Lessons from the Energy industry's top performing companies

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Driving value in upstream Oil & Gas

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Overview

The need to understand and assess value in the Oil & Gas sector has never been greater than it is today.

Over the next twenty years the sector will need to invest substantial amounts of capital to meet the growing demand for energy – and do so in the context of rising cost pressure and competitive forces.

This paper examines the ability of companies in the upstream Oil & Gas sector to drive value for shareholders on this large future investment.

We have done this by identifying the top performing companies, as measured by their return on capital employed (ROCE) over the past 7 years, and isolating the key characteristics that enable them to deliver returns over and above that of their peers.

The best performing companies – those in the top quartile – generated an average ROCE of more than 32 per cent between 2006-2012. This is higher than the 21 per cent achieved for the industry as a whole and significantly better than the 9 per cent (or less) recorded for companies in the bottom quartile.

The three factors we believe best explain the difference in their performance are:

1. Selectivity not velocity in their approach to capital investment – it's not about how much you spend but what you spend it on that counts.

2. Commitment to driving capital productivity – top performers are on average almost twice as effective as their peers in terms of capital productivity.

3. A strong focus on operating excellence – companies in the top quartile had production costs almost 10 per cent lower than the industry average.

The upward trajectory of global energy demand presents enormous opportunities for companies in the upstream Oil & Gas sector for the next two decades. The companies that want to stay ahead of the pack and deliver strong returns to their shareholder will be those paying careful attention to these three factors.

Introduction

The Oil & Gas sector is operating in an environment of unprecedented opportunity, mixed with a high degree of volatility and risk. The industry has grown strongly over the past decade and its outlook is equally positive, driven by three central economic and demographic drivers of demand: population growth, global GDP growth and rising energy consumption (Figure 1).

While the sector has clearly benefited from these megatrends, in particular the recent economic expansion in the emerging / Non-OECD economies, uncertainty is rising. There is unrelenting pressure on prices, operating costs are escalating, and investors' confidence that value can be delivered from the considerable investment in capital has been shaken.

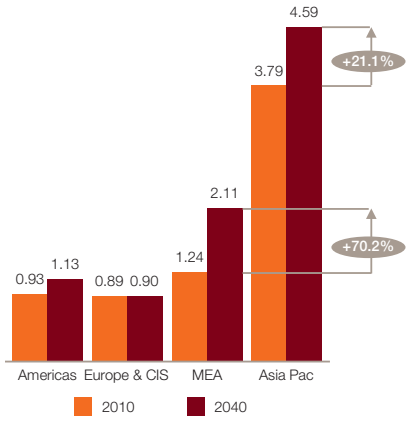
Given the capital intensity of the Oil & Gas sector, there never has been a greater need to understand and assess value. Competitive pressures are forcing management to explore options for real change to improve the overall productivity and efficiency of the businesses under their control.

Figure 1: The three megatrends shaping the Oil & Gas sector

Population Growth

Over the last 20 years the industry has benefited from a rapid rise in population, which has seen the global inhabitants increase by 1.6 billion people.

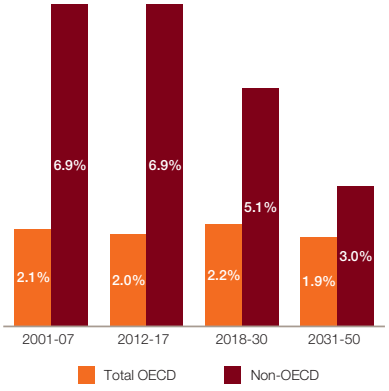
Even though these rates of growth are now declining, the global population is forecast to grow by 1.4 billion over the next 20 years (or 0.9% p.a.).



Global GDP Growth

This will continue, and is driven by economic growth in the Asia Pacific region.

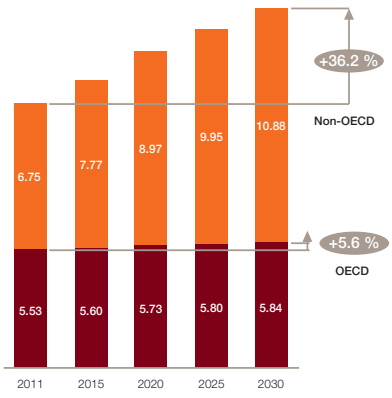
Projections of global GDP growth indicate an expected growth of between 3.3 – 3.7% p.a. from 2013 to 2030.



Energy Consumption

World primary energy consumption is projected to grow by 1.6% per annum up to 2030, adding 39% to global consumption.

Almost all (96%) of the growth is in non-OECD countries.

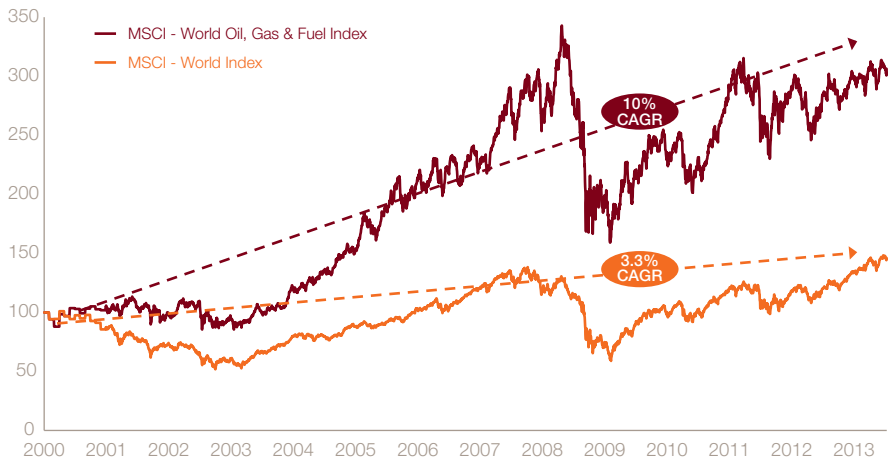


Sources: ExxonMobil – "The outlook for energy: A view to 2040"; BP – "Economic Outlook 2030", U.S. Energy Information Administration (EIA)

If there has been a change in the assessment of company performance in recent years, it has been in scrutinising if Oil & Gas companies have delivered shareholder value, as determined by the ability to drive strong surplus returns on invested capital. This ability to deliver strong performance will be critical as companies face large increases in capital expenditure over the next twenty years in order to meet the world's growing demand for energy.

And even more-so because the Oil & Gas sector has established a relatively high benchmark in terms of setting and meeting expectations about strong performance in the future. The average annual return for companies in the MSCI World Oil, Gas and consumable Fuels Accumulation Index[1]– a good proxy for measuring industry performance – was 10%. This represents a significant outperformance compared to a measure of performance across all sectors, which averaged 3.3% over the same period (Figure 2).

Figure 2: Oil & Gas generated significant returns in the period 2000 – 2013



[1] Source: S&P Capital IQ – The MSCI – World Oil & Gas Share Price Accumulation Index provides investors with a price plus gross cash dividend return assuming the dividends are reinvested at the time of distribution.

Aim and scope of the study

Our study explores the link between growth and value in the upstream (Exploration and Production) activities of 74 of the largest global Oil & Gas companies, based on published financial statements for the periods 2006 to 2012.[2]

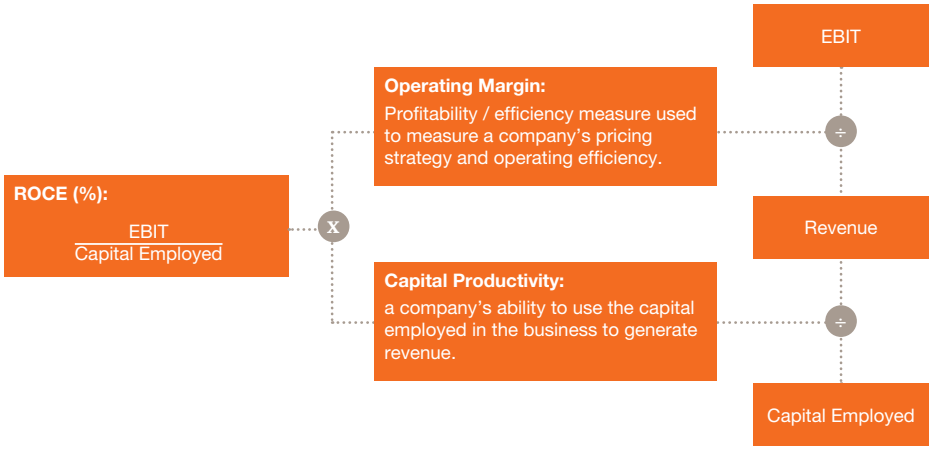
We have done this by identifying the top performing companies, in terms of their ability to deliver greater value for shareholders as measured by their return on capital employed (ROCE), and isolating the key characteristics that enable them to deliver returns over and above that of their peers, independent of their growth record.

The study concentrates solely on the upstream activities of these companies and downstream activities such as refining, transport and retail, as well as activities outside the Oil & Gas sector have been excluded from the analysis.

We chose ROCE as a measure of performance because it is a worthy proxy for value. A key question for investors and company executives alike is whether the capital invested in a business earns a higher return than an investment alternative with a similar risk profile. An answer to this question – which itself differentiates the value-based management approach from other managerial styles – can be derived through a focus on operating efficiency and capital productivity.

When both these metrics are combined we derive ROCE (Figure 3), a ratio that highlights the rate of return which the business is generating compared to the capital employed to generate those returns and are key determinants of underlying market value.

Figure 3: Structural Components of ROCE



[2] See Appendices for further details of the study participants and methodology

Who are the top value performers and why?

Table 1 lists the companies in the upstream Oil & Gas sector whose average ROCE between 2006 and 2012 placed them in the top quartile of all the companies included in the study. Companies in the top quartile recorded an average ROCE of greater than 32 per cent.

Notable is the fact that this group generates twice the ROCE compared to the sector as a whole, which was on average 21 per cent between 2006 and 2012. In other words, top performers significantly outperform the rest of the industry.

Even so, those companies in the bottom quartile generated reasonable returns, averaging 9 per cent for the same period. In the context of the volatility created during this time as a result of the global financial crisis, the overall performance of the upstream Oil & Gas sector is quite outstanding.

Top performers significantly outperform their peers.

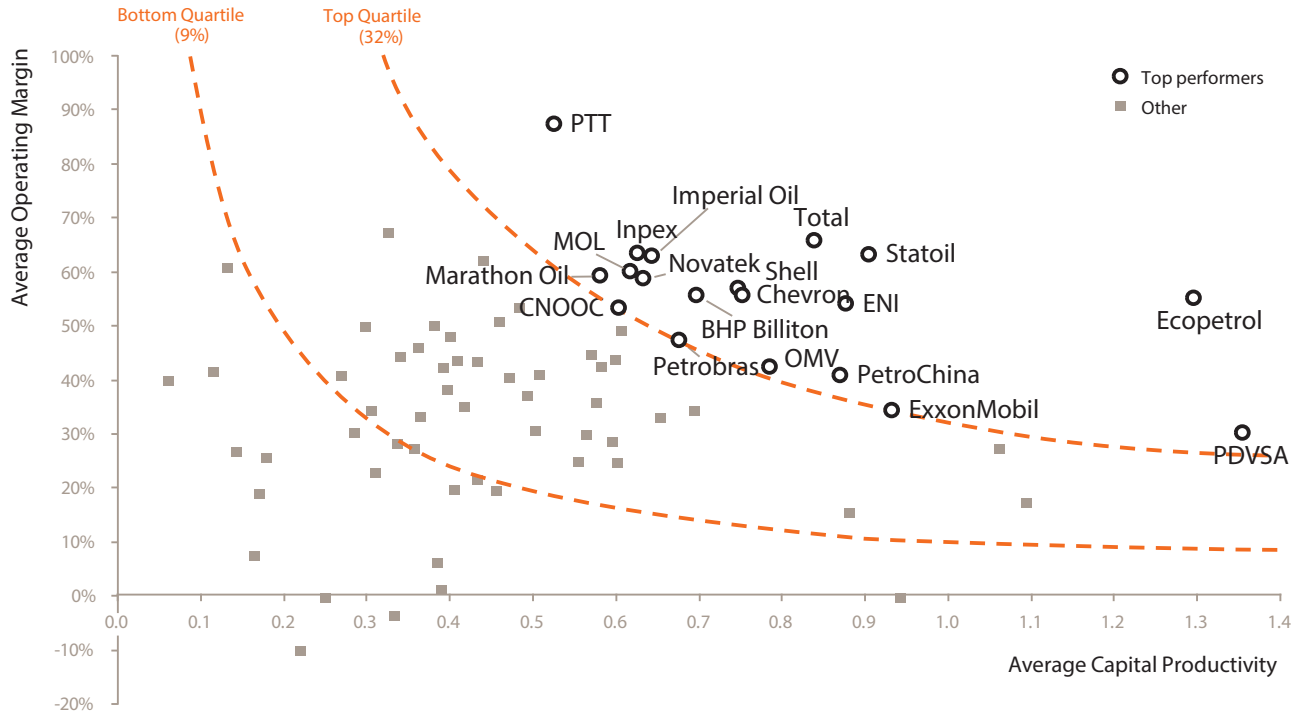
Table 1: Top Performers in the Global Upstream Oil & Gas Sector (2006-2012)

Rank	Top performers	Based in	Total Assets (US$m)	Upstream ROCE (%)	Upstream Operating Margin %	Upstream Capital Productivity
1	Ecopetrol	Colombia	$64,521	71%	55%	1.30
2	Statoil	Norway	$140,515	57%	63%	0.90
3	Total	France	$227,125	55%	66%	0.84
4	ENI	Italy	$184,578	47%	54%	0.88
5	PTT	Thailand	$53,747	46%	87%	0.53
6	Shell	Netherlands	$350,294	42%	57%	0.75
7	Chevron	United States	$232,982	42%	55%	0.75
8	PDVSA	Venezuela	$218,424	41%	30%	1.36
9	Imperial Oil	Canada	$29,464	40%	63%	0.64
10	Inpex	Japan	$32,566	40%	63%	0.63
11	BHP Billiton	Australia	$129,273	39%	55%	0.70
12	Novatek	Russia	$15,215	37%	59%	0.63
13	MOL	Hungary	$21,696	37%	60%	0.62
14	PetroChina	China	$344,207	35%	41%	0.87
15	Marathon Oil	United States	$35,306	34%	59%	0.58
16	OMV	Austria	$40,340	33%	42%	0.79
17	CNOOC	China	$72,379	32%	53%	0.60
18	Petrobras	Brazil	$331,645	32%	47%	0.68
19	ExxonMobil	United States	$333,795	32%	34%	0.93
	Top Performers Average			**38%**	**54%**	**0.75**
	Industry average			21%	38%	0.51

Sources: Evaluate Energy, Annual financial statements, Investor presentation and PwC analysis. See appendices for details relating to the companies included in the sample and our methodology.

Figure 4 shows where all the companies in the study sit on the two dimensions of ROCE – operating margins and capital productivity. What is clear from the results is that the top performers tend to have strong results on both dimensions. To be a high performer therefore you need to have strong operating margins and high capital productivity; being good at only one is generally not enough to put you in the top quartile in terms of generating value.

Figure 4: Top performers tended to score high on both dimensions of Return on Capital Employed (2006-2012)



Note: Capital Productivity is defined as revenue generated per $ capital employed

Key drivers of value

These results beg the question — what are the characteristics of these companies that differentiate them from their peers and why is their outperformance so significant?

Based on our cross-sectoral work in the Energy, Utilities & Mining sectors, our specific recent experience with Oil & Gas megaprojects and from interviews with industry participants we have identified three core differentiators of value:

1. **Selectivity, not velocity, in their approach to capital management**
2. **Commitment to driving capital productivity**
3. **A focus on operating excellence**

Capital expenditure has increased significantly, albeit at a slower rate in recent years, while production growth stagnates.

Selectivity, not velocity, in capital expenditure

Prior to examining the performance of individual companies in terms of the value they generate from their capital investment, we first considered the impact of several industry-wide trends.

First is that even though Oil & Gas companies have continued to increase upstream spending, production growth has stagnated (Figure 5). For the companies included in this study, we estimated that between 2006 and 2012 upstream capital expenditure increased by 72 per cent while production grew by only 6.6 per cent.

Second is that, based on this level of spending, the upstream sector as a whole is doubling its asset base every 3.3 years, indicating a strong pursuit of growth. Between 2006 and 2013 the industry outlaid more than $3.1 trillion in capital expenditure to exploration and development projects.

Third is that capital velocity - the ratio of capital expenditure to the capital employed in the business and a proxy for measuring the growth agenda of organisations in capital intensive industries – is slowing, from a high of 0.38 in 2006 to 0.30 in 2012 (Figure 6).

The slowdown in the velocity at which organisations are committing capital, indicates heightened selectivity and capital discipline within the sector. In other words, companies are being more considered and deliberate about their investments. For example, North American companies have redirected spending from gas to oil and liquids-rich plays and dominant companies and those with limited oil acreage have slowed capital spend ruthlessly.

Figure 5: Upstream capital expenditure has risen exponentially

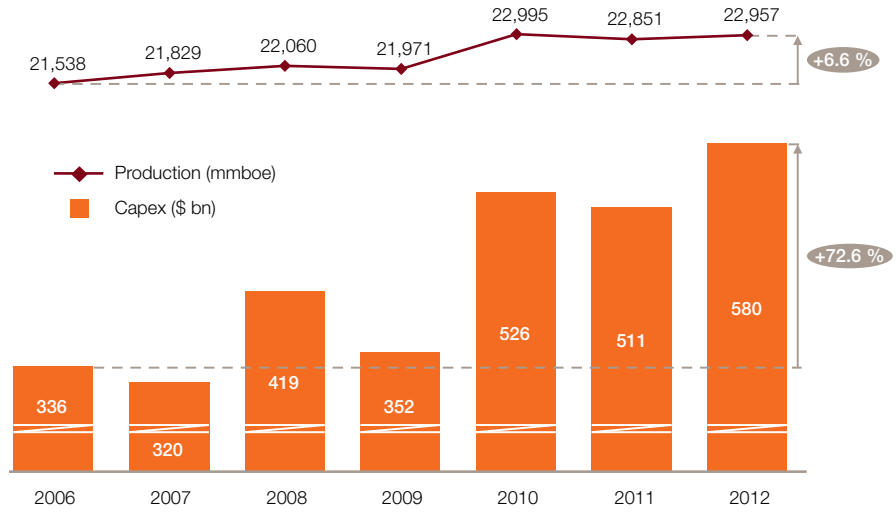
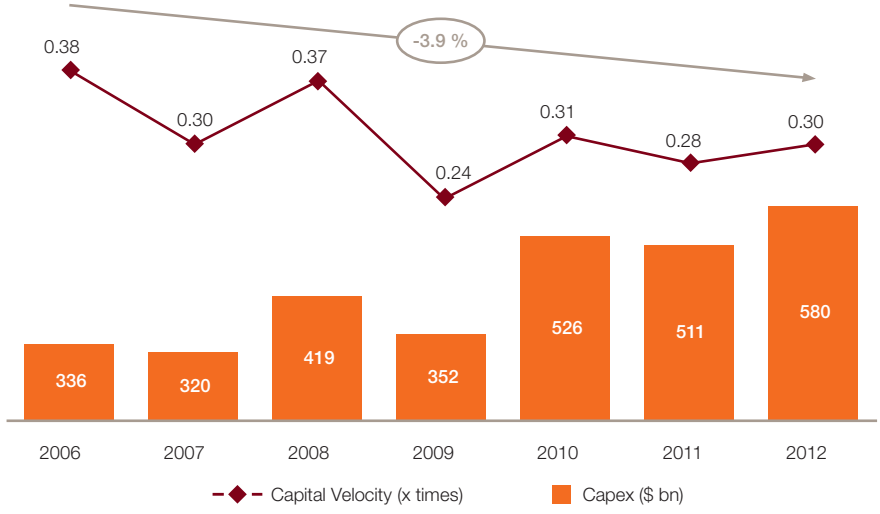
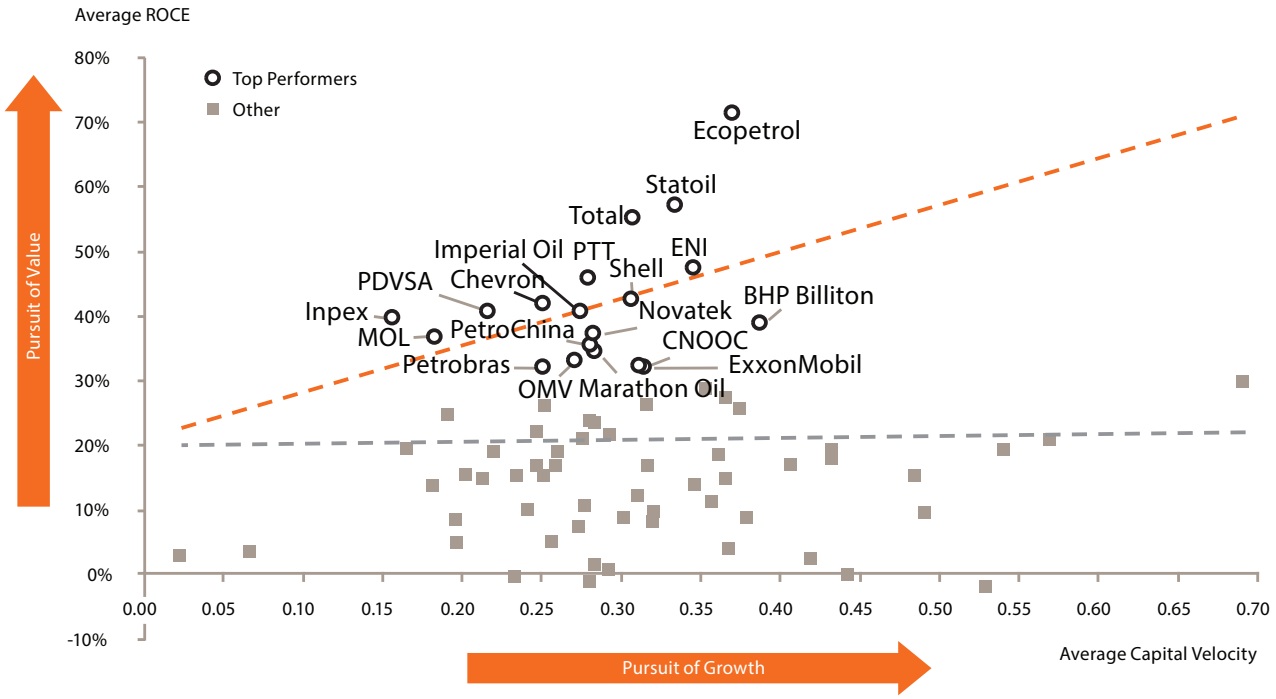


Figure 6: Capital Velocity* in Upstream Oil & Gas



* Capital Velocity is the ratio of CAPEX to Capital Employed. It is PwC's proxy for measuring an organisation's growth agenda in capital intensive industries.

Figure 7: Selectivity, not velocity, leads to greater value



So in the context of growing but slowing capital spend and decreasing production growth, the question of why some companies are able to deliver significantly greater returns on that investment compared to their peers become critical.

Figure 7, highlights that pursuing growth does not necessarily generate value. Our analysis shows that other than the top performers, the pursuit of growth has minimal correlation with delivering value, when measured by returns on capital employed. Equally an overly constricted rationing of capital in the quest to minimise risk can lead to significant value opportunities being overlooked.

The top performer group however, demonstrates a positive relationship between returns on capital generated and their pursuit of growth as measured by capital velocity. Our view is that the best performing companies maintain a continuous focus and disciplined approach to investment prioritisation and capital allocation. They consider the selectivity of their project portfolio, not the velocity of their investments, as the core driver of value.

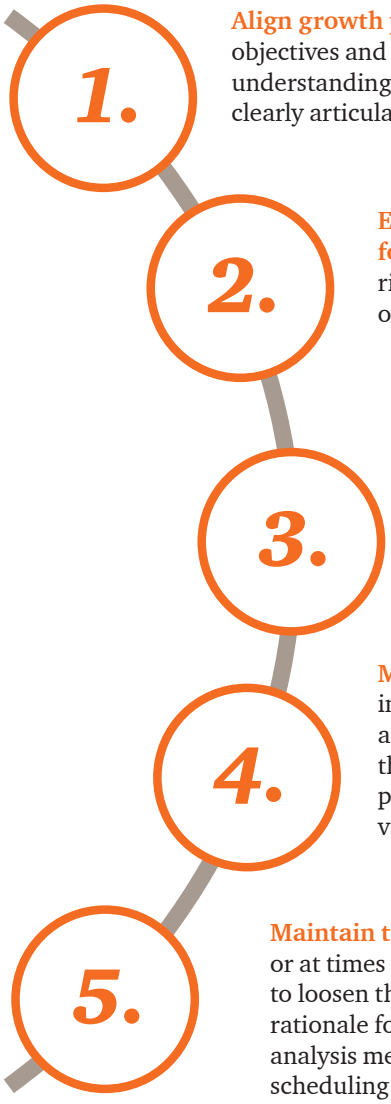
In other words, it's not how much or how fast you spend but what you spend it on that counts. Some of this group have pursued brownfield expansions of their existing resource base, while others choose to pursue projects that required lower capital investment relative to the productive capacity produced.

In the context of the need to maintain agility and constantly monitor how investment projects are adding or destroying portfolio value, these companies ensure that factual and realistic measurement and reporting frameworks are in place, as major capital projects progress through early design, into detailed evaluation and eventually full-scale development.

These findings become more salient in light of the fact that too many projects still fail to deliver. Despite significant advances in improving governance structures for capital projects, data from the IPA indicates that almost 65 per cent of industrial megaprojects (i.e. capital budgets greater than US $1 billion) fail to meet business objectives. Forty-one per cent of the megaprojects studied were from the Oil & Gas sector.[3]

[3] *Merrow, E.W (2011) "Industrial Megaprojects": John Wiley & Sons, Inc. New Jersey*

Key traits of an effective capital decision framework



Align growth portfolio with the business strategy. Establishing the link between the strategic objectives and the growth portfolio plan provides the shareholders and the market with a clearer understanding of the direction of the organisation. For a large global company operating without a clearly articulated growth plan, there is considerable opportunity for wasted effort.

Establish a formal approach to portfolio optimisation including a strong framework for evaluation and prioritisation of investment alternatives. Ensure that there is more rigour between major review points to link effective governance and control with the reality of projects to facilitate timely and well-informed decisions.

Identify and select investment alternatives based on strategy, values, risks and dependency. Prior to any portfolio consideration, potential projects should be considered for basic financial feasibility. This initial project evaluation should give a strong picture of the robustness of the project as a stand-alone proposition with the only portfolio assumptions at this stage being the delivery of any other major projects deemed as critical enablers.

Monitor performance and if required, inform changes to the project plan. An active, independent and sceptical review process can challenge each project's cost / benefit assumptions with respect to current and emerging market conditions. Best practice shows that "Black Hat" reviews undertaken by a suitably qualified team, independent of the project feasibility / management team can often uncover significant risk and potential value improvements.

Maintain the rigour in the approval of investments at all times. During commodity price booms or at times of optimism around global growth, it is tempting for even the most stringent of companies to loosen their approach to the approval of major capital investment projects. Even if the basic rationale for the investment is economically sound, accelerated investment approval without robust analysis methods can result in significant delays and cost blowouts due to practical problems around scheduling and procurement.

As projects become comparable on a time and value basis, the risk component must also be incorporated into the ranking process. Each project's expected return – including the positive and negative risk impacts to the expected return – should be confirmed and operational accountability for delivery of those returns should be embedded early. Optimising a portfolio also requires an organisation to maintain alignment to business objectives and ensure projects are still integrated with the growth plan.

Effective portfolio optimisation

It is crucial that all stakeholders and joint venture partners understand the complexities of portfolio optimisation.

Prior to any portfolio consideration, potential projects should be considered for basic financial feasibility. A portfolio approach at a minimum should rank projects on a combination of value metrics such as Net Present Value, Internal Rate of Return and Capital Efficiency Ratio.

Once a robust identification process has been put in place and the investment alternatives are narrowed, stakeholders must then measure and rank all reasonable value creating options by their respective return rates.

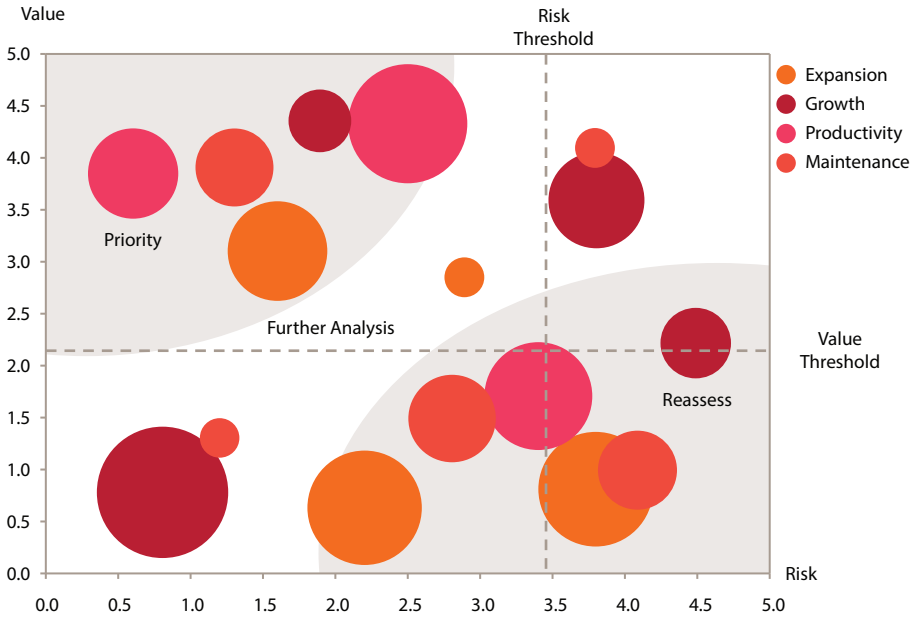
Additionally key indicators such as cost curve percentile, margin curve percentile, future option value and a metric representing some internal measure of strategic fit / risk are required at a minimum.

Risks to project delivery can be mitigated and engineering scope be reduced to cut costs while retaining the majority of benefits. Often the 'Do Minimum' option is overlooked during the front end engineering and design stage.

Best practice also dictates that the operational factors driving the expected future returns are checked and reviewed at a number of decision points. It's important that these are not overlooked in the face of the detailed assessment of capital that often dominates at this early stage of the capital lifecycle.

Figure 8 shows a typical project prioritisation matrix that categorises projects on the basis of risk and value. High value low risk projects are given priority over other combination.

Figure 8: Project prioritisation – Focus on the Value / Risk Tradeoff



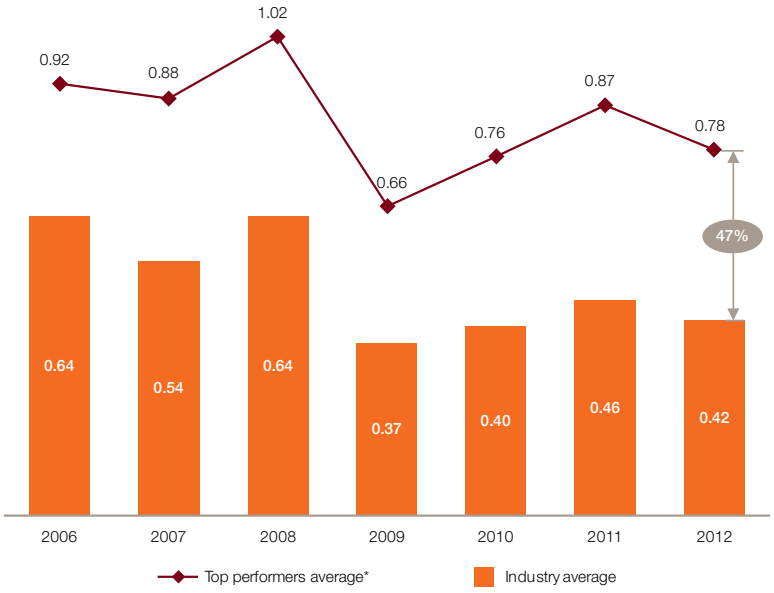
Driving capital productivity is a key challenge

Capital productivity in the Oil & Gas sector has been declining continuously since 2006. Our analysis below shows that the industry has been less than efficient in its use of capital resources over the same period (Figure 9).

Our analysis shows that the decline in upstream productivity is as consistent amongst the top performers as in the industry as a whole. The major difference is that the top performers are on average almost twice as effective as their peers in terms of capital productivity (Figure 9).

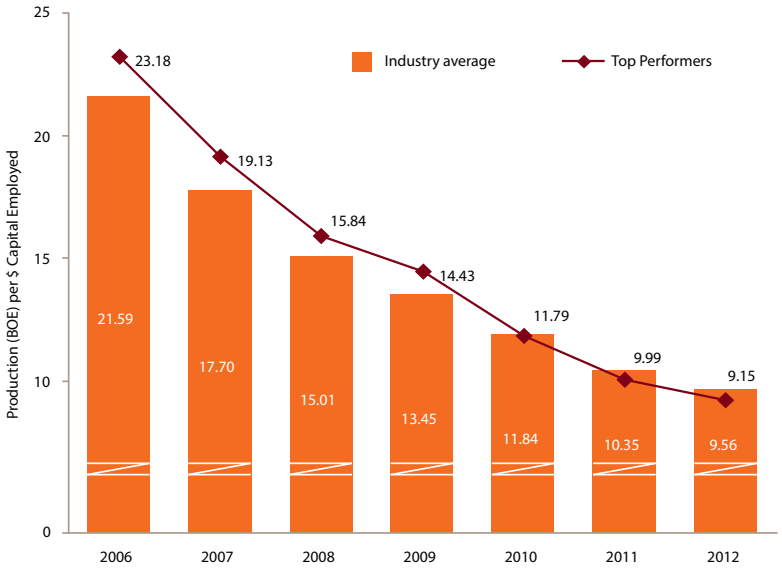
Although we have defined productivity from a financial perspective, we have also examined the issue of unit (output) productivity and have seen the same story (Figure 10). The industry as a whole is achieving almost half the output compared to seven years ago relative to the capital employed in real terms. This trend is as consistent among the top performers as the industry as a whole and has occurred despite increases in production and advances in technology and innovation including the increased use of unconventional technologies (i.e. horizontal drilling, fracking) in the onshore Oil & Gas sector.

Figure 9: Capital Productivity* in the upstream Oil & Gas sector



* Capital Productivity is defined as $ revenue generated per $ capital employed.

Figure 10: Unit Capital Productivity* has been decreasing



* Unit Capital productivity – Production (boe) per $ Capital Employed (Nominal Terms).

Many in the industry believe that in the medium term the recent wave of investment will near completion, resulting in large-scale exploration and development projects teams rapidly downsizing to smaller operational workforces, which they believe will lead to a consequent uplift in productivity. Whilst this scenario may eventuate in certain cases, we believe the outlook for the sector as a whole will result in a continued need to invest and that capital productivity is unlikely to improve any time soon.

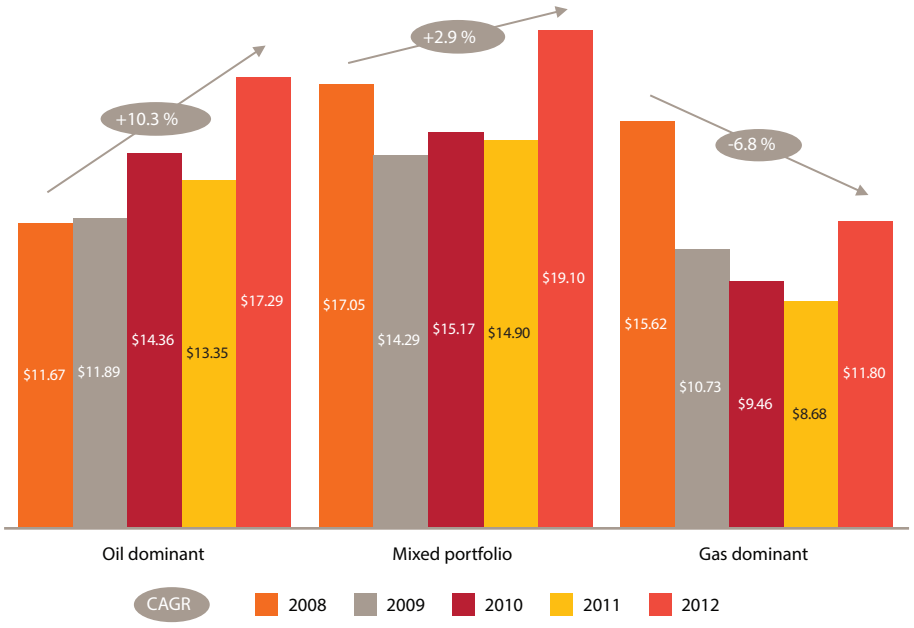
Oil & Gas exploration is an expensive and risky activity. Finding and developing reserves is increasingly more expensive (Figure 11). Apart from the gas sector which succeeded in lowering its average F&D Costs in the last seven years, the remainder of the upstream sector faced increased cost pressures.

Offshore and "frontier" exploration is generally undertaken by large International or National oil corporations, with deep-water exploration wells costing in excess of $150 million in many instances.

Surprisingly, onshore exploration in both the conventional and unconventional areas is dominated by junior explorers, with exploration being a less costly exercise and some wells costing little more than $250,000 to complete. However, as the North American shale experience shows many more wells are required to generate the production equivalent to a conventional find and the development infrastructure (gathering, cleansing and compression facilities) significantly add to the total costs of development.

But some of the top performers are finding ways to challenge this trend and drive growth in capital productivity. Two of the features of top performers we identified were capital optimisation and reliability-focused asset management.

Figure 11: Finding & Development costs ($ / boe reserve add) on a 3 year rolling average



Capital optimisation

The most recent example of a renewed focus on driving capital productivity comes from Woodside and Shell's efforts to pursue Floating LNG (FLNG) technology to commercialise the Browse project, located in the Indian Ocean, 425 km north of Broome in Western Australia. It is estimated to contain contingent volumes of 15.9 tcf of dry gas and 436 million barrels of condensate and the joint venture will pursue a 3.6 mtpa FLNG facility to monetise the asset.

This follows the decision in April this year to reject the 12.0 mtpa onshore liquefaction development at James Price Point due to cost concerns and the ability to drive adequate capital returns. The decision has the potential to eliminate $10 billion in capital expenditure compared to the onshore development at James Price point.

The only other major FLNG project under development is Petronas' Kanowit FLNG project scheduled for deployment in 2015. With a 1.2 mtpa capacity, it is expected to convert gas into LNG from the Kanowit gas field, 180km offshore from the Sarawak province in Malaysia. Its production is destined for the Malaysian domestic market and enables Petronas to monetise a stranded gas asset. The FLNG option eliminates substantial capital costs associated with alternative development options such as subsea pipelines to shore and onshore processing facilities.

Reliability focused asset management

As the upstream sector depends more and more on increasingly complex collections of physical assets, its ability to achieve and sustain reliable production delivery becomes increasingly dependent on the selection, operation and condition of physical assets. The safety of the asset and of the wider community also become progressively more reliant on the condition of those assets.

Top performers manage the demanding balance between risk, cost, and performance (availability and reliability). They demonstrate systematic and coordinated practices that optimally and sustainably manage their assets, risks and expenditures over the asset life-cycle.

They have avoided the trap of running their assets into the ground as a result of focusing solely on cost, but through an unrelenting focus on asset / well availability and reliability have ensured the optimum balance is reached, without compromising safety.

A strong focus on operating excellence is imperative

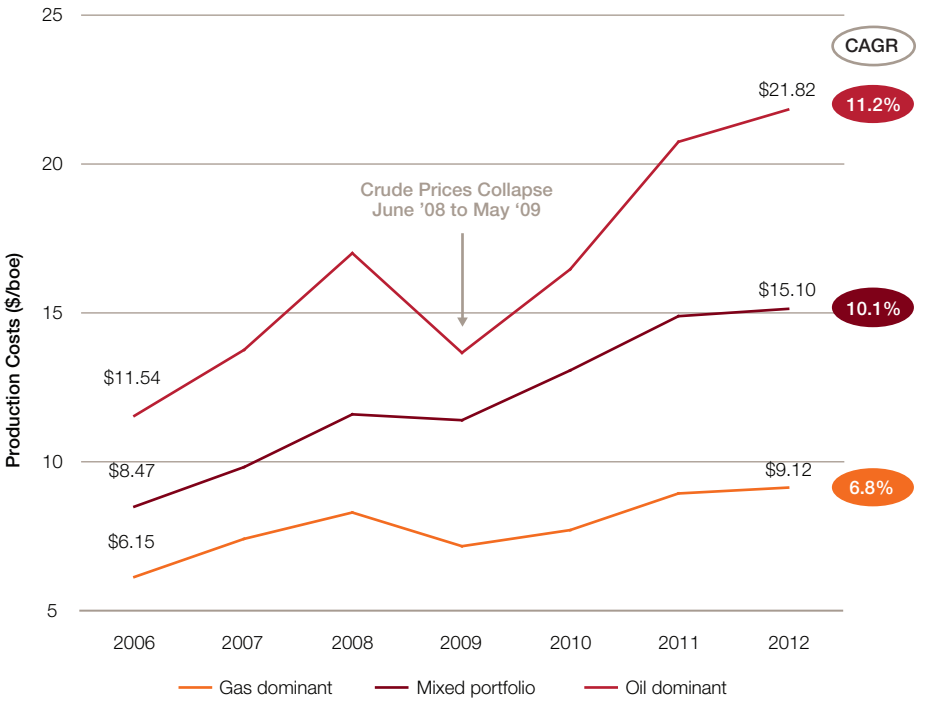
Over the last seven years production costs in the Oil & Gas sector have increased from a low of 6.8% amongst gas dominant companies, to a high of 11.2% for those companies whose production profile is dominated by Oil (Figure 12).

The only period where the industry managed to improve efficiency was in the period immediately following the global financial crisis. The sudden collapse of oil prices from a peak of $145 in June 2008 to a low of around $40 in February 2009 saw a renewed and rapid shift in focus to operating excellence and cost efficiency. In the immediate two years post this collapse we saw operating cost per BOE decline to levels below their pre GFC level.

It is notable that the gas companies have been more successful in controlling operating costs (6.8% CAGR). This performance results from a managerial focus on operating efficiency to ensure survival as a result of gas prices for North American producers dipping from $13mmbtu in October 2005 to a low of $2mmbtu in May 2012.

During these industry cycles we have seen that companies who use pricing pressure as an opportunity to deeply transform their operating model around cost efficiency thrive, and in the process deliver significant value for their shareholders.

Figure 12: Production (Lifting) Costs ($/boe) 2006 to 2012



The production costs of the top performers were on average more than 10 per cent lower than the industry average in 2012, but differs by production mix (Figure 13).

A consistent theme emerges from this study, and as we explored looking at the top quartile performance of companies. We see a significant productivity improvement opportunity, should the industry as a whole replicate the performance exhibited by top quartile performance. In fact, the opportunity to close this gap represents almost $22 billion in annualised value.

Based on our experience working across the sector we have identified the following characteristics that differentiate the top performers in terms of their ability to production costs down and efficiency up.

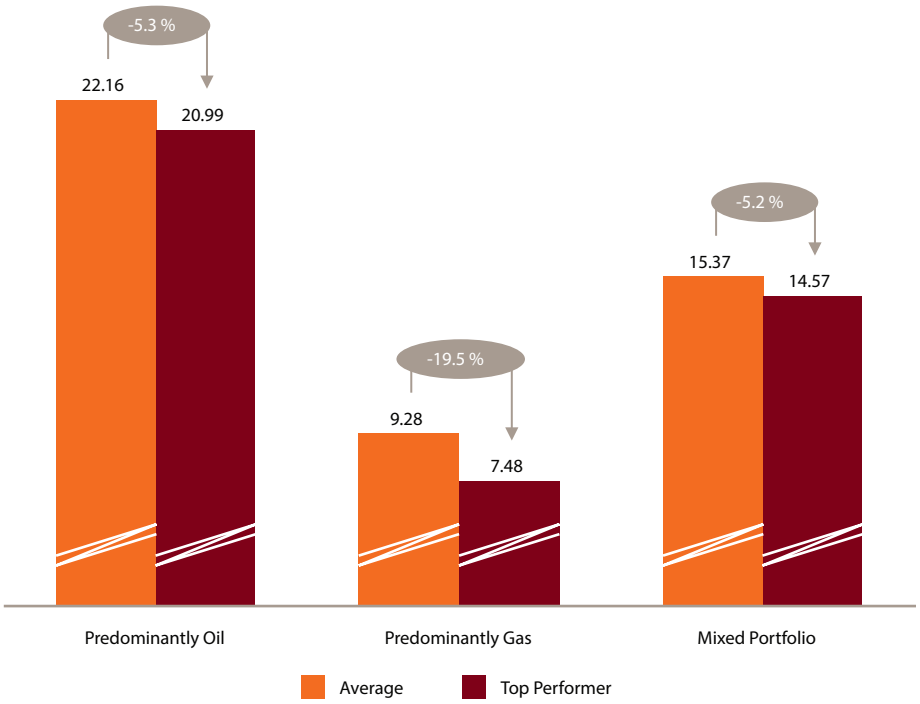
Experience and learning matters

Top performers are learning organisations. They realise that in order to drive down the cost curve they must first drive their people up the experience curve.

This performance gap in production costs outlined above cannot be explained away by differing production profiles. An opportunity to close this gap exists, should those in the bottom quartile of performance make headway in closing the performance gap.

The percentage of time field operatives spend on core production activity needs to be measured. Within the top performers we would expect this to sit in the 60 to 70 per cent range, with industry averages significantly lower.

Figure 13: Production (Lifting) Costs ($/boe) for 2012 by Production Profile



Note: We converted gas volumes into energy equivalent barrels of oil using an average factor of 6,000 (i.e. Six thousand cubic feet of gas equals one barrel of oil equivalent), it facilitates comparison of total reserves or production volumes across all companies in the study.

The production costs of the top performers were on average more than 10 per cent lower than the industry average.

"If you want to drill the best well possible, make the best business decision, you want to get that data as quickly as you can and you want it to be high quality."

Jackie Mutschler, Head of upstream technology for BP [4]

Well and reservoir optimisation

Our data indicates that there is a best practise differential of 15 to 20 per cent between top performers and the industry average for well efficiency and production metrics. This performance gap is consistent irrespective of whether the well is conventional or unconventional, onshore or offshore, deep-water or shallow.

Better performance is driven by leveraging geological knowledge of core plays, a dynamic field management approach and high operational efficiency. We see a significant percentage of the top performers implementing structured performance improvement programs, including regular independent production checks and well-bore reviews. This attention to maximising ultimate recovery rates typically translates into significant value both from a revenue and cost perspective.

Technology

On the 22nd October 2013, BP opened its new computing centre in Houston, claiming it to be the world's largest supercomputer used for commercial research. The centre will have a total processing power of 2.2 petaflops, enough to make 2,200 trillion calculations a second, halving the time that it takes BP to process data from seismic surveys. It will have 1000 terabytes of memory and 23.5 petabytes of disk space.[4]

The computing power to grasp and interpret the enormous quantity of data that the industry holds and produces on a daily basis has become a key competitive advantage in the world of exploration and development.[4]

BP believes the investment will keep BP at forefront of seismic imaging technology, enhancing capabilities in exploration and reservoir management. The following facts highlights the need for the upstream sector to continuously invest in the latest technology to be in the race to discover new resources: BP's computing needs are 20,000 times greater today than they were in 1999; they can now complete an imaging project in one day that would have taken four years using computing technology from just 10 years ago.

Innovation

Innovation is vital to ensuring the value of existing reservoirs are maximised and reserves are recovered efficiently and in an environmentally low impact manner. Enhanced oil/gas recovery (sometimes referred to as improved oil/gas recovery or tertiary recovery) is now commonplace across the Oil & Gas sector and has significantly contributed to productions volumes from assets that were previously either depleted or nearing depletion.

For example, Pemex's Cantarell oil field in the Gulf of Mexico, has for many years used compressed nitrogen (N^2), which is pumped into reservoir under high pressure to raise the pressure in this field and thus ensure the flow of oil and improve yields, in the process extending the productive life of the oilfield.

For the past 40 years, exploration and development of Norwegian continental shelf has been characterised by giant conventional oil plays (e.g. Statfjord, Ekofisk, Gullfaks, Oseberg and Troll) and current average recovery factors are about 46 per cent. However seventy five per cent of discoveries on the NCS since 2007 have been classified as small and the future will continue to be characterised by marginal fields and enhanced oil recovery techniques.[5]

"The future in these waters looks very different from what's been the case earlier."

Ståle Tungesvik, SVP – Reserves and Business Development Statoil [5]

[4] *http://www.bp.com/en/global/corporate/press/press-releases/bp-opens-new-facility-houston-largest-supercomputer.html*

[5] *http://www.statoil.com/en/technologyinnovation/fielddevelopment/ons2010arealfasttrack/pages/whyfasttrack.aspx*

Conclusion

The Oil & Gas sector can assume there will be continued demand growth for its products for at least the next twenty years, but it cannot assume it will necessarily continue, to deliver double-digit growth in value to shareholders.

Cost pressures, competitive forces and falling productivity will continue to challenge companies to find new and innovative ways of deploying the large amounts of capital investment in order to meet investor expectations of high returns.

But the opportunity for driving superior value still exists. The top performers are showing that it's possible to be selective in the use of capital to drive value, to continue to drive the productivity of capital and keep production costs down through a focus on operational excellence.

The challenge for the rest of the industry is to learn the lessons from its top performers and start to close the performance gap. Doing so will not only improve the value they can deliver for their shareholders, but also help them better meet the world's growing demand for energy.

Appendices

Approach

The central point of this paper is to examine the link between growth and value in the upstream (Exploration and Production) Oil & Gas industry only, not including midstream (processing and refining) or downstream (marketing and distribution). The analysis was based on two main ratios: capital velocity and return on capital employed (ROCE). These ratios were used as proxy for measuring growth intensity and "surplus return", respectively.

PwC engaged Evaluate Energy to provide the required operational and financial data for this paper. The findings in the study are based on PwC's analysis of the Evaluate Energy Database. Evaluate Energy is a leading supplier of competitor analysis and benchmarking data for the international Oil & Gas industry (www.evaluateenergy.com).

The list of selected companies (Table 1) for analysis was based on the Top 100 global Oil & Gas companies based on the total asset position as at 31 December 2012 reported on annual reports. Additionally, two companies outside this rank were included. From the selected list, 28 companies were removed from the sample given that upstream operations were not considered significant or public data was not available. This resulted in a total of 74 companies included in the analysis (Tables 2 & 3).

Companies were then classified based on segment, type and production profile.

Segment

- **Upstream Only** – companies involved only in Exploration and Production activities;
- **Integrated** – companies involved in the upstream and/or midstream and/or downstream activities.

Type

- **NOC** – National Oil Company;
- **NOC Hybrid** – National Oil companies where government has less than 50% share but still exercise significant influence in the company;
- **IOC** – International Oil Company;
- **Independent** – Exploration and Production company with total assets of less than US$100 billion.

Production profile

- **Gas Dominant** – average gas production greater than 60% of company's total production;
- **Mixed** – average oil/gas production greater than 40% but lower than 60% of total production;
- **Oil Dominant** – average gas production greater than 60% of company's total production.

List of companies

Table 2 - Companies included in the study

Rank	Company	Based in	Company type	Segments	Production profile	Total Assets (US$ millions)
1	Gazprom	Russia	NOC	Integrated	gas dominant	396,454
2	Shell	Netherlands	IOC	Integrated	mixed portfolio	350,294
3	PetroChina	China	NOC	Integrated	oil dominant	344,207
4	ExxonMobil	United States	IOC	Integrated	mixed portfolio	333,795
5	Petrobras	Brazil	NOC	Integrated	oil dominant	331,645
6	BP	United Kingdom	IOC	Integrated	oil dominant	300,193
7	Chevron	United States	IOC	Integrated	oil dominant	232,982
8	Total	France	IOC	Integrated	oil dominant	227,125
9	PDVSA	Venezuela	NOC	Integrated	oil dominant	218,424
10	Sinopec	China	NOC	Integrated	oil dominant	201,026
11	ENI	Italy	IOC	Integrated	mixed portfolio	184,578
12	Statoil	Norway	NOC	Integrated	mixed portfolio	140,515
13	BHP Billiton	Australia	Independent*	Integrated	mixed portfolio	133,685
14	Rosneft	Russia	NOC – Hybrid	Integrated	oil dominant	126,740
15	ConocoPhillips	United States	IOC	Integrated	mixed portfolio	117,144
16	Lukoil	Russia	NOC – Hybrid	Integrated	oil dominant	98,961
17	Repsol	Spain	Independent	Integrated	mixed portfolio	85,813
18	Suncor	Canada	Independent	Integrated	oil dominant	76,708
19	CNOOC	China	NOC – Hybrid	Integrated	oil dominant	72,379
20	BG Group	United Kingdom	Independent	Integrated	gas dominant	65,247
21	Ecopetrol	Colombia	NOC	Integrated	oil dominant	64,521
22	Occidental	United States	Independent	Upstream	oil dominant	64,210
23	Apache	United States	Independent	Upstream	mixed portfolio	60,737
24	PTT	Thailand	NOC	Integrated	gas dominant	53,747
25	Anadarko	United States	Independent	Upstream	mixed portfolio	52,589
26	Canadian Natural Resources	Canada	Independent	Upstream	oil dominant	49,146
27	Hess Corp	United States	Independent	Integrated	oil dominant	43,441

* Although BHP Billiton has total assets greater than $100 billion, it is considered an independent as a significant portion of its assets are mining assets.

Table 2 - Companies included in the study - Continued

Rank	Company	Based in	Company type	Segments	Production profile	Total Assets (US$ millions)
28	Devon	United States	Independent	Upstream	gas dominant	43,326
29	Gazprom Neft	Russia	NOC	Integrated	oil dominant	42,710
30	Chesapeake	United States	Independent	Upstream	gas dominant	41,611
31	OMV	Austria	Independent	Integrated	mixed portfolio	40,340
32	Marathon Oil	United States	Independent	Upstream	oil dominant	35,306
33	Husky Energy	Canada	Independent	Integrated	oil dominant	35,259
34	Inpex	Japan	NOC – Hybrid	Integrated	mixed portfolio	32,566
35	Imperial Oil	Canada	Independent	Integrated	oil dominant	29,464
36	EOG Resources	United States	Independent	Upstream	gas dominant	27,337
37	Woodside	Australia	Independent	Upstream	mixed portfolio	24,810
38	Cenovus	Canada	Independent	Integrated	mixed portfolio	24,298
39	Sasol	South Africa	Independent	Integrated	oil dominant	24,049
40	Talisman Energy	Canada	Independent	Upstream	mixed portfolio	21,858
41	MOL	Hungary	NOC – Hybrid	Integrated	mixed portfolio	21,696
42	Nexen	Canada	Independent	Upstream	oil dominant	20,607
43	Encana	Canada	Independent	Upstream	gas dominant	18,700
44	Galp Energia	Portugal	Independent	Integrated	oil dominant	18,384
45	Santos	Australia	Independent	Upstream	gas dominant	17,672
46	Noble Energy	United States	Independent	Upstream	mixed portfolio	17,554
47	Murphy Oil	United States	Independent	Integrated	oil dominant	17,523
48	YPF	Argentina	NOC	Integrated	mixed portfolio	16,304
49	Novatek	Russia	NOC – Hybrid	Upstream	gas dominant	15,215
50	Penn West Exploration	Canada	Independent	Upstream	mixed portfolio	14,540
51	Pioneer Natural Resources	United States	Independent	Upstream	mixed portfolio	13,069
52	CONSOL Energy	United States	Independent	Upstream	gas dominant	12,671
53	Linn Energy	United States	Independent	Upstream	mixed portfolio	11,451
54	Denbury Resources	United States	Independent	Upstream	oil dominant	11,139
55	SandRidge Energy	United States	Independent	Upstream	gas dominant	9,791
56	WPX Energy	United States	Independent	Upstream	gas dominant	9,456
57	Tullow Oil	United Kingdom	Independent	Upstream	oil dominant	9,382
58	Continental Resources	United States	Independent	Upstream	oil dominant	9,140
59	QEP Resources	United States	Independent	Upstream	gas dominant	9,109
60	EQT	United States	Independent	Upstream	gas dominant	8,850
61	Concho Resources	United States	Independent	Upstream	oil dominant	8,589
62	Newfield Exploration	United States	Independent	Upstream	gas dominant	7,912
63	Whiting Petroleum	United States	Independent	Upstream	oil dominant	7,272

Table 2 - Companies included in the study - Continued

Rank	Company	Based in	Company type	Segments	Production profile	Total Assets (US$ millions)
64	Oil Search	Papua New Guinea	Independent	Upstream	oil dominant	7,103
65	Pacific Rubiales	Canada	Independent	Upstream	oil dominant	7,087
66	Sherritt International	Canada	Independent	Upstream	oil dominant	6,781
67	Southwestern Energy	United States	Independent	Upstream	gas dominant	6,738
68	Range Resources	United States	Independent	Upstream	gas dominant	6,729
69	MDU Resources	United States	Independent	Integrated	gas dominant	6,682
70	Cimarex	United States	Independent	Upstream	gas dominant	6,305
71	Energen	United States	Independent	Upstream	gas dominant	6,176
72	National Fuel Gas	United States	Independent	Integrated	gas dominant	5,935
73	Vermilion Energy	Canada	Independent	Upstream	oil dominant	3,087
74	Niko Resources	Canada	Independent	Upstream	gas dominant	1,461

Table 3 - Companies not included in the study

- Bashneft
- CNPC
- Dong Energy
- ENAP
- Freeport-McMoRan Copper & Gold
- GDF SUEZ
- Grupa Lotos
- JX Holdings
- KazMunayGas
- KazMunaiGas Exploration Production
- Kinder Morgan Energy Partners
- Korea National Oil Corporation
- Maersk Group
- Mitsui
- Mubadala Development
- OGX
- ONGC
- Pemex
- Pertamina
- Petronas
- Plains Exploration & Production
- Polish Oil & Gas
- RWE-DEA
- SOCAR
- Surgutneftegaz
- TAQA Dong Energy
- Tatneft
- TNK-BP International

Ratios – calculations and data utilised

The analysis is based on key financial and operational annual figures for the period between 2006 and 2012. Average of the ratios for this 7-year period were utilised to compare and evaluate companies' performance.

Given the average return on capital employed for the period, companies sitting on the top quartile were defined as the top performers of the industry. The remaining companies were defined as "others". "Top performers" average performance was compared to the industry average or to "others" average.

Return on capital employed (ROCE) was calculated by multiplying average operating margin for the period by average Capital productivity for the period.

Operating margin was calculated by dividing total upstream EBIT by the total upstream revenue.

Capital productivity was calculated by dividing average upstream revenue by average capital employed.

Capital velocity was calculated by dividing total upstream capex by capital employed. This is PwC's proxy metric for measuring an organisation's growth agenda in capital intensive industries.

Finding & development costs are defined as the total exploration and development costs incurred divided by reserves booked for a particular year.

Upstream Segment as a % of total – Where information on upstream segment is not available, a ratio based on Capitalised Costs (as per segment report – purely for the upstream segment) divided by Net PP&E (as per the Balance Sheet Statement) is utilised to infer the upstream only portion of that item for the company.

EBIT was extracted from the segment report. If the company reports earnings on a post-tax basis then the figure is adjusted to add tax back as per the effective tax rate for the period. If earnings is reported post interest then interest is added back as per the income statement. If no segmental breakdown has been reported then the income statement is used and scaled according to the Upstream Segment as a % of total item.

Total upstream revenue is taken from the Results of Operations table when available. Otherwise, upstream revenue is taken from the income statement.

Capital employed was calculated based on the average capital employed for the upstream segment if reported by companies. Otherwise, it was calculated based on the company's total average capital employed multiplied by the Upstream Segment as a % of total item.

Total upstream Capex Upstream Capex is taken from the Results of Operations table when available. Otherwise the item was taken from the income statement.

Annual Production Production figures are presented as millions barrel of oil equivalent (mmboe) per annum. Gas production measured as thousand cubic feet of gas equivalent (mcfe) was converted using a ratio of six mcf of gas to one boe.

Gas Conversion We converted gas volumes into energy equivalent barrels of oil using an average factor of 6,000 (i.e. Six thousand cubic feet of gas equals one barrel of oil equivalent)

* We converted gas volumes into energy equivalent barrels of oil using an average factor of 6,000 (i.e. Six thousand cubic feet of gas equals one barrel of oil equivalent)

Key contacts

Author

Brian Cooke
Partner, Brisbane

Brian is a Partner with PwC's Australian Consulting practice based in Brisbane, where he leads the practice within the CSG/LNG sector. He has extensive experience in energy, including advising leading Australian and international Oil & Gas companies in advance of taking LNG projects to final investment.

Contributing author

Gui Capper
Manager, Brisbane

Gui is a Consultant in our Energy, Utilities & Mining team and has deep experience working with Australian and global clients on large-scale Oil & Gas projects.

National

Australian Energy, Utilities & Mining Leader

Jock O'Callaghan
Melbourne
+61 (3) 8603 6137
jock.ocallaghan@au.pwc.com

Queensland

Brian Cooke
Brisbane
+61 (7) 3257 8630
brian.cooke@au.pwc.com

Stephen Loadsman
Brisbane
+61 (7) 3257 8304
stephen.loadsman@au.pwc.com

New South Wales

Brad McBean
Sydney
+61 (2) 8266 4516
brad.mcbean@au.pwc.com

Victoria

Matt Guthridge
Melbourne
+61 (3) 8603 3160
matt.guthridge@au.pwc.com

Liza Maimone
Melbourne
+61 (3) 8603 4150
liza.maimone@au.pwc.com

South Australia

Andrew Forman
Adelaide
+61 (8) 8218 7401
andrew.forman@au.pwc.com

Western Australia

Justin Eve
Perth
+61 (8) 9238 3554
justin.eve@au.pwc.com

Andrew Friars
Perth
+ 61 (8) 9238 3050
andrew.friars@au.pwc.com

WL 127008856