Equity Analysis for

Chesapeake Energy (CHK)

Published by **Jonathan W. Jones** on **February 15, 2020**

Company Overview

Chesapeake Energy is an “upstream” Oil & Gas company, based out of Oklahoma. They specialize in the exploration and production of Oil, Natural Gas, and Natural Gas Liquids (NGL).

The company is currently in a transitional phase from focusing on Natural Gas, to focusing on Oil. Nevertheless, Oil accounted for 25% of CHK’s total barrels produced in Q2 2019 but is expected to grow in the future.

In contrast, the production of Natural Gas and Natural Gas liquids respectively accounted for 68% and 7% of the barrels sold in the same quarter. All other revenue for Chesapeake was derived from the “Marketing, Gathering, and Compression” segment.

Operations

Exploration and Production

As the name implies, this segment consists of Chesapeake’s activities regarding exploring for, and obtaining, Oil, Natural Gas, and Natural Gas Liquids (NGL).

The actual revenues that are derived from this segment, come from selling these fossil fuels into the open market. Some of the major buyers of Chesapeake’s energy, include Valero Energy, Royal Dutch Shell, and BP. Furthermore, any hedging activities that come out to be net positive, are also included under the revenues for this segment.

Nonetheless, quite a bit of investment goes into the exploration for these fossil fuels. Some of the main expenditures for this segment include the cost of extraction, gathering, processing, and transportation expenses. Lastly, there are many state and local tax implications for onshore, domestic well drillers, such as Chesapeake.

Another important part of this segment, are Chesapeake’s reserve amounts for each fuel. After the initial costs of drilling and setting up all necessary infrastructures, Chesapeake can begin to tap into the total reserves for that particular area. As previously mentioned, Chesapeake is several years into their transition from focusing on Natural Gas to focusing on Oil. With that being said, the vast amount of CHK’s reserve amounts are still in Natural Gas. Specifically, the Marcellus Shale region holds 48% of these reserves.

Marketing, Gathering, and Compression

Unlike Exploration and Production, CHK’s Marketing segment doesn’t include any physical extraction of fossil fuels.

Instead, this segment primarily focuses on the broad category of marketing services. These services include anything from commodity price structuring to the contracted administration services for Chesapeake, and other companies that hold a stake in Chesapeake wells. Other

relevant services include negotiations for gathering, hauling, transportation services, and value-enhancement techniques.

Last year, this segment produced just under $5.08 billion in revenue for Chesapeake. However, marketing expenses were $5.16 billion and General Administrative costs were another $280 million.

Chesapeake loses money in this segment because, although considered to be revenue, Chesapeake is essentially paying their own subsidiary company for all of those services listed above.

Industry

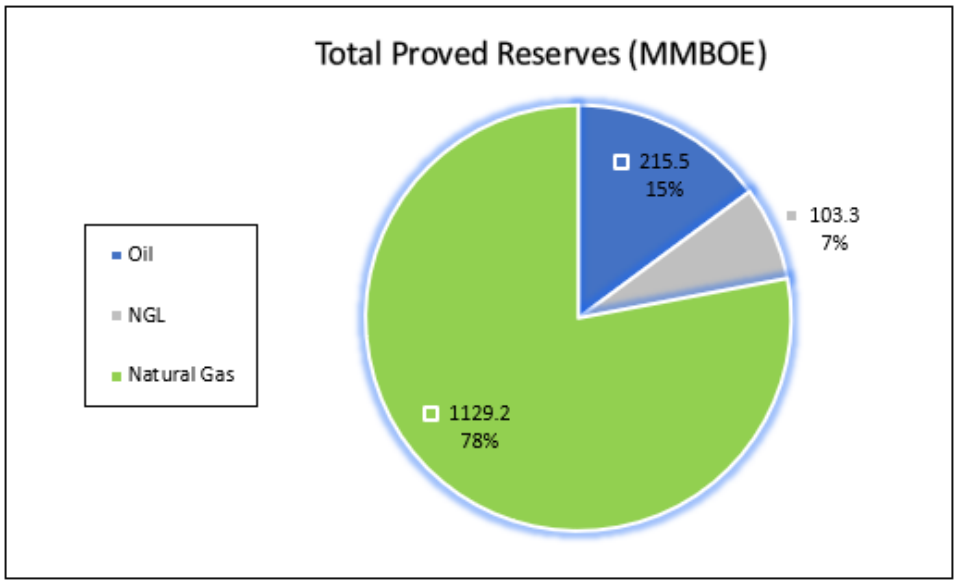
Proved Reserves

Proved reserves are used to give investors an idea on the amount of resources that can be recovered from a company's deposits; within a reasonable level of certainty.

Similarly, monetary values for proved reserves are based on a set price via the company. Chesapeake's reserve values for instance, are set at $65.56 for oil, and $3.10 for Natural Gas. Proved reserves revenue amounts, listed on the balance sheet, are what's left over after the industry-standard 10% discount rate (PV-10 method).

On a side note, it's important to know that "Proved Reserves" are based on properties that have already been drilled. If the properties weren't drilled, the proved fuels would be considered Proved Undeveloped Reserves (PUDs). Regardless, both types are combined on the balance sheet to get the "Total Proved" value estimate.

As of the end of 2018, Chesapeake's Total Proved reserves:



1. MMBOE: Barrel of Oil Equivalent (in millions)
2. Marcellus, Haynesville and Eagle Ford regions, accounted for approximately 40%, 27%, and 22% of Natural Gas reserves, respectively.

Enhanced Cash Flows/Cyclicality

Any movements in either Crude Oil or Natural Gas will have a huge impact on both energy company stock prices as well as their fundamentals.

This is an industry-wide problem for the energy sector. Yet, it's a problem that no one in the sector can control. Thus, it makes it nearly impossible for a company to accurately forecast several years ahead.

When the market for fossil fuels inevitably turns down, these companies are still left with substantial lease and debt obligations. Nonetheless, if an Oil and Gas company is going to survive, they need to properly position themselves for downturns in the market.

This is where the need for enhanced capital and sustainable cash flows comes into play. Furthermore, many companies keep a strong balance sheet even while commodity markets are hot. These factors allow an energy company to pay off debts, pay employees, etc., even while struggling for top-line revenue.

Energy companies often have revolving funds available to them for quick borrowing during a downturn.

Margins/CapEx

The last two important factors in Chesapeake's industry, are margins and capital expenditures.

Chesapeake has gross margins ranging from 55-57%. Industry averages for gross margins typically fall in the same range, with 58% being the average.

Chesapeake's operating margins, are also mostly in-line with the industrial average. Their operating margins were 11.2% and 14.4% in 2018 and 2017 respectively, versus the industry-average 15.21%. The slight difference in margins was mainly caused by the restructuring they've been doing.

What's more, being in the commodities industry, Chesapeake tends to incur a lot of write downs in asset values. Again, this is an industry wide problem and influences all exploration and production companies.

Much like how margins in the Oil and Gas industry shift every few years, so do capital expenditures.

A prime example of this, was in the Marcellus shale boom that began in late 2008. In 2012 total costs and capital expenditures relating to their Oil and Gas segment, nearly topped $14 billion.

To put that into perspective, after the price of Natural Gas had been cut in half from 2014 to 2016, related expenditures to their Oil and Gas segment fell to just $4.6B. This example perfectly highlights the boom and bust cycles of the industry, as well as their related costs.

Geography

Chesapeake's reserves can be broken down into 6 main geographical locations:

- Marcellus Shale – Northeastern Pennsylvania
- Haynesville Shale – N
- Eagle Ford Shale – South Texas
- Brazos Valley – Southeast Texas
- Powder River Basin – Wyoming
- Mid-Continent – Anadarko Basin – Northwestern Oklahoma

The majority of their Natural Gas reserves are in the Marcellus and Haynesville regions. In the first 6 months of 2019, these regions accounted for 84% of Natural Gas revenues (before hedging).

Subsequently, Oil revenues from Q2 2019 can be broken down below:

Revenues by Region (Q2 2019)

Region	Oil Revenue	%	Natural Gas	NGL	Total Region Rev.	% Total
Marcellus	$ -	-	$ 198	$ -	$ **198**	17%
Haynesville	$ -	-	$ 164	$ -	$ **164**	14%
Eagle Ford	$ 349	50%	$ 37	$ 20	$ **406**	34%
Brazos Valley	$ 199	28%	$ 9	$ 5	$ **213**	18%
Powder River Basin	$ 102	15%	$ 18	$ 8	$ **128**	11%
Mid-Continent	$ 50	7%	$ 10	$ 10	$ **70**	6%
Revenues (before derivatives)	$ **700**		$ **436**	$ **43**	$ **1,179**	

1. Numbers are in millions

Short Term Outlook

Chesapeake's balance sheet has been the primary concern for investors. In fact, the company has already started bankruptcy filings

1. CHK: Green; S&P: Blue; XOP (Oil&Gas Exp. & Prod. ETF): Brown
2. via Investing.com

This chart began in mid-2010. At that time, the stock was already about a third of the price it was during its 2008 highs. Incredibly CHK stock has fallen from its highs of over $62 in 2008, to lows of under $2 today.

Debt

Out of simplicity, we'll start off with Chesapeake's debt load.

Earlier, we briefly discussed the Marcellus Shale boom that led Chesapeake into the debt situation they're in today. Now we'll go more into depth about why, and how this happened.

Although it was known for some time that the Marcellus Shale region in Northeastern Pennsylvania held reserves of Natural Gas, the extend of the reserves were not known. However, when geological surveys started to uncover vast amounts of Natural Gas in the late 2000s, companies started flocking into the region. Additionally, more efficient drilling and new technologies played a large role in this shift. By 2012, Marcellus Shale was found contain the largest amount of recoverable Natural Gas in the United States.

Consequently, several companies were trying to gain hold of the region. Chesapeake's main competitors at the time were Cabot Oil & Gas, Chief Oil & Gas, and East Resources. In order to compete, Chesapeake had to put up large amounts of capital. This capital funded expenditures such as:

- Leases to Mineral Rights
- Drilling and completion costs
    - Sand & water involved in the Hydraulic Fracturing process
    - Construction of well pads
- Additional machinery and vehicles
- Transportation of the gas
- Employee salaries, benefits, housing, etc.

Chesapeake spent many billions of Dollars securing the region for future growth. Even though this future growth has yet to pay off, Chesapeake is still left with the massive debt load from that time.

At its height, the peak long-term debt level had reached nearly $13 billion. Fortunately, Chesapeake's debt has started to look much better as of recent.

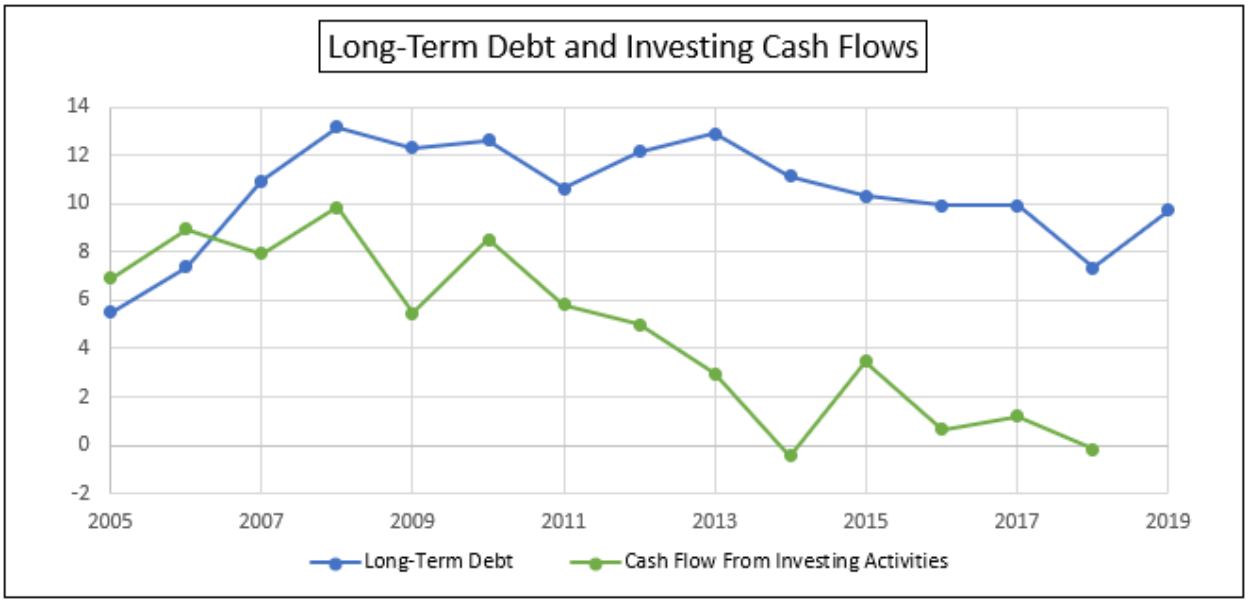
Primarily through the use of asset sales, Chesapeake dwindled their debt down to $7.3 billion at a fixed rate of 6.79%, and $800 million in variable debt, averaging a rate of 4.74% by the end of 2018. However, the assets/liabilities from their recent acquisition of Brazos Valley came online in 2019. As a result, Chesapeake is back up to $9.7 billion in long-term debt.

Furthermore, Chesapeake's high borrowing rates over the past decade can be attributed to their junk bond ratings of CCC+ from S&P and Caa2 from Moodys. These ratings have been active for quite some time, and even after debt restructuring in 2015 the company still faces junk bond status.

Nevertheless, analysts have predicted several times through 2015-2017 that Chesapeake would file for Bankruptcy. Yet, with a massive $1.8 billion pay down of their debt in 2018, it appears that these fears have been subdued for the time being. Chesapeake's focus on cash flows and other asset sales has also helped.

It's also important to note that in the next 3 years CHK only has $1.93 billion in payments due. The rest of their debt is due in 2023 or beyond. Therefore, they now have some time on their hands to focus on operations, rather than on debt restructuring.

Pictured below, is a chart demonstrating Chesapeake's decrease in leverage.



1. Numbers are in billions of $
2. Cash Flows from Investing Activities below 0 indicate a net positive cash flow

As you can see above, Chesapeake's long-term debt has slowly started to shrink. This strengthening of the balance sheet has been the product of less capital spending as well as a string of asset sales; both showcased by the drastic shift in Investing Cash Flows.

Asset Sales

Strategic selling of assets has, for several years, been the go-to method of paying off long term debt at Chesapeake. Although good in some ways, shareholders never want to see a company's overall size shrinking. Regardless, this section covers a few of the major asset sales that Chesapeake has done since 2013.

Pipeline Assets

The first major asset sale Chesapeake did, was the sale of its pipeline and other related assets to Global Infrastructure Partners for just over $4 billion. This transaction occurring during 2012, at the height of the Aubrey McClendon scandals.

Chesapeake's pipeline assets were a long term investment that offered a cheaper, and a more reliable, means of transportation for their fuels. It goes without saying, that this sale was done out of necessity, rather than choice. Furthermore, it doesn't come as a surprise that slowly one of the long term goals of Chesapeake management is to slowly build up their pipeline assets again.

In substitution for owning their own pipelines, Chesapeake had to go out and pay companies like Williams to use their pipelines instead. Also, when pipelines either aren't an option, or when they're just too expensive, Chesapeake hires local trucking companies to move the fuels to different locations. Either way, owning their own pipelines again are a must for Chesapeake.

2013

This was a busy year of asset sales for Chesapeake; and it had to be. In 2013 they had just reached their peak debt levels, and needed to sell billions of Dollars in assets in order to stay afloat.

Chesapeake's first major sale of 2013 came from what was their Mississippi Lime region. Fossil fuel giant, Sinopec, purchased around half of CHK's 850,000 leasing acres for $1 billion. The sale came as a disappointment to shareholders at the time, who were led to believe the property was worth much more. In fact, the $2,400 per acre Chesapeake received was less than a third of what the company said the land was worth in a presentation the year prior.

The lack-luster sale of Mississippi Lime assets would not be enough for Chesapeake to maintain operations. Their target asset sales were $2.5 billion in 2013, leaving quite a shortfall of funds. To compensate, Chesapeake decided to sell 55,000 net acres in the Northern Eagle Ford Shale and 9,600 net acres in the Haynesville Shale regions. These transactions combined to raise $1 billion in funding.

2014

Although Chesapeake originally wanted to avoid selling Marcellus Shale assets, they were in a tough position.

In December 2014, Chesapeake was forced to sell a large portions of their oil and gas assets in the Marcellus and Utica Shale formations to Southwestern Energy. The net transaction proceeds of $4.975 billion included approximately 413,000 net acres in northern West Virginia and southern Pennsylvania. At the time, there were around 1500 wells in the area, producing nearly 57,000 Barrel of Oil Equivalents every day.

2016/2017

In 2016 and 2017, Chesapeake continued the selling of their Haynesville and Utica Shale assets.

Chesapeake divested their Utica Shale region by approximately $1.25 billion in 2016, and $1.41 billion in 2017. Divestitures mainly consisted of non-core assets, and proceeds from these transactions were used to repay debt

Additionally, 2017 saw the sale of 119,500 net acres in the Haynesville Shale region. The sale equated to $915 million in gross proceeds, but took 576 wells offline, thus reducing Natural Gas production by approximately 3% for the year (2% of total fuel production).

Lastly, Chesapeake received proceeds of approximately $350 million, net of post-closing adjustments, for the sale of other oil and natural gas properties covering various operating areas. The majority of these sales were smaller Natural Gas assets.

2018

Finally, 2018 marked the year that Chesapeake concluded their asset sales; at least for the time being.

All said, during 2018 Chesapeake divested $2.23 billion of proved and unproved properties.

The vast majority of these divestitures came on July 26, 2018, when CHK entered into an agreement to sell its remaining assets in the Utica Shale operating area. Proceeds from the sale totaled $1.87 billion, however a rule enforced by the SEC made Chesapeake recognize a $578 million loss under the Income Statement.

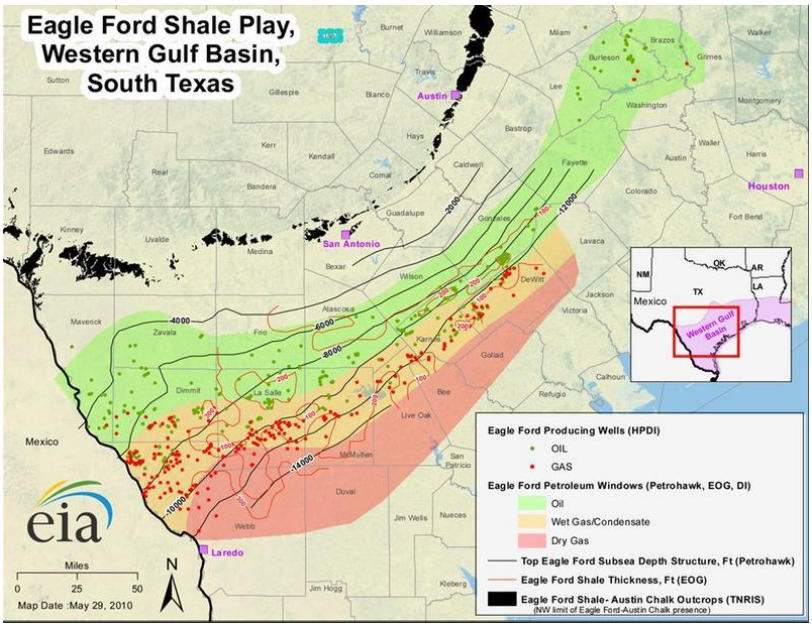
Through the sale, Chesapeake gave up a massive 559 mmboe in proved, Natural Gas, reserves. Yet, at the same time CHK recorded extensions and discoveries of 270 mmboe, primarily related to undeveloped well additions located in Marcellus and Powder River Basin operating areas.

Nevertheless, the other major sale in 2018 was when Chesapeake sold large portions of their acreage and other producing properties in the Mid-Continent. Specifically, the sale included the rest of their Mississippi Lime assets, raising around $491 million before closing adjustments.

Included in the sale was around 238,500 net acres, and interests in approximately 3,200 wells.

Although Chesapeake gave up a lot in 2018, they did so with a purpose. Not only were they focused on repaying debt, but they were also focused on their future purchase of Brazos Valley.

Brazos Valley



Source: Energy Information Administration

In February of 2019, Chesapeake purchased 420,000 acres that was originally owned by WildHorse Resource Development Corporation. These 420,000 acres were located in the heart of the Eagle Ford shale, and Austin Chalk formations in Texas.

In total, WildHorse cost Chesapeake nearly $4 billion though their combined cash-and-stock deal. When all was said and done, outstanding shares for Chesapeake stock doubled, Chesapeake had to borrow $381 million in cash from their own revolving credit facility, and Chesapeake also had to assume $1.4 billion in debt.

Needless to say, this was a “lose-lose” situation for current CHK shareholders. Chesapeake’s stock, which had already been beaten down from balance sheet reductions and low fossil fuel prices, fell more than 12% on the news.

However, the deal wasn’t all bad; at least in the long term. In fact, CEO Robert Lawler said the acquisition would allow Chesapeake to generate free cash flow “much sooner” than without the deal. Nonetheless, Brazos Valley will be a huge part of Chesapeake’s plan to generate free cash flows that are equal to costs by 2020.

In addition to playing a pivotal role in Chesapeake’s plan to generate enhanced cash flows, Brazos Valley will also be a vital part of the company’s shift from Natural Gas to Oil.

Transition from Natural Gas to Oil

As we mentioned before, Chesapeake is currently in a long-term transition plan that involves shifting focus from Natural Gas to Oil. During an investor call in Q2, management even went as

far to state that all new capital expenditures in 2019 would be focused around Oil; mainly in their Brazos Valley operating area.

Nevertheless, Oil accounted for 25% of CHK's total barrels produced in Q2 2019, but is expected to grow in the future. Furthermore, when you look at the Oil and Gas revenues, Oil actually accounted for almost 46% of sales (after net derivative contracts). Before derivative contracts, Oil was over 50% of Oil and Gas revenues.

To put the transition into perspective, Chesapeake was formerly the nation's second largest Natural Gas producer. However, asset sales and a lack of capital put towards Natural Gas have slowed their production rates.

While rivals have been making acquisitions and expanding their drilling efforts, Chesapeake has fallen by the way-side. Chesapeake is now the sixth largest Natural Gas producer in the US; still a large producer, but definitely not to the scale they were several years ago.

Even though the long-term aspirations of Oil look brighter for Chesapeake, they've had to do quite a bit of restructuring. As a result, earnings have suffered and share prices have been pushed down. Anytime a company shifts their core business, profits are harder to come by for several years.

Nonetheless, CHK's shift in business strategy has not fully been welcomed by shareholders. However, Chesapeake's largest concern during that last few years hasn't been their shift from Natural Gas to Oil, but it has been the low prices of these underlying commodities.

Oil and Gas Prices

Clearly debt problems, fears of Bankruptcy, and asset sales haven't been a bullish factor for CHK shares in the past few years. With that being said, a strong recovery in the underlying commodity markets of Crude Oil and Natural Gas would essentially make these problems disappear for the time being.

Crude Oil and Natural Gas prices are the key determinant to Chesapeake's performance. Therefore, the poor performance in both of these markets during the past several years, and really for the past decade, have kept CHK shares depressed.

1. Oil Futures: Black; Gas Futures: Green; XOP (Oil & Gas Exp. & Prod. ETF): Blue
2. via Investing.com

As you can see prices for both commodities have been down for quite some time. Natural Gas prices are actually lower than they were in 2000, and the XOP Oil & Gas ETF has lost value since its inception. There are countless factors influencing why these prices are lower. Without going into depth, here are a few of the major influences over the last decade, according to World Bank:

"The recent plunge in oil prices has been driven by a number of factors: several years of upward surprises in the production of unconventional oil; weakening global demand; a significant shift in OPEC policy; unwinding of some geopolitical risks; and an appreciation of the U.S. dollar."

You can read the rest of the detailed article here

To counter lower fossil fuel prices, Chesapeake has done several things. Primarily though, they have decreased the break-even price for which they produce Oil. At one of their more efficient locations, Brazos Valley, as long as Oil prices are above $39 a barrel, Chesapeake is making money.

Ultimately, Chesapeake's share price is heavily based on the short and long-term shifts in Oil and Gas prices.

Long Term Outlook

Although we cannot predict where commodity markets will stand in the future, we can outline the direction Chesapeake plans to take. What's more, we can analyze how the company may utilize their assets, and any sort of problems they may face.

Oil

As stated before, Oil has been a second-tier focus for CHK for a long while. Nevertheless, the company was willing to take the risk of slightly adjusting their business platform, in order to see potential gains in the future.

These gains will come in the form of enhanced cash flows, which will come from increased margins as well as their Oil assets.

Notably, Chesapeake's largest push into Oil has been Brazos Valley. If a company has desires to get into the Oil industry, Brazos Valley is the place to do it.

This is because, the Austin Chalk, which lies atop the Eagle Ford (Brazos Valley), is undergoing a renaissance. Oil producers have begun to deploy technology that was developed in the shale boom, thus boosting their Oil outputs.

This is especially a great opportunity for Chesapeake, namely because they were one of the key drivers during the shale boom. In fact, much of the technology found, was developed through Chesapeake's capital expenditures.

However, output isn't the only area where CHK will see gains in the future. Management has also been excited about the integration they will be able to create throughout their assets.

Soon, Chesapeake will be launching a process for a new oil pipeline gathering agreement in the Brazos Valley operating area. Signing a pipeline gathering agreement with a midstream partner, essentially will streamline how Chesapeake moves their product. Furthermore, it will greatly reduce their current reliance on trucking oil volumes, thereby improving cost structure in the region.

Additionally, Chesapeake management has voiced plans to transport Brazos Valley oil into the Gulf coast market. This move would allow them to benefit from improved pricing, versus West Texas Intermediate (WTI) they are subjected to now.

Finally, in the Powder River Basin Chesapeake has been connecting new wells to their oil gathering system every week. The more wells that are hooked up to the oil gathering system, the lower gathering expenses they will see per well.

Under current production levels, these integration factors throughout the Brazos Valley and Powder River Basin operating areas will net Chesapeake $200-280 million in operating savings, every year.

Lastly, it's imperative that Chesapeake keeps capital expenditures driving production. If Chesapeake maintains the expected production levels that they will reach by the end of this year, Oil reserves will run out in approximately 3.2 years. This production rate is at 185,000 barrels per day, with wells operating 364.5 days a year.

Capital expenditures allow exploration and production companies to either get more reserves out of an operating location, or to just buy new operating areas. Either way, capital expenditures are the driving force to continued performance in Oil and Natural Gas companies.

Natural Gas

Even though it seems as if Natural Gas has been forgotten about by Chesapeake, it will still be a vital part of their revenues for years to come.

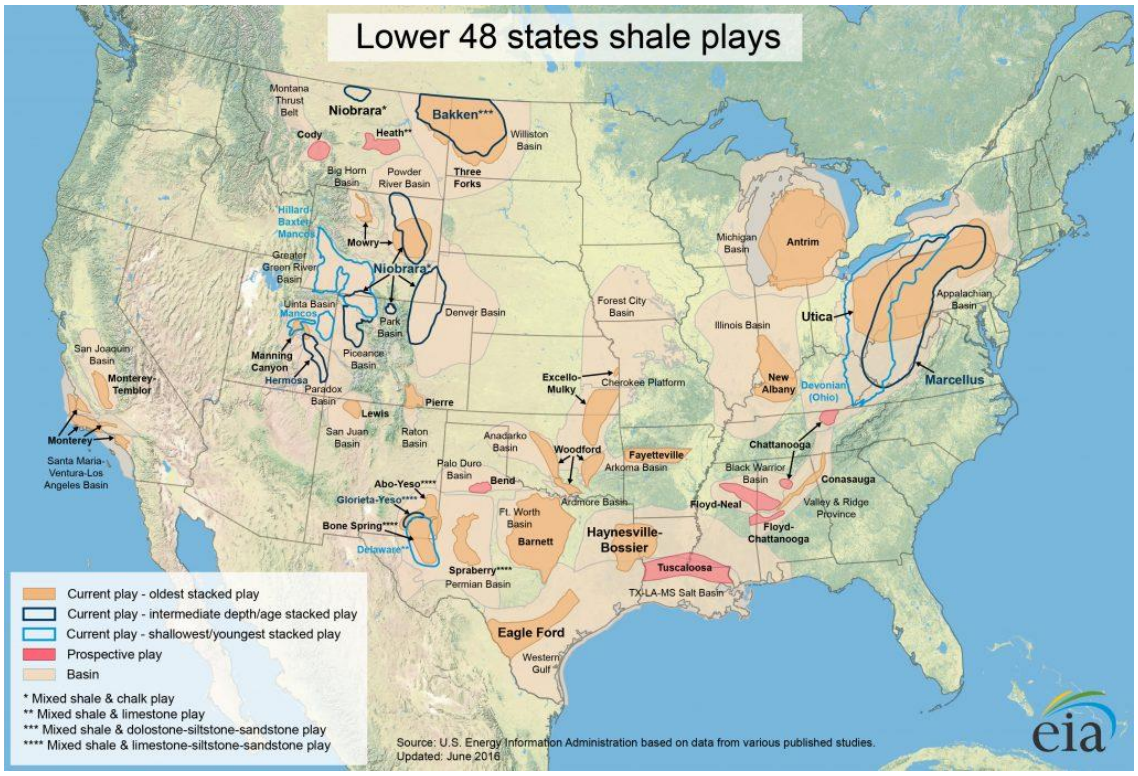
Primarily, the company is excited about the excess reserves that they have in the Marcellus and Haynesville operating areas. Large quantities of both proved and unproved reserves are at readily available in these regions. Ergo, if the price of Natural Gas turns bullish again, Chesapeake already has the assets in place to take advantage of the situation. In any event, they can drill more wells, hook them up to local pipelines, and receive their high margins.

There are also some specific geographical advantages of the Marcellus region. Located in Northeastern Pennsylvania, many of the wells that have been drilled are just a few hours from places such as Philadelphia, New Jersey, and New York City.

With that being said, New York State's Governor, Cuomo, has banned drilling and pipeline services in the state. Not only does this serve as a major barrier to the NYC metro, but the ban also serves as a barrier to all of the New England States. Rather than tapping into the local reserves of the Marcellus Shale, most of the cities in this area must transport natural gas from Russia in order to sustain power.

Nevertheless, the long-term location of the Macellus region is prime. Although policy change cannot be predicted, it is possible that the anti-drilling sanctions will end for New York State.

Either way, the prime location of these wells make transporting the Natural Gas much cheaper, and more efficient than through other places in the Country.



Source: US Energy Information Administration

Additionally, these cities are some of the largest commercial hubs in the world, which brings us to our next point.

The main use of Natural Gas in today's economy is for commercial real estate and to create electricity. Office buildings, apartment complexes, and factories are very commonly powered by Natural Gas.

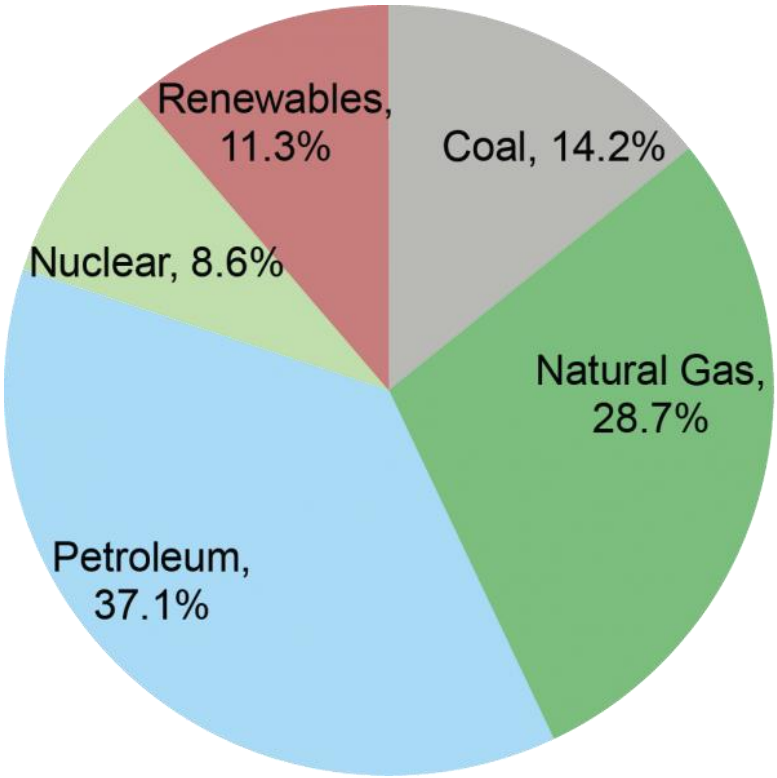
Natural Gas is reliant on these property types, and energy providers, to keep demand up. If a trend begins to develop in either of these industries, Natural Gas prices are likely to follow said trend.

The largest threat to Natural Gas is, of course, renewable energies.

Fossil Fuels

Some of the most important questions for the future, revolve around Fossil Fuel usage. With that being said, we cannot try to accurately predict what will happen with Fossil Fuels. There are too many Geopolitical factors involved to make such an assumption. However, there are three things that we can point out that are entirely factual.

The first fact we know is that Fossil Fuels, mainly Petroleum and Natural Gas, make up the vast majority of energy use today. Showcased below, the demand for Oil and Natural Gas won't go away for some time.



Source: University of Michigan's School for Environment and Sustainability

Because they're so vastly used today, a rapid shift in usage is not likely to happen.

Secondly, we can factually point out that Per Capita energy in the US will decline in the future; as it has been for quite some time. It's impossible to argue that our technologies have become more efficient, and thus have been using less and less energy.

Lastly, the usage of Renewable Energies has been up-ticking for quite some time. Unless emissions regulations begin to revert, and/or governments become less concerned about the environment, this trend will likely continue.

The chart below does a great job at showcasing this growth in Renewable Energies as well as Per Capita energy consumption in the US.

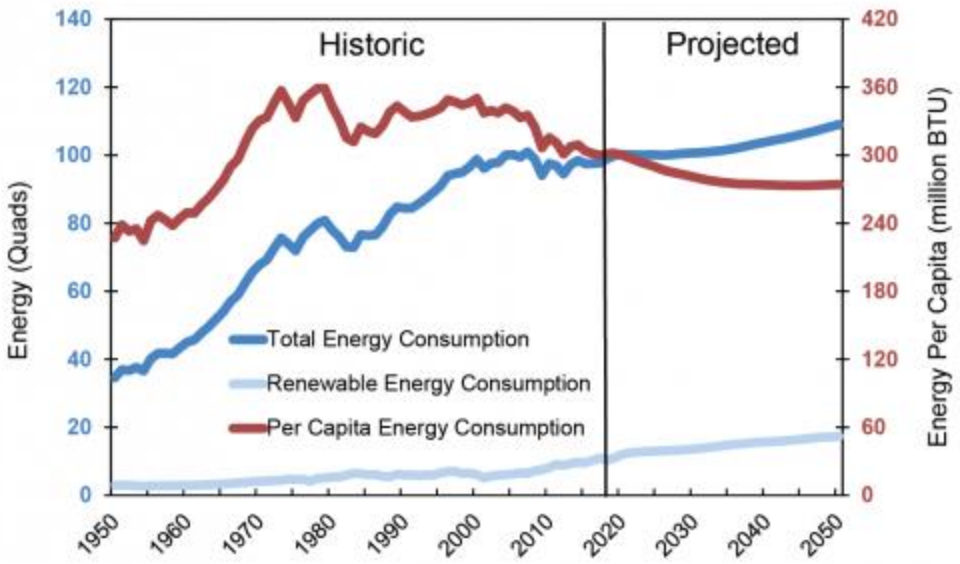


Chart was sourced from the University of Michigan's School for Environment and Sustainability

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Risk Factors

Oil/Natural Gas Prices

The most obvious risk factor for Chesapeake, is their reliance on the unpredictable commodities markets of Oil and Natural Gas.

Revenues can swing billions of dollars from year to year, yet costs remain relatively the same. Thus, the bottom line is extremely unstable at times.

However, it isn't just lower revenues that CHK shareholders have to worry about. In fact, some of the most damaging effects of lower Oil and Natural Gas prices come in a different form.

Impairments

One of the interesting characteristics of commodity companies, are the massive write downs they incur during bad economic times.

Write downs happen when commodity prices fall, bringing profit margins down with them. In bad times this margin falls enough to where it gets to the point where the company wouldn't even be profitable anymore at that particular price.

Take Chesapeake's Brazos Valley for instance. The break even point at this operating area is $39.45. Thus, if average Oil price sales were to fall below this number, an impairment would have to occur. This is because the property would be deemed as "not profitable" to gather from; at least at that time.

Not surprisingly, some of Chesapeake's largest impairments have occurred in the 2000's, when prices have been most volatile. For instance, when Oil prices plummeted in 2014, Chesapeake was forced to write down $18.2 billion of their Property/Plant/Equipment on their Balance Sheet. In 2015, Oil prices continued to drop, and another write down of over $4 billion was incurred.

Nevertheless, part of the reason that energy and commodity companies get hit so hard during sell-offs, is because the bad seems to just get worse. Conversely, during recoveries stocks generally soar back up to all-time highs again. A big influence in these stock swings are impairments.

Land Leases

Another aspect of energy companies often overlooked are their land leases.

Most of Chesapeake's leases have a three to five-year primary term. In most cases, this is more than enough time for Chesapeake to establish themselves on the property. On the contrary, sometimes they are unable to begin reduction before the lease ends.

Unless a well is drilled, and production of either Oil or Natural Gas has begun on the land, than they will have to either resign the lease, or let it go. If the leases on these undeveloped properties expire and Chesapeake is unable to renew them, they will lose the right to develop the related properties.

Although this very rarely happens, if Chesapeake got to a point where they couldn't afford to put capital into an unproved reserve area, they might lose access.

Government/Geopolitical

In the Exploration and Production industry, a very real risk factor includes approvals of permits to drill, increased taxes, and environmental regulations.

It's no secret that the Oil and Natural Gas industry is so construction heavy that it can destroy the areas they operate in. Furthermore, the environmental effects of hydraulic fracturing can include the harming of local ecosystems, underground water contamination, and spills from waste water storage areas.

To combat these numerous concerns, local and state governments can do several things.

First, governments can regulate the influence of companies like Chesapeake by making them purchase permits. Similarly, they can limit the amount of these permits that they give out to companies in the area.

Of course, it's also important to note that a state or a local government can ban drilling entirely. Usually this won't happen because of the economic gain the area ends up receiving. However, New York State is one example of a government who has banned Hydraulic Fracturing all together.

Secondly, state governments tend to impose additional taxes on Oil and Natural Gas companies. Through these taxes, local governments expect to recover their money spent on expenditures related to the influx of people and equipment to the area. One example of these types of expenditures could be the money spent on repairing roads that were damaged by the Oil and Gas company.

This brings us to our third point; sometimes Oil and Natural Gas companies like Chesapeake are hit with fees and/or reparations for their drilling habits. Even though the state and local governments collect taxes for things like road repair, occasionally roads are so badly damaged that they force companies to shell out the capital to fix them entirely.

In addition to road repairs, Oil and Natural Gas companies are responsible for any environmental problems that occur during exploration and production. Sources of environmental problems can range widely, but in the past the largest concern has been the contamination of ground water.

Debt

The last notable concern specific to Chesapeake, is the level of debt they're in.

As we mentioned before, Chesapeake will most likely be able to meet their debt obligations for the next few years. Much of their debt matures in 2023 and beyond. Therefore, unless there's a large downturn in commodity prices, Chesapeake should be fine for several years.

Valuation

The extreme fluctuations in commodity markets make valuing companies like Chesapeake difficult. Although some years a company may see profitability that they never have never seen before, the very next year earnings can likely turn negative again. Thus, the main way to value a commodity company is to smooth out earnings.

We do this by finding the average price of oil over the past 30 years (adjusted for inflation), and we determine the company's expected output of Oil and Natural Gas.

In the case of Chesapeake, long term Oil prices have averaged out to $56.85 a barrel. On the other hand, Natural Gas prices have been much more volatile, but average out to $2.56 in the same time frame.

Production levels for Chesapeake were based off of management's expectations, as well as where they plan to invest in the future. For the foreseeable future, they're expected to produce around 68-70 million barrels of oil per year, and around 650 million barrels of oil equivalent in Natural Gas.

As far as 2019 is concerned, we already know enough information to somewhat accurately predict cash flows for the year. Oil prices thus far have averaged out to $55 a barrel, and they're expected to finish the year with around 50 million barrels produced. In contrast, Natural Gas has averaged $2.53 this year, and Chesapeake will produce roughly 700 mmboe for the year.

Lastly, as the company continues their operations forward, one of their major initiatives is to start paying of their debt. Furthermore, the mix of Oil/Gas sales is expected to shift in favor of Oil. With these factors in mind, we updated the Cost of Capital several times throughout the valuation.

The expected changes in debt led us to choose a Free Cash Flow to Firm valuation method.

Unlevered Beta: 1.03

- Estimated unlevered beta for the Oil and Gas Exploration/Production Industry

Levered Beta:

- 2019 → 2023 = 1.03(1 + (1 – 0.165)(2.32)) = 2.97
- 2023 Forward = 1.03(1 + (1 – 0.165)(1.40)) = 2.23
    - Effective Tax Rate of 16.5%
    - Debt/Equity ratio is currently 2.32, long-term Debt/Equity ratio should move towards the sector average of 1.40.

Cost of Equity:

- 2019 → 2023 = 1.75 + 2.97(5.20) = 17.19%
- 2023 Forward = 1.75 + 2.23(5.20) = 13.35%
    - Risk free rate of 1.75% (10 year treasury)

After-Tax Cost of Debt:

- 2019 → 2023 = (1.75 + 3.50) x (1 – 0.165) = 4.38
- 2023 Forward = (1.75 + 3.25) x (1 – 0.165) = 4.18
    - Corporate credit spreads of 3.50 and 3.25, respectively

Cost of Capital: Cost of Equity(Mkt Cap/(Mkt Cap + Debt)) + After-Tax Cost of Debt(Debt/(Debt + Mkt Cap))

- 2019 → 2023 = 17.19(2620/(2620 + 9722)) + 4.38(9722/(9722 + 2620)) =
    - 7.10%
- 2023 Forward = 13.35(2620/(2620 + 9722)) + 4.18(9722/(9722 + 2620)) =
    - 6.13%

Growth Rate = 3%

- We assumed a 3% growth rate in Chesapeake's revenues

Operating Margins:

- Because we based our valuation off of average commodity prices as well as production levels, it was important to analyze CHK's operating margins.
  - 2019 = 16%
    - Based off of Q1, Q2, and expected future results
  - 2020 Forward = 20%
    - Based off of Chesapeake's average of 17.93%, plus 3% additional efficiencies related to Oil production.

Cash Flows

	2019	2020	2021	2022	2023
Revenue	5000	6000	6180	6365	6556
Operating Income	800	1200	1236	1273	1311
Op. Income(1 - Tax)	800	1101	1032	1063	1095
Reinvestment (g/ROC)	41.66%	39.70%	38.70%	37.50%	41.66%
FCFF	**467**	**664**	**633**	**664**	**639**

Terminal Value

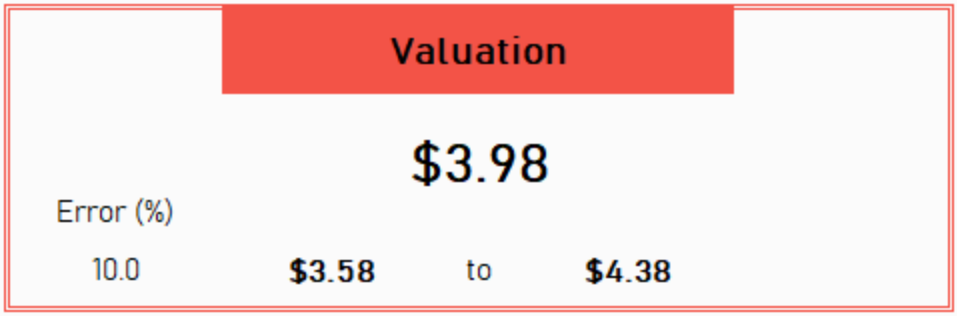
$$\frac{1095 \times (1.03) \times (1 - (0.03/0.072))}{(0.0613 - 0.03)} = 19{,}234$$

Final Calculation

$$\frac{436}{1.071} + \frac{579}{(1.071)^2} + \frac{515}{(1.071)^3} + \frac{505}{(1.071)^4} + \frac{(639 + 19{,}234)}{(1.071)^4(1.0613)} = 16{,}267$$

Valuation = (16,267 - 9722 + 4 - 39) = 6,510

Valuation = (FCFF – Long Term Debt + Cash – Minority Interests)



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