25th April 2016

Integrated Oil & Gas
BP P.L.C. (BP)

Deepwater, Divestments and Cost Discipline

BP is currently trading at $32.00. Using our valuation techniques we have projected a share price of $ 33.05 using Net Asset Value, $34.77 using NAV with Monte Carlo and $32.75 using the Discounted Cash Flow method. We therefore do not believe there is enough of a margin and recommend a hold for BP.

- **Positive Production growth.** Short term production see's BP reaping new capacity from 17 new major startups. However this is heavily skewed towards natural gas. We expect Crude oil production to remain flat, while gas to increase as much as 7% in 2017.

- **Divestment strategy after 2010 have provided flexibility for Deepwater Horizon uncertainties.** With continued divestments planned, we expect the company to navigate themselves adequately through the current period of lower oil prices. We expect divestments to add $3Bn in 2016 and $2Bn.

- **Revenue**. Analysing Revenue across the 4 streams of business, we expect revenue to stay relatively flat for the next 2 years. After which we see a slight decline. This is due to lower for longer oil prices and narrow margins due to competition in the downstream segment.

- **Cost Discipline.** We expect BP's CapEx to be $17Bn through to 2017. Reducing by 7% thereafter. BP's downsizing strategy has focussed their attention on their large DeepWater Resource base. This is allowing the company to efficiently control spending, yet keep production at above average industry levels

Recommendation: HOLD

Company Report

Industry: Integrated Oil & Gas

Share Price vs S&P 500: 2011-2016

Legend: BP ------- S&P 500 ------

Target Share Prices

Share Prices	Base		% (over)/undervalue
NAV Monte Carlo	$	34.77	9%
NAV	$	33.05	3%
DCF	$	32.75	2%
Current	$	32.00	

Key Statistics

Stock Data	
Market Cap	$98.66Bn
EV/EBITDA	16.38
P/E	12.76
ROE	-6.07%
52 Week Range	$27.01-$43.85
EPS	($2.12)
Div Yield	7.47%

Samuel Butler
+353 83 362 55 54
Samuel.butler.1@ucdconnect.ie

Khushil Nathoo
+353 83 482 42 73
Khushil.Nathoo@ucdconnect.ie

Please see the disclaimer at the back of this report for important information.

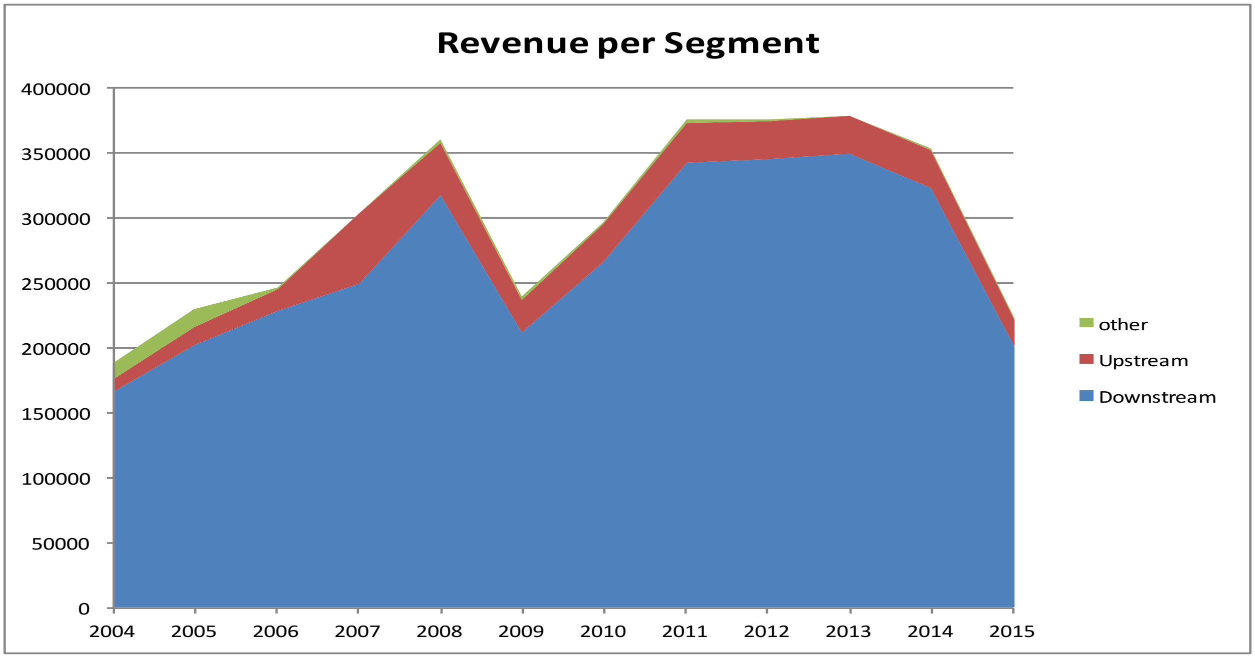
COMPANY PROFILE

- **BP p.l.c[1].** operates as an integrated oil and gas company worldwide, founded in 1889 and is headquartered in London, the United Kingdom. BP currently has 79,200 employees across its upstream, and downstream segments of business The company has a market cap of $98.02 Billion. BP's 2015 Loss of $6.482 billion is their largest loss in 20 years and has plans to cut 7000 jobs by next year. Capital expenditure is expected to decline to the $17billion-$19billion range in 2016, down from $19.5 billion in 2015 and $23.8billion in 2014.
- **The Upstream segment** engages in the oil and natural gas exploration, field development, and production. At this stage oil and gas is located, tested, drilled and extracted from the reserve.[2] Income from the this segment is closely in line with the prices of crude oil and natural gas. These commodity prices are subject to external factors over which the companies have no control over, for example, product demand, industry reserve levels, OPEC's actions and the occurrence of wars. The upstream segment of a company is also impacted by the company's ability to explore, acquire and efficiently produce crude oil and natural gas.
- **The Downstream Segment** These operations occur after the production stage through to the point of sale. This stage includes the refinement of crude oil and the creation of by-products such as gasoline, jet fuel, diesel and liquefied natural gas. Earnings for the downstream segment are tied to margins on refining, manufacturing and marketing of products that include gasoline, diesel, jet fuel and petrochemicals. Industry margins are somewhat volatile and are affected by global and regional supply and demand balance for refined and petrochemicals. It offers lubricants, and related products and services under the Castrol, BP, and Aral brands
- **Rosneft[3]** is Russia's largest oil company and the world's largest publicly traded oil company in terms of hydrocarbon production. BP's 19.75% share of Rosneft's proved reserves – on an SEC basis – is 5 billion barrels of oil and 11 trillion cubic feet of gas. Rosneft's downstream operations include interests in 15 refineries.
- **Other businesses and corporate** comprises of the biofuels and wind businesses, the group's shipping and treasury functions, and corporate activities worldwide.

[1] Yahoo Finance
[2] http://www.investopedia.com/terms/u/upstream.asp
[3] BP Annual Report and Form 20-F 2015

Revenue and Operating Income by Segment

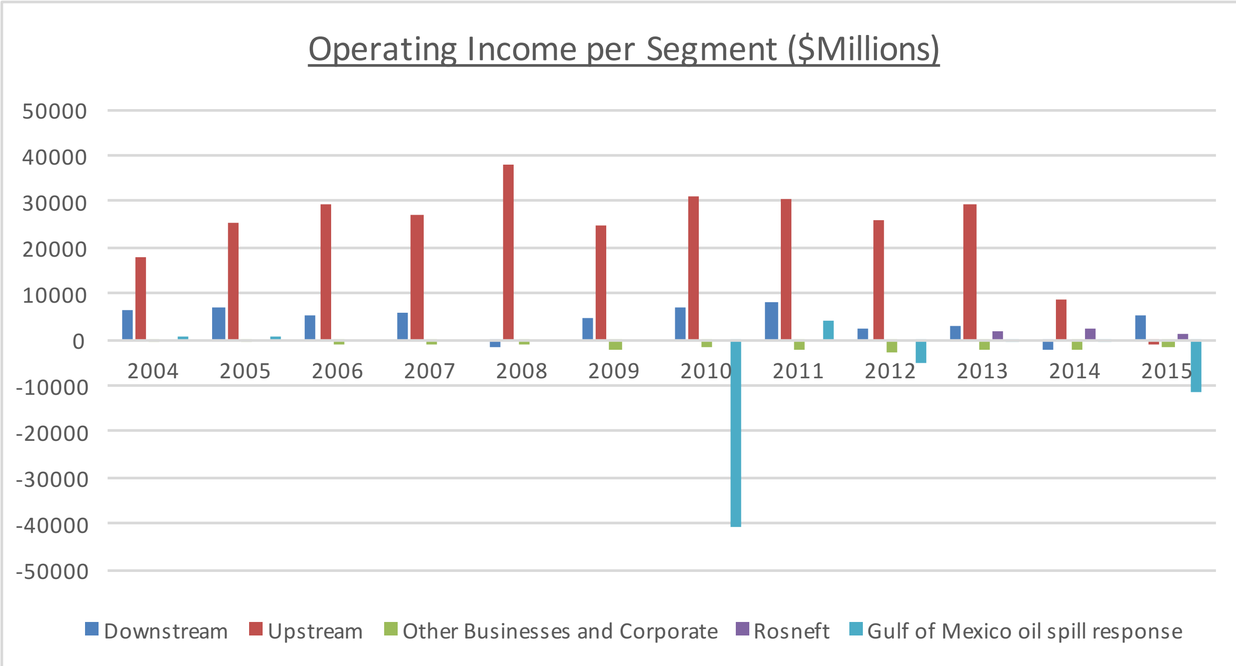
Exhibit 1: Revenue per segment



Source: 2015, 20-F

- From Exhibit 1, we see that like ExxonMobil and Chevron, the majority of the BP's revenue is generated by the downstream segment. That is to say, in 2015, 90% ($200 Billion) of the firm's revenue was from downstream sales.
- In 2015, BP's upstream segment contributed $43.24 Billion or 20% of Total Revenue, however, 50% of this was due to sales to the downstream segment. As a result, only 10% of BP's actual revenue is attributable to the upstream segment.

Exhibit 2: Operating Income per segment



Source: 2015, 20-F

- While the majority of the revenues come from the downstream segment of the business, the upstream segment is the most profitable. The upstream business produces a historical average figure of 77% of the companies operating income, whereas for the downstream segments this figure is 18%. With the dramatic drop in oil prices over the past year, the firm's upstream profitability has declined tremendously. In 2015, the upstream Segment made a loss of $967 Million. Whereas the downstream segment made an operating profit of $5.25 Billion.
- BP's 19.75% investment in Rosneft has been paying dividends since 2013. This comes as no surprise as Russia currently produces more oil than anyone else. In 2015, BP received $1.3 Billion from their holdings in Rosneft.
- BP's Other Business and Corporates has been making a loss for a number of years. This is largely due to the high replacement costs associated with renewable energy. This business segment made a loss of $1.77 Billion in 2015.
- Lastly BP's Gulf of Mexico oil spill response reduced operating income by a further $11.7 Billion. This is a big increase from 2014's figure of $800 million. The reason for this is that the United States Government ordered BP to " fully and finally resolve any and all natural water damages"[4].

[4] BP. PLC Group Results, Fourth Quarter and full year 2015 (For immediate release), 2 February 2016

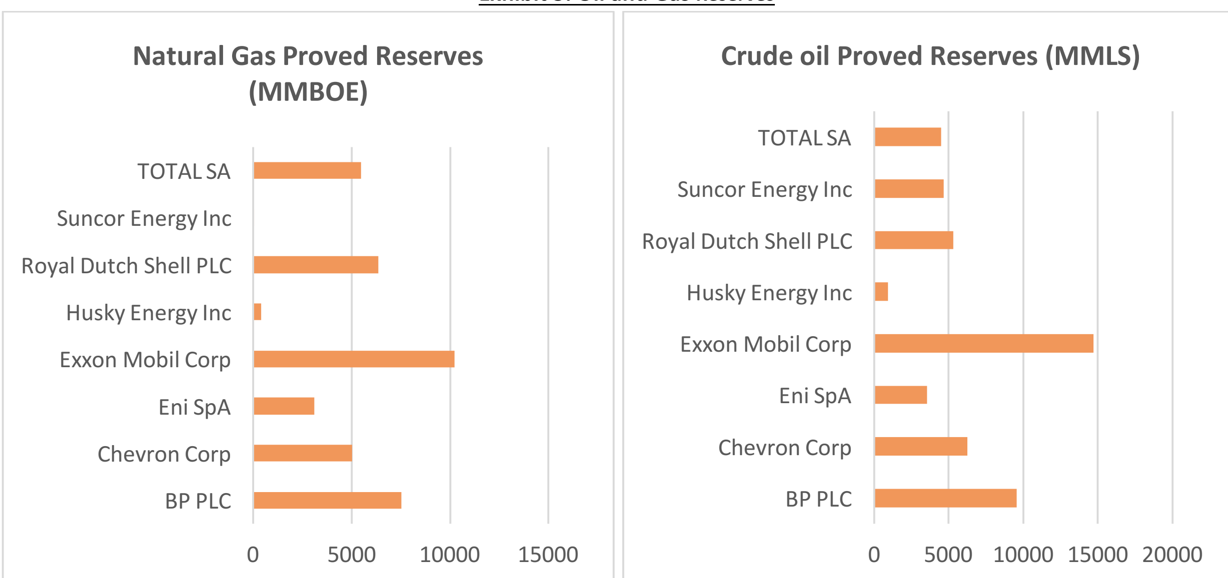
Industry OPERATING Metrics

For this industry, the key operating metrics are Proved Reserves, Production, Proved Reserves Replacement ratio and the Reserve Life ratio.

Reserves

- BP has the second highest total proved reserves (after ExxonMobil) in the industry with **17,180** million barrels of oil equivalent (MMBOE). Moreover, from Exhibit 3 we see that the company has both the the second highest proved reserves of natural gas at **7,513** MMBOE and the second highest proved reserves of Crude oil at **9559** million barrels.
- Proved reserves, is an important driver for the integrated oil and gas industry. By BP holding significantly more reserves in these finite commodities than their competitors (bar ExxonMobil), this gives them a valuation advantage.

Exhibit 3: Oil and Gas Reserves



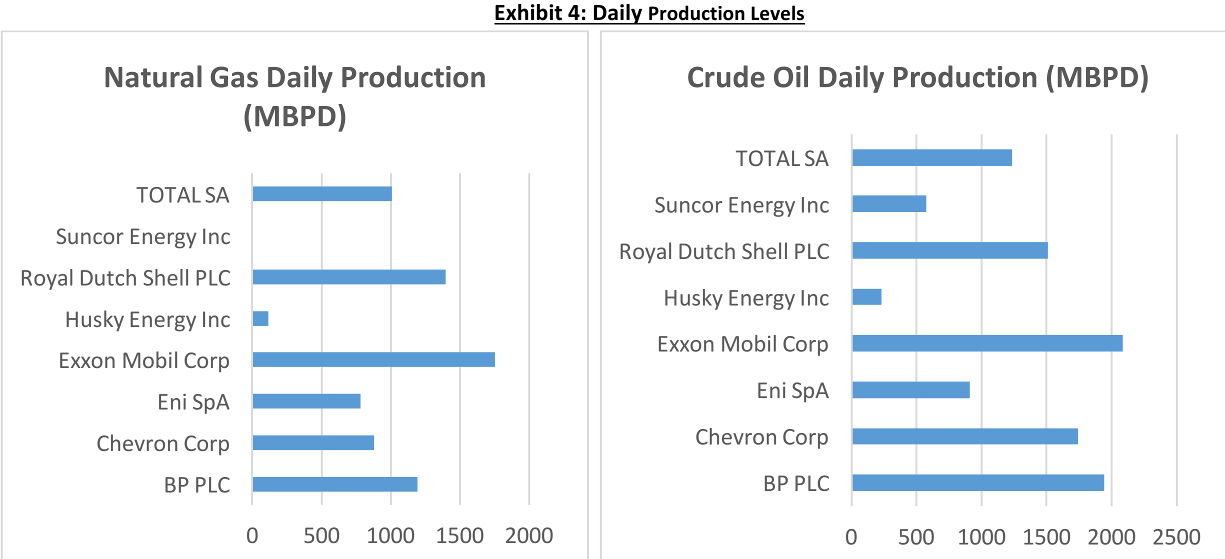
Source: Current Bloomberg Data

- Proved reserves replacement ratio is the extent to which the year's production is being replaced by proved reserves added to the companies reserve base. In 2015, companies reserve ratio was 61%, this is similar to their 2014 figure of 61%, however it is much lower than their longer term average of 103%.

Production

- Production is the causal result of reserves and is an important measure of performance since it determines gross revenue, and when combined with costs, the companies cash flow. Companies control production and generally produce at rates to maximize return on investment, but differences arise in how oil and gas is produced depending on location, level of production and market conditions. Companies may shut-in or curtail gas production to protect wellbore stability or because of low prices, while oil wells are almost always operated at full capacity.[5]
- We see BP produces **3,136** thousands of barrels of oil equivalent per day, 22% less than ExxonMobil, the market leader, but larger than any other supermajor.
- Furthermore, BP produces natural gas at a rate of **1,191** thousand barrels of oil equivalents per day, 33% more than the industry average of 890 MMBOE.
- BP also produces crude oil **1,945**thousand barrels of oil per day, 52% more than the industry average of 1,280 MBbls.

Exhibit 4: Daily Production Levels



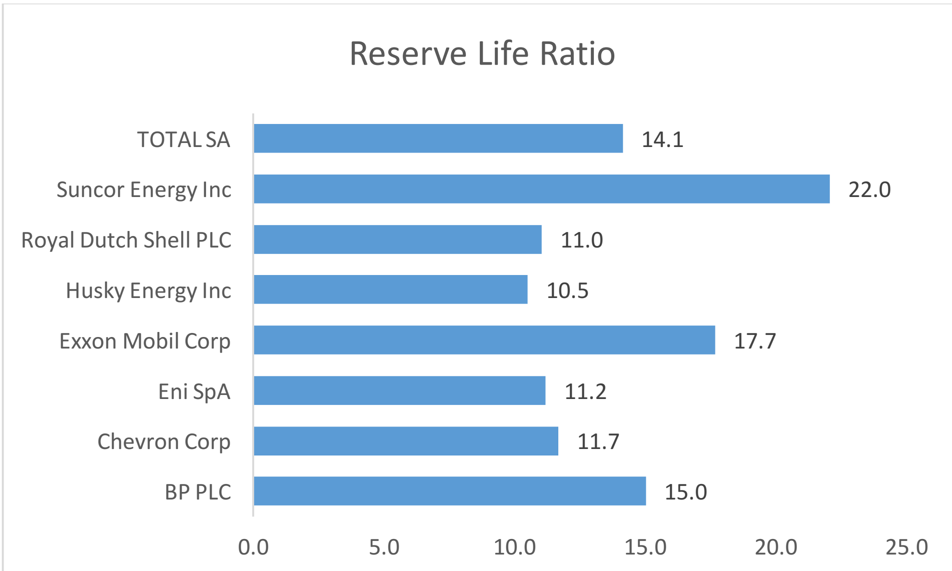
Source: Current Bloomberg Data

[5] Mark J. Kaiser, Yunke Yu, 2012, Oil and Gas Financial Journal.

R/P Ratio

- The R/P Ratio or the Reserve life ratio is an industry specific operating metric indicating the number of years in which the total proved reserves (without adding further reserves) would be depleted, given our daily production rates. The bigger the R/P ratio, the more value investors see in a company and as such will pay a premium for this long term investment. BP currently has a Reserve life of 15 years, this the second largest of the "Super majors" behind ExxonMobil.

Exhibit 5: Reserve Life Ratio



Source: Current Bloomberg Data

Forecasts

Production

- BP's principal areas of oil and natural gas production are in Angola, Argentina, Australia, Azerbaijan, Egypt, Iraq, Trinidad, UAE, the UK and the US
- BP successfully completed 3 major upstream projects in 2015 and plans to start production from 17 start-ups by 2020. 11 of these projects will be focused on natural gas. See exhibit 6a and 6b.

Exhibit 6a: Global upstream projects

Our Upstream project pipeline

Key: Oil Gas

*BP operated

Project	Location	Type	
2015 start-ups			
Kizomba Satellites Phase 2	Angola	Deepwater	Oil
Greater Plutonio Phase 3*	Angola	Deepwater	Oil
Western Flank Phase A	Australia	LNG	Gas
Expected start-ups 2016-2020			
Projects currently under construction			
Angola LNG	Angola	LNG	Gas
In Amenas compression	North Africa	Conventional	Gas
In Salah Southern Fields[a]	North Africa	Conventional	Gas
Point Thomson	Alaska	Conventional	Gas
Quad 204*	North Sea	Conventional	Oil
Thunder Horse water injection*	Gulf of Mexico	Deepwater	Oil
Clair Ridge*	North Sea	Conventional	Oil
Juniper	Trinidad	LNG	Gas
Oman Khazzan*	Middle East	Tight	Gas
Persephone	Asia Pacific	LNG	Gas
Thunder Horse South expansion*	Gulf of Mexico	Deepwater	Oil
West Nile Delta Taurus/Libra*	Egypt	Conventional	Gas
Culzean	North Sea	High pressure	Gas
Shah Deniz Stage 2*	Azerbaijan	Conventional	Gas
Taas-Yuryakh expansion	Russia	Conventional	Oil
West Nile Delta Giza/ Fayoum/Raven*	Egypt	Conventional	Gas
Western Flank Phase B	Australia	Conventional	Gas

Project	Location	Type	
Expected start-ups 2017-2020			
Design and appraisal phase			
Angelin	Trinidad	LNG	Gas
Atoll	Egypt	Conventional	Gas
B18 Platina*	Angola	Deepwater	Oil
Mad Dog Phase 2*	Gulf of Mexico	Deepwater	Oil
Snadd*	North Sea	Conventional	Gas
Tangguh expansion*	Asia Pacific	LNG	Gas
Trinidad onshore compression	Trinidad	LNG	Gas
Trinidad offshore compression	Trinidad	LNG	Gas
Vorlich*	North Sea	Conventional	Oil

Beyond 2020

We have an additional 35-40 projects in the pipeline for post-2020 start-up.

- Mix of resource types across conventional oil, deepwater oil, conventional gas and unconventionals.
- Broad geographic reach.
- Range of development types, from new to producing fields where we can use existing infrastructure.

[a] Started up in February 2016.

Source: Current 2015 Annual Report

Exhibit 6b: BP Upstream Project Pipeline

BP Upstream Project Pipeline							
Oil				Gas			
	% ownership	MBOED	Production		% ownership	MBOED	Production
2016							
Thunder Horse Water Injection	75%	23	17.25	In Amenas	46%	107	49.22
Quad 204	36%	122	43.92	Point Thomson	32%	8	2.56
			61.17				51.78
2017							
Clair Ridge	29%	99	28.71	Juniper	70%	94	65.8
Thunder Horse South Expansion	75%	42	31.5	Oman Khazzan Gas	60%	200	120
				Persephone	17%	50	8.5
				West Nile Delta	60%	237	142.2
			60.21				336.5
2018 -2020							
				Culzean	16%	99	15.84
				Shah Deniz	29%	370	107.3
				Western Flank	17%	77	13.09
							136.23

Source: BP website

- Analyzing the company's projects that are in the construction phase, we forecast the following oil and gas production growth rates:
- BP expects full-year 2016 underlying production to be "*broadly flat*"[6], with 2015. After looking into BP's ownership of the projects going online we see a 1% growth rate for both oil and gas as conservative estimate for 2016.
- The upstream projects that are expected to go online in 2017 are heavily skewed towards natural gas production. As a result, we forecast natural gas production to increase by 7% in that year. In contrast, we find that the projects producing oil in 2017 are very similar to that of the ones going online in 2016, we therefore maintain oil growth at 1%.
- Subsequently, from 2018 to 2020, BP has 3 large natural gas projects that will increase 2017 production by 10%. The exact timing of these projects within this period is still largely uncertain. As a result, we conservatively spread this growth across the period, increasing production by 3.3% year on year.
- In terms of growth in oil production beyond 2017, the company has not provided guidance. The high costs associated with the large Deepwater oil field projects (Thunder Horse) that are expected to come online in 2016-2017 indicate that oil production will stay flat at 2017 levels as the company consolidates its portfolio of projects until 2020. As oil prices begin to increase (beyond 2020) and as the company proportionately increases its capital spending we expect production to increase to levels higher than we have forecasted in 2020.

[6] BP. PLC Group Results, Fourth Quarter and full year 2015 (For immediate release), 2 February 2016

Exhibit 7: Daily Production Forecast (appendix 4)

Daily Production	2016	2017	2018	2019	2020
Crude Oil (MBbls)	1244.32	1256.76	1256.76	1256.76	1256.76
Natural Gas (MCf)	6010.51	6431.25	6643.48	6862.71	7089.18

Prices

- To price both oil and natural gas we used a **random walk**, more specifically a Geometric Brownian Motion Simulation.
- In general, forecasts made by the EIA have been found to be inaccurate in recent years. They seemed to have misunderstood the movements in commodity prices in the past decade. Fischer, Morgenstern and Hernnstadt (2008) concluded in their discussion paper *"Understanding Errors in EIA Projection of Energy Demand"* that the EIA underestimated total energy demand by an average of 2% per year. Moreover, the residual projection errors range up to 7%.
- With the difficulty in forecasting oil prices being a serious concern, the federal reserve engaged in a series of discussion papers in order to find the most accurate method to do so. In the July 2011 paper, they concluded that besides approaches such as the Auto Regressive Conditional Heteroskedasticity models and the Hamilton model (2003, 2010), the oil price could be predicted by filliping a coin to predict in which direction it would move (ie. a Random walk). [7]
- In our commodity forecasts we chose to do a Monte Carlo Geometric Brownian Motion simulation. We ran 10,000 simulations for a period of 5 years.
- In our simulation we used the current prices of both oil and gas as our initial prices respectively. Each time step was considered to be a day. For instance, the oil the price between for day t is:

$$\textit{Oil Price}_t = \textit{Oil Price}_0 \ \textit{x exp}((\mu - \frac{\sigma^2}{2})t + \sigma W\_t \qquad (1)$$

Therefore, the Expected oil Price at time t is:

$$E[\textit{Oil Price}_t] = \textit{Oil Pice}_0 \ \textit{x exp}\ (\mu t) \qquad (2)$$

and

$$\mu = \upsilon + \lambda \qquad (3)$$

Where μ is the total drift, υ is the true drift and λ is the markets risk premium for holding oil.

- To calculate the volatility in our model, we looked at the implied volatility on a one-year Vanilla call option on Brent Crude oil, we found σ to be 0.247.

[7] http://www.federalreserve.gov/pubs/ifdp/2011/1022/ifdp1022.pdf

- To calculate the total drift component for the first years, we first found the value of μ that equates the current oil price to the 1-year futures price. The one year futures price is \$46.73[8] p/b. However, from our previous simulations we felt that this value was too high, and as such we believe that the market is adding a risk premium for currently holding oil. With the commodity prices experiencing significant swings in the past 6 months we feel that this Risk premium is warranted.
- Subsequently, subtracting \$1 from our Futures price (to account for the risk premium) we calculate υ (=μ), the true drift rate to be 0.09369329 (9.36%) using equation 2 above. This implies risk aversion through a risk premium of 2.16%(λ).
- We followed this procedure in order to calculate the 2-year drift rate as well. The 2-year futures price is \$48,13, giving a true drift rate of 0.0724222 (7.2%) in the second year and an additional risk premium of 1% was calculated.
- After two years we believe that futures prices do not encompass technological progress in the oil price. Technological innovation in the oil and gas industry has the ability to increase exploration and production, thus impacting the recovery of oil prices.
- As a result, in our model we add another term to our drift component θ, the rate of technological progress, to the year 3 and year 4 drift rate. This rate reduces υ by 2.34% in year 3 giving a net, true drift rate of 4.78%. In year 4 we repeat this process, reducing this rate by 2.34%, giving us a true drift rate of 2.78%.
- The rate of technological progress, θ (2.34%), was taken from a study conducted by the IMF and articulated in their 2012 working paper *The Future of oil: Geology vs Technology.*
- Finally, we removed the drift component from year 5 onwards, to illustrate the uncertainty in oil prices going forward.
- Using our market implied values of $\upsilon\ and\ \sigma$ we simulated our Geometric Brownian motion on matlab (see Appendix A).
- The reason for calculating our parameters and subsequent prices in this way, instead of taking historical figures, is because we feel that our model would accurately account for the markets expectation of the future commodity prices in our simulation.

Exhibit 8: Forecasted Commodity Prices

Year	E[Oil Price]
2016	$ 45.80
2017	$ 49.13
2018	$ 51.35
2019	$ 52.78
2020	$ 52.82

Year	E[Gas Price]
2016	$ 2.00
2017	$ 1.89
2018	$ 1.57
2019	$ 2.20
2020	$ 2.56

For discussion on macroeconomic factors see appendix I.

[8] CME Crude oil Futures Quotes (20/04/2016)

Revenue Forecast

- To forecast revenue, we split the revenue stream up into the four different business segments, upstream, downstream, Gains on Sale of Assets and Other Income.
- To forecast upstream, we used our projection figures from our prices and production. We take revenue from this section as being price multiplied by production.
- For our downstream segment, we calculated Continuous Annual Growth Rate as being -5%. Therefore, in projecting 2016 -2020 downstream revenue we used this figure. This is inline with the BP's guidance, which has stated that they "Anticipate a weaker refining environment"[9], this is partly due to narrowing margins due to demand lagging behind supply, In addition to this, BP has been unable to manage the growing competition from newer more efficient refineries, especially in Asia. As a result, they have started converting their uncompetitive refineries to fuel-import terminals.
- To forecast the gains on sale of assets and other income we did the following. Analyzing Revenue from previous years' divestments, we see that the company has made an average gain on asset sales of 23.78%. Using our projected future Disposals (see Divestments) we multiply these figures by 23.7% to get our forecasted gains on sale of assets.
- Lastly, to calculate other income, which comprises of the biofuels and wind businesses. We used a CAGR of -4%. While the company has not provided any guidance for this segment, we do not expect the current trend to change.

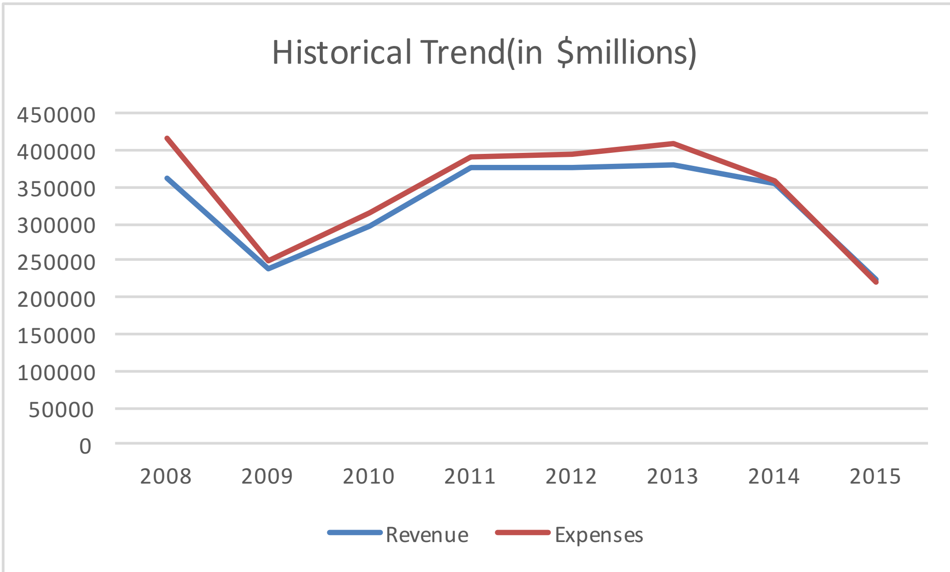
Exhibit 9: Revenue Forecast

Revenue forecast	2016	2017	2018	2019	2020
Upstream	25,253.81	26,973.44	27,362.24	29,721.92	30,938.18
Downstream	189,566.66	179,228.63	169,454.38	160,213.17	151,475.93
Gains from sale of Assets	713.57	475.71	475.71	475.71	475.71
Other Income	587.30	564.52	542.62	521.57	501.34
Revenue	216,121.34	207,242.29	197,834.95	190,932.37	183,391.15

[9] BP Annual Report and Form 20-F 2015

Expenses Forecast

Exhibit 10: Historical Trend for Revenues and Total Expense



- Exhibit 10 shows that both Revenue and Total expenses follow almost an identical trend. Additionally, we see that revenue and expenses, which are the main inputs in valuing a company, are highly correlated, with a correlation coefficient of 0.98.
- As a result, we have focused on analyzing revenue growth of BP and have used that as a proxy for the growth in expense (excluding litigation) as we expect that the close relationship between revenue and expense to continue. Appendix 5 shows the breakdown.

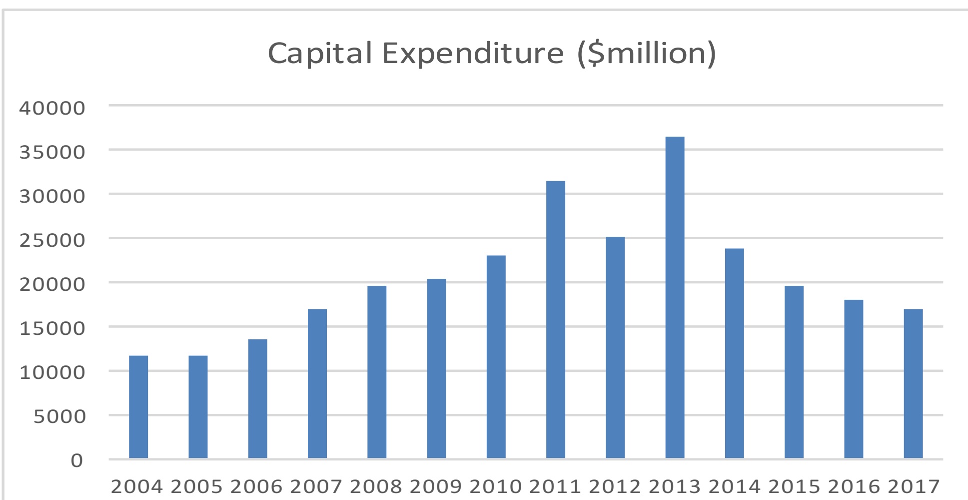
EBITDAX (See Appendix D)

- EBITDAX is a measure used to estimate ongoing operating profitability. Unlike EBITDA, it adds back the expenses the firm would incur for costs of exploration. Therefore, it becomes very important for Oil & Gas companies. Ultimately, it measures the profitability to assist in financing further exploration efforts. To forecast EBITDAX it is first needed to forecast Depreciation, Depletion and Amortization (DD&A), interest expense and exploration figures. DD&A and exploration expenses following Revenues CAGR (see Expenses Forecast Section). In forecasting interest, we took an arithmetic average of the historical values and kept the interest expenses figure constant going forward. We see EBITDAX increasing going forward due to the better forecasted oil environment.

Capital Expenditure(CapEx)

- Right up to 2013. Many of the supermajors were increasing their capital spending. This was due to a sudden abundance of new opportunities. Resultantly, these companies started taking on more long life capital-intensive projects, where the Capex was front-end loaded.
- Post 2013, BP has embarked on large scale downsizing (see divestments) and have focused their attention on their large Deepwater resource base. This strategy has allowed them to cut capital spending, optimize current projects with the result of keeping production at above average industry levels. That is exploration is currently being shelved.
- BP expects organic capital expenditure will be in the range of $17-19Billion a year through to 2017. The company has, in previous years overestimated this figure and as such, we take a conservative figure of $17 Billion a year through to 2017[10].
- While the company has not explicitly provided guidance on capital expenditure after 2017, the lack of optimism in new projects, vague description of expected future start-ups and comments made by CEO Robert Dudley that BP's current business model can "*withstand a longer period of lower oil prices*" [11] suggest that capital spending will be cut further through 2020. We therefore have reduced capital spending by the post 2013 geometric average of changes in capital spending of 7% a year thereafter. Statements made by the company, and our analysis of the business suggest that Capital Expenditure cuts will decrease as oil prices begin to get back to its long-term equilibrium level, we do not predict this to happen before 2020.

Exhibit 11: Capital Expenditure Forecast



[10] BP Third Quarter 2015 Results
[11] BP Webcast on 27th October 2015

Litigation

- BP Plc has settled most of its potential liability from the 2010 Deepwater Horizon oil spill, and may have closed the door on damages under the Oil Pollution Act. BP's guidance on litigation expenses going forward suggests that the company expects cash outflows in 2016 of $530 Billion in respect of the criminal settlement with the United States Department of Justice.
- The company has stated that it is not possible to reliably estimate the remaining liability for business economic loss claims as well as litigation costs. We agree with this statement and have therefore forecasted that BPs litigation charges will be zero from 2017 onwards.

Divestments

- BP has adjusted to the changing environment and met payments related to the 2010 Deepwater Horizon oil spill by continuing to adapt and rebalance by focusing on a stronger, refocused, rebalanced portfolio. It is balanced between different geographies, different resource types, different parts of the value chain and different life cycles. Getting this balance right provides resilience and longevity.
- BP's strategy going forward in terms of divestment is value over volume. Therefore, they will look to divest assets that no longer fit with our strategy and deepen our involvement in assets which add the most value. We don't see this continued divestment as a negative. BP is getting rid of projects that aren't offering a positive NPV and in turn leaning the company and adding more weight to the more profitable projects.
- They are trying to capture the greatest value through the cycle in each business segment. Right now in the Upstream this means managing the timing of investments, looking in particular to ensure we are capturing the maximum benefits of industry deflation, while at the same time preserving future growth objectives. In the Downstream segment, BP now has a more focused portfolio of manufacturing assets with strong competitive advantages and marketing businesses that are differentiated from the competition.
- In 2015, BP completed the $10 billion divestment programme announced in October 2013 with $2.8 bn of this coming in 2015. We are forecasting that BP will increase their divestment programme in 2016 to $3billion before returning to a rate of $2billion per year thereafter. This is in line with estimates provided by the company. Divestment proceeds will provide added flexibility to help manage both continuing oil price volatility and BP's commitments in the US. These divestments will help BP keep dividends at current levels of close to $7billion going forward and stop BP from having to dip into the debt market going forward, as dividends and capital expenditure will be covered by our forecasted divestments and operating cash flows.

VALUATION

Summary

We valued BP using two different valuation techniques: Discounted Cash Flow (DCF) and Monte Carlo Net Asset Value.

Exhibit 12: Valuations

Share Prices	Base	% (over)/undervalued
NAV Monte Carlo	$ 34.77	9%
NAV	$ 33.05	3%
DCF	$ 32.75	2%
Current	$ 32.00	

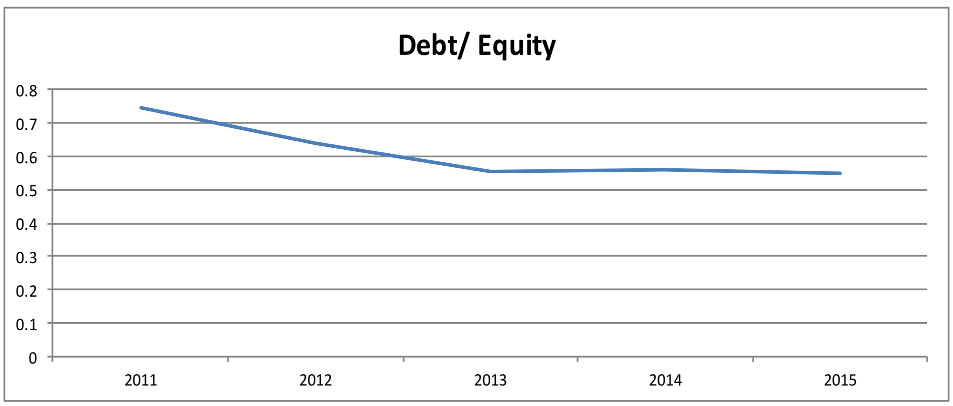
Our results for these models can be seen in Exhibit 12. BP is currently trading at $32.00. Therefore, under both of our valuation models we are recommending a HOLD on this stock. Our DCF model gives us an upside of 2%. Whereas, our Monte Carlo Net Asset Valuation give us a value with 8% upside. Therefore, we recommend a HOLD as we don't believe there is any value in investing in this stock at these price levels.

Weighted Average Cost of Capital: 8.62% (See Appendix F)

Firstly, we calculated the WACC to be 8.62%. We used this figure as the appropriate discount rate instead of using the industry standard which is assumed to be 10%. The model is explained below. WACC was used instead of APV as we see that the D/E ratio has been stable in past couple of years and we believe this will continue into the future, see exhibit 13.

- **Weights:** We calculated the weight of BP's equity and debt. We used the market cap to calculate BP's weight in equity and we used the book value of debt to calculate weight in debt. Thus we added the latest two-year average short term and long term debt to find this. BPs capital structure is 33:67, Debt : Equity.

Exhibit 13: Debt/ Equity ratio



- **Cost of equity calculation**

$$r_{avb} = r_f + \beta(r_m - r_f)$$

where $r_f = risk - free\ rate$

β = Beta of company

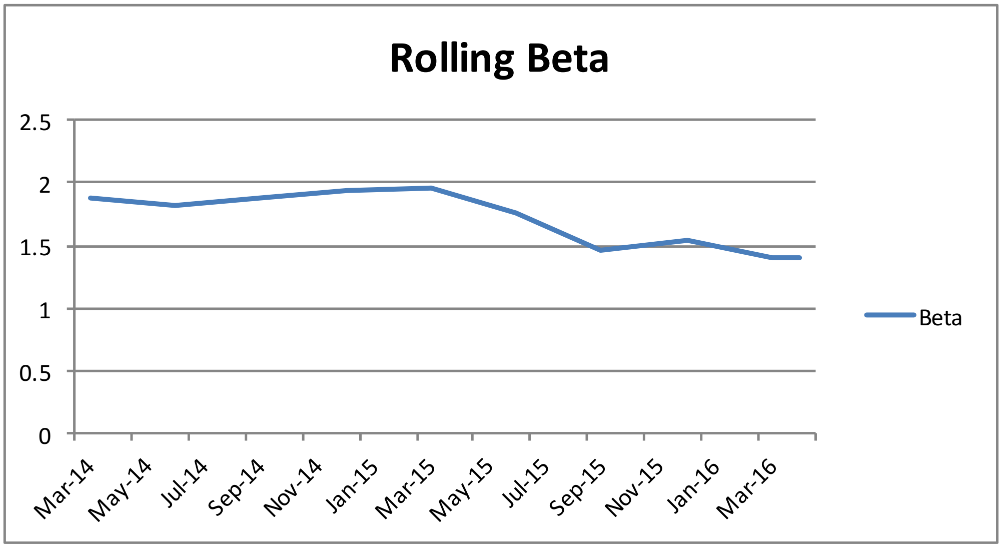
$(r_m - r_f)$ = Implied risk premium

We get a final cost of equity figure of 12.3%.

- **Risk-free Rate:** We decided to use the 10-year Treasury constant maturity rate as the return on the riskless asset. This figure is 1.78%.

- **BETA:** To calculate our beta, we regressed the monthly excess returns of the company on the excess returns of the market portfolio using a 60-month rolling window. BP's adjusted beta is calculated to be 1.4 This figure reflects the current riskiness of the company compared to the market. You can see the Beta trend in the graph below.

Exhibit 14: Beta trend line



- **Equity Risk Premium:** This was calculated by simply subtracting the risk free rate from the expected market return. We got a value of 7.5%

- **Cost of debt:** We used last years' interest expense and divided this by the two-year average debt. This figure worked out to be 1.7%.

- **Tax Rate:** We utilized the two-year average tax rate for this. We have a tax rate of 26.1%.

Discounted Cash Flow

DCF's are ultimately the most commonly used valuation technique. There are several factors that are key to getting a reasonable value. These include, management, growth rate of the industry and the quality of assets owned. Our base case estimation gives us a projected share price of **$32.75** which means the company is undervalued by 2%. Our unlevered free cash flow projections can be viewed in appendix D.

Exhibit 15: DCF Valuation

DCF	Share Price	% (over)/undervalued
Base	$ 32.75	2%

Assumptions:

- **Revenue:** As previously mentioned. This revenue figure changed for our bull, base and bear cases.
- **Terminal Multiple:** Within our DCF we decided against using a terminal growth rate. Alternatively, we used an EBITDAX multiple to compute our terminal value. We used a multiple of 7.3x. This value is the median for the 8 supermajors. See appendix D for forecasted EBITDAX.
- **Expenses:** Grew at revenue CAGR due to high correlation with revenue as discussed in the above section
- **Capex:** Discussed in earlier section.
- **Discount Rate:** Used the WACC figure as our discount factor, 8.62%.
- **Tax rate:** Based on the last 5-years effective tax rates, 28.3%.

Our DCF model calculates the model enterprise value. Our discounted cash flow revolves around two major parts. Firstly, we projected the total FCF for the years 2016-2020. Then we proceeded by discounting our values appropriately according to our WACC figure of 8.63%. Next, we calculated our models terminal value using the terminal multiple method and selecting an EV/EBITDAX multiple. Our discounted FCF and Terminal value were added to give a total enterprise value. We then worked back to find our implied share price.

Net Asset Value

NAV is the most used valuation technique when it comes to valuing integrated Oil & Gas companies. This is a twist on the traditional DCF model with everything in this model flowing from BP's current proved reserves. Oil & Natural Gas are finite resources and it is near impossible to know when these resources will run out. So, as the revenue stream starts to decline over time Oil & Gas companies will have declining free cash flows. Oil & Gas companies can't continue to grow forever and production will ultimately cease at some time in the future. Existing reserves are ultimately reduced to zero over time. [12]The NAV model gives us a share price of $33.05, which means the company is undervalued by 3%.

Exhibit 16: NAV Valuation

NAV	Share Price	% (over)/undervalued
Base	$ 33.05	3%

- **ASSUMPTIONS:** We have listed the assumptions we took in Exhibit 17. We also assume that BP will shut down once current reserves run out. We have already made assumptions about the price of Oil & Gas in a previous section. However, production will ultimately stop once the current reserves run out. Lastly we assume that BP are not spending any more on CapEx. That is to find new reserves, finding new land, acquiring companies. [13]To value the other segment of BP, Downstream, we look at the current EBITDA figures coming from these segments and assign industry standard multiples to these segments of the company.

Exhibit 17: NAV Assumptions

NAV Assumptions	
Natural Gas Reserves (BCF)	33,027
Oil Reserves (Mbbls)	4,689
Natural Gas Equivalents (Bcfe)	61,161
Discount Rate	8.6%

[12] http://www.investopedia.com/ask/answers/021915/how-nav-used-oil-gas-and-energy-investments.asp
[13] https://breakingintowallstreet.com/biws/oil-gas-nav-modeling-revenue-projections/

Exhibit 18: NAV Calculations for revenues and cash flows

Year		Natural Gas Beginning Reserves (Bcf)	Natural Gas Annual Production (Bcf)	Natural Gas Median Price $ / Mcf
2016	1	33,027	2,200	$ 2.00
2017	2	30,827	2,347	1.89
2018	3	28,480	2,425	1.57
2019	4	26,055	2,505	2.20
2020	5	23,550	2,595	2.56
2021	6	20,955	2,595	2.56
2022	7	18,361	2,595	2.56
2023	8	15,766	2,595	2.56
2024	9	13,171	2,595	2.56
2025	10	10,577	2,595	2.56
2026	11	7,982	2,595	2.56
2027	12	5,388	2,595	2.56
2028	13	2,793	2,595	2.56
2029	14	198	198	2.56
2030	15	-	-	2.56
2031	16	-	-	2.56

Year		Oil Beginning Reserves (MBbls)	Oil Annual Production (MBbls)	Oil Median Price $ / Bbl
2016	1	4,689	455	$ 45.80
2017	2	4,234	459	49.13
2018	3	3,775	459	51.35
2019	4	3,316	459	52.78
2020	5	2,857	460	52.82
2021	6	2,397	460	52.82
2022	7	1,937	460	52.82
2023	8	1,477	460	52.82
2024	9	1,018	460	52.82
2025	10	558	460	52.82
2026	11	98	98	52.82
2027	12	-	-	52.82
2028	13	-	-	52.82
2029	14	-	-	52.82
2030	15	-	-	52.82
2031	16	-	-	52.82

Year		Revenue ($ in Millions) Natural Gas	Oil	Total Revenue
2016	1	4,396	20,858	$ 25,253.81
2017	2	4,437	22,537	26,973.44
2018	3	3,807	23,555	27,362.24
2019	4	5,511	24,211	29,721.92
2020	5	6,642	24,296	30,938.18
2021	6	6,642	24,296	30,938.18
2022	7	6,642	24,296	30,938.18
2023	8	6,642	24,296	30,938.18
2024	9	6,642	24,296	30,938.18
2025	10	6,642	24,296	30,938.18
2026	11	6,642	5,154	11,795.99
2027	12	6,642	-	6,642.28
2028	13	6,642	-	6,642.28
2029	14	507	-	507.46
2030	15	-	-	-
2031	16	-	-	-

- The reserve changes are just the reserves minus the annual production. After 5 years we assume there won't be any long-term production decline so future production will be at year 5's level. Also it is common practice to assume that our final year projection for prices will stay the same going forward. Revenue is equal to price multiplied by production in this case. To calculate the revenue of our upstream segment we take our forecasted production and prices and multiplied them. Adding the reserves from both the Oil & Natural Gas gives us our upstream NAV value.
- We implemented a tax rate of 38% in this model. This tax rate is the average over the previous five years. This gives us our after tax cash flows. Using the WACC as our discount rate we get the Net Present Value (NPV) of these after tax cash flows.

Present Value of Cash Flows from Proved Reserves ($ in Millions)	$114,485.52

- We used comparative analysis to value the other two segments of the company. We firstly calculated EBITDA originating from Downstream in 2015 and applied an industry standard multiple of 3x to the Downstream segment. Adding the segments together we get an enterprise value of $128 Billion.

Downstream ($ in Millions)		
12/31/2015 EBITDA:	$	4,793
EV/EBITDA Multiple:		3.0 x
Estimated EV:	**$**	**14,379**

Exhibit 19: NAV Valuation Share price

Enterprise Value:	$	128,865
Balance Sheet Adjustments:	$	(26,136)
Implied Equity Value:	$	102,729
Diluted Shares Outstanding:		3108
Implied Share Price:	$	33.05

Accounting for balance sheet adjustments this equates to an implied share price of **$33.05.**

Net Asset Value with Monte Carlo Simulation

Supplementing the Net Asset Value model, the oil and gas industry apply Monte Carlo modelling to account for the uncertainty in the prices of oil and gas. We first obtained price data for oil from 1988 to present and natural gas from 1990 to present, respectively. For each of these commodities we then calculated the year on year growth rate, looked at their histogram and found the distribution that matches it best based on the Chi-Squared goodness of Fit.

Exhibit 20a: Fitted Oil Distribution

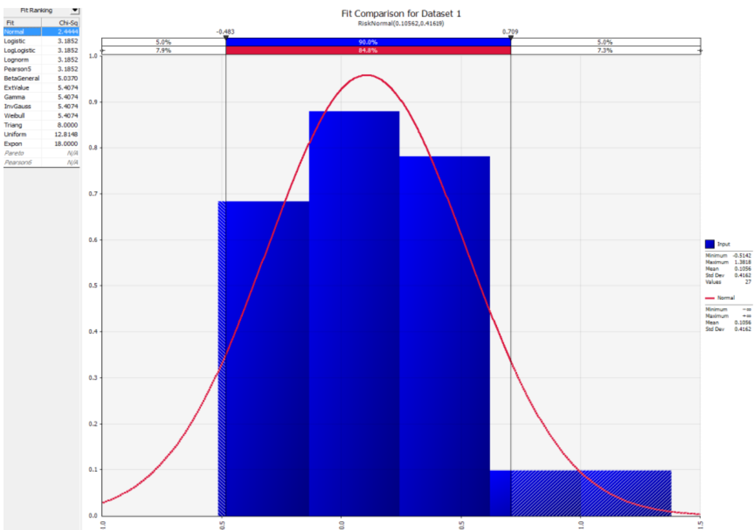
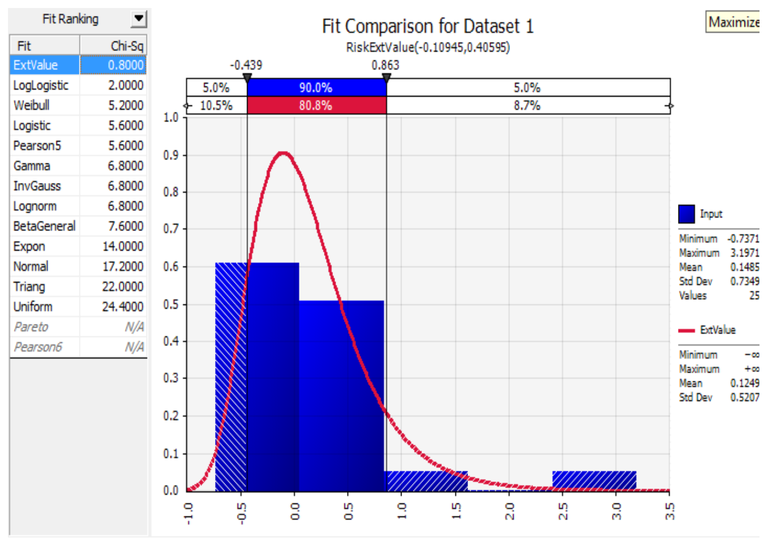


Exhibit 20b: Fitted Gas Distribution



- From Exhibit 20 above we see that the best fitted distribution for the oil growth rates is the Normal Distribution with mean 0.010562 and standard deviation 0.41619.
- The best distribution for the natural gas growth rates turns out to be the Extreme Value Distribution (-0.109545, 0.40595) with mean 0.1485 and standard deviation of 0.7349 (see Exhibit 15).

- Using these as our inputs, we then set up our Net Asset Value Model, varying our growth rates and hence the annual oil and gas prices with each iteration. We then ran 10,000 iterations in our simulation. We also set a maximum on our oil price at $140 per barrel and and natural gas at $10 MMBtu, in line with EIA forecasts.[14]
- Our discount rate stayed the same as in our DCF calculation.
- We decided to alter the basic NAV models production to react to the oil price. We added the following condition, if our simulated oil prices were greater than the previous year and also the simulated oil price was greater than our forecasted oil price, production grew by 5% more than our forecasted production. If this condition was not satisfied than production stayed at our forecasted production levels. We believe BP would increase oil production further if they see higher oil prices.

Exhibit 21: Simulated Oil Price Growth

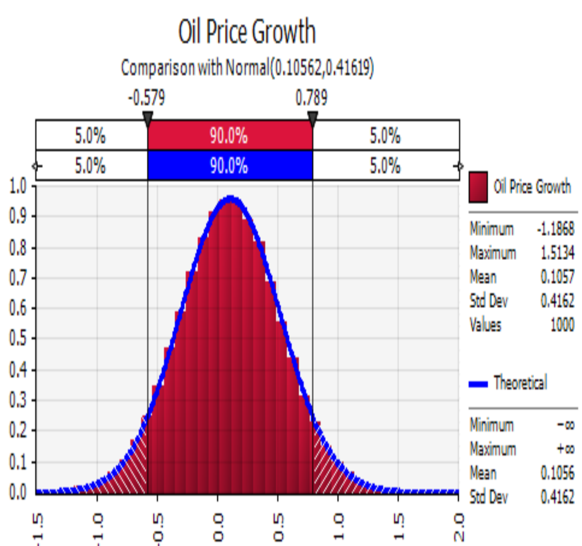
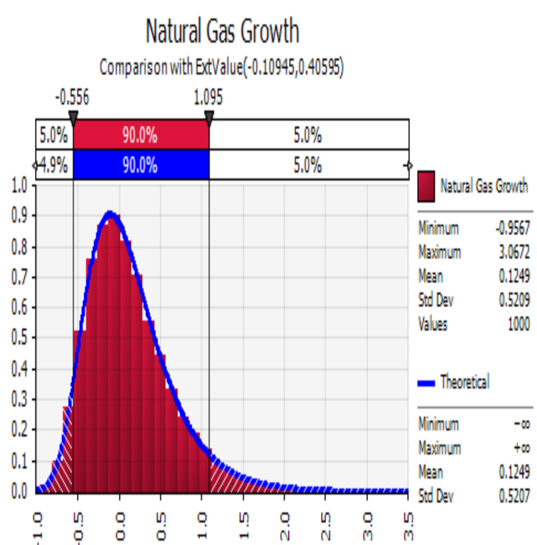


Exhibit 22: Simulated Gas Price Growth

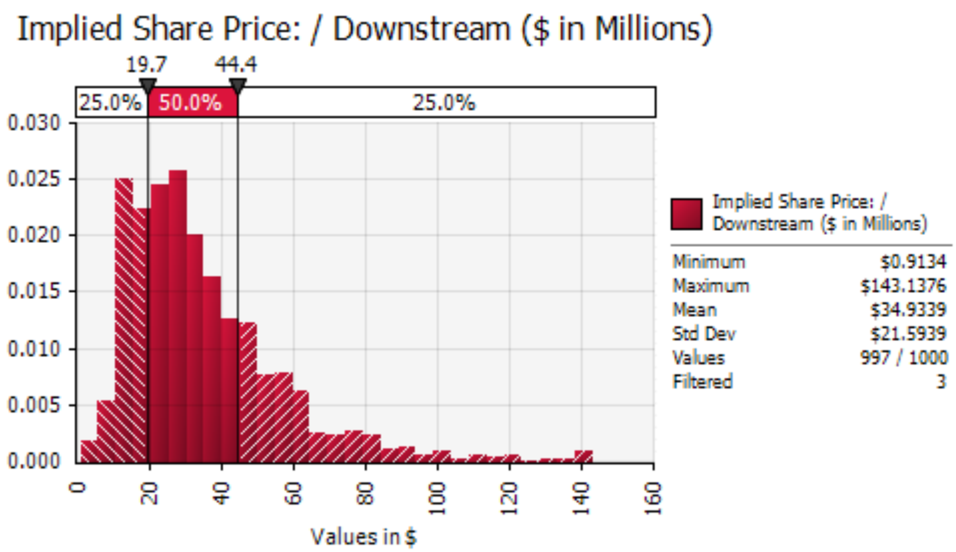


- In Exhibit 21 & 22 above illustrates our resultant oil price and natural gas price growth rate distribution from our simulation.

- The resultant share price of the company, our output from this model, produced a mean value of $34.93.

[14] http://www.eia.gov/oiaf/aeo/tablebrowser/

Exhibit 23: Implied Share Price – Result of NAV

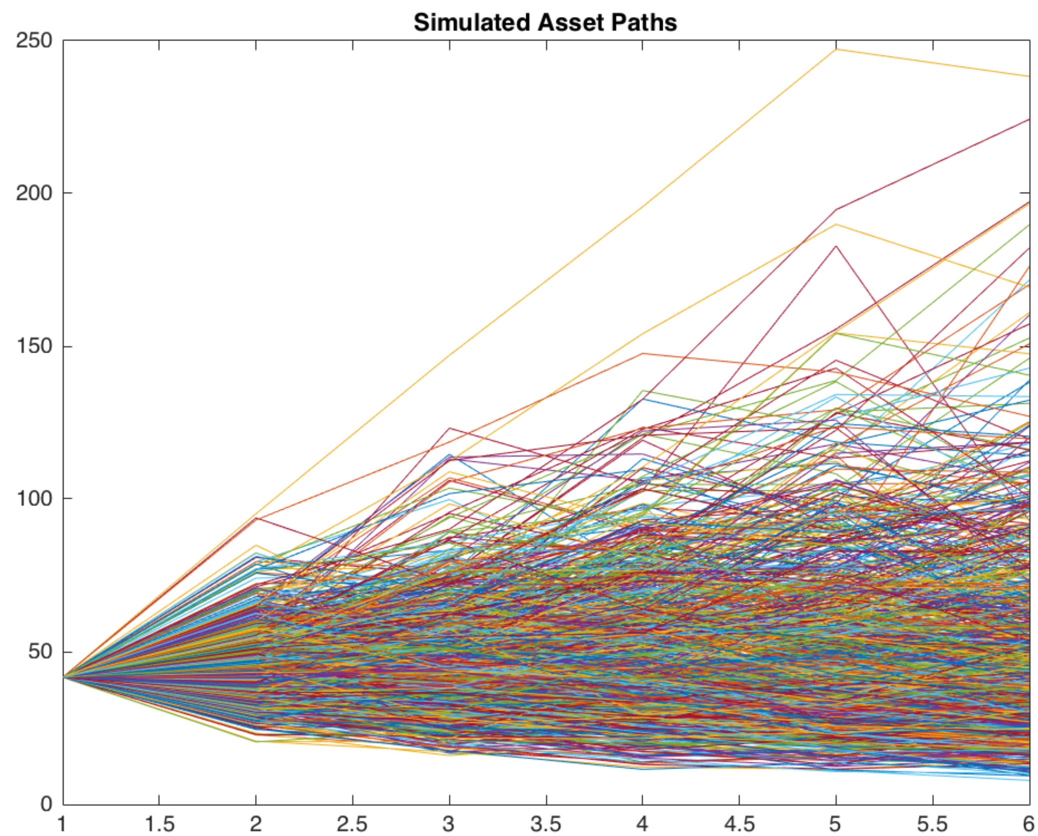


- In order for our simulation to be accurate we filtered out values were the Price of the share was below 0, in our simulation this only happened three times.

- If we look the Bear and Bull cases of our prices Exhibit 23 (which were the 25th and 75th percentile of our distribution respectively) we see that our Bear price is $19.7 and our Bull Price is $44.4.

APPENDIX

A. Simulated Oil Paths



B. Production Profile & Forecasting

BP - Production Profile										
	Historical					Projected				
December 31,	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Days in Year:	365	366	365	365	365	366	365	365	365	366
Average Daily Production:										
Gas (MCF):	6,807.00	6,609.00	6,259.00	6,016.00	5,951.00	6,010.5	6,431.2	6,643.5	6,862.7	7,089.2
Oil (MBbls):	1,285.00	1,179.00	1,176.00	1,106.00	1,232.00	1,244.3	1,256.8	1,256.8	1,256.8	1,256.8
Total Daily MMcfe:	**14,517.00**	**13,683.00**	**13,315.00**	**12,652.00**	**13,343.00**	**13,476.43**	**13,971.82**	**14,184.06**	**14,403.29**	**14,629.76**
Total Annual Production:										
Natural Gas Liquids (BCF):	2,484.6	2,418.9	2,284.5	2,195.8	2,172.1	2,199.8	2,347.4	2,424.9	2,504.9	2,594.6
Oil (MMBbls):	469.0	431.5	429.2	403.7	449.7	455.4	458.7	458.7	458.7	460.0
Total Bcfe:	**5,298.71**	**5,007.98**	**4,859.98**	**4,617.98**	**4,870.20**	**4,932.37**	**5,099.72**	**5,177.18**	**5,257.20**	**5,354.49**
Average Daily Production Growth / (Decline) Rates:										
Gas:		(2.9%)	(5.3%)	(3.9%)	(1.1%)	1.0%	7.0%	3.3%	3.3%	3.3%
Oil:		(8.2%)	(0.3%)	(6.0%)	11.4%	1.0%	1.0%	0.0%	0.0%	0.0%

C. Expenses Forecast

BP - Expense Projections										
($ in Millions or Per Mcfe Where Noted):										
	Historical					Projected				
December 31,	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Expenses Per MMcfe of Production ($ in Thousands):										
Purchases	$ 5.38	$ 5.85	$ 6.14	$ 6.10	$ 3.38	$ 3.14	$ 2.86	$ 2.64	$ 2.47	$ 2.28
Production & manufacturing expenses	$ 0.46	$ 0.55	$ 0.54	$ 0.56	$ 0.74	$ 0.68	$ 0.62	$ 0.58	$ 0.54	$ 0.50
production & similar taxes	$ (0.01)	$ 0.16	$ 0.15	$ 0.06	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.02	$ 0.01
Depreciation and depletion	$ 0.21	$ 0.25	$ 0.28	$ 0.33	$ 0.31	$ 0.29	$ 0.26	$ 0.24	$ 0.23	$ 0.21
Impairment & losses on sales	$ 0.04	$ 0.13	$ 0.04	$ 0.19	$ 0.04	$ 0.04	$ 0.03	$ 0.03	$ 0.03	$ 0.03
Exploration expenses, including dry ho	$ 0.03	$ 0.03	$ 0.07	$ 0.08	$ 0.05	$ 0.04	$ 0.04	$ 0.04	$ 0.04	$ 0.03
Distribution & admin expense	$ 0.26	$ 0.27	$ 0.26	$ 0.27	$ 0.24	$ 0.22	$ 0.20	$ 0.19	$ 0.17	$ 0.16
Fair Value on embedded derivatives	$ (0.00)	$ (0.01)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Expenses Per Mcfe:	**$ 6.37**	**$ 7.23**	**$ 7.47**	**$ 7.60**	**$ 4.78**	**$ 4.44**	**$ 4.03**	**$ 3.73**	**$ 3.49**	**$ 3.22**
Total Production-Linked Expenses ($ in Millions):										
Purchases	$ 285,133.00	$ 292,774.00	$ 298,351.00	$ 281,907.00	$ 164,790.00	$ 154,902.60	$ 145,608.44	$ 136,871.94	$ 130,028.34	$ 122,226.64
Production & manufacturing expenses	$ 24,163.00	$ 27,677.00	$ 26,127.00	$ 26,079.00	$ 35,895.00	$ 33,741.30	$ 31,716.82	$ 29,813.81	$ 28,323.12	$ 26,623.73
production & similar taxes	$ (626.00)	$ 8,158.00	$ 7,047.00	$ 2,958.00	$ 1,036.00	$ 973.84	$ 915.41	$ 860.49	$ 817.46	$ 768.41
Depreciation and depletion	$ 11,357.00	$ 12,687.00	$ 13,510.00	$ 15,163.00	$ 15,219.00	$ 14,305.86	$ 13,447.51	$ 12,640.66	$ 12,008.63	$ 11,288.11
Impairment & losses on sales	$ 2,058.00	$ 6,275.00	$ 1,961.00	$ 8,965.00	$ 1,909.00	$ 1,794.46	$ 1,686.79	$ 1,585.58	$ 1,506.31	$ 1,415.93
Exploration expenses, including dry ho	$ 1,520.00	$ 1,475.00	$ 3,441.00	$ 3,632.00	$ 2,353.00	$ 2,211.82	$ 2,079.11	$ 1,954.36	$ 1,856.65	$ 1,745.25
Distribution & admin expense	$ 13,958.00	$ 13,357.00	$ 12,611.00	$ 12,266.00	$ 11,553.00	$ 10,859.82	$ 10,208.23	$ 9,595.74	$ 9,115.95	$ 8,568.99
Fair Value on embedded derivatives	$ (68.00)	$ (347.00)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Production-Linked Exp:	**$ 337,495**	**$ 362,056**	**$ 363,048**	**$ 350,970**	**$ 232,755**	**$ 218,790**	**$ 205,662**	**$ 193,323**	**$ 183,656**	**$ 172,637**

D. EBITDAX

BP - Non-Cash and One-Time Expenses, EBITDA, and EBITDAX

($ in Millions)

	Historical					Projected				
December 31,	2011	2012	2013	2014	**2015**	2016	2017	2018	2019	2020
Operating Income:	$ 25,212	$ 11,017	$ 23,451	$ 3,780	$ (9,571)	$ (2,668)	$ 1,580	$ 4,512	$ 7,276	$ 10,754
Plus: DD&A:	11,357	12,687	13,510	15,163	15,219	14,306	13,448	12,641	12,009	11,288
Plus: Income tax Expense	12,619	6,880	6,463	947	(3,171)	(756)	448	1,278	2,061	3,047
EBITDA:	**$ 49,188**	**$ 30,584**	**$ 43,424**	**$ 19,890**	**$ 2,477**	**$ 10,882**	**$ 15,475**	**$ 18,431**	**$ 21,346**	**$ 25,089**
EBITDA Margin %:	13%	8%	11%	6%	1%	5%	7%	9%	11%	14%
Plus: Exploration:	1,024	745	2,710	3,029	1,829	1,867	1,867	1,867	1,867	1,867
EBITDAX:	**$ 50,212**	**$ 31,329**	**$ 46,134**	**$ 22,919**	**$ 4,306**	**$ 12,749**	**$ 17,343**	**$ 20,299**	**$ 23,213**	**$ 26,956**
EBITDAX Margin %:	13%	8%	12%	6%	2%	6%	8%	10%	12%	15%

E. WACC

WACC Calculation	
Capital Structure	
Debt-to-Total Capitalization	33.20%
Equity-to-Total Capitalization	66.80%
Cost of Debt	
Cost of Debt	1.67%
Tax Rate	26.13%
After-tax Cost of Debt	1.23%
Cost of Equity	
Risk-free Rate	1.78%
Market Risk Premium	7.50%
Levered Beta	140.10%
Size Premium	0.00%
Cost of Equity	12.29%
WACC	**8.62%**

F. Tax Forecasting

BP - Tax Rate Projections										
	Historical					Projected				
December 31,	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Income Tax %:										
Current:	31.7%	34.8%	20.3%	14.8%	40.0%	28.3%	28.3%	28.3%	28.3%	28.3%

G. Income statement

BP - Income Statement										
($ in Millions Except Per Share Data)										
	Historical					Projected				
December 31,	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Revenue:	**386,216**	**388,074**	**396,217**	**358,678**	**225,982**	**216,121.34**	**207,242.29**	**197,834.95**	**190,932.37**	**183,391.15**
Expenses:										
Purchases	$ 285,133	$ 292,774	$ 298,351	$ 281,907	$ 164,790	$ 154,903	$ 145,608	$ 136,872	$ 130,028	$ 122,227
Production & manufacturing expenses	24,163	27,677	26,127	26,079	**35,895**	$ 33,741	$ 31,717	$ 29,814	$ 28,323	$ 26,624
production & similar taxes	(626)	8,158	7,047	2,958	**1,036**	$ 974	$ 915	$ 860	$ 817	$ 768
Depreciation and depletion	11,357	12,687	13,510	15,163	**15,219**	$ 14,306	$ 13,448	$ 12,641	$ 12,009	$ 11,288
Impairment & losses on sales	2,058	6,275	1,961	8,965	**1,909**	$ 1,794	$ 1,687	$ 1,586	$ 1,506	$ 1,416
Exploration expenses, including dry holes	$ 1,520	$ 1,475	$ 3,441	$ 3,632	$ 2,353	$ 2,212	$ 2,079	$ 1,954	$ 1,857	$ 1,745
Distribution & admin expense	13,958	13,357	12,611	12,266	**11,553**	$ 10,860	$ 10,208	$ 9,596	$ 9,116	$ 8,569
Fair Value on embedded derivatives	(68)	(347)	-	-	**-**	$ -	$ -	$ -	$ -	$ -
Litagation	8,906	6,249	1,400	1,296	**1,145**	$ 530	$ -	$ -	$ -	$ -
Total Expenses:	**346,401**	**368,305**	**364,448**	**352,266**	**233,900**	**218,790**	**205,662**	**193,323**	**183,656**	**172,637**
Profit before interest & tax	**$ 39,815**	**$ 19,769**	**$ 31,769**	**$ 6,412**	**$ (7,918)**	**$ (2,668)**	**$ 1,580**	**$ 4,512**	**$ 7,276**	**$ 10,754**
Finance Costs	$ 1,187	$ 1,072	$ 1,068	$ 1,148	$ 1,347	**$ 1,164**	**$ 1,164**	**$ 1,164**	**$ 1,164**	**$ 1,164**
Net Finance expenses pensions	400	566	480	314	**306**					
Operating Income	**$ 38,228**	**$ 18,131**	**$ 30,221**	**$ 4,950**	**$ (9,571)**	**$ (3,833)**	**$ 416**	**$ 3,348**	**$ 6,112**	**$ 9,590**
Income Tax Expense:										
Current	$ 12,619	$ 6,880	$ 6,463	$ 947	$ (3,171)	$ (755.98)	$ 447.63	$ 1,278.42	$ 2,061.37	$ 3,046.78
Total Income Tax Exp.:	**12,619**	**6,880**	**6,463**	**947**	**(3,171)**	**(756)**	**448**	**1,278**	**2,061**	**3,047**
Net income attributable to BP	**25,212**	**11,017**	**23,451**	**3,780**	**(6,482)**	**$ (1,912)**	**$ 1,132**	**$ 3,234**	**$ 5,215**	**$ 7,707**
Net income attributable to noncontrolling interests	$ 397.00	$ 234.00	$ 307.00	$ 223.00	$ 82.00	$ 24.50	$ (14.51)	$ (41.44)	$ (66.81)	$ (98.75)
Net Income Including noncontrolling Interests:	**$ 25,609**	**$ 11,251**	**$ 23,758**	**$ 4,003**	**$ (6,400)**	**(1,937)**	**1,147**	**3,275**	**5,281**	**7,806**

H. DCF Model

BP - Unlevered Free Cash Flow Project	31/12/2016	31/12/2017	31/12/2018	31/12/2019	31/12/2020
Daily Production (MMcfe):	$ 13,476.43	$ 13,971.82	$ 14,184.06	$ 14,403.29	$ 14,629.76
		4%	2%	2%	2%
Revenue:	$ 216,121.34	$ 207,242.29	$ 197,834.95	$ 190,932.37	$ 183,391.15
		-4%	-5%	-3%	-4%
EBITDAX:	$ 12,748.92	$ 17,342.51	$ 20,298.85	$ 23,213.32	$ 26,956.38
		36%	17%	14%	16%
Operating Income (EBIT):	$ (2,668.36)	$ 1,579.98	$ 4,512.37	$ 7,275.92	$ 10,754.09
		-159%	186%	61%	48%
Less: Taxes	$ 755.98	$ (447.63)	$ (1,278.42)	$ (2,061.37)	$ (3,046.78)
		-159%	186%	61%	48%
Plus: DD&A	$ 13,877.55	$ 13,076.92	$ 12,153.22	$ 11,294.76	$ 10,496.94
		-6%	-7%	-7%	-7%
Working Capital (Increase) / Decrease:	$ 31.16	$ 153.22	$ 252.96	$ 333.45	$ 397.35
		392%	65%	32%	19%
Less: Capital Expenditures:	$ (17,000.00)	$ (17,000.00)	$ (15,799.18)	$ (14,683.19)	$ (13,646.02)
		0%	7%	7%	7%
Unlevered Free Cash Flow	$ (5,004)	(2,638)	$ (159)	$ 2,160	$ 4,956
		47%	94%	1457%	129%
Present Value of Free Cash Flow	$ (4,801)	$ (2,330)	$ (129)	$ 1,617	$ 3,416
		51%	94%	1349%	111%
Normal Discount Period:	*1.000*	*2.000*	*3.000*	*4.000*	*5.000*
Mid-Year Discount:	*0.500*	*1.500*	*2.500*	*3.500*	*4.500*
Free Cash Flow Growth Rate:		*47.3%*	*94.0%*	*1457.2%*	*129.5%*

I. Macroeconomic Discussion

- We feel oil has currently found a floor at earlier levels. Saudi Arabia dragged a reluctant OPEC along with it on a supply-fueled bid to increase their market share in world oil markets in 2014. Saudi's aim: a test of the strength and robustness of non-OPEC oil production, explicitly aimed at a band of high-cost, unconventional producers rapidly appearing on the horizon. Saudi and OPEC's production overload forced many US oil rigs to call it quits. North America is 501 rotary rigs (53.8%) lower than last year. However, above $45/$50 and a myriad of US oil rigs come back online, shortly followed by shale pipelines that switch on like a tap.

- Market dynamics are changing fast. Output is slipping all over the place: in China, Latin America, Kazakhstan, Algeria, the North Sea. The US shale industry has rolled over, though it has taken far longer than the Saudis expected when they first flooded the market in November 2014. The US Energy Department expects total US output to drop to 8.6m barrels per day (b/d) this year from 9.4m last year. China is filling up the new sites of its strategic petroleum reserves at a record pace. Its oil imports have jumped to 8m b/d this year from 6.7m in 2015, soaking up a large part of the global glut.

- There are also certain risks around the oil price. Saudi's primary foe is Iran. International sanctions have been lifted against Iran after scaling back its nuclear program. Ultimately, this means that Iran are free to export oil causing even extra supply to the already struggling industry. At current oil prices it isn't feasible for Iran to produce at its highs. However, it ultimately has the resources to keep World production at its highs. We feel energy demand will continue to grow as economy's grow. Now, the global economic fundamentals are shifting as China, still a vast economy slows down from its period of hyper-growth, and new countries such as India are anticipated to play a more prominent role in the future of the global economy. Therefore, we are ultimately happy with our price projections and that oil will trade at much lower levels than recent highs for longer.