

# *EIA's Energy Outlook 2016*



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*for*

*U.S. EIA China Visit*

*November 2016 | China*

*by*

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Independent Statistics & Analysis  
**U.S. Energy Information Administration**

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EIA is the Nation's official source of energy information and, by law, its data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government.

**Annual Energy Outlook 2016**  
 Early Release with summary of Reference case projections through 2040

**What's New**

- AEQ2016 Early Release: Summary of Two Cases > May 17
- 2012 CBECES consumption and expenditures, detailed tables, and public use microdata > May 17
- International Energy Outlook 2016 > May 11

**Coming Up**

- India Country Analysis Brief >
- Uranium Marketing Annual > Annual Energy Outlook >

**Today in Energy** *Posted May 18, 2016*

**Future power sector carbon dioxide emissions depend on status of Clean Power Plan >**

Trends in carbon dioxide (CO<sub>2</sub>) emissions from electricity generation through 2040 depend significantly on whether or not the Clean Power Plan (CPP) rule issued last August by the U.S. Environmental Protection Agency (EPA) is implemented. Analysis in EIA's *Annual Energy Outlook 2016* (AEO2016) examines what the CPP could mean for the fuels used to generate electricity, especially coal. [More](#).

**U.S. energy-related carbon dioxide (CO<sub>2</sub>) emissions (1990-2040)**  
 gBtuB metric tons

**Data Highlights**

- WTI crude oil futures price**  
 5/17/2016: \$48.31/barrel  
 ↑ \$3.55 from week earlier  
 ↓ \$11.12 from year earlier
- Natural gas futures price**  
 5/17/2016: \$2.048/MMBtu  
 ↓ \$0.110 from week earlier  
 ↓ \$0.962 from year earlier
- Retail gasoline price**  
 5/16/2016: \$2.242/gal  
 ↑ \$0.022 from week earlier  
 ↓ \$0.502 from year earlier
- Crude oil inventories**  
 5/13/2016: 541.3 million barrels  
 ↑ 1.3 million barrels from week earlier  
 ↑ 58.1 million barrels from year earlier
- Weekly coal production**  
 5/7/2016: 10.949 million tons  
 ↓ 2.310 million tons from week earlier  
 ↓ 5.104 million tons from year earlier

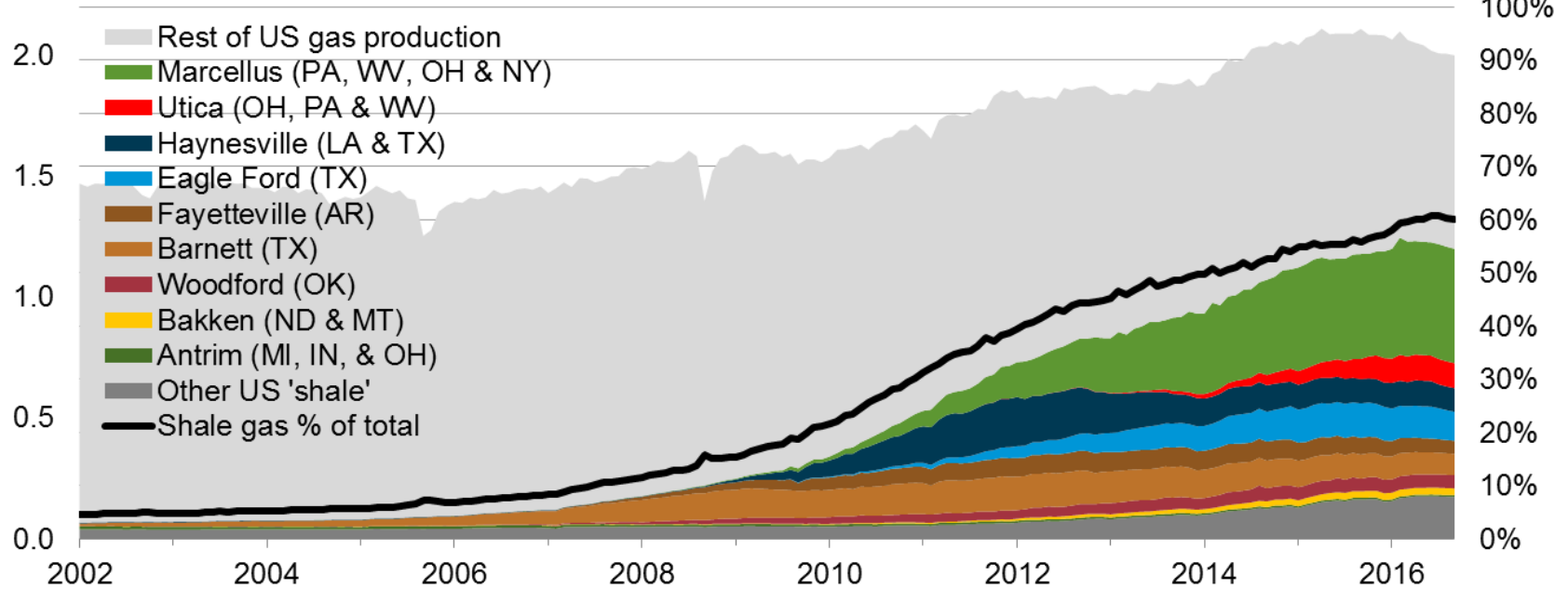
Source: EIA, *Annual Energy Outlook 2016*

# U.S. short term oil and natural gas outlook

# Estimated U.S. shale gas production was 1.2 Bcm/d in September 2016 about 60% of total U.S. dry production (2.0 Bcm/d)

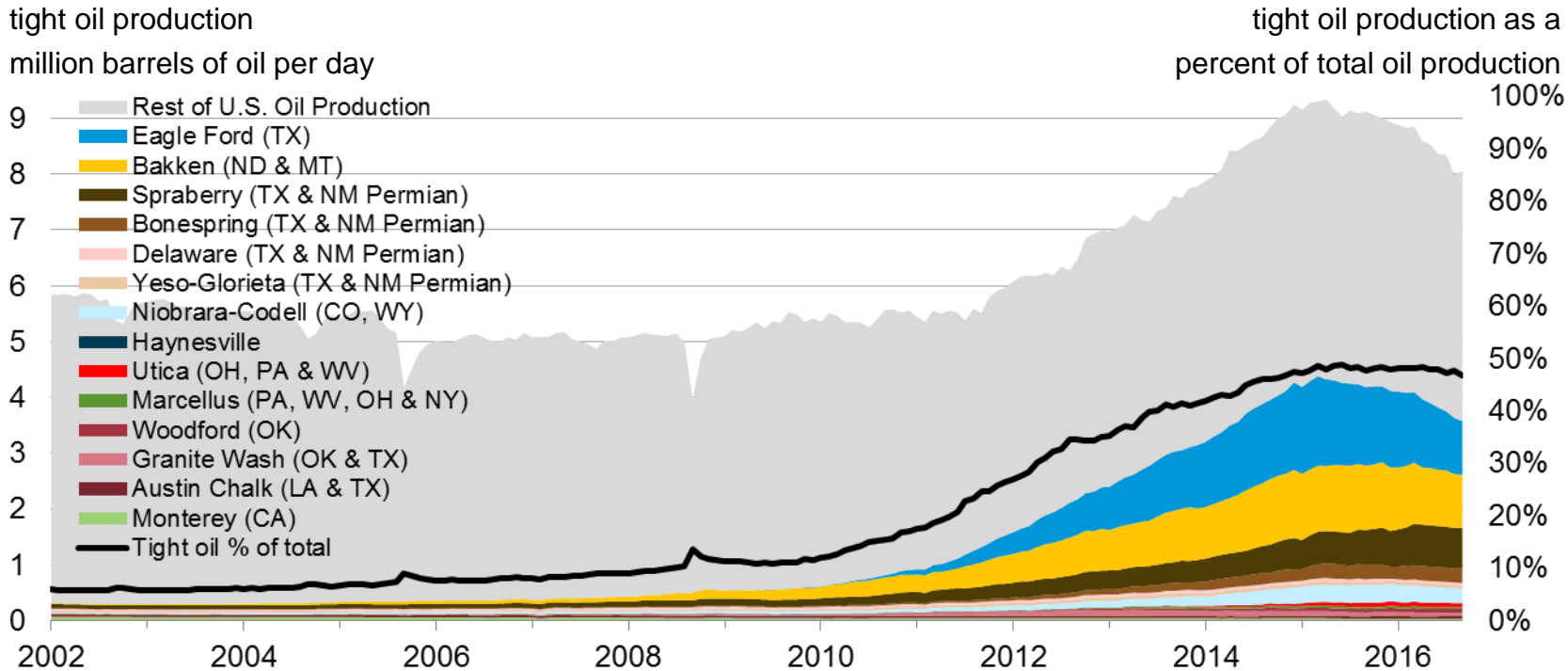
natural gas production (dry)  
billion cubic meters per day

Shale gas production as a  
percent of total gas production



Sources: EIA Natural Gas Monthly, STEO through September 2016 and DrillingInfo.

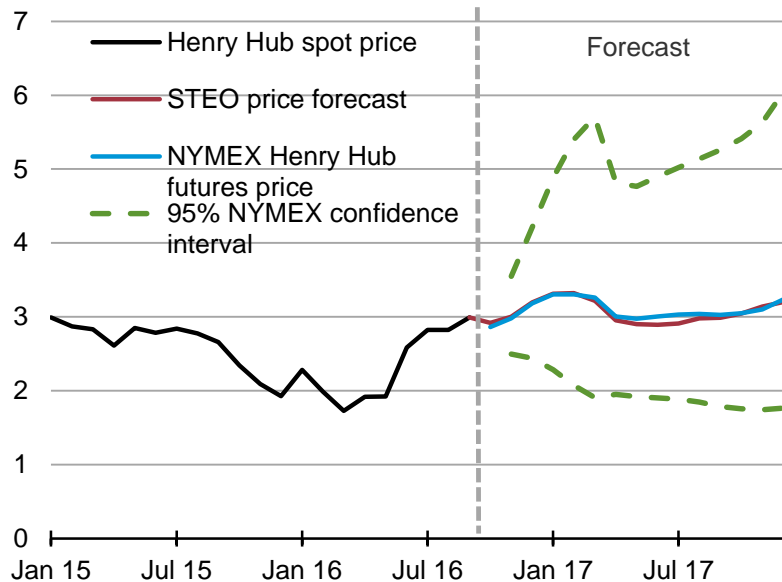
# Estimated U.S. tight oil production was 3.9 MMbbl/d in September 2016 about 47% of total U.S. oil production (8.4 MMbbl/d)



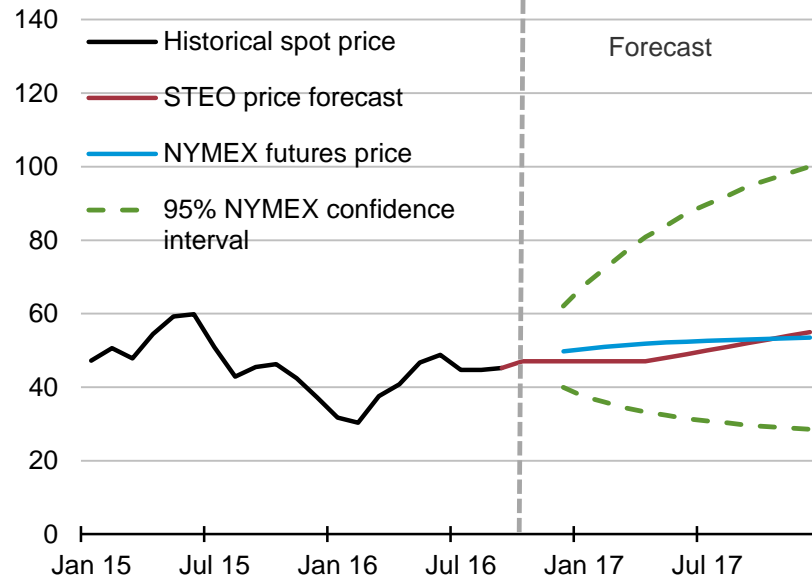
Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through September 2016 and represent EIA's official tight oil estimates, but are not survey data. State abbreviations indicate primary state(s).

# EIA forecasts Henry Hub spot prices to average \$3.15/MMBtu and West Texas intermediate crude oil to average \$47/b this winter.

Henry Hub natural gas price  
dollars per million Btu



West Texas intermediate (WTI) crude oil price  
dollars per barrel

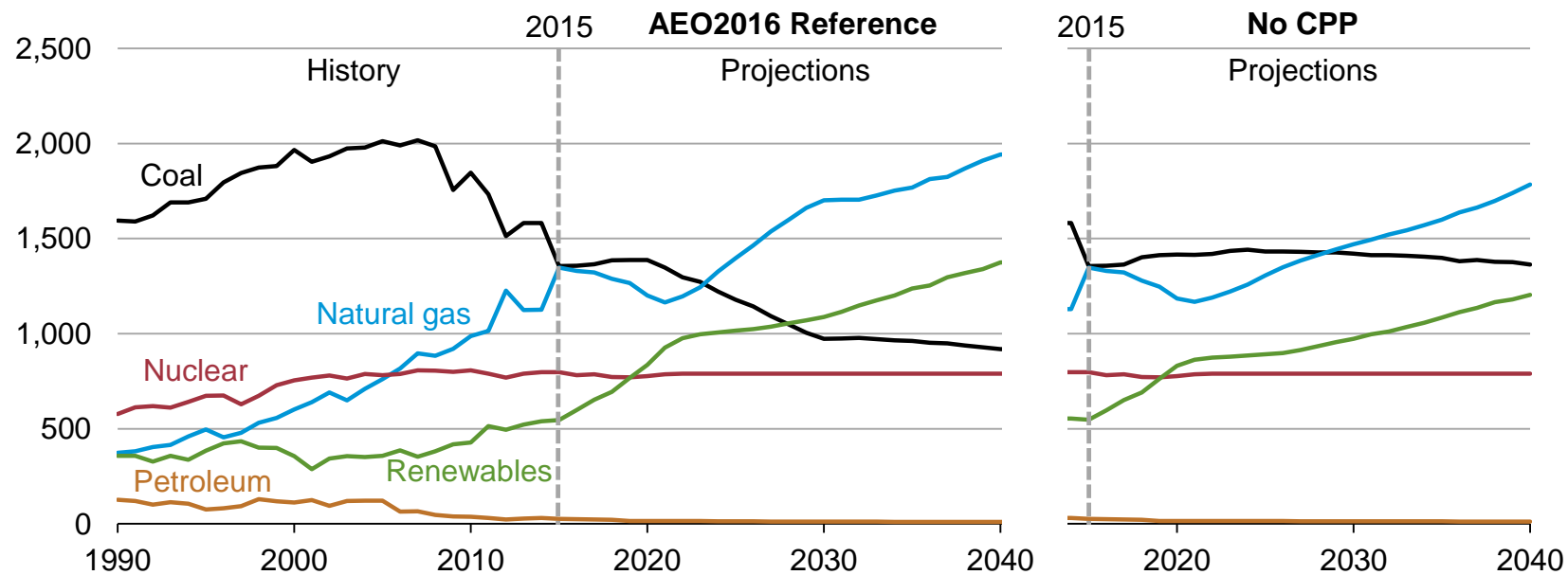


Note: Confidence interval derived from options market information for the 5 trading days ending October 6, 2016. Intervals not calculated for months with sparse trading in near-the-money options contracts.

Source: EIA Short-Term Energy Outlook, October 2016, and CME Group.

# Both natural gas and renewable generation surpass coal by 2030 in the Reference case, but only natural gas does so in the No CPP case

net electricity generation  
billion kilowatthours



Source: EIA, Annual Energy Outlook 2016

# International short term energy outlook

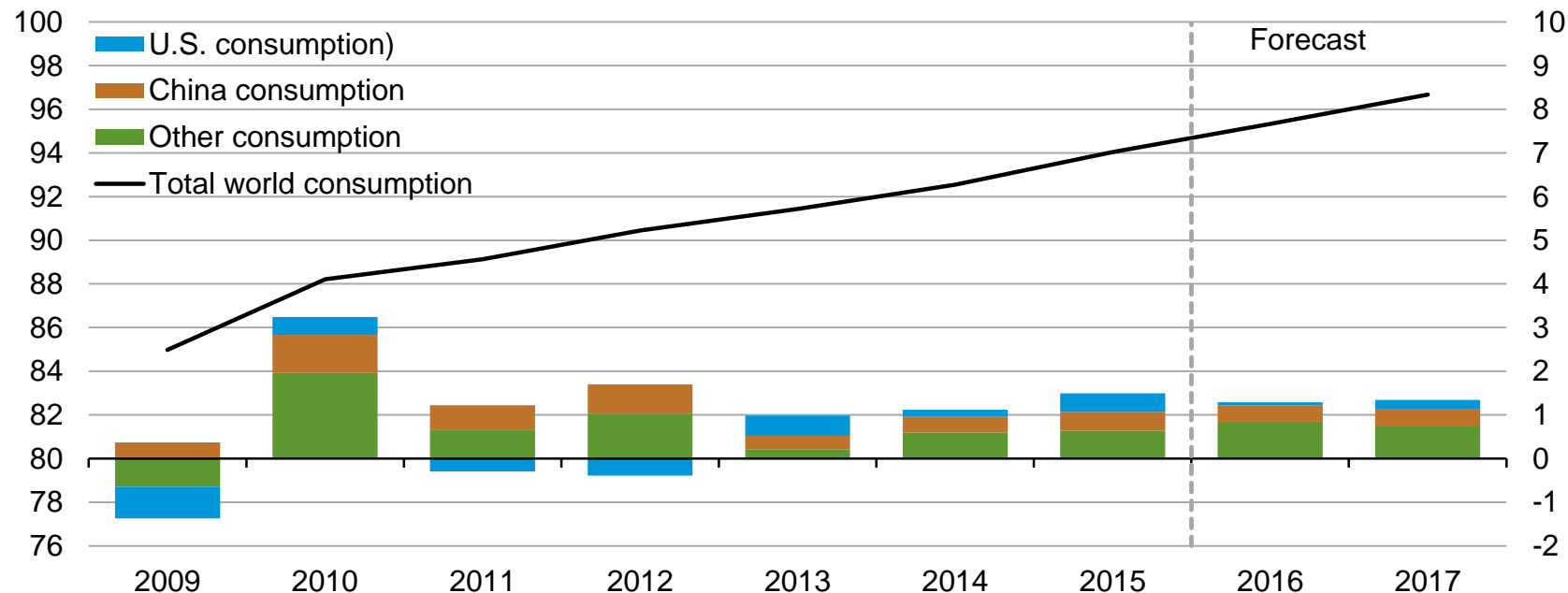


# World liquid fuels consumption

total world consumption

million barrels per day (MMb/d)

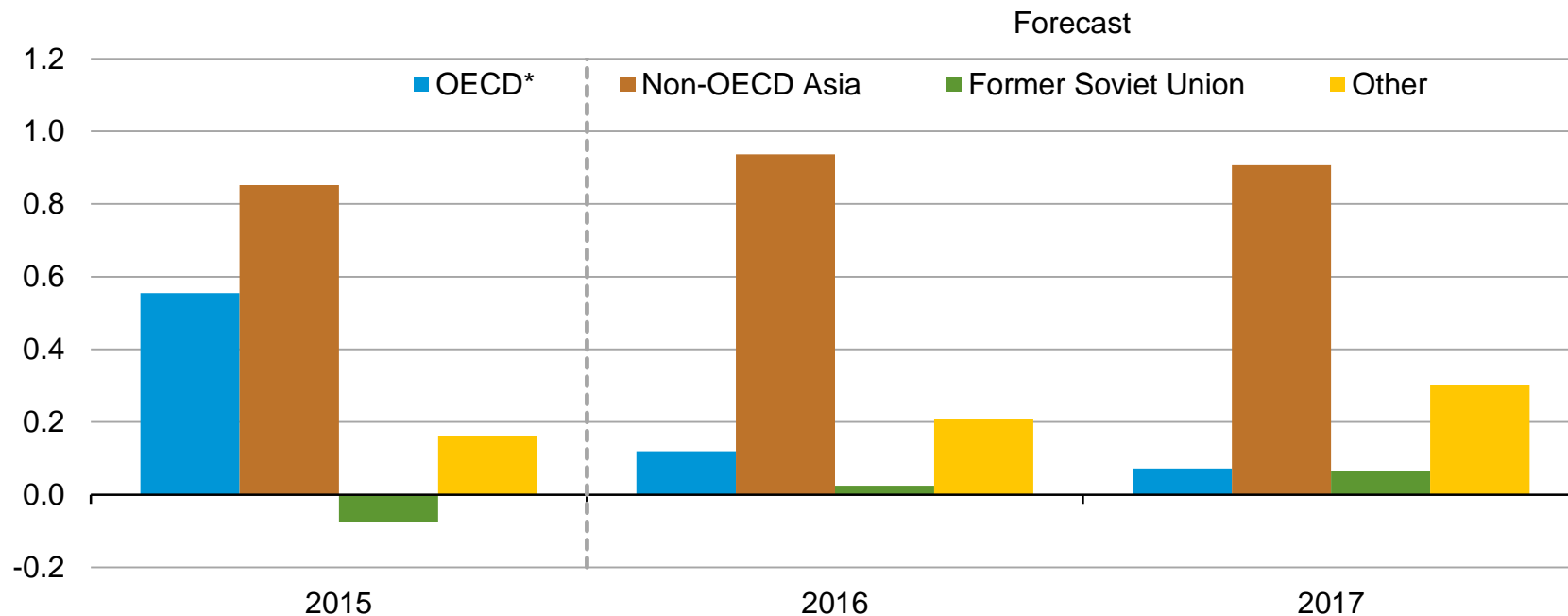
change in consumption  
annual change (MMb/d)



Source: Short-Term Energy Outlook, October 2016.

# World liquid fuels consumption growth

million barrels per day



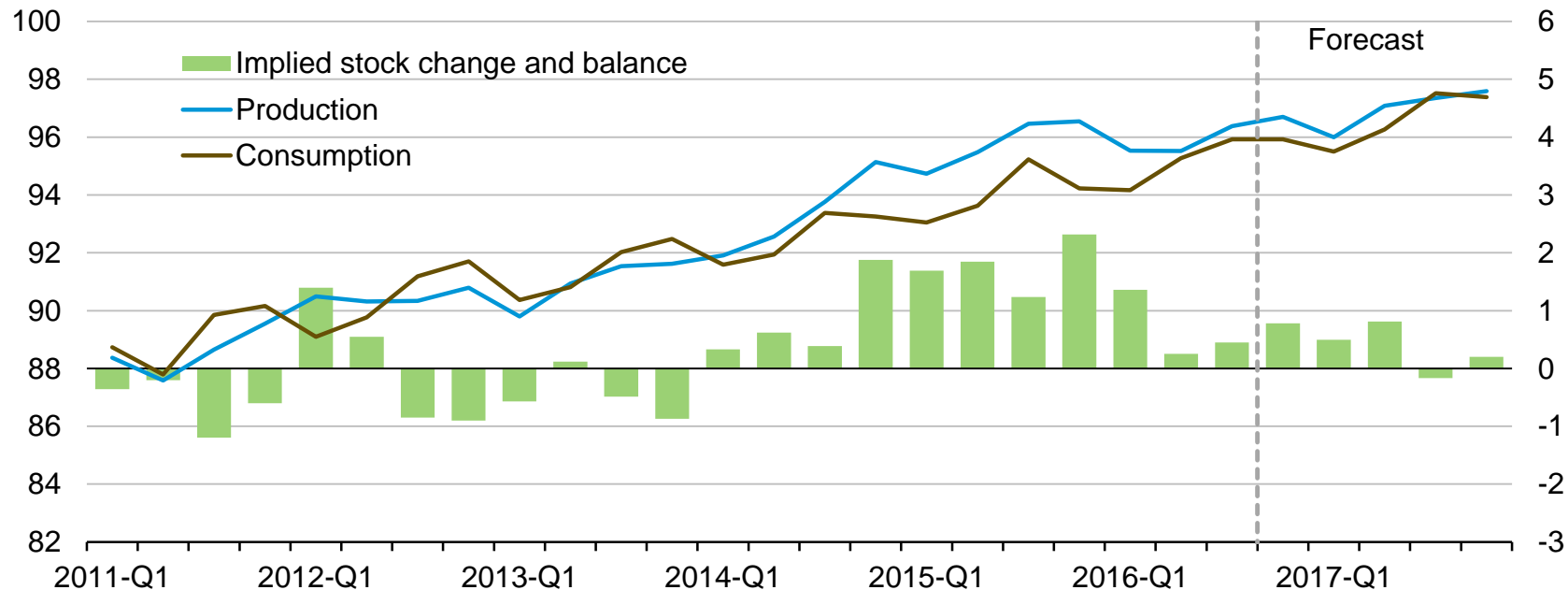
\* Countries belonging to the Organization for Economic Cooperation and Development

Source: Short-Term Energy Outlook, October 2016.

# World liquid fuels production and consumption balance

world production and consumption  
million barrels per day (MMb/d)

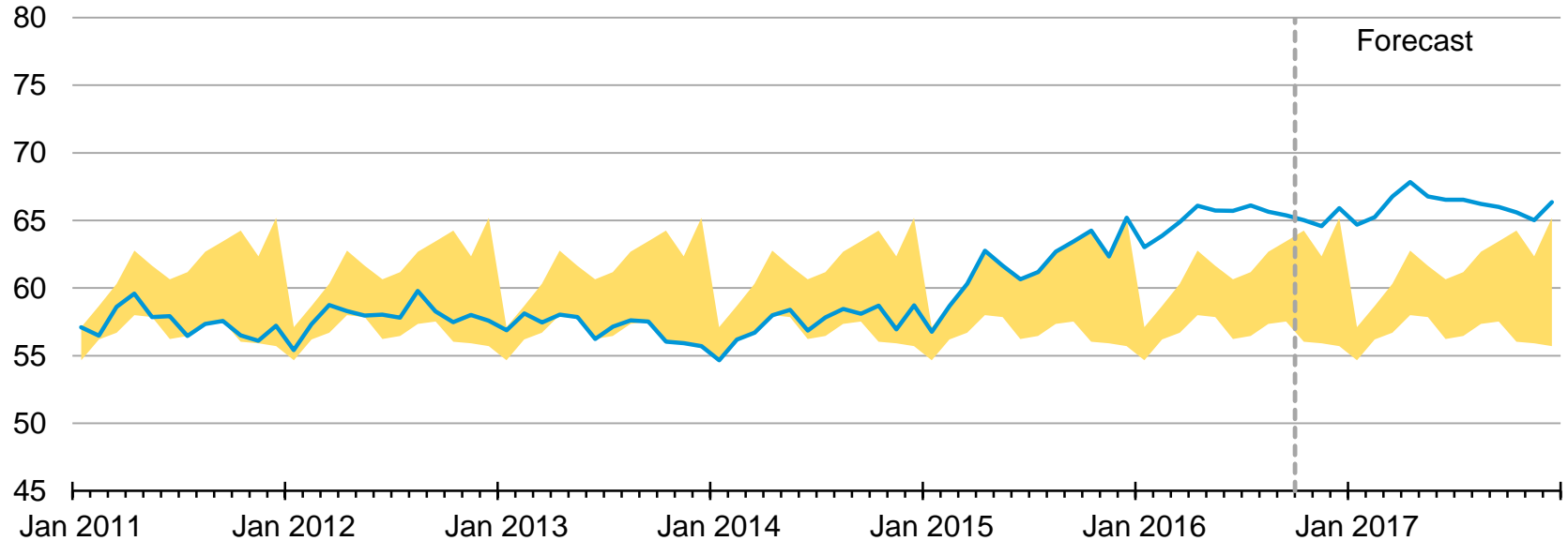
implied stock change and balance  
million barrels per day (MMb/d)



Source: Short-Term Energy Outlook, October 2016.

# OECD commercial stocks of crude oil and other liquids

days of supply



Note: Colored band around days of supply of crude oil and other liquids stocks represents the range between the minimum and maximum from Jan. 2011 - Dec. 2015.

Source: Short-Term Energy Outlook, October 2016.

# International long-term energy outlook

## Key findings in EIA's long-term global outlook (IEO2016)

- World energy consumption increases from 549 quadrillion Btu in 2012 to 629 quadrillion Btu in 2020 and then to 815 quadrillion Btu in 2040, a 48% increase (1.4%/year). Non-OECD Asia (including China and India) account for more than half of the increase. Population grows 0.9%/year.
- The industrial sector continues to account for the largest share of delivered energy consumption; the world industrial sector still consumes over half of global delivered energy in 2040.
- Renewable energy is the world's fastest-growing energy source, increasing by 2.6%/year; nuclear energy grows by 2.3%/year, from 4% of the global total in 2012 to 6% in 2040.
- Fossil fuels continue to supply more than three-fourths of world energy use in 2040.

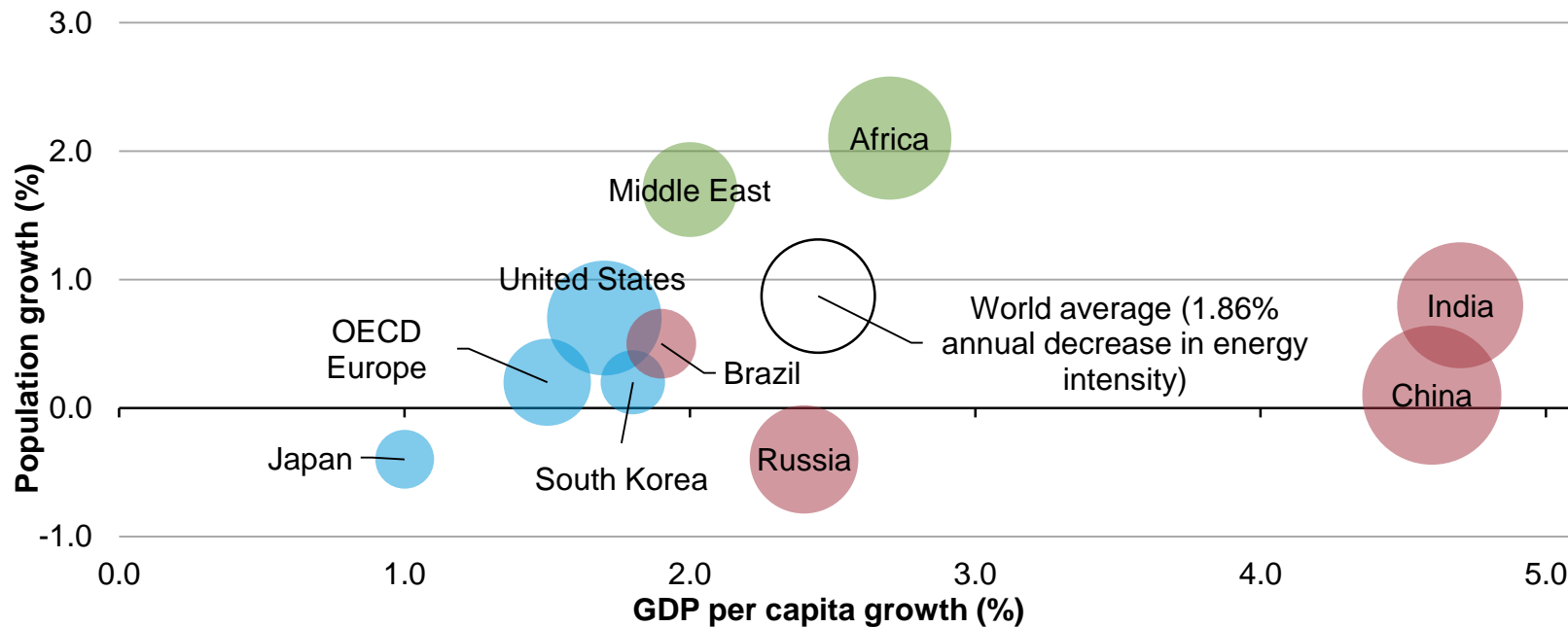
## Key findings in the IEO2016 (continued)

- Among the fossil fuels, natural gas grows the fastest. Coal use plateaus in the mid-term as China shifts from energy-intensive industries to services and worldwide policies to limit coal use intensify. By 2030, natural gas surpasses coal as the world's second largest energy source.
- In 2012, coal provided 40% of the world's total net electricity generation. By 2040, coal, natural gas, and renewable energy sources provide roughly equal shares (28-29%) of world generation.
- With current policies and regulations, worldwide energy-related carbon dioxide emissions rise from about 32 billion metric tons in 2012 to 36 billion metric tons in 2020 and then to 43 billion metric tons in 2040, a 34% increase.

# Economic activity and population drive increases in energy use; energy intensity (E/GDP) improvements moderate this trend

average annual percent change (2012–40)

percent per year

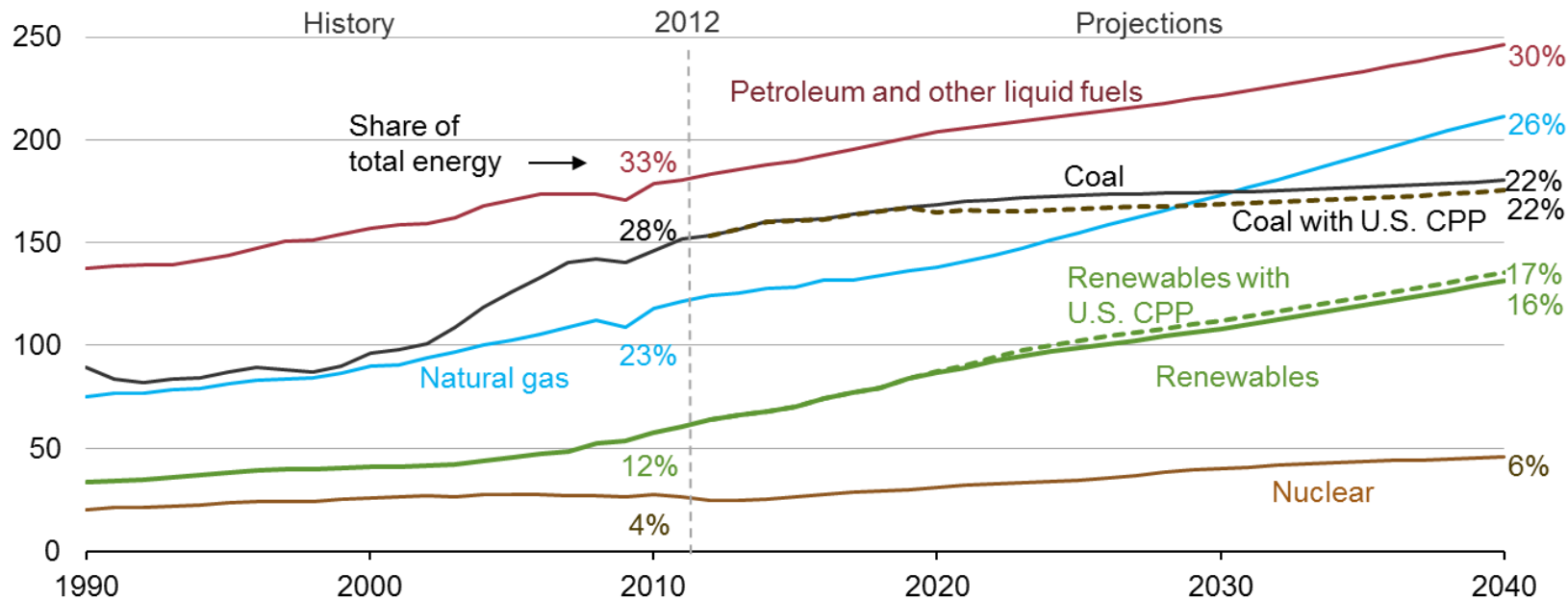


Source: EIA, International Energy Outlook 2016



# Global energy shares: renewables grow fastest, coal use plateaus, natural gas surpasses coal by 2030, and oil maintains its leading share

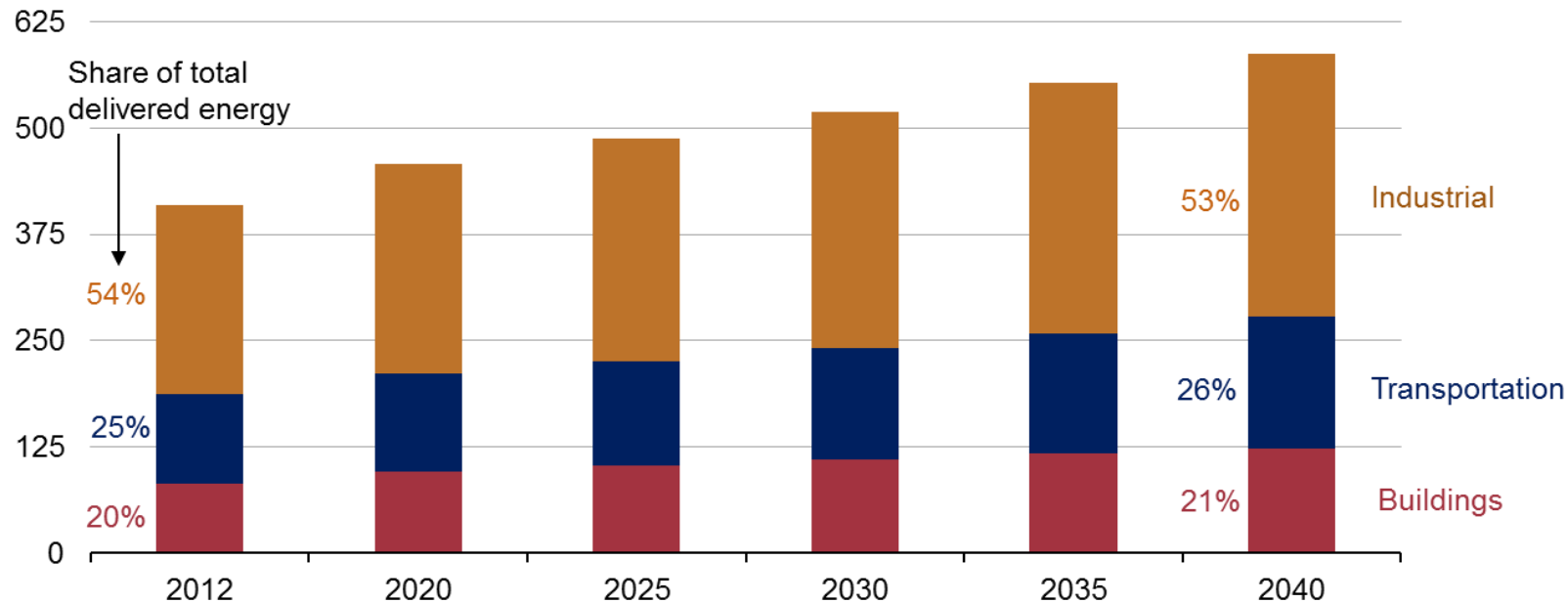
world energy consumption  
quadrillion Btu



Source: EIA, International Energy Outlook 2016 and EIA, Analysis of the Impacts of the Clean Power Plan (May 2015)

# As total world energy consumption grows, shares by end-use sector remain relatively unchanged

world delivered energy consumption by end-use sector  
quadrillion Btu

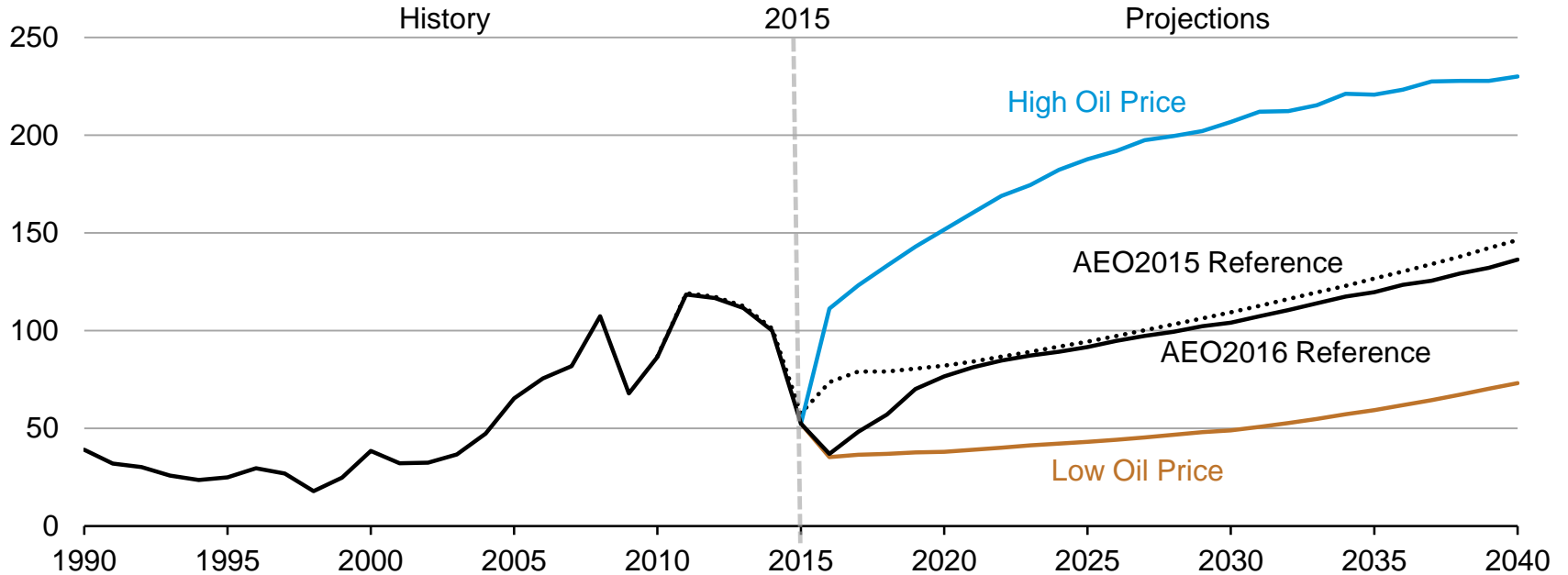


Source: EIA, International Energy Outlook 2016

# Liquid fuels markets

# Near-term crude oil price scenario is lower in AEO2016

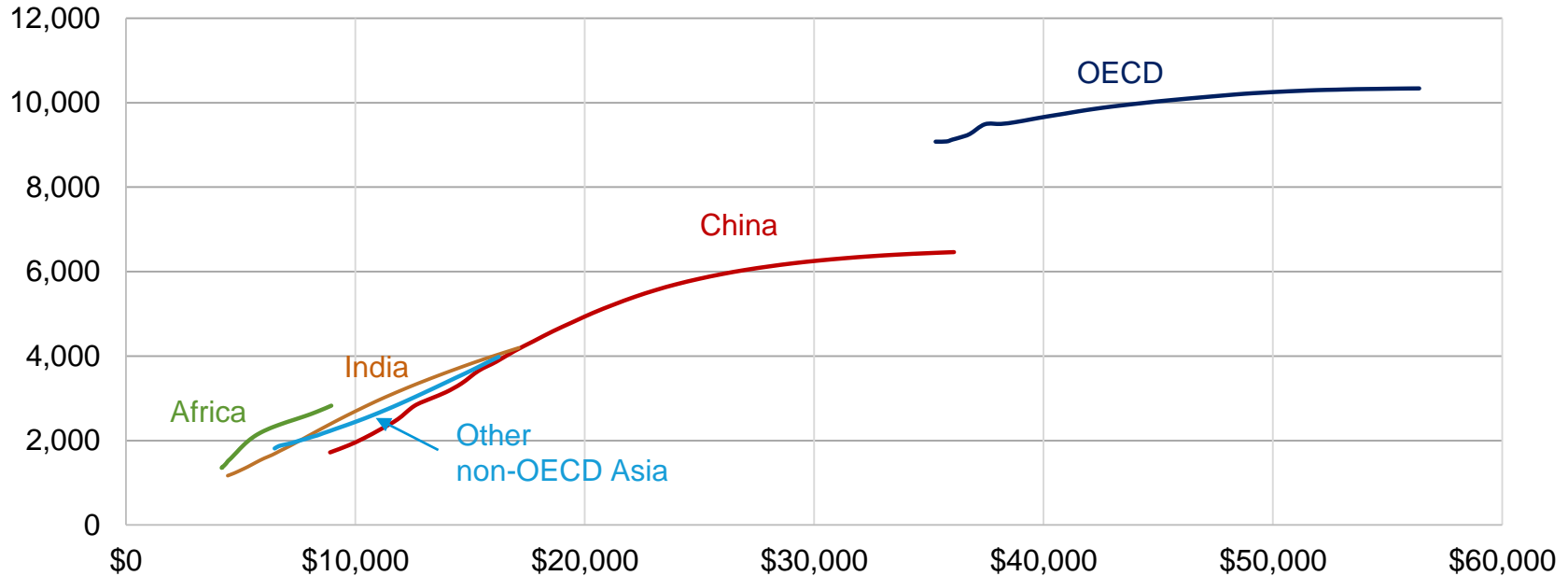
Brent crude oil spot price  
2015 dollars per barrel



Source: EIA, Annual Energy Outlook 2016 Reference case and Annual Energy Outlook 2015 Reference case

# Passenger-miles per person will rise as GDP per capita grows; travel growth is largely outside the OECD

passenger-miles per capita (left-axis) and GDP per capita (horizontal-axis) for selected country groupings 2010–40

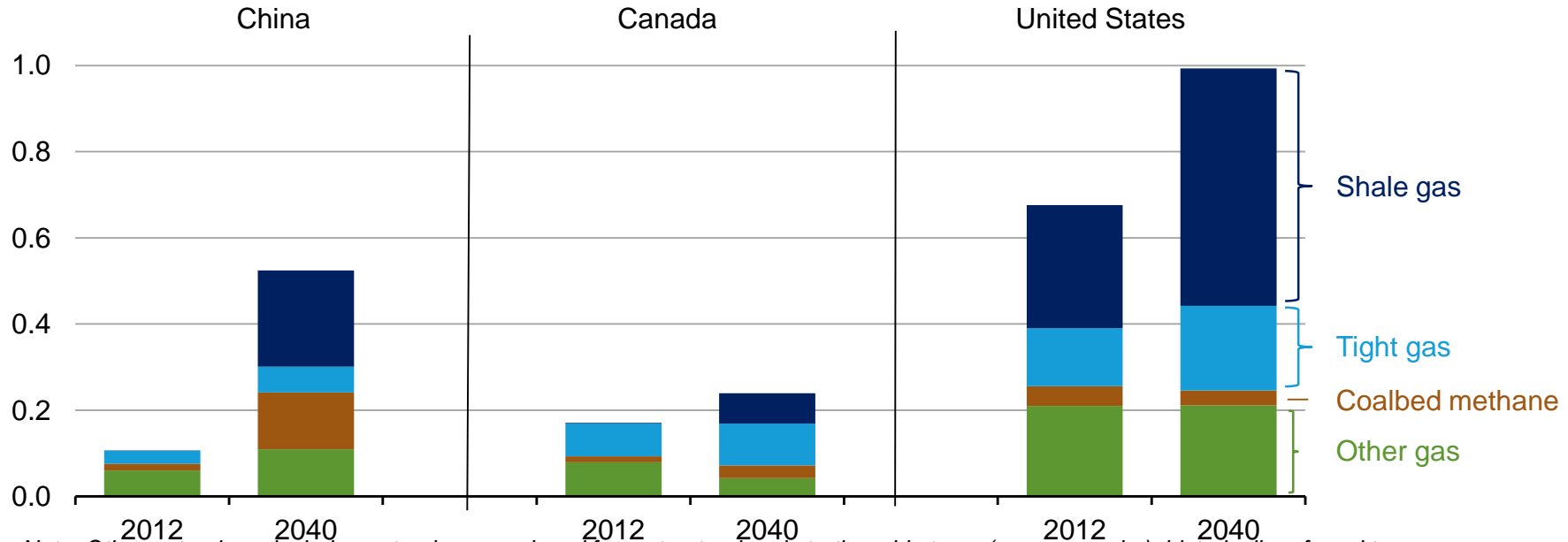


Source: EIA, *International Energy Outlook 2016*

# Natural gas markets

# Shale gas, tight gas, and coalbed methane will become increasingly important to gas supplies, not only for the U.S., but also China and Canada

natural gas production by type  
trillion cubic meters

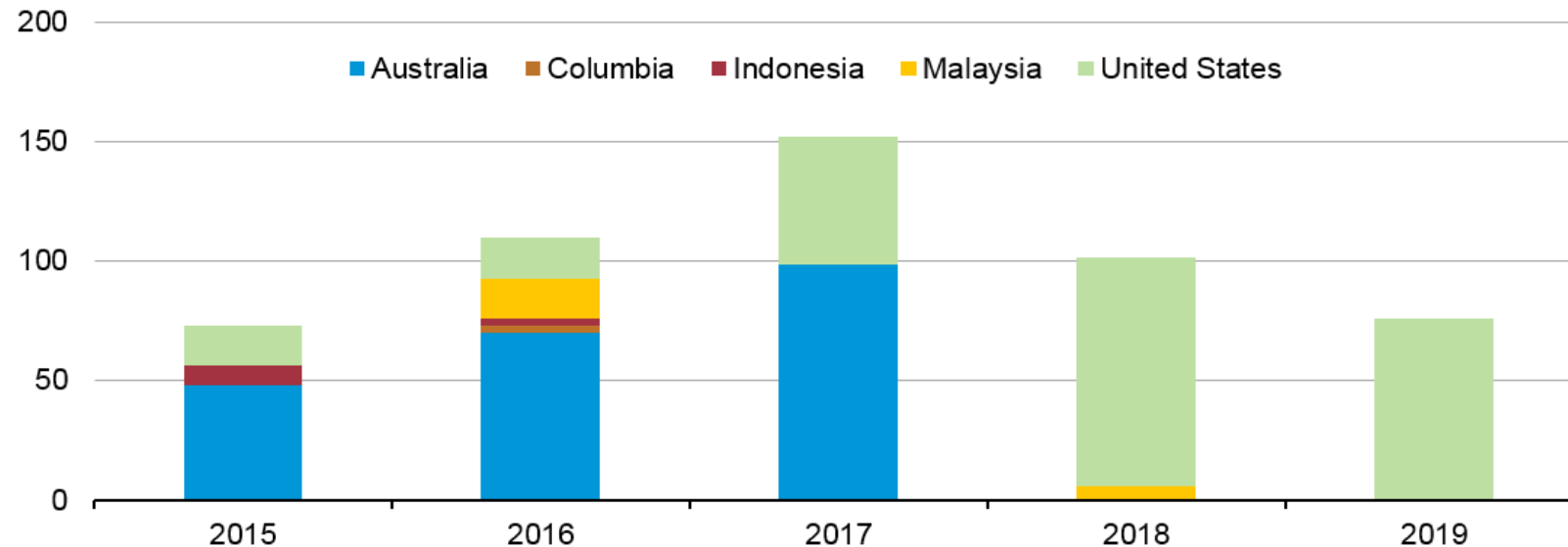


Note: Other natural gas includes natural gas produced from structural and stratigraphic traps (e.g. reservoirs), historically referred to as 'conventional' production.

Source: EIA, International Energy Outlook 2016

# Liquefaction capacity additions over the 2015-19 time period will increase global capacity by over 30%

LNG capacity additions  
million cubic meters per day



*Note: Capacity additions in 2015-19 include projects currently under construction, and represent nameplate capacity, not adjusted for ramp-up*

*Source: U.S. Energy Information Administration estimates based on trade press*

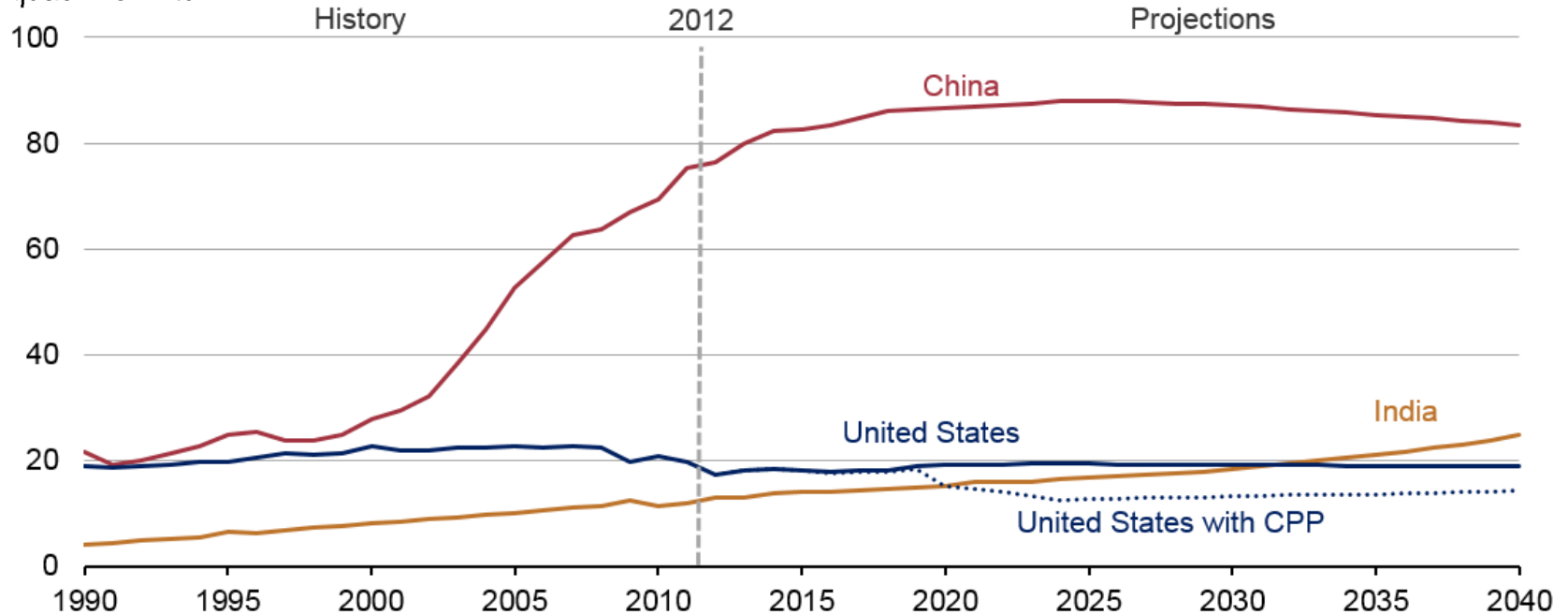


# Electricity markets

# Of the world's three largest coal consumers, only India is projected to continue to increase throughout the projection

coal consumption in the US, China, and India

quadrillion Btu

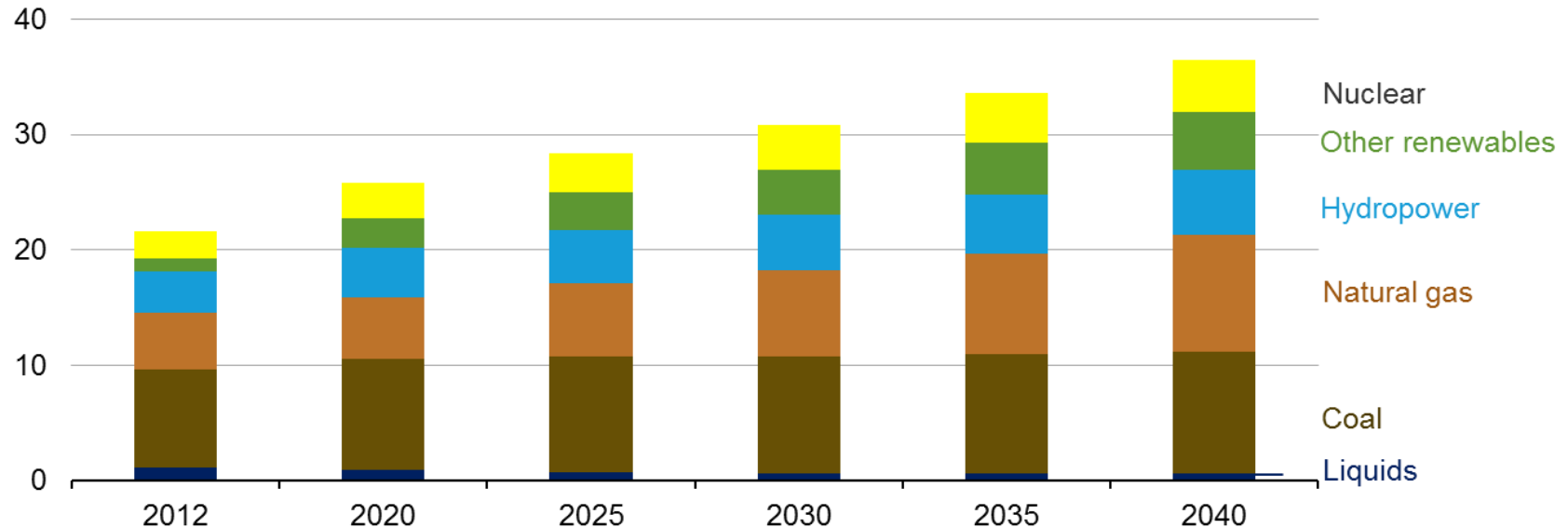


Source: EIA, *International Energy Outlook 2016* and EIA, *Analysis of the Impacts of the Clean Power Plan* (May 2015)

# Renewables, natural gas, and coal all contribute roughly the same amount of global net electricity generation in 2040

world net electricity generation by source

trillion kilowatthours



Source: EIA, International Energy Outlook 2016

# 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)

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

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

Monthly Energy Review | [www.eia.gov/mer](http://www.eia.gov/mer)

Today in Energy | [www.eia.gov/todayinenergy](http://www.eia.gov/todayinenergy)

State Energy Profiles | [www.eia.gov/state](http://www.eia.gov/state)

Drilling Productivity Report | [www.eia.gov/petroleum/drilling/](http://www.eia.gov/petroleum/drilling/)

International Energy Portal | [www.eia.gov/beta/international/?src=home-b1](http://www.eia.gov/beta/international/?src=home-b1)