Current Issues in Oil and Gas Valuations

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Contents

Current Issues in Oil and Gas Valuations

Introduction

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Taylor West

Partner-in-Charge, Valuation, Forensic & Litigation Services, Houston

Education

- *MBA, Finance*
  Rollins College
- *BA, International Relations*
  Rollins College

Professional Affiliations

- *American Society of Appraisers*
- *National Association of Valuators and Analysts*

Professional Bio

Taylor West is partner-in-charge in the Firm's Advisory and Consulting practice, located in the Houston, Texas office. Mr. West specializes in the valuation of corporate debt, equity and derivative securities, partnership interests, and intangible assets of privately held and publicly traded businesses. His valuation projects serve a variety of purposes, including mergers and acquisitions, financial reporting, tax reporting, litigation, bankruptcy, portfolio valuation, and corporate planning.

Mr. West serves domestic and global clients in numerous industries, including energy, healthcare, technology, real estate, hospitality, consumer and industrial products, telecommunications, and financial services, among others. He has advised corporate valuation clients on more than $50 billion of M&A transactions in the past decade. His work has been reviewed by the Internal Revenue Service and all of the major accounting firms.

Additionally, Mr. West has been a regular public speaker on the topic of valuation and was appointed to the Standard & Poor's Capital IQ Client Advisory Board. He was also recognized as one of Houston Business Journal's 40 Under 40 honorees.

Mr. West began his career as a financial analyst at an energy corporation and then joined the advisory practice at a major global accounting firm in 2000. Since then, he has held leadership positions at global accounting and consulting firms, including being appointed the National Oil and Gas Practice Leader at the world's largest independent valuation firm.

Gorby Nguyen, CPA

Advisory Director

Education

- *MS, Accountancy*
  University of Houston
- *BBA, Accounting*
  University of Houston

Professional Affiliations

- *American Institute of Certified Public Accountants*

Professional Bio

Gorby Nguyen is a Director in Marcum's Advisory group and is based in Houston, TX. Mr. Nguyen is well-versed in valuation services, financial modeling, and middle-market M&A advisory. He has advised companies ranging from small, family-owned businesses to large Fortune 100 companies on various valuation issues.

Mr. Nguyen has helped clients navigate valuation issues relating to financial reporting and tax reporting requirements, pre-deal M&A pricing, financial forecast due diligence, litigation and other matters.

Being based in Houston, Mr. Nguyen has developed deep expertise in the energy industry, including oil and gas, power generation (renewables or fossil fuels), and refining and marketing. Mr. Nguyen also has extensive experience working with companies in the technology, waste management, real estate, and manufacturing industries.

Mr. Nguyen joined Marcum in 2020. Previously, he worked for other middle-market accounting firms, independent consulting firms, and was with a Big 4 firm prior to joining Marcum.

Mr. Nguyen is a Certified Public Accountant licensed by the State of Texas.

MARCUM Energy & Mining Industry Group

- The MARCUM Energy & Mining Industry Group is comprised of professionals located in industry-centric markets who have vast experience advising key players across all industry sectors, from upstream exploration and production through downstream refining and retail, as well as the companies who service these sectors.
- Cross-functional team, integrating deep industry expertise from across MARCUM's broad service portfolio. The team is led by Jeff Houston (Assurance), Martin Martinez (Tax), and Taylor West (Advisory).
- Experienced in serving a diverse array of energy and mining clients, ranging from family-held businesses to the largest integrated oil companies.
- Learn more about the MARCUM Energy & Mining Industry Group at the following links:
  - Oil and Gas - www.marcumllp.com/industries/oil-gas
  - Mining - www.marcumllp.com/industries/mining

Current Issues in Oil and Gas Valuations

Overview of the Current Oil and Gas Environment

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Notable Current Trends

- Investors have shifted their focus from companies with growth strategies to companies that can yield interim returns. This has driven M&A/IPO activity down.
- New industry activity has declined significantly over the past few years as indicated by rig counts, “drilled, but uncompleted” wells (“DUCs”), and workforce headcounts.
- Bankruptcies are reaching highest levels since 2016.
- Operational strategies have shifted focus to improving efficiency and optimization of assets.

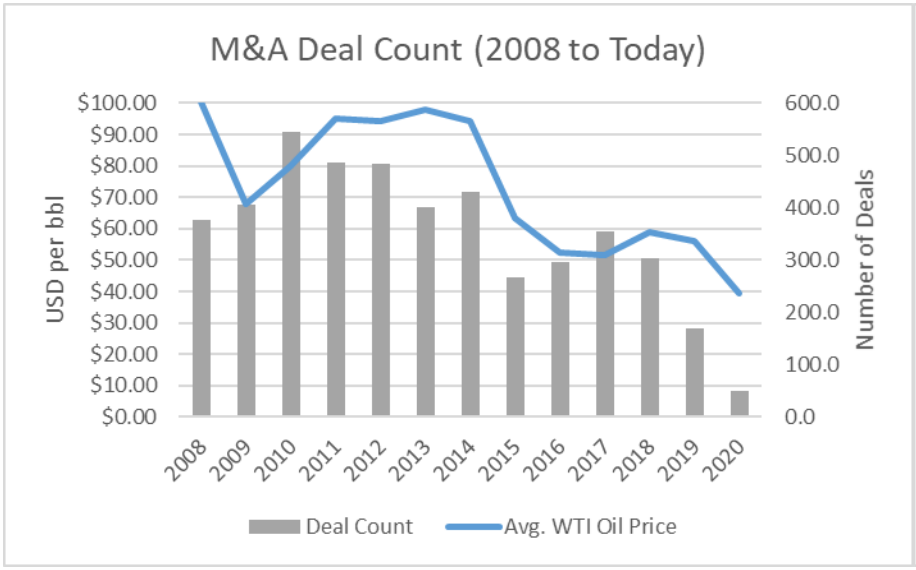
Investor Expectations

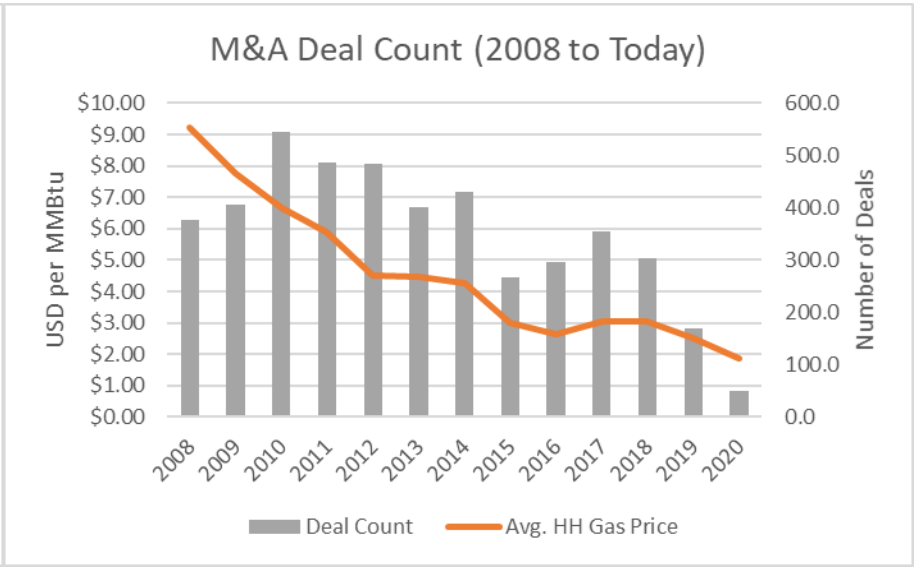
- During the early 2010s, oil and gas companies and their investors focused their strategies on growing their oil and gas holdings across the United States. This resulted in high valuations for oil and gas properties, especially those in the Permian Basin of West Texas.

- However, when oil prices began to drop from $103 per barrel in 2014 to $46 in 2016, expected returns began to diminish and investors began souring on the oil and gas industry.

- Investors began requiring oil and gas companies to shift focus from growth to yielding positive interim returns.

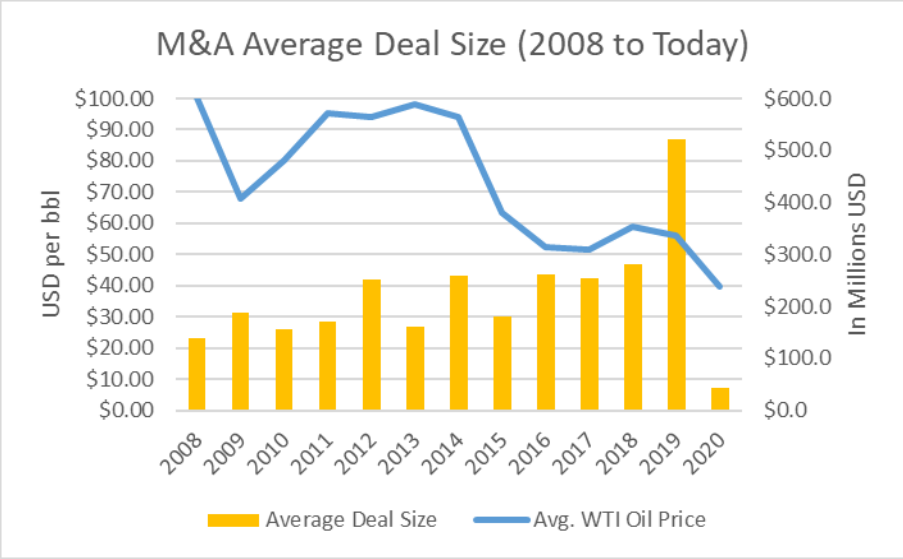
Investor Expectations and Deal Counts

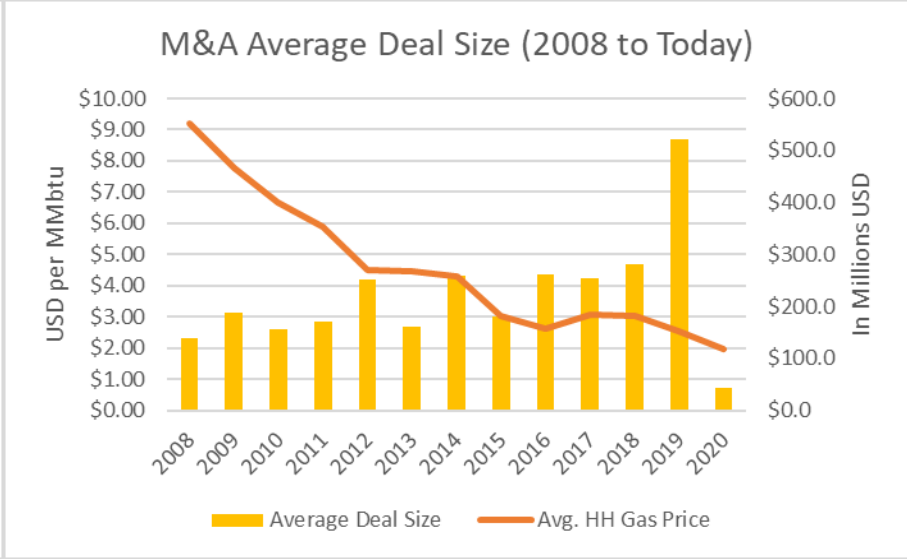




Source: *S&P Capital IQ*

Investor Expectations and M&A Deal Size

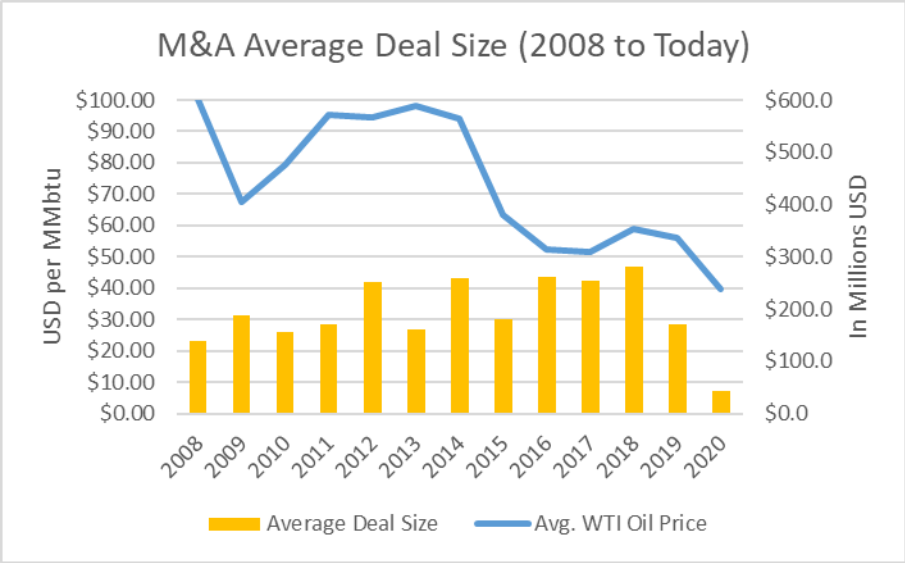


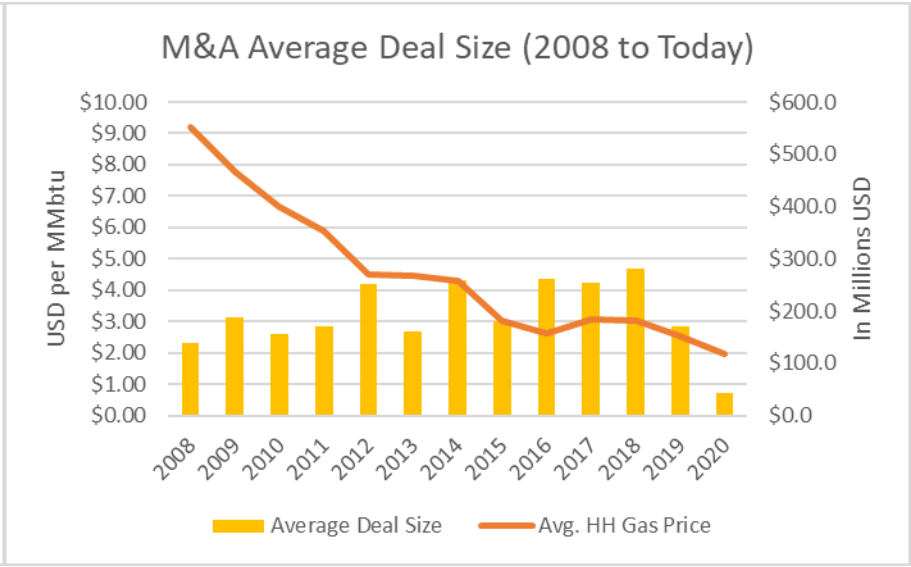


**2020 excludes the announced Chevron – Noble Energy deal that is estimated to be valued at $5 billion.*

Source: *S&P Capital IQ*

Investor Expectations and M&A Deal Size





2019 excludes Occidental Petroleum – Anadarko Deal valued at approximately $59.9 billion.

Source: *S&P Capital IQ*

Largest M&A Deals by Year

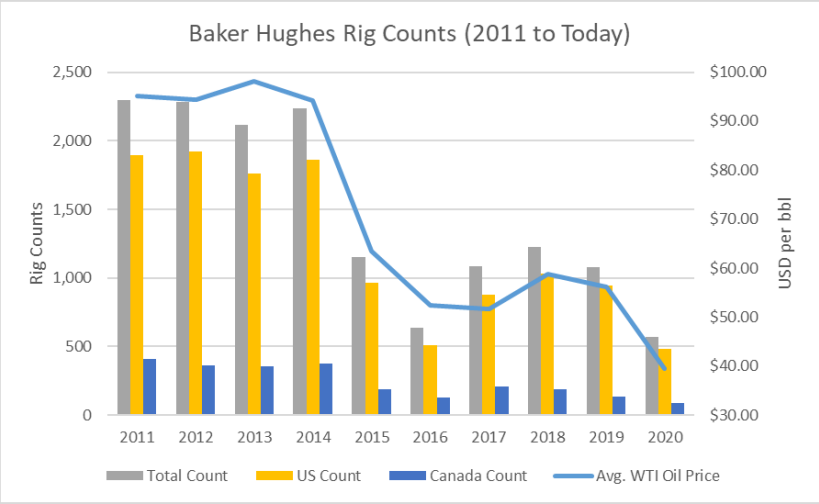
Year	Deal Size	Buyer	Target
2008	$ 5,560.2	Shell Canada Limited	Duvernay Oil Corp.
2009	40,763.5	Exxon Mobil Corporation (NYSE:XOM)	XTO Energy Inc.
2010	5,469.9	Chevron Corporation (NYSE:CVX)	Arkhan Corporation
2011	15,753.6	BHP Group (ASX:BHP)	Petrohawk Energy Corporation
2012	19,221.7	CNOOC Limited (SEHK:883)	CNOOC Petroleum North America ULC
2013	6,000.0	Devon Energy Production Company, L.P.	Eagle Ford Assets
2014	13,681.4	Repsol, S.A. (BME:REP)	Repsol Oil & Gas Canada Inc.
2015	4,452.1	Suncor Energy Inc. (TSX:SU)	Suncor Energy Ventures Holding Corporation
2016	7,677.7	LinnCo, LLC	Linn Energy, Inc.
2017	13,238.2	Cenovus Energy Inc. (TSX:CVE)	Remaining 50% Interest in FCCL Oil Sands Partner and Majority of Western Canada Deep Basin Gas Asset
2018	10,500.0	BP American Production Company	Petrohawk Energy Corporation
2019	2,792.8	WPX Energy, Inc. (NYSE:WPX)	Felix Energy, LLC
2020	541.0	Seneca Resources Corporation; NFG Midstream Covington, LLC	U.S. Appalachia Assets of SWEPI LP

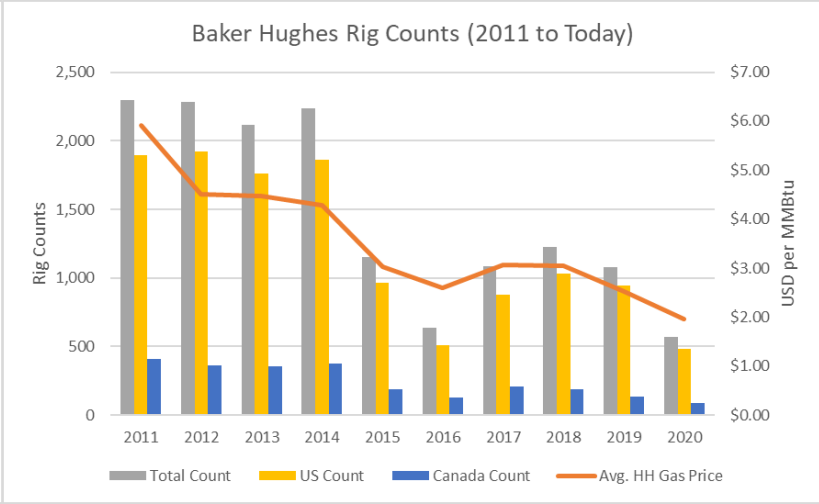
Source: *S&P Capital IQ*

Excludes Occidental Petroleum – Anadarko Deal valued at approximately $59.9 billion as an outlier.

Oil and Gas Activity – Rig Counts

- As of August 14, 2020, the rig count in the US and Canada was 298, down over 89% from the peak rig count of 2,707 in 2012.
- Even before the COVID-19 shutdown began (March 13, 2020), rig count was at 967, which represents a drop of 70% from the peak.
- Some of the drop can be attributed to better technology and drilling methods. However, economic and market factors are big drivers of the trends.

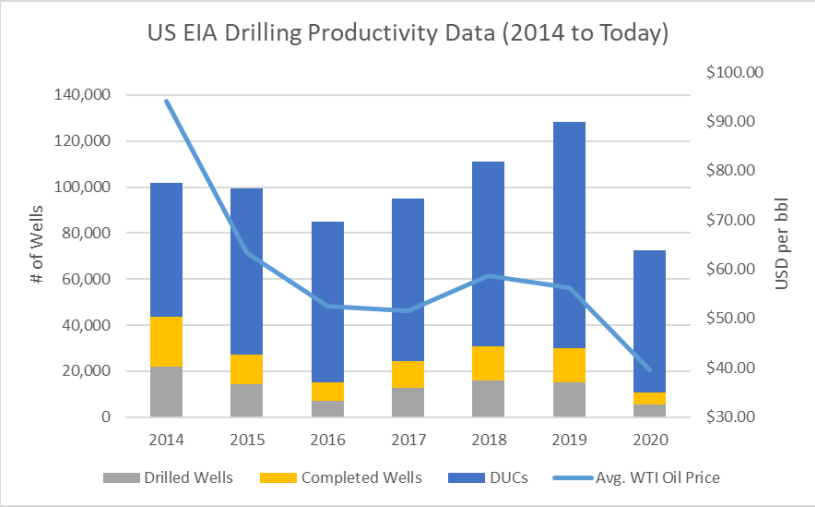


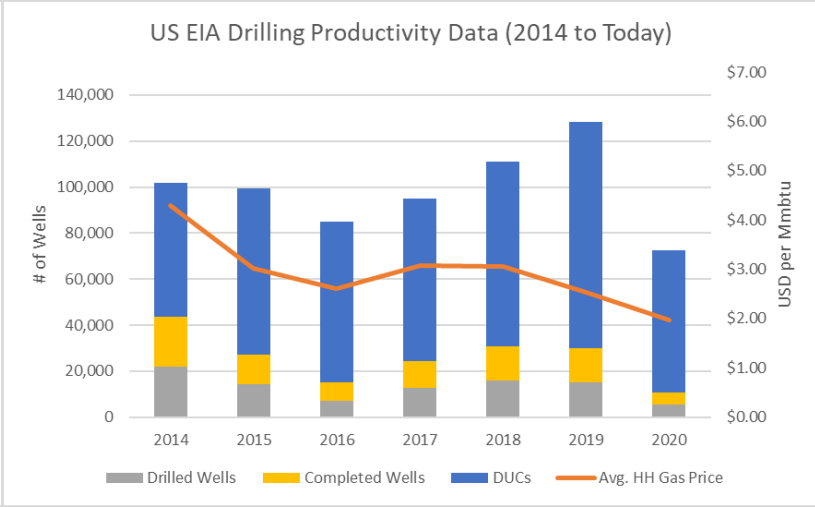


Source: *Baker Hughes Rig Count*, September 21, 2020

Oil and Gas Activity – Well Counts

- The number of oil and gas wells have decreased from 2014 to today based on US EIA data of wells in major US plays.
- DUC well inventories remain high at 7,665 as of September 2020, however the industry has seen wells completed at a greater rate than new drills.
- This trend is a strong indication that oil and gas pricing has led to a steep decline in new oil and gas activity.

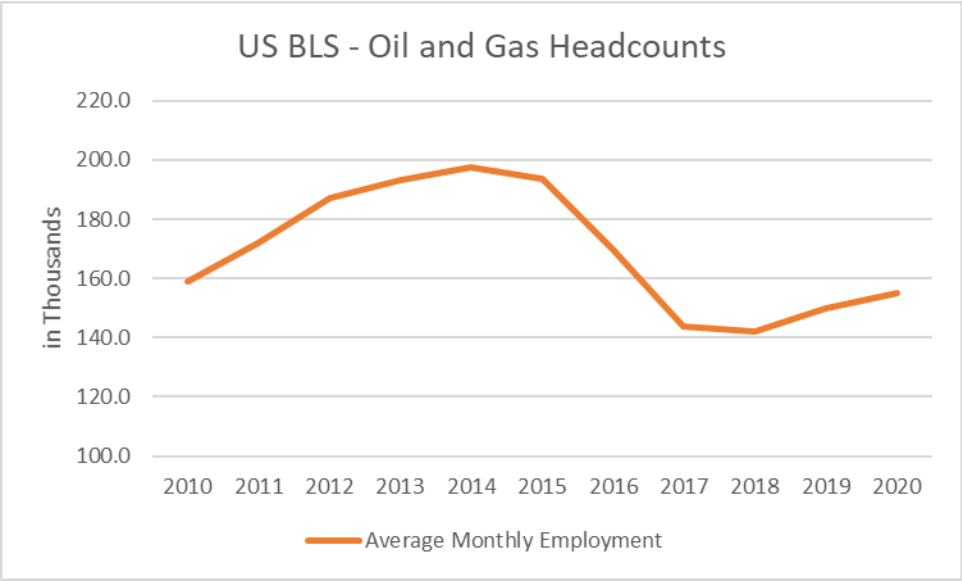




Source: *US EIA Drilling Productivity Report*, September 2020

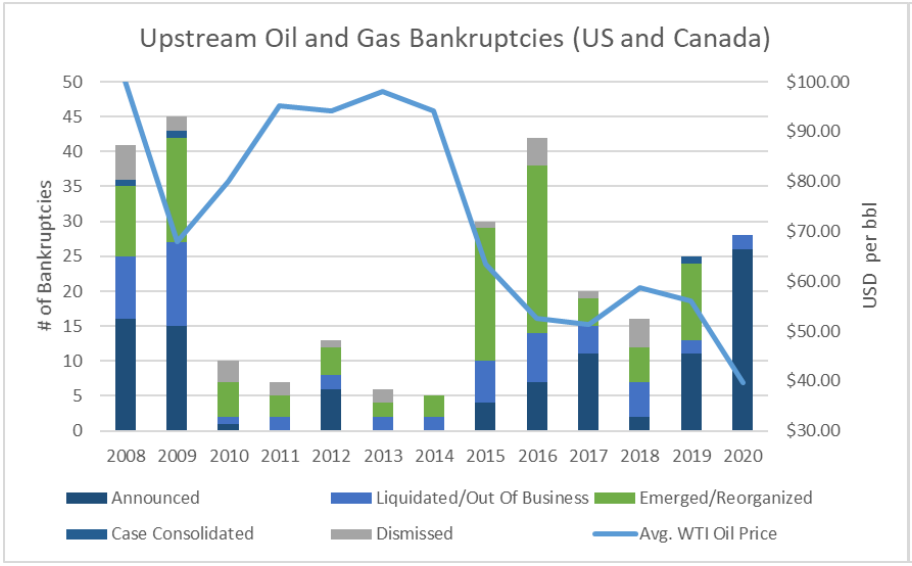
Oil and Gas Activity – Workforce

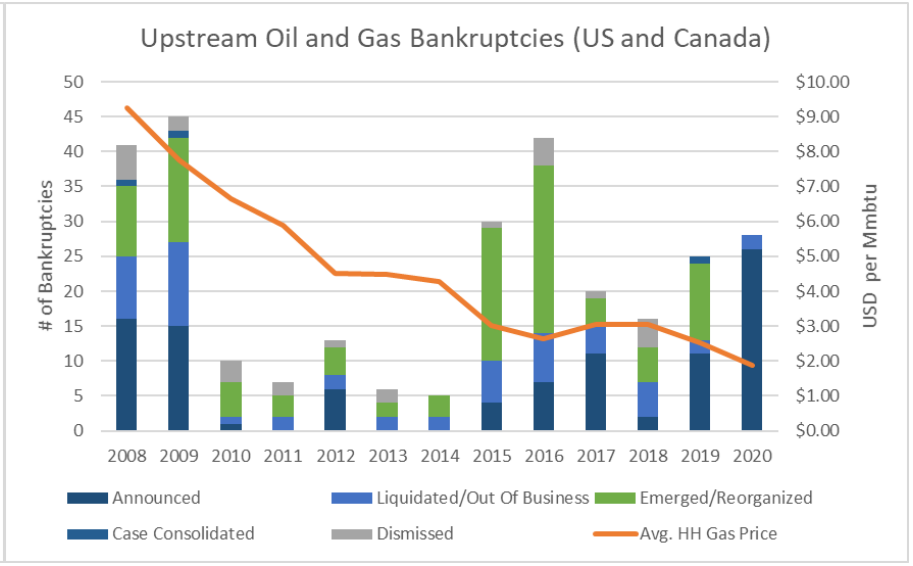
- The seasonally adjusted headcount of employees working in oil and gas extraction declined significantly from its peak in 2014 to 2018, but is seeing a steady increase starting in 2019.



Source: *US Bureau of Labor Statistics*

Oil and Gas Bankruptcies





The number of bankruptcies in the upstream oil and gas sector correlates with commodity pricing and expectations. Accordingly, we've seen an uptick in announced bankruptcies with the drop in oil and gas prices the last two years.

Source: *S&P Capital IQ*

Oil and Gas Operational Trends

- We’ve seen more oil and gas operating rely on *pad drilling* to boost production and lower costs over the last 10 years. Pad drilling is drilling multiple wellbores, rather than a single well on a single piece of land, also known as a *pad*.

- More companies are relying on digital transformation to improve productivity of wells, reduce costs, and to increase drilling success rates. Technologies such as artificial intelligence, cloud computing, and advanced robotics have transformed the industry.

Current Issues in Oil and Gas Valuations

Trends in Deal Structures

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Current Transaction Trends

- Proved developed producing (“PDP”) reserves reign supreme in upstream oil and gas transactions.
- More creative transaction structures (e.g. DrillCo transactions, contingent consideration) and alternative financing options (e.g. volumetric production payments) as equity capital is harder to obtain.
- Acquisition of upstream assets and related midstream assets for cost benefits and optionality in business model.
- Acquisition of upstream assets to leverage synergies with downstream (refining) assets.

Focus on PDPs

- Over the past few years, we have seen oil and gas market participants focus almost exclusively on acquiring PDP reserves due to the demand for interim returns or positive free cash flows.

- As a result, the pricing of undeveloped reserves (i.e. proved undeveloped and unproved reserves) has been much lower than we've seen historically, and at times have been $0.

- The lack of new drilling activity lends support to the notion that PDP reserves will continue to reign supreme in M&A over undeveloped reserves in the near future.

Traditional Debt Financing Options

- Bank Loans
- Public Bond
- U.S. Private Placements
- Retail Bonds
- Mezzanine Finance
- Reserve-Based Lending
- Convertible Debt

DrillCo Transactions

- DrillCo transactions are ventures between an investor and an oil and gas operator where the investor agrees to finance all or a portion of the drilling capital for a specified number of wells in return for a working interest in such wells. These arrangements don't involve the creation of a new company.

- DrillCos are not cookie cutter arrangements and can have a variety of structures based on the needs of the investor and the operator.

- More oil and gas operators are resorting to DrillCo transactions in order to obtain the financing needed to develop oil and gas properties as access to capital from traditional sources, such as banks, has tightened.

Contingent Consideration

- Due to the volatility of oil and gas prices and uncertainty surrounding type curves, market participants have been incorporating contingent consideration in recent deals to mitigate related risks.
- Contingent payment can be dependent on future commodity pricing, achievement of production targets, hitting first oil or gas, or many other oil and gas factors.
- From 2008 to today, we have seen and increased reliance on contingent consideration in oil and gas deals, especially since 2016. Contingent consideration existed in approximately 5.0% of deals in 2008. For year-to-date 2020, it is observed in approximately 16.0% of deals
- A few notable deals with contingent consideration is presented below.

Year	Buyer	Seller	Contingent Consideration Description
2019	Murphy Oil	LLOG	$200 million in payments contingent on revenues from certain properties exceeding contractual thresholds and $50 million contingent on first oil from certain projects.
2019	Ensign Natural Resources	Pioneer Natural Resources USA, Inc.	$450 million in payments contingent on future commodity prices (Total consideration was $475 million).
2020	Castleton Resources	Range Resources	$90 million in payments contingent on future commodity prices.

Source: *S&P Capital IQ*

Upstream + Midstream Assets

- In recent years, we have observed pure upstream players enter into deals to acquire upstream assets and related midstream assets (i.e. gathering and processing assets). The more integrated approach helps improve cost structure for the upstream assets while also providing the buyer more optionality in their assets.

- Notable recent deals are below.

Year	Buyer	Seller	Description
2018	Diversifed Gas & Oil Plc	EQT Corporation	DGOC acquires upstream and related midstream infrastructure assets in Appalachian basin for $575 million.
2020	National Fuel Gas Company / Seneca	SWEPI LP (a Shell Company)	NFG acquires upstream and midstream assets located in Pennsylvania for $541 million.
2020	MACH Resources	Alta Mesa	MACH acquires upstream and midstream assets in the SCOOP/STACK from Alta Mesa for $220 million.

Source: *S&P Capital IQ*

Downstream Getting Upstream

- Many downstream and integrated players have taken advantage of the down market for upstream oil and gas assets by buying up reserve assets at a lower price to provide cheaper feedstock for their downstream business (i.e. refineries, liquefaction of natural gas, etc.).

- We are seeing liquefied natural gas (“LNG”) players acquire upstream assets to fulfill tolling commitments with LNG exporters.

Trends in Valuation Services

- Due to the downturn in the oil and gas industry, we have observed more impairment issues with companies throughout the industry (upstream, midstream, downstream, etc.).
- We are observing more companies argue for bargain purchases in oil and gas transactions for financial reporting purposes under ASC 805/IFRS 3.
- We are seeing more complex capital structures as companies get more creative in financing their businesses.
- We are seeing much higher required returns on assets for investments in the industry.
- We are performing more oil and gas commodity price simulations.

Current Issues in Oil and Gas Valuations

Oil and Gas Valuation Methodology

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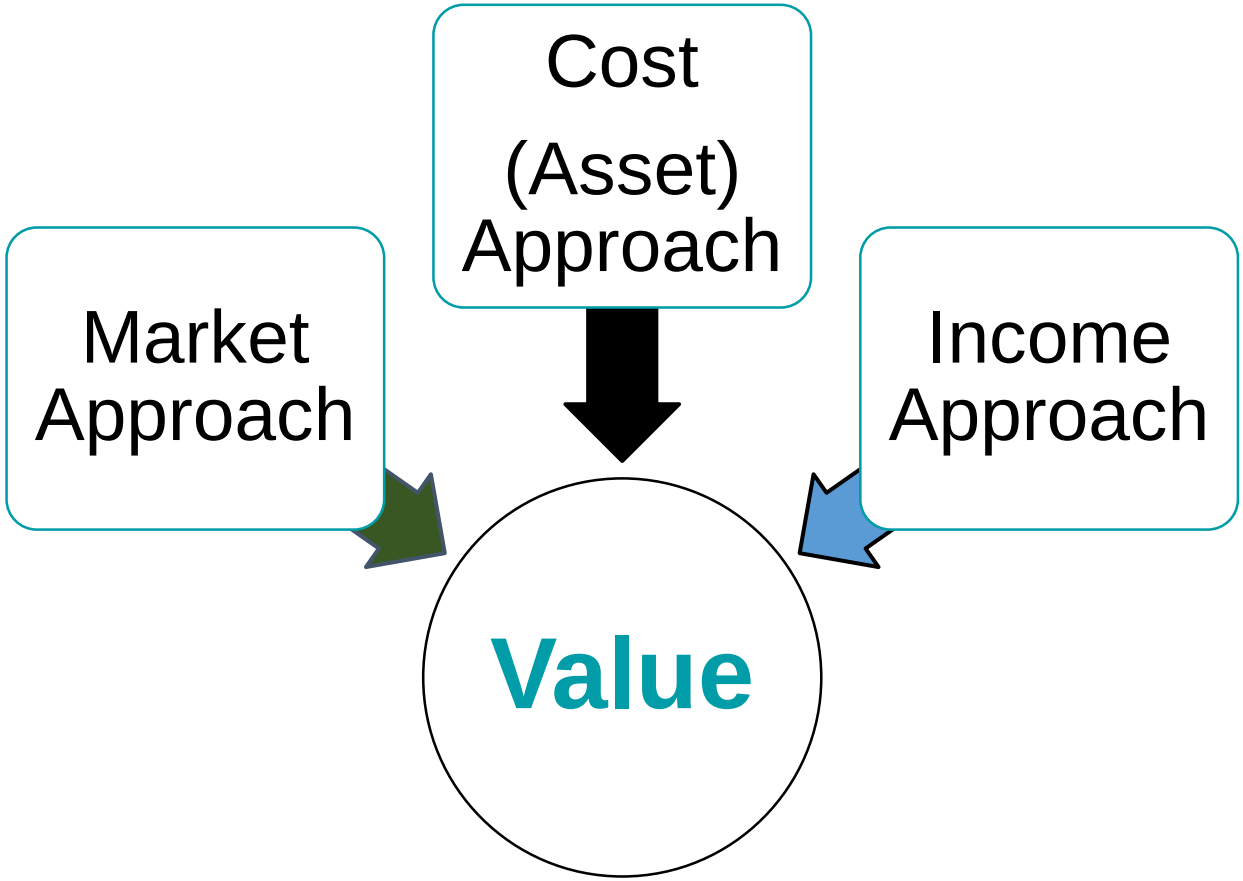
Valuation Approaches



Market Approach
Guideline Public Company Method & Transaction Method

Derivation of Multiples

Company Selection:

- Industry of Focus
- Region of Operations
  - Country; basin; field
- Asset Base:
  - Onshore vs. Offshore; Conventional vs. Unconventional; Developed vs. Undeveloped Mix; Maturity of Assets
- Type of Geology
  - Well Depths; Type of Reservoir; Types of Wells
- Relative Size
  - Revenue; Reserves; Production; Market Values (MVIC & MVE)
- Growth & Profitability Expectations
- Company Track Record and Management Reputation
- Reserve Replacement Cost Ratio ($ / Boe)
- Finding & Development Cost Ratio ($ / Boe)
- Recycle Ratio %
- Production or "Lifting" Costs ($ / Boe of Production)
- Company-Specific Risks
- Taxable vs. Non-Taxable

Types of Multiples

EV / Resource Volume:

- Proved reserves (as measured in boe or mcf) is commonly utilized for businesses or assets with proved reserves
- Resource estimates may also be used for earlier stage assets / enterprises
- Be mindful of reporting periods, as public companies may have dated information

EV / Avg. Daily Production:

- Attempt to line up average production period across comparables and subject
- When selecting multiples, consider non-producing assets in the comparables and subject that may influence the implied multiple of daily production

EV / EBITDAX:

- Aligns successful efforts and full cost reporting
- May not reflect asset base considerations
- EBITDAX = EBITDA plus exploration costs (related to full costing vs. successful efforts)

EV / Acreage:

- Commonly used to value non-producing assets
- Consider multiple zones in stacked plays

Application of Multiples

Subject Company Information:

- Average Daily Production
  - Timing and adjustments
- Proved Reserves
  - Subject Company SEC Report
  - GPC timing of reporting
- Subject Company EBITDAX
- Subject Company Acreage

Key Considerations:

- Selection of Market Multiples
  - Reserve life
  - Liquids vs Gas mix
  - % Developed
  - Upside not included in reserves
- Control / Minority Considerations
  - Guideline Public Company vs. Transaction Method

Information Sources:

- Enverus Database (1Derrick, PLS, and DrillingInfo)
- S&P's CapitalIQ Database;
- Other transaction databases

Market Approach – GPC Multiples Example

Guideline Public Company Analysis									
Guideline Company	Ticker	Enterprise Value	Total Proved Reserves (Mboe)	Total Daily Production (Mboe)	$/Proved Mboe	$/Mboe/day	EV/ 2019 EBITDAX	EV/ 2020 EBITDAX	EV/ 2021 EBITDAX
Cimarex Energy Co.	NYSE:XEC	4,020.2	619.6	192.8	$ 6.49	$ 20.85	2.8x	4.6x	4.0x
Continental Resources, Inc.	NYSE:CLR	10,325.8	1,619.3	247.6	6.38	41.70	3.1x	6.6x	5.4x
Ovintiv Inc.	TSX:OVV	9,124.2	2,188.7	480.1	4.17	19.01	3.3x	3.7x	4.8x
SandRidge Energy, Inc.	NYSE:SD	68.8	89.9	63.5	0.77	1.08	0.5x	n/a	n/a
Devon Energy Corporation	NYSE:DVN	6,863.9	757.2	580.8	9.07	11.82	4.0x	4.9x	5.3x
Marathon Oil Corporation	NYSE:MRO	8,130.5	1,205.0	405.6	6.75	20.04	2.7x	5.1x	4.5x
Panhandle Oil and Gas Inc.	NYSE:PHX	91.2	17.7	5.1	5.14	17.74	3.6x	n/a	n/a
Maximum					9.07	41.70	4.0x	6.6x	5.4x
Upper Quartile					6.62	20.45	3.4x	5.1x	5.3x
Mean					5.54	18.89	2.9x	5.0x	4.8x
Median					6.38	19.01	3.1x	4.9x	4.8x
Lower Quartile					4.65	14.78	2.8x	4.6x	4.5x
Minimum					0.77	1.08	0.5x	3.7x	4.0x

Source: S&P's CapitalIQ database. Data presented for illustrative purposes only and may not be accurate as displayed.

Market Approach
Guideline Transaction Multiples Example

Guideline Transaction Analysis								
Transaction Date	Buyer	Seller	Purchase Price	Proved Reserves	Net Acres	$/Acre	Proved $/Boe	Price Adjusted Proved $/Boe
9/1/2015	Ajax Resources, LLC;Kelso & Company	W&T Offshore, Inc.	$ 376,100.0	37,296.3	25.0	$ 15,044.00	$ 10.08	$ 8.28
5/26/2015	Ring Energy, Inc.	Undisclosed company(ies)	75,000.0	4,700.0	5.0	15,000.00	15.96	10.85
10/13/2014	Mid-Con Energy Partners, LP	Undisclosed company(ies)	120,000.0	6,100.0	100.0	1,200.00	19.67	8.86
8/11/2014	EnerVest, Ltd.;Undisclosed company(ies)	HighMount Exploration & Producti	805,000.0	119,850.0	250.0	3,220.00	6.72	3.46
7/25/2014	RSP Permian, Inc.	Undisclosed company(ies)	259,000.0	22,000.0	10.0	25,900.00	10.60	4.88
4/8/2014	Athlon Energy Inc.	Hibernia Holdings, LLC;Piedra En	873,000.0	31,000.0	35.0	24,942.86	24.63	11.47
3/27/2014	Parsley Energy, Inc.	Pacer Energy Ltd.	165,300.0	8,100.0	20.0	8,265.00	20.41	8.26
2/27/2014	Ring Energy, Inc.	Undisclosed company(ies)	6,450.0	1,450.0	3.0	2,150.00	3.99	1.66
2/20/2014	Diamondback Energy Inc.	Undisclosed company(ies)	114,300.0	2,752.0	10.0	11,430.00	41.53	15.16
2/18/2014	Diamondback Energy Inc.	Undisclosed company(ies)	174,000.0	4,185.0	17.0	10,235.29	41.58	15.38
1/24/2014	Athlon Energy Inc.	Undisclosed company(ies)	88,000.0	2,900.0	88.0	1,000.00	30.34	12.35
1/17/2014	RSP Permian, Inc.	Rising Star Energy	13,253.0	1,696.0	5.0	2,650.60	7.81	3.25
Maximum						25,900.00	41.58	15.38
Upper Quartile						15,011.00	26.06	11.69
Mean						10,086.48	19.44	8.65
Median						9,250.15	17.81	8.57
Lower Quartile						2,525.45	9.52	4.53
Minimum						1,000.00	3.99	1.66

Source: S&P's CapitalIQ database. Data presented for illustrative purposes only and may not be accurate as displayed.

Market Approach
Guideline Transactions Price-Adjustment

Guideline Transaction Analysis													
Purchase Price	Proved Reserves	% Gas Weight	% Oil Weight	Oil Price Trxn Date	Oil Price Vdate	% Change	Gas Price Trxn Date	Gas Price Vdate	% Change	Weighted Adjustment	$/Acre	Proved $/Boe	Price Adjusted Proved $/Boe
$ 376,100.0	37,296.3	11.0%	89.0%	59.7	28.8	-51.7%	3.33	1.73	-48.0%	**-51.3%**	$ 15,044.00	$ 10.08	$ 4.91
75,000.0	4,700.0	20.0%	80.0%	53.7	28.8	-46.3%	3.38	1.73	-48.8%	**-46.8%**	15,000.00	15.96	8.49
120,000.0	6,100.0	11.0%	89.0%	103.8	28.8	-72.2%	4.43	1.73	-60.9%	**-71.0%**	1,200.00	19.67	5.71
805,000.0	119,850.0	71.5%	28.5%	99.8	28.8	-71.1%	4.56	1.73	-62.0%	**-64.6%**	3,220.00	6.72	2.38
259,000.0	22,000.0	26.0%	74.0%	103.0	28.8	-72.0%	4.48	1.73	-61.3%	**-69.2%**	25,900.00	11.77	3.62
873,000.0	31,000.0	33.0%	67.0%	100.3	28.8	-71.3%	4.35	1.73	-60.2%	**-67.6%**	24,942.86	28.16	9.12
165,300.0	8,100.0	25.0%	75.0%	97.5	28.8	-70.4%	4.36	1.73	-60.3%	**-67.9%**	8,265.00	20.41	6.55
6,450.0	1,450.0	8.0%	92.0%	93.9	28.8	-69.3%	4.15	1.73	-58.2%	**-68.4%**	2,150.00	4.45	1.40
114,300.0	2,752.0	23.0%	77.0%	93.5	28.8	-69.2%	4.21	1.73	-58.8%	**-66.8%**	11,430.00	41.53	13.79
174,000.0	4,185.0	25.0%	75.0%	95.0	28.8	-69.6%	4.20	1.73	-58.7%	**-66.9%**	10,235.29	41.58	13.76
88,000.0	2,900.0	40.0%	60.0%	102.3	28.8	-71.8%	4.40	1.73	-60.6%	**-67.3%**	1,000.00	30.34	9.91
13,253.0	1,696.0	17.0%	83.0%	101.0	28.8	-71.5%	4.41	1.73	-60.7%	**-69.6%**	2,650.60	7.81	2.37

Source: S&P's CapitalIQ database. Data presented for illustrative purposes only and may not be accurate as displayed.

Discounted Cash Flow Method

- The Income Approach indicates the value of a business or asset based on the present value of the cash flows that the business or asset is expected to generate in the future.

- Primary Components of the DCF Method:

1. Future Cash Flows
    - Discrete vs. Terminal
    - Risked vs. Un-risked
    - Real vs. Nominal
    - Reserve Categories (PDP, PDNP, PUD, Probable; Possible; Resources)

2. Discount Rate
    - Weighted Average Cost of Capital (WACC)
        - Cost of Equity (Build-Up Method; CAPM)
        - Cost of Debt
    - Where are risks considered - forecast vs. discount rate

Discounted Cash Flow Method

- Free Cash Flow Calculations for Oil and Gas Interests:

Cash Flow Item	Working Interests	Royalty Interests
Net Production	X	X
Multiplied by: Realized Price per Unit	X	X
Revenue	X	X
Less: Production Taxes	X	X
Less: Operating Expenses	X	
Less: Corporate G&A	X	
EBITDAX	X	
Less: Intangible Drilling Costs	X	
Less: Tax Depreciation and Depletion	X	
Operating Income	X	
Less: Income Taxes	X	
After-Tax Net Income	X	
Plus: Tax Depreciation and Depletion	X	
Less: Tangible Capital Expenditures	X	
After-Tax Free Cash Flows	X	

DCF Method - Revenue

- **Production Forecast**
  - Based on either internal or third-party engineering studies of reserves.
  - Production could be risked or un-risked depending on preference.
- **Pricing Forecast**
  - Determine appropriate benchmark pricing and long-term outlook.
  - Apply pricing differentials for transportation and quality.

	Projected	
	12/31/20	12/31/21
Net Oil Production (Mbbl)	394.3	886.9
Reserve Adjustment Factor	*90.0%*	*90.0%*
Risked Oil Production (Mbbl)	354.9	798.2

	Projected	
	12/31/20	12/31/21
Management's Crude Oil Base Pricing	$ 31.66	$ 39.67
Reserve Report Net Crude Oil Pricing	31.24	39.15
Crude Oil Price Differential	(0.42)	(0.53)
Crude Oil Price Differential Percentage	**98.7%**	**98.7%**

Data and related calculations presented for illustrative purposes only.

DCF Method – Operating Expenses

Key Considerations:

- Fixed vs. Variable (May Impact Risking)
  - Royalties
  - Production Taxes
  - Severance Taxes
  - Ad Valorem Taxes
- Real vs. Nominal
  - Escalate Expenses?
- Corporate G&A
- Asset Retirement Obligations ("ARO")

	Allocation %	Projected 12/31/20	Projected 12/31/21
Operating Expenses Analysis			
Projected Total Operating Expenses - Real Basis		$ 4,809.8	$ 11,588.5
Escalation Factor		*1.00*	*1.02*
Projected Total Operating Expenses - Nominal Basis		4,809.8	11,845.8
Variable Operating Expenses	*60.0%*	2,885.9	7,107.5
Reserve Adjustment Factor		90.0%	90.0%
Risked Variable Operating Expenses		**2,597.3**	**6,396.7**
Fixed Operating Expenses	*40.0%*	1,923.9	4,738.3
Reserve Adjustment Factor		100.0%	100.0%
Risked Fixed Operating Expenses		**1,923.9**	**4,738.3**

Data and related calculations presented for illustrative purposes only.

DCF Method – Capital Expenditures

Key Considerations:

- Real vs. Nominal
- Drilling vs. Completion
- Tangible vs. Intangible
- Tax Implications

	Allocation %	Projected 12/31/20	Projected 12/31/21
Capital Expenditures Analysis			
Projected Total Capital Expenditures - Real Basis		$ 39,580.3	$ 48,826.3
Escalation Factor		*1.00*	*1.02*
Projected Total Operating Expenses - Nominal Basis		39,580.3	49,910.3
Drilling Capital Expenditures	*60.0%*	23,748.2	29,946.2
Reserve Adjustment Factor		100.0%	100.0%
Risked Drilling Capital Expenditures		**23,748.2**	**29,946.2**
Completion Capital Expenditures	*40.0%*	15,832.1	19,964.1
Reserve Adjustment Factor		100.0%	100.0%
Risked Completion Capital Expenditures		**15,832.1**	**19,964.1**
Total Risked Capital Expenditures		**39,580.3**	**49,910.3**
Tangible Capital Expenditures	*20.0%*	**7,916.1**	**9,982.1**
Expensed Intangible Drilling Costs	*80.0%*	**31,664.2**	**39,928.2**
Capitalized Intangible Drilling Costs	*0.0%*	**-**	**-**

Data and related calculations presented for illustrative purposes only.

DCF Method – Tax Considerations

- Overall corporate tax rate applied as appropriate from a market perspective.
- Key Considerations:
  - Taxable vs. Non-Taxable
  - Depletion, depreciation, and amortization benefits
    - Allocation between Leasehold and Tangible
    - Units of Production vs. 7-Year MACRS
  - Net Operating Loss Carry-forwards
    - Potential Limitations (IRC Section 382)

Asset-Level vs. Company-Level Valuations

In performing oil and gas valuations, it is important to distinguish between the valuation of the oil and gas assets and the company itself (i.e. equity value or invested capital value).

Asset-Level Considerations

- Oil and gas reserves are depleting assets that have a decline curve for cash flows.
- Preferred methodologies:
  - DCF Method (could require additional corporate costs to be incorporated)
  - Transaction Method (asset transaction)

Entity-Level Considerations

- Companies that operate in the upstream sector can have different strategies that impact valuation methodology. Some companies can continuously replenish reserve assets through acquisitions and/or development. Others may decide to cease operations or exit when the reserves are fully mature.
- Preferred methodologies:
  - Cost Approach – NAV with adjusted value for reserves
  - DCF Method with full cost burden (i.e. all corporate-level costs included)
  - Transaction Method (corporate transaction)
  - Guideline Public Company Method

Specific attributes of the subject assets or entity may lead the analyst to consider different methodologies than those categorized above.

Royalty Interest vs. Working Interest vs. Raw (Unevaluated) Acreage

- Oil and gas interests can generally be separated between three types: royalty interests, working interests, or raw acreage.
- Each type has unique economic attributes that dictate the appropriate valuation methodology to utilize.
- *Royalty interests* represent the right to receive a portion of production. These interests are passive in nature and typically does not require an owner to pay any operating costs. This type of interest is generally valued using an income approach. Publicly traded royalty trusts could also be used as guidelines.
- *Working interests* represent an ownership of rights to explore, drill and produce oil and gas from a property. An owner is generally obligated to pay a percentage of the costs to lease, drill, produce, and operate a well. The DCF Method is our preferred method to value such interests. A market approach would also be acceptable in certain situations.
- *Raw (unevaluated) acreage* represents mineral interest rights in property that is undeveloped. Such interests are generally valued using a multiple of net acreage if not reserve data is available.

Current Issues in Oil and Gas Valuations

Value Driver: Commodity Pricing

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Oil and Gas Forward Pricing

- Key issues include:
  - Futures strip pricing (e.g. NYMEX or ICE) vs. Analyst Estimates
  - NGL Pricing
  - Commodity price simulations

Strip Pricing vs. Analyst Estimates

- As shown below, futures contracts are not liquid beyond a few years. As a result, a determination must be made as to how to forecast pricing beyond that period.
- Options include:
  - Escalate strip pricing beyond the period that the futures contracts lose liquidity.
  - Consider third-party forward estimates for commodity pricing (e.g. investment banks, industry analysts, engineering firm estimates).
  - Develop proprietary price forecast (e.g. simulation, client data, etc.).

NYMEX Natural Gas Strip Pricing		
Year	Price (per MMBtu)	30-Day Volumes
2020	2.17	10,463.0
2021	2.59	1,762.1
2022	2.45	62.5
2023	2.43	5.3
2024	2.43	1.2
2025	2.45	0.0
2026	2.48	0.0
2027	2.52	0.0

NYMEX Crude Oil Strip Pricing		
Year	Price (per Bbl)	30-Day Volumes
2020	31.66	38,317.9
2021	36.16	2,869.4
2022	38.30	379.8
2023	40.29	78.5
2024	42.31	11.1
2025	44.31	3.4
2026	46.30	3.2
2027	48.48	1.1

Source: *S&P Capital IQ, April 9, 2020.*

NGL Pricing

- The common method to price natural gas liquids is calculating the NGL price as a percentage of crude oil prices.
- However, due to a depressed market for NGLs, the NGL price has been at historical lows relative to crude oil prices. In such a situation, a determination must be made whether to stick with applying the price ratio provided by Management, or ratchet up the pricing to be on a normalized level in the long run.
- Options include:
  - Stick with management forecasts, even if low pricing in the long-term.
  - Consider third-party forward estimates for commodity pricing (e.g. investment banks, industry analysts, engineering firm estimates).

Commodity Price Simulations

- As we see more contingent consideration included in deals that are dependent on market factors, including commodity pricing, we are going to be performing more simulations of forward pricing for oil and gas.
- There is debate in the valuation world on whether commodity pricing should be simulated using a Geometric-Brown Motion or a Mean-Reversion. These options would drive significantly different results for forward pricing.

Current Issues in Oil and Gas Valuations

Value Driver: Discount Rates

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Discount Rates for Oil and Gas

- Key issues include:
  - Discounts for Royalty Interests vs. Working Interests
  - CAPM vs. BUM for Cost of Equity
  - Size Premium vs. Alpha (Asset-Specific Risk)
  - Discount for lack of control

Royalty Interests vs. Working Interests

- As discussed earlier in this presentation, royalty interests and working interests have different attributes that affect its risk profile.
- Because royalty interests represent a percentage of production, or related proceeds, in oil and gas reserves without the burden of having to develop or operate the assets, the discount rate may be lower than a working interest in the same reserves.
- There are publicly-traded royalty trusts that could be relied upon in developing a discount rate for a royalty interest in a CAPM. It is key to distinguish oil and gas companies by the type of interests they hold.

CAPM vs. BUM

- Our preference is to rely on the CAPM to derive a cost of equity for oil and gas assets. However, we have observed fellow practitioners use the BUM to develop a discount rate.
- The BUM relies on industry risk premium data that encompasses companies that have working interests and royalty interests. The data relied upon in deriving the industry risk premium could also be dated, which could distort the cost of equity depending on the valuation date due to the industry being highly volatile.
- The CAPM allows you to more account for risks related to:
  - Oil and gas interest type
  - Region(s) of operation
  - Asset mix
  - Other market factors

Size Premium vs. Alpha (Asset-Specific Risk)

- There is debate in the valuation community on whether a size premium or alpha should be included in developing a discount rate.
- Size Premium
  - Argument for: The larger the asset being valued, the lower the risk profile.
  - Argument against: It is a tangible asset where the risk is not influenced by size. You wouldn't apply a size premium for a piece of machinery so why would you do it for oil and gas reserves?
- Alpha
  - Argument for: There could be risk factors unique to oil and gas reserves not inherent in the market/empirical data relied upon to derive a discount such as old reserve data, lack of operator experience, etc.
  - Argument against: All risks related to oil and gas reserves should be accounted for in the market data and related forecast.
- Some practitioners will be willing to apply both. Some will apply neither. And some will apply one but not the other.

Discount for Lack of Control

- There is debate on whether or not a discount for lack of control ("DLOC") is applicable when valuing an oil and gas company.
- DLOC
  - Argument for: Target premiums are observed in the acquisition of oil and gas companies, which implies a discount for lack of control. Furthermore, oil and gas assets are considered real property for tax purposes and it is agreed that real estate can have a DLOC.
  - Argument against: When valuing oil and gas holding companies, one must determine what the control elements related to the assets are. If the holder is non-op, there's really not a control element beyond whether to hold or divest the asset. As a result, a DLOC is minimal to none.
- We believe the consideration of a DLOC is based on circumstances and the type of reserve assets the company holds.

Discussion Topic: What kind of discount rates do you believe are appropriate in today's environment and what kind of adjustments do you make?

Current Issues in Oil and Gas Valuations

Value Driver: Reserve Risking

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Reserve Risking

- Reserve Adjustment Factor versus stratified discount rates:
  - Reserve adjustment factor (“RAF”) are a “haircut” to reserve forecasts.
  - Varying the discount rate based on reserve category.
- RAF applied to specific line items versus cash flow:
  - RAF applied to production and variable costs.
  - RAF applied to cash flow or indicated value.
- We’ve seen valuation practitioners use all of the methods above.

Reserve Adjustment Factors

- A key consideration in valuing Upstream oil & gas companies is understanding the inherent risk by reserve categories and appropriately adjusting for these risks in the DCF Method.
- The following table illustrates an example of supporting reserve risk adjustment measures:

Source:	PDP	PDNP	PUD	Probable	Possible	Contingent Resources	Prospective Resources
Survey*	100%	85%	60%	40%	20%	10%	5%
SEC (1P)	90% or Greater in Aggregate			n/a	n/a	n/a	n/a
SEC (2P)	50% or Greater in Aggregate				n/a	n/a	n/a
SEC (3P)	10% or Greater in Aggregate					n/a	n/a
Market Guidance	?	?	?	?	?	?	?

**Various surveys are available that provide insight into how different market participants view reserve risk factors. This example is solely for illustrative purposes and does not tie to any specific survey results.*

Reserve Adjustment Factor Issues

- We’ve seen RAFs applied to:
  - Sum of free cash flows
  - Production and expenses
  - Production and variable expenses (fixed costs and capex are un-risked)

- However, we have noticed a variety of adjustments applied to other categories. Specifically, we’ve seen more practitioners apply high RAFs to unproven reserves and resources with the argument that such reserves are technically PUD reserves.

Discussion Topic: Have you observed risking adjustments change in today's environment or have they been consistent with past risking?

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Q&A

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