Abstract

Based on the earlier work of pioneers in risk management in the offshore industry, the panel will discuss various types of risk associated with the new opportunities and challenges that now face the offshore industry. The various risks include geological and engineering evaluations, commercial concerns, weather risks, and setting contract terms between culturally diverse people. The panel will speak to identifying the risks, setting risk base-lines, and addressing uncertainty. Having a reasonable assessment of risk allows decision-makers to assess the true value and potential return of projects in the offshore industry and provides clear windows of opportunity for investors.

INTRODUCTION

The decision to go forward with new energy opportunities, and pursue an associated offshore project is clearly premised on an expectation of a return on investment. The return, however, is affected by the amount of risk a project bears whether such risk is an operational risk including the use of new technologies or a commercial risk. It is important that each investor have a clear understanding of the known and potential risks. Different parties will be comfortable with different degree of risk. Each party must understand the degree of risk the other party is willing to accept and what type of return is expected. So, it is not only preferable, but imperative, that individuals, teams and entities adopt and use reliable methodologies in order to make informed decisions.

This paper is designed to provide a general outline of the different risks to be considered in an offshore industry project and offers examples of each type of risk. The paper has been written to facilitate discussion and questions for attendees to ask the panel at the conference, and may further serve as an outline or checklist when analyzing and determining various risks in any offshore industry project.

Discussion

I. Operational Risks

A. Geological

Common geological concerns often center on structure, reservoir, hydrocarbon charge and seal. Other geological factors can be of a geohazard nature including:

- Slope instability
- Shallow gas
- Natural gas hydrates and their climate-controlled dissociation
- Shallow water flows
- Mud diapirism and mud volcanism
- Active fluid seepage and seafloor pockmark formation
- Seismicity – which may trigger slides – may cause tsunamis and disturb subsurface geological conditions, e.g. pore pressures
- Excess pore pressure development, in relation to fluid migration and sediment accumulation
- Assessment of geotechnical properties of seabed sediments

Geohazards may also be manmade. These manmade geohazards include “existing offshore installations, pipelines or cables, shipwrecks, military dumping grounds, and maritime regulations”.

Effects of Geological Risks: The geological team has to estimate several geotechnical parameters in assessing potential oil and gas reserves. “In nature, all the geotechnical parameters "fit" -- that is, the various physical properties of an undiscovered subsurface oil or gas reservoir are interrelated and compatible with each other, as well as with the geological characteristics of the parent trend or basin.”

Some key prospect geotechnical parameters include:

- Prospect Reserves (EUR as bbl, mcf or BOE)
- Productive Area (Acres)
- Average Net Pay (Feet)
- HC-Recovery Factor (b/af, mcf/af)
  - Porosity (%)
  - HC Saturation (%)
  - Shrinkage Factor (%)
  - Recovery (%)
• Gas/Oil Ratio
• Subsurface Temperature and Pressure (Degrees Celsius and Psi)
• Initial Production Rate (bbl/day, mcf/day)
• Production Decline Rate (%/year).

As Dr. Rose later concluded: “Bottom line: Remember that all such parameters fit in nature. If you take pains as a professional prospector to be sure they all fit together in your prospect, chances are that you’ve got the geotechnical picture -- and the prospect evaluation -- about right.”

B. Marine and Weather

Marine and weather conditions are interrelated, especially with the reference to marine conditions often as a subcategory of weather conditions. Weather conditions that are not normally marine in nature that affect work may include the risk of lightning strikes during thunderstorms at or near fabrication yards. Typical marine conditions that may affect offshore work include wind, tropical storms, loop/eddy currents, river currents, turbidity flows, waves and tides.

Effects of Marine and Weather Risk: The marine, fresh water bodies and the atmosphere are complex integrated systems that interact with the land (even the underwater terrain), sun and lunar influences. To fully appreciate the weather impact requires a complete review of the weather system including the atmosphere, the water surface and below the water’s surface.7 The weather impact of storms can shut-down production on a temporary or long term basis.6, 7

Similarly, events such as underwater currents, tides and waves and sometimes exceed the operational capabilities of vessels used in offshore operations.

As a result, one company is moving beyond the United States Federal regulatory requirements and through an agreement with the National Oceanic and Atmospheric Administration, the company will place on certain offshore platforms real-time sensors, transmitters and back-up power systems to gather information regarding storms in the Gulf of Mexico.5 These sensors will collect meteorological and oceanographic information such as “wave height and direction, strength of currents and the level of heat in the water, which can indicate how much energy can be drawn into a storm.”8

C. Engineering

Some of the common engineering areas of concern include:
• Exploration risks, including mobile drilling units and drilling operations
• Construction and installation risks
• Operating risks including sub-sea installations and pipelines, fixed, floating or tethered platforms and including process, separation and transmission risks
• Platform decommissioning.9

Effects of Engineering Risk: Engineering risks typically arise along with other concerns such as weather and safety. As one operator reported in regard to the post Hurricane Katrina recovery effort “…progress on the repair and recovery of the TLP and export pipelines was ahead of schedule and production was expected to resume in the second half of May. Production will continue to ramp up over the next several weeks and Mars production will be restored to pre-Katrina rates by the end of June. ‘The Mars platform recovery and deepwater pipeline repairs were among the most technologically complex operations in the world, and our people were up to the task, completing the work safely and ahead of schedule,’ said Marvin Odum, Executive Vice President and head of Shell Exploration & Production in North and South America.4,10

D. Security, Health, Safety and Environment

Offshore energy development often involves numerous worksites and offices that vary in the type and location. These are often the subject of different governmental jurisdictions whether of a state, federal or international nature. Each governmental jurisdiction has regulations that seek to improve security and protections regarding the environment together with the health and safety of the workers. Often, the regulations are the responsibility of several governmental agencies even within a specific level of government.

For example, security regulations typically govern the access to marine transportation facilities and vessel security. A country may also limit transportation of goods within the countries territorial waters to domestic vessels with only limited exceptions for certain activities. Similarly, health and safety regulations may limit the exposure of workers to certain conditions that would be considered hazardous or impair the health and safety of workers. Such concerns might center on noise levels, the air quality at the worksite, confined space conditions and time periods, working at height conditions, etc… Likewise, environmental concerns center on air emissions and water pollution and often extend to protection of the overall habitat of certain species that may include both biological and anthropological sites.

Effects of Security, Health, Safety and Environmental Risks: Security risks can jeopardize investment and development opportunities in areas where a threat exists. In addition, the additional security measures can substantially increase development costs in a location with security threats. Security threats can vary from terrorist attacks to crime oriented attacks such as carjacking. In fact, one operator has an entire fleet of Toyota Land Cruisers but does not use the Land Cruisers at night due to the fact that “the thieves like them too much.”11 Security threats can escalate from attacks on infrastructure such as pipelines, platforms to oil tankers and hostage taking of workers in large numbers.12 Additionally, these attacks may sometimes occur while vessels are in transite between locations and not at the actual worksites.13

Safety for workers is a critical factor in maintaining a workforce that is productive. When an event occurs that injures or even kills workers, the company has substantial investigation and reporting responsibilities. These notification and investigating
responsibilities result not only in internal company policies, but also contractual requirements with partners, contractors and regulatory requirements from governments. Additionally, the litigation that results from accidents often has a substantial cost impact. The loss of a worker can have a big impact on the moral and goodwill within the local or even broader community. Likewise, the company loses the contribution of a valuable team member with regard to the injured or killed worker. The scale of accidents also has a tremendous impact on operations locally and globally if the accident is catastrophic.\footnote{\textsuperscript{14}}

Governmental pressure, regulations or even fines regarding environmental concerns can have substantial impact. Regulatory and mitigation measures regarding carbon dioxide emissions impacts operations and uncertainty regarding what regulations apply also affect corporate planning.\footnote{\textsuperscript{15}} When a company has a high profile environmental accident, the court may award damages for damaging the environment when no other court in that jurisdiction has done so before for damaging the environment.\footnote{\textsuperscript{16}}

E. Infrastructure

Infrastructure conditions include port access, facility capabilities (e.g. port berthing capabilities, spool base capabilities, warehouse space, crane capabilities, winterization requirements, etc.), pipeline access and capacity, road/rail and bridge conditions, and market access.

Effects of Infrastructure Risk: Recently, port congestion has become a critical concern especially in the Middle East and in Australia. In 2007, the line of ships waiting to load coal in Newcastle, Australia did not drop below 37 ships. While in June of 2007 due to the effects of a storm, the line of ships waiting to load coal reached a record 79 ships.\footnote{\textsuperscript{17}} As a result some companies have notified clients of their inability to make the scheduled deliveries to clients and claimed the port congestion as a force majeure event under contract delaying the delivery.\footnote{\textsuperscript{17}} In the long term, some authors have stated that consolidation and mergers may help eliminate duplication of port facilities and increased investment in the capacity of ports may help relieve some port congestion problems locally in Australia and in other locations.\footnote{\textsuperscript{18}}

Access to infrastructure such as a pipeline can be a critical factor in developing resources. Pipelines serve as a method of transporting a natural resource such as natural gas to a broader market than the local market, if such local market exists at all.\footnote{\textsuperscript{19}, \textsuperscript{20}} Similarly, the lack of pipeline capacity can create market disruption similar to port congestion. For additional and an in-depth review of the transportation infrastructure concerns facing the delivery of energy resources, I suggest reading the \textit{Topic Paper \#12 Infrastructure}.\footnote{\textsuperscript{21}}

Additionally, fabrication yard facilities are a critical component of infrastructure. Fabrication yards have human resources concerns such as finding qualified personnel such as welders, but fabrication yards also need to have sufficient space, crane capacity along with adequate port berthing capabilities.\footnote{\textsuperscript{22}} Absent these critical facilities, companies may have to look to non-local fabrication yards to complete projects.

F. Resources

Companies use a variety of resources for offshore energy development. Material resources such as steel, cement and vessels are important factors along with the needed human element of finding people with the required skills to perform the required work.

Effects of Resource Risks: Project progress often rests on a ready supply of resources. There is a detailed discussion of the human resource concerns facing energy industry in \textit{Topic Paper \#23 Human Resources}.\footnote{\textsuperscript{23}}

Currently, vessels, materials of human resources are in short supply and/or are not always easy to access. Therefore, a project can suffer delays of substantial cost increases or even deficiencies in the quality of work. Many companies are facing temporary or even long term shortages in resources and as a result the economic balance between suppliers and purchasers of resources can change depending on the interaction of the supply and demand requirements regarding a particular resource. Occasionally, companies attempt to lower increased costs by outsourcing some functions or restructuring compensation for employees.\footnote{\textsuperscript{24}} Companies sometimes shift some work to low cost centers within the company.

G. Technological Concerns

Technology encompasses the ability to meet the challenges of the difficult conditions that companies encounter in developing offshore resources. These challenges can vary from the increased depths and harsh environments where a company must obtain the resources to the very challenging chemical make-up of the resource or even the location of the resource within the strata.

Rapid innovation has led to increases in financing projects and, as a result, different issues may arise during the project that affects continuity of the operation. While funding is not exclusively dependent on the success of the technology, if the technology fails the corporate partners have to absorb the costs. Therefore, when a project is designed, proper analysis and risk profiles are crucial to all inventors whether equity or debt. This analysis and structuring process is important to all parties involved in the project to decide what degree of risk each is willing to accept and what is a reasonable expectation on their return on investment.

Noteworthy, technology can prove to be a competitive advantage in markets where normally a company might have difficulty penetrating especially if the local market lacks the necessary expertise.\footnote{\textsuperscript{24}} However, the local market may require the company to partner with local companies to help develop the local expertise.

Similarly, companies may find that technology licensing may be a practical solution to solve project concerns or even be part of a company plan to incorporate technology licensing into the business strategy.\footnote{\textsuperscript{25}} Licensing may provide a royalty stream of income or
serve as a more cost efficient way to solve a technological problem.

As part of integrating technology licensing into a strategic plan companies need to answer the following questions:

- Does a technology’s greatest potential lie in what it can contribute to the company’s own productivity?
- Is it something every company in the industry might be interested in?
- Does it have applications in other markets and industries?26

The effect of integrating technology licensing into a corporate strategy can result in a substantial portion of a company’s net income deriving from technology licensing.26

In contrast, a company may decide to share technology in the form of a technology donation. A technology donation may increase local expertise or have a broader objective. A technology donation might take the form of a grant of patent rights to a patent-sharing plan or patent commons that an independent organization might administer, for example for the promotion and use of green technology.27

II. Commercial Risks

A. Contractual/Legal/Political

The contract that parties agree to work under often depends on the corporate philosophies of the parties, the parties’ other contractual requirements (e.g. operating agreements or consortium agreements), regulatory requirements and/or market conditions. The parties often encounter some limitation on the freedom to contract which generally originates from a public policy concern of a governmental entity. Standard contractual concerns include the following:

- Parties to the agreement
- Duration of the agreement
- Role of the parties
- Scope of the agreement/work and variation procedures
- Obligations of the parties, for example:
  - Payments
  - Warranty
  - Liability
  - Insurance
  - Taxes
  - Ownership/use of property
  - Confidentiality
  - Development, operations and decommissioning
  - Force majeure
  - Management
  - Governance procedures
- Dispute resolution
- Governing law.

Effects of Contractual Risks: Generally most parties view the terms of an agreement as the formal document that regulates the relationship of the parties. However, sometimes parties forget that the law of one or more governmental jurisdictions may also affect or even regulate the terms of the agreement and the relationship between the parties. Additionally, if a transaction significantly affects local concerns such as the labor market, then this transaction may face more governmental scrutiny than a transaction that does not seem to generate a significant local concern. For example, one company has experienced numerous delays during the merger with another domestic operator due to the continuing concerns that the local labor unions have regarding the merger of the two companies.28

Additionally, parties may have some concern regarding the sanctity of agreements. Periodically, governments and companies seek adjustments to their agreements. Often these attempts at renegotiation occur when the economic potential of offshore resources or the value of assets and costs change, especially if the change is substantial from the level at the original contract negotiation.29

B. Insurance

Insurance is “coverage by contract whereby one party undertakes to indemnify or guarantee another against loss by a specified contingency or peril”.30 So basically, insurance provides a way to share the financing for protection from a specific risk. The risk does not go away just because a party has insurance, but the insurance coverage would provide a way of mitigating the impact that a specific risk could have on a party.

Some examples of typical insurance coverage that parties might consider using include:

- Workers’ compensation
- Employer’s liability
- Auto
- Aircraft
- Professional liability
- Hull and maintenance
- Protection and indemnity
- Builder’s all risk/construction all risk
- Political risk
- Local insurance requirements.

In addition, insurance policies include various provisions regarding coverage such as exclusions and notice requirements. Similarly, governments often require specific insurance coverage for certain types of work or worksites, such as the various transportation, harbor, maritime or vessel insurance requirements. In addition on a macroeconomic level, another consideration is the underwriting capacity of the insurance markets.

Effects of Insurance Risks: Increasingly, underwriters have become more aware of the specific concerns that affect the offshore industry. Underwriters became painfully aware of the implications that pollution risk can have on the insurance and reinsurance markets as a result of the Exxon Valdez oil spill and the ongoing litigation.31 Likewise, the WELCAR offshore CAR policy wording reflects the new underwriters’ perspectives regarding the risks surrounding offshore construction projects. In the WELCAR, the specific provisions regarding limiting the assureds under the
policy, quality assurance/quality control requirements, and coverage regarding damage for defective parts reflect a concern by underwriters to minimize exposure for certain perils.32 Additionally, underwriters will sometimes highlight certain risks found at the worksite such as weather as the cause of a specific accident. In a recent bulletin the London P & I Club stated the following:

- Recent personal injury cases handled by the Club have included accidents in which the ship’s motion in heavy weather has been a causative factor.
- The types of incidents have included injuries to crew members falling while working aloft, a hand injury when a heavy auxiliary engine part unexpectedly shifted while being removed for maintenance, and a chest injury suffered when a power tool slipped as a ship rolled.
- Where a risk assessment had been carried out in respect of the accidents involving deck crew, the responsible officer had been fully aware of the prevailing conditions but had not made sufficient allowance for the ship’s motion. Interestingly, in the cases where the task was being performed in the engine room, the entry on the risk assessment form for ‘Weather and Sea Hazard’ was in each case “not applicable”.
- While it is the case that dealing with rolling, for example, is less of an issue for someone on the bottom plates in the engine room than it is for a crew member on the monkey island, these recent cases are reminders that, when a ship rolls, the engine room moves too.33

C. Finance

The monetary aspects of project finance include factors such as the time value of money, cash flow, profitability, solvency, and capital budgeting and access to capital. Likewise on a macroeconomic level, there is the consideration of the investment (debt/equity) capacity of the financial markets.

Effects of Financial Risk: If a company’s capital budgeting exceeds cash flow, the company must consider shedding assets, increase borrowing or floating more shares of stock to cover the capital cost. This type of “access to capital challenge” can limit growth opportunities for a company. Since capital cost in exploration and production are generally extremely high “most energy producers in the U.S. have a ‘voracious capital appetite’. “34

Even though some entities have experienced difficulties raising capital from investors, new investment in “clean technology” increased substantially during 2007.35 Investment in “clean technology” such as wind and solar power rose thirty-five percent to reach 117.2 billion dollars from 86.5 billion dollars in 2006.36 Concerns regarding decreasing supplies of traditional energy sources fueled this drive in investment dollars to “clean technology” energy investments.35 This trend shows no current signs of slowing, but there are concerns that “investors’ excitement is running ahead of what can be delivered” with “volatility, as in any growth sector where valuations are driven more by expectation than by proven historical cash flows.”35

Additionally, some markets experienced more investment in alternative energy and other new “clean technology” than other markets.36 This was especially true in comparing the investment in “clean technology” between Europe and the United States.36 European investment in “clean technology” was only about one-third of what U.S. investors invested in “clean technology” in 2007.36 This was down from a two-thirds level of what U.S. investors invested in “clean technology” in 2006. The big driver in this shift is the “stampede” of venture capital into “clean technology” from the financial centers in Silicon Valley and Boston.36 However, there is concern regarding an investment bubble, especially regarding solar energy and the ability to deliver proven technology from obtaining breakthroughs in voltaic cells by using technology from the chip industry.36

D. Tax

Taxes can apply directly or indirectly to a project. Some direct tax implications on projects include:

- Withholding Taxes
- Value Added Taxes
- Export/Import Duties and Fees
- Severance Taxes/Royalty Payments
- Registration Fees.

Indirect taxes on projects include:

- Corporate/Income Taxes
- Taxes on Employees’ wages
- Social Taxes
- Property/Ad Valorem Taxes.

Effects of Tax Risks: The net effect of a tax on an offshore project is an increase in the cost of the project. Likewise a decrease in a tax results in a decrease in the cost of a project affected by the tax. The amount of the increase or decrease on project costs will vary depending on how directly the tax applies to a particular project. Generally the financial community focuses on the effects taxes have on company performance and then highlight how a tax affects a specific project. For example, a new production tax law in Alaska probably would cut one operator’s earnings by 250 million dollars, including a retroactive portion of the production tax of about 100 million dollars for years 2006 and 2007.37 The company would probably offset this production tax with 350 million dollars from a Canadian tax cut and along with the release of escrowed funds regarding the Hamaca project in Venezuela.37

III. Project Size and Execution Risks

Overlapping all of the Commercial and Operational concerns discussed above is a growing concern regarding both the size of the projects and the ability to execute projects to the specifications required and within the needed time contraints. As the size of the
projects increase, one tool that operators and contractors have used is to either split the scope of work between various parties or to form a consortium or joint venture with other parties to share the risk between the various parties. This risk sharing can help minimize the exposure that any one party might have regarding a particular project. These cooperative arrangements must often deal with cultural and governance differences especially if the parties are from different countries or regions in the world.

Project size and execution on one project can also influence not only the other projects in a particular company, but also other projects in the specific country or region. An example of this is what one author recently termed the “Thunder Horse Effect” in the Gulf of Mexico. The author noted that rig contraints and personnel shortages would possibly delay several floater projects from 2008 until 2009 or even later.

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