



## Winter Fuels Outlook

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EIA forecasts that average household expenditures for all major home heating fuels will rise this winter because of expected colder weather and higher energy costs. Average increases vary by fuel, with natural gas expenditures forecast to rise by 12%, home heating oil by 17%, electricity by 8%, and propane by 18%. Most of the increase reflects expected colder weather rather than higher energy costs. A warmer-than-forecast winter would see lower increases in expenditures, and a colder-than-forecast winter would see higher increases in expenditures.

For the purposes of this outlook, EIA considers the winter season to run from October through March. The average household winter heating fuel expenditures discussed in this supplement are a broad guide to changes compared with recent winters. Fuel expenditures for individual households are highly dependent on the size and energy efficiency of individual homes and their heating equipment, along with thermostat settings, local weather conditions, and market size (see [Winter Fuels Outlook table](#)).

Temperatures this winter, based on the most recent forecast of heating degree days from the National Oceanic and Atmospheric Administration (NOAA), are expected to be colder than last winter across the country. However, last winter was significantly warmer than normal. On average, temperatures across the United States are expected to be 13% colder than last winter, with forecasts ranging from 27% colder than last winter in the South region to 4% colder than last winter in the West.

Despite the expectation of colder temperatures compared with last winter, temperatures across the eastern United States are expected to be comparable to the average of the previous five winters. In the West, temperatures are forecast to be about 7% colder than the previous five-winter average. However, recent winters provide a reminder that weather can be unpredictable; the winters of 2013–14 and 2014–15 were generally colder than normal, while the past two winters were much warmer than normal. Recognizing this potential variability, the *Winter Fuels Outlook* includes forecasts for scenarios where heating degree days in all regions are 10% higher (colder) or 10% lower (warmer) than forecast.

**Natural Gas.** Nearly half of all U.S. households heat primarily with natural gas. EIA expects households heating primarily with natural gas to spend \$69 (12%) more this winter compared with last winter. The increase in forecast expenditures compared with last winter is driven by a 9% increase in consumption and a 2% increase in price. For the winter of 2017–18, residential natural gas prices are forecast to average \$10.36 per thousand cubic feet (Mcf) and average consumption is forecast to total 62 Mcf per household. The increase in consumption reflects forecast heating degree days that are 13% higher this winter compared with last winter.

Although forecast residential natural gas prices are expected to be 2% higher this winter compared with last winter, Henry Hub spot prices are expected to average \$3.18 per million British thermal units (MMBtu) (\$3.30/Mcf) this winter, which is 5% higher than last winter. Higher forecast Henry Hub prices reflect higher expected use of natural gas across all consuming sectors and higher expected natural gas exports. Increases in Henry Hub prices generally pass through to residential prices slowly over a long period. The rates utilities charge for delivered natural gas can be set by state utility commissions a year or more in advance and reflect the cost of natural gas purchased over many months. Also, residential prices include charges to cover utility operating costs and the cost to transport and distribute natural gas that are not directly linked to spot market prices.

Under a 10% colder scenario, EIA projects residential natural gas consumption and prices to be 18% and 1% higher, respectively, than last winter and average expenditures to be 20% higher compared with last winter. Under a 10% warmer scenario, which would still be colder than last winter, EIA projects natural gas consumption to be less than 1% higher than last winter, prices to be 2% higher and expenditures to be 3% higher than last winter.

EIA projects natural gas inventories will total 3.8 trillion cubic feet (Tcf) at the end of October, based on expected injection rates. During the first three months of the 2017 injection season, which starts in April, the rate of natural gas inventory builds was lower than the five-year average. However, cooler-than-average temperatures in August reduced the use of natural gas for electricity generation, which contributed to builds that were above the five-year average during August 2017 and September 2017.

The differential between pricing hubs in Appalachia and Louisiana (Henry Hub) is expected to persist. Pipeline constraints in the Appalachian region continue to pose challenges for natural gas produced from the Marcellus and Utica regions in Ohio, Pennsylvania, and West Virginia. Heading into this winter, two pipeline projects expected to come online to alleviate some of the constraints to moving that natural gas to demand centers in the Midwest have been delayed. The 3.25 billion cubic feet per day (Bcf/d) [Rover Pipeline Project](#) was slated for completion in November 2017, but its current in-service date is the first quarter of 2018. Currently, Rover is delivering 0.6 Bcf/d of natural gas from eastern Ohio's Cadiz Ohio River System to pipeline interconnects in northwest Ohio. The in-service date of the [Nexus Gas Transmission Project](#), designed to deliver 1.5 Bcf/d of natural gas supplies out of the Utica region has also been pushed back (from the fourth quarter of 2017 to the first quarter of 2018).

In the last several years, there have been some pipeline projects completed to alleviate constraints for Appalachian gas. Last November, the [Algonquin Incremental Market \(AIM\) Project](#) came online to deliver gas from the Marcellus region in Pennsylvania to New England. This November, the New England market will be serviced by an additional 0.13 Bcf/d from the [Atlantic Bridge](#) pipeline, and the [Connecticut Expansion Project](#) will add about 0.07 Bcf/d of capacity.

New England also has access to liquefied natural gas (LNG) imports (from the Massachusetts based facilities at Everett and the offshore Northeast Gateway, with peak regasification capacities of 1.0 and 0.6 Bcf/d, respectively). S&P Global data indicate that the Algonquin Citygate forward prices have reached almost \$9/MMBtu for January and February 2018. In an especially cold winter, the Boston area could outcompete other destinations for LNG cargoes.

The Northeast also receives imports of natural gas from Canada. To remain competitive with Marcellus natural gas, [TransCanada has reduced and simplified its toll rates](#) for its Mainline pipeline, which sends natural gas produced in Western Alberta to demand centers in eastern Canada, New York, and Pennsylvania. Contracts under the new rate structure can be entered into by November 1, 2017, with approval from Canada's National Energy Board. This increased competition between Appalachian natural gas and imported Canadian natural gas could encourage supplies to flow to the Northeast region especially during the winter season when demand is elevated and pipelines into New England are often constrained.

Last winter the United States was a net importer of natural gas, averaging 0.6 Bcf/d. However, for the first time, EIA expects the United States to be a natural gas net exporter this winter, with net exports averaging 1.4 Bcf/d. Both increased pipeline capacity to Mexico and LNG export capacity on the Gulf Coast are supporting higher levels of exports compared with last year.

**Heating Oil.** EIA expects households heating primarily with heating oil to spend an average of \$215 (17%) more this winter than last winter, reflecting retail prices that are 25 cents/gallon (gal) (10%) higher and consumption that is 6% higher than last winter. Despite the higher forecast expenditures, expected average household heating expenditures this winter are about 15% lower than the previous five-year winter average.

In the scenario that assumes a 10% colder-than-forecast winter, projected expenditures are \$397 (32%) higher than last winter. In this case, heating oil prices are forecast to be 33 cents/gal (14%) higher than last winter and consumption 16% higher. In the 10% warmer scenario, which would still be colder than last winter, projected expenditures are \$57 (5%) higher than last winter resulting from forecast heating oil prices that are 20 cents/gal (8%) higher and consumption that is 4% lower than last winter.

Reliance on heating oil is highest in the Northeast region. About 21% of households in this region use oil for space heating, down from 25% five years ago as an increasing number of homes switched to using natural gas and electricity for space heating. Nationwide, 5% of households use heating oil.

Heating oil prices are expected to be higher than last winter because of higher crude oil prices and because of higher distillate fuel margins (the price difference between wholesale distillate fuel and crude oil).

The Brent crude oil price, which is the crude oil price most significant in determining U.S. petroleum product prices, is forecast to average \$54/barrel (b) this winter, which is \$2/b (6 cents/gal) higher than last winter. Brent crude oil prices are forecast to be higher than last year

as a result of gradually tightening global oil balances. Despite being higher than last winter, crude oil prices are still forecast to remain below levels seen from 2011–14. 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.

For winter 2017–18, EIA expects that heating oil wholesale margins will average 41 cents/gal, which would be 14 cents/gal higher than last winter. Lower distillate fuel inventory levels, [strong demand for U.S. distillate exports](#), and the expectation of close-to-normal temperatures this winter are expected to help contribute to higher heating oil wholesale prices.

Distillate fuel inventories, which include heating oil, totaled 35.5 million barrels on September 29 in the Northeast, which is 16.8 million barrels lower than at the same time last year, and 1.9 million barrels lower than the previous five-year average for this time of year. Distillate inventories have fallen heading into this winter because of recent refinery outages along the U.S. Gulf Coast [after Hurricane Harvey](#) coupled with strong demand, as global industrial and economic activity expands.

U.S. refinery runs fell because of Hurricane Harvey, but they are expected to increase in the coming months and to be higher than last winter. High levels of refinery supply of distillate fuel have the potential to moderate prices somewhat. Also, strong distillate margins are expected to encourage refiners to maximize distillate production.

However, if temperatures become severely cold, the Northeast typically turns to imports for distillate fuel supply, and prices have the potential to rise above forecast levels. Higher prices encourage imports to be shipped to the region. If a cold snap in the U.S. Northeast coincides with a cold snap in Europe, the main source of U.S. imports, additional upward pressure on distillate prices might occur.

**Electricity.** Households heating primarily with electricity are forecast to spend an average of \$74 (8%) more this winter on their electricity bills. This increase in expenditures is a result of 6% higher consumption, including both heating and non-heating uses of electricity, and about 2% higher residential electricity prices than last winter. Among U.S. households, 40% rely on electricity as their primary heating source. Nearly two-thirds of homes in the South heat primarily with electricity compared with only 16% in the Northeast.

In the 10%-colder-than-forecast scenario, expected household electricity expenditures are \$108 (12%) higher than last winter, primarily because consumption is expected to be 10% higher. Although colder-than-expected weather would tend to increase generation fuel costs, residential electricity prices would not rise immediately. Instead, the effect of colder temperatures would pass through to retail electricity rates over the succeeding months of 2018. The effect of colder-than-forecast temperatures on electricity prices would be greatest in the West South Central states (Arkansas, Louisiana, Texas, and Oklahoma), where annual average residential prices would grow by 6% next year if there is a cold winter, in contrast to the region's base case forecast of a 4% growth.

The 10%-warmer-than-forecast scenario, which would still be 2% colder than last year's warm winter, results in expected household electricity expenditures that are \$38 (4%) higher than last winter.

The mix of energy sources used to generate electricity this winter is slightly different from last year. The prices of coal and natural gas delivered to electric generators are expected to be higher this winter, up 5% and 11%, respectively. However, EIA expects generation from both of these fuels to increase from last winter to offset forecast declines in generation from hydropower and nuclear power.

[Record levels of precipitation earlier this year](#) led to substantial levels of hydroelectric generation towards the end of winter 2016–17. Water supply during the upcoming winter months is expected to be closer to normal, leading to lower levels of generation from hydropower than last winter. Nuclear generation is also expected to be slightly lower than last winter because more plants are expected to [shut down for maintenance](#) during the months of October and November.

**Propane.** About 5% of all U.S. households heat primarily with propane. EIA expects these households to spend more on heating this winter compared to last winter because of stronger heating demand and higher propane prices. The projected increases in expenditures from last winter vary by region. EIA expects that households heating with propane in the Northeast will spend an average of \$221 (11%) more this winter than last winter, reflecting prices that are about 6% higher and consumption that is 5% higher than last winter. Households in the Midwest are expected to spend an average of \$249 (21%) more this winter, with forecast average prices that are 8% higher and forecast consumption that is 12% higher than last winter.

In the 10%-colder-than-forecast scenario, projected expenditures are \$503 higher than last winter in the Northeast, with prices that are 33cents/gal (11%) higher than last winter and consumption that is 13% higher. In the cold-weather scenario, forecast expenditures are \$592 higher than last winter in the Midwest, with prices that are 41 cents/gal (24%) higher than last winter and consumption that is 21% higher.

In the 10%-warmer-than-forecast scenario, projected expenditures are \$137 lower than last winter in the Northeast, with prices that are 10 cents/gal (3%) lower than last winter and consumption that is 4% lower. In the warm-weather scenario, forecast expenditures are \$68 higher than last winter in the Midwest, with prices that are 5 cents/gal (3%) higher than last winter and consumption that is 3% higher.

Propane prices are expected to be higher than last winter because of higher crude oil prices, which feed into higher prices for propane, and because of tighter propane supplies nationally. Propane production at natural gas plants and refineries is forecast to be 7% higher this winter than compared to last winter, while total propane consumption is expected to be 2% higher than last winter, and net exports 4% lower. Propane inventories enter this heating season at levels below the five-year average for this time of year, after beginning last winter well above the five-year average level.

U.S. propane inventories in the last week of September were 78.0 million barrels, which was 9% below the previous five-year average, according to EIA's [Weekly Petroleum Status Report](#). Propane inventories typically build between April and October and begin drawing down in late-September or October as temperatures begin to drop.

[Strong global demand](#) for propane contributed to Gulf Coast and Midwest inventories that remained on the low side of the normal inventory range since early 2017. However, inventories rose sharply in late August into September after Hurricane Harvey, as propane-consuming petrochemical plants, export facilities, and the entire distribution system were not fully operational.

[Inventories in the Midwest](#), the region most reliant on propane for heating and agricultural uses, ended September 4% below the five-year average. However, a regional breakdown shows stocks across the northern Midwest at or above the five-year averages. The use of propane to dry corn during the fall harvest is expected to be relatively low because the cost of propane is high relative to corn prices. However, if propane prices continue to be higher at the Gulf Coast market hub at Mont Belvieu, Texas, than at the Midwest hub at Conway, Kansas, it may provide incentive for more propane to move to the Gulf Coast as infrastructure fully recovers from hurricane outages.

**Wood.** According to the U.S. Census Bureau's [American Community Survey](#), about 2.2 million households (2%) used cord wood or wood pellets as a primary residential space-heating fuel in 2016. EIA's [Residential Energy Consumption Survey](#) estimates another 9.3 million households (8%) use wood as a secondary source of heat, making wood second only to electricity as a supplemental heating fuel in 2015.

In 2015, one in four rural households used wood for primary or secondary space heating, compared with 6% of urban households. Wood use was most common in New England, where 20% of households used wood.

This report was prepared by the U.S. Energy Information Administration (EIA), the statistical and analytical agency within the U.S. Department of Energy. By law, EIA's data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. The views in this report therefore should not be construed as representing those of the U.S. Department of Energy or other federal agencies.

# EIA Winter Fuels Outlook



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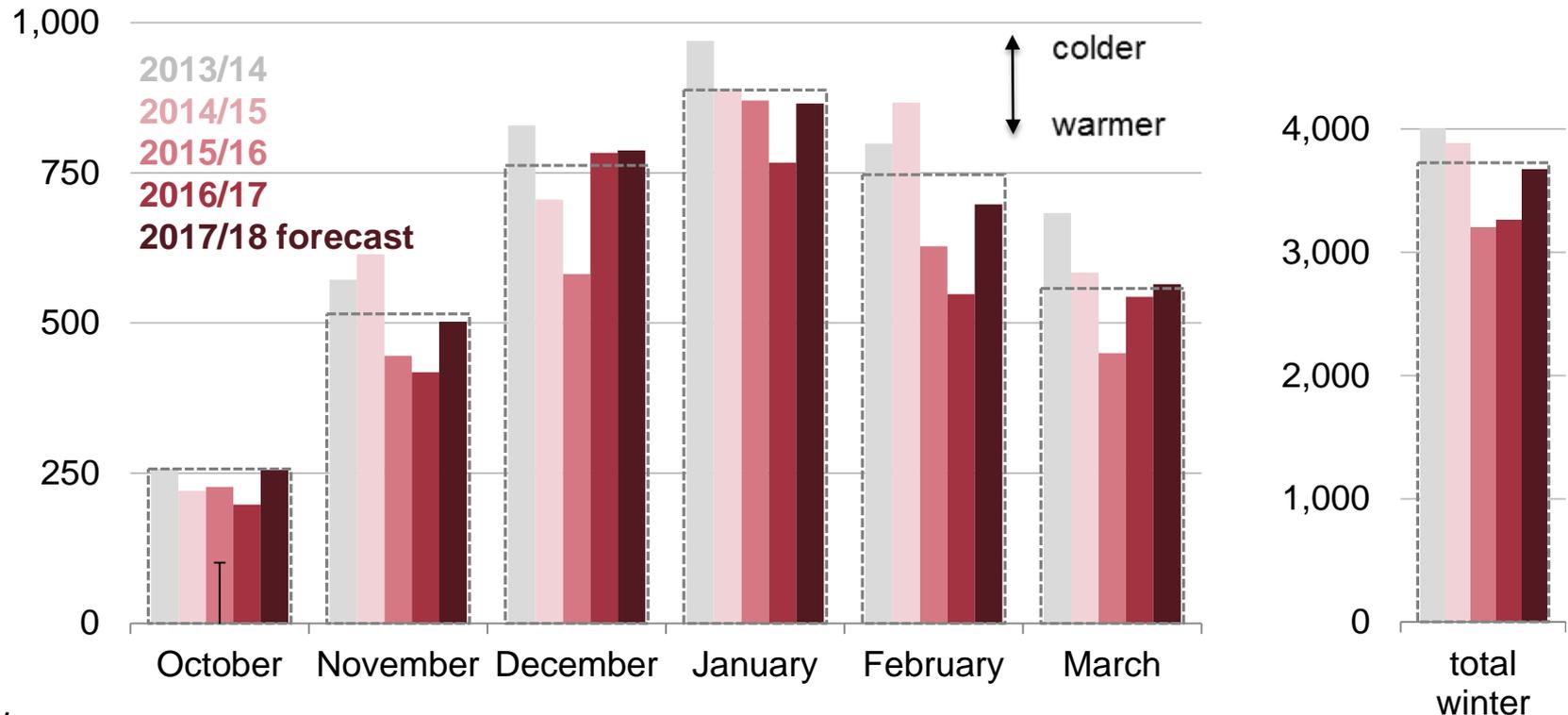
*October 11, 2017*

## The main determinants of winter heating fuels expenditures are temperatures and prices

- This winter's weather forecast predicts a return to close-to-normal temperatures. The latest outlook from the National Oceanic and Atmospheric Administration (NOAA) expects winter temperatures to be colder than last winter, with projected heating degree days in the Northeast, Midwest, South, and West ranging from 4% colder in the West to 27% colder in the South.
- EIA expects heating fuel prices for homes that heat with electricity, heating oil, natural gas, and propane to be higher than prices last winter.
- Although overall heating fuel expenditures are expected to be higher than last winter, they are comparable to or lower than during winters from 2010–11 through 2014–15, except for electricity, where expenditures are higher than both last year and the 2010–11 through 2014–15 average.

# NOAA forecasts U.S. heating degree days this winter to be 13% higher than last winter but lower than the 10-year average

U.S. current population-weighted heating degree days

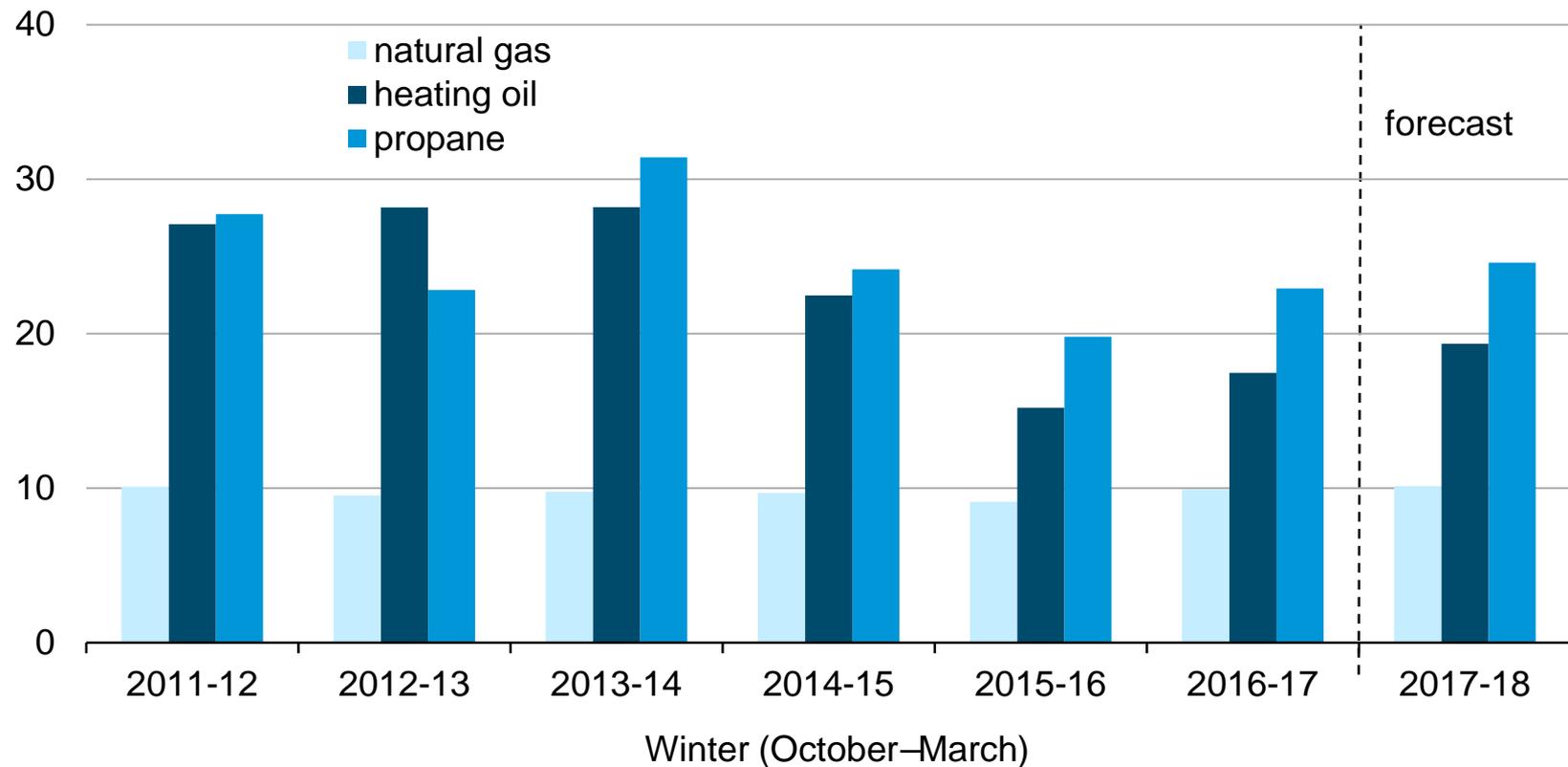


Note: EIA calculations based on National Oceanic and Atmospheric Administration (NOAA) data. The dashed lines indicate each month's prior 10-year average for October 2007–March 2017. Projections reflect NOAA's 14–16 month outlook.

Source: EIA Short-Term Energy Outlook, October 2017.

# Fuel prices are forecast to be slightly higher than last winter, but heating oil prices are expected to remain below levels from 2011–14 when crude oil prices were higher

U.S. average residential winter heating fuel prices  
dollars per million Btu



Source: EIA Short-Term Energy Outlook, October 2017.

Fuel expenditures are expected to be higher this winter (October 1–March 31) compared with last winter, but the comparison with the previous five winters is mixed

Change in base case forecast fuel expenditures		
Fuel	Compared with previous five-winter average	Compared with last winter
Heating oil*	<b>-14%</b>	<b>17%</b>
Natural gas	<b>6%</b>	<b>12%</b>
Propane *	<b>2%</b>	<b>18%</b>
Electricity	<b>6%</b>	<b>8%</b>

Note: \* Propane expenditures are a volume-weighted average of the Northeast and Midwest regions. All other fuels are U.S. volume-weighted averages. Propane and heating oil prices do not reflect prices locked in before the winter heating season starts.

Source: EIA Short-Term Energy Outlook, October 2017.

## EIA's outlook includes scenarios with temperature forecasts that are 10% warmer and 10% colder than the base case

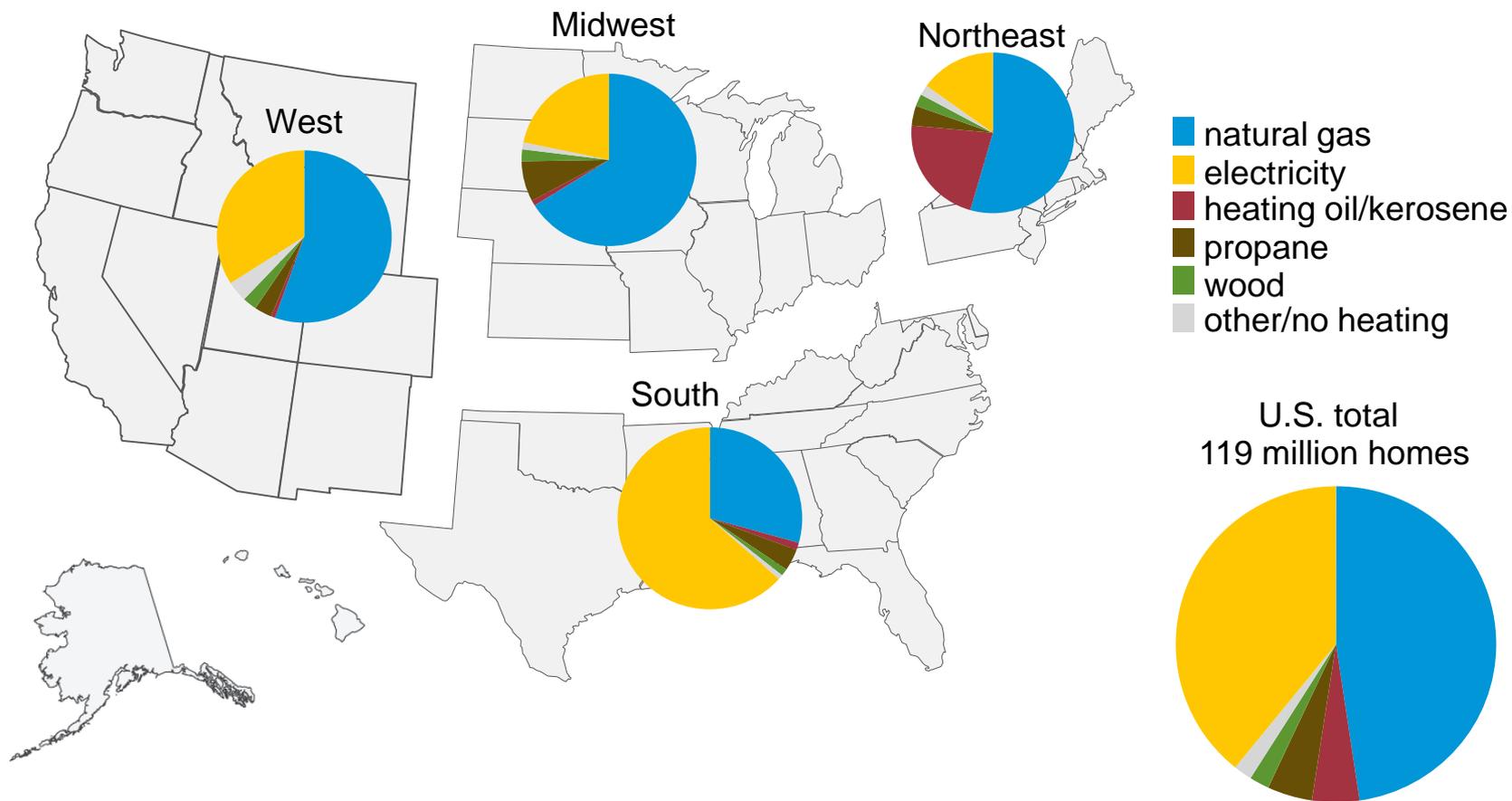
Change in forecast fuel expenditures from last winter			
Fuel	Base Case	If 10% warmer than forecast	If 10% colder than forecast
Heating oil*	<b>17%</b>	<b>5%</b>	<b>32%</b>
Natural gas	<b>12%</b>	<b>3%</b>	<b>19%</b>
Propane *	<b>18%</b>	<b>2%</b>	<b>41%</b>
Electricity	<b>8%</b>	<b>4%</b>	<b>12%</b>

Note: \* Propane expenditures are a volume-weighted average of the Northeast and Midwest regions. All other fuels are U.S. volume-weighted averages. Propane and heating oil prices do not reflect prices locked in before the winter heating season starts.

Source: EIA Short-Term Energy Outlook, October 2017.

# Heating fuel market shares vary across U.S. regions

Share of homes by primary space-heating fuel and Census region



Source: U.S. Energy Information Administration based on 2016 American Community Survey

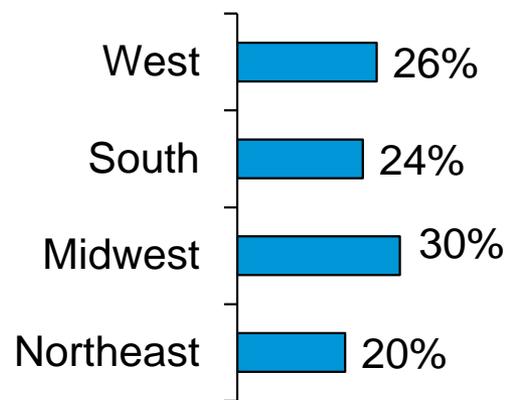
# Natural Gas

## Winter 2017–18 takeaways – Natural gas

- As of September 29, inventories of natural gas in working storage were similar to the five-year average but 4% lower than year-ago levels.
- Inventories are expected to end October at 3.8 trillion cubic feet, which would be 1% lower than the five-year average for this time of year.
- Dry natural gas production this winter is forecast to average 77 billion cubic feet/day, an 8% increase compared with last winter.
- Henry Hub spot prices are forecast to average \$3.18/million British thermal units (MMBtu) this winter, a 5% increase from last winter, because demand is expected to be higher with the return to typical winter temperatures.
- Although pipeline buildout has improved the ability to move Marcellus and Utica natural gas to demand centers in the Northeast, not all planned projects are currently online, and consumers could still experience localized price volatility during periods of very cold temperatures.

# Natural gas heating expenditures are expected to increase based on the current forecast, but temperatures will be a key variable

Regional share of all U.S. households that use natural gas as their primary space heating fuel



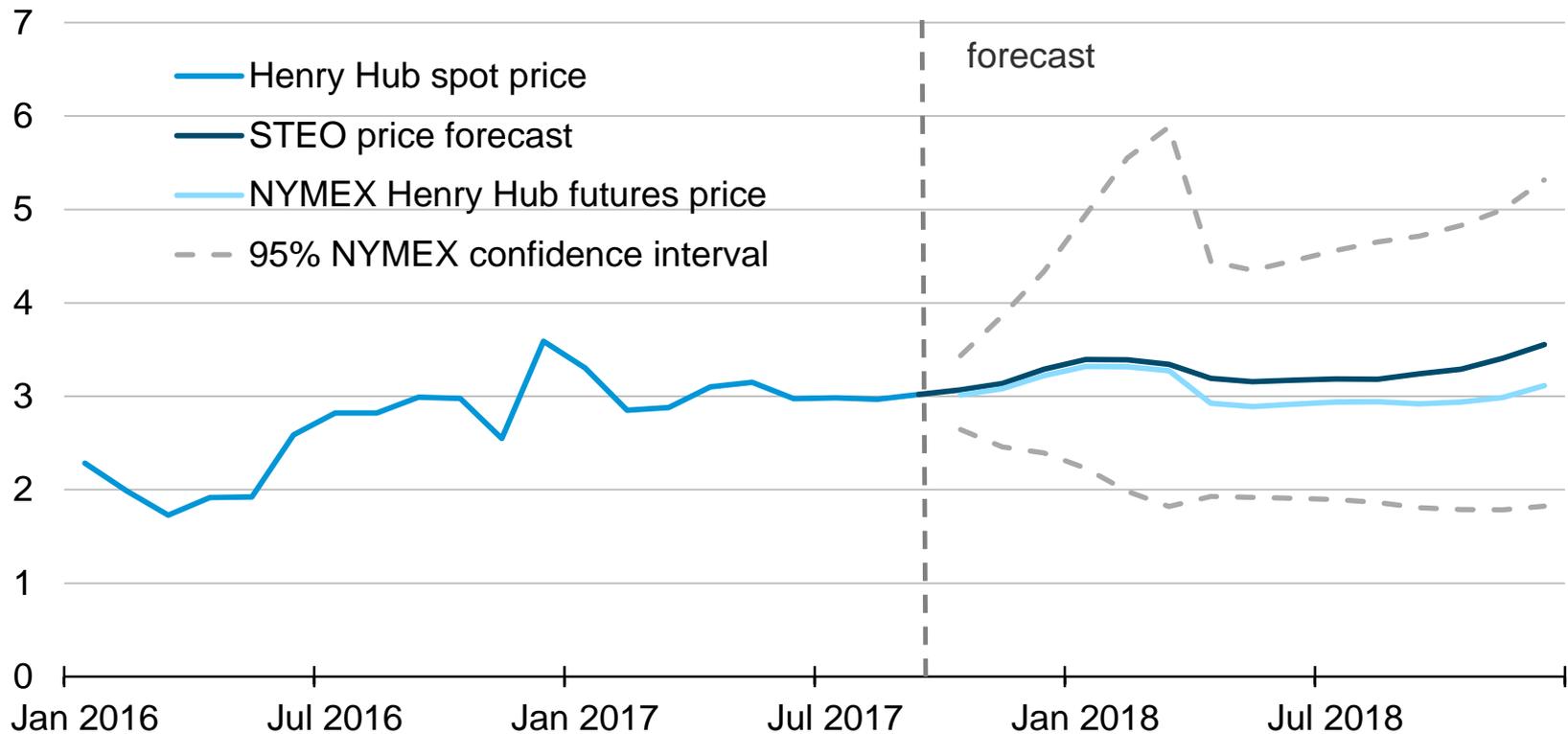
Change from last winter (forecast)

	Consumption	Average price	Total expenditures
West	3%	1%	4%
South	20%	-6%	13%
Midwest	12%	7%	20%
Northeast	5%	4%	10%

Source: EIA Short-Term Energy Outlook, October 2017.

# EIA forecasts Henry Hub spot prices (wholesale) to average \$3.18/MMBtu this winter, but significant uncertainty exists

Henry Hub natural gas price  
dollars per million Btu

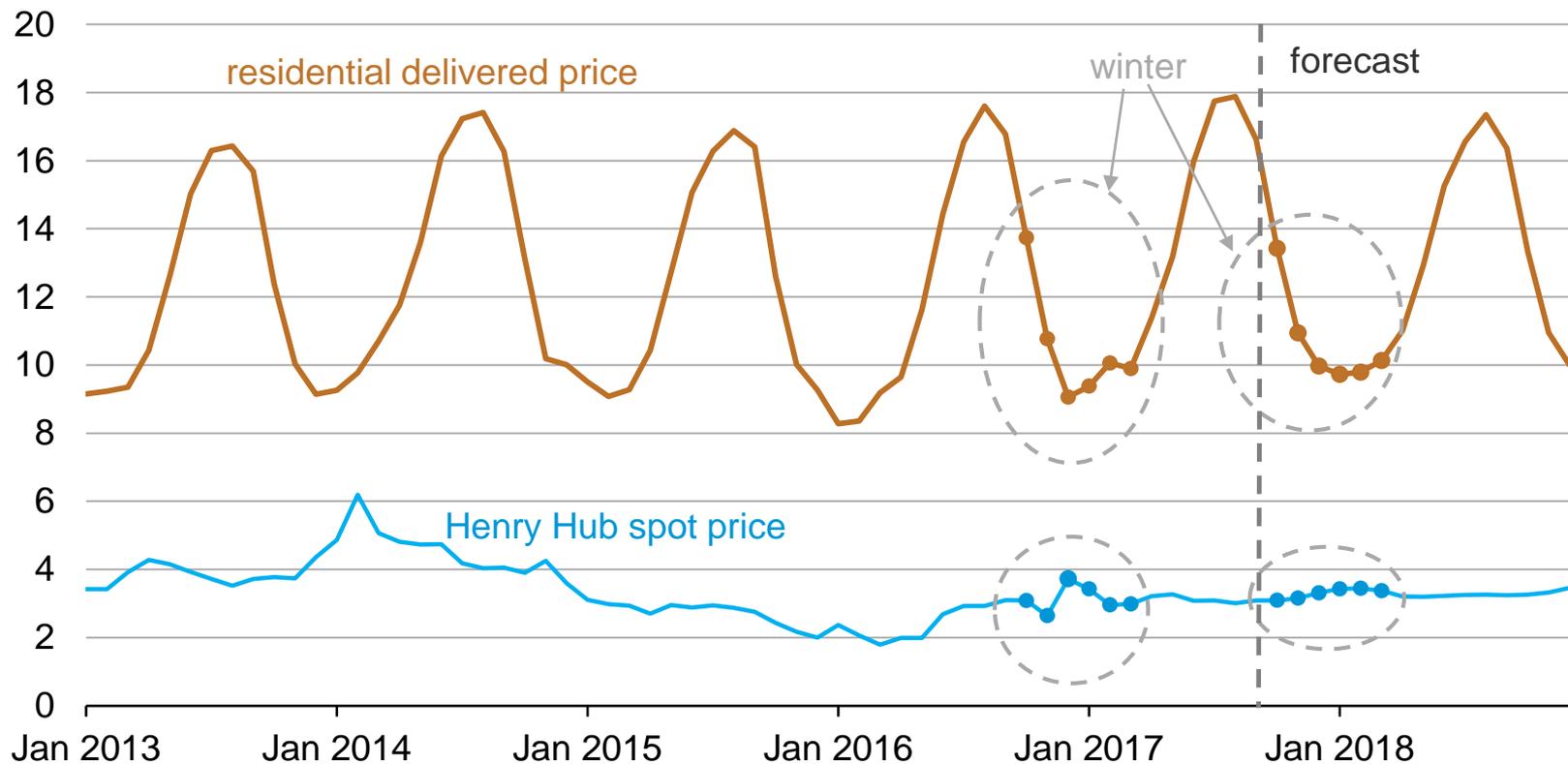


Note: Confidence interval and futures prices derived from market information for the five trading days ending October 5, 2017. Intervals not calculated for months with sparse trading in near-the-money options contracts.

Source: EIA Short-Term Energy Outlook, October 2017, and CME Group.

# EIA expects average residential natural gas prices to be 2% higher than prices last winter

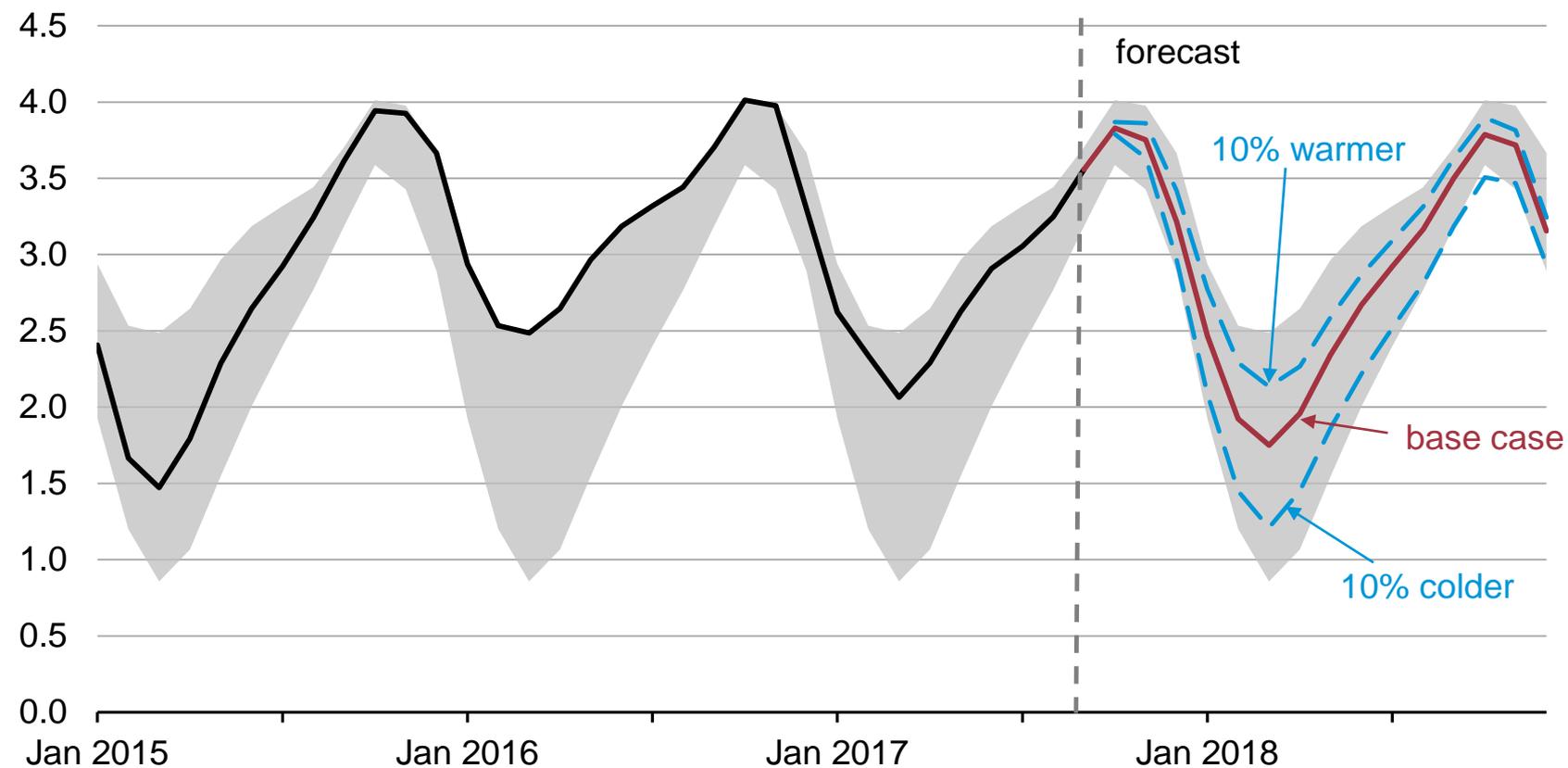
monthly average natural gas prices  
dollars per thousand cubic feet (Mcf)



Source: EIA Short-Term Energy Outlook, October 2017, and Thomson Reuters.

# Natural gas inventories on September 29 were near the previous five-year average

U.S. total end-of-month working natural gas inventories  
trillion cubic feet



Note: Gray band represents the range between the minimum and maximum from 2012 to 2016.

Source: EIA Short-Term Energy Outlook, October 2017.

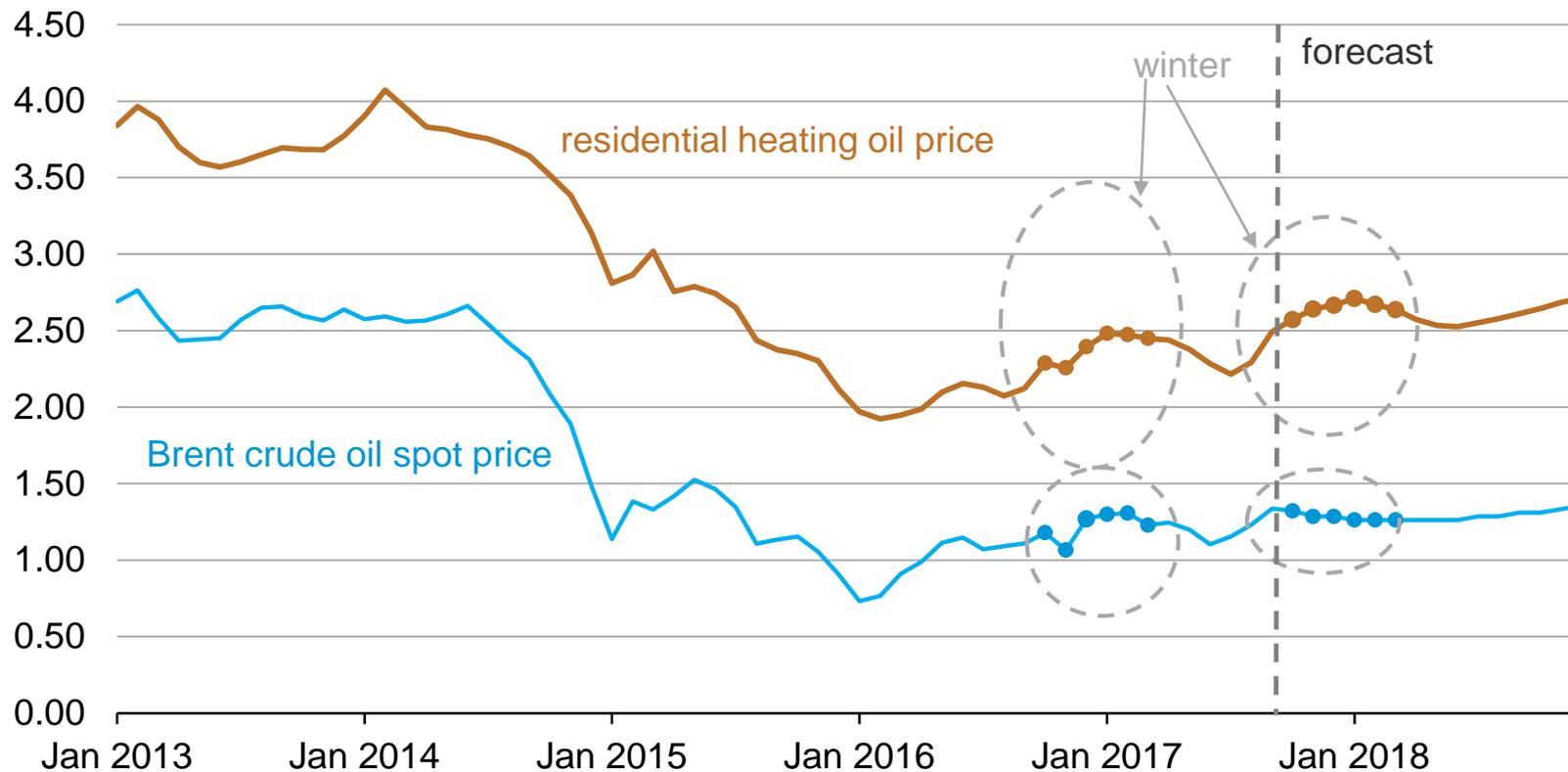
# Heating Oil

## Winter 2017–18 takeaways – Heating oil

- Brent crude oil spot prices are expected to average \$54 per barrel (b) this winter, \$2/b (6 cents/gal) higher than last winter, but they are not expected to return to 2010–14 levels; however, crude oil prices are very uncertain.
- Distillate stocks in the Northeast totaled 35.5 million barrels on September 29, 16.8 million barrels (32%) lower than the same time last year and 5% lower than the previous five-year average.
- Unless severely cold temperatures in the Northeast coincide with severely cold temperatures in Europe, ample distillate supplies should be available to meet demand, but localized supply issues are possible.
- Distillate fuel demand growth has been stronger than in recent years, contributing to higher heating oil prices.

# EIA expects average residential heating oil prices to be 10% higher than prices last winter

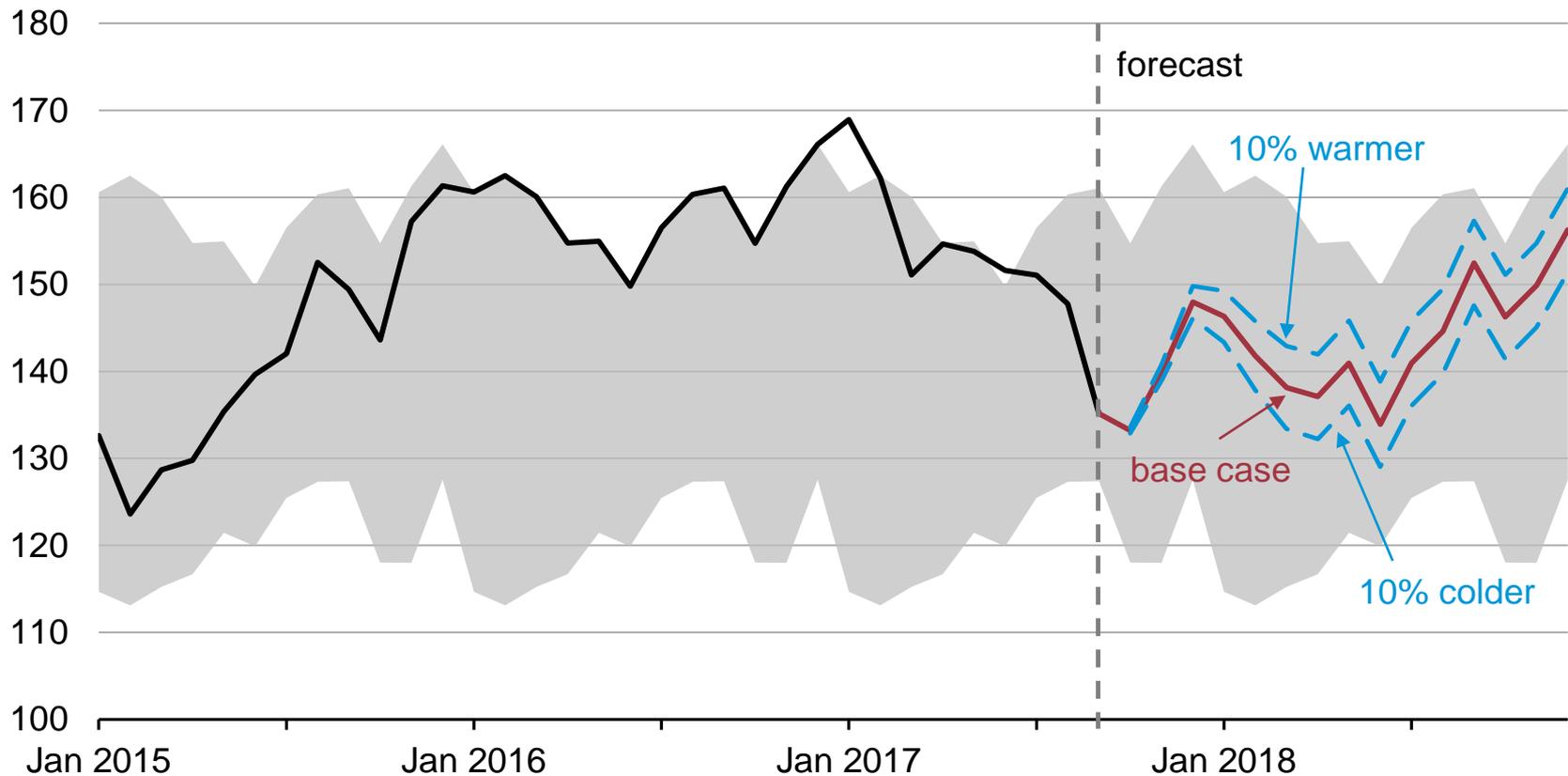
monthly average heating oil and Brent crude oil prices  
dollars per gallon



Source: EIA Short-Term Energy Outlook, October 2017, and Thomson Reuters.

# Distillate inventories are expected to remain within the five-year average range, even in the 10% colder scenario

U.S. total end-of-month distillate inventories  
million barrels



Note: Gray band represents the range between the minimum and maximum from 2012 to 2016.

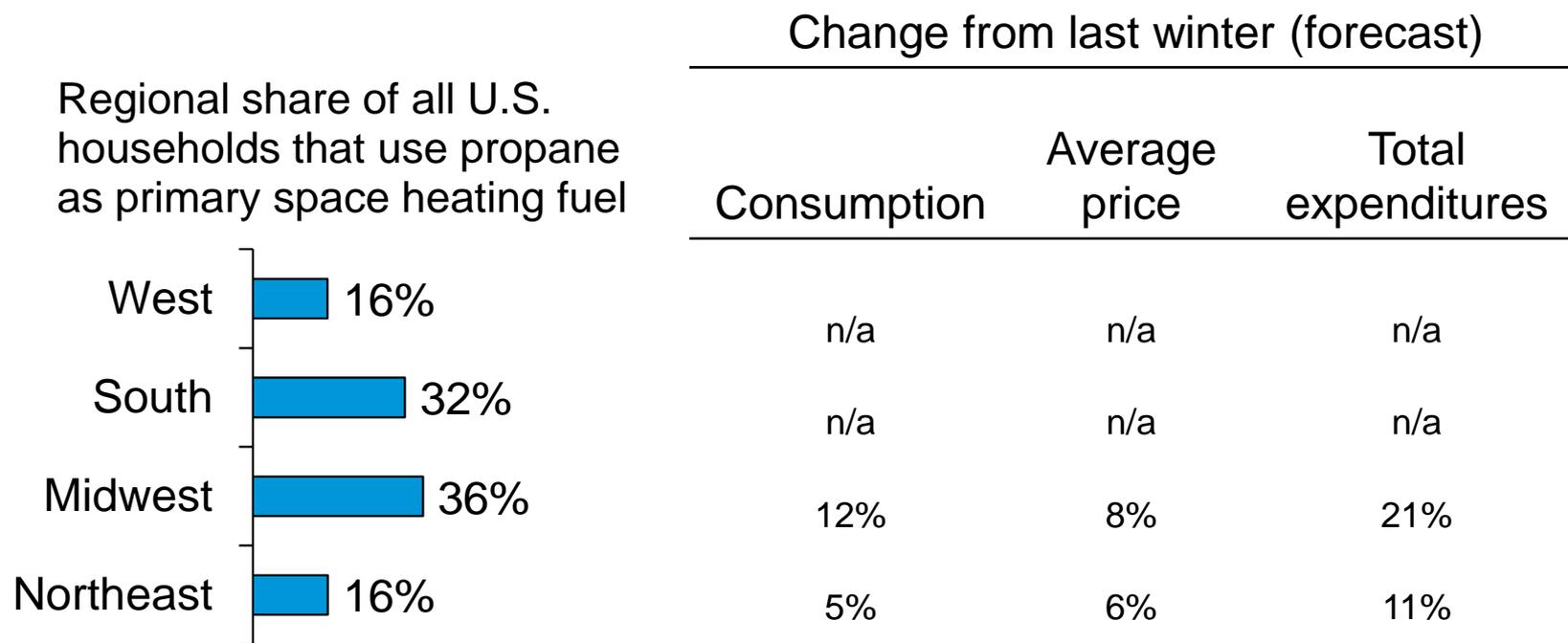
Source: EIA Short-Term Energy Outlook, October 2017.

# Propane

## Winter 2017–18 takeaways – Propane

- Propane production is forecast to be 7% higher this winter compared with last winter, while total propane consumption is expected to be 2% higher than last winter and net exports 4% lower.
- Propane inventories enter this heating season at levels lower than the five-year average for this time of year after beginning last winter well above the five-year average level.
- U.S. propane inventories in the last week of September were 78.0 million barrels, which was 9% lower than the previous five-year average for that time of year.
- Inventories in the Midwest, the region most reliant on propane for heating and agricultural uses, ended September 4% lower than the five-year average. However, regional detail shows stocks across the northern Midwest at or above the five-year average.

## EIA forecasts propane expenditures to be higher than last winter's level but lower than the average winter expenditures from 2010–11 through 2014–15

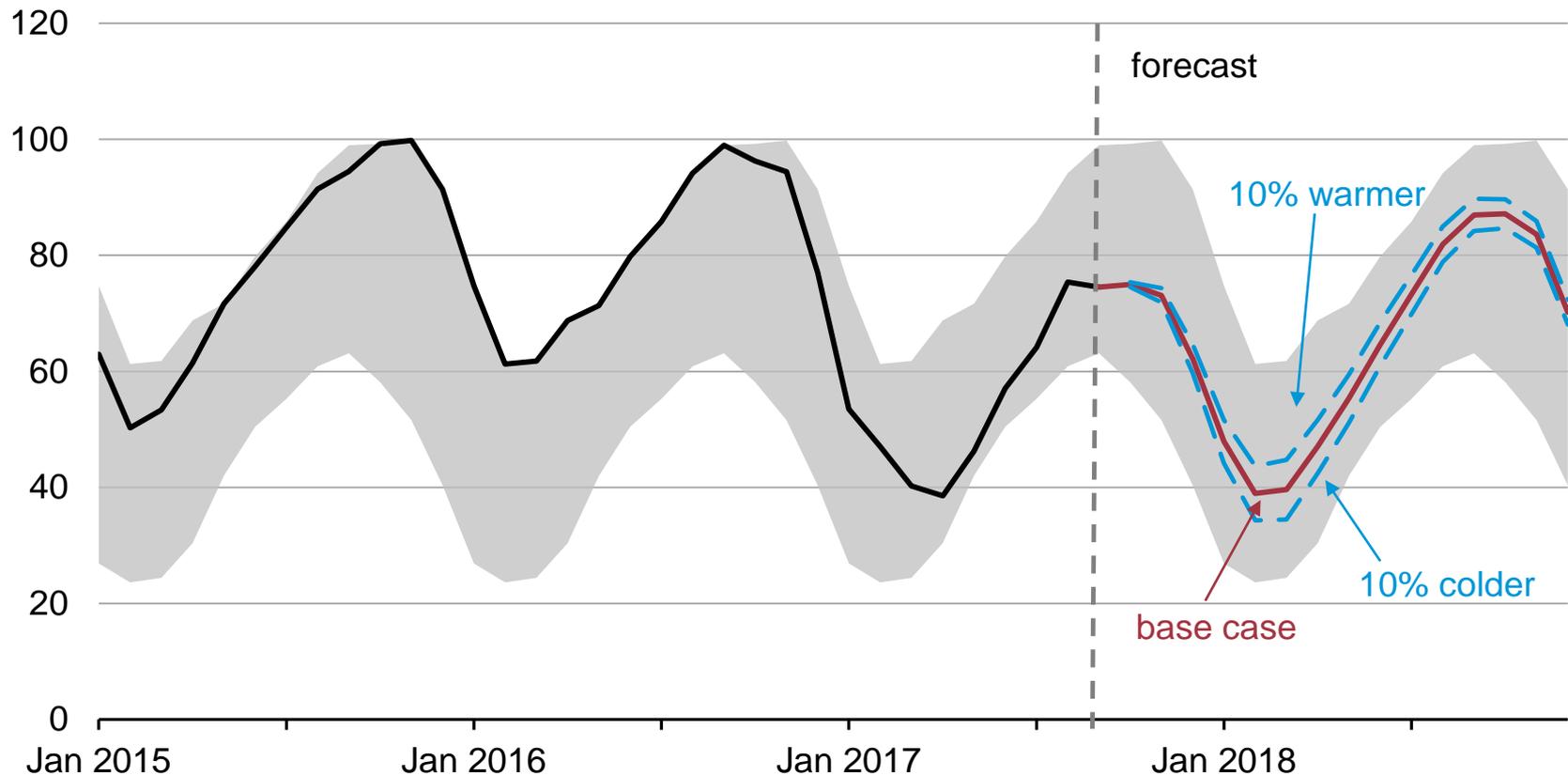


Note: n/a = not available because of insufficient underlying data to create forecast

Source: EIA Short-Term Energy Outlook, October 2017.

# Propane inventories are starting the winter in the middle of the five-year range but below 2016 record high levels

U.S. total end-of-month propane inventories  
million barrels



Note: Gray band represents the range between the minimum and maximum from 2012 to 2016.

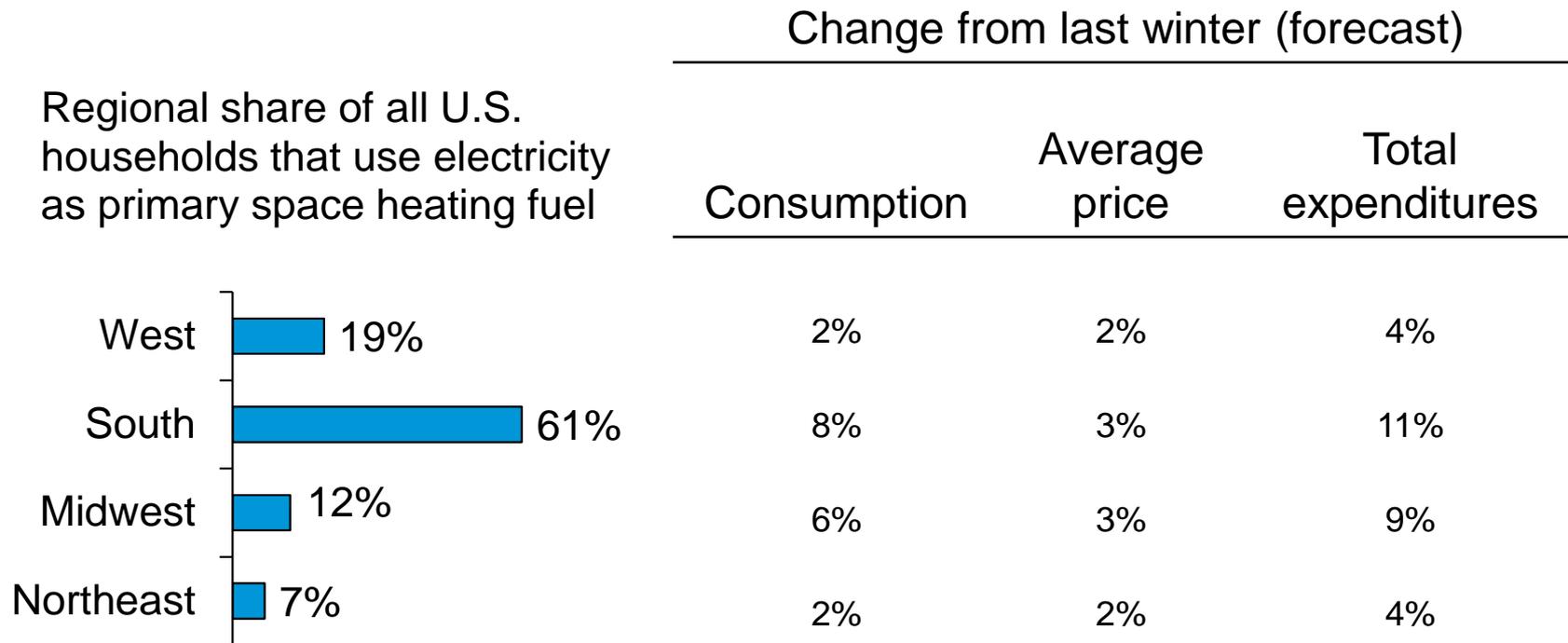
Source: EIA Short-Term Energy Outlook, October 2017.

# Electricity

## Winter 2017–18 takeaways – Electricity

- Because wholesale electricity prices are slow to pass through to consumers, yearly increases in expenditure deviations are driven more by temperatures.
- Electricity consumption is expected to be 6% higher this winter compared with last winter because of a forecast return to relatively normal temperatures.
- Residential electricity prices are expected to be up 2% this winter compared with last winter.
- New natural gas pipeline capacity into New England should help alleviate some competition for the fuel between power generators and residential consumers, but Northeast electricity markets could still be affected by constrained natural gas supplies into the region.

## Winter electricity bills are expected to be higher compared with last winter, but temperatures will be a key variable



Source: EIA Short-Term Energy Outlook, October 2017

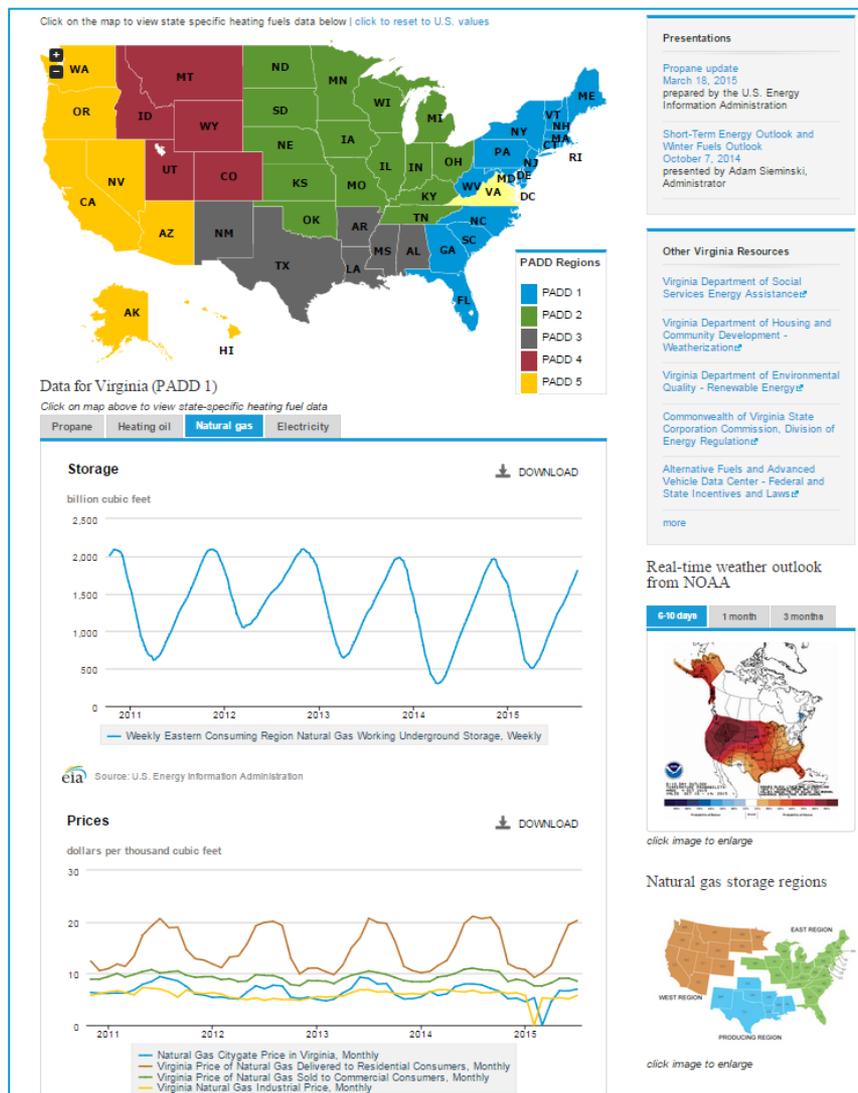
# Annual growth in residential electricity prices averaged 1.5% over the past five winters

U.S. winter average residential electricity price  
cents per kilowatthour



Source: EIA Short-Term Energy Outlook, October 2017

# Winter Heating Fuels Webpage



[www.eia.gov/special/heatingfuels](http://www.eia.gov/special/heatingfuels)

- Availability and pricing for the four principals heating fuels
  - Propane
  - Heating oil
  - Natural gas
  - Electricity
- Data for each state are available on the clickable map
- Links to resources for each state
- Current week and three-month weather forecasts from NOAA
- Downloadable graphs as an image or as a spreadsheet