

The Future of US Shale. Clouded by Sentiment.

December 9th, 2020

Oxford Institute for Energy Studies/KAPSARC

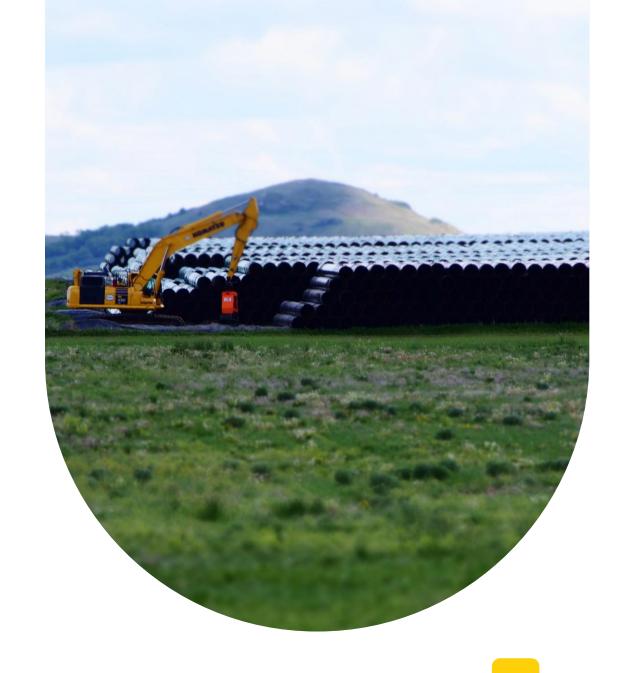
Would Shale Impede or Accelerate the Global Energy Transition?

PetroNerds

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We are closing the gap between the micro and the macro, discerning trends and keeping you informed of what is happening on the ground.

We provide solutions that are pragmatic and progressive.





Outline

US Shale Oil Market Background and Outlook

Permian and US Shale Activity





US Shale Market Background

Outlook and Nuances



A Unique and Compounded Correction

- The impact of negative sentiment on the oil industry combined with this green wave and tech momentum cannot be underscored enough. No industry has been harder hit by COVID than the oil industry when comparing many metrics. The US oil and gas industry has shed tens of thousands of jobs. Exxon is no longer in the DOW and has just taken one of their biggest write offs in history. There is talk of the dividend being threatened. Energy makes up just 2 percent of the S&P 500. BP is selling their London headquarters.
- Most leaders in the industry expect the Biden administration to be Obama 2.0. He will not be Obama 2.0.
- This downturn is unlike any the world or industry has experienced. Trying to forecast
 activity based on prior understandings of basins, especially the Permian Basin, may
 yield incorrect results. Oil price corrections, as in any economic correction, create
 lasting changes and shifts in behavior.
- Shale rebounded, heartily, in the 2014 correction. The background is different now, in terms of capital availability, political sentiment, and regulatory concerns, but the rock is not. This is a very resilient industry.
- Sentiment and future concerns, driven by the worst price collapse in oil's history, are jading the analytical trajectory of this market, not just in the US, but globally.



Outlooks and Views

I've never ever seen the industry in a lower morale mode than they are this year then tremendous amounts of layoffs and office closures throughout the industry.

...And going forward, crystal clear, we're not going to be growing oil into an oversupplied market.

But I think our stock has been in undue pressure, because of the federal acreage issue. I think it's been discounted too heavily. As we view the matter, like you said, we got eight plus years of growing on non-federal acreage that will not take away from the each ability to generate higher returns or reduce our capital efficiency.

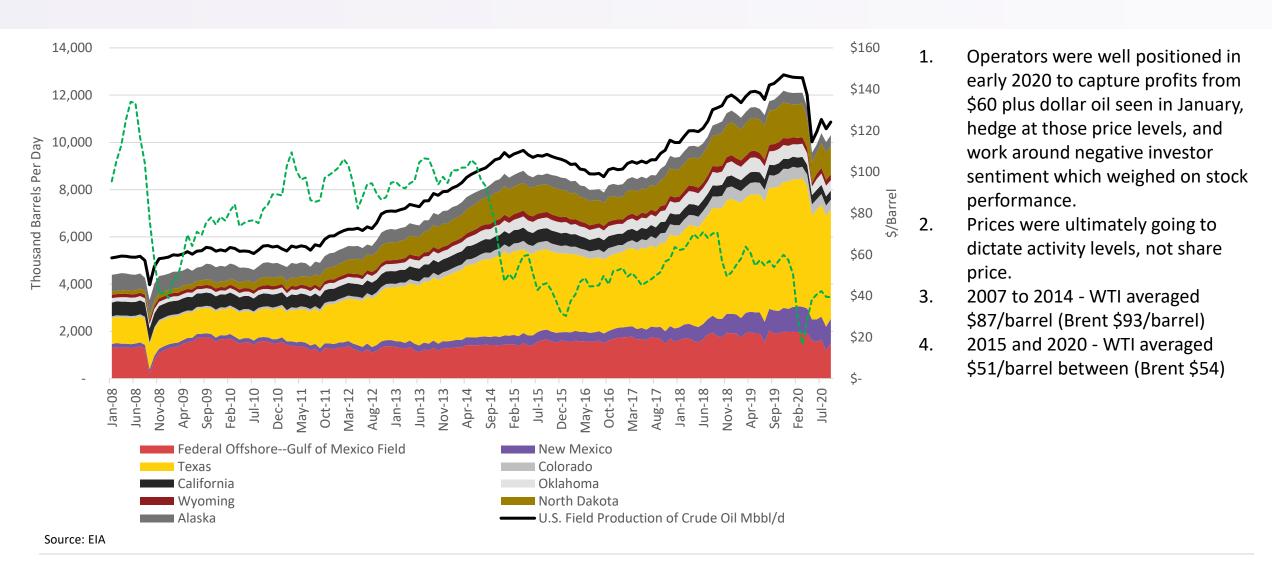
Bill Thomas, EOG CEO, Barclays CEO Energy Power Conference, September 9, 2020

I cannot recall a time in my life, when there were so many people around me telling me exactly what the future will look like. They have been wrong before, and they will be wrong now. Cimarex has the capability and flexibility to deal with an uncertain future. Until then, we will show up each and every day and compete.

Tom Jorden, Cimarex CEO, Nov 5, 2020, Q3 2020 Earnings Call



US Production has Recovered to 11 mbd at \$40/barrel

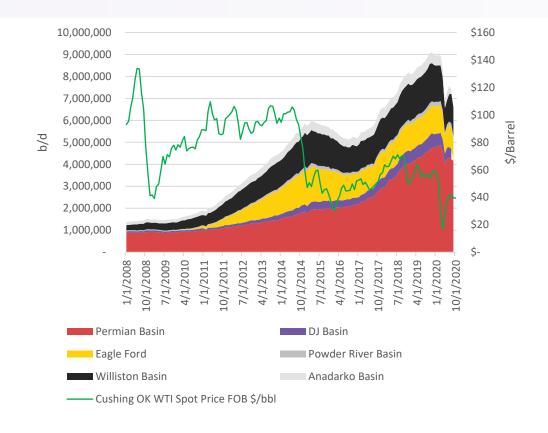




Shale Production



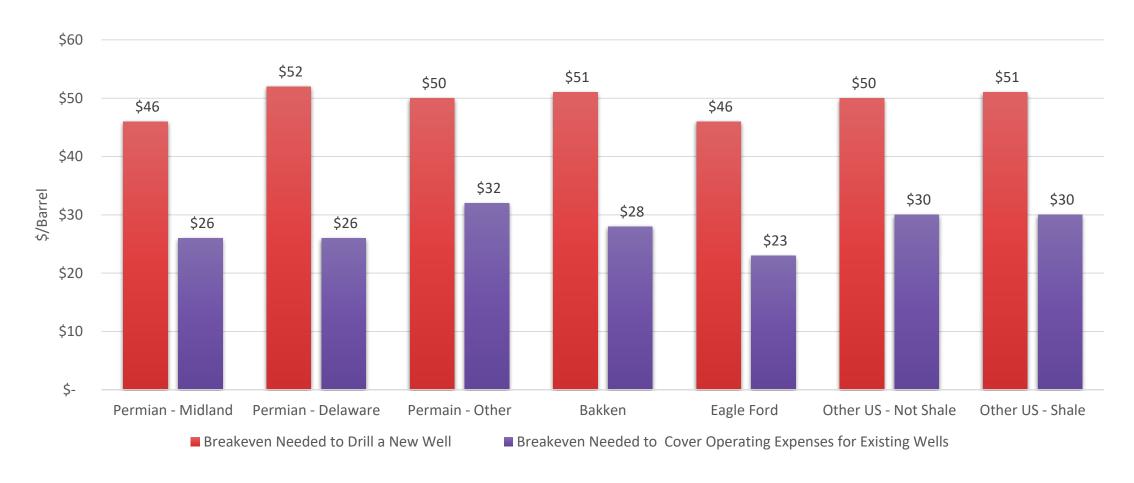
Shale production declined dramatically with shut ins, has since recovered somewhat, and faltered with substantially less activity.



Shale production hit over 9 mbd at the end of 2019 and is now 7.26 mbd.



Breakevens for Major US Plays – Dallas Fed Survey



Source: Dallas Fed Survey



Investor Sentiment Shifts in US Shale

Investor sentiment toward US shale has defined how people think about the future this business and should be thought about critically when analyzing US shale (and other booms taking place) and thinking about the future of shale and oil more broadly. US oil prices have averaged \$53/barrel from 2015 through February 2020.

2010 to 2014

2015 and 2016

2017 to 2019

2020

Average WTI/Brent \$92/\$102

Euphoria. \$100/barrel.

Operating companies cannot drill wells fast enough.

Nobody is worried about "cost."

Average WTI/Brent \$46/\$48

Correction and Permiana.
The end of 2014 sets in and the mood begins to shift.
Production and growth is favored by investors.

Average WTI/Brent \$58/\$63

Reality. Investor pressure.

Prices remain low. Free Cash
Flow in 2019 for some.

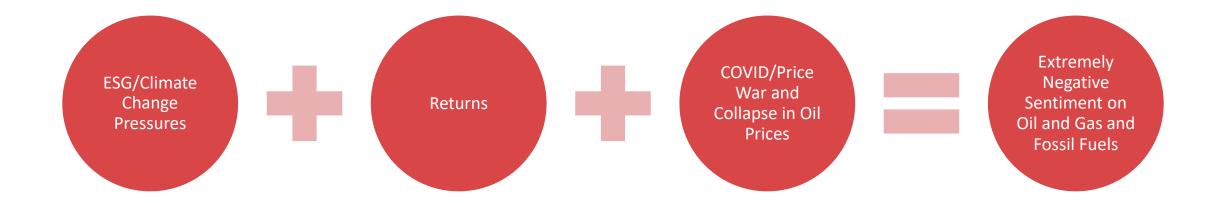
Operators continue to move
forward regardless of stock
performance.

Average WTI/Brent \$39/\$41

Devastation. The year started at \$60 and plunged to below zero. Oil is beginning to claw its way back and is now squarely feeling the pressure of ESG and anti oil.

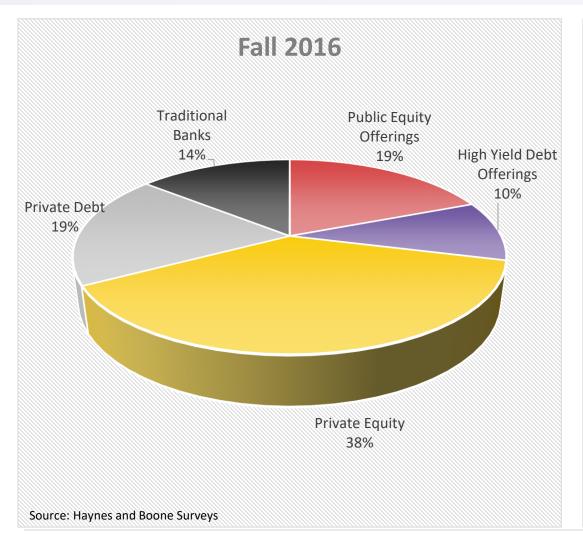


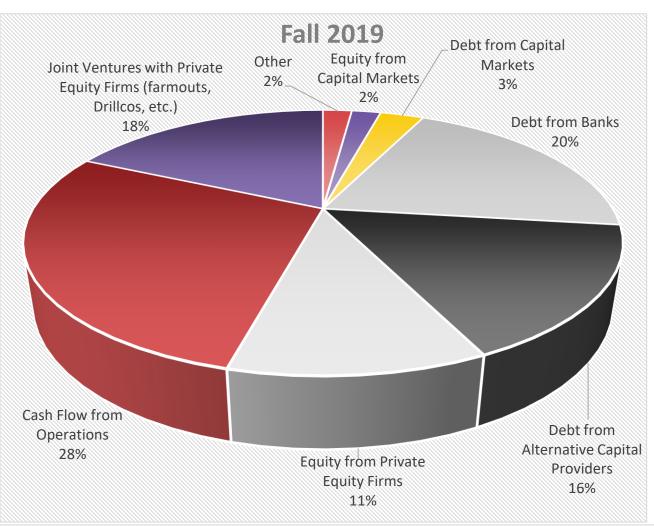
2020 - Trifecta





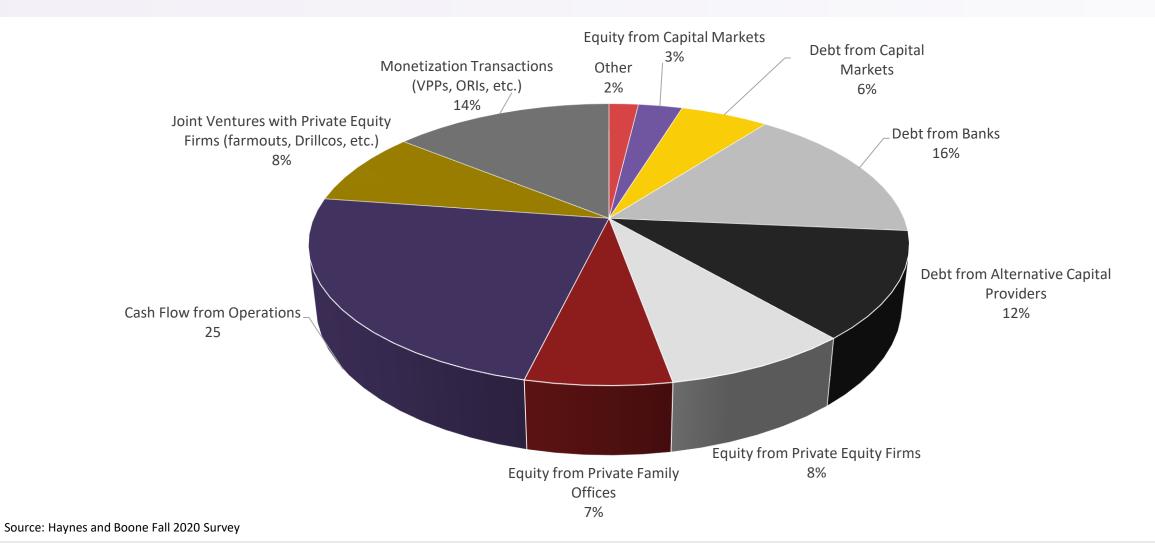
Where was the money coming from? How were operators sourcing dollars?





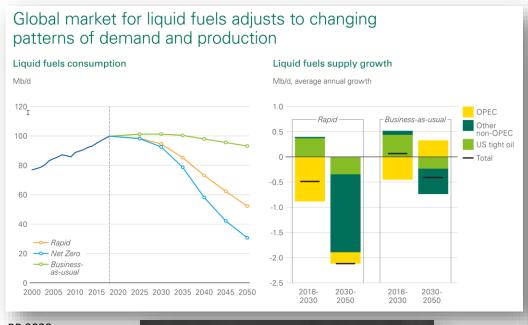


What it will look like in 2021? Post Covid Mayhem?



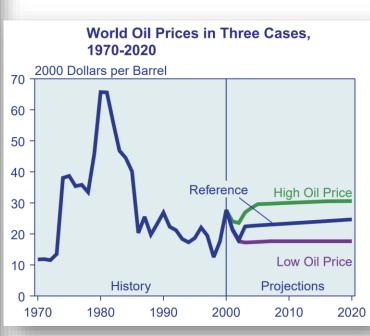


"Investing in the Un-investible" - Thinking about the Future of Oil Differently





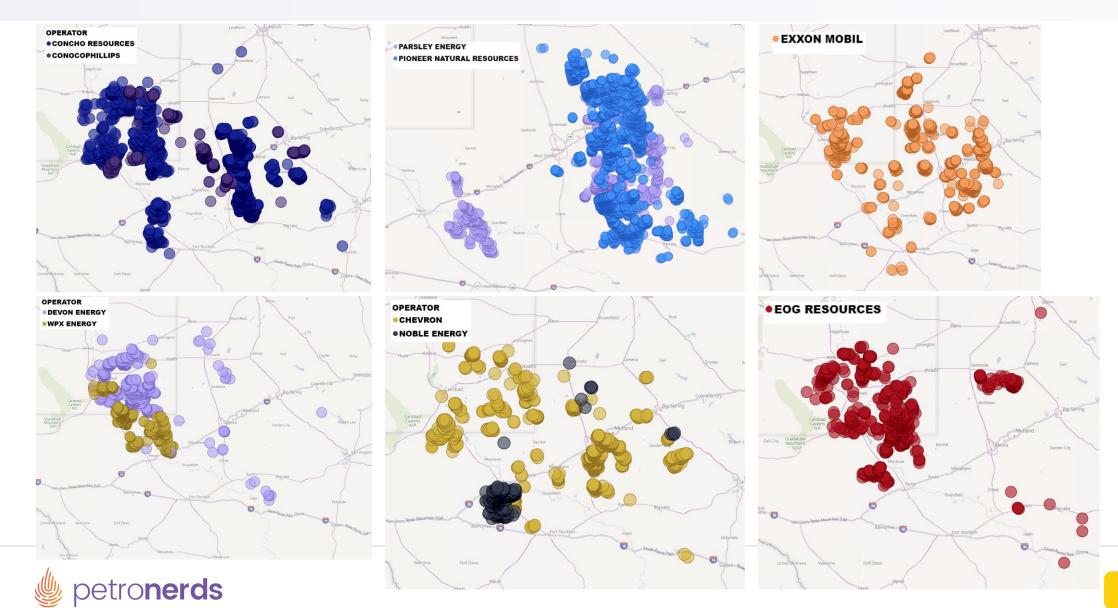




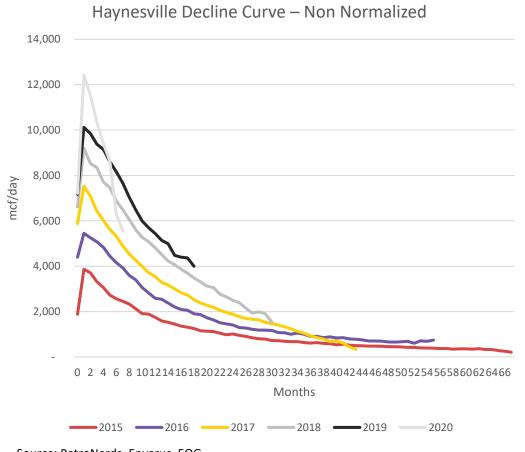
EIA International Energy Outlook 2002



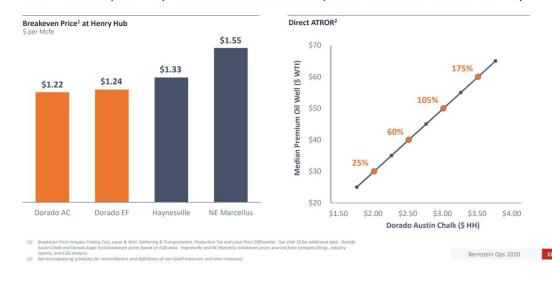
Permian Consolidation



Liberty Oilfield Services and EOG's Q3 Push into Natural Gas

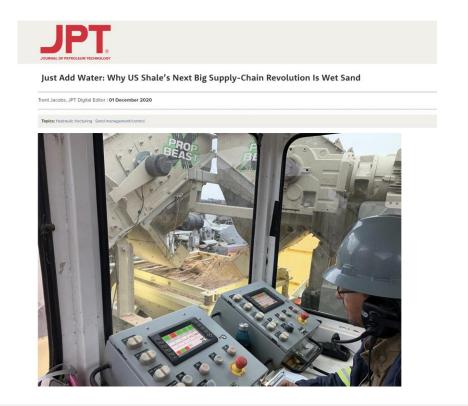




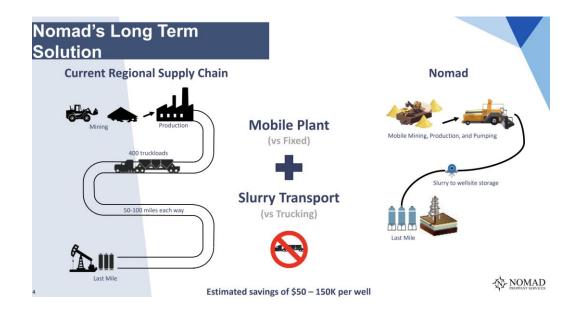




Thinking about Frac Sand Differently – Again – Another Way to Lower Cost



Nomad and other frac sand players in the space are looking to mine almost directly at the well site, further driving down cost, and taking out any need for trucking or last mile solutions.



This was fiction and few years ago and is now seeing considerable momentum.

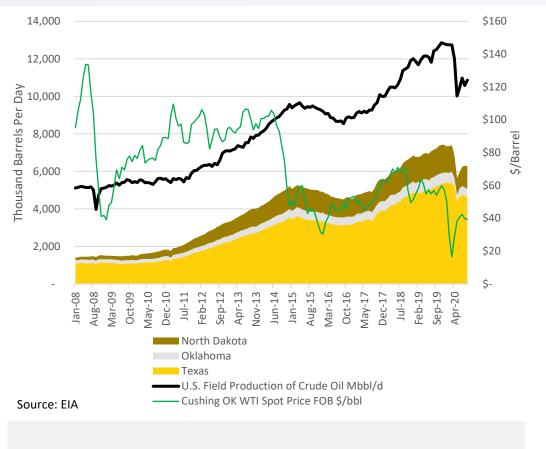


Biden is Not Obama 2.0 for Oil and Gas

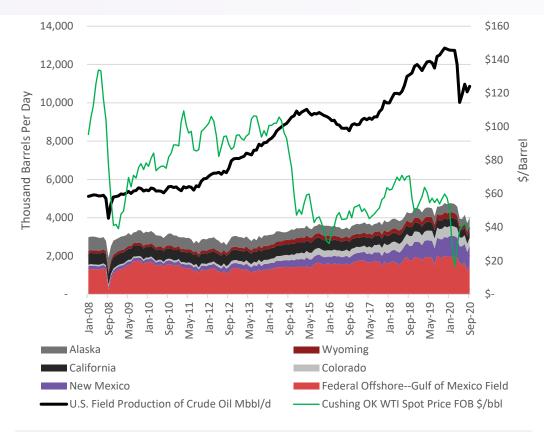
- The Biden administration is being viewed and greeted with optimism by industry leaders. They believe he will effectively act like a version of the previous Obama administration which got involved in Keystone XL, amped up the EPA, but otherwise really left shale alone and allowed US oil and natural gas production to flourish.
- The regulatory burden on water and air quality standards, permitting delays on Federal Land, further constraints on pipelines and infrastructure are all potential realities.
- The aggressive climate plan set forth by the new administration, the views of the hard left on climate, and Biden admitting
 that one of the first places to tackle climate change will be energy production all point to a much cloudier picture for oil
 and gas drilling, fracing, and future production in the US.
- It is hard to see how a Biden administration will work proactively with oil and gas. Governor Polis should be an example of this in Colorado.
- Increased taxes on oil and gas would have been a given if a blue wave had taken place and Democrats had increased their numbers in the senate. The runoff in Georgia is an important election in this regard.



Safe States with Little to No Federal Land vs. States with Significant Federal Land Exposure



North Dakota, Oklahoma, and Texas have limited Federal Land exposure.



New Mexico, Wyoming, Colorado, Alaska, California, and Offshore all have significant Federal Land exposure.



Shale Production and Activity Update

US Shale and Permian Basin



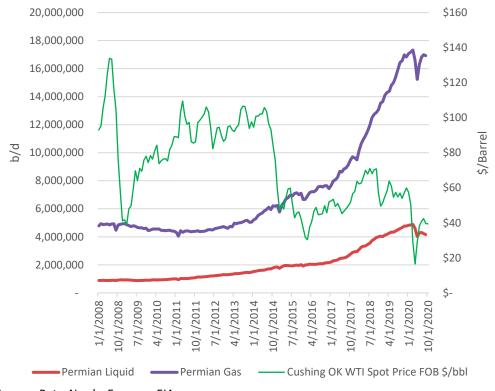
US Rig Count and Prices



The US rig count rises from the low of 244 in early August to 320 last week. The oil rig count bottomed at 172 in August and has since continue to climb to 214 as of 11/25/20.

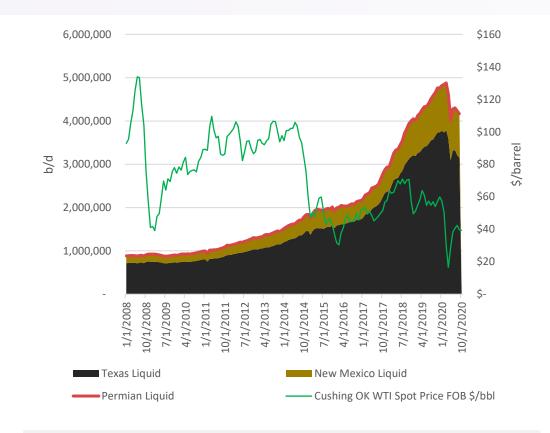


Permian Basin Production – 4.9 mbd Pre Covid



Source: PetroNerds, Enverus, EIA

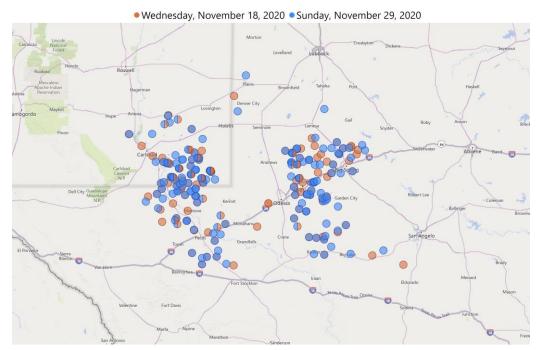
Permian Basin production hit 4.9 mbd prior to the onset of the COVID price collapse.



New Mexico accounts for 1 mbd of Permian Basin production, doubling in just 3 years.

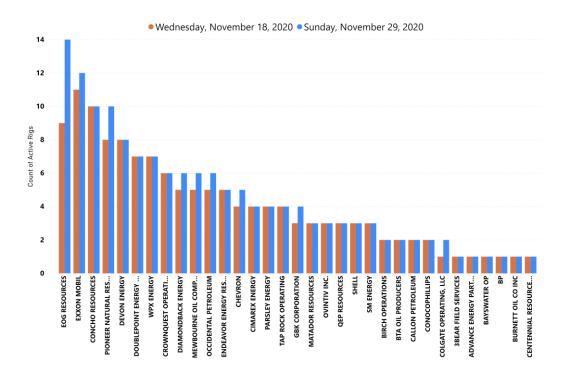


Significant Rig Increases in the Permian Basin in an 11 Day Period



Source: PetroNerds, Enverus

Rig concentration continues to be concentrated in the northern most portions of the Delaware and Midland.



EOG overtook Exxon in the rig count in the Permian Basin, adding a whooping 5 rigs in only an 11 day period.

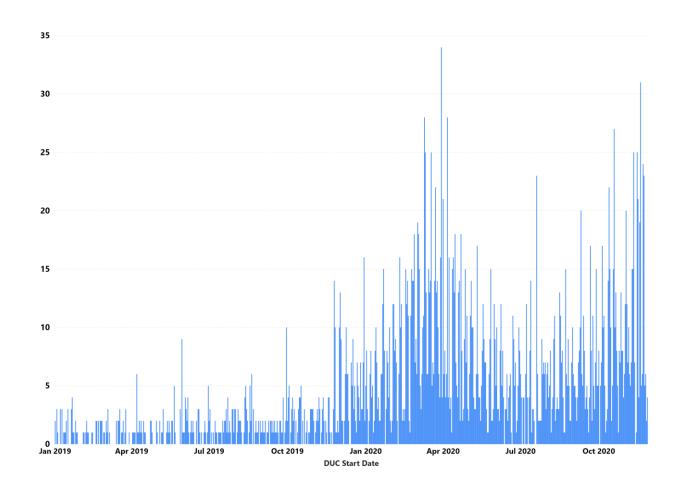


The Rig Count Continues to Improve and the Players Involved Continue to Grow

Operatpr	1/6/2020		Operator	7/27/2020			Operator	10/18/2020			Operator	11/11/2020	Operator	11/29/2020	
EXXON MOBIL	51 41 operators with 1 rig	1	EXXON MOBIL	24	17 operators with 1 rig	1	EXXON MOBIL	13	24 operators with 1 rig	1	EXXON MOBIL	11 30 operator with 1 ri	1 EOG RESOURCES	14 3	1 operators with
DIAMONDBACK ENERGY	20 16 operators with 2 rigs	2	CONCHO RESOURCES	9	7 operators with 2 rigs	2	CONCHO RESOURCES	9	5 operators with 2 rigs	2	CONCHO RESOURCES	10 4 operators with 2 rig	s 2 EXXON MOBIL	12 5	operators with 2
EOG RESOURCES	20 4 operators with 3 rigs	3	DEVON ENERGY	9	4 operators with 3 rigs	3	DEVON ENERGY	8	5 operators with 3 rigs	3	EOG RESOURCES	9 6 operators with 3 rig	s 3 CONCHO RESOURCES	10 6	operators with 3
PIONEER NATURAL RESOURCES	20 10 operators with 4 rigs	4	PIONEER NATURAL RESOL		4 operators with 4 rigs	4	PIONEER NATURAL RESOURCE	S 8	8 operators with 4 rigs	4	DEVON ENERGY	8 4 operators with 4 rig	s 4 PIONEER NATURAL RES	10 5	operators with
CONCHO RESOURCES	18	5	WPX ENERGY	-	,	5	EOG RESOURCES	7		5	PIONEER NATURAL RESOURCES	8	5 DEVON ENERGY	8	
OCCIDENTAL PETROLEUM	18	6	CROWNQUEST OPERATIN	(5	6	WPX ENERGY	7		6	DOUBLEPOINT ENERGY LLC	7	6 DOUBLEPOINT ENERGY	7	
CHEVRON	16	7	DIAMONDBACK ENERGY	(i i	7	DIAMONDBACK ENERGY	5		7	WPX ENERGY	7	7 WPX ENERGY	7	
SMITH ENERGY OPERATING CON- STEWARD ENERGY II, LLC	1		8 SURGE OPERATING		1	39	LAREDO PETROLEUM	1		39	ENCORE PERMIAN HOLDINGS LE	2 1	39 FLAT CREEK RESOURCE	ES 1	L
TALL CITY OPERATIONS LLC	1	39	TALL CITY OPERATIONS	ш_	1	40	NOVO OIL & GAS NORTHERN D	1		40	FLAT CREEK RESOURCES, LLC	1	40 FRANKLIN MOUNTAIN	IE 1	L
TEXLAND PETROLEUM, L.P.	1		Total	1	27	41	PARK HILL DISPOSAL LLC	1		41	FRANKLIN MOUNTAIN ENERGY	LL¢ 1	41 GUIDON ENERGY MG	M1 1	L
TITUS OIL & GAS PRODUCTION, I	1					42	PIEDRA OPERATING, LLC	1		42	GUIDON ENERGY MGMT SERVICE	CES 1	42 HANNATHON PETROL	EU 1	L
TRILOGY OPERATING, INC.	1					43	PRIMEXX ENERGY PARTNERS LT	T 1		43	HANNATHON PETROLEUM, LLC	1	43 HENRY RESOURCES LI	.C 1	L
TRIPLE CROWN RESOURCES LLC	1					44	RILEY EXPLORATION, LLC	1		44	HIGHPEAK ENERGY HOLDINGS, L	LLC 1	44 HIGHPEAK ENERGY H	OLI 1	L
Total	378					45	SPUR ENERGY PARTNERS LLC	1		45	JETTA OPERATING CO., INC	1	45 LAREDO PETROLEUM	1	L
						46	STEWARD ENERGY II, LLC	1		46	LAREDO PETROLEUM	1	46 MCCLURE OIL COMPA	N) 1	L
						47	SUMMIT PETROLEUM INC	1		47	NOVO OIL & GAS NORTHERN DE	1	47 PATRIOT RESOURCES,	LL 1	L
						48	SURGE OPERATING	1		48	PIEDRA OPERATING, LLC	1	48 PIEDRA OPERATING, I	LC 1	L
						49	TERRAIN WATER SOLUTIONS, L	_		49	PRIMEXX ENERGY PARTNERS LTI	D 1	49 PINON OPERATING, L	LC 1	L
							Total	138		50	RELIANCE ENERGY INC	1	50 POINT ENERGY PARTI	IEF 1	L
											RILEY EXPLORATION, LLC	1	51 PRIMEXX ENERGY PAI		L
											ROFF OPERATING COMPANY LLC	C 1	52 RP OPERATING, L.L.C.	1	L
											SPUR ENERGY PARTNERS LLC	1	53 SEGURO OIL AND GAS	,	L
											SUMMIT PETROLEUM INC	1	54 SEQUITUR ENERGY RE		L
											TRIPLE CROWN RESOURCES, LLC	1	55 SPUR ENERGY PARTN	ER 1	L
										56	UNKNOWN	1	56 STRAND ENERGY, LC	1	L
											Total	158	57 SUMMIT PETROLEUM		L
													58 TRIPLE CROWN RESO	-	L
													Total	173	2

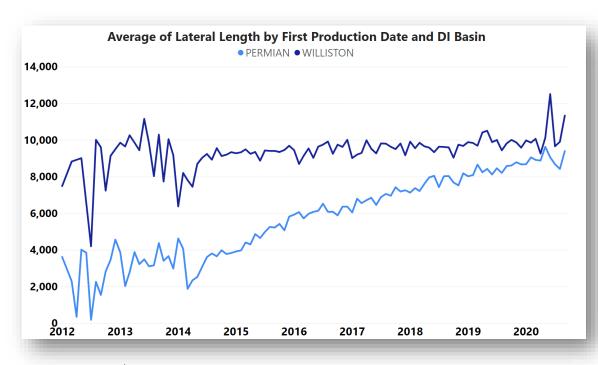


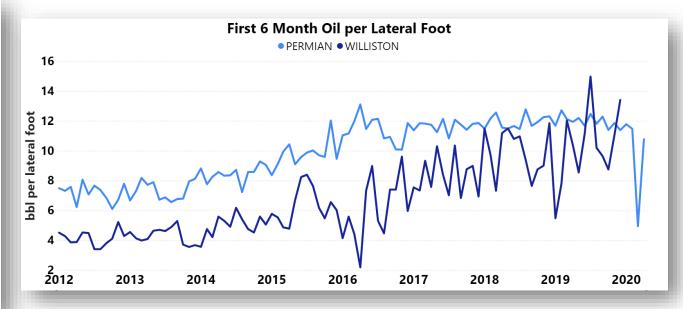
Permian DUCs Build Up





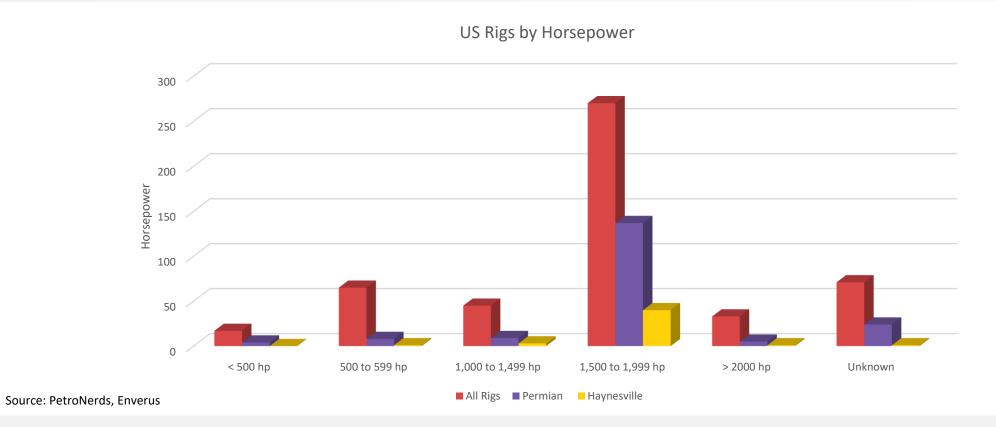
Lateral Length and Productivity for Williston and Permian







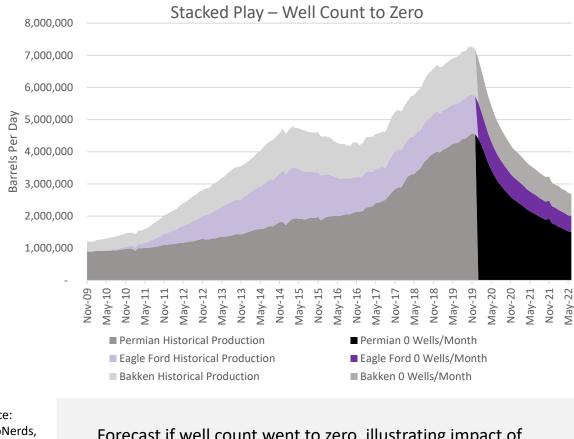
The Highest Spec Rigs are Drilling



Of the rigs running, the most efficient or highest horsepower rigs are the ones running. This means wells are being drilled faster and more efficiently. Operators are noting substantial gains in drilling feet per day (two mile laterals drilled in 10 days in the Delaware), completed feet per day is up. Cost per lateral foot is declining.

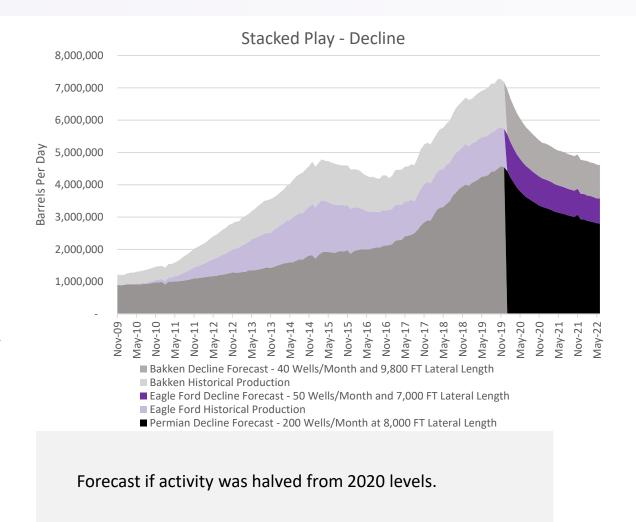


Forecast in April 2020



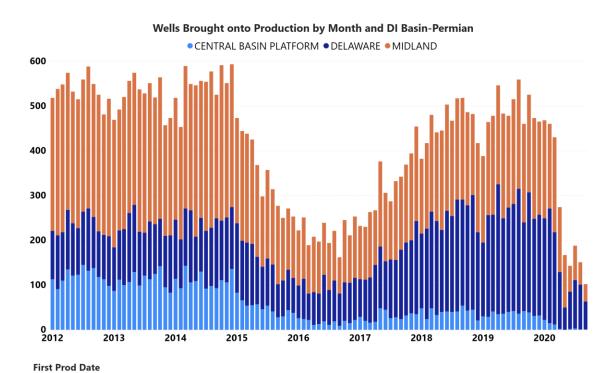
Source: PetroNerds, raw data DrillingInfo/En ervus

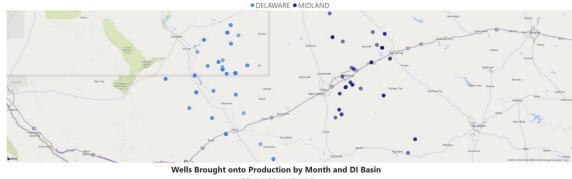
Forecast if well count went to zero, illustrating impact of potential and severe shut-ins.

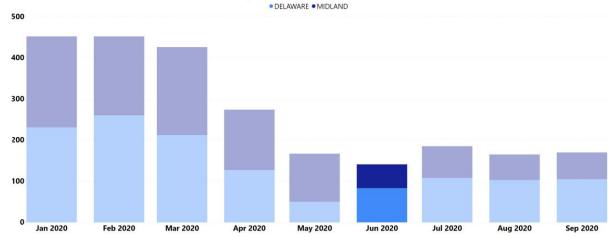




Well Additions in the Permian Basin









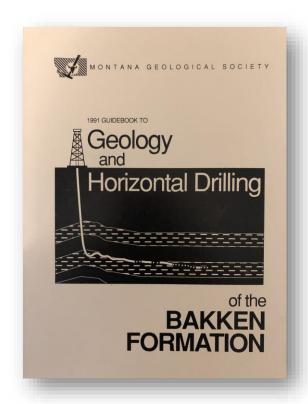
So What will Happen to US Production and US Shale?

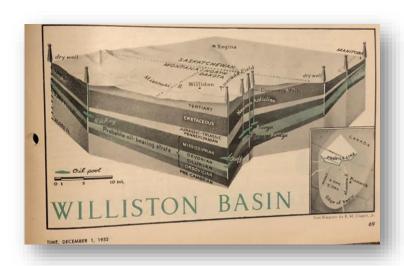
- It looks bad and it is bad, but operators are getting back to work. Operators are feeling more confident at these prices levels and are hoping to see \$50 oil next year. Most importantly, operators are focused on cost. Do not expect to see absolute volume growth in the US. The sentiment around oil and gas, the depth of the price correction in April 2020, and the pressure by the new administration will hamper optimism and potential growth in the industry.
- Expect places with limited Federal Land to flourish, like Texas, Oklahoma, and North Dakota. Expect operators like EOG and service providers like Liberty to
 continue to exceed expectations in terms of productivity growth and efficiency.
- Drilling longer laterals a little bit faster has meaningful implications across the board. Drilling slightly longer laterals and keeping productivity flat on a barrels per foot basis means production increases.
- Remember that operators doing well make money in the high \$40s and make even more money at \$50. The lower their well cost, the more free cash flow they
 bring in and the higher incentive there is to produce a little bit more crude oil. EOG can grow at 8 to 10 percent a year at \$50 oil.
- The 2014 price correction induced the Permian frenzy and accelerated production growth and productivity gains, all while prices averaged just \$53 a barrel for the past 5 years. Yes, investors had the backs of the operators. But for those still in the oil patch, and there are many, this price correction has offered them another chance to pivot, reinvent, and survive. Do not write off oil and gas just yet. And do not write off US shale. The Saudi's are budgeting \$50, Exxon is budgeting \$50, and shale flourished at \$50.

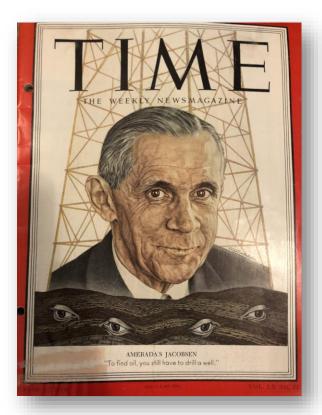


What is Old Will be New Again.

The US Shale Patch is Not Dead. Nor is Oil. Shale 3.0 may very well be a transfer of knowledge from the US to the Middle East.







Contact







LOCATION Denver

Appendix

Additional Slides



'Fracking' Used to Be the Future of Oil Drilling. This Company Is Betting It's Not Dead Yet.

"The internet was massively transformative, but the original investments in those companies massively destroyed capital," he said. "And then eventually the industry matured, and you've got strong businesses and not a crazy amount of unprofitable companies. Today the shale industry is going through that."

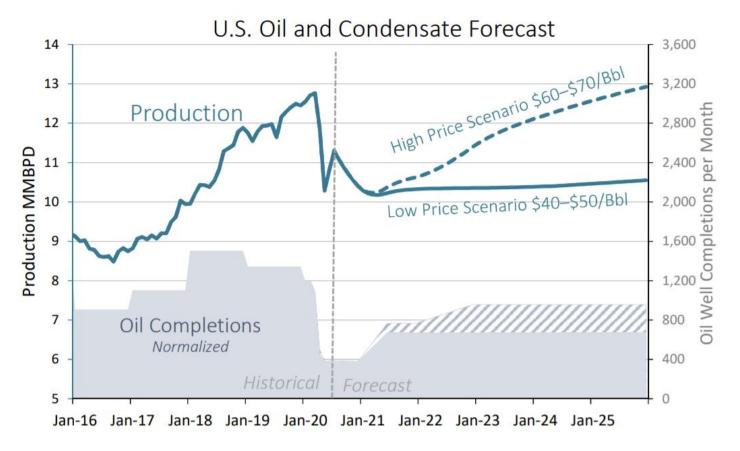
"It's a little bit of both," Wright told Barron's. "The depth of this downturn was May and June, and pricing was just outrageous. It's actually still terrible, but it's better today than June. You'll see a gradual, slow recovery in pricing. And it doesn't take a lot of movement and pricing to help. I think there's some of that that will come because capacity is shrinking from people going out of business."

At the same time, Wright said that "with technology and with some scale, we'll be able to deliver the same thing at a lower price than we can today. So our profitability at a certain price will be enhanced. I wouldn't hang our hat just on increasing pricing."

Barrons, Avi Salzman Sept. 22, 2020 10:02 am ET / Original Sept. 22, 2020 8:19 am ET



Energy Transfer Partners Sees US Oil Production Flat Even at Sustained Lows in Oil Prices



Source: September 2020 Investor Presentation



EOG Notes the Declining Cost in Wells and the Ability to Grow Production at \$50

EOG Culture Compounds the Impact of Innovation



Outlook to 2022 - 2023



Disciplined Growth Optimizes Returns and Free Cash Flow Potential



Embrace Change and Challenge Everything

- Pleased But Not Satisfied



Decentralized Structure

Leverage Innovation and Efficiencies
 Simultaneously Across Multiple Plays



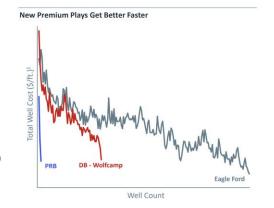
Take Advantage of Learnings from Other Plays

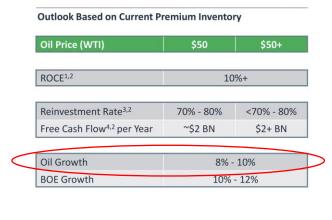
- Open Communication of New Ideas
- New Plays Build on Existing Institutional Knowledge and Best Practices



Sustainable Cost Reductions Through Cycles

- 75% of Reductions in 2020 Due to EOG Innovation and Efficiencies
- 25% of Reductions Due to Cyclical Service Costs





Returns Focused

 Returns Increase Each Year With Cost Reductions and Productivity Improvements

Disciplined Growth

- Dependent on Oil Market Fundamentals
- 8 10% Oil Growth Compounds Benefit of Margin Improvements
- Optimizes Returns and <u>Current + Future</u> Free Cash Flow to Maximize Total Shareholder Value

Significant Free Cash Flow

- Free Cash Flow Priorities:
- Sustainable Dividend Growth
- Strengthen Balance Sheet
- Value Accretive Share Repurchases and Other Cash Return Options
- Low-Cost Property Additions

(1) Well Costs = Drilling, Completion, Well-Site Facilities and Flowback.

Bernstein Ops 2020

)20 5

Return on Capital Employed calculated using reported net Income (GAAP).
 See accompanying schedules for reconciliations and definitions of non-GAAP measures and other measures.
 Reinvestment Rate = Capex / Discretionary Cash Flow.

Bernstein Ops 2020

11

Source: EOG Investor Presentation, Bernstein Conference, November 17, 2020

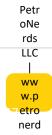


Liberty had an Optimistic Outlook in their Earnings Call (setting themselves up well for SLB deal)

-outlook for us next year actually pretty good, you got a reshuffling of the deck, customers and even percent of work for larger customers. So outlook for us next year. Yes, I would say quite positive.
- Let me give a little math will end this year with probably in the oil basins maybe 100 frac fleets working.
 By our bottom up analysis basin by basin of crews. It takes about 165 crews in the oil basins, to keep
 US oil production flat at our now projected end of year oil production rate.
- Probably need 25 or 30 crews to run the gas basins, to keep gas production roughly flat. So we've got to go from it, and again, if you add in the gas basin, maybe we'll end this year 125, 130 crews, probably need 190 to 200 just to hold U.S. production flat. You need another 80 or 85 crews to grow U.S. production by a million barrels a day.
- So which I do not believe will happen next year. I think we've seen tremendous discipline from the customers I think that message and that push to get returns up. But the average active frac crews nationwide next year will likely be meaningfully higher than it will be at the end of this year. And Liberty's market share or whatever activity is there will probably continue to migrate up.

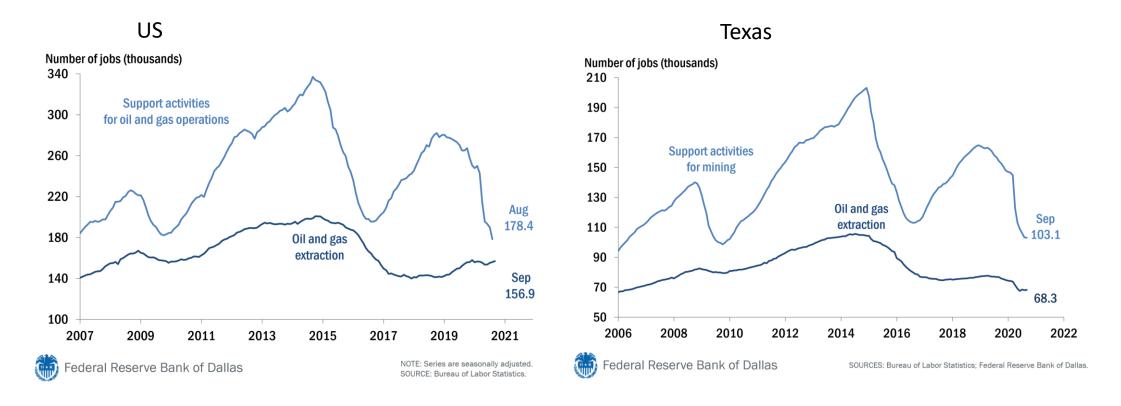
Source: Liberty Oilfield Services, Q2 2020 Earnings Call





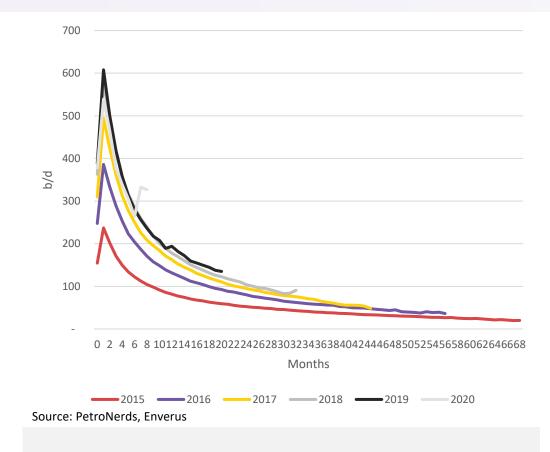
US Oil and Gas Job Losses

• The impact on jobs that support the industry has been severe. Furthermore, these numbers do not account for the total economic impact across the value chain of crude oil and natural gas production, processing, and export.

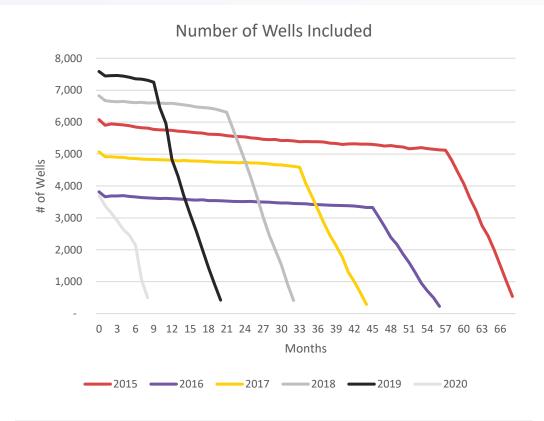




Permian Basin Decline Curve



The Permian Basin decline curve has faltered in 2020, not unexpectedly, but remains in line with 2018 and just below 2019.



The number of wells brought online in 2020 has also declined substantially.



Nat Gas is Hot Again

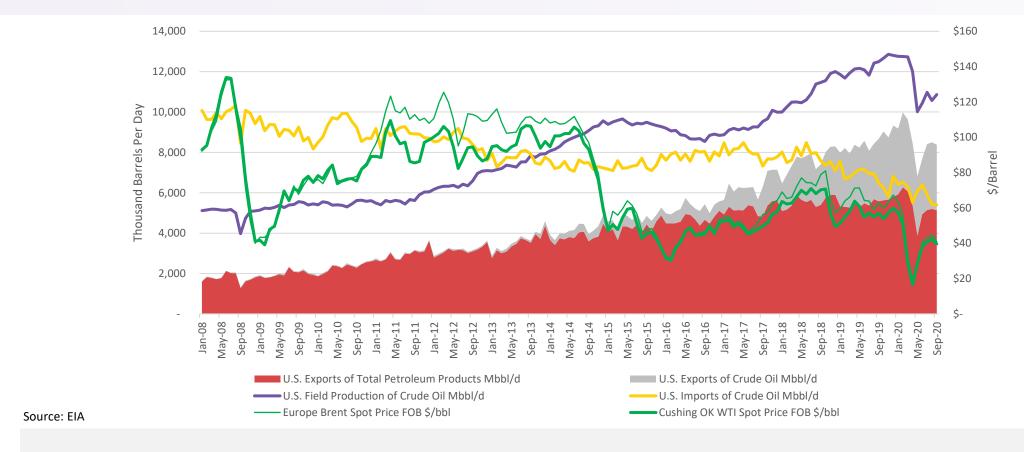
- 1. Part of the interest in natural gas right now by US E&Ps is driven from both the stability of the commodity, the relative "greenness," the ease of extraction, and simply the sentiment around it.
- 2. EOG and Liberty both announced their big natural gas moves in the third quarter of 2020 on their earnings calls.
- 3. "Gas" was mentioned 31 times in the Liberty call while "Haynesville" was mentioned 14 times.
- 4. "Gas" was mentioned 43 times in the EOG earnings call.
- 5. The third quarter also marked an entry into our first major gas basin, the Haynesville Shale, with an existing customer.

 The Haynesville is a world-class gas resource, geographically advantaged, being developed by a crew of strong operators.

 We are excited to plant our flag in the Haynesville. Chris Wright Q3 2020 LBRT Earnings Call
- 6. Along with substantial cost reductions and solid earnings results, we announced Dorado our new premium South Texas natural gas play. Tim Driggers EOG Q3 2020 Earnings Call



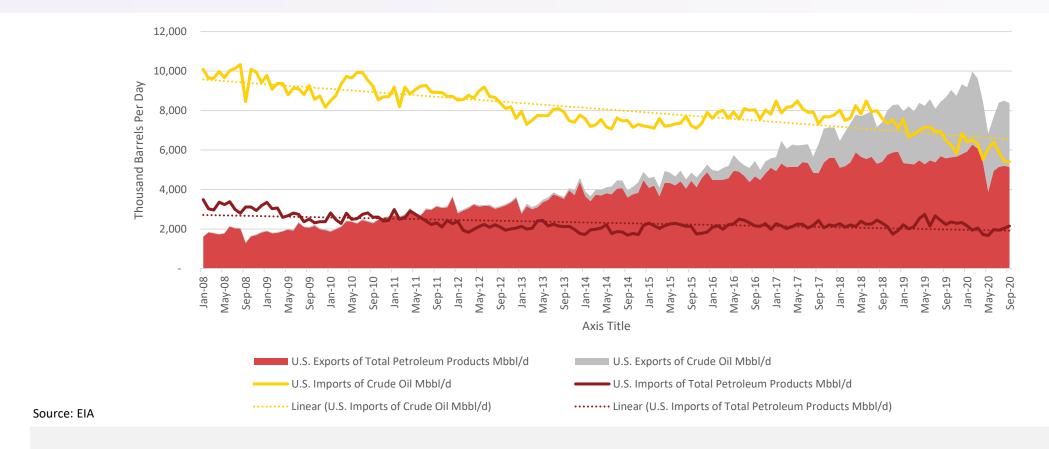
US Oil Production, Oil Imports, Exports of Oil and Exports of Product



US production growth, from just over 5 mbd in 2008 has allowed the US to drop crude oil imports considerably while running refineries at full steam and exporting vast amounts of diesel, gasoline, propane and other products.



The US is a Net Exporter of Crude Oil and Petroleum Product Combined



Crude oil imports and petroleum product imports have been in a steady decline since 2008 as oil production surged. Exports of product and oil and increased to 10 mbd combined prior to covid and have recovered to over 8 mbd. This creates significant value to the US economy and is not captured in jobs lost or gained in oil and gas.

