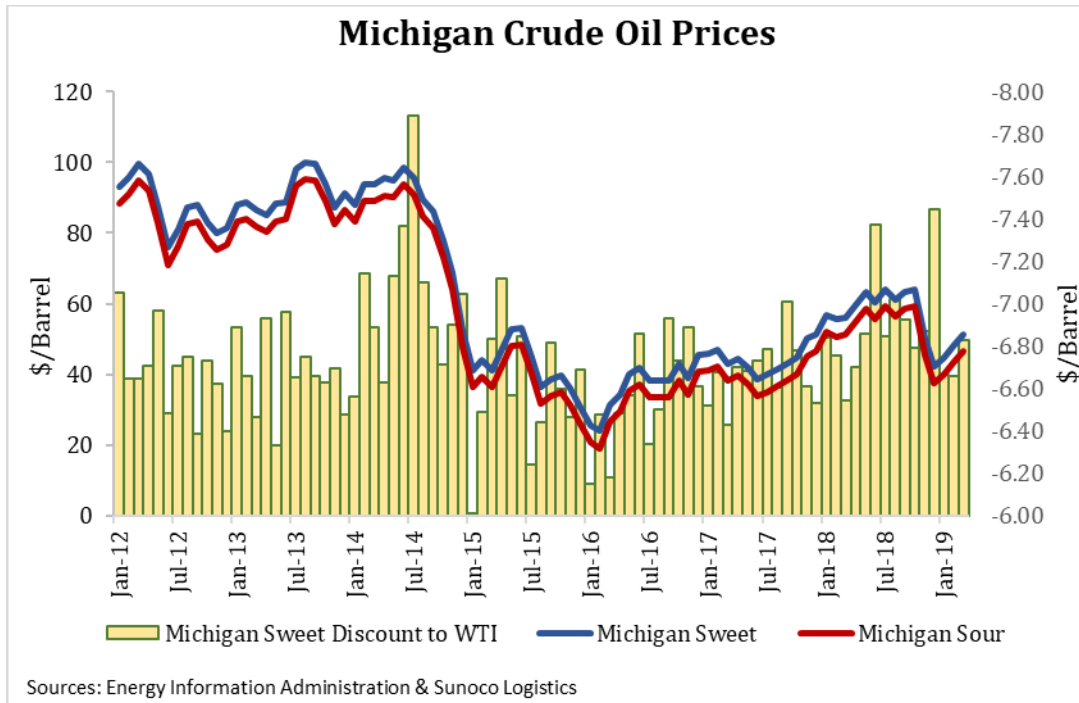
According to the EIA, Michigan had 54 million barrels of proved crude oil reserves³ at the end of 2017. The amount of proven reserves fluctuates as new fields are discovered or adjustments are made as new reservoirs in existing fields are found. Proved reserves do not include stocks of crude oil already produced. Crude oil stocks in the Midwest have

grown, reaching 143.9 million barrels on May 31, 2019, an 18 percent increase over levels seen at this time last year. Absent unexpected infrastructure or supply problems, it is expected that the price and supply of petroleum products will be stable for the remainder of 2019.

The price received for crude oil produced in Michigan generally tracks well with the U.S. benchmark West Texas Intermediate (WTI). Over the past five years, Michigan sweet crude oil has sold at an average discount of \$6.75/barrel compared to WTI. Michigan sour blends of crude oil typically trade at a discount to sweet blends, with recent average discounts being approximately \$4.75/barrel. The EIA projects WTI crude oil to end 2019 at \$58/barrel, which means Michigan crude oil producers might expect to receive \$51.25/barrel for sweet blends and \$46.50/barrel for sour blends, assuming historical discounts remain relatively stable.

³ Proved reserves of crude oil as of December 31 of the report year are the estimated quantities of all liquids defined as crude oil, which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Source: *Energy Information Administration*

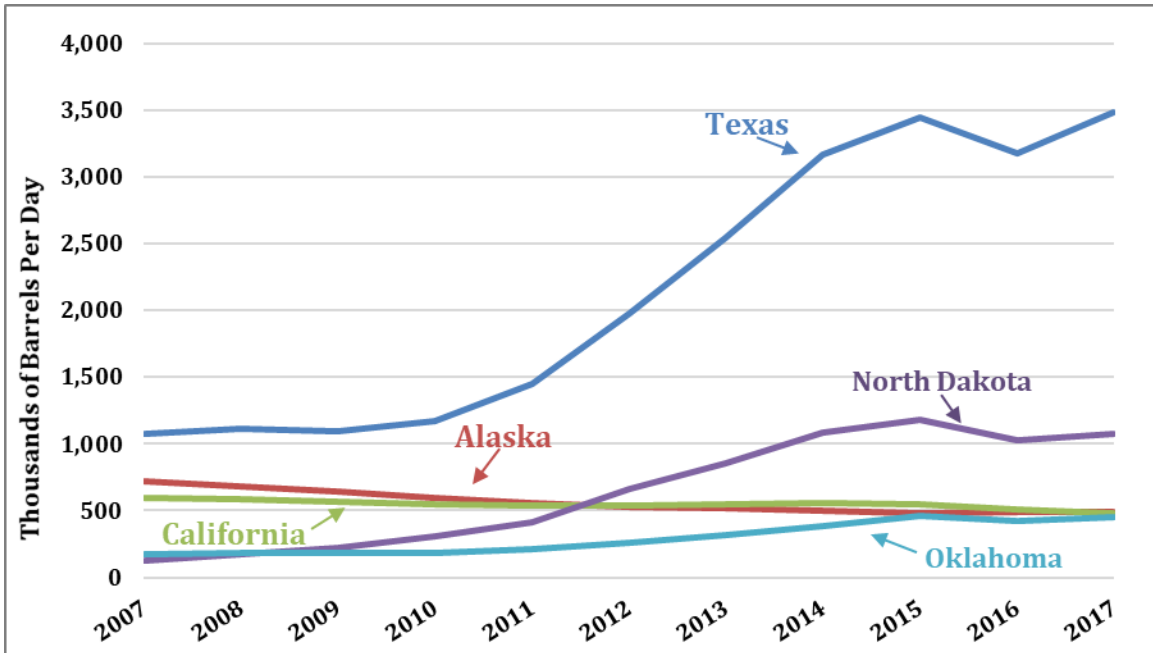


U.S. Outlook

The EIA’s May Short Term Energy Outlook (STEO) revised U.S. crude oil production figures upward from just a month ago, suggesting that the recent increases seen in the price of crude oil are contributing to growth in domestic production. U.S. crude oil production averaged 10.96 million b/d in 2018 and is expected to increase to 12.45 million b/d in 2019 and to 13.38 million b/d in 2020. As crude oil production in the Permian production region (Texas) grew beyond capacity of existing pipeline infrastructure, producers were forced to significantly discount their oil and transport product by rail or truck. Price differentials for WTI crude oil priced in Midland, Texas, increased to as much as \$10/barrel in 2018 compared to its European counterpart, Brent crude oil. However, recent pipeline extensions and the repurposing of one pipeline has added much needed takeaway capacity for the region. EIA expects that growing Permian production through 2019 has the potential to create similar pipeline constraints, although price differentials should not widen to the highs seen in 2018 due to additional capacity expansion projects coming online in the third quarter of 2019.

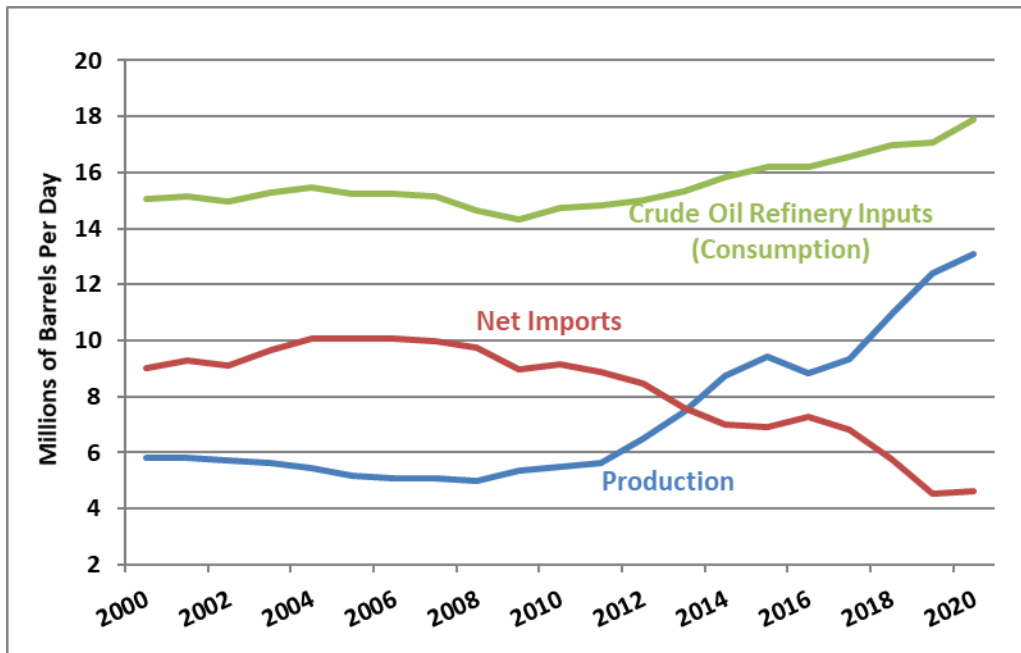
U.S. crude oil stocks have generally been on the rise since the third quarter of 2018 and remain well within the five-year range for this time of year. As of May 31, 2019, the U.S. had 483 million barrels in inventory, about 11 percent above this time last year.

Annual U.S. Crude Oil Production



Source: Energy Information Administration

U.S. Crude Oil Demand and Net Imports



Sources: U.S. Energy Information Administration, Short-Term Energy Outlook April 2019

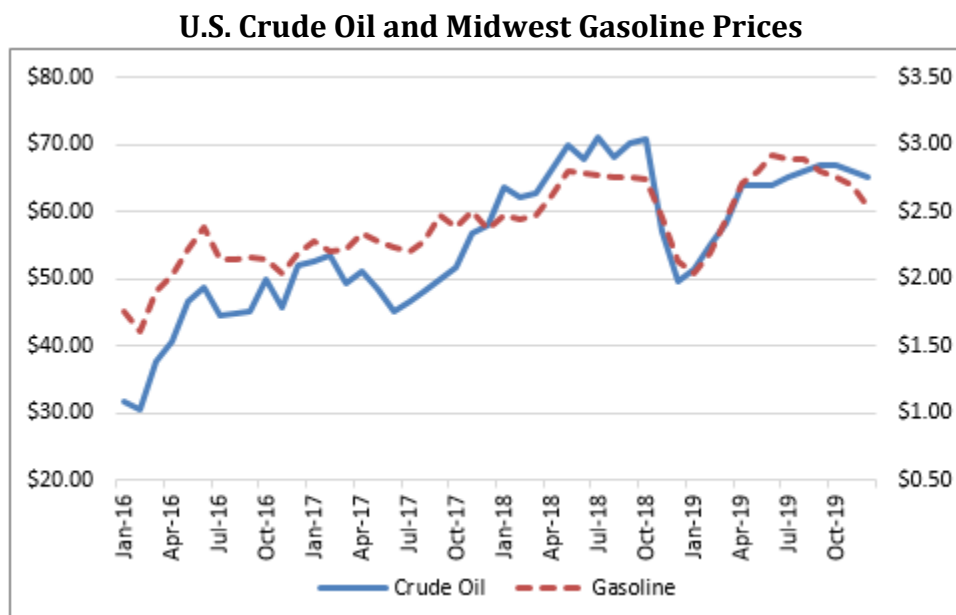
World Outlook

The EIA STEO reports that global petroleum consumption will grow by 1.38 million b/d in 2019, and an additional 1.53 million b/d in 2020. Nearly 80 percent (1.22 million b/d) of the growth in 2019 is attributed to non-Organization for Economic Cooperation and Development (OECD) nations, as continued economic growth leads to expanded usage and demand for petroleum.

Petroleum production and supply is expected to grow by 0.6 million b/d in 2019, and by 2.0 million b/d in 2020, despite reductions in Organization of Petroleum Exporting Countries (OPEC) production. OPEC continues to reaffirm its commitment of achieving market balance and stability, which means voluntary production cuts will likely continue. Gaining significant attention in oil markets as of late are the geopolitical risks in Iran and Venezuela. On November 5, 2018, the U.S. fully reinstated sanctions previously imposed on Iran, but in the meantime allowed waivers to eight countries to continue importing Iranian crude oil. However, this past April the U.S. announced the end of the waivers and demanded all countries end their purchases of Iranian crude oil by May 1, 2019 – reducing global crude oil supplies and adding upward pressure on prices. Venezuelan crude oil production has been on a steep decline the past few years as political turmoil and a struggling economy have prevented much needed investment.

Crude oil prices have been working higher the past two years but remain well below the past decade high of \$99.67/b set in 2008. EIA projects that West Texas Intermediate (WTI) crude oil will average \$62.79/b in 2019 and \$63/b in 2020. The Brent (North Sea) crude oil spot price is forecast to average \$69.64/b and \$67/b, 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 and diesel fuel, as seen in the graph below.



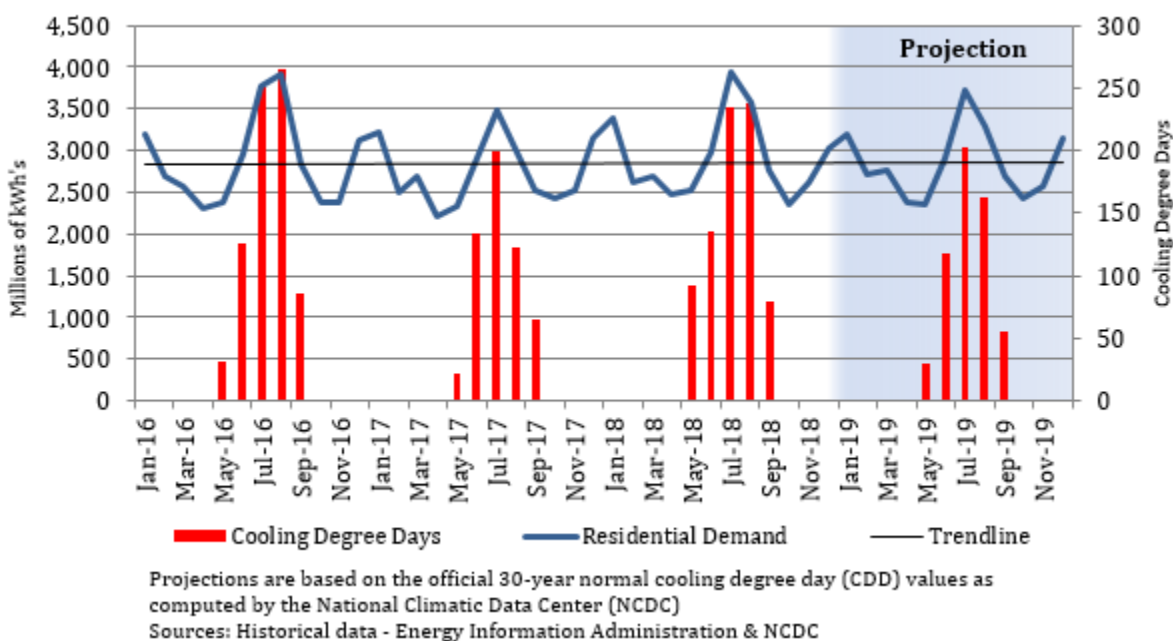
Sources: U.S. Energy Information Administration, Short-Term Energy Outlook May 2019,
Note: Gasoline prices are for regular unleaded, including taxes.

Electricity

Demand

Assuming normal weather, Michigan’s total electric sales for 2019 are projected to decrease by 0.9 percent to 102.9 thousand gigawatt hours (GWh) compared to 103.8 thousand GWh in 2018. Both the residential and commercial sectors are expected to decrease their consumption by 2.2 and 0.6 percent respectively. Residential and commercial electricity consumption is largely dependent on weather resulting in demand fluctuations for heating and cooling. In 2018, the summer cooling season (May-Sept.) was 37 percent warmer than normal, and heating season monthly temperatures were about 1 percent below normal. These abnormal temperatures throughout 2018 likely contributed to the increase in total electricity consumption compared to 2017. Our predictive models assume normal temperatures throughout 2019, which is a key contributor to the year-over-year decrease in total electricity consumption. However, current Climate Prediction Center (CPC) degree day forecasts indicate a slightly warmer than normal 2019 summer (2.8 percent), which may lead to increased electricity use over the summer. Industrial sector demand for electricity, which is less dependent on weather fluctuations and more highly correlated to economic activity, is expected to increase by 0.3 percent.

Residential Electricity Demand vs. Cooling Degree Days



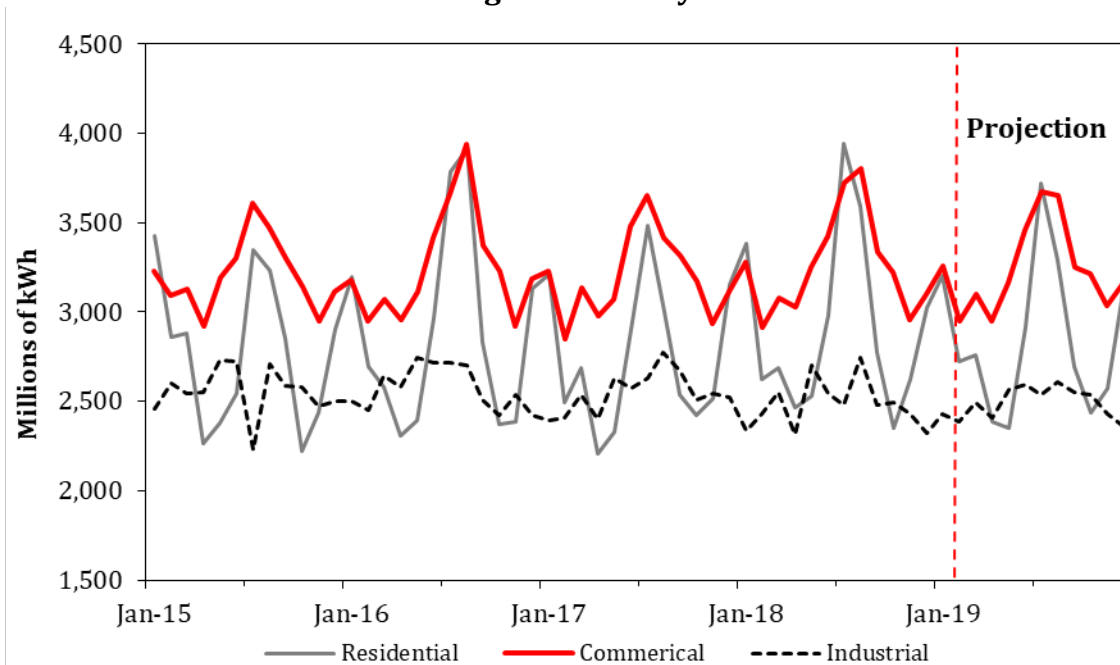
This summer’s projected combined coincident system peak electrical demand – including retail choice – plus planning reserve margin requirements for a large portion of the lower peninsula primarily comprised of the joint Consumers Energy and DTE Electric service areas is expected to be 21,976 megawatts (MW) according to MISO’s 2019/20 Resource Planning Auction results.⁴ For comparison, the 2018 summer projected combined coincident system peak electrical demand including retail choice plus planning reserve requirements was projected to be 21,121 MW for the same footprint.⁵ The 2019 projected requirements are approximately four percent higher than was

⁴ MISO 2019/20 Resource Planning Auction Results – <https://cdn.misoenergy.org/20190415%20RASC%202019-20%20PRA%20Results336185.pdf>

⁵ MISO 2018/19 Resource Planning Auction Results – <https://cdn.misoenergy.org/2018->

projected for 2018. In 2018, the actual electrical demand for bundled customers in Consumers Energy’s service territory peaked at 7,568 MW on July 5, and in DTE’s service territory at 11,418 MW on September 5. Electricity consumption typically peaks during hotter summer periods as air conditioner usage spikes for businesses and residents.

Michigan Electricity Sales



Source: Historical Data – Energy Information Administration

Supply

To serve Michigan’s electrical needs, load serving entities in Michigan rely in part on power purchased from wholesale markets operated by the MISO and PJM Interconnection (PJM). Compared to 2018/2019, the amount of generation capacity required to serve Michigan’s Lower Peninsula (Zone 7) increased by 10.6 MW in 2019/2020, while the amount of generation capacity needed to serve Michigan’s Upper Peninsula and the eastern half of Wisconsin (Zone 2) rose by 195 MW.⁶ In comparison to 2018/2019, imports into Zone 7 this year dropped from 320 MW to 164.4 MW, while exports from Zone 2 increased from 0 MW to 87 MW.

The 2019/20 MISO Resource Auction clearing prices for Zone 7 and Zone 2 were \$24.30 and \$2.99/MW-Day, respectively. This compares to \$10.00/MW-Day for both zones in last year’s auction. MISO-wide, the predominant fuel types to clear the 2019/20 auction were natural gas (38%) and coal (35%). Nuclear (9%), solar (1%), and wind (2%) were also represented in the auction. Although wind and solar represent a small portion of the overall capacity in the MISO region, 680 MW of solar and 2,698 MW of wind capacity cleared the 2019/20 auction, compared to 461 MW and 2,229 MW in the previous year, respectively.

[19%20PRA%20Results173180.pdf](#)

⁶ More precisely, capacity in MISO’s PRA is measured in ZRCs (zonal resource credits), where one ZRC is equal to one megawatt of unforced capacity from a planning resource for a specific planning year pursuant to MISO tariffs.

Price

Year-over-year changes in residential electrical bills can vary substantially from utility to utility, with some residents seeing their bills decrease while other customers' rise. Residential bills in areas of the Central and Western Upper Peninsula, where population densities tend to be lower and the local power grid is challenged by various constraints imposed on and by the surrounding electrical generation and transmission systems, continue to be some of the highest in the state, despite year-over-year decreases.

Michigan Electric Rate Comparison

	2018		2019		Percent Change
	Monthly Bill	¢/kWh	Monthly Bill	¢/kWh	
INVESTOR OWNED					
AEP (I&M) Combined	\$65.74	13.15	\$69.27	13.85	5.4%
Alpena Power	\$75.44	15.09	\$72.68	14.54	-3.7%
Consumers Energy	\$81.12	16.22	\$78.34	15.67	-3.4%
DTE Electric	\$80.63	16.13	\$71.29	14.26	-11.6%
Northern States Power	\$63.59	12.72	\$65.49	13.10	3.0%
UMERC - (FORMERLY WEPCO)	\$79.84	15.97	\$77.85	15.57	-2.5%
UMERC - (FORMERLY WPS)	\$70.48	14.10	\$67.99	13.60	-3.5%
Upper Peninsula Power	\$110.07	22.01	\$109.81	21.96	-0.2%
Upper Peninsula Power Iron River	\$105.46	21.09	\$105.90	21.18	0.4%
COOPERATIVE					
Alger Delta	\$102.44	20.49	\$102.44	20.49	0.0%
Cherryland	\$77.55	15.51	\$73.55	14.71	-5.2%
Cloverland	\$72.24	14.45	\$70.48	14.10	-2.4%
Great Lakes	\$85.58	17.12	\$88.13	17.63	3.0%
Homeworks Tri-County	\$86.39	17.28	\$87.39	17.48	1.2%
Midwest	\$82.29	16.46	\$86.61	17.32	5.3%
Ontonagon County REA	\$123.33	24.67	\$123.33	24.67	0.0%
Presque Isle	\$77.24	15.45	\$72.33	14.47	-6.4%
Thumb	\$79.61	15.92	\$79.61	15.92	0.0%
MUNICIPAL					
Holland Board of Public Works*	\$74.88	14.98	\$77.87	15.57	4.0%
Lansing Board of Water and Light	\$74.68	14.94	\$81.32	16.26	8.9%
Marquette Board of Light and Power	\$85.35	17.07	\$83.95	16.79	-1.6%

Note: Monthly Bill calculations are based on usage of 500 kWh/month and exclude state sales tax.

* Includes participation in renewable energy program.

Michigan Electricity Sales Projection
(Millions of kWh)

			Residential	Commercial	Industrial	Total
Historical	2016	Total	34,542	38,986	30,934	104,462
	2017	Total	32,977	38,326	30,589	101,892
	2018	Total	34,971	39,115	29,808	103,894
Projection	2019	January	3,206	3,258	2,426	8,890
		February	2,720	2,951	2,388	8,059
		March	2,762	3,099	2,495	8,355
		April	2,386	2,951	2,404	7,741
		May	2,349	3,163	2,562	8,073
		June	2,918	3,461	2,597	8,976
		July	3,722	3,673	2,534	9,929
		August	3,290	3,652	2,611	9,553
		September	2,694	3,252	2,548	8,493
		October	2,433	3,215	2,537	8,184
		November	2,571	3,034	2,428	8,033
		December	3,154	3,165	2,358	8,677
		2019	Total	34,202	38,874	29,888
	2018-2019 Change		-2.2%	-0.6%	0.3%	-0.9%

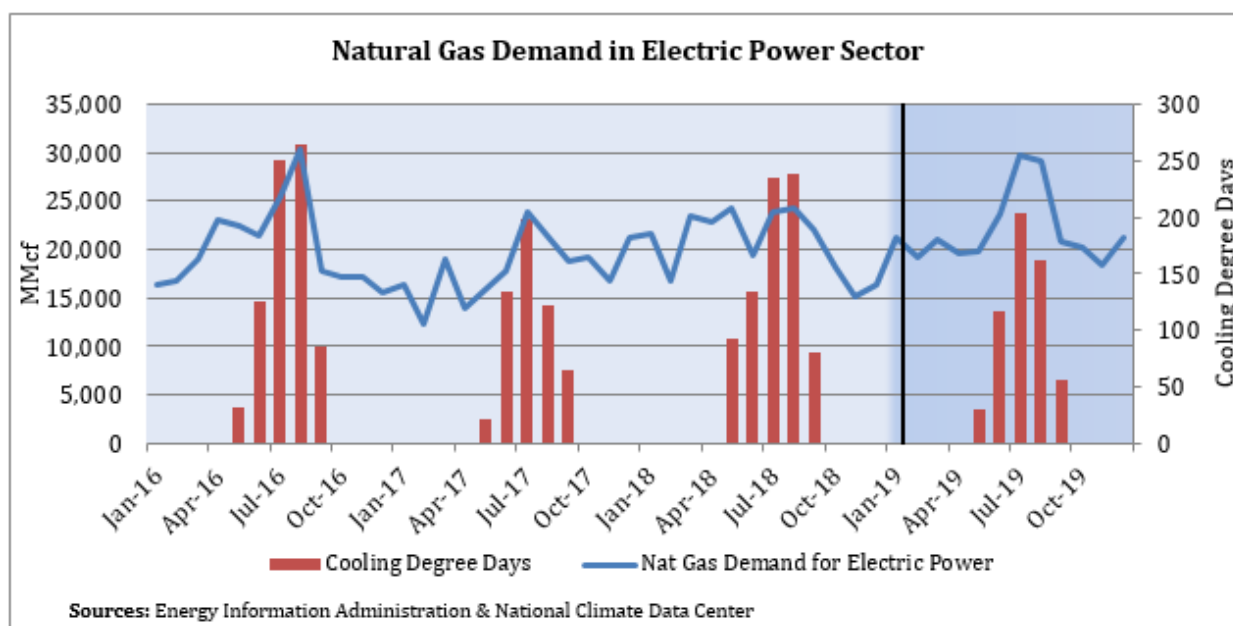
NOTE: Projected electricity sales are based on historical trends.

SOURCES: Historical Data -- Energy Information Administration, U.S Department of Energy. Projections: Energy Security Section, MPSC.

Natural Gas

Demand

Natural gas demand in Michigan is expected to rise by 1.4 percent in 2019, primarily due to overall upward trending demand by the electric power sector, as well as additional use from an anticipated increase in cooling needs this summer. Weather variation greatly affects natural gas usage in the electric power sector. Current projections from NOAA's Climate Prediction Center (CPC) indicate that the 2019 summer cooling season (May-September) may be about 2.8 percent warmer than the 1981-2010 normal. Deviations from these weather projections could lead to very different consumption patterns as homes and businesses increase their electricity use to combat the heat. In addition to weather influenced demand, consumption for electricity generation is likely to be influenced by the price of natural gas. Henry Hub natural gas spot prices are forecasted to average \$2.75 per thousand cubic feet (Mcf) this summer compared to \$3.02 per Mcf last summer. In the event that these prices rise unexpectedly, natural gas usage could be reduced. Total sales for 2019 are projected to be 963.8 Bcf, compared to 950.6 Bcf in 2018.



Supply

Working gas storage inventories for the lower 48 states were 1,986 Bcf for the week ending May 31, 2019, 9 percent higher than 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. In Michigan, storage inventories to end the heating season are believed to have been 37 percent lower than the previous March five-year average, primarily due to colder than normal weather. Michigan's storage volume is projected to gradually increase throughout the summer, reaching 581.7 Bcf by October 2019. 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 percent of Michigan's natural gas needs are supplied via its own natural gas production wells. However, this production continues to slowly decline, and is expected to decrease by 5.9 percent to

84.9 Bcf in 2019. Net interstate deliveries are projected to increase by 11.2 percent to 908 Bcf in 2019 as a result of projected increases in demand and falling in-state production.⁷

Additional factors that may influence supply and prices include summer temperatures and infrastructure outages. A warm summer causes electricity generators to use more natural gas for peak generation. This increased use of natural gas to meet peak electric loads would exert additional pressure on supply and prices. Damage to major natural gas production or transmission infrastructure, such as from an active hurricane season in the Gulf of Mexico, can also drive up prices. However, with the emergence of shale gas (natural gas produced from shale in Pennsylvania and Ohio) and new pipeline infrastructure for transport, Michigan has become less reliant on natural gas from the Gulf of Mexico producing region. This increase in supply diversity will help to keep gas prices relatively stable in Michigan for the upcoming year.

Price

Natural gas wholesale (spot) prices were relatively stable, averaging approximately \$3.28/Mcf (million cubic feet) last winter. During May 2019, the Henry Hub futures price for June contracts averaged \$2.60/Mcf, which is \$0.12 below the average price at the same time in 2018. U.S. storage inventory levels as of May 31, 2019, were 1,986 Bcf. This is approximately 10.1 percent above storage levels one year ago, but 10.8 percent below the five-year average.

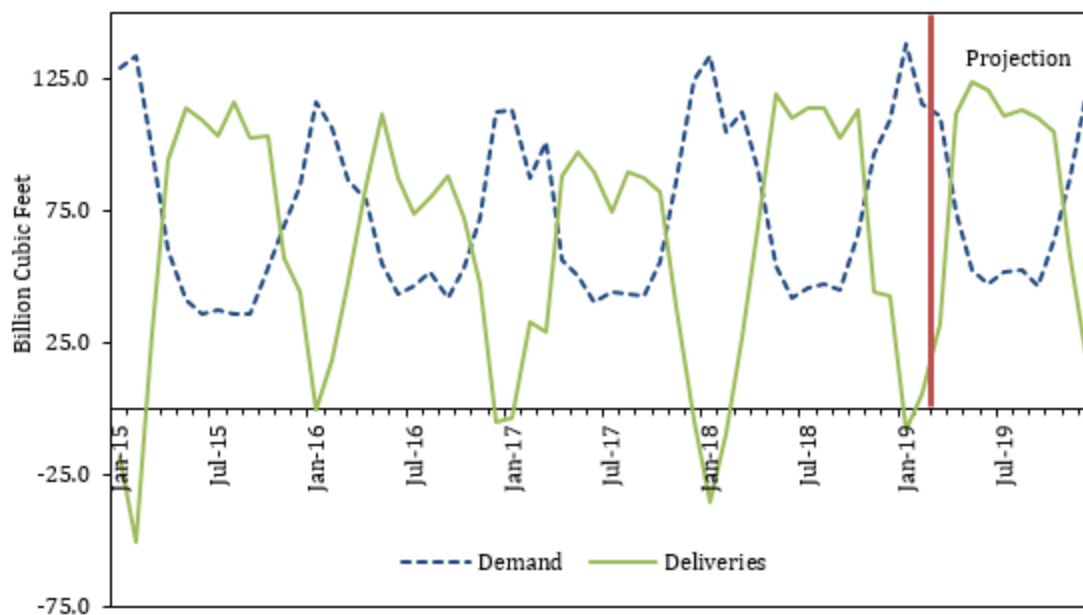
The Energy Information Administration's (EIA) May STEO projects Henry Hub natural gas spot prices to average \$2.79/Mcf through 2019, with prices dropping to an average of \$2.78 for 2020. The EIA's projected prices reflect robust production levels, but also increased demand due to power generation, exports to Mexico, and LNG exports. The elevated production levels are in part due to the abundant Marcellus and Utica shale gas supply now finding markets more accessible with new pipeline capacity coming on line. The EIA forecasts that natural gas storage injections will outpace the previous five-year average during the April-through-October injection season and that inventories will reach 3.7 Tcf at the end of October, which would be 13% higher than October 2018 levels.

The average monthly summer bill for the four largest gas utilities⁸ (Gas Cost Recovery (GCR) factor + distribution charge + customer charge) in Michigan is projected to be approximately \$34 for April 2019 through October 2019. The commodity cost makes up about 33 percent of this price. A residential customer's annual gas bill for April 2019-March 2020 period is forecasted to be \$754 based on the April 2019 billed GCR factors. If prices remain at current levels, this year's average annual gas bill is expected to be \$20 lower than last year's annual bill based on normal consumption for both years. This anticipated decrease is largely due to falling U.S. natural gas prices.

⁷ A net interstate delivery is natural gas from out of state used to meet total demand which excludes Michigan production and storage.

⁸ Consumers Energy, DTE Gas (formerly MichCon), SEMCO, and Michigan Gas Utilities (MGU)

Michigan Natural Gas Supply and Demand



Michigan Natural Gas Supply and Demand (Billion Cubic Feet--BCF)

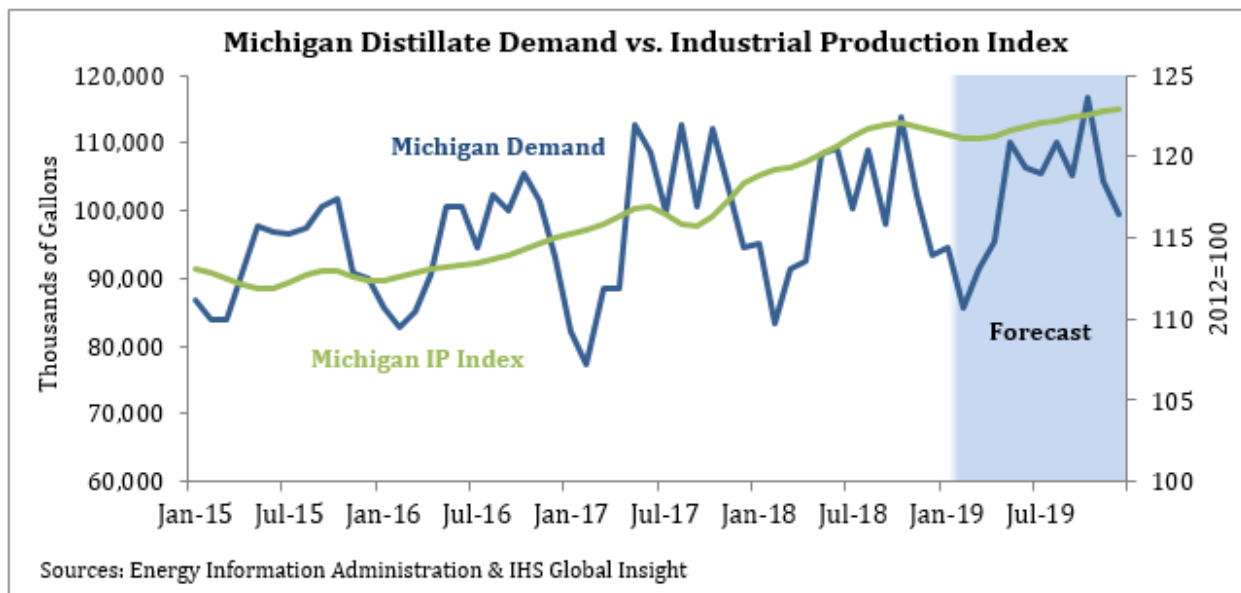
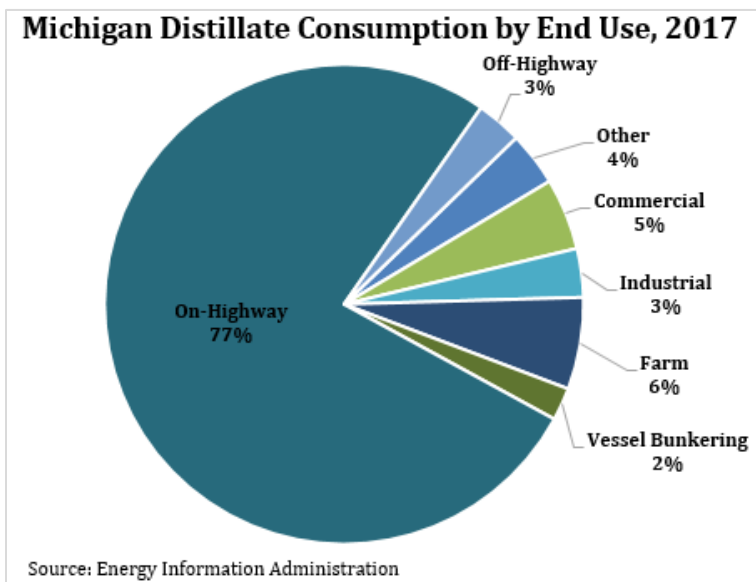
		Total Demand	Net Interstate Deliveries	Michigan Production	To (From) Storage	Working Gas Storage Balance
Historical	2016 Total	867.6	709.3	100.8	-	530.0
	2017 Total	848.3	704.7	96.0	-	482.4
	2018 Total	950.6	816.8	90.3	-	438.9
Projection	2019 January	138.4	-7.5	7.2	-160.5	300.1
	February	116.2	5.9	6.4	-92.2	196.2
	March	111.0	32.5	7.1	-69.7	124.7
	April	75.0	111.9	6.8	33.0	168.4
	May	53.0	124.1	7.1	85.3	246.6
	June	47.4	121.2	6.9	70.2	327.2
	July	52.2	111.2	7.1	65.4	393.4
	August	52.8	113.8	7.2	70.1	461.6
	September	46.6	110.9	7.3	76.4	533.2
	October	64.6	105.6	7.6	43.4	581.7
	November	87.8	58.1	7.2	-19.8	559.2
	December	118.7	20.4	7.2	-88.4	468.1
	2019 Total	963.8	908.0	84.9	-	468.1
	2018-2019 change	1.4%	11.2%	-5.9%	-	6.6%

NOTES: The Michigan production series is compiled by the Operations & Wholesale Markets Division, MPSC. Net interstate deliveries are calculated using total demand less the sum of Michigan production and change in Michigan storage. Working gas storage balance is end of month/year. SOURCES: Historical Data -- Demand and Storage from Energy Information Administration, U.S. Department of Energy. Projection: Energy Security Section, MPSC.

Distillates

Demand

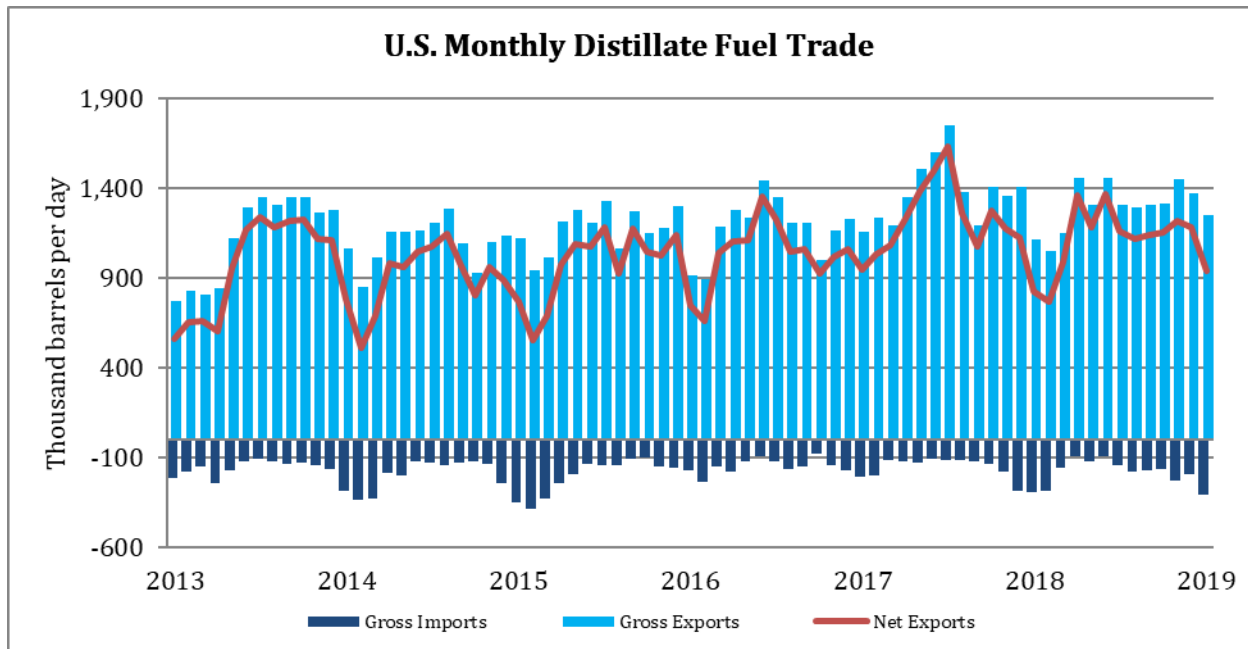
Distillate sales in Michigan are projected to increase by 2.3 percent to 1,224 million gallons in 2019, following an increase of 1.3 percent in 2018. Diesel fuel remains the prime component of distillate demand, over 98 percent, with the majority being used for transportation by highway trucks. Other users of distillates, although less prominent, include the agriculture, commercial, and industrial sectors, as well as vessel bunkering. As evidenced by the graph below, distillate use in Michigan is typically seasonal in nature with individual peaks occurring in the Spring, late Summer, and early Fall. These peaks can likely be attributed to farm activity in the Spring and Fall and increased vessel activity as the Great Lakes become free of ice. Industrial production in Michigan is expected to increase throughout the year, contributing to the boost in distillate demand. The forecasting model used for distillate demand assumes normal weather conditions and uses projections for industrial production, therefore any significant departures from these projections has the potential to change distillate demand figures.



Since peaking in the mid-1980s, distillate usage for home heating markets (No. 2 Fuel Oil) in the Midwest, including Michigan, has been on a steady decline as homeowners have converted to other heating systems such as natural gas, propane, or electricity. According to the 2017 American Community Survey, only 1.2 percent of Michigan households use fuel oil as a heating source.

Supply

In 2018, distillate fuel production averaged 5.17 million barrels per day with no signs of slowing down as we move forward in 2019. As of the week ending June 7, 2019, distillate production was at 5.2 million barrels per day. While U.S. demand has been largely flat or with only modest increases, international demand has been steadily growing and has urged U.S. refiners to continue targeting export markets. U.S. exports of distillate fuel oil continues to be robust and averaged 1.3 million barrels per day in 2018. In the graph below, net exports can be seen reaching historic highs in 2017 and have since remained strong. In the past year, U.S. distillate inventories have risen to levels near the middle of the five-year range and as of the week ending June 7, 2019, stood at 128.4 million barrels, up from 114.7 million barrels a year ago.



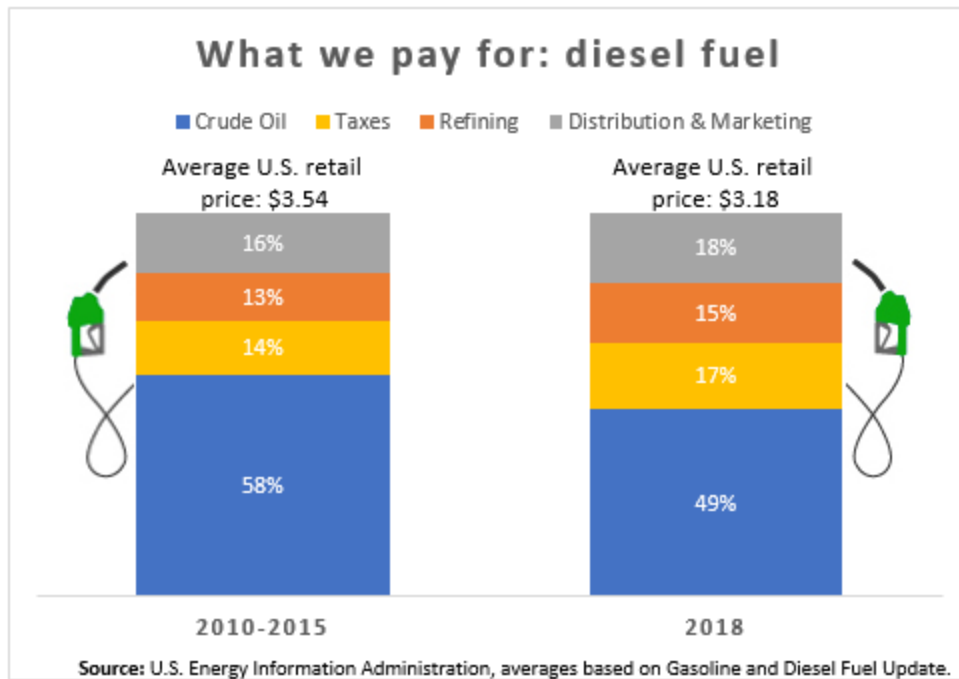
Source: Energy Information Administration

Price

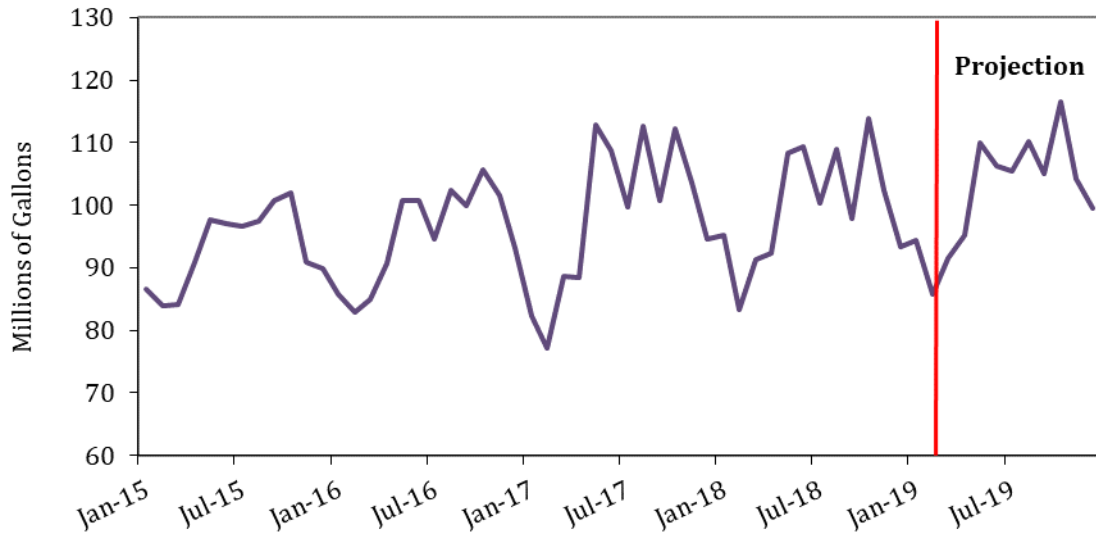
According to the EIA, U.S. on-highway diesel fuel retail prices, which averaged \$3.18/gallon in 2018, are projected to remain steady at an average of \$3.18/gallon in 2019. For the week of June 3, the average Midwest price of \$3.03/gallon was \$0.19 lower than last year, and \$0.11 below the U.S. average. According to the AAA Fuel Gauge Report; the Michigan on-highway retail diesel fuel price as of June 17 was \$2.99/gallon, \$0.30 lower than last year. Michigan residential heating oil prices averaged \$2.67/gallon (excluding sales tax) to end the 2018/19 heating season, seven cents higher than the same time last year. The 2018/19 heating season began with residential heating oil at a price of \$2.94/gallon (Oct. 1, 2018). Prices remained near the \$3.00/gallon level until the beginning of December when crude oil prices began to ease, allowing for heating oil prices to fall to a low of \$2.27/gallon in January. Heating oil supplies remained

Passage of House Bill 4738, Public Act 176 of 2015, amended the Motor Fuel Tax Act to increase motor fuel taxes. Effective January 1, 2017, tax on diesel increased from 15 cents per gallon to 26.3 cents per gallon. Diesel tax rates will be adjusted annually based on consumer inflation (U.S. Consumer Price Index), with increases capped to 5% per year, effective January 1, 2022.

adequate throughout the heating season, helping to reduce price volatility. Increased heating oil prices to start the heating season were largely a function of higher crude oil prices.



Michigan Distillate Fuel Oil Sales



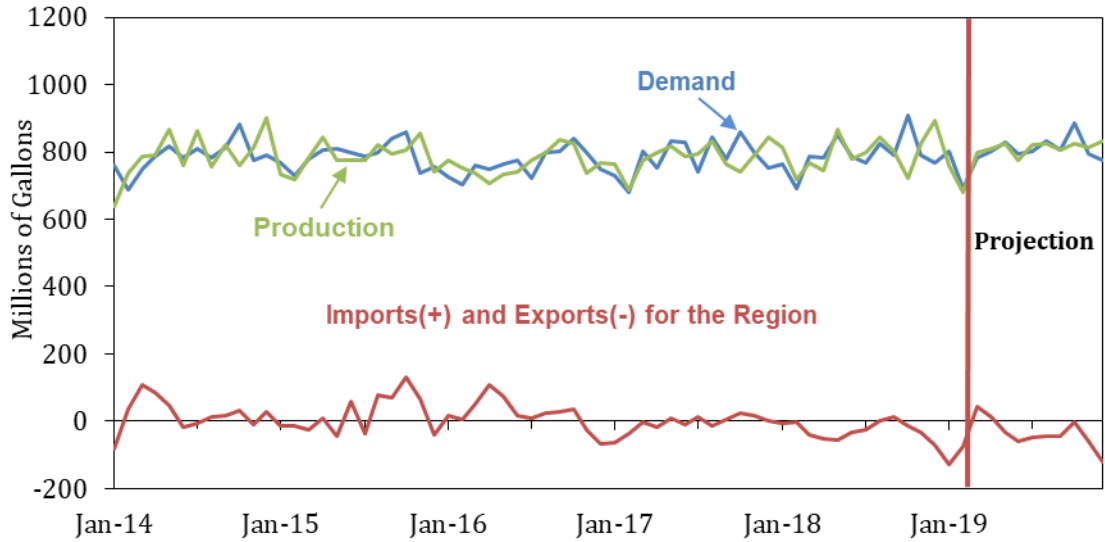
Michigan Distillate Fuel Oil Sales Projection

(Millions of Gallons)

			Diesel		Prior	
			Fuel	Total	Year	% Change
Historical	2016	Total	1,134.5	1,142.8	1,117.4	2.3%
	2017	Total	1,172.3	1,181.2	1,142.8	3.4%
	2018	Total	1,185.4	1,196.7	1,181.2	1.3%
Projection	2019	January	92.0	94.4	95.1	
		February	84.0	85.7	83.3	
		March	90.4	91.4	91.4	
		April	94.8	95.3	92.4	
		May	109.7	110.0	108.3	
		June	106.0	106.3	109.3	
		July	105.2	105.5	100.4	
		August	109.7	110.1	108.9	
		September	104.6	105.1	98.0	
		October	115.9	116.6	114.0	
		November	103.1	104.2	102.3	
		December	97.7	99.4	93.3	
	2019	Total	1,213.0	1,224.0	1,196.7	2.3%

NOTES: These projections assume normal degree day accumulations for the remainder of the year.
 SOURCES: Historical data – Energy Information Administration, U.S. Department of Energy.
 PROJECTIONS: Energy Security Section, MPSC

Regional Distillate Fuel Oil Supply and Demand



Regional Distillate Fuel Oil Supply and Demand

(Millions of Gallons)

			Production	Inventories	Demand
Historical	2016	Monthly Average	742.5	539.2	765.9
	2017	Monthly Average	788.5	514.6	783.0
	2018	Monthly Average	824.2	532.5	792.7
Projection	2019	January	886.9	520.8	801.9
		February	753.1	507.7	692.8
		March	755.9	522.9	784.8
		April	793.8	528.4	802.4
		May	861.1	527.9	827.0
		June	837.7	510.1	794.8
		July	868.7	529.2	802.6
		August	872.0	523.1	832.4
		September	850.2	524.0	805.4
		October	825.8	462.8	884.8
		November	874.4	481.0	795.2
		December	954.9	539.5	774.9
	2019	Monthly Average	844.5	514.8	799.9

NOTES: Production projections based on expected refinery capacity utilization and recent trends. Regional demand estimates are based on the recent regional trend. The region is comprised of Illinois, Indiana, Kentucky, Michigan, Tennessee, and Ohio.

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

PROJECTIONS: Energy Security Section, MPSC.

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