WINTER 2016

SEASONAL HAZARD FORECAST

The Ohio Emergency Management Agency

Watch
Office

Current as of: October 21
Scheduled Update: December

24/7 365 days a year
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Executive Summary

This outlook forecasts potential threats that could affect Ohio this winter. Information from state and federal agencies was used to write this document. Based on this information the following projections are made:

1. Ohio is forecast to experience near-normal winter temperatures.
2. Most of Ohio is forecast to experience above-average precipitation.
3. Ohio is not projected to experience heating fuel shortages this winter.
4. ODOT does not anticipate a shortfall in road salt or brine supply.
5. Multiple planned events are scheduled for this winter, which are possible targets for terrorist attack.
6. The post-election period in November may result in protests.
7. CDC does not report any shortfalls in influenza vaccine production.

Weather

The Ohio EMA Watch Office has developed this analysis to provide an in-depth look at the climate forecast for December, January and February. This report includes forecasts and data from leading federal agencies charged with producing temperature, precipitation, and La Nina/El Nino outlooks. Current forecasts indicate that the winter will see near-normal temperatures with above-average precipitation. La Niña conditions are expected to develop this fall and persist through the winter months. Drought conditions will not have a significant impact and are expected to remain at or below current levels.

TEMPERATURE OUTLOOK

The National Oceanic and Atmospheric Administration (NOAA) is forecasting that Ohio will have an equal chance for above and below average temperatures for the months of December, January, and February (DJF). Figure 1 contains a table listing average high temperatures at select cities for DJF. Figure 2 below depicts NOAA's temperature forecast for DJF. Increased probabilities for above-normal temperatures exists across the southern United States. This is largely due to warming trends over the past few decades and the associated reduction and delay in sea ice formation. These predictions are based on the latest climate computer model simulations, historical trends, and current weather conditions.

City	Average High Temperature		
	December	*January*	*February*
Columbus	39.3	36.0	39.6
Cleveland	38.3	34.4	37.5
Cincinnati	43.2	40.1	44.7
Akron	37.1	33.9	37.2
Toledo	36.4	32.6	36.0
Athens	41.0	37.4	41.6
Dayton	38.1	34.7	38.9
Portsmouth	44.4	41.0	45.0

Figure 1: Average (1981-2010) Monthly High Temperature by City[1]
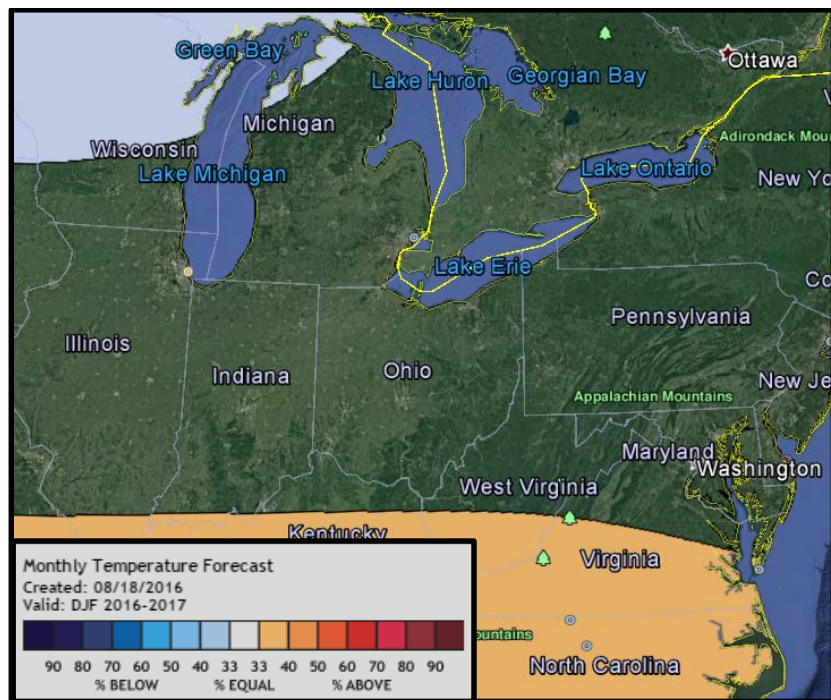

Figure 2: Temperature forecast for NDJ. Source: Climate Prediction Center[2]

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[1] National Climatic Data Center (2016) Data Tools: 1981-2010 Normals, Source:
http://www.ncdc.noaa.gov/cdo-web/datatools/normals
[2] Climate Prediction Center (2016) CPC Outlooks, Source: http://www.cpcpara.ncep.noaa.gov/

As the graph below demonstrates, Ohio's average temperature during the winter season has trended upward on almost a yearly basis since the mid 1970's. This graph depicts the average temperature throughout the season, not the average high temperature. Based upon this information, it is reasonable to expect that this winter will again be warmer than usual.
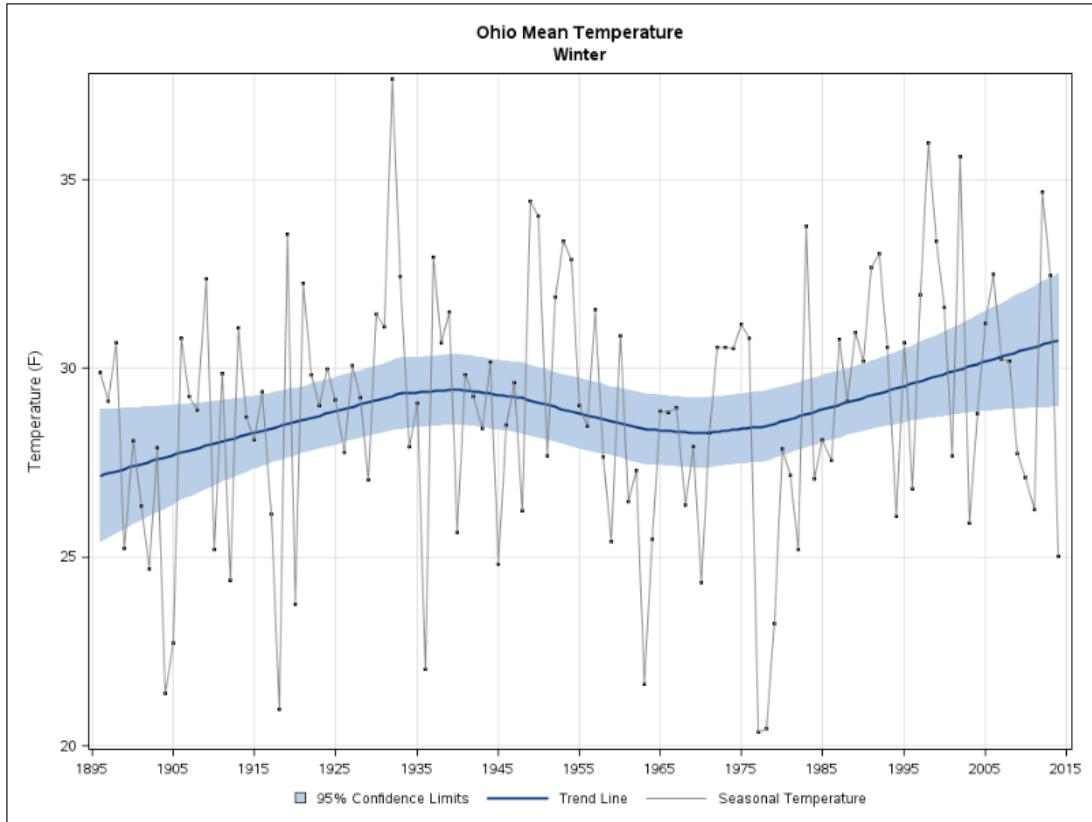

Figure 3: Mean winter temperature for Ohio. Source: National Climatic Data Center[3]

PRECIPITATION OUTLOOK

Average monthly precipitation amounts for select cities in Ohio are listed in Figure 4. These averages reflect total liquid precipitation that falls in a typical month. Snowfall accumulations are included in the averages, but are calculated by melting the snow to a liquid. The Climate Prediction Center is forecasting that much of Ohio will likely see above average precipitation over the winter. A 33-40% chance for rain and snow totals that are greater than average is currently forecast (Figure 5). During July, insufficient rainfall coupled with above normal temperatures contributed to an increase in short-term drought across parts of Ohio. Recent precipitation that has fallen in drought-stricken areas combined with expected above normal precipitation during the fall and winter months will allow for drought conditions to improve or remain at levels that will not produce significant impacts.

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[3] National Climatic Data Center (2016) State Annual and Seasonal Time Series, Source: https://www.ncdc.noaa.gov/temp-and-precip/state-temps/

City	Average Liquid Precipitation (inches)		
	December	*January*	*February*
Columbus	2.81	2.53	1.97
Cleveland	3.10	2.72	2.34
Cincinnati	3.15	2.82	2.54
Akron	2.58	2.18	1.95
Toledo	2.68	2.05	2.07
Athens	3.00	2.60	2.59
Dayton	3.12	2.71	2.24
Portsmouth	3.23	3.05	2.78

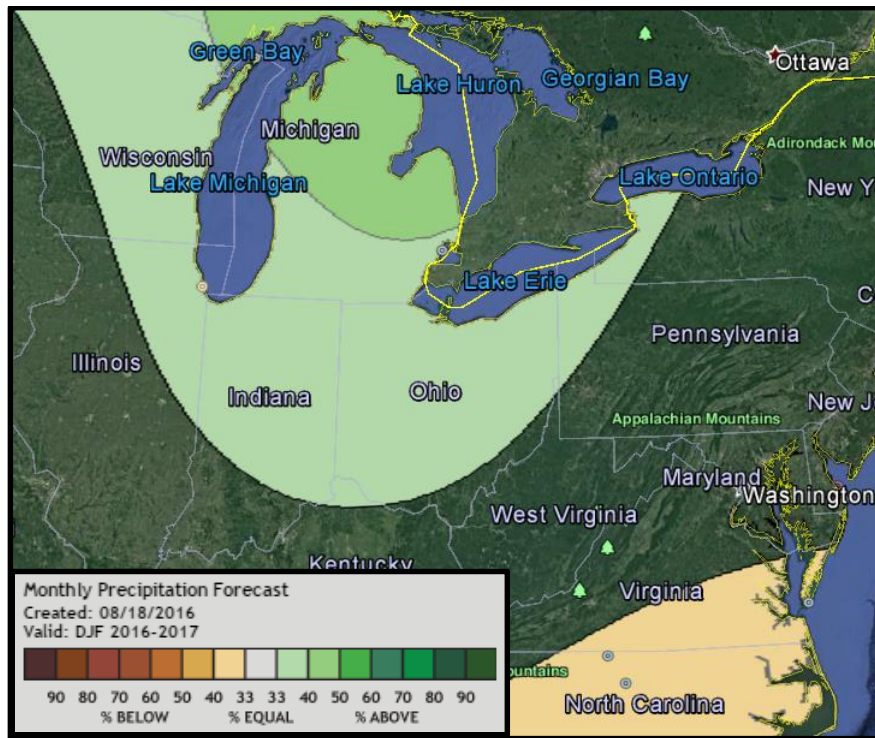*Figure 4: Average (1981-2010) Monthly Precipitation by City[4]*

Figure 5: Precipitation Forecast for NDJ. Source - Climate Prediction Center[5]

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[4] National Climatic Data Center (2016) Data Tools: 1981-2010 Normals, Source: http://www.ncdc.noaa.gov/cdo-web/datatools/normals

[5] Climate Prediction Center (2016) CPC Outlooks, Source: http://www.cpcpara.ncep.noaa.gov/

LA NIÑA

The Climate Prediction Center, a branch of NOAA, has issued a La Niña Watch for fall 2016 and winter 2017. Forecasters indicate that a 70% chance of mild La Niña conditions developing this fall and persisting through the winter months in the Northern Hemisphere[6]. La Niña effects have historically been the strongest during the winter months. For the Midwest, fall tends to be warmer and drier than normal while winter is wetter than normal as seen in Figure 6 below. However, there are also many other complicated factors in the atmosphere and oceans that can impact Ohio's weather patterns.
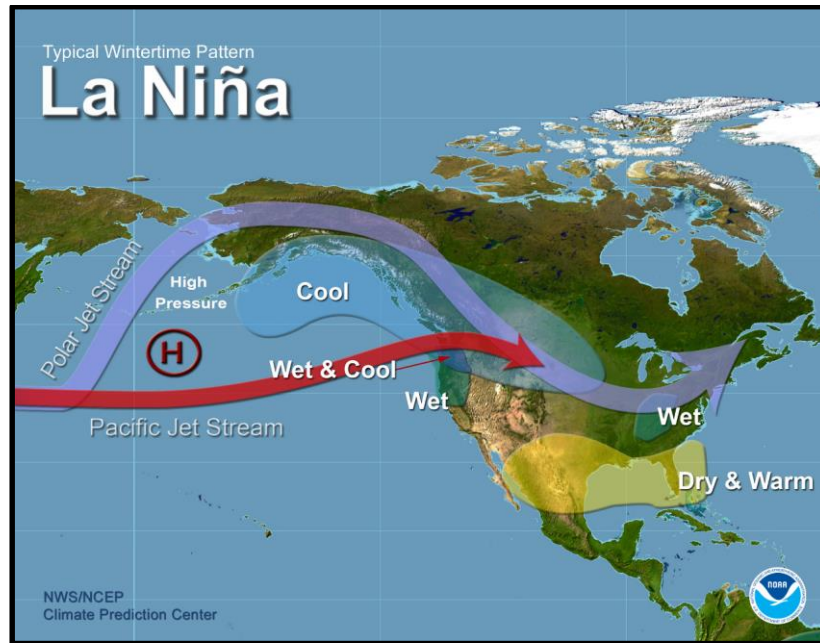

Figure 6: A typical winter weather pattern during La Nina[7]

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[6] Climate Prediction Center (2016) El Nino/La Nina Southern Oscillation Diagnostic Discussion, Source: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml
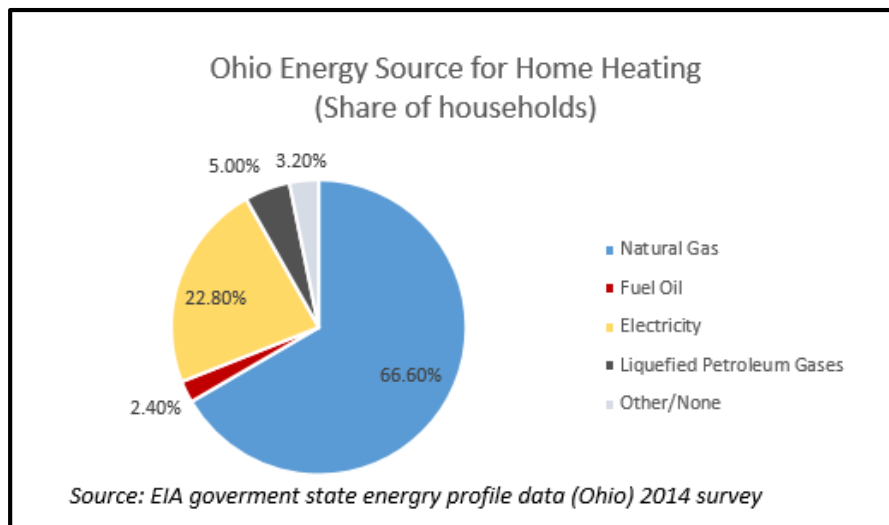[7] Pacific Maritime Environmental Laboratory, Explaining El Nino, Source: http://www.pmel.noaa.gov/elnino/what-is-la-nina

Heating Fuel Supply

The US Energy Information Administration (EIA) in its Winter Fuels Outlook does not project that heating fuel shortages will occur this winter. Consumers are forecast to spend more money on fuel this year than last year, but less than they did from 2010-14 when fuel prices were elevated. The US Department of Agriculture (USDA) predicts low to moderate usage of heating fuel to dry crops this fall.

Projected changes in average U.S. household heating fuel expenditures from last winter are:

- 11% higher for homes that heat primarily with natural gas
- 20% - 38% higher for homes using heating oil
- 30% higher for homes using propane heat
- Expenditures may decrease if the region experiences slightly warmer winter temperatures.[8]

Ohio Energy Source for Home Heating
(Share of households)

Natural Gas 66.60%
Fuel Oil 2.40%
Electricity 22.80%
Liquefied Petroleum Gases 5.00%
Other/None 3.20%

Source: EIA goverment state energry profile data (Ohio) 2014 survey

PROPANE

About 5% of all U.S. households heat primarily with propane. EIA expects these households to spend less this winter than average, but this will still be more than last winter.[9] The projected increase varies across regions. EIA expects that households heating with propane in the Midwest will spend an average of $290 (30%) more than last winter, reflecting prices that are about 14% higher and consumption that is 13% higher than last winter.
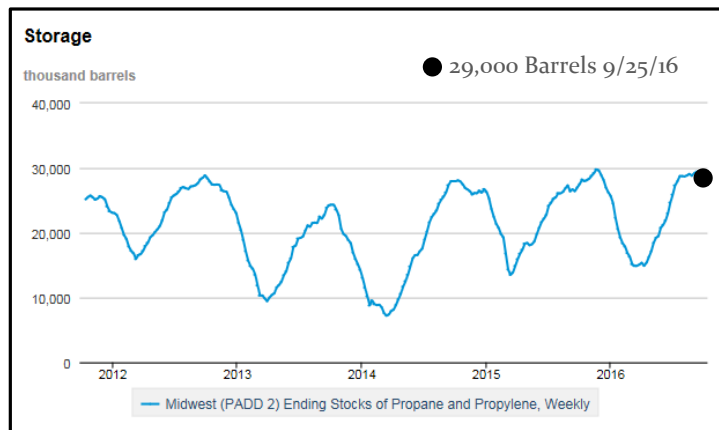
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[8] Energy Information Administration. Winter Fuels Outlook October 2016.
http://www.eia.gov/forecasts/steo/special/winter/2016_winter_fuels.pdf
[9] Energy Information Administration. Winter Fuels Outlook October 2016.
http://www.eia.gov/forecasts/steo/special/winter/2016_winter_fuels.pdf
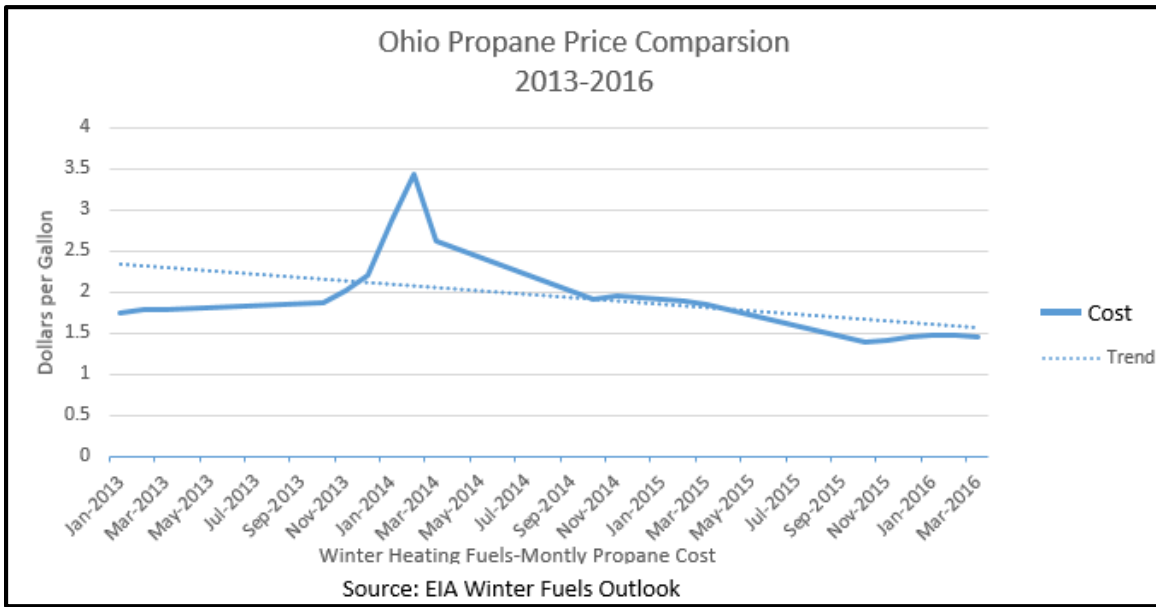
Source: U.S. Energy Information Administration-U.S. Propane Stocks

Heading into the winter months, U.S. inventories of propane and propylene reached 104 million barrels during the first week of October, one of the highest levels since EIA began collecting weekly propane inventory statistics in 1993 and 19 million barrels higher than at the same time period in 2014.[10]

[10] Energy Information Administration. Winter Fuels Outlook October 2016.
http://www.eia.gov/forecasts/steo/special/winter/2016_winter_fuels.pdf
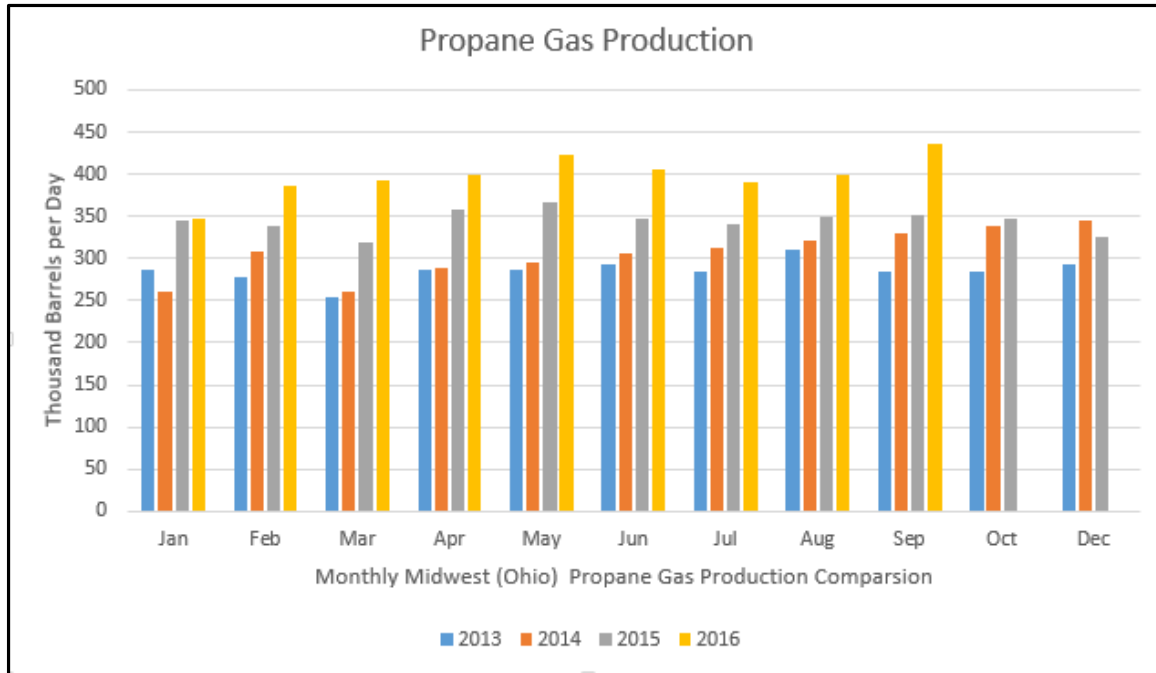
Source: U.S. Energy Information Administration-PADD 2 Propane Production data (Ohio) 2013-2016

EIA reports that due to higher inventory levels and improved rail delivery networks there are more robust propane supply chains than two years ago, when the Midwest saw prices spike during extremely cold weather. However, local markets could still see tight supply conditions, particularly in cases of severely cold temperatures.[11]

NATURAL GAS

Nearly half of all U.S. households' heat with natural gas, and the average household could expect a 22% increase in natural gas expenditures this winter compared with last winter given the U.S. Energy Information Administration base case for temperatures.

EIA forecasts a 10% increase in residential natural gas consumption this winter as temperatures are expected to be slightly colder than last winter. Additionally, residential prices for natural gas this winter are forecast to be 11% higher than last winter.

Natural gas inventories have risen consistently during the storage injection season that typically runs from April through the end of October. EIA projects inventories will total 3,966 Billion Cubic Feet (Bcf) at the end of October, which would be a record high going into the heating season. Strong storage injections this summer reflect high summer production and expanded storage capacity. If early fall heating demand is low, it is possible that inventories could top 4,000 Bcf during November. Under the base case winter forecast, EIA expects inventories to end the winter at

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[11] Energy Information Administration. Winter Fuels Outlook October 2016.
http://www.eia.gov/forecasts/steo/special/winter/2016_winter_fuels.pdf

1,896 Bcf. Even in the event of another cold winter, EIA does not expect stocks to fall below 1,000 Bcf by the end of this heating season.[12]

HEATING OIL

EIA expects households heating primarily with heating oil to spend an average of $378 (38%) higher than last winter, reflecting retail prices that are 42 cents/gal (20%) higher and consumption that is 15% higher. In the 10%-colder-weather scenario, projected expenditures are $556 higher than last winter, with prices that are 50 cents/gal (25%) higher than last winter.[13]

Heating oil prices are expected to be slightly higher than last winter because of crude oil prices that are expected to increase by 24% over last winter.

Brent crude oil prices are forecast to remain below levels in recent years as the global oil market continues to experience an excess of supply to consumption. However, crude oil prices are highly uncertain, and any deviation in crude oil prices from forecast levels would cause a similar deviation in retail heating oil prices and consumer expenditures

Distillate fuel supplies are also ample heading into the winter. Slowing economic growth in emerging economies, which have been major drivers of distillate consumption in recent years, has reduced growth in global demand for distillate fuel. Additionally, relatively strong gasoline refining margins during the past summer encouraged record-high global refinery runs.

CROP DRYING

The U.S. Department of Agriculture (USDA) reports that the U.S. could see a record 15.2 billion-bushel corn harvest this fall. Despite this news, the need for crop drying is expected to have a light to moderate crop drying demand for propane.

Late harvesting and weather conditions will dictate the need for some crop drying this fall. Last year, the LPGas industry reported only 3 billion barrels used for U.S. crop drying operations.[14]

- Demand is down by 5 million barrels since 2009 and 4 million barrels since 2014.
- Gas producers predict only 2 million barrels for this year's crops.

The USDA attributes the expected lower demand for crop drying for this year's harvest, due to several factors:

- Growing conditions have been good and in many cases corn may come out nearly ready to go into the elevator.
- Farmers were able to plant their corn early and in many cases is maturing on schedule.

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[12] Energy Information Administration. Winter Fuels Outlook October 2016. http://www.eia.gov/forecasts/steo/special/winter/2016_winter_fuels.pdf

[13] Propane demand for crop drying looking bearish, Clifton Linton, editor, Energy Transport Insider, https://ltnllcdotcom.wordpress.com/2016/08/25/propane-demand-for-crop-drying-looking-bearish-despite-projections-of-record-corn-harvest/

[14] Propane demand for crop drying outlook –LPGas Magazine http://www.lpgasmagazine.com/crop-drying-outlook-what-propane-retailers-can-expect-from-fall-gallon-sales/

- The harvested corn could have a moderate moisture level and require minimal heated drying.
- If any drying is required most could be done with electric fans-air dry process.
- 2015 fall harvest yielded a light crop drying season and farmers had a significant gas supply carry-over for this year's harvest.

ELECTRICITY

Households heating primarily with electricity are forecast to spend an average of 5% more this winter, as a result of 5% higher residential electricity prices and 5% higher consumption than last winter. About 39% of all U.S. households rely on electricity as their primary heating source, ranging regionally from 15% in the Northeast to 63% in the South.

EIA expects the annual average U.S. residential electric price to fall by 0.6% during the winter of 2016 and then rise by 3.0% in 2017.

Winter Driving Preparedness

ODOT is currently inventorying salt to prepare for the upcoming winter season. Overall, ODOT is at 90% salt capacity. Of the 12 ODOT districts, all but three are at or above 90% salt capacity levels, and the three below 90% are above 82%.[15] ODOT continues to prepare for the winter season by strategically increasing salt stockpiles across Ohio.

ODOT has 3 Operating Posts (OPs) with less than or equal to 25% stock availability, and 7 OPs with less than or equal to 50% stock availability.[16] While ODOT works to stock all OPs to full capacity, it is filling stockpiles strategically and will transport salt across the state to critical areas if needed.

ODOT District Salt Stock and Storage Capacities in Tons

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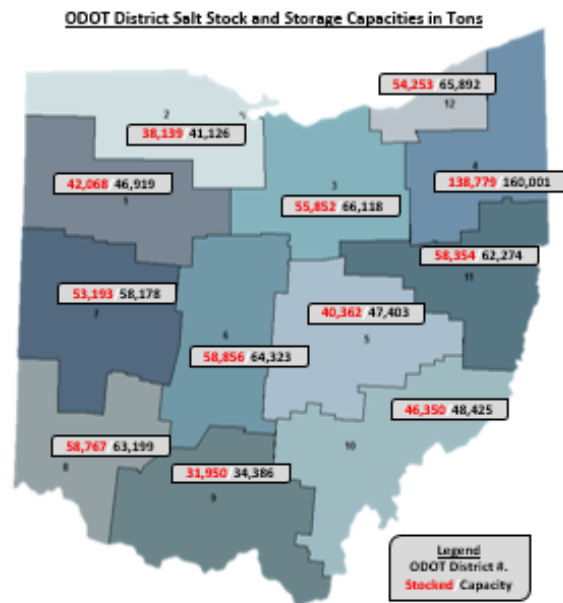
[15] *Information provided by Samuel Grier of Ohio Department of Transportation. October 4, 2016.*
[16] *Information provided by Samuel Grier of Ohio Department of Transportation. October 4, 2016.*

ODOT ACTIONS

A number of logistic-related actions have been taken by ODOT to ensure adequate levels of salt are available and appropriately placed for application during the winter of 2016-2017. These actions include securing salt during summer months to ensure adequate coverage during winter, and increasing the use of brine. From October 2016 to March 2017, ODOT has contracts to replenish diminishing salt stockpiles.[17] Counties will also monitor and place orders to maintain adequate levels of salt. ODOT is increasing the use of brine. Salt often bounces and scatters during application, leaving less of the salt on the travel lanes. Introducing a liquid (salt brine or other approved liquids), just prior to the salt being discharged from the truck, reduces the bounce and scatter of salt. Applying these liquids can reduce the amount of salt used. In addition to helping salt inventories last longer, salt brine is also used as a pretreating agent. Applied directly to roadways before a storm, brine dries and leaves a layer of salt residue which melts and prevents snow from bonding to the pavement.[18] This does not permanently prevent snow from bonding to the roadway, but gives ODOT extra time to mobilize crews and treat roads.

Salt and Brine Consumption

ODOT plans to increase its use of brine and manufactures brine internally. Brine costs $0.12 per gallon ($0.12 for about every 30 tons), while the current salt contract costs Ohio $43.00 per ton. ODOT currently has 677,665 tons of salt with an overall capacity of 750,000 tons of salt. Last winter, 2015-2016, Ohio used 544,960 tons of salt and 16,821 tons of brine.[19]
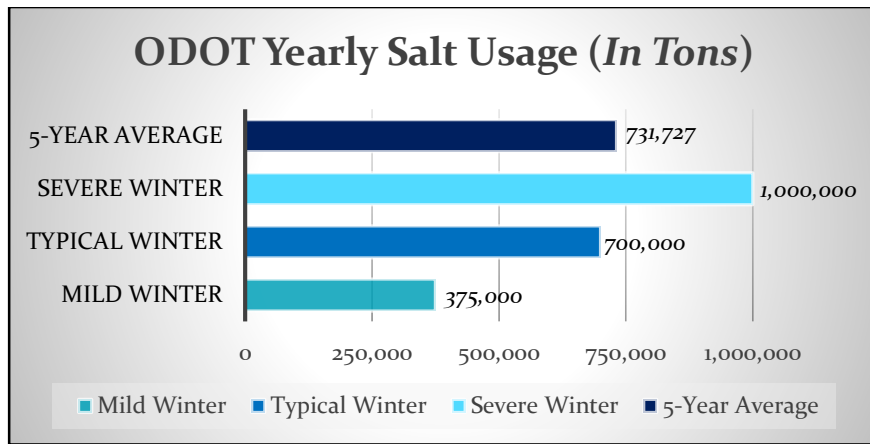
Average Yearly Salt Usage by ODOT[20]

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[17] *Information provided by Dean Alatsis of Ohio Department of Transportation. September 29, 2016.*
[18] *Information provided by Dean Alatsis of Ohio Department of Transportation. September 29, 2016.*
[19] *Information provided by Samuel Grier of Ohio Department of Transportation. October 4, 2016.*
[20] *Information provided by Samuel Grier of Ohio Department of Transportation. October 4, 2016.*

Scheduled High Profile Events

In the current environment, we are particularly concerned about homegrown violent extremists who could strike with little or no notice. The tragic events of the last six months with the Orlando nightclub shooting, IED explosions in New York and New Jersey, and mass stabbings in Minnesota all reinforce this. Accordingly, increased public vigilance and awareness continue to be of utmost importance.

The Department of Homeland Security advises that terrorist-inspired individuals and homegrown violent extremists may be encouraged or inspired to target public events or places.[21] As we saw in the attacks in the U.S. and overseas, terrorists will consider a diverse and wide selection of targets for attacks.

Terrorist use of the Internet to inspire individuals to violence or join their ranks remains a major source of concern. In the current environment, DHS is also concerned about threats and violence directed at particular communities and individuals across the country, based on perceived religion, ethnicity, nationality or sexual orientation.[22]

Ohio EMA identified seasonal events taking place this winter where 10,000 or more people are likely to gather at one time and could present a target for a high profile attack. There are many outdoor festivals in Ohio which are not listed which could also qualify, especially due to the lack of physical security, screening, and barriers.

In addition, based on the divisiveness of the current presidential election, the time period immediately following the announcement of the popular vote and the day of the inauguration could be tenuous for major metropolitan areas of Ohio. Organized protests announced via social media platforms are likely depending on the election outcome and the response of the candidate who failed to gain the necessary electoral votes to win.

Our assessment of the highest profile events for Ohio from November 2016 through early March 2017 are the following:

| High Profile Event	Date(s)	Location
National Election	November 8, 2016	Local polling places
Columbus International Festival	November 12-13, 2016	Ohio Expo Center
U.S. Presidential Inauguration	January 20, 2017	U.S. Congress
Arnold Sports Festival-Columbus	March 3-5, 2017	Columbus Convention

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[21] NTAS Advisory 2016.001-B
[22] NTAS Advisory 2016.001-B

Influenza

INFLUENZA SEASON

Seasonal influenza, also known as the flu, is an illness that causes fever, headache, tiredness, cough, sore throat, nasal congestion and body aches. It is usually spread from person to person by coughing and sneezing. Flu season in Ohio can begin as early as October and run as late as March. However, it is not uncommon for sporadic cases to appear all year long. [23] Neither CDC nor ODH publish forecasts on the severity of an upcoming influenza season.

The Ohio Department of Health provides weekly reporting on influenza activity from October through May. According to the five-year average for Ohio, peak influenza activity occurs in early January, although this can vary. During last year's season, peak influenza activity in Ohio did not occur until mid-March (See ODH provided chart below).[24]
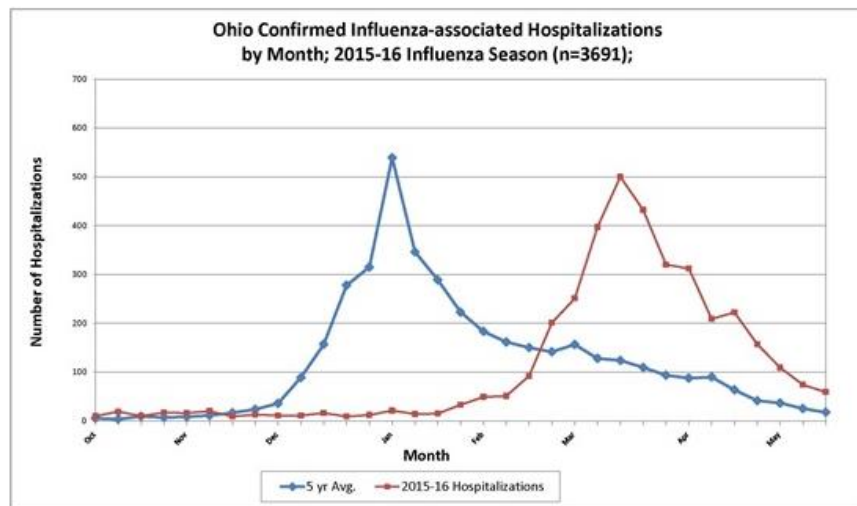
INFLUENZA VACCINES

The Centers for Disease Control and Prevention (CDC) recommends a yearly flu vaccine for everyone six months old and older.[25] Flu vaccine is manufactured by private suppliers, these suppliers have indicated that 157 to 168 million doses of vaccine will be made available nationally for this season. The most vaccine doses ever distributed in the United States was 155.1 million during the 2009-2010 season (See chart below).[26]
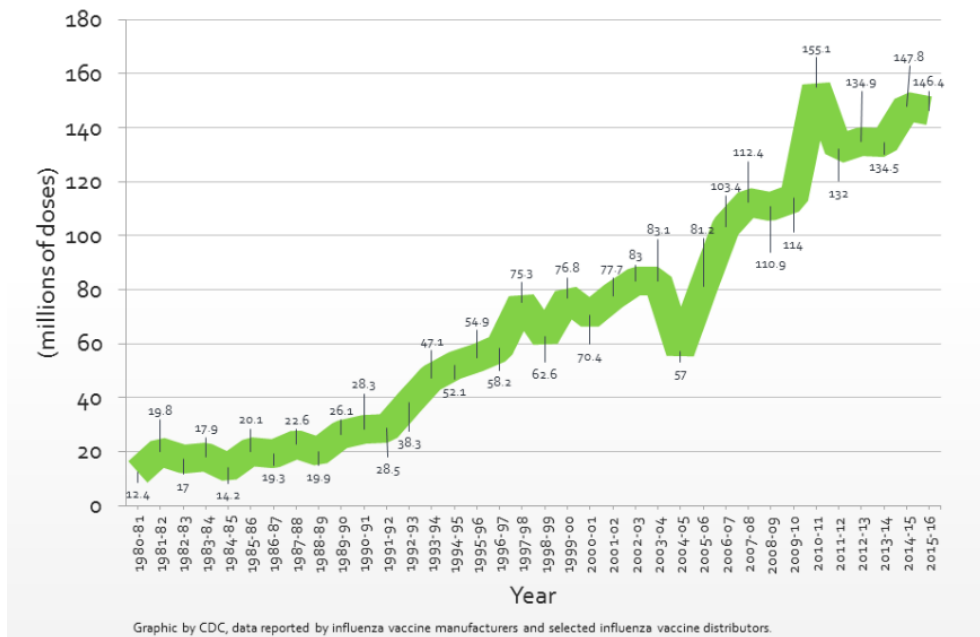
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[23] Ohio Department of Health, accessed October 8, 2016
http://www.odh.ohio.gov/features/odhfeatures/seasflu/seasonalinfluenza.aspx/
[24] Ohio Department of Health, accessed October 8, 2016
https://www.odh.ohio.gov/features/odhfeatures/seasflu/Ohio%20Flu%20Activity.aspx
[25] CDC, accessed October 8, 2016 http://www.cdc.gov/flu/about/season/flu-season-2016-2017.htm
[26] CDC, accessed October 8, 2016
http://www.cdc.gov/flu/professionals/vaccination/vaccinesupply.htm

Influenza Vaccine Distribution (CDC)

Flu vaccines are designed to protect against the influenza viruses that experts predict will be the most common during the upcoming season. Three kinds of influenza viruses commonly circulate among people today: Influenza A (H1N1) viruses, influenza A (H3N2) viruses, and influenza B viruses. Each year, these viruses are used to produce seasonal influenza vaccine.

The 2016- 2017 trivalent influenza vaccine is made from the following three viruses:

• A/California/7/2009 (H1N1) pdm09-like virus

• A/Hong Kong/4801/2014 (H3N2)-like virus

▪ B/Brisbane/60/2008-like virus). This is a B/Victoria lineage virus.[27]

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[27] Ohio Department of Health, accessed October 8, 2016
http://www.odh.ohio.gov/features/odhfeatures/seasflu/seasonalinfluenza.aspx/