EIA's Energy Outlook 2016

For

Ernst and Young Energy Executive Insight Session

October 12, 2016 | Washington, D.C.

By

Adam Sieminski, Administrator

U.S. Energy Outlook: key takeaways from AEO2016

- Energy use per dollar of Gross Domestic Product declines through 2040 allowing for economic growth without upward pressure on energy consumption and related emissions.
- Market forces drive up oil prices throughout the projection and U.S. production increases in response.
- Natural gas production increases despite relatively low and stable natural gas prices.
- Technological improvements are key drivers of U.S. oil and gas production.

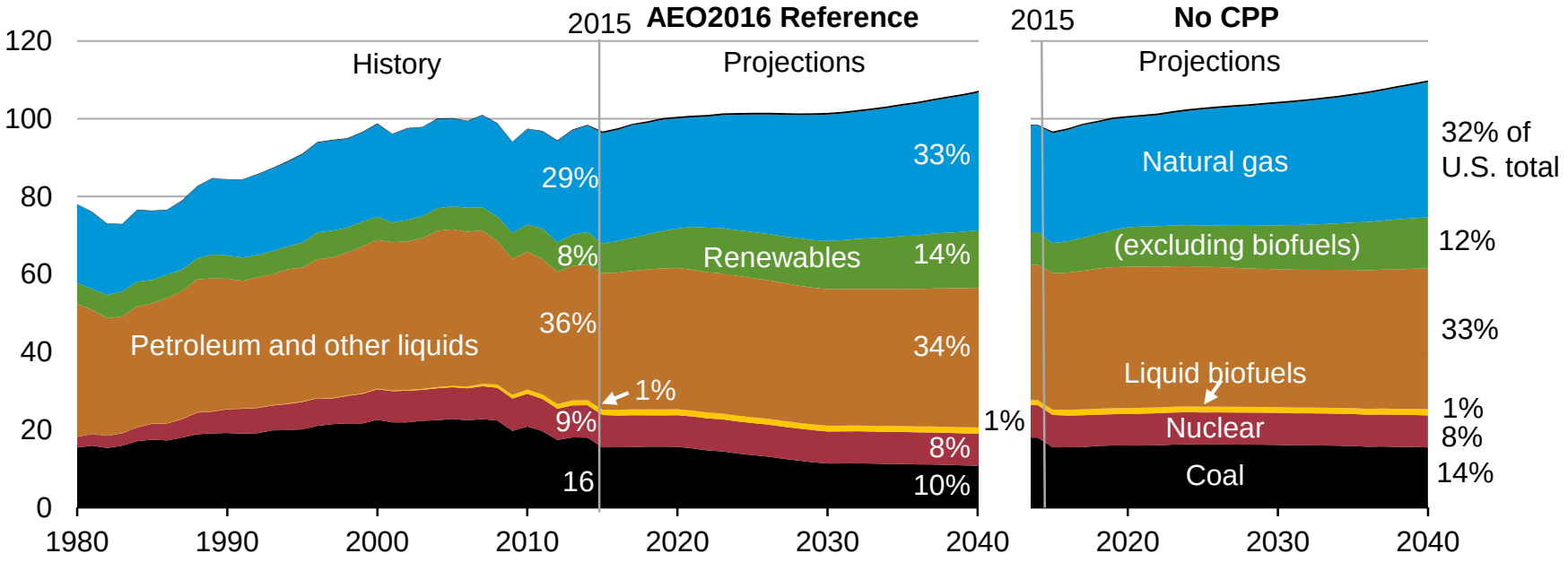
U.S. Energy Outlook: key takeaways from AEO2016 (continued)

- Net exports of liquefied natural gas range between 3.5 Tcf and 10.6 Tcf in 2040 depending on relative prices in foreign markets.
- EPA's proposed medium and heavy-duty vehicle Phase 2 standards would increase fuel economy, resulting in 18% lower diesel consumption in 2040 compared with the Reference case.

Reductions in energy intensity largely offset impact of gross domestic product (GDP) growth, leading to slow projected growth in energy use

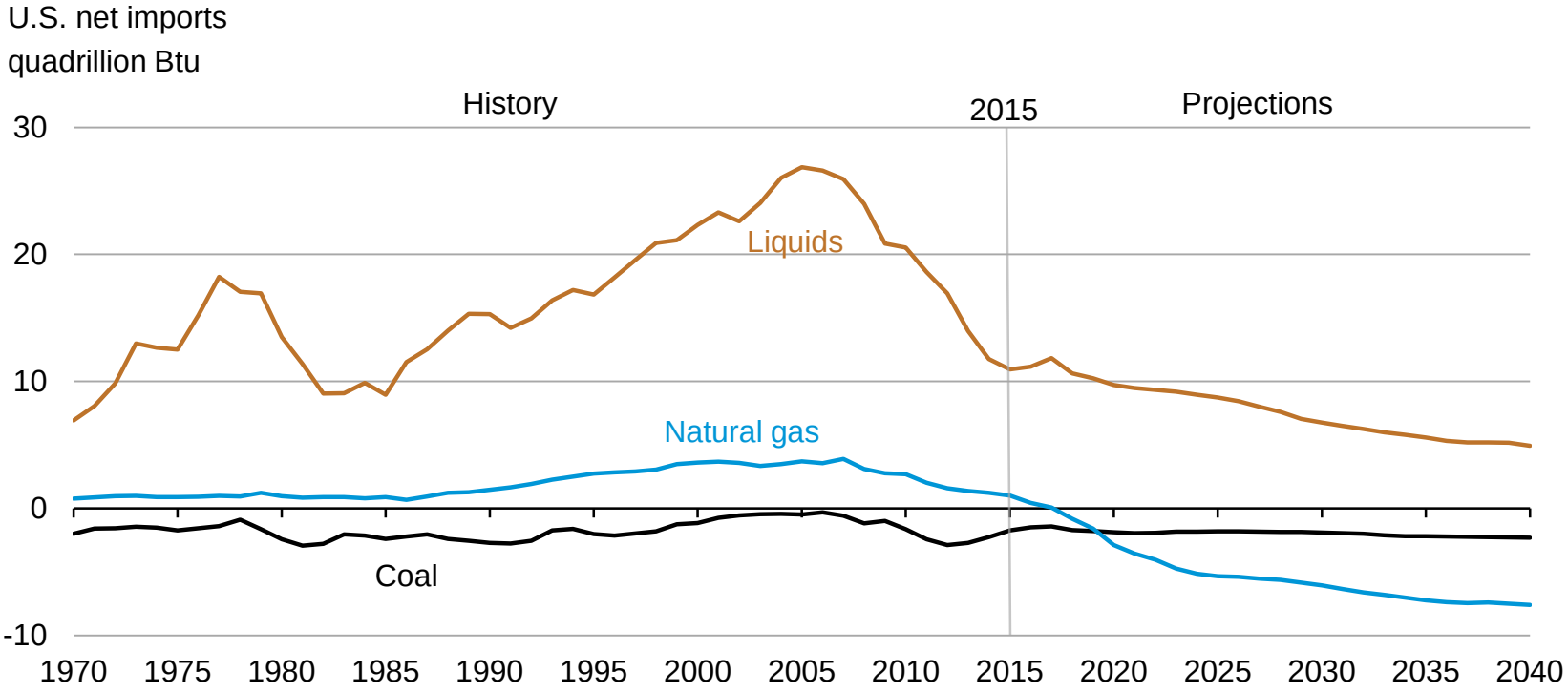
U.S. primary energy consumption

quadrillion Btu



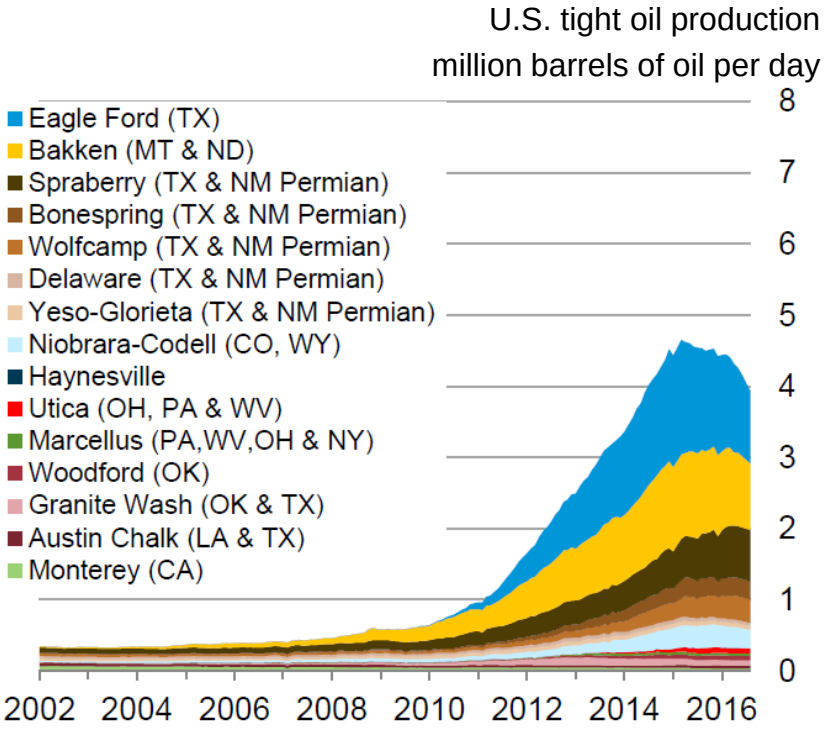
Source: EIA, Annual Energy Outlook 2016

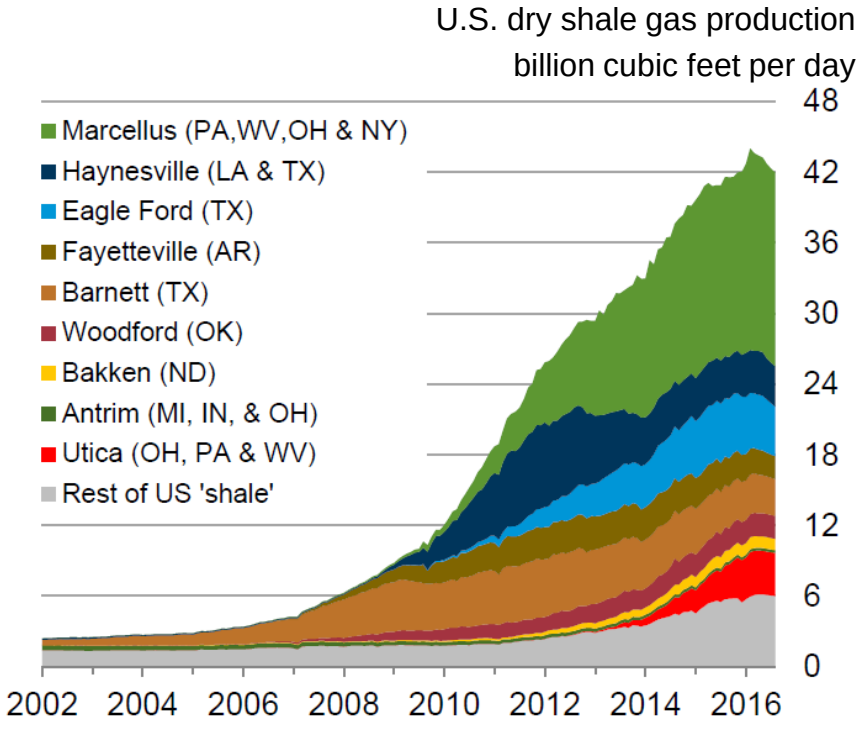
U.S. net energy imports trend downward, reflecting increased oil and natural gas production coupled with slowly growing or falling demand



Source: EIA, Annual Energy Outlook 2016

The U.S. has experienced a rapid increase in natural gas and oil production from shale and other tight resources

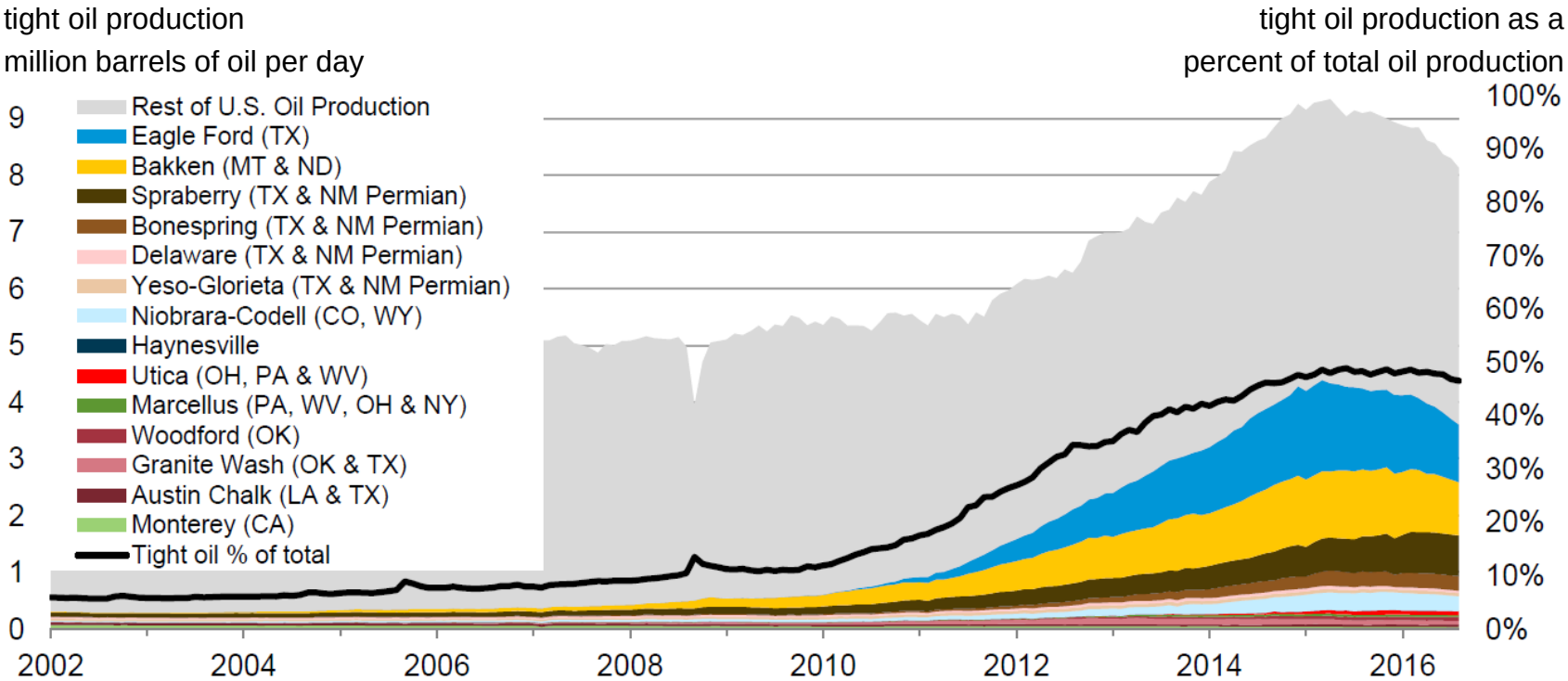




Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through August 2016 and represent EIA's official tight oil & shale gas estimates, but are not survey data. State abbreviations indicate primary state(s). Note: Scales are presented at approximate barrel of oil equivalent.

Petroleum and other liquids

Estimated U.S. tight oil production was 3.9 MMbbl/d in August 2016 about 47% of total U.S. oil production (8.5 MMbbl/d)

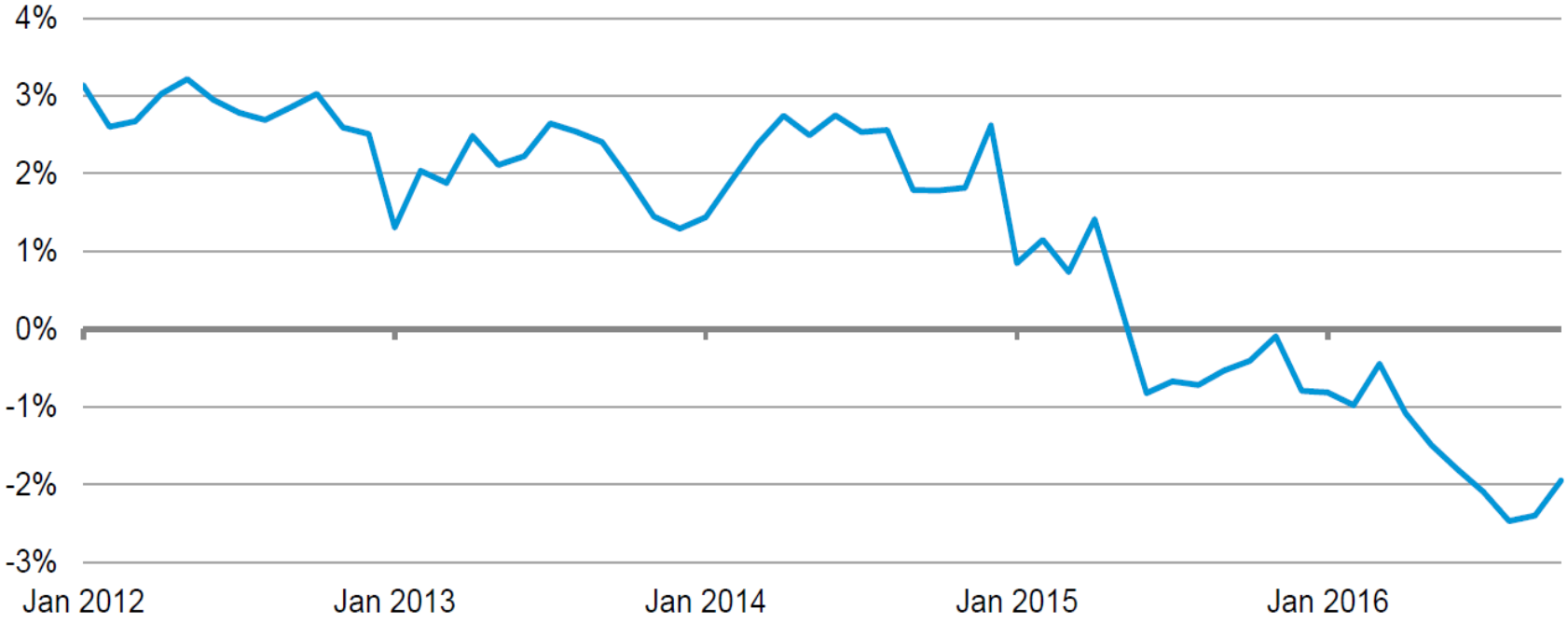


Sources: EIA derived from state administrative data collected by DrillingInfo Inc. Data are through August 2016 and represent EIA's official tight oil estimates, but are not survey data. State abbreviations indicate primary state(s).

Production growth in top crude producing regions (Permian, Bakken, Niobrara, and Eagle Ford) reverses in early 2015

monthly percent change

three month rolling average

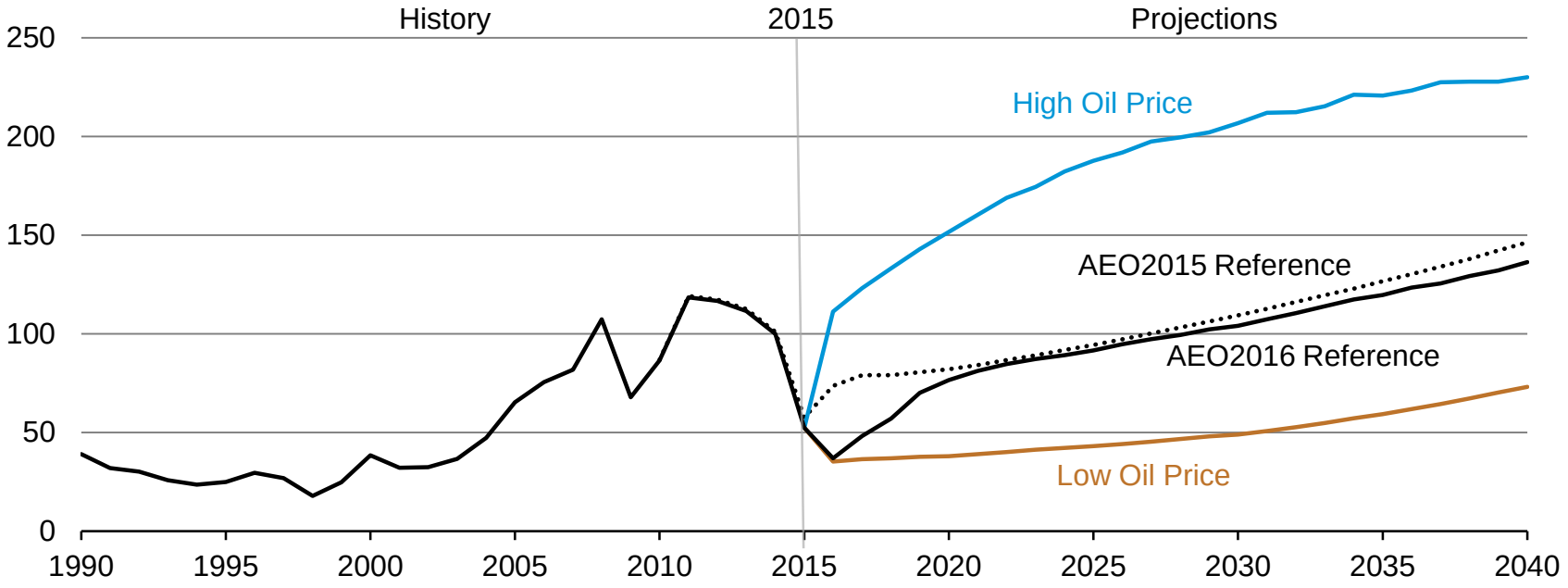


Source: EIA, Drilling Productivity Report, September 2016

Near-term crude oil price scenario is lower in AEO2016

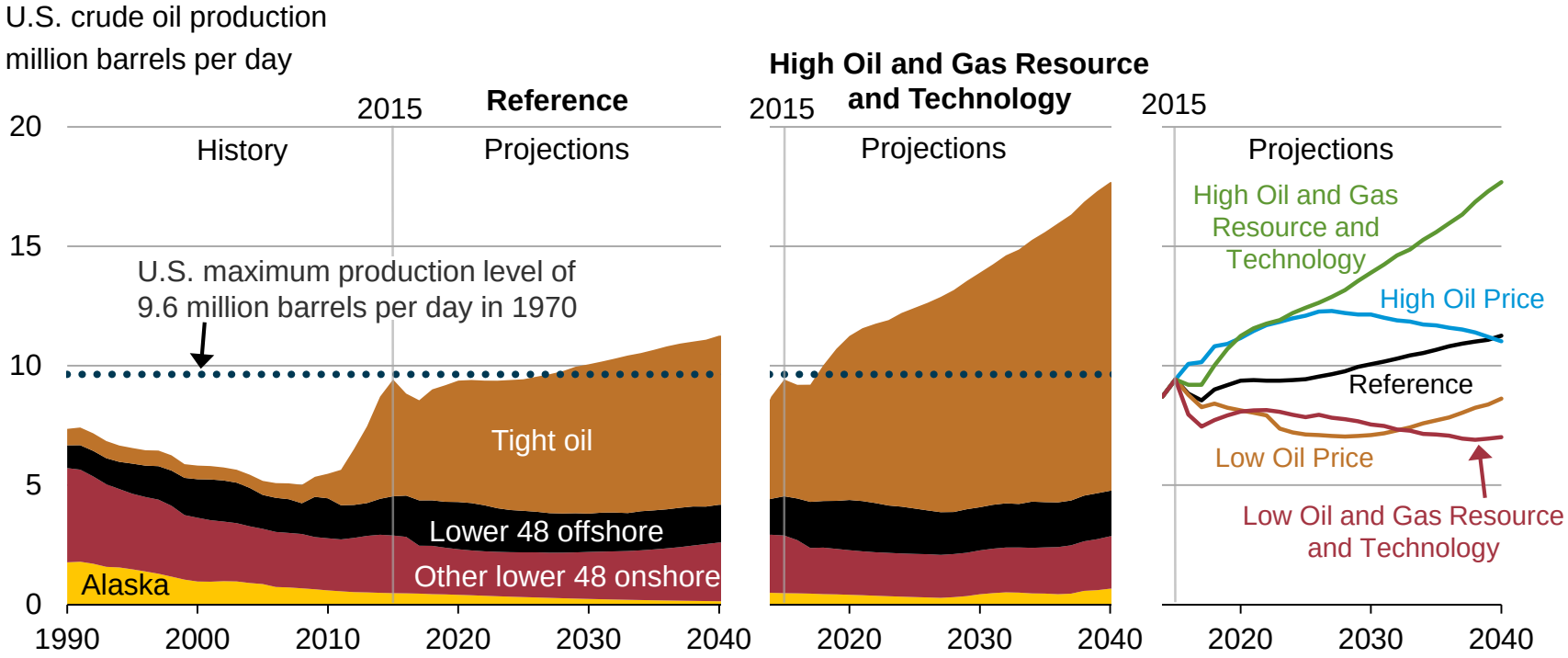
Brent crude oil spot price

2015 dollars per barrel



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

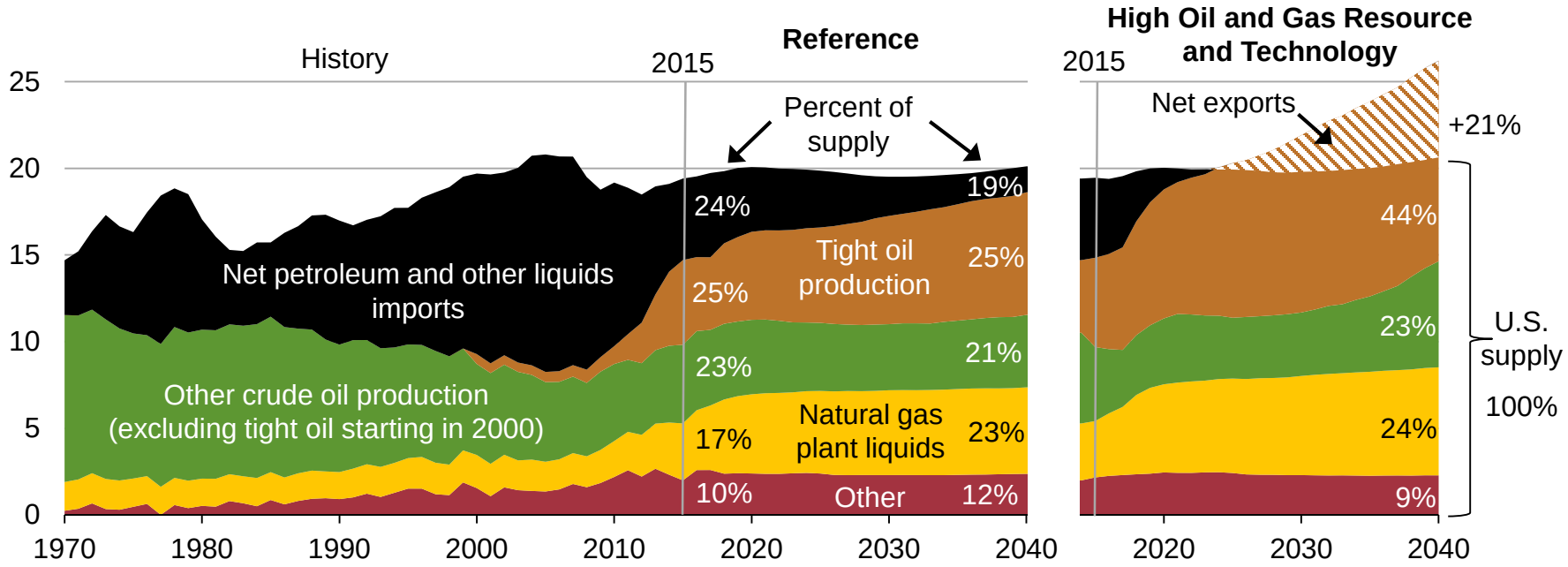
U.S. crude oil production rises above previous historical high before 2030; alternative price and resource/technology cases can differ



Source: EIA, Annual Energy Outlook 2016

Combination of increased tight oil production and higher fuel efficiency drives projected decline in oil imports

U.S. liquid fuels supply
million barrels per day



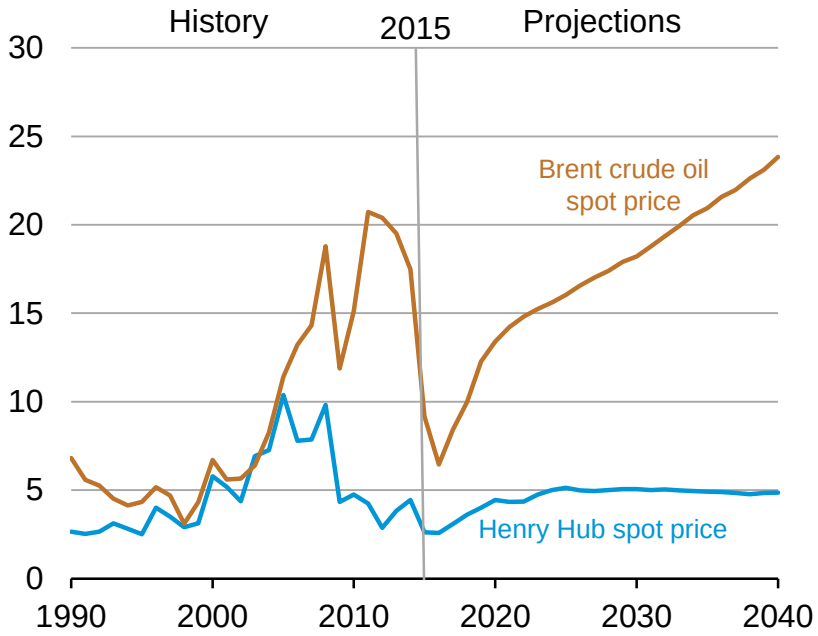
Note: "Other" includes refinery gain, biofuels production, all stock withdrawals, and other domestic sources of liquid fuels

Source: EIA, Annual Energy Outlook 2016

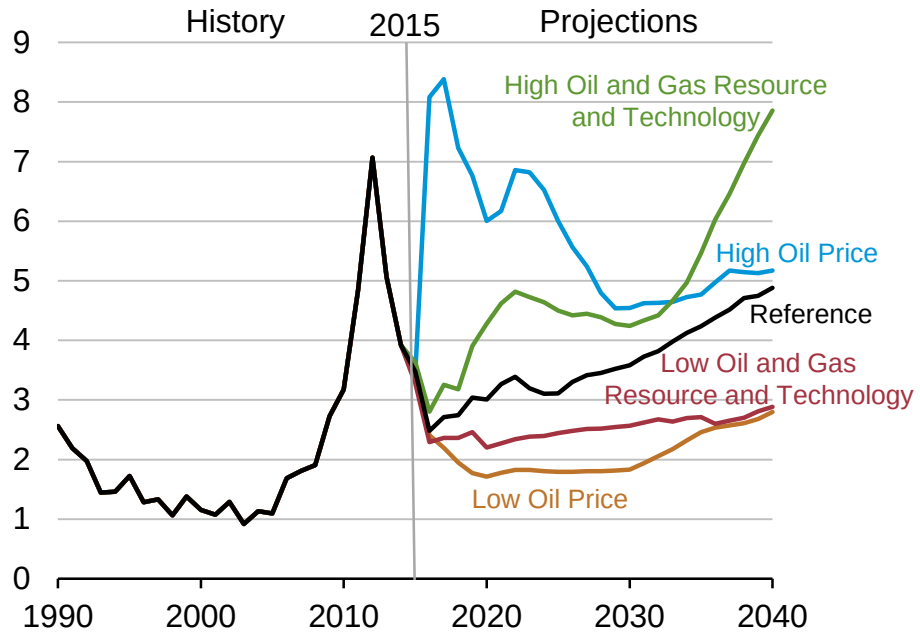
The price relationship between crude oil and natural gas impacts producer economics and production levels for both commodities

energy spot prices under Reference case

2015 dollars per million Btu



oil-to-gas price ratio



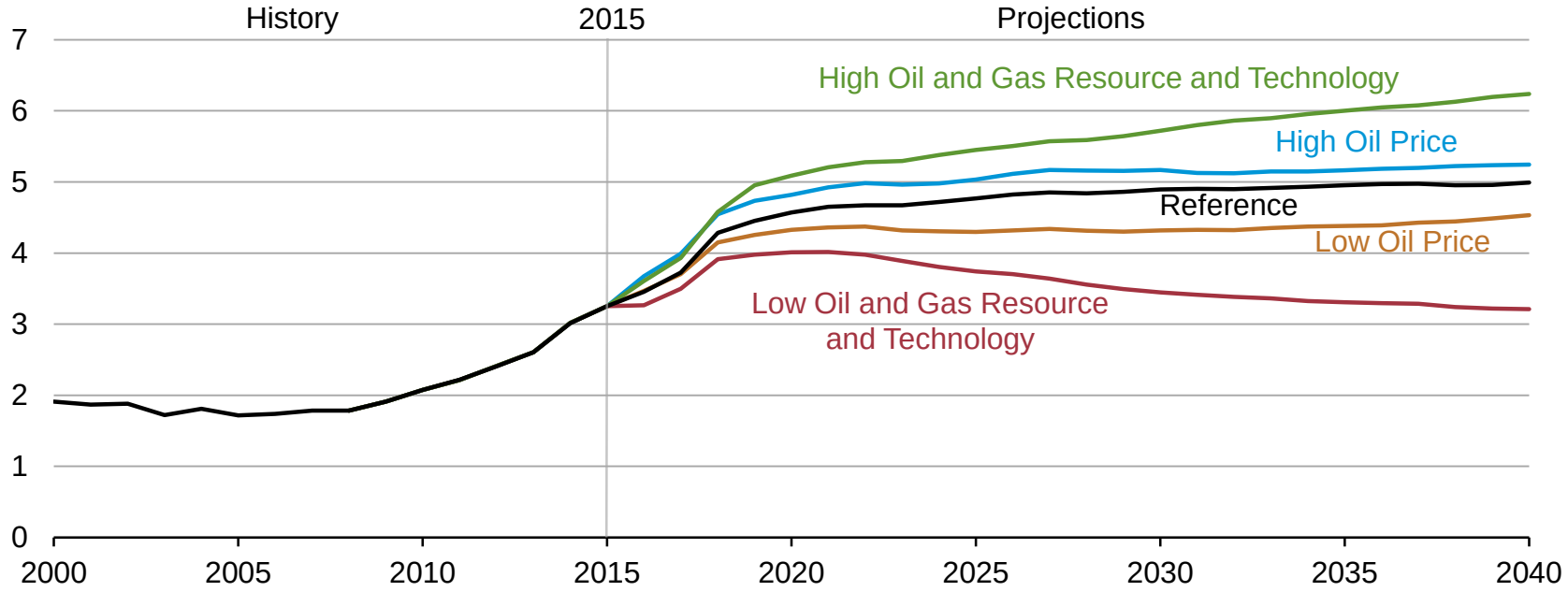
Source: EIA, Annual Energy Outlook 2016

Natural Gas

Future domestic natural gas plant liquids production depends on both domestic resource endowment and world crude oil prices

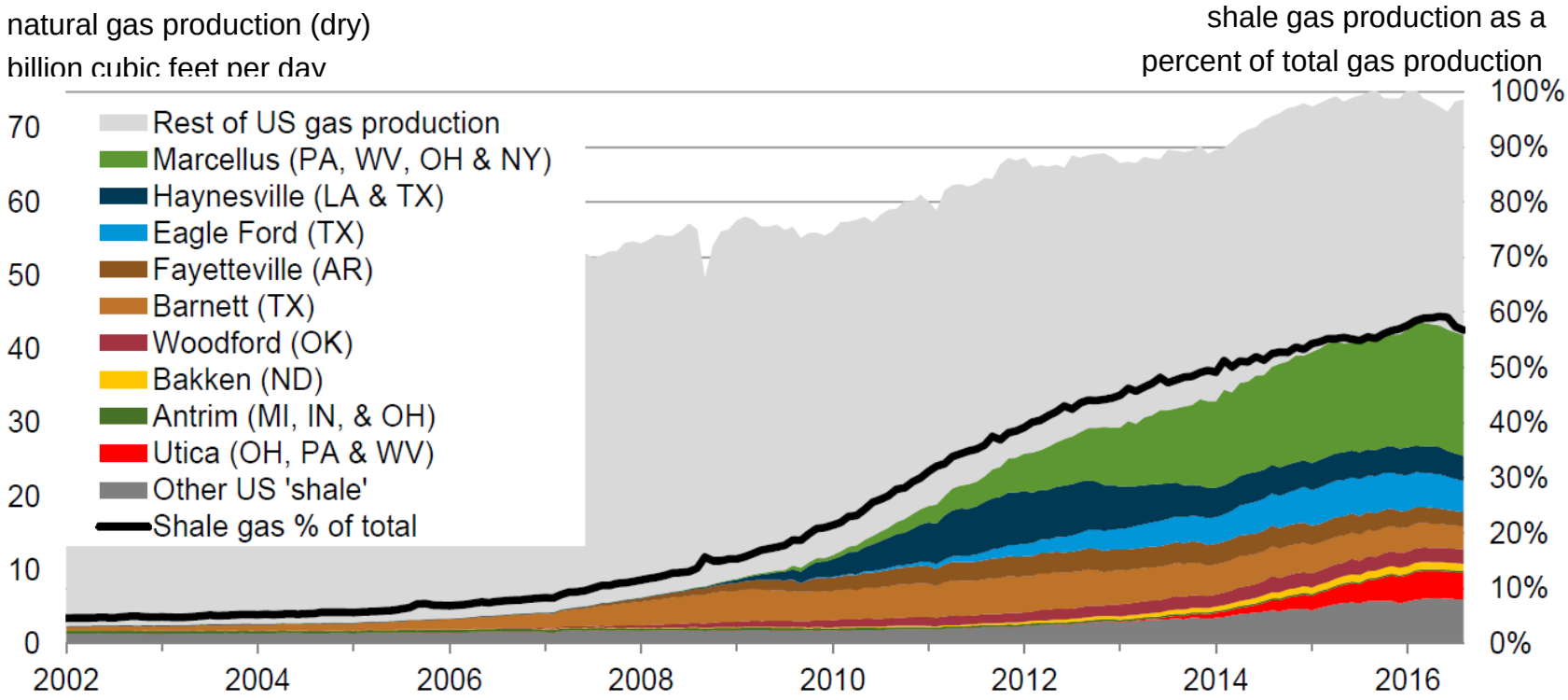
U.S. total natural gas plant liquids production

million barrels per day



Source: EIA, Annual Energy Outlook 2016

Estimated U.S. shale gas production was 41.9 Bcf/d in August 2016 about 57% of total U.S. dry production (73.9 Bcf/d)

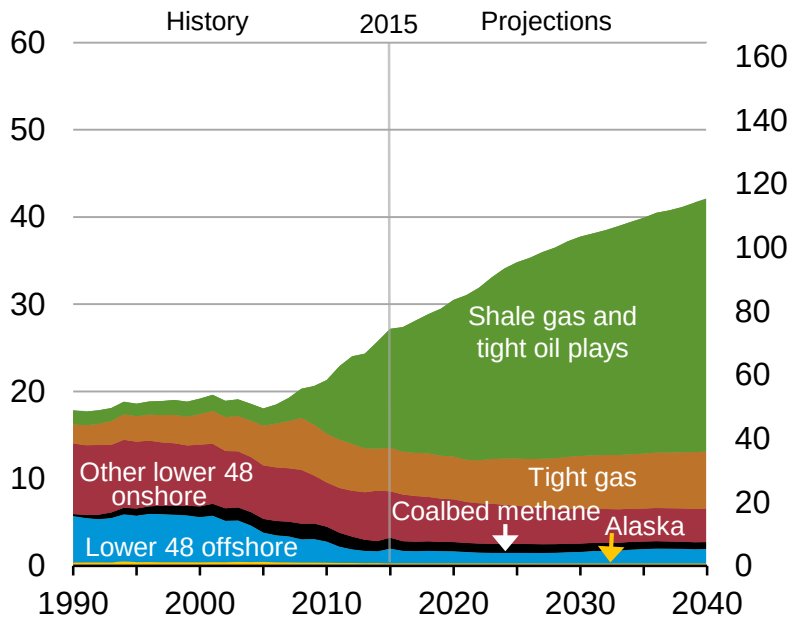


Sources: EIA Natural Gas Monthly, STEO through August 2016 and DrillingInfo.

U.S. natural gas production dominated by shale resources; alternative price and resource /technology assumptions could be quite different

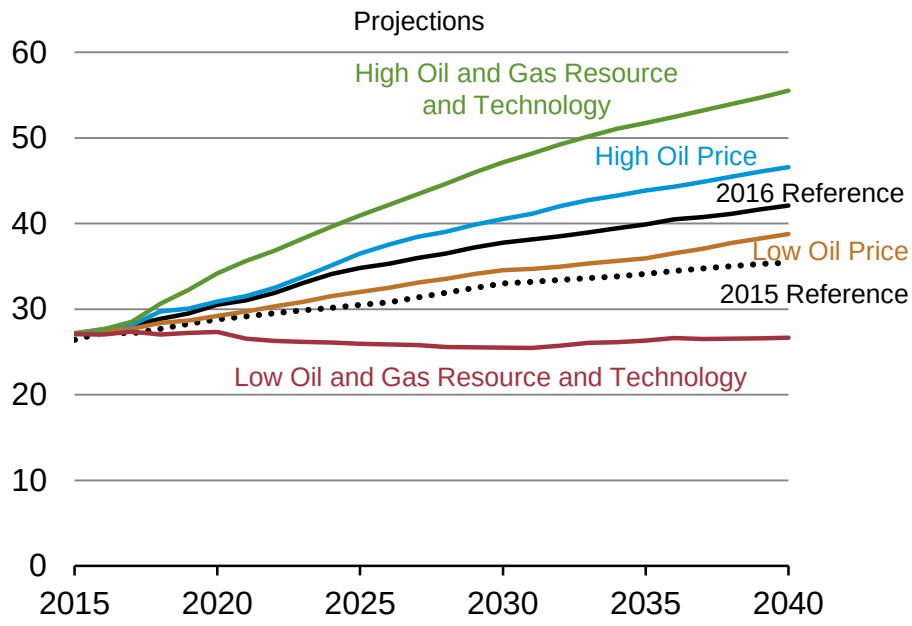
U.S. dry natural gas production

trillion cubic feet billion cubic feet per day



U.S. dry natural gas production

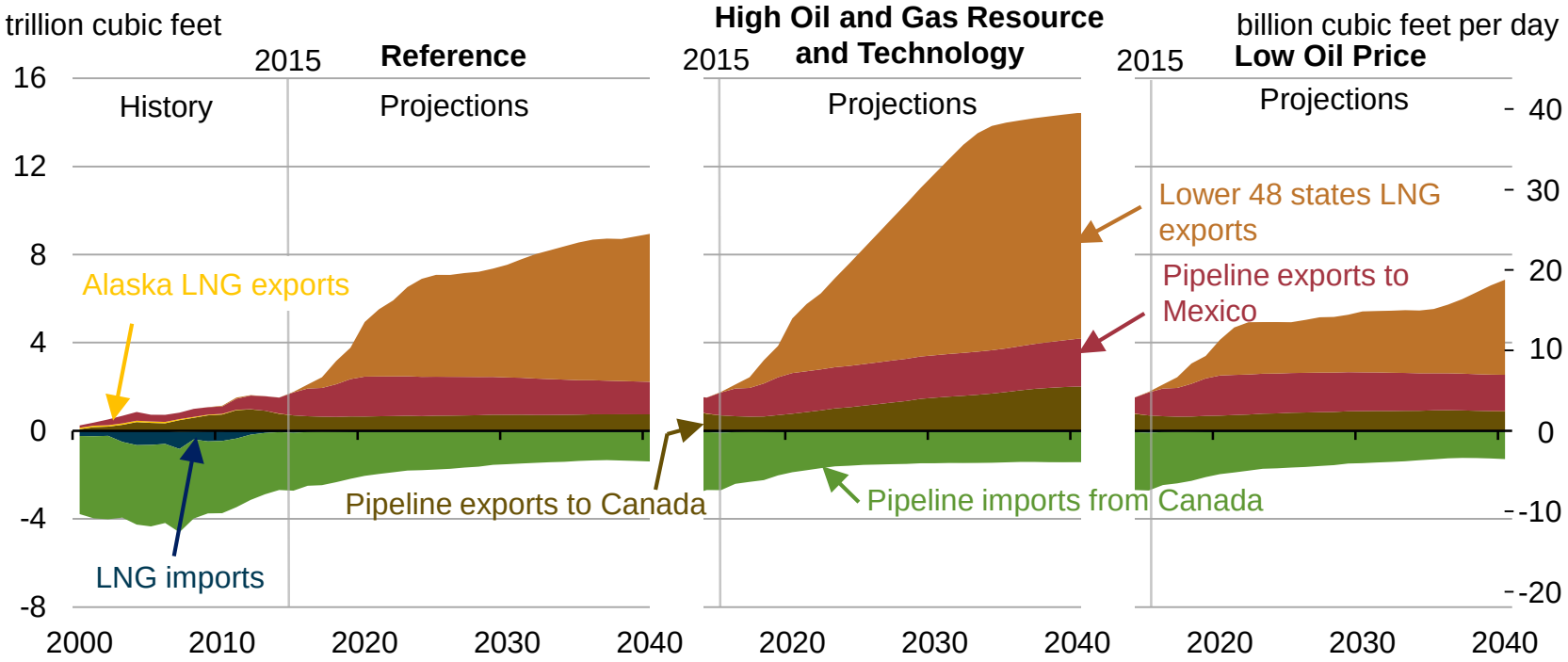
trillion cubic feet



Source: EIA, Annual Energy Outlook 2016

Projected U.S. natural gas exports reflect the spread between domestic natural gas prices and world energy prices

U.S. natural gas imports and exports

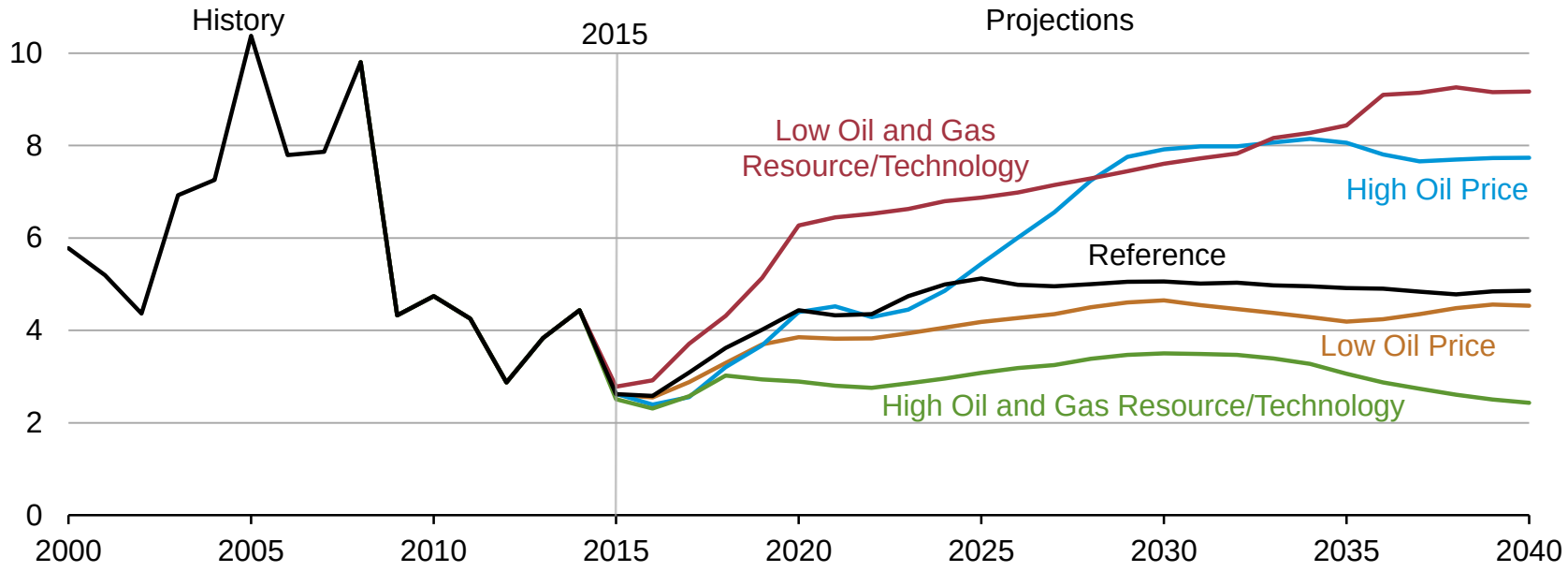


Source: EIA, Annual Energy Outlook 2016

Future domestic natural gas prices depend on both domestic resource availability and world energy prices

average Henry Hub spot prices for natural gas

2015 dollars per million Btu

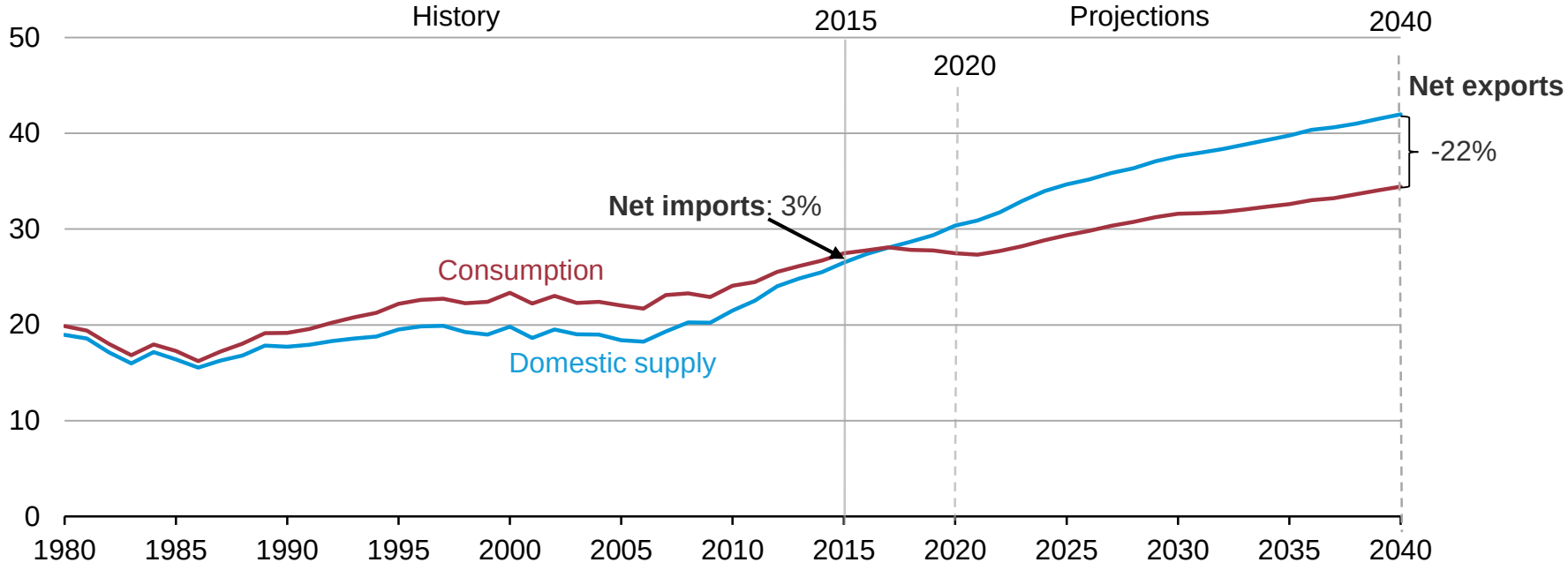


Source: EIA, Annual Energy Outlook 2016

U.S. natural gas production will soon exceed consumption, making the United States a net exporter

U.S. energy production and consumption

quadrillion Btu



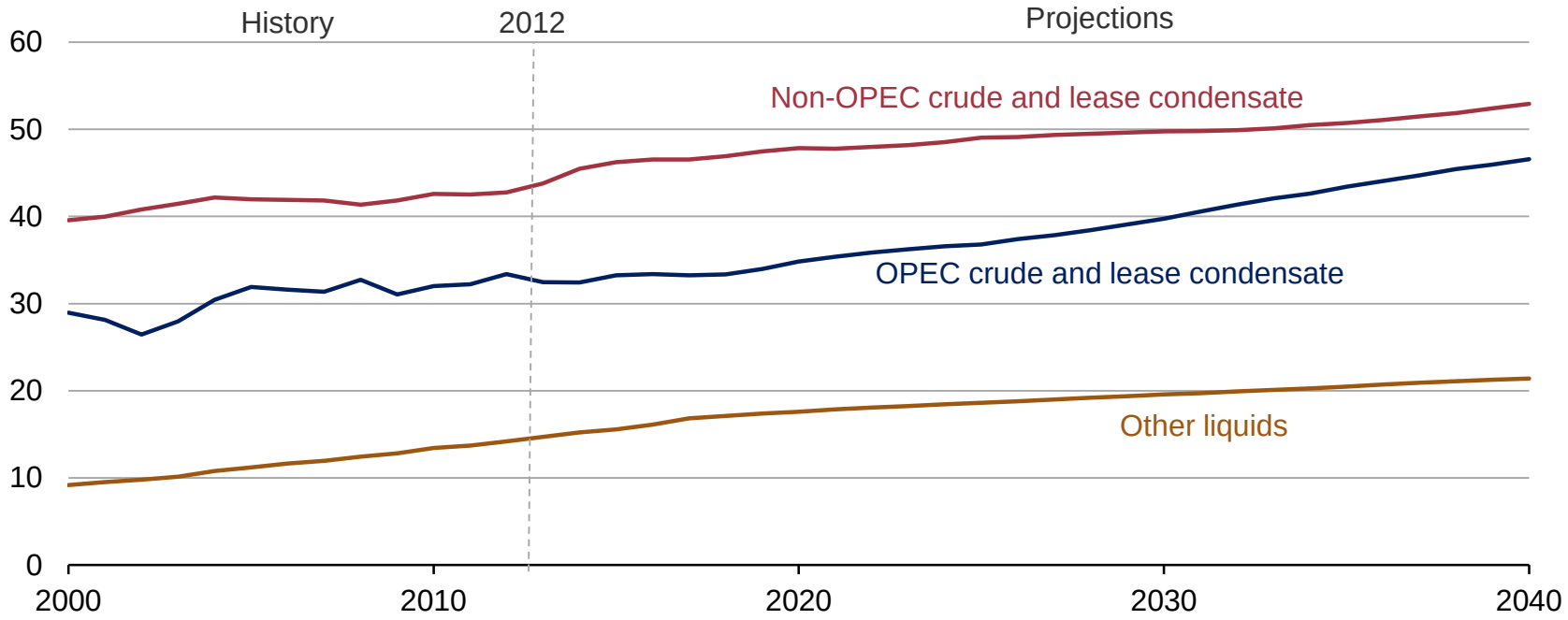
Source: EIA, Annual Energy Outlook 2016

Global outlook

Liquid fuels supplies from both OPEC and non-OPEC producers increase through 2040

world production of petroleum and other liquid fuels

million barrels per day

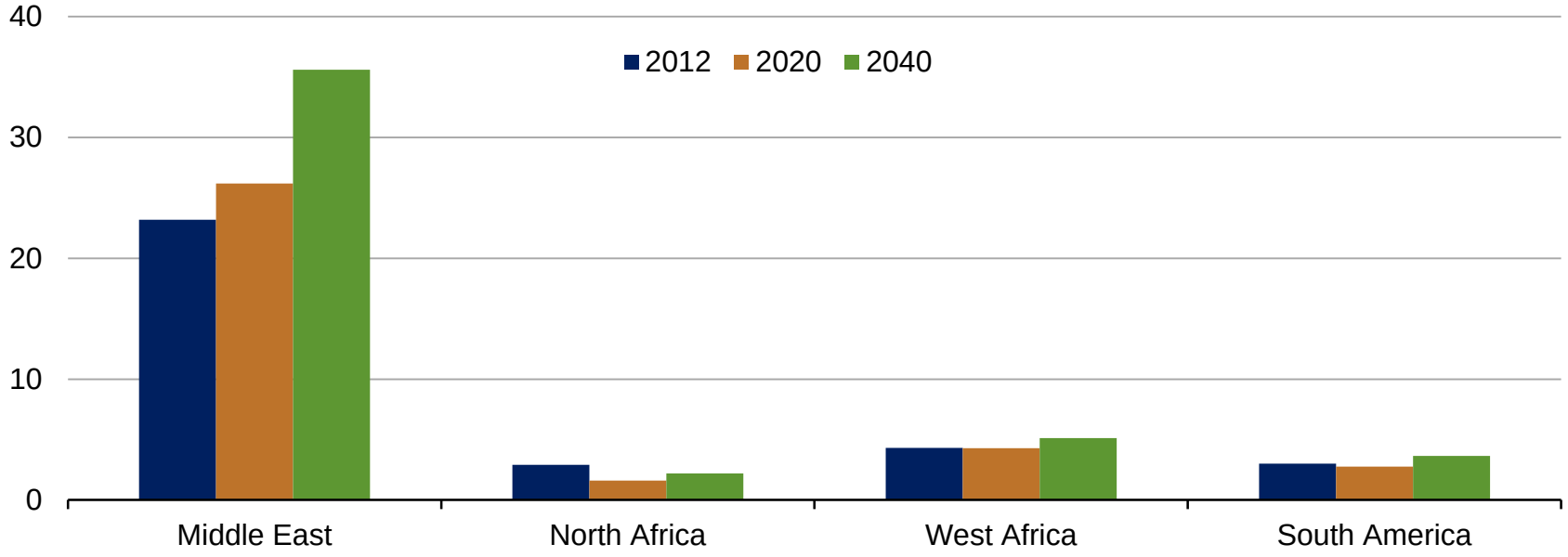


Source: EIA, International Energy Outlook 2016

Growth in OPEC production comes mainly from the Middle East

OPEC crude and lease condensate production

million barrels per day

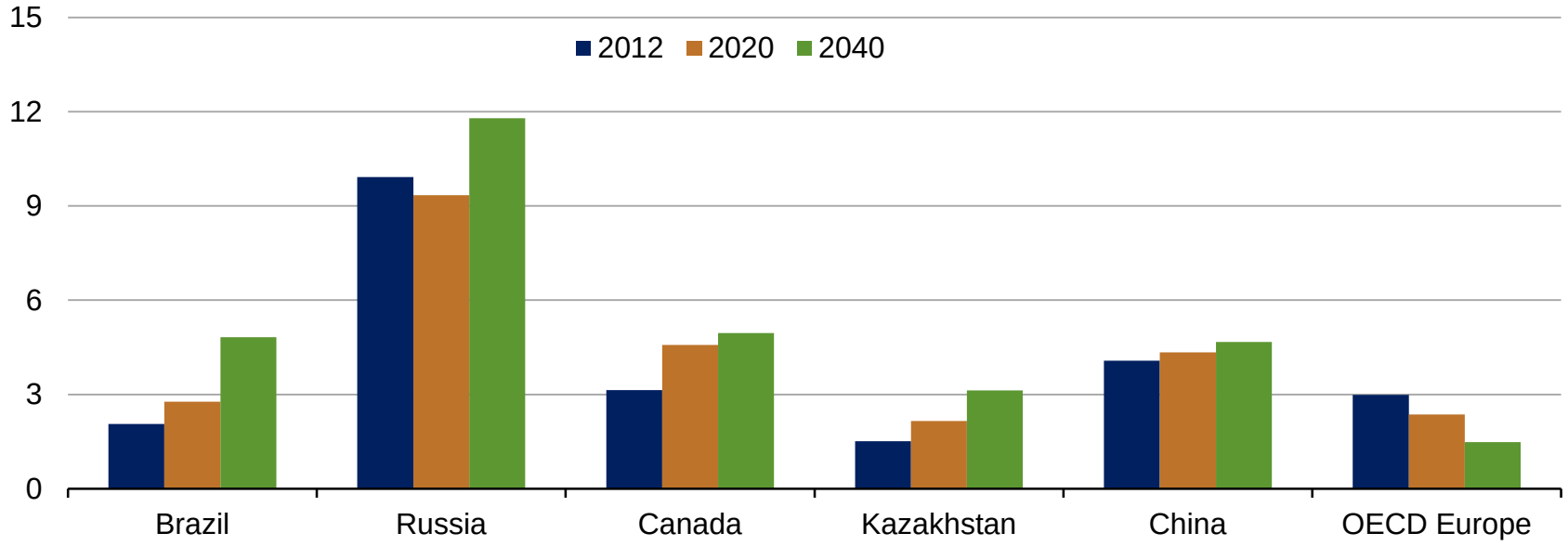


Source: EIA, International Energy Outlook 2016

Increases to non-OPEC oil supplies outside the United States are primarily from Brazil, Russia, Canada, and Kazakhstan

non-OPEC crude and lease condensate production in selected country groupings

million barrels per day

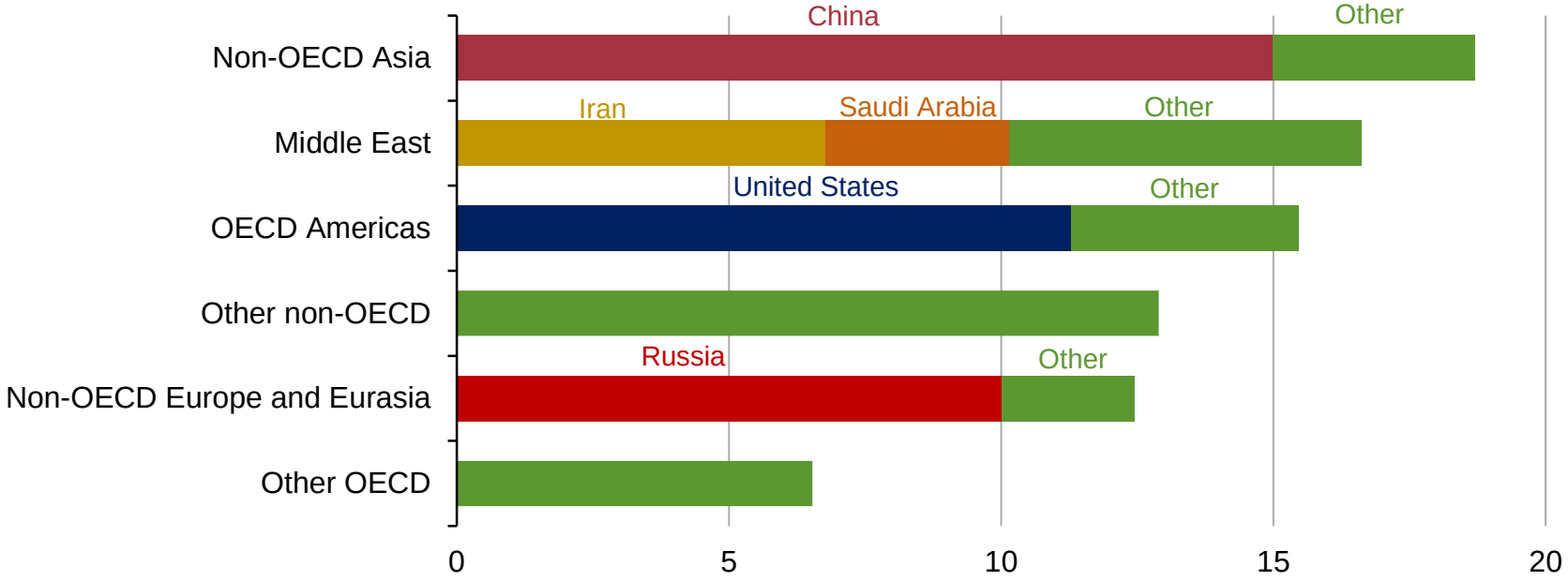


Source: EIA, International Energy Outlook 2016

Non-OECD Asia, Middle East, and OECD Americas account for the largest increases in natural gas production

world change in natural gas production, 2012–40

trillion cubic feet

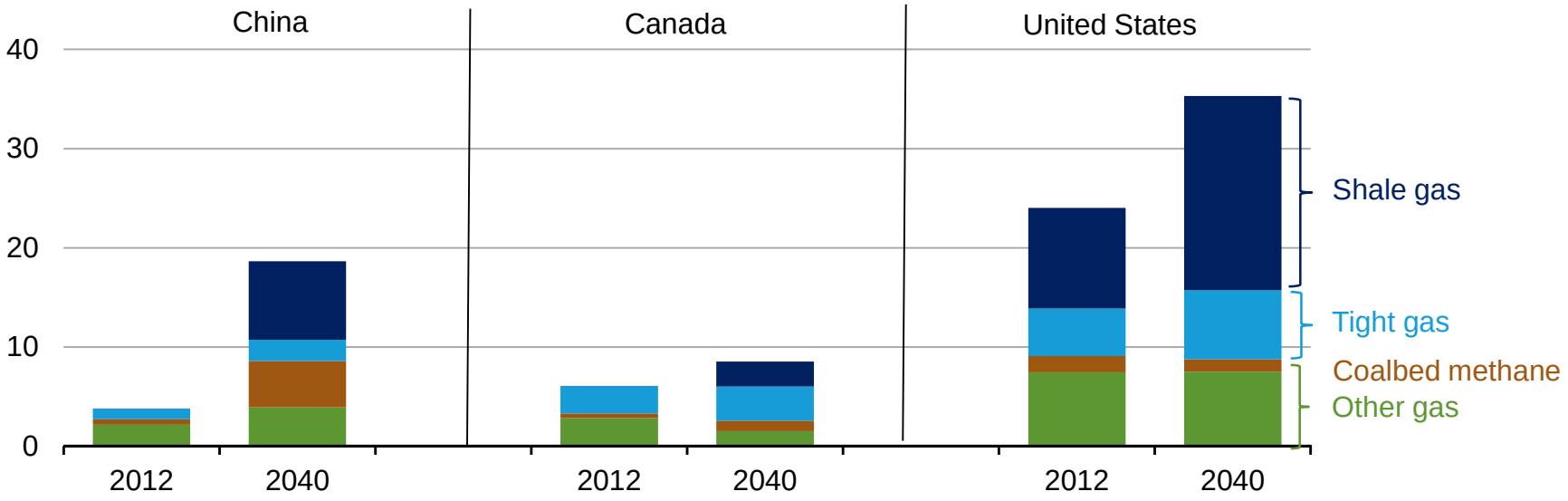


Source: EIA, International Energy Outlook 2016

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 feet



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

For more information

U.S. Energy Information Administration home page | www.eia.gov

Annual Energy Outlook | www.eia.gov/aeo

Short-Term Energy Outlook | www.eia.gov/steo

International Energy Outlook | www.eia.gov/ieo

Monthly Energy Review | www.eia.gov/mer

Today in Energy | www.eia.gov/todayinenergy

State Energy Profiles | www.eia.gov/state

Drilling Productivity Report | www.eia.gov/petroleum/drilling/

International Energy Portal | www.eia.gov/beta/international/?src=home-b1