

EIA Expanded Geographic Coverage of Oil and Natural Gas Production: EIA-914 Survey Expansion and its Implications on EIA Reporting and Forecasting*

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Abstract

In 2015 EIA has expanded its reporting of monthly oil (including lease condensate) and natural gas production by 10 additional states. The addition of these states – Arkansas, California, Colorado, Kansas, Montana, North Dakota, Ohio, Pennsylvania, Utah, and West Virginia – significantly enhances EIA's monthly coverage, which was previously limited to Louisiana, New Mexico, Oklahoma, Texas, Wyoming, and the Federal Gulf of Mexico.

Accompanying EIA's expanded coverage has been a new webpage, Monthly Crude Oil and Natural Gas Production, which replaces the Monthly Natural Gas Gross Production Report. EIA will use it to report survey-based estimates for monthly crude oil and natural gas production from the states covered by the new EIA-914 survey, including production data categorized by API gravity, an important measure of crude oil quality.

Monthly oil and natural gas production estimates for 15 states, the Federal Gulf of Mexico, and the rest of the country (aggregated and reported as “Other States”) are provided through February 2016. These estimates are based on data collected from a sample of U.S. operators on the expanded Form EIA-914 survey, with the exception of Alaska, which directly reports its volumes. Monthly production estimates for the expansion states, as with the original individually surveyed states and areas, are available with only a two-month lag for example, the May release includes production estimates for February 2016. Previously, estimates for these 10 states were delayed by as much as two years.

The expanded geographic scope of the EIA-914 survey is in response to significant increases in U.S. oil and natural gas production over the past several years, as well as important changes in production sources over this period. For example, the original EIA-914 survey, which was initiated in 2005, did not offer individual coverage for states such as Pennsylvania that have undergone transformative natural gas production growth, or for other states.

Oil and natural gas production data collected on the EIA-914 survey are used as inputs to several EIA products, including the Natural Gas Monthly and EIA forecasts such as the Short-Term Energy Outlook and the Annual Energy Outlook.

EIA expanded geographic coverage of oil and natural gas production: EIA-914 survey expansion and its implications on EIA reporting and forecasting

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Overview

- The U.S. Energy Information Administration (EIA) currently collects survey data directly from crude oil and natural gas operators in 15 states, the federal Gulf of Mexico (GOM), and other states
- uses the survey data to estimate total monthly production for United States

Introduction

- EIA replaced its historical approach to modeling monthly oil production and expanded coverage for natural gas production
- After detailed review, EIA staff determined that estimates based on its expanded EIA-914 survey provide a better reflection of monthly state production than the previous Average Lag Ratio approach (ALR)
- This updated methodology applies to estimates for oil and natural gas production beginning with January 2015

Historically, EIA used the Average Lag Ratio Method (ALR) to estimate state-level monthly oil production volumes

- ALR estimates are based mainly on data published by the state
 - Historically, state data is incomplete when first published due to processing times, and becomes more complete over time
 - ALR predicts what the eventual state total will be, after a lag period. The ALR method is a three-step process:
 - Step 1. The lag time, measured in months, is determined for each state. This is the number of months that it usually takes for data to be within 0.5% of the final value.
 - Step 2. An average-lagged ratio (ALR) for each state is calculated where the ratio is the state reported data divided by the EIA-182 first purchase data.
 - Step 3. State-level production is estimated. The state-level production estimate is calculated by multiplying the ALR by the EIA-182 first purchase production data.
- Some states took several months to as much as two years to report complete (final) data

Data side

- Daily U.S. oil production grew by more than 70% between January 2011 and January 2015 (from 5.4 MMbbl/day to about 9.4 MMbbl/day)
- Daily U.S. natural gas production (gross withdrawals) grew by more than 20% between January 2011 and January 2015 (from 74 Bcf/day to 89 Bcf/day)
- This rapid growth increased public interest in hydrocarbon production and led EIA to expand geographical coverage and begin collecting monthly crude oil production data
- This information improves EIA reporting and forecasting, and it informs policy makers and general public on topics such as refining capacity, crude oil exports, and legislative initiatives

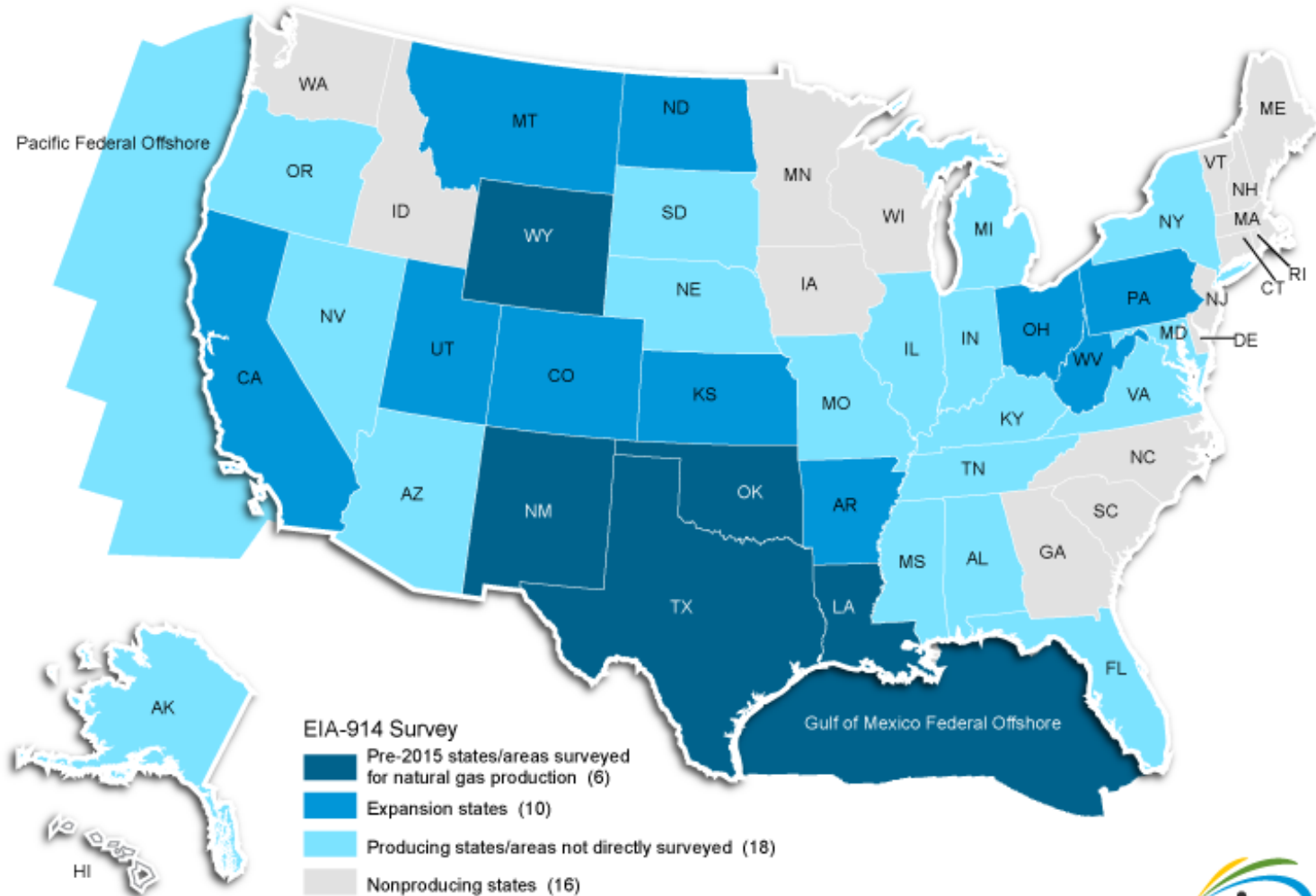
Rationale outlook

- Why did EIA expand the form?
 - Available production data are not current, state reporting delays for natural gas and oil production are lengthy
 - Shale plays have increased the importance of U.S. oil production
 - “How much light/heavy oil is produced in the U.S.?” has become an important question
 - The growing importance of many states included in the previous “Other States”
- What has been added to the previous survey ?
 - More individual states
 - Oil and lease condensate production
 - Oil and lease condensate volumes by API gravity categories

Geographical coverage

- The EIA-914 began collecting **natural gas** production data in 2005 from 5 states (**Louisiana, New Mexico, Oklahoma, Texas, and Wyoming**), federal **GOM**, and other states (as a group). Oil production was not included (5+GOM)
- In 2015, EIA improved the EIA- 914 form to add more states: additional individual states are **Arkansas, California, Colorado, Kansas, Montana, North Dakota, Ohio, Pennsylvania, Utah, and West Virginia** (10)
- “Other States” is much smaller now, reduced from 28 to 17, and only includes Alabama, Arizona, Florida, Illinois, Indiana, Kentucky, Maryland, Michigan, Mississippi, Missouri, Nebraska, Nevada, New York, Oregon, South Dakota, Tennessee, Virginia (17) and federal Pacific Offshore
- EIA does not collect any data for Alaska on this survey

Geographical coverage



Source: U.S. Energy Information Administration.



Current EIA-914

- **15 states + GOM + Other States, about 400 operators**

Information collected by this Survey:

- Natural gas information (accounts for 92% of total U.S. production)
- Crude oil and lease condensate information (accounts for 92% of total U.S. production)
- Oil volumes by API gravity category
- Acquisitions, divestitures, and subsidiaries

Protection of Confidentiality and Deadlines

- Names of companies are confidential and cannot be disclosed by any EIA employee or any of its contracted employees
- Information submitted by companies is confidential and cannot be disclosed by any EIA employee or any of its contracted employees
- Protection is perpetual and company data will not be shared with state or federal regulatory agencies
- Data can be shared for statistical analysis only, so long as company-level data are protected

Deadlines

- Companies are to report their 914 data for the “reporting month” 40 days after the end of the “reporting month”
- For example, September 2016 data are due 40 days after the end of September, which is typically November 9

Sampling perspectives

- Collect data from only a subset of all oil and gas production companies
- EIA-914 is designed to provide 85 percent coverage for both oil and gas production for the lower 48 states and GOM
 - EIA collects data from a sample of less than 400 out of 13,000 currently active operators of oil and natural gas wells
- In fact, EIA-914 covers more than 92 percent of both oil and gas production for lower 48 states and GOM
- Data from this relatively small number of operators make it possible to generate statistically representative estimates of production within two months of the production month

How does EIA estimate monthly production for all individually sampled states?

- EIA estimates monthly production for all individually sampled states by modeling the relationship between data from states and data from other federal agencies assembled by DrillingInfo, Inc. (DI) and data reported on Form EIA-914. The relationship between DI data and Form EIA-914 data is modeled using a Weighted Least Squares (WLS) linear regression.

Summarizing the estimation process in terms of approximate percent of U.S. oil production:

- 92% of U.S. production is estimated with WLS using Form EIA-914 data
- 5% is state-reported data from Alaska
- 3% is estimated using the previous method because these states are not individually sampled on Form EIA-914

Monthly Crude Oil

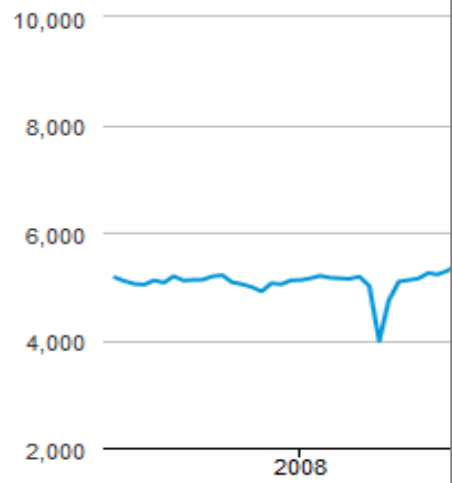
Release date: August 31, 2016 | Next release: September 15, 2016

Crude oil

Natural gas

U.S. crude oil production

thousand barrels per day



— U.S. Crude Oil (Thousand Barrels per Day)

CRUDE OIL (thousand barrels per day)

| State/area | Jun-16 | May-16 | Percent change | Jun-15 | Percent change |
|---------------------------------|--------|--------|----------------|--------|----------------|
| U.S. | 8,701 | 8,894 | -2.2↓ | 9,320 | -6.6↓ |
| Alabama | 22 | 22 | -1.9↓ | 27 | -19.0↓ |
| Alaska | 470 | 505 | -6.9↓ | 447 | 5.3↑ |
| Arizona | 0 | 0 | 0.0 | 0 | -94.2↓ |
| Arkansas | 14 | 14 | 0.4↑ | 17 | -15.8↓ |
| California | 492 | 510 | -3.6↓ | 549 | -10.5↓ |
| Colorado | 309 | 311 | -0.9↓ | 348 | -11.4↓ |
| Federal Offshore Gulf of Mexico | 1,542 | 1,614 | -4.5↓ | 1,413 | 9.1↑ |
| Federal Offshore Pacific | 20 | 23 | -15.5↓ | 24 | -18.6↓ |
| Florida | 5 | 5 | 0.1↑ | 7 | -19.2↓ |
| Illinois | 25 | 23 | 6.0↑ | 26 | -5.4↓ |
| Indiana | 5 | 5 | 8.5↑ | 6 | -12.8↓ |
| Kansas | 101 | 101 | -0.4↓ | 136 | -25.9↓ |
| Kentucky | 11 | 3 | 227.5↑ | 6 | 72.0↑ |
| Louisiana | 157 | 161 | -2.8↓ | 171 | -8.5↓ |
| Michigan | 16 | 16 | 2.3↑ | 18 | -7.8↓ |
| Mississippi | 61 | 59 | 3.2↑ | 70 | -11.8↓ |

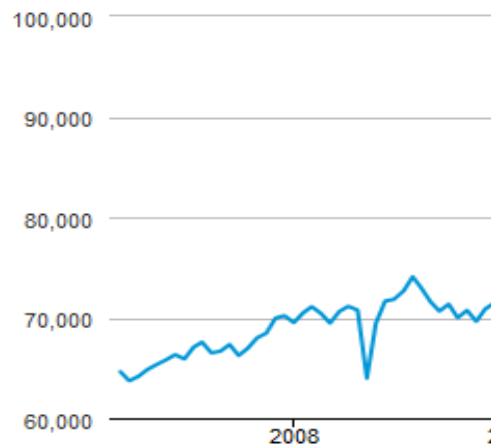
Monthly Crude Oil

Release date: August 31, 2016 | Next release date: September 30, 2016

Crude oil Natural gas

U.S. natural gas production (gross)

million cubic feet per day



— U.S. Natural Gas Gross Withdrawals (Million Cubic Feet per Day)

NATURAL GAS (million cubic feet per day)

| State/area | Jun-16 | May-16 |
|---------------------------------|--------|--------|
| U.S. | 87,799 | 89,292 |
| Alaska | 7,793 | 8,684 |
| Arkansas | 2,243 | 2,315 |
| California | 575 | 584 |
| Colorado | 4,551 | 4,665 |
| Kansas | 685 | 698 |
| Louisiana | 5,042 | 5,068 |
| Montana | 143 | 144 |
| New Mexico | 3,548 | 3,508 |
| North Dakota | 1,618 | 1,612 |
| Ohio | 3,840 | 3,922 |
| Oklahoma | 6,722 | 6,813 |
| Pennsylvania | 14,478 | 14,242 |
| Texas | 22,399 | 22,460 |
| Utah | 998 | 1,026 |
| West Virginia | 3,439 | 3,691 |
| Wyoming | 4,844 | 4,796 |
| Federal Offshore Gulf of Mexico | 3,347 | 3,504 |
| Other States | 1,533 | 1,558 |

Additional data and methodology



Table 1. Crude oil and lease condensate production in the United States  



Table 2. Crude oil and lease condensate production in the United States with monthly and annual changes  



Table 3. Natural gas gross withdrawals in selected states and the Federal Gulf of Mexico  





Table 4. Natural gas gross withdrawals in selected states and the Federal Gulf of Mexico with monthly and annual changes  

Table 5. Crude oil and lease condensate production by API gravity category in selected Lower 48 states and the Federal Gulf of Mexico  

| | | |
|-------|-------|-------|
| -6.8▼ | 3,787 | -9.2▼ |
| 1.0▲ | 5,293 | -8.5▼ |
| -4.5▼ | 3,716 | -9.9▼ |
| -1.6▼ | 1,661 | -7.7▼ |

EIA-914: The value of the data

EIA uses the information submitted on Form EIA-914 to create key EIA's products:

[Monthly Crude Oil, Lease Condensate, and Natural Gas Production Report](#)

[Natural Gas Monthly](#)

[Petroleum Supply Monthly](#)

[Monthly Energy Review](#)

[Natural Gas Annual](#)

[Petroleum Supply Annual, Volume 1](#)

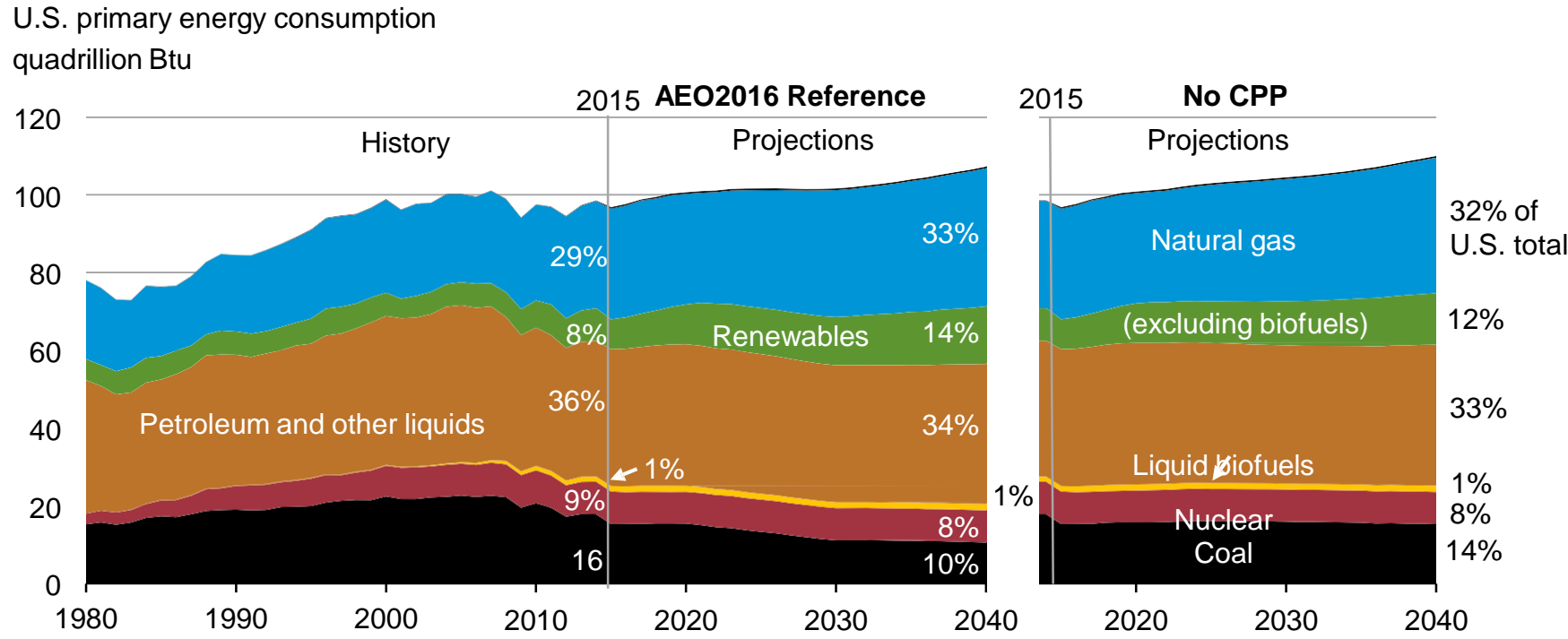
[Petroleum Supply Annual, Volume 2](#)

[Annual Energy Outlook](#)

[Short-Term Energy Outlook](#)

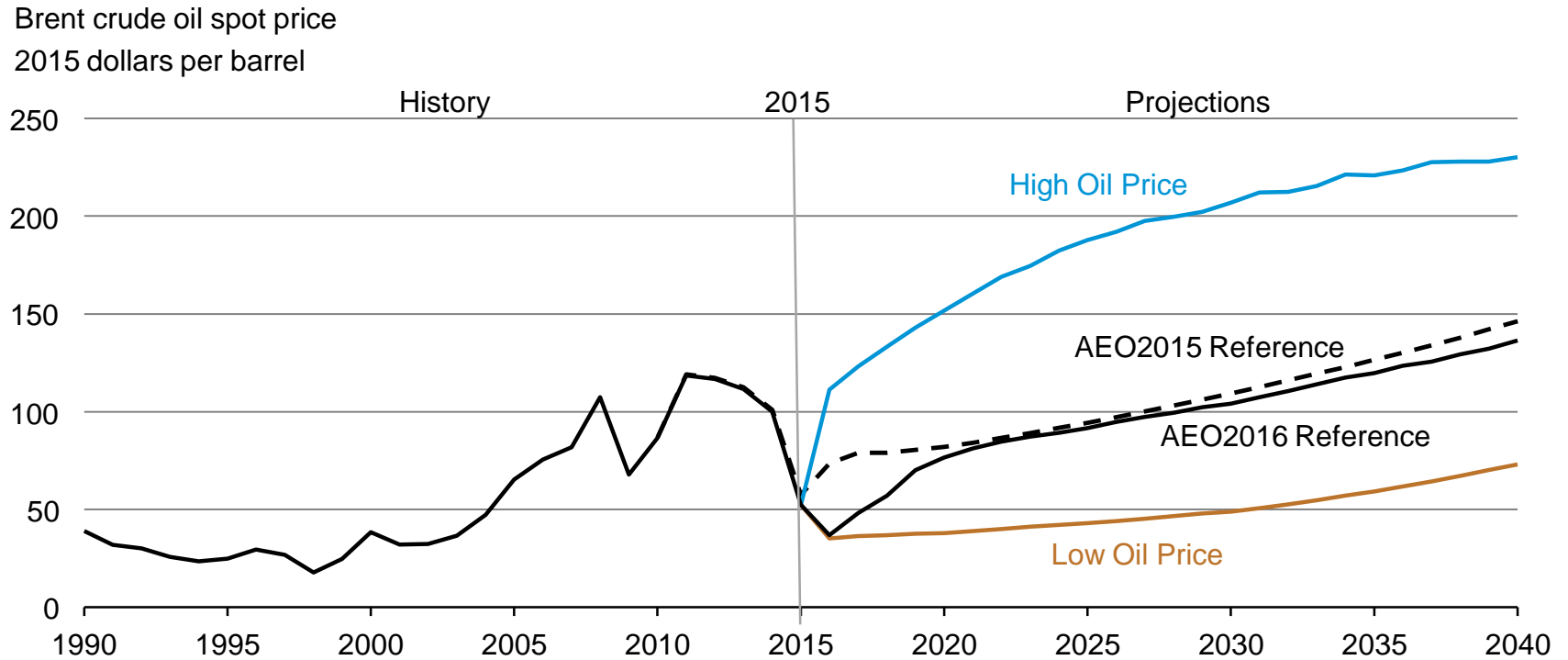
Petroleum AEO 2016

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



Source: EIA, Annual Energy Outlook 2016

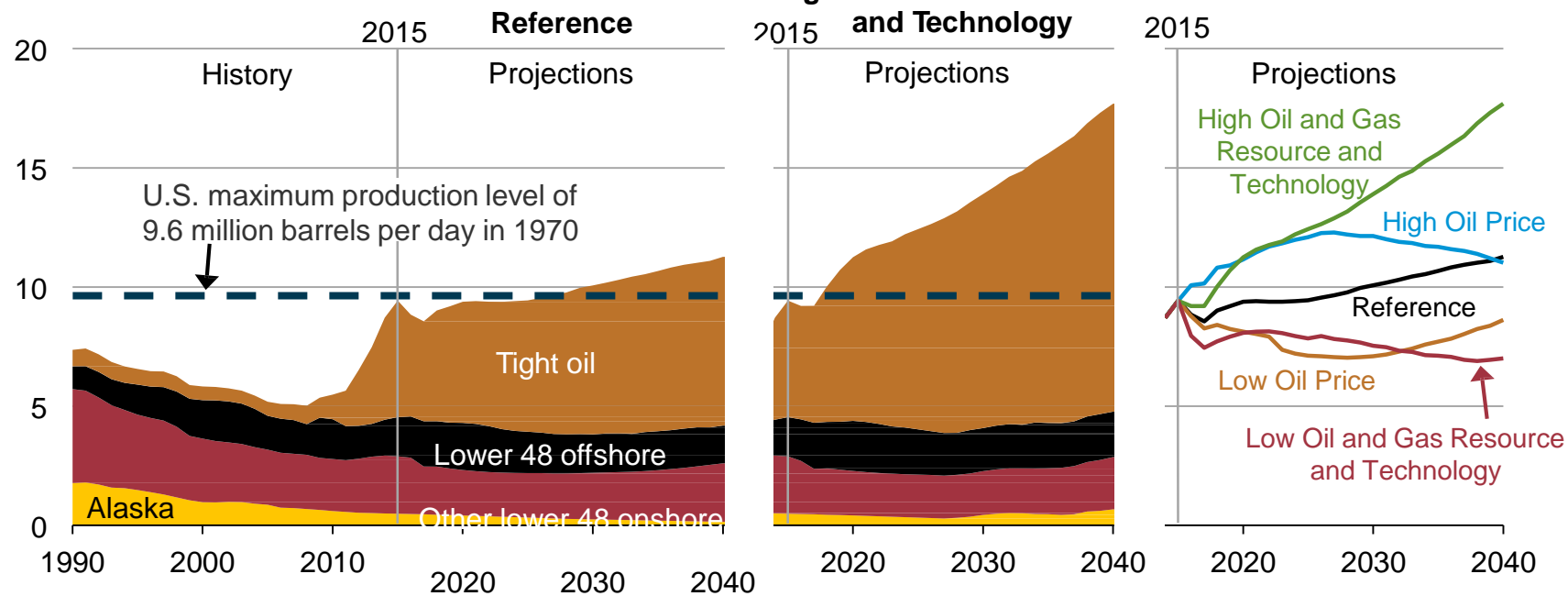
Near-term crude oil price scenario is lower in AEO2016



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

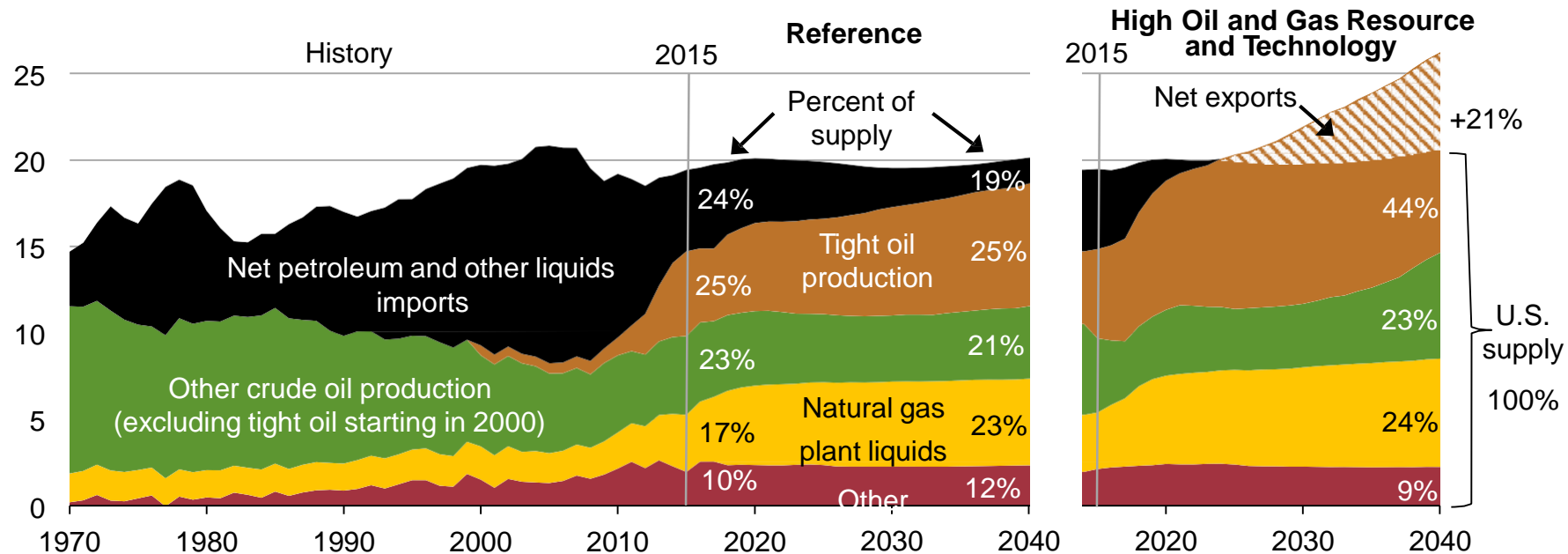
U.S. crude oil production
million barrels per day



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

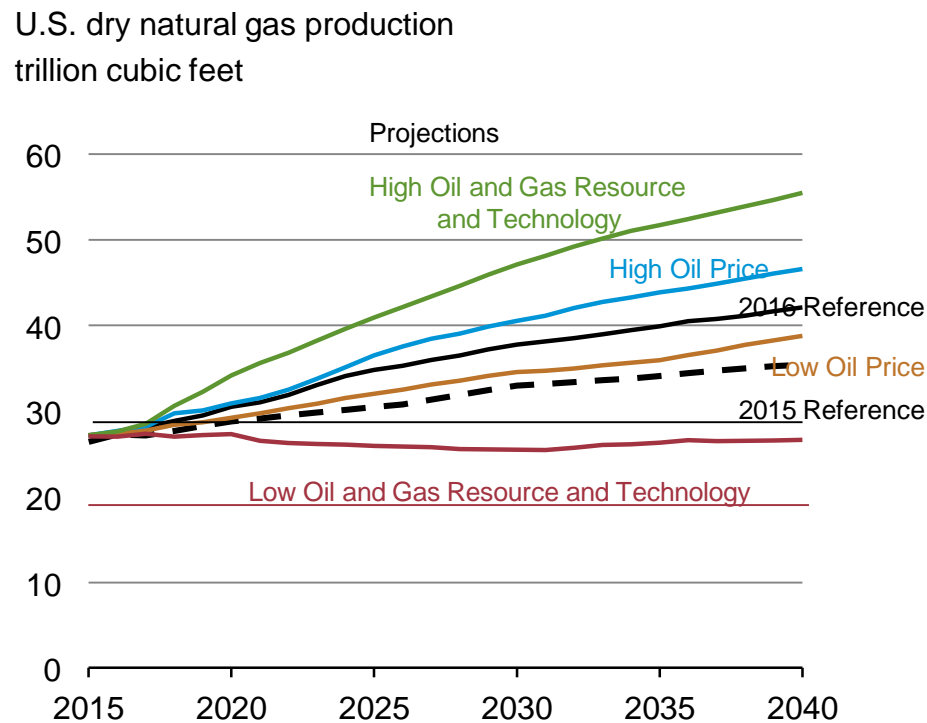
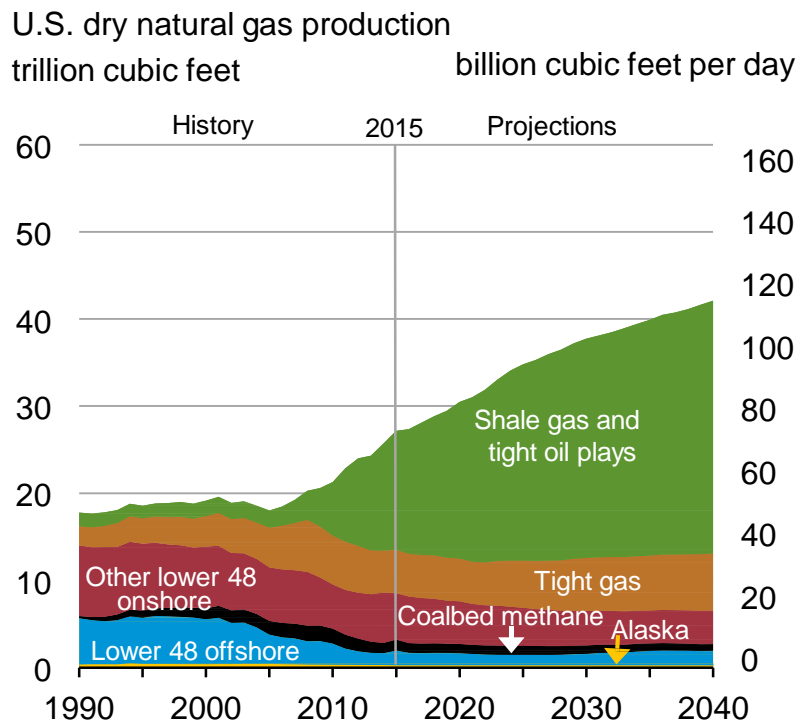


Note: "Other" includes refinery gain, biofuels production, all stock withdrawals, and other domestic sources of liquid fuels

Source: EIA, Annual Energy Outlook 2016

Natural gas AEO 2016

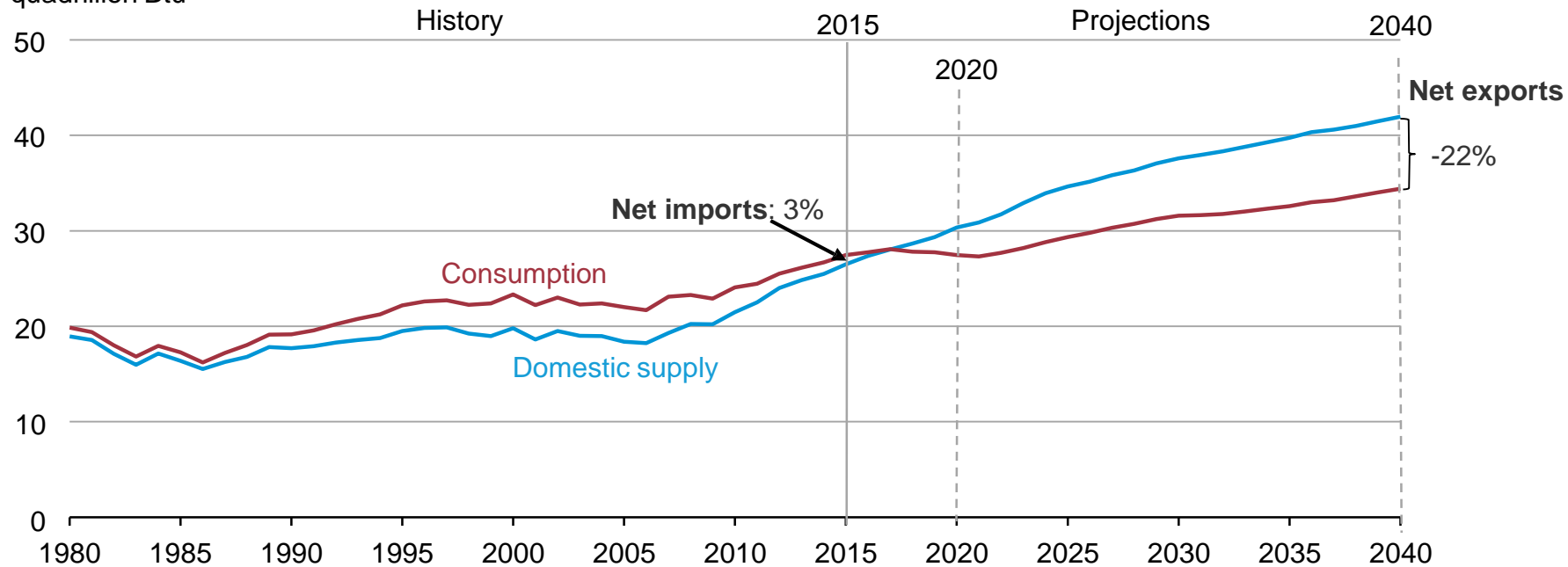
U.S. natural gas production dominated by shale resources; alternative price and resource /technology assumptions could be quite different



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

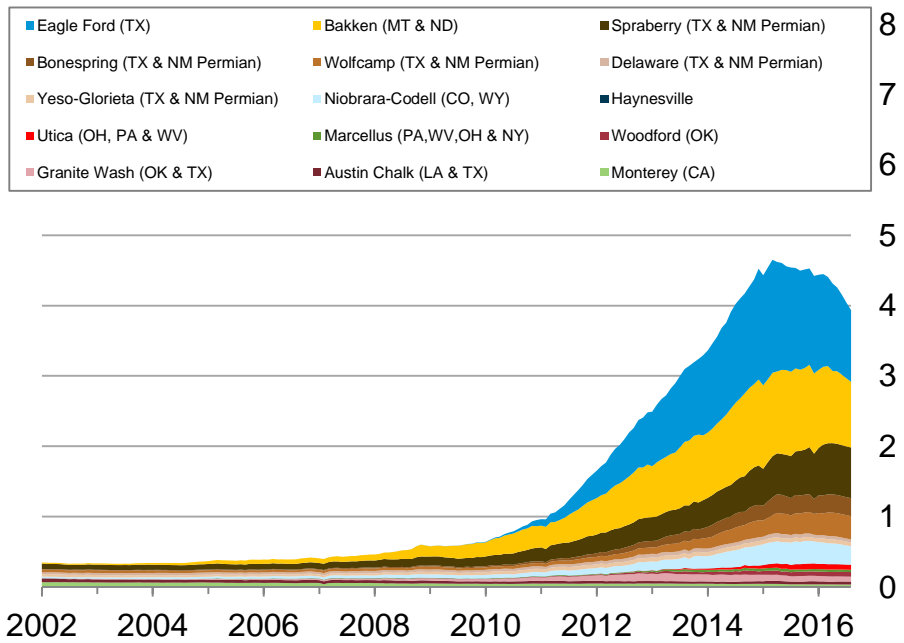


Source: EIA, Annual Energy Outlook 2016

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

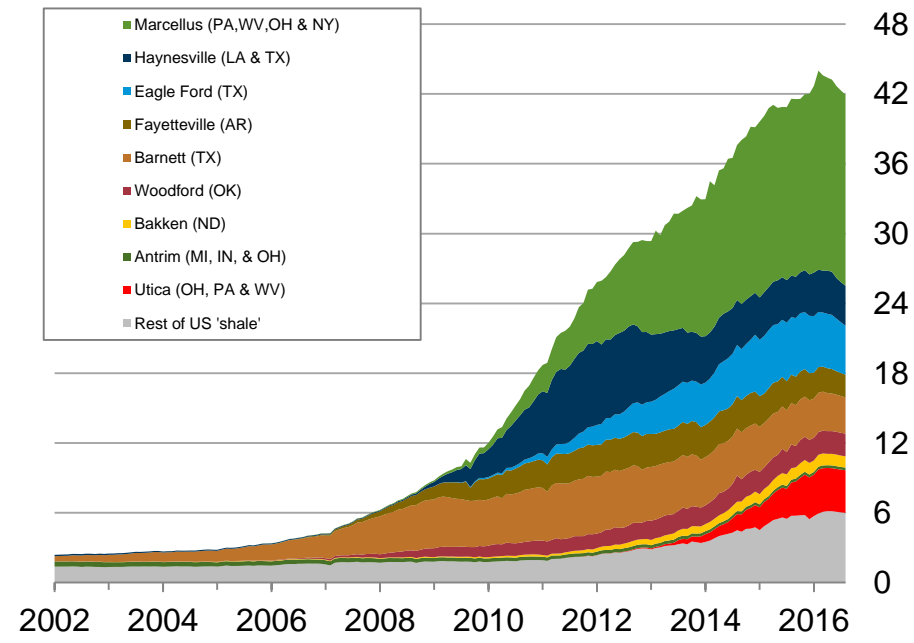
U.S. tight oil production

million barrels of oil per day



U.S. dry shale gas production

billion cubic feet per day



Source: EIA

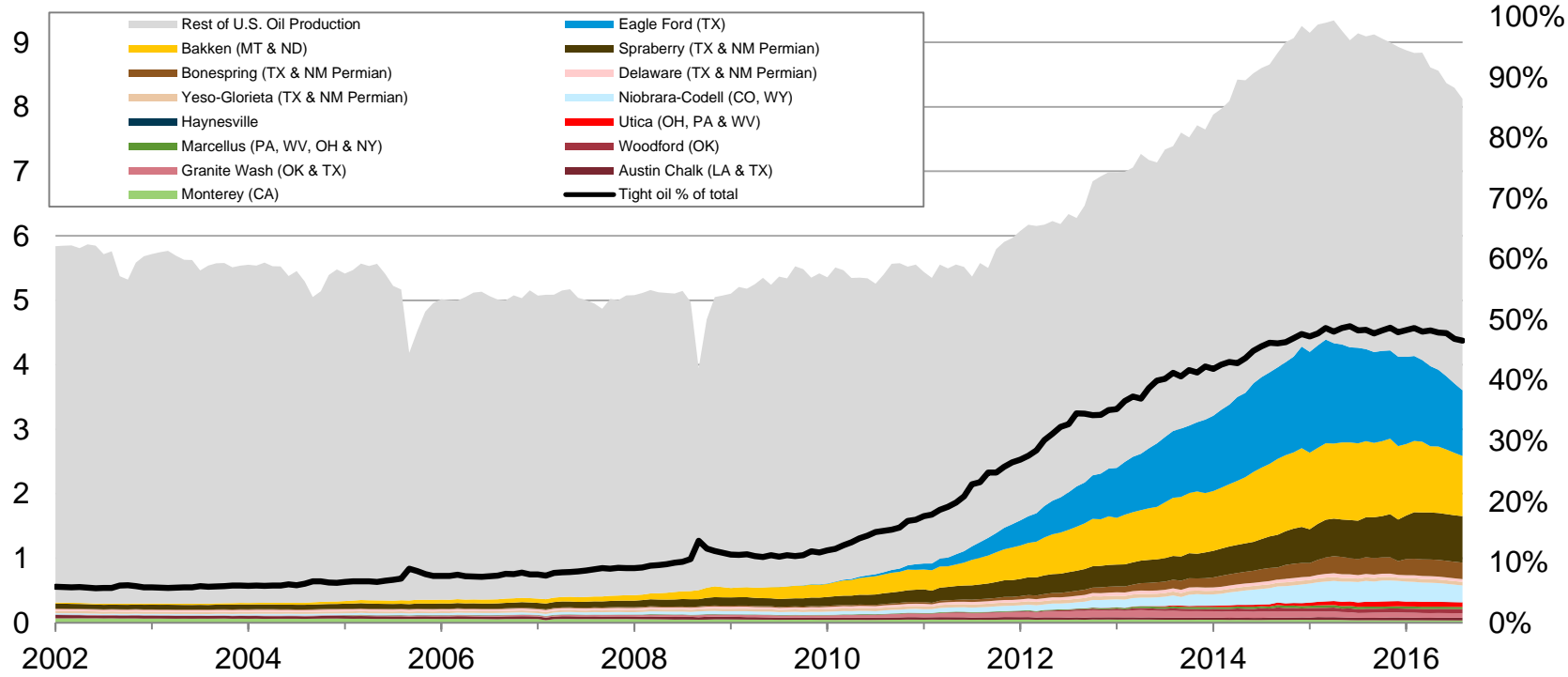
Estimated U.S. tight oil production was 3.9 MMbbl/d in August 2016 about 47% of total U.S. oil production (8.5 MMbbl/d)

Tight oil production

Tight oil production

million barrels of oil per day

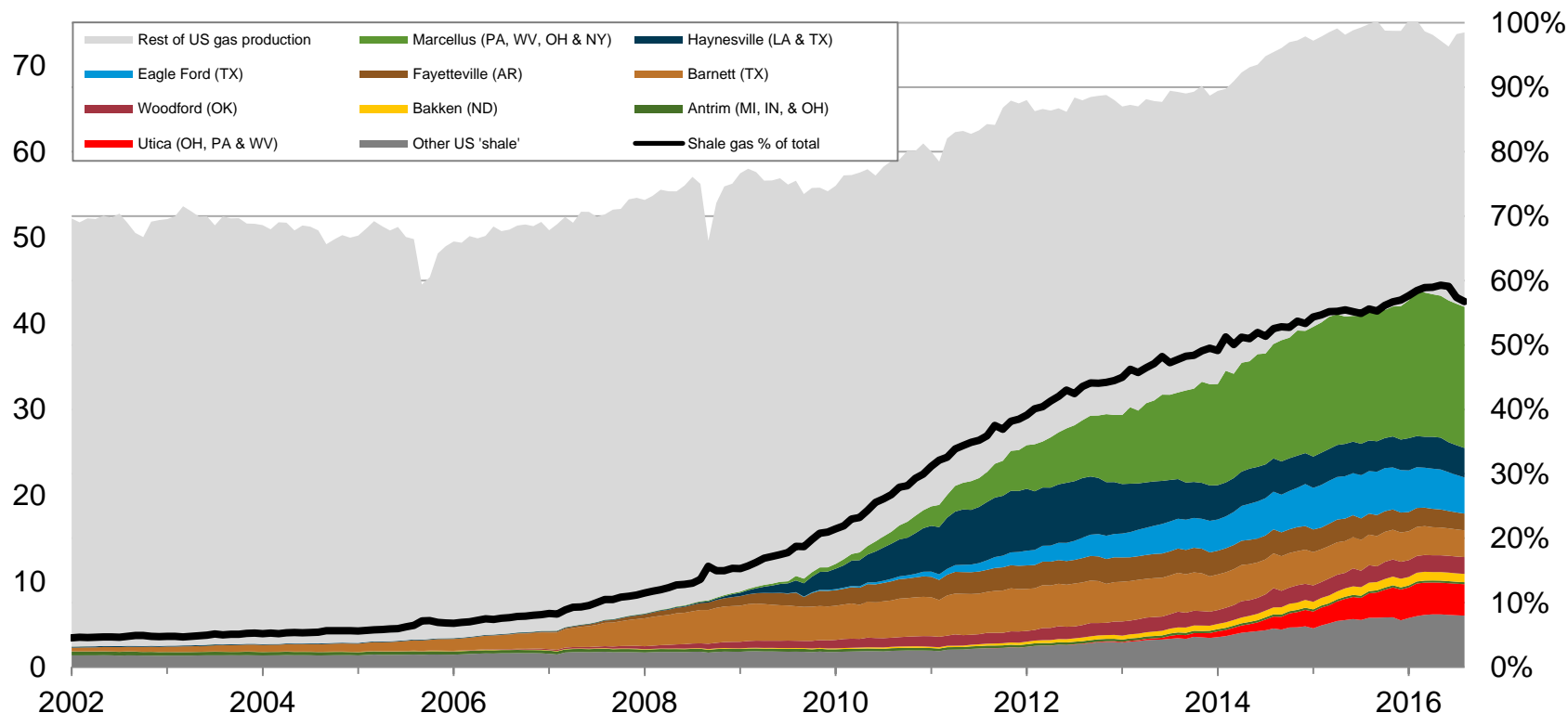
as a percent of total oil production



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)

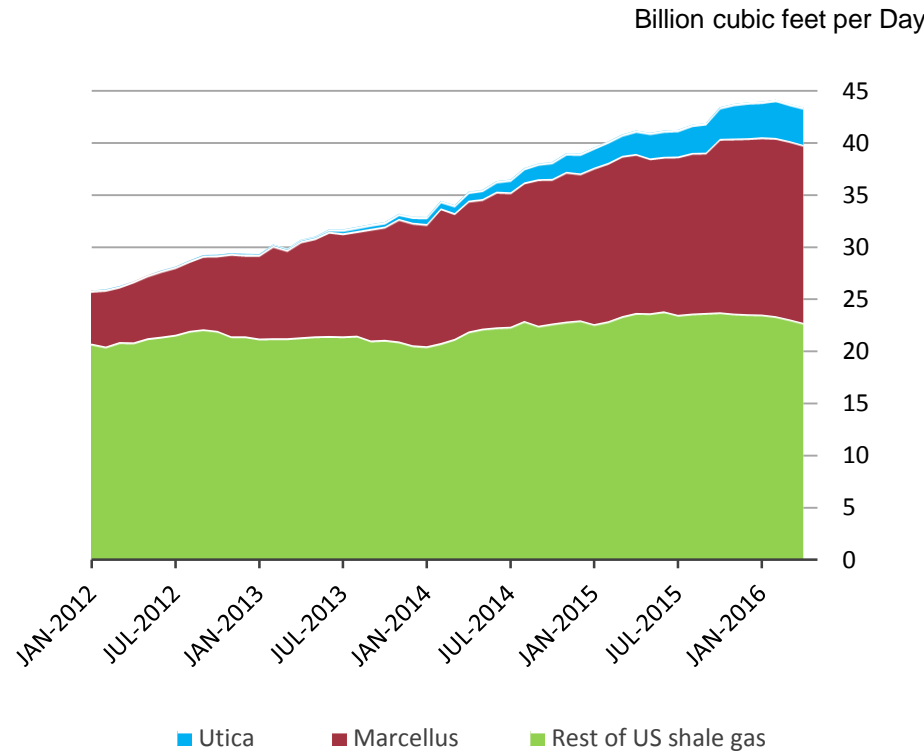
Natural gas production (dry)
billion cubic feet per day

Shale gas production
as a percent of total gas production

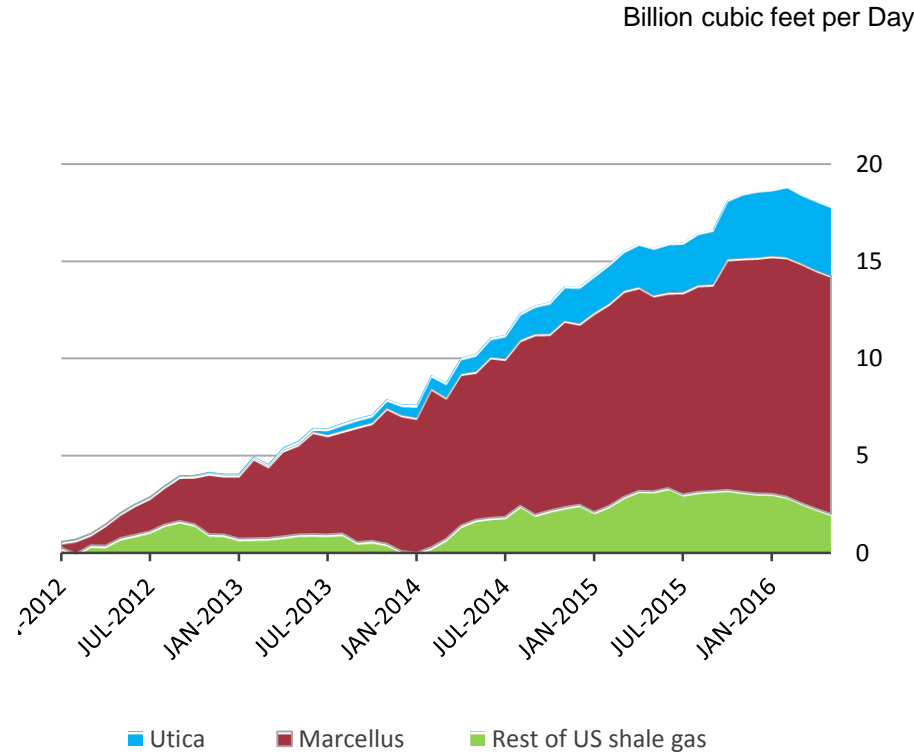


Most of the incremental shale gas production growth since 2012 in the U.S. has come from Appalachia with Utica playing a bigger role

Total U.S. and Appalachian shale dry natural gas production since 2012



Incremental shale gas production growth in Appalachian and Rest of U.S. since 2012



Sources: EIA

Key takeaways from AEO2016

- Reductions in energy intensity largely offset impact of GDP growth and slow down projected growth in energy use
- 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

For more information

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

Annual Energy Outlook | www.eia.gov/forecasts/aeo

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

International Energy Outlook | www.eia.gov/forecasts/ieo

Today In Energy | www.eia.gov/todayinenergy

Monthly Energy Review | www.eia.gov/totalenergy/data/monthly

State Energy Portal | www.eia.gov/state

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