The Economics of Oil and Natural Gas from a Global, National and State Perspective

February 8, 2017

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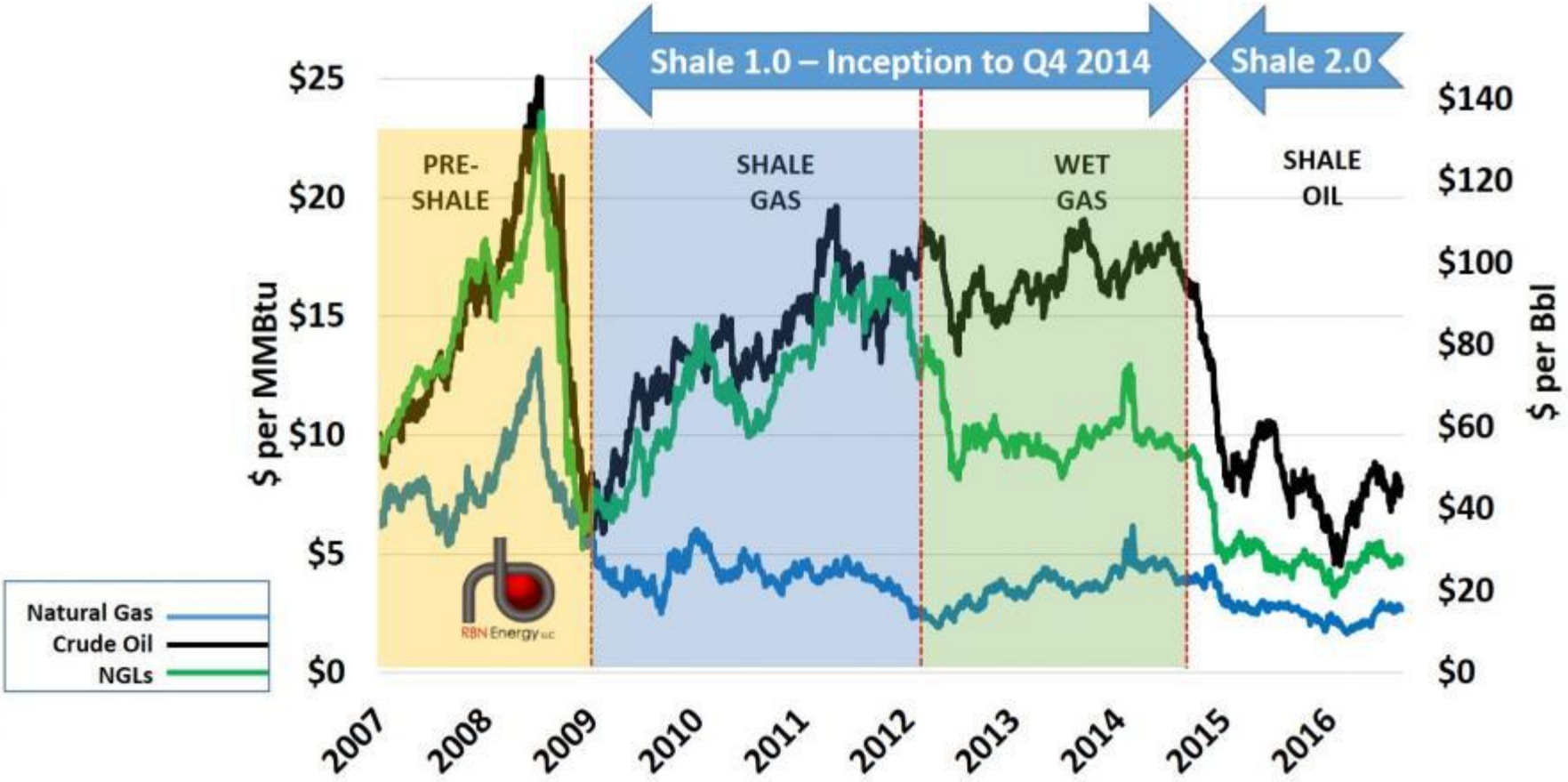
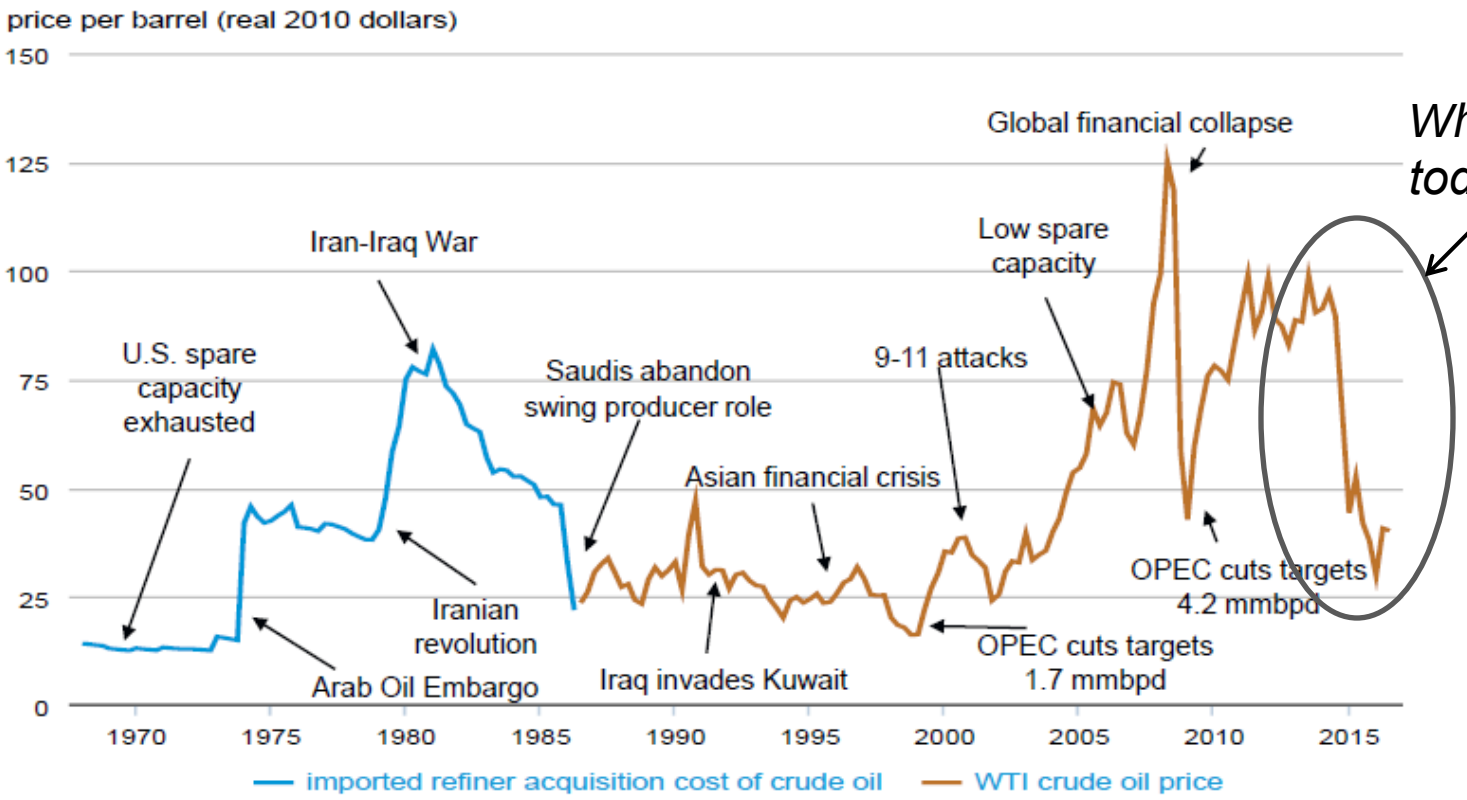
The Stages of U.S. Unconventional Growth



Source: RBN Energy

Oil Markets

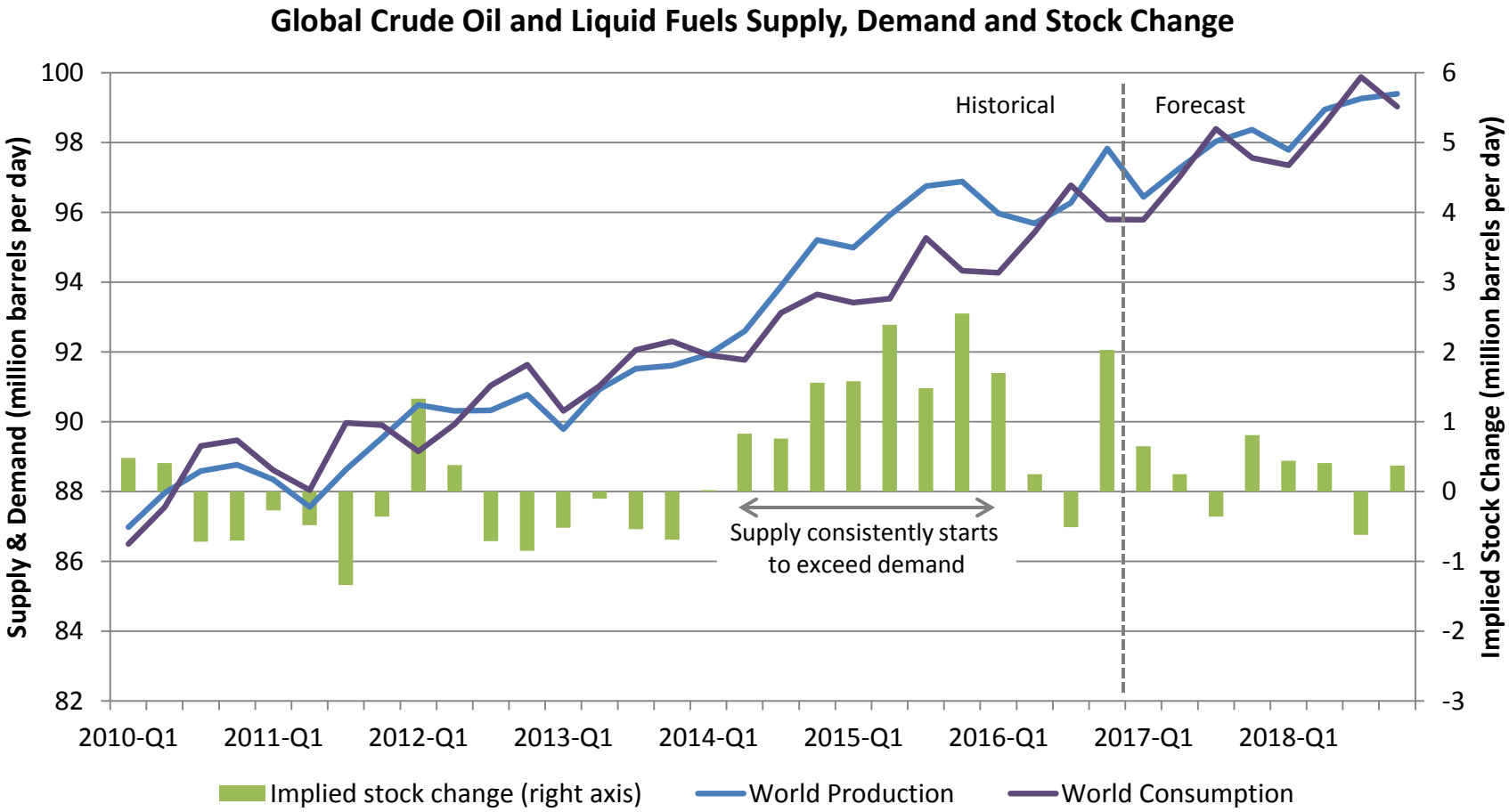
Crude Oil Prices & Event Timeline



What is driving today's prices?

Source: EIA, Thomson Reuters

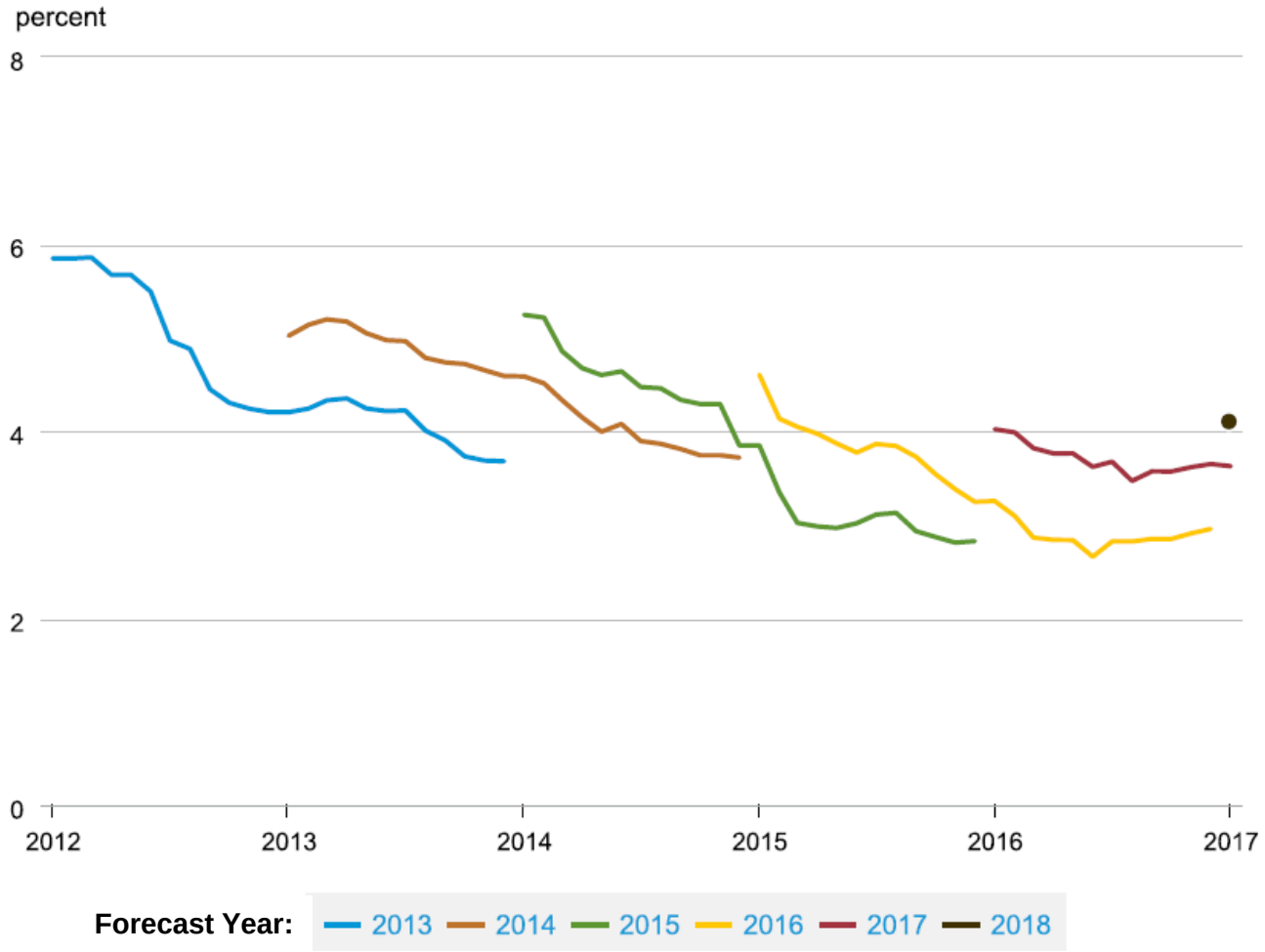
Global supply has consistently exceeded demand since the start of 2014; the Energy Information Administration (EIA) forecasts a return to market balance starting in the third quarter of 2017



Source: EIA, Short-term Energy Outlook, January 2017

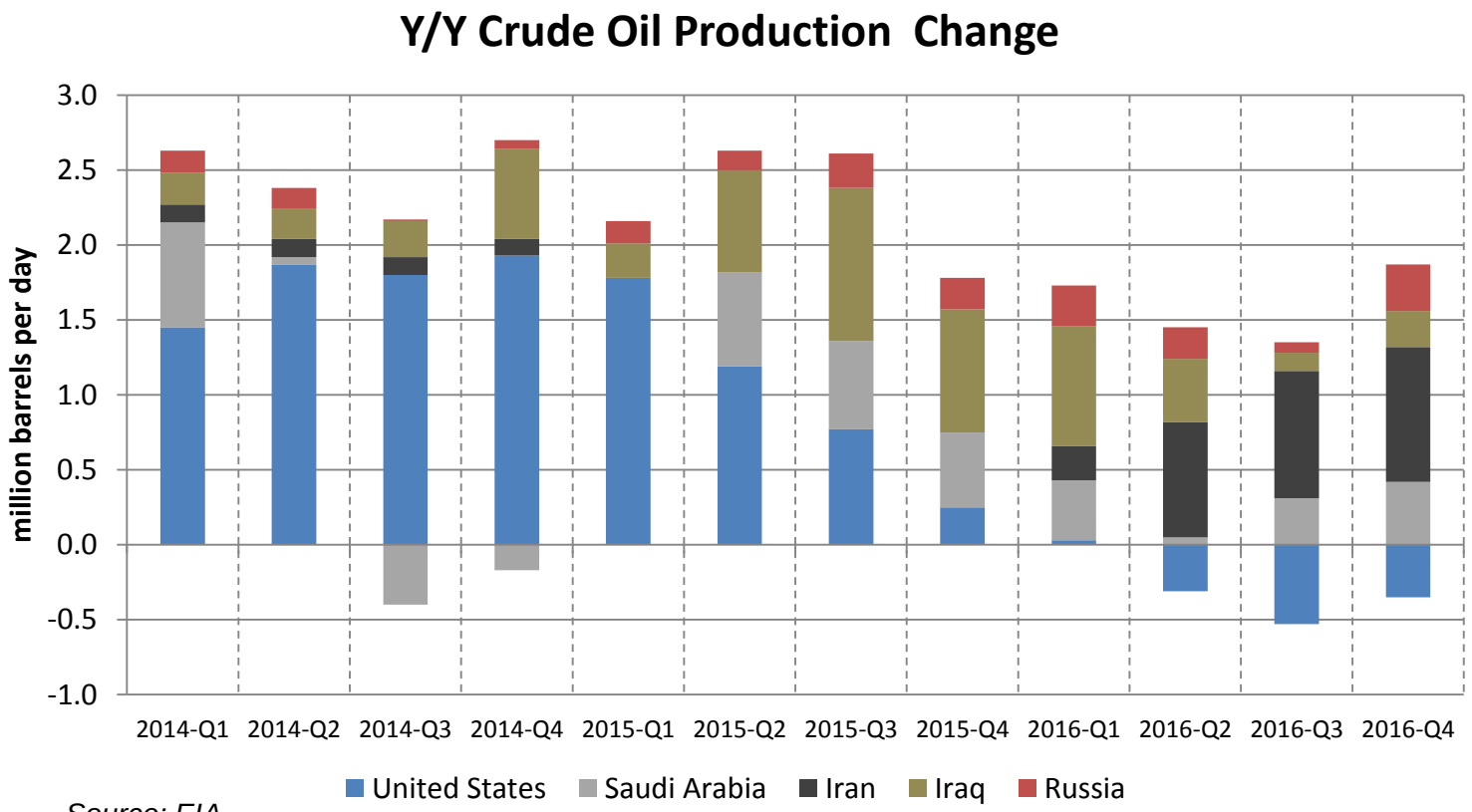
GDP Growth in non-OECD countries has not kept pace with expectations.

GDP Growth in non-OECD Countries (Annual Expectations)



Source: EIA Short-term Energy Outlook, January 2017

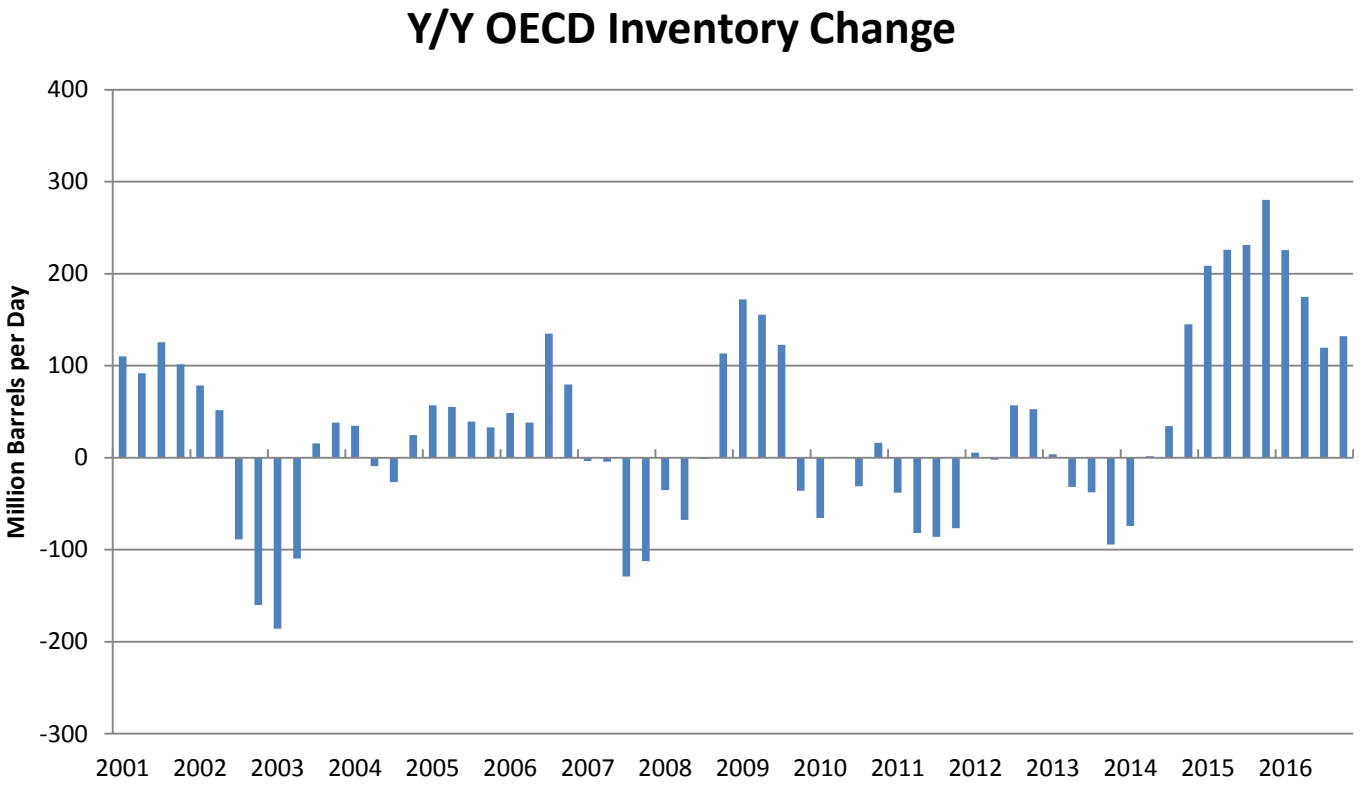
In 2016 U.S. oil production declines year over year while several OPEC members continue to increase production.



Source: EIA

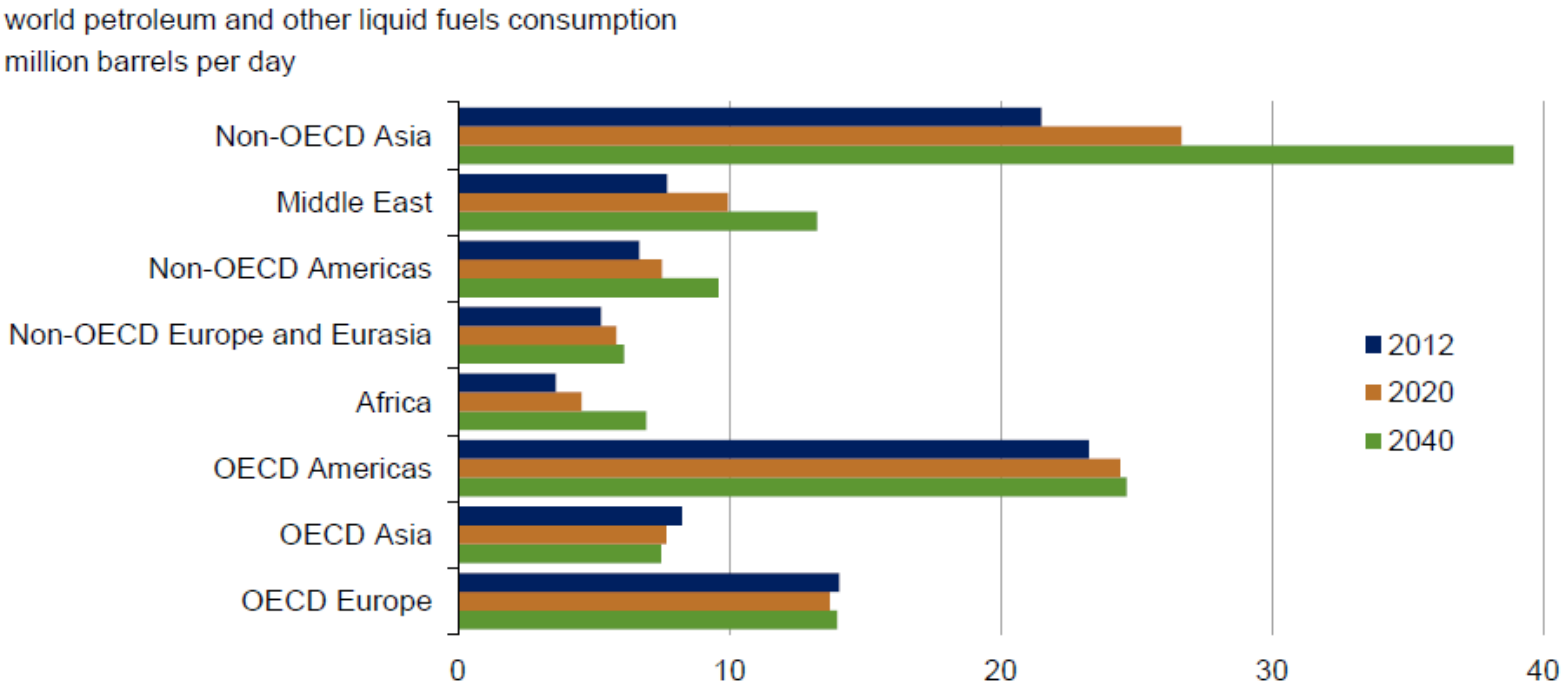
Iraq and Saudi Arabia added over 1.1 million barrels per day of production in 2015 and another 0.7 million barrels per day in 2016. In addition, Iranian production lifted to pre-sanction levels in 2016 (+0.7 million barrels per day).

The magnitude and duration of the inventory build since the last quarter of 2014 has been the highest and longest in fifteen years.



Source: EIA

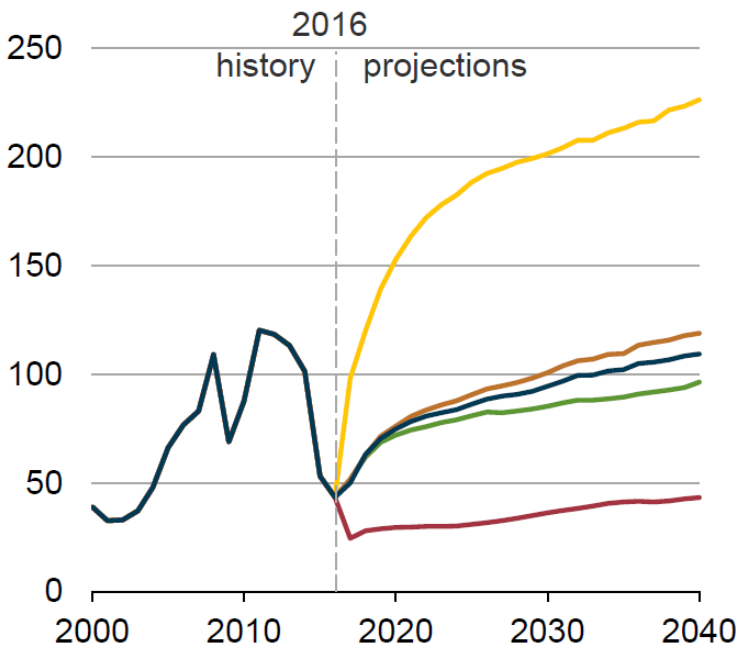
Most of the growth in world oil consumption occurs in non-OECD countries, specifically in Asia.



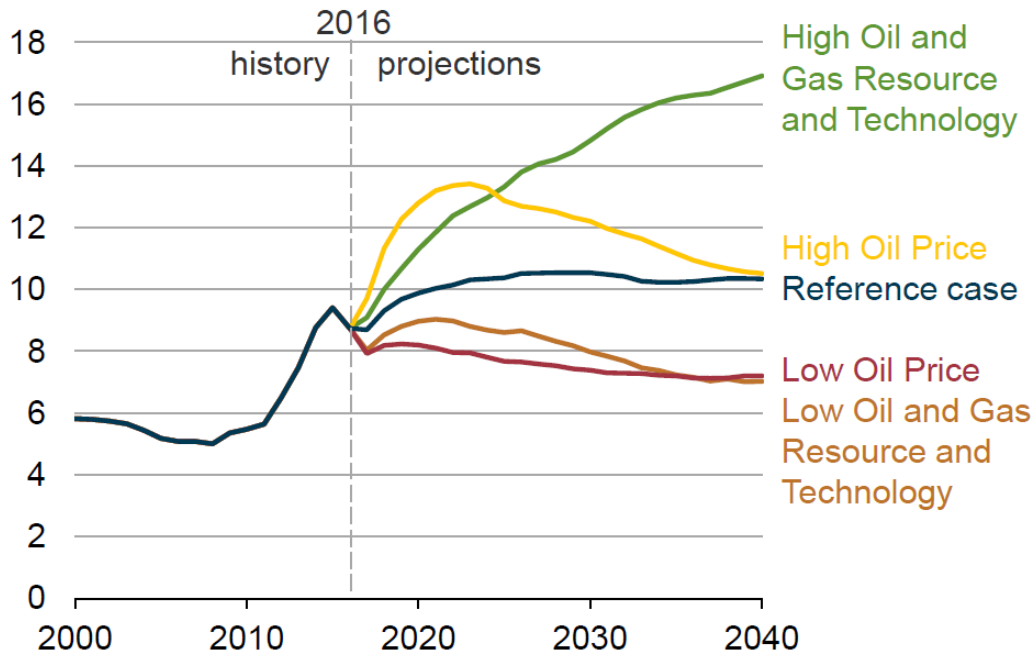
Source: EIA, International Energy Outlook, 2016

EIA projects that oil prices will recover to $75 per barrel by 2020 across the majority of the Annual Energy Outlook 2017 cases.

North Sea Brent oil price
2016 dollars per barrel



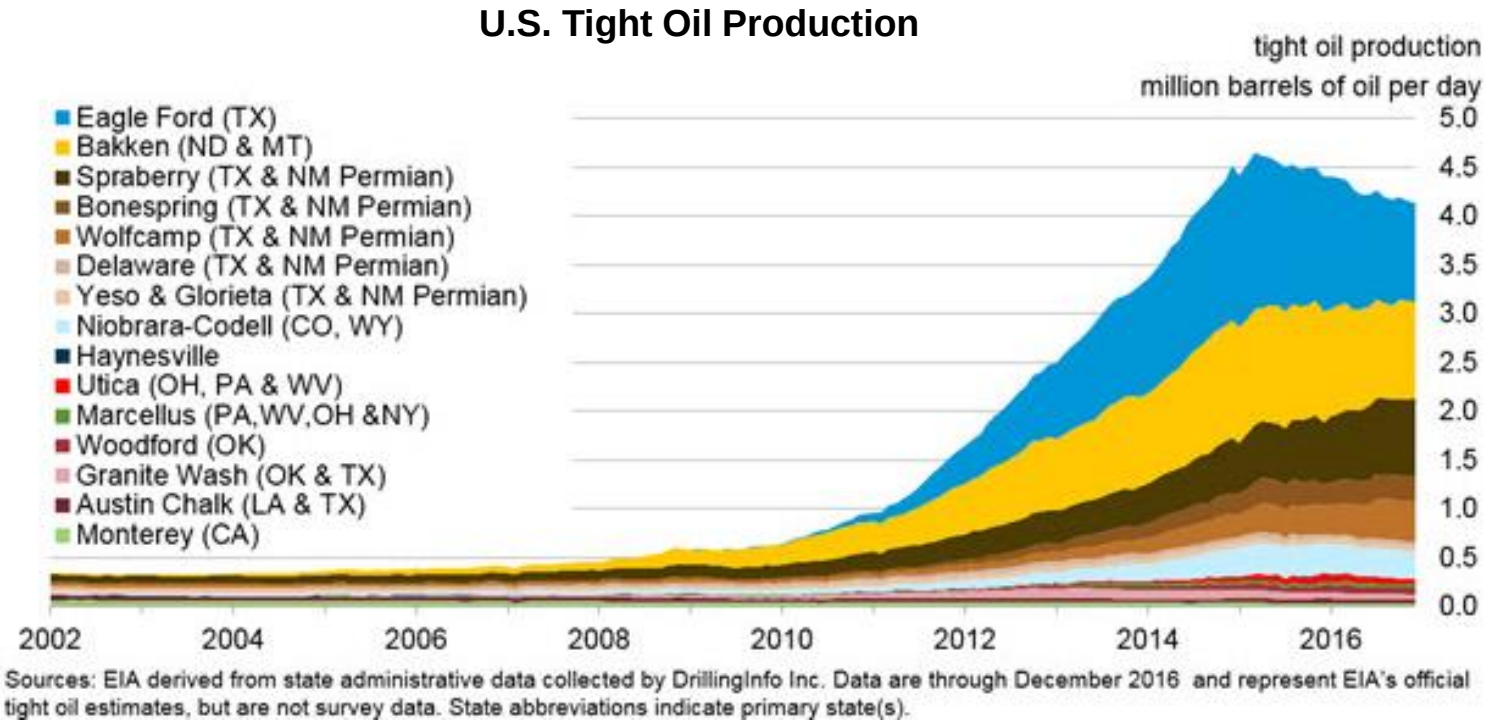
Crude oil production
million barrels per day



Source: EIA, Annual Energy Outlook 2017

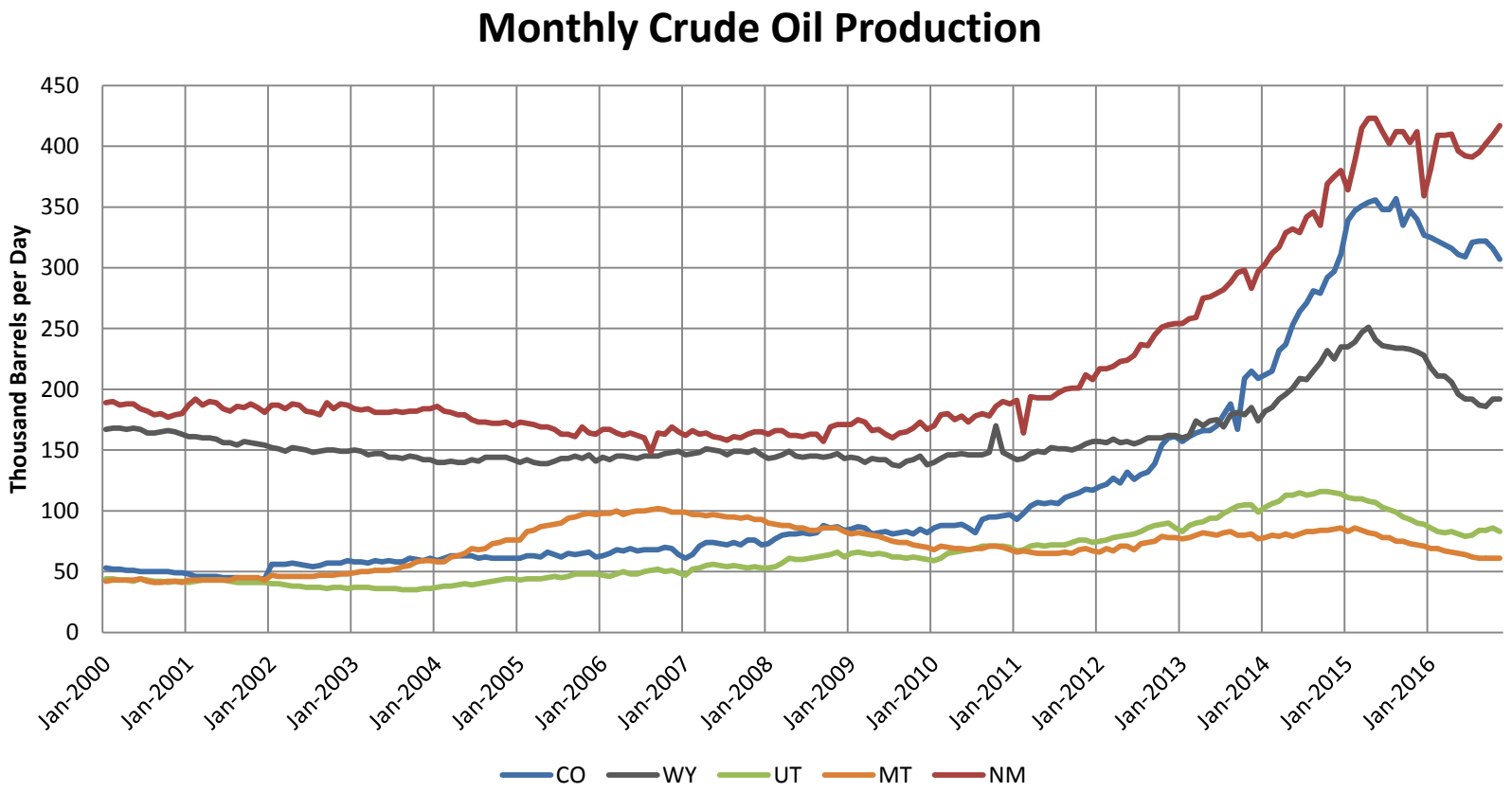
Colorado Oil Supply

Oil production across U.S. tight oil plays



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

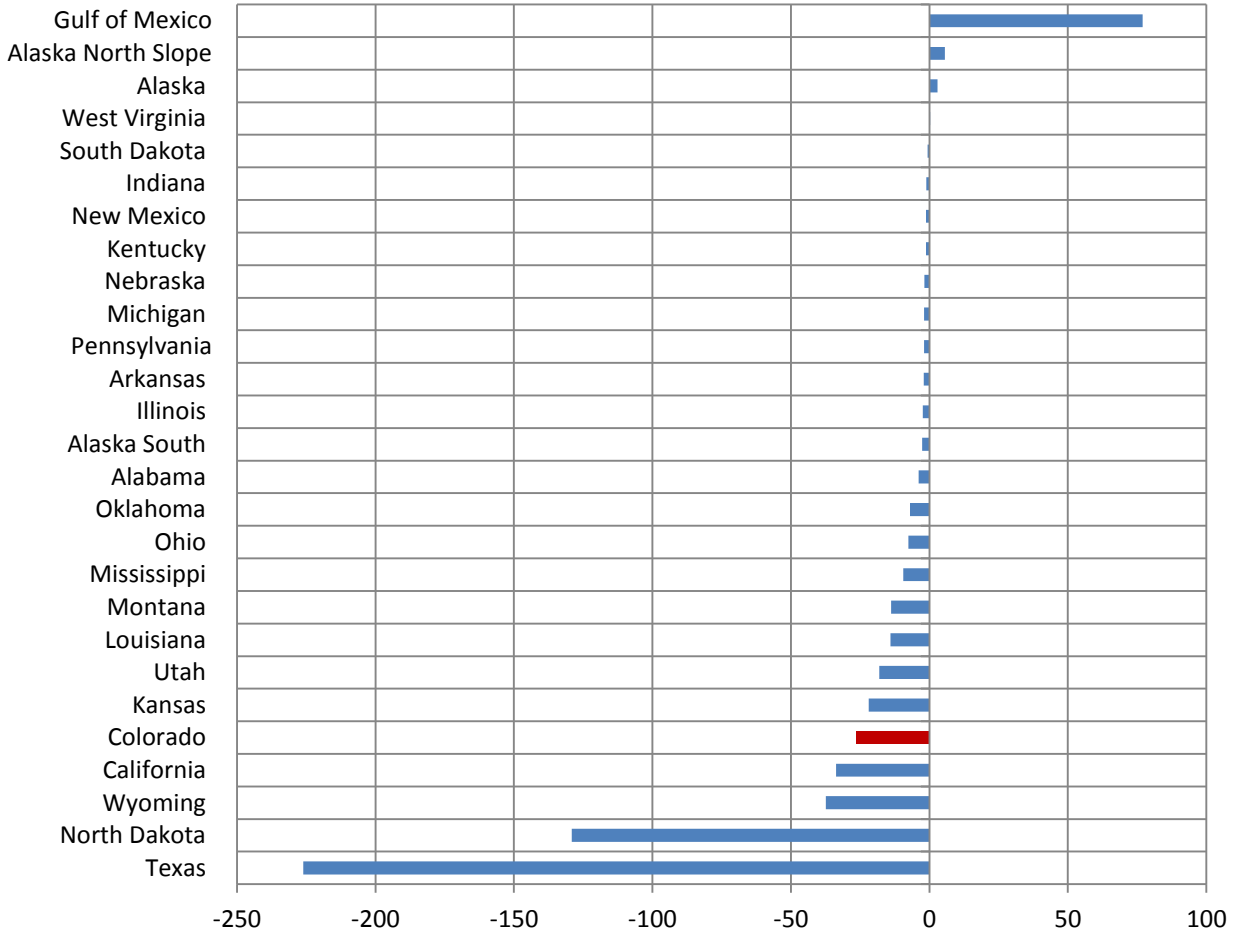
Colorado crude oil production had one of the fastest growth rates in the U.S. between 2013 and 2015. While production has declined from 2015 highs, production still remains strong.



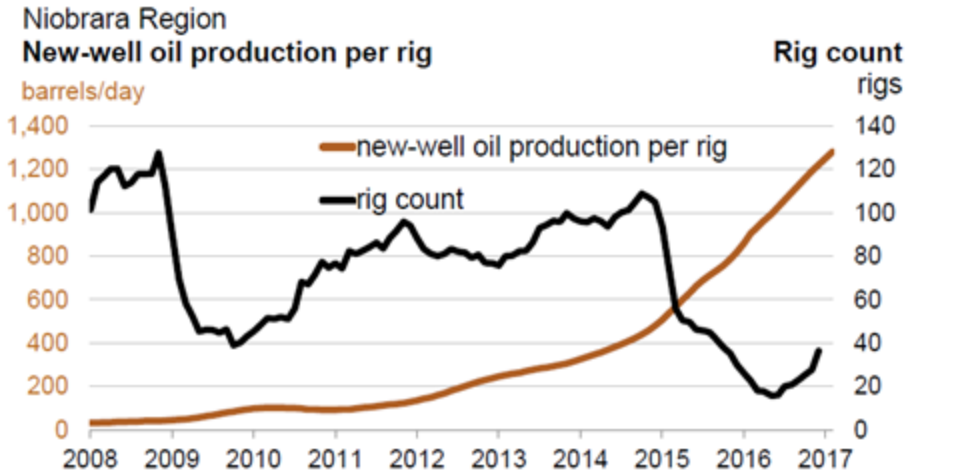
Colorado crude oil production in 2016 was 26 thousand barrels per day less than 2015 levels.

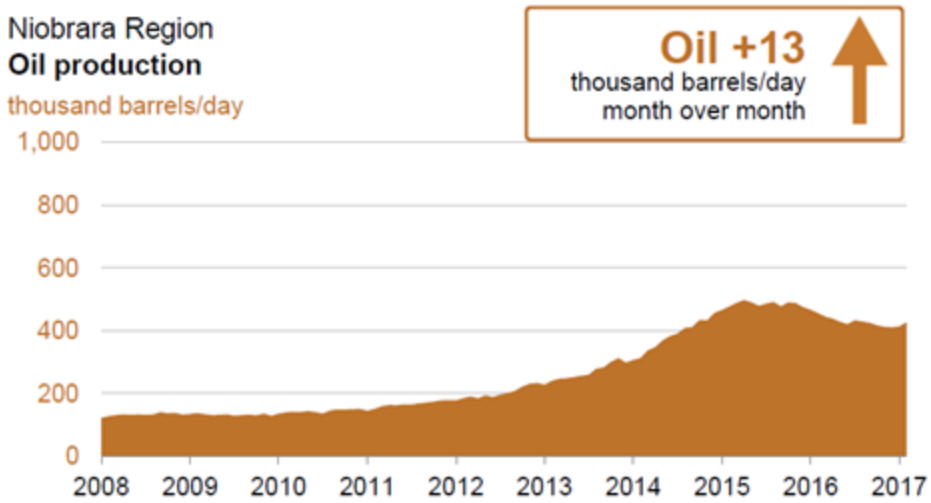
Crude Oil Production Change (000 barrels/day)

2016 (through Oct) - 2015



Niobrara Oil Drilling Productivity and Production





Source: EIA, Drilling Productivity Report, January 2017

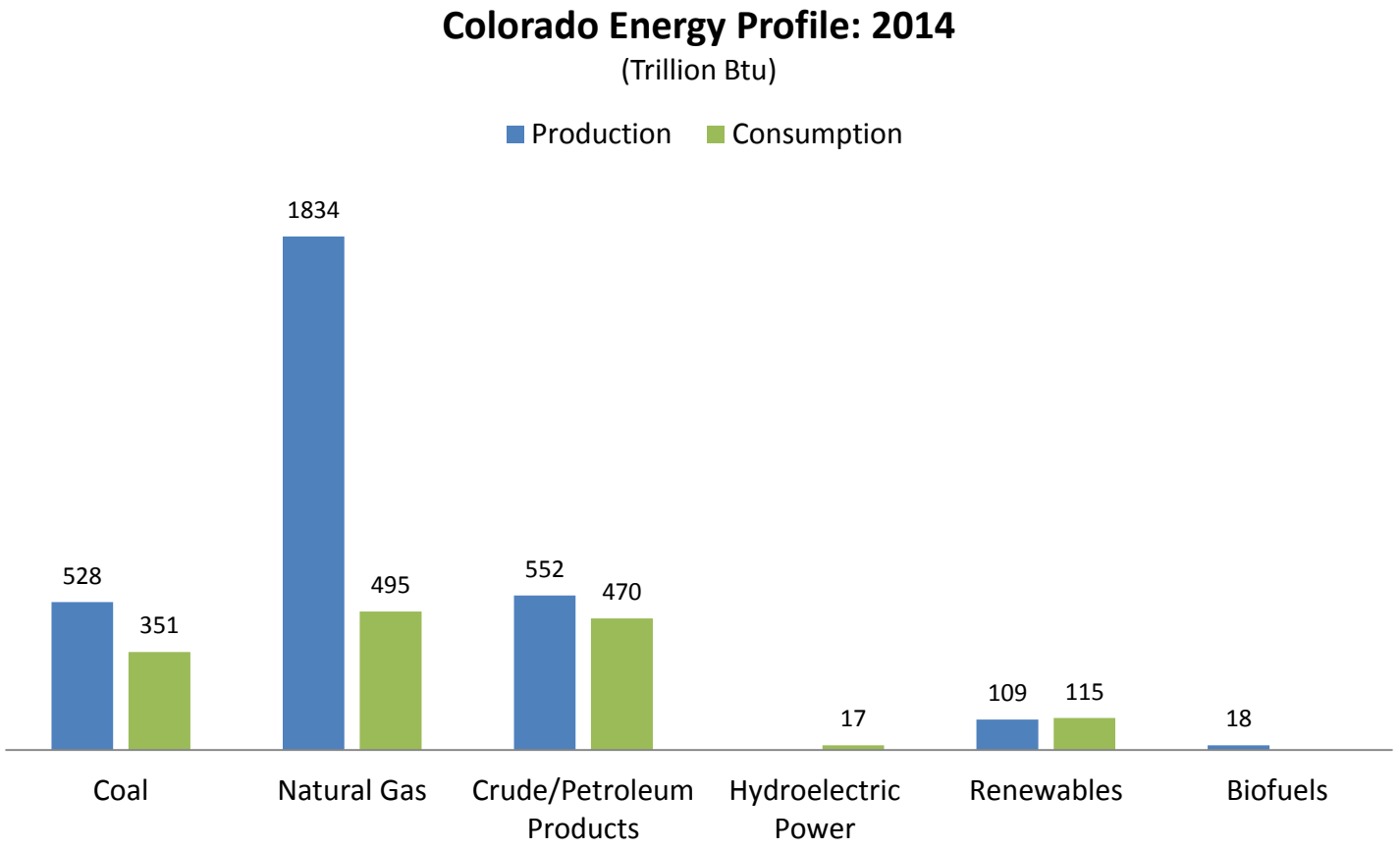
Rig count has continued to rebound since the second quarter of 2016.

Productivity per rig continues to increase.

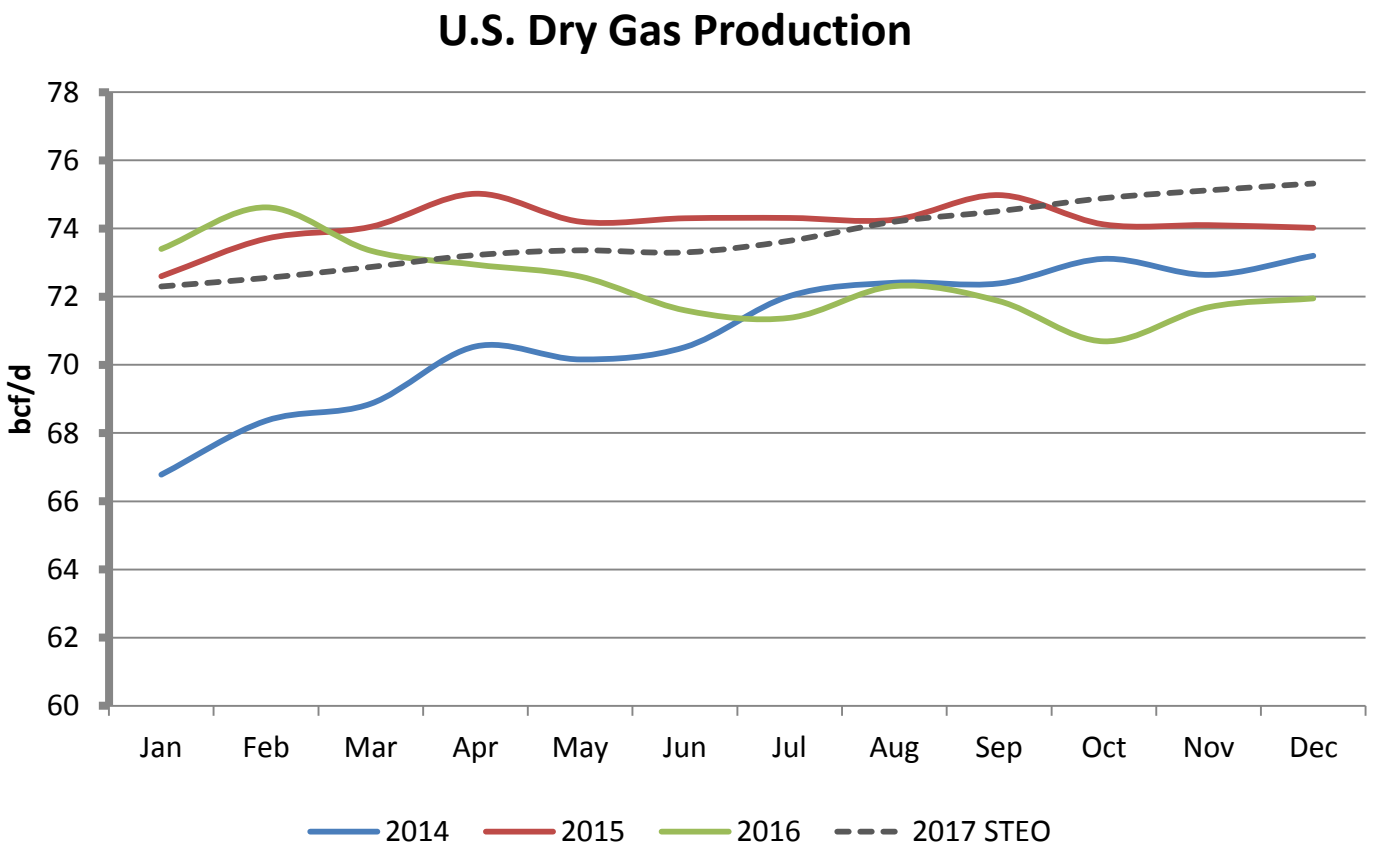
Oil production is expected to be 13 thousand barrels per day higher in February 2017 over January 2017.

Natural Gas Markets

Colorado is a net energy exporter mainly due to its natural gas production.

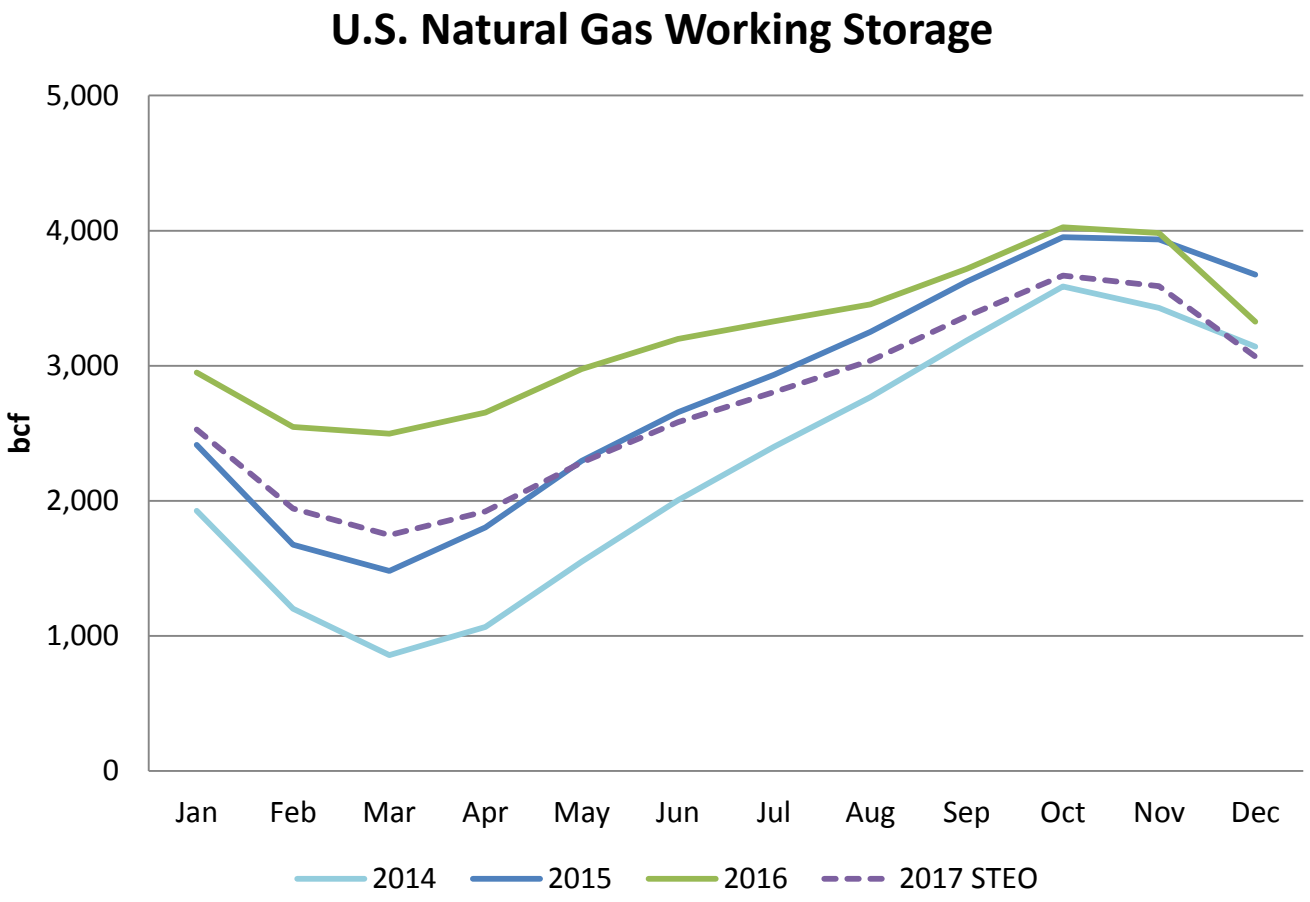


Total U.S. Dry Natural Gas Production Decreased in 2016 relative to 2015. However, EIA expects 2017 production to return to 2015 levels by the third quarter of 2017.



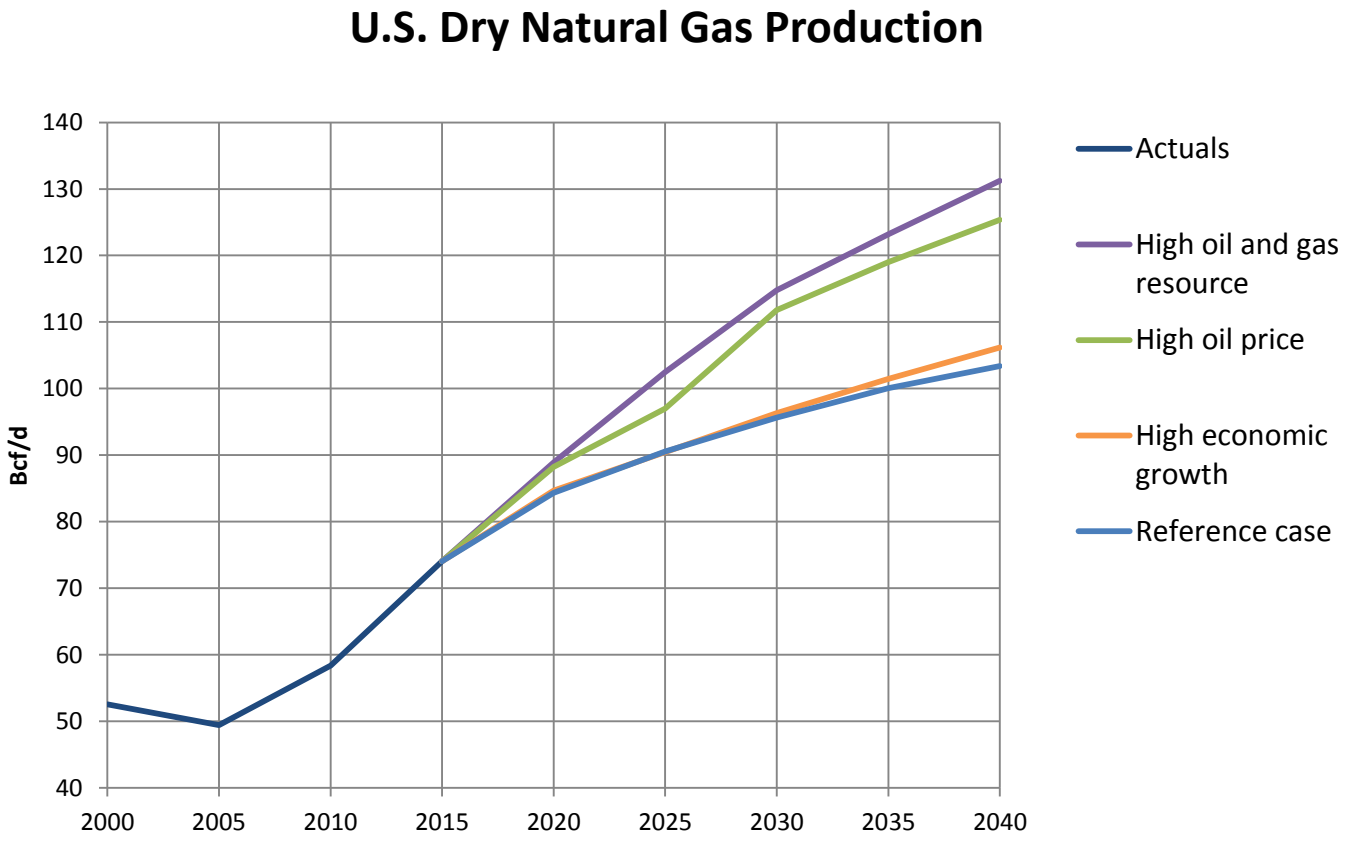
Source: EIA, Short-term Energy Outlook, January 2017

The lower 2016 production and continued strong demand pulls from the power generation sector throughout 2016 has helped to bring working natural gas storage levels back into balance.



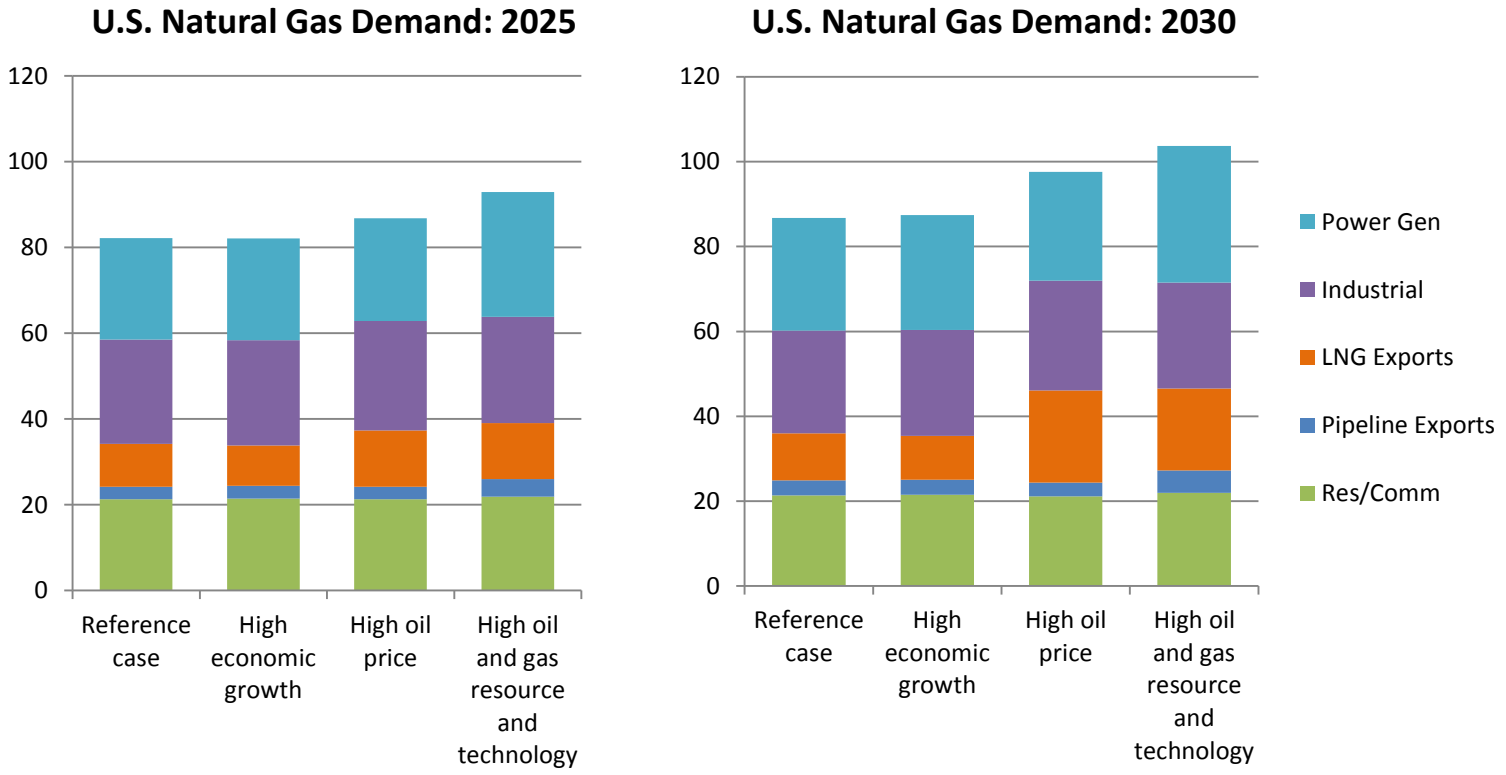
Source: EIA, Short-term Energy Outlook, January 2017

Alternative assumptions cause significant differences in U.S. natural gas production projections.



Source: EIA, Annual Energy Outlook, 2017

Natural gas demand sector growth is impacted by different drivers.

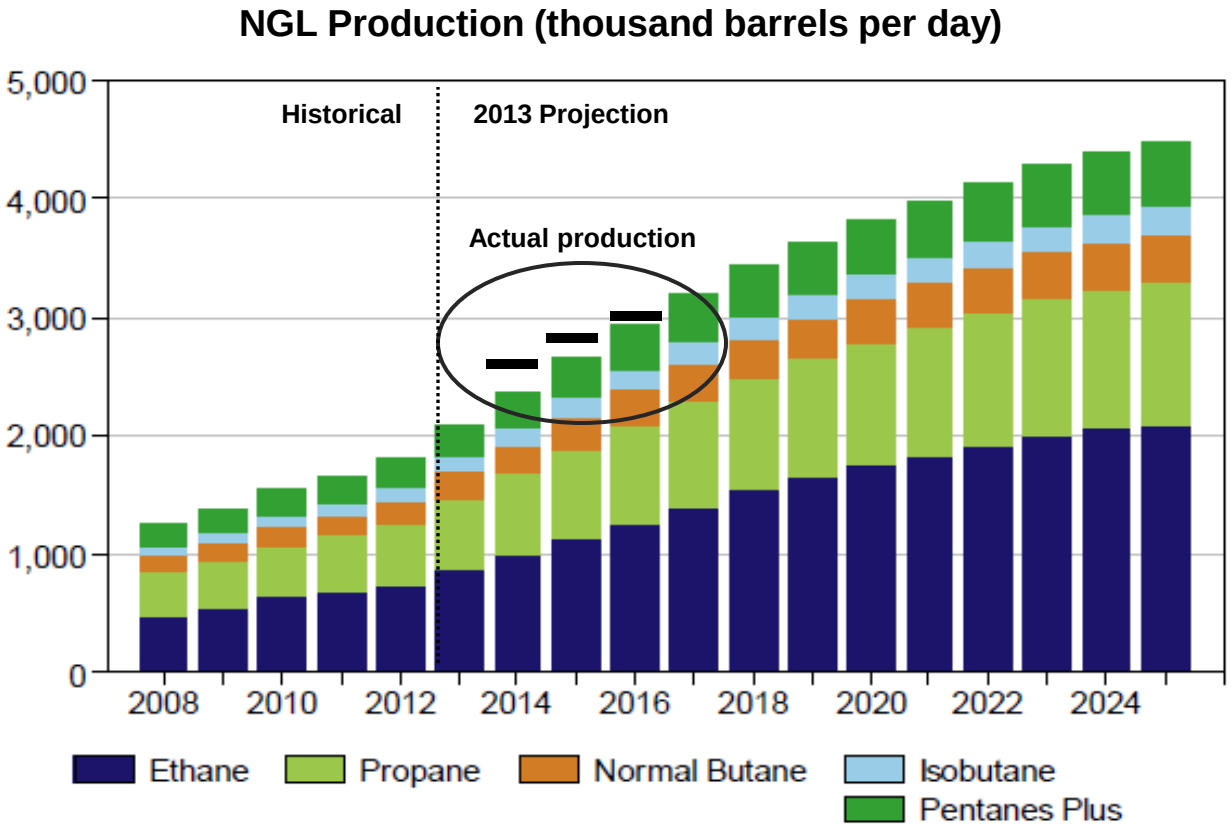


Source: EIA, Annual Energy Outlook, 2017

The largest demand growth opportunities include industrial, LNG exports and power generation. High oil prices will drive the most growth in LNG exports and industrial demand while high oil and gas resources will drive the most growth in power generation.

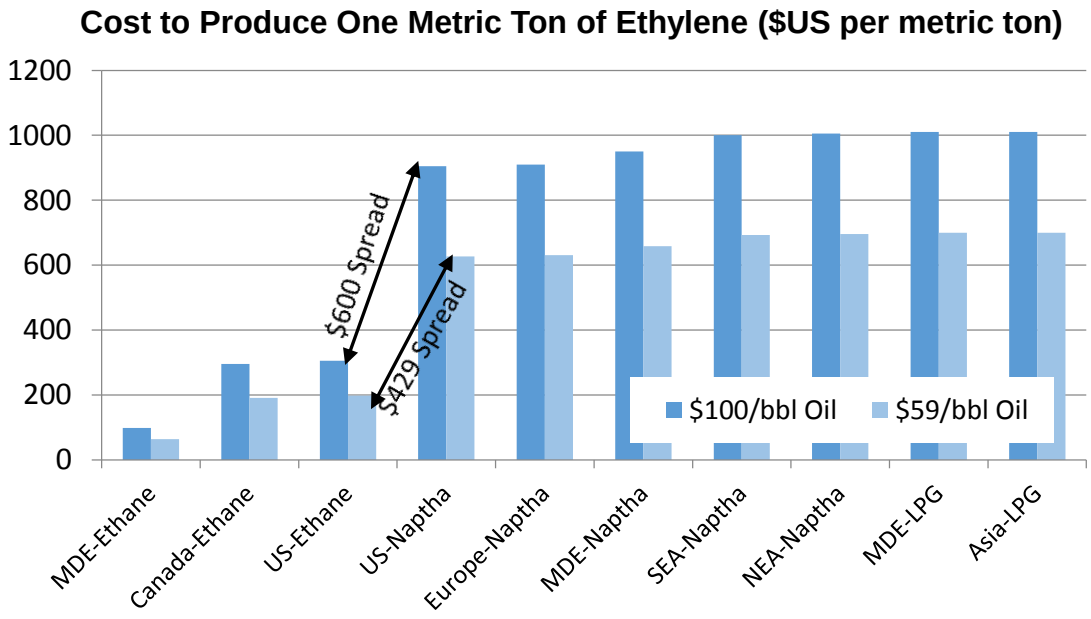
Industrial Specifics

Natural gas plant liquids production exceeds expectations.



Source: IHS, America's New Energy Future, September 2013; EIA, Natural Gas Plant Liquids Production, January 2017

The driver of U.S. competitiveness is the cost to convert ethane to ethylene versus naptha to ethylene.



Source: IHS- America's new energy future report, volume 3.

Petrochemicals, primary metals, nonmetallic mineral products and paper lead the natural gas intensity rankings.

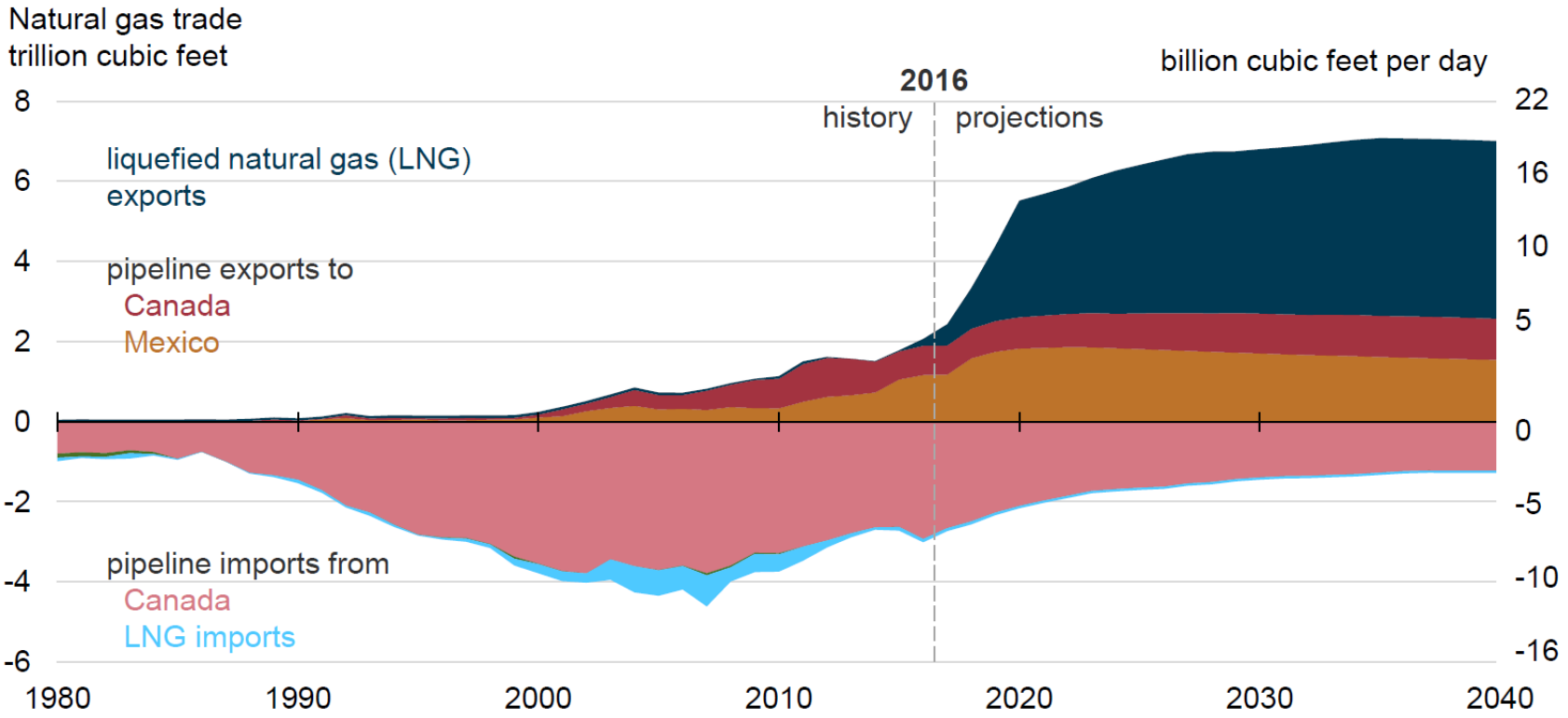
Natural Gas and Electricity Use by Manufacturing Sub-sectors in 2010						
Manufacturing Sub-sector	Natural gas consmption (billions of cubic feet)	NG Intensity: billions of cubic feet/$1 billion in constant 2010 output	Intensity rank	Net electricity use (million kWh)	Electricity use intensity: million kWh/$1 billion in constant 2010 output	Intensity rank
311 Food	**567**	**0.94**	**7**	**75,407**	**124.74**	**9**
312 Beverage and Tobacco Products	37	0.21	16	8,449	48.06	19
313 Textile Mills	**31**	**1.08**	**6**	**13,240**	**459.99**	**1**
314 Textile Product Mills	9	0.42	11	2,458	114.15	11
315 Apparel	2	0.16	18	1,069	83.44	15
316 Leather and Allied Products	1	0.11	19	243	26.14	21
321 Wood Products	**34**	**0.47**	**10**	**15,323**	**210.26**	**6**
322 Paper	**390**	**2.40**	**3**	**60,497**	**372.13**	**3**
323 Printing and Related Support	33	0.37	12	13,704	154.02	8
324 Petroleum and Coal Products	**892**	**1.93**	**5**	**47,014**	**101.70**	**12**
325 Chemicals	**2,192**	**3.41**	**1**	**131,932**	**205.52**	**7**
325 Plastics and Rubber Products	101	0.52	9	45,797	234.20	5
327 Nonmetallic Mineral Products	**266**	**2.65**	**2**	**32,576**	**324.68**	**4**
331 Primary Metals	**550**	**1.99**	**4**	**117,284**	**423.51**	**2**
332 Fabricated Metal Products	**159**	**0.52**	**8**	**37,206**	**121.61**	**10**
333 Machinery	70	0.21	15	20,386	61.34	17
334 Computer and Electronic Products	41	0.09	21	29,503	66.00	16
335 Electrical Equip., Appliances, and Components	35	0.32	13	10,689	99.17	13
336 Transportation Equipment	125	0.16	17	38,832	50.52	18
337 Furniture and Related Products	13	0.23	14	4,960	88.89	14
339 Miscellaneous	16	0.10	20	7,598	47.01	20
Durables	1,309	0.49		314,357	117.26	
Non-durables	4,255	1.77		399,810	166.31	
Total	5,564	1.09		714,167	140.45	

Sectors in grey and bold are natural gas intensive sectors

Soources: IHS CERA, March 2014, US Industrial Gas Demand – the Striking Turnaround ProgressesIHS, 2015. US Industry Service, Output by Manufacuring Sector. United States Deparment of Energy, Energy Information Administration, 2010, Manufacturing Energy Consumption Survey, Table 1.1 First Use of Energy for All Purposes (Fuel and Nonfuel) http://www.eia.gov/consumption/manufacturing/data/2010/.

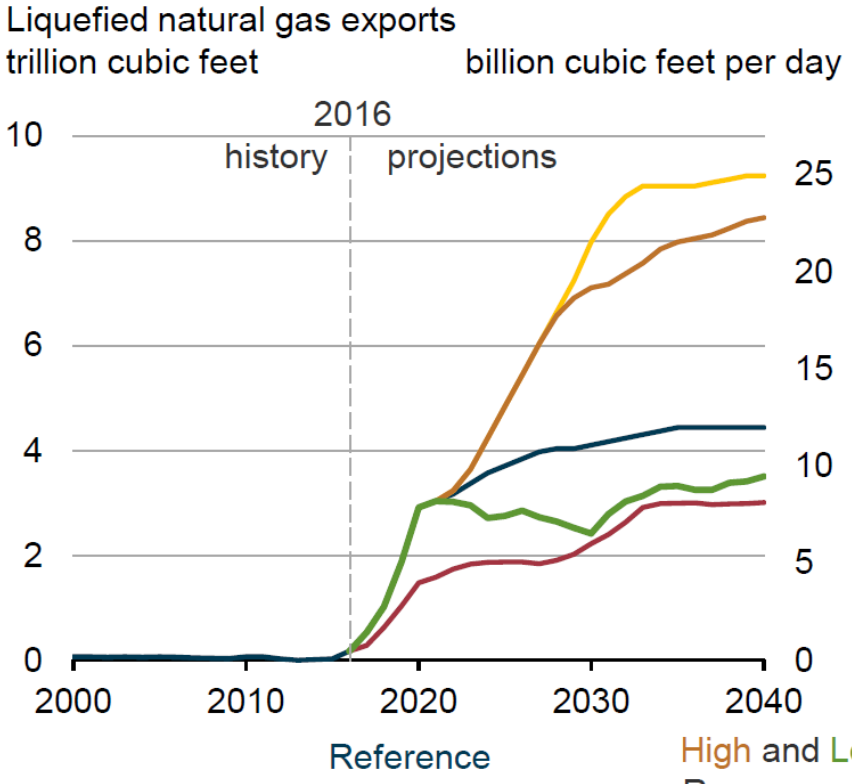
Natural Gas Trade

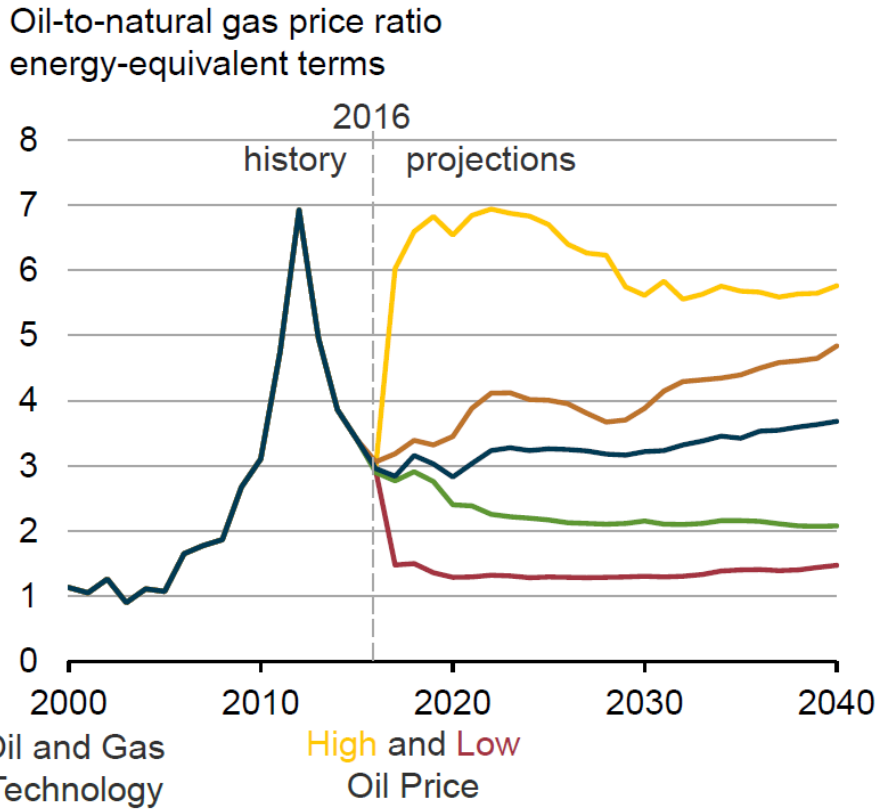
Increased natural gas trade is driven by LNG export and pipeline exports to Mexico.



Source: EIA, Annual Energy Outlook 2017

Global demand for LNG, oil, and global and domestic natural gas prices impact expected future U.S. LNG export volumes.

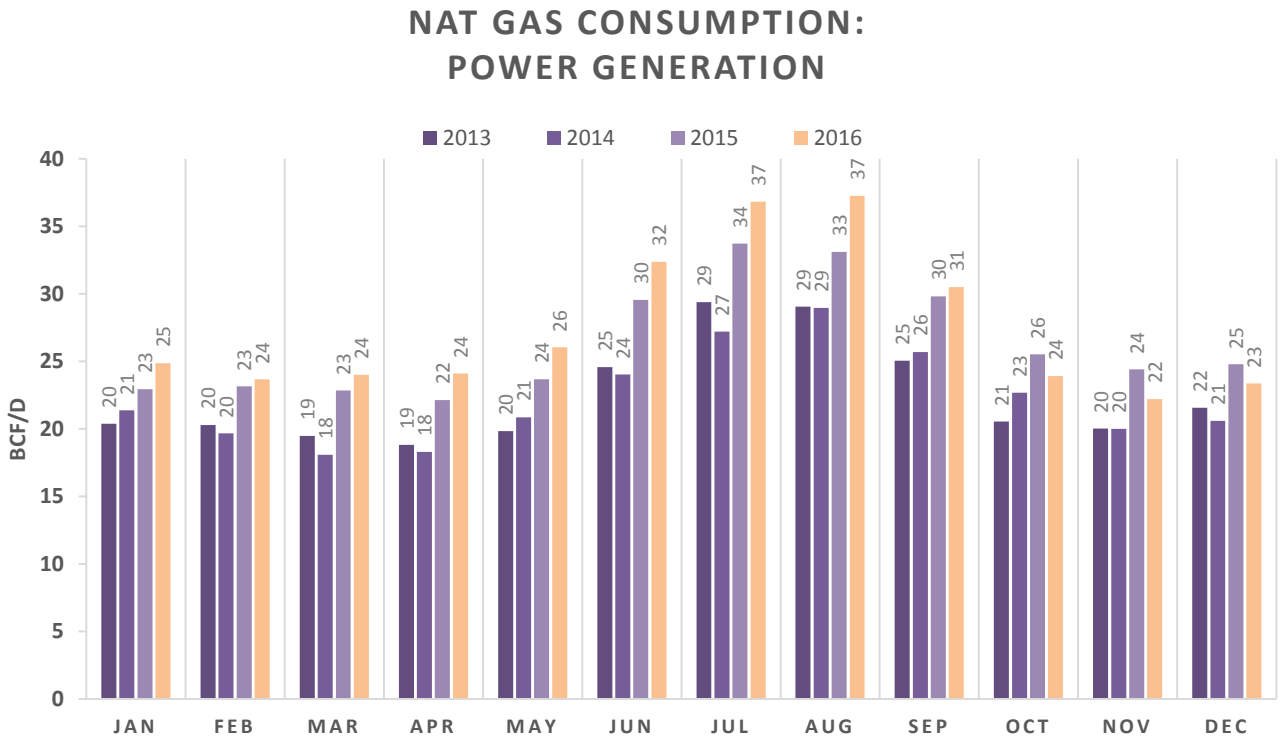




Source: EIA, Annual Energy Outlook 2017

Power Generation

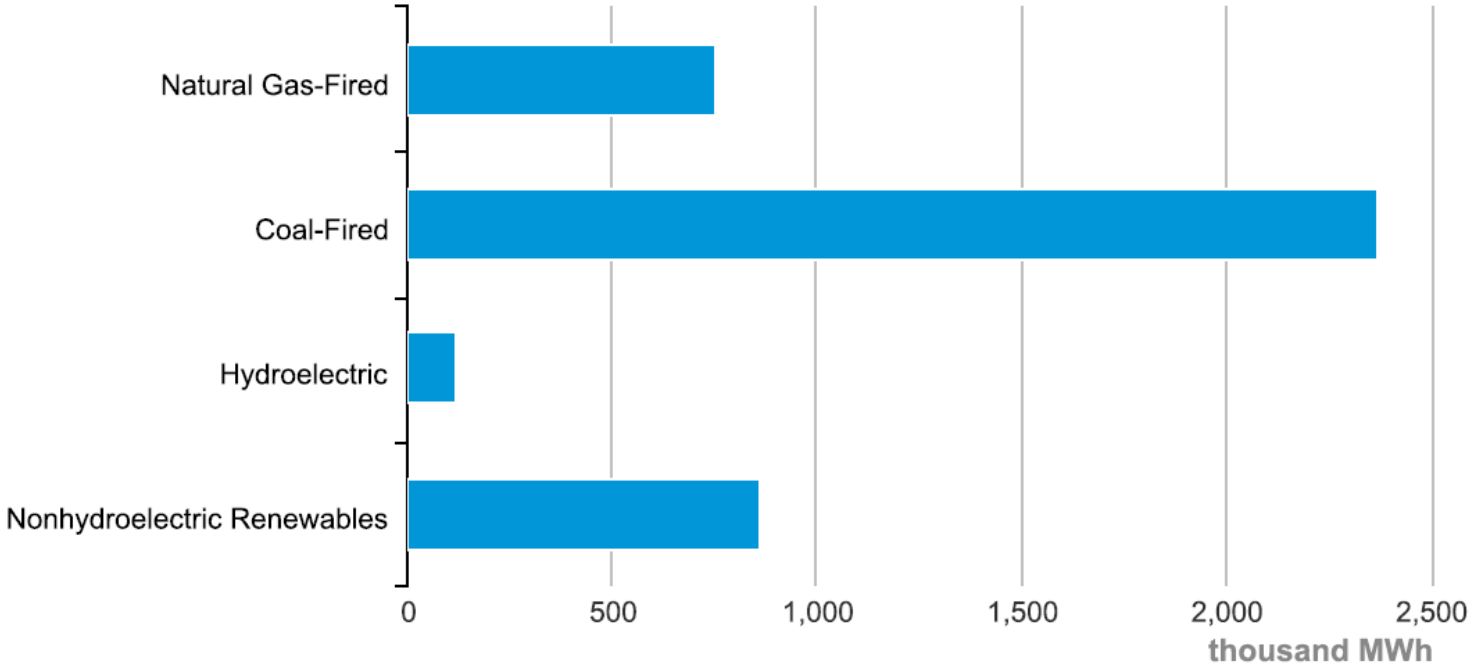
Natural gas consumed for power generation was the highest on record in 2016 at 27.5 Bcf/d.



Source: EIA, Short-term Energy Outlook, January 2017

Coal-fired power generation was highest in CO, with non-hydroelectric renewables coming in second.

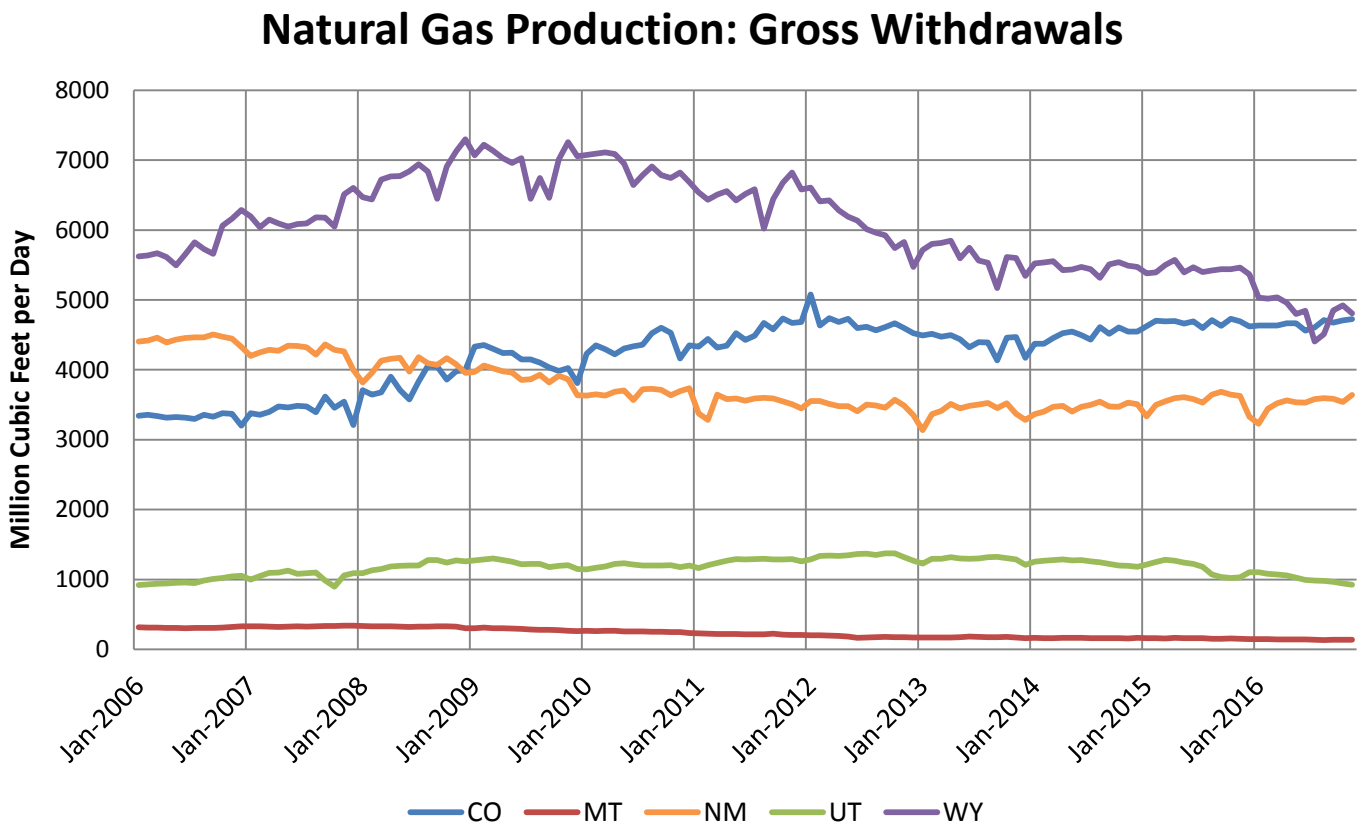
Colorado Net Electricity Generation by Source, Oct. 2016



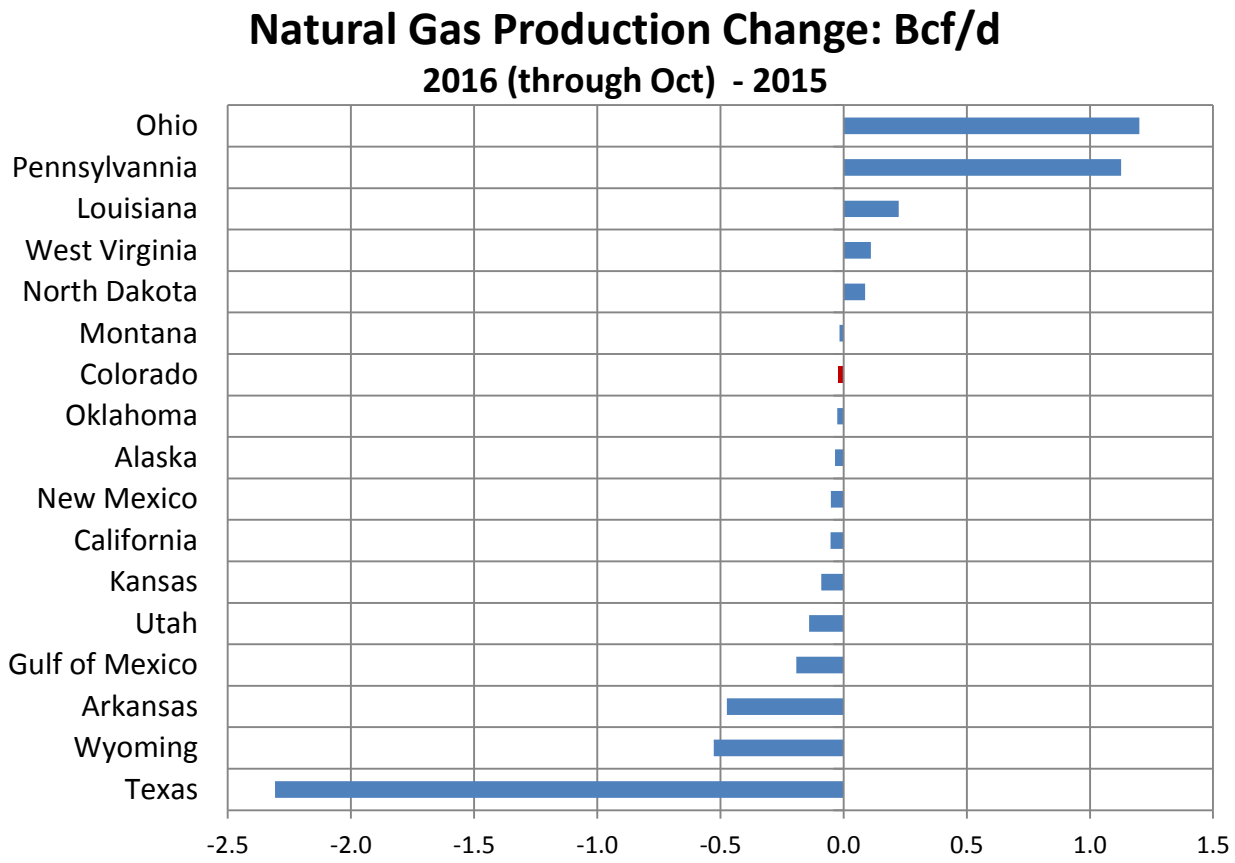
Source: EIA, Electric Power Monthly

Colorado Natural Gas Supply

Colorado natural gas production in 2016 remained flat to 2015 levels.

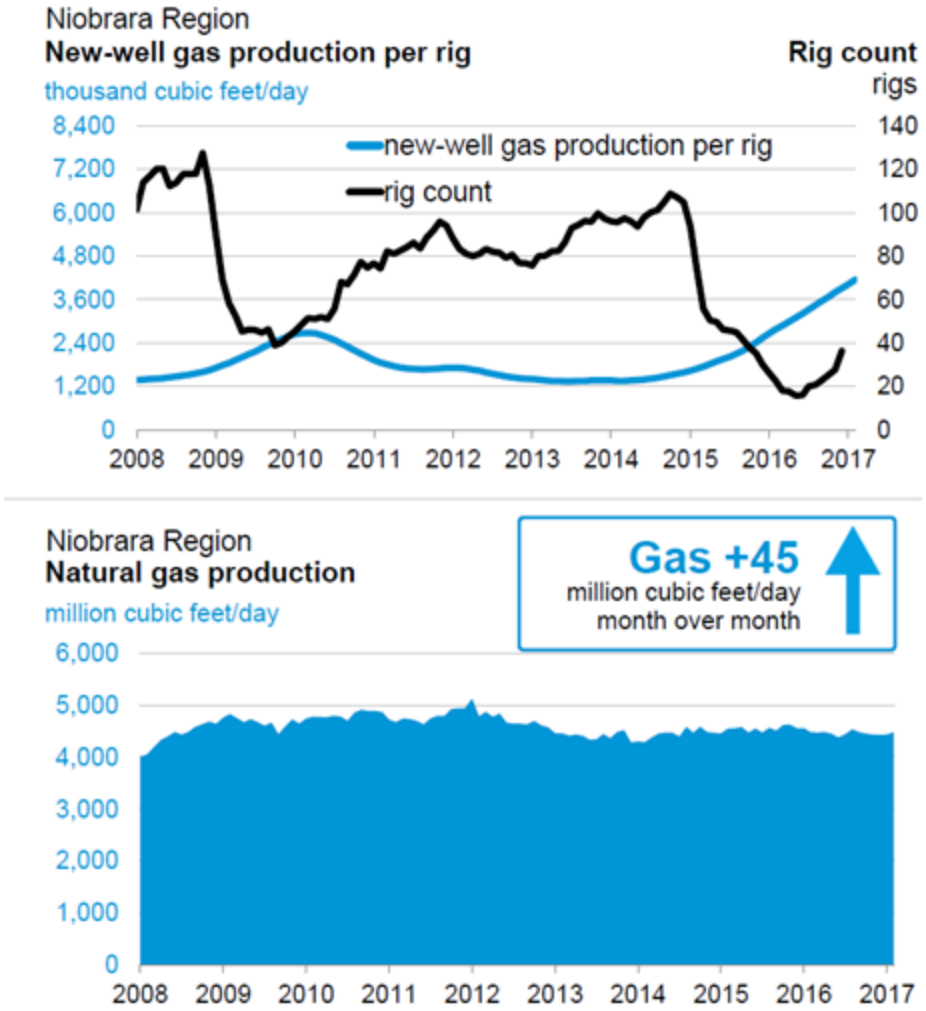


Large year over year natural gas production declines were realized in Arkansas, Wyoming and Texas in 2016 relative to 2015.



Source: EIA, Natural Gas Production, January 2017

Niobrara Natural Gas Drilling Productivity and Production



Source: EIA, Drilling Productivity Report, January 2017

Rig count has started to rebound since the second quarter of 2016.

Productivity per rig continues to increase.

Natural gas production is expected to be 45 million cubic feet per day higher in February 2017 over January 2017.

Thank you.