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Geothermal Energy in Oil & Gas Fields

Where to Next? Volatile Economics in the Oil Field

SMU Geothermal Lab

- May 19, 2015

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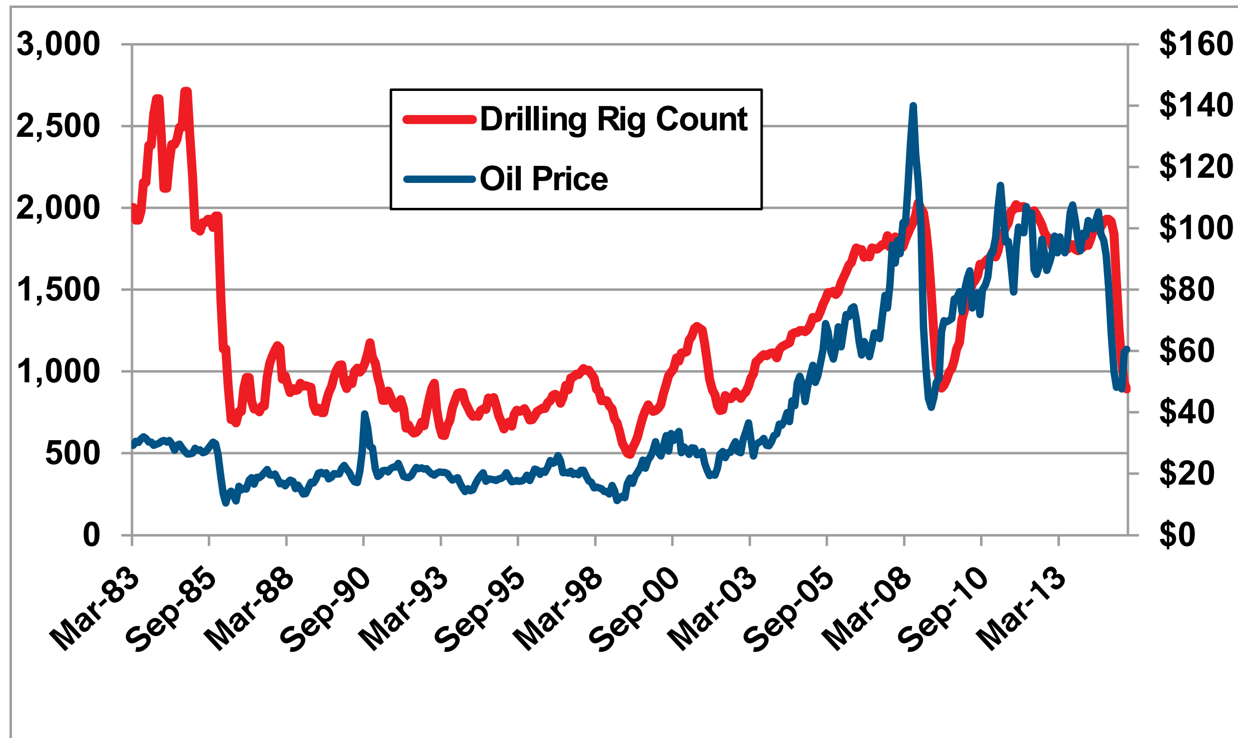
Welcome to the Next Down-cycle

- Oil prices have nosedived in the last six months
- The future's strip only hits $63 three years out
- The US "over-achieved", proved its potential and flooded the world
- Demand has been anemic and looks to stay that way for a while
- The US rig count is down almost 50% - vertical down 60% and horizontal down 40%
- Recovery looks like a "bathtub" rather than a "V" or "U"

Oil Hubs	Qtr-Qtr	from Q2 2014	Current Price
WCS	-39%	-58%	$35.21
Kern	-38%	-60%	$37.83
MAYA	-34%	-54%	$44.35
WTI	-33%	-53%	$48.76
WTS	-33%	-50%	$47.66
WTI Midland	-32%	-51%	$47.24
MARS	-32%	-51%	$49.36
LLS	-30%	-50%	$53.07
ANS	-30%	-52%	$52.24
Dubai	-29%	-50%	$52.61
URALS	-29%	-51%	$52.50
Brent	-29%	-51%	$54.21
Canadian Bow River	-8%	-12%	$70.97

Source: Bloomberg LLC

Oil & Activity Volatility



- Notice the volatility, even in the years that look "flat", the rig count moved between 600 and1,200 rigs, with oil going from $147 to $35 in almost a straight line

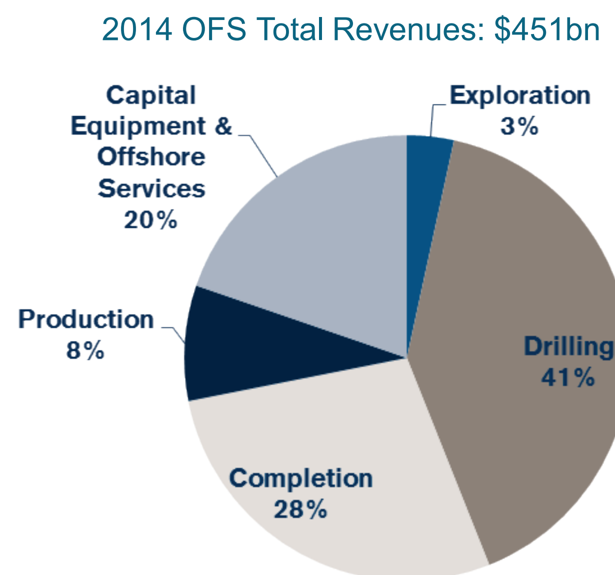
Industry Segments

OFS industry aids in the exploration and production of oil and natural gas

– Oil Service companies aid independent exploration and production companies (E&Ps), international oil companies (IOCs) and national oil companies (NOCs) in the exploration and production of oil and natural gas. Some of the largest Oil Service companies are SLB, HAL & BHI (to combine pending deal), and WFT.

- The industry is made up of several segments/life cycle categories.

1) Exploration/Seismic
2) Drilling
3) Completion
4) Production
5) Capital equipment & offshore services



Source: Spears & Associates

Compare and Contrast

- The 2009 stimulus bill resulted in more than $600 million of technology research at 135 projects in 25 states. Treasury awarded 7 geothermal developers $154 million in tax credits. Projects under development will require $35 billion in direct investments and with 30,000 full time jobs.
- That year, the oil industry spent $265 billion looking for and producing oil and gas
- In 2014, the industry brought on more capacity in one year than in 2 decades, adding 21 new utility scale power plants with a total of 620 MW of power capacity to total over 3,390 MW installed in the US.
- The oil industry will see a $75 billion decline in spending in 2015 in the US alone with over 75,000 direct job losses so far, after hitting $450 billion in global spending last year

Positives and Issues

- It is estimated that current geothermal equates to 33 million barrels of oil per year, or $2 billion annually.
- It is among the lowest capital and operating cost energy sources
- Location, location, location

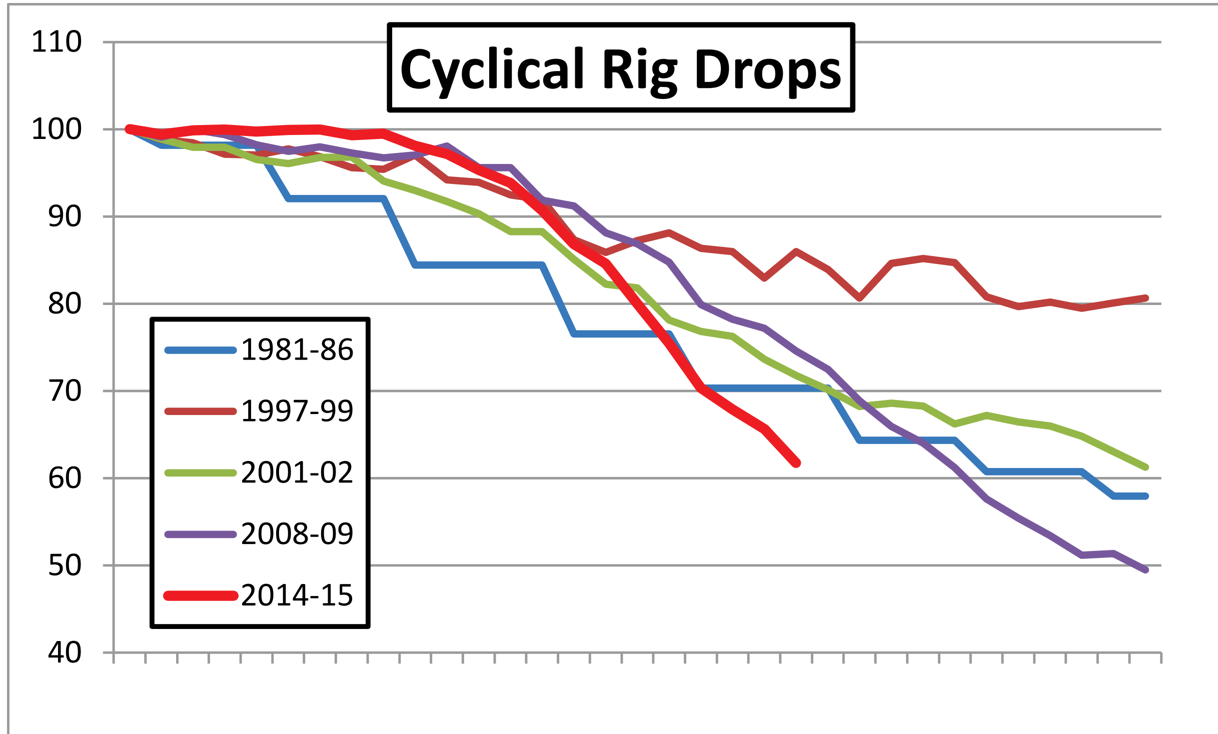
- The market does not yet reflect full cycle costs of any energy source
- It is primarily a “retail” energy source and needs to be more “commercial”

- Clean and substitutes generation of
  - 22 million tons of CO_2
  - 200 thousand tons of SO_2
  - 80 thousand tons of

Competition is Economic, At Times

- Oil prices dropped from $100 in June 2014 to $44 in March 2015
- Natural gas prices dropped from $13 in 2008 to $2 in 2012, is below $3 today and is expected to be “capped” at $4.50 or so longer-term
- The energy is exportable
- Geothermal is very local
- The “vested interest” argument is well entrenched
- Tax credits have improved the economics and viability but to just compete “heads up” isn’t enough.
- Price dislocations change corporate and consumer behavior
- Regulatory actions are still positive
- Pollution versus Climate Change shifted the argument

This is the Most Severe Rig Count Drop in History



So now the question becomes one of duration

Oil Now Has a Very Different Role - Suppression

- Oil prices have always risen to “pull” production levels higher so supply and demand balance, with demand driving its action
- Due to the *success* of US shale, our ability to almost double US oil production in less than five years, in a market that had peaked production decades ago, the role of the oil price has changed
- Now oil prices act as a *“governor”* on US production growth since our ability to increase production at a price exceeds the rest of the world
- The US is now the world’s *swing producer*, due to our volumes if not our economics, and the responsibilities that implies
- The “collateral damage” to global conventional production accelerates its decline and increases the call on US shale *over time*
- It forces a change in behavior across the industry, as it adjusts to the new, and likely lower, role of the oil price

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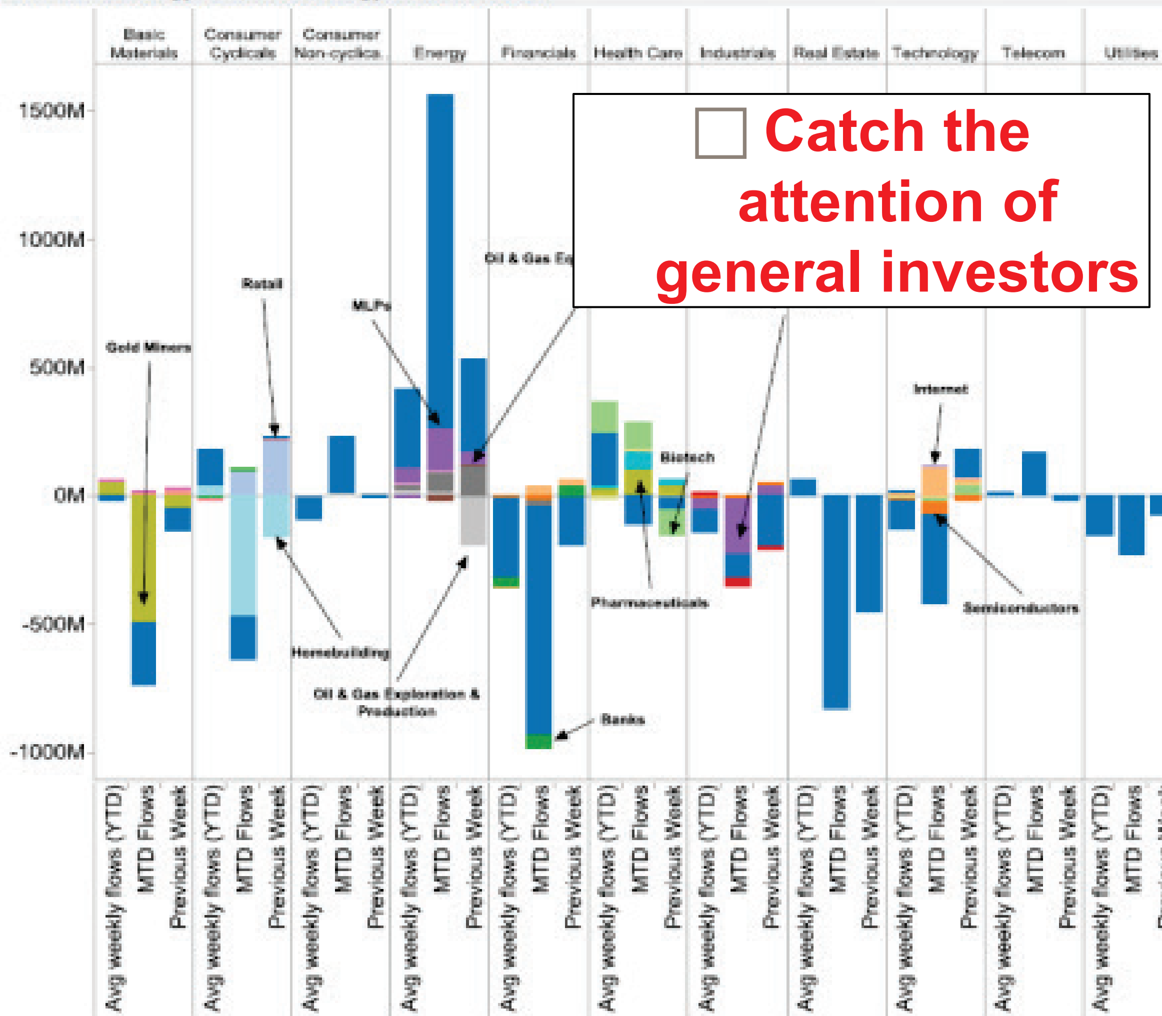
“It’s Different this time”

- This a SUPPLY-based Down-cycle
- Demand can “snap” or “bounce” right back
- Supply is harder to keep down
- E&P is embedded in management’s DNA
- “Killing a Vampire with Toothpicks” – It takes a while
- The US horizontal rig count already dropped by 45%
- SLB warns of extended duration of weak price and activity
- Pricing weakness is likely to be the biggest surprise
- There has to be a change in behavior in the relationship between Oil companies and OFS companies, accelerated by lower oil prices but rarely do changes in major oil companies of any kind happen quickly

Energy ETFs Have Seen $7 billion in Inflows



- Catch the attention of general investors

Sector ETF Flows	Previous Week	YTD Flows
Energy	$339.7M	$7.08B
Technology	$167.6M	($1.84B)
Consumer Cyclicals	$70.1M	$2.88B
Theme	$30.3M	$0.08B
Consumer Non-cyclicals	$3.3M	($1.57B)
Telecom	($16.0M)	$0.32B
Utilities	($71.8M)	($2.68B)
Health Care	($93.8M)	$6.08B
Basic Materials	($102.3M)	$0.78B
Financials	($125.2M)	($6.08B)
Industrials	($157.2M)	($2.10B)
Real Estate	($451.4M)	$1.05B

Industry focus	Previous Week	YTD Flows
Retail	$225.1M	($145.0M)
Oil & Gas Equipment & ..	$118.5M	$357.5M
Software	$48.8M	($83.4M)
Transportation	$47.2M	($837.4M)
MLPs	$46.2M	$991.4M
Banks	$44.3M	($610.3M)
Gold Miners	($47.6M)	$993.0M
Biotech	($102.1M)	$1,988.7M
Homebuilding	($159.3M)	$664.3M
Oil & Gas Exploration & ..	($195.3M)	$462.4M

Note: Blue bars represent broad based sector products. Source: Credit Suisse Trading Strategy, ETF.com. Data through 4/24/2015.

Realities of the Oil Industry Today

- US Production growth is needed, just not as much as last year, *yet*
- The horizontal rig count won't go back to Q4 2014 level for some time
- Once we have bottomed, we will stay down for 1-2 years
- SLB said it would take several years to get halfway back to Q4 14 activity
- A "bathtub" shaped recovery
- But back to secular growth off the bottom for years…
- At a lower growth rate than 2010-2014

But the world needs US oil production growth over time so eventually, US activity will recovery and grow

What is the Real Impact

- Direct job losses
  - SLB has cut 15% of its global workforce, 20,000 people, with Texas hit the hardest
  - HAL reported having cut 15% of its workforce, mostly in the US
  - BHI has cut 17% of its workforce, mostly in the US
- Not expected to be a short-term decline but more “structural”
- Challenger, Gray & Christmas peg it at 51,747 jobs lost in Q1, Forbes says 75,000 in Houston alone, CBRE says 100-140k jobs directly and derivative.
- 58% of Houston office space is tied directly or indirectly to the oil industry
- No more $200k/yr truck drivers

Sources: Bloomberg, CBRE

Banks with Energy Exposure

Bank	Enrgy Exp/ Total Loans	EnrgyLoans ($ millions)
MidSouth Bancorp	20%	$ 256
BOK Financial	19%	$ 2,552
Cullen/ Frost Bankers	15%	$ 1,601
Hancock Holding	13%	$ 1,735
Green Bancorp	10%	$ 149
ViewPoint Financial Group	9%	$ 284
Iberiabank Corp.	8%	$ 886
National Bank Holdings Co	7%	$ 162
Texas Capital Bancshares	7%	$ 933
Property Bancshares	7%	$ 644

Source: Marketwatch

- Regional banks have significant exposure to energy though E&P redeterminations are being generous. For now.

The Risk Goes Up the Longer the Cycle Stays Difficult

- "Excessive oil and gas loan concentrations have been a key factor in the failure of some banks during periods of steep price declines," the Office of the Comptroller of the Currency (OCC) notes with bureaucratic understatement in its handbook for U.S. bank examiners.
- Falling oil and gas prices can have a negative impact on firms beyond producers themselves, rippling out to hurt oilfield service companies, drilling contractors, water haulers, construction companies, local hotels, housing projects, restaurants and even convenience stores
- "Banks with regional concentrations in areas that are heavily dependent on the oil and gas economy can be severely affected beyond the direct lending for oil and gas production," the handbook warns, instructing examiners to watch out for unintended concentrations of credit risk.

It Isn't the End of the World – It Just Feels Like It

- US shale oil production has take US production from 5 million barrels/day in 2009 to 9.5 million barrels today
- Oil production here increased by almost 1.6 million barrels last year alone
- We are 80% of global production growth over the last 3 years
- The industry is VERY good, almost too good for our own good
  - We created the problem and no one will bail us out
  - Demand isn't likely to "bounce" or "snap" back
  - We have to slow US production **growth** close to zero
- Trying to get the E&P industry to not grow production is tough
- And only accomplished by constraint of capital – lower oil prices
- Once we accomplish that, we will see a return to almost secular growth but at a slower pace than 2010-2014

What Can Be Done

- Use the opportunity to find longer-term structural improvement to the businesses processes in your operations. Improving the efficiency of your business is different than providing efficiencies to customers

- Oil companies operate on a different metric today – Returns rather than Growth. Appeal to their needs. Make their use of your business improve their returns and efficiencies. It isn't just about price

- Clean out the closet. Just because things have been done a certain way, don't keep doing them "just because". Let go people who don't make the company better – it does them a favor

- Improve capital allocation and capital return tracking metrics. Full cycle returns are critical and too much too late kills them. Capital discipline and the discipline to track capital efficiency

Deepwater – Its Own Little World

- **Rolling**. Deepwater activity was rolling into a down-cycle even before oil prices started to drop, and was exacerbated by it
- **Death Knell**. IOCs were pressured to increase dividends and buybacks and could either cut capex or redirect incremental capex to faster cash return and higher overall return projects
- **Returns over Growth**. Deepwater, with 200% inflation over the last five years, has a 7 year cash cycle and 11%-14% expected returns today vs. 3 year cash returns and 40%+ ROIC in the Eagle Ford.
- As a result, incremental $'s leave deepwater, whose production growth over the last three years is ZERO, and goes to onshore shale which has been 80% of GLOBAL production growth over the same period
- **Step Change**. We need a dramatic change in the behavior of oil companies and the technology of subsea. Quick???

Deepwater – Part 2

- We have stacked 26-39 deepwater rigs so far with virtually none expected to work again. Jack-ups are next
- 18 months ago, the industry insisted no rigs would be stacked for the foreseeable future
- Competition for capital and returns are increasingly the focus
- FIDs are being delayed to lock in the lowest prices
- Delays in orders kills absorption and earnings
- It is a business cycle and in 2-3 years will have improved returns and will bring oil companies back to offshore.
- And in a few years, deepwater capex will start growing again but not like the 10%-12% CAGR seen over the last five years

And then all will be right with the world

Valuations Appear Rich Though they Do at Bottoms

- Offshore equipment names are still under pressure as deepwater is expected to have a slower recovery than US onshore

	2015	2016	2015	2016	2015	2016	Current
	Implied EV/ Ebitda		Implied P/ E		Implied CPS		Price
DRQ	9.5x	11.1x	16.0x	18.6x	14.2x	15.1x	$ 75.85
FTI	9.4x	10.4x	16.7x	18.5x	12.2x	12.9x	$ 42.46
CAM	8.9x	9.6x	17.7x	18.9x	11.9x	11.1x	$ 54.81
NOV	7.0x	8.2x	15.6x	18.2x	10.2x	11.6x	$ 52.92
FI	7.4x	7.8x	25.4x	25.0x	14.6x	15.5x	$ 20.56
OIS	9.8x	9.7x	31.4x	28.2x	9.5x	9.4x	$ 44.49

Geothermal Has No Corporate Ownership

- There are very few Geothermal companies
- There are Geothermal divisions of larger companies but they end up having little “corporate” voice
- Therma Source - private
- Terra-Gen - private
- Gradient Resources – private
- US Geothermal - $50 million
- Ormat Technologies - $2.5 billion, only company of size

With little sponsorship, lobbying, advertising, economic benefits are all under most radars

Opportunities Arise from Adversity

- Significant consolidation in smaller companies by the huge amount of private capital raised – KKR, Apollo, Bain, Carlyle and more
- Financing "assistance" from non-traditional sources
- Value of technology will increase – Efficiency matters most
- "Increase your returns" will trump simple "save you money"
- Reducing capital employed and employing more efficient business operating practices will increase in importance
- Demographics make "wisdom" increasingly valuable
- Huge number of offerings were "left at the altar"

A change in behavior by entrenched oil companies is not an overnight event but sorely needed and accelerated by the need to perform, the benefit of a "return-based" discipline

Companies Mentioned *(Price as of 27-Jan-2015)*

National Oilwell Varco (NOV.N, $57.7, UNDERPERFORM, TP $43.0)

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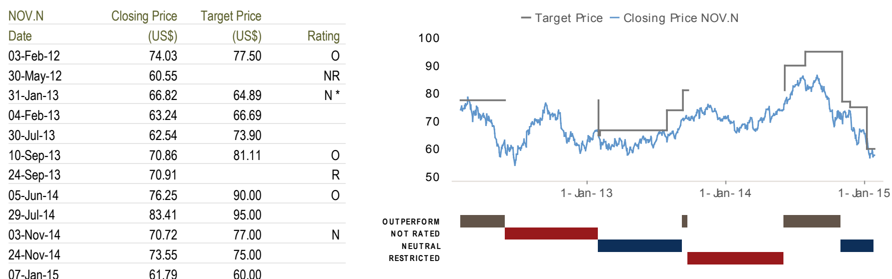
3-Year Price and Rating History for National Oilwell Varco (NOV.N)



NOV.N Date	Closing Price (US$)	Target Price (US$)	Rating
03-Feb-12	74.03	77.50	O
30-May-12	60.55		NR
31-Jan-13	66.82	64.89	N *
04-Feb-13	63.24	66.69	
30-Jul-13	62.54	73.90	
10-Sep-13	70.86	81.11	O
24-Sep-13	70.91		R
05-Jun-14	76.25	90.00	O
29-Jul-14	83.41	95.00	
03-Nov-14	70.72	77.00	N
24-Nov-14	73.55	75.00	
07-Jan-15	61.79	60.00	

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Price Target: (12 months) for National Oilwell Varco (NOV.N)

Method: Our 12-month target price of NOV is $60 per share. Our target price is based on 7.5x our 2015 EBITDA estimate. Since the end of 2008, NOV's average EV/EBITDA multiple is 7.0x.

Risk: Risks to our $75 target price are twofold: those specific to the company and those that relate to the broader oilfield service industry. Company-specific risks include (1) the company's ability to maintain its leading onshore and offshore rig equipment market share position, (2) a slowdown in the number of onshore and offshore drilling rigs in use globally, (3) delays in deepwater crude oil and natural gas exploration and development, (4) changes in and compliance with post-Macondo restrictions and regulations, (5) ill-timed or poorly integrated acquisitions, and (6) successful development and implementation of new technological advancements. In addition, industry-specific risks include (1) fluctuations in crude oil and natural gas prices, (2) reduced global oil demand, (3) global GDP, (4) global deepwater/offshore capex spending, (5) interest rate risk, (6) environmental and government regulations, (7) increased competition, and (8) geopolitical risks.

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