



Natural gas outlook: supply, demand and prices.

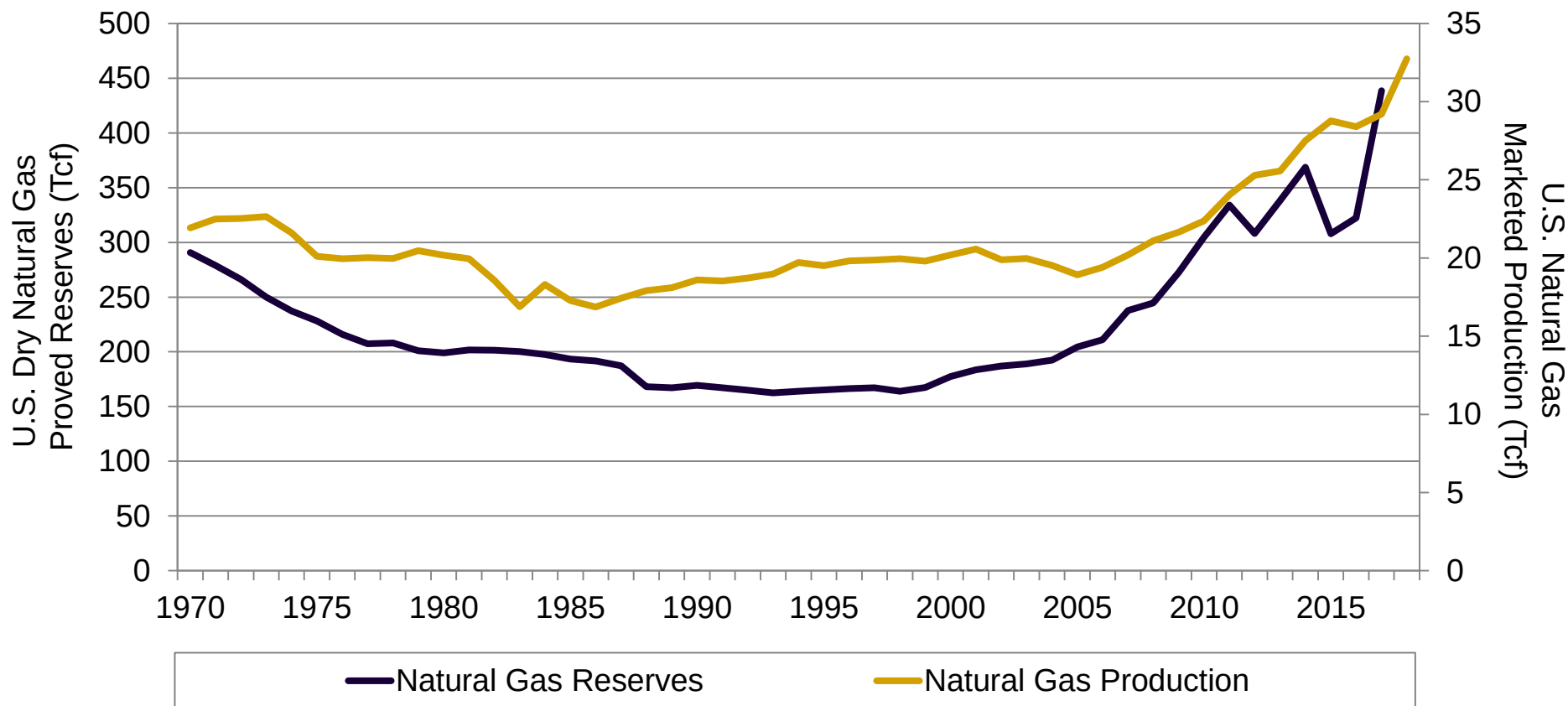
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David E. Dismukes, Ph.D.
Center for Energy Studies
Louisiana State University

Natural gas supply trends

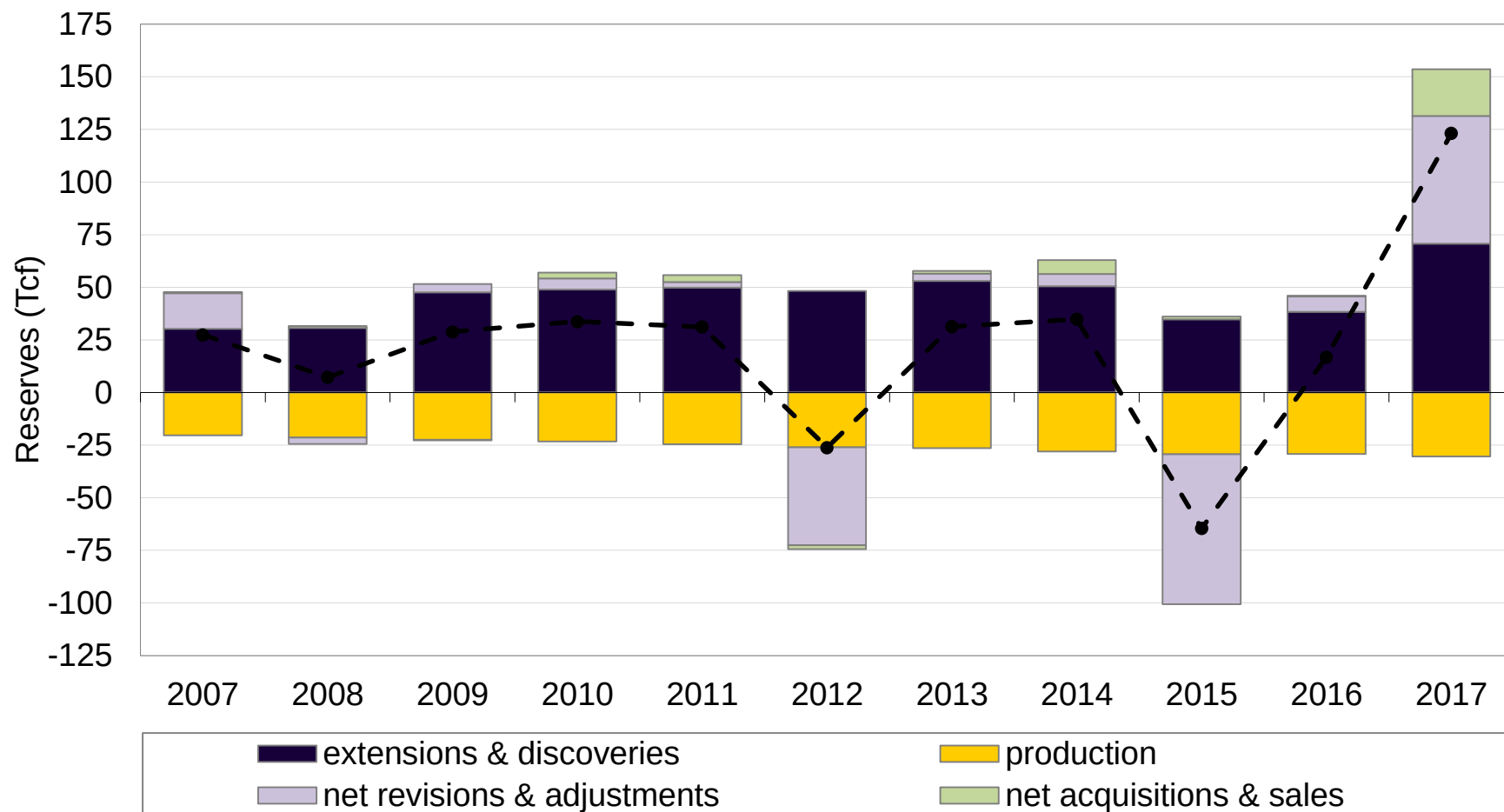
Changes in reserves and production.

Natural gas production and reserves are at levels not seen since the 1970s and both U.S. natural gas production and reserves are now at an all-time recorded peak.



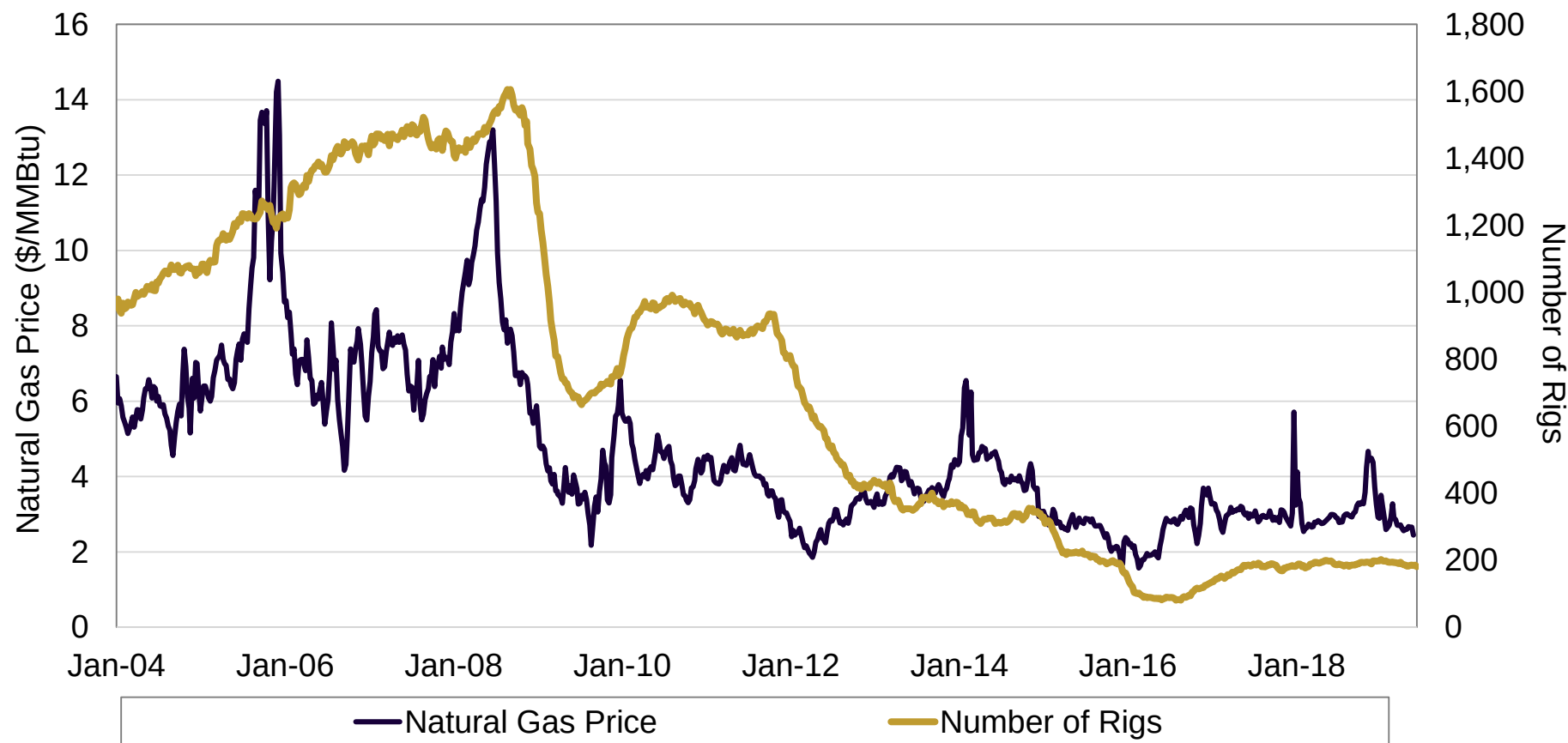
Annual Energy Outlook, natural gas reserve revisions.

Net revisions increased U.S. total natural gas proved reserves by 41.3 Tcf in 2017. This increase is significantly larger than any revisions reported in the last 10 years.



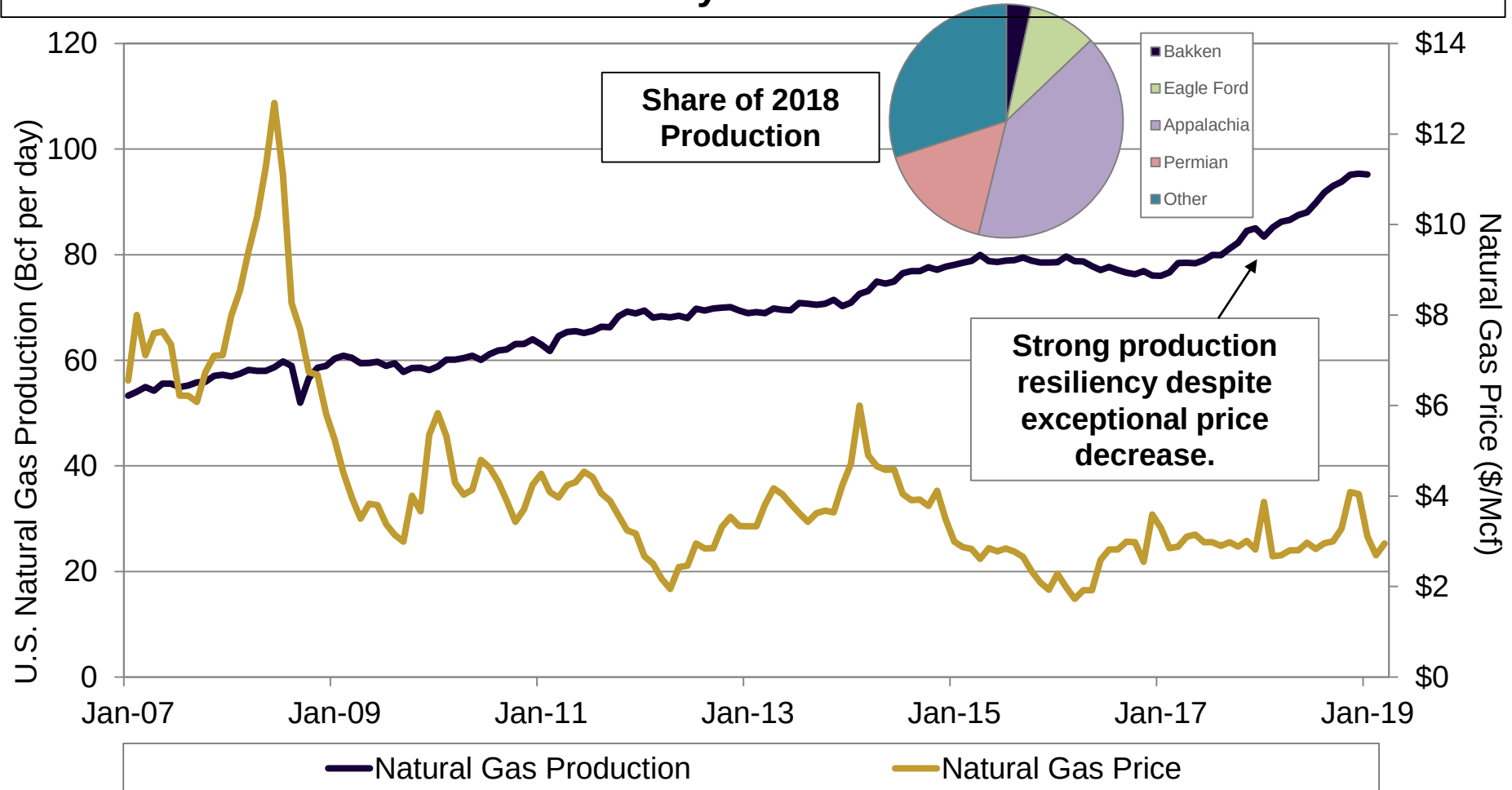
Natural gas drilling activity.

Natural gas rigs closely follow the natural gas spot price. Price decrease that started in 2008 has reduced natural gas drilling attractiveness.



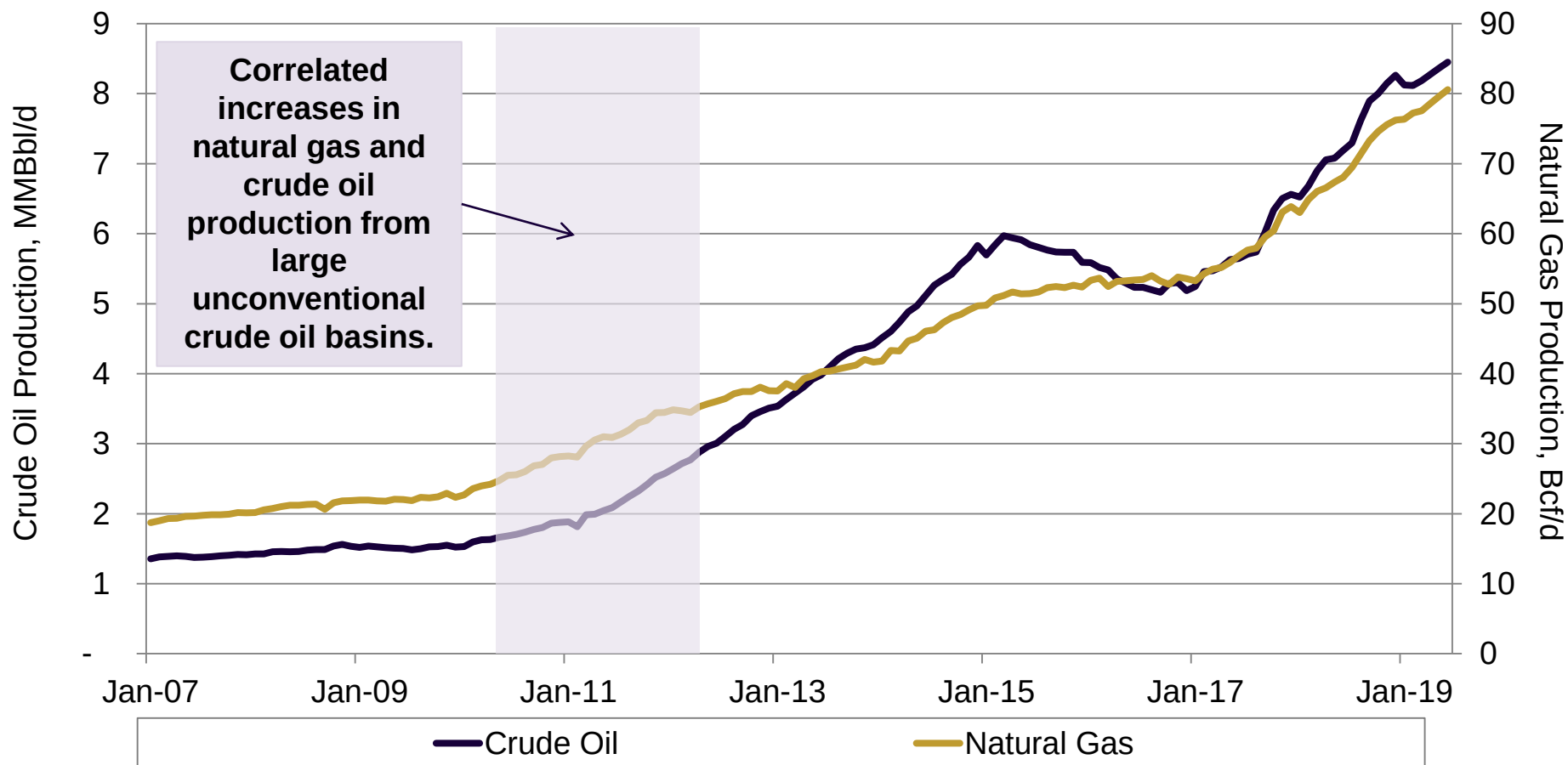
Monthly U.S. natural gas production.

U.S. natural gas production has increased about 60 percent in the last 10 years.



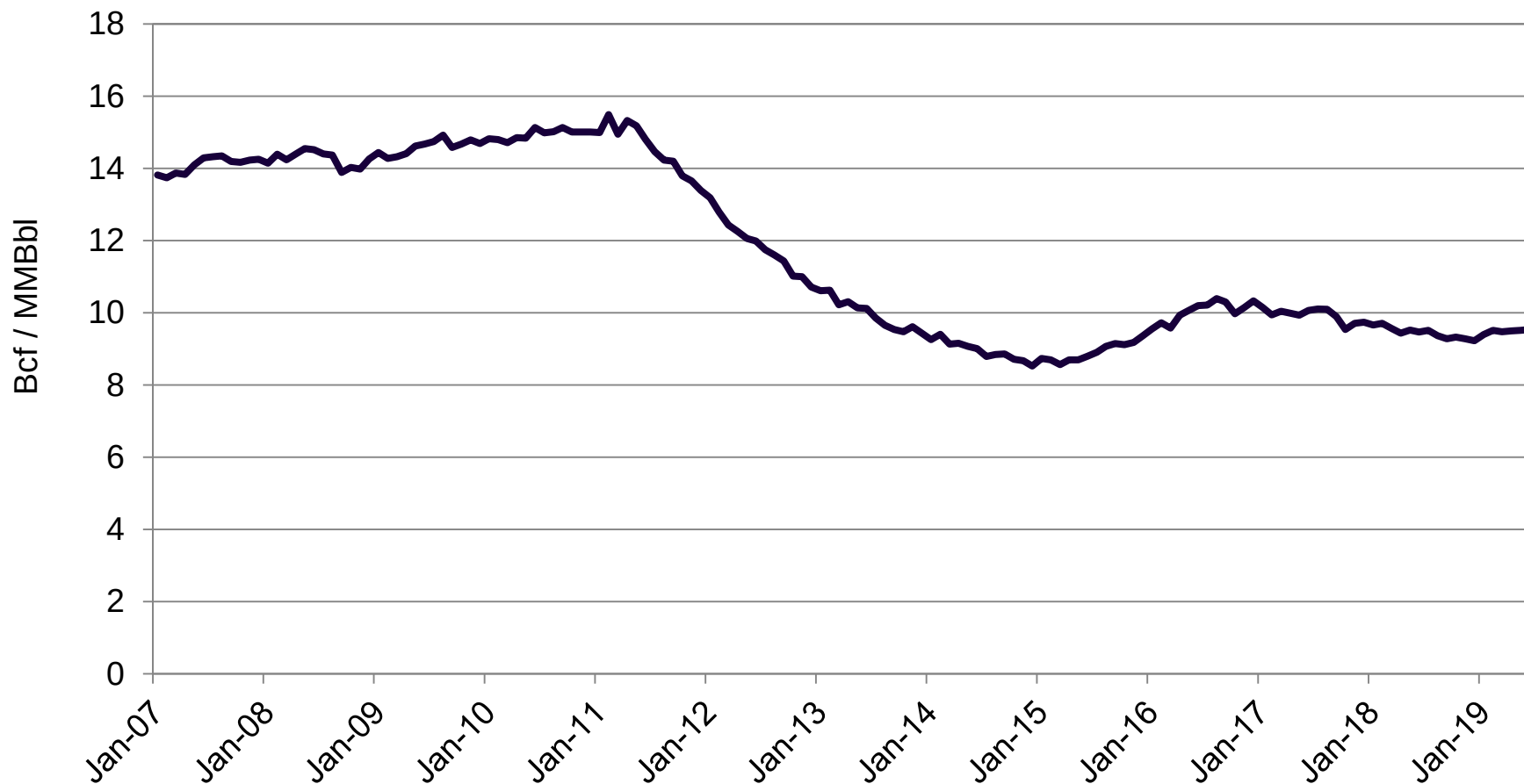
Shale Oil and Gas Production (7 Major Plays)

Considerable amount of “free” natural gas (“associated gas”) coming from unconventional crude oil production. Helps to explain (in part) the continued strength in natural gas production in the face of rapid rig count decreases.



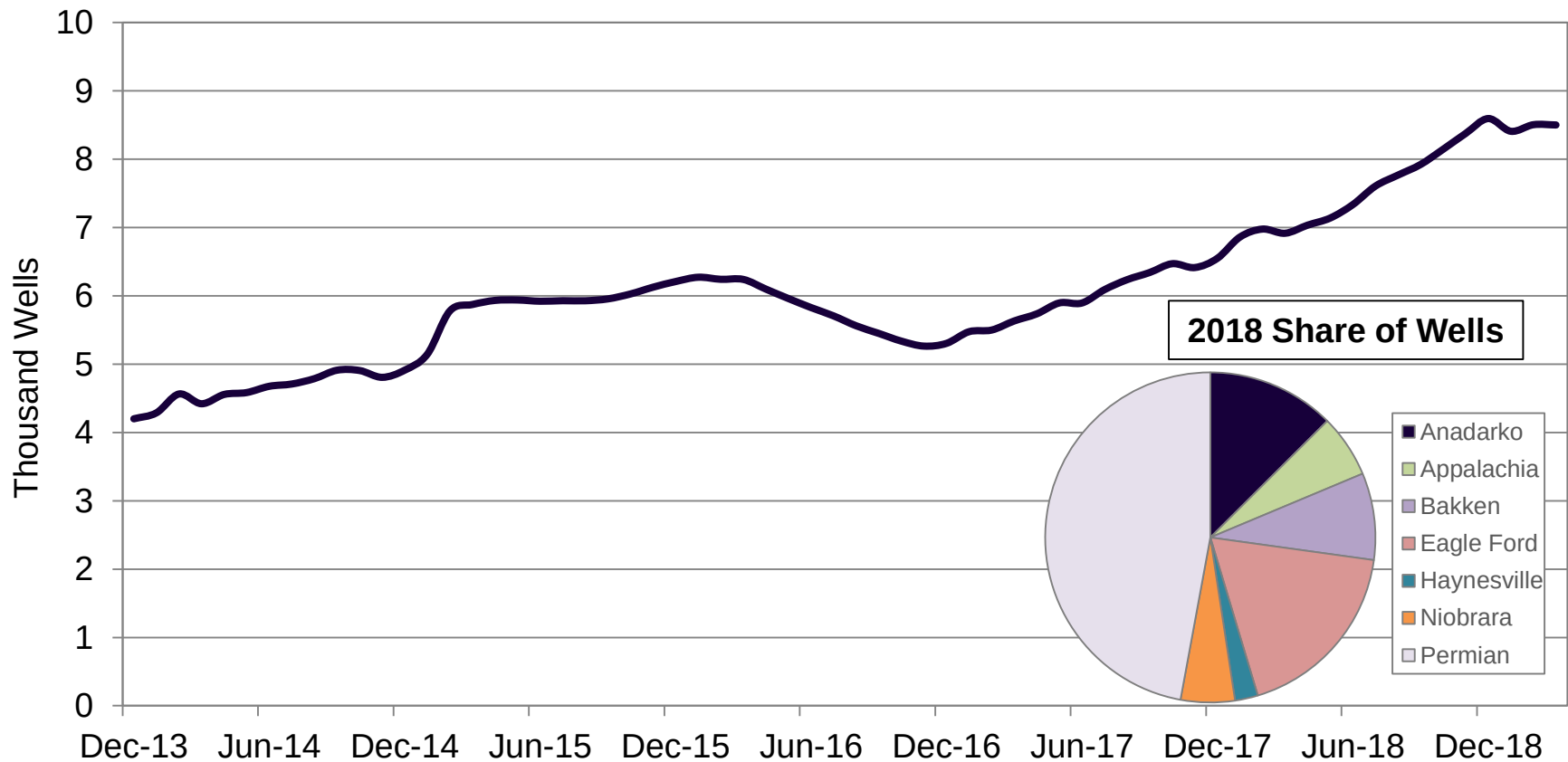
Relationship of Shale Oil and Gas Production

Growth in “free gas” has already started to slow, once crude oil rig, and then production activity slows. It could have implications for natural gas markets.



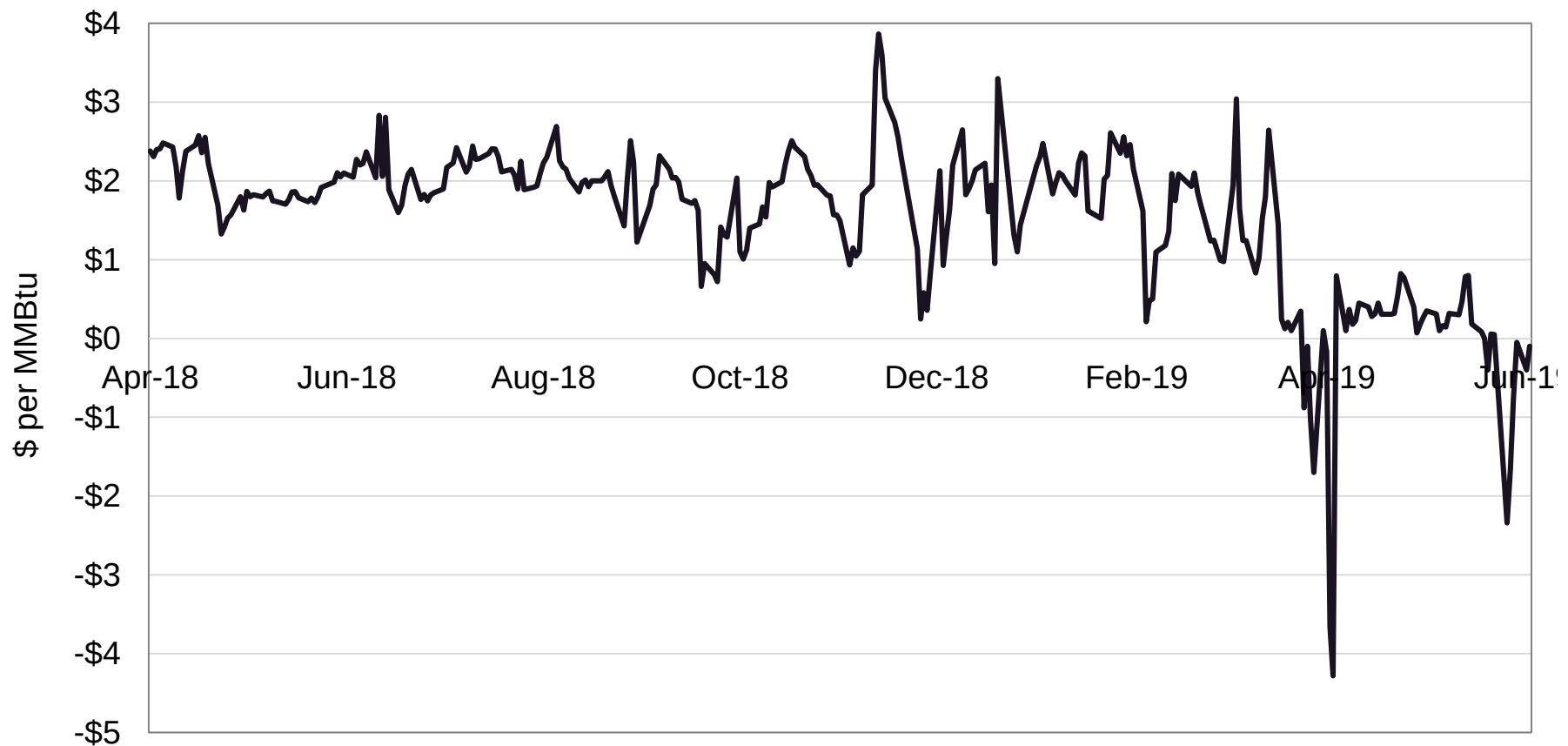
Monthly drilled but uncompleted wells.

Drilled but uncompleted wells have increased by almost 50 percent in the last few years.



Daily natural gas price at Waha trading hub (West Texas)

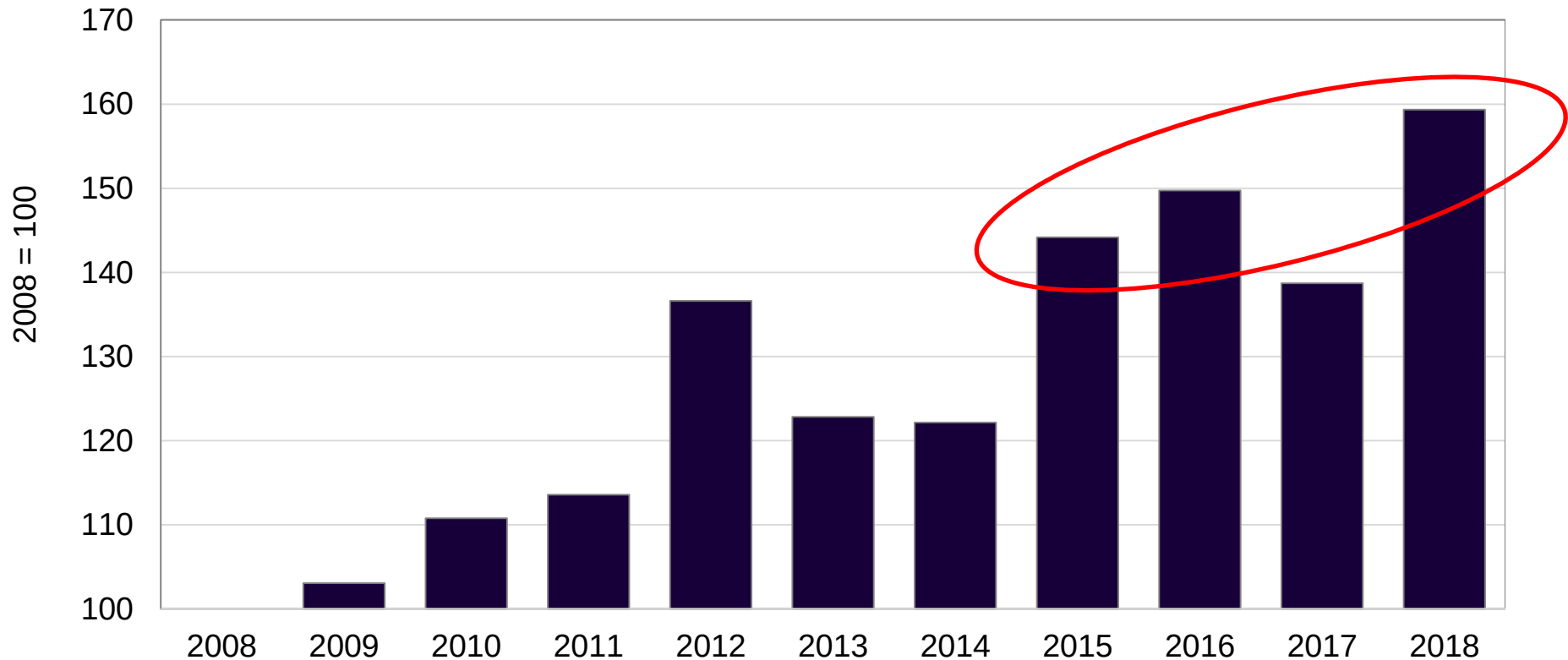
Natural gas prices at Waha Hub plunged to negative levels in April 2019 and again in June due to pipeline constraints and problems at compressor stations.



Natural gas demand trends

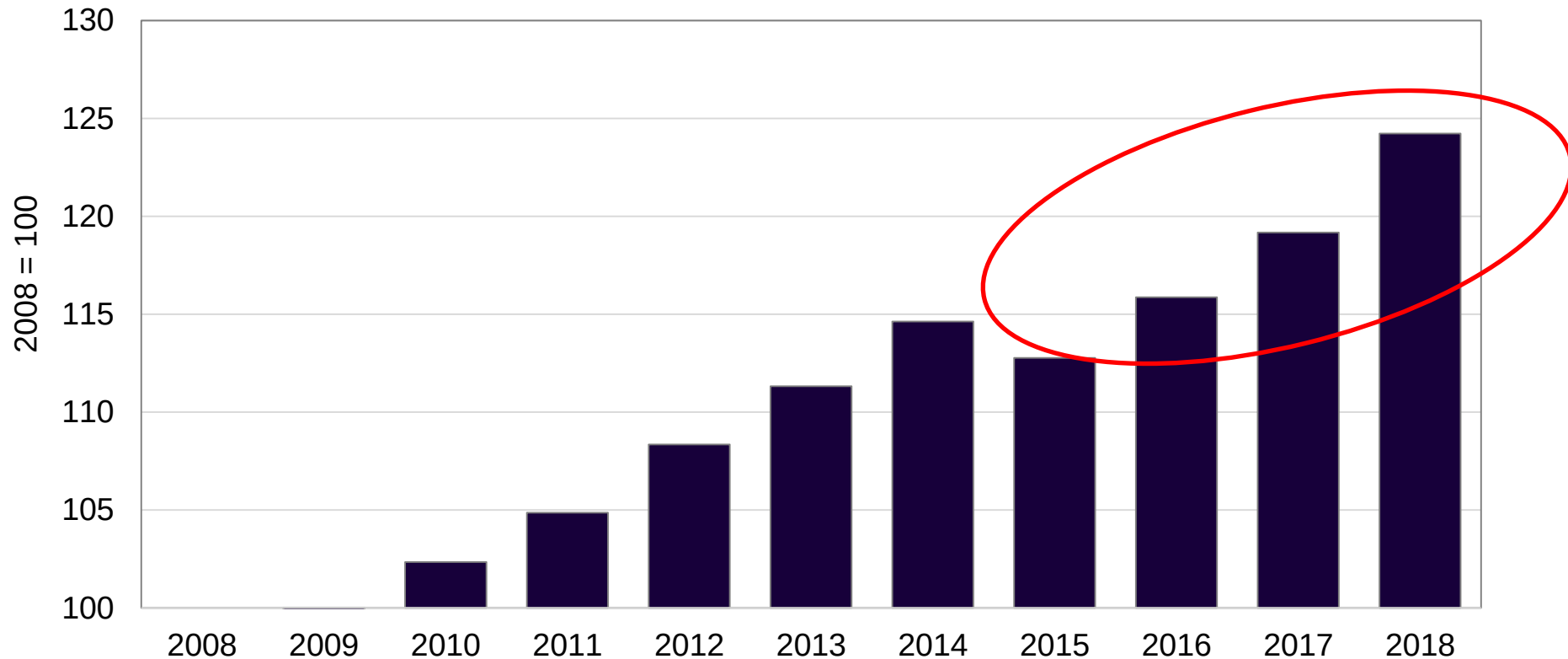
Year-over-year growth trend in power generation natural gas demand.

Natural gas demand from the electric power industry has increased 60 percent in the last 10 years.



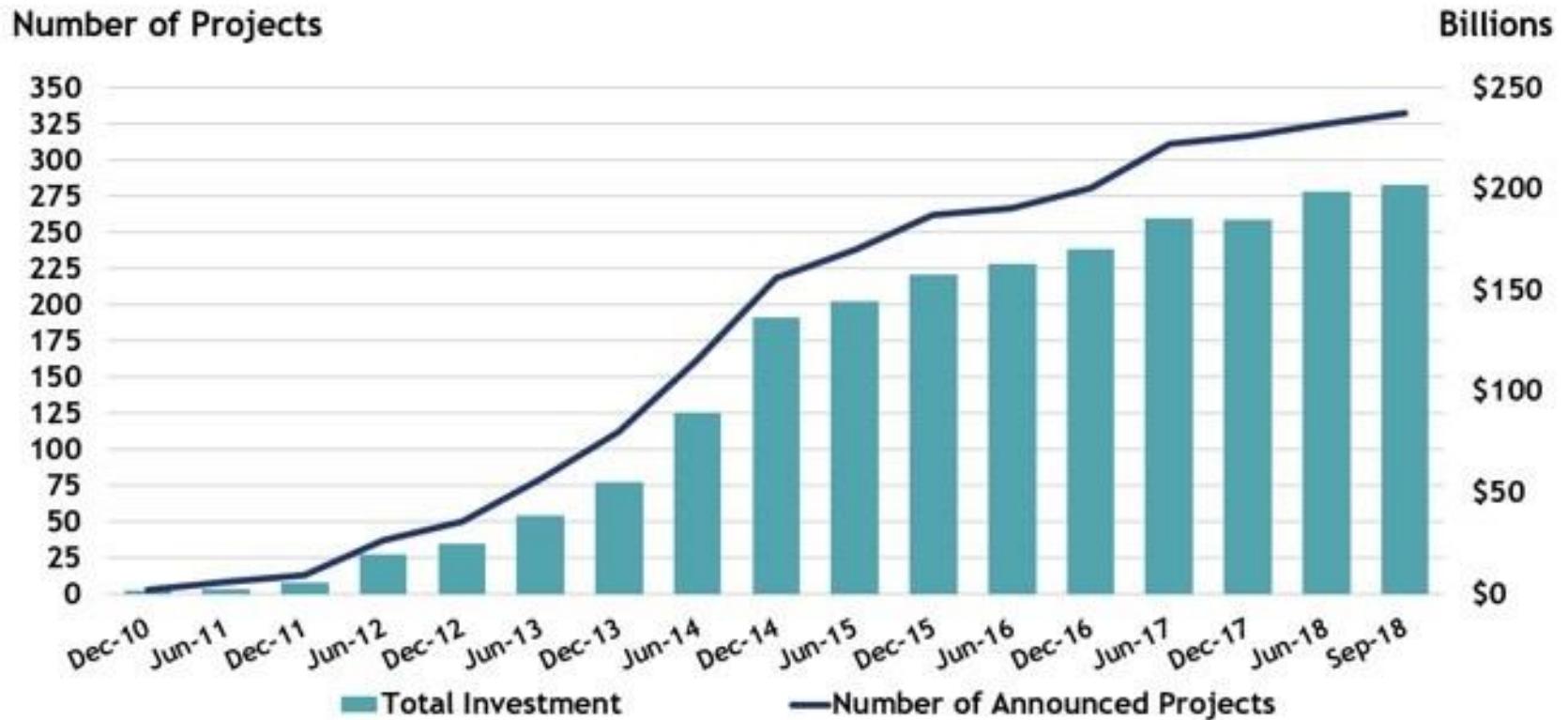
Year-over-year growth trend in industrial natural gas demand.

Natural gas demand from the electric power industry has increased 24 percent in the last 10 years.



Chemical industry investments from shale gas, cumulative.

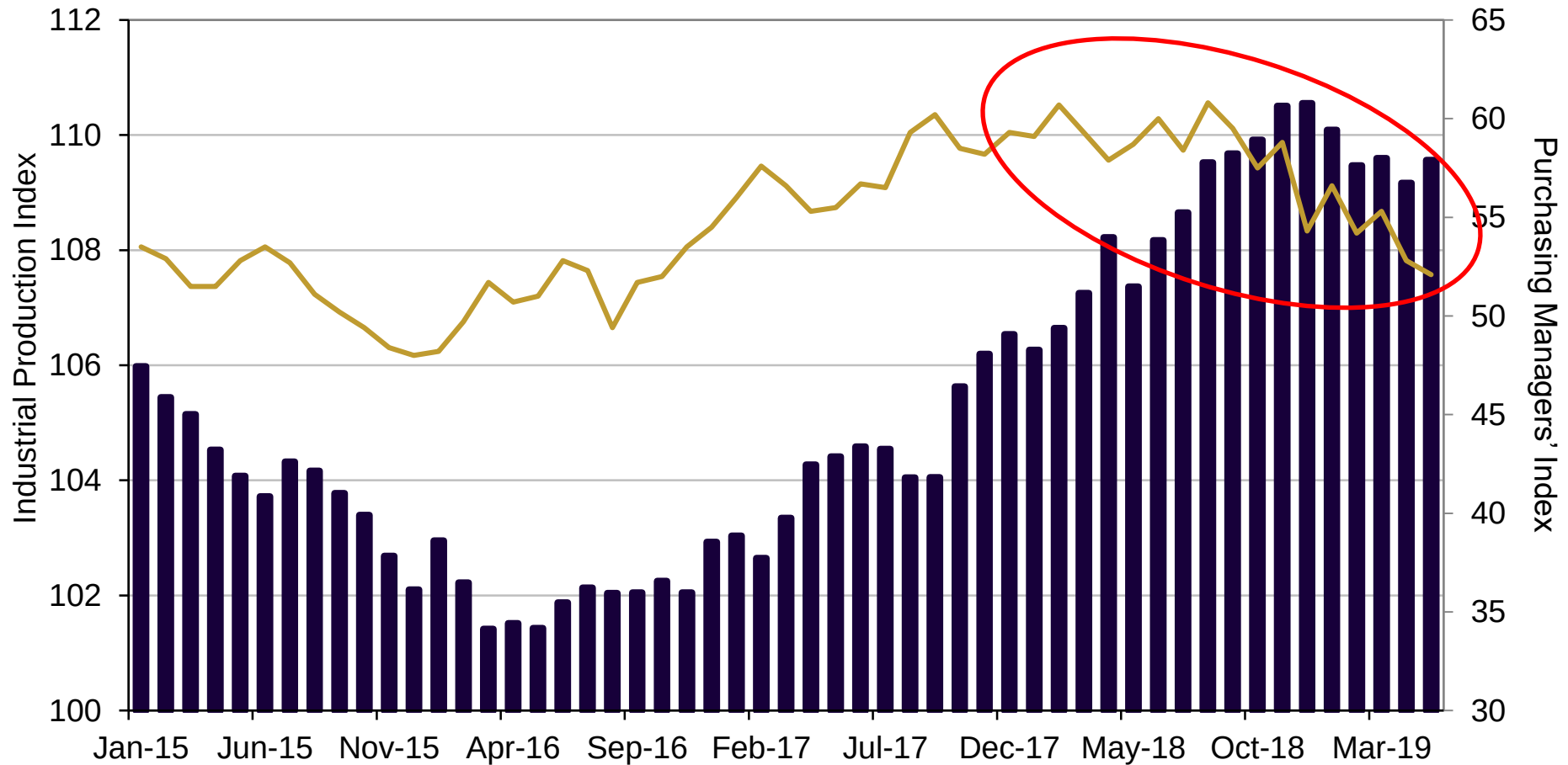
The American Chemistry Council announced that U.S. chemical and plastics industry investment linked to natural gas from shale formations has **surpassed \$200 billion**. Since 2010, 53 percent of the investment has been completed or is under construction and 41 percent in the planning phase.



Source: ACC analysis

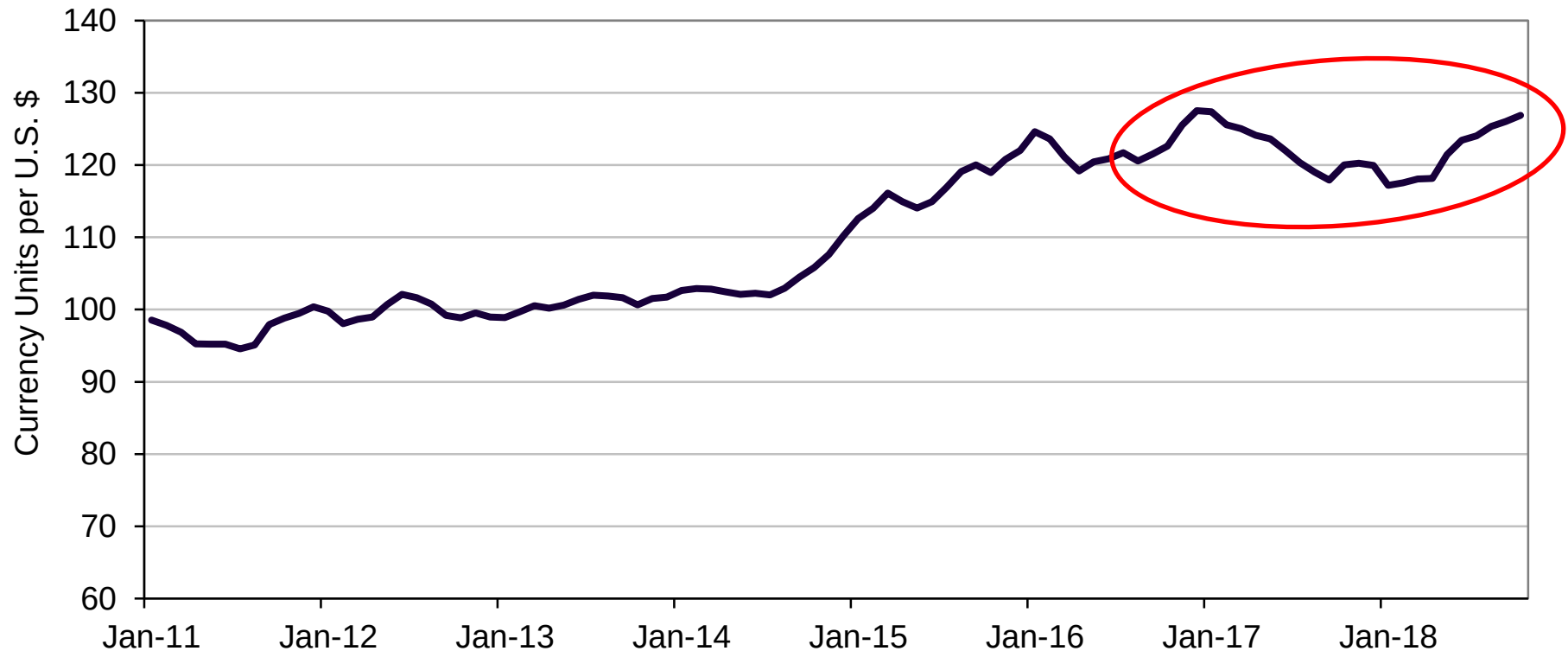
U.S. industrial production index.

Industrial production and purchasing indices have been consistently increasing since the lows of 2016; but are starting to fall.



Dollar valuations (Federal Reserve Broad Index).

The dollar is up relative to the currencies: 25 percent appreciation over last five years, but just one percent in the last 12 months.

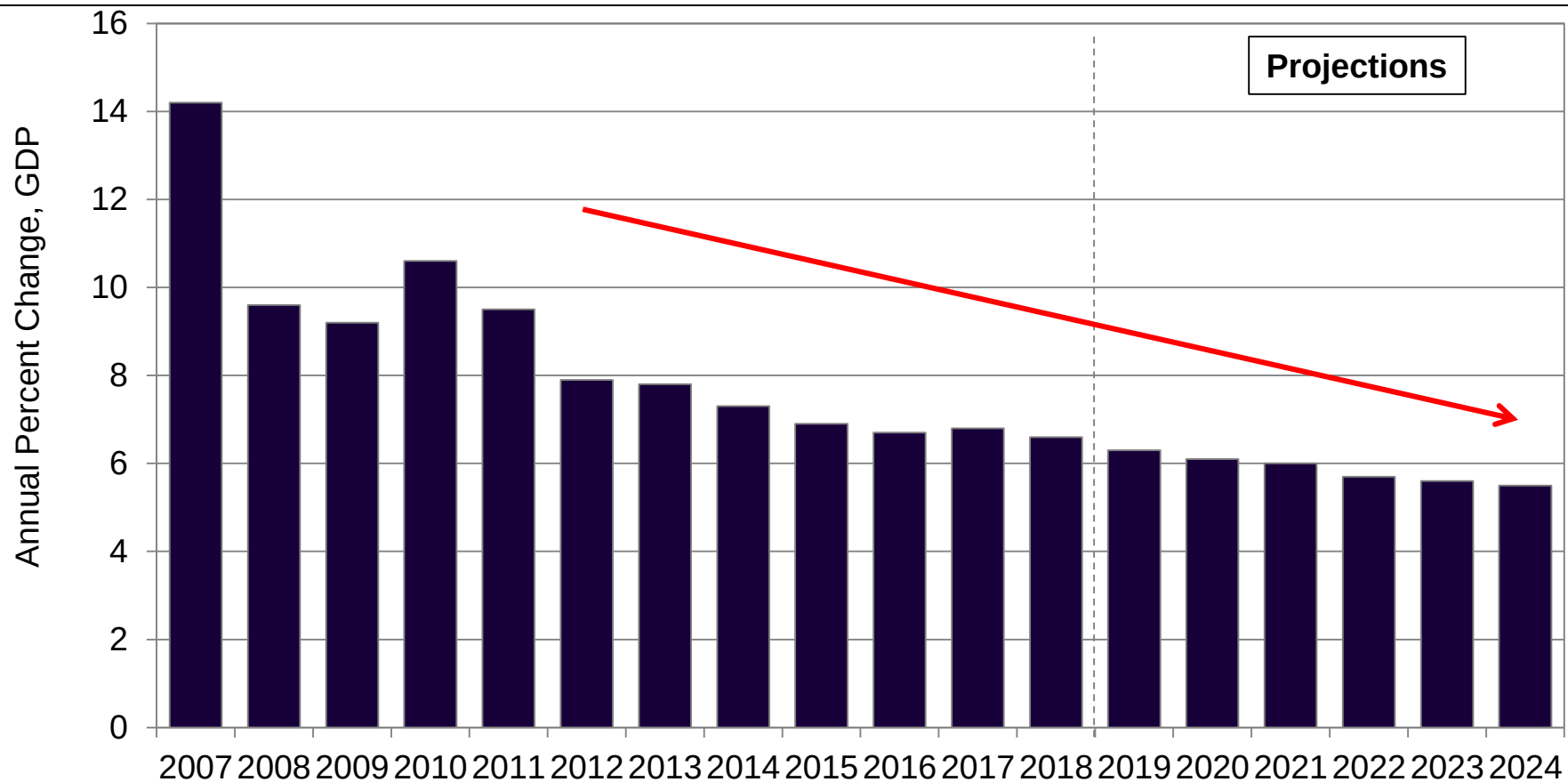


Note: The Broad Index is a weighted average of the foreign exchange values of the U.S. dollar against the currencies of a large group of major U.S. trading partners. Base year is 2002.

Source: Federal Reserve Bank of St. Louis.

Changes in Chinese GDP.

Chinese economic growth officially reported at 6.6 percent, reflecting expectations of expansionary policy mix and a goal of doubling real GDP between 2010 and 2020



Projections

Energy trade

GOM LNG capacity

Regasification

-  Existing
-  Under Construction
-  Approved

Liquefaction

-  Existing
-  Under Construction
-  Approved

Existing

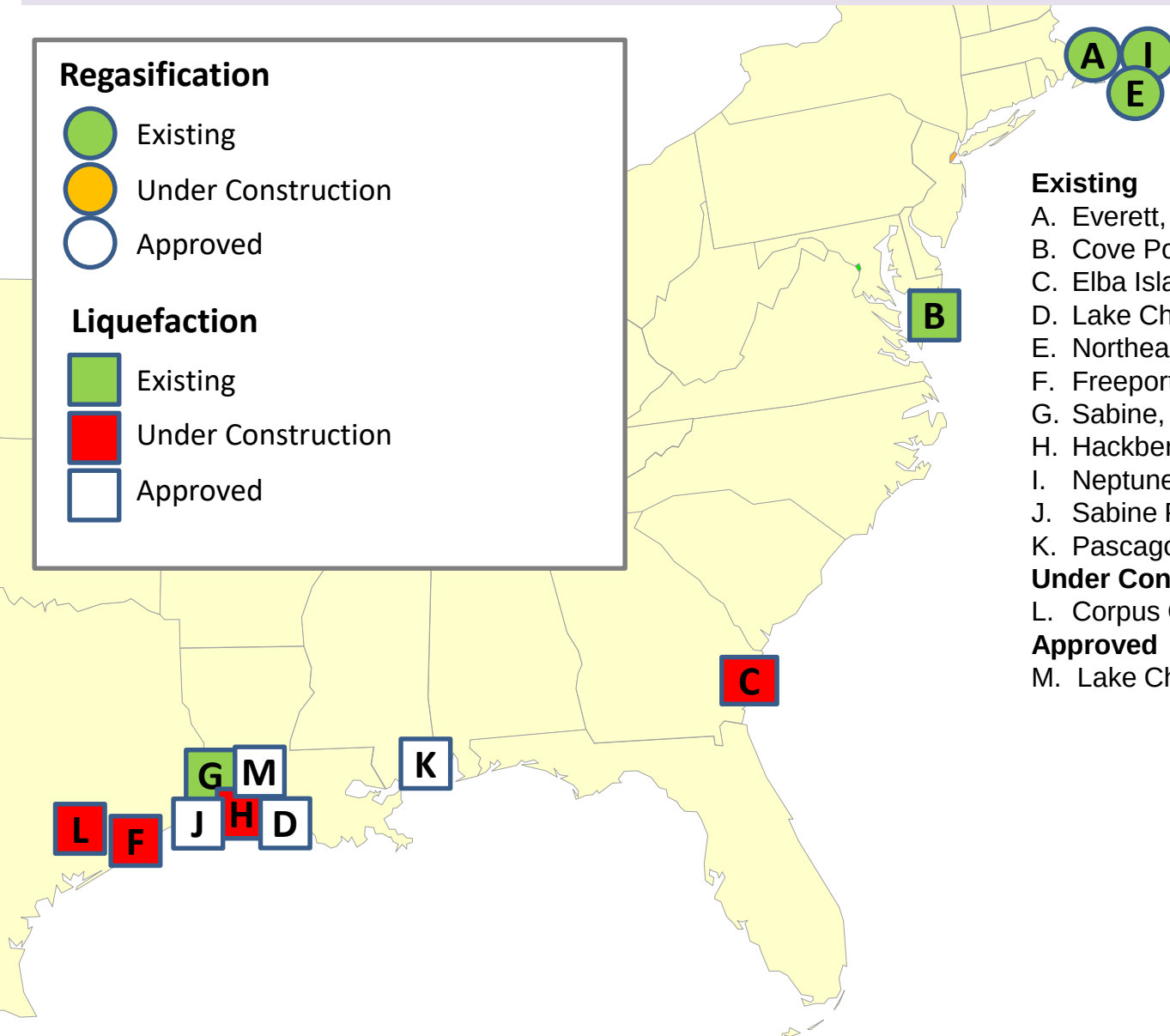
- A. Everett, MA: 1.035 Bcfd
- B. Cove Point, MD: 1.8 Bcfd
- C. Elba Island, GA: 1.6 Bcfd (+0.5 Expansion)
- D. Lake Charles, LA: 2.1 Bcfd
- E. Northeast Gateway, Offshore MA: 0.8 Bcfd
- F. Freeport, TX: 1.5 Bcfd (+2.5 Expansion)
- G. Sabine, LA: 4.0 Bcfd
- H. Hackberry, LA: 2.1 Bcfd
- I. Neptune, Offshore MA: 0.4 Bcfd
- J. Sabine Pass, TX: 2.0 Bcfd
- K. Pascagoula, MS: 1.5 Bcfd

Under Construction

- L. Corpus Christi, TX: 2.14 Bcfd

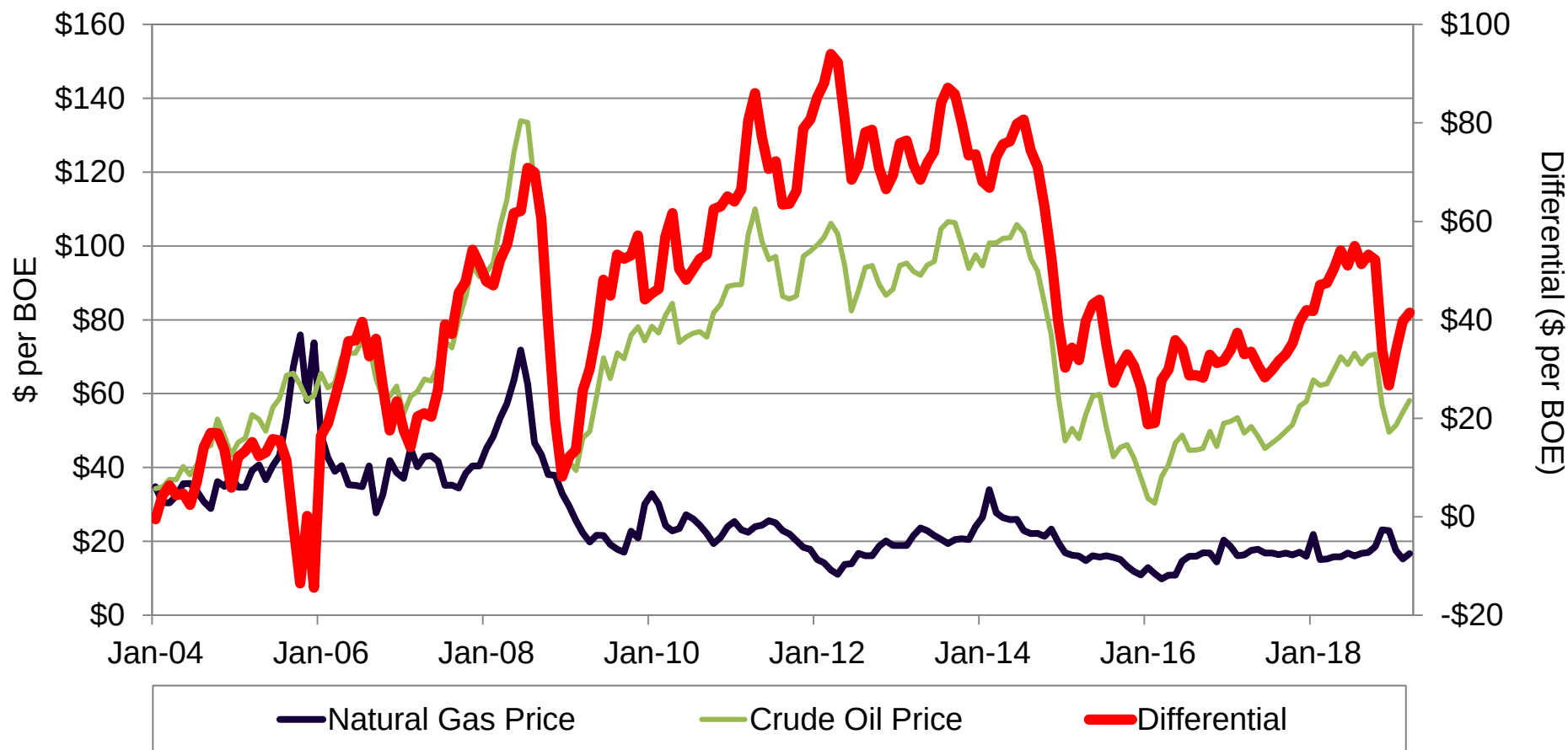
Approved

- M. Lake Charles (Magnolia): 1.08 Bcfd



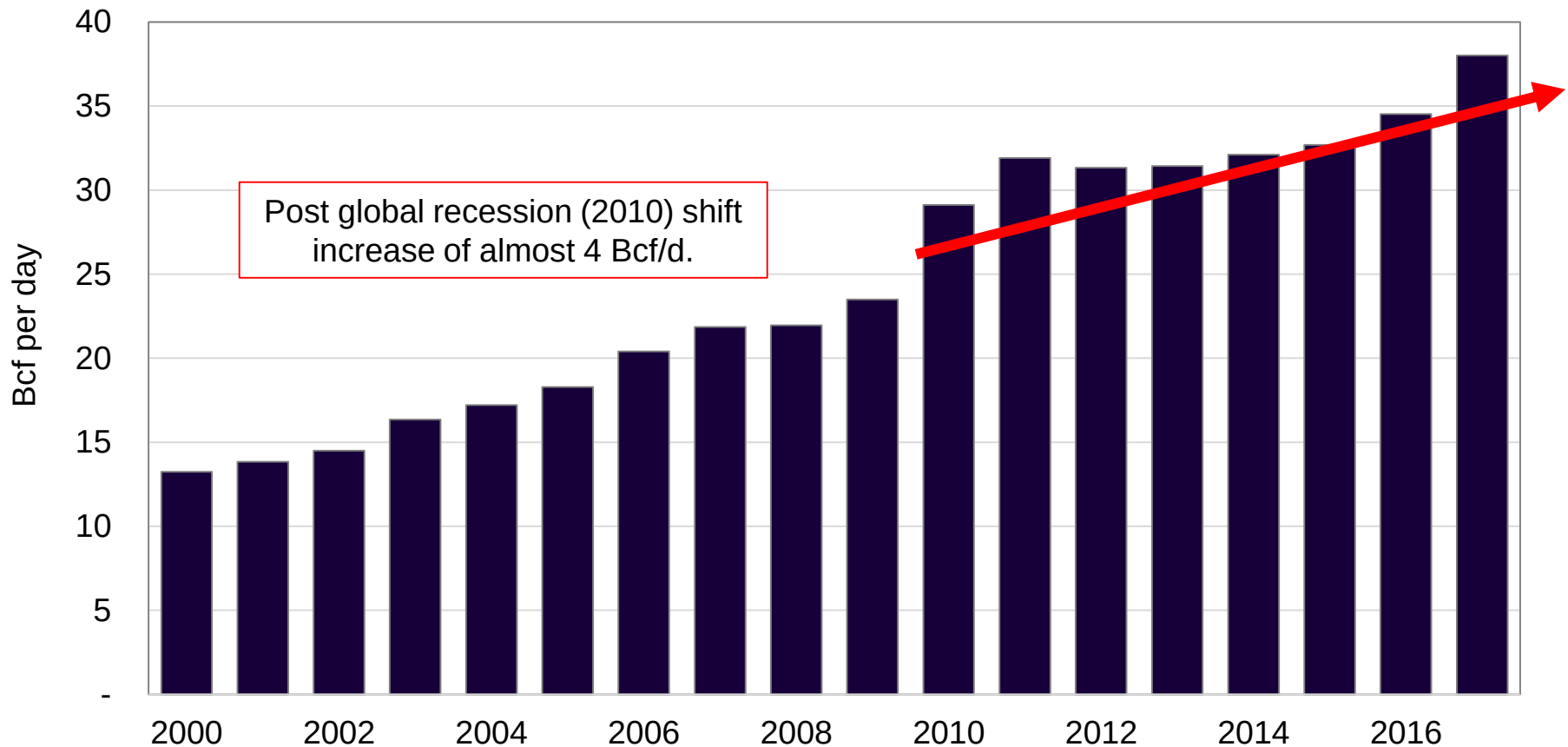
Natural gas and crude oil prices

Natural gas/crude oil price spreads well in excess of \$60 per Bbl and as high as \$90 per Bbl. These differentials have collapsed by about half.



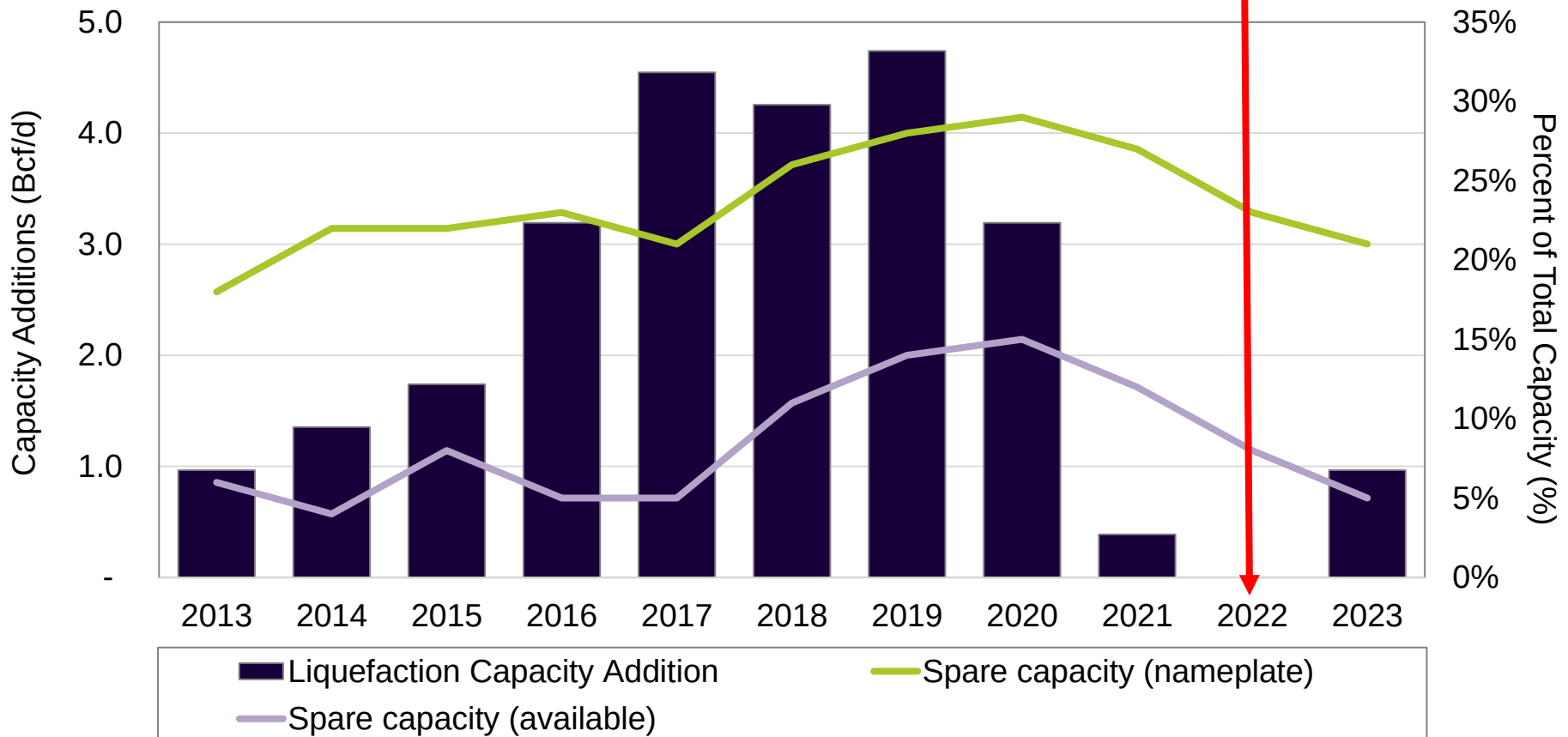
World LNG trade volumes.

World LNG trade volumes have increased at an **average annual rate of seven percent over the last 18 years** and have increased **73 percent over the last 10 years.**



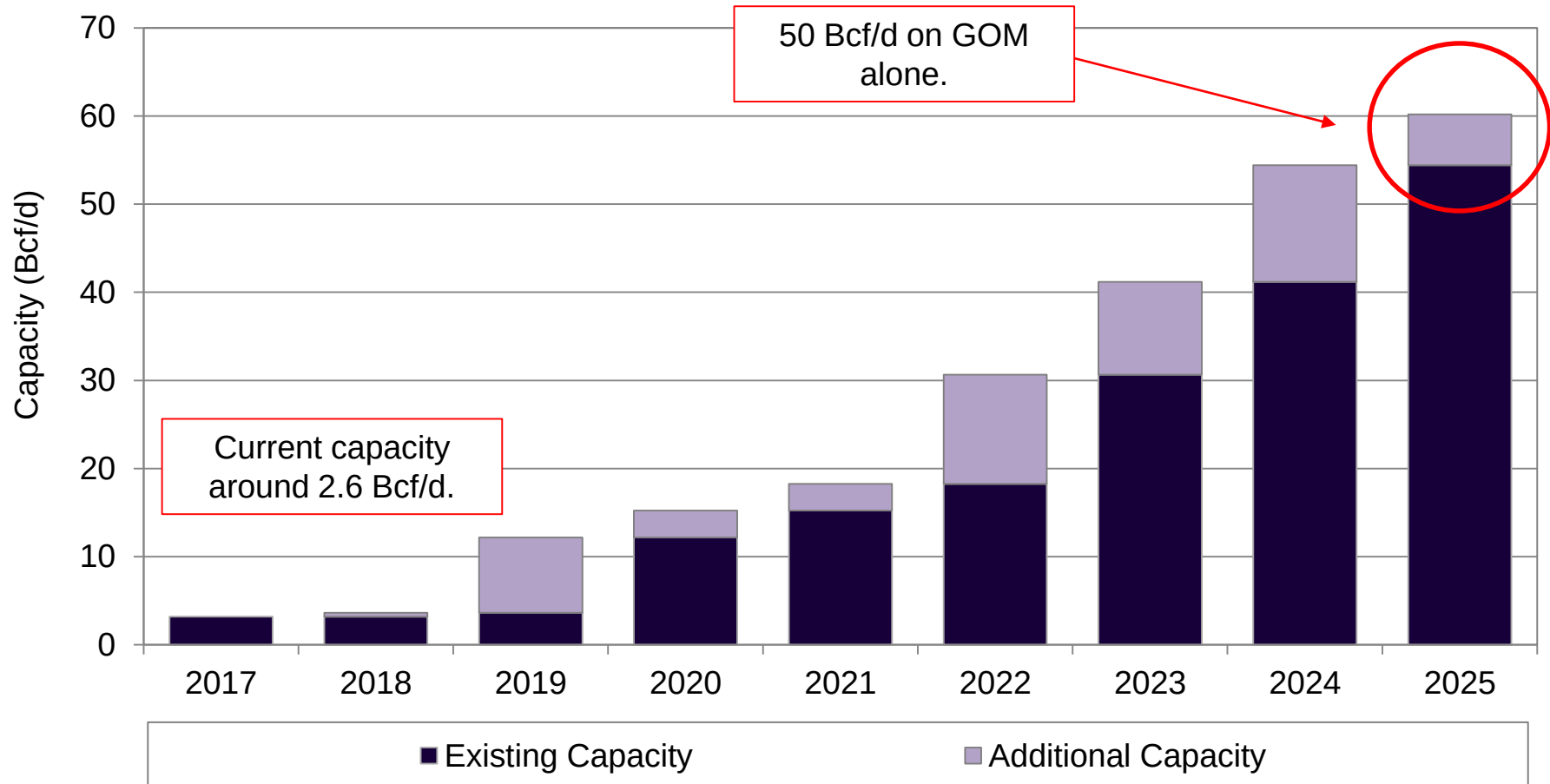
LNG liquefaction capacity additions.

Excess capacity facilitating considerable competition – “nirvana” (for developers) is anticipated to arrive around **2021-2022** as capacity tightens and it becomes sellers’ market.



U.S. LNG capacity development outlook.

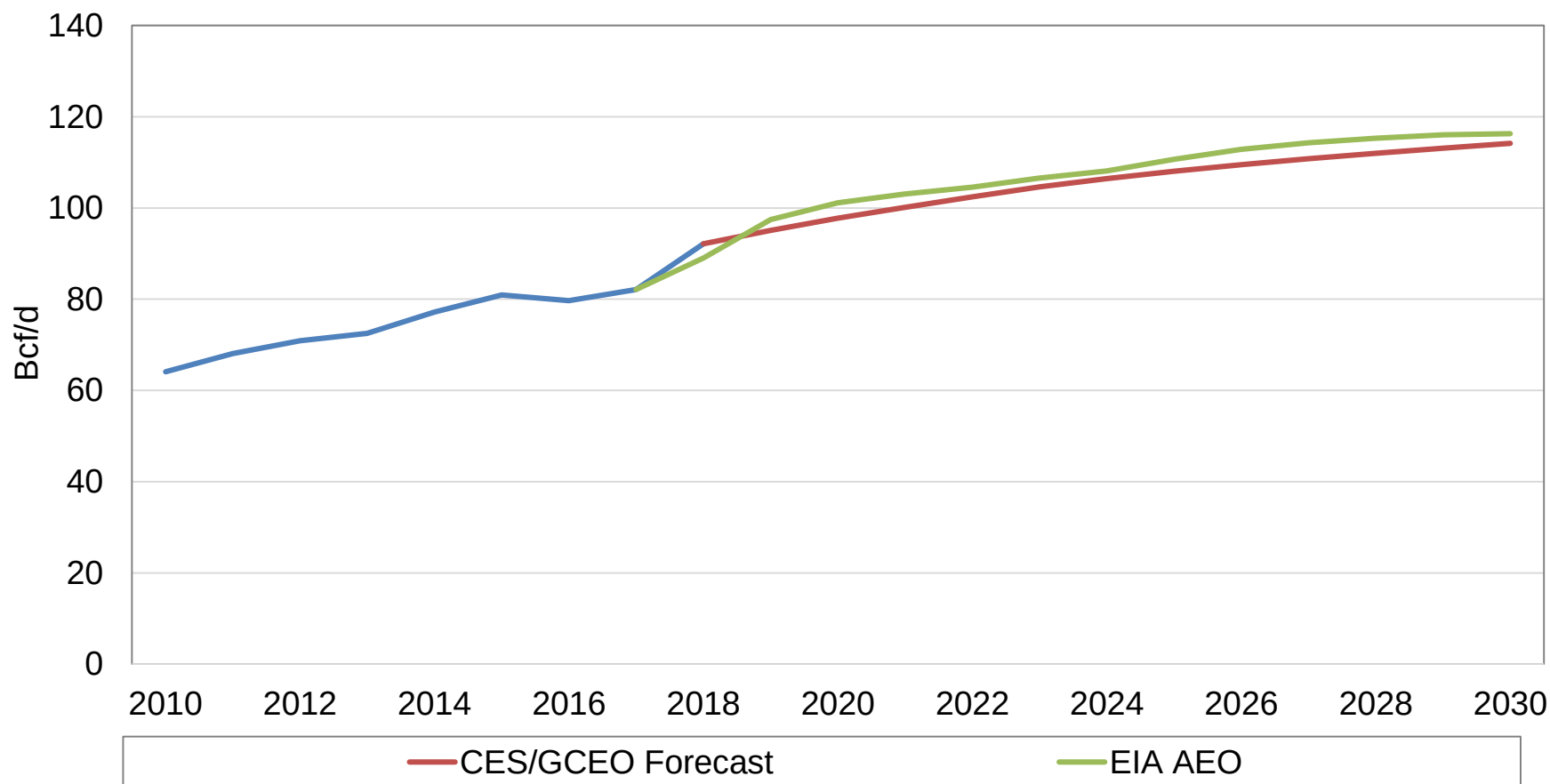
If all of the LNG applications currently filed with the Department of Energy were to come online, U.S. liquefaction capacity would exceed 60 Bcf per day by 2025.



Market outlook

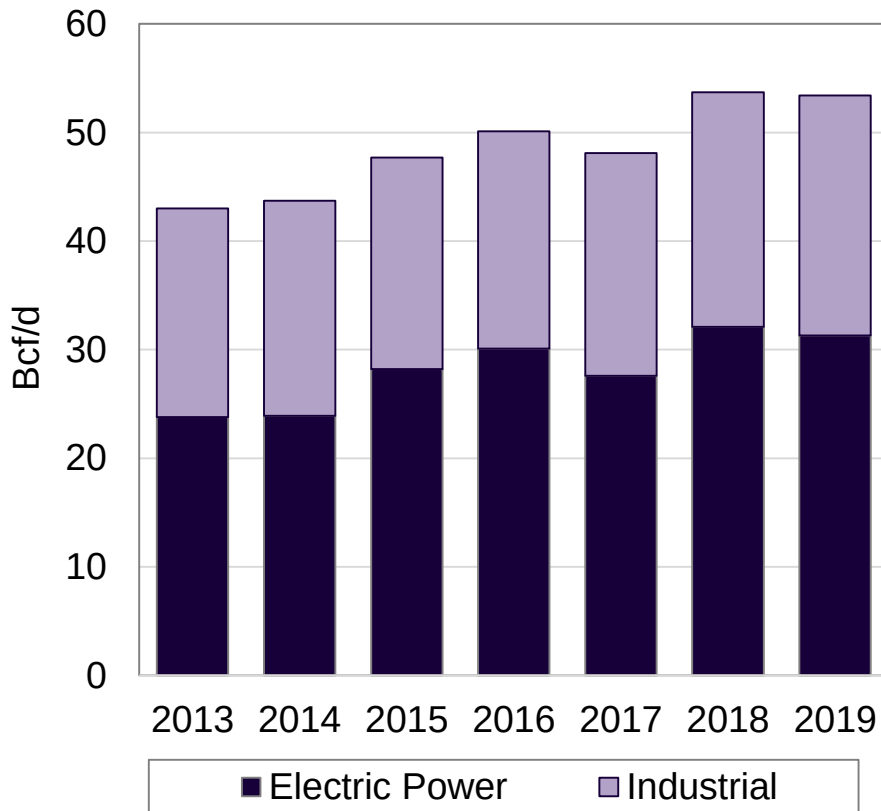
Natural gas supply outlook.

CES/GCEO anticipates natural gas production to increase at an average annual rate of 1.8 percent; EIA is forecasting 2.3 percent.

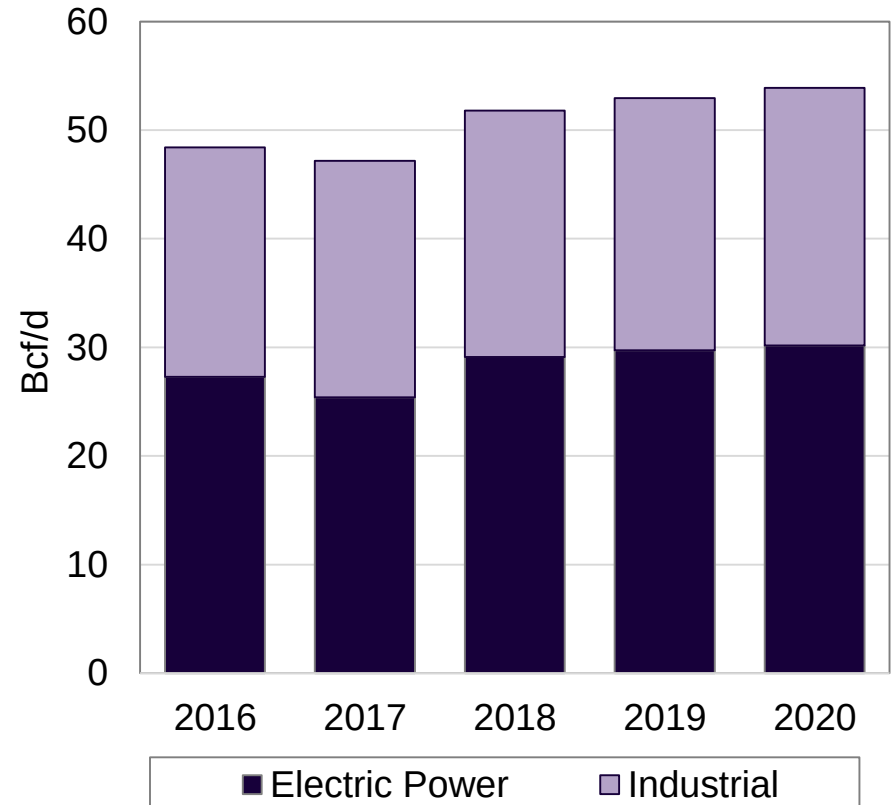


Natural gas demand trends (by customer class).

The NGSA anticipates **summer 2019 demand to be slightly lower than last year**, but still significantly higher than recent years.

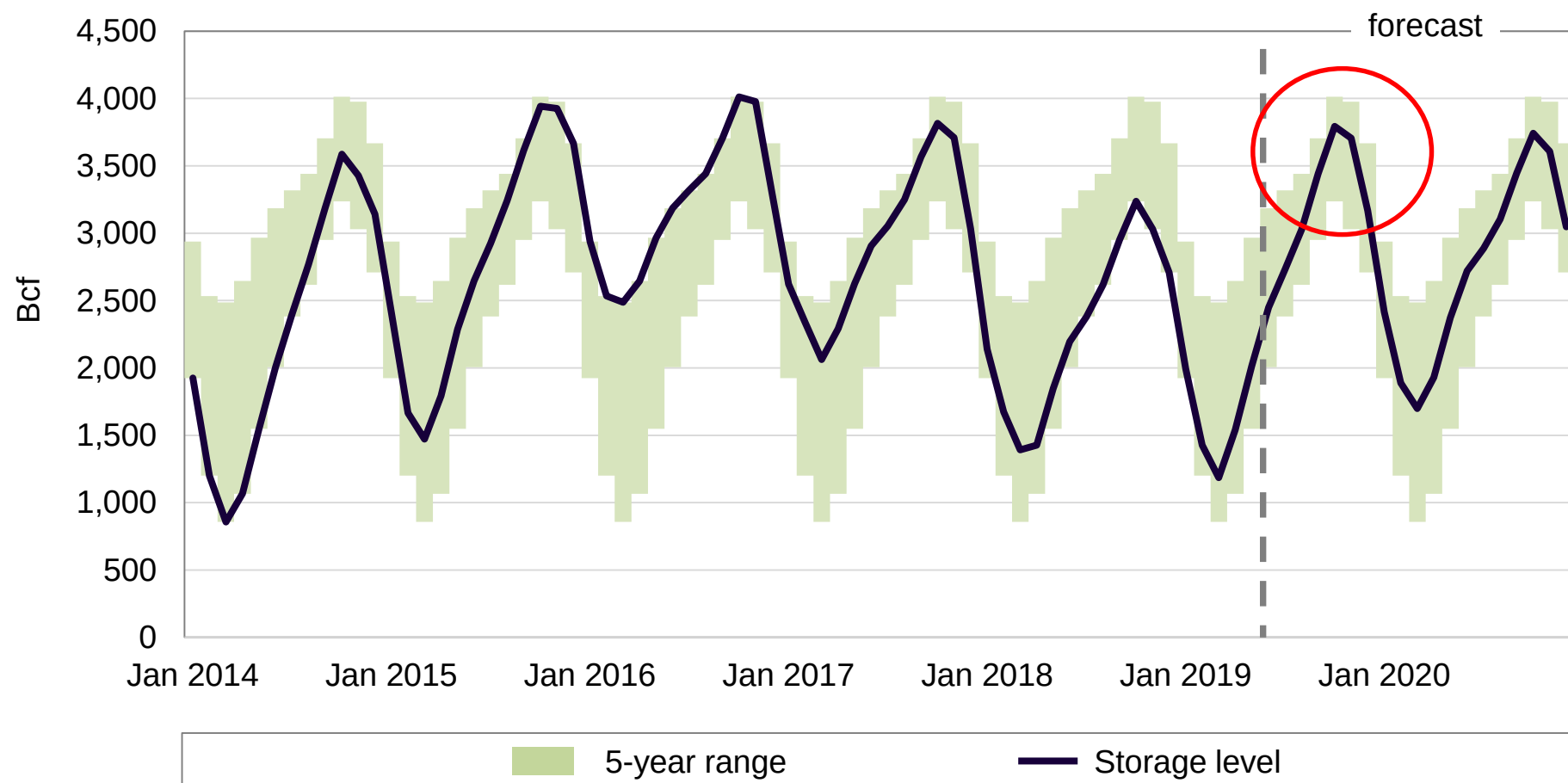


EIA is expecting a **two percent increase in electric power and industrial demand (2019-2020)**; and an 11 percent overall increase since 2016.



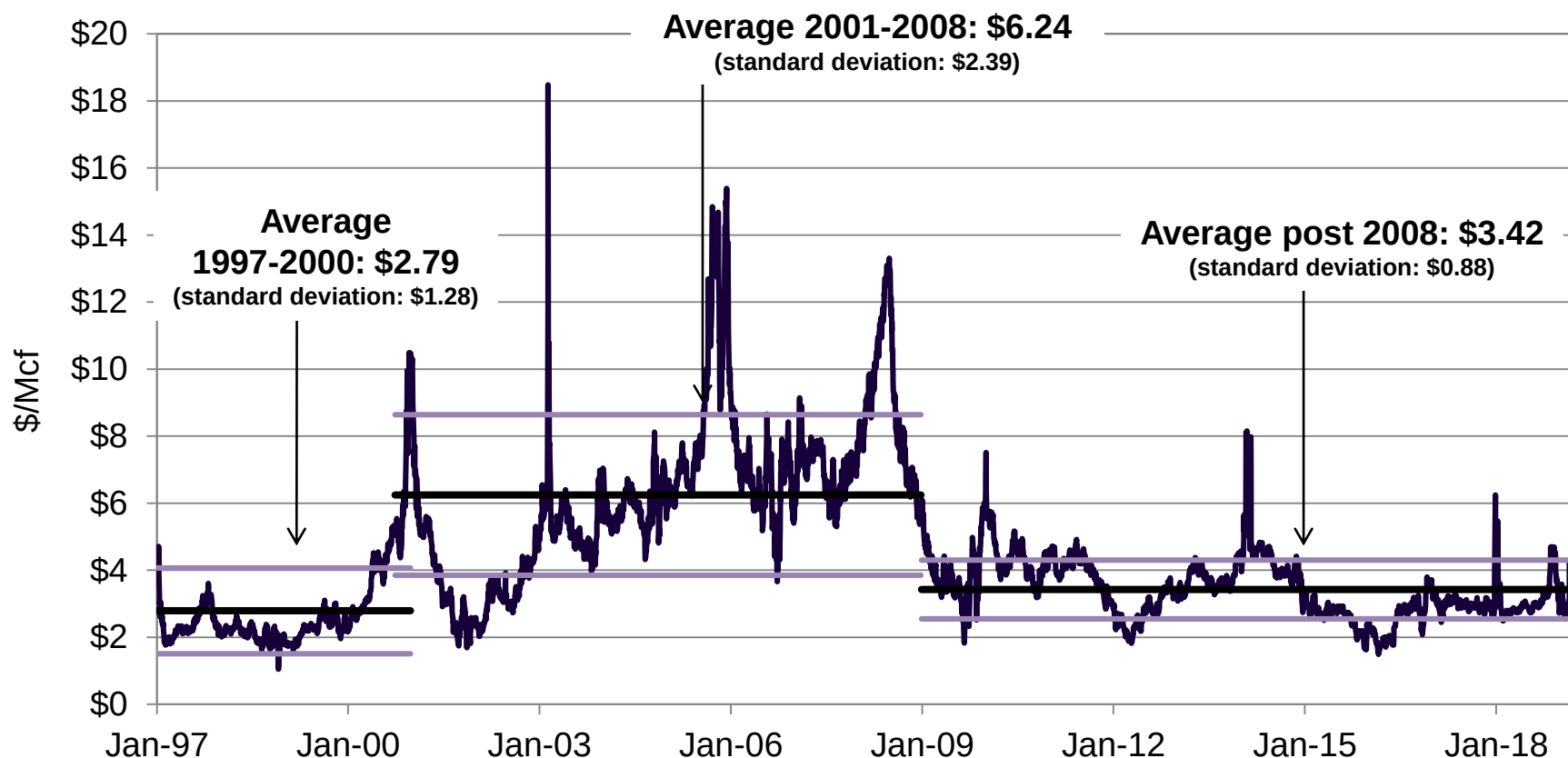
Natural gas storage outlook.

Natural gas storage injections are anticipated to **will outpace recent averages and reach 3.8 Tcf** at the end of October, which would be **15 percent higher than October 2018 levels.**



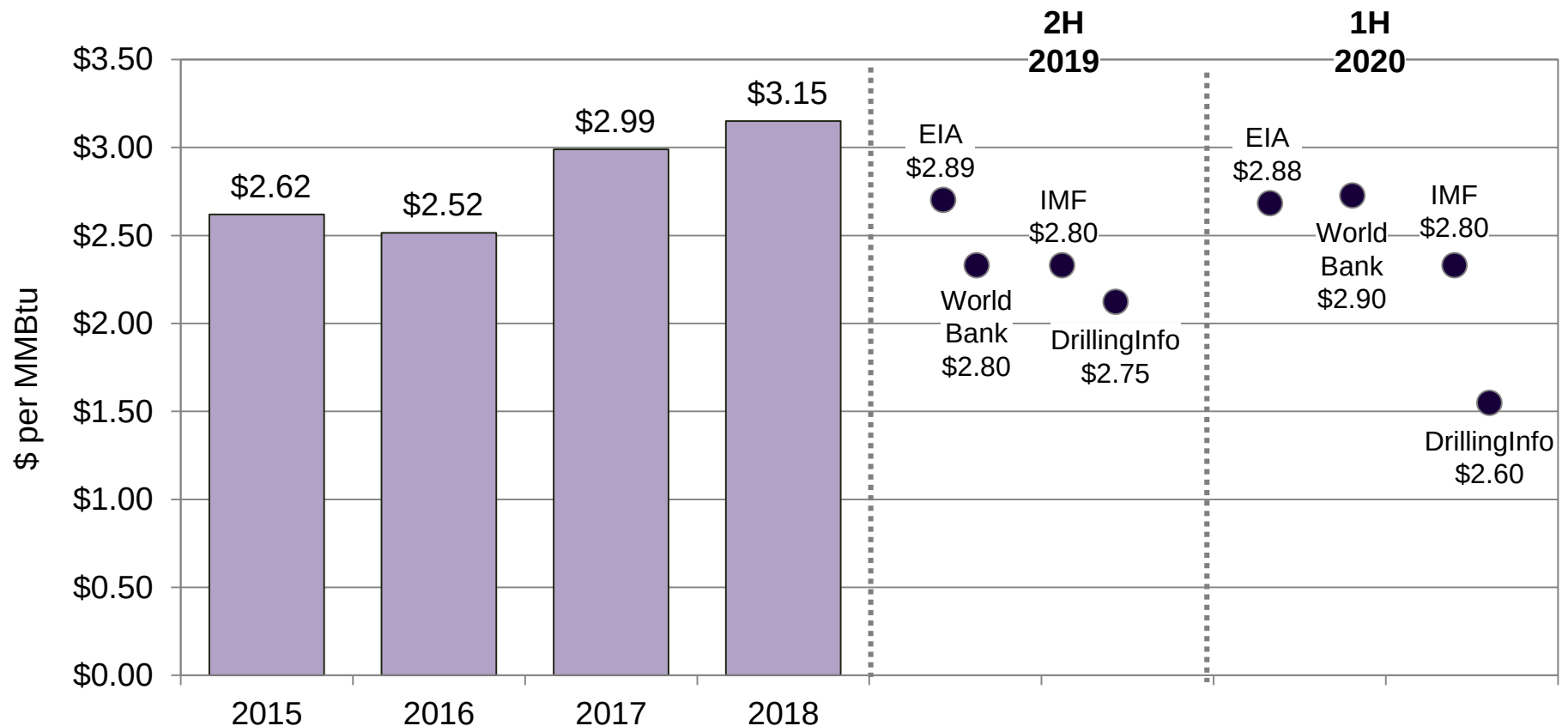
Natural gas price trends.

Natural gas price reductions (and reductions in volatility) are the direct result of unconventional oil and gas development.



Natural gas price outlook.

Natural gas prices are **expected to drop below \$3 per MMBtu** for the foreseeable future.



Conclusions

Conclusions.

- Market continues to be **well-supplied** – likely to be record production year.
- Supplies are entirely **dominated by unconventional resources**, considerable supplies coming from **associated gas**.
- Continued strong **interactions between global oil markets and natural gas** due to the drilling relationships and export opportunities.
- Power generation, industrial demand will be the key market drivers on demand side. Continues concerns about **global economic weakness**; U.S. activity cool down will impact **industrial natural gas demand**, particularly chemicals.
- **LNG exports** will continue to **grow at slow and measured pace**, considerable global competition in near term, excess capacity.
- **Overall prices are low, volatility down**, likely to have record injections to go into heating season well supplied.

Questions, comments and discussion.



David E. Dismukes

Professor and Executive Director

Center for Energy Studies

Email: dismukes@lsu.edu

Phone: 225-578-4343

URL: www.enrg.lsu.edu