

Rockin' the Rockies

TRISHA CURTIS

PETRONERDS, PRESIDENT AND CO-FOUNDER

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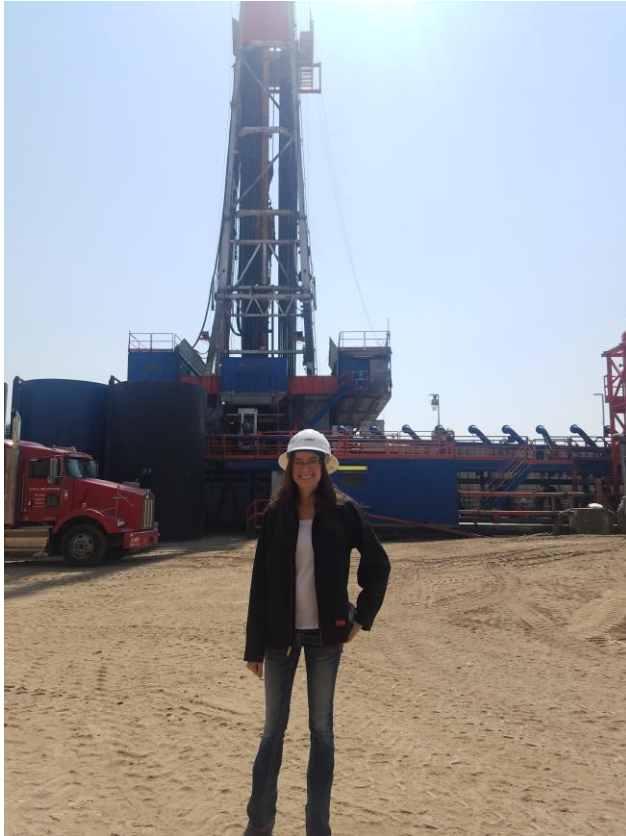
DUG DENVER

MAY 15, 2019

What is a PetroNerd?



About PetroNerds and Our Services

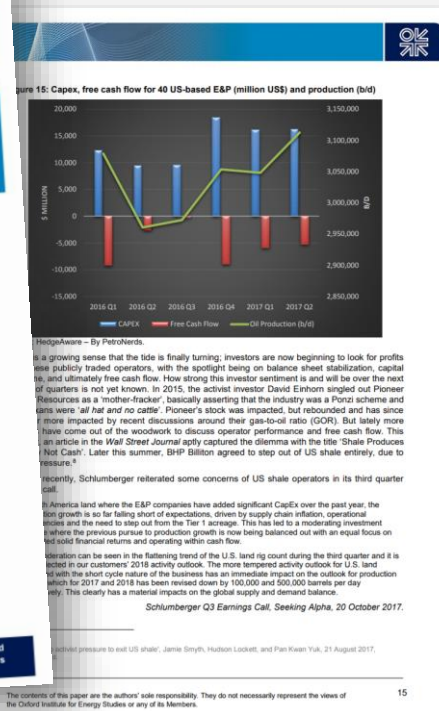


- Boutique energy analytics and advisory firm based in Denver, CO
- Personalized, data-driven advisory services
- Help our clients understand how the oil market impacts their business
- Provide data and actionable insights needed, not reports and projections that are never read
- HedgeAware – Interactive, 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

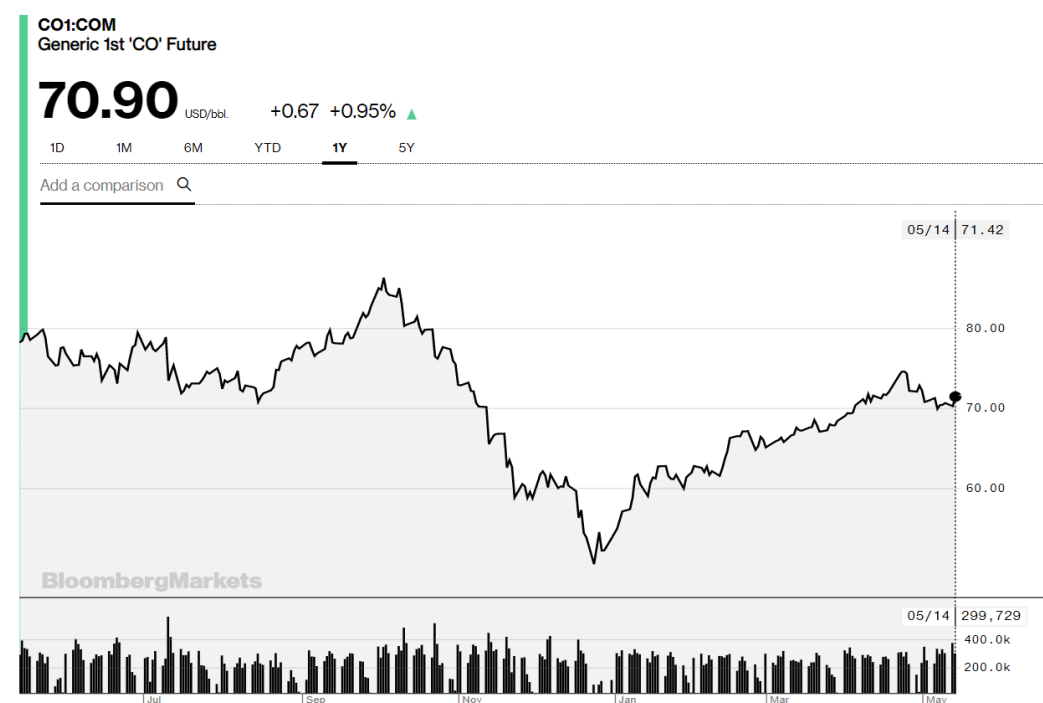
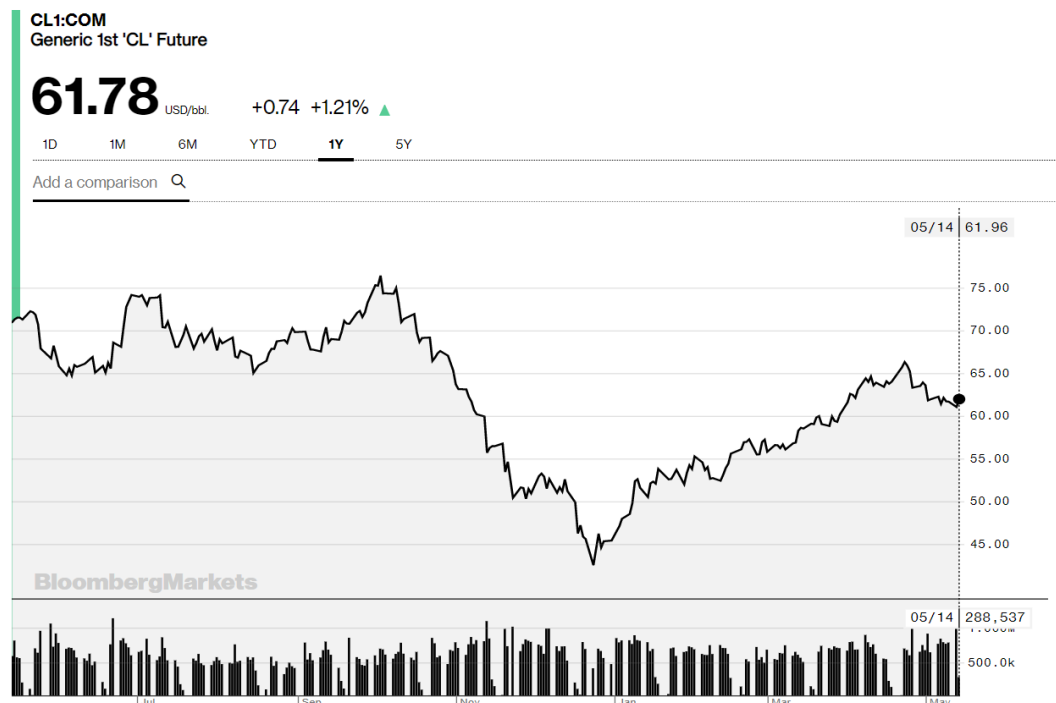
“Completion Design Changes and the Impact of US Shale Well Productivity”

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



Oil Market

Oil Prices



Supply, Supply, Supply

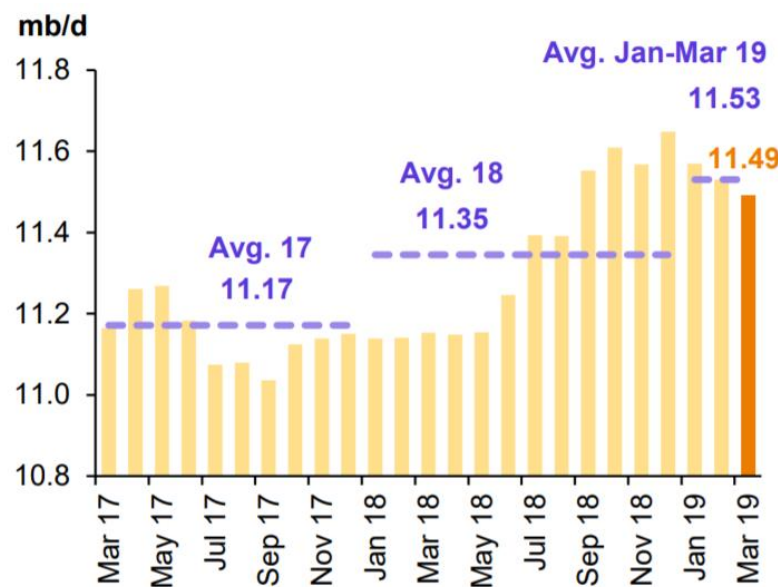
Saudi 9.8 mbd (from 11.1 plus mbd)

Russia 11.5 mbd (from 11.7 mbd)

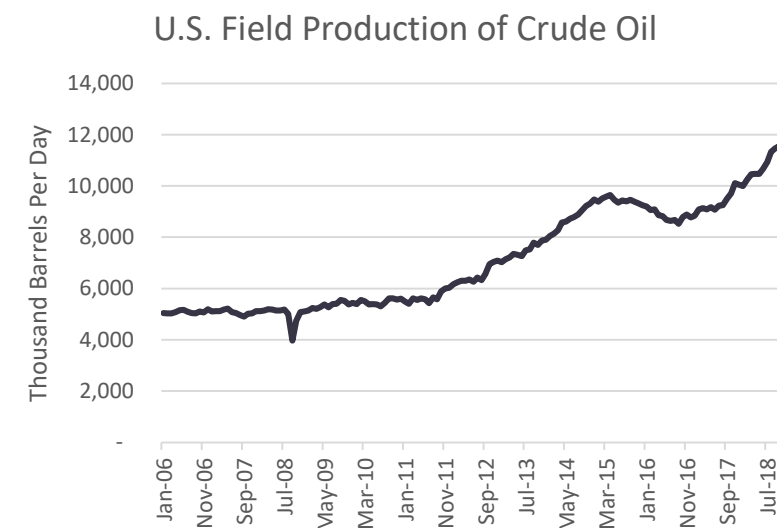
US 11.9 mbd

	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.

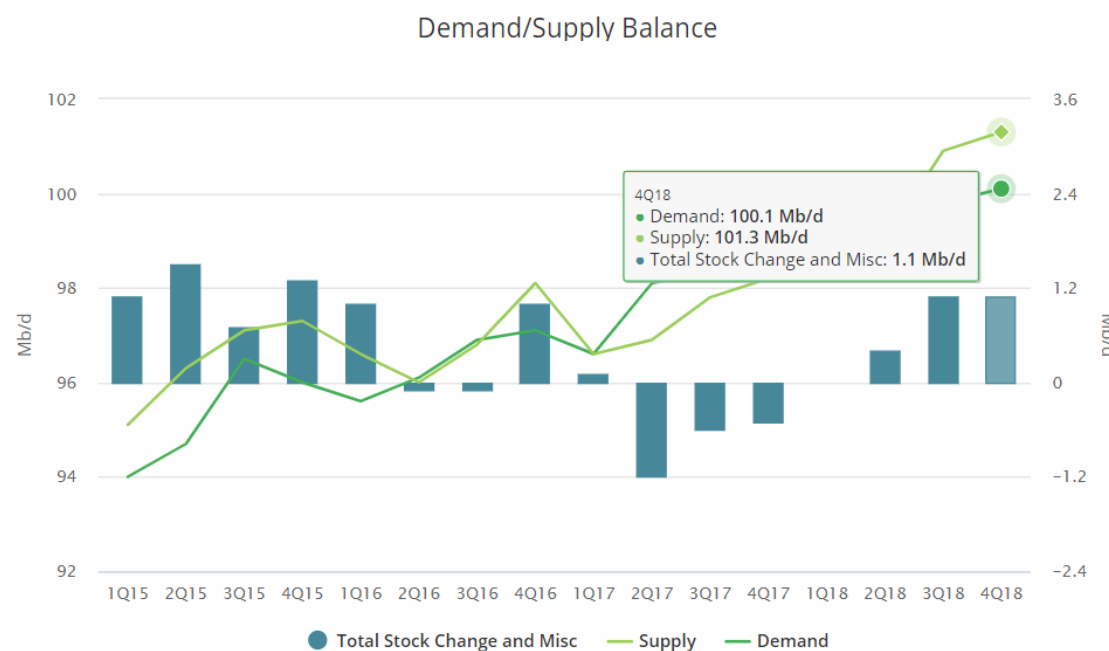


Sources: Nefta Compass and OPEC Secretariat.



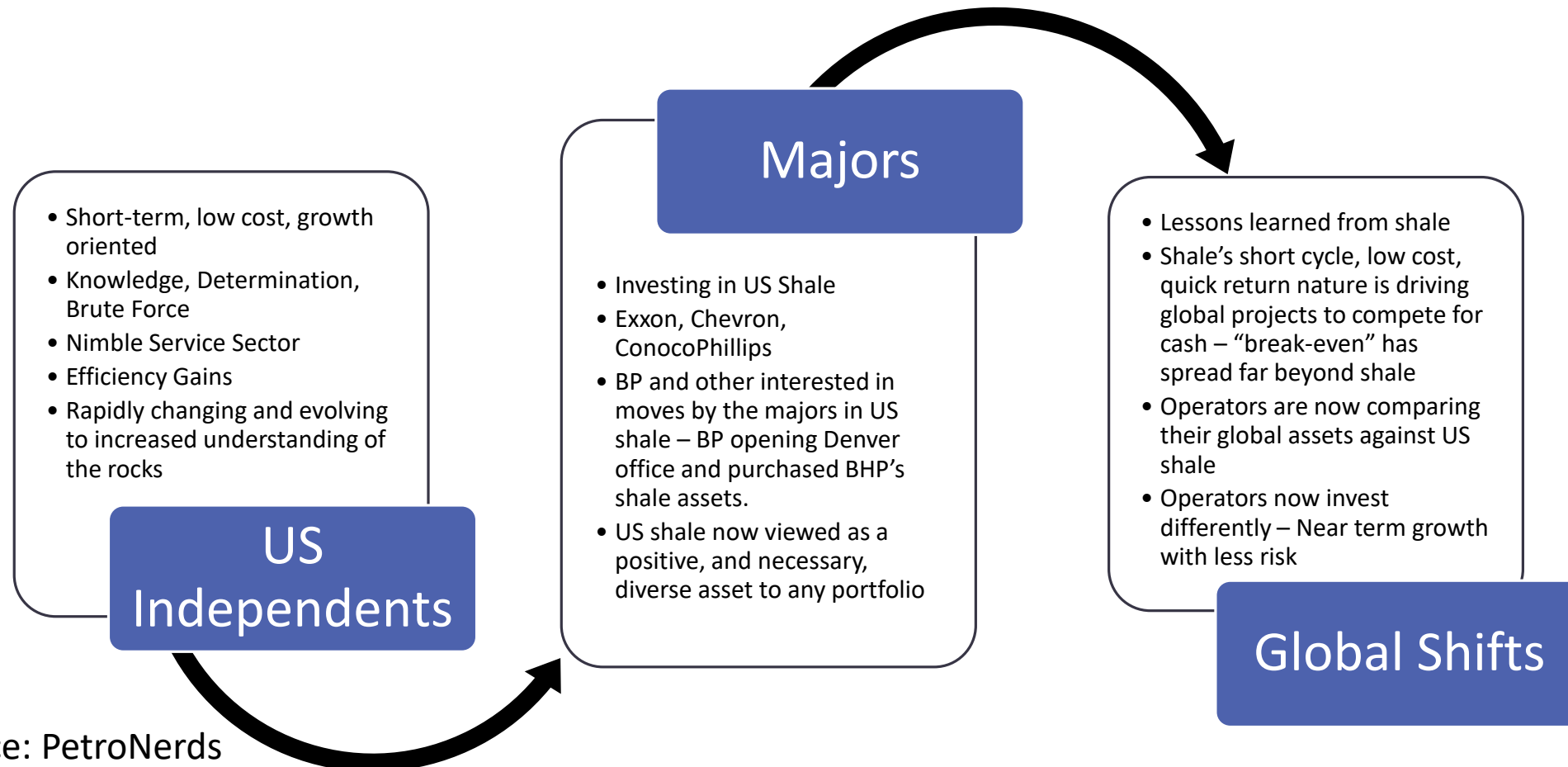
Source: EIA

IEA Q4 2018 Oil Supply and Demand



Source: EIA

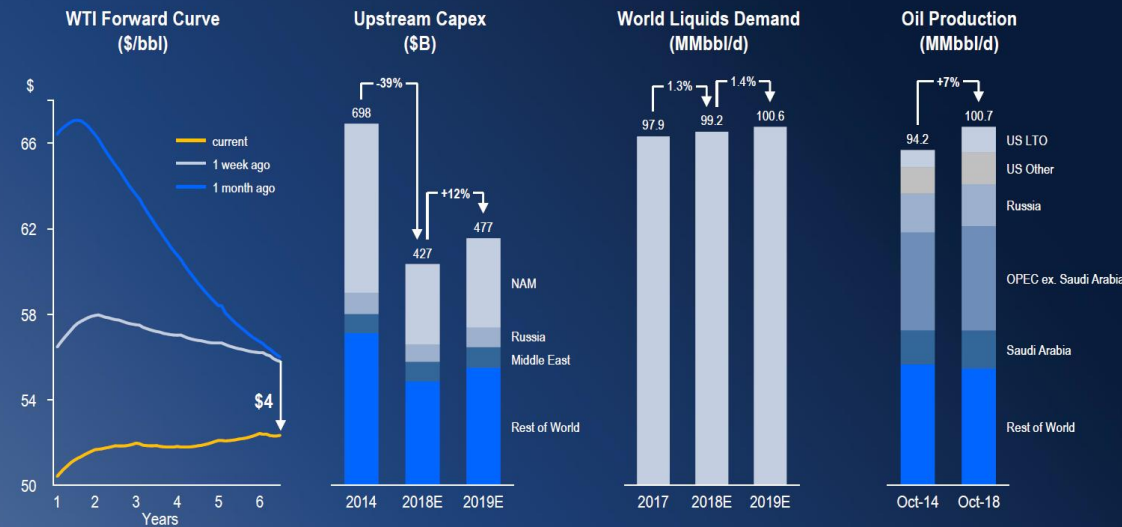
Shale Model Inspiring Broader Changes



Source: PetroNerds

But Some Still Focused on Investment Shortfalls

Oil Price Slide Increases Uncertainty and Decreases Visibility



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Sources: Data Stream, Energy Aspects, IEA, EIA, Bloomberg, IHS Markit, SLB analysis

Schlumberger

Shale Market Dynamics



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

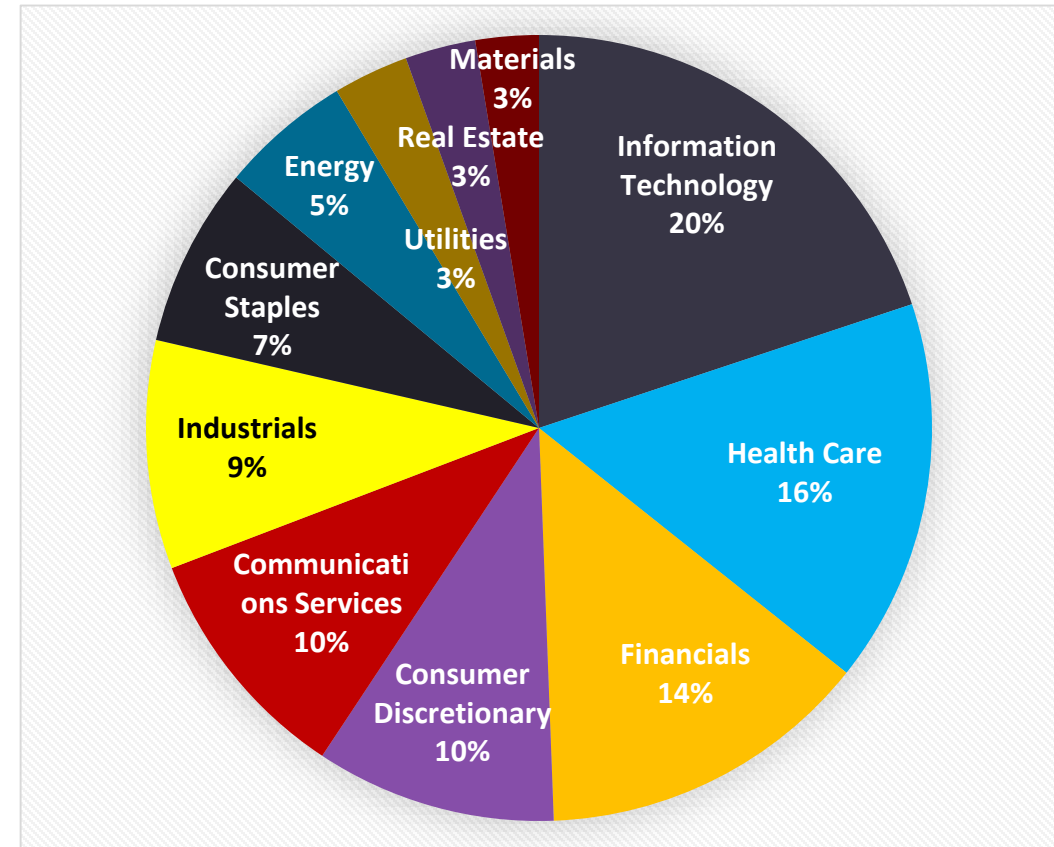
Little Big Oil

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

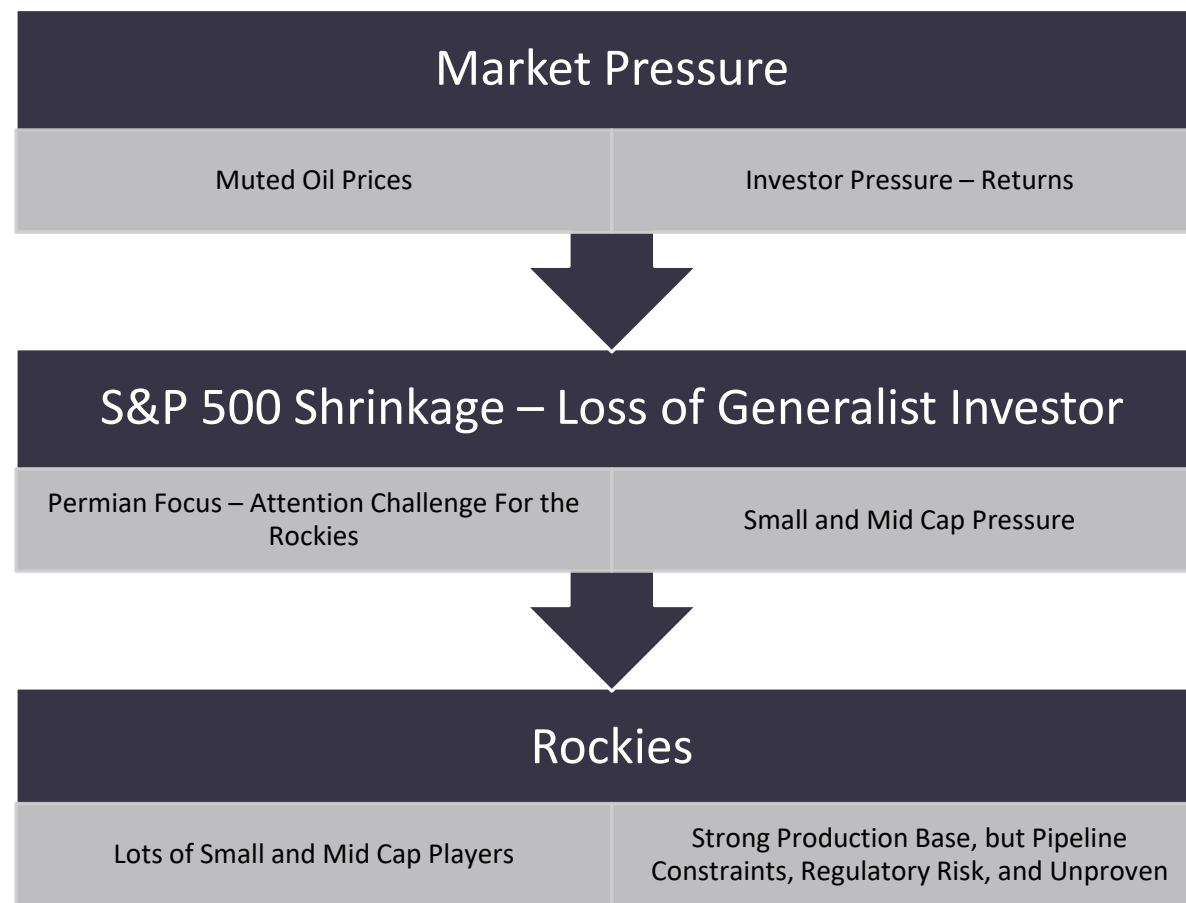


Source: Bloomberg, September 21, 2018

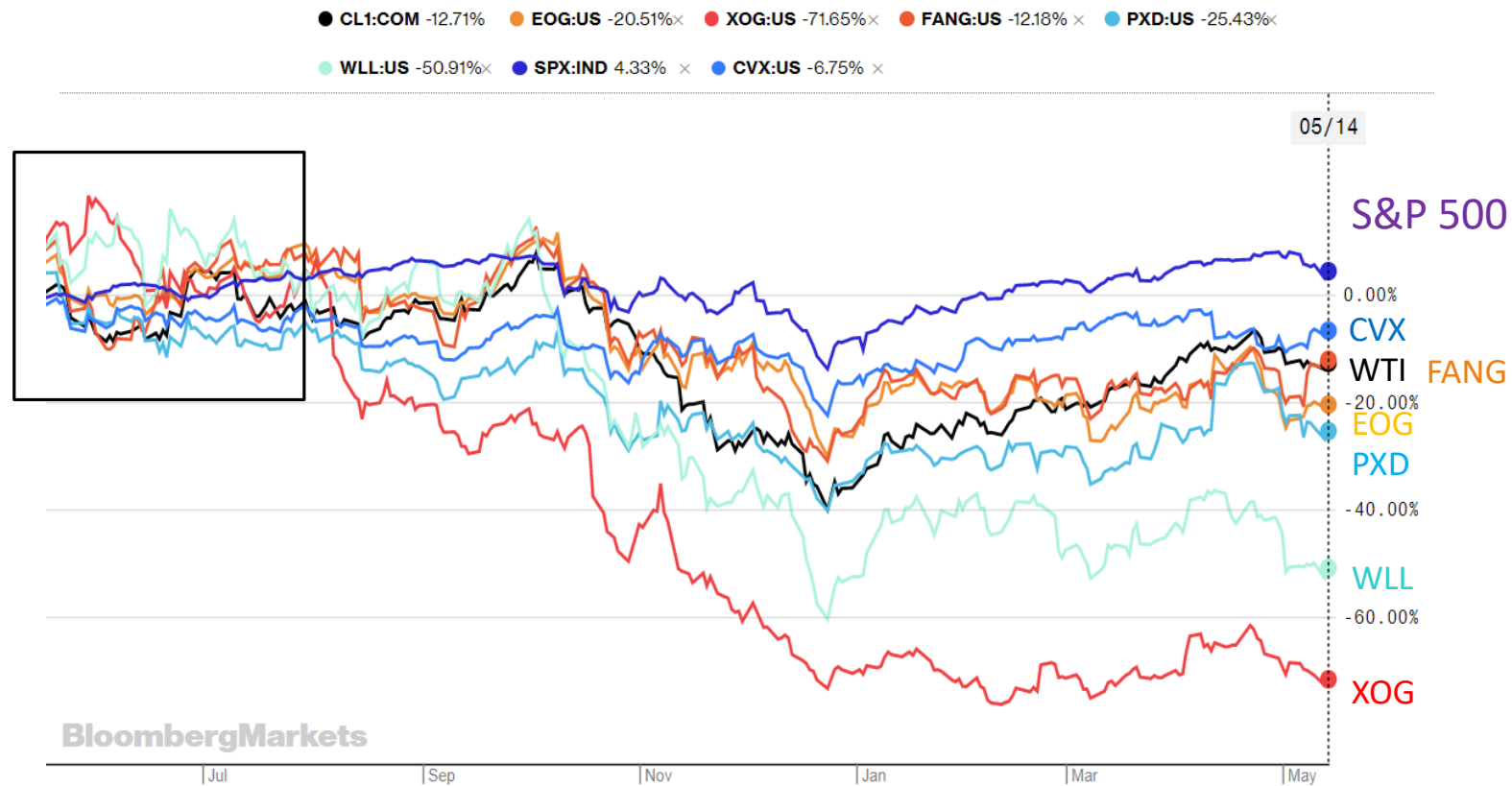


Source: The Balance, November 2018

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!

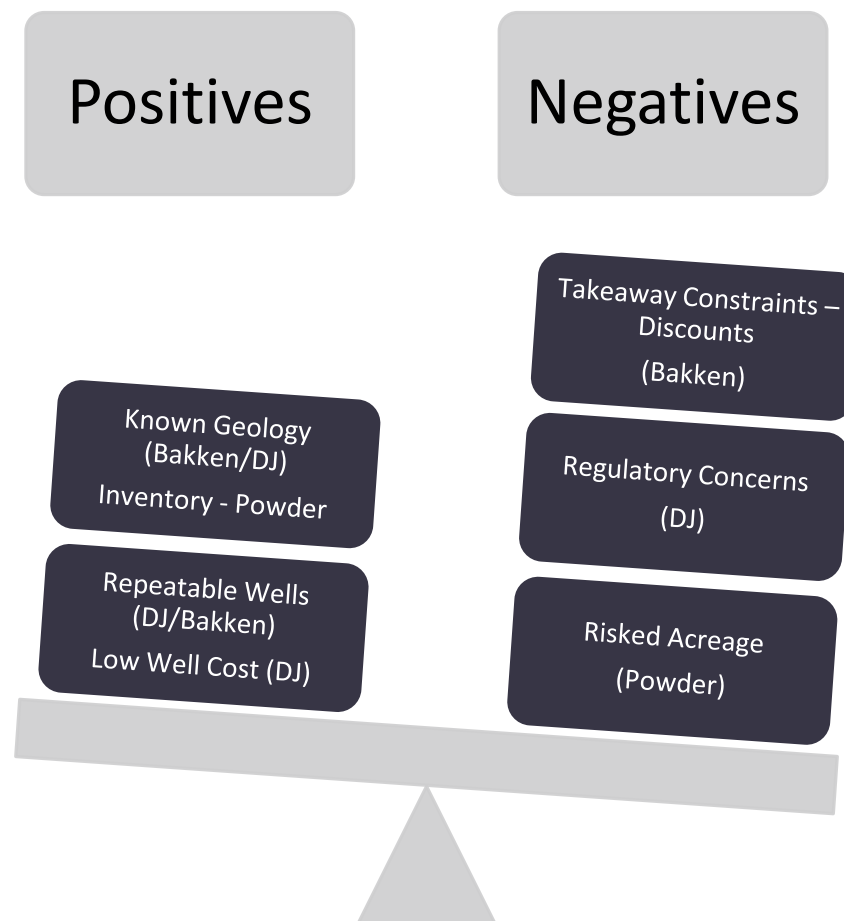
2018 – Investor pressure on returns continues to build, oil prices move up, but stock prices are muted, get free cash flow positive or at the very least free cash flow neutral

- 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

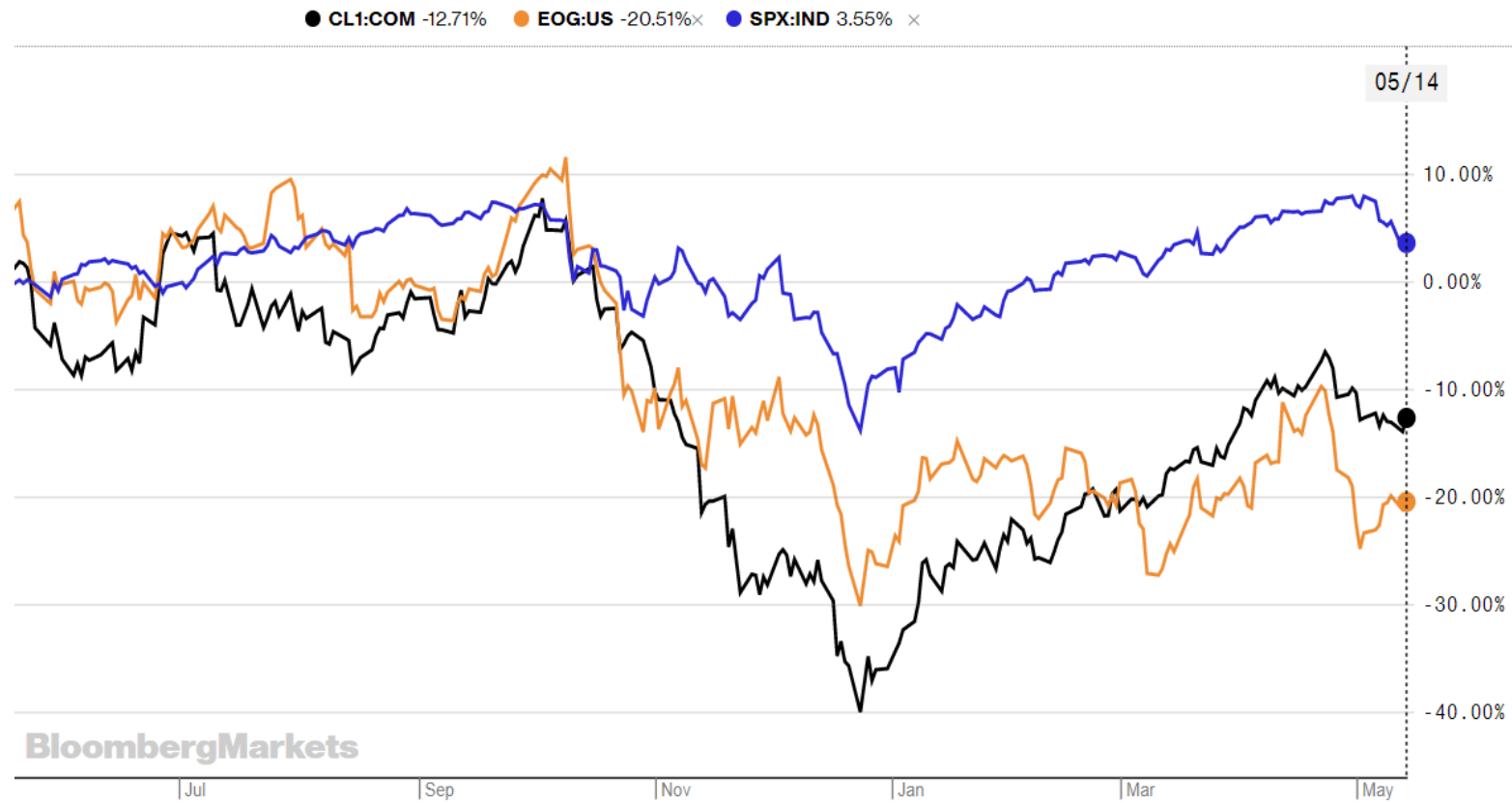
EOG Resources / SPDR S&P Oil & Gas E&P ETF / S&P 500



Source: Bloomberg

Note: Performance indexed to 100.

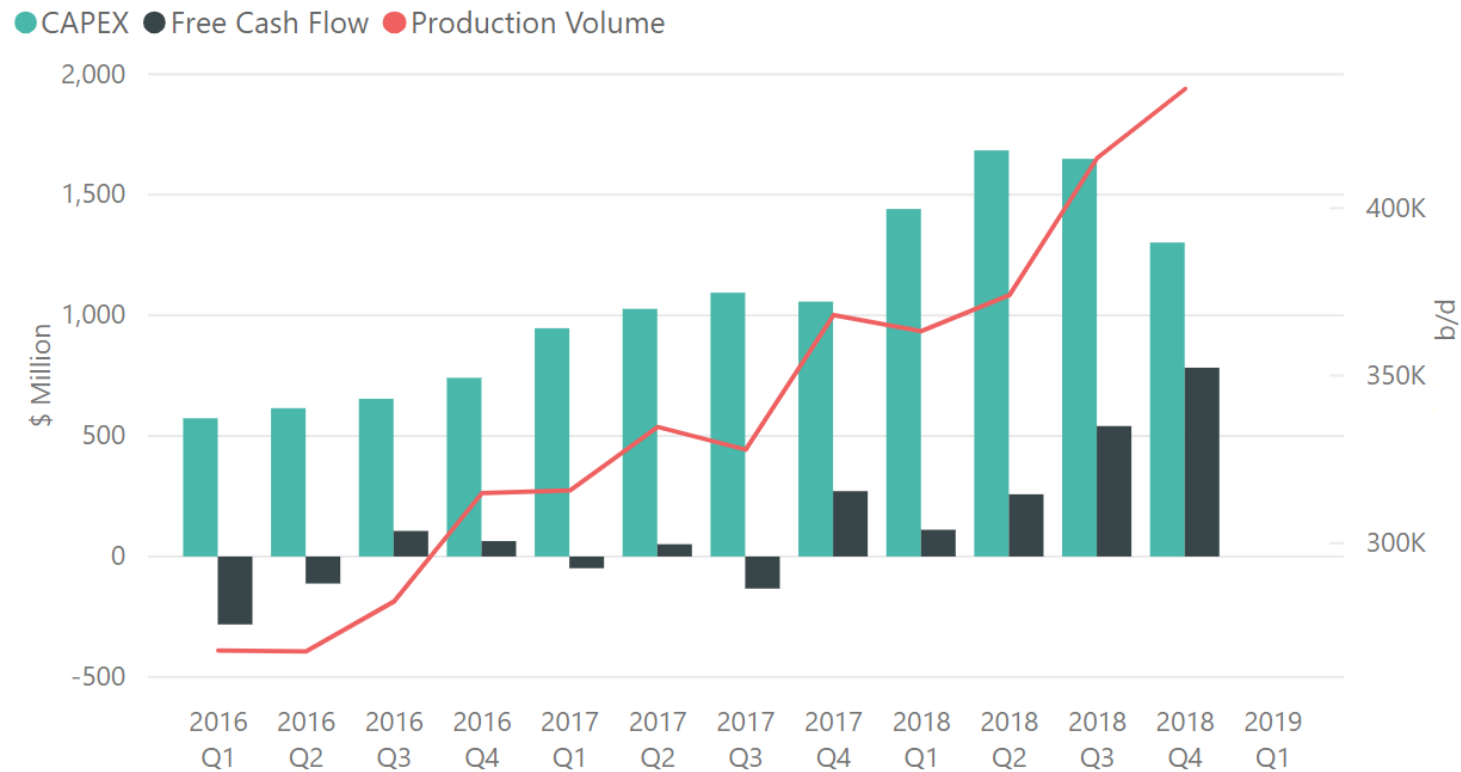
EOG – WTI and S&P



EOG CAPEX, Free Cash Flow, and Production

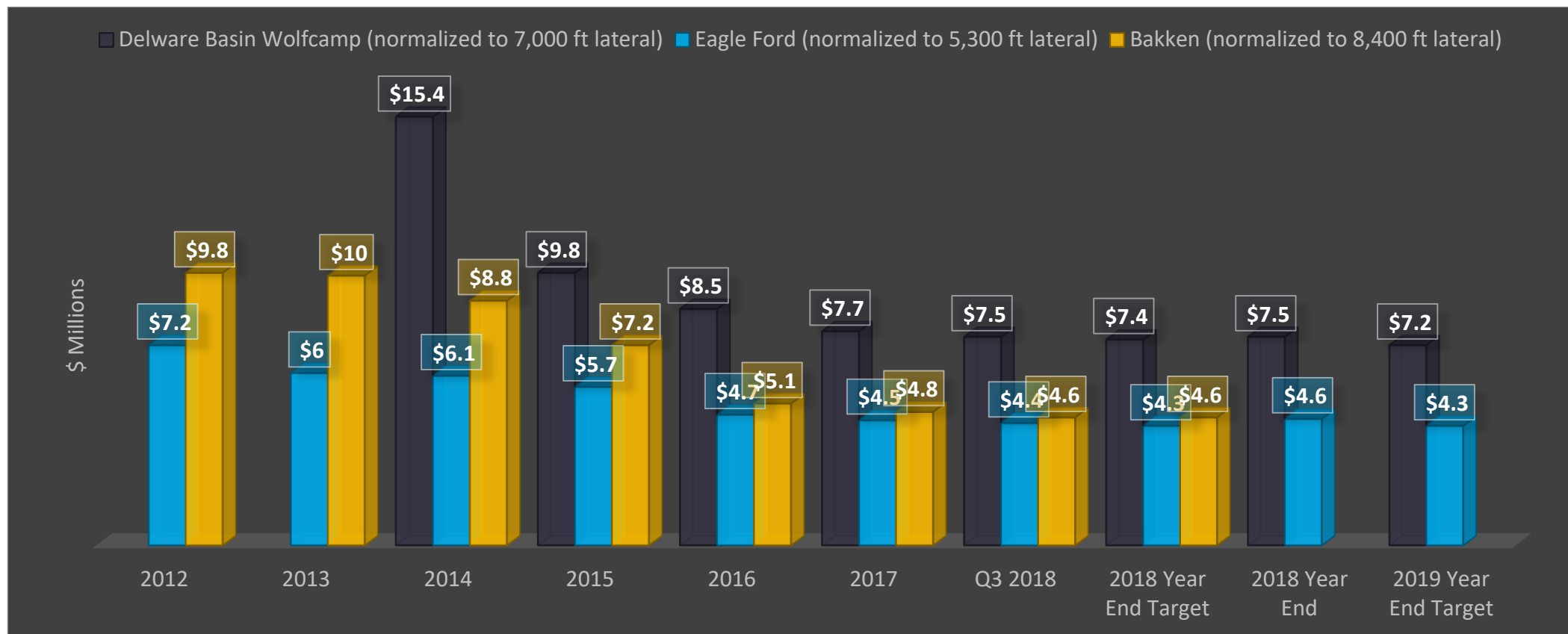


CAPEX, Free Cash Flow and Production Volume by Period



Source: HedgeAware, PetroNerds

EOG Completed Well Costs

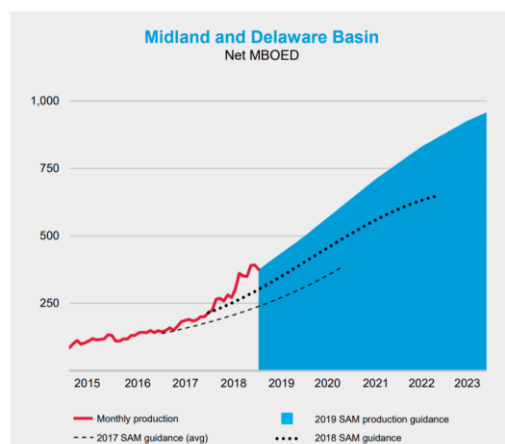


Source: PetroNerds, EOG Investor Presentations

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



See Appendix: slide notes for definitions, source information, calculations, and other.

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Focused on returns

900 MBOED in 2023
20 operated rigs
7-10 net novv rigs

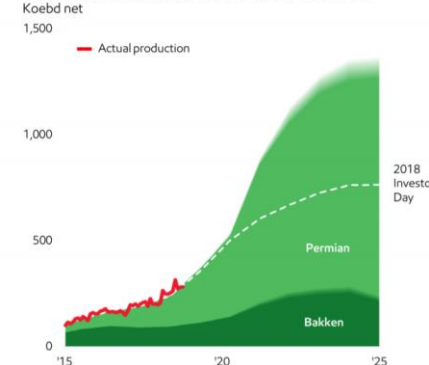
**Cash flow positive
by 2020**

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Source: Chevron Investor Day Presentation, March 5, 2019

UPSTREAM PERMIAN Five outstanding developments

PERMIAN AND BAKKEN PRODUCTION, 2019 OUTLOOK¹



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

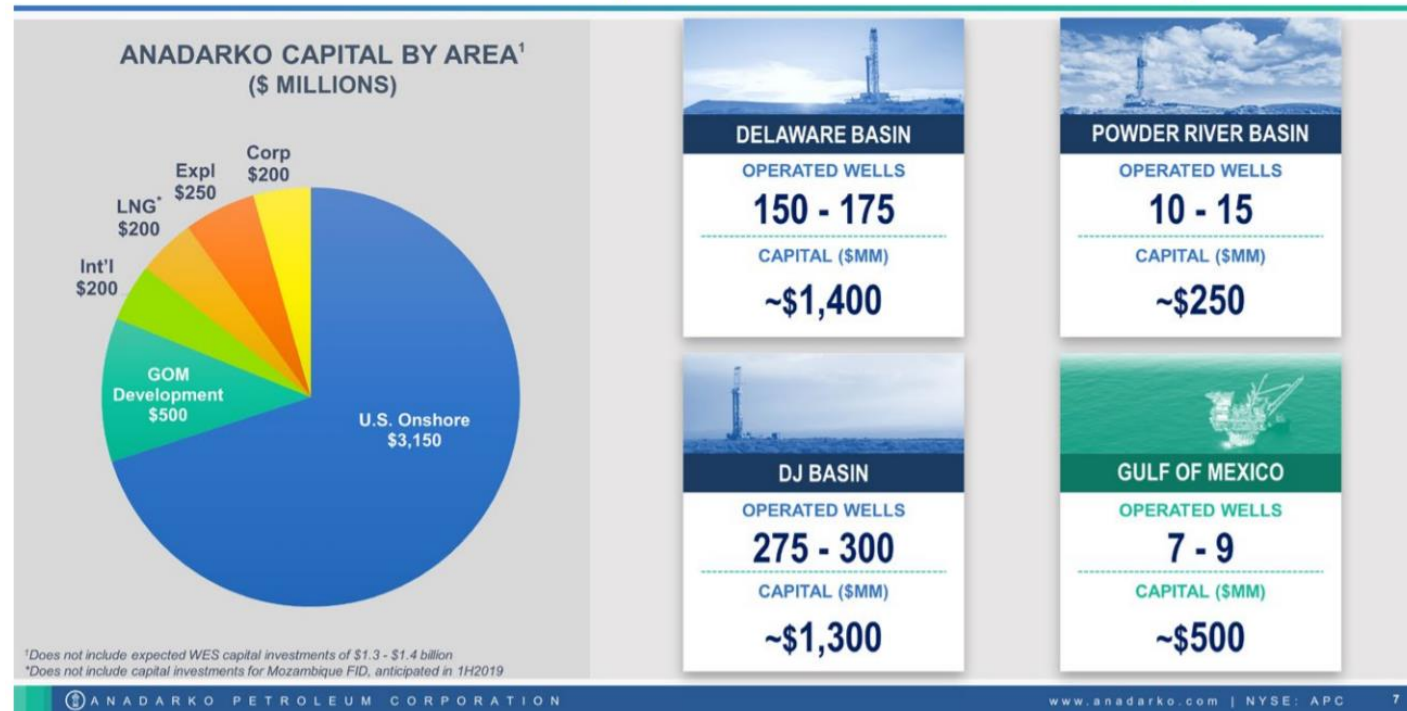
By *Bradley Olson*
May 10, 2019 2:30 p.m. ET



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

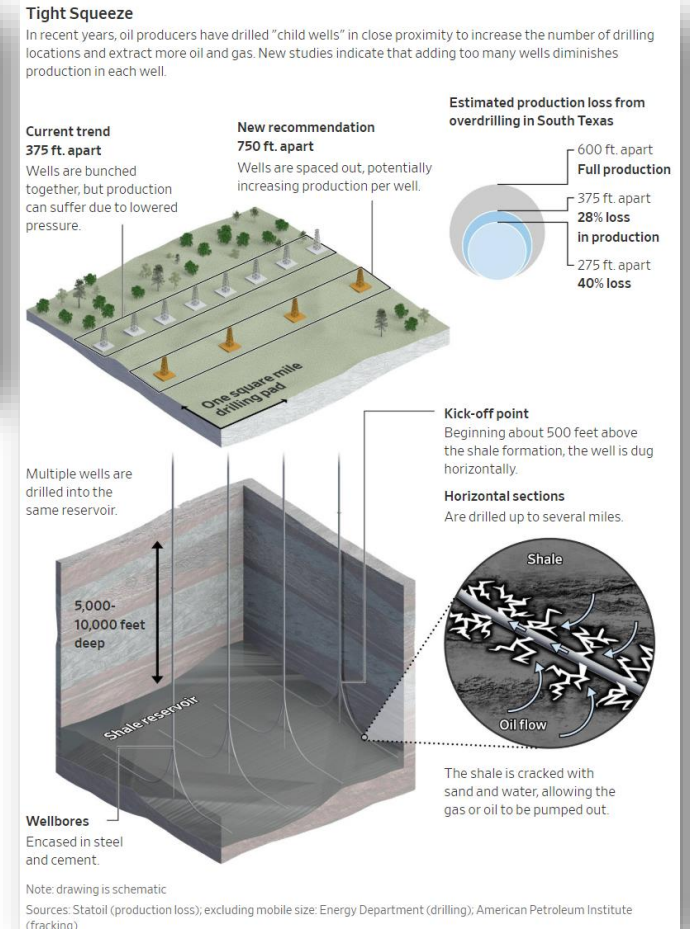
0 COMMENTS

High
Proppant
Volumes

High Fluid
Volumes

And Tight
Spacing

Recipe for
Poor Well
Performance?



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

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 ○	○	○ Monitor peer results (Midland/Martin)
	JM ○	○	○ Monitor peer results (Midland/Martin)
	LS ○ Initial Parsley operated test (Upton)	○	○ Increased proppant (Midland/Martin)
	UWCA ○ Initial test (Upton)	○	○
	WCA ○	○ Test lower proppant loadings	○ Increased proppant (All Counties)
	UWCB ○ Stacked configuration (Upton/Reagan); 330' density tests (Reagan)	○ Stacked configuration (Upton/Reagan) and lower proppant tests	○ Stagger configuration (Upton/Reagan) and increased proppant
	LWCB ○	○	○
	WCC ○ Initial success (Reagan)	○ Delineation work (Reagan/Glasscock)	○ Defer activity (low Waha prices)
	WCD ○	○	○ Monitor peer results (Midland/Reagan)
	3BS ○	○ Initial test (Reeves)	○ Monitor peer results
Delaware Basin Well Selection	UWCA ○ Initial test (Pecos)	○ Stagger configuration	○
	LWCA ○	○	○ Increased proppant (Pecos)
	UWCB ○ Initial test (Pecos)	○	○ Monitor peer results

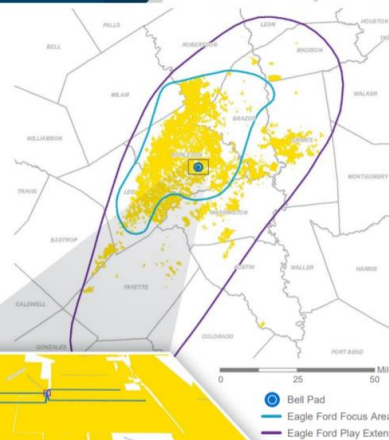
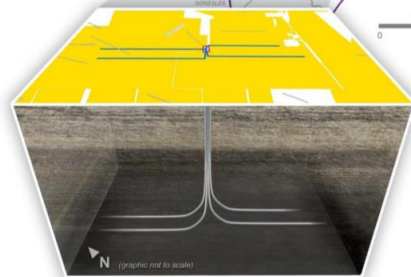
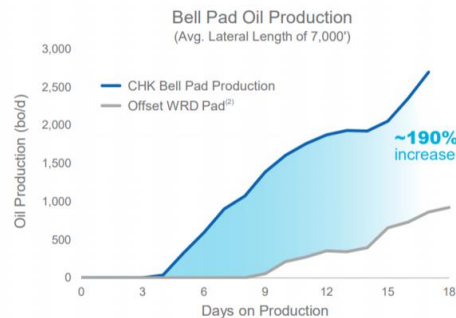
Source: Parsley Energy, May 2019, Q1 2019 Earnings

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



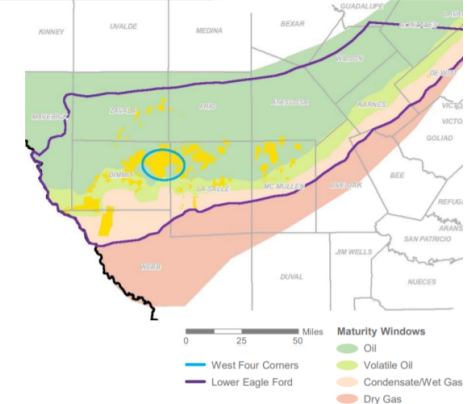
CHESAPEAKE ENERGY

1Q 2019 Earnings

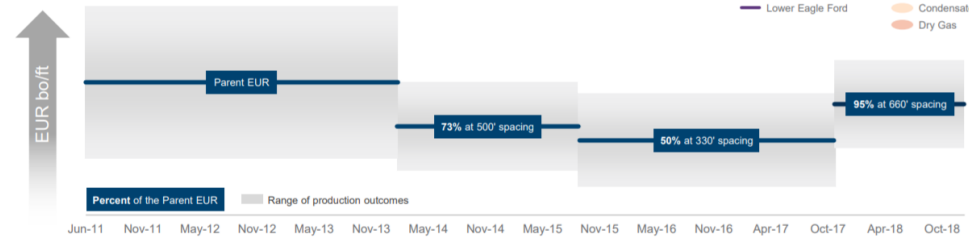
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EAGLE FORD WELL SPACING ENHANCING PRODUCTION

- 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⁾



Well Productivity Progression – West Four Corners Region



CHESAPEAKE ENERGY

(1) Source: RS Energy Group
1Q 2019 Earnings

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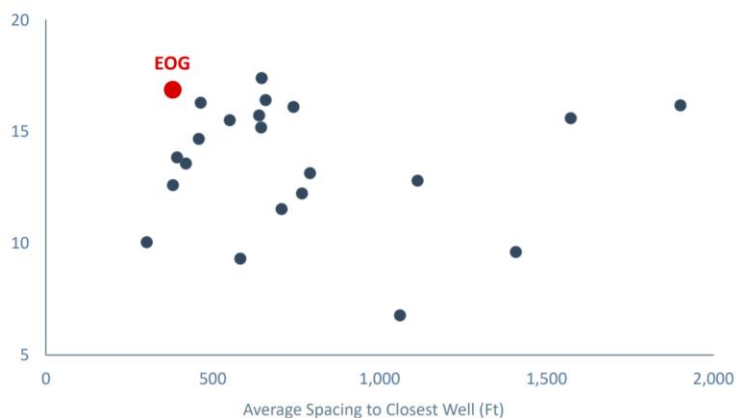
EOG vs. PXD on Well Spacing

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.

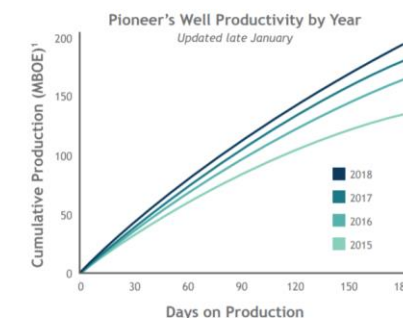
(1) Peers include APA, CFE, CRZO, CVX, CXO, DYN, FANG, JAG, MRO, MTDI, NBL, OAS, OXY, PDCE, PE, RDS, WPK, XEC, XOM and two private operators.

1Q 2019

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Capitalizing on Unmatched Footprint in World Class Asset

Horizontal Development Strategies



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

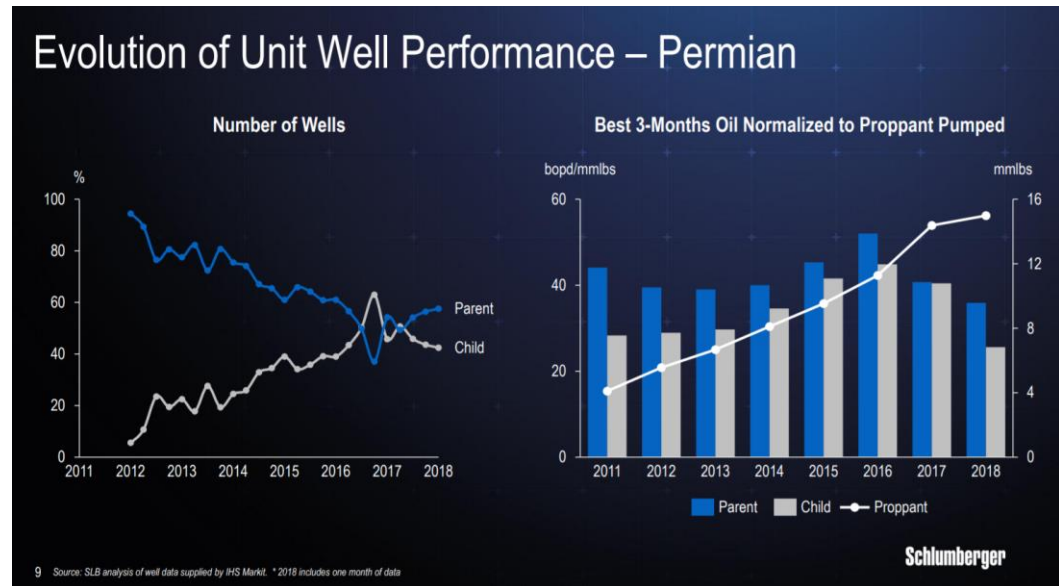
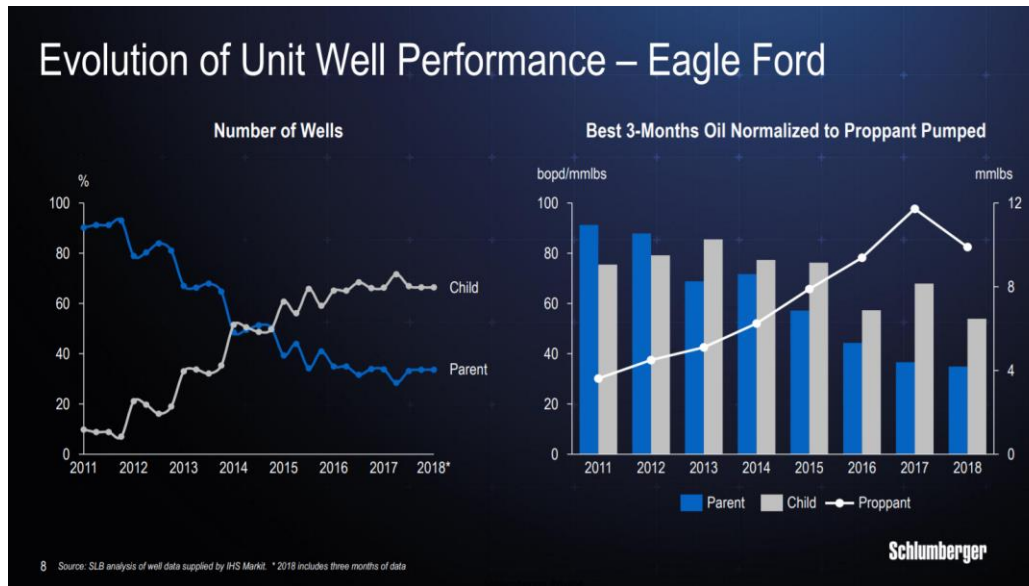
Chase Mulvehill

....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....?



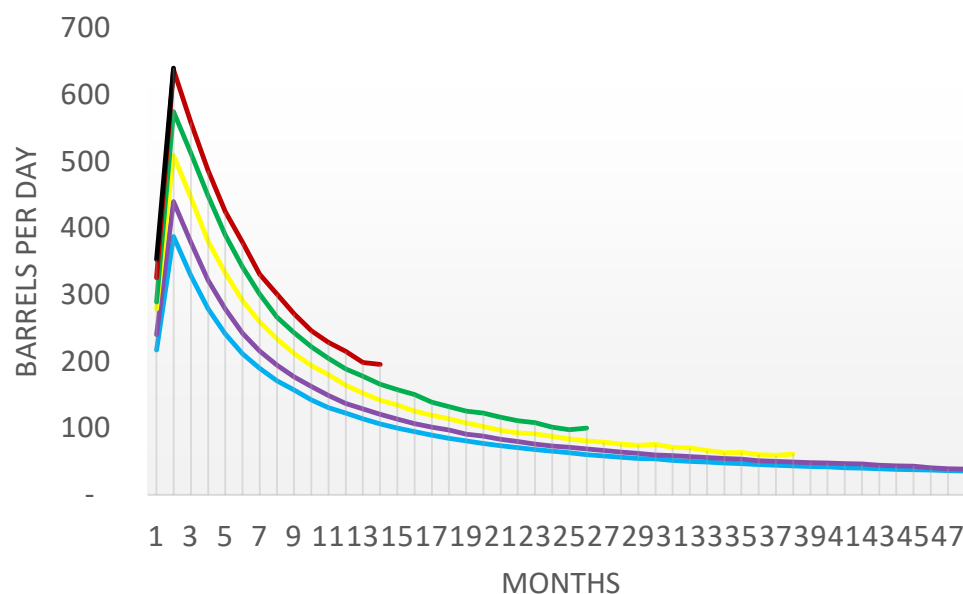
Source: Schlumberger Investor Presentation, September 2018

Production and Productivity

Shale Play Type Curves

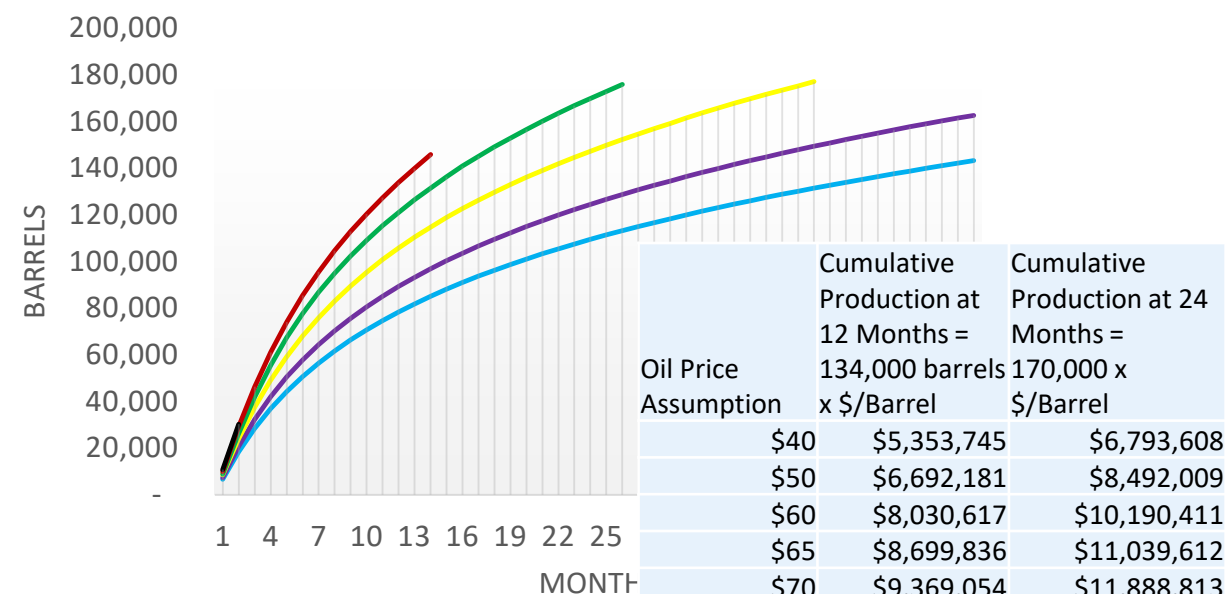
Permian, DJ, Williston, Powder, and Texas and Louisiana Gulf Coast Basins

Type Curve



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

Cumulative Barrels

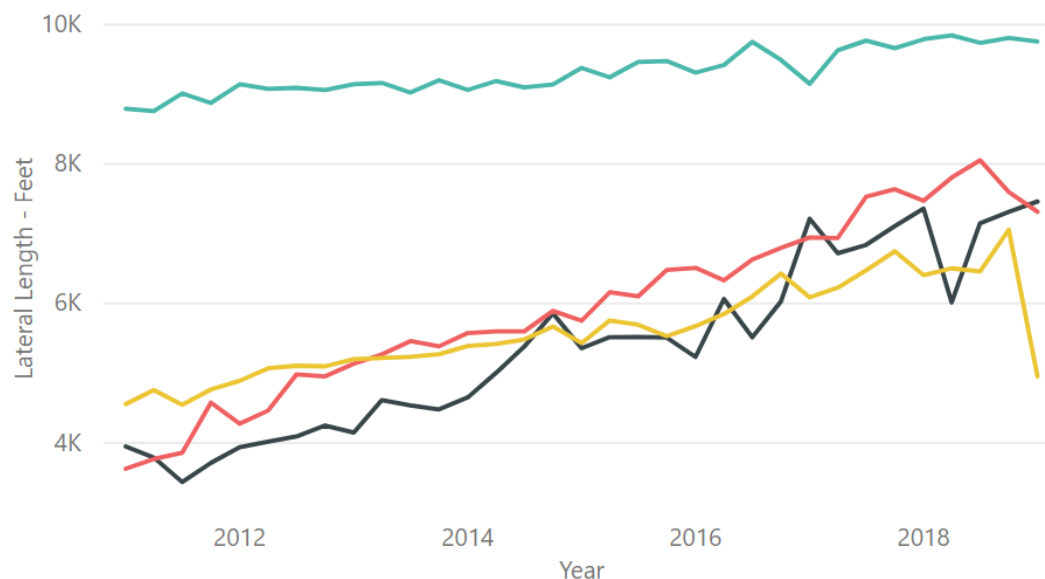


— 2014 Cum Barrels — 2015 Cum Barrels — 2016 Cum Barrels
— 2017 Cum Barrels — 2018 Cum Barrels — 2019 Cum Barrels

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

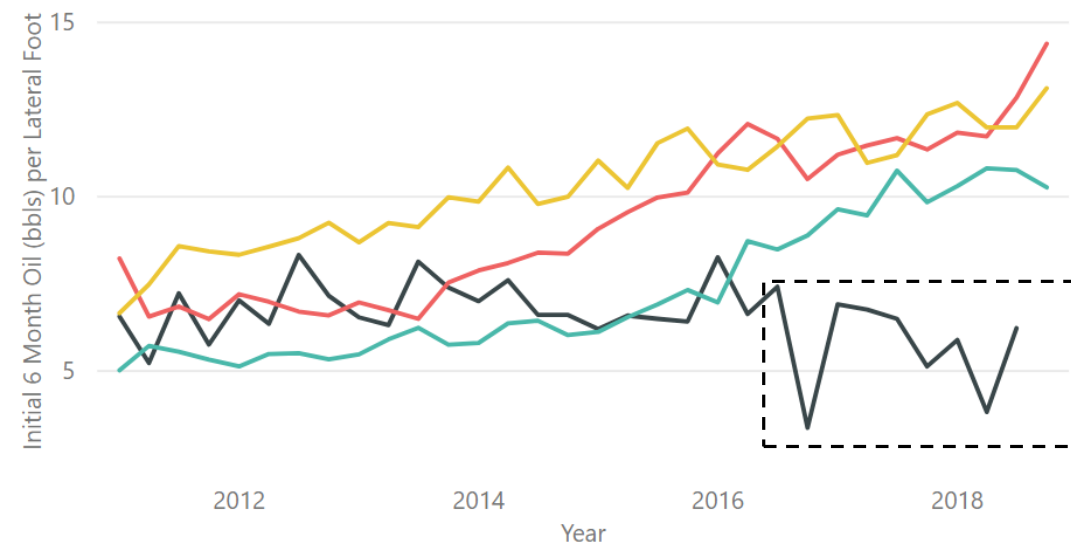
Average Lateral Length

AAPG Geologic Province ● DENVER JULESB... ● PERMIAN BASIN ● TEXAS & LO... ● WILLISTON



First 6 Month Oil Per Lateral Foot

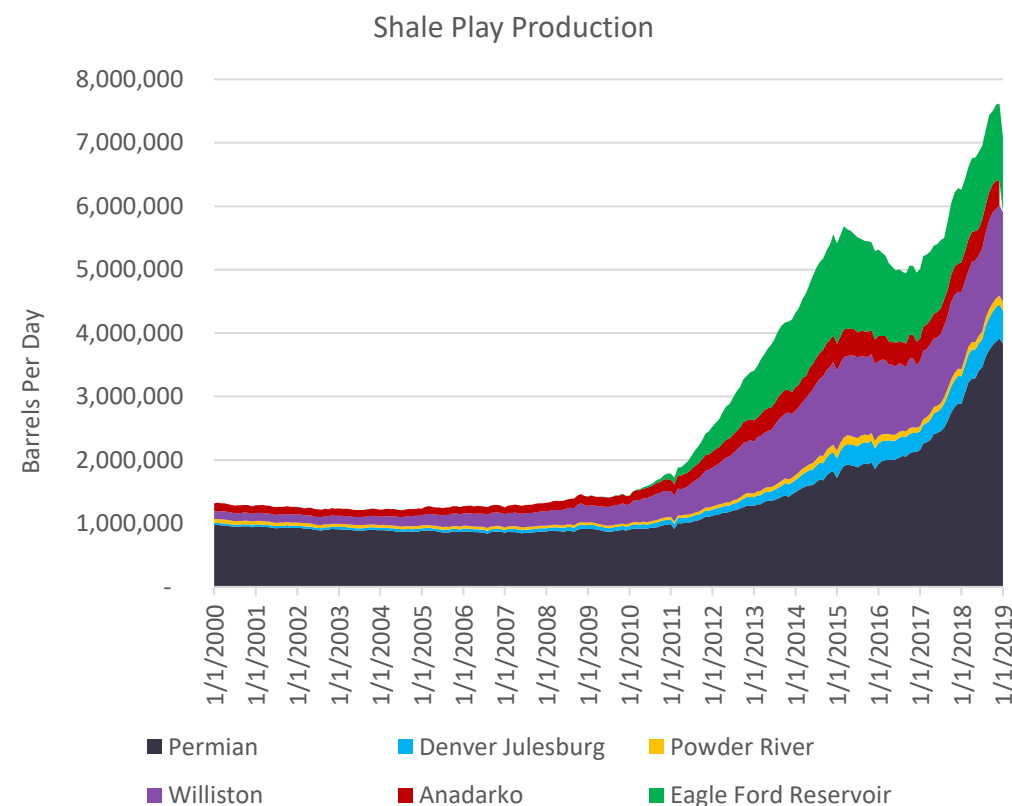
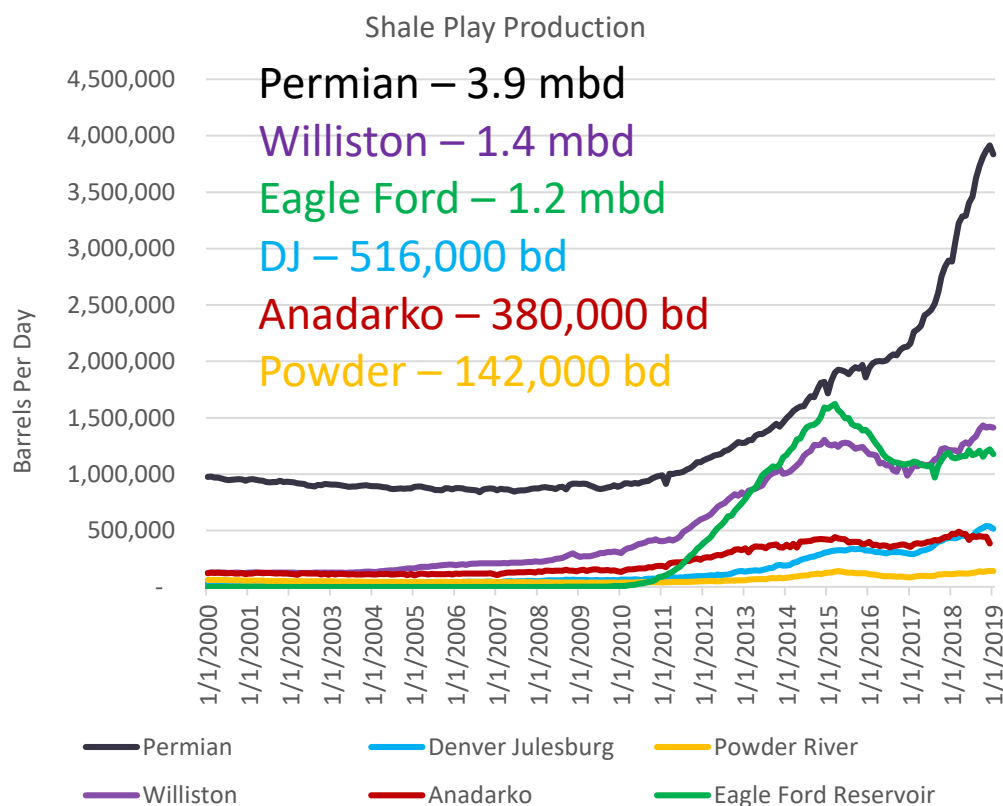
AAPG Geologic Province ● DENVER JULESB... ● PERMIAN BASIN ● TEXAS & LO... ● WILLISTON



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

Infrastructure constraints, pent up productivity

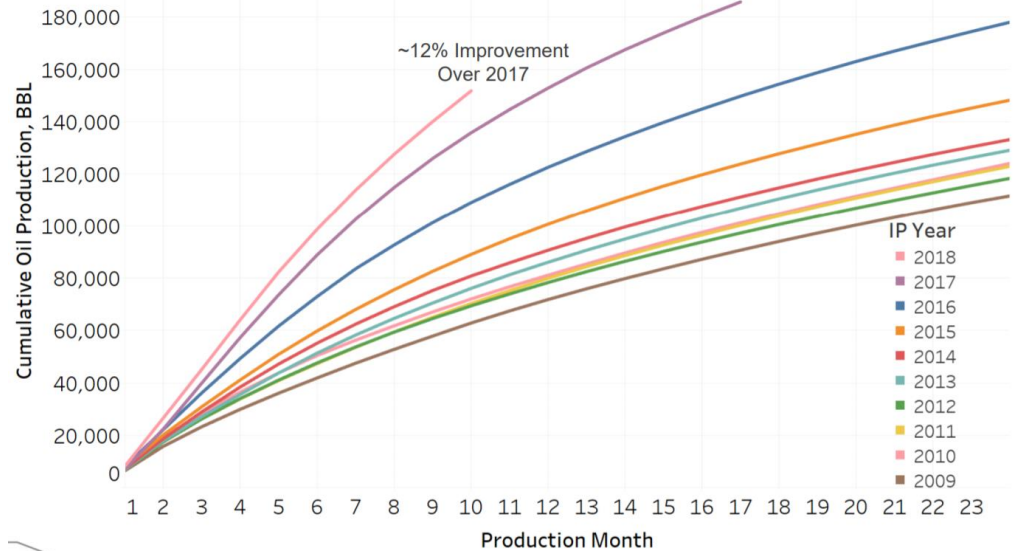
US Shale Oil Play Production by Basin



Source: PetroNerds, DrillingInfo

Williston – Continued Growth

Statewide Oil Performance

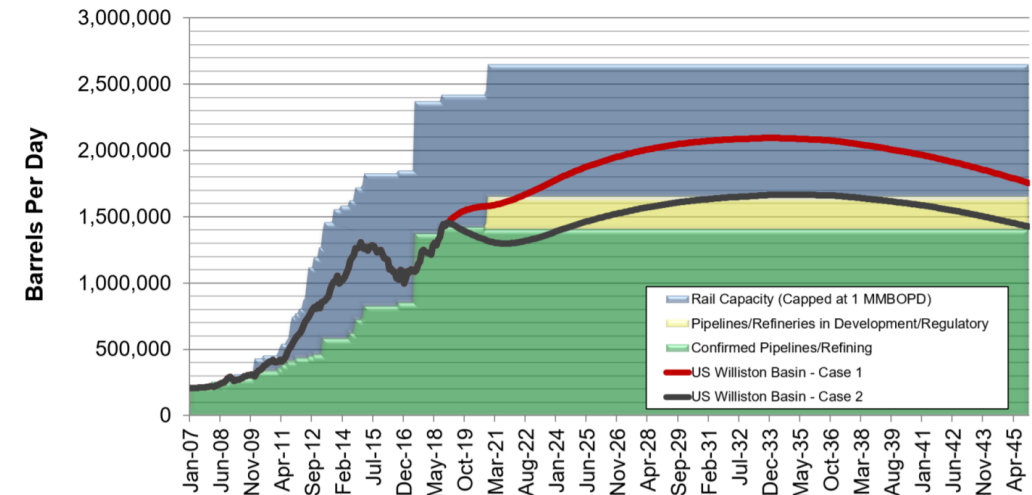


Kringstad - North Dakota Pipeline Authority

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

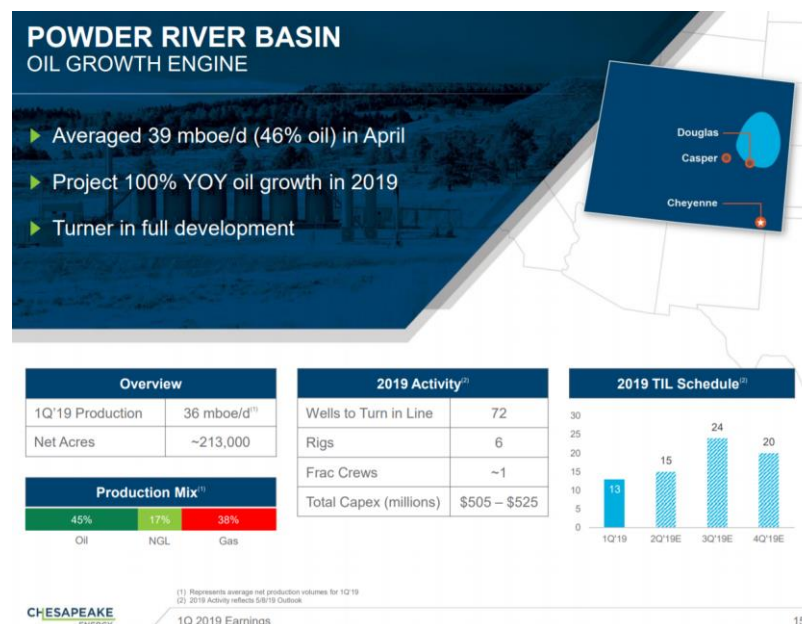
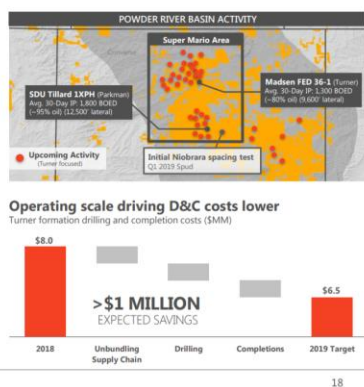
\$270 to \$300
Million CAPEX

\$505 to \$525
Million CAPEX

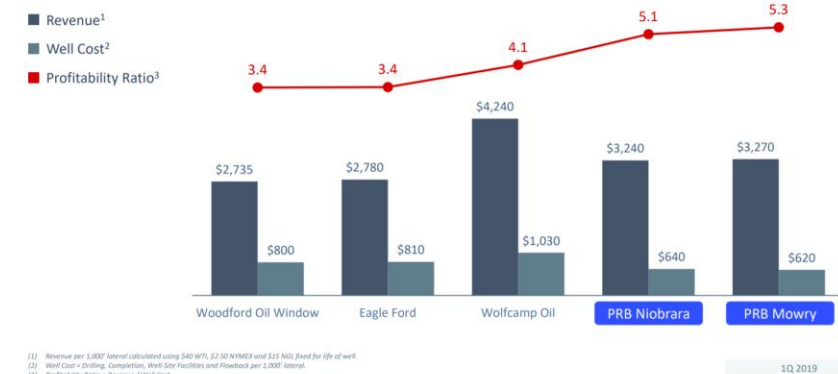
40 Net Completions
(double that of Bakken)

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



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



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.

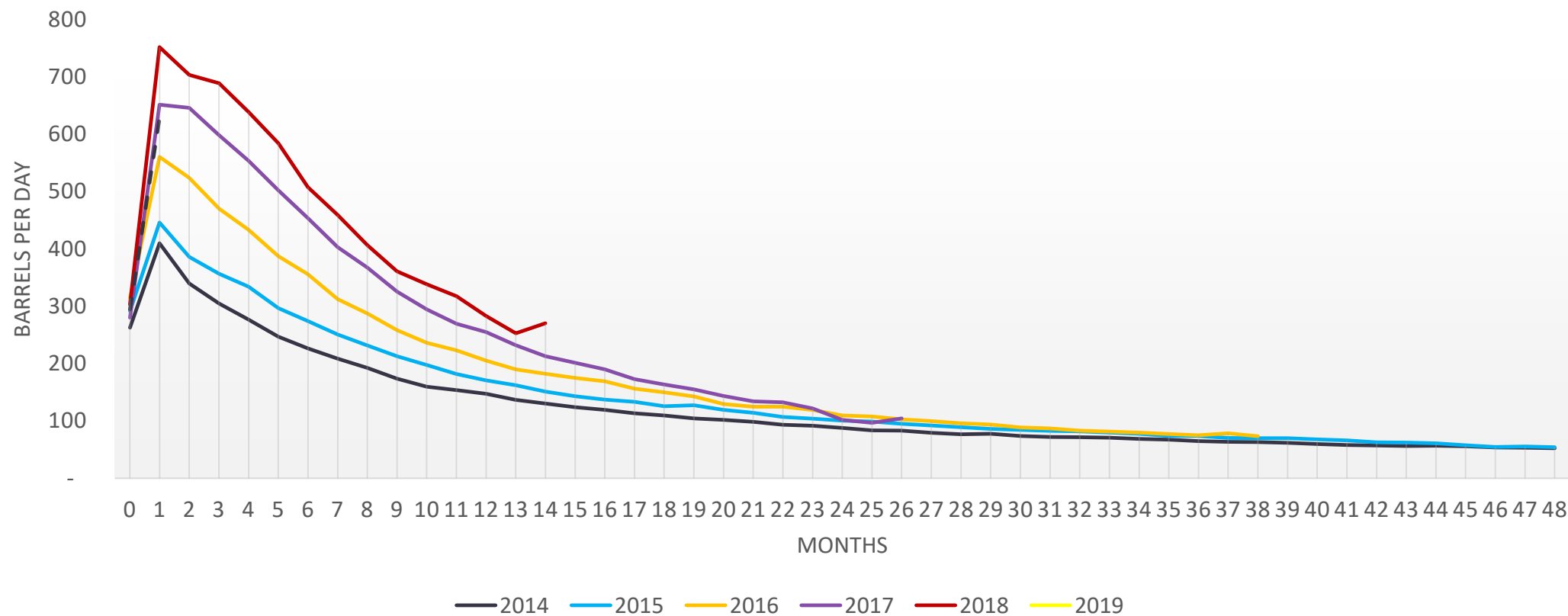
1. Q1 call – understand regulatory environment
2. Low, repeatable well cost

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

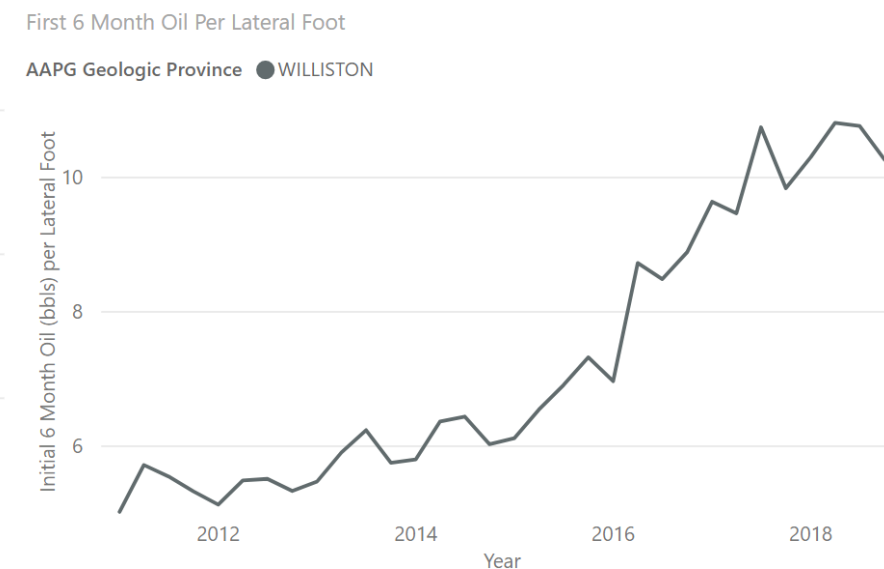
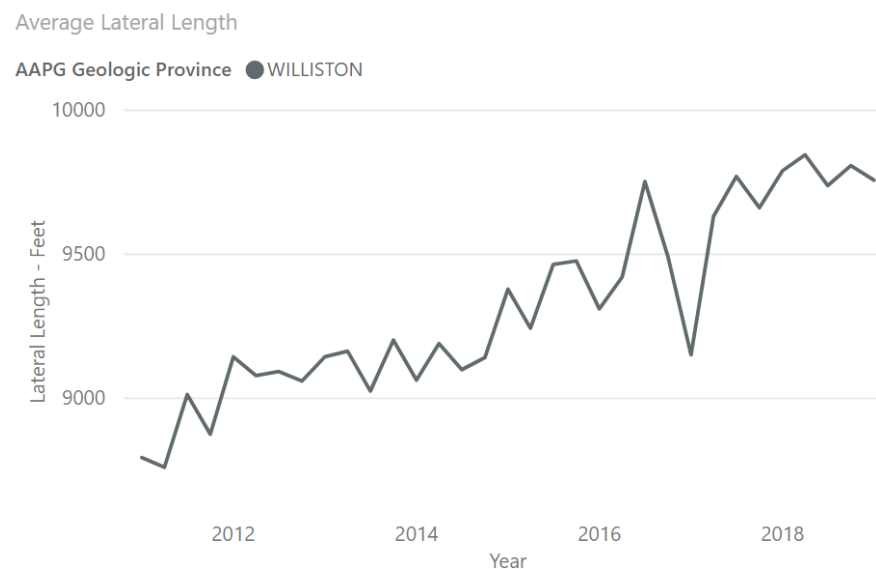
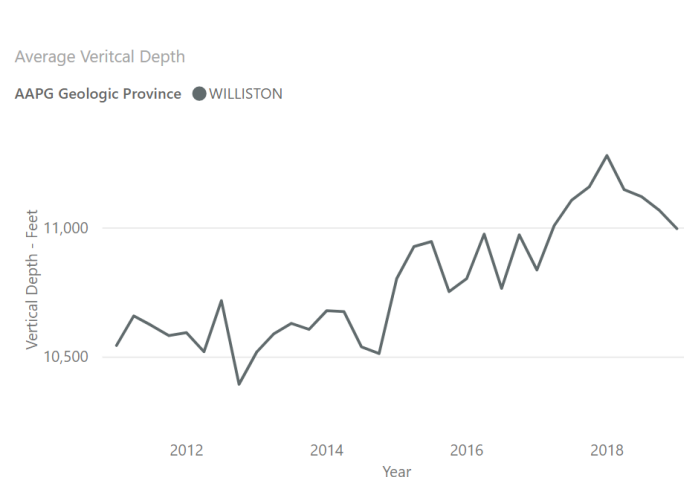
Codell				
	Lateral Length (ft)	D&C Cost (\$million)	F&D Cost (\$/Boe) ⁽¹⁾	EUR (MBoe)
1 mile	4,200	\$2.6	\$9.31	345
1.5 mile	6,800	\$3.5	\$7.16	610
2 mile	9,400	\$4.2	\$6.01	875
2.5 mile	12,000	\$5.2	\$5.69	1,140

Source: Extraction, Q1 2019 Earnings

Williston Basin Type Curve

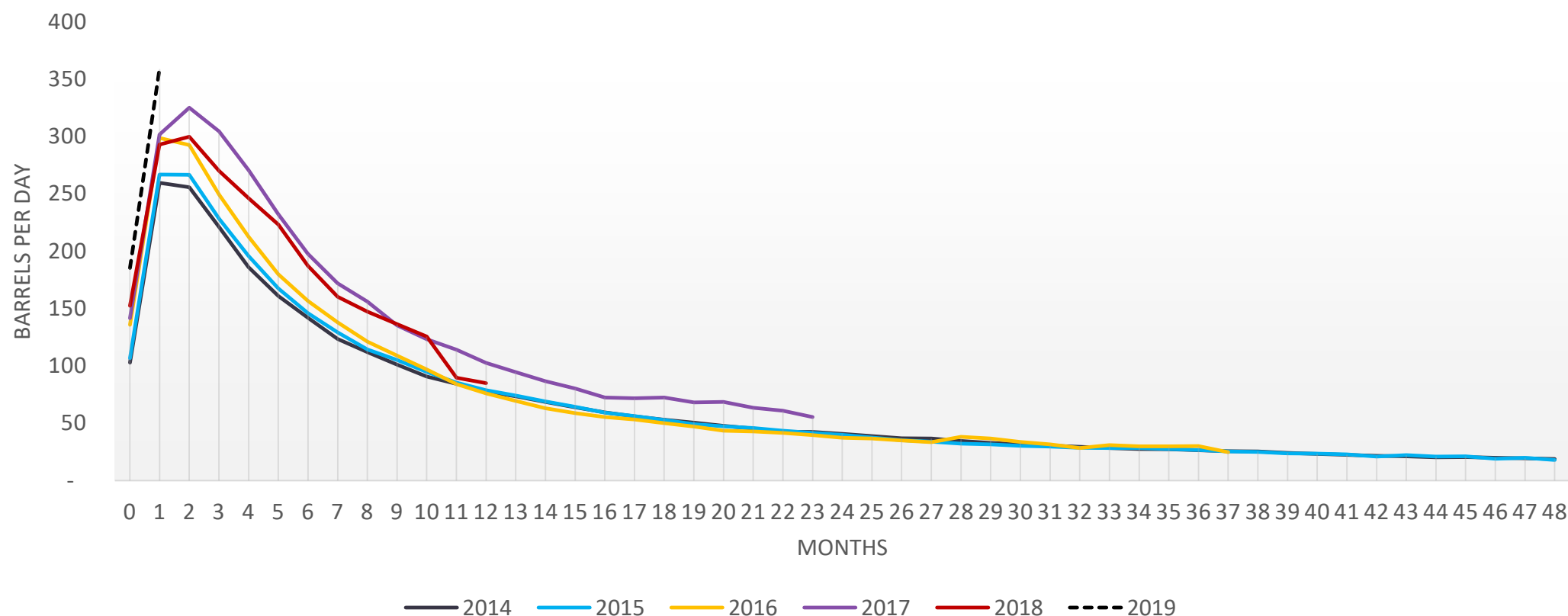


Williston Basin Productivity



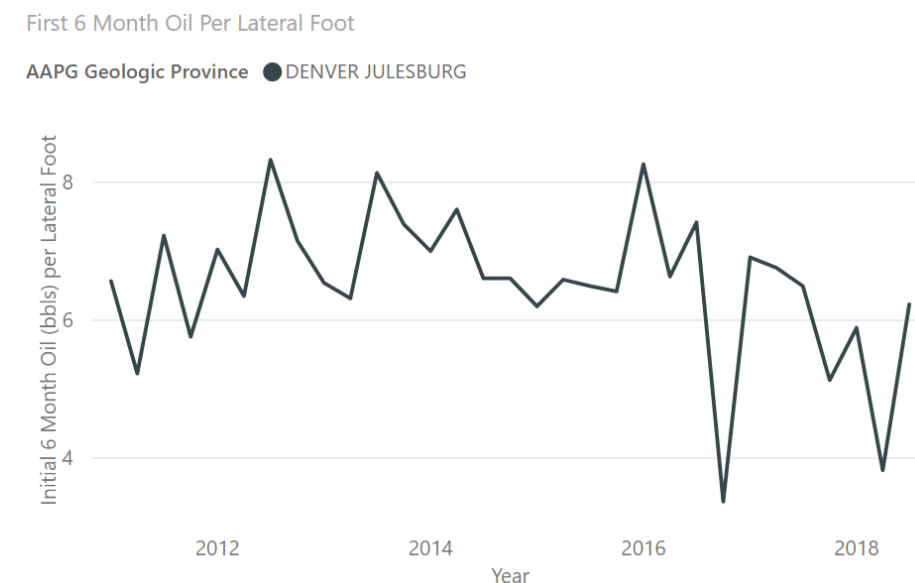
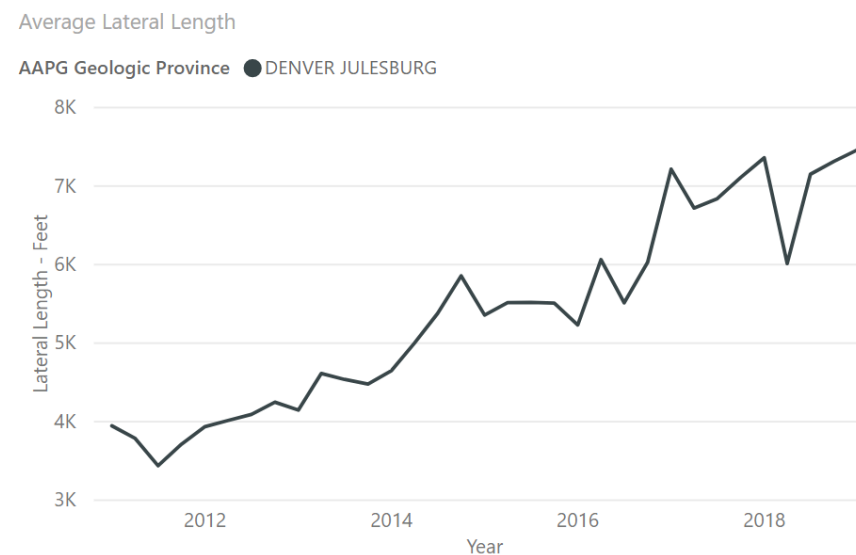
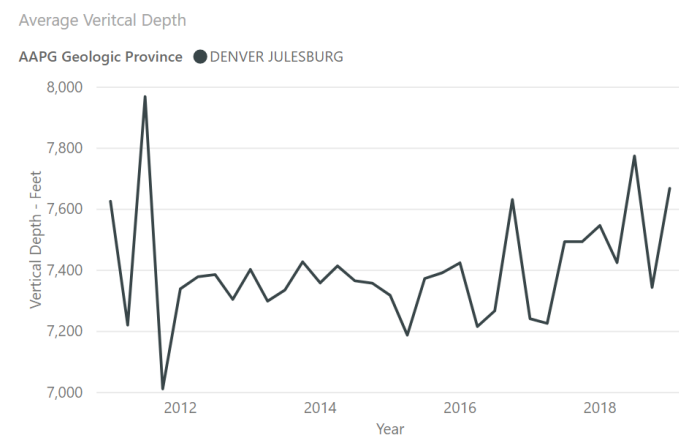
Source: PetroNerds, DrillingInfo

DJ Basin Type Curve



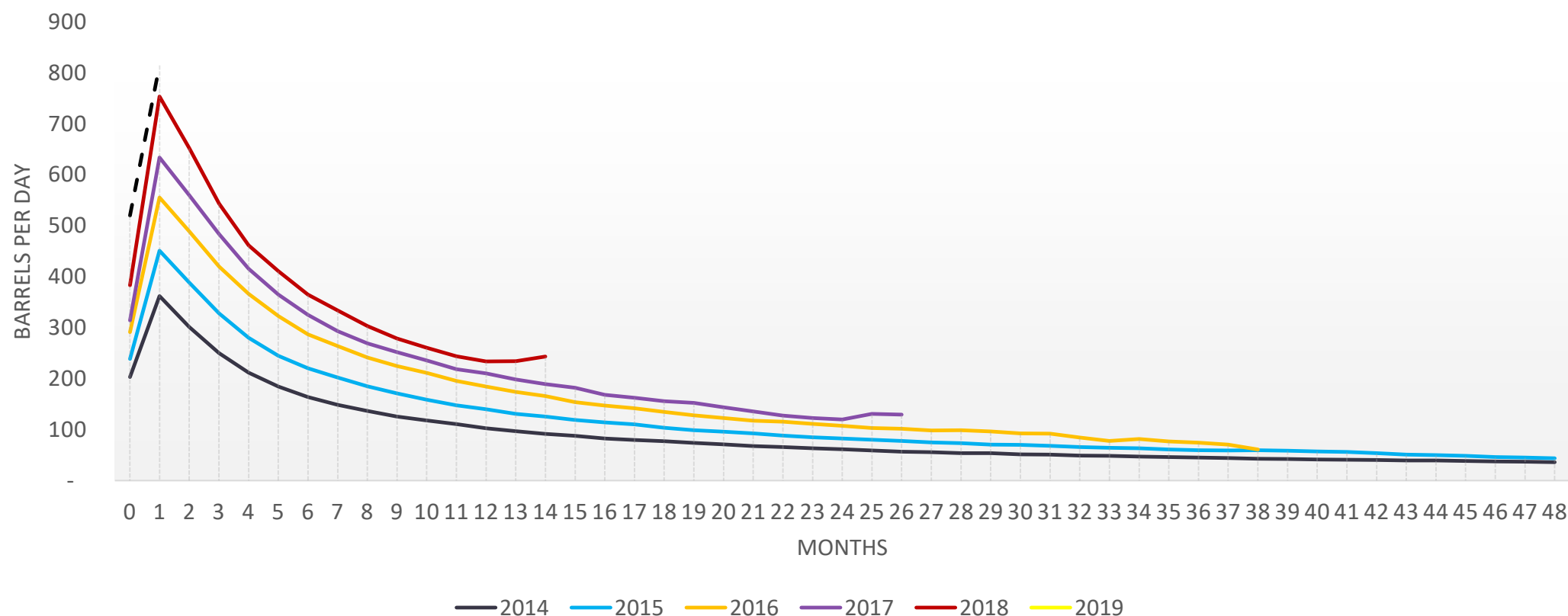
Source: PetroNerds, DrillingInfo

DJ Basin Productivity



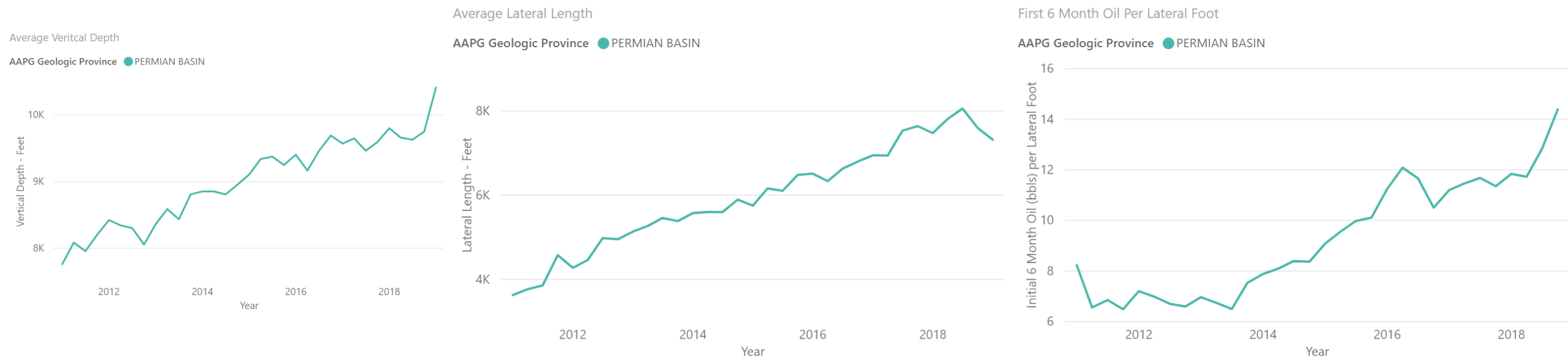
Source: PetroNerds, DrillingInfo

Permian Basin Well Productivity



Source: PetroNerds, DrillingInfo

Permian Basin Productivity



Source: PetroNerds, DrillingInfo