

# EIA Winter Fuels Outlook



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*Angelina LaRose*

*New York Energy Forum*

*New York City*

*October 12, 2017*

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

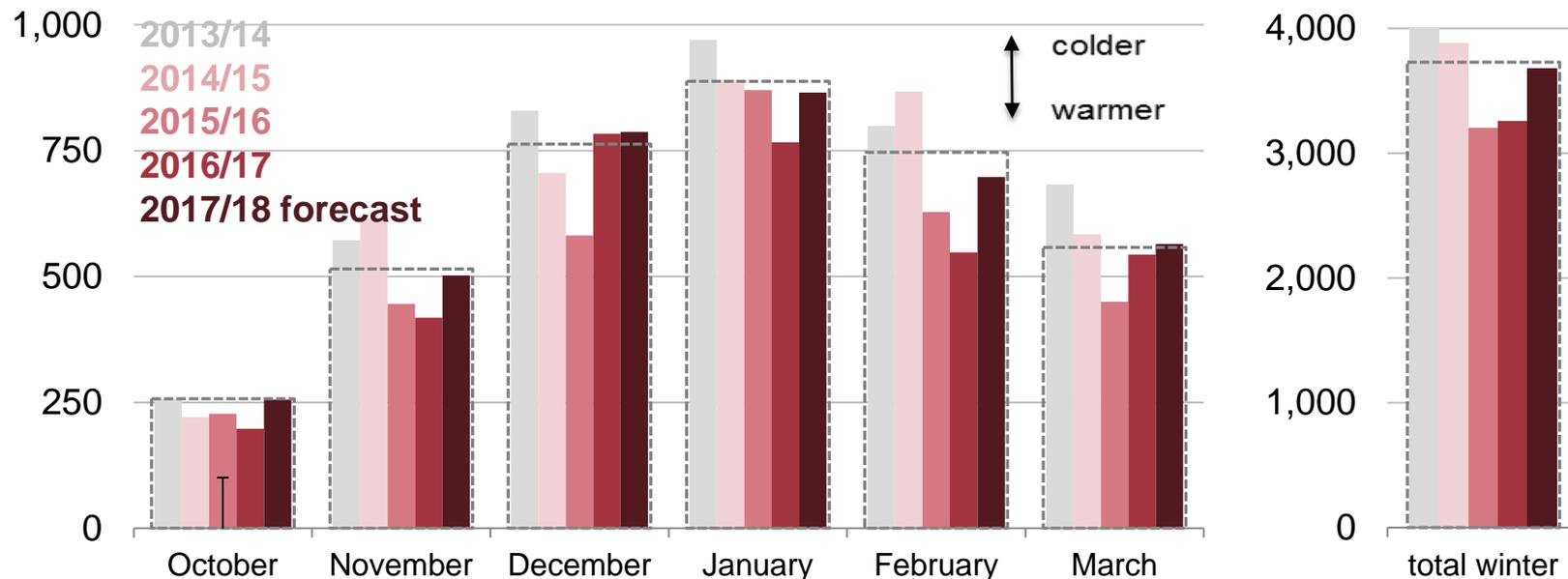
Temperatures: This winter's weather forecast predicts a return to close-to-normal temperatures. The latest outlook from National Oceanic and Atmospheric Administration (NOAA) expects winter temperatures to be colder than last winter, with projected heating degree days in the Northeast, Midwest, South and West ranging from 4% colder in the West to 27% colder in the South.

Prices: EIA expects heating fuel prices for homes that heat with electricity, heating oil, natural gas, and propane to be higher than prices last winter.

Expenditures: 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

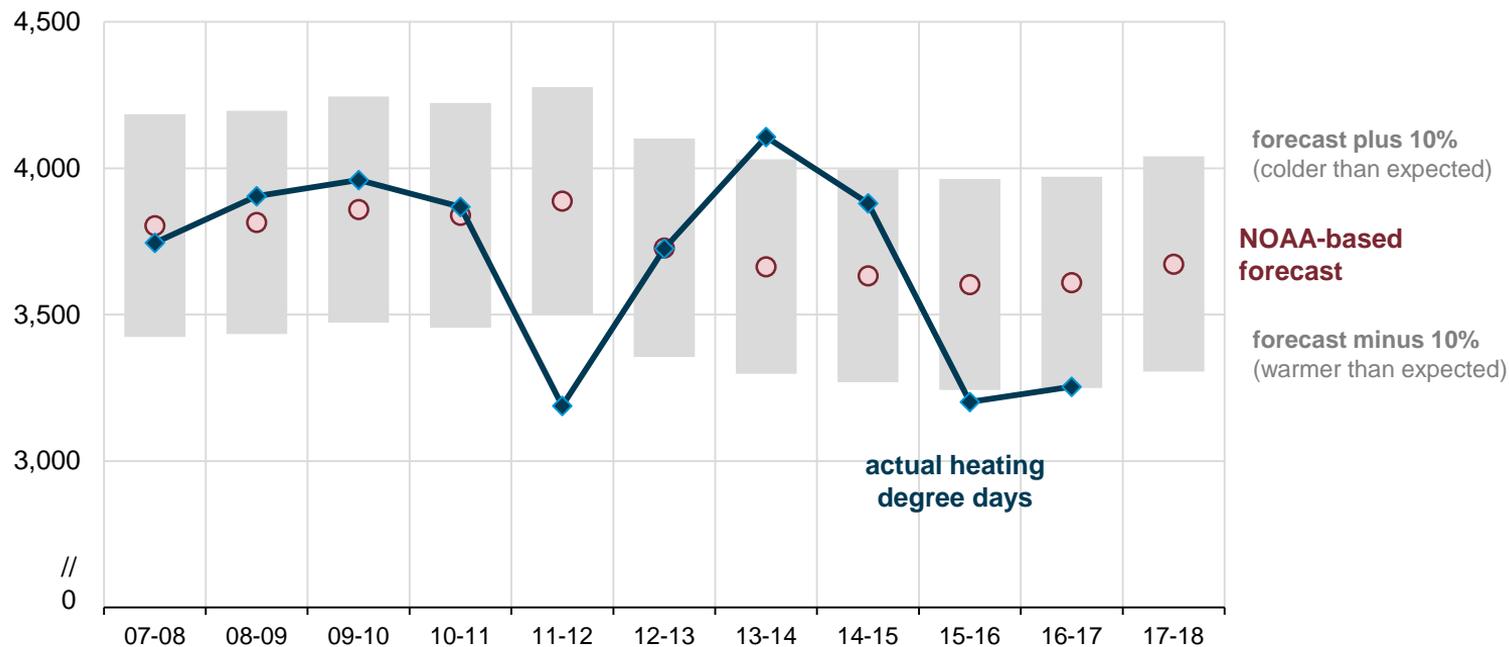


Note: EIA calculations based on National Oceanic and Atmospheric Administration (NOAA) data. The dashed lines indicate each month's prior 10-year average for October 2007–March 2017. Projections reflect NOAA's 14–16 month outlook.

## The past two winters had warmer-than-normal weather

### U.S. total heating degree days in winter months (October through March)

heating degree days



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

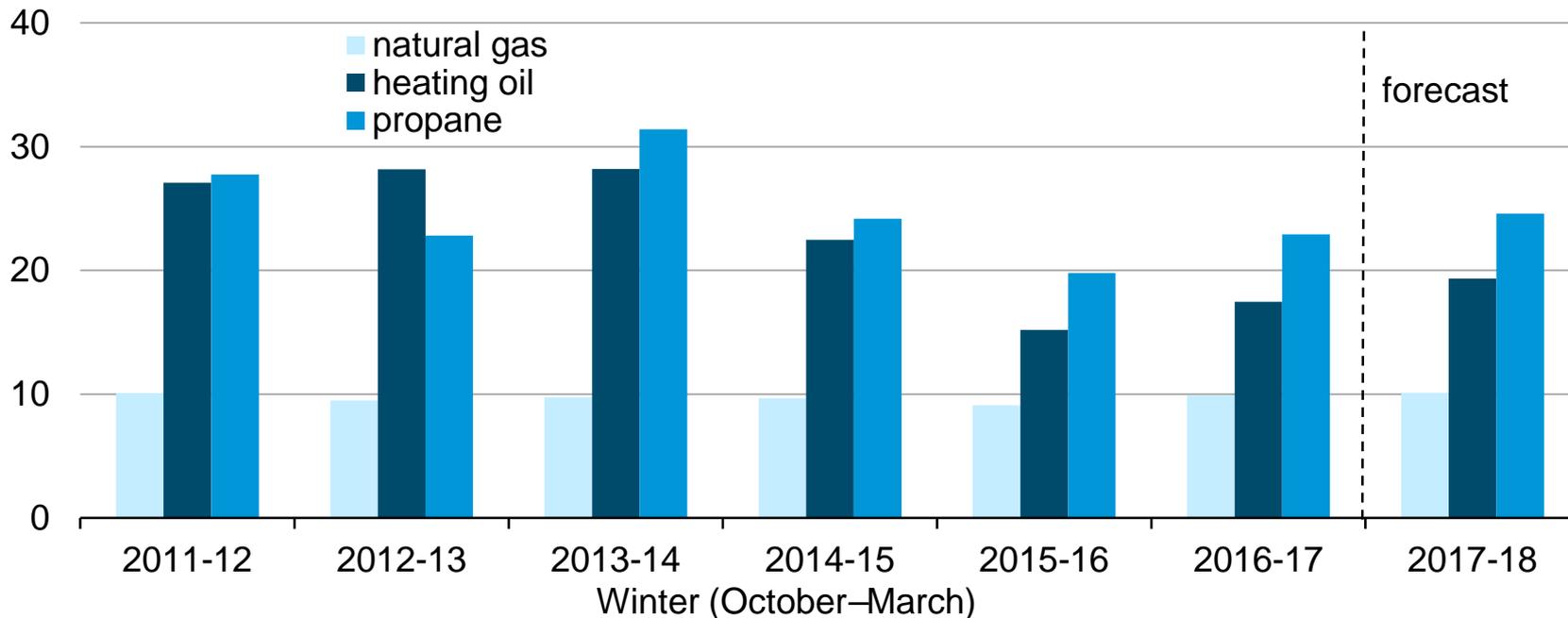
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## Fuel prices are forecast to be slightly higher than last winter, but heating oil prices are expected to remain below levels from 2011–14 when crude oil prices were higher

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



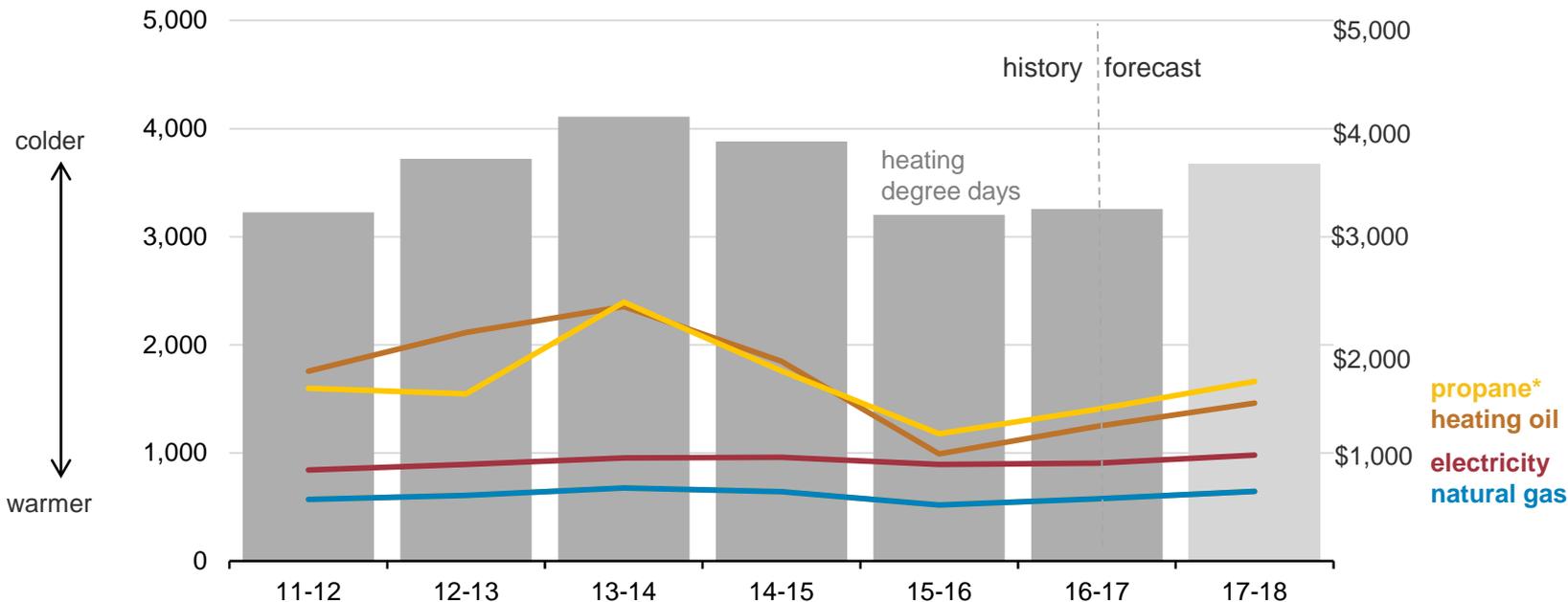
Source: EIA Short-Term Energy Outlook, October 2017.

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# Most U.S. households can expect higher heating expenditures this winter (October through March) than the last two winters

heating degree days (weather)

Winter expenditures (dollars per household)



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

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

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

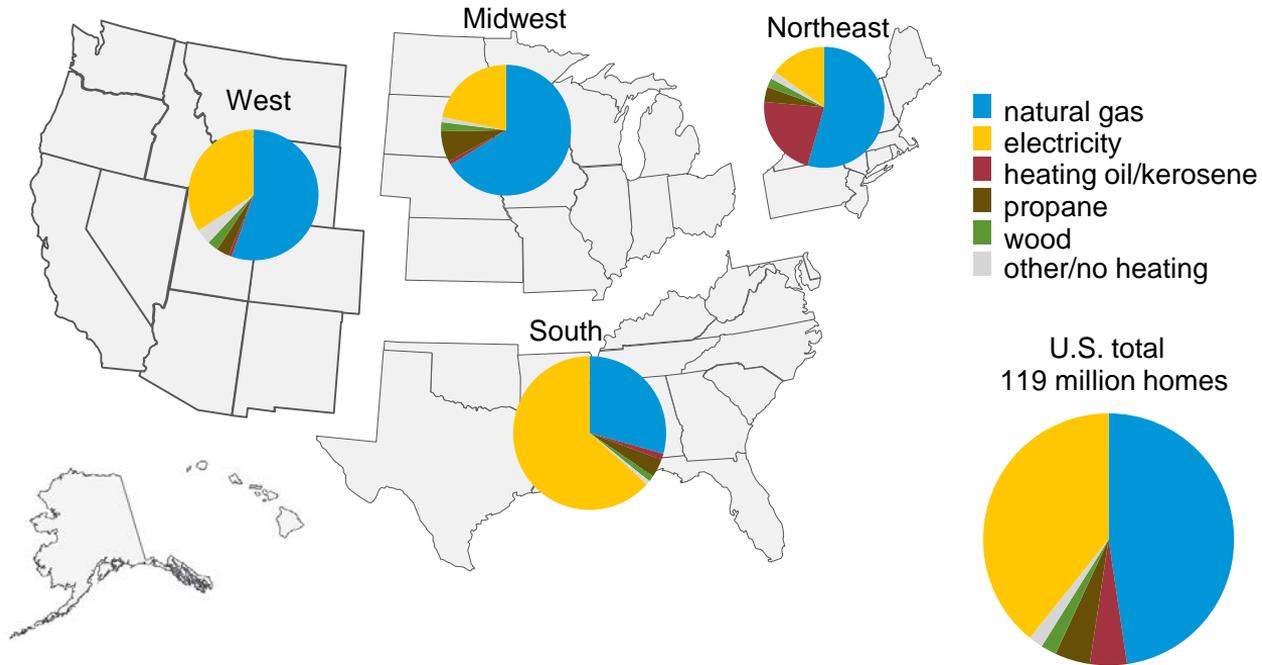
Change in forecast fuel expenditures from last winter			
Fuel	Base Case	If 10% warmer than forecast	If 10% colder than forecast
Heating oil*	<b>17%</b>	<b>5%</b>	<b>32%</b>
Natural gas	<b>12%</b>	<b>3%</b>	<b>19%</b>
Propane *	<b>18%</b>	<b>2%</b>	<b>41%</b>
Electricity	<b>8%</b>	<b>4%</b>	<b>12%</b>

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

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

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# Natural Gas

## Winter 2017-18 takeaways – Natural gas

Prices: 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.

Inventories: 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. 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.

Production: Dry natural gas production this winter is forecast to average 77 billion cubic feet/day, an 8% increase compared with last winter.

Infrastructure: 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.

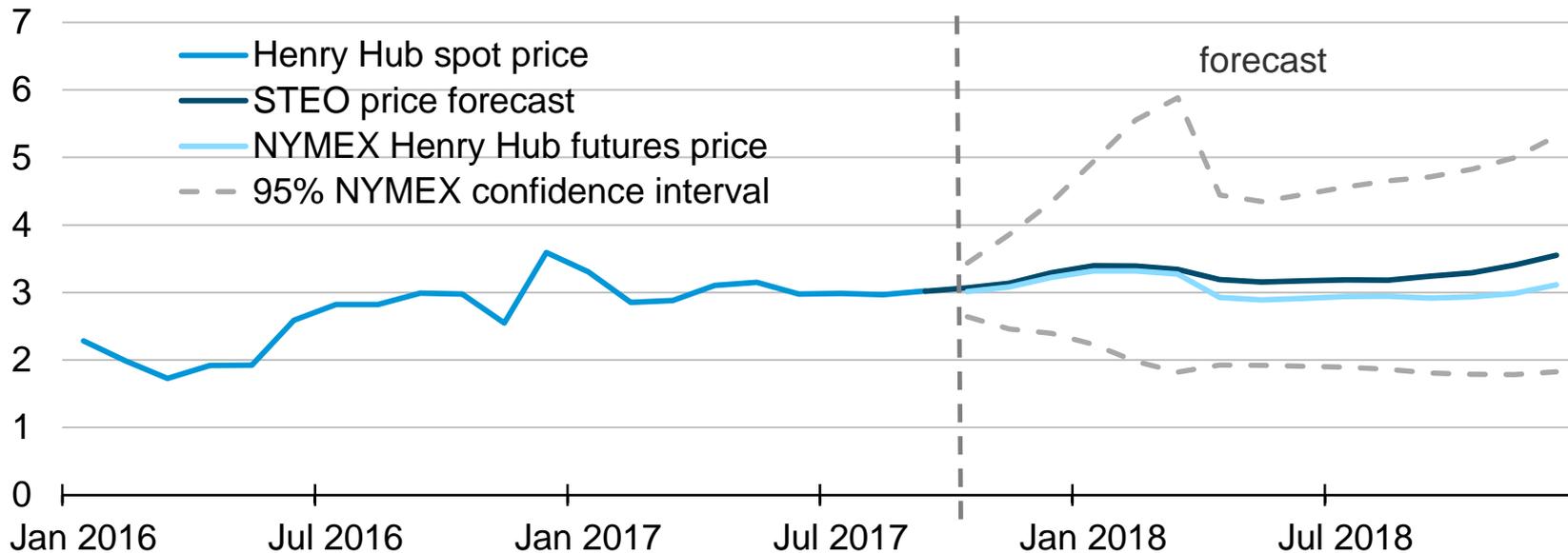
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## EIA forecasts Henry Hub spot prices (wholesale) to average \$3.18/MMBtu this winter, but significant uncertainty exists

Henry Hub natural gas price

dollars per million Btu

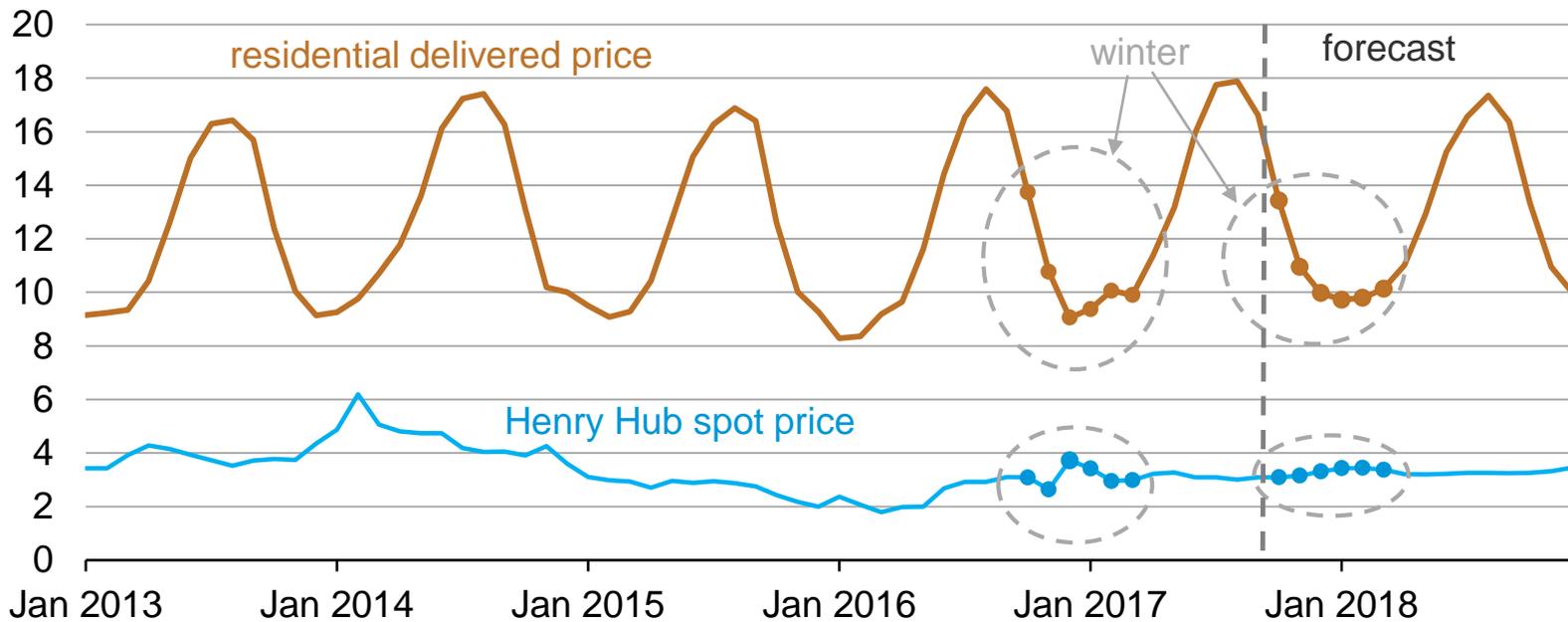


*Note: Confidence interval and futures prices derived from market information for the five trading days ending October 5, 2017. Intervals not calculated for months with sparse trading in near-the-money options contracts.*

*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

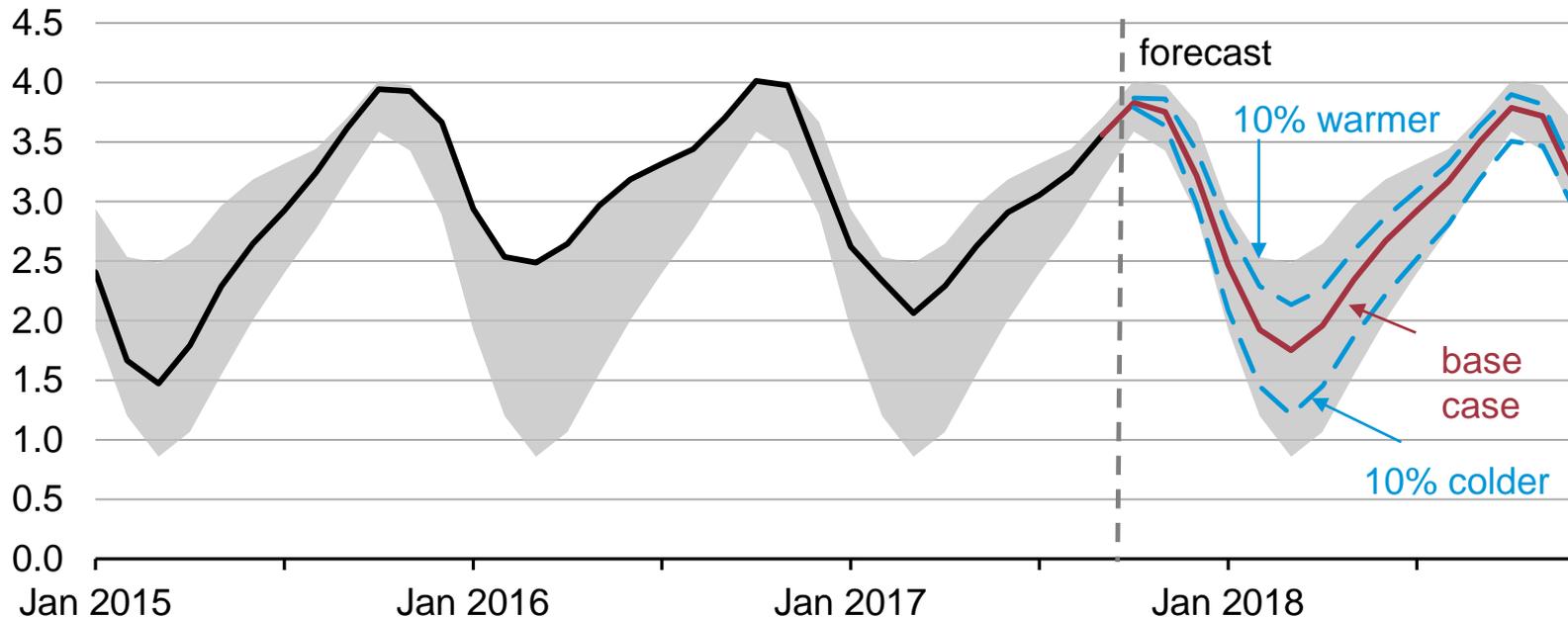


Source: EIA Short-Term Energy Outlook, October 2017.

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## 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

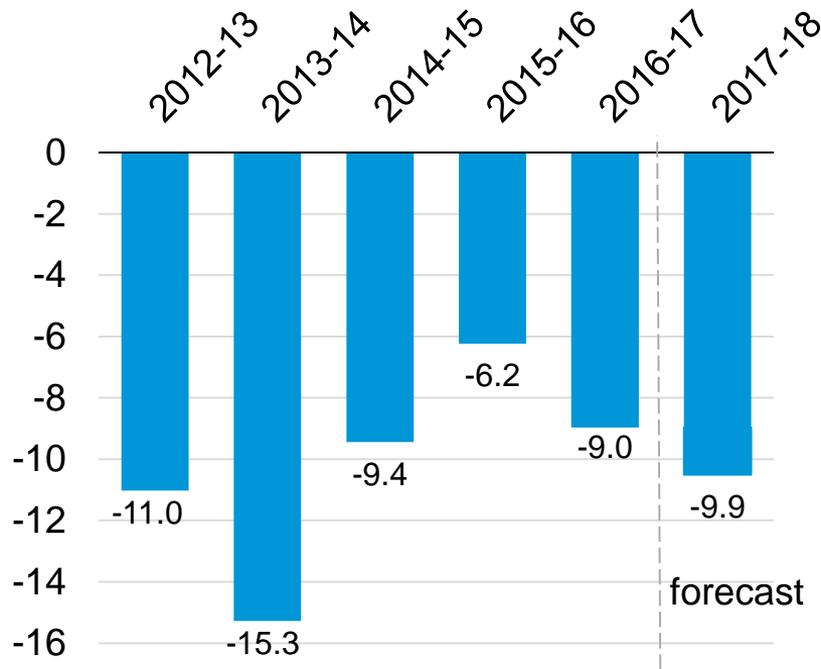


Note: Gray band represents the range between the minimum and maximum from 2012 to 2016.

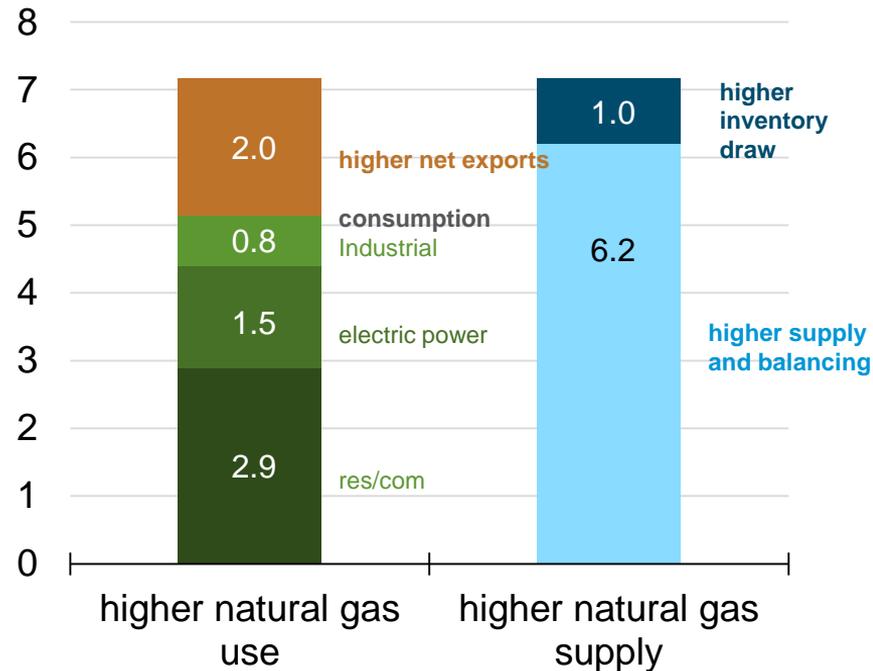
Source: EIA Short-Term Energy Outlook, October 2017.

# Natural gas inventory draws are expected to be slightly higher this year, driven by higher forecast consumption and exports

Winter natural gas inventory change  
billion cubic feet per day



Projected change from previous winter  
billion cubic feet per day



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

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# Heating Oil

## Winter 2017-18 takeaways – Heating oil

Prices: 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.

Inventories: 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.

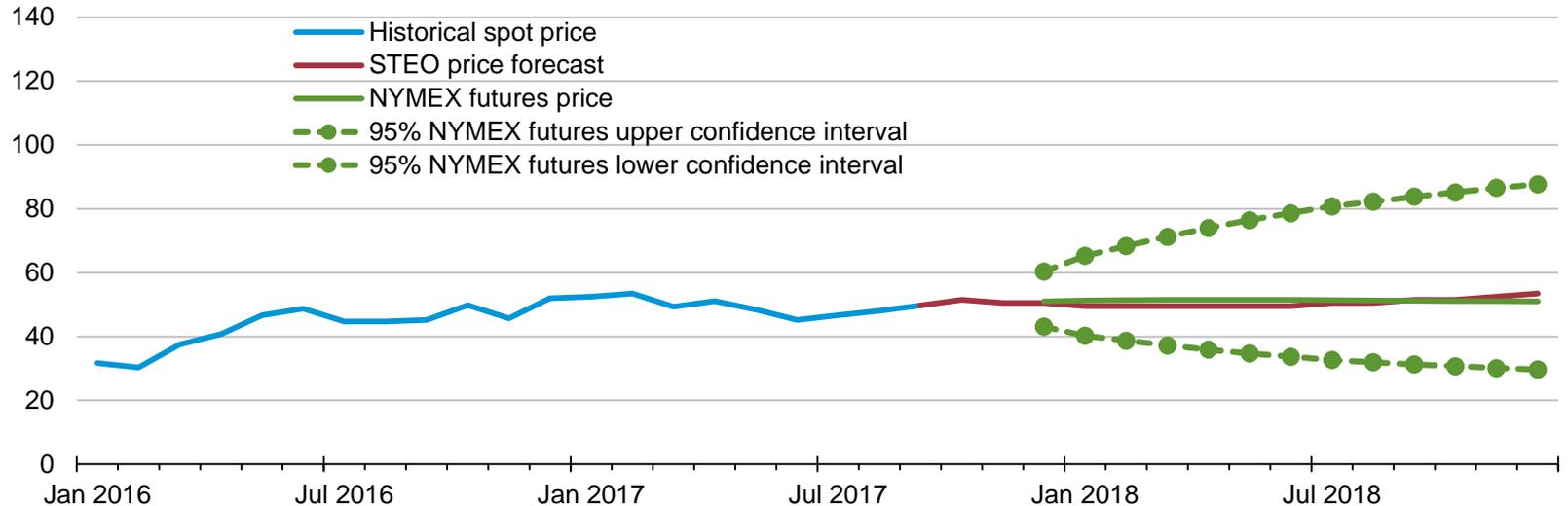
Supply: Unless severely cold temperatures in the Northeast coincide with severely cold temperatures in Europe, ample distillate supplies should be available to meet demand, but localized supply issues are possible.

Consumption: Distillate fuel demand growth has been stronger than in recent years, contributing to higher heating oil prices.

# West Texas Intermediate (WTI) average crude oil prices are forecast to be \$3.50/b lower than Brent prices in 2018.



## WTI crude oil price dollars per barrel

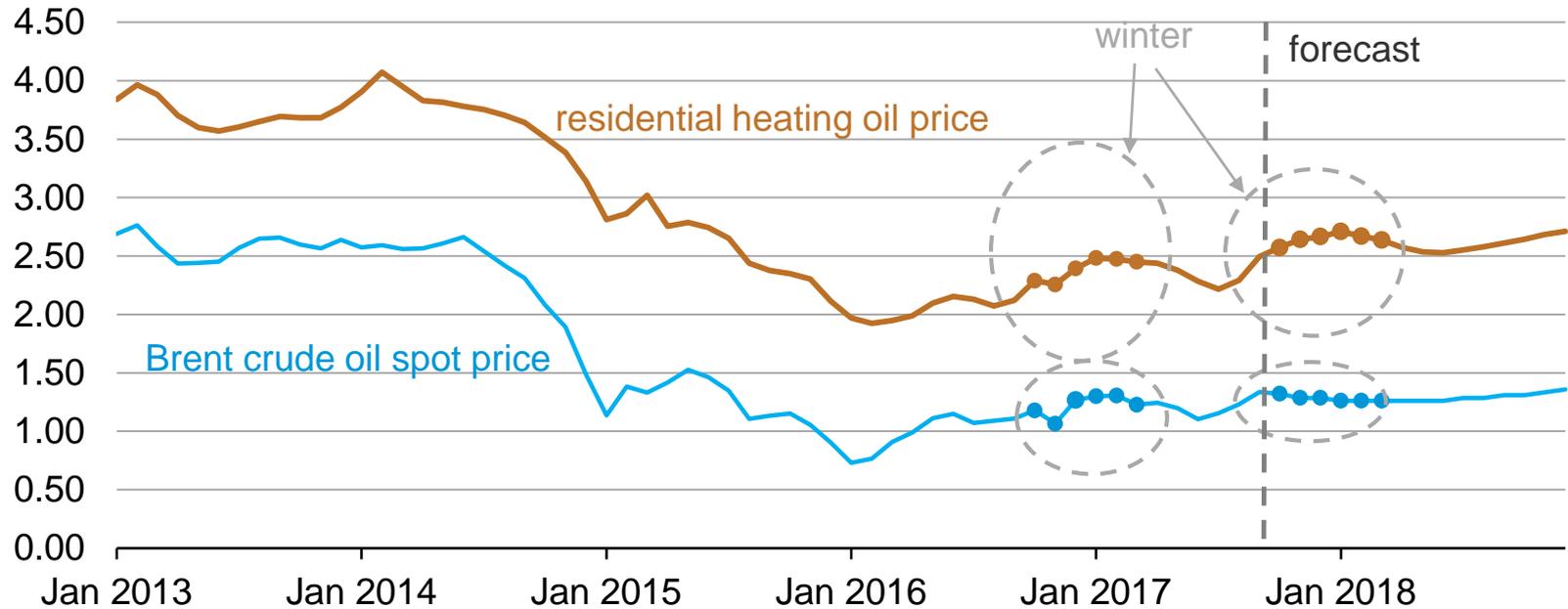


Note: Confidence interval derived from options market information for the 5 trading days ending Oct 5, 2017. Intervals not calculated for months with sparse trading in near-the-money options contracts.

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

# 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

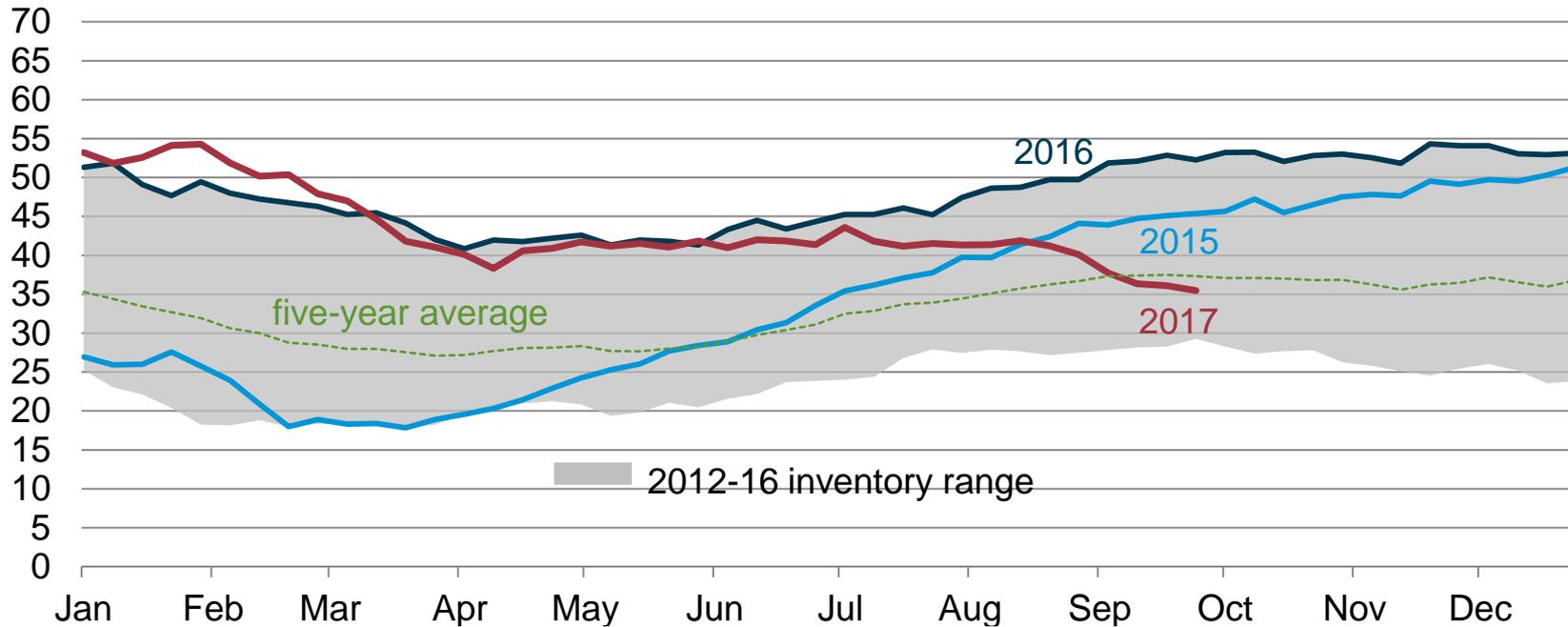


Source: EIA Short-Term Energy Outlook, October 2017, and Thomson Reuters.

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# Northeast distillate inventories have fallen in recent weeks, partly because of the effects of Hurricane Harvey

Weekly Northeast distillate inventories  
million barrels

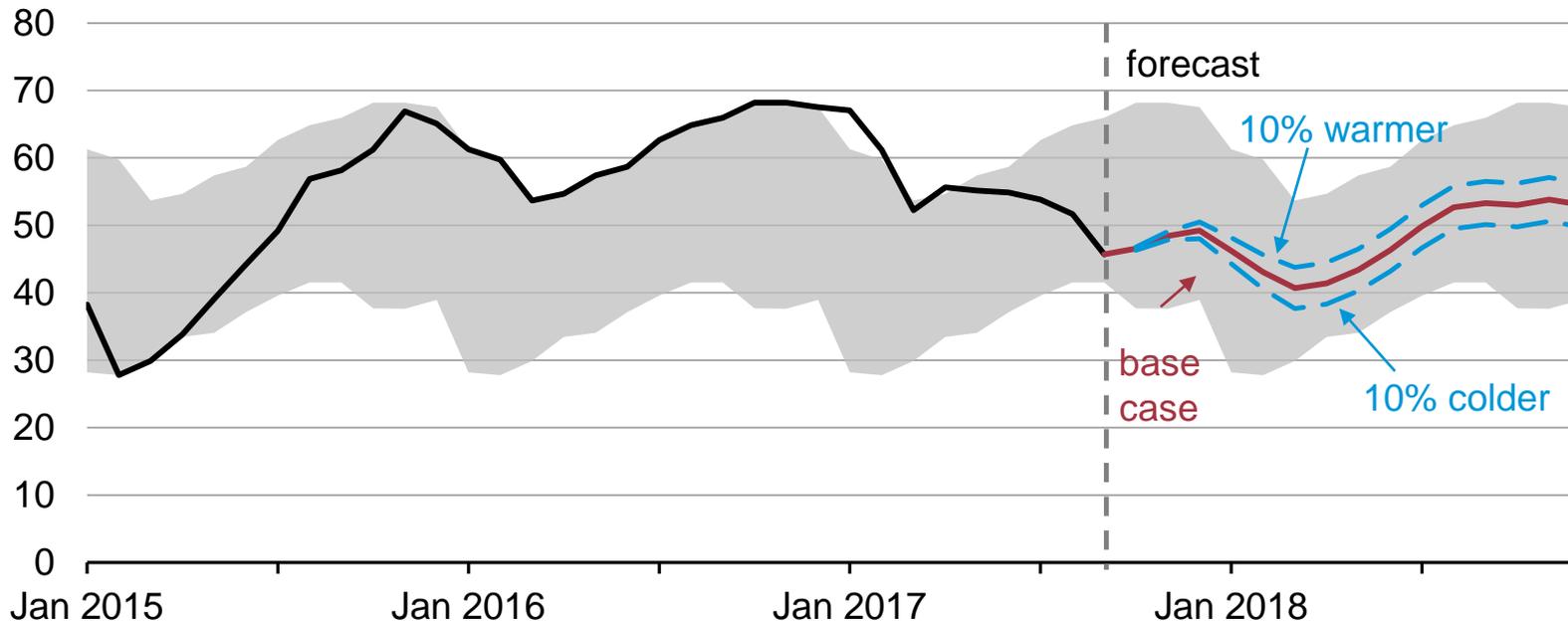


Source: EIA, Weekly Petroleum Status Report and Petroleum Supply Monthly.

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## East Coast distillate inventories are expected to remain within the five-year average range even in a 10%-colder scenario

East Coast 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

Inventories: 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.

Production: 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.

## 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

Regional share of all U.S. households that use propane as primary space heating fuel



Change from last winter (forecast)

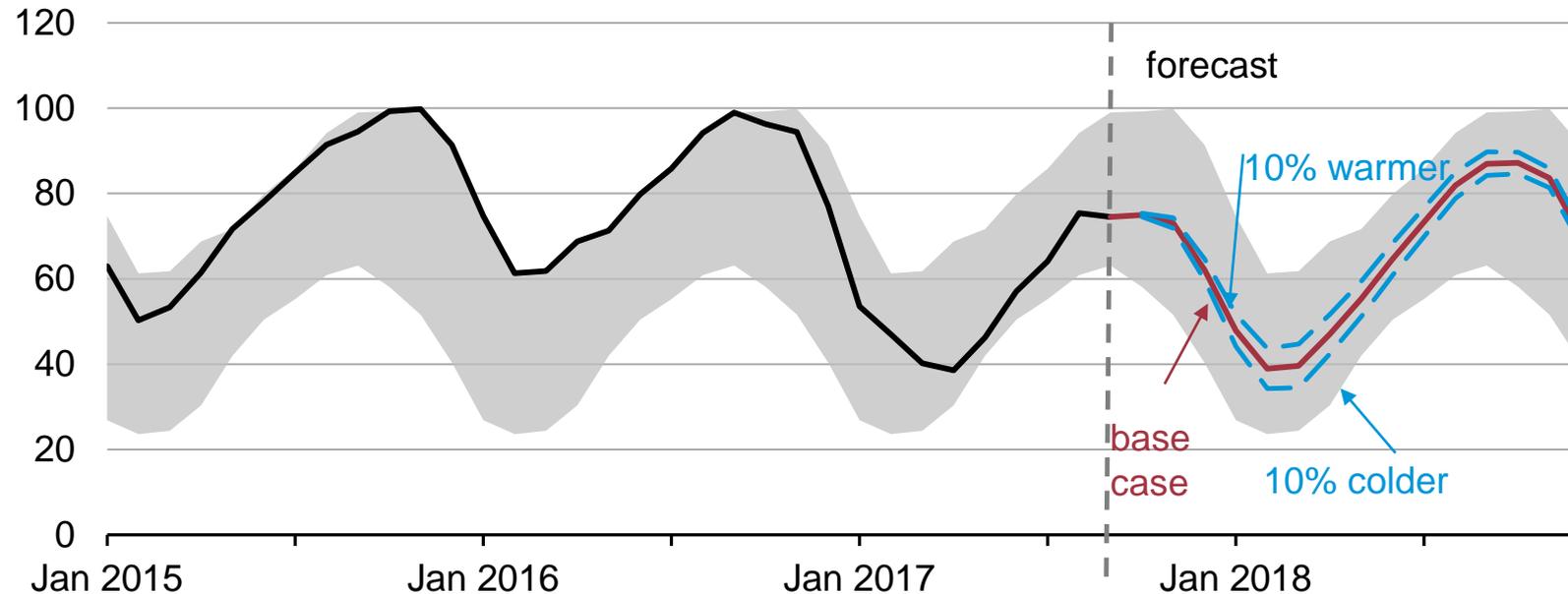
	Consumption	Average price	Total expenditures
West	n/a	n/a	n/a
South	n/a	n/a	n/a
Midwest	12%	8%	21%
Northeast	5%	6%	11%

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 levels

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

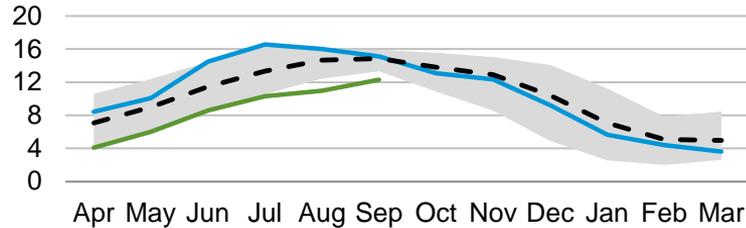


Note: Gray band represents the range between the minimum and maximum from 2012 to 2016.

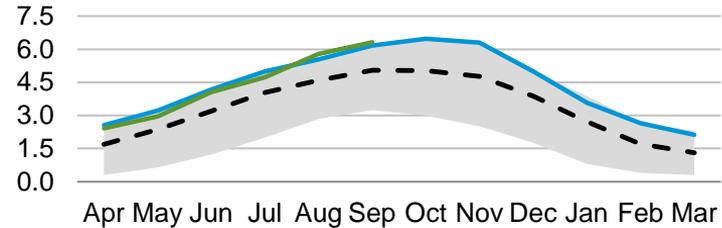
Source: EIA Short-Term Energy Outlook, October 2017.

# Propane inventories in most areas of the Midwest are relatively high, but they are low in Kansas

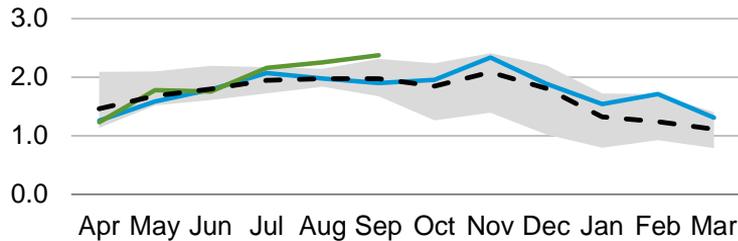
**Kansas propane stocks**  
million barrels



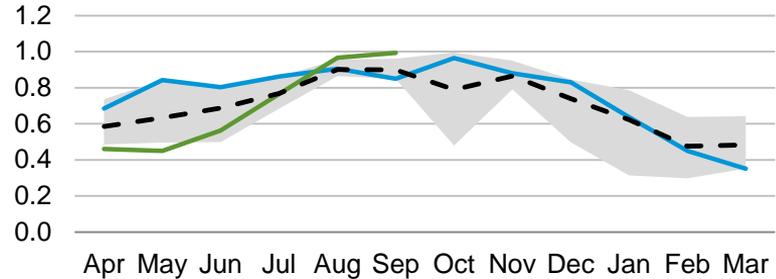
**Michigan propane stocks**  
million barrels



**Illinois, Indiana, Ohio propane stocks**  
million barrels



**Iowa, Minnesota, Wisconsin propane stocks**  
million barrels



Note: propane/propylene for fuel use only; data include stocks at terminals, gas plants, and refineries only (excluding pipelines)

Source: EIA Weekly Petroleum Status Report

# Electricity

## Winter 2017-18 takeaways – Electricity

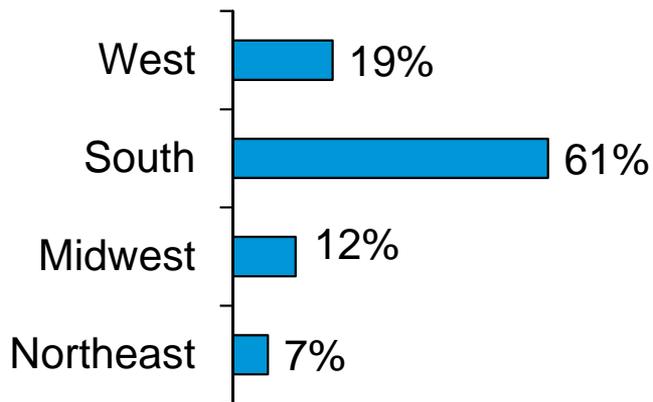
Prices: Because wholesale electricity prices are slow to pass through to consumers, yearly increases in expenditure deviations are driven more by temperatures. Residential electricity prices are expected to be up 2% this winter compared with last winter.

Consumption: Electricity consumption is expected to be 6% higher this winter compared with last winter because of a forecast return to relatively normal temperatures.

Infrastructure: 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

Regional share of all U.S. households that use electricity as primary space heating fuel



	Change from last winter (forecast)		
	Consumption	Average price	Total expenditures
	2%	2%	4%
	8%	3%	11%
	6%	3%	9%
	2%	2%	4%

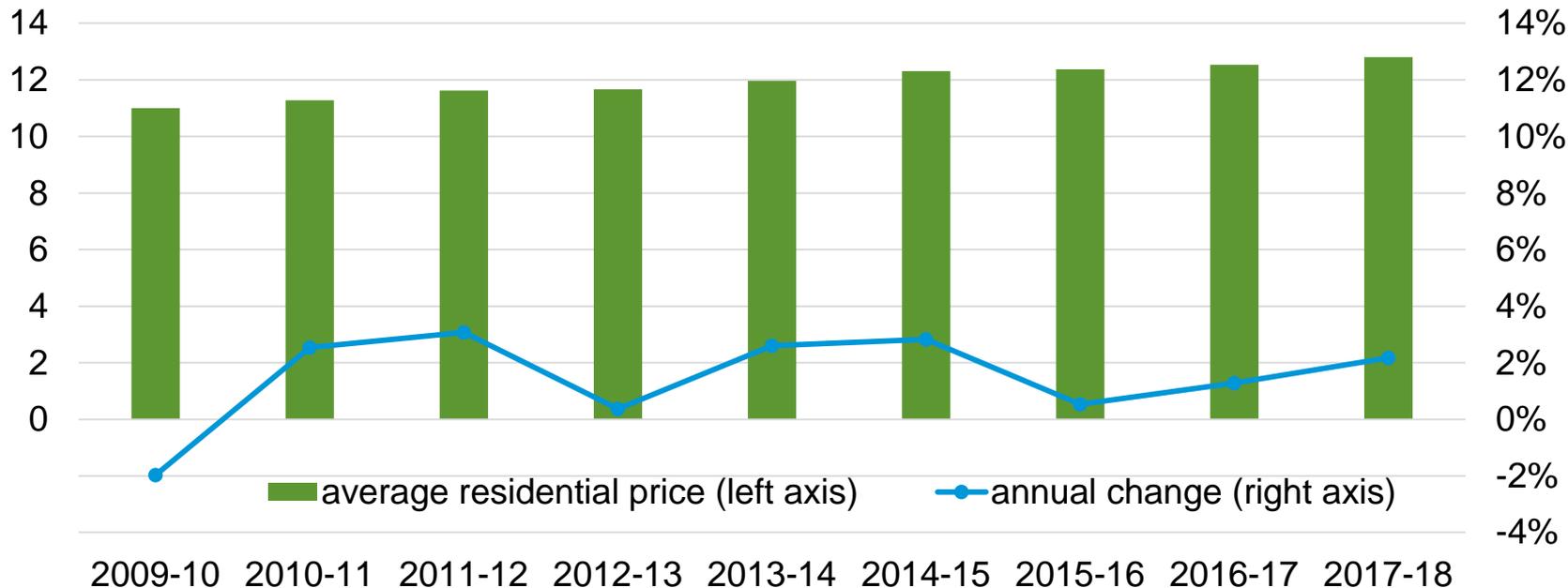
Source: EIA Short-Term Energy Outlook, October 2017

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## 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

## For more information

U.S. Energy Information Administration home page | [www.eia.gov](http://www.eia.gov)

Short-Term Energy Outlook | [www.eia.gov/steo](http://www.eia.gov/steo)

Annual Energy Outlook | [www.eia.gov/aeo](http://www.eia.gov/aeo)

International Energy Outlook | [www.eia.gov/ieo](http://www.eia.gov/ieo)

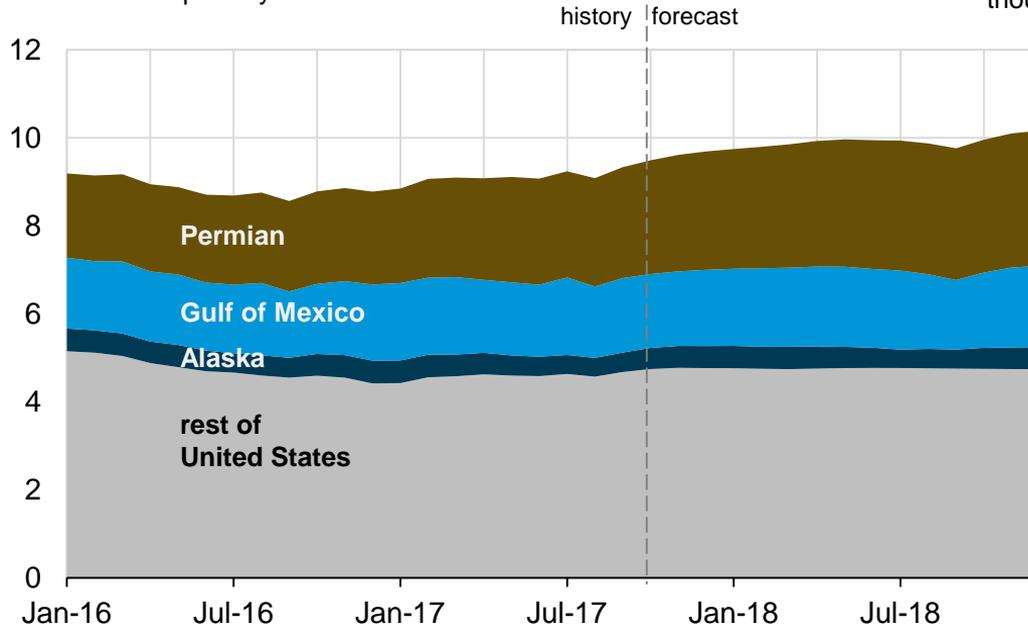
International Energy Statistics database | [www.eia.gov/ies](http://www.eia.gov/ies)

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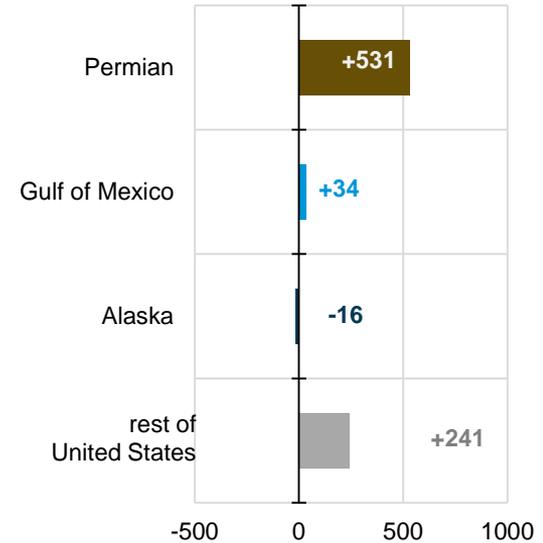
# Extra Slides

# Permian region is leading the growth between 4Q 2016 and 4Q 2017

**Monthly U.S. crude oil production**  
**Jan 2016 - Dec 2018**  
 million barrels per day



**Projected change**  
**4Q 2017 vs 4Q 2016**  
 thousand barrels per day



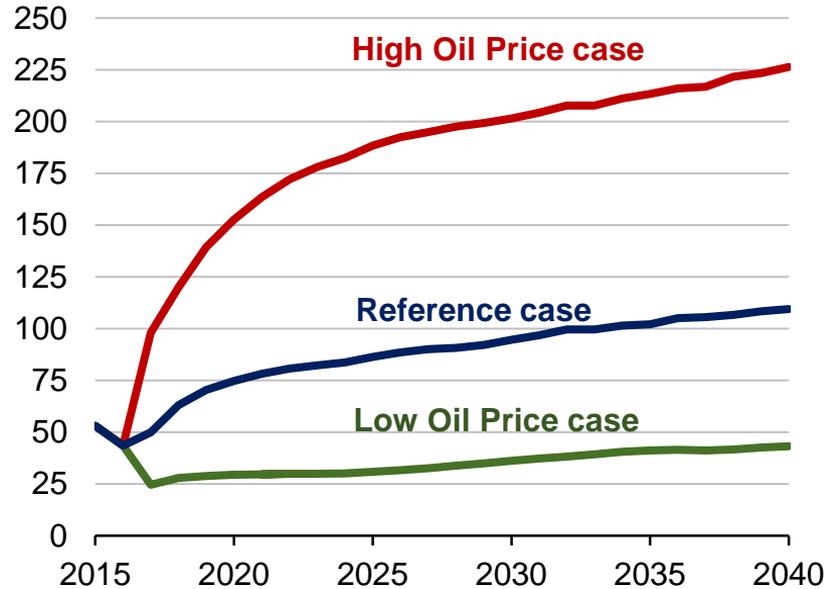
Source: U.S. Energy Information Administration, October Short-Term Energy Outlook and TWIP  
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# *International Energy Outlook 2017*

# Future oil prices are another key source of uncertainty in the projections

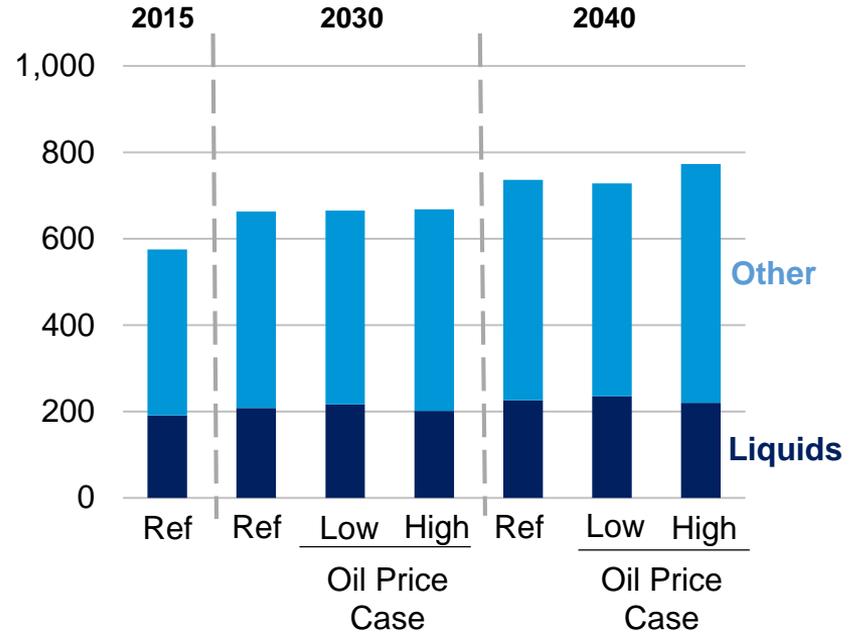
## World oil prices in three cases

real 2016 dollars per barrel



## World energy consumption in three cases

quadrillion Btu



Source: EIA, International Energy Outlook 2017

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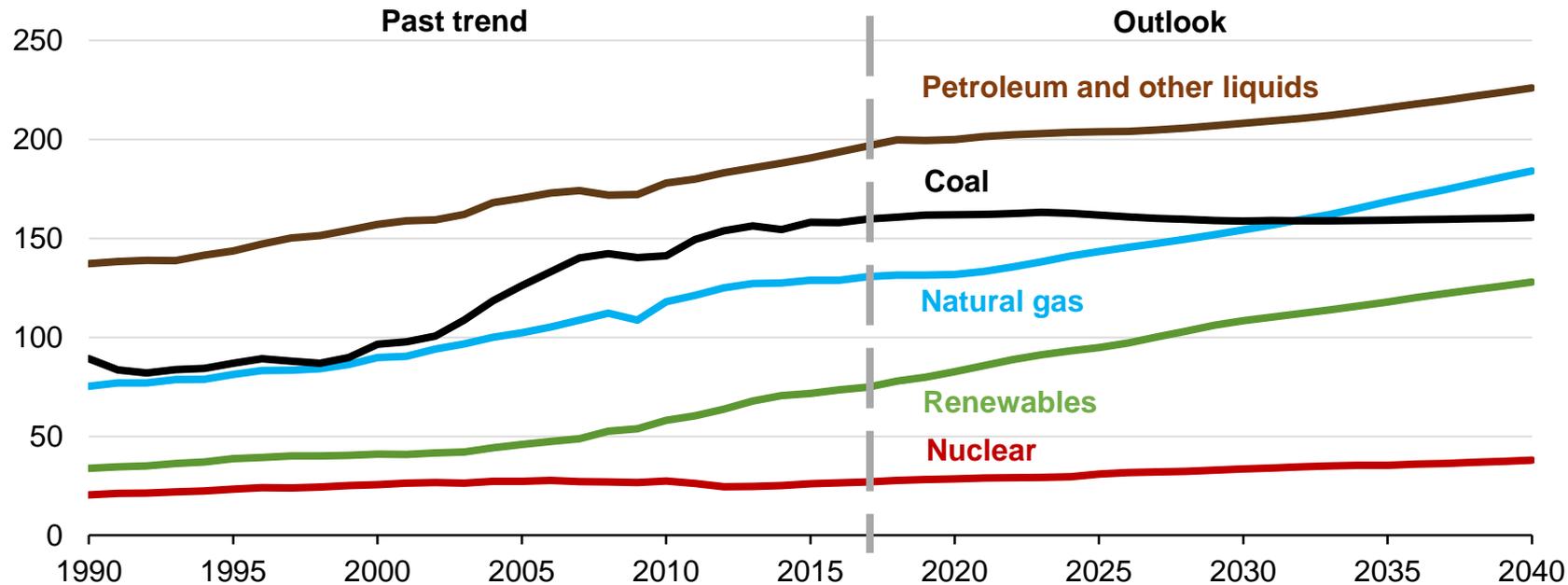
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# Energy consumption increases over the projection for all fuels other than coal in the Reference case with renewables being the fastest-growing energy source

## World energy consumption by energy source

quadrillion Btu



Source: EIA, International Energy Outlook 2017

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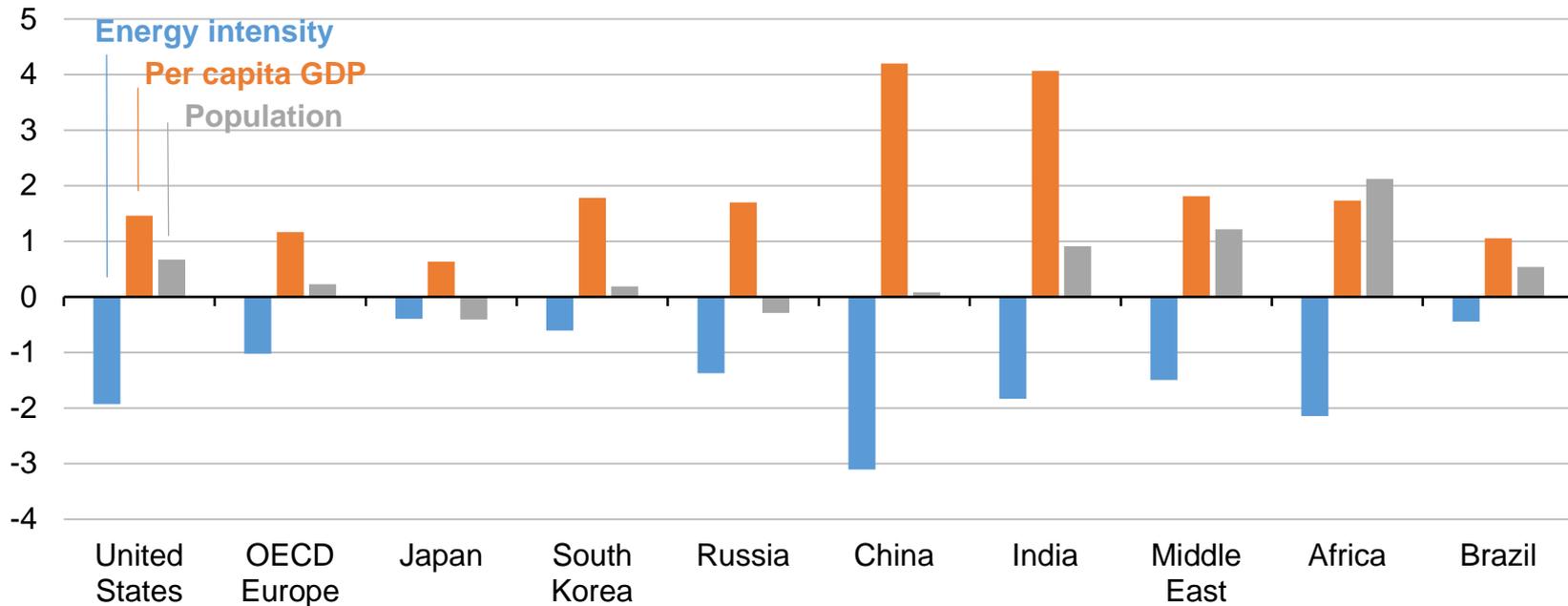
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# Income and population growth heavily influence energy demand, but improvements in energy intensity can offset associated increases in energy consumption

## Energy intensity, per capita GDP, and population growth in selected regions

average annual percent change, 2015-40



Source: EIA, *International Energy Outlook 2017*

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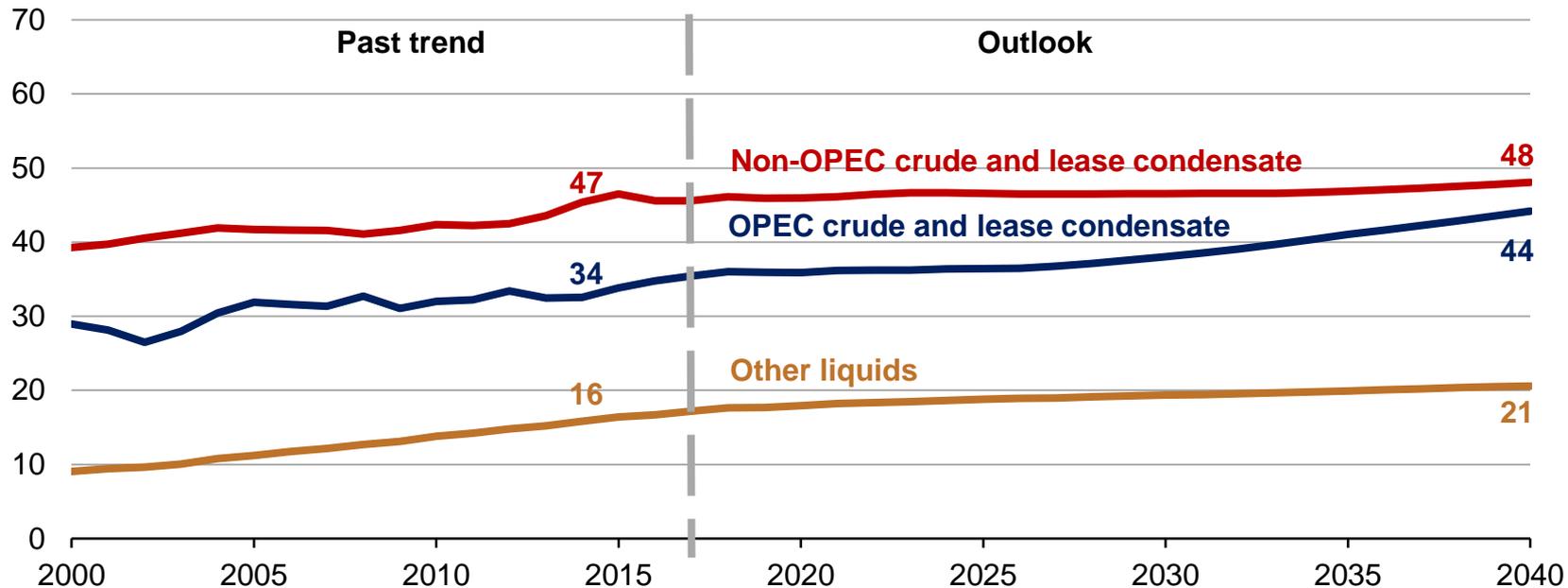
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# Liquid fuel supplies increase from 2015 to 2040 with most of the growth occurring in OPEC crude oil and lease condensate

## World petroleum and other liquids production

million barrels per day



Source: EIA, International Energy Outlook 2017

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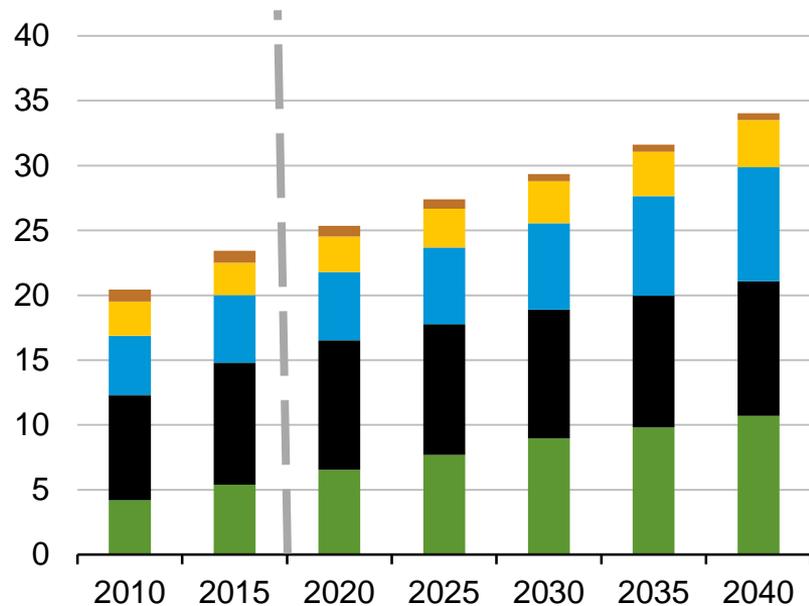
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# In the Reference case, renewables and natural gas provide much of the growth in electricity generation with their combined share of the total rising to 57% in 2040

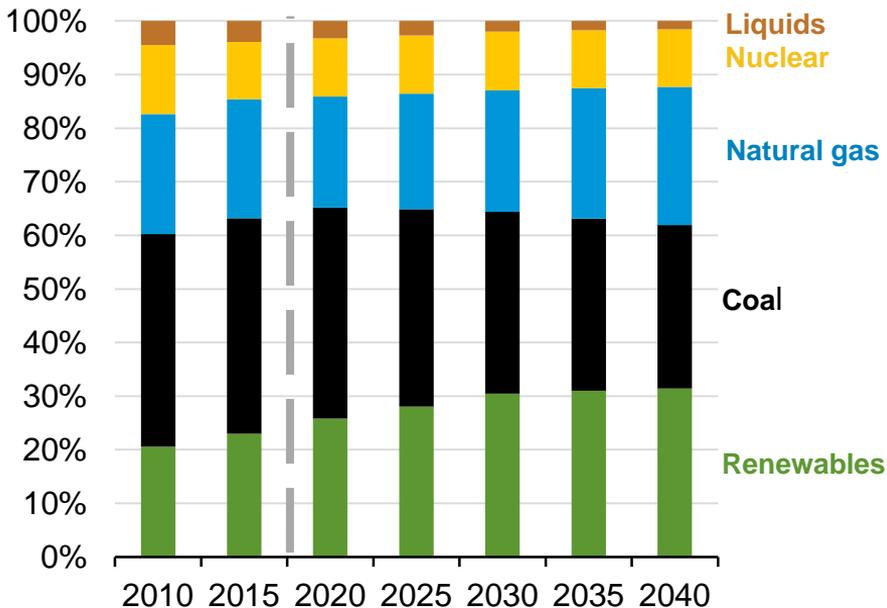
## World electricity generation by fuel

trillion kilowatthours



## Share of net electricity generation

percent



Source: EIA, International Energy Outlook 2017

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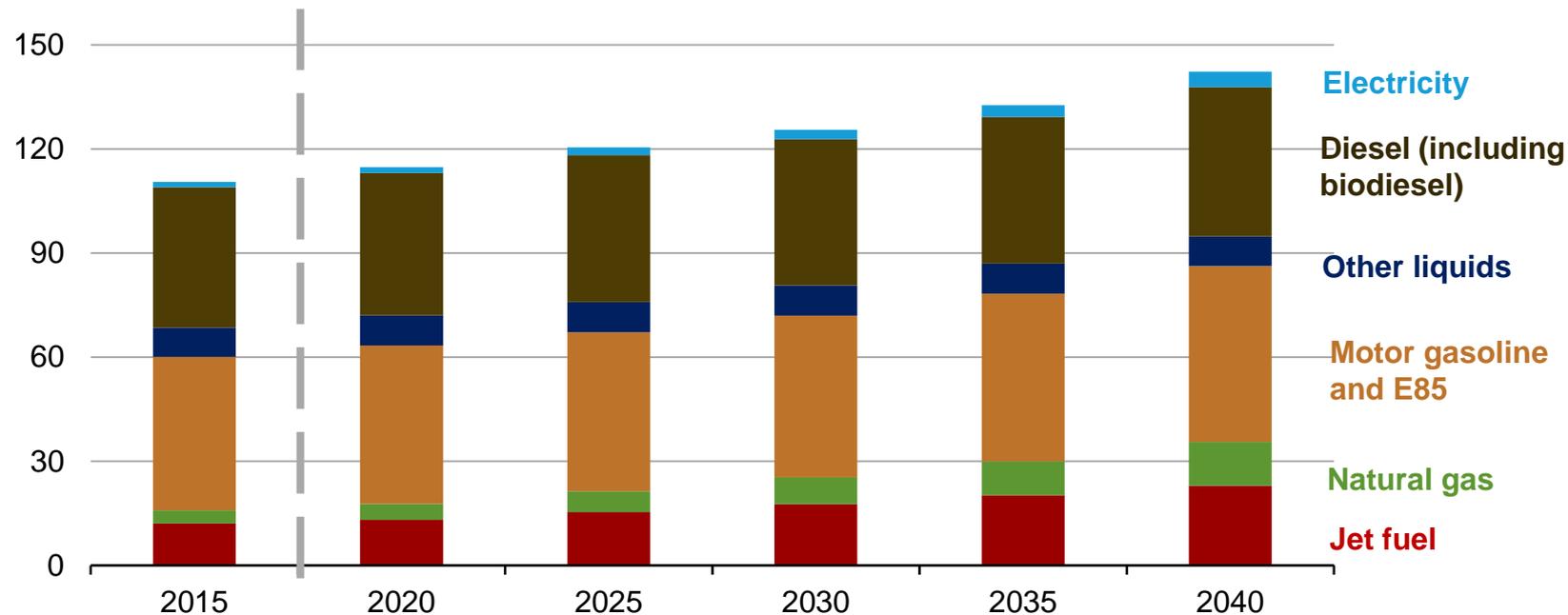
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# Motor gasoline and diesel continue to dominate the transportation fuel mix, but jet fuel, natural gas, and electricity grow fastest in the Reference case

## Transportation sector delivered energy consumption by source

quadrillion Btu



Source: EIA, International Energy Outlook 2017

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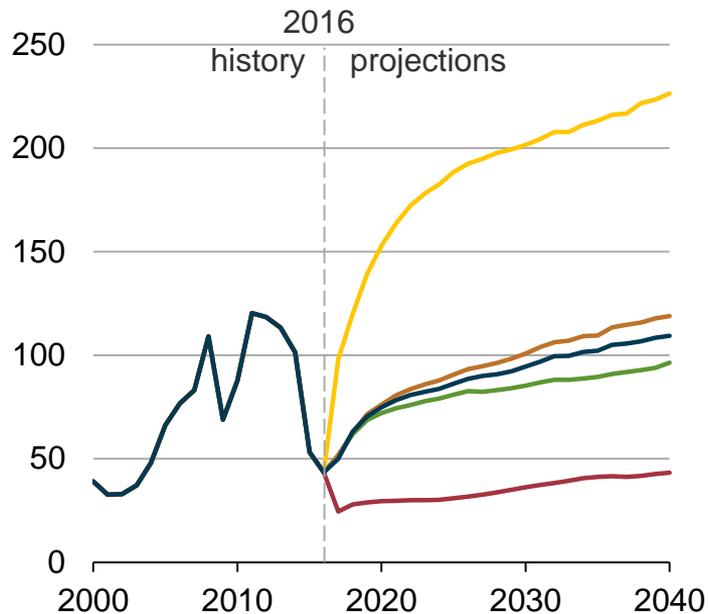
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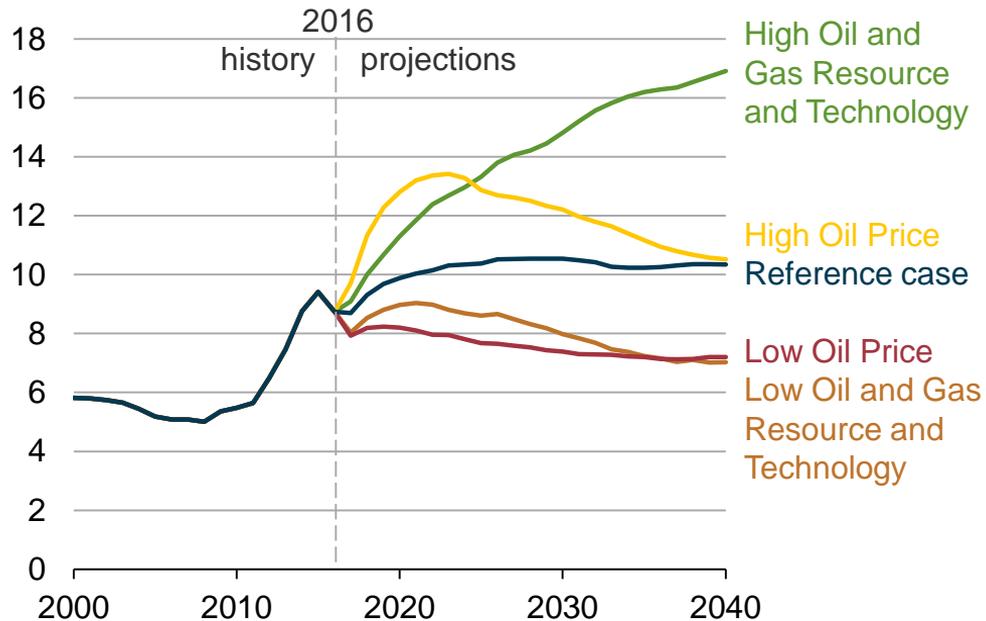
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# Reference case oil prices and production rise from current levels, price paths and production levels in the side cases are very different from those in the Reference case

North Sea Brent oil price  
2016 dollars per barrel



Crude oil production  
million barrels per day



Source: EIA, Annual Energy Outlook 2017

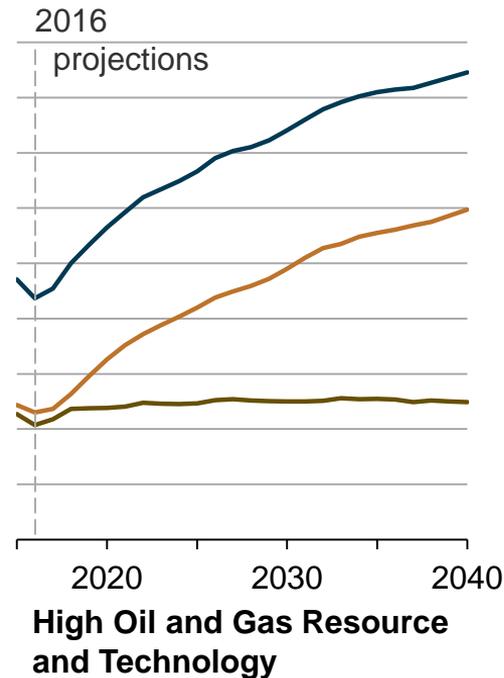
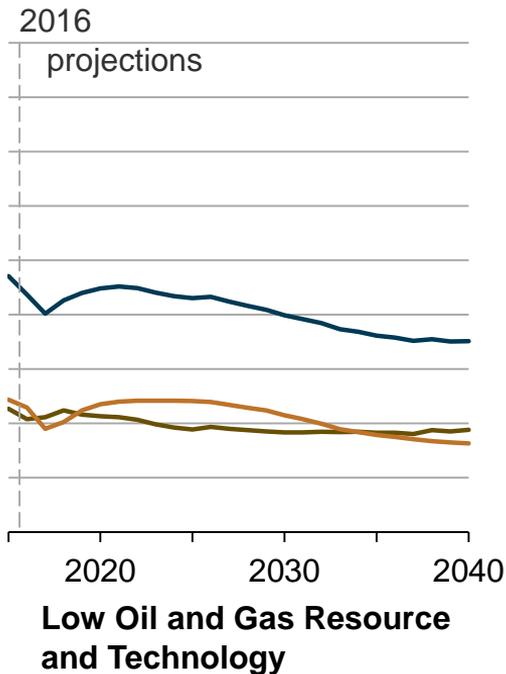
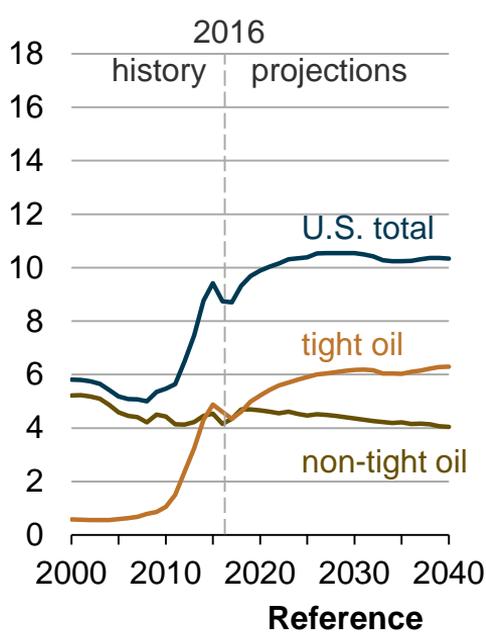
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# Tight oil dominates U.S. production in the Reference case, but other types of oil production continue to yield significant volumes

Crude oil production  
million barrels per day



Source: EIA, Annual Energy Outlook 2017

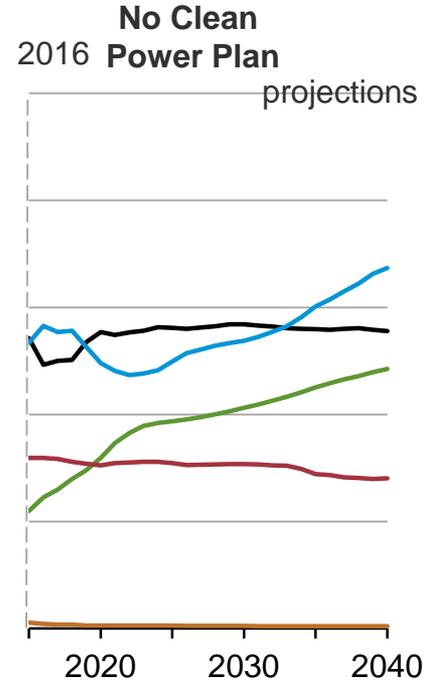
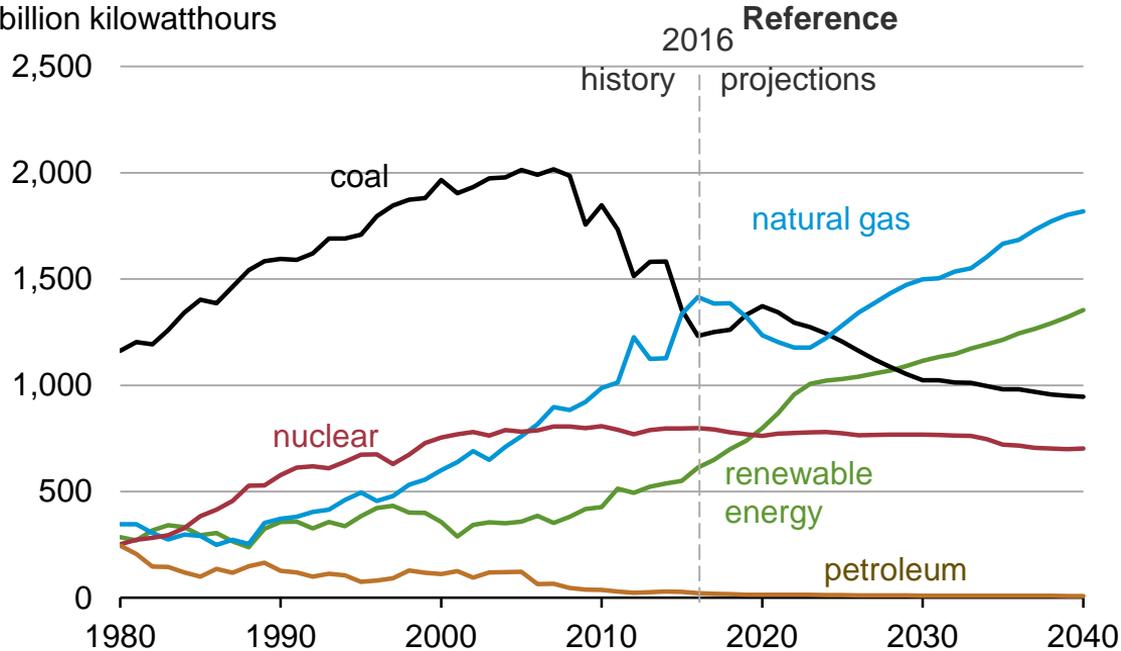
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# Fuel prices and current laws and regulations drive growing shares of renewables and natural gas in the electricity generation mix as coal's share declines over time in the Reference case

U.S. net electricity generation from select fuels  
billion kilowatthours



Source: EIA, Annual Energy Outlook 2017

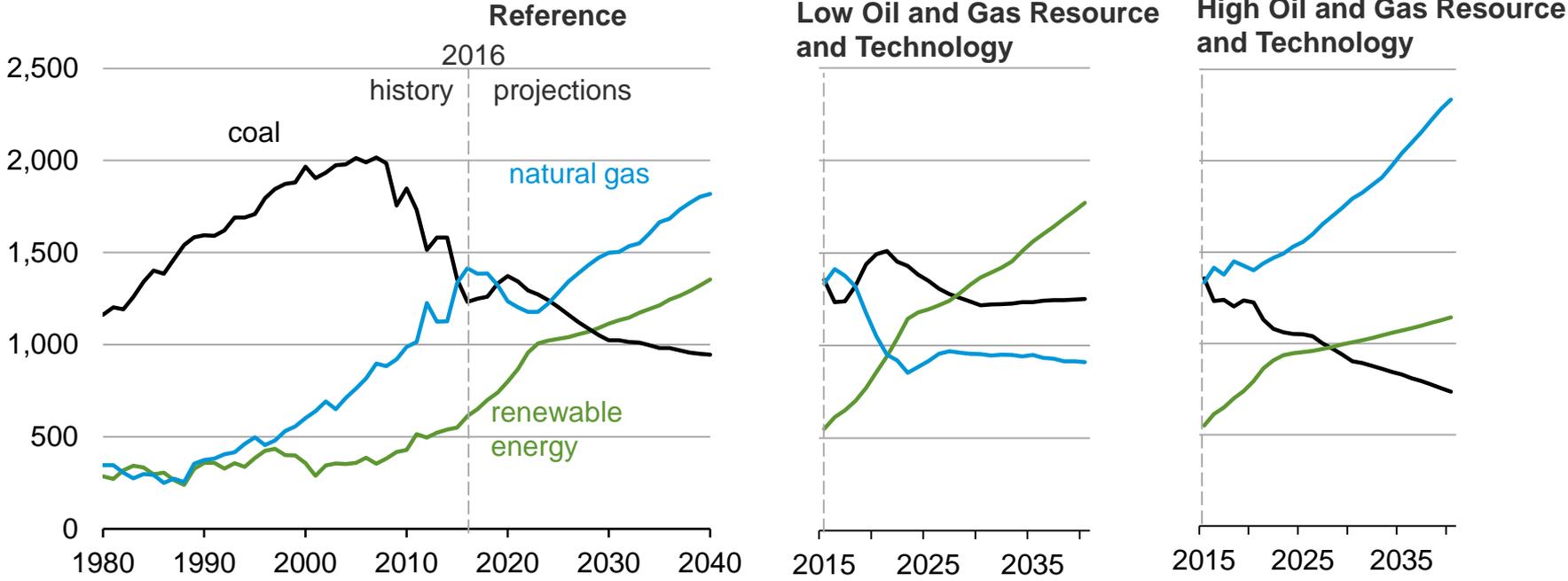
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# Natural gas resource availability affects prices and plays a critical role in determining the mix of coal, natural gas, and renewable generation

U.S. net electricity generation from select fuels  
billion kilowatthours



Source: EIA, Annual Energy Outlook 2017

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