Michigan Energy Appraisal

WInter Outlook 2016/17

MI Energy
Michigan Agency for Energy
November 2016

Preface

The Michigan Energy Appraisal is a semi-annual assessment of Michigan's energy baseline. The assessment assists in developing a 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 Agency for Energy (MAE) with assistance from the Operations & Wholesale Markets Division and Regulated Energy Division of the Michigan Public Service Commission (MPSC), Department of Licensing and Regulatory Affairs, State of Michigan.

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A major source of data and analysis used in this appraisal is from 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: http://www.dleg.state.mi.us/mpsc/reports/energy/.

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.

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Highlights
Energy Appraisal – Winter 2016/17

If temperatures return to normal, consumption of natural gas, propane, and heating oil will increase significantly compared to the previous heating season, which was 14 percent warmer than normal. That increase in consumption would result in an increase in heating bills, despite low commodity prices. Regional and national inventories remain strong across each sector, and barring any unforeseen geopolitical, infrastructure, or weather-related event, current supply should be adequate to meet expected demand and help keep prices in-check.

Natural Gas – Assuming normal winter weather through the 2016/17 heating season, total natural gas sales in Michigan are projected to increase by 7.5 percent in 2016 to 888.7 billion cubic feet (Bcf). This increase is based on two primary factors: an expected increase in natural gas usage for electric power generation and an expected boost in demand for commercial and residential space heating. Due to an unseasonably warm winter last year -- 14 percent warmer than normal -- a return to historical winter temperatures would increase natural gas consumption this winter as demand for space heating rebounds. Expectations are for continued relative stability of natural gas prices, however residential consumers should expect to see their winter expenses rise about 25 percent over the 2016/17 winter season due to anticipated increases in natural gas consumption.

Propane – Michigan propane usage is projected to increase by about 2.66 percent in 2016, assuming normal winter weather through the remainder of the year. This moderate growth takes into account last year's warmer than average (14 percent) winter with expectations of a return to colder temperatures for the beginning of this winter season. Propane usage on a seasonal basis (2015/16 vs. 2016/17) is likely to increase significantly if expectations of colder winter weather are realized. Both U.S. and Midwest propane inventories remain strong and at the top of their five-year ranges. For the week of November 14, 2016, the average residential propane price in Michigan was around $1.70/gallon, about 15 cents higher than this time last year.

Petroleum – In 2014, Michigan consumed an estimated 167.9 million barrels of petroleum products. The majority of petroleum products consumed in the state are motor fuels, such as gasoline and diesel fuel. Due to Michigan's limited crude oil production, approximately 96 percent of petroleum consumed in Michigan is imported from neighboring states and Western Canada. Crude oil stocks in the Midwest remain high, reaching 136.2 million barrels on October 21, 2016, a 3 percent increase over levels seen at this time last year. Assuming normal weather and absent unexpected supply problems, it is expected that the price and supply of petroleum products will be stable for the remainder of 2016.

Motor Gasoline – Gasoline sales in Michigan are projected to increase by 1.7 percent in 2016, marking the fourth straight year of increased demand. Regionally, gasoline sales are expected to increase at a slightly greater rate of 2.3 percent in 2016. These forecasts are consistent with national trends of increasing consumption from additional vehicle miles

traveled (VMT), which is likely attributable to "generally low gasoline prices, growing employment, and rising wages," according to the EIA's Short Term Energy Outlook. According to AAA Fuel Report, the average price for a gallon of regular unleaded gasoline in Michigan was $2.02 on November 16, 2016, 14 cents less than the average price at this time last year ($2.16).

Distillate Fuels – Total distillate sales in Michigan are projected to increase by 2 percent in 2016, to 1.14 billion gallons. This would mark the fourth year of growth in distillate sales, and like motor gasoline, is largely influenced by the reduction in fuel costs. Diesel fuel accounts, on average, for over 99 percent of the total distillate consumption, with the remainder consisting of heating oil, kerosene, and No. 1 distillate. Heating oil (No. 2) continues to decline as a primary fuel source for home heating in Michigan, although remains prevalent in the Northeast U.S. According to AAA Michigan, the average price of diesel in Michigan was $2.38 for November 16, 2016, 37 cents below the price seen at this time last year. The average cost of No. 2 distillate fuel (heating oil) was $2.03 on November 14, 2016, almost 11 percent below the cost of heating oil at this time last year.

Electricity – No supply shortages or transmission constraints are expected to affect the ability of Michigan utilities to meet winter peak electric demand. Assuming normal weather, Michigan's total electric sales for 2016 are projected to increase 1.6 percent to 103.5 thousand GWh compared to 101.8 thousand GWh in 2015. This growth is expected primarily in the residential and industrial sectors. One of the primary drivers of electricity demand in the residential market is for home cooling during hot weather. The 2016 summer was about 26 percent warmer than historical averages which led to increased consumption. Industrial sector demand, which is less dependent on weather fluctuations, is expected to grow 2.5 percent, which reflects continued strength in industrial activity.

Winter Heating Bills – Although prices for natural gas, heating oil, and propane are expected to remain relatively low and comparable to where each was a year ago, overall expenditures are projected to rise this year with a projected return to cooler, more typical winter weather. Further, should this season's winter temperatures deviate from historical norms, the National Oceanic and Atmospheric Administration (NOAA) expects it is more likely to do so toward colder temperatures rather than warmer, which would impose additional heating costs on Michigan households.

November 28, 2016
Michigan Agency for Energy
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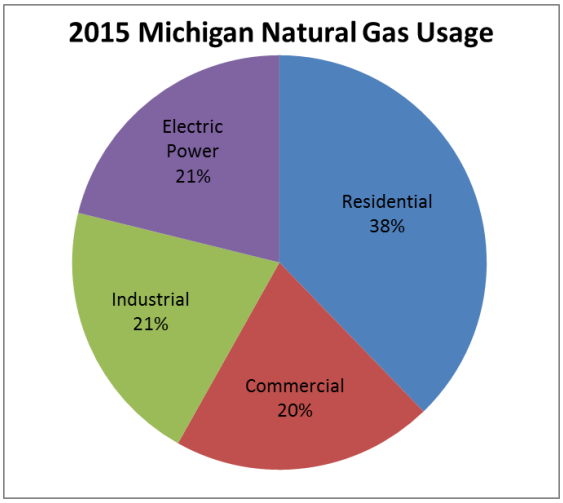
Natural Gas

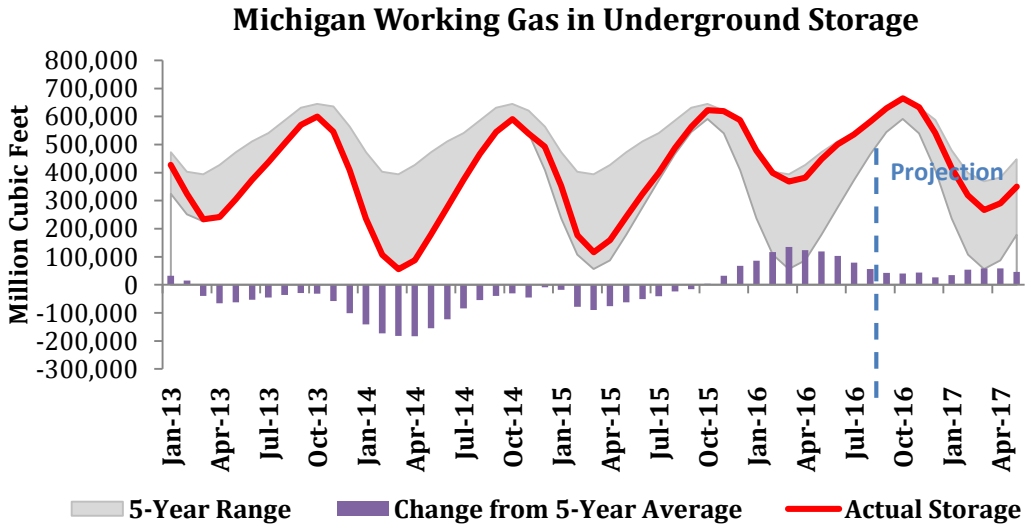
Demand

Assuming normal winter weather through the 2016/17 heating season, total natural gas sales in Michigan are projected to increase by 7.5 percent in 2016 to 888.7 billion cubic feet (Bcf), and should be expected to increase further should EIA's prediction of a colder-than-normal winter occur. This increase is driven by two primary factors: an expected increase in natural gas usage for electric power generation and an expected boost in demand for commercial and residential space heating. The rise in consumption is dampened slightly by successful statewide efforts to reduce energy waste at least 0.75% annually. Consumption in the electric generation sector is expected to increase by about 43 percent in 2016, following a 56 percent rise the year before. In past years, consumption varied greatly from year to year, primarily dependent on summer weather and usage of natural gas at peaking plants. However, the electric power industry is undergoing a major shift towards natural gas generation to take advantage of lower fuel costs and to reduce air pollution. Lastly, due to an unseasonably warm winter last year -- 14 percent warmer than normal -- a return to cooler temperatures should increase natural gas consumption this winter as demand for space heating rebounds. Natural gas use is greatest among residential customers, where it is used to heat about 77 percent of Michigan households.



Supply

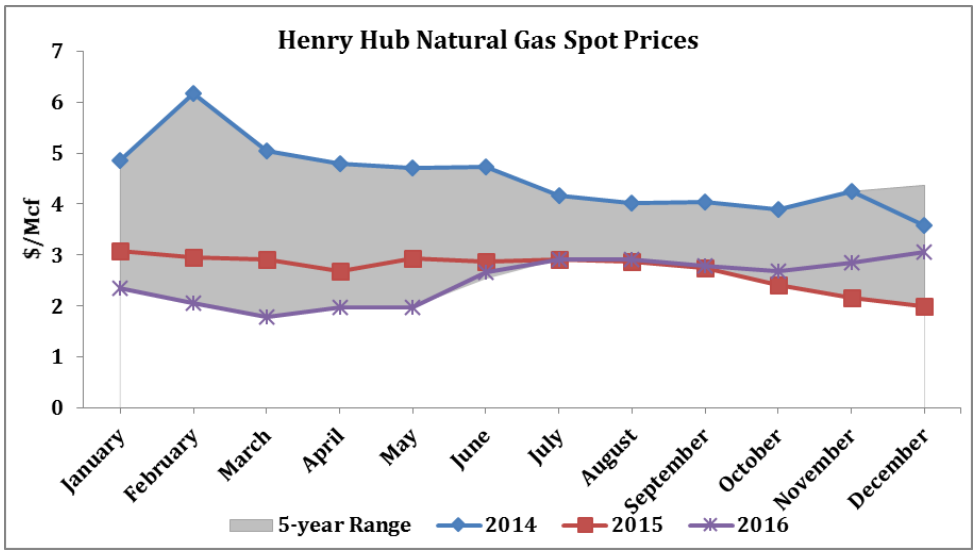
Storage levels in Michigan are projected to be around 665 Bcf in October 2016, which is about 1 percent above the five-year average for this time of year. Higher inventories are a



result of unseasonably warm temperatures last winter which caused lower withdrawal rates and higher-than-normal storage volumes to start the spring injection period. Michigan has over 10 percent of the nation's available underground storage capacity for natural gas, the largest of any state. Approximately 13 percent of Michigan's natural gas demand was met through in-state production in 2015. Production from these wells is projected to decline by 5 percent in 2016. This unique combination of underground storage and in-state production provide Michigan a higher level of resiliency to extreme winter weather compared to other states or regions.

Prices

In 2016, natural gas prices increased gradually from last winter's lows until stabilizing over the summer. This price stability is a direct result of continuing production strength from shale gas basins, even considering demand increases in the electric power sector. The wholesale price for natural gas averaged approximately $2.83/Mcf (thousand cubic feet) during 2016's summer months and is projected to move slightly higher through year's end.

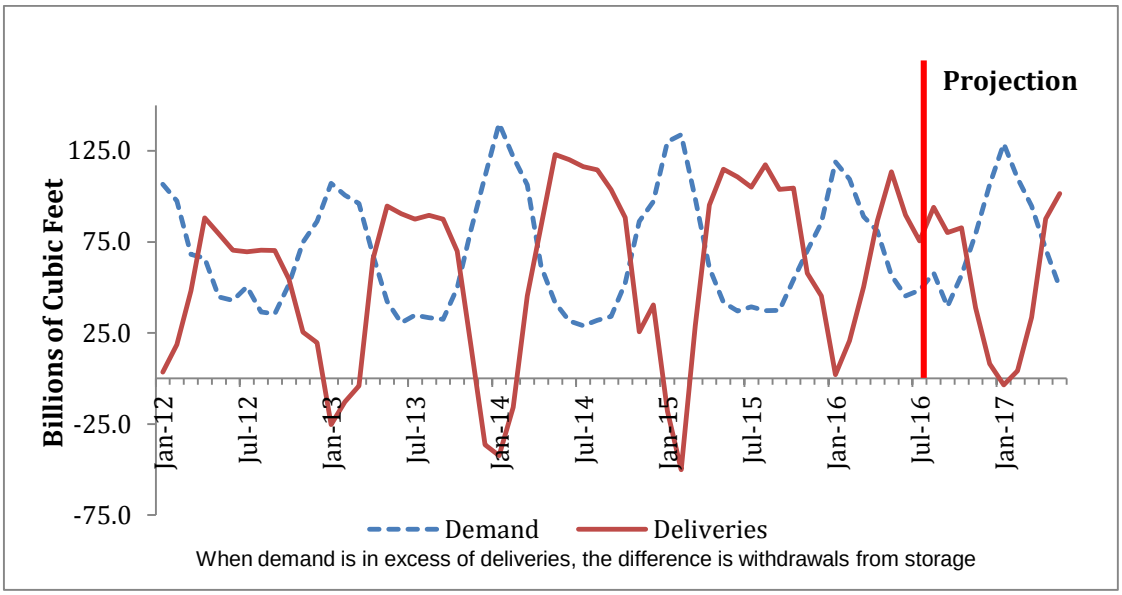


The total residential bill for natural gas service is comprised of the wholesale cost of gas purchased by Michigan utilities (Gas Cost Recovery (GCR) factor), the cost of interstate transport and delivery, the monthly customer charge, and the energy optimization surcharge. On a dollar-per-unit basis, residential natural gas bills are expected to be roughly the same as last winter for customers of the four largest gas utilities: Consumers Energy, DTE Gas, Semco, and Michigan Gas Utilities. On the whole, however, residential consumers should expect to see their heating expenses rise by as much as 25 percent over the 2016/17 winter, due to anticipated increases in natural gas consumption with the return to normal (historical) winter weather.

	Cost Breakdown (per Mcf)					**Percent Change**
	Commodity Charge	Distribution	Total Average Cost	Customer Charge (monthly)	**Winter Bill** Forecast	
Four Largest Gas Utilities	$3.35	$2.83	$6.18	$12.24	$516	25%

Note: commodity charge refers to the price of fuel; 2016/17 winter usage is estimated at 73.6 Mcf/month.

Michigan Natural Gas Supply & Demand



Michigan Natural Gas Supply and Demand

(Billions of Cubic Feet – BCF)

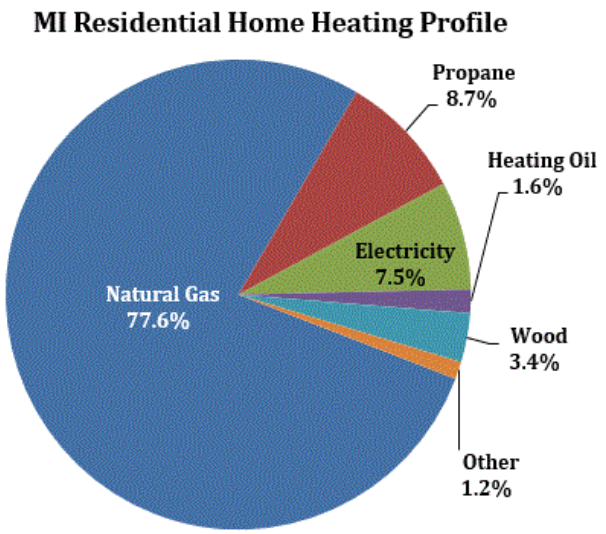
			Total Demand	Net Interstate Deliveries	Michigan Production	To (From) Storage	Storage Balance
Historical	2013	Total	787.3	524.6	122.3	-140.4	409.1
	2014	Total	833.8	802.9	114.0	83.1	492.2
	2015	Total	826.4	815.4	106.3	95.4	587.6
	2016	January	119.0	2.0	8.6	-108.3	479.2
		February	109.5	20.8	8.0	-80.7	398.6
		March	89.0	50.3	8.6	-30.0	368.5
		April	80.9	86.6	8.2	13.9	382.4
		May	56.5	113.4	8.5	65.5	447.9
		June	45.3	89.7	8.3	52.7	500.6
Projection		July	48.4	75.6	8.6	35.8	536.4
		August	58.0	94.1	8.7	44.7	581.1
		September	39.5	80.1	8.3	48.9	630.0
		October	56.7	82.7	8.6	34.6	664.6
		November	79.4	38.8	8.3	-32.2	632.4
		December	106.5	8.0	8.3	-90.2	542.2
	2016	Total	888.7	742.2	101.0	-45.4	542.2
2015-2016 change			7.5%	-9.0%	-5.0%	-147.6%	-7.7%
	2017	January	129.0	-3.5	8.1	-124.4	417.7
		February	110.0	4.2	7.6	-98.2	319.5
		March	94.6	33.5	8.1	-53.0	266.5
		April	71.1	87.6	7.7	24.2	290.7
		May	49.9	101.6	8.0	59.7	350.4

NOTES: Projected demand assumes normal winter weather. Net interstate deliveries are calculated using sales less the sum of Michigan production and change in Michigan storage. Storage balance is end of month/year.
SOURCES: Historical Data -- Demand and storage from the Energy Information Administration, DOE; Production from Operations & Wholesale Markets Division, MPSC; Projection – Energy Security Section, MAE. r = revised data

Propane

Demand

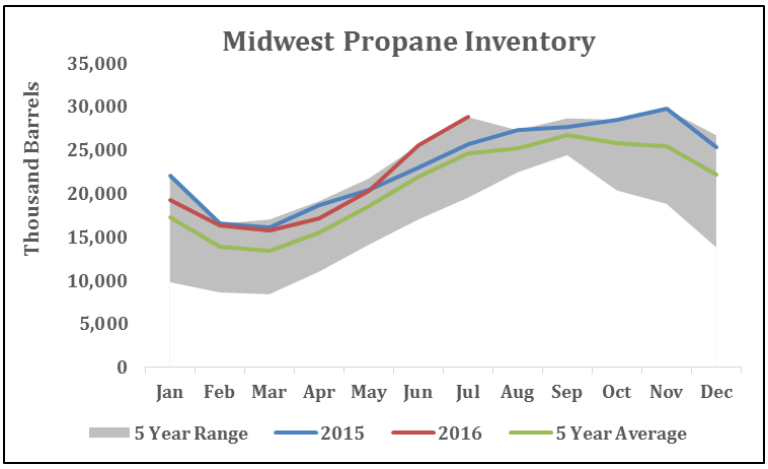
Propane usage in Michigan is projected to increase by about 2.66 percent in 2016, assuming normal winter weather through the remainder of the year. This moderate growth takes into account last year's warmer-than-average (14 percent) winter as well as expectations of a return to colder temperatures for the beginning of this winter season. Propane usage on a seasonal basis (2015/16 vs. 2016/17) is likely to increase significantly if expectations of colder winter are realized.



According to the EIA, about 5 percent of U.S. households heat with propane; however, in Michigan it is estimated to be almost 9 percent. Weather remains the largest determinant of propane use for residents. Based on forecasts by the National Oceanic and Atmospheric Association (NOAA)[1], the Midwest is expected to have a normal winter, with the U.P. and the northern lower peninsula of Michigan having a greater chance of colder temperatures. NOAA also predicts that the entire State of Michigan is likely to experience greater precipitation this winter season (i.e., more snow) than normal.

Supply

Due to an abundance of natural gas liquids (resulting from natural gas drilling) and buoyed by continued strength in the propane export markets, U.S. propane production remains high. The four-week average Midwest propane production for the week ending November 11, 2016, was 417,000 b/d, up about 16 percent from the same period last year.

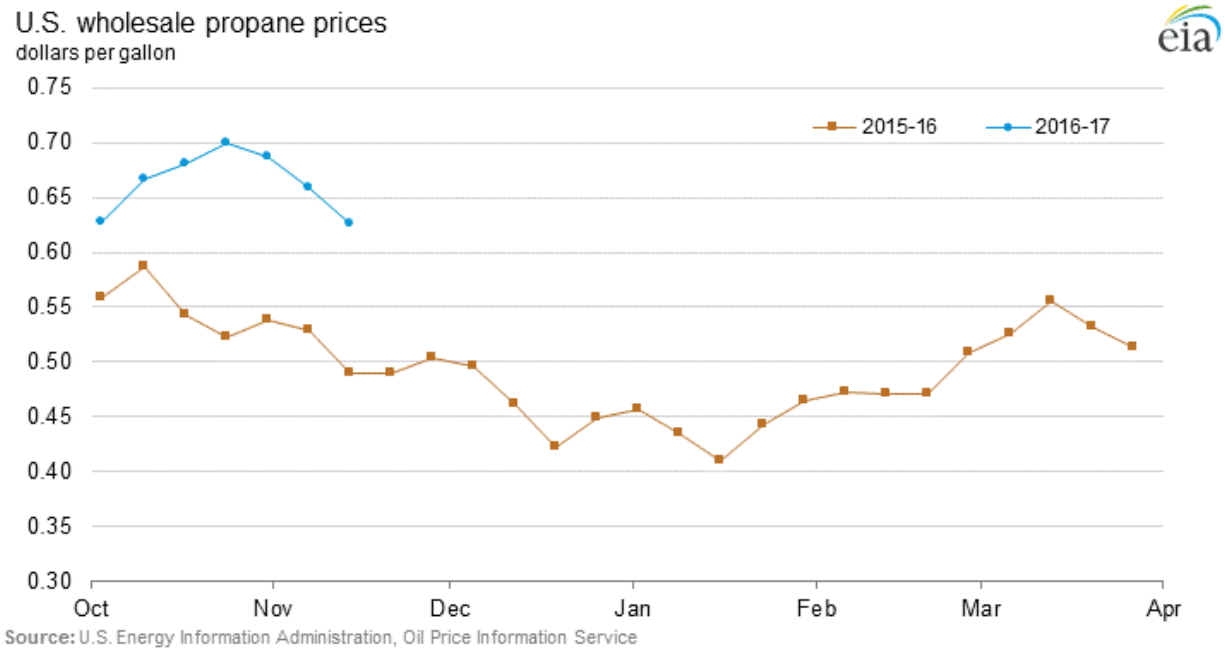


[1] NOAA, Climate Prediction Center - http://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=2

U.S. inventories of propane and propylene reached 100.8 million barrels as of November 11, some of the highest levels seen in the 23 years that EIA has collected weekly propane inventory statistics and above the five-year average. According to the EIA, PADD 2 (Midwest) propane stocks were 27.2 million barrels as of November 11 (down slightly from 2015), but at the top of the five-year range for this time of the year.

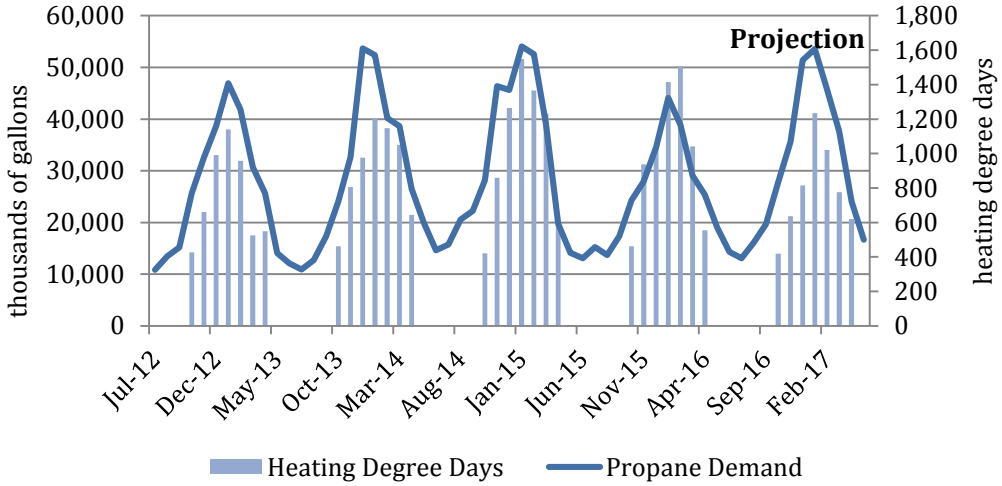
Prices

Retail propane prices remained low and stable during the winter of 2015/16 with the average price of propane from October to March being $1.66 per gallon in Michigan, a decrease of almost 22 percent from the survey period in 2014/15. The average retail high of $3.02 was reached in the week of October 12, 2015, based on a weighted average of SHOPP[2] survey calls. According to EIA, wholesale propane prices started the winter a touch over last year, but have begun to level off and currently stand about 28 percent over this time last year. While this is likely to lead to increases in retail propane prices, the strong inventories at the national and regional level should have a dampening effect on future price swings. For the week of November14, 2016, the average residential propane price in Michigan was around $1.70/gallon, about 15 cents higher than this time last year.



[2] State Heating Oil and Propane Program (SHOPP) compiles average weekly residential prices from heating oil and propane suppliers in Michigan during the winter heating season (Oct. to Mar.). http://www.dleg.state.mi.us/mpsc/reports/shopp/

Michigan Propane Sales to All Customers



Michigan Propane Sales Projections

(Millions of Gallons)

			Total Demand	Historical (prior year)	% Change
Historical	2013	Total	322.6	264.1	22.1%
	2014	Total	371.0	322.6	15.0%
	2015	Total	325.6	371.0	-12.2%
	2016	January	44.1	54.0	
		February	38.9	52.6	
		March	29.0	38.9	
		April	25.4	19.7	
		May	19.0	14.2	
		June	14.3	13.1	
		July	13.1	15.2	
Projection		August	16.1	13.7	
		September	19.6	17.4	
		October	27.7	24.3	
		November	35.6	27.9	
		December	51.4	34.6	
	2016	Total	334.2	325.6	
2015-2016 Change			2.66%		
	2017	January	53.6	44.1	
		February	45.7	38.9	
		March	37.7	29.0	
		April	24.0	25.4	
		May	16.7	19.0	

NOTES: Projected demand assumes normal weather for the remainder of the year
SOURCES: Historical Data -- Energy Information Administration, U.S. Department of Energy
Projection – Energy Security Section, MAE.

Petroleum

Michigan/Midwest Outlook

In 2014, Michigan consumed an estimated 167.9 million barrels of petroleum products. The majority of petroleum products consumed in the state are motor fuels, such as gasoline and diesel fuel. Due to Michigan's limited crude oil production, approximately 96 percent of petroleum consumed in Michigan is imported from neighboring states and Western Canada. In-state production peaked in 1979 at 35 million barrels per year and has since declined to 6.4 million barrels in 2015. As a result, the majority of crude oil is imported via pipeline as are refined petroleum products produced in Illinois, Ohio, and other states. Michigan maintains one active refinery in Southeast Michigan, owned and operated by the Marathon Petroleum Corporation, which processes approximately 132,000 barrels of crude oil per day (b/d) and produces gasoline, diesel fuel, petroleum coke, and asphalt.

Crude oil stocks in the Midwest remain high, reaching 141 million barrels on November 11, 2016, a 3.7 percent increase over levels seen at this time last year. Assuming normal weather and absent unexpected supply problems, it is expected that the price and supply of petroleum products will be stable for the remainder of 2016.

West Shore Pipe Line

Wisconsin's West Shore Pipe Line, which transports refined petroleum products from Milwaukee to Green Bay, was taken out of service on March 10, 2016. Although unknown at the time, it is now believed that the pipeline is unlikely to come back into service for at least two years, given that doing so would require a complete replacement of the line in order to ensure safety. This shutdown has affected petroleum supply in upper Wisconsin, which is a major supply terminal for the Upper Peninsula (U.P.) of Michigan.

Firms that previously took product from the Green Bay terminals were required to travel further south to a terminal near Milwaukee, or west to terminals in Junction City, Waupun, Chippewa Falls, Flint Hills (all in Wisconsin) or Duluth, MN. Sending trucks to these alternate terminals added one to four hours of travel time to each run and resulted in increased congestion at the terminal racks. This congestion increased wait time for product load, thus delaying the transportation of fuel even longer.

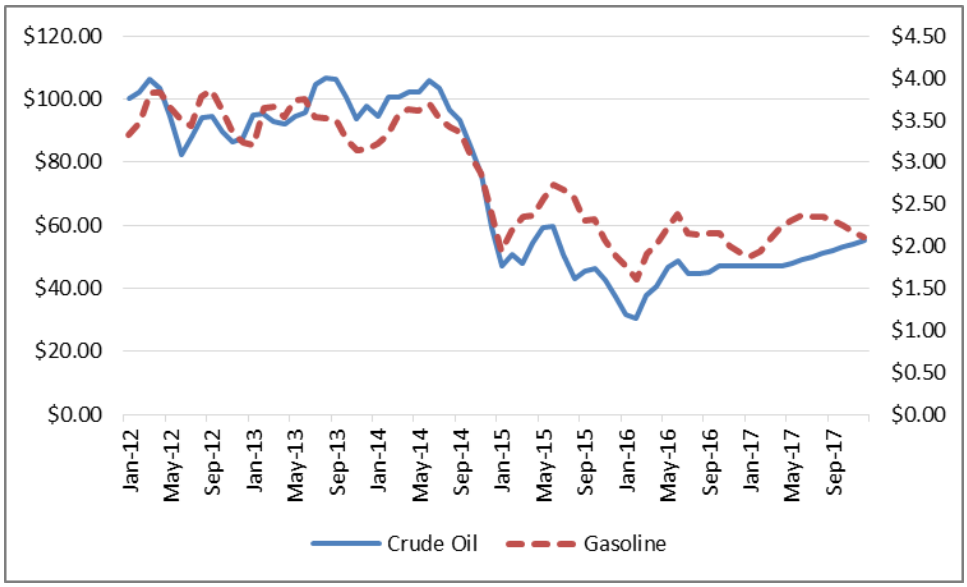
To help suppliers cope with the additional driving and waiting time, Michigan and Wisconsin worked with the Federal Motor Carrier Safety Administration (FMCSA) to establish hours of service (HOS) waivers for truck drivers responding to the energy emergency. These waivers were in effect from April to September.

At this time, through hard work and use of the HOS waivers, petroleum suppliers are doing a very good job of keeping the state, especially the U.P., supplied with fuel. They not only travel farther distances but have invested in additional trucks and drivers. Fuel prices in the U.P. were not dramatically affected given the extra costs of transportation, no widespread fuel outages occurred, and the tourist/driving season in the U.P. was not impacted. MAE staff continues to monitor the situation.

U.S. Outlook

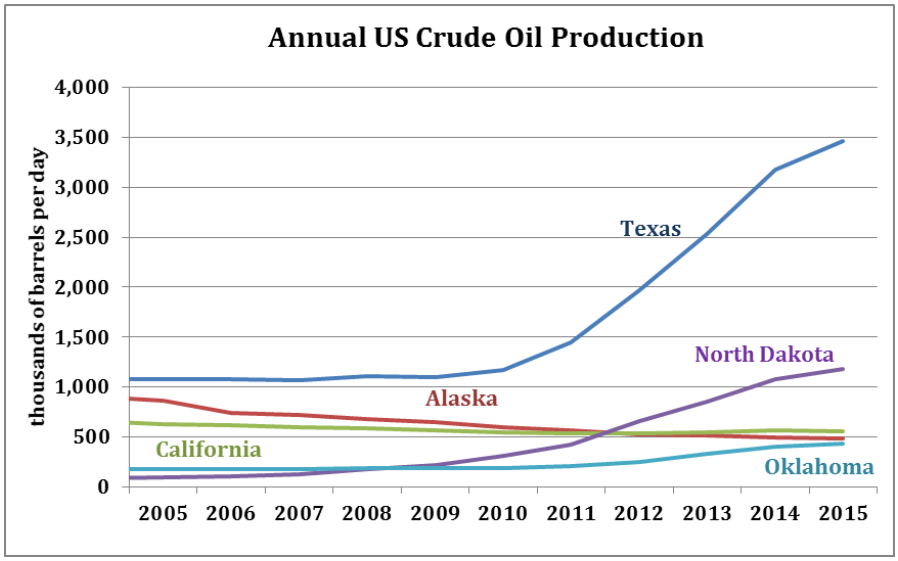
According to the Federal Highway Administration, vehicle miles traveled are expected to grow 0.9 percent over the next 20 years as consumers take advantage of cheaper gasoline prices and increases in disposable income. Gasoline consumption is expected to grow by 160,000 b/d in 2016 before flattening out in 2017 due to countervailing increases in fleet-wide fuel economy. Distillate fuel consumption (i.e., diesel fuel) is expected to decrease 2.5 percent or 100,000 b/d in 2016 before rebounding by 80,000 b/d in 2017. Decreases in 2016 can be attributed to the mild 2015/2016 winter and softening demand in the oil, gas and coal markets where diesel fuel is used for operations and rail shipments.

Crude Oil and Gasoline Prices



Sources: U.S. Energy Information Administration, Short-Term Energy Outlook October 2016,
Note: Gasoline prices are for regular unleaded, including taxes.

U.S. crude oil production averaged 9.4 million b/d in 2015, exceeding last year's estimates, and in spite of depressed crude oil prices and reduced rig counts. Production is expected to retreat in 2016 averaging 8.7 million b/d and remain relatively stable into 2017. Domestic production continues to be led by Texas and North Dakota which have steadily increased their daily output since 2009. As a result of increased domestic production, the portion of U.S. liquids consumption met by net petroleum imports have remained at levels not seen in decades.



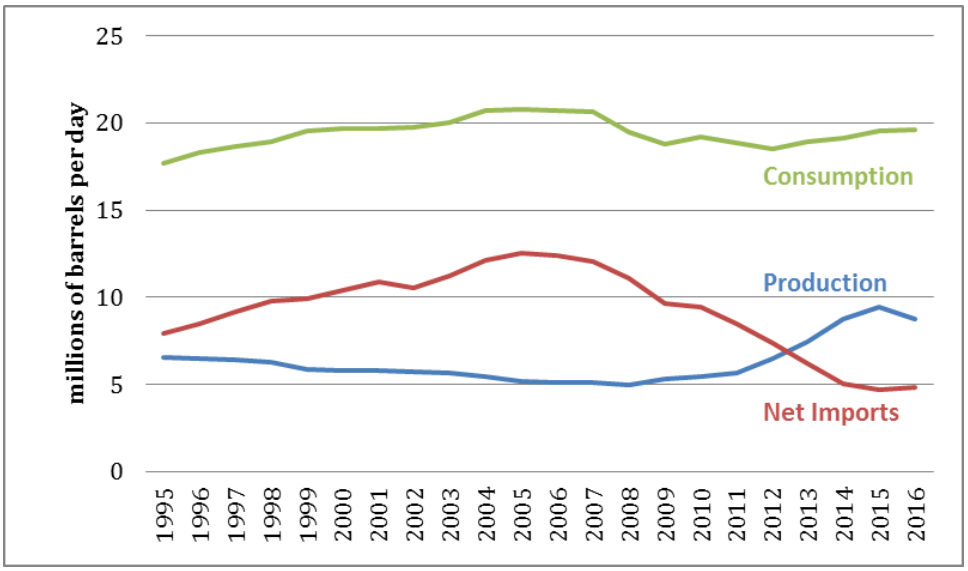
U.S. crude oil stocks have been above the five-year

average since December 2014. As of November 11, 2016 the U.S. had 490 million barrels in inventory, 35 million barrels or 7.7 percent above this time last year.

World Outlook

The EIA's October Short Term Energy Outlook reports that global petroleum consumption will grow by 1.3 million b/d in 2016. This consumption level should continue through 2017 as manufacturing activity in previously struggling countries (Brazil, Russia) is improving and traditional growth markets of China and India continue expanding.

U.S. Total Petroleum Demand and Net Imports



Sources: U.S. Energy Information Administration, Short-Term Energy Outlook October 2016

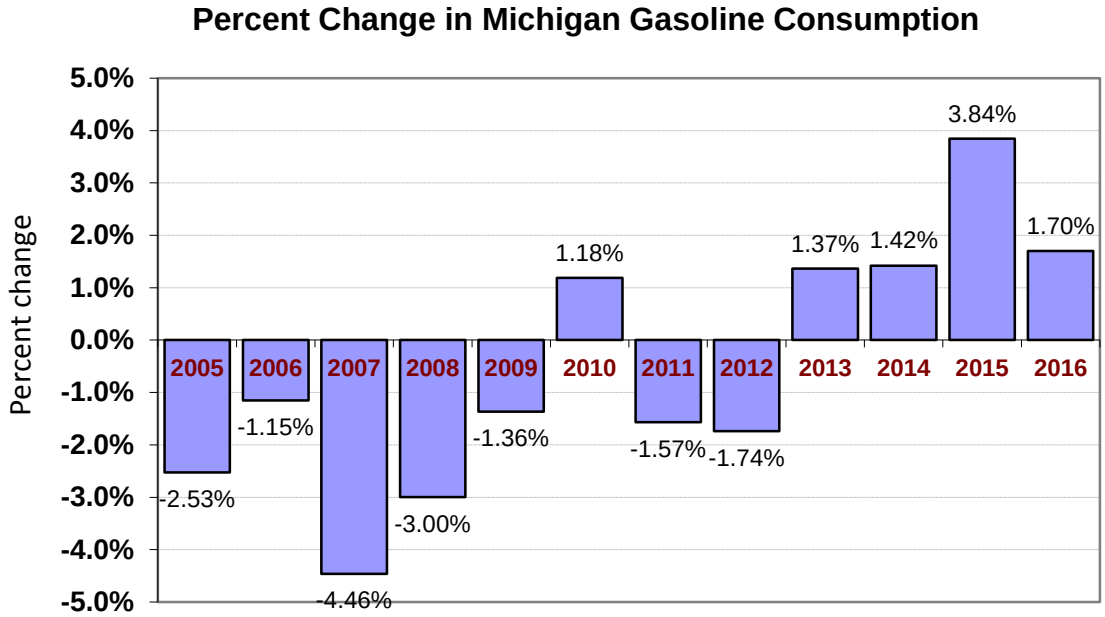
Petroleum production and supply from nations outside the Organization of the Petroleum Exporting Countries (OPEC) is expected to grow by 1.5 million b/d in 2015, with declines likely for 2016 and 2017. The U.S. has been the primary contributor to non-OPEC growth in recent years, however lower crude prices are dampening this trend. Production within OPEC grew by 2.5 percent in 2015, reaching 31.8 million b/d. Iran and Saudi Arabia are expected to contribute significantly to future growth, however recent discussions within OPEC have established production ceilings which if honored, could limit future growth and lead to a rise in crude oil prices. The EIA projects crude oil production capacity to average 1.5 million b/d in 2016 and 1.3 million b/d in 2017. Spare production capacity at these levels is normally indicative of a tight oil market, however with steady production and strong inventory levels the world oil market remains rather fluid.

Crude oil prices continued to average under $50/b through 2016, contributing significantly to value at the pump. EIA projects that West Texas Intermediate (WTI) crude oil will average $42/b in 2016 and $50/b in 2017. The Brent (North Sea) crude oil spot price is forecast to average just slightly higher at $43/b and $51/b, respectively. WTI and Brent are light sweet crudes used as international benchmarks in spot market pricing.

Motor Gasoline

Demand

Gasoline sales in Michigan are projected to increase by 1.7 percent in 2016, marking the fourth straight year of increased demand. Regionally, gasoline sales are expected to increase at a slightly greater rate of 2.3 percent in 2016.[3] These forecasts are consistent with national trends of increasing consumption from additional vehicle miles traveled (VMT), which is likely attributable to "generally low gasoline prices, growing employment, and rising wages" according to the EIA's Short Term Energy Outlook.



Source: Energy Information Administration, Department of Energy - EIA 782c

Supply

Regional (PADD 2) gasoline production is projected to increase by 4.1 percent for 2016 despite a 3 percent reduction in refinery utilization for the first seven months of 2016 to 91.3 percent. Although refinery runs have produced more product than last year, it is estimated that the region will end the year with reduced inventories as export markets remain strong. As of November 4th, the PADD 2 region held 48.7 million barrels of gasoline inventories, a 1.8 million or 4 percent increase over this time last year.

As mentioned in the petroleum section, gasoline supplies throughout Michigan were strained this summer after a petroleum product pipeline in Wisconsin ceased operation. This supply constraint was managed through a series of public and private sector actions. The State of Michigan successfully lobbied the federal government to extend hours of

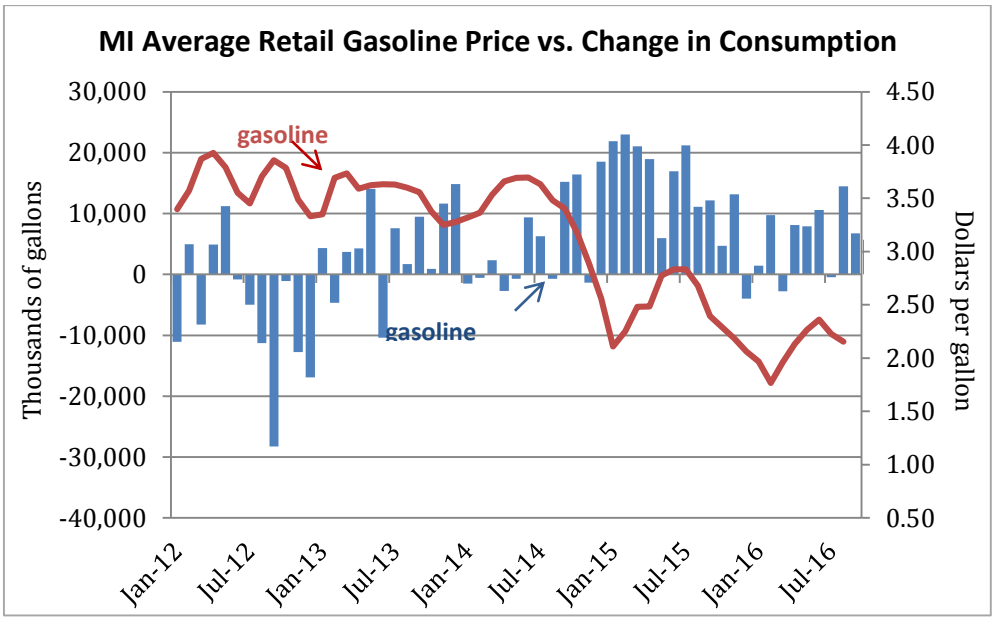
[3] The region is comprised of Illinois, Indiana, Kentucky, Michigan, Tennessee, and Ohio.

service waivers to truck drivers transporting petroleum products, and the many players that make up the supply chain for transporting and selling petroleum products responded by hiring additional drivers, purchasing additional equipment, traveling greater distances, and managing product to ensure that Michigan consumers were adequately supplied with fuel with as little impact to price as possible.

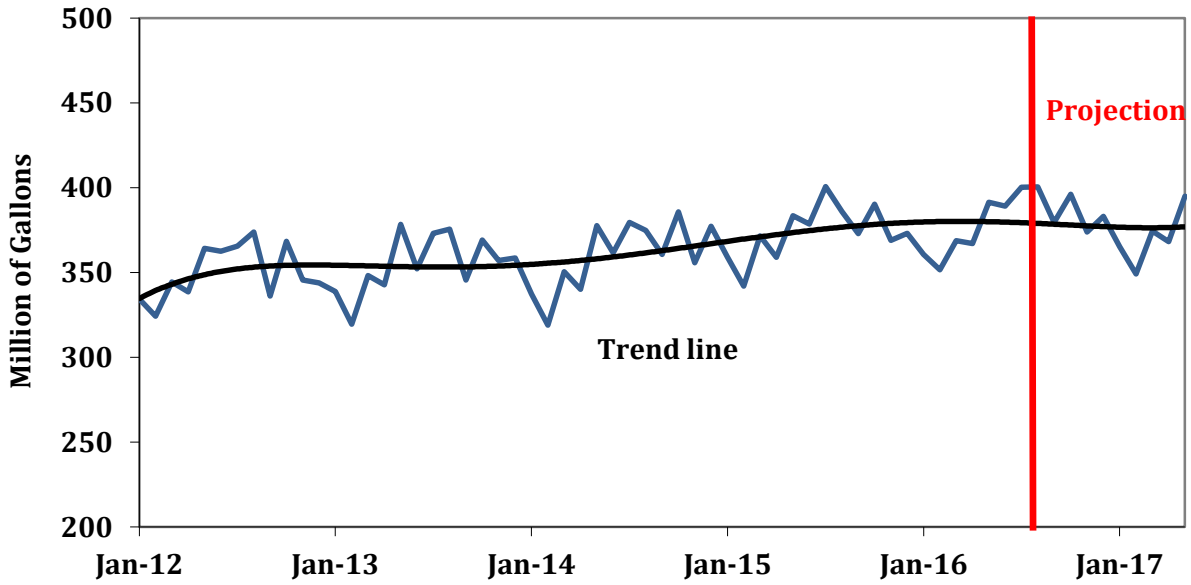
Prices

As the graph below indicates, the price of gasoline has a strong influence on consumption levels. According to AAA Fuel Report, the average price for a gallon of regular unleaded gasoline in Michigan was $2.02 on November 16, 2016, 14 cents less than the average price at this time last year ($2.16).

AAA reports that the U.S. average price for regular gasoline was $2.15 per gallon as of November 16, 2016, just 1 cent lower than the same time last year, but a striking $1.88 reduction from the record set on July 17, 2008 (46 percent decline). The EIA expects U.S. retail gasoline prices to average $2.08/gal in 2016 and $2.26/gal in 2017.



Michigan Gasoline Sales



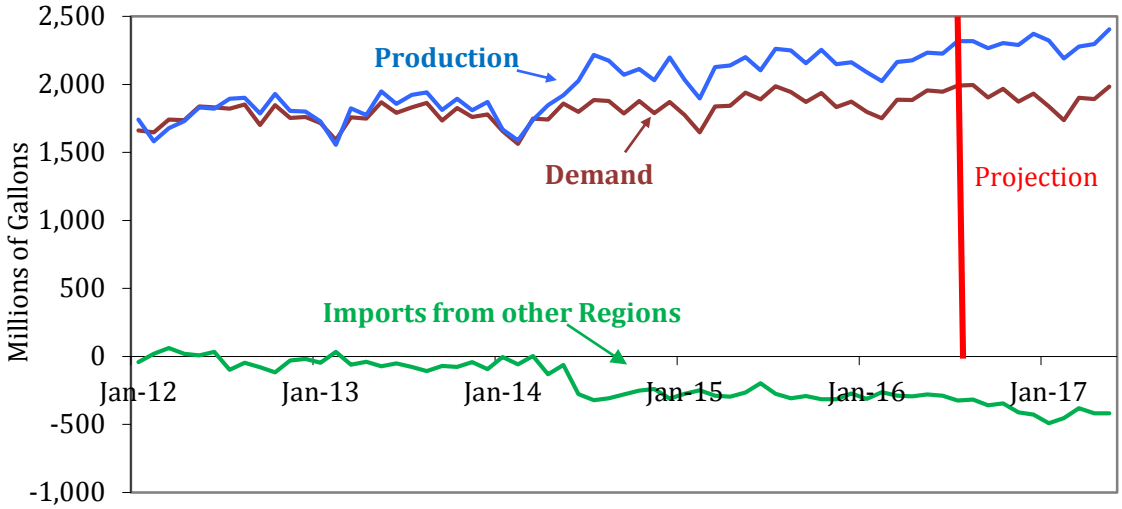
Michigan Gasoline Sales Projections

(Millions of Gallons)

		Total All Grades	Historical (prior year)	% Change
Historical 2013	Total	4,259.3	4,201.9	*1.4%*
2014	Total	4,319.9	4,259.3	*1.4%*
2015	Total	4,485.9	4,319.9	*3.8%*
2016	January	360.7	359.3	
	February	351.7	341.9	
	March	368.8	371.6	
	April	367.2	359.1	
	May	391.5	383.6	
	June	389.1	378.5	
	July	400.3	400.7	
Projection	August	400.4	385.9	
	September	379.6	372.9	
	October	396.1	390.4	
	November	373.9	368.9	
	December	383.2	373.2	
2016	Total	4,562.3	4,485.9	*1.7%*
2015-2016	Change	1.7%		
2017	January	365.1	360.7	
	February	349.2	351.7	
	March	374.5	368.8	
	April	368.2	367.2	
	May	394.9	391.5	

NOTE: These projections are based on moderate growth in Michigan's economy and stable gas prices.
SOURCE: Historical data - Energy Information Administration, U.S. Department of Energy.
Projections – Energy Security Section, MAE.

Regional Gasoline Supply and Demand



Regional Gasoline Supply and Demand

(Millions of Gallons)

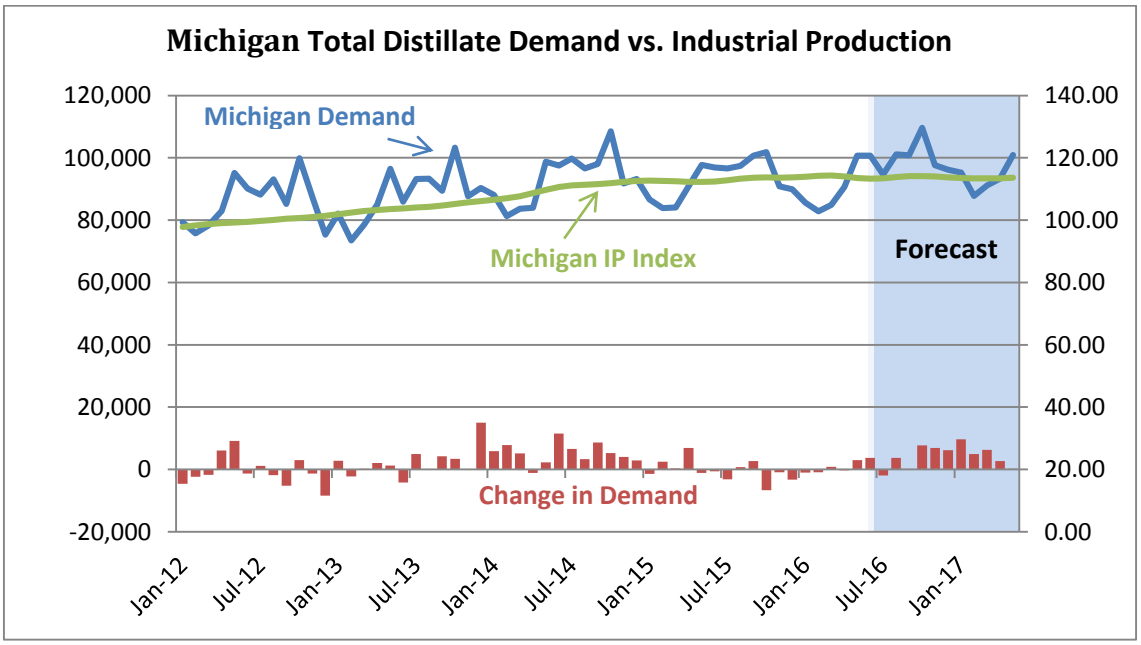
			Production	Inventories	Demand
Historical	2013	Average	1,827.7	206.1	1,772.1
	2014	Average	1,966.0	126.5	1,787.2
	2015	Average	2,144.3	91.2	1,864.4
	2016	January	2,089.8	87.5	1,798.1
		February	2,024.4	98.9	1,750.0
		March	2,165.4	88.8	1,886.6
		April	2,177.3	87.3	1,884.8
		May	2,233.8	85.3	1,956.2
		June	2,226.1	77.1	1,945.7
		July	2,318.1	81.2	1,990.1
Projection		August	2,316.9	83.6	1,996.1
		September	2,265.0	85.6	1,902.9
		October	2,302.5	75.5	1,966.0
		November	2,289.3	80.5	1,873.6
		December	2,372.4	92.7	1,932.8
	2016	Average	2,231.8	85.3	1,906.9
2016-2017 change			4.1%	-6.4%	2.3%
	2017	January	2,322.6	86.4	1,837.4
		February	2,191.0	86.2	1,737.6
		March	2,276.6	80.1	1,901.9
		April	2,297.5	66.8	1,892.8
		May	2,404.8	69.5	1,982.6

NOTE: Production projections are based on refinery utilizations and recent trends.
SOURCE: Historical data - Energy Information Administration, U.S. Department of Energy.
Projections – Energy Security Section, MAE

Distillate Fuels

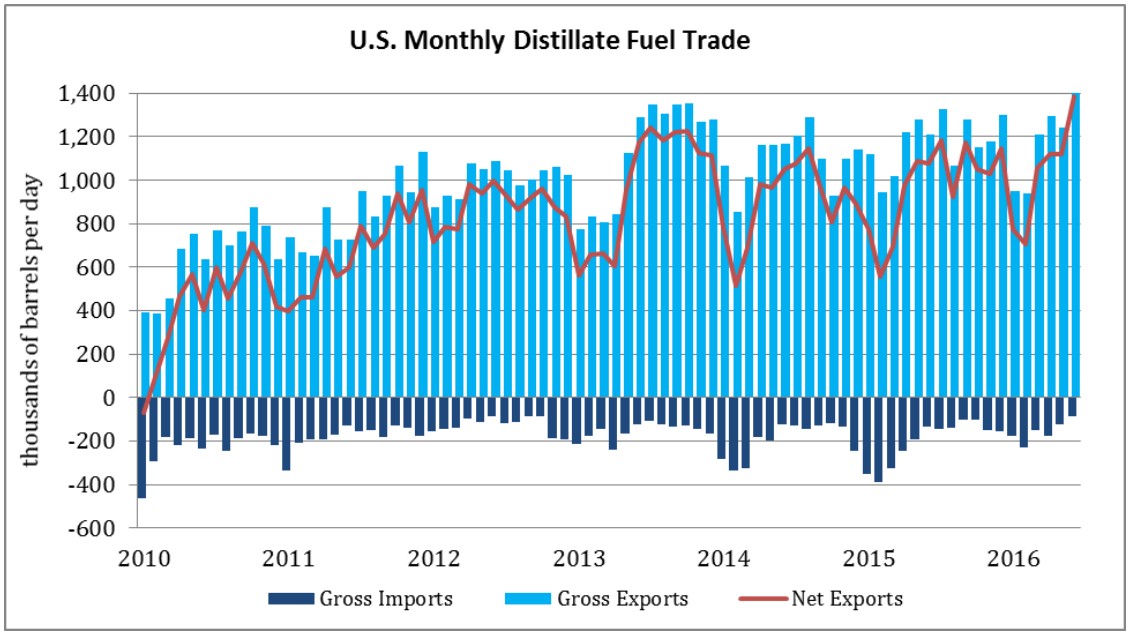
Demand

Total distillate sales in Michigan are projected to increase by 2 percent in 2016, to 1.14 billion gallons. Diesel fuel accounts, on average, for over 99 percent of the total distillate consumption, with the remainder consisting of heating oil, kerosene, and No. 1 distillate. This would mark the fourth year of growth in distillate sales, and like motor gasoline, is largely influenced by the reduction in fuel costs. Industrial production is also directly linked to distillate sales as trucking and railroad industries are large consumers of diesel fuel. Michigan's industrial production index increased about 2.1 percent in 2015 and is expected to throttle back to 0.4 percent growth for this year. Heating oil (No. 2) continues to decline as a primary fuel source for home heating in Michigan, although remains prevalent in the Northeast U.S.



Supply

Regional refineries are expected to produce an average of 730 million gallons of distillate fuel oil per month in 2016, a decrease of 4.6 percent from 2015. This decrease may be attributable to a lower refinery utilization for 2016 which averaged 91.3 percent for the first seven months, compared to 94.1 percent for 2015. For the week ending November 11, 2016, national inventories of distillate oil were 148.9 million barrels, 6 percent higher than at this time last year and above the five-year range for this time of year. Distillate stocks have remained at or above the middle of the five-year range since the beginning of this year, indicating a market that is amply supplied.



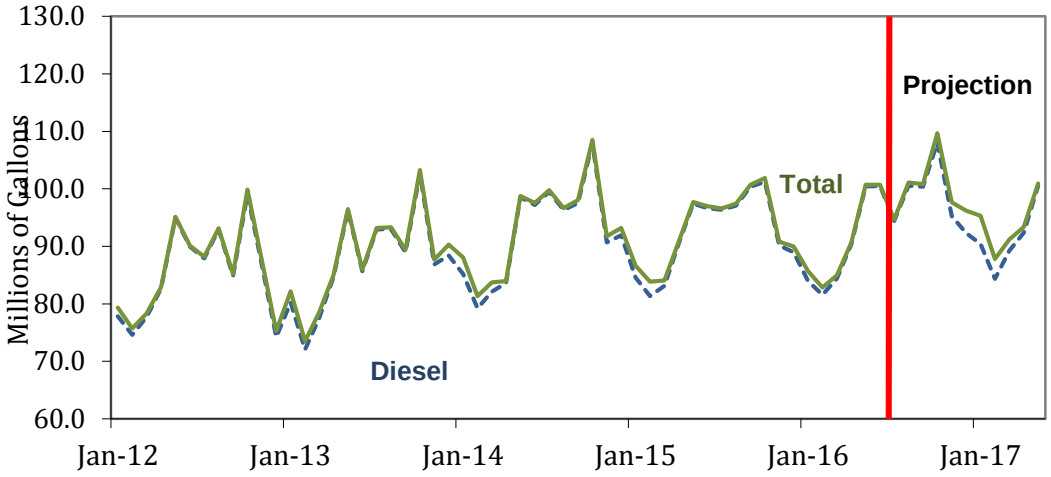
Prices

Nationally, the EIA expects retail prices for on-highway diesel fuel to average $2.31 per gallon this year, a drop of 40 cents from 2015. According to AAA Michigan, the average price of diesel in Michigan was $2.38 for November 16, 2016, 37 cents below the price seen at this time last year.

The average cost of No. 2 distillate fuel (heating oil) was $2.03 on November 14, 2016, almost 11 percent below the cost of heating oil at this time last year. The principal price driver for heating oil is the U.S. refiner acquisition cost of crude oil, which has averaged below $45 since August 2015.[4] Other factors affecting the price of heating oil include the seasonality of demand from weather conditions, competition in local markets, and regional operating costs.

[4] The refiner acquisition cost of crude oil is the cost of crude oil, including transportation and other fees paid by the refiner. The composite cost is the weighted average of domestic and imported crude oil costs.

Michigan Distillate Fuel Oil Sales



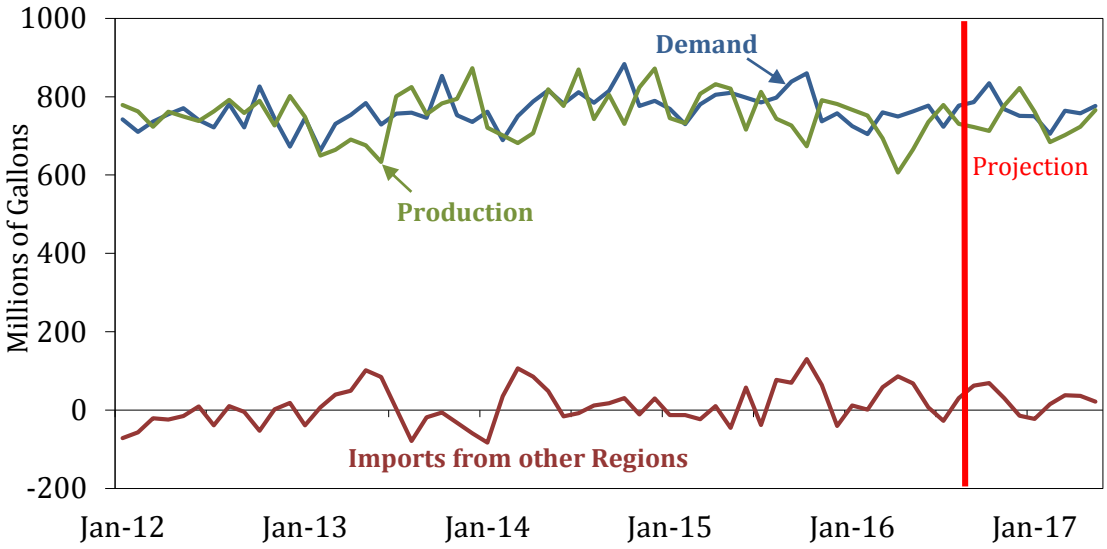
Michigan Distillate Fuel Oil Sales Projection

(Millions of Gallons)

			Diesel Fuel	Total Distillate	Prior Year	% Change
Historical	2013	Total	1049.2	1,058.8	1,030.9	2.7%
	2014	Total	1109.8	1,121.3	1,058.8	5.9%
	2015	Total	1107.9	1,117.4	1,121.3	-0.3%
	2016	January	83.9	85.7	86.7	
		February	81.6	82.9	83.8	
		March	84.4	84.9	84.1	
		April	90.4	90.6	90.9	
		May	100.4	100.7	97.7	
		June	100.5	100.7	97.0	
		July	94.4	94.6	96.6	
Projection		August	97.6	99.0	97.4	
		September	97.2	99.1	100.7	
		October	106.2	109.6	101.9	
		November	92.9	96.1	90.8	
		December	90.8	95.8	89.9	
	2016	Total	1,120.2	1,139.6	1,117.4	
2015-2016 Change			1.1%	2.0%		
	2017	January	90.4	95.3	85.7	
		February	84.3	87.8	82.9	
		March	89.3	91.2	84.9	
		April	92.4	93.3	90.6	
		May	100.6	100.9	100.7	

NOTES: These projections assume normal heating degree day accumulations for the remainder of the year.
SOURCES: Historical data -- Energy Information Administration, DOE. Projections – Energy Security Section, MAE,
* = Other Distillate is comprised of: Kerosene, No. 1 Distillate and No. 2 Fuel Oil

Regional Distillate Fuel Supply and Demand



Regional Distillate Fuel Oil Supply and Demand

(Millions of Gallons)

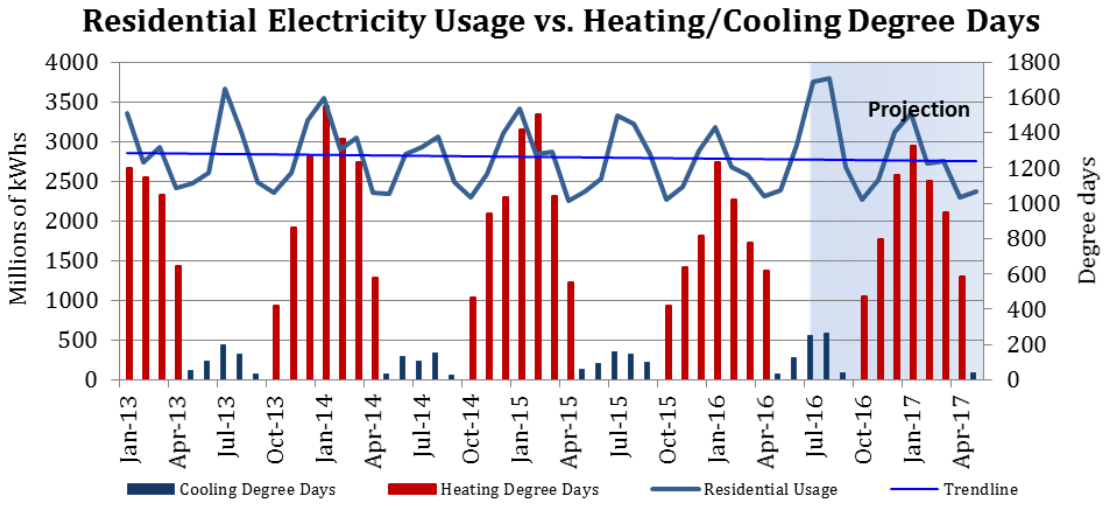
			Production	Inventories	Demand
Historical	2013	Average	741.1	493.9	750.5
	2014	Average	770.8	485.6	787.3
	2015	Average	765.3	500.8	788.9
	2016	January	766.2	562.3	724.6
		February	752.1	611.0	704.2
		March	694.2	604.0	759.6
		April	606.2	546.9	749.6
		May	665.2	517.8	762.1
		June	735.5	482.7	777.3
		July	778.8	510.5	723.6
Projection		August	730.9	494.3	777.3
		September	722.2	492.3	786.5
		October	712.5	439.2	834.7
		November	777.3	478.9	768.0
		December	821.7	535.3	751.0
	2016	Average	730.2	522.9	759.9
	2017	January	761.6	524.5	750.1
		February	683.9	518.1	705.3
		March	701.8	493.5	764.3
		April	723.6	495.6	757.3
		May	765.9	507.0	776.3

NOTES: Production projections based on expected refinery capacity utilization, recent trends, and normal weather.
SOURCES: Historical data -- Energy Information Administration, DOE; Projection – Energy Security Section, MAE

Electricity

Demand

Michigan utilities will once again head into winter with adequate reserves to meet consumer demand. Assuming normal weather, Michigan's total electric sales for 2016 are projected to increase 1.6 percent to 103.5 thousand GWh compared to 101.8 thousand GWh in 2015. This growth is expected primarily in the residential and industrial sectors and reflects ongoing efforts to reduce energy waste across all sectors. One of the primary drivers of electricity demand in the residential market is for home cooling during hot weather. The 2016 summer was about 26 percent warmer than historical averages which led to increased consumption. Industrial sector demand, which is less dependent on weather fluctuations, is expected to grow 2.5 percent, which reflects continued strength in industrial activity.



Michigan's combined coincident peak electrical demand, for both the Consumers Energy and DTE Electric service areas, this summer was 19,366 megawatts (MW) according to documents filed in Case No. U-17992. Consumers Energy's peak electric demand this summer was 7,635 MW, which occurred on August 11, 2016. DTE Electric's peak demand was 10,513 MW, which occurred a day later on August 12, 2016.

Supply

Significantly warmer-than-normal temperatures this summer placed stress on Midcontinent Independent System Operator Inc.'s (MISO) and PJM

Electric Capacity

Due to extreme temperatures, reduced capacity margins, and infrastructure outages, MISO and PJM, the wholesale energy market operators serving Michigan, will occasionally issue "max-generation" notices signifying electric capacity constraints. One notable event occurred this summer on July 21, when MISO data indicated Michigan came within 2% of requiring use of emergency capacity. Since 2010, MISO alone has issued 17 alerts, 6 warnings, and ultimately experienced 4 max-generation events in which emergency actions were taken to ensure the reliability of the electric grid.

Interconnection's (PJM) ability to meet peak demand for the summer. No supply shortages or transmission constraints are expected to affect the ability of Michigan utilities to meet winter peak electric demand, which can be up to 25 percent lower than the summer peak. In addition to power that they generate, Michigan utilities can purchase external electricity supply from wholesale markets administered by MISO and PJM as needed.

Price

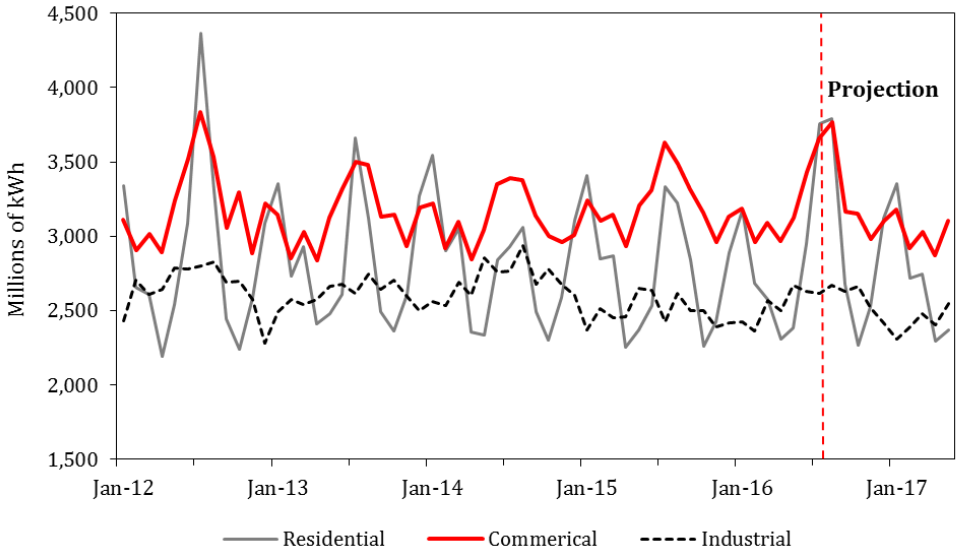
Electricity prices for rate regulated utilities have experienced moderate growth for most Michigan consumers and generally reflect changes to each company's Power Supply Cost Recovery (PSCR)[5] factors. Some utilities have seen decreases in 2016, namely, Alpena Power, Northern States Power and Wisconsin Public Service.

Michigan Rate-Regulated Utilities

	2015		2016		Percent Change	Reference Case #
	*Monthly Bill	¢/kWh	*Monthly Bill	¢/kWh		
INVESTOR OWNED						
Alpena Power	$68.87	13.774	$66.41	13.28	-3.60%	U-17910
Consumers Energy	$74.98	14.996	$76.49	15.3	2.00%	U-17918
DTE Electric	$73.11	14.622	$77.95	15.59	6.60%	U-17920
AEP (I&M) Combined	$56.36	11.272	$58.51	11.7	3.80%	U-17919
Nortern States Power	$66.69	13.338	$64.95	12.99	-2.60%	U-17913
Upper Peninsula Power	$115.22	23.044	$120.04	24.01	4.20%	U-17911
Upper Peninsula Power Iron River	$108.31	21.662	$117.55	23.51	8.50%	U-17911
Wisconsin Electric	$79.90	15.98	$80.02	16	0.20%	U-17912
Wisconsin Public Service	$58.30	11.66	$47.14	9.43	-19.10%	U-17914
COOPERATIVES						
Thumb	$69.00	13.8	$69.46	$13.89	0.70%	U-17917
*Monthly Bill calculations are based on usage of 500 kWh/month						

[5] Power Supply Cost Recovery (PSCR). Power supply costs consist of costs for purchased power, fuel, transmission, and certain environmental expenditures exclusive of profit. These costs are recovered via the PSCR base, which is included in base rates, and the PSCR factor, which is a variable component that can be adjusted monthly as power supply costs fluctuate. These costs are reviewed for prudency and reconciled to corresponding PSCR revenues on an annual basis. Any under or over recovery of PSCR revenues are charged or refunded to the customer through an increase or decrease in a subsequent month's PSCR factor.

Michigan Electricity Sales



Michigan Electricity Sales Projection

(GWh)

			Residential	Commercial	Industrial	Total
Historical	2013	Total	34,012	37,697	31,322	103,031
	2014	Total	33,514	37,347	32,446	103,307
	2015	Total	33,254	38,631	29,928	101,813
	2016	January	3,179	3,188	2,422	8,789
		February	2,683	2,964	2,366	8,013
		March	2,577	3,090	2,565	8,232
		April	2,305	2,969	2,499	7,773
		May	2,386	3,125	2,667	8,178
		June	2,951	3,430	2,628	9,009
		July	3,758	3,660	2,613	10,031
Projection		August	3,790	3,766	2,672	10,228
		September	2,679	3,169	2,630	8,478
		October	2,264	3,153	2,667	8,083
		November	2,524	2,984	2,517	8,026
		December	3,120	3,103	2,420	8,644
	2016	Total	34,217	38,601	30,666	103,484
2015-2016 change			2.9%	-0.1%	2.5%	1.6%
	2017	January	3,354	3,176	2,307	8,837
		February	2,720	2,922	2,393	8,035
		March	2,746	3,029	2,478	8,252
		April	2,298	2,873	2,407	7,578
		May	2,367	3,105	2,549	8,022

NOTE: Projected electricity sales are based on historical trends.
SOURCES: Historical Data -- Energy Information Administration, U.S Department of Energy.
Projection: Energy Security, MAE.

Michigan Household Winter Heating Fuel Summary

2016-2017 Projected Residential Heating Season Expenditures[1]

	Weather Normalized		
	10% Below	**Midpoint**	**10% Above**
Natural Gas			
Consumption (Mcf)	66	74	81
Avg. Price ($/Mcf)	$6.18	$6.18	$6.18
Expenditures ($)	$470	$516	$562
Heating Oil			
Consumption (gallons)	487	541	595
Avg. Price ($/gallon)	$2.16	$2.16	$2.16
Expenditures ($)	$1,052	$1,168	$1,285
Propane			
Consumption (gallons)	711	790	869
Avg. Price ($/gallon)	$1.70	$1.70	$1.70
Expenditures ($)	$1,211	$1,345	$1,480

[1] Projections assume a return to 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 October residential price in Michigan. All prices are assumed to hold constant over the winter. Projected usage is based on EIA and MAE data and calculations from MAE staff.

The *Winter Heating Fuel Summary* depicts what a typical Michigan household is projected to consume and spend on their primary heating fuel during the 2016-2017 winter heating season. Actual usage for any given home will depend on a number factors, including the relative energy efficiency of the home, the home's location and size, the occupants' individual heating preferences, and the number of appliances in the home which consume that particular winter fuel.

Supplies of all three fuels continue to remain at or near their 5-year highs for this time of year, which is helping to stabilize and depress the prices charged to Michigan households. Accordingly, the *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.

Although prices for natural gas, heating oil, and propane are expected to remain relatively low and comparable to where each was a year ago, overall expenditures are projected to rise this year with a projected return to cooler, more typical winter weather. Further, should this season's winter temperatures deviate from historical norms, the National Oceanic and Atmospheric Administration (NOAA) expects it is more likely to do so toward colder temperatures rather than warmer, which would impose additional heating costs on Michigan households.

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Michigan Energy Appraisal
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