

Turn risks and opportunities into results

Exploring the top 10 risks and opportunities for global organizations

Oil and gas sector





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Introduction

While risk continues to dominate the business agenda, competition is also becoming just as dominant a feature. Market volatility, pricing pressure, variations in market performance, demanding stakeholders – all have contributed to a global economy that encourages competitive drive. And with that drive comes opportunity. For that reason, we have broadened the scope of what has traditionally been our *Business Risk* report to incorporate both risks and opportunities.

This report is part of a wider cross-sector piece of research that explores the top 10 business risks and opportunities globally and across seven sector groups. The seven sectors are oil and gas, retail, power and utilities, banking, government and public administration, health care, and life sciences.

As in previous years, we have taken a “bottom-up” approach to our work, gathering opinions from leading industry-based and academic commentators, across the seven global sector groups.

In addition, for the first time, this year we have conducted a second wave of research. This comprised a large-sample survey of companies and governments in 15 countries in order to rank the risks and opportunities, obtain forecasts on whether these challenges would be more or less important in 2013, and discover how leading organizations in each of the seven sectors are responding to these challenges.

Our research suggests that access to reserves is the number one risk for the oil and gas sector, particularly with regard to political constraints and competition for proven reserves. Uncertain energy policy is the number two risk and remains in a continued state of flux in many key geographies. As the industry moves into new territories and new forms of unconventional energy, there’s been a lot of discussion about the need to maintain licence to operate. Safe operations, environmental safety, and transparency are clearly key for this to be maintained. A consequence of failing to manage many of the risks highlighted in this report, may lead to the loss of licence to operate.

With regard to opportunities, frontier acreage was ranked number one. Areas previously regarded as too difficult, too expensive or too politically unstable to justify operations have become more economically viable given expectations of high energy demand and advances in technologies and business processes. Similar factors are also driving the opportunity ranked number two: unconventional sources, such as shale gas, oil sands and coalbed methane. Growing energy demand alongside a tightening of access to conventional supply, and advances in technology, have made unconventional sources commercially viable. Other opportunities included rising emerging market demand, investing in innovation, alternative fuels, and building regulatory confidence.

The top 10s are the result of a qualitative, opinion-gathering process, designed to identify the key risks and opportunities for businesses in 2011 and beyond. However, we also recognize that the definition of risks and opportunities varies from sector to sector and from company to company, depending on objectives and many other factors. As such, we hope the list will trigger a debate that we would like to explore further. Are the items on the lists similar to those you are monitoring? Are they your top 10? Have our panelists missed anything critical?





Executive summary

Based on our interviews with oil and gas sector commentators and our global multi-sector survey (which included 82 oil and gas executives in 15 countries), we have compiled the following rankings of the top 10 risks and opportunities for oil and gas companies in 2011.



The top 10 risks

1. Access to reserves: political constraints and competition for proven reserves

Up one place from the 2010 report.

While limits on access are not new, they do form a crucial part of the strategic landscape for international oil companies. Indeed, our global multi-sector survey found that oil and gas respondents were more likely than those in any other sector to report difficulties in managing the risks associated with the expansion of government's role.

2. Uncertain energy policy

Down one place from the 2010 report.

Energy policy is in a continued state of flux in many key geographies. Meanwhile, the consequences of last year's oil spill in the Gulf of Mexico continue to be felt in the debate over deepwater regulations.

3. Cost containment

Unchanged from three in the 2010 report.

John Avaldsnes, EMEIA Oil & Gas Leader at Ernst & Young, contended that: "In a competitive, tight-margin industry like oil and gas, cost containment will always be a high priority." At present, rising costs are being driven both by cyclical factors and the end of "easy oil."

4. Worsening fiscal terms

Unchanged from four in the 2010 report.

"Under uncertain market conditions, governments tend to make regulatory changes to their benefit," as one panelist noted. Another commentator we spoke to concurred: "The use by governments of tax claims, real or not, as a pressure point to coerce oil companies appears to be increasing."

5. Health, safety and environmental risks

New this year.

Health, safety and environmental issues have risen on the oil and gas industry's agenda, reflecting both increased public pressure and more complex operational challenges. Thirty-two percent of oil and gas respondents reported that they had faced difficulties in responding to such rising public expectations.

6. Human capital deficit

Up one place from the 2010 report.

The top drivers of this risk, as reported by oil and gas respondents to our global multi-sector survey, were a shortage of personnel with necessary skills and increased global competition for talent. Twenty-two percent of oil and gas respondents indicated a lack of qualified personnel was already impacting their operations.

7. New operational challenges, including unfamiliar environments

Up three places from the 2010 report.

Three years ago, this was a "below the radar" risk in our report. The threat has now moved onto the radar, and is still rising.

8. Climate change concerns

Down three places from the 2010 report.

Though the Copenhagen summit of 2009 failed to achieve a breakthrough, pressure on companies can arise from other stakeholders. Risks related to climate concerns cannot be fully managed solely as a regulatory compliance issue.

9. Price volatility

Down three places from the 2010 report.

The unrest in the Middle East and North Africa region in the first half of 2011 resulted in an oil price surge. Of course, given the increase in exploration and production costs, volatility on the downside poses an equal or greater challenge.

10. Competition from new technologies

Below the radar last year.

In addition to new technologies for exploration and production, the sector is impacted by broader technological advancements, such as alternative power generation and the electrification of energy delivery.



The top 10 opportunities

1. Frontier acreage

The pushing out of operational boundaries is clearly an opportunity for those companies that have the requisite competencies. "Frontier acreage was not an opportunity that existed 30 years ago with the technology as it was," as one panelist noted.

2. Unconventional sources

Growing energy demand alongside a tightening of access to conventional supply, and advances in technology, are making unconventional sources commercially viable. This has broad implications – as one panelist put it, "Unconventionals rewrite the rules."

3. Conventional reserves in challenging areas

Our panelists made a distinction between countries, such as Iraq or Nigeria on the one hand, that present investors with significant political and security challenges, and the Arctic and other ecologically sensitive areas on the other, which pose a number of environmental challenges for operators.

4. Rising emerging market demand

Our global multi-sector survey found that 21% of oil and gas respondents had encountered challenges in their efforts to tap expanding emerging market demand. However, some 51% of oil and gas respondents reported making significant investments to achieve growth in emerging markets.

5. NOC-IOC partnerships

The industry is seeing international oil companies (IOCs) increasingly partnering with national oil companies (NOCs) from net-importing countries. Positive approaches were demonstrated recently by the partnership of BP and China National Petroleum Corporation (CNPC) concerning the development of Iraq's Rumaila field.

6. Investing in innovation and R&D

A number of factors are putting pressure on companies in the oil and gas sector to focus on innovation. Nonetheless, only a minority, 41%, of oil and gas companies said that they had succeeded in embedding innovation as a core element of company strategy.

7. Alternative fuels, including second generation biofuels

An organizational failure to prioritize this issue is the challenge most frequently reported by oil and gas respondents looking to take advantage of cleantech opportunities, including second and third generation biofuels.

8. Cross-sector strategic partnerships

The commentators we interviewed gave a number of examples of cross-sector strategic partnerships. The most frequently quoted included working with auto or technology companies investing in renewables.

9. Building regulatory confidence

In a highly regulated industry such as the oil and gas sector, regulatory confidence is about business survival. But "green growth" initiatives and government involvement in the energy sector are increasingly important to maintain licence to operate.

10. Acquisitions or alliances to gain new capabilities

In an increasingly competitive industry, entering into an alliance or an acquisition becomes a way for oil and gas companies to access new growth opportunities – be it expanding their supply base, accessing a new consumer market or gaining access to, and understanding of, new technologies.

A long, dark shadow of a person is cast across a wide, gravelly path that stretches into the distance. The path is flanked by low-lying green and yellow vegetation. In the background, there are rolling hills under a clear, light blue sky. The overall scene is bright and open, suggesting a vast, natural environment.

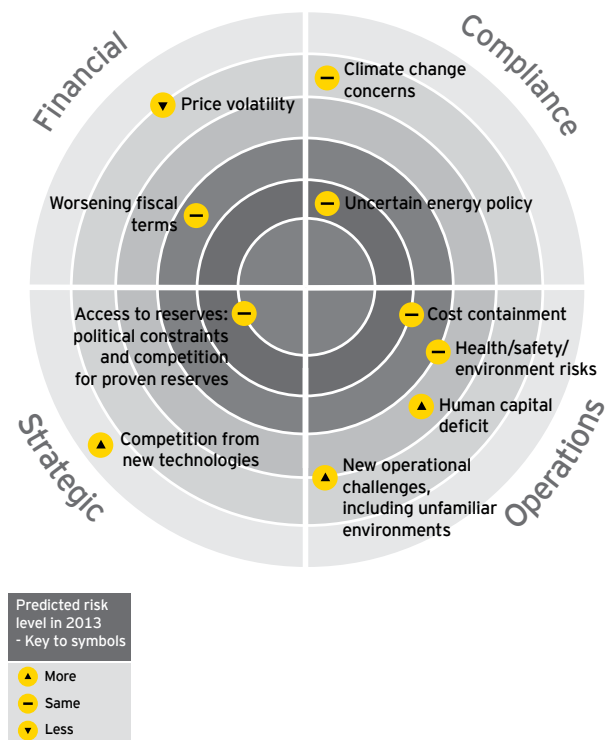
Part 1: risks

Ernst & Young sector risk radar

Our risk radar is a simple device that allows us to present a snapshot of the top 10 risks in the oil and gas sector.

The risks at the center of the radar are those that the industry analysts and executives we interviewed, on average, thought posed the greatest challenge to oil and gas companies in the years ahead. Arrows indicate whether the executives thought the risk would rise or fall in importance by 2013.

The radar is divided into four sections that correspond to the Ernst & Young Risk Universe™ model. Compliance threats originate in politics, law, regulation or corporate governance. Financial threats stem from volatility in markets and the real economy. Strategic threats are related to customers, competitors and investors. Finally, operational threats affect the processes, systems, people and overall value chain of a business.



The top 10 risks

1. Access to reserves: political constraints and competition for proven reserves

A combination of political unrest in North Africa and the Middle East, high oil prices and the growth of new, government-backed rivals has pushed this risk to the top of our list this year, having been ranked second on our risk list in 2010. Moreover, the oil and gas panel expects this risk to remain at a roughly similar level of impact in 2013. "The outlook is unlikely to change in the near future, which will put pressure on the future growth and sustainability of major oil companies," as one panelist noted.

Today, much of the open access to large-scale reserves tends to be limited to mature fields where production is declining. In many new market opportunities, companies are faced with either very strong local content or ownership provisions (such as in Brazil, where companies must partner with a local organization), or the government does not allow companies to participate in the market on an equity basis, instead limiting participation, in effect, to service contracts. In this case, companies are usually paid a per-dollar margin – consequently, there is a limited upside to the deal should oil prices rise.

While these conditions are not new, they do form a crucial part of the strategic landscape for international oil companies (IOCs). As one panelist said: "Although IOCs are very healthy in financial terms, they are finding it difficult to replace their reserves to ensure future sustainability."

Indeed, our global multi-sector survey found that oil and gas respondents were more likely than those in any other sector to report limited success in managing risks associated with the expansion of government's role. Fifty-five percent said so, against 41% for power and utilities, the next-highest sector. The increasing government role in the sector is a reflection of the vital fiscal and strategic role of oil and gas in many countries.

The recent events in North Africa have served as a reminder to the international oil community that areas that have been on a trajectory toward greater openness could see reversals. Companies operating in Libya now face uncertainty over whether the government will honor the existing agreements that they hold with IOCs and national oil companies (NOCs).

Strategies adopted by oil and gas respondents for managing risks associated with the expanding role of government

Ranked by frequency of mention

Rank*	Mitigating factor
1	Investment in compliance and adherence to legal requirements
2	Adjustments to business strategy to respond to the rising role of government

** Based on 20 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*

Higher oil prices will make it more attractive for governments to pursue policies that enhance the government's share of revenues in the country's oil and gas sector. This discourages investment and often leads to declining output; however, higher oil prices also make it attractive for regimes to sustain such policies, at least in the short term. This is the case in Venezuela, for example, where opportunities for foreign companies are extremely limited and where the hydrocarbon industry has experienced a series of political risk events.

"A combination of loans to energy-rich developing countries, deep pockets, and the linkage of energy deals to infrastructure investments ... all combine to create huge advantages for government-owned and government-backed companies."

The trend of increased competition from government-owned and government-backed companies also shows no sign of diminishing. High commodity prices encourage governments to establish or expand NOCs as a way of enhancing the benefits from production in a manner that is less discouraging to inward investment than, for instance, adverse shifts in a country's fiscal regime.



When NOCs and IOCs compete outside of their own countries, no case is exactly the same, but IOC advanced technology and familiarity with complex projects tends to be set against a range of benefits that only an NOC can offer. Perhaps overstating the case somewhat, Julian Lee of the Centre for Global Energy Studies noted that: “A combination of loans to energy-rich developing countries, deep pockets, and the linkage of energy deals to infrastructure investments ... all combine to create huge advantages for government-owned and government-backed companies.”

This competition is influenced by the objectives set for NOCs by their home government, which vary by country. One much-discussed goal is to secure access to sources of energy. A second goal is to secure an understanding of technology that may have some application back home. For example, China, with its potentially very large quantities of coal-seam methane and shale gas, is buying into shale gas projects in North America and coal-seam methane opportunities in Australia. Of course, while Chinese companies gain the headlines, the oil and gas sector is also likely to see the internationalization of NOCs from other emerging economies including Brazil, Russia, India and Korea.

Access to reserves is declining even in some historically open markets. For instance, tightening of environmental safety standards can affect approval processes, thereby delaying projects and investments and negatively impacting a company's costs. Such tightening can also completely cut off access to reserves, often as a result of the protection of ecologically sensitive and biodiverse areas such as national parks, or areas close to population centers.

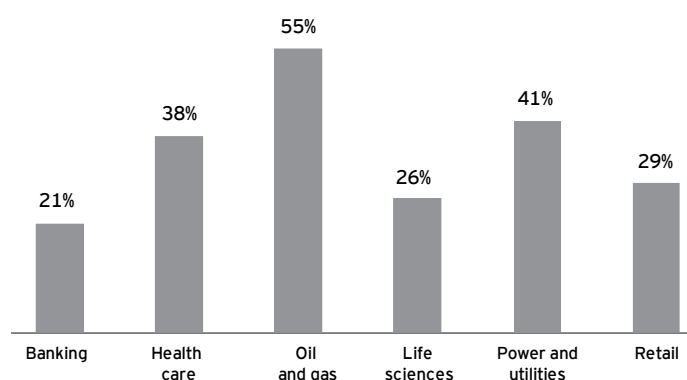
An emerging element of this risk is related to shareholder action. Several oil and gas companies have come under pressure from shareholder groups over their investments in certain countries where human rights abuses have been alleged. “As shareholders become more politically aware and concerned about the activities of the companies in which they hold stakes, this form of limiting access to reserves in certain countries could begin to grow,” explained one panelist. To date, only investments in Sudan and Burma have been directly affected by this trend, but such action could spread to investments in other countries deemed to have poor records on human rights. This may again become

an issue in light of the waves of protests sweeping North Africa and the Middle East, especially with respect to the potential for new borders all over the continent. It remains to be seen how oil companies would engage with a partitioned Libya, for example.

Our survey found that the most common response to expanding government roles among oil and gas companies was to focus on compliance. Arguably, this is a limited approach, and responses based on adjustments to strategy may be necessary. Many IOCs are being creative and willing to consider some deals or arrangements that they may not have 5 to 10 years ago. The contractual agreements seen in Iraq suggest that majors are willing to move outside of their conventional business models.

Another response to this risk is to look to areas where access is less of an issue, such as unconventional oil and gas. However, this comes with another set of challenges, and it is crucial that companies keep abreast of new technologies, such as shale gas recovery techniques. Companies will need to be more open about moving into new markets, especially when this takes place through new vehicles. “Companies will live and die in the future by their ability to commercialize reserves in markets that are known to them,” noted Ernst & Young Global Oil & Gas Leader, Dale Nijoka.

Percentage reporting they are challenged by the expansion of government's role, by sector





2. Uncertain energy policy

Our oil and gas panel was in agreement that uncertain energy policy continues to pose a significant risk, ranking it in the top three risks for the third year in a row (it placed first in 2010 and second in 2009). As one panelist put it: “Uncertainty over the future energy policy of both consuming and producing countries remains a high-level risk for the oil and gas industry.”

The panel expects the risk to remain at around the same level of severity in 2013.

The top driver of regulatory risks, as reported by oil and gas companies in our global multi-sector survey, is the sector-specific regulatory pressures. These pressures on the sector include environmental and community-driven constraints on reserve access, discussed in relation to risk one, and uncertainty regarding energy policy. Also of concern to oil and gas respondents were general regulatory tightening (such as on environmental issues) and challenges posed by new legislation.

Lack of progress on policy debates has left energy policy in a continued state of flux in many key geographies. The US faces legislative gridlock over energy policy, with little prospect of clarity around the issue before the next electoral process in 2012. International climate change talks have so far failed to produce a comprehensive agreement on greenhouse gas reduction measures to replace the Kyoto protocol when it expires next year.

Meanwhile, the consequences of the oil spill, in 2010, in the Gulf of Mexico continue to be felt in the debate, particularly over deepwater regulations. The blowout of the well has resulted in revised regulation and oversight of offshore drilling operations,

Drivers of uncertain energy policy, as reported by organizations surveyed

Ranked by frequency of mention

Rank*	Driver
1	Sector-specific regulatory pressures
2	General trend toward regulatory tightening
3	New legislation
4	Creation of new regulatory oversight bodies
5	Rising CSR pressures
6	Rapid pace of changes in regulation

** Based on 52 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown*

although the geographical spread of this impact, as well as its duration, may be limited. Nonetheless, longer permitting processes may make drilling in US waters more costly and, as one panelist explained: “The removal of liability caps could make the Gulf of Mexico too expensive for any but the largest oil companies, restricting access for the independents.”

Policy uncertainty impacts not only conventional reserves but unconventional energy sources as well. As new energy sources are found and commercialized, the regulatory framework struggles to keep pace with the developments in the industry. This can lead to moratoriums while feasibility and impact assessments are completed. Such delays have impacted both shale gas and coal seam methane in a number of geographies. Regulatory and fiscal frameworks for these sources are also sometimes uncertain.



Another, more extreme, aspect to the risk, is that uncertainty in legislative outcomes may lead investors to question the prospects of the oil and gas industry. As a former senior executive in the sector put it: “Price and regulatory uncertainty will cause capital markets to question the long-term enterprise value of oil and gas companies.”

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Faced with uncertainty on both national and international levels, oil and gas companies need to execute strategies in the context of existing policies and to take account of the economics of supply and demand. While future energy policy is notoriously difficult to predict, it is crucial that companies anticipate and prepare for increased operational costs as a result of more stringent regulations. Majors have continued to run expensive operations in places such as the Gulf of Mexico, but small to mid-cap companies may need to redeploy their activities to more cost-effective onshore operations, which are not affected by stricter regulation.

Our global multi-sector survey showed that oil and gas companies are relatively confident in their ability to manage regulatory risks; some 59% reported relatively successful strategies. The most commonly reported approach was to rely on the risk management function to address regulatory challenges; the second-most common was to invest in government relations capabilities.



3. Cost containment

Risks associated with cost management rank at number three on the radar for the second year in a row. The oil and gas panel expected it to remain at a similar level of impact in 2013.

As John Avaldsnes, EMEA Oil & Gas Leader at Ernst & Young, argued: “In a competitive, tight-margin industry like oil and gas, cost containment will always be a high priority.”

“Oil and gas extraction from accessible acreage is increasingly challenging, and demands costly new technology – which in turn requires personnel with higher technical skills to operate. This is yet another addition to overall costs.”

Companies are facing increasing pressure on their cost containment efforts as a result of a number of factors. Firstly, operating environments for oil and gas companies have become more complex, posing both physical challenges (resulting from, for instance, deepwater drilling or Arctic exploration and production) and political challenges (in the form of insecurity or regime instability). More complex operations generally mean more costly operations, as an academic panelist explained: “Oil and gas extraction from accessible acreage is increasingly challenging, and demands costly new technology – which in turn requires personnel with higher technical skills to operate. This is yet another addition to overall costs.”

Drivers of cost containment risks, as reported by oil and gas organizations surveyed

Ranked by frequency of mention

Rank*	Driver
1	Legislation restricting flexibility to cut costs
2	Political pressure on organizations when considering cuts

** Based on 45 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*

Another factor, as one commentator noted, is that “increased and constantly changing safety and environmental reporting requirements are causing a substantial increase in compliance costs.” Costs are also impacted by cyclical factors, as rising exploration activity has led to a significant increase in drilling cost, just as the cost of raw materials (such as steel) has risen as a result of booming demand from China.

Interestingly, the main issues preventing companies from responding to this risk, according to oil and gas respondents to our global multi-sector survey, are legislative in nature. Thirteen percent reported such challenges; the remainder felt that their efforts to control costs were at least somewhat effective.

Despite this focus on legislative challenges, the industry is also facing higher operational costs as it addresses the shifting demographics of an aging and retiring workforce, while at the same time seeking to ensure that experience and knowledge is not lost.

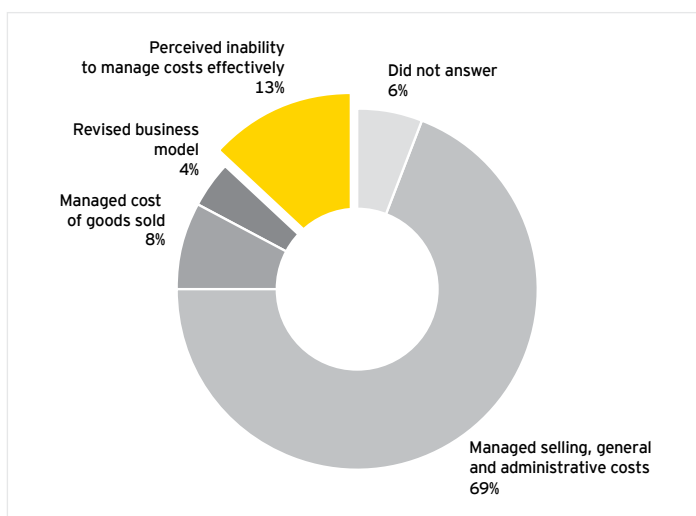
According to our global multi-sector survey, in responding to rising costs, the most frequently reported initiative for oil and gas companies was to adopt process optimization and embedding of controls. While this is not a cost-cutting strategy per se, the



emphasis is understandable given that many of the industry's cost challenges stem from the growing complexity of upstream operations.

Some companies have focused on revising their budgeting processes or reducing headcount, while others seek advice from external consultants on how to manage costs. Sixty-nine percent of oil and gas respondents reported achieving reductions in selling, general and administrative (SG&A) costs, and 8% reported reducing costs of goods and services. Generally, companies in the oil and gas sector seeking to contain costs will focus heavily on third-party spend, headcount, shared services and outsourcing.

Sector responses to cost cutting



Strategies adopted to mitigate risk are shown in grey
Reasons provided for failing to mitigate risk are shown in colour

Factors mitigating cost containment risks, as reported by organizations surveyed

Ranked by frequency of mention

Rank*	Mitigating factor
1	Process optimization and embedding of controls
2	Revisions to budgeting and forecasting process
3	Reduction of headcount
4	Standardization of product portfolio and/or optimization of technologies
5	Enhanced IT and infrastructure
6	Focus on core business model

* Based on 45 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.



4. Worsening fiscal terms

For the second year in a row, this risk is fourth on our radar for the oil and gas sector. Our oil and gas panel expected that this risk's importance will remain at its current elevated level over the next two to three years.

“Under uncertain market conditions, governments tend to make regulatory changes to their benefit.”

Of course, the fiscal and contractual terms offered by host countries change over time and depend on a multitude of factors, including the size and complexity of the resource, current levels of investment, the degree of competition and national experience. However, governments tend to take a more assertive stance when prices rise: “Under uncertain market conditions, governments tend to make regulatory changes to their benefit. This has previously been the case in the petroleum industry and is returning in some cases. Domestic supply obligations and changes to fiscal regimes are re-emerging, which will affect upstream investment,” as one panelist put it. Another commentator concurred: “The use by governments of tax claims, real or not, as a pressure point to coerce oil companies appears to be increasing. Governments appear to be using them as bargaining chips in equity negotiations.” In one example, despite declining gas prices, the UK Government recently raised the levy on North Sea oil and

gas production, defending its policy by arguing that the North Sea's oil tax regime was last modified in 2006 (when the price of oil was US\$66 per barrel).

In addition to tightening of fiscal terms, there is a discernable trend toward service agreements for non-complex and mature fields on the one hand, and retention of production sharing agreements (PSAs) for complex and demanding resources – which require high technological input – on the other.

“The use by governments of tax claims, real or not, as a pressure point to coerce oil companies appears to be increasing. Governments appear to be using them as bargaining chips in equity negotiations.”

These shifts are pushing IOCs into competition with service companies. As one panelist explained, “Host governments either expect oil companies to act as little more than service companies or they go directly to the oil and gas service companies, cutting out the oil companies altogether.” Examples are Ecuador, which introduced service contracts last year and Turkmenistan, which awarded service companies the contracts to manage the development of its South Yoloten field (although one of China's



NOCs will also take part). The Turkmen Government has since reiterated its intention to restrict PSAs with foreign oil companies to offshore areas.

“Host governments either expect oil companies to act as little more than service companies or they go directly to the oil and gas service companies, cutting out the oil companies altogether.”

Where resources are demanding and complex, host governments are retaining PSA contractual regimes. This highlights the leverage that technology brings to companies that want to achieve good terms when operating abroad and, conversely, the impact that a loss of a company's technological lead can have. Russia is considering offering PSAs to produce difficult oil deposits and to encourage investment in poorly explored areas. Brazil is offering PSAs for the development of its challenging pre-salt resources.



5. Health, safety and environmental risks

This risk is, in effect, a new entrant to the radar this year, although related to risks seven and eight, among others. It ranks fifth; and on balance, our oil and gas panel believe that the impact of health, safety and environmental (HSE) risks on the sector will be roughly unchanged in three years' time.

Investment in CSR was identified by our global survey as being the most frequently reported response to HSE risk (as shown in the chart on the opposite page). HSE issues have risen on the oil and gas industry's agenda in recent years. This reflects both an increased focus of oil and gas companies on a more sustainable and robust operating model and the fact that the industry is facing more complex operational challenges than ever before (see risk seven).

It also reflects the rising power of local community stakeholders. As one panelist noted: "Environmental opposition to oil and gas development in particularly fragile ecological areas – such as the Arctic – will become even more entrenched." Our global multi-sector survey found that 32% of oil and gas respondents had faced difficulties in responding to such rising public expectations. A further 9% indicated difficulties in responding to a negative public image of the sector.

A stronger emphasis on HSE issues may affect the ability of companies to explore and produce oil and gas in certain regions, particularly ecologically sensitive areas. Specifically, there are growing public and political concerns over the environmental impact of unconventional oil and gas exploitation. "Environmental considerations may significantly reduce enthusiasm about shale gas and even limit the development of shale gas production in some regions, especially in Europe where it may turn out to be socially unacceptable," explained Philippe Copinschi, Lecturer

in International Oil Relations at l'Institut d'Etudes Politiques de Paris (Sciences Po). "Fracking" – the process of putting water and chemicals down wells under high pressure to fracture the underlying rock and increase gas flow – carries with it potential dangers in terms of chemical spills, water aquifer contamination, above-ground water pollution and the use of significant scarce water resources. As one commentator noted: "How these risks are perceived and regulated will greatly affect the spread of unconventional gas technology."

The developments following the Gulf of Mexico spill have shown that both the industry and the regulatory bodies are now evaluating the suitability of the different regulations and the effectiveness of safety management practices among operators and suppliers.

"Companies with capabilities related to health and safety may occasionally be preferred bidders in licensing rounds or contract awards, as governments seek their expertise to avoid environmental disasters and work-related accidents."

Specifically, public concerns over the environmental effects of energy production have, as one panel member noted, "Forced governments to become 'visibly' in charge. In practical terms, it has translated into either an enactment of new regulations or a tighter enforcement of existing regulations. In either case, the inevitable consequence is an increase in exploration and production costs." Stricter legislation is expected to raise costs for offshore exploration and production (E&P) in several jurisdictions,

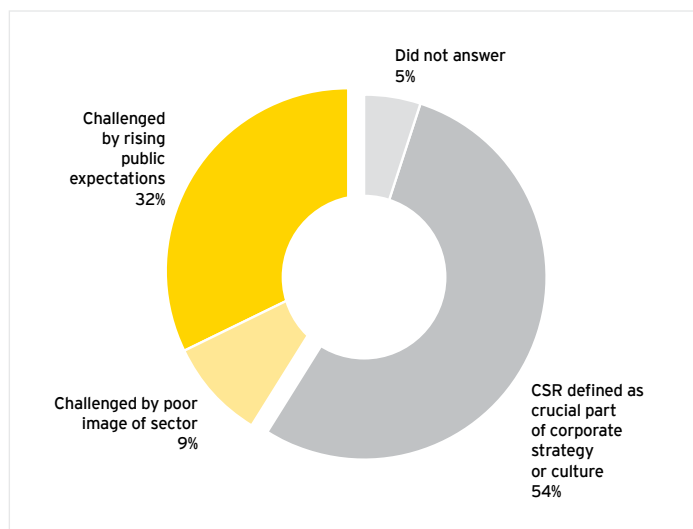


a challenge that will, as previously noted, hit smaller players hardest. “The additional requirements are only just beginning to be addressed,” said one panelist. Clearly, this risk requires companies to move beyond merely identifying, understanding and monitoring the challenge to put in place the necessary actions to mitigate the risk. The use of a sophisticated risk register has limited value without relevant action. Companies must ensure they have an in-depth overview and understanding of their “state of health” at any point in time and the robustness of people and processes with regard to the risk of major accidents.

Rising HSE pressures will most likely force companies to adapt in four ways. Firstly, they must improve management’s overview of the company’s exposure; secondly, they must ensure consistency between the companies’ goals and strategies and its HSE exposure; thirdly, they must ensure full integration of HSE in the company’s governance model; finally, they must continuously monitor how the organization facilitates and executes on the risks identified through the risk management process (and identified in the risk register). Although adapting to new systems is expensive, it will save in the long term.

As another panel member pointed out, this could have an upside, if the current trend toward emphasis of HSE capabilities continues to escalate: “Companies with capabilities related to health and safety may occasionally be preferred bidders in licensing rounds or contract awards, as governments seek their expertise to avoid environmental disasters and work-related accidents.”

Sector responses to social acceptance risk (CSR)





6. Human capital deficit

While the oil and gas sector is by no means in crisis in terms of a talent gap, a serious situation could arise if insufficient action is taken to develop the next generation of skilled workers. Consequently, this year sees the risk of human capital deficit, ranked at seventh last year, rising by one place on our risk radar. “An aging workforce and a shortage of new recruits will remain critical factors in an era where fossil fuels are seen by many as a ‘dirty’ or sunset industry,” noted one industry expert.

On balance, the panelists we spoke to expect this risk to become even more crucial for companies by 2013.

Unsurprisingly, the top drivers of this risk, as reported by oil and gas respondents to our global multi-sector survey, were a shortage of personnel with necessary skills and increased global competition for talent. Twenty-two percent of oil and gas respondents indicated a lack of qualified personnel was already impacting the sector. A further 7% indicated problems with a lack of organizational focus on managing talent, although these kinds of problems were reported with less frequency than in many other sectors.

The oil and gas industry suffers from a deteriorating brand image. The industry has long been a target for environmental activism and periodically suffers high-profile environmental incidents. This could amplify the loss of talent to more “fashionable” sectors, such as renewables.

“Further raising the profile of the industry and changing old-fashioned perceptions is vital if companies are to recruit, nurture and retain the next generation of skilled engineers and talented business leaders.”

Companies in developing countries face different issues, in that, according to one panelist, “Although environmental considerations are not a main driver for career choice in developing countries, the lack of specialized courses and a robust education system contributes to a deficit in qualified personnel.”

Drivers of human capital deficit risks, as reported by organizations surveyed

Ranked by frequency of mention

Rank*	Driver
1	Shortage of personnel with necessary skills
2	Increased global competition for talent
3	Lack of development in talent management processes
4	Negative impacts of law or regulation on organization’s ability to attract talent

** Based on 38 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*

As Penny Stocks, Human Capital partner with Ernst & Young LLP, put it: “Further raising the profile of the industry and changing old-fashioned perceptions is vital if companies are to recruit, nurture and retain the next generation of skilled engineers and talented business leaders.” The industry suffers from an aging workforce, with almost 45% of workers above 45 years of age. A significant proportion of the industry’s workforce will retire over the next 5 to 10 years and it appears there is no adequate replacement for this knowledge and expertise. Given the time required to build relevant skills as well as the cost of replacement, action must be taken in advance of a serious problem emerging. “This problem is set to get gradually bigger as people retire, but the solution requires early action,” as one panel member put it.

Human capital will also need to be developed to keep up with technological advances in the industry as operations become increasingly complex and take place in less favorable places. One panelist explained: “Production of oil and gas will demand an increasingly knowledgeable and technically competent workforce at all levels. Technology-driven plays require scientists and practitioners to work together to deliver new equipment, methodology and management systems to explore and produce hydrocarbons in the most sustainable and safe way.”

Skills development will also be key if offshore oil and gas operators are to come to terms with the growing problem of their maturing – and in some cases – decaying assets, which raise serious concerns about integrity and safety.



In our global multi-sector survey, oil and gas companies reported having a well-developed program for managing talent as the main strategy for addressing human capital risks. Other strategies included enhancing diversity and focusing on the development of an organizational culture that encourages retention.

It is encouraging to note that 55% of the oil and gas executives we surveyed said they have already implemented measures to address this risk. Of the seven sectors we covered, oil and gas was the most proactive in talent management; for most sectors, the comparable figure was between 40% and 50%.

As encouraging as these figures are, they suggest that companies are – understandably – focusing primarily on the organization level, which may not serve to address talent-shortage issues. Managing this risk effectively will require a number of strategic shifts. Firstly, companies need to take a more globally connected view on talent development, including working collaboratively to implement strategies for building depth of expertise in the growing engineering pools in developed countries – such as job rotation, investing in local education, lobbying to influence education policies, establishing global academies and sharing resources.

Secondly, more flexible working conditions and creative pay arrangements should be introduced. By implementing innovative flexible working arrangements, making better use of technology

Factors mitigating human capital deficit risks, as reported by organizations surveyed

Ranked by frequency of mention

Rank*	Mitigating factor
1	Well-developed program for managing talent
2	Embedded culture of developing employee potential
3	Increased diversity of workforce
4	Focus on employee satisfaction

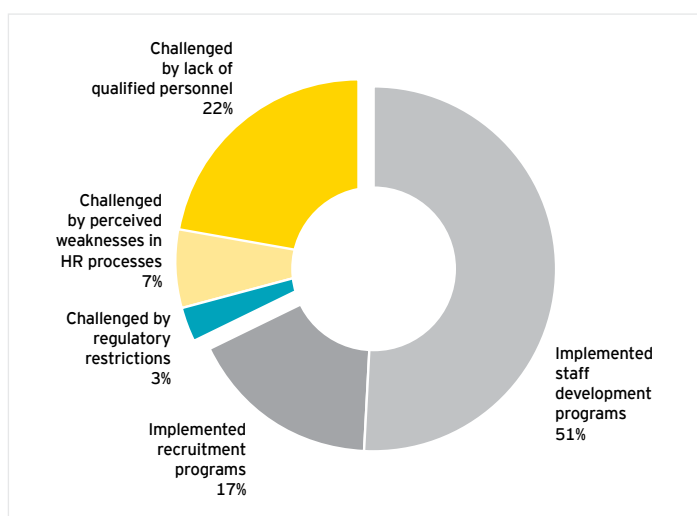
* Based on 38 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.

and establishing different incentive schemes, companies can better utilize their retiring population. It is estimated that such initiatives, if implemented effectively, could potentially add four to five years to the working life of highly skilled oil and gas professionals. One panellist commented, "It is in a company's best interest to offer educational incentives."

Thirdly, capturing and extracting the knowledge and expertise of the retiring workforce by implementing codified standards and repeatable work processes is key to avoiding high costs owing to demographic changes.

Finally, developing talent across the pipeline will be crucial. Companies need to take a more strategic view to managing their talent throughout their careers – having a clear employee value proposition and supporting learning and development, career pathing and succession planning schemes will all help.

Sector responses to managing talent



Strategies adopted to mitigate risk are shown in grey
Reasons provided for failing to mitigate risk are shown in colour



7. New operational challenges, including unfamiliar environments

There is a shared recognition in the industry that the time of “easy” oil and gas is over for most IOCs, and many NOCs. For this reason, the challenge of unfamiliar operational environments has moved up the risk list. Three years ago, this was a “below the radar” risk in our report. Last year, the threat moved onto the radar in 10th position. This year the risk moves up a further three places. Looking ahead two to three years, the oil and gas panel, perhaps extrapolating from recent trends, expected that this risk would increase still further in its impact on sector performance.

“Although the industry has always pushed technological boundaries, it is under ever keener scrutiny and the frontiers are becoming ever more remote.”

Because oil and gas reserves are getting harder to access as supplies are consumed and political barriers rise, the industry is pushed toward the pursuit of less accessible sources. Companies face both physically challenging environments, such as ultra-deepwater and the Arctic, and politically testing environments, such as insecure regions and those with unstable regimes. “Although the industry has always pushed technological boundaries, it is under ever keener scrutiny and the frontiers are becoming ever more remote,” explained an analyst at an industry research institute.

Operating in new environments requires management of several challenges. These include technological developments; changes to the way companies can execute and operate across the value chain; the need for more and different skill sets from future employees; and the need for different organizational models between the host country, operator, partners and suppliers.

If these challenges are addressed effectively, the risks associated with challenging environments can be managed. Indeed one panelist commented that, “The response to the blow-out in the Gulf of Mexico was made several times more complex by the extreme depth of the water.” Other new environments will pose

their own challenges, both to operations and to responses to accidents, for which companies will have to be prepared.

To be sure, in response to rising global demand for energy, the oil and gas industry has demonstrated an ability to develop and adapt new technologies to meet the challenges it faces in pursuit of new supply. Companies are consciously and proactively investing in innovation and R&D. John Avaldsnes, EMEIA Oil & Gas Leader at Ernst & Young, commented that: “The oil and gas industry is a long-term business and the industry is already working on the challenges ahead, knowing that it takes significant time, resources and capabilities to develop new technology.”

“The response to the blow-out in the Gulf of Mexico was made several times more complex by the extreme depth of the water. Other new environments will pose their own challenges, both to operations and to responses to accidents, for which companies will have to be prepared.”

Companies must continuously invest in, develop and adopt new technologies if they want to be able to improve their operational performance and adapt to new operational challenges. This can be done in many ways: i) via strategic commitments to research and development; ii) through ongoing investment in existing facilities with the goal of enhancing recovery over the life span of the field; and, finally, iii) development of joint ventures with technology providers to support tomorrow’s technology needs. Companies also need to take an innovative approach to building new relationships, ensuring stronger integration across the value chain.



8. Climate change concerns

Despite the slow progress of international climate talks, oil and gas companies face pressure from many stakeholders to address climate change concerns. However, this risk has slipped three places in our risk list, having ranked fifth in 2010. The industry panelists we interviewed expect risks relating to climate change to remain roughly at this level of impact over the next three years.

“Oil and gas companies will increasingly be evaluated by public opinion on their policy regarding climate change.”

Though the Copenhagen summit of 2009 failed to achieve a breakthrough, pressure on companies can arise from other stakeholders. One panelist claimed, “Given that inter-governmental negotiations over climate change has failed to produce a legislation with binding targets in order to replace the Kyoto Protocol that will expire in 2012, civil society groups may have to turn directly to companies to address the climate change issue. Oil and gas companies will increasingly be evaluated by public opinion on their policy regarding climate change.” An academic member of the panel concurred: “There will be massive pressures for companies to contribute to reductions in carbon emissions ... and strong stakeholder pressures will continue.”

Of course, climate change concerns are now firmly on most oil and gas companies' agendas and are being addressed through the inclusion of the issue into routine processes. A large number of companies are now engaged in carbon reporting processes after the Environmental Protection Agency declared carbon dioxide to be a dangerous pollutant in 2009.

Nonetheless, risks related to climate concerns cannot be fully managed solely as a regulatory compliance issue. Risks also need to be addressed via a continued focus on adaptation, mitigation, recognition of new market requirements and a response to increased stakeholder expectations. Indeed, one panelist claimed that: “Companies' ability to understand and address public requirements regarding climate change issues will become an important element of competition within the industry.”

“Companies' ability to understand and address public requirements regarding climate change issues will become an important element of competition within the industry.”

A recent survey by Ernst & Young¹ of 300 global executives found that executive leadership is critical to realizing the full potential of the business response to climate change. Strong governance practices must ensure that responsible officers throughout the organization understand the climate change strategy, goals and decision-making processes. Responsible officers must be accountable for managing risks and empowered to act accordingly. Accountability can be embedded more broadly into the corporate culture by including climate change key performance indicators (KPIs) in performance metrics. Having a consistent global framework for reporting greenhouse gas emissions data and metrics for climate change initiatives can also help organizations manage these initiatives against internal objectives, as well as benchmark their efforts against peers.

1. *Action amid uncertainty: the business response to climate change*, Ernst & Young, 2010



9. Price volatility

Ranked sixth in our 2010 report, risks relating to oil and gas price volatility have moved three places down the risk list this year. The panel of experts we interviewed predicted that the risk would become less significant between now and 2013, recent volatility in energy markets notwithstanding.

Price volatility tends to be caused by geopolitical or macroeconomic shocks. The recent unrest in the Middle East and North Africa region in the first half of 2011 resulted in an oil price surge. In early February, the price of crude passed the US\$100 per barrel mark, and then rose above US\$120 per barrel in April.

“Companies cannot be in this business and ignore the volatility of pricing, because investment decisions are very long term and the volatility of the price curve is very extreme.”

Such volatility creates numerous challenges. While capital-intensive oil and gas projects will benefit from sustained high oil prices, the global economy is likely to be impacted negatively, and the problems created may be persistent.

Of course, volatility on the downside poses an equal or greater challenge. Annette Hester of the Center for Strategic and International Studies commented that, “Given the certain increase in exploration and production costs for oil and gas sectors, the industry is particularly vulnerable to price volatility.” While oil

prices remain relatively high, the natural gas market continues to face a supply boom. “As a consequence of the shale gas revolution and global economic recession, gas prices have fallen dramatically... and uncertain market conditions have affected gas investments,” noted one commentator.

Some analysts argue that shale gas will produce a revolution in energy availability. In the United States, despite a regulatory framework that may increasingly inhibit profit (for example, stringent regulation concerning the hydraulic fracturing process), the outlook is for rapid growth, and recent research has suggested great potential in Europe and Asia as well.

Gas prices are also likely to be affected by the switch from oil-linked pricing arrangements to gas-on-gas pricing, a move that has already taken place in the United States and, to a lesser extent, the United Kingdom, and may be about to begin in Europe. In the long term, the growing supply of shale gas means that the gas price is increasingly becoming delinked from the oil price. This has serious implications for many players in the sector. As Marcela Donadio, Ernst & Young Americas Oil & Gas Leader, pointed out: “Companies cannot be in this business and ignore the volatility of pricing, because investment decisions are very long term and the volatility of the price curve is very extreme.”

Small to mid-cap companies and large independents are particularly exposed to price volatility, while major IOCs or NOCs are at an advantage. Stress-testing each investment case is one common method used by companies to avoid being taken by surprise by the impacts of price volatility. Also, ensuring that the investment is based on a realistic rate of return is another mitigating step companies can take. For smaller organizations, entering into partnerships with companies with a stronger balance sheet is a way to reduce their exposure.



10. Competition from new technologies

The challenges associated with new technologies in the oil and gas industry have gradually moved into the list of top 10 risks (this risk was ranked “below the radar” last year). Our panelists expect these risks to continue to increase in importance over the next two to three years.

Our global multi-sector survey found that some 14% of oil and gas respondents reported difficulty in managing emerging technology risks. The most commonly reported driver of the risk is a failure to develop an innovation culture and processes.

In addition to new technologies for exploration and production, the sector is impacted by broader technological advancements. For instance, one panelist mentioned that the cost of alternative power generation is expected to fall, which in the long term could threaten the market share of oil and gas companies that fail to adapt. Another panelist mentioned the further electrification of energy delivery, most particularly transport, as the “single biggest threat to oil demand.” Indeed, energy is increasingly being delivered in the form of electricity, a process that would be greatly accelerated if advances are made in electricity storage. If electric cars take hold, the negative implications for oil and the positive implications for gas would be substantial.

While companies cannot afford to ignore this risk, choosing which technology to invest in presents an ongoing challenge. “White elephant investments are potentially company breakers and are related to the current high rate of technological innovation,” said one panelist, editor at a leading energy and metals information provider. Idle US liquefied natural gas (LNG) terminals are one example of companies being wrong-footed technologically.


Our global multi-sector survey found that, for oil and gas respondents, the most common approach to managing this risk is continuous monitoring of new technologies. Other strategies mentioned include developing a means to innovate constantly in products, services and processes, and prioritizing and investing in innovative IT systems and IT expertise. Nearly one-fifth of the oil and gas executives we interviewed said they have already invested massively in IT. Forty-five percent claimed to have developed an “innovative culture” at their company as a response to challenges posed by emerging technologies.

Factors mitigating risks from new emerging technologies, as reported by oil and gas organizations surveyed

Ranked by frequency of mention

Rank*	Mitigating factor
1	Continuous monitoring of new technologies
2	Continuous innovation of products, services and manufacturing processes
3	Organization-wide prioritization of IT
4	Merger or acquisition to gain key technological capabilities
5	Development of a knowledge management system

* Based on 34 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.



Part 2: opportunities

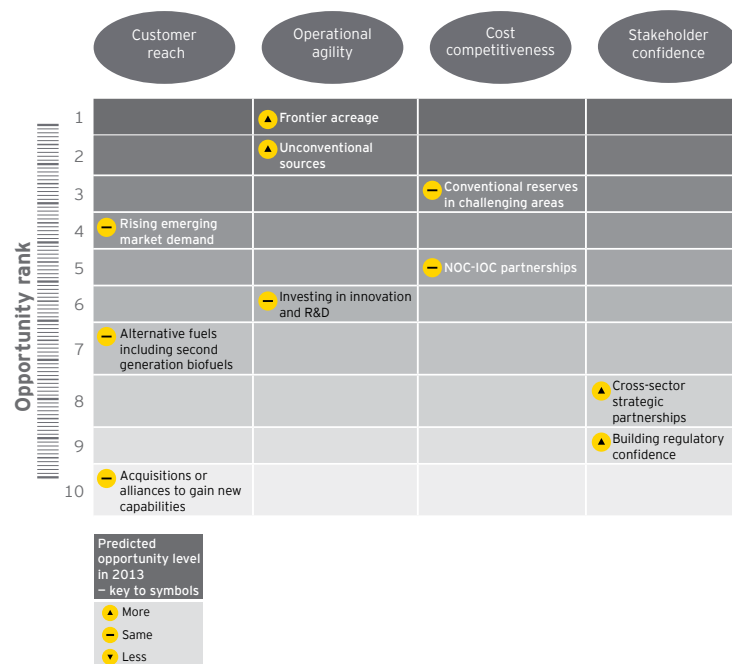
Ernst & Young opportunity ladder

The opportunity ladder presents a snapshot of the top 10 opportunities for companies in the oil and gas sector.

The opportunities at the top of the ladder are those that the commentators and executives we interviewed thought would have the greatest impact on oil and gas companies' performance in the years ahead. Arrows indicate whether the executives thought the potential performance impact of the opportunity would rise or decline by 2013.

The ladder is divided into four sections. These represent the four drivers of competitive success identified in our *Competing for growth* research. This study showed that successful companies – the top quartile in both revenue and EBITA growth – have focused on executing four drivers of competitive success:

- ▶ Customer reach – to optimize their potential market
- ▶ Operational agility – to maximize their effective response
- ▶ Cost competitiveness – to optimize their profitability
- ▶ Stakeholder confidence – to secure both talent and support for achieving their goals



The top 10 opportunities

1. Frontier acreage

Oil and gas companies are today moving into parts of the world previously regarded as too difficult, too expensive or too politically unstable to justify operations. But expectations of high energy demand and advances in technologies and business processes have made these new frontiers economically viable. Indeed, frontier acreage ranks as the biggest opportunity for oil and gas companies in 2011, a development that is arguably most strongly driven by technological advances. Furthermore, our oil and gas panel of experts and executives expect to see the opportunity continue to grow over the next two to three years.

“As opportunities become rarer and more difficult, the industry will have to go further afield, and move into geographies and geologies that are more challenging than they historically have had to.”

This pushing out of operational boundaries is sometimes viewed as a necessity. As Dale Nijoka, Ernst & Young Global Oil & Gas Leader, described it: “As opportunities become rarer and more difficult, the industry will have to go further afield, and move into geographies and geologies that are more challenging than they historically have had to.” But it is clearly also an opportunity for those companies that have the requisite competencies. A proliferation of new technologies and improved seismic data and interpretation techniques has lately seen oil and gas companies move into frontier acreage such as the Arctic, Greenland, the Falklands, the east coast of Africa and the northern Gulf of

Guinea. “These were not opportunities that existed 30 years ago with the technology as it was. These are technologies that either developed because they had to develop, or they developed and opportunities have been found where you can now use those technologies,” explained one executive.

“A new accident could accelerate the adoption of very restrictive legislations that would jeopardize access to ‘new frontiers’ territories such as the ecologically fragile Arctic region, ultra-deepwater areas offshore Brazil or in the Gulf of Guinea.”

With new technology opening up new reserves, the industry is seeing a “land grab” to get acreage in resource-rich areas. There is also a “technology grab.” That is, many companies have signed joint ventures and other partnerships to obtain commercial access but also, perhaps more importantly, to gain access to new technologies and understand its transferability to different markets.



Looking ahead to 2013, companies will need to be more flexible about where they go with their business, both in terms of investing in new relationships and in new geographies. They will also need to be technologically flexible. In the words of Dale Nijoka, Ernst & Young Global Oil & Gas Leader, “Those companies that are innovative, creative, can build relationships with the relevant governments, have the risk appetite and have the technology to recognize the opportunities, will be successful.”

“Those companies that are innovative, creative, can build relationships with the relevant governments, have the risk appetite and have the technology to recognize the opportunities, will be successful.”

Simultaneously, the industry faces an increasing tide of regulation around business ethics, HSE compliance and zero tolerance for spills (see risk five). “A new accident could accelerate the adoption of very restrictive legislations that would jeopardize access to ‘new frontiers’ territories such as the ecologically fragile Arctic region, ultra-deepwater areas offshore Brazil or in the Gulf of Guinea,” noted one of our oil and gas panelists.

2. Unconventional sources

The opportunity related to unconventional reserves is driven, in essence, by the same factors driving opportunity one. Growing energy demand alongside a tightening of access to conventional supply, and advances in technology, have made unconventional sources commercially viable. In addition to meeting demand, unconventional sources also offer a means to address the energy security concerns of import-dependent countries. This is why our panelists ranked this opportunity in second place on the opportunity ladder. On balance, the panelists believe the impact of unconventional sources on the performance of oil and gas companies will continue to grow between now and 2013.

“The development of unconventional gas in one region (the United States), combined with LNG as a global product and price transference mechanism, will impact other, previously disconnected, gas markets. In other words, Europe does not necessarily need a shale gas revolution of its own, if China has one, freeing up LNG for the European market.”

Unconventional sources – such as shale gas, oil sands and coalbed methane – offer a number of benefits for governments and companies, including the ability to reduce dependence on traditional oil-producing regions and offsetting production declines from mature fields. So far, unconventional sources have been found largely in Western markets where access tends to be less problematic. In North America, the quantity of recoverable unconventional sources of energy, particularly shale gas and tar sands, has had a significant impact on energy security in Canada and the United States.

In turn, this has had an effect on the global gas market balance, as one panelist explained: “The development of unconventional gas in one region (the United States), combined with LNG as a global

product and price transference mechanism, will impact other, previously disconnected, gas markets. In other words, Europe does not necessarily need a shale gas revolution of its own, if China has one, freeing up LNG for the European market.”

It was pointed out by a number of commentators that, at times, the pace of technological change is delayed by the fact that the regulatory environment struggles to keep pace with developments in the industry. For example, the fast development of shale gas in the United States has overtaken the regulator’s ability to manage some of the associated issues, such as possible environmental impacts related to the production process, the “fracking” technology. While shale gas is a huge natural resource that cannot be overlooked, the industry needs to ensure that it is managed in a structured, coherent way that minimizes any environmental side effects.

Like resources in frontier geographies, the production of unconventional resources in an economically viable manner requires companies to have access to the latest industry technology. Operationalizing emerging technology is therefore key. One strategy to this end is to make more effective use of partnerships with oilfield service companies. As one panelist noted, in terms of industry R&D spending, three of the top five places are occupied by oilfield service companies.

It is also important that oil and gas companies engage in a balanced and pro-active discussion with regulators, the public and their shareholders on the perceived risks associated with production of unconventional sources.

“Unconventionals rewrite the rules.”

Driven by energy security concerns and growing energy demand, investment in unconventional sources will continue in years to come. It is likely to be accelerated by the global economic recovery and the continuous influx of Asian, particularly Chinese, capital into projects around the globe. This appears likely to have broad implications for energy markets, resource security and the relative performance of oil and gas companies. As another panelist put it: “unconventionals rewrite the rules.”

3. Conventional reserves in challenging areas

Exploration and development of conventional reserves in difficult areas – whether for political, environmental or other reasons – ranks third on our opportunity ladder. On balance, the analysts we interviewed expected the scale of this opportunity to remain relatively unchanged to 2013 in its potential impact on industry performance.

Our panelists made a distinction between countries such as Iraq or Nigeria on the one hand, that present investors with significant political and security challenges including uncertain regime outlook, and the Arctic and other ecologically sensitive areas on the other, which pose a number of environmental challenges for operators.

“Technologies that allow higher recovery levels from existing conventional oil fields will yield additional oil flows and considerable commercial benefits.”

Iraq is one of the most important of the security-related challenges. With the largest accessible oil reserves on earth, and ambitious expansion plans, Iraq is central to future oil supply. While initial results from the development of existing Iraqi oil fields by IOCs are good, with early targets being met or exceeded, the Iraqi Government’s target of producing about 12 million barrels per day by 2017 is unlikely to be met. This may lead to renegotiations with IOCs regarding their contract terms, a process which is likely to prove both lengthy and politically controversial.

In terms of environmentally sensitive areas, the Arctic is perhaps most important as increasing energy prices are making operations commercially viable. The US Geological Survey estimates that up to 20% of the world’s remaining oil and natural gas reserves are located in the Arctic.

The consequences of a spill in the Arctic could have far broader impacts than the recent one in the Gulf of Mexico. After the spill in the Gulf, states controlling Arctic access, including Canada and Norway, declared temporary moratoria on deepwater drilling. Notably, Greenpeace, in its review of Greenland’s recent decision to give Cairn Energy permission to drill Arctic wells, specifically questioned the company’s harsh-conditions drilling experience. This suggests that when companies seek permission to conduct

Arctic operations, their specific capabilities will be closely scrutinized by stakeholders.

Of course, the Arctic is not without geopolitical risk as well: as resources in the region become more lucrative, the Arctic will take on increasing strategic significance. Each of the five surrounding countries – Russia, United States (Alaska), Canada, Norway and Denmark (Greenland) – regard part of the Arctic seas as their “national waters” and will be making claims to an extended continental shelf, which would give exclusive rights to resources on or below the seabed.

To take full advantage of opportunities in environmentally challenging locations, companies will have to invest in technology development and people management, and focus on designing adaptive business models. More advanced technology will inevitably improve and enhance oil recovery, and will also allow companies to operate in sensitive environments. As one panelist put it: “Technologies that allow higher recovery levels from existing conventional oil fields will yield additional oil flows and considerable commercial benefits.” Technology will also reduce production risks, and diminish environmental impacts.

“The oil and gas industry has demonstrated a tremendous ability to adapt to challenges – this is likely to continue.”

But operating without HSE incidents will present significant management challenges, especially where multiple partners are involved. By aligning the right people, processes and technologies to support decision-making, a company will be able to increase its ability to handle complex projects that do not allow for error. Integrating business units, value chains, operating models and partnerships, and focusing on how the functional experience and capacity is utilized across the value chain all become critical.

Companies will continue to pursue exploration in challenging areas as long as it is economical for them to do so. Those that are able to constantly develop and adapt new technology and enhance operational effectiveness will increase their supply base. “The oil and gas industry has demonstrated a tremendous ability to adapt to challenges – this is likely to continue,” noted John Avaldsnes, EMEIA Oil & Gas Leader at Ernst & Young.

4. Rising emerging market demand

With non-OECD countries, particularly China and other Asian economies, now the engine for global growth, emerging market energy demand has become one of the key opportunities for oil and gas companies looking to grow their client base. This stands in stark contrast to the decline of oil demand in the OECD, a process that predated the financial crisis in both Europe and Japan. Non-OECD demand growth is expected to outweigh OECD demand decline by a factor of about seven-to-one. As one panelist, a scholar of economics and regulation of the energy industry, explained: “The demand for oil and gas will originate from the developing world in the future. Therefore, focusing on these countries makes more sense in a difficult market situation.” Our oil and gas panel expects the scale of this opportunity to remain at roughly the same level of intensity between now and 2013.

“The demand for oil and gas will originate from the developing world in the future. Therefore, focusing on these countries makes more sense in a difficult market situation.”

Producers are using upstream infrastructure investments to take advantage of the shift in demand growth from the Atlantic Basin to the Asia Pacific region. The main example from the producer side is Chinese-Russian investments in oil, gas and coal; from the consumer side, it is Chinese gas import pipelines. The growth of terminals for liquefied natural gas (LNG) is another example.

Challenges to rising emerging markets demand, as reported by organizations surveyed

Ranked by frequency of mention

Rank*	Challenge
1	Tendency to focus on home markets following setbacks in Asia
2	Lack of market-specific expertise
3	Inability to turn market share into profit in emerging markets

** Based on 55 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*

Our global multi-sector survey found that some 21% of oil and gas respondents had encountered challenges in their efforts to tap expanding emerging market demand. Covering respondents including oil and gas service companies, IOCs, NOCs and independents, the most common obstacle cited was a poor track record in Asia. Such setbacks can make it difficult to maintain momentum in continuing to pursue emerging market opportunities. Other obstacles reported included a lack of emerging market expertise, and a poor track record in terms of profitability.

One likely reason for these survey results is that IOCs face increasing competition in the refining and petrochemical sectors as the last decades have seen the evolution of an entirely new breed of NOC – those that guard their consumer markets as they expand abroad. This “new breed” of NOCs in consuming nations has a growing focus on international supply chains that pushes them into globalization, but also privileged access to rapidly growing domestic markets. This trend has tended to push IOCs into an upstream development role.



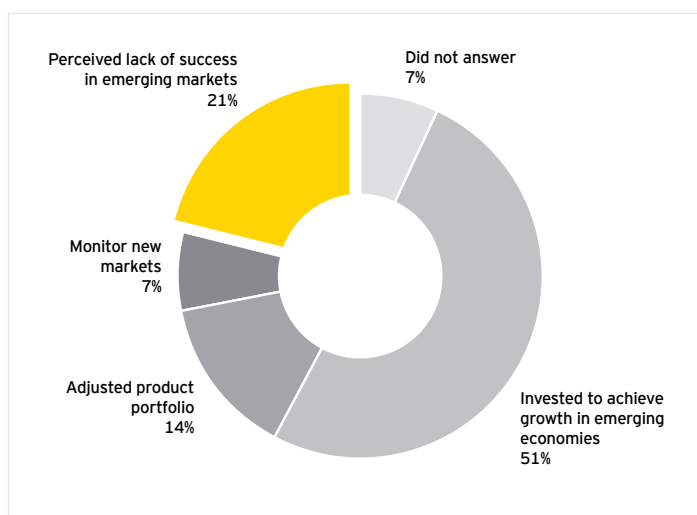
Of course, many IOCs will still seek to pursue vertical integration strategies in emerging markets. Based on their technological advantages, Western IOCs can engage in a strategic trade-off where access to technology is offered in return for access to consumer markets. However, performance in emerging markets is often dependent on government pricing policy, making these markets a risk-laden environment for any foreign commercial operator. For example, refiners in China and India operate in semi-regulated pricing environments; in such markets, governments often try to insulate consumers from rising international crude prices.

In our global multi-sector survey, the most commonly reported factor enabling oil and gas companies to be successful in emerging markets was simply the absence of an alternative: that is, rising competitive pressure in home markets was perceived as the driving force in making the necessary investment and skill development possible. The second most frequently cited enabling factor was to have a flexible strategy for different markets. For instance, partnering with a local company will help companies manage the often complex bureaucracy in the host country, better anticipate regulatory risks and obtain local knowledge.

“For those companies able to gain access to customers in emerging markets, rising energy demand in these countries can provide tremendous opportunities for downstream growth, as long as the market economics are attractive.”

Overall, some 51% of oil and gas respondents reported making significant investments to achieve growth in emerging markets. “For those companies able to gain access to customers in emerging markets, rising energy demand in these countries can provide tremendous opportunities for downstream growth, as long as the market economics are attractive,” noted Julian Lee, Senior Energy Analyst at the Centre for Global Energy Studies.

Sector responses to emerging market demand growth



Strategies adopted to mitigate opportunity are shown in grey
Reasons provided for failing to mitigate opportunity are shown in colour

5. NOC-IOC partnerships

National oil companies (NOC) and international oil companies (IOC) partnerships are ranked as the fifth most important opportunity for oil and gas companies in 2011. Our oil and gas panel expects this opportunity to remain at a roughly consistent level of impact to 2013.

“The NOCs of developing net oil consuming nations are the IOCs of the future.”

Today, NOCs from net-importing countries play a significant role as gatekeepers of future fossil fuel demand growth, particularly since this growth has slowed, or in some cases, reversed in the developed world (see opportunity four). As a result, the industry is seeing IOCs increasingly partnering with NOCs from net-importing countries. These NOCs hold out the promise of reciprocal access to their regulated domestic markets, while IOCs offer upstream cooperation on international assets.

From the NOC point of view, such partnerships can have multiple strategic benefits. As an academic member of the panel pointed out, “The NOCs of developing net oil consuming nations are the IOCs of the future. The key they hold is to the centers of demand growth, what they want is access to resources, technology and project management skills. The two can be married by IOC and consumer nation NOC cooperation in international upstream developments.”

From the IOC point of view, traditionally, the goal of partnership has been to gain access to known reserves. However, there are other potential benefits as well, such as mitigation of risk. “NOC-IOC partnerships could potentially help leading companies to have a better relationship with governments of oil-rich countries, helping to avert risk of rising global competition and unfavorable government policies,” commented another panelist.

As NOCs continue to forge successful partnerships with IOCs, both parties will become better managers of the associated challenges. Positive approaches were demonstrated recently by the partnership of BP and the China National Petroleum Corporation (CNPC) concerning the development of Iraq’s Rumaila field. Elsewhere, ONGC Videsh (the international petroleum company of India) is partnering with ExxonMobil on the Sakhalin I project in Russia.

As NOCs become more powerful outside their home markets and, as such, less distinguishable from IOCs, IOCs must be able to articulate exactly what they can bring to a partnership. IOCs still boast cutting-edge technological expertise in-house, an advantage so far unmatched by NOCs. While Chinese companies are happy to partner with foreign NOCs, the preference appears to be for partnering with IOCs as they offer greater technology transfer opportunities, particularly on complex and capital-intensive upstream projects.

“NOC-IOC partnerships could potentially help leading companies to have a better relationship with governments of oil-rich countries, helping to avert risk of rising global competition and unfavorable government policies.”

As a result, the industry is likely to see more partnerships form in the area of offshore, deepwater drilling and in other hostile operating environments requiring up-to-the-minute technologies (see opportunity one). As one of our panelists noted, “IOCs’ technological lead is a core part of their offering when it comes to international partnerships.”

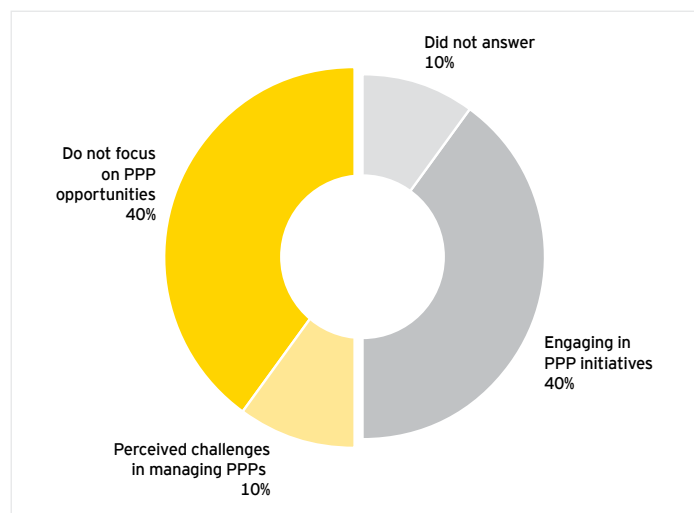


Panel members emphasized that communication is vital in a partnership and that unsuccessful cases are those that lack clear and direct communication, particularly as to the expectations of each partner. Though cultural divergences are sometimes quoted as a barrier to successful collaboration, one of the senior oil and gas executives that we interviewed pointed out that “Different cultural backgrounds and goals can provide synergy.” Another panelist argued for a further reason for partnership in an environment of rising sovereign risk: “Tougher borrowing requirements for government-backed oil companies have meant they need IOC capital more. This may be a trend that peaks and perhaps reverses to some extent within the next five years.”

“Different cultural backgrounds and goals can provide synergy.”

Our global multi-sector survey found that two-fifths of oil and gas executives stated that they are already successfully engaging in this type of public-private partnering initiatives. About the same proportion were uninterested. Ten percent stated that they had engaged in such partnerships, but unsuccessfully.

Sector responses to public-private partnerships (PPP)



*Strategies adopted to mitigate opportunity are shown in grey
Reasons provided for failing to mitigate opportunity are shown in colour*

6. Investing in innovation and R&D

Oil and gas companies continue to invest in innovation and R&D – this year’s opportunity number six – as a means to increase their competitive advantage and their operational agility. Our oil and gas panel expects the scale of this opportunity to remain roughly unchanged between now and 2013.

A number of factors are putting pressure on companies in the oil and gas sector to focus on innovation. One of these is the increasing pressure to lower carbon emissions. “Regulation and new funding streams will increase demand for emission-reducing technologies,” noted an academic member of the panel. Another panelist commented that: “The rising importance of climate change and health and safety concerns [raises the returns to innovation] in areas such as technology patents in process improvement, sulfur dioxide recovery, waste reduction and disposal, soil restoration or less polluting fuels.”

“Regulation and new funding streams will increase demand for emission-reducing technologies.”

A second factor driving companies to invest in innovation is related to the desire to access oil and gas in more challenging areas (such as ultra-deepwater and shale oil and gas wells) as well as getting more oil out of the ground in nearly depleted wells. As one panelist explained: “Upstream information analysis and management has been recognized recently and a large scope exists for productivity improvement by developing better analytical and information processing systems.”

Challenges to innovation and R&D, as reported by oil and gas organizations surveyed

Ranked by frequency of mention

Rank*	Challenge
1	Lack of specific expertise or knowledge
2	Organization is too conservative
3	Insufficient focus or investment
4	Insufficient strategic or organizational flexibility

** Based on 44 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*

Finally, a third driver is associated with the desire to become an attractive partner for JVs and other forms of collaboration between industry players. “IOCs’ technological lead is a core part of their offering when it comes to international partnerships,” noted one panelist.

“IOCs’ technological lead is a core part of their offering when it comes to international partnerships.”

According to our global multi-sector survey, lack of specific expertise or knowledge is the challenge most frequently reported by oil and gas respondents looking to take advantage of this opportunity. Other noted limiting factors included having an organization with an overly conservative outlook or having insufficient focus or investment in innovation. Some 27% of oil and gas respondents reported that they felt their organization had not been innovative enough.



Not surprisingly, our survey found the most frequently reported strategy among oil and gas companies that consider themselves successful in exploiting this opportunity, was to make innovation an organization-wide strategy. Other strategies included focusing on process improvements relating to innovation management, monitoring future needs and investing in renewable energies. Nonetheless, only a minority, 41%, of oil and gas companies said that they had embedded innovation as a core element of their strategy.

Factors enabling innovation, as reported by oil and gas organizations surveyed	
Ranked by frequency of mention	
Rank*	Enabling factor
1	Organization-wide strategy of continuous innovation
2	Well-established processes for managing innovation
3	Monitoring and investigation of future needs
4	Investing in renewable energy
5	Investment in new markets, products, brands and services
6	Investment in IT systems

** Based on 44 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*

7. Alternative fuels, including second generation biofuels

Alternative fuels, such as second generation biofuels, provide another potential revenue stream for oil and gas companies. This opportunity places perhaps surprisingly high, at seventh in our top 10 list in 2011. The industry executives and analysts we spoke to believed that the importance of this opportunity would remain around the same between now and 2013.

“Second generation biofuels may provide opportunities, although much will depend on the policy decisions taken between pursuit of biofuels and pursuit of electric and hybrid vehicles.”

Our global multi-sector survey found that an organizational failure to prioritize this issue is the challenge most frequently reported by oil and gas respondents looking to take advantage of cleantech opportunities, including second and third generation biofuels.

The success of biofuels as a viable alternative fuel depends almost entirely on governments putting in place appropriate policy in support of their development and wider application. First generation biofuels have been hit by uneven policy support that reflects wider concerns about sustainability and the difficulty of incorporating biofuels into the existing fuel supply chain. Demand for food and demand for oil are both driven by the same factors – population and income growth – and the conflict over whether land should be used to grow food or a substitute for oil

Challenges to investing in cleantech, as reported by organizations surveyed

Ranked by frequency of mention

Rank*	Challenge
1	Failure to prioritize cleantech
2	Not perceived as relevant to organization or sector
3	Public and customers not interested in cleantech

** Based on 38 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*

looks likely to re-emerge as economic recovery takes hold. One panelist noted that: “Second generation biofuels may provide opportunities, although much will depend on the policy decisions taken between pursuit of biofuels and pursuit of electric and hybrid vehicles.”

Second generation biofuels, which still require land-intensive biomass feedstock, have not yet delivered on the optimistic expectations of recent years. While they may use non-food energy crops, yield is still a key factor in bringing down the cost of production to a viable level. As such, they will still compete against food crops. There are exceptions, such as algae, which require water rather than fertile land, but the use of algae for fuel production remains some years from commercial production.

“Biologically based second generation biofuels are the most promising non-fossil fuel transport technologies with the least food-or-fuel problem.”



Despite the drawbacks, there is still considerable optimism about second generation biofuels. One of our panelists asserted that: “Biologically based second generation biofuels are the most promising non-fossil fuel transport technologies with the least food-or-fuel problem.”

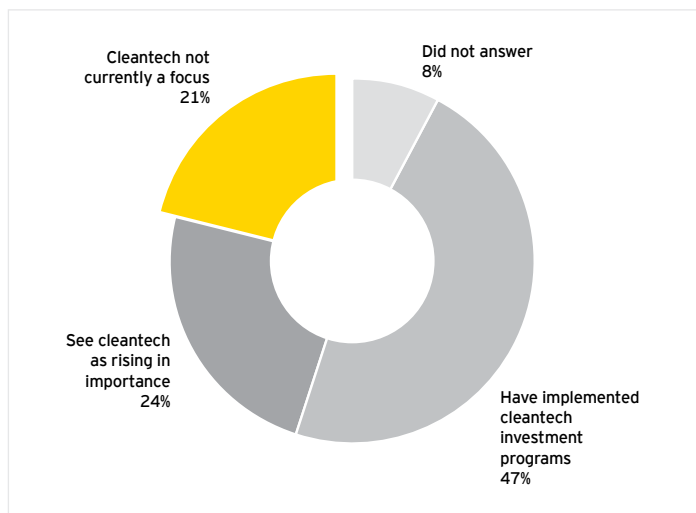
Where they receive significant government support, biofuels have an important impact on the fuel supply. This is most evident in the OECD, where biofuels are a key component in the overall decline in fossil fuel usage. Using the United States as an example, one of our panelists noted that, “An increase in biofuel blend allowance to 15% in the United States ... has the potential to substantially increase demand for sugar-cane ethanol in 2011 and beyond.”

While alternative fuels are not yet produced on a commercial scale, with the exception of Brazil, oil and gas companies must position themselves in advance of future developments. As one commentator put it: “Oil and gas companies need to invest today in order to make sure that they are not missing out on tomorrow.”

Factors enabling investing in cleantech, as reported by organizations surveyed	
Ranked by frequency of mention	
Rank*	Enabling factor
1	Centrality of cleantech to organization's innovation strategy
2	Expected growth in market for eco-friendly products and services
3	Growing need to increase energy efficiency/decrease carbon emissions
4	Increasing sector-specific importance of cleantech
5	Increasing importance of cleantech for CSR
6	Shift in corporate culture to reflect importance of green issues
7	Increasing public pressure to invest in cleantech

* Based on 38 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.

Sector responses to investing in cleantech



Strategies adopted to mitigate opportunity are shown in grey
Reasons provided for failing to mitigate opportunity are shown in colour

Among the oil and gas companies we surveyed, one of the most commonly reported factors enabling companies to succeed in exploiting cleantech opportunities was to have a corporate innovation strategy in which cleantech plays a central role. A narrow minority (47%) of respondents reported that they had already invested in cleantech opportunities.

8. Cross-sector strategic partnerships

Creating new market opportunities through cross-sector strategic partnerships ranks 8th in our list of top 10 opportunities in 2011. Looking forward, our oil and gas panel, on balance, expects the impact of this opportunity to grow between now and 2013.

The experts we interviewed gave a number of examples of cross-sector strategic partnerships. The most frequently quoted included working with auto or technology companies investing in renewables. Technologies developed in the space and shipping and marine sectors will also be important enablers for developing tomorrow's ultra-deepwater fields.

As one academic panelist explained: "Oil companies can potentially benefit from technical innovations, new capabilities and business opportunities by working across sectors in alliance with firms in the auto industry, energy sector, mining, chemicals and agriculture. Possible examples include strategic alliances for development of hydrogen vehicles, alternative energy schemes and improved environmental safety."

Another motivation for partnerships is that, in the future, much leading-edge innovation is likely to take place in emerging markets. While not perhaps true for NOCs with access to "easy oil," this is very likely to be true in emerging areas such as alternative fuels and cleantech. Given the growth in energy consumption in emerging markets, these countries are likely to be leaders in energy innovation. As one executive noted, "The main driver here is the remarkable growth in capacity and confidence of Chinese science and engineering. There has been a shift in the locus of scientific research, R&D and innovation."

"Some non-governmental organizations (NGOs) have become increasingly interested in building partnerships with multinationals from the oil and gas sector for development projects. From the company's point of view, cooperation with NGOs may offer innovative solutions to environmental and social challenges."

In a completely different vein, a trend highlighted by another panelist is for oil and gas companies to partner with development organizations. These partnerships are driven by growing shareholder expectations for corporate social responsibility and, to some extent, local content requirements. As he explained: "Some non-governmental organizations (NGOs) have become increasingly interested in building partnerships with multinationals from the oil and gas sector for development projects. From the company's point of view, cooperation with NGOs may offer innovative solutions to environmental and social challenges. Cross-sector partnerships for community development are also a way for the company financing a project to share responsibility for the delivery of the project with other stakeholders." For example, Chevron now partners with NGOs in Nigeria, Indonesia, South Africa, Angola and Thailand. Such activities can also help to improve relations with local communities, particularly through the design and implementation of development projects for those communities.



9. Building regulatory confidence

Our ninth opportunity, as ranked by our oil and gas panel, is building regulatory confidence. The panelists we interviewed expect this to rise in impact on company performance in the sector between now and 2013.

In a highly regulated industry such as the oil and gas sector, focusing on building regulatory confidence is about business survival. Companies must actively demonstrate to potential partners, including governments, that they are suitable candidates in a bidding process or in a public-private partnership. They must also demonstrate that they are able to obtain a “license to operate.” Furthermore, they need to show that they are not only compliant with existing regulation but that they also anticipate and prepare for future guidelines that are likely to be put in place. Both governments and other stakeholders will have an interest in a company’s health, safety and environmental capabilities.

One initiative that companies are increasingly taking in order to build regulatory confidence is to prepare for some type of global carbon regulation, whether it takes the form of a tax or a more market-driven initiative such as cap and trade. Although carbon regulation has not progressed as fast as expected, due to setbacks in North America, Australia and globally at Copenhagen and Cancun, panelists noted that companies are moving ahead of regulation. “Even if regulation is still emergent in these regions, the expectation that some form of carbon penalization will be forthcoming at some point in the future is already entrenched in company strategies and decisions,” said one industry expert.

A further and related driver of this opportunity over the next few years is likely to be “green growth” initiatives. These initiatives are based around the view of low-carbon technologies as a tool not only for emissions reduction but also the development of national competitive advantage in a sunrise industry. This opens a wider range of cooperative possibilities, such as government-

sponsored “green” investment banks. The potential benefits to companies able to build the confidence of regulators are obvious. For instance, companies venturing into biofuels will wish to have a supportive regulatory regime in place, and may need to rely on government support in the early stages.

“Even if regulation is still emergent in these regions, the expectation that some form of carbon penalization will be forthcoming at some point in the future is already entrenched in company strategies and decisions.”

Building regulatory confidence will also be increasingly crucial given the rising role of governments in the sector (see risk one). In some parts of the world, development of upstream resources has become the exclusive preserve of the government-owned oil and gas company. In other countries, notably Russia and Brazil, “strategic” reserves, generally fields above a certain size, can only be developed by government-owned companies, or consortia in which government-owned companies have a majority interest. Elsewhere, developments can only be undertaken in partnership with the government-owned company, or local companies are given priority (Nigeria has recently given domestic oil operators priority in the award of oil blocks as part of local content requirements). To be sure, eventually, a lack of advanced technologies, skills and organizational capacity may lead to IOCs being brought back in. However, those that are brought back in will clearly need to have excellent relationships with regulators and a very good understanding of local political conditions.

10. Acquisitions or alliances to gain new capabilities

Acquisitions and alliances to gain new capabilities was ranked by our panel as the 10th most important opportunity in 2011. The opportunity is expected, according to the industry executives and analysts we spoke to, to remain at a roughly consistent level of impact over the next two to three years.

In an increasingly competitive industry, entering into an alliance or an acquisition, becomes a way for oil and gas companies to access new growth opportunities – be it expanding their supply base, accessing a new consumer market or gaining access to and understanding of new technologies. For example, shale gas technology has recently been a core focus of oil and gas companies, particularly Asian NOCs: “The desire for unconventional gas technology and expertise in this area has led to a series of Indian and Chinese investments in the US gas sector, the primary aim of which is technology transfer,” explained one panelist (see also opportunity five).

Indeed, emerging market NOCs are becoming more viable international partners in terms of finance, project management and other resources. The growth of NOCs is likely to shape the acquisition and alliance landscape over the next few years.

Making use of acquisitions or alliances is also about selecting a portfolio of assets appropriate to a company’s capabilities and strategy. As one of our panelists explains: “Many new frontiers, whether geographical or technological, are frequently opened up by small, agile independent companies that are prepared to take risks avoided by the majors. This pattern will continue in the future, with the majors then seeking alliances or acquisitions to gain new capabilities, or access to new areas.”

Challenges to acquisitions or alliances to gain new capabilities, as reported by oil and gas organizations surveyed

Ranked by frequency of mention

Rank*	Challenge
1	Lack of experience in merger and acquisition deals
2	Lack of perceived value in merger or acquisition

** Based on 32 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.*



According to our global multi-sector survey, a lack of experience in deals is the challenge most frequently reported by oil and gas respondents looking to take advantage of acquisitions and alliances. The second-most frequently reported issue was that merger and acquisition (M&A) responsibility lies with the parent company. This was followed by skepticism about the value in acquisitions or alliances.

That said, almost four-fifths of the industry executives we surveyed in the sector said they had entered new markets via M&A, were currently considering a merger or acquisition or are monitoring markets for potential acquisition targets. Those executives who reported they had been relatively successful in exploiting this opportunity reported success factors including continuous scanning for opportunities fitting a defined profile, and enhancing analysis capabilities to make rapid decisions confidently.

Factors enabling acquisitions or alliances to gain new capabilities, as reported by oil and gas organizations surveyed	
Ranked by frequency of mention	
Rank*	Enabling factor
1	Acquisition or merger to enter new product or service markets
2	Continuous searching for opportunities based on a defined profile
3	Enhanced capability to analyze concrete M&A opportunities
4	Acquisition or merger to enter new geographical regions

* Based on 32 responses from oil and gas respondents to our global multi-sector survey. Rank order may not reflect statistically significant differences in all cases. Unclassifiable/refused responses not shown.



Methodology

Identifying strategic challenges

We interviewed a panel of nine experts in the oil and gas sector, asking each interviewee to identify the top risks and opportunities for their sector in 2011, as well as risks and opportunities “below the radar” that could rise into the top 10 in the years ahead.

The panelists included a vice president at a global energy company, a senior energy analyst at a leading think tank, and an independent expert with 30 years of experience in the international petroleum industry.

We asked the panelists to focus on risks and opportunities for the “leading global organizations” in the oil and gas sector. We also asked them to provide commentary on how they saw the risks and opportunities evolving over the next three years, and for their views on how organizations should respond.

The analysts’ risks and opportunities were grouped and aggregated to form a strategic challenge list for the oil and gas sector. This was also done for six other industry sectors; the risks and opportunities that were common to the largest number of sectors were then promoted to a global list.

Ranking the challenges and understanding how organizations are managing these challenges

The second phase of our research was to conduct a large-sample survey of companies and governments in 15 countries in order to rank the strategic challenges, obtain forecasts on whether these challenges would be more or less important in 2013, and discover how leading organizations in each of the seven sectors are responding to these challenges.

In 15 countries, a total of 82 interviews were conducted for the oil and gas sector. This resulted in between four and nine interviews per country.

Unlike the analysts we interviewed, respondents to our large-sample survey were asked to focus on challenges for their own organization, not the sector as a whole. Only organizations ranking risks and opportunities among the top four were subsequently asked about measures to address these challenges.

Linking the sector reports to the global report

For the purposes of the sector reports, where there was a clear link between the sector and global risks and opportunities, we have included the relevant charts from the main report. In some cases, the risk or opportunity was too specific to a particular sector and in those instances we have not been able to link back to the global lists and so no charts have been included.

Notes

Individual open-ended responses were in most cases coded as a single answer. However, in some cases, an individual's response was ambiguous or lengthy, and therefore coded as multiple answers. To present the data as clearly as possible, figures in excess of 100%, which have been produced as a result of this coding process, have been adjusted to sum to 100%. The conclusions drawn about the relative frequency of responses within sectors are not affected by this adjustment. To avoid error, when comparisons are made between sectors, the unadjusted figures are used.

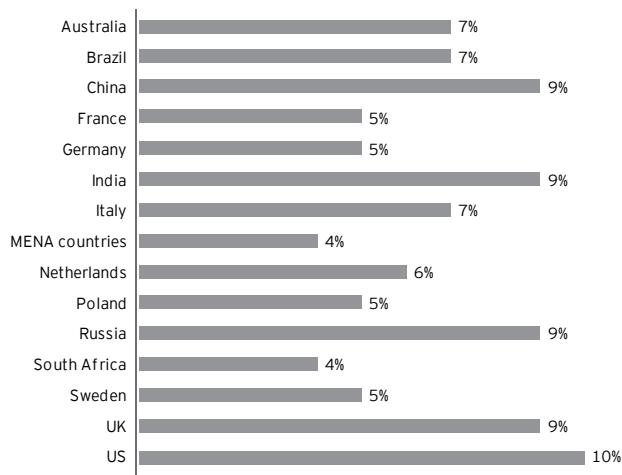
Our global report addresses high-level macro risks and opportunities. Our sector reports address sector-specific risks and opportunities. For this reason, the relative ranking of risks and opportunities is sometimes different.

Risk and opportunity rankings in our global report reflect the results of a large-sample survey regarding current issues. Risk and opportunity rankings in our sector reports are based on forward-looking analysis by panels of sector professionals. For this reason also, the relative ranking of risks and opportunities is sometimes different.

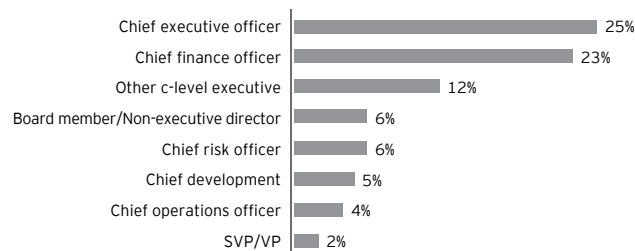
Respondent demographics

The following charts show the profile of the 82 interviewees we surveyed and the organizations they represent.

Geographic location



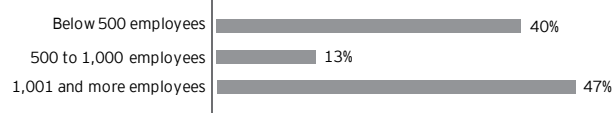
Leadership management level



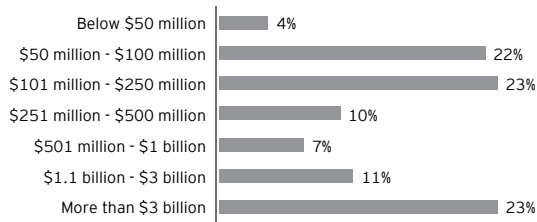
Operational level



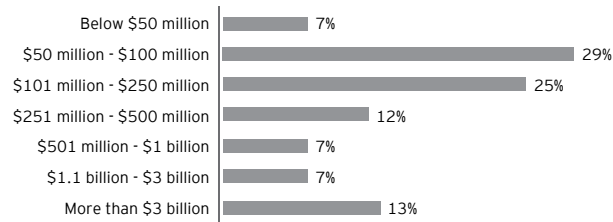
Size of workforce



Worldwide annual revenue (in US\$)



Domestic annual revenue (in US\$)





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