



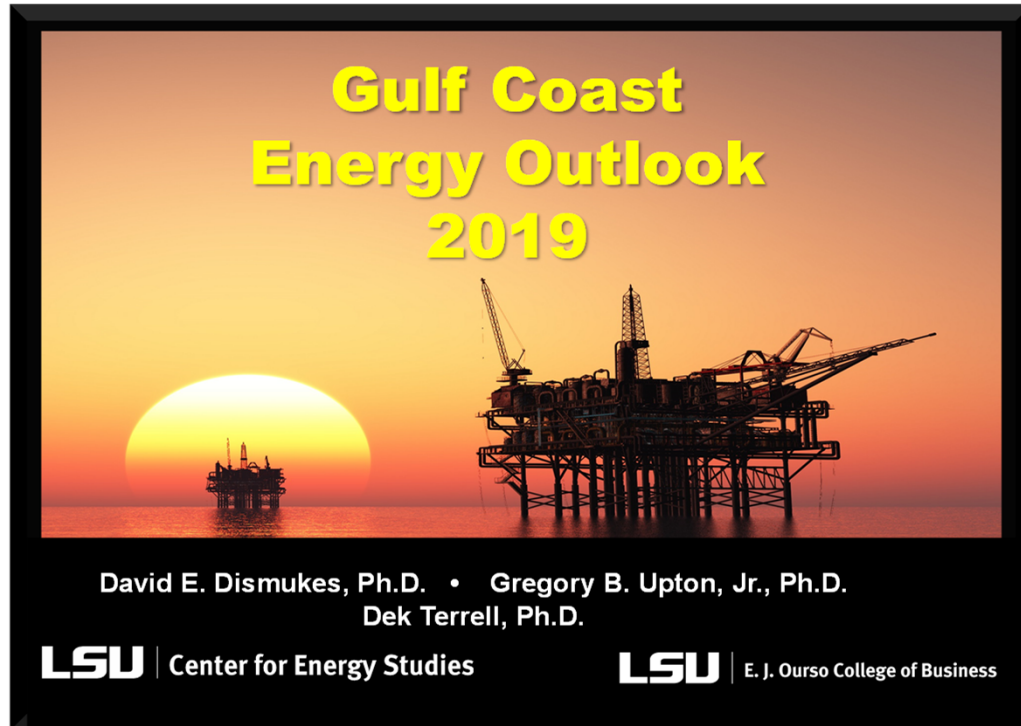
Gulf Coast Energy Outlook 2019: Regional trends and outlook.

*Women's Energy Network – Louisiana Chapter, Monthly Luncheon,
Baton Rouge, LA, April 23, 2019.*

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

2019 Gulf Coast Energy Outlook

Presentation is based upon materials from recent 2019 GCEO.



Gold



Silver



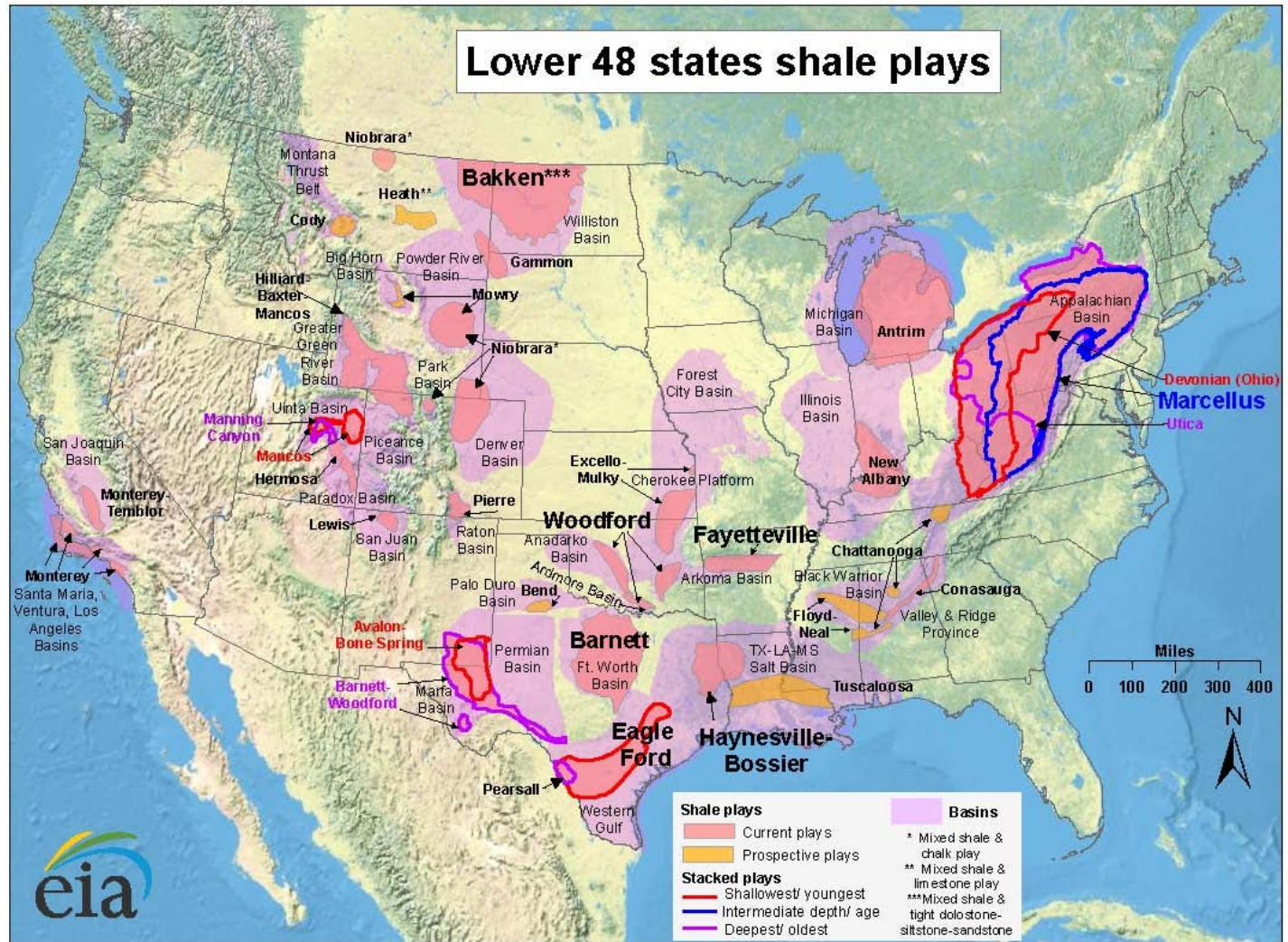
Bronze



Crude oil and natural gas

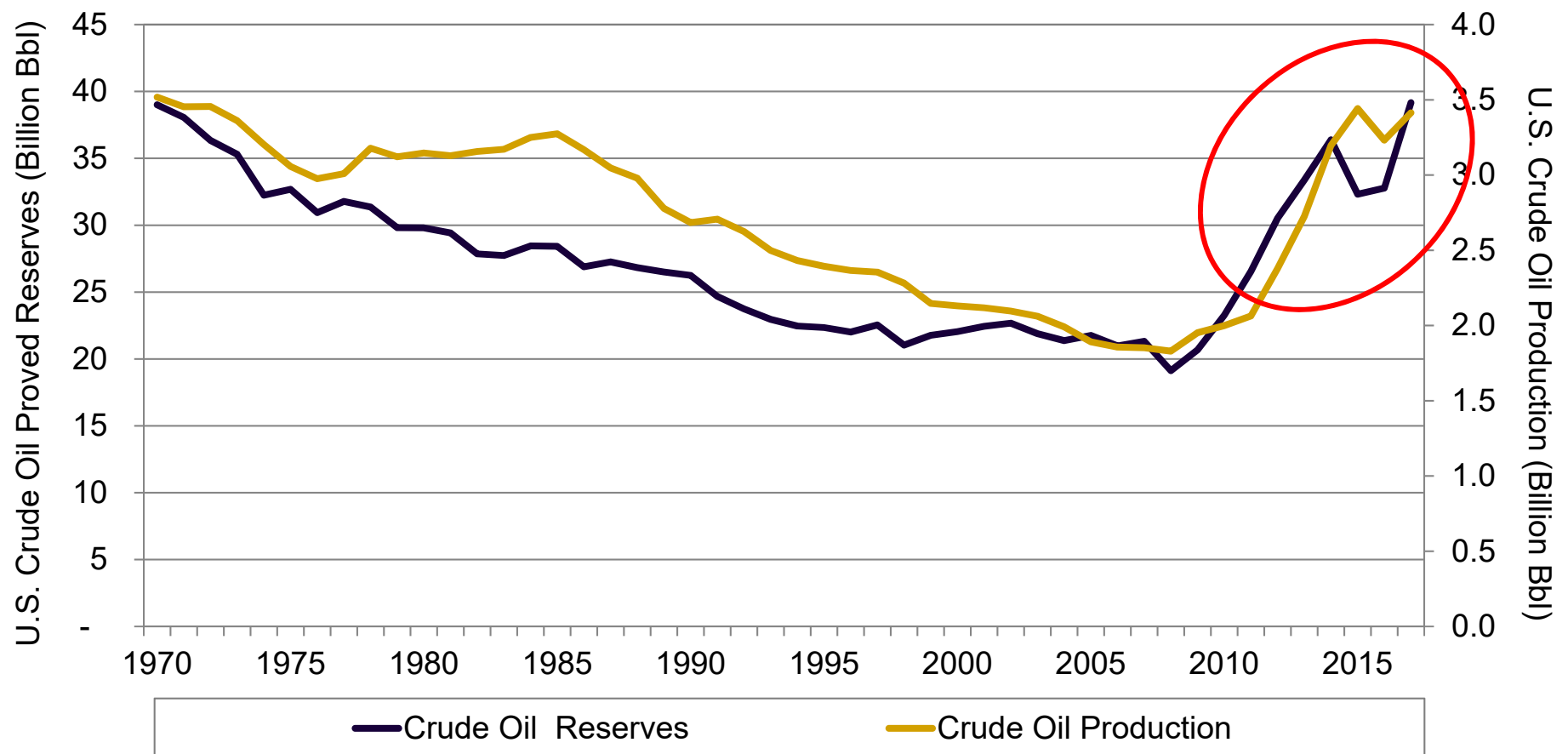
Domestic shale gas basins and plays.

U.S. unconventional production from shale plays has unleashed a considerable level of domestic energy production. This production, however, is arising in new areas, leading to a number of market, infrastructure, and institutional changes.



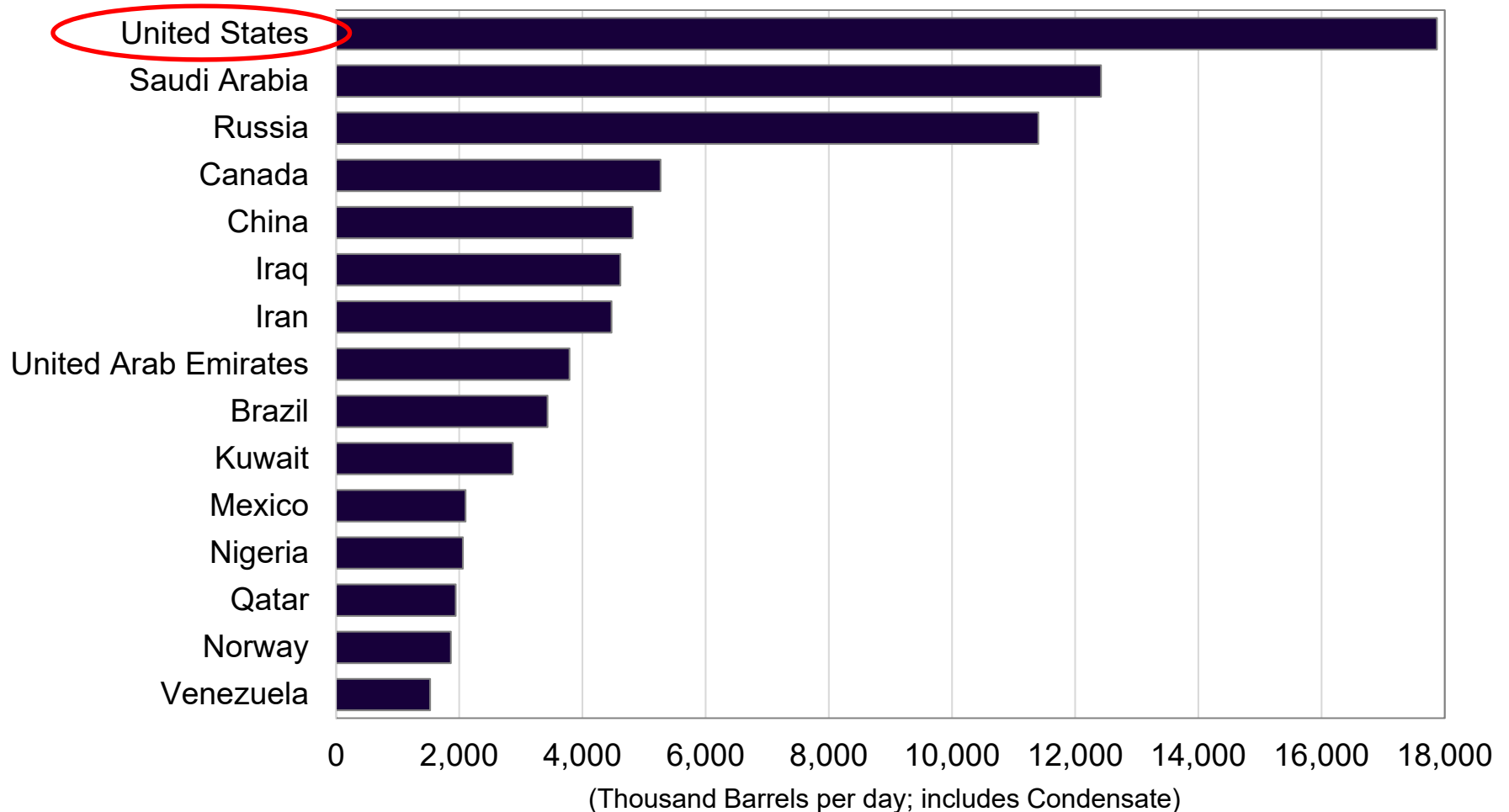
Changes in crude oil reserves and production.

Crude oil production and reserves are climbing back to levels **not seen since the early 1980s (reserves)**. Creates **new domestic resource opportunities** for U.S. refineries.



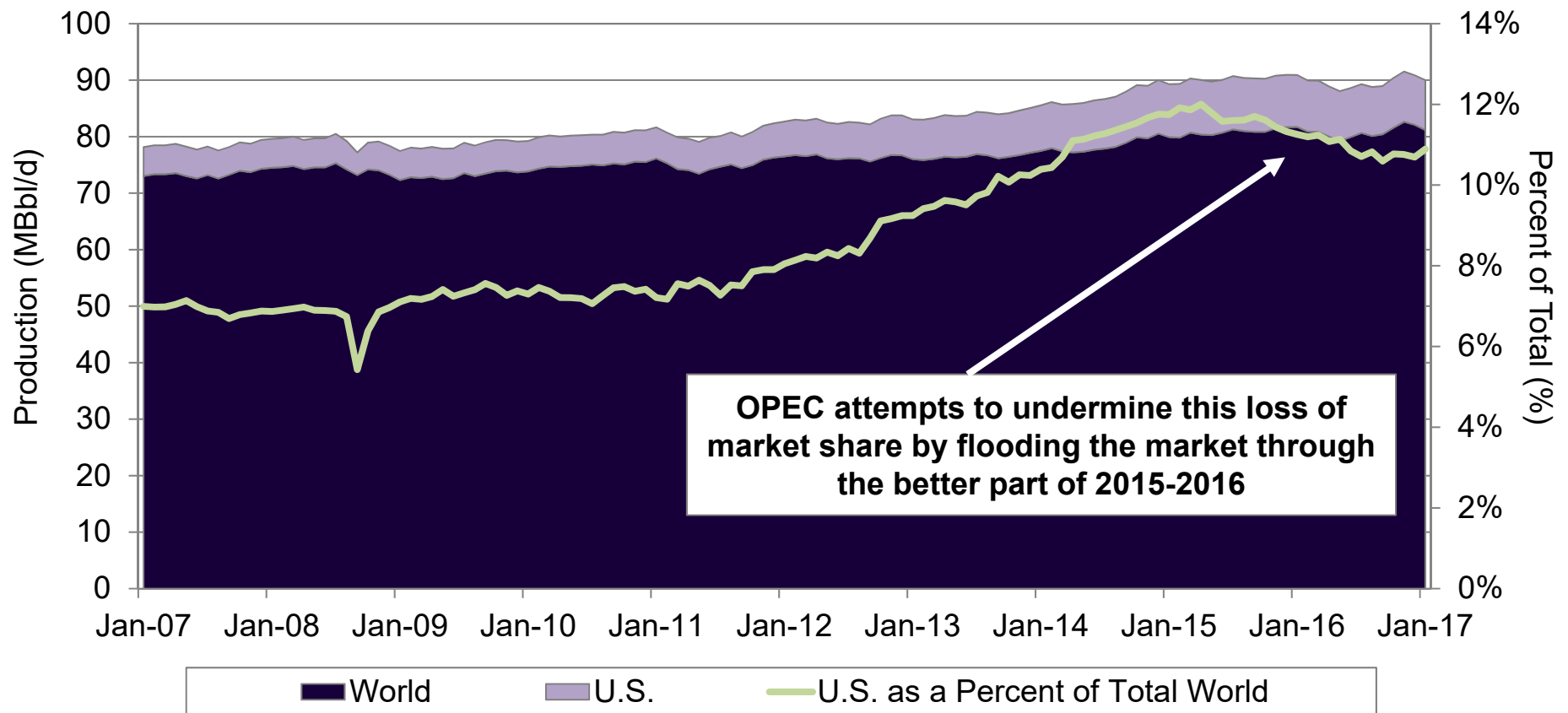
World crude oil production (2018).

The U.S. is now the largest producer of crude oil (2018).



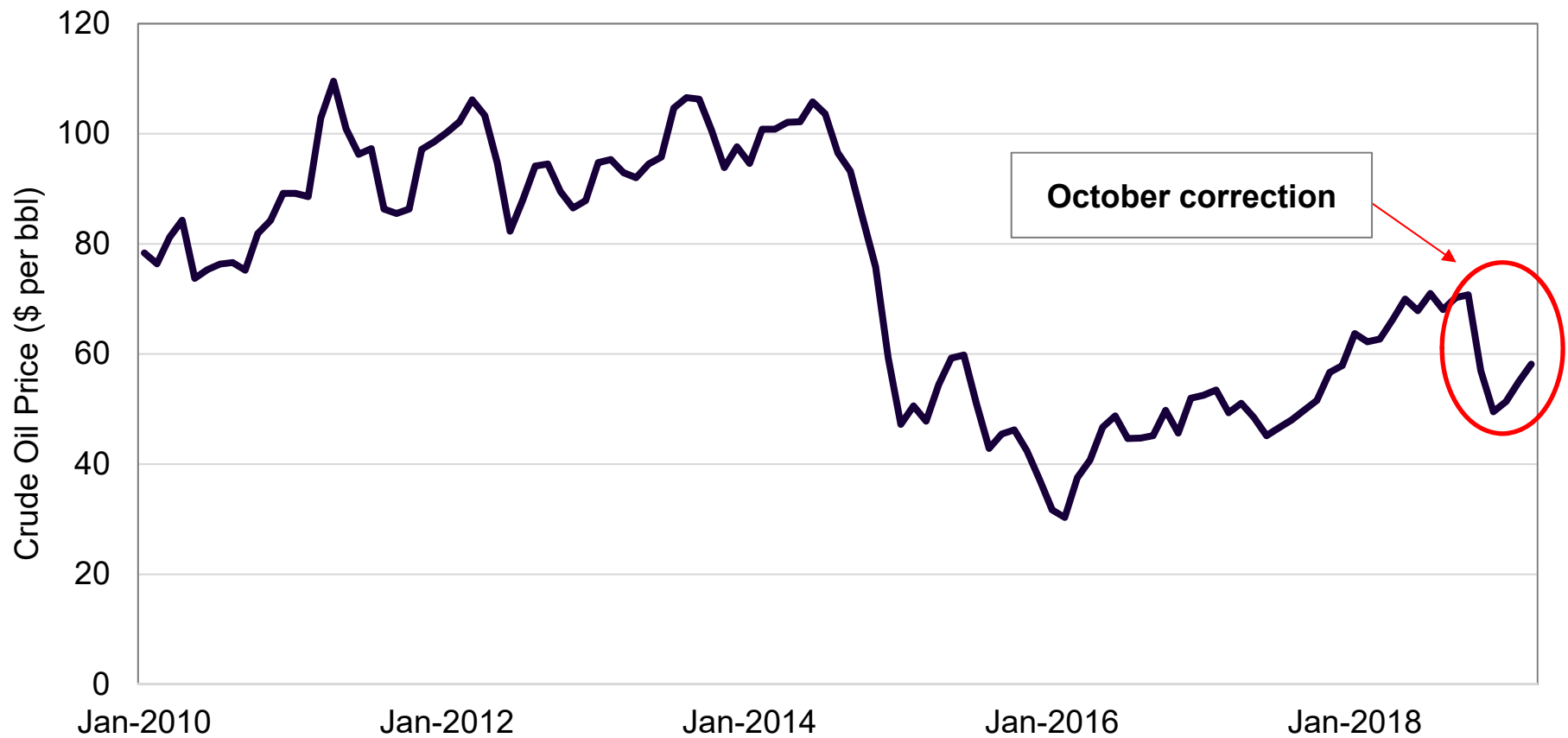
Monthly global and U.S. crude oil production.

In the last ten years, global crude oil production has increased at an average annual rate of 1.3 percent. The U.S. share has increased from seven percent to around 14 percent.



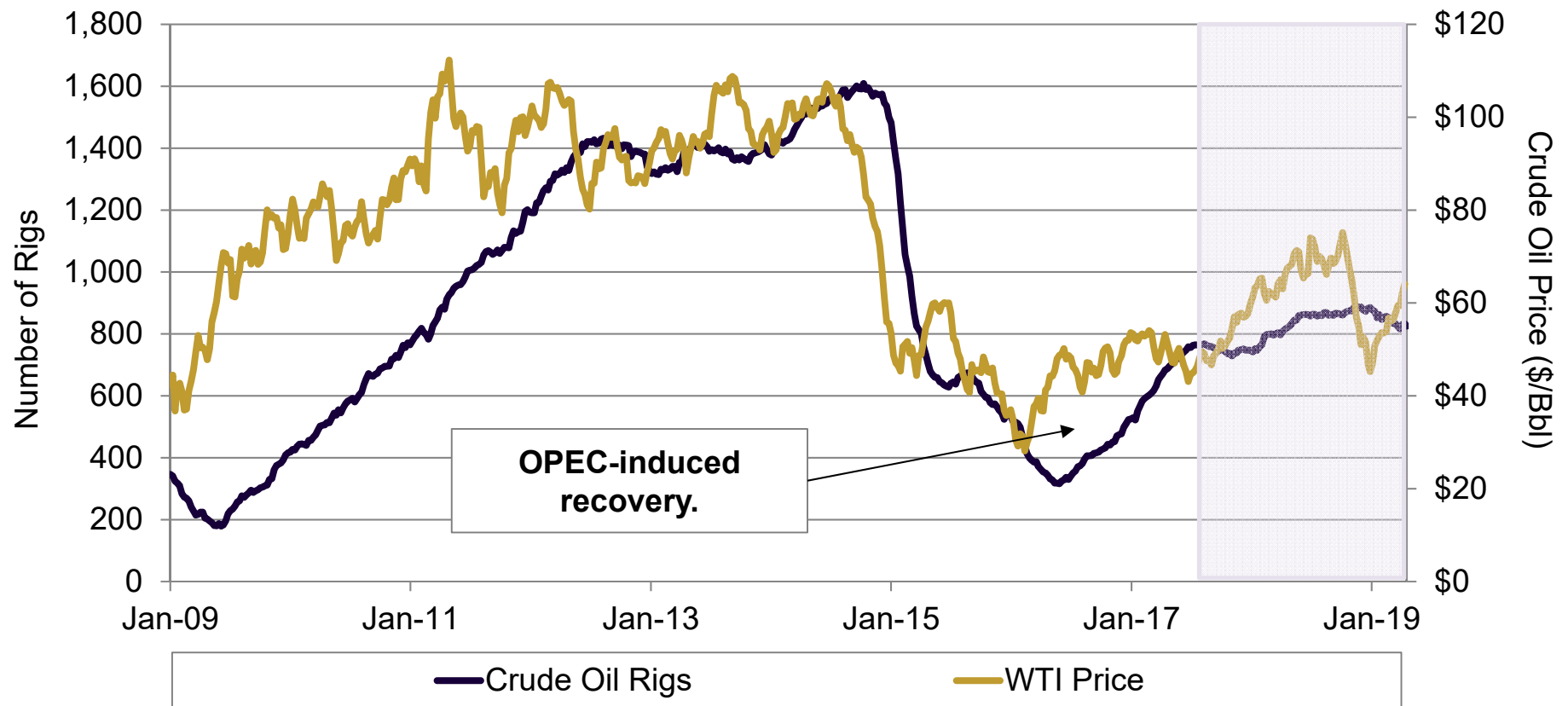
U.S. crude oil prices.

U.S. crude oil prices fell over 70 percent from over \$100/bbl to around \$35/bbl (June 2014 to February 2016). Recovery cut back about half of that difference.



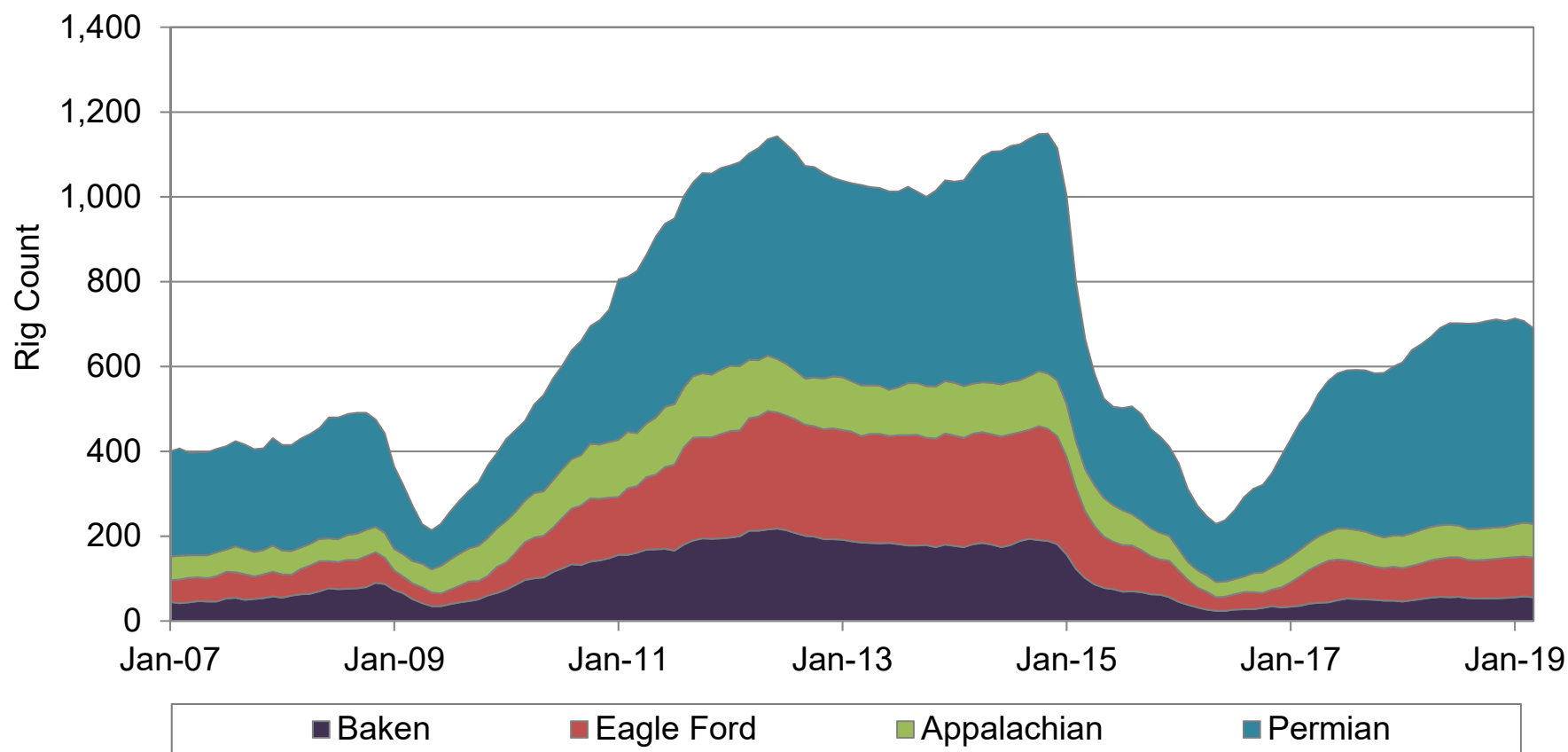
U.S. crude oil prices and rig count.

Price/rig price responsiveness is weakening considerably since mid-year 2017 (shaded area).



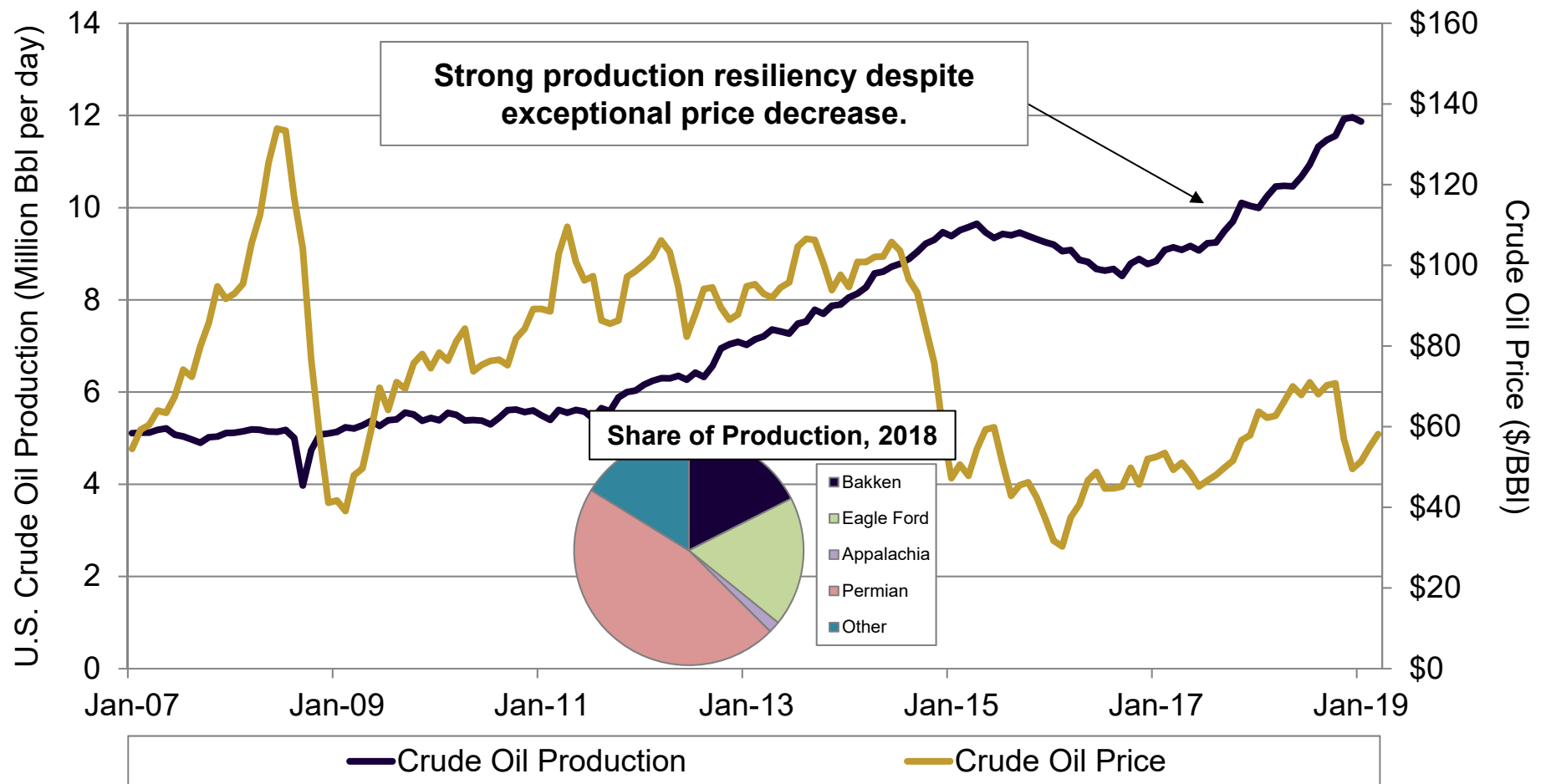
Monthly U.S. horizontal drilling rig activity (per major basin).

Horizontal rig activity increased by 400 percent to 2015 but fell by over half during the ensuing price collapse. Current rebound is highly concentrated in the Permian basin.



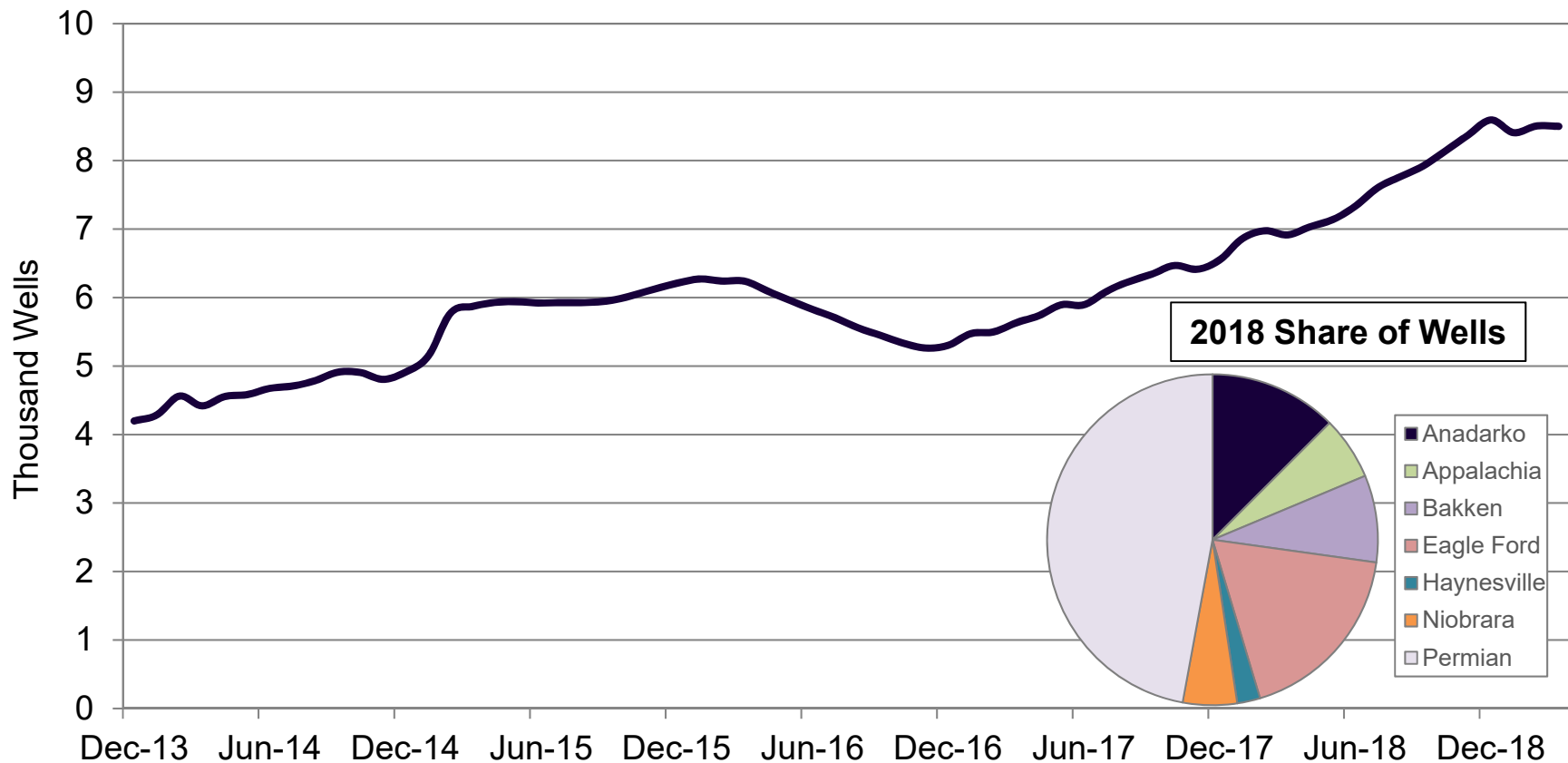
Monthly U.S. crude oil production.

U.S. crude oil production volumes are up by over 100 percent relative to historic trends. While production was down, it is still resilient and strong.

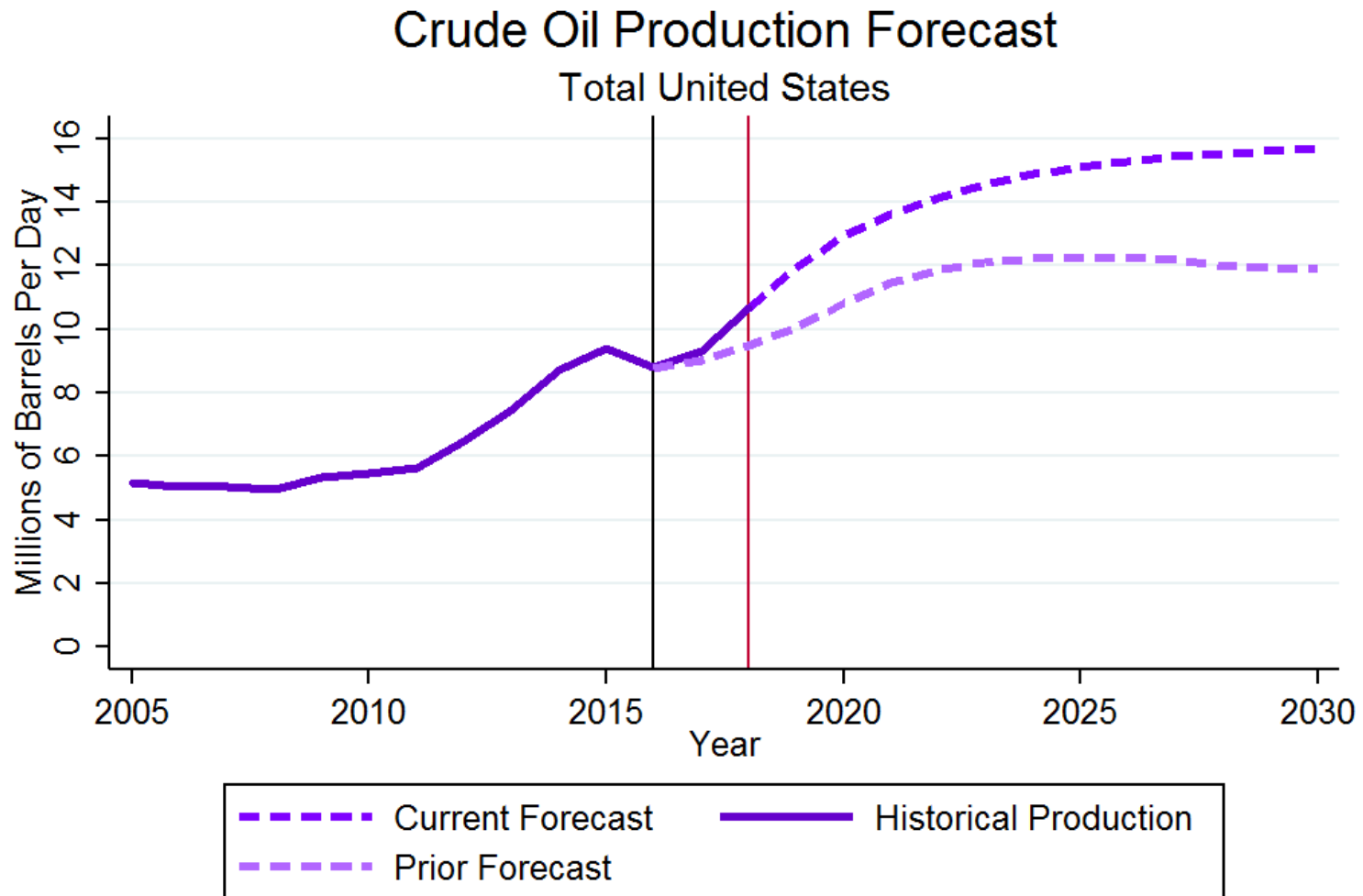


Monthly drilled but uncompleted wells.

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

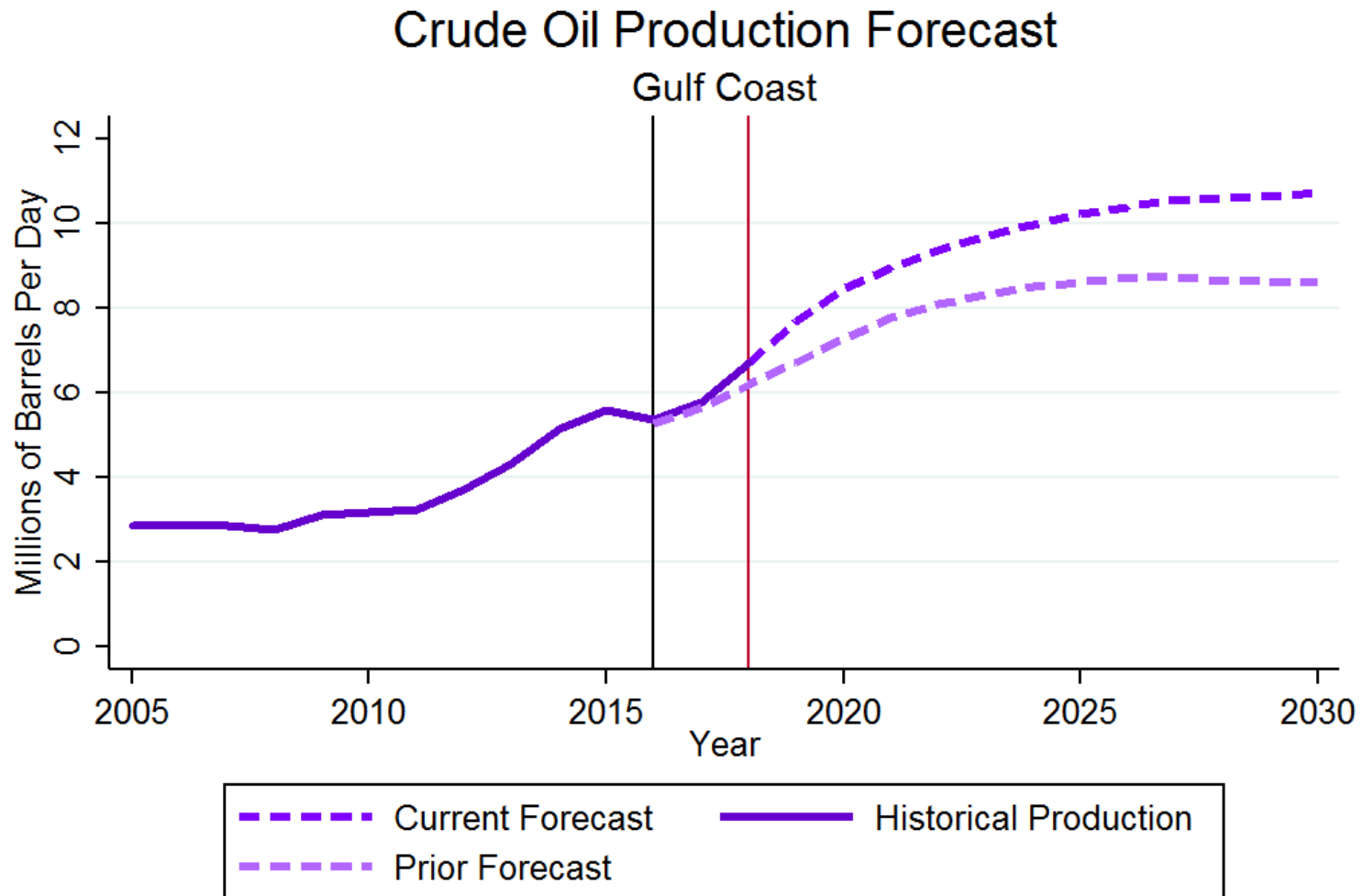


Forecast performance.



Forecasts based on DrillingInfo Prodcast.

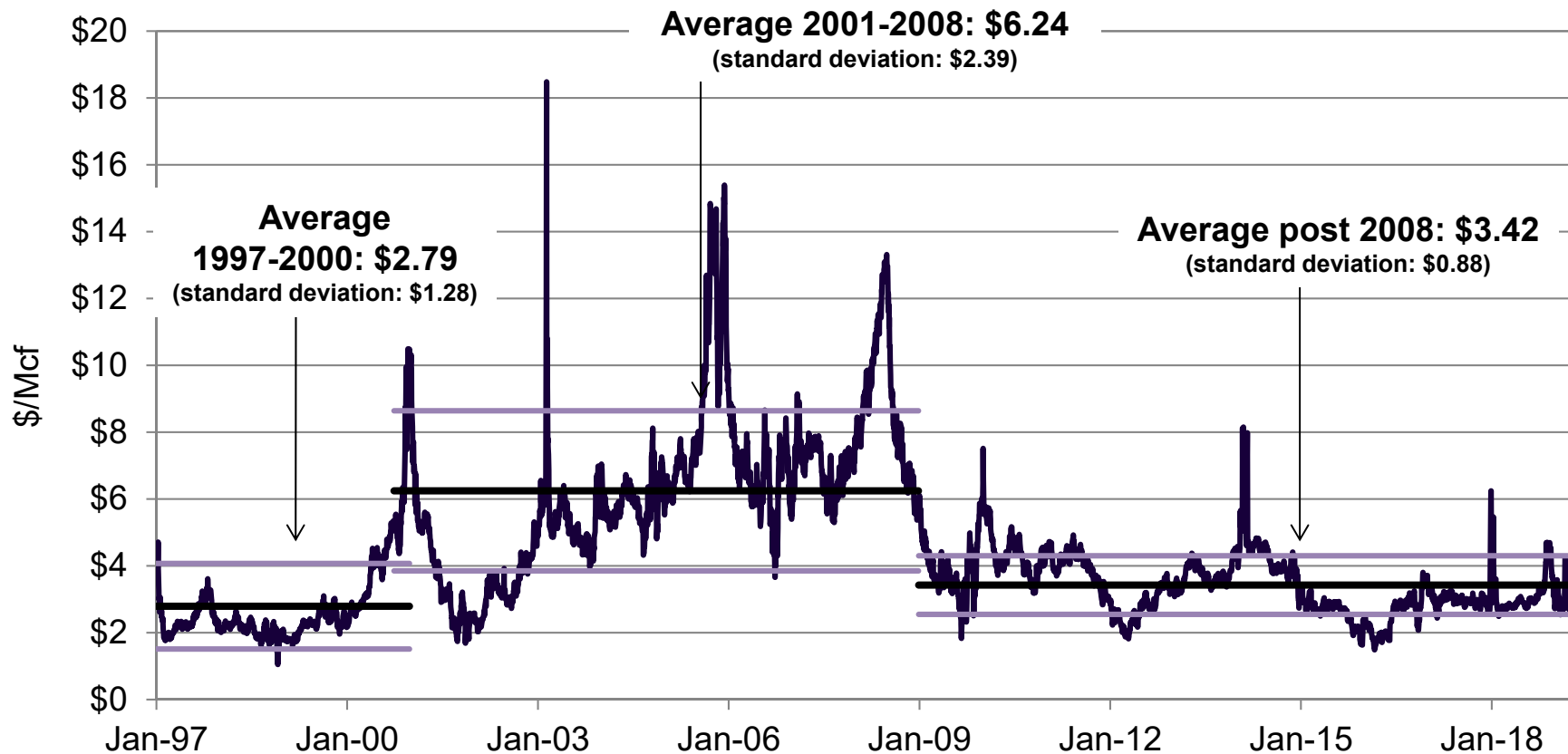
Forecast performance.



Forecasts based on DrillingInfo Prodcast.

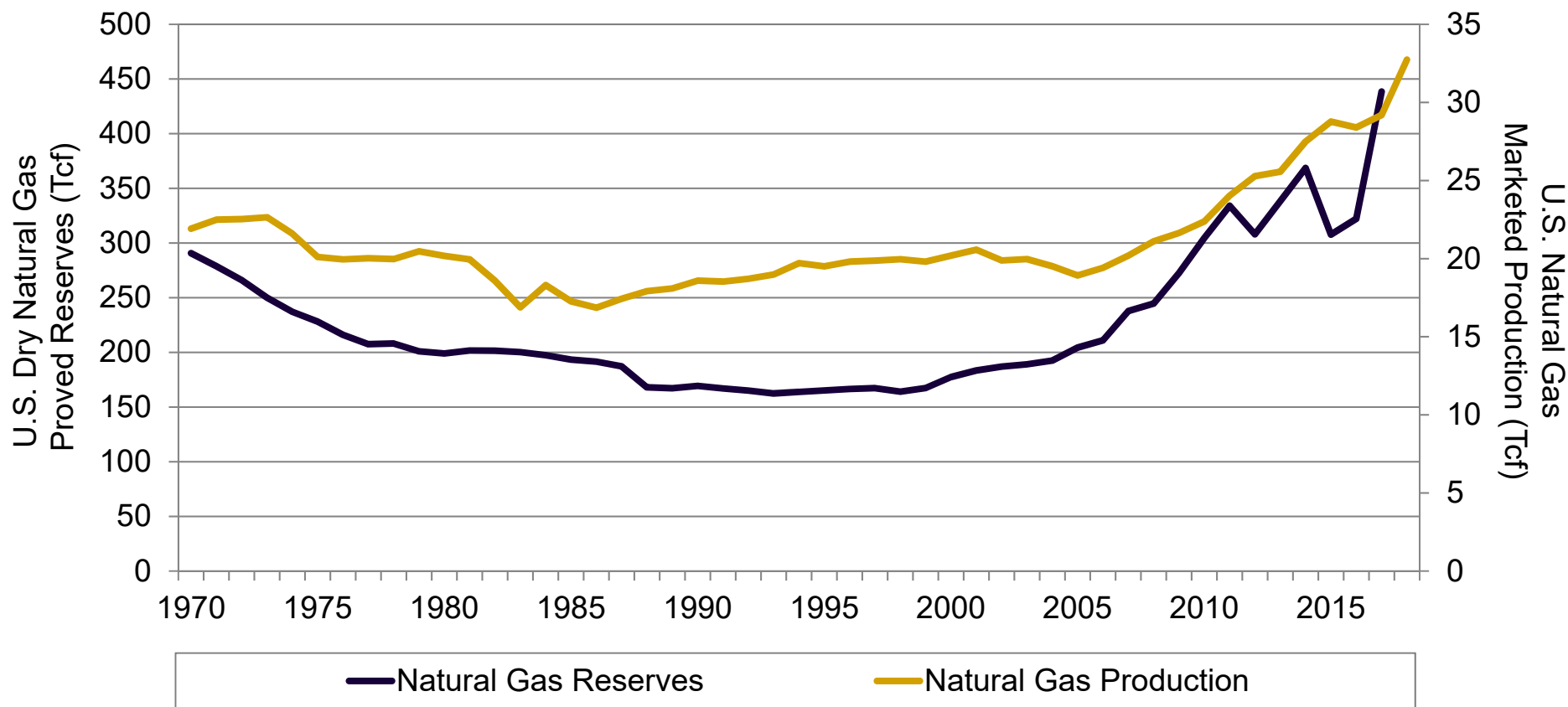
Natural gas price trends.

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



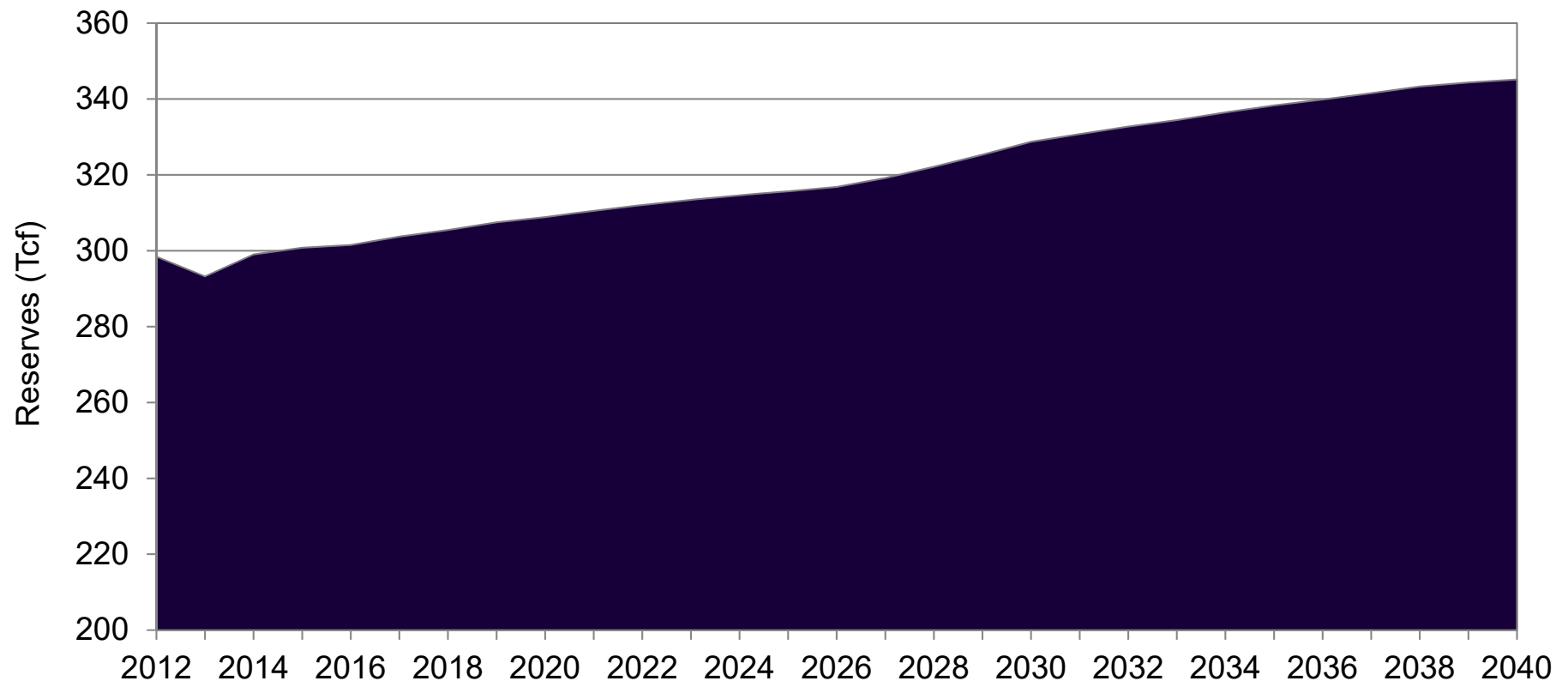
Changes in reserves and production.

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.



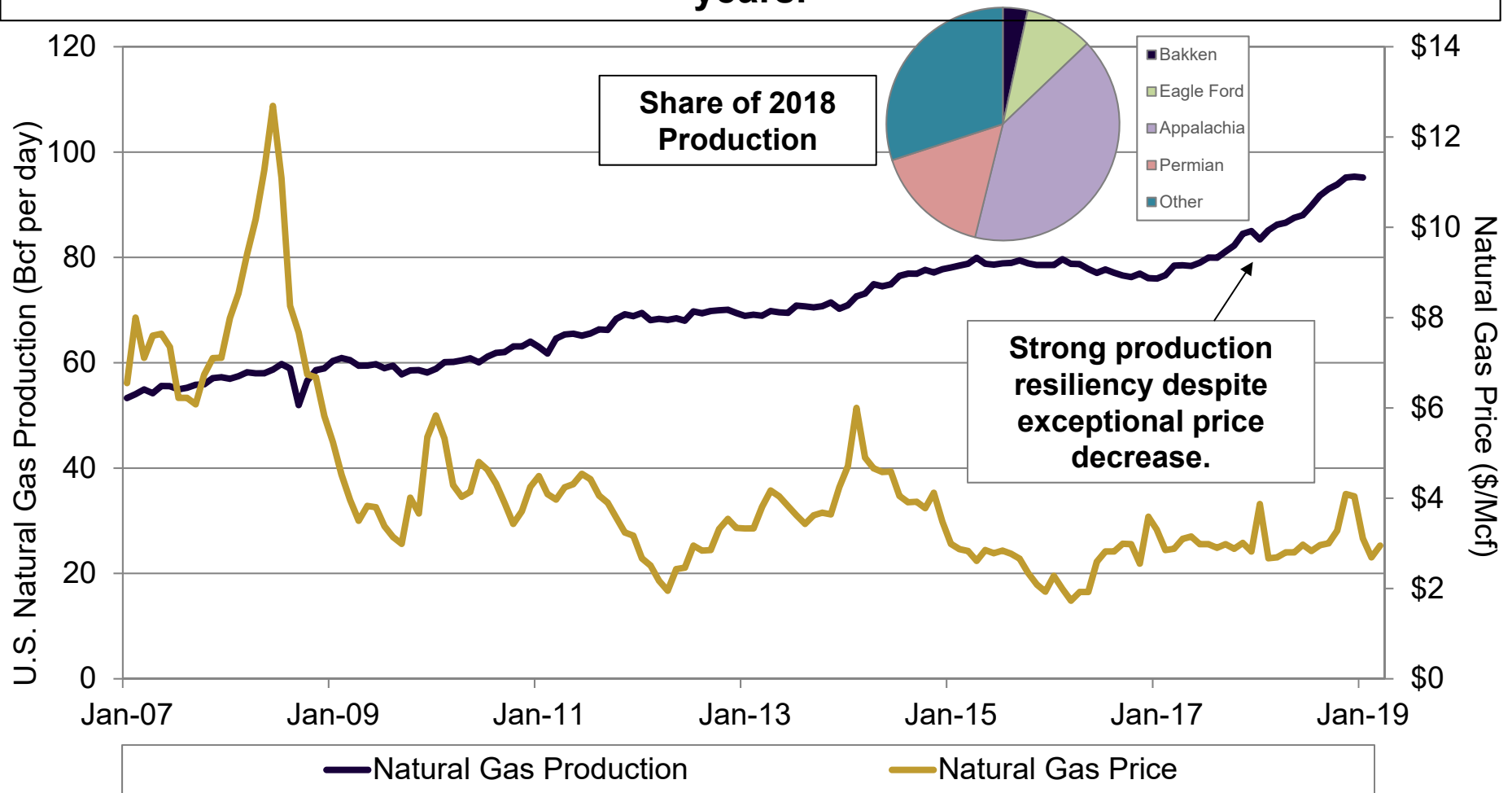
Annual Energy Outlook, natural gas reserves.

Unconventional resources are not a “flash in the pan” and are anticipated to continue to increase over the next two decades or more.

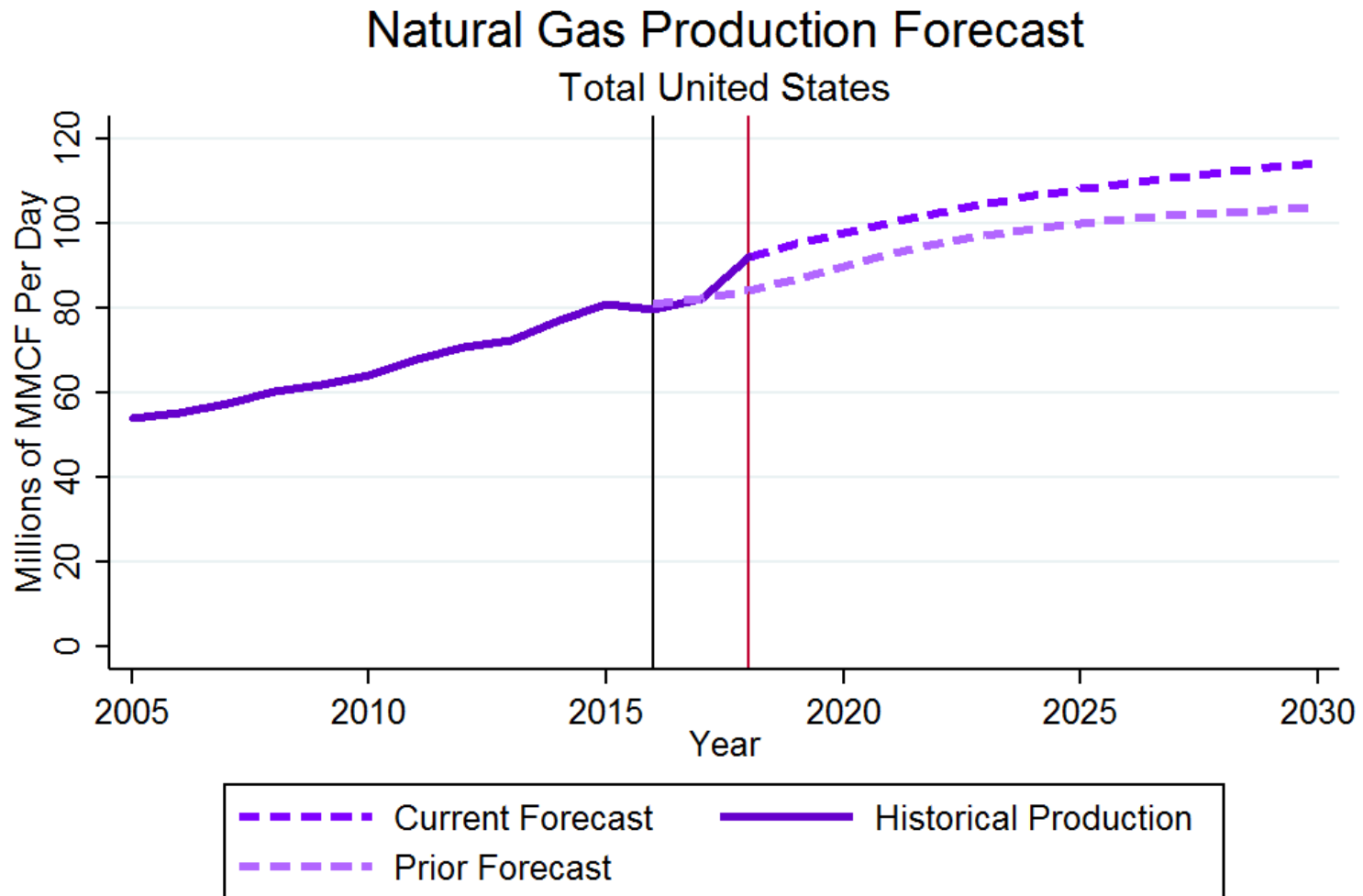


Monthly U.S. natural gas production.

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

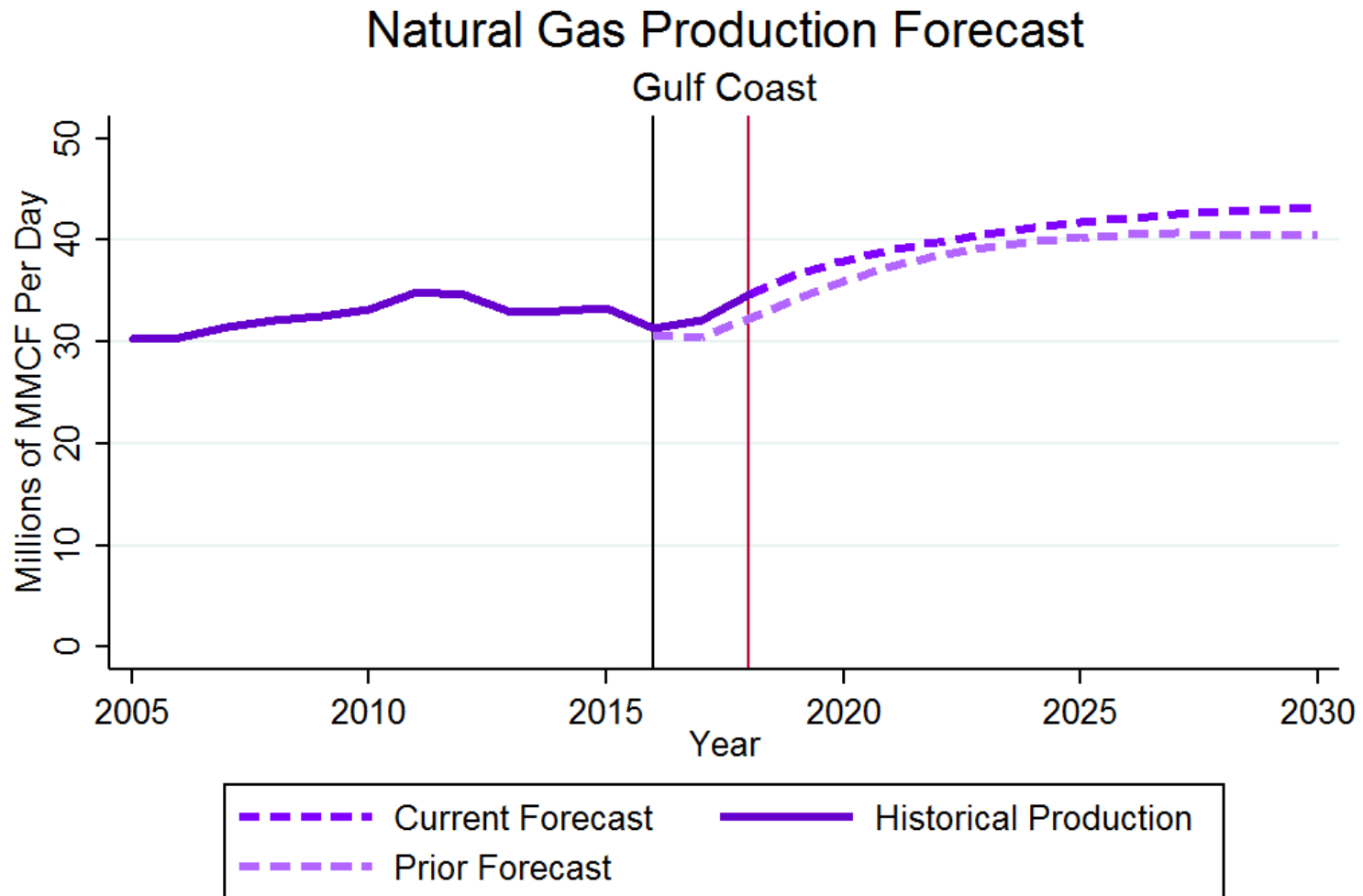


Forecast performance.



Forecasts based on DrillingInfo Prodcast.

Forecast performance.

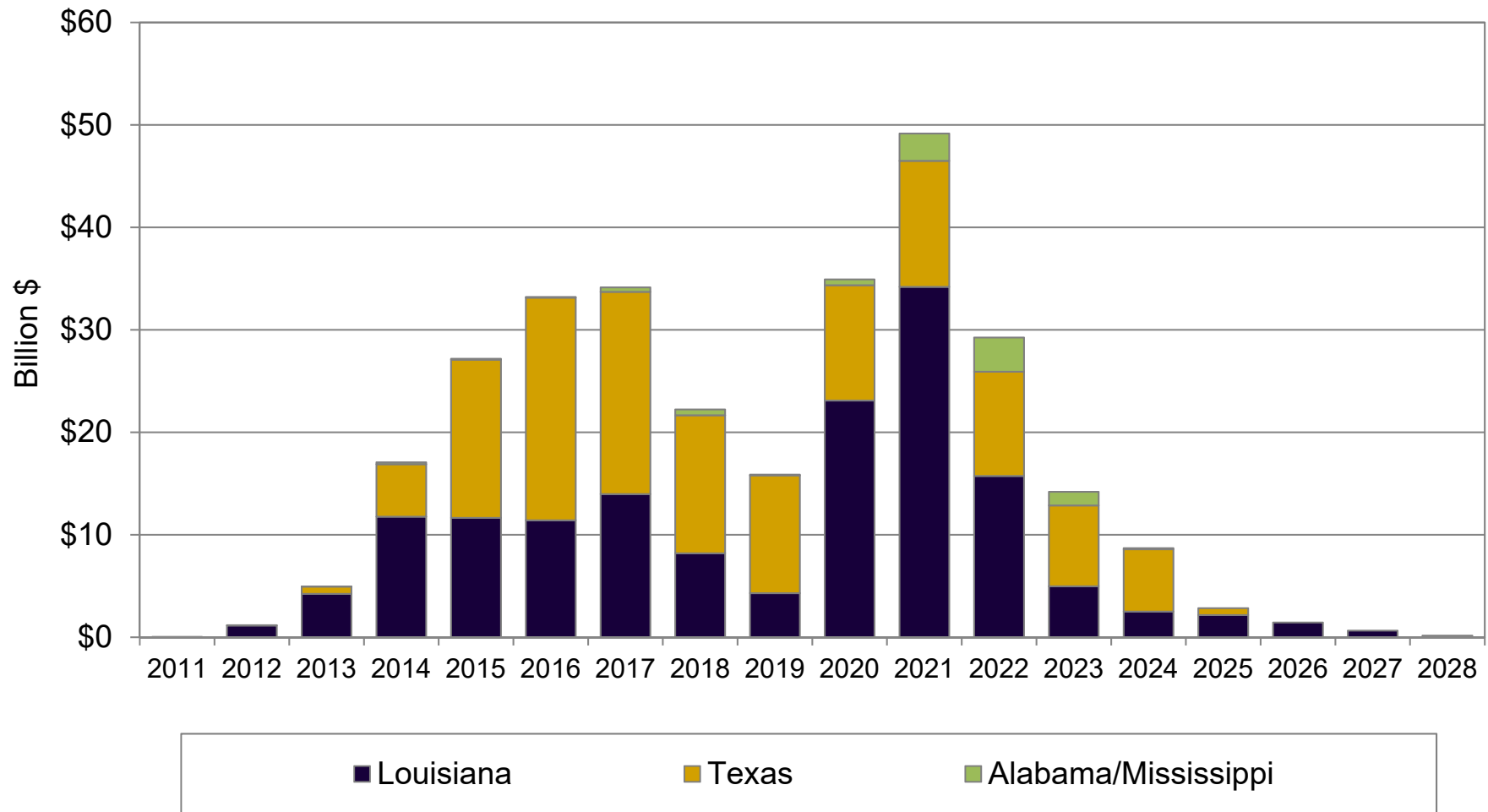


Forecasts based on DrillingInfo Prodcast.

Energy infrastructure

Gulf of Mexico region – energy manufacturing capital expenditures (by state).

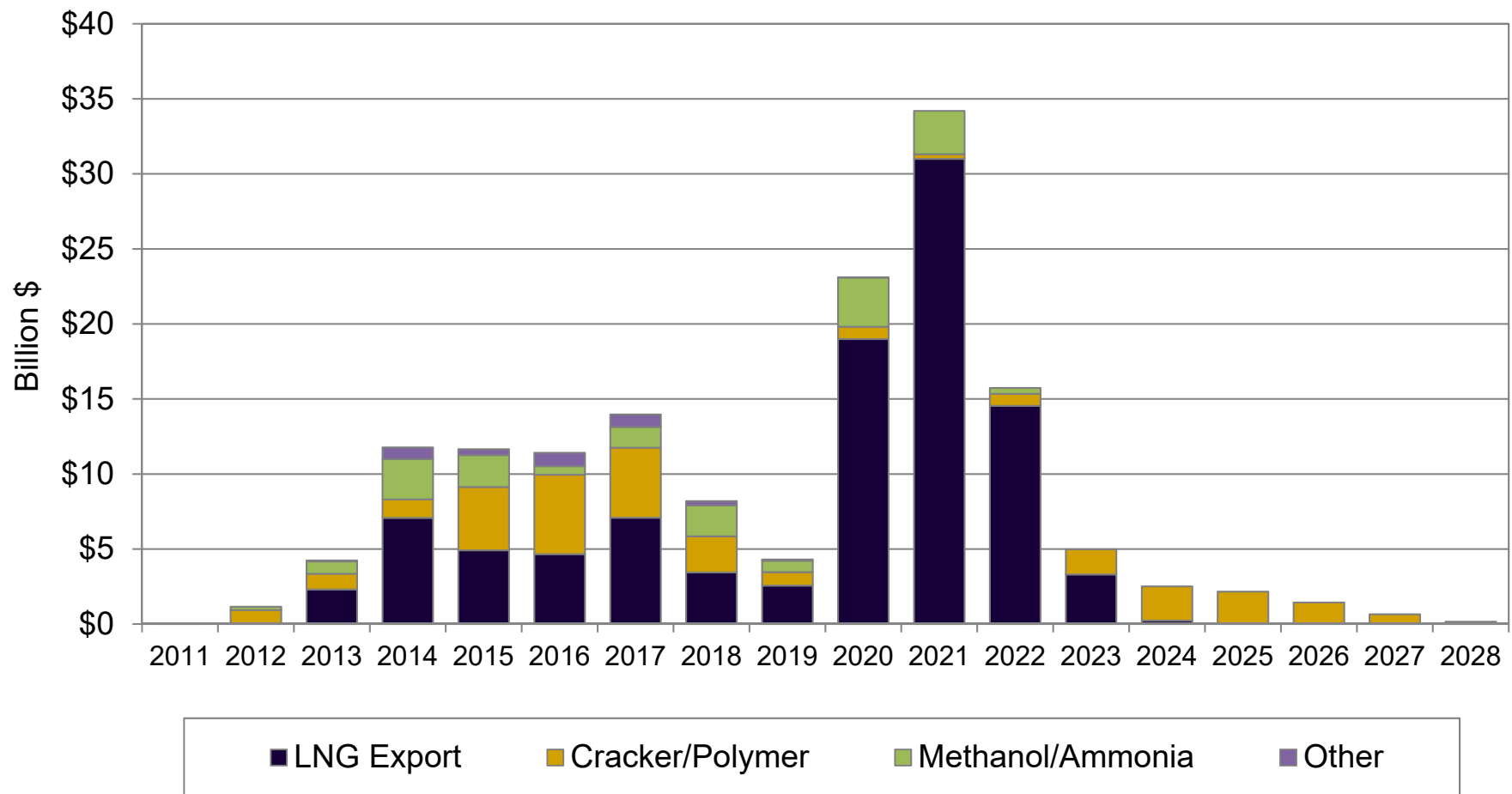
Capital expenditures have been relatively balanced across the two states.



Source: David E. Dismukes (2013). *Unconventional Resources and Louisiana’s Manufacturing Development Renaissance*. Baton Rouge, LA: Louisiana State University, Center for Energy Studies and author’s updates.

Louisiana total capital expenditures by sector.

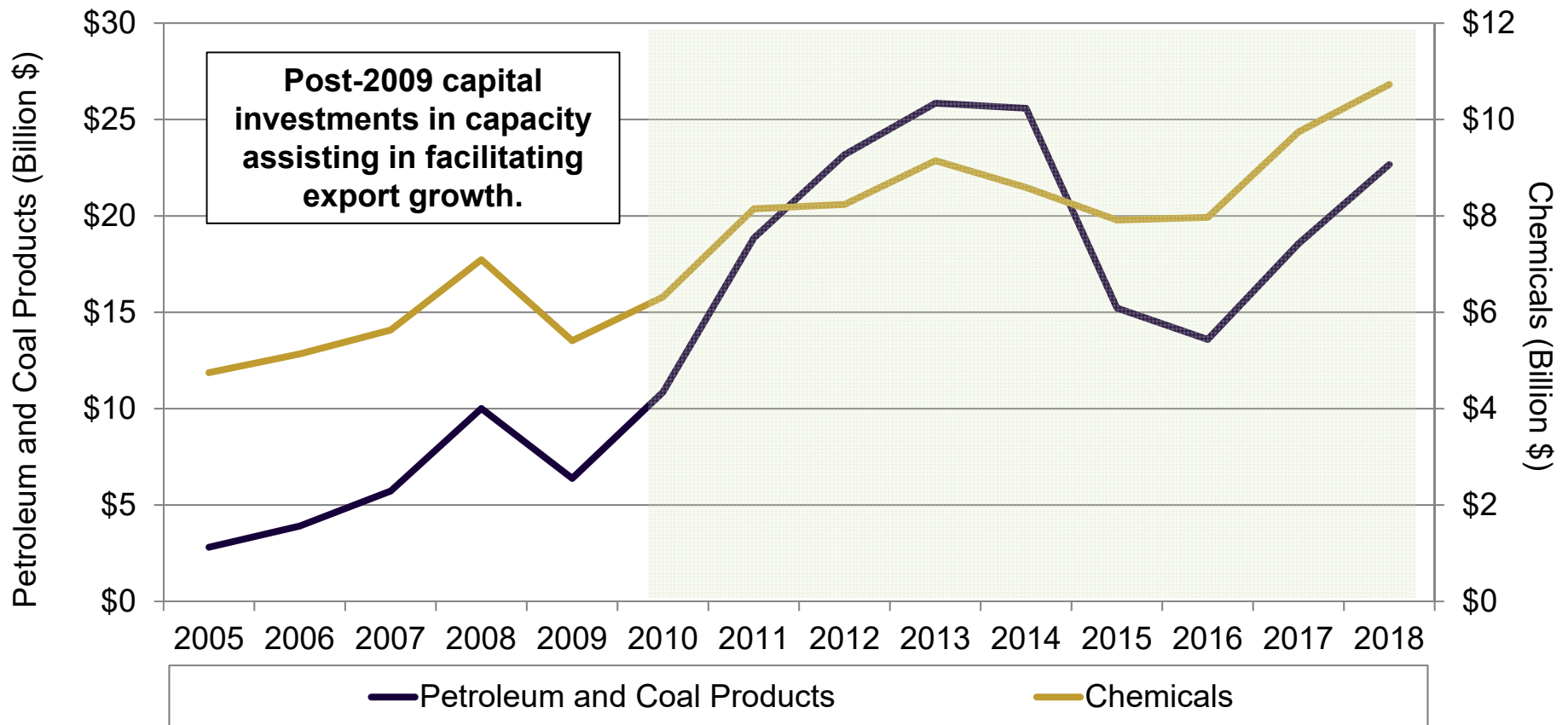
The Louisiana capital expenditures are more heavily weighted to LNG export facilities than in Texas.



Source: David E. Dismukes (2013). *Unconventional Resources and Louisiana's Manufacturing Development Renaissance*. Baton Rouge, LA: Louisiana State University, Center for Energy Studies and author's updates.

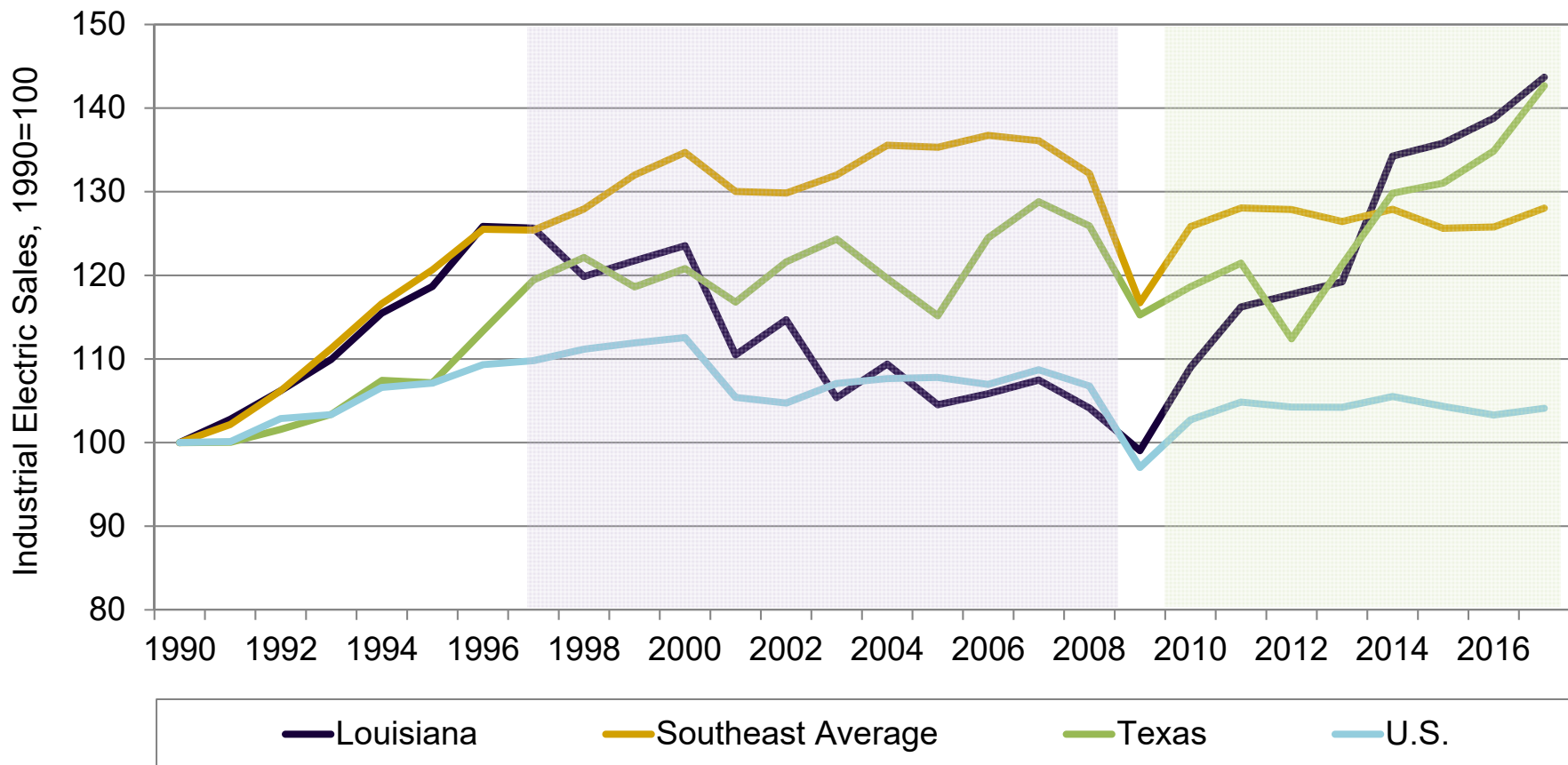
Louisiana exports (chemicals and refined product).

Louisiana exports of petroleum and coal products increased 180 percent since 2009. Petroleum exports have increased 255 percent and chemical exports have increased 100 percent. All facilitated by new capacity investments.



Industrial electric sales comparisons.

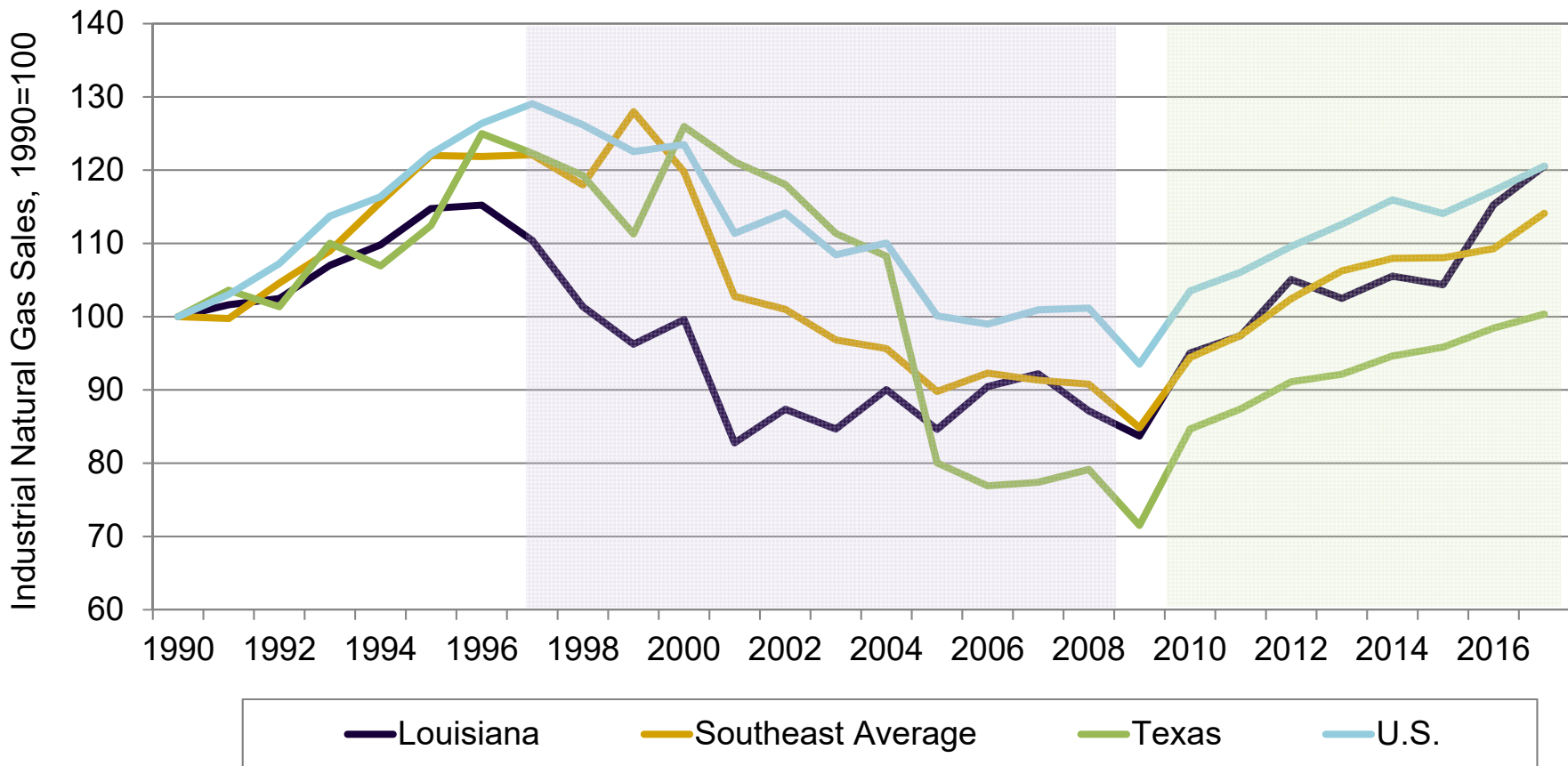
Louisiana's industrial electric sales (proxy for onsite production activity) fell 21 percent between 1996 and 2009. Since then, they have jumped 45 percent.



Note: Southeast states include Alabama, Arkansas, Florida, Mississippi and Georgia.
 Source: U.S. Energy Information Administration.

Industrial natural gas sales comparisons.

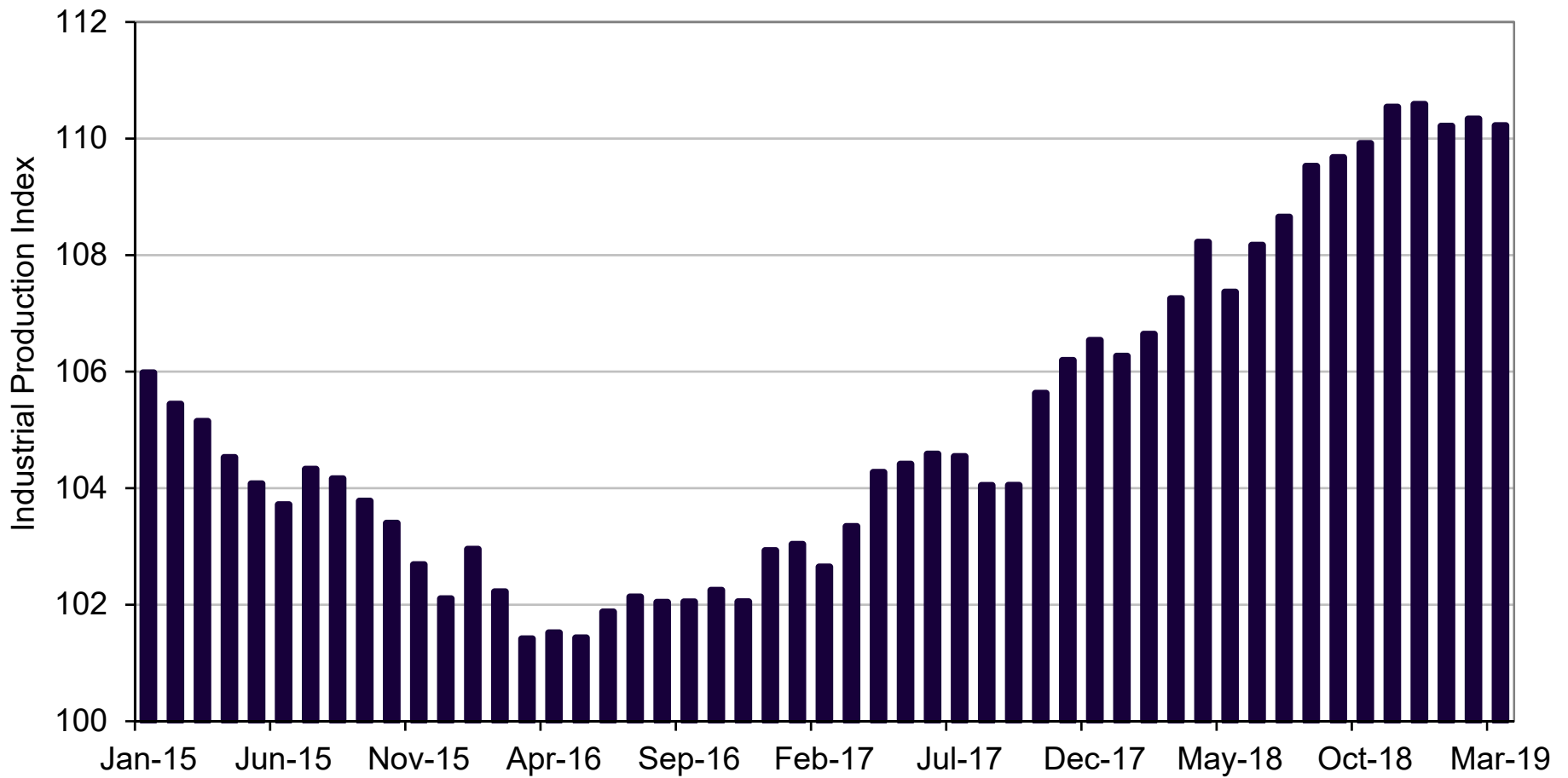
Louisiana's industrial natural gas sales (proxy for onsite production activity) fell 27 percent between 1996 and 2009. Since then, they have increased 44 percent.



Note: Southeast states include Alabama, Arkansas, Florida, Mississippi and Georgia.
 Source: U.S. Energy Information Administration.

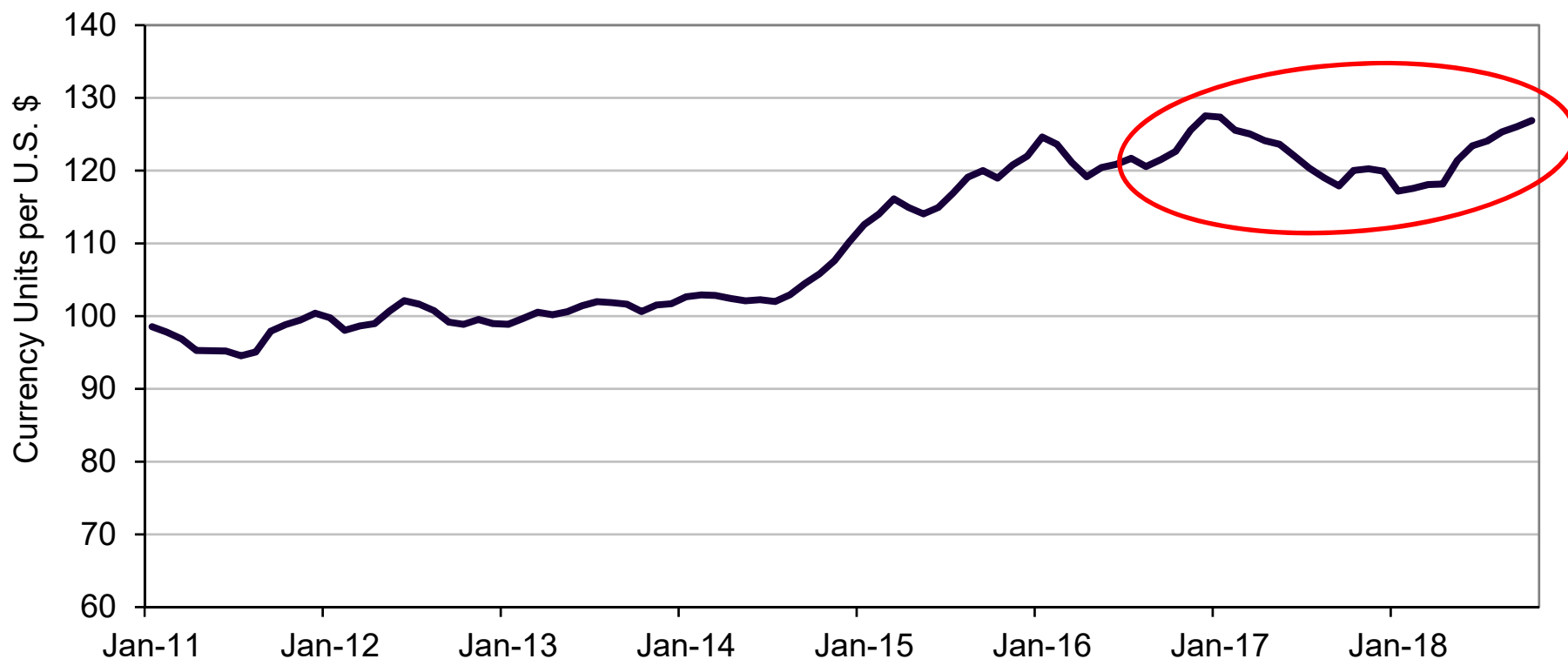
U.S. industrial production index.

Industrial production consistently increasing since the lows of 2016.



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.

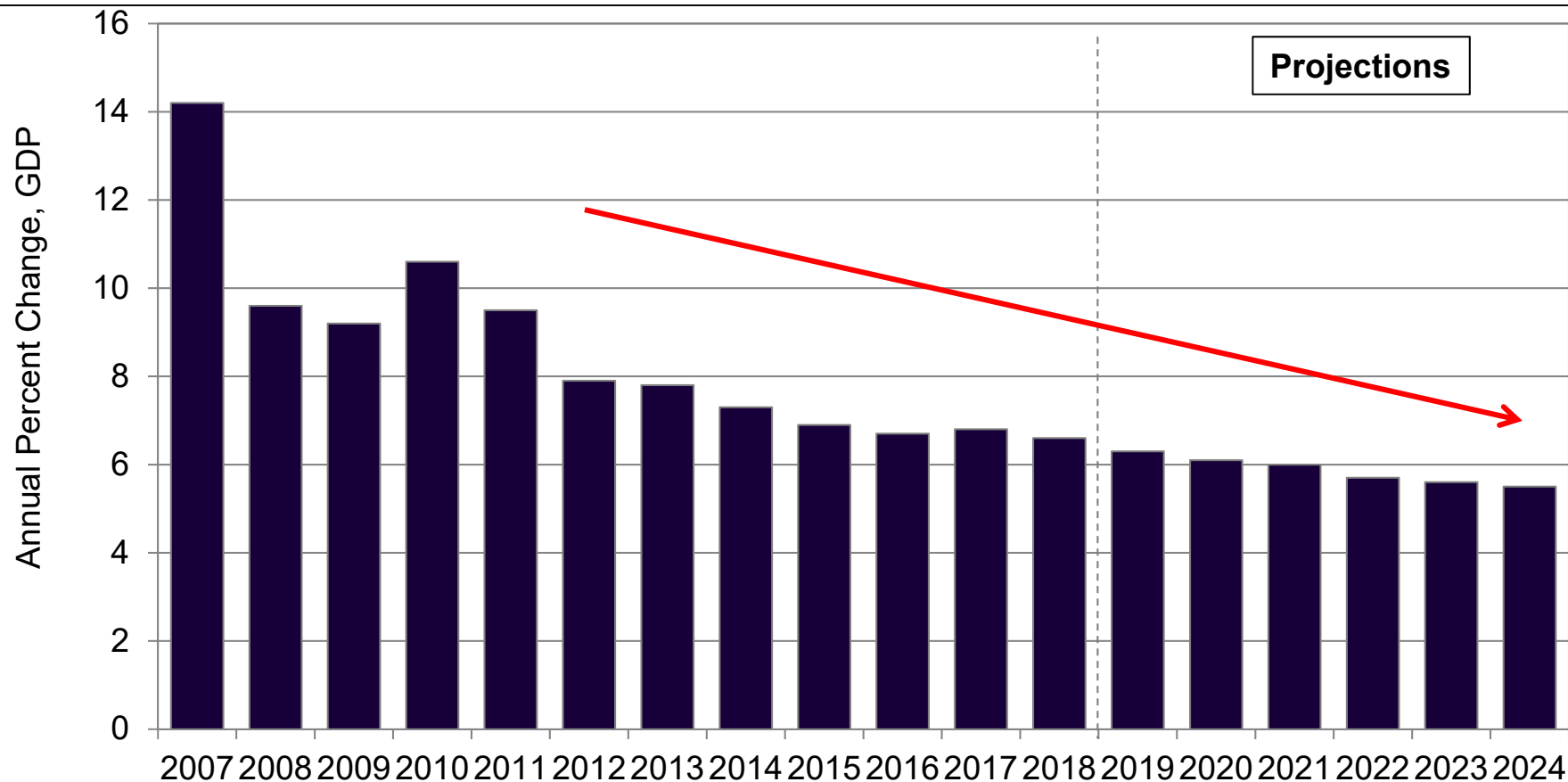


Note: The Broad Index is a weighted average of the foreign exchange values of the U.S. dollar against the currencies of a large group of major U.S. trading partners. Base year is 2002.

Source: Federal Reserve Bank of St. Louis.

Changes in Chinese GDP.

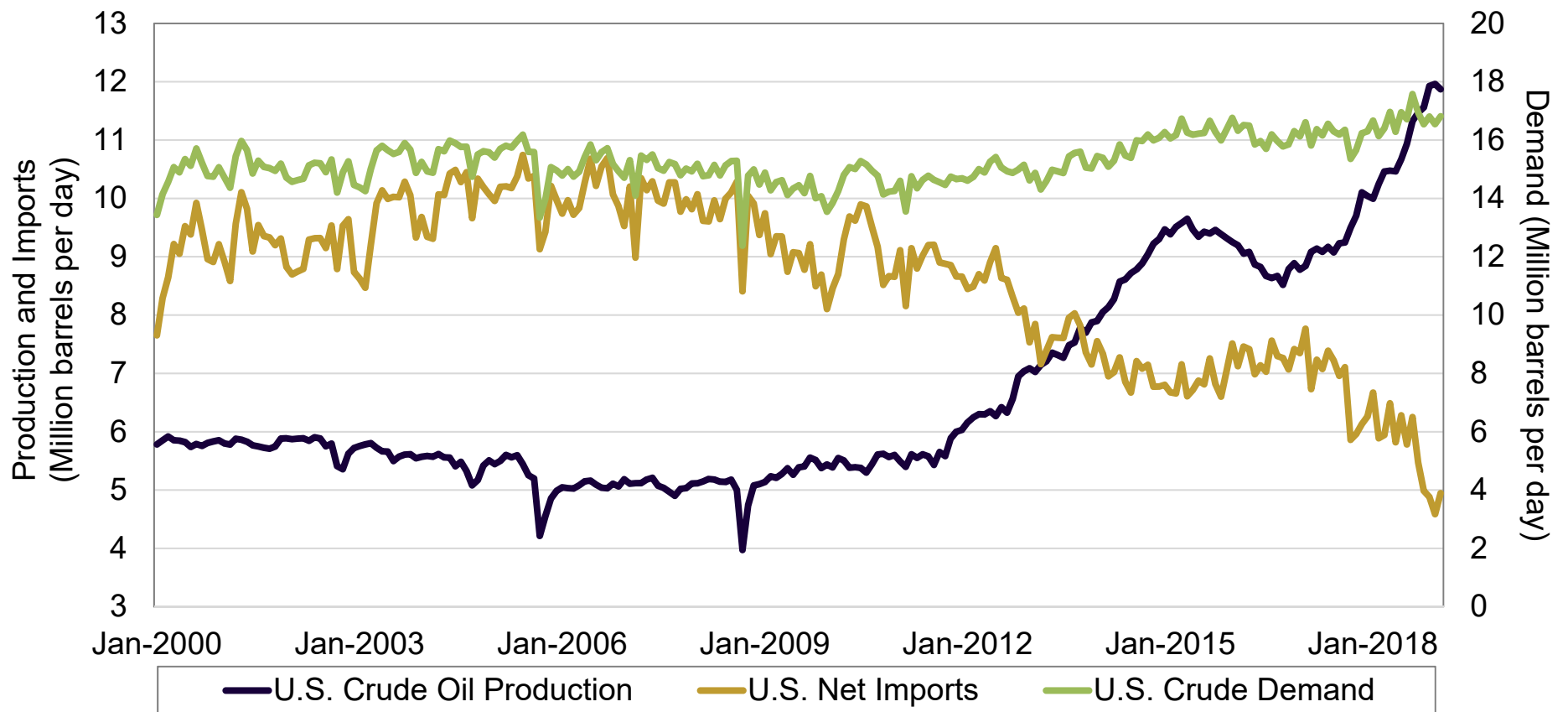
Chinese economic growth officially reported at 6.6 percent, reflecting expectations of expansionary policy mix and a goal of doubling real GDP between 2010 and 2020



Energy trade

U.S. crude oil production and imports.

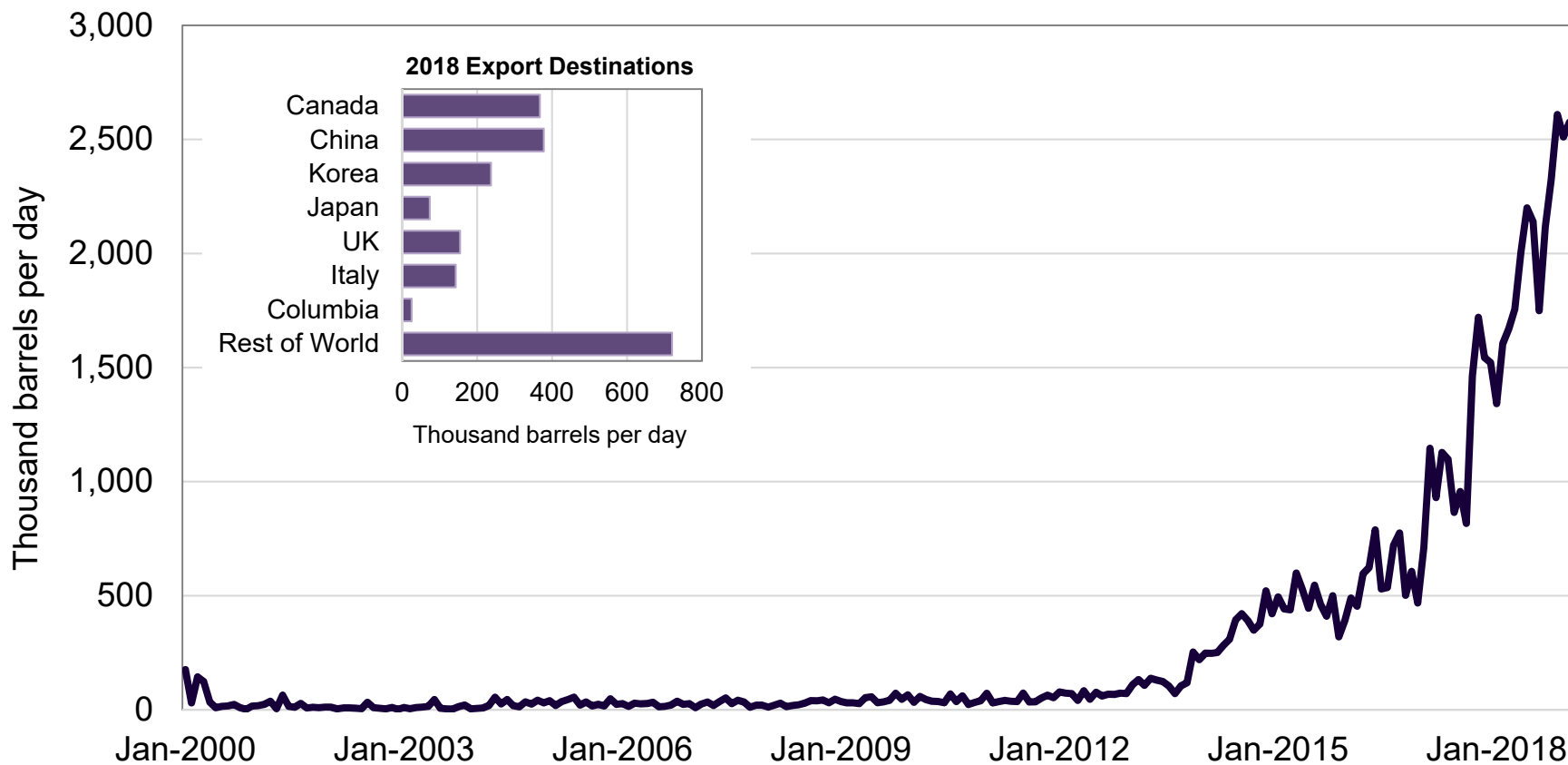
U.S. **crude oil production surged** in 2012 through 2015. Production did fall during the first nine months of 2016, but increased at the end of the year and has continued to increase since. Meanwhile, **U.S. imports of crude oil have fallen** as U.S. demand for crude oil has remained constant.



CONFIDENTIAL

U.S. crude oil exports.

In December 2015, **restrictions on exporting U.S. produced crude oil were lifted**. In 2016, the **U.S. exported an average of 520,000 barrels per day** reaching **1.1 million barrels per day in 2017**. Opportunities for the U.S. to participate further in global crude oil exports are considerable, and the Gulf Coast will be the beneficiaries of these opportunities.



CONFIDENTIAL

A two-way LOOP: facilitating an Louisiana energy export economy.

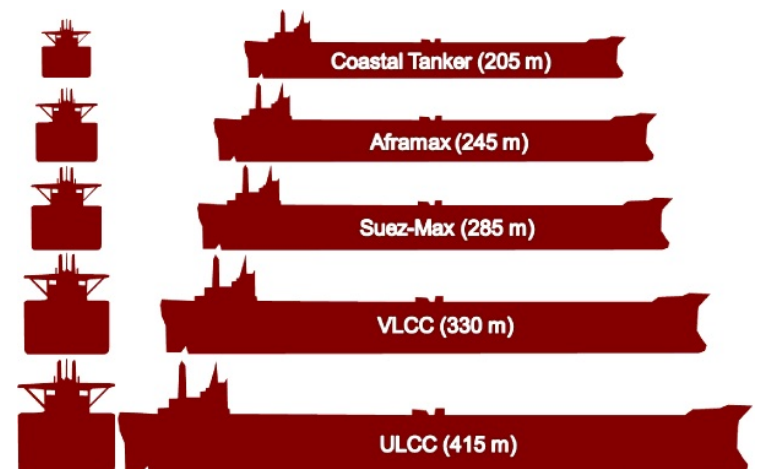
In July 2017 LOOP announced it was pursuing contracts to **start exporting crude oil**.

The **“two-way LOOP”** would provide connecting logistics from the Clovelly Hub to the deepwater port.

The facility would require **minor modifications** to pump oil in both directions and service could be available in early 2018.

Most U.S. crude exports are **shipped from Houston or Corpus Christi**. However, these Texas facilities **cannot accommodate the largest tankers carrying full loads**. Smaller vessels are being used to transfer cargoes to large tankers elsewhere.

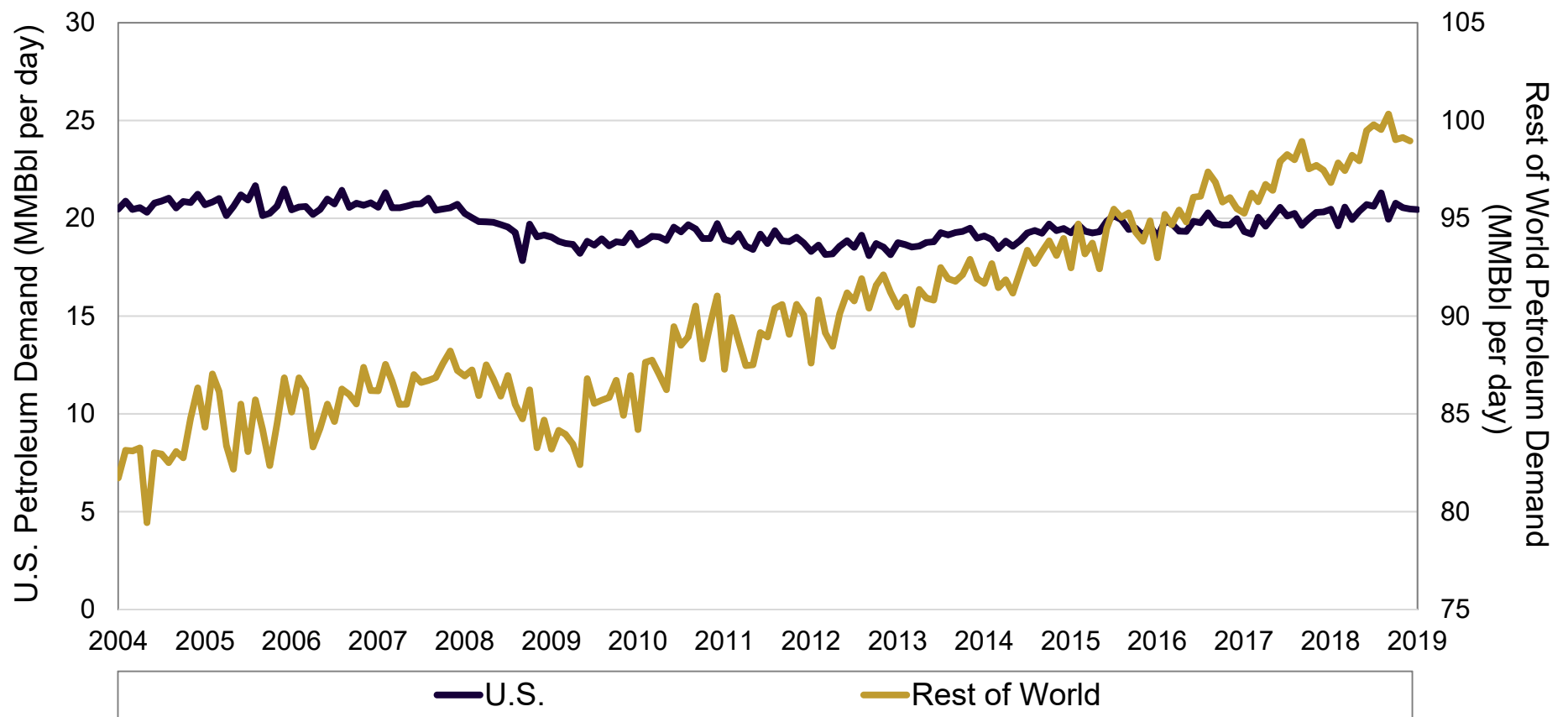
Exporting from LOOP would lower freight costs. And, LOOP’s multi-tank storage hub would allow for customer-specific blending of different crude grades.



Note: ¹2017 is 6-month average, January through June.

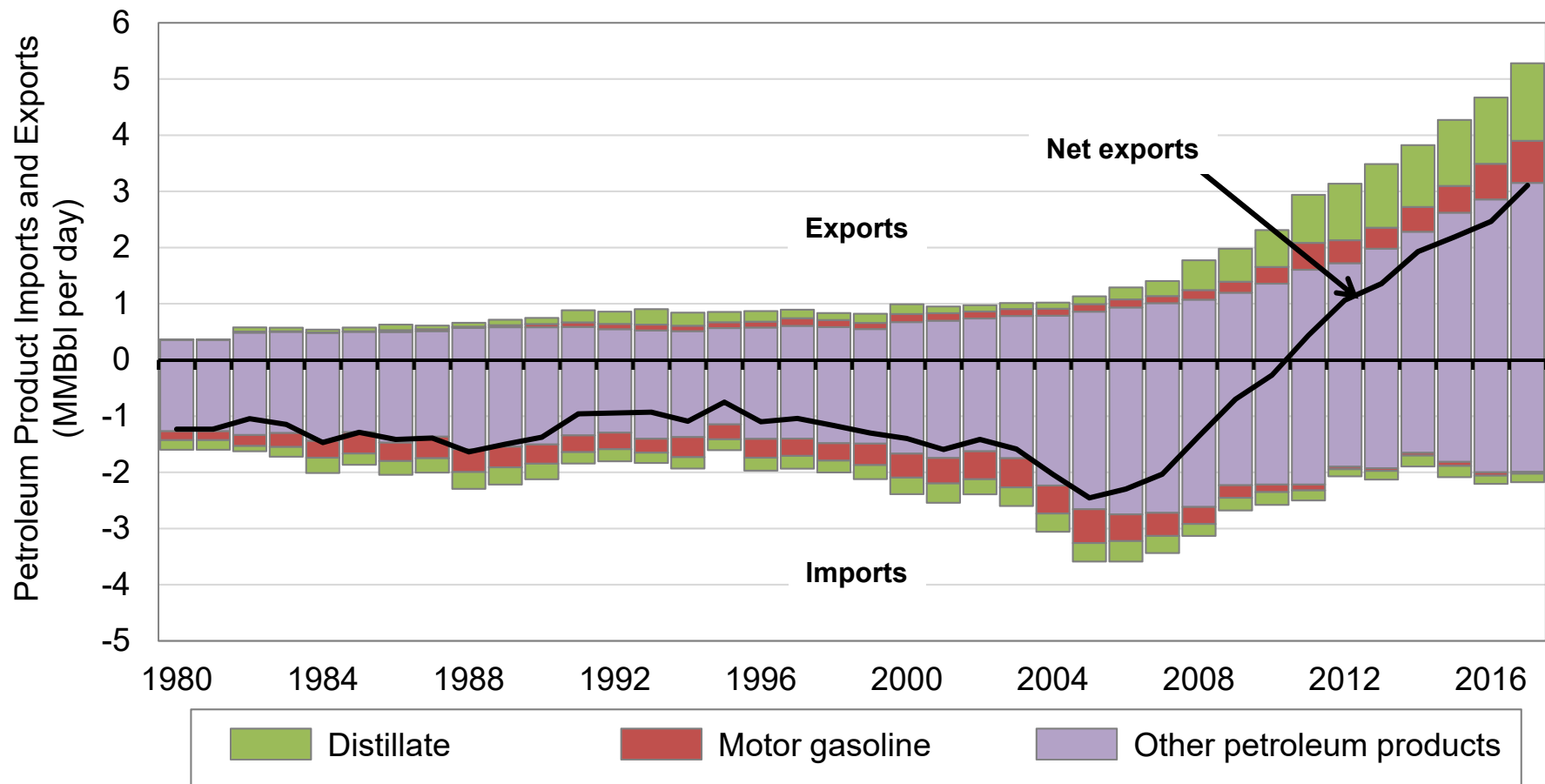
Petroleum and liquid fuels demand.

U.S. demand for liquid fuels has been relatively flat, while **demand in the rest of the world has been increasing** underscoring the opportunities for new **Louisiana-based energy exports.**

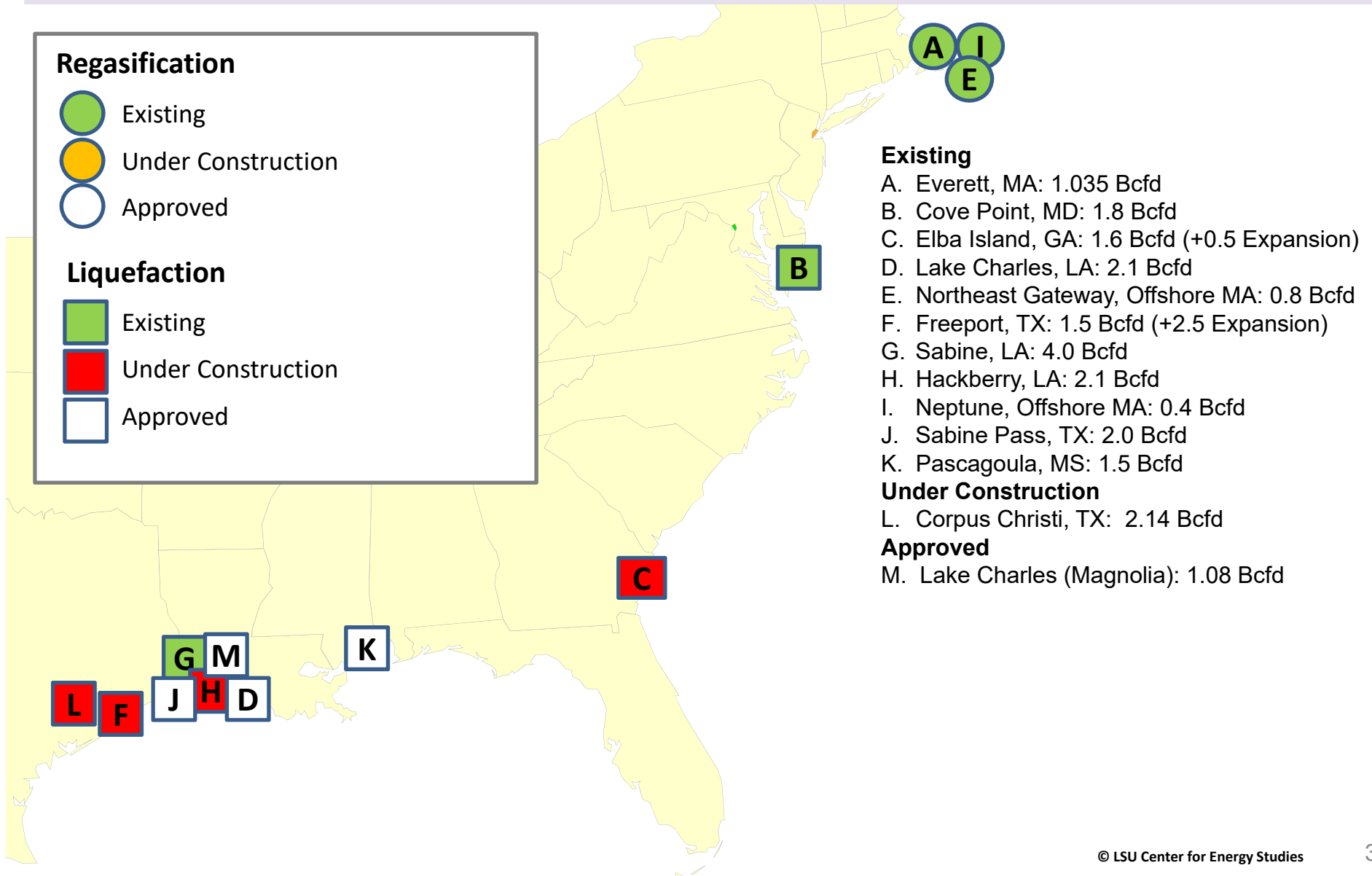


U.S. petroleum product imports and exports.

In 2011, the U.S. became a net exporter of petroleum products. Net exports have increased over 600 percent since then.

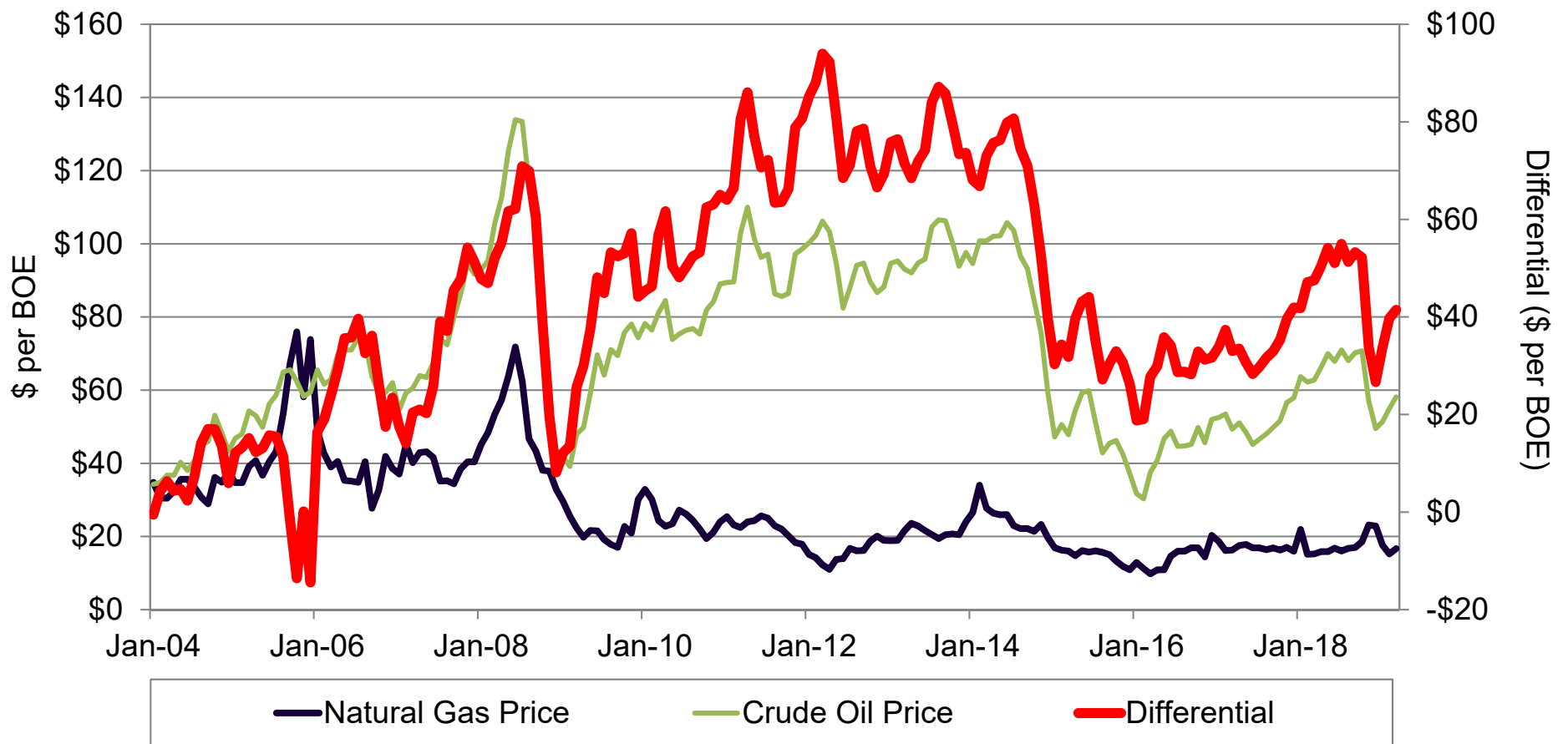


GOM LNG capacity



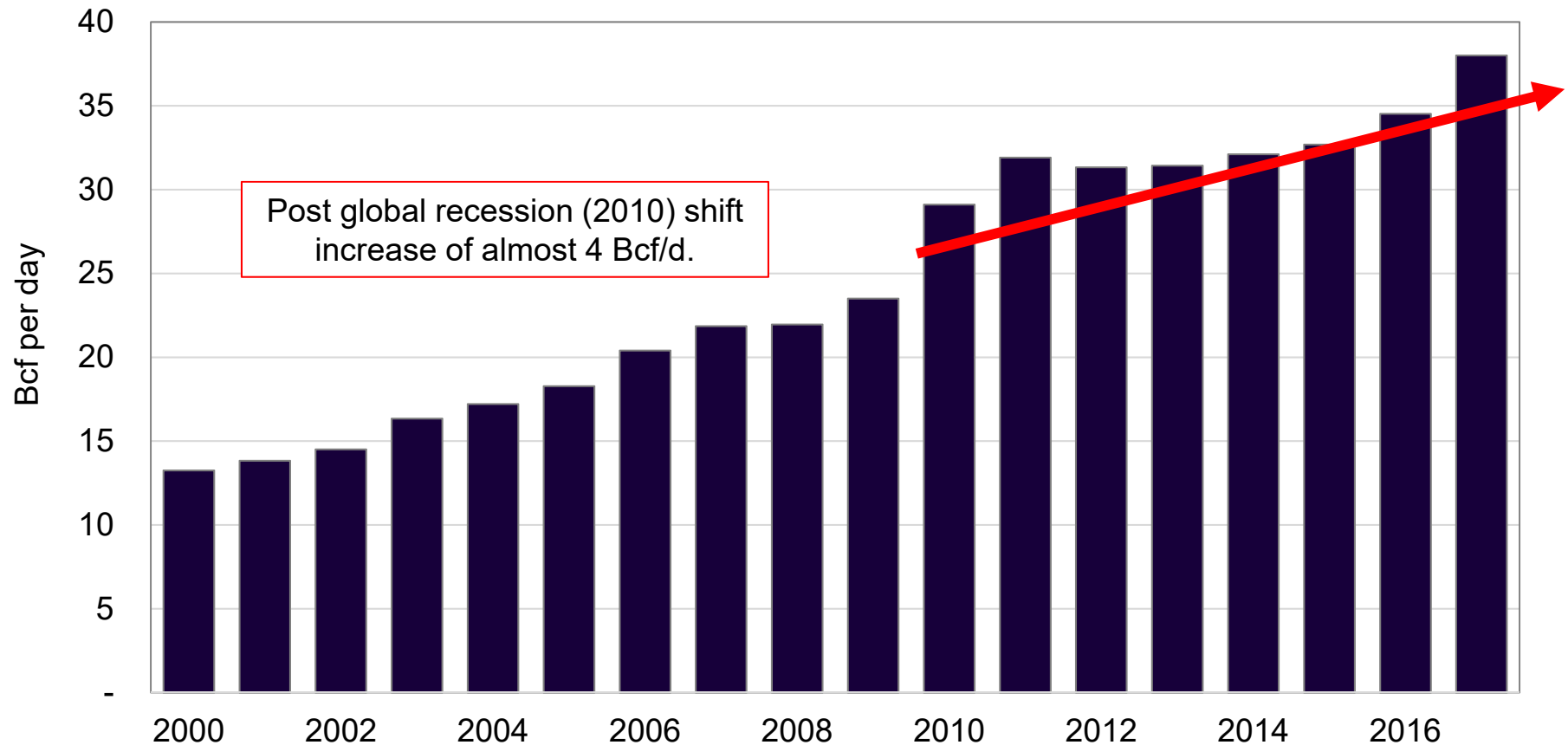
Natural gas and crude oil prices

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.



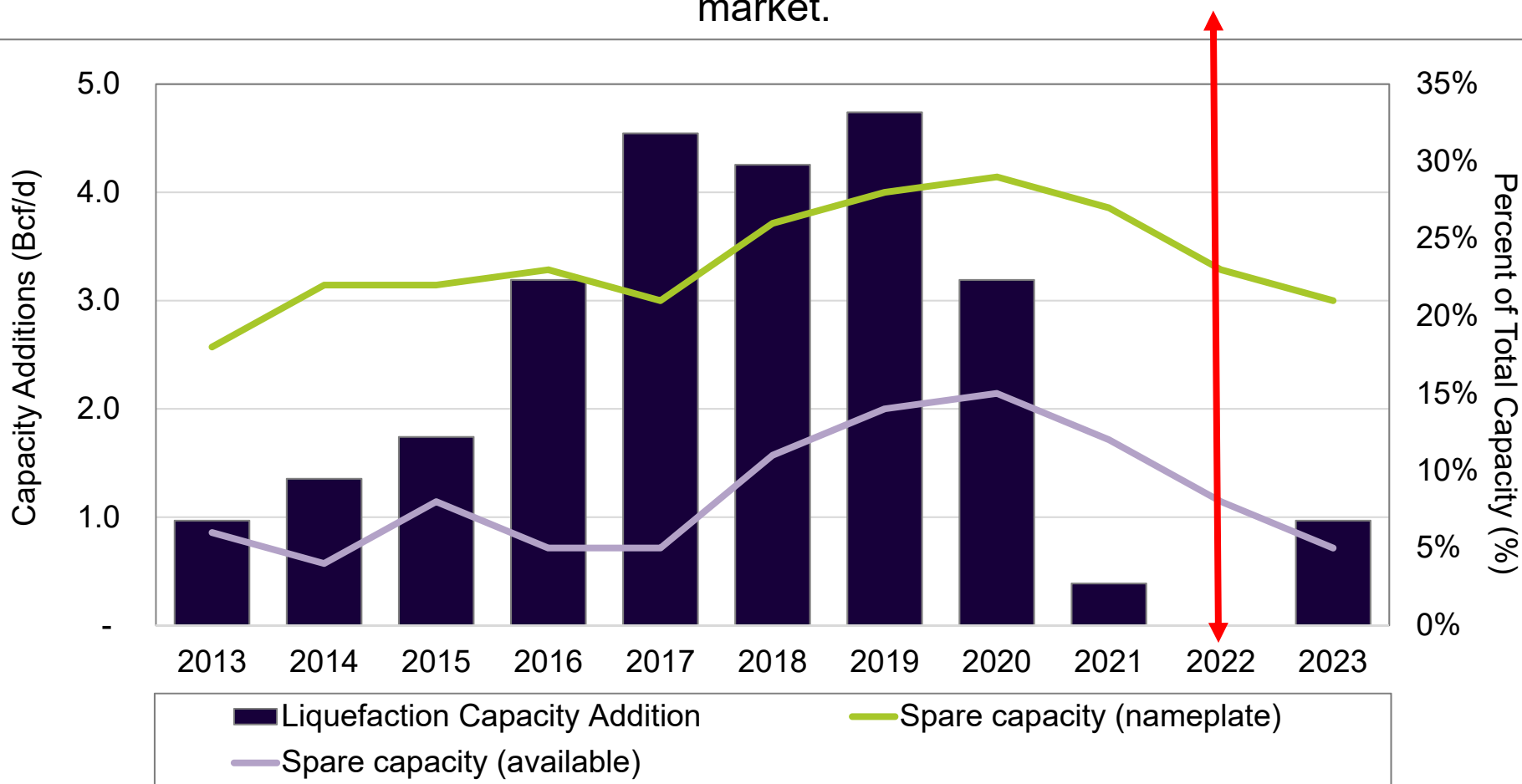
World LNG trade volumes.

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.**



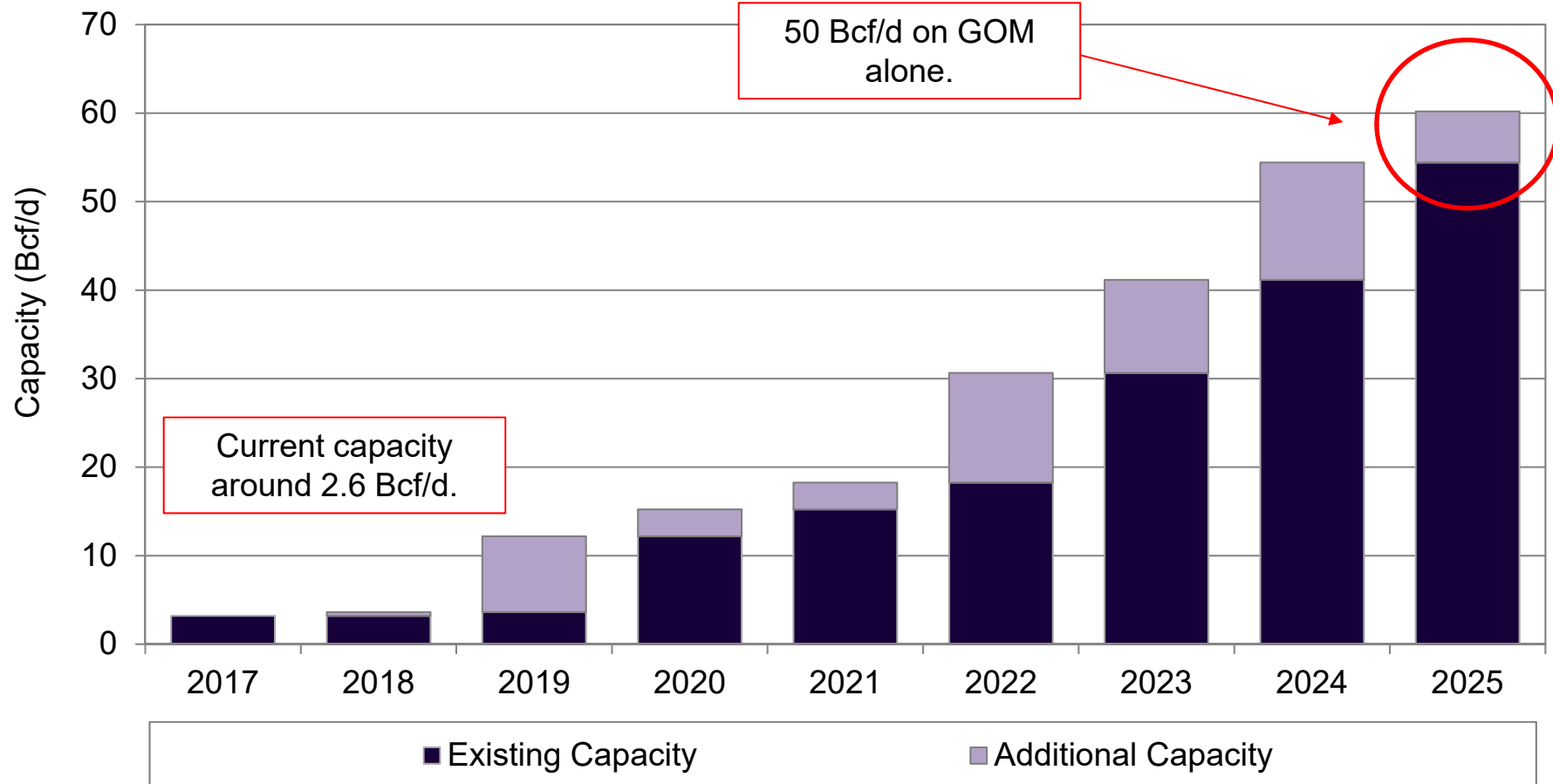
LNG liquefaction capacity additions.

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.



Conclusions

Conclusions – Oil and natural gas.

- Domestic **crude oil and natural gas** production should **continue to be strong**.
 - The nation and region will build upon existing productivity gains.
 - **Drilling activity** may start to geographically **diversify**, but not enough to knock the Permian basin off its perch as being the premier U.S. unconventional basin.
 - The overall “**cool-down**” in **crude oil demand** should allow infrastructure development to catch up with production requirements.
 - “**Quality over quantity**” mentality by larger companies. Drilling responsiveness has changed in the last recovery period, being more tepid given investor expectations about balance sheet improvement versus drilling (capital budgets are flat).
- The **price outlook** (crude oil, natural gas) is a little **more complicated** than last year.
 - 2017 saw crude prices rise (natural gas flat). Market has now shifted to **correction mode** (crude oil) given changing expectations.
 - **Crude prices likely range-bound at current levels.**
 - Over the next year, the issue will be **economic growth** and the corresponding issues of Fed tightening, exchange rates, inflation, and fiscal stimulus and geopolitical impacts.

Conclusions– Petrochemical/Refining

- The 2019 GCEO petrochemical industry outlook is flat.
 - The **capacity utilization outlook for existing and recent investments will likely not increase in any measurable fashion** given a number of global headwinds that include: (a) a slow-down in Asian demand; (b) increased dollar valuations; and (c) continued trade policy uncertainties.
 - The GCEO does not anticipate any chemical industry or LNG project cancellations, but it is not implausible to see that many **currently-announced projects move out** their anticipated project commercial **operation dates** in order to account for the current global market and geo-political uncertainties.
- The 2019 GCEO sees a continued positive, yet limited growth outlook for U.S. refining. Refineries will benefit from continued growth of U.S. crude oil supplies and the geographic diversity of those supplies. The sector will also benefit from **continued pipeline infrastructure** moving into and within the region. Product demand growth and storage will be the top issues to watch.

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