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Thought of the Day
Energy: Exploration & Production

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Thought of the Day: Converting diesel powered drilling rigs to natural gas

Summary:
Today's Thought of the Day focuses on the conversion of diesel powered drilling rigs to natural gas or a derivative thereof such as LNG. Initiatives on this front by proven natural gas operators such as Chesapeake Energy (CHK) and EnCana Corporation (ECA) have caught our attention due to the amount of savings each company pertains to garner from making the switch. For instance, CHK announced last July that its plans to convert over 100 of its drilling rigs plus its entire pressure pumping fleet to run off LNG will reduce diesel fuel consumption by ~350,000 gallons per day and equate to annual savings of ~$230 million. Additionally, on ECA's Q4 conference call, management proclaimed they saved ~$11 million on fuel costs in 2011 by utilizing approximately 14 LNG fueled rigs. After collecting data from the likes of Stewart Stevenson, EnCana, Pioneer Drilling (PDC), Chesapeake's Market Development Team, and Prometheus Energy, we agree that economic incentive to make the swap is very compelling. In fact, we think the payback period for operators willing to make the call to the bullpen and to bring in the nat gas flamethrower (okay probably a horrible metaphor) can be as short as 182 days if the rig utilizes field gas or 616 days if the rig runs off LNG.

Highlights

The Incentive:

A typical rig uses between 62.5 to 83.33 gallons of diesel fuel per hour depending on horsepower and the drilling assignment. With daily fuel consumption totaling between 1,500 gallons and 2,000 gallons and current diesel prices at ~$4 per gallon, daily fuel costs for operators range from $6,000 to $8,000 per day. Utilizing a mid-point, these 100% diesel powered rigs rack up a hefty fuel tab of $2,554,416 per annum. For Chesapeake who operates 157 rigs, this equates to a non-trivial annual fuel cost of $401 million (assuming these rigs are running full-time).

However, per our contact at the privately held Prometheus Energy, which is one of the largest suppliers of LNG to the industrial sector and a pioneer in the LNG drilling business (they're active on 9 LNG rigs currently and set to skyrocket to over 30 rigs in 2013), we learned the majority of drilling motors in existence today, such as the industry staple the Caterpillar 3512, are capable of being reconfigured to utilize a bi-fuel mix (70% gas and 30% diesel). A converted rig will use on average 6.9 Mcf of gas (Math: 1 gal diesel= 0.135 Mcf gas) and 21.87 gallons of diesel an hour. Assuming $3/Mcf gas prices and $4 diesel, the daily fuel costs will be $2,596/ day and $947,428/year. Applying this annual cost to CHK's 157 rigs, the company would realize total fuel cost per annum of $148.7MM, representing a sizable 63% savings vs. running a fleet of 100% diesel fired rigs. However, this scenario only comes to fruition if CHK can utilize the gas from existing wells in the field. This is a tough feat though as unprocessed gas typically possesses at least some associated liquids and/or impurities that must be stripped before being fed to the engines on the rig. Additionally, rigs drilling exploration prospects won't have the luxury of tapping nearby wells, thus requiring a different solution as well. In these cases the use of LNG is a viable, but higher priced, alternative.

A bi-fuel rig that uses 70% LNG in lieu of nat gas, will consume on average 85.73 gallons of LNG (Math: 1 gal diesel= 1.68 gal LNG) and 21.87 gallons of diesel an hour. Assuming $1.75/gal for LNG (25% discount for commercial client) and $4 diesel, the daily fuel costs will be $5,700/day and $2,080,572/year. Applying this annual cost to CHK's 157 rigs, the company would realize total fuel cost per annum of $326.6MM, representing fuel savings of 18.5% vs. running a fleet of 100% diesel fired rigs. The biggest issue with LNG is availability. CHK stated that the closest LNG plant to its oilfields in western Oklahoma is 500 miles away, which causes some obvious cost and reliability issues. As a result, CHK is contemplating building its own LNG plants at a cost of approximately $30MM-$50MM. The company stated that such a plant would have the capacity to produce approximately 100,000 gallons of LNG a day.

Converting from diesel to natural gas in drilling rigs

1 Drilling Rig	100% Diesel	70% Natural Gas; 30% Diesel	70% LNG; 30% Diesel
Fuel/hour	72.9	6.9 Mcf & 21.87 gal	85.73 gal & 21.87 gal
Cost/GGE	$ 4.00	$ 1.48	$ 3.26
Cost/hour	$ 292	$ 108	$ 238
Cost/day	$ 6,998	$ 2,596	$ 5,700
Cost/year	$ 2,554,416	$ 947,428	$ 2,080,572

Source: GHS Research

Conversion costs and payback: We were somewhat surprised to hear from Stewart & Stevenson that converting a drilling rig to run off a mix of diesel and natural gas actually isn't all that expensive. We were quoted an approximate price of $75,000 per motor or $300,000 per rig (assumes a rig utilizes 3 engines continuously and has 1 backup). After talking with CHK we've also factored in an additional $500,000 per rig for related LNG infrastructure costs (10,000-15,000 gallon storage tank and vaporizer unit are the big ticket items) bringing the total conversion to approximately

$800,000 per rig. Using our 70% gas/LNG and 30% diesel bi-fuel base-case scenarios above, converting from a diesel powered drilling rig results in fuel cost savings of $4,402 per day utilizing natural gas and $1,298 per day using LNG - a payback period of 187 days and 616 days, respectively.

The Payback

Economic Viability- Gas	
Conversion Cost	$ 800,000
Per Day Savings	$ 4,403
Per Year Savings	$ 1,606,988
Payback Days	181.71

Economic Viability- LNG	
Conversion Cost	$ 800,000
Per Day Savings	$ 1,298
Per Year Savings	$ 473,844
Payback Days	616.24

Source: GHS Research

Commodity supply & demand - does this move the needle? We were also curious to see what impact the shift from diesel powered rigs to bi-fuel rigs could have on the overall diesel and natural gas markets. Applying our fuel consumption assumptions above to the 1,972 rigs currently active in the US and assuming that each rig currently runs solely off diesel, the aggregate fuel consumption of diesel by drilling rigs is 947MM gallons annual, which represents 2.3% of the total US diesel demand in 2011. If operators were to convert 50% of the 1,972 drilling rigs to run off a fuel slate of 70% natural gas and 30% diesel, US diesel use would be cut 441MM gallons, decreasing total demand by 1.5%. On the gas side of the equation, the incremental demand created through the conversions would equate to 163 Mmcfpd, which represents 0.2% of the total daily U.S. natural gas demand.

	Diesel Consumption (MM Gal.)	Natural Gas Consumption (Bcf/d)
Total U.S.	54,450	66.8
Drilling rigs operating with 100% diesel	1,259	0
Rigs % of Total	2.3%	0.0%
Switch to 50% rigs running 30% diesel/70% gas	819	0.163
Absolute Change	-441	0.163
% of Total Consumption	-0.8%	0.2%

Source: GHS Research

Conclusion: We expect the trend of converting 100% diesel powered rigs to run off a combination of gas/LNG and diesel will accelerate given the historic spread between oil and gas prices and the attractively quick payback after making the initial capital investment. While the movement doesn't appear like it will make a noticeable impact on overall gas demand, it does have the potential to decrease diesel demand at the margin.

Energy Disclosures

I, Mike Kelly, CFA, certify that the views expressed in this report accurately reflect my personal beliefs about this company and that I have not and will not receive compensation directly or indirectly in connection with my specific recommendations or views contained in this report.

Global Hunter Securities, LLC received compensation for investment banking services from Pioneer Drilling Co. in the past 12 months.

Global Hunter Securities, LLC acted as Co-Manager for an offering of securities for Pioneer Drilling Co. in the past 12 months.

Global Hunter Securities, LLC makes a market in shares of Pioneer Drilling Co..

As with all employees of Global Hunter Securities, LLC, a portion of our analysts' compensation is based on investment banking revenues.

Global Hunter Securities, LLC does and seeks to do business with the companies covered in this research report.

Risks & Considerations for Chesapeake Energy Corp. (CHK)

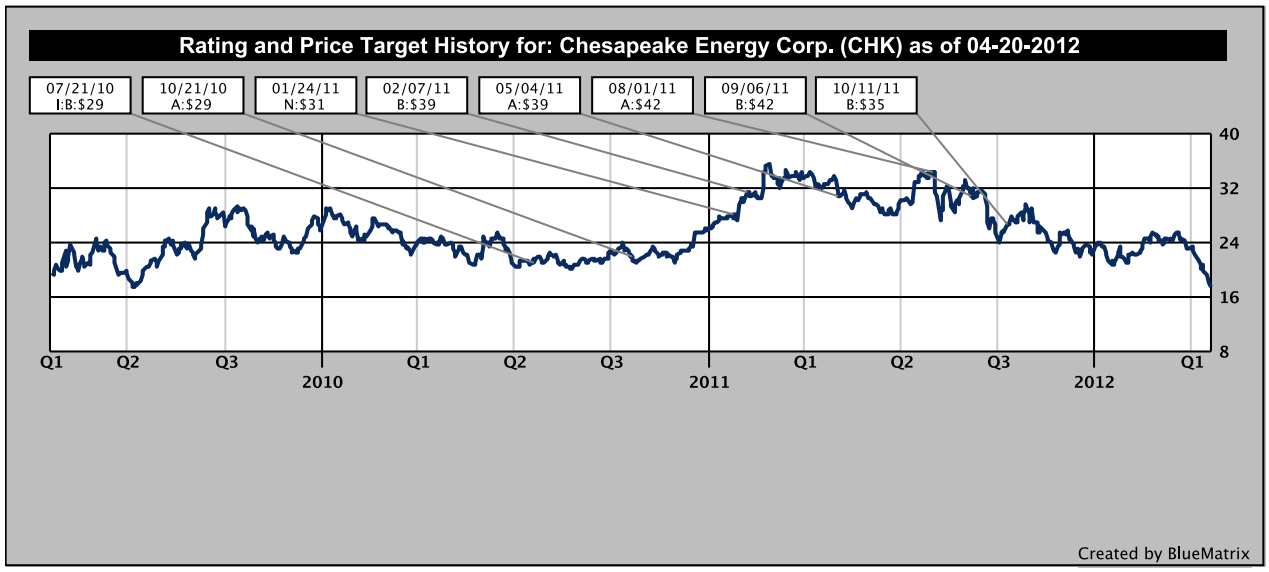
Risks to CHK include commodity price fluctuations, changes to project economics, infrastructure delays, unforeseen and/or unsuccessful drilling results, and changes to corporate strategies and capital allocation.

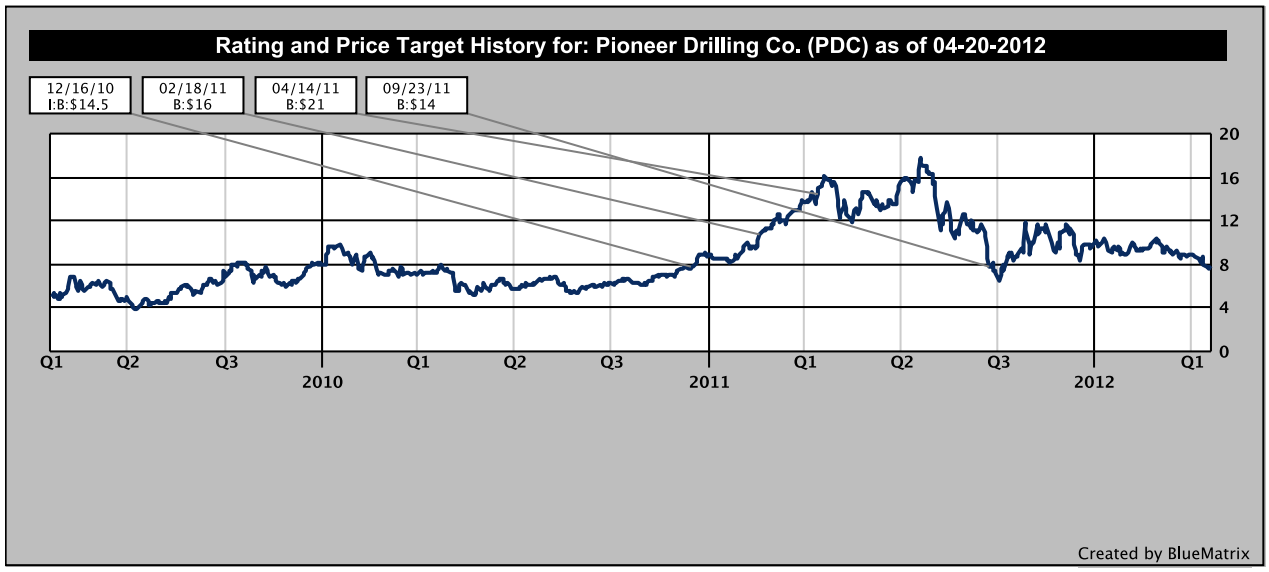
Risks & Considerations for Pioneer Drilling Co. (PDC)

- **The company is reliant upon the energy industry for its revenues.** Weak crude oil and natural gas prices, along with declining capital spending budgets from E&P companies may adversely impact the company's operating and financial results.
- **PDC is a small player in a large, fragmented industry.** We estimate there to be over 2,500 marketed land rigs in the U.S., meaning PDC controls less than 3% of the marketed fleet. Being a smaller player suggests the company may have more difficulty increasing pricing in competitive markets and may suffer weaker utilization levels than larger, better capitalized peers in a competitive pricing environment.
- **Shortages in equipment and qualified, skilled personnel may harm the company.** An upward trending rig count means fewer qualified employees are available to work on the company's equipment, therefore PDC may be subject to implementing wage increases to attract and retain skilled labor. Additionally, shortages in drilling equipment, drilling mud, drill pipe, drill collars, drill bits, and cement could limit drilling operations and jeopardize relations with customers.
- **Contract drilling and production services involve operating hazards, which could adversely impact operating and financial results, particularly if the company is not insured or indemnified against such risks.** Specifically, blowouts, fires and explosions associated with the loss of well control, collapse of the borehole, lost or stuck drill strings, and damage or loss from natural disasters could negatively impact the company.
- **The company's international exposure subjects it to potential political and economic risks.** The company operates 8 rigs in Colombia which contribute a material portion of revenues. Political or economic issues that could derail operations or terminate contracts would adversely impact results.
- **Further disclosures available in the company's most recent 10-K and 10-Q filings.**

Other Companies Mentioned in This Report

- Chesapeake Energy Corp. (CHK: $17.44, Buy)
- Pioneer Drilling Co. (PDC: $7.62, Buy)
- Encana Corporation (ECA: $17.90)





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Explanation of Ratings

Buy - The stock should be purchased aggressively at current prices. The stock is expected to trade higher on an absolute basis and be a top performer relative to peer stocks over the next 12 months.

Speculative Buy - The stock is expected to trade higher on an absolute basis and be a top performer relative to peer stocks over the next 12 months; however, there is higher than average risk associated with the investment that could result in material loss.

Accumulate - The stock should be purchased at current prices. The stock has an attractive risk/reward and is expected to outperform peer stocks over the next 12 months.

Neutral - The stock has average risk/reward and is expected to perform in line with peer stocks over the next 12 months.

Reduce - The stock should be sold at current prices. The risk/reward has become less attractive and is expected to underperform peer stocks over the next 12 months.

Sell - The stock should be sold aggressively at current prices. The stock is expected to trade lower on an absolute basis and be a top underperformer relative to peer stocks over the next 12 months.

NA - A rating is not assigned.

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Total	175	100%	20	100%	11.4%

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Note: Ratings Distribution as of April 20, 2012

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