

Rockin' the Rockies

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DUG DENVER

MAY 15, 2019

What is a PetroNerd?



About PetroNerds and Our Services



- Boutique energy analytics and advisory firm based in Denver, CO
- Personalized, data-driven advisory services
- Help our clients understand how the oil market impacts their business
- Provide data and actionable insights needed, not reports and projections that are never read
- HedgeAware – Interactive, cloud-based solution for quickly assessing the hedging strategies and past performance of U.S. oil and gas producers on a single, easy to use platform

Forthcoming Report on Productivity

“Completion Design Changes and the Impact of US Shale Well Productivity”

<http://www.petronerds.com/wp-content/uploads/2017/11/OIES-PetroNerds-Completion-Design-and-Productivity-2017.pdf>



THE OXFORD INSTITUTE FOR ENERGY STUDIES
A RECOGNIZED INDEPENDENT CENTRE OF THE UNIVERSITY OF OXFORD

November 2017

Completion Design Changes and the Impact on US Shale Well Productivity

I. Introduction

The 2014 oil price downturn caused the US unconventional oil and gas industry to undertake an array of cost-cutting measures affecting both capital and operational expenditures. Focus shifted towards operational efficiency, well design, and the maximization of each dollar spent, and away from the gold rush mentality that had characterized the former \$100/b price environment. Perhaps counterintuitively, the emphasis on efficiency has helped to propel consecutive years of well productivity gains¹ across several shale plays. These gains have continued into 2017, even as the industry still grapples at profitability. This paper seeks to build on our previous work – including the 2016 OIES paper *Unravelling the US Shale Productivity Gains* – on well productivity gains. Specifically, it examines the continued productivity growth across multiple US shale plays and attempts to identify the factors contributing to this growth, as well as address some of the potential economic constraints.

Drilling, completing, and producing shale or tight oil and gas wells has always been both an art and a science. Over the past three years, in a sub-\$60 oil price environment, this has never been more true. A combination of science, technological advancement, and brute force experimentation has led to broad productivity gains across the shale patch. In the long run, the shale industry will continue to improve well productivity, but in the short run, economic constraints could impact productivity gains as operator profitability faces renewed scrutiny. But – geologically and technologically speaking – there is certainly room to grow.

We have interviewed engineers and technical experts from a wide range of industry fields over the past year to ascertain exactly what factors are driving increases in well productivity. The jury remains out. It is quite apparent that there are many known unknowns regarding sub-surface science, and the industry is actively trying to unlock these. There is much room to grow. Well productivity can and will continue to improve as these enigmas are solved.

Efficiencies have been found in nearly all stages of the drilling and completions process (although it has been the service companies who have borne the brunt of pricing concessions). One example is the reduction in spud to total depth times, coupled with increased drilling precision. The speed and cost at which wells are drilled, from spud to total depth, is a mere fraction of what it was in 2014. Bakken and Eagle Ford wells can be drilled in under a week. Some Denver-Julesburg Basin wells are drilled in less than three days. Despite the more rapid pace, precision has improved.² Geosteering advances have

Energy Insight: 21

Triha Curtis, Co-Founder Petronerds & OIES Research Associate and Benjamin Montalbano, Co-Founder Petronerds

The contents of this paper are the authors' sole responsibility. They do not necessarily represent the views of the Oxford Institute for Energy Studies or any of its Members.



HedgeAware – By PetroNerds

is a growing sense that the tide is finally turning; investors are now beginning to look for profits in publicly traded operators, with the spotlight being on balance sheet stabilization, capital discipline, and ultimately free cash flow. How strong this investor sentiment is and will be over the next few quarters is not yet known. In 2015, the activist investor David Einhorn singled out Pioneer Resources as a ‘mother-fracker’, basically asserting that the industry was a Ponzi scheme and that it was ‘all hat and no cattle’. Pioneer’s stock was impacted, but rebounded and has since recovered. More impacted by recent discussions around their gas-to-oil ratio (GOR). But lately more have come out of the woodwork to discuss operator performance and free cash flow. This article in the Wall Street Journal aptly captured the dilemma with the title Shale Producers (Not Cash). Later this summer, BHP Billiton agreed to step out of US shale entirely, due to pressure.⁴

Recently, Schlumberger reiterated some concerns of US shale operators in its third quarter call.

“In America land where the E&P companies have added significant CapEx over the past year, the lion’s share is so far falling short of expectations, driven by supply chain inflation, operational issues and the need to step out from the Tier 1 acreage. This has led to a moderating investment in where the previous pursue to production growth is now being balanced out with an equal focus on solid financial returns and operating within cash flow.

Operation can be seen in the flattening trend of the U.S. land rig count during the third quarter and it is listed in our customer’s 2018 activity outlook. The more tempered activity outlook for U.S. land with the short cycle nature of the business has an immediate impact on the outlook for production which for 2017 and 2018 has been revised down by 100,000 and 500,000 barrels per day respectively. This clearly has a material impact on the global supply and demand balance.

Schlumberger Q3 Earnings Call, Seeking Alpha, 20 October 2017.



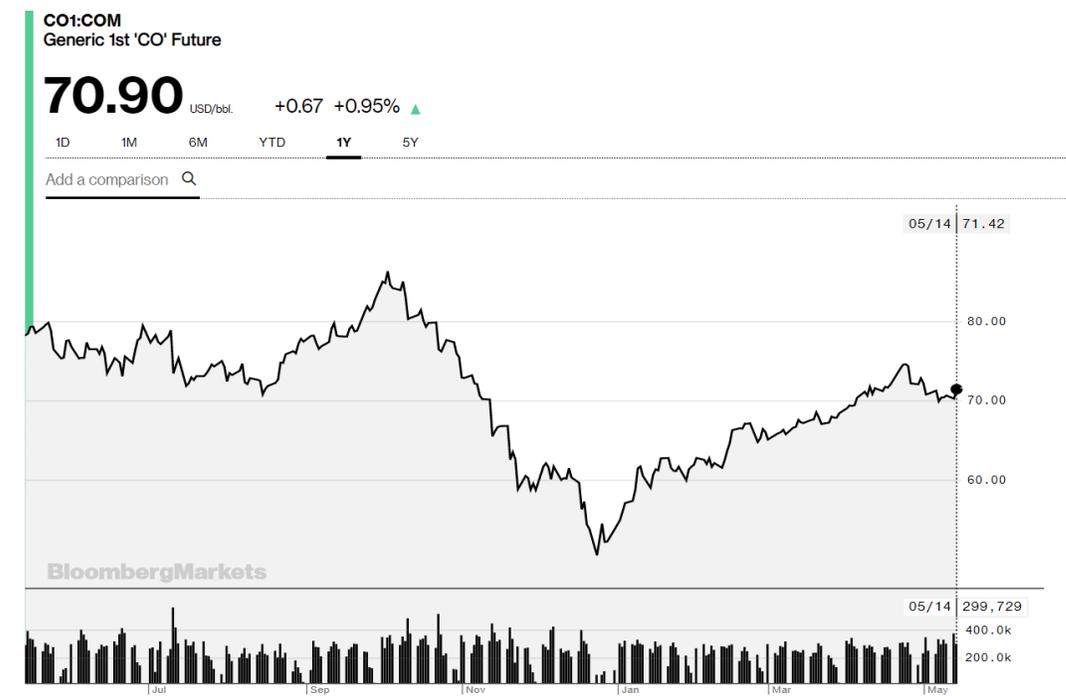
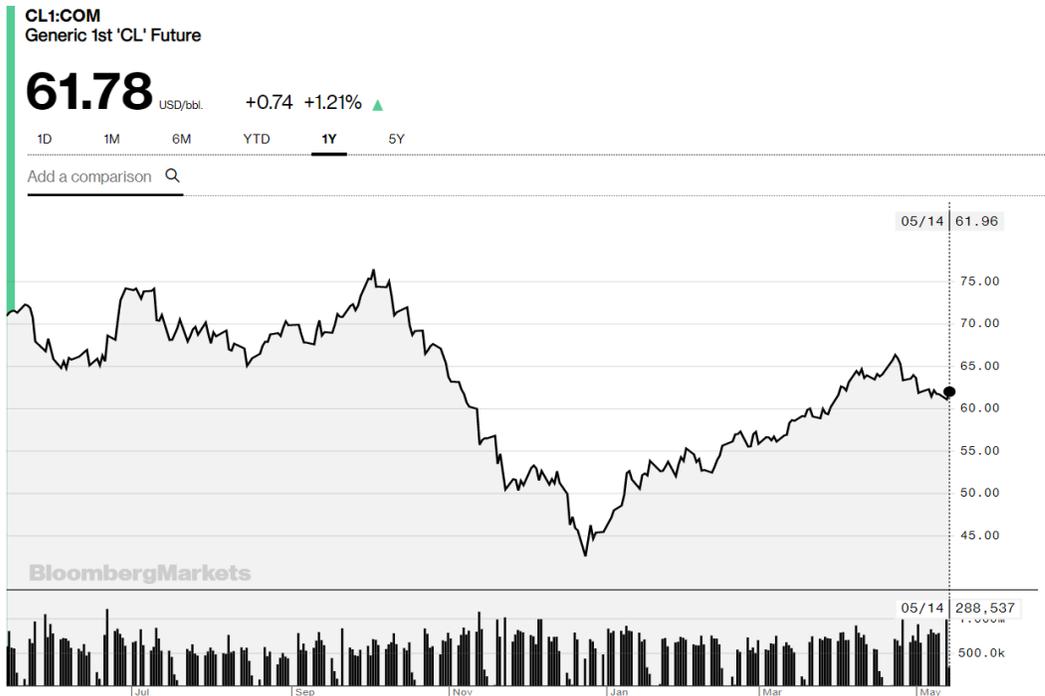
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Oil Market

Oil Prices



Supply, Supply, Supply

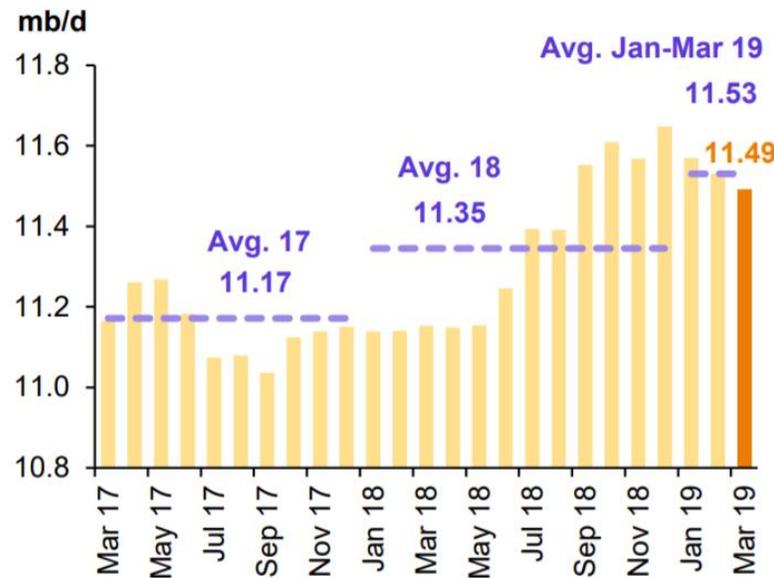
Saudi 9.8 mbd (from 11.1 plus mbd)

Russia 11.5 mbd (from 11.7 mbd)

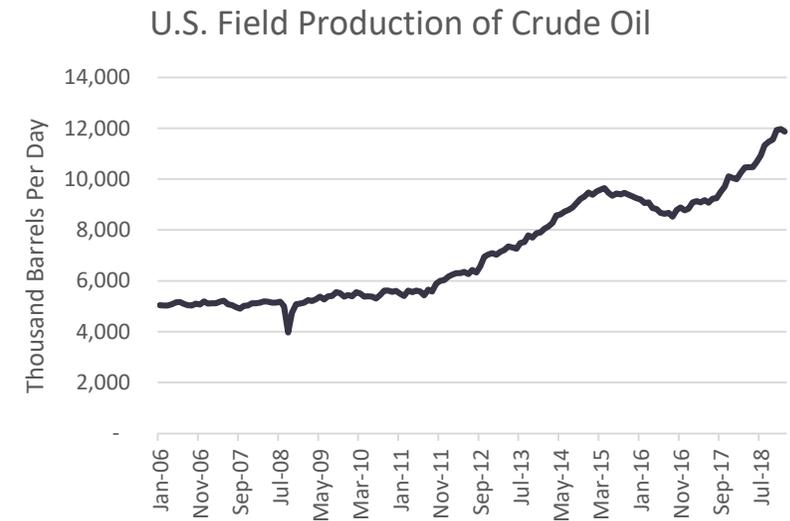
US 11.9 mbd

	2017	2018	3Q18	4Q18	1Q19	Jan 19	Feb 19	Mar 19	Mar/Feb
Algeria	1,047	1,042	1,059	1,055	1,021	1,019	1,026	1,018	-7
Angola	1,634	1,505	1,470	1,497	1,449	1,444	1,448	1,454	7
Congo	252	318	320	320	327	315	321	344	23
Ecuador	530	519	526	517	522	520	524	524	0
Equatorial Guinea	133	125	124	116	119	112	121	124	3
Gabon	200	186	184	185	204	195	204	214	9
Iran, I.R.	3,813	3,553	3,603	2,982	2,718	2,731	2,726	2,698	-28
Iraq	4,446	4,550	4,606	4,668	4,626	4,712	4,647	4,522	-126
Kuwait	2,708	2,746	2,797	2,774	2,714	2,723	2,709	2,709	-1
Libya	811	952	892	1,059	963	883	902	1,098	196
Nigeria	1,658	1,719	1,704	1,741	1,730	1,733	1,723	1,733	11
Saudi Arabia	9,954	10,311	10,422	10,749	10,028	10,179	10,118	9,794	-324
UAE	2,915	2,986	2,982	3,234	3,067	3,075	3,068	3,059	-9
Venezuela	1,911	1,354	1,272	1,191	966	1,151	1,021	732	-289
Total OPEC	32,013	31,865	31,961	32,087	30,454	30,793	30,557	30,022	-534

Notes: Totals may not add up due to independent rounding.
Source: OPEC Secretariat.

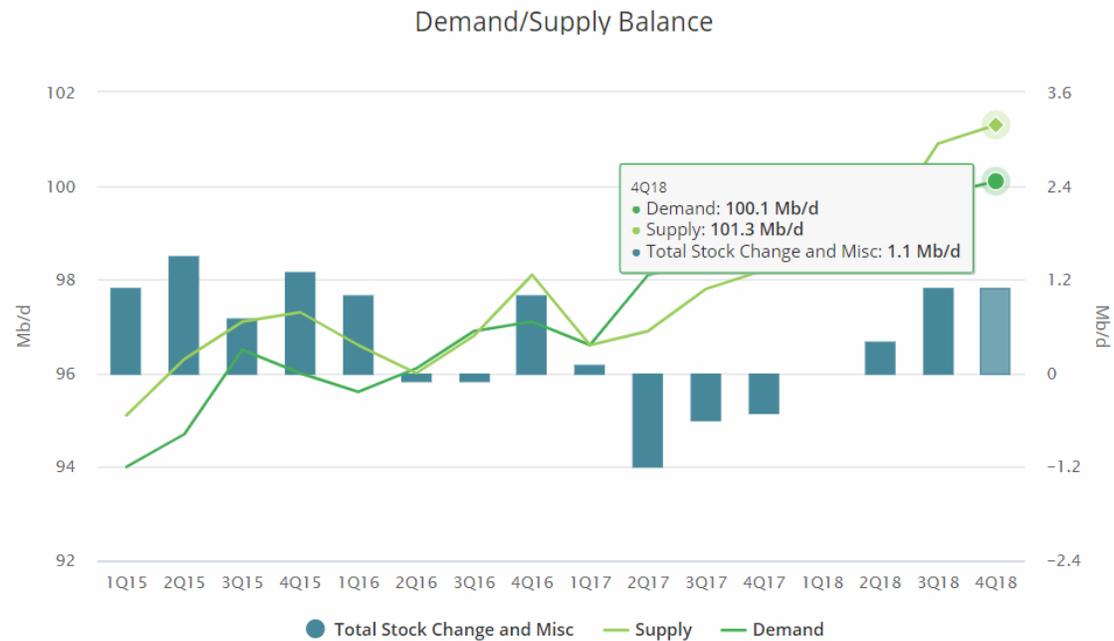


Sources: Nefta Compass and OPEC Secretariat.



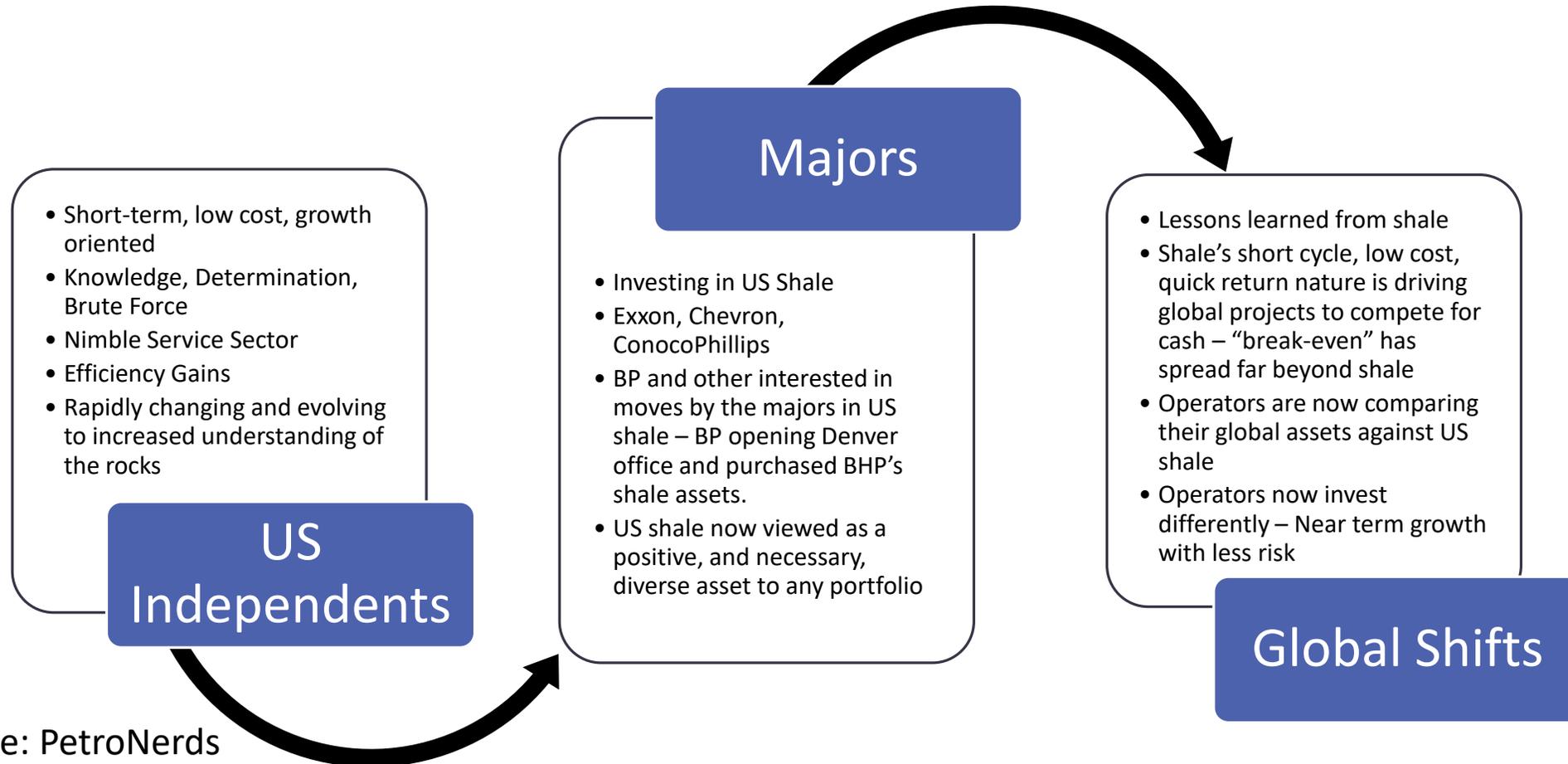
Source: EIA

IEA Q4 2018 Oil Supply and Demand



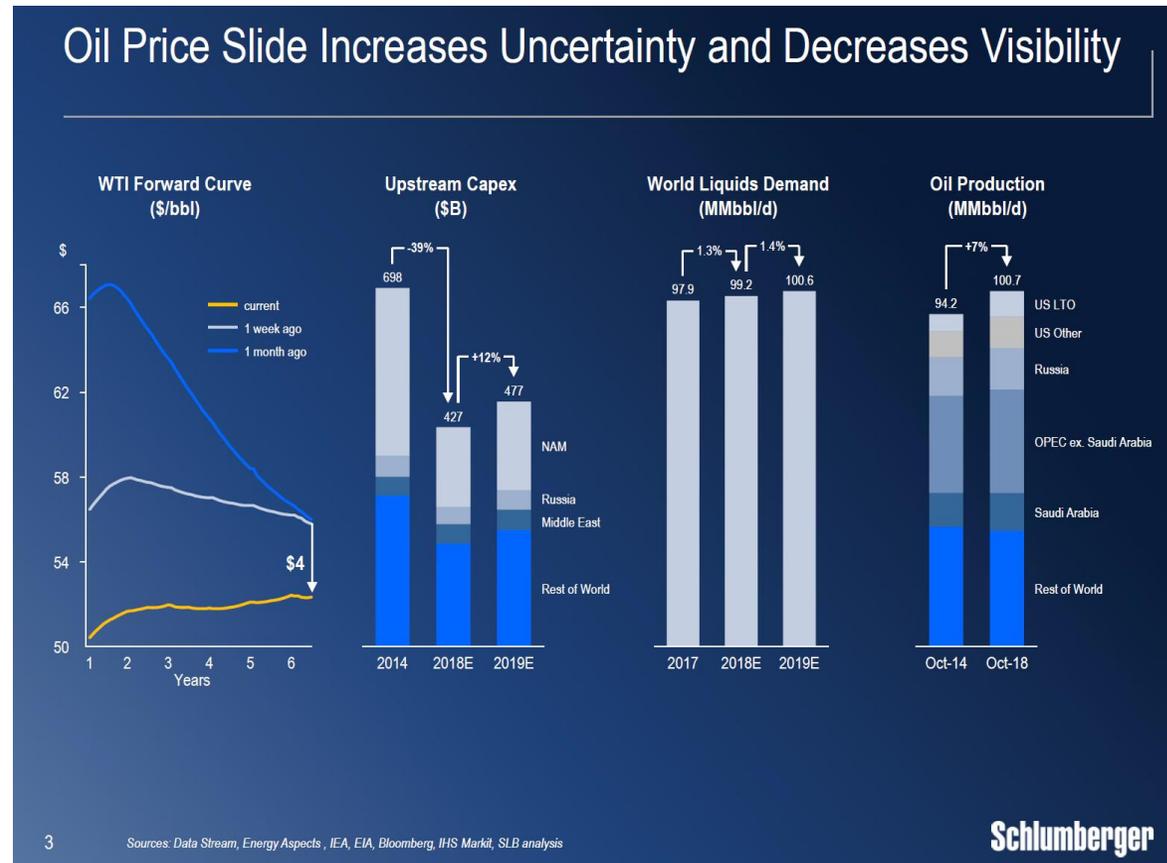
Source: EIA

Shale Model Inspiring Broader Changes



Source: PetroNerds

But Some Still Focused on Investment Shortfalls



Shale Market Dynamics

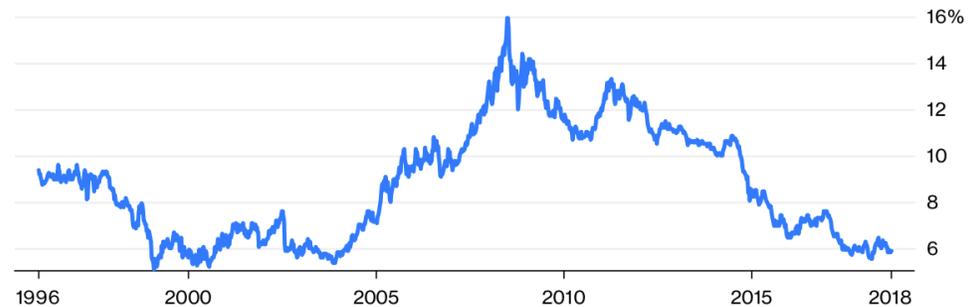


Energy's Weighting in the S&P 500 is Now Just 5 Percent

Little Big Oil

Energy's weighting in the stock-market is at 2004 levels, when global demand was one-sixth lower and Brent crude averaged just \$38

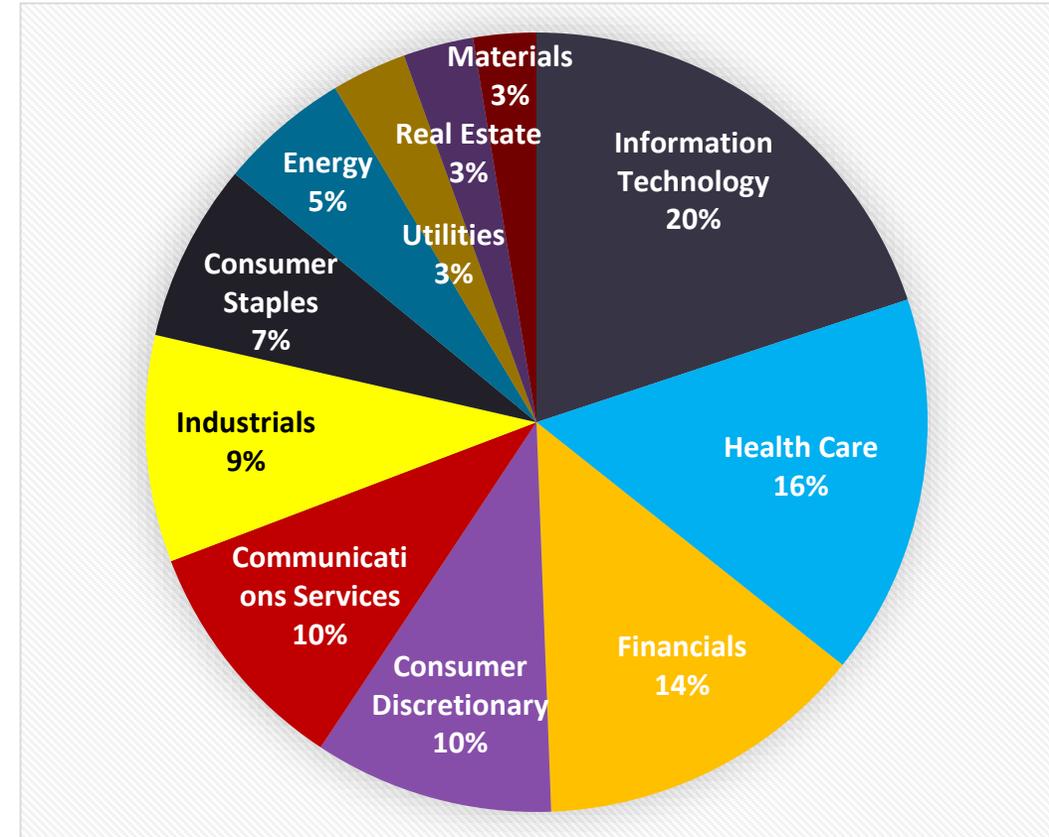
Energy's weighting in the S&P 500



Source: Bloomberg

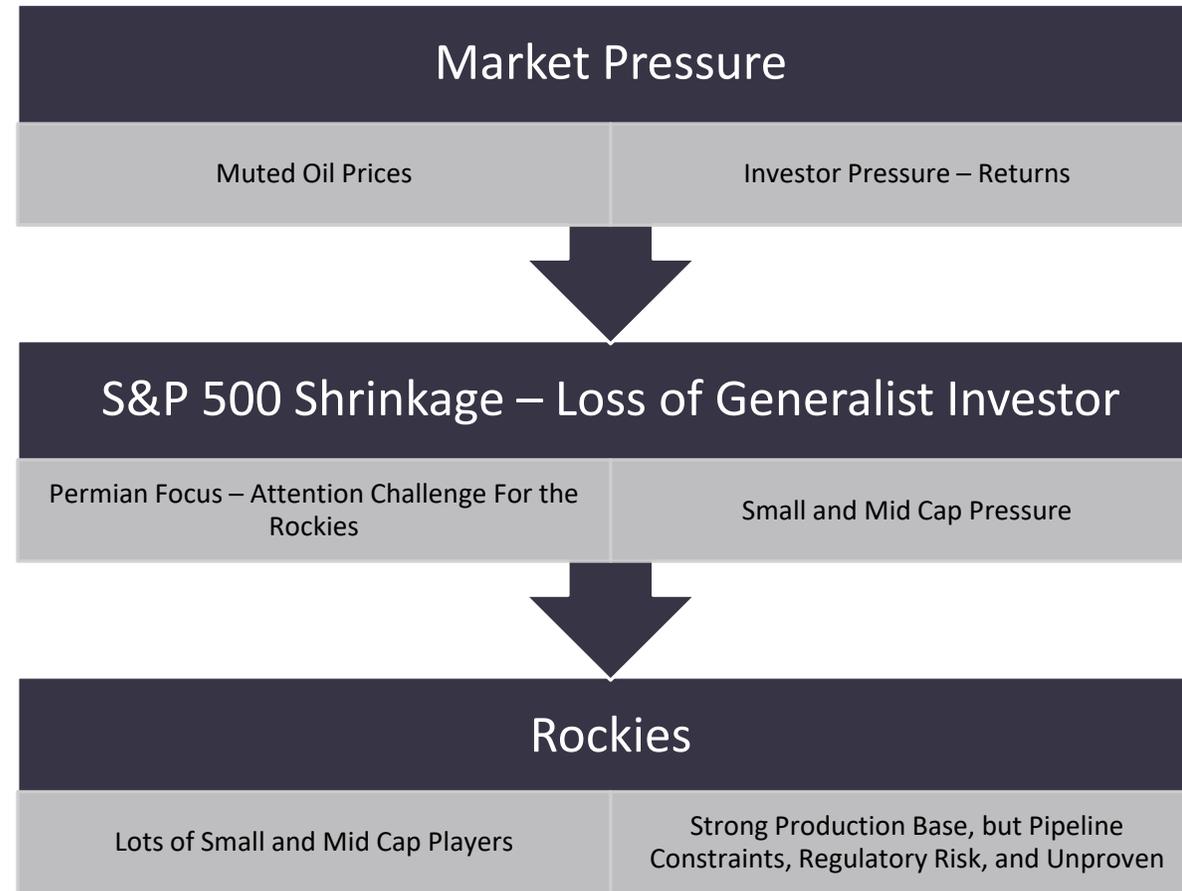
BloombergOpinion

Source: Bloomberg, September 21, 2018

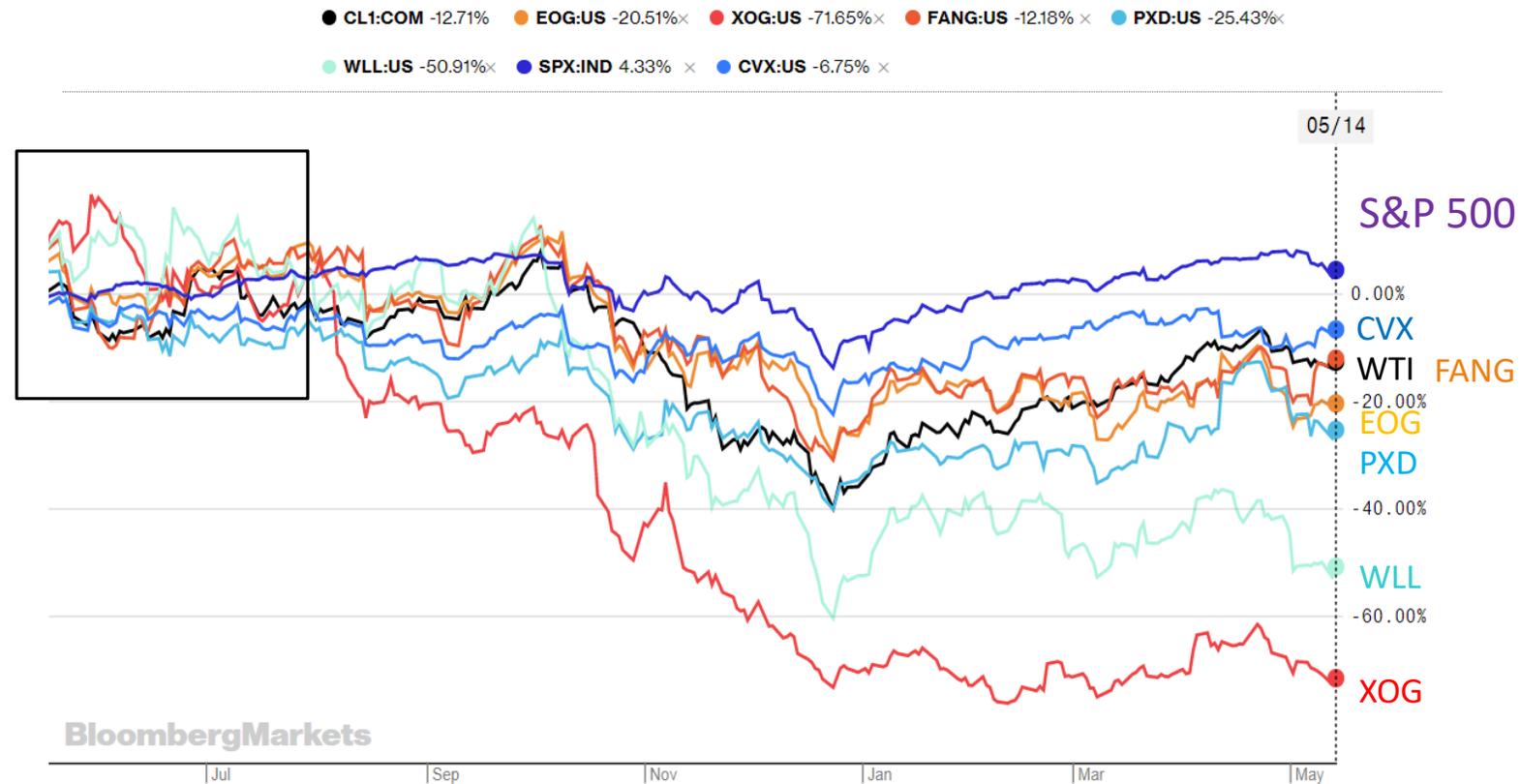


Source: The Balance, November 2018

Considering Market Pressure When Analyzing the Rockies



Weight on the Rockies



Evolution of Investor Pressure

Pre 2014 – Need More than the Bakken, Double Down in the Bakken, Find a New Bakken

2014 Oil Price Correction – Pump and Produce, Lots of Sand and Lots of Water, High IPs, Give me Cash Flow

2015 to 2016 – PERMANIA, Prices are Sub \$60 but Buy Anything and Everything, Dry Powder, No Production, at Any Cost!

- strict drilling and leasing requirements

2017 – Start Focusing on Cash Flow!

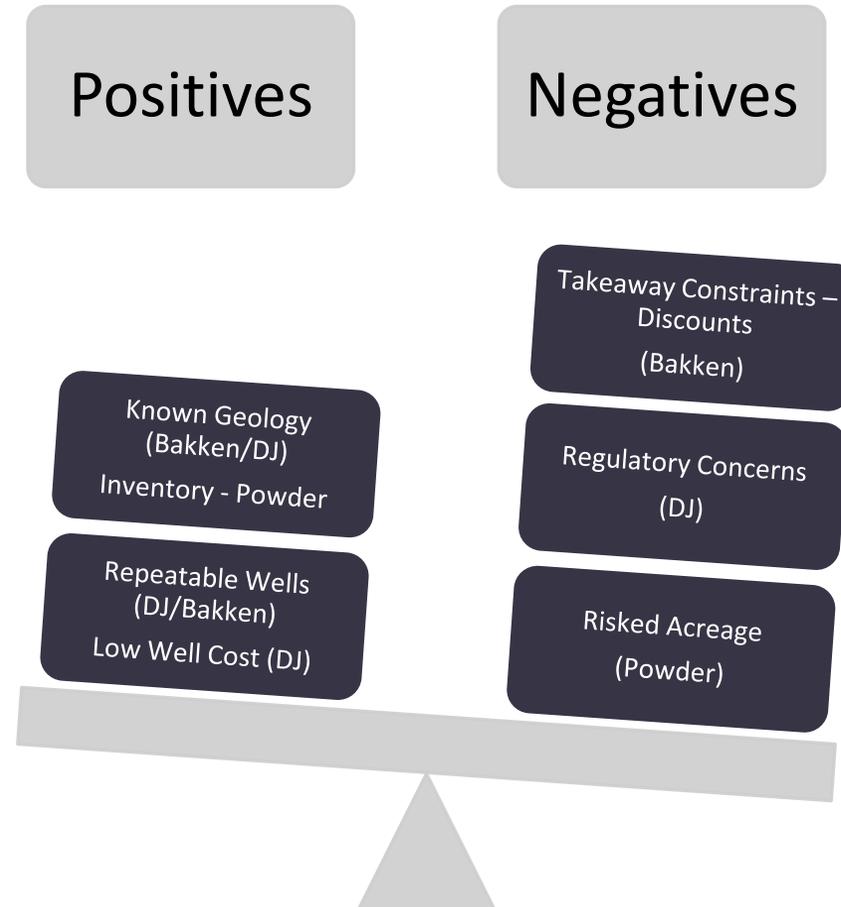
2018 – Investor pressure on returns continues to build, oil prices move up, but stock prices are muted, get free cash flow positive or at the very least free cash flow neutral

- want inventory and scale, but we might penalize if you do this

2019 – Oil went to \$44 on Christmas eve! Show me that free cash flow, production growth, inventory, mergers, dividends, share buybacks, and all money returned shareholders above \$50

- Favoring majors and short cycle

Weighing the Rockies



Last Quarter – Even EOG....

Bloomberg Opinion

Business

How Unloved Are Frackers? Even the Best Got Called Out

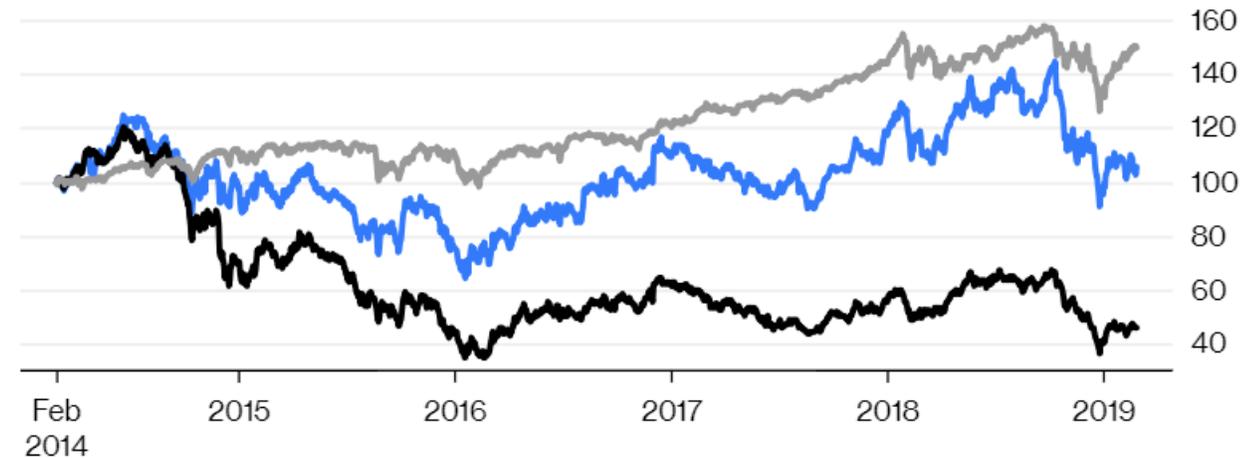
EOG Resources is beating its rivals but not the market. It may be time to give investors another reason to buy.

By [Liam Denning](#)
February 27, 2019, 11:29 AM MST

Winning The Heats But Losing The Race

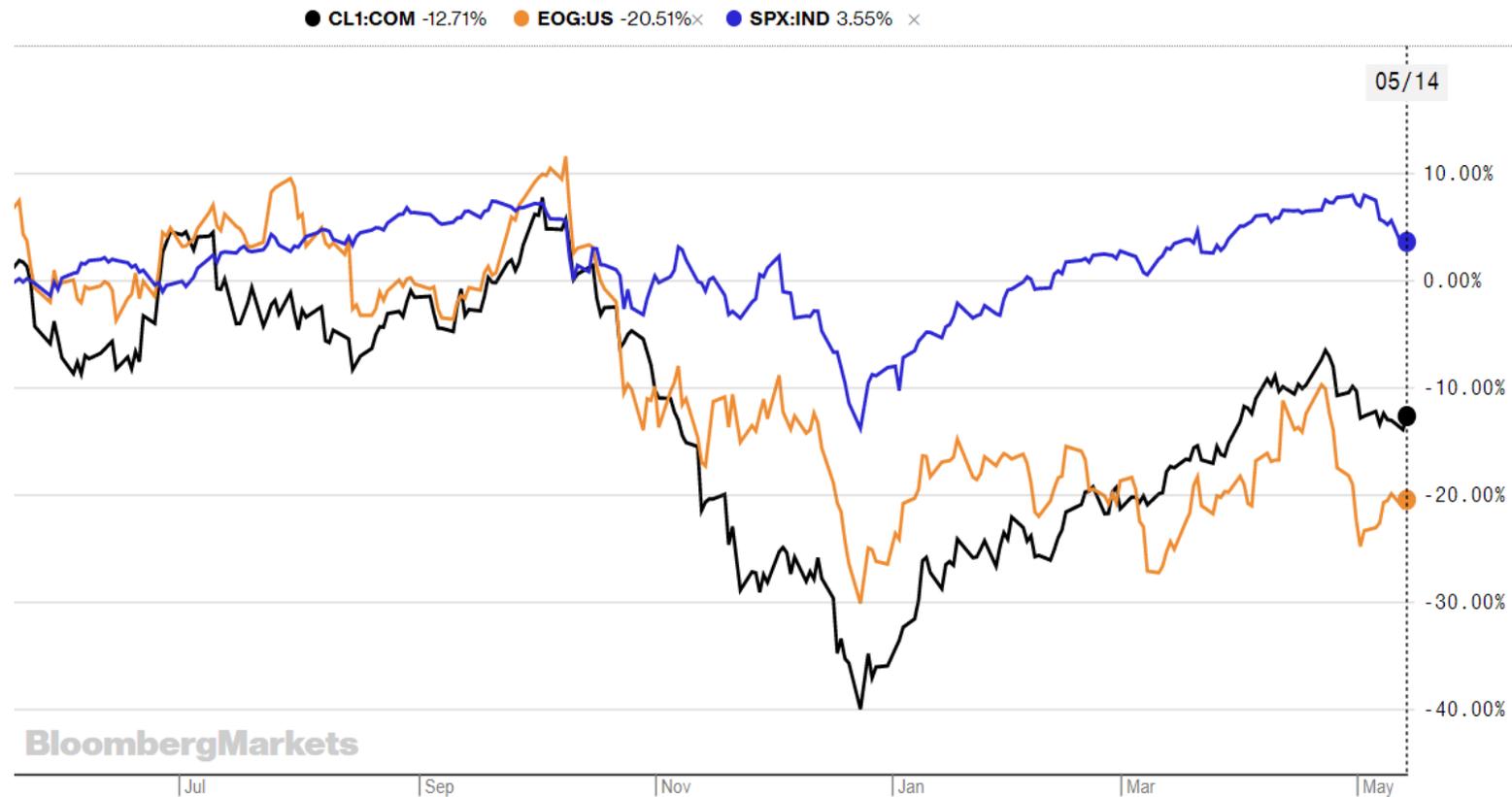
EOG has done way better than the E&P sector overall, but both have been trounced by the broader market

EOG Resources / SPDR S&P Oil & Gas E&P ETF / S&P 500



Source: Bloomberg
Note: Performance indexed to 100.

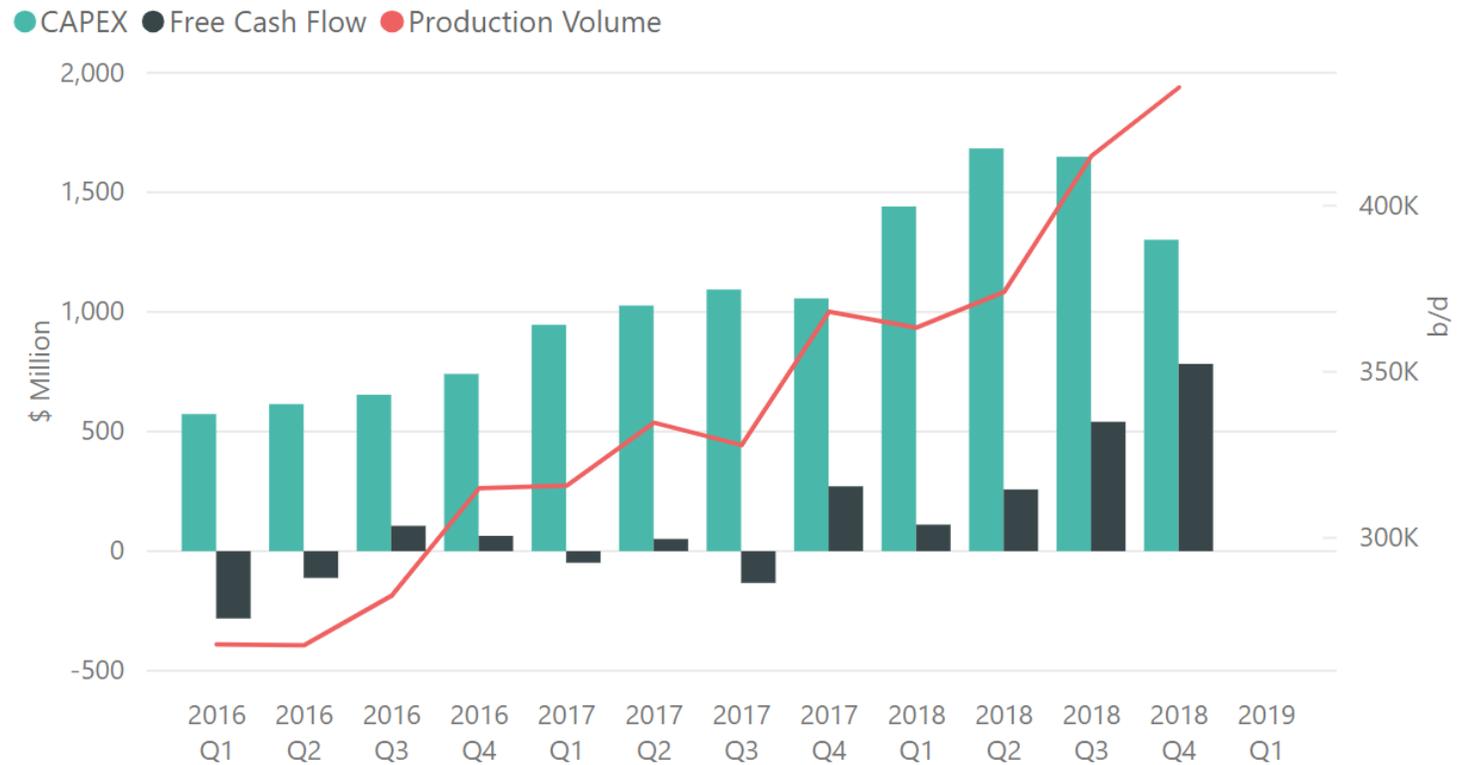
EOG – WTI and S&P



EOG CAPEX, Free Cash Flow, and Production

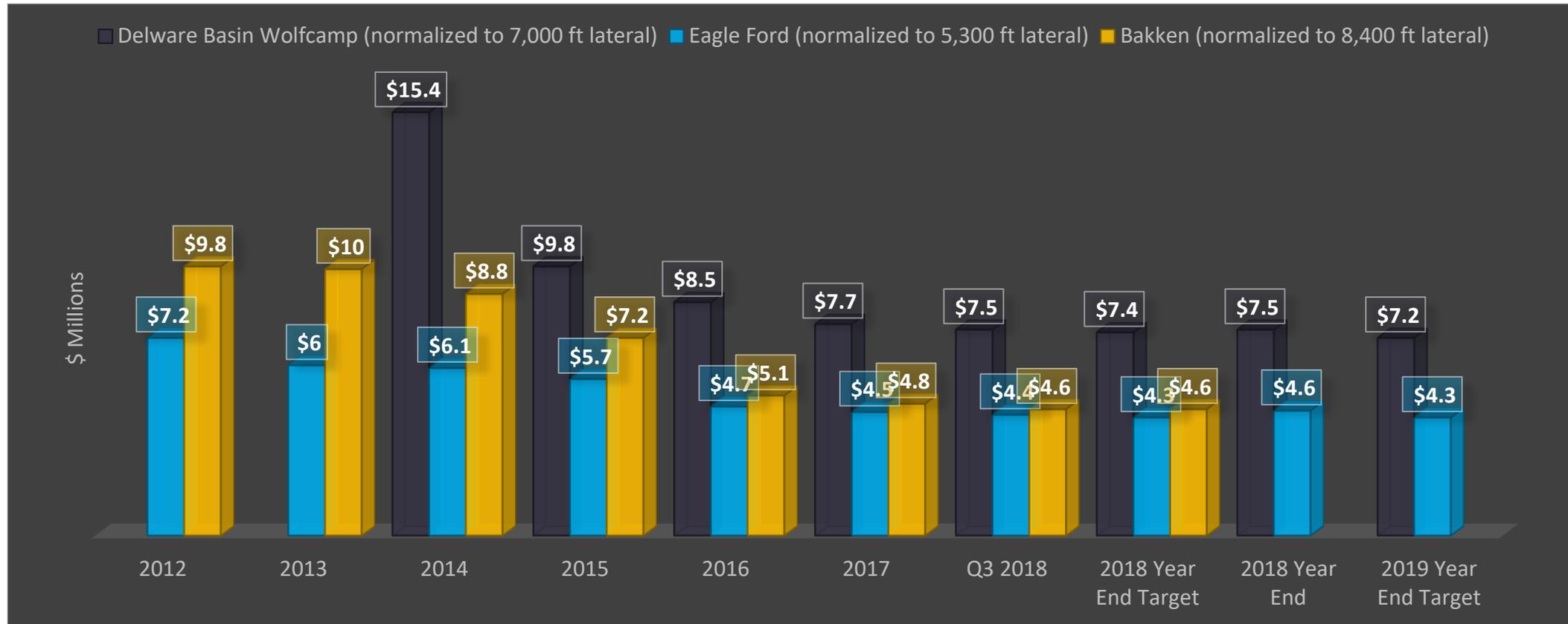


CAPEX, Free Cash Flow and Production Volume by Period



Source: HedgeAware, PetroNerds

EOG Completed Well Costs

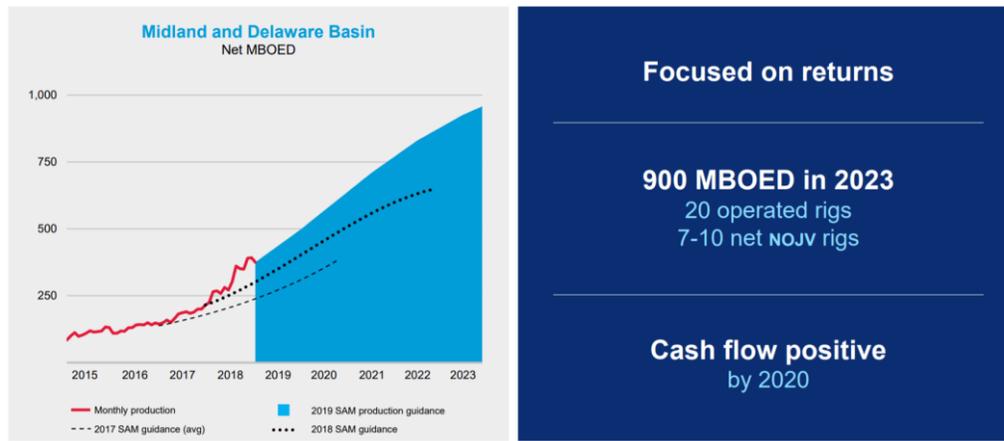


Source: PetroNerds, EOG Investor Presentations

Chevron and Exxon – Permian Growth Forecasts – Favoring Short Cycle

Exxon and Chevron both favoring short-cycle, stable growth. Both expect to grow their Permian Basin production to nearly 1 million boed each by 2024.

Outperformance resets expectations



© 2019 Chevron Corporation

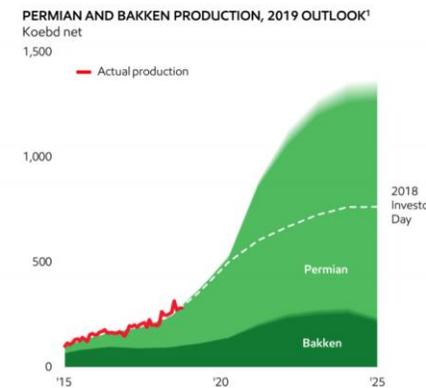


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Source: Chevron Investor Day Presentation, March 5, 2019

UPSTREAM PERMIAN

Five outstanding developments



¹ Potential production. Permian includes Midland and Delaware basins
See supplemental information

2018 Investor Day recap

- 600 Koebd by 2025

2019 update

- Production on plan; 100% growth YE17 to YE18
- Production outlook up significantly
 - >1,000 Koebd by 2024
 - Average >10% return at <\$35/bbl
- Increases driven by:
 - Further Delaware delineation
 - Innovative development plan

40

Source: ExxonMobil Investor Day Presentation, March 6, 2019

Occidental and Anadarko

THE WALL STREET JOURNAL
 Home World U.S. Politics Economy **Business** Tech Markets Opinion Life & Arts Real Estate WS.
 BUSINESS
Occidental Chief Defends Anadarko Deal to Shareholders
 In sign of dissent, Occidental board sees lowest vote totals in years



Occidental Petroleum Chief Executive Vicki Hollub is seen at the Milken Institute Global Conference in Beverly Hills, Calif. on April 29. PHOTO: KYLE GRILLOT/BLOOMBERG NEWS

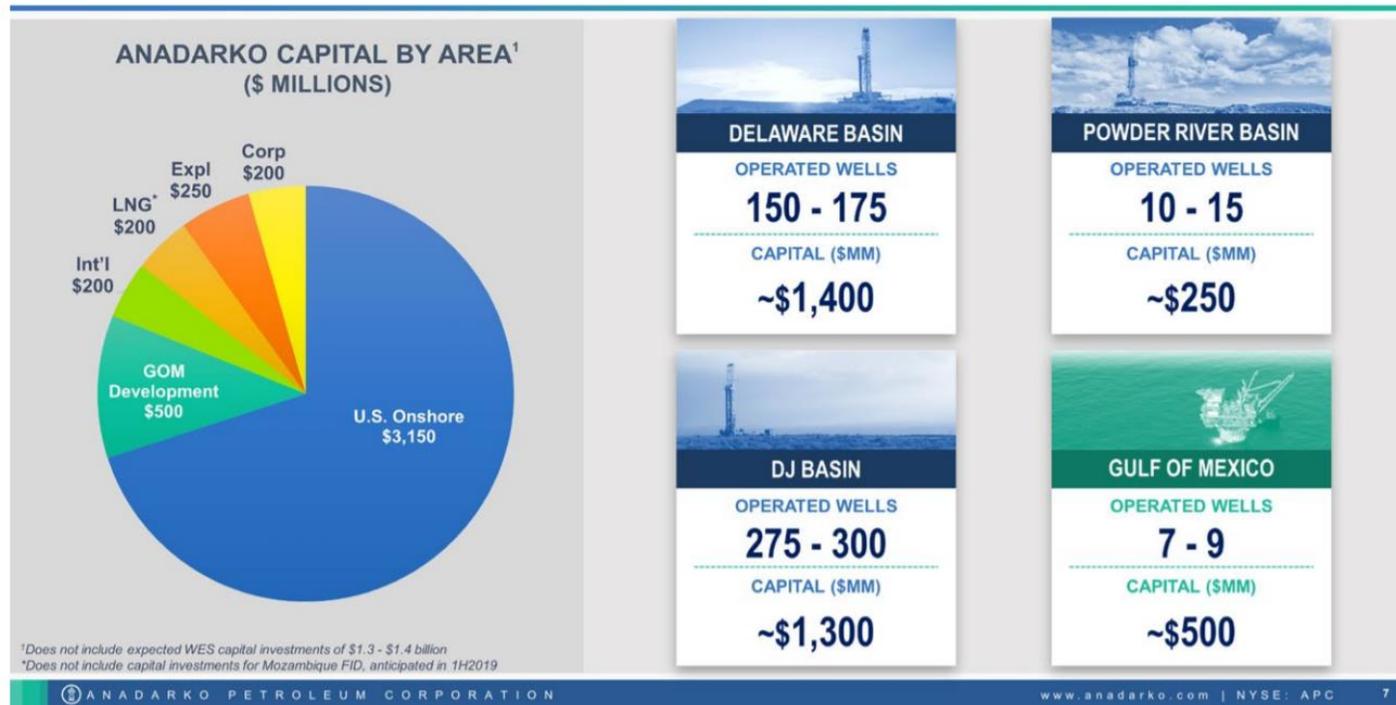
By Bradley Olson
 May 10, 2019 2:30 p.m. ET



Anadarko Spending \$1.3 Billion in the DJ in 2019



Focused 2019 Capital Allocation and Activity



Source: Bank of America 2018 Global Energy Conference, November 15, 2018

Are well spacing issues really going to kill the boom?

THE WALL STREET JOURNAL.

MARKETS

Shale Companies, Adding Ever More Wells, Threaten Future of U.S. Oil Boom

Newer wells drilled close to older wells are generally pumping less oil and gas and could hurt output, leading frackers to cut back on the number of sites planned and trim overall production forecasts

By *Christopher M. Matthews, Rebecca Elliott and Bradley Olson*

March 3, 2019 6:26 p.m. ET

0 COMMENTS



Tight Squeeze
In recent years, oil producers have drilled "child wells" in close proximity to increase the number of drilling locations and extract more oil and gas. New studies indicate that adding too many wells diminishes production in each well.

Well Spacing	Production Impact
600 ft. apart	Full production
375 ft. apart	28% loss in production
275 ft. apart	40% loss

Current trend
375 ft. apart
Wells are bunched together, but production can suffer due to lowered pressure.

New recommendation
750 ft. apart
Wells are spaced out, potentially increasing production per well.

Estimated production loss from overdrilling in South Texas

One square mile drilling pad

Kick-off point
Beginning about 500 feet above the shale formation, the well is dug horizontally.

Horizontal sections
Are drilled up to several miles.

Shale reservoir
5,000-10,000 feet deep

Wellbores
Encased in steel and cement.

Shale
The shale is cracked with sand and water, allowing the gas or oil to be pumped out.

Oil flow

Note: drawing is schematic
Sources: Statoil (production loss), excluding mobile size; Energy Department (drilling); American Petroleum Institute (fracking)

Changes in Inventory – Changes in Spacing – EVOLVING



Delivering on Wider Spacing Earlier than Promised

Formation	Development Zone	Wells per DSU	
		NAV/ Tight Spacing	ROR/ Wide Spacing
UWC	UW-AB	12 - 16 Wells	4 - 8 Wells
	UW-CD		
	UWE-MWA		
MWC	MW-B	12 - 16 Wells	4 - 8 Wells
	MW-C		
	MW-D		
LWC	LW-AB	6 - 8 Wells	4 Wells
	LW-C		
Cline	CLINE-AB	6 - 8 Wells	4 Wells
	CLINE-CD		
Total Well Count per DSU		36 - 48 Wells	16 - 24 Wells

All second quarter completions will be developed in the UWC/MWC at 4 - 8 wells per DSU



Note: Excludes ABW, Canyon and Spraberry formations
Drilling spacing unit (DSU)

8

Source: Laredo, May Q1 2019 Earnings

Optimizing the 2019 Plan



	"Transformational" 2017	"Simplified" 2018	2019 Action Plan	
	"NPV-Focused"		"ROR-Focused"	
Agenda	Achieve scale	Recapture operational efficiency	Boost capital efficiency by 8-10%+ and accelerate progress to self-funded growth	
Program Details	Large rig ramp and delineation-heavy development program	Steady development pace across geographically balanced program	Reduce activity, increase proppant, high-grade development approach	
Spacing Pattern (Wells/Section/Bench)	~8-16 across	~8 across	~4-8 across	
Midland Basin Well Selection	MS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Monitor peer results (Midland/Martin)
	JM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Monitor peer results (Midland/Martin)
	LS	<input checked="" type="radio"/> Initial Parsley operated test (Upton)	<input type="radio"/>	<input type="radio"/> Increased proppant (Midland/Martin)
	UWCA	<input checked="" type="radio"/> Initial test (Upton)	<input type="radio"/>	<input type="radio"/>
	WCA	<input checked="" type="radio"/>	<input type="radio"/> Test lower proppant loadings	<input type="radio"/> Increased proppant (All Counties)
	UWCB	<input checked="" type="radio"/> Stacked configuration (Upton/Reagan); 330' density tests (Reagan)	<input type="radio"/> Stacked configuration (Upton/Reagan) and lower proppant tests	<input checked="" type="radio"/> Stagger configuration (Upton/Reagan) and increased proppant
	LWCB	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
	WCC	<input checked="" type="radio"/> Initial success (Reagan)	<input type="radio"/> Delineation work (Reagan/Glasscock)	<input type="radio"/> Defer activity (low Waha prices)
WCD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Monitor peer results (Midland/Reagan)	
Delaware Basin Well Selection	3BS	<input type="radio"/>	<input checked="" type="radio"/> Initial test (Reeves)	<input type="radio"/> Monitor peer results
	UWCA	<input checked="" type="radio"/> Initial test (Pecos)	<input type="radio"/> Stagger configuration	<input type="radio"/>
	LWCA	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/> Increased proppant (Pecos)
	UWCB	<input checked="" type="radio"/> Initial test (Pecos)	<input type="radio"/>	<input type="radio"/> Monitor peer results

Primary Development Focus Secondary Development Focus (1-2 wells) Future Development Potential

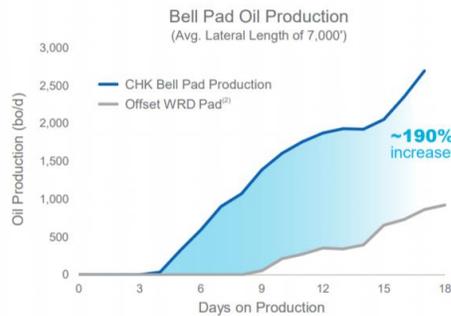
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Source: Parsley Energy, May 2019, Q1 2019 Earnings

Chesapeake's Tweaks on Spacing/Completions

OPTIMIZED COMPLETIONS YIELDING RESULTS

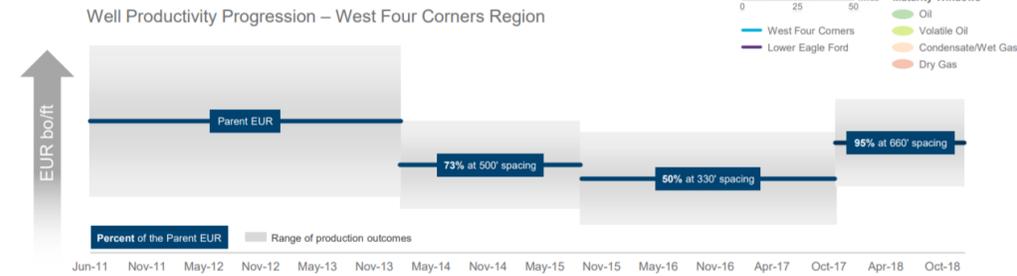
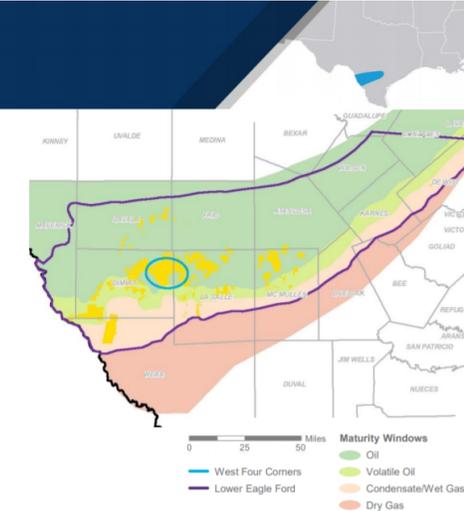
- ▶ Driving significant efficiencies
 - 45% reduction in average stage pump time
 - 30% reduction in pumped water while maintaining sand volume
 - ~190% improvement, 6.7 mbo,⁽¹⁾ over historic performance in traditionally weaker-performing portion of the play



(1) Improvement is over a normalized offset analog
 (2) Offset WRD pad normalized to four wells per pad and lateral length of 7,000'

EAGLE FORD WELL SPACING ENHANCING PRODUCTION

- ▶ Significantly reduced parent-child EUR degradation with 660' spacing
- ▶ Increased spacing and larger completions contribute to lower decline rates
- ▶ Lowest well cost per foot operator on the western portion of the play⁽¹⁾



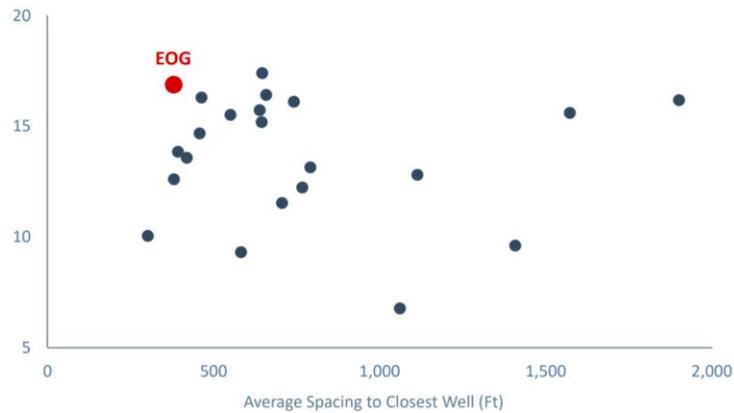
(1) Source: RS Energy Group

EOG vs. PXD on Well Spacing

Industry-Leading Well Productivity with Tighter Spacing in 2018 Delaware Basin

6-Month Cumulative Oil Production (Bo per ft)

EOG Peers¹

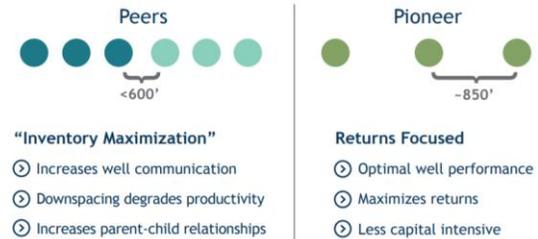


Source: Citi Research and Drilling Info.
 (1) Peers include APA, CPE, CRZO, CVX, CXO, DYN, FANG, JAG, MRQ, MTDI, NBL, OAS, OXY, PDCE, PE, RDS, WPK, XEC, XOM and two private operators.

1Q 2019 37

Capitalizing on Unmatched Footprint in World Class Asset

Horizontal Development Strategies

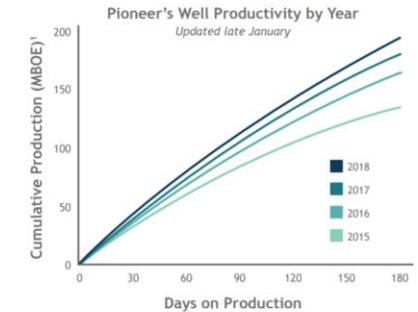


"Inventory Maximization"

- ⓪ Increases well communication
- ⓪ Downspacing degrades productivity
- ⓪ Increases parent-child relationships

Returns Focused

- ⓪ Optimal well performance
- ⓪ Maximizes returns
- ⓪ Less capital intensive



Pioneer's ~680,000 net acres allows for optimal development strategy minimizing parent-child impacts

PIONEER NATURAL RESOURCES
 1) Production normalized for shut-ins. Wells grouped by POP year. Production normalized to a lateral length of 10,000'.

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Schlumberger Has Concerns, Again

...the well-established market consensus that the Permian can continue to provide 1.5 million barrels per day of annual production growth for the foreseeable future is starting to be called into question. ...we believe the main challenge in the Permian going forward is more likely to be reservoir and well performance as the rate of infield drilling continues to accelerate.

At present, our industry has yet to understand how reservoir conditions and well productivity change as we continue to pump billions of gallons of water and billions of pounds of sand into the ground each year.

In the Permian, the percentage of child wells in the Midland Wolfcamp basin has just reached 50% and we are already starting to see a similar reduction in unit well productivity to that already seen in the Eagle Ford suggesting that the Permian growth potential could be lower than earlier expected.

Schlumberger Q3 2018 Earnings Call, Paal Kibsgaard

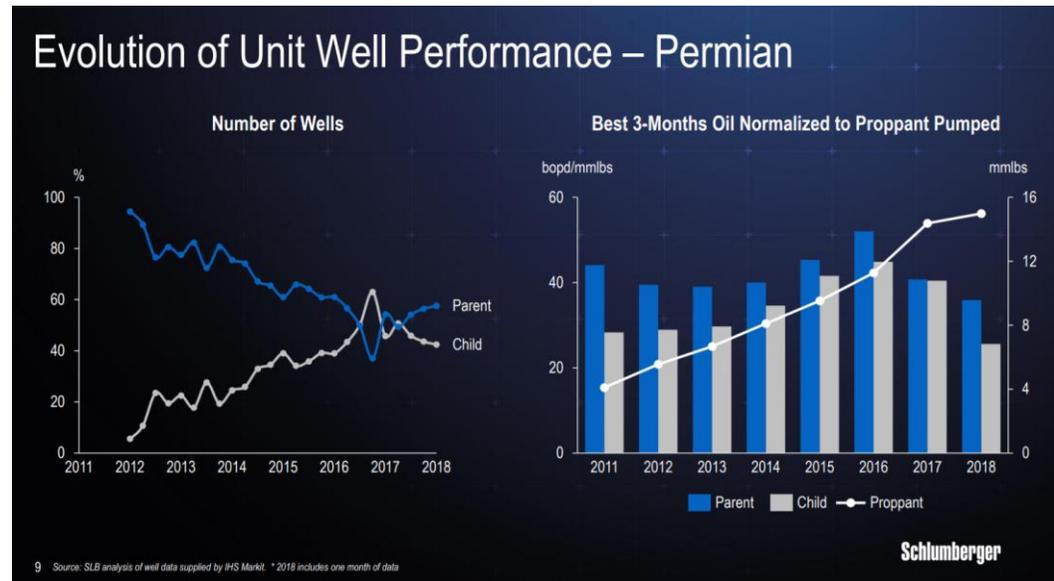
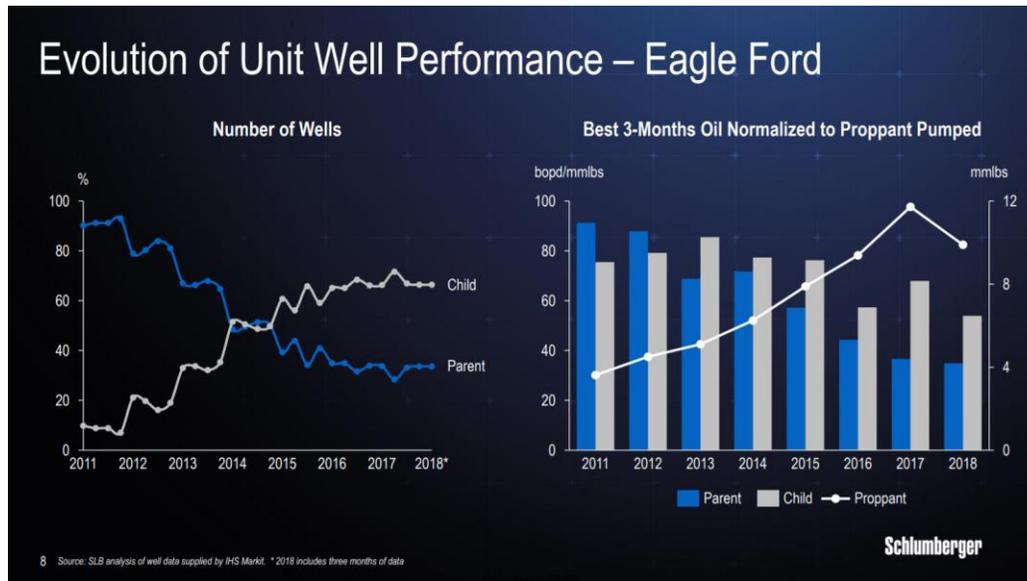
Chase Mulvehill

...you talked about U.S. shale production and the challenges around that that you are starting to see. These challenges – is this something that can be solved through technology or is this just reservoir challenges that we have to deal with?

Paal Kibsgaard

No. I think it can absolutely be solved through technology....it requires a bit more of a reservoir focus on how the wells are drilled, how the wells are fracked, and we need a little bit more data to make sure that we do the right things here. But the measurements are available, the analysis and interpretation of the measurements are available and the remedies that we need to do to the frac fluids are also available. It's just a matter of adopting these technologies. We have them all ready to go.

Measuring Performance on Proppant Volumes Pumped....?



Source: Schlumberger Investor Presentation, September 2018

Completion Design Modifications

Continue



So Called "Evolution..."

"The whole frac theory now is kind of short, shorter fatter fracs if you will rather than longer, thinner fracs, and as the whole industry is kind of gone that way." Centennial Resource Development, Q1 2017, Seeking Alpha

4. BBI Optimization and Cost Reduction

Designing completions to allow more rock to be contacted closer to the wellbore

COMPLETION OPTIMIZATION PROGRAM

Designing completions to allow more rock to be contacted closer to the wellbore

System 1.0 Initial Frac Design (2013-2014)	System 2.0 Initial Frac Design (Q4 2014-2016)	System 3.0 Current Frac Design (Q1 2018 - Today)
1,000 well program	1,000 well program	1,000 well program
2000' well	2000' well	2000' well
100' cluster spacing	100' cluster spacing	100' cluster spacing
100' well spacing	100' well spacing	100' well spacing
100' well spacing	100' well spacing	100' well spacing
100' well spacing	100' well spacing	100' well spacing

Haynesville Completion Evolution

Evolving completions maximize near-wellbore stimulation

Original Design (2010 - 2014)	Recent Design (2015 - Current)	Testnet (Current)
4,000' laterals	4,000' - 10,000' laterals	15,000' laterals
1,000' well program	1,000' well program	1,000' well program
100' cluster spacing	100' cluster spacing	100' cluster spacing
100' well spacing	100' well spacing	100' well spacing
100' well spacing	100' well spacing	100' well spacing

EOG Resources High-Density vs. Old Completion Technology

2010 Completions: 440,000 Events

2015 Completions: 4,000 Events

Enhance Connectivity to Contact More Surface Area | Contain Events Closer to Wellbore

<https://tz.wp.com/www.oilandgas360.com/wp-content/uploads/2016/09/BBI-Frac-Design-Evolution.png>
 Source: Slide from Pioneer Natural Resources Q4 2016 Investor Presentation
 Goodrich Petroleum, A&D Conference Presentation, October 2017
 EOG Resources, Q2 2017 Investor Presentation



Pre 2014



2018



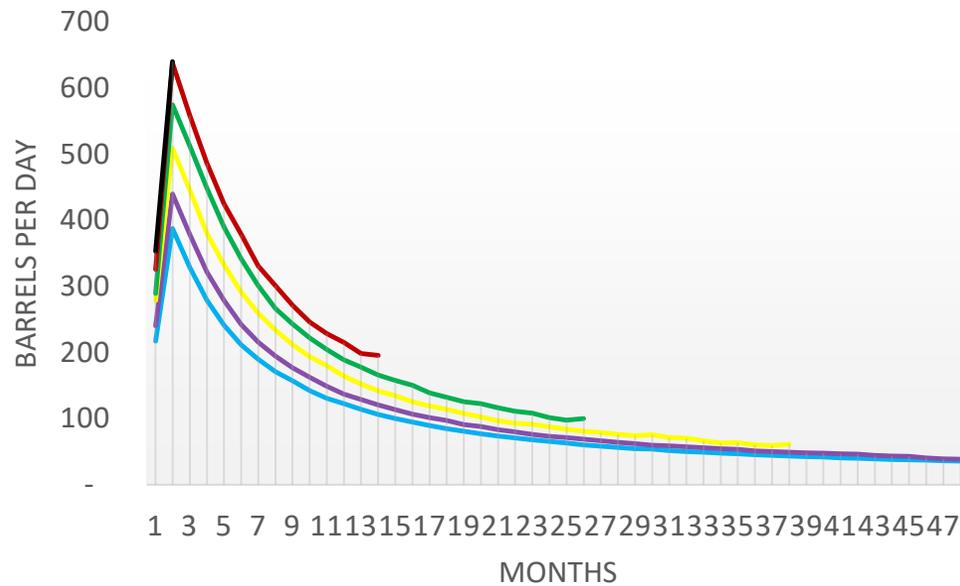
Source: PetroNerds

Production and Productivity

Shale Play Type Curves

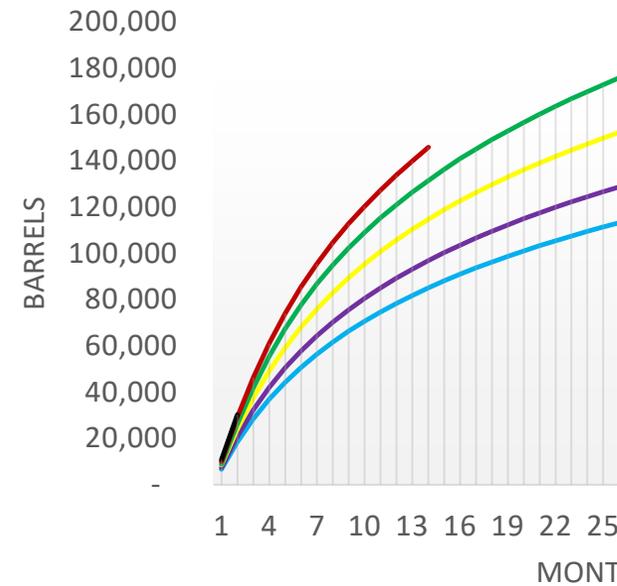
Permian, DJ, Williston, Powder, and Texas and Louisiana Gulf Coast Basins

Type Curve



— 2014 Type Curve — 2015 Type Curve — 2016 Type Curve
— 2017 Type Curve — 2018 Type Curve — 2019 Type Curve

Cumulative Barrels

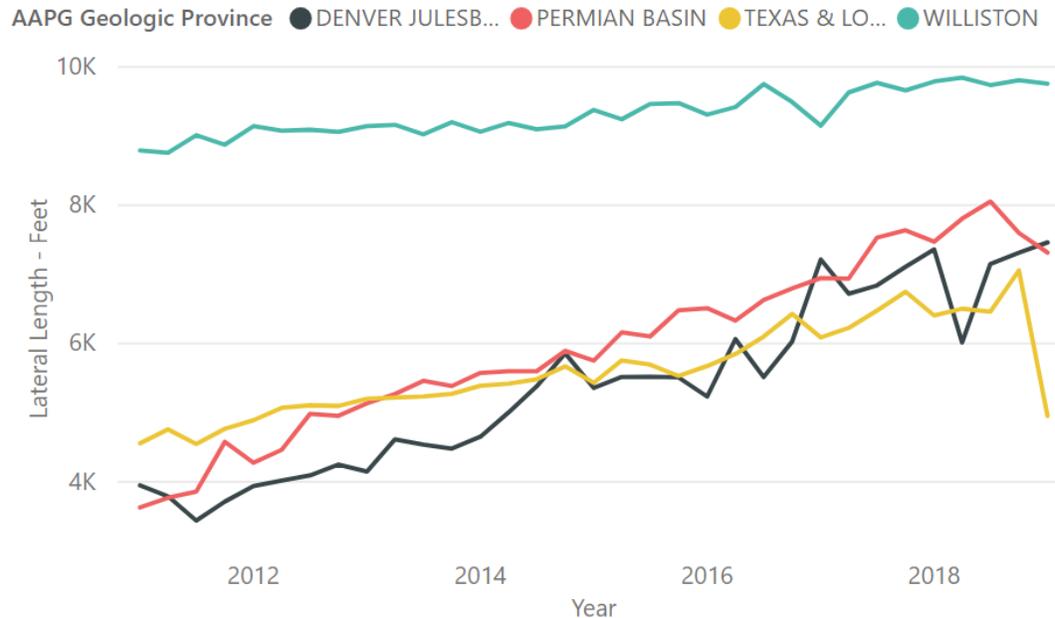


— 2014 Cum Barrels — 2015 Cum Barrels — 2016 Cum Barrels
— 2017 Cum Barrels — 2018 Cum Barrels — 2019 Cum Barrels

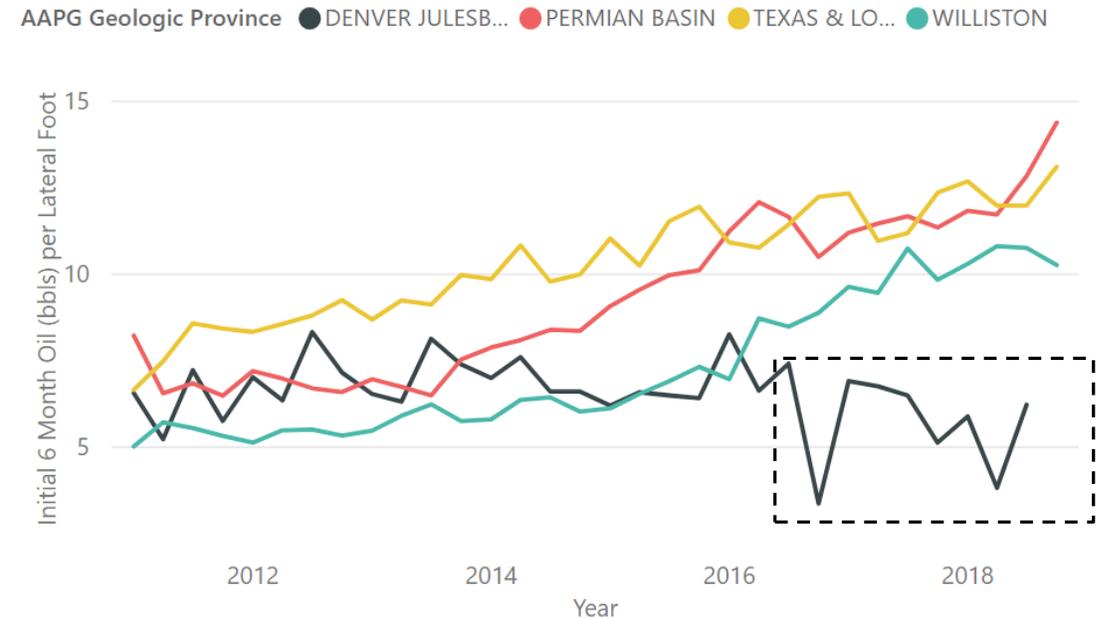
Oil Price Assumption	Cumulative Production at 12 Months = 134,000 barrels x \$/Barrel	Cumulative Production at 24 Months = 170,000 x \$/Barrel
\$40	\$5,353,745	\$6,793,608
\$50	\$6,692,181	\$8,492,009
\$60	\$8,030,617	\$10,190,411
\$65	\$8,699,836	\$11,039,612
\$70	\$9,369,054	\$11,888,813
\$75	\$10,038,272	\$12,738,014

Is Productivity Improving When Normalized for Lateral Length? In Most Cases, Yes.

Average Lateral Length



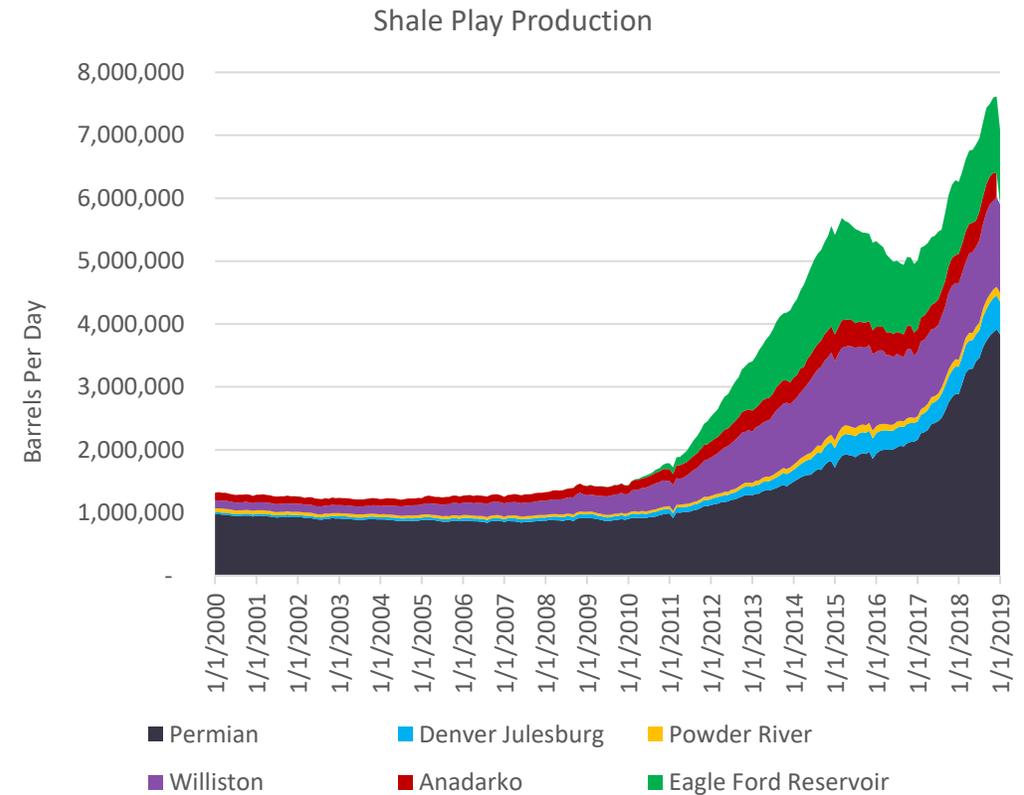
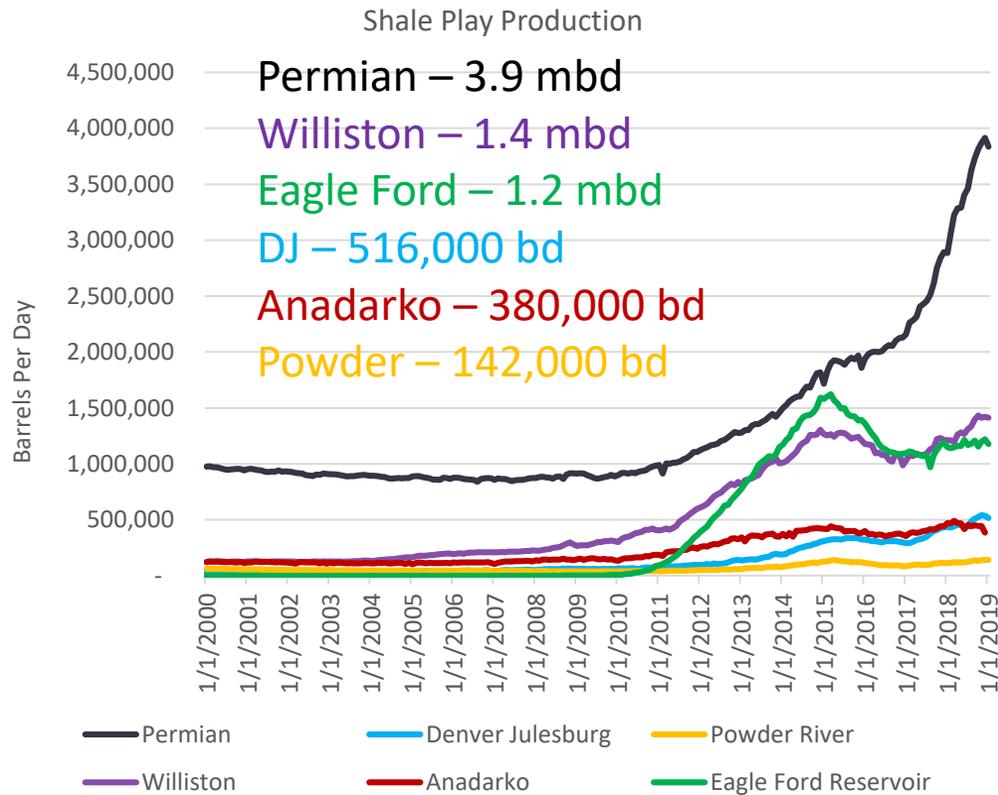
First 6 Month Oil Per Lateral Foot



Infrastructure constraints, pent up productivity

Source: PetroNerds, DrillingInfo. Data points are quarterly averages.

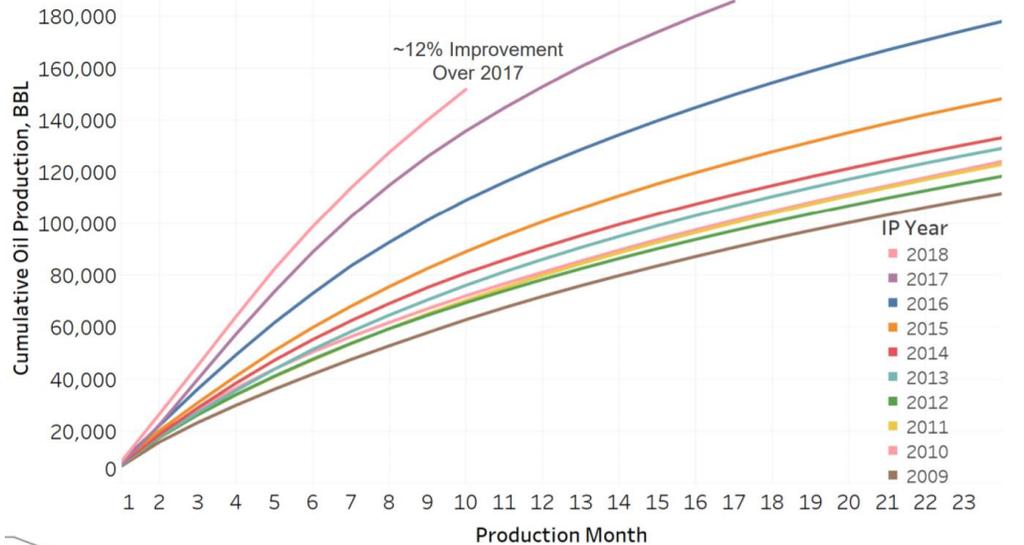
US Shale Oil Play Production by Basin



Source: PetroNerds, DrillingInfo

Williston – Continued Growth

Statewide Oil Performance

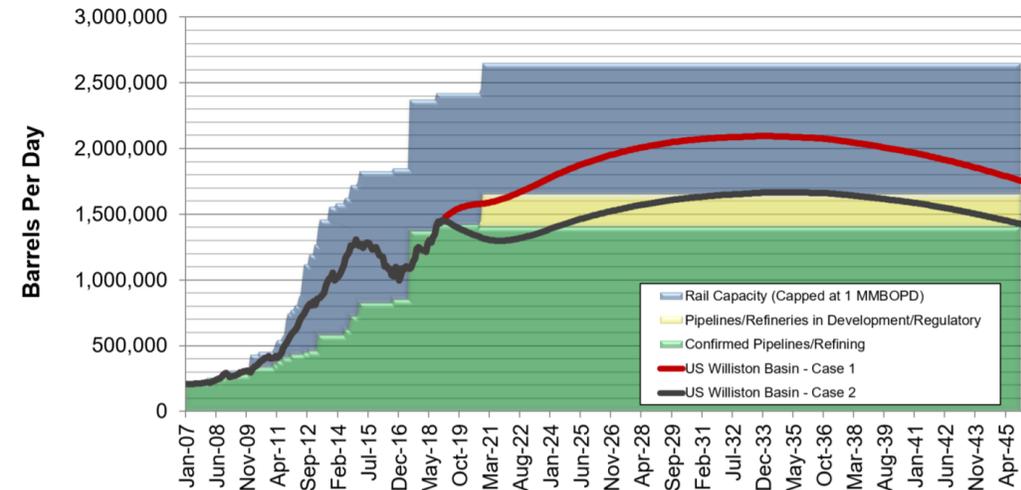


Kringstad - North Dakota Pipeline Authority

Average BKN/TF Well Performance Statewide

Williston Basin Oil Production & Export Capacity, BOPD

Assumes Current Technology – Enhanced Oil Recovery Not Included



Production forecast is for visual demonstration purposes only and should not be considered accurate for any near or long term planning.

JJ Kringstad - North Dakota Pipeline Authority

Powder – Turner Focus, Future Niobrara

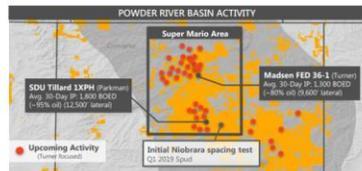
\$270 to \$300
Million CAPEX

\$505 to \$525
Million CAPEX

40 Net Completions
(double that of Bakken)

Powder River Basin – Growth Set to Accelerate

- A top-tier emerging oil growth opportunity
 - Stacked pay position in oil fairway (>300k net acres)
 - Activity targeting Turner, Parkman & Niobrara intervals
- Activity increasing: 4 rigs & dedicated frac crew
 - Q1 2019 net production increased 15% vs. Q4 2018
 - Expect >50% oil exit rate growth (Q4 '19 vs. Q4 '18)
 - Oil volume growth to accelerate in 2H 2019
- Structural improvements to drive capital efficiency
 - 2019 program focused on Turner development drilling
 - Expect savings of >\$1 million per well (see chart)
- Niobrara possesses scalable growth potential
 - 200,000 net acres of stacked pay in oil fairway
 - Initial 3 operated wells successful (avg. IP30 >1,000 BOD)
 - NEXT CATALYST:** Initial spacing test spud in Q1



Operating scale driving D&C costs lower
Turner formation drilling and completion costs (\$MM)



- Averaged 39 mboe/d (46% oil) in April
- Project 100% YOY oil growth in 2019
- Turner in full development

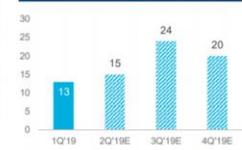
Overview

1Q'19 Production	36 mboe/d ⁽¹⁾
Net Acres	~213,000

2019 Activity⁽¹⁾

Wells to Turn in Line	72
Rigs	6
Frac Crews	~1
Total Capex (millions)	\$505 – \$525

2019 TIL Schedule⁽²⁾



Production Mix⁽¹⁾



(1) Represents average net production volumes for 1Q19
(2) 2019 Activity reflects 5/8/19 Outlook



1Q 2019 Earnings

Powder River Basin Plays Competitive in Premium Portfolio (\$M per 1,000' Lateral)



(1) Revenue per 1,000' lateral calculated using 840 WTI, \$2.50 NYMEX and \$15 NGL. Based on life of well.
(2) Well Cost = Drilling, Completion, Well-Site Facilities and Flowback per 1,000' lateral.
(3) Profitability Ratio = Revenue / Well Cost.



1Q 2019 41

Source: Devon, Chesapeake, EOG, Q1 2019 Earnings

DJ Basin – “Well Positioned”

Well-Positioned in Colorado After Passage of SB181

Expect No Impact to Core Drilling Inventory

“This is an important step forward for the stability of Colorado, to end the oil and gas wars in a way that everybody wins.”

- Governor Jared Polis¹

“It does not give them blanket authority to do things like a ban or a long-term moratorium that is effectively a ban.”

- SENATE MAJORITY LEADER STEVEN FENBERG²

“In Broomfield we were fortunate to work with Extraction Oil & Gas, a company that is sensitive to our community’s needs. Together we crafted a memorandum of understanding (“MOU” and our Operator Agreement) that went far beyond the thresholds of the typical standard in the industry.”

- Broomfield Mayor Randy Ahrens³

Extraction already operates within the spirit of SB-181 in several aspects:

- Obtaining local permits before applying for state permits
- Statutory pooling only occurred once below 45%+ consent in company history
- Best-in-Class BMPs recognized by regulatory agencies, third-party auditors and federal agencies for protection of public health, welfare and the environment
- Ability to implement innovative “tankless” facility designs that protect air quality

Extraction’s technology and innovative practices position us well to compete in the new regulatory environment

(1) SB-181 Signing Ceremony, April 9, 2019.
 (2) Colorado State Senate Concurrence on House Amendments, April 3, 2019.



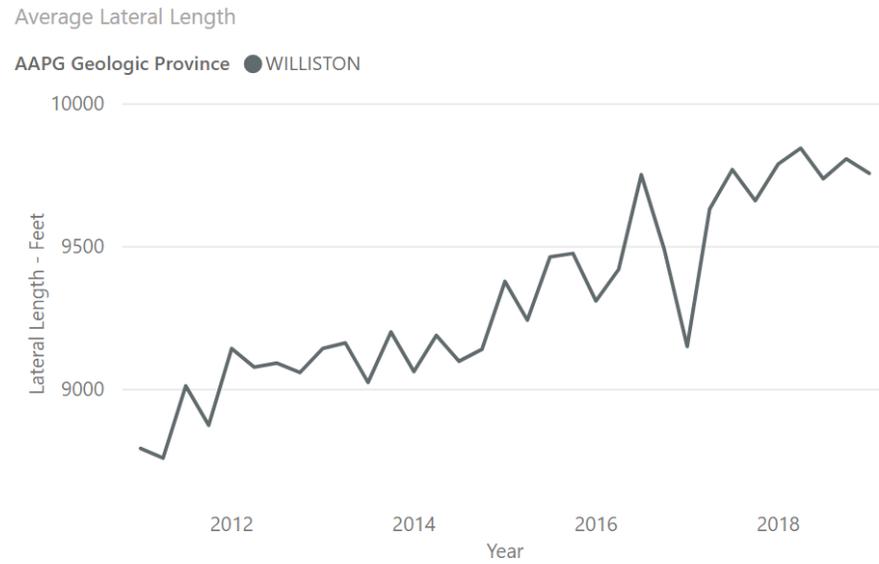
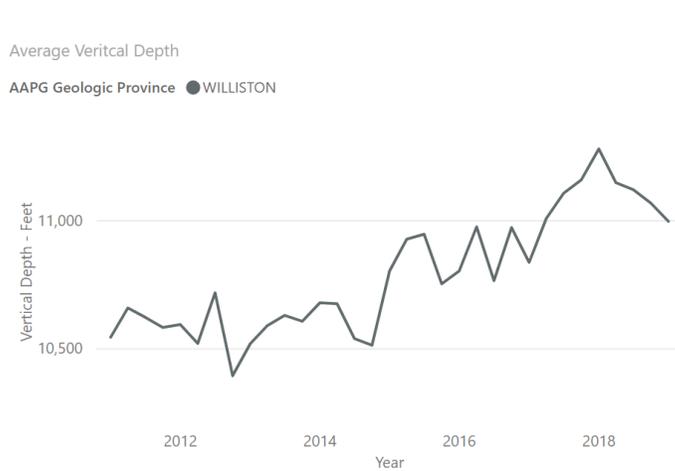
1. Q1 call – understand regulatory environment
2. Low, repeatable well cost

Niobrara (Standard Completions)				
	Lateral Length (ft)	D&C Cost (\$ million)	F&D Cost (\$/Boe) ⁽¹⁾	EUR (MBoe)
1 mile	4,200	\$2.9	\$10.96	325
1.5 mile	6,800	\$4.0	\$8.61	575
2 mile	9,400	\$4.9	\$7.41	825
2.5 mile	12,000	\$6.0	\$7.02	1,075

Codell				
	Lateral Length (ft)	D&C Cost (\$million)	F&D Cost (\$/Boe) ⁽¹⁾	EUR (MBoe)
1 mile	4,200	\$2.6	\$9.31	345
1.5 mile	6,800	\$3.5	\$7.16	610
2 mile	9,400	\$4.2	\$6.01	875
2.5 mile	12,000	\$5.2	\$5.69	1,140

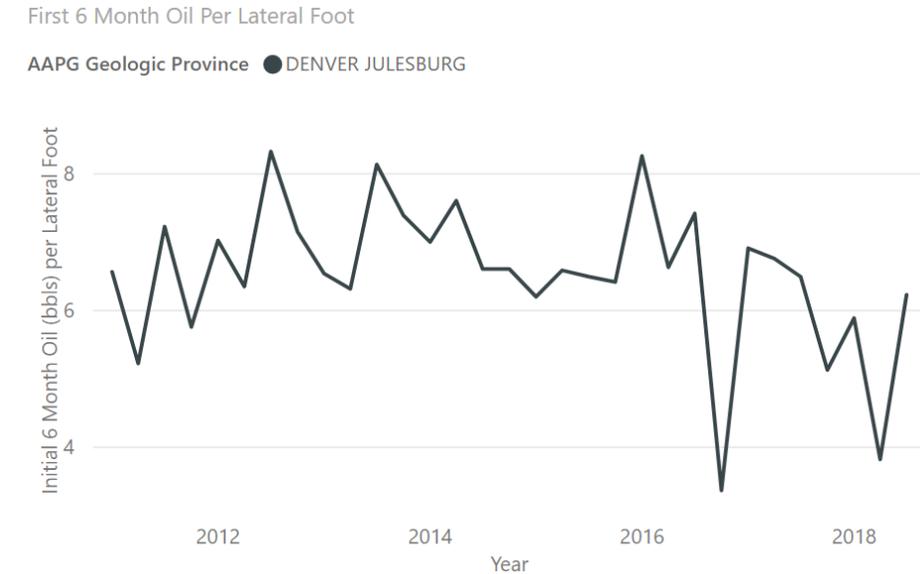
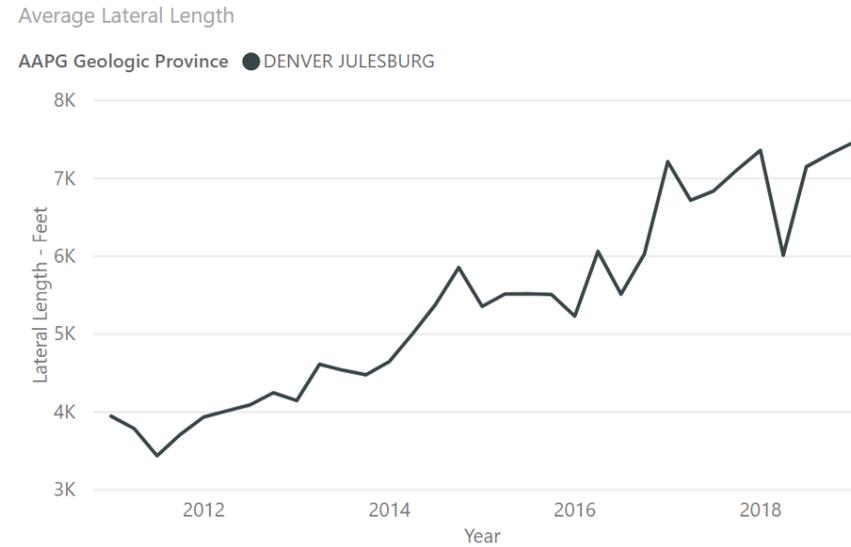
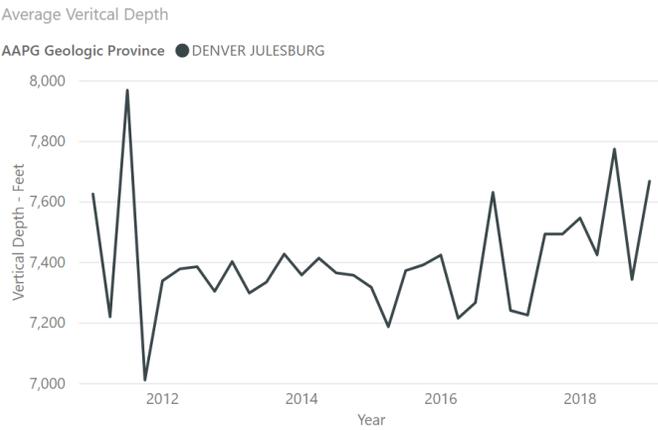
Source: Extraction, Q1 2019 Earnings

Williston Basin Productivity



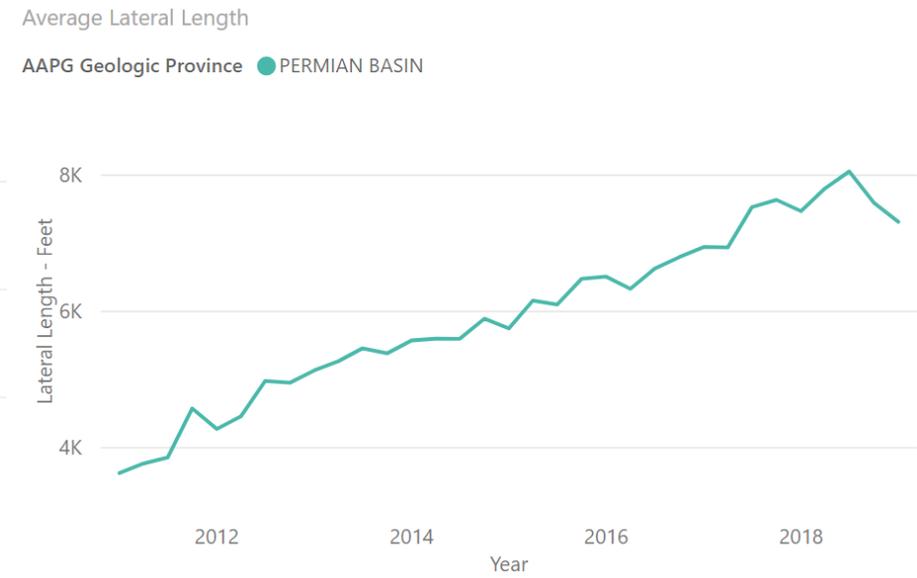
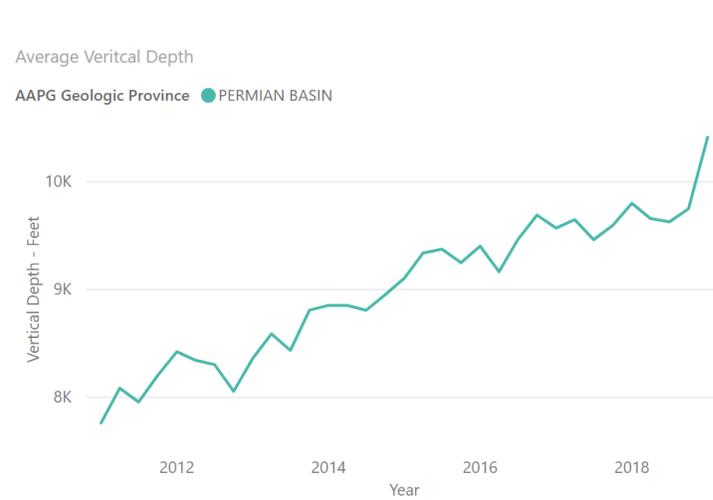
Source: PetroNerds, DrillingInfo

DJ Basin Productivity



Source: PetroNerds, DrillingInfo

Permian Basin Productivity



Source: PetroNerds, DrillingInfo