

The debate on risky oil assets bubbles up

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The oil and gas sector is undergoing profound changes: rising costs and increasingly challenging operational conditions leave little room for doubt that the era of easy oil is over. As major oil companies are increasingly forced to explore unconventional frontier reserves, investors' concern over the riskiness of these investments, especially vis-à-vis potential carbon regulation and the uptake of alternative technologies, is putting the sector under unprecedented pressure to demonstrate a capability to find a sustainable mode of operation.

There is widespread agreement in the market that the era of easy oil is history. In fact, over the past two decades, the production (output) and proven reserves growth (which determine future production) of International Oil Companies' (IOCs) portfolios have shown a 1.4% and 1.6% compounded annual growth rate (CAGR), respectively, for the past twenty years; however, this number conceals the reality of a significant slow-down over the past decade. On the other hand, oil prices have consistently risen, from a little over \$20 per barrel (bbl) in 1994, to over \$100/bbl this year, making oil the largest earnings driver for the sector."

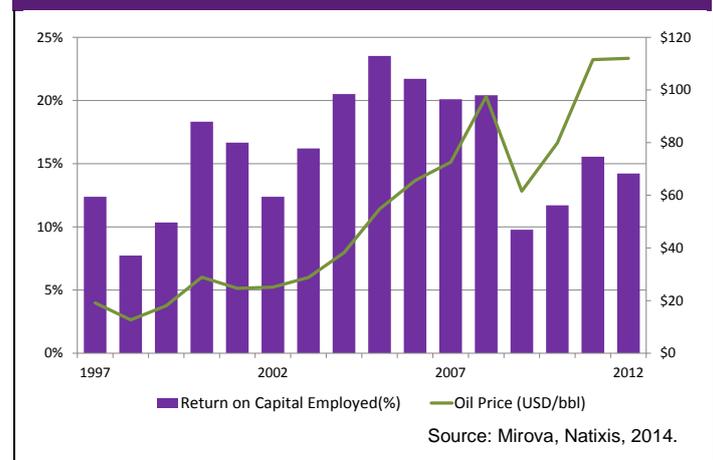
“ Despite increasing oil prices, high sector costs have eroded return on capital employed in the sector

Today, the average Return on Capital Employed (ROCE) of the ten largest international oil companies (ranked by reserves) is running at levels similar to those registered in the late nineties. As shown in figure 1, ROCE peaked in 2005, when oil prices were around \$20/bbl. However, oil prices increased six-fold over the 1997-2012 period, indicating that sector costs rose practically as fast as returns could compensate for. This

also suggests that the foregrounding of new resources, such as shale and tight oil, have not so far helped integrated oil majors with diversified portfolios in boosting their balance sheets.

New challenges emerge...

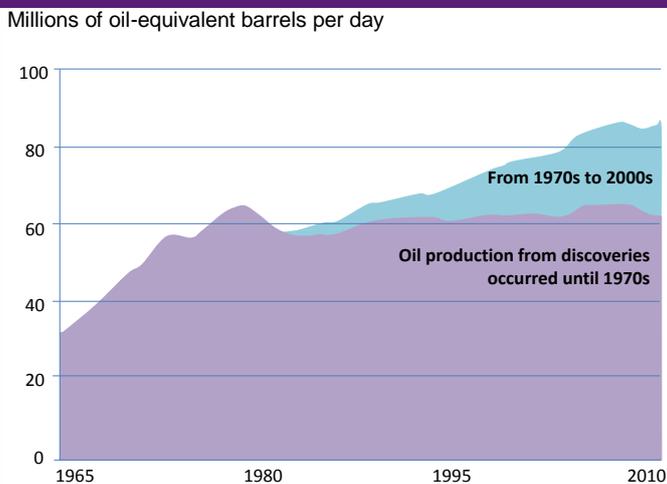
Figure 1. Return on Capital employed vs. oil price



There are a number of interrelated factors that contribute to explaining why the sector has been experiencing such increasing challenges:

1. **Declining oil production:** several important areas in which the oil majors are heavily involved are experiencing natural decline, with the North witnessing the heaviest slump in productivity. Looking at the situation historically, oil discoveries have been quite meager in the past thirty years; since the early 80s we have consumed more oil each year than the extractable fraction of new discoveries. As figure 2 illustrates, 75% of the oil produced today was discovered before 1980. This is reflected in companies' reserve replacement ratios, or RRRs (the amount of proven reserves¹ added to a company's reserve base compared to its production in a given a year), which have declined to an average of 95% this decade from the 119% of the previous ten years. It also has an impact on future investments: even if oil demand does not grow, new investments in the sector will nonetheless be needed in the sector to replace declining reserves.

Figure 2. Global oil production by discovery date



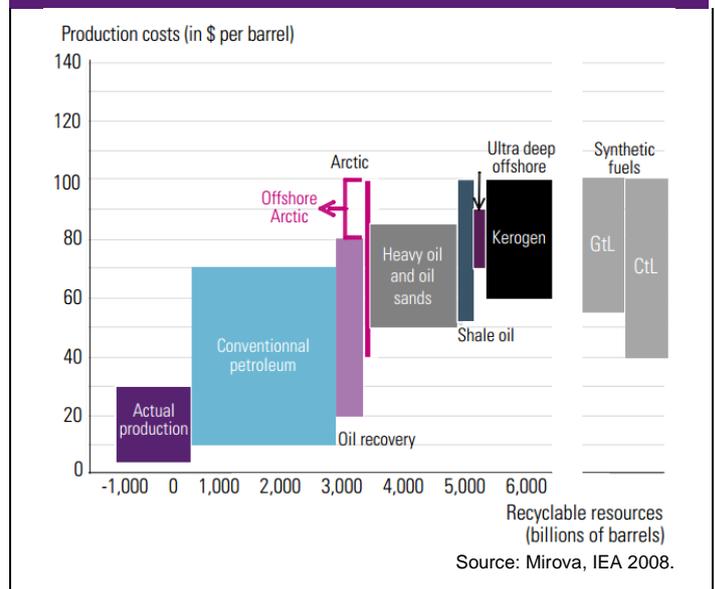
Source: Mirova, Exxon Mobil, Wood Mackenzie.

2. **Shifting balance of power:** Currently, around 90% of readily and cheaply accessible oil and gas reserves are held by national oil companies (NOCs) — which largely equates to OPEC countries — compared to only 10% in the 1970s. Although to the real volume of

¹ Reserves describes the volume of hydrocarbons that are anticipated to be produced cost-effectively using today's technology.

reserves detained by OPEC national companies (estimated to hold about two-thirds of the world's proven reserves) remains shrouded in secrecy, this changed situation has pushed IOCs to develop greater technical competences in the area of harsh operating conditions., Such know-how is increasingly sought by countries such as Argentina, Brazil and Russia, that

Figure 4. Long-term oil supply cost-curve



Source: Mirova, IEA 2008.

wish to explore their unconventional frontier reserves.

“ 75% of the oil produced today was discovered before the 80s

3. **Extreme conditions:** The pursuit of oil in places where access is difficult has noticeably increased operational challenges as well as the risk of project delays. For instance, last January, the American Ninth Circuit Court of Appeal ruled that licences granted to Shell in the Chukchi Sea (Alaska) in 2008 were wrongfully issued, because the environmental risks involved in Arctic drilling had not been fully taken into account, and the estimates of proven reserves were not based on adequate analysis. As a consequence, Shell's CEO

announced that the group has shelved its exploration programme in Alaska for 2014. In 2013, we identified the Arctic as an extremely risky frontier for oil companies, and one where investors should be particularly wary (see [Mirova's study Offshore Oil in the Arctic: should investments be frozen?](#)).

year, whereas industrial sectors (e.g. chemicals, capital goods) experienced a 4% decline over the same period.

Historical problems persist...

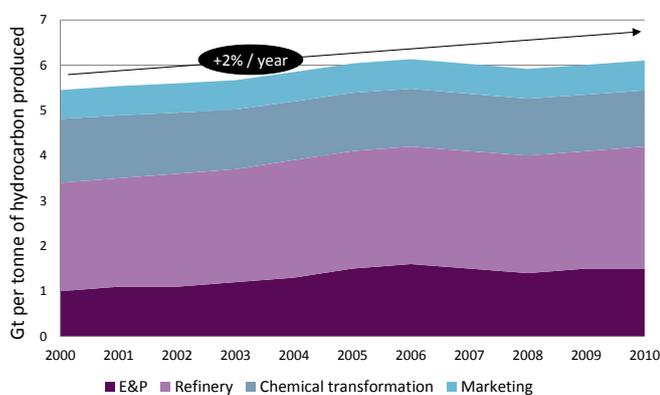
These new challenges aside, the sector remains exposed to historical problems stemming from geo-political risks and local socio-economic issues, which have often been exacerbated by the high environmental and social impacts of today's operations. Such issues are not set to go away, even though increased exploration and production challenges have brought new problems to the fore:

1. **Political instability:** Oil and gas companies have long operated in countries with an unstable political context, such as Libya, where, after Kaddafi's regime collapsed in 2011, oil majors with significant exposure to the country such as ENI and Repsol suffered production halts and uncertainties. In addition, political instability has also led to asset expropriation, as in the case of YPF, confiscated from Repsol by the government of Argentina in 2010. More recently, separatist tensions in eastern Ukraine have led to rapidly broadening sanctions against Russian and Ukrainian companies on the part of the West. This could have a significant impact on western oil majors like ExxonMobil, BP and Shell that have significant investments and plans for future development in Russia.

Corruption and poverty: Operating in extremely poor countries where transparency around the distribution of royalties from oil extraction is low has long earned oil majors a place in the spotlight, as in the case of Shell, alongside ENI, Total, Chevron and ConocoPhillips for their operations in Nigeria. As a result, some IOCs have recently decided to leave the country by selling their assets to local companies, as ConocoPhillips did this year.

Technical challenges: With projects becoming bigger and more complex, operational delays are a persistent challenge for the industry. The super-giant Kashagan oil field in Kazakhstan, led by the consortium of ENI, Total, Shell and ExxonMobil, began production in 2011, nearly a decade behind schedule, and will be shut down for two years due to pipeline leaks.

Figure 3. Primary energy consumption in the O&G sector



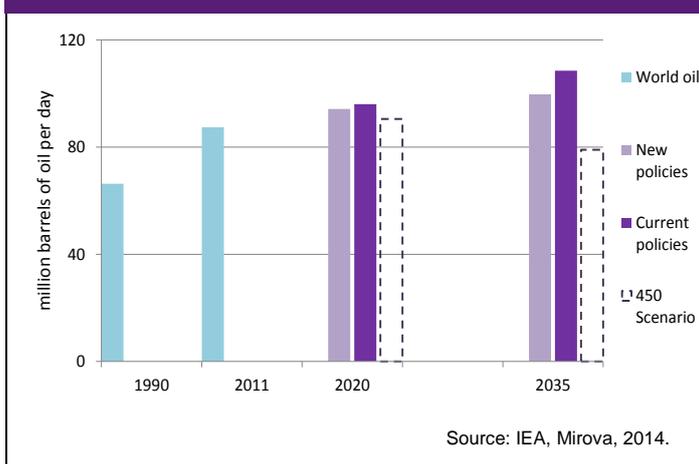
Source: Shell, Ipieca, Mirova, 2013.

4. **Rising costs:** As IOCs are forced to seek oil in places it is harder to access, or where the quality of hydrocarbons makes extraction more difficult, such as oil sands, extra-heavy oil, deep offshore and shale oil, sector costs rise steeply. Although, in the US, shale gas, extraction costs have abated due to the implementation of new technologies, contributing to a reduction in the price of gas, in most other cases the technological challenges posed by unconventional hydrocarbons have driven capital spending upwards: over the past two decades, average project size increased fivefold, driven primarily by the use of more advanced technologies to penetrate increased water depths, or by different resource categories. This contributes to explaining the 10% per year increase in investment budgets since 2004. In addition to this capital intensity, variable costs also exhibit an upward tendency; complex extraction processes, combined with a decreased quality of hydrocarbons, have pushed the sector's energy consumption upwards, for a total average rise of 2% per

Concerned investors face risk denial over stranded assets

In light of increasing challenges, oil majors all announced investment cuts in 2014 and promised to deliver sustained dividends as a means of regaining investors' confidence. These announcements are partly explained by the fact that the sector as a whole is exiting a significant investment cycle, with several important projects entering production between 2013 and 2015. However, there remains uncertainty as to whether the industry will be able to avoid production delays that would further increase costs.

Figure 5. World oil demand by scenario



Within this context, however, investors are also concerned about another issue: the risk of “stranded assets.” This argument, developed by the Carbon Tracker Initiative 2 in 2011, goes roughly as follows: in the carbon-constrained world depicted by the IEA’s 450 Scenario,³ many fossil-fuel assets will necessarily become ‘unburnable,’ leading to lost value for both companies and investors. Under this scenario, oil demand in 2035 will reach 79 million barrels per day (mb/d), i.e. 25% of global primary energy demand, down from 32% in 2011 (see figure 5). This contraction would expose unconventional ‘frontier’ reserves, such as deep-water and oil sands, to the greatest potential devaluation, since these are the most

² The Carbon Tracker Initiative is a non-profit organisation working to align the capital markets with the climate change policy agenda.

³ The IEA’s 450 Scenario assumes strong policy action globally to put greenhouse-gas emissions on a long-term trajectory that will ultimately limit the global average temperature increase to 2 °C.

expensive, risky and carbon-intensive to extract, as previously discussed.

Nonetheless, even without a carbon-constrained scenario, increased oil prices and high sector costs could create momentum towards the deployment of technological solutions to replace oil in various end-use sectors. However, within the context of transport, which accounts for about 2/3 of oil end-use, renewables play a limited role as substitutes for oil. In our view, the risk for the oil sector will become tangible with the increase in lightweight vehicles that use less fuel and, most importantly, with the commercial expansion of the electric car. While today the electrification of transport is still far from a mainstream phenomenon, there remains, in our view, room for technological improvement that can increase the appeal of this form of transport and spur higher demand (see Mirova’s December 2013 study [Sustainable Mobility](#)).

“ The battle over fossil fuels will be waged in the electric sector

Expanded use of the electric car is set to reduce demand for oil, thereby shifting the debate around decarbonisation toward the electric sector. The electric sector will become the actual battlefield for the deployment of non-fossil feedstock (as a reminder, around 41% of electricity currently comes from coal and 22% from gas). In this context, renewable energy, energy storage and smart-grid infrastructure will need to play a leading role in the decarbonisation of energy. As a matter of fact, the IEA recently reported that additional investment in the electric sector is needed in order to meet the 2050 carbon reduction objective of +2°C. In this context, the Paris-based agency predicts that the electric sector will increasingly compete with the oil sector to feed the world’s increasing energy needs.

Investors’ concerns vs. risk denial

When questioned about the risk of stranded assets, western majors have so far dismissed investors’ concerns by pointing out that the probability of reaching a global climate deal at the next Conference of Parties (COP) scheduled in Paris in 2015 is practically nil, as is the possibility that the 450 Scenario will



ever materialise. In fact, following shareholder pressure, ExxonMobil published two reports detailing its carbon-risk management last March. In these reports, the company ruled out any risk of its portfolios' containing stranded assets, arguing that a business as usual scenario will prevail, with corresponding growth of oil demand. A similar position was recently taken by Shell, which has argued that in light of carbon policy delays, its investments – most of which have a 10-year time frame - are preserved from a potential “carbon bubble”. On the other hand, Shell is betting on carbon capture and storage technologies, which have yet to achieve large-scale commercial application.

Other oil majors such as BP and Total issued a more concise response to investors. BP categorically dismissed the probability of a low-carbon scenario hitting its portfolio, without revealing any additional details of its carbon risk-assessment. Total, however, reassured investors that through a portfolio 50% tilted towards gas, and investments in solar technologies via SunPower, the company is protected from carbon risks (although, today, SunPower represents less than 1% of Total's revenues). It is thus evident that all companies view their climate risk exposure as limited to the probability of a global climate agreement in the short-term, which they estimate as nil. They consistently fail to take into consideration the possibility of national carbon regulations or other environment-related risks to their portfolio (e.g. extreme weather events, reduced sector subsidies to favour new technologies, an expansion of electrified transport, etc.), arguing that the totality of their assets are safe simply because demand for oil is expected to rise in the IEA's other scenarios (i.e. the business as usual scenario and the New Policy Scenario⁴) without providing granular insight into their assessment of carbon risk by asset or by type of resource, which is what concerned investors seek.

Be this as it may, oil majors' recently-announced capex cutbacks indicate that current oil prices are not high enough for them to earn sufficient returns across their portfolios, let alone on specifically capital intensive projects that are subject to significant and recurrent delays, such as the Kashagan fields, or Shell's Arctic operations.

⁴ The New Policy scenario takes account broad policy commitments and plans that have been announced by countries, including national pledges to reduce greenhouse-gas emissions and plans to phase out fossil-energy subsidies, even if the measures to implement these commitments have yet to be identified or announced. This broadly serves as the IEA's baseline scenario.

The attitude of oil majors is reminiscent of some energy utilities that, a decade ago, decided not to invest heavily in renewable energies, such as RWE. As it happens, following the German government's decision in 2011 to phase out nuclear power plants across the country starting from 2015, this company is now forced to switch to coal power plants and has very little room to manoeuvre, given its low exposure to renewables (a mere 6% of its portfolio or thereabouts), while the renewable energy market, through subsidies and preferential grid access, has increased its market share in Germany to a record high 24%. As a result, RWE's new CEO, Peter Terium, recently acknowledged the company's mistake in entering the renewables market “possibly too late.”

What choices do investors have?

To summarise, the attitudes of investors with regard to the issue of climate change could follow either one of the following routes:

- In a 450 ppm scenario, the growth of oil companies will be less than the current market discount and thus the valuations of these companies are currently inflated. Investors following this route therefore have no interest in investing in these companies.
- In a 'business as usual' scenario, future growth is more likely to be in line with current market forecasts, unless the climate starts affecting oil companies materially, along with the rest of the economy. While it may be advantageous for investors to make short to medium-term investments within this context, they will need to ask themselves whether such investment choices do not encourage companies to promote a climate scenario that will have a deleterious impact on all their investments in the medium to long term.

It is thus clear that whatever the climate scenario turns out to be, oil companies will be making investments carrying increasingly heavy risks, both financial and environmental, that exacerbate the likelihood of accidents like Macondo, which could dramatically affect current valuations. Thus, investors need to think carefully about the risk/return profile before investing.

Without waiting for debates over 'stranded assets', or the obligation for investors to divest from oil companies to reach their current levels, Mirova arrived several years ago at the conclusion that there are simply more attractive risk/return

profiles in the markets. We would however, consider revising this opinion if we encountered a corporate strategy coherent with the concerns of a low carbon economy. And one may also wonder whether current debates about how rational it is to invest in the oil sector are really about fundamental analysis, or whether they rather reflect anxieties about the investment styles involved: passive, quasi-passive (little leeway to deviate from traditional benchmarks) or short-term-oriented.

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