Where Did All The Capital Go?

A look at full life-cycle economics for key U.S. shale plays

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How did we get here?

- Oil and gas capital development has always been a story of boom and bust, with supply and demand dictating commodity price and driving development decisions
- Throughout the 2000's the shale gas development was driven by continually increasing gas prices
- Oil and liquids started to become the preferred product, and operators followed suit by moving to develop positions in more "liquid-rich" plays such as parts of Texas, North Dakota, and Colorado
- In response, companies started stripping out the natural gas liquids (NGL's) as the value of associated liquids tracked closer to the rising oil prices

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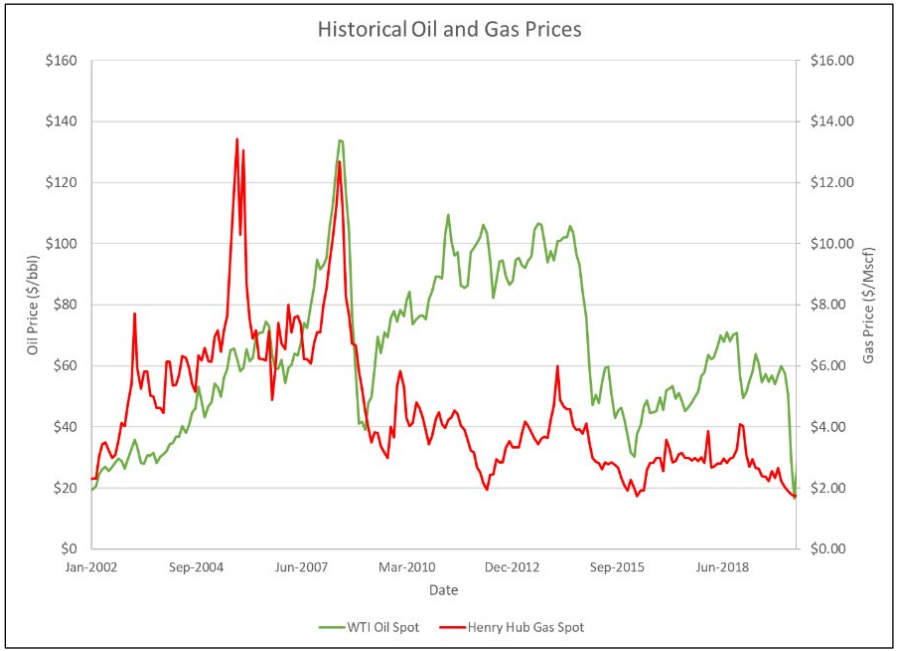
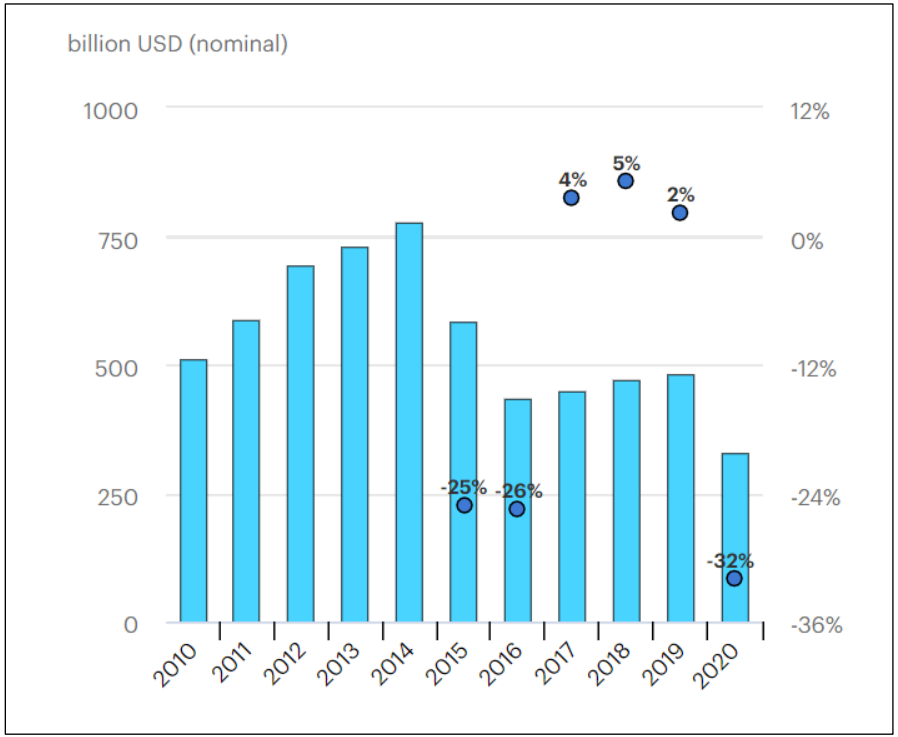
Oil and Gas Price History



- While oil production was on the rise in the US due to unconventional oil development, international oil production held steady
- Emerging BRIC countries (Brazil, Russia, India, and China) maintained supply until the end of 2014
- The market was over-supplied, and prices plummeted
- Throughout 2015 and 2016, global oil market continued to be oversupplied by over 1 million barrels per day (bpd)
- Until OPEC cut production by 1.2 million bpd in November 2016, causing oil prices, to once again rise

Investment and Production

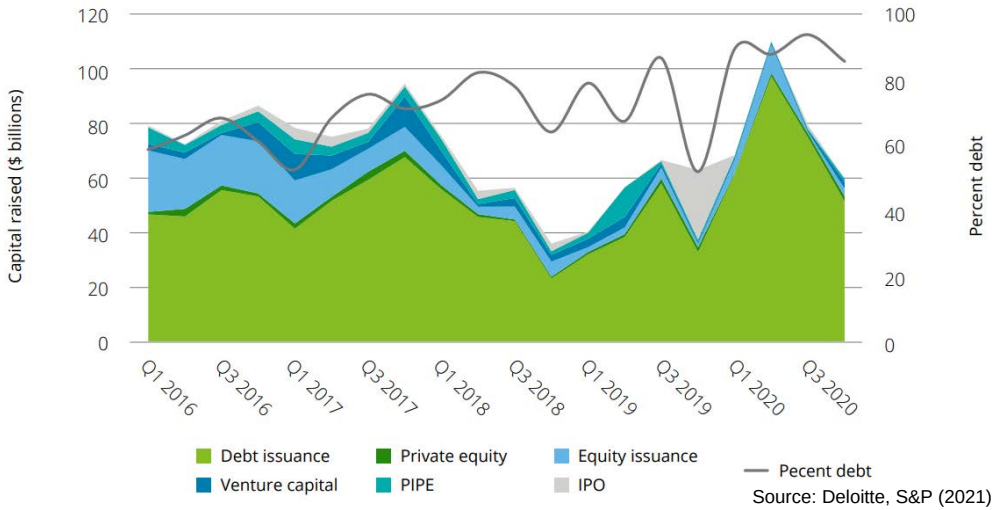


Source: IEA (2020)

Source: EIA

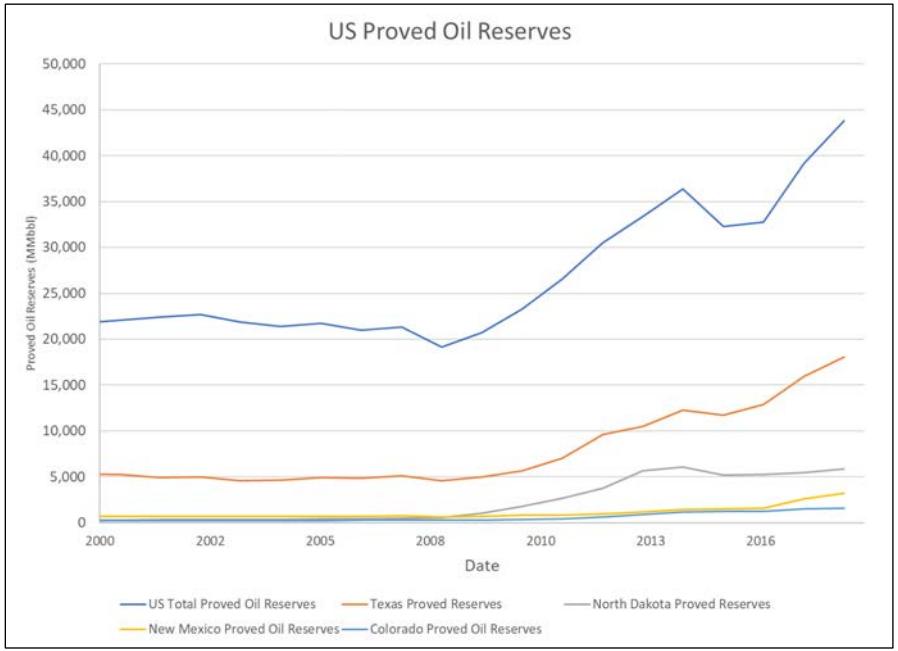
Private capital might have dried up, but debt is on the rise

- Debt issuance hit a 5-year high in Q2 2020
- Investors focused on high returns, found better opportunities in other sectors



Source: Deloitte, S&P (2021)

US Proved Reserves



Proved Reserves:

- Proved Developed Producing (PDP)
- Proved Undeveloped (PUD)

PDP reserves:

- Producing wells with no remaining drilling and completion capital assigned to them. The associated cash flows do not include the payback on the capital investment because reserves are forward-looking

PUD reserves:

- All drilling and completion costs are included
- Land acquisition costs excluded

- Increased production and reserves have historically been the focus in investor community
- These numbers do not show the ability of an oil and gas company to generate free cash flow and give investors a return on their investment.

US Regional Price Differentials

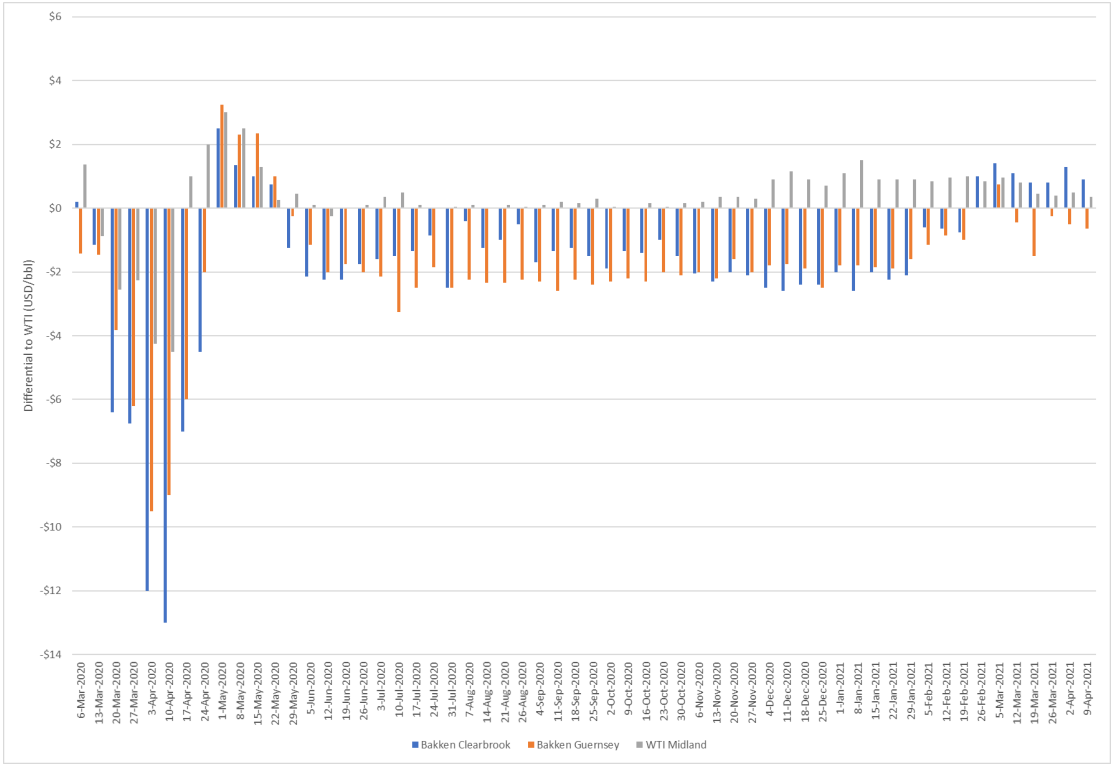
Demand Recovery:

- Global demand expected to be between 90.5 and 95 MMbbl/d by end of 2020, and 2021 range expected to be 94 to 99 MMbbl/d
- Significant uncertainty in market

Supply:

- Supply will continue to be adjusted using curtailed production, storage inventories, DUCs and then new drilling
- US storage levels are declining, but still above the 5-year average

US Regional Price Differentials to WTI

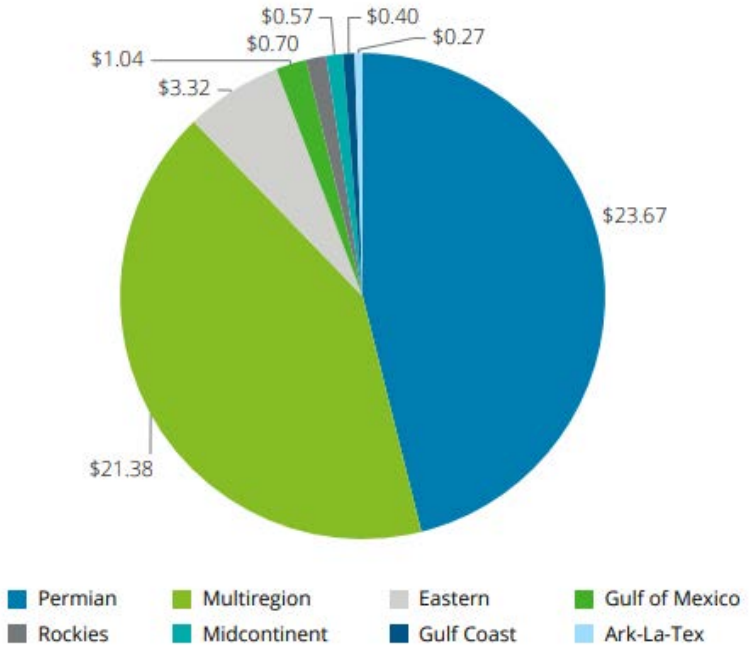


Source: Bloomberg, Sproule

Permian Remains Top Target

- Pure Permian acquisitions account for majority
- Multi-region has some Permian included (Noble / Chevron, WPX / Devon)
- Third highest is Appalachia

Upstream Deals in 2020 by Value (Billion USD)



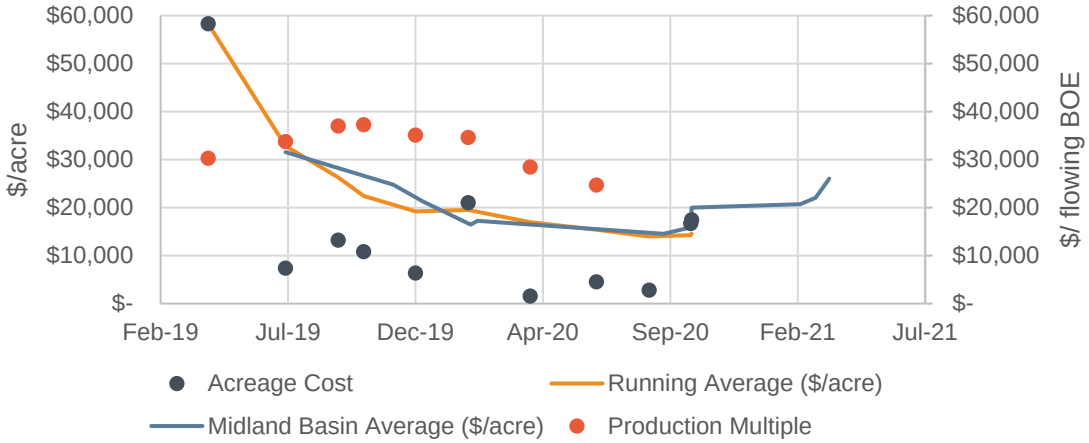
Source: Deloitte, Enverus

Workflow

Economic Workflow

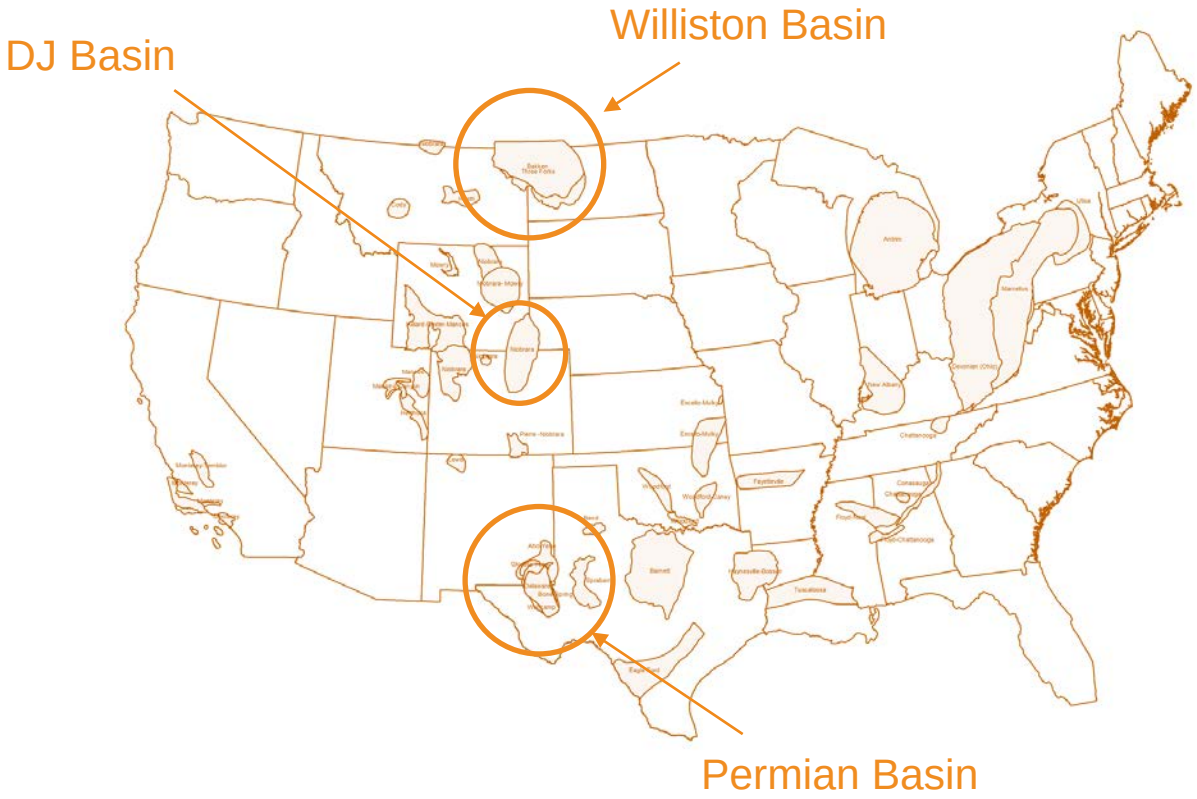
- Average type curves were developed for 2-mile laterals based on available production history
- Land acquisition, drilling & completion capital, and operating expenses were obtained from public sources of information
- WI/NRI assumed at 100/80%
- These type curves and cost assumptions were evaluated at three fixed net oil prices, $20/bbl, $40/bbl and $60/bbl

Cost Parameters	Williston Basin (Bakken)	Dj Basin (Niobrara)	Permian Basin NM (Wolfcamp)
2019 Land Acquistion Cost ($/acre)	$ 15,000	$ 10,000	$ 40,000
2020 Land Acquisition Cost ($/acre)	$ 3,600	$ 3,000	$ 14,600
Drilling & Completion Capital (Million $)	$ 7.5	$ 4.7	$ 8.5
Operating Expense ($/month)	$ 10,000	$ 4,000	$ 10,000
Water Expense ($/bbl)	$ 2.50	$ 2.50	$ 2.50
Taxes	Oil 10%, Gas $0.0712/Mscf	Oil 5%, Gas 5%, Ad Valorem 1%	Sev & Ad Valorem 8%
Abandonment Capital	$ 150,000	$ 150,000	$ 150,000
EUR - Oil (mbo)	686.9	329.1	663.1



Source: Enverus, Sproule

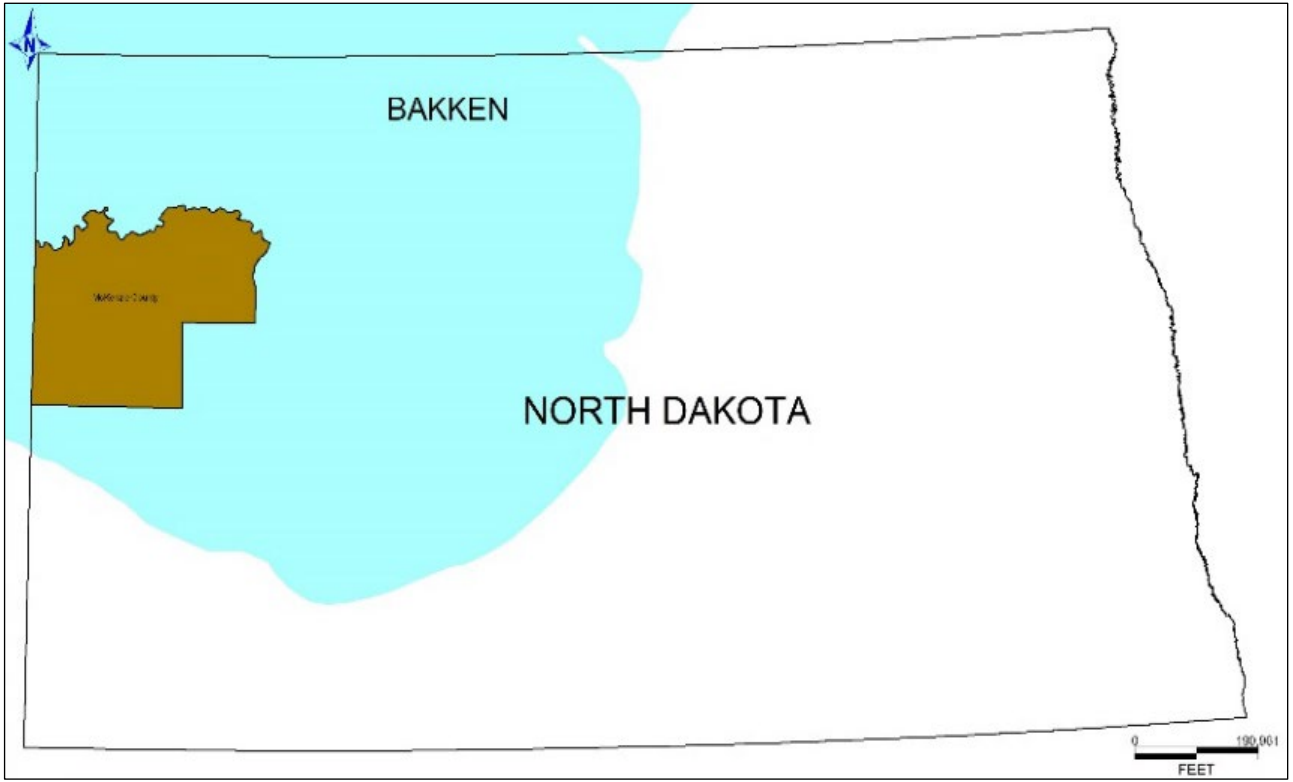
Regional Analysis



Williston Basin analysis

Highlights

- One of the first “unconventional” plays
- Located in North Dakota and Montana, the major unconventional targets are the Bakken and Three Forks formations.
- Horizontal drilling specifically targeting the Middle Bakken started in 2003 and dramatically increased in 2006.
- Crude is 40-43° API. Water handling is an issue, given high water volumes.
- Oil differentials: Recent differentials developments with DAPL resulting in $1.00 – $1.50 / bbl premium on oil price.



Source: Company Presentations, Sproule

Recent Happenings in the Williston Basin

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Dakota Access pipeline to remain open

APRIL 9, 2021 2:42 PM

The U.S. Army Corps of Engineers on Friday said it will allow Energy Transfer's Dakota Access oil pipeline to keep running, after an environmental permit was scrapped last year, a blow to activists who wanted to see the line shut.

The Dakota Access pipeline will remain in operation while the federal government reviews its environmental impacts, a lawyer for the federal government indicated Friday.

Source: BIC Alliance

Lawyer Ben Schifman, who represented the federal government, said the Biden administration is requiring the pipeline to abide by conditions that were set in a now-vacated permit that allowed for its construction but "has not taken any additional action."

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Shares of North Dakota #oil producers Oasis Petroleum, Continental Resources and Enerplus were trading higher after the U.S. Army Corps of Engineers said it would allow the Dakota Access #pipeline to run.

Shares of Oil Producers Tied to Dakota Access Pipeline Rise
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Williston Basin (Bakken)

Cost Parameters	Williston Basin (Bakken)
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Drilling & Completion Capital (Million $)	$ 7.5
Operating Expense ($/month)	$ 10,000
Water Expense ($/bbl)	$ 2.50
Taxes	Oil 10%, Gas $0.0712/Mscf
Abandonment Capital	$ 150,000
EUR - Oil (mbo)	686.9

Breakevens (net oil price):

- 2020 - Without Acq. Costs = $21.80/bbl
- 2020 - Acquisition Costs = $22.50/bbl
- 2019 – Acquisition Costs = $27.20/bbl

- Bakken did not see the mass shut-in of production in early 2020, but operators laid down rigs and cut capital spending

- Using 2019 acquisition costs, the breakeven price is pushed north of $25/bbl
  - Slow M&A activity in the basin
  - Capital investment has moved out of the basin

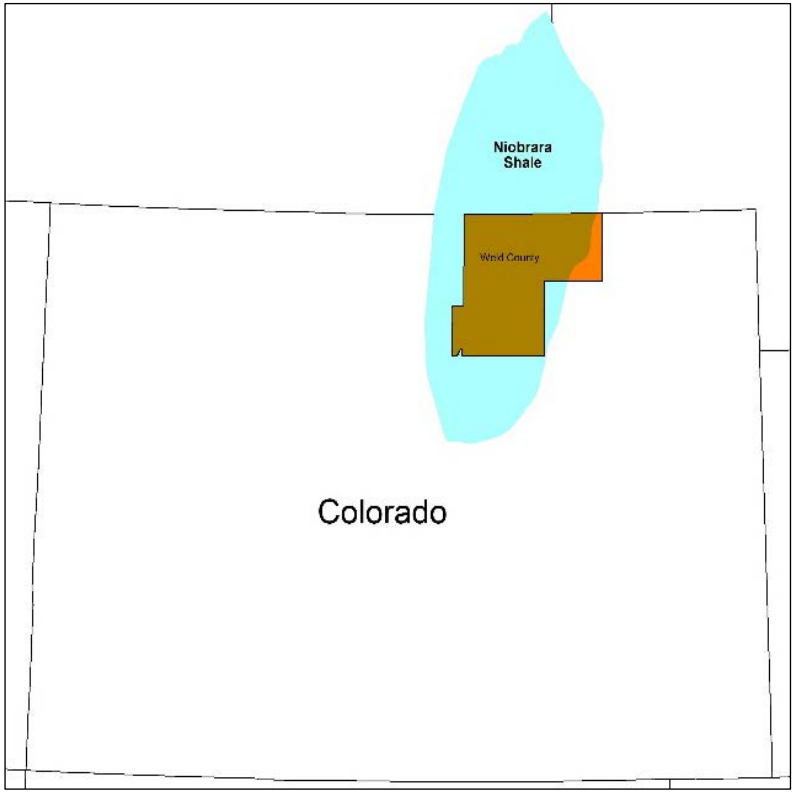
- Land acquisition costs need to come down significantly before capital begins to flow back into the basin. This will likely become even more of a sticking point given the 2020 outlook

- Pure-play operators are picking up acreage as larger E&P's divest non-core assets.
- Land acquisition costs have appeared to come down, inviting investment in the basin to return

Denver - Julesburg Basin analysis

Highlights

- Located in Colorado, Wyoming and Nebraska, the major unconventional targets are the Niobrara and Codell formations.
- Weld country contains majority of operations in basin due to existing infrastructure and legacy leases.
- Horizontal drilling specifically targeting the Niobrara and Codell in the Wattenburg field started in 2009.
- Crude is 45-58° API in Wattenburg.
- Oil Differentials: Decreased recently with March differentials at $0.50 / bbl.



Source: Company Presentations, Sproule

DJ Basin (Niobrara)

Cost Parameters	Dj Basin (Niobrara)
2019 Land Acquistion Cost ($/acre)	$ 10,000
2020 Land Acquisition Cost ($/acre)	$ 3,000
Drilling & Completion Capital (Million $)	$ 4.7
Operating Expense ($/month)	$ 4,000
Water Expense ($/bbl)	$ 2.50
Taxes	Oil 5%, Gas 5%, Ad Valorem 1%
Abandonment Capital	$ 150,000
EUR - Oil (mbo)	329.1

Breakevens (net oil price):

- 2020 - Without Acq. Costs = $22.00/bbl
- 2020 - Acquisition Costs = $25.00/bbl
- 2019 – Acquisition Costs = $31.85/bbl

- Operators with strong acreage positions (legacy leases) could operate in free cash flow at lower net oil prices ($22/bbl)

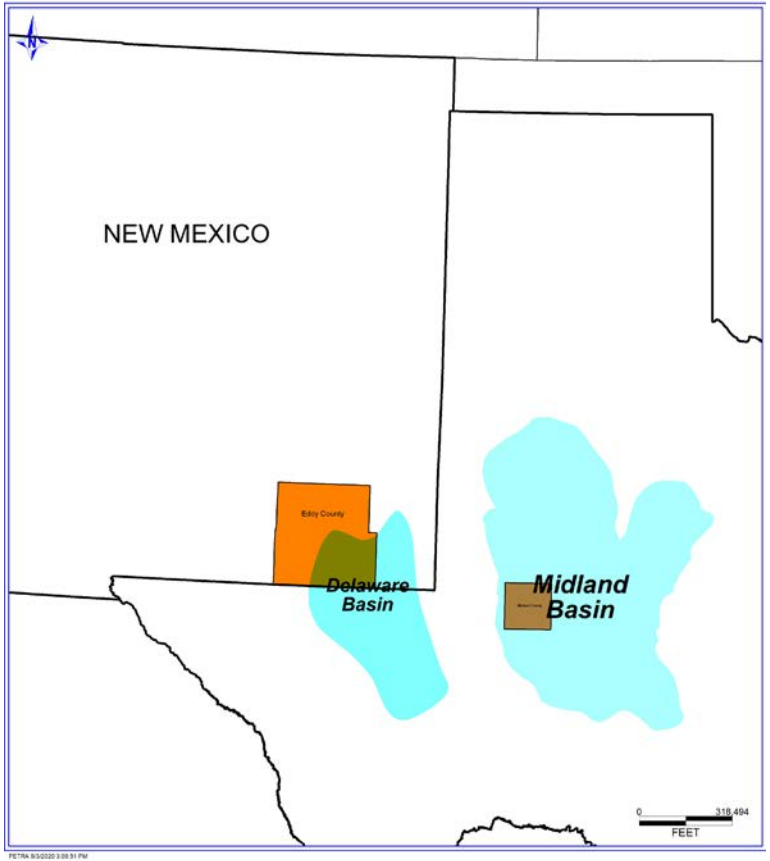
- Capital flow into the DJ basin seemed to halt in 2019
  - Most activity was M&A as major players worked to consolidate positions

- Two main issues in relation to capital investment in the DJ Basin:
  - Ongoing social and political risk of investment in Colorado. Despite low costs, this risk is expected to drive down future acquisition costs in the basin.
  - Return on capital invested not as high as in other basins

Permian (Delaware) Basin analysis

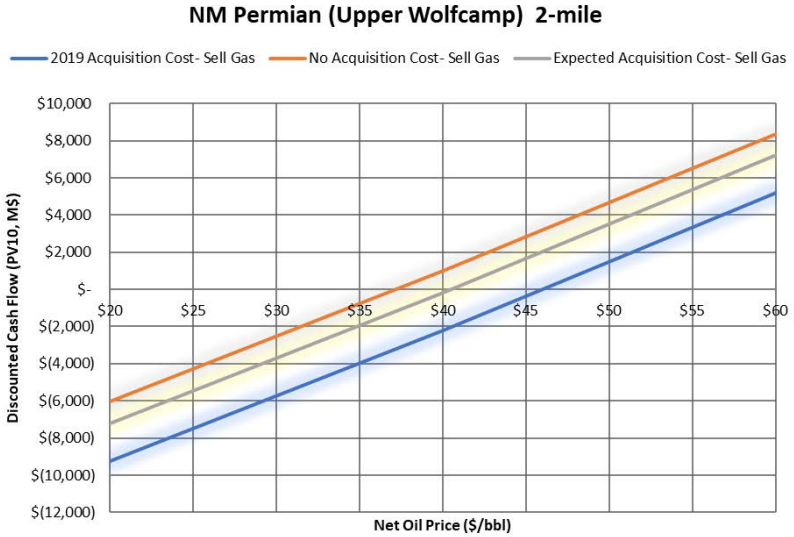
Highlights

- Located in Texas and New Mexico, the Permian includes the Delaware Basin, Midland Basin and Central Basin Platform.
- The main targets for unconventional drilling in the Delaware Basin are the Bone Springs and Wolfcamp formations.
- Crude density varies from 35-45° API. Water handling is an issue, given high water volumes (over 5 bblwater/bbloil) and rising associated gas volumes result in significant flaring.
- Oil Differentials: Has seen significant improvements. Current crude trades at or near basis.



Source: Company Presentations, Sproule

Permian Basin (Wolfcamp)



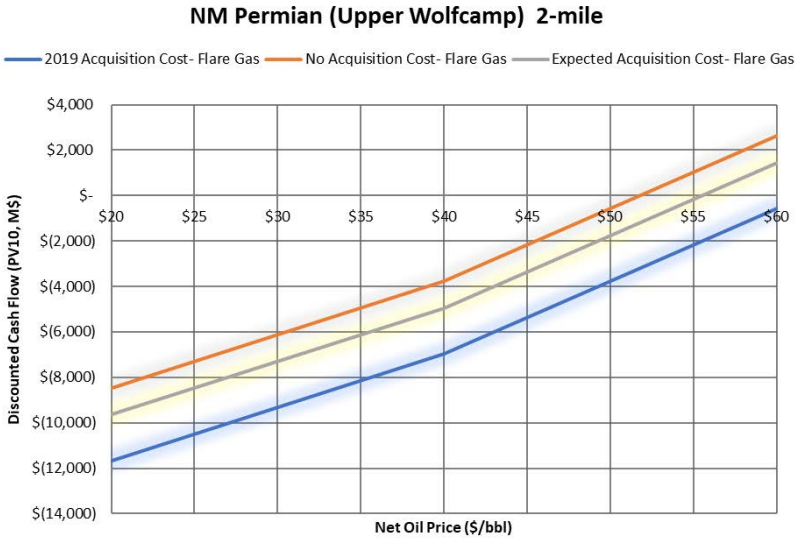
Cost Parameters	Permian Basin NM (Wolfcamp)
2019 Land Acquistion Cost ($/acre)	$ 40,000
2020 Land Acquisition Cost ($/acre)	$ 14,600
Drilling & Completion Capital (Million $)	$ 8.5
Operating Expense ($/month)	$ 10,000
Water Expense ($/bbl)	$ 2.50
Taxes	Sev & Ad Valorem 8%
Abandonment Capital	$ 150,000
EUR - Oil (mbo)	663.1

Breakevens (net oil price):

- 2020 - Without Acq. Costs = $37.00/bbl
- 2020 - Acquisition Costs = $40.50/bbl
- 2019 – Acquisition Costs = $46.00/bbl

- Oil differentials during 2019 were close to zero, and in some cases, operators received a premium.
- Land acquisition costs continued to explode from 2017, resulting in significant capital expense.
- High breakeven cost can explain very little M&A activity in 2019.
- Well positioned companies that find cost synergies with existing operations, the cost of land acquisition is expected to drop so there should be opportunities.
- If oil prices improve in the second half of 2020, cash flow from existing wells will improve encouraging more capital investment and consolidation of operations.

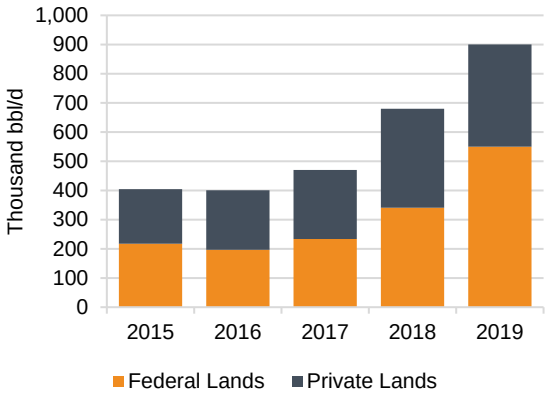
Permian Basin (Wolfcamp)- Flaring Case



- In New Mexico, ability to apply for flaring permits is now very restricted, enforcing a 2% or under flaring limit.
- Added costs for flaring and venting will be enforced by the NM OCD.
- Basin economics dependent on company's ability to sell gas.
- By flaring the gas, not only is there a significant environmental impact, but the gas and associated NGL revenue streams are literally burned. In New Mexico, where there are penalties associated with flaring permits, the economic impacts are dire.
- Texas has not imposed any penalties for flaring, if a company is not able to sell the gas, the breakeven values required to return capital to investors are impacted.

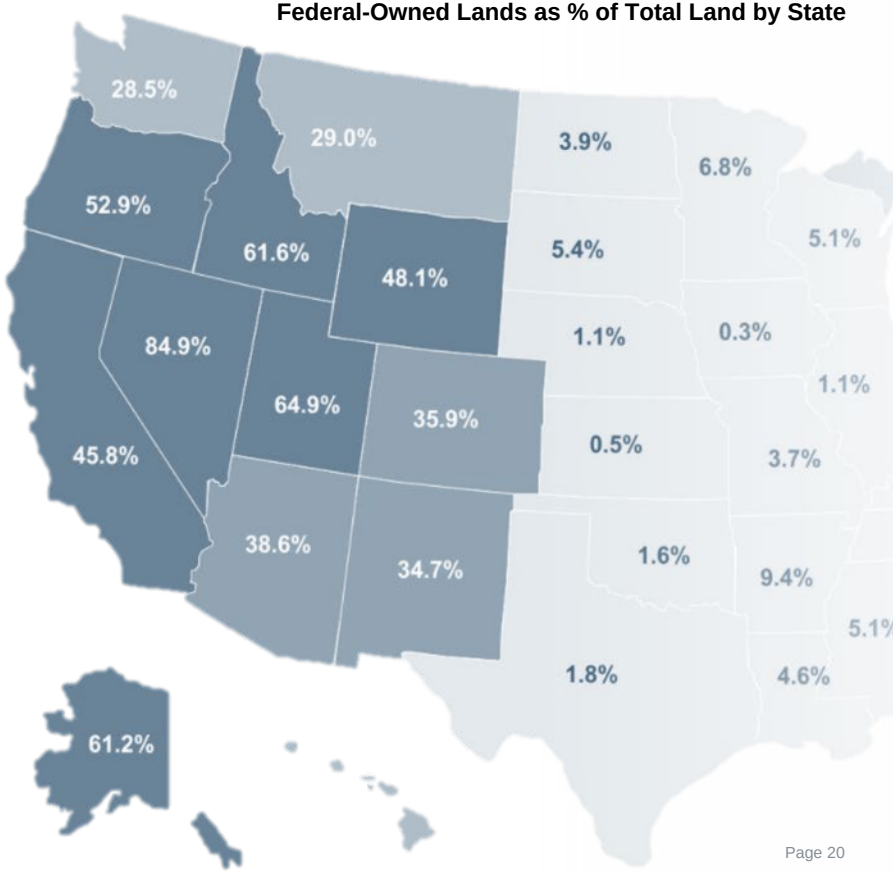
Ban on Federal Leasing: Impacts on Western States

New Mexico Crude Oil Production by Land Type



- Share of total U.S. production from Federal Land:
  - Oil = 24%
  - Natural Gas = 13%
- New Mexico is largest onshore contributor (550 MM BBL / day)
  - Virtually all of this production comes from Lea and Eddy Counties in the Delaware Basin
- Wyoming (#2), North Dakota (#3), & Colorado (#4) follow New Mexico for production from Federal Land
- Over 1/3 of New Mexican state revenue comes from Oil and Gas royalties

Federal-Owned Lands as % of Total Land by State



Source: Sproule/Boost Analysis, Mises Institute

Basin specific summary

- **Williston Basin:** investment has yielded free cash flow for investors with long term positions
- **DJ Basin:** despite lower costs, production volumes, and breakeven prices, still not seeing capital investment due to political and regulatory uncertainty in Colorado.

- **Permian Basin:** has been the focus for a lot of investors since 2017. Despite increased capital, investors have not seen a return on investment due to high costs (land acquisition) and operating expenses (water disposal, flaring)

Conclusion

- When project economics includes full lifecycle land and well costs, the breakeven net oil prices tell the story on the investment operations
- Land acquisition costs become a large driving factor in the success or failure of a prospect
- 2019 saw companies looking to figure out balance sheets to generate free cash flow and repay capital investment and debt before 2020 downturn
- As prices stay lower for longer, a lot of companies are going to continue to struggle
- Access to outside investor capital is going to continue to be a challenge, as investors look to put their capital into other industries with better return on investment.

Thank You for Attending

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