Achieving results through strategic ERM maturity

Tuesday, April 12, 2016 | 10:15am – 11:15am
Speakers

Iman Al-Gharabally
ERM Team Leader

Chris Mandel
SVP Strategic Solutions
Today’s agenda

• Introductions, overview and foundation for maturity
• The KPC ERM journey
  • Transformation
  • Challenges
  • Results
• Closing comments and Q&A
Do some risks matter more than others?
Which risks are you accountable for?

**Strategic**
- Acquisitions
- Business Model
- Competition
- Demographic Changes
- Disruptive innovation
- Market
- Etc.

**Operations**
- Customer service
- Infrastructure
- Processes
- System capabilities
- Talent
- Etc.

**Financial**
- Capital
- Cash flow
- Credit
- Debt obligations
- Foreign exchange
- Liquidity
- Etc.

**External**
- Economy
- Environment
- Geopolitical
- Regulatory
- Tax policies
- Weather events
- Etc.

THE RISK TYPE SPECTRUM
Key sources of value destruction

Source: Corporate Executive Board
Choosing your risk range focus
Seven important characteristics of risk maturity models

1. Risk appetite management – Policy to lead decision making and responsibility within guidance
2. Managerial support within the corporate culture
3. Unites events with process sources
4. Executing strategy and vision using the balanced scorecard
5. Revealing risks – assessing risks to document both risks and opportunities
6. Business sustainability – seamless integration to operational planning

Source: Risk Methods
RIMS risk maturity model

**Adopt ERM Approach**
Denotes the degree of executive support for an ERM-based approach within the corporate culture. Activities cut across all processes, functions, business lines, roles and geographies.

**ERM Process Management**
Degree that a repeatable and scalable risk management process is integrated into business and resource/support units, using a sequential series of steps that support uncertainty reduction and promote opportunity exploitation.

**Risk Appetite Management**
Degree of accountability for (1) defining acceptable boundaries 2) calculating and articulating risk tolerance 3) developing a risk portfolio 4) considering scenarios, and 5) attacking gaps between perceived and actual risks.

**Root Cause Discipline**
Degree of discipline applied to measuring root cause by: 1) determining sources 2) understanding impacts 3) identifying trends, and 4) measuring effectiveness of controls.

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RIMS risk maturity model

**Uncovering Risks**
Degree of quality and coverage (penetration) throughout the organization for uncovering uncertainties related to organizational goals achievement.

**Performance Management**
Degree to which organizations are able to execute on vision and strategy in tandem with risk management activities.

**Business Resiliency and Sustainability**
Extent to which an organization integrates business resiliency and sustainability aspects for its operational planning into its ERM process.
Aon risk maturity model

• A participative and comparative vehicle by ratings
• Characteristics:
  • Board understanding and commitment
  • Executive level risk stewardship
  • Risk communications
  • Culture, engagement and accountability
  • Risk identification
  • Stakeholder participation
  • Risk info and decision making processes
  • Integrating risk and human capital processes
  • Analysis, quantification and demonstrated value
  • Focus on value creation
Protiviti’s risk maturity perspective

• Responding to risks that matter most
• 6 infrastructure elements that advance maturity
  • Policies
  • Processes
  • People & organization
  • Reports
  • Methods and assumptions
  • Systems and data
• Board questions
• Five levels of maturity
• Stages of a capability maturity framework
Key considerations

• No “one size fits all”
• Correlation among attributes
• Risk as an integral aspect of strategy
• Value additive considerations
  • Executing vision and strategy guided by risk
  • Integration of risk tactics into key processes
  • Key actions that drive value gains
  • Integration as a driver for uncovering new risks
• A 25% firm value premium
• Doing what your firm needs and supports
What really matters?

Risk Efficiency and Effectiveness

- Understanding & Interpretability
- Consistency
- Gumption & Influence
- Communication Clarity
- Downside Protection: J1
- Value Creation J2
What really matters?

Risk Efficiency and Effectiveness

- Embedded risk culture
- Reliable measureability
- Process rigor
- Managing to appetite & tolerances
- Aligning or integrating with strategy
KPC ERM
Transformation Journey, Achievements & Challenges
Kuwait Petroleum Corporation

- The national oil company of Kuwait;
- Operates in Exploration and Production, Refining, Petrochemical and Transportation;
- Activities concentrated domestically with increasing growth overseas;
- Overseas expansion mostly through joint ventures and joint operations;
- Production currently in excess of 3 million BPD and 120 million scfd of associated and free gas;
- Petrochemical business focused on polyolefins, aromatics and glycols;
- Turnover – c. KD 39 billion (2014/15)
- Assets – .c. KD 32 billion (2014/15)
- Capex in fixed assets c. KD 32 bn next five years:
- Number of employees – c.18000
KPC ERM journey

• Corporate Risk Management Department formed in 2002; essentially an insurance buyer of standard energy policies

• Defined an Enterprise Risk Management (ERM) Strategy in 2005 based upon the principles of COSO and the AZ/NZS 4360: 2004 Risk Management Guidelines

• Implemented first phase of strategy through 2006 and 2007 with following features:
  • ERM Policy created
  • Subsidiaries implemented policy at subordinate level
  • ERM Framework and procedures introduced
  • Semi qualitative risk matrix and risk register developed
  • Integrated processes adapted and deployed
  • Early risk quantification of some key risks
  • Resource growth and capability building
  • ERM information system from Avanon introduced
  • Insurance programs continue to be adapted

• In 2009 our ERM maturity was deemed to be comprehensive

• ERM 2030 Strategy developed in 2010 with implementation beginning September 2011, aimed at placing KPC ERM at the strategic maturity level
Avanon OpRisk Suite

OpRisk Reporting Module (ORM)
Action Tracking Module (ATM)
Loss Tracking Module (LTM)
Self Assessment Module (SAM)
Indicator Rating Module (IRM)
Quants. (QTM)
Administration Management Module (AMM)

Treat Risks
Assess Risks
Communicate & Consult
Monitor & Review
Establish the Context
Identify Risks
Analyze Risks
Integrate Risks
Evaluate Risks

Avanon OpRisk Suite
OpRisk Reporting Module (ORM)

Loss Tracking Module (LTM)
Self Assessment Module (SAM)
Indicator Rating Module (IRM)
Quants. (QTM)
Administration Management Module (AMM)

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Towards excellence in Enterprise Risk Management

Risk Management Society

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<table>
<thead>
<tr>
<th>Maturity</th>
<th>Description</th>
<th>Commentary</th>
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<tbody>
<tr>
<td>2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 5</td>
<td>Risk management is built into decision-making. The organization selectively</td>
<td>• Focus on value creation and preservation</td>
</tr>
<tr>
<td>Strategic</td>
<td>seizes opportunities because of its special ability to exploit risks.</td>
<td>• Institutionalized</td>
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<tr>
<td></td>
<td></td>
<td>• Confidence in ability to manage risks based on track record</td>
</tr>
<tr>
<td>Level 4</td>
<td>Risks are treated as a portfolio at the enterprise level and are correlated</td>
<td>• Calculation of risk measures that can be aggregated</td>
</tr>
<tr>
<td>Integrated</td>
<td>and aggregated across risk types and business units.</td>
<td>• Risk treatment integrated and costs optimized</td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
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<tr>
<td>Level 3</td>
<td>Risk management is enterprise-wide and encompasses all risk types including</td>
<td>• Risks clearly linked to strategic objectives</td>
</tr>
<tr>
<td>Comprehensive</td>
<td>strategic and operational.</td>
<td>• Defined and documented</td>
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<tr>
<td></td>
<td></td>
<td>• Forward looking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Clear accountability</td>
</tr>
<tr>
<td>Level 2</td>
<td>Risk management functions independently within business units. Risk types</td>
<td>• Capabilities vary across BUs</td>
</tr>
<tr>
<td>Fragmented</td>
<td>managed are limited to hazard, financial, and compliance.</td>
<td>• No cross-BU coordination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Some expertise within limited number of risk types such as market, credit, or hazard</td>
</tr>
<tr>
<td>2002</td>
<td></td>
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<tr>
<td>Level 1</td>
<td>Risk management activities are ad hoc. No overarching risk management</td>
<td>• Success depends on individuals</td>
</tr>
<tr>
<td>Initial/Ad Hoc</td>
<td>philosophy or objectives are defined.</td>
<td>• People are unaware of risks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Risks managed reactively</td>
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</table>
Moving towards quantifying risks and using risk-based metrics to take strategic and investment decisions

Most financial institutions use RAROC in their investment decisions

Goldman Sachs

HSBC

J.P. Morgan

Deutsche Bank

Barclays

Natural resources corporations also use risk-based quantitative metrics for appraising their investments, although the actual metrics vary

<table>
<thead>
<tr>
<th>Company</th>
<th>Example risk-based metrics¹</th>
<th>Decisions impacted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goldman Sachs</td>
<td>P10 and P90 of project value</td>
<td>Investment decision</td>
</tr>
<tr>
<td></td>
<td>Value at risk (P50-P10)</td>
<td>Project prioritization</td>
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<td>IRR at risk</td>
<td></td>
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<tr>
<td>HSBC</td>
<td>Expected NPV (P50)</td>
<td>Projects prioritization</td>
</tr>
<tr>
<td></td>
<td>P10 and P90 of project value</td>
<td></td>
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<tr>
<td>J.P. Morgan</td>
<td>Net income distributions</td>
<td>Portfolio risk-return assessment vs. risk appetite</td>
</tr>
<tr>
<td></td>
<td>IRR at risk</td>
<td>Prioritization of small projects</td>
</tr>
<tr>
<td>Santos</td>
<td>Full NPV and IRR probability distribution curves</td>
<td>Prioritization of major mining projects</td>
</tr>
<tr>
<td>Newmont</td>
<td>Cumulative NPV distributions</td>
<td>Project approval</td>
</tr>
<tr>
<td>Vattenfall</td>
<td>Risk adjusted returns</td>
<td>Project approval</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Portfolio selection</td>
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<tr>
<td>Alcoa</td>
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</tbody>
</table>

All these metrics are covered by the risk-return quantification methodology

¹ Metrics used in one or more major project / portfolio decisions in recent years; breath of applicability throughout organization varies

SOURCE: McKinsey
Corporations across sectors are taking a hard look at how they manage risk

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of confidence</td>
<td>“Given recent events, we have lost confidence in our ability to reliably anticipate, assess, and respond to our risks.”</td>
</tr>
<tr>
<td>Discontinuities</td>
<td>“We do not sufficiently understand how our risks are changing, as a result of changes in our environment or in our own strategy.”</td>
</tr>
<tr>
<td>Finding balance</td>
<td>“We need a better approach to ‘setting the dial’ on risk taking, to avoid whipsawing between too bold and too conservative.”</td>
</tr>
<tr>
<td>External scrutiny</td>
<td>“We are under increasing pressure to bring our risk management to best-practice levels.”</td>
</tr>
<tr>
<td>Efficiency</td>
<td>“Our risk management approach is too complex, bureaucratic, and ineffective. How can we refocus on value?”</td>
</tr>
</tbody>
</table>
We are committed to transform risk management as a way to support our 2030 strategy

<table>
<thead>
<tr>
<th>KPC Vision and mission</th>
<th>How ERM is supporting achievement of the overall vision of the Kuwaiti Oil Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vision</strong>: To reach <strong>leading global position in the oil and gas field</strong> through</td>
<td></td>
</tr>
<tr>
<td>• Being <strong>secure and reliable supplier of hydrocarbons</strong></td>
<td></td>
</tr>
<tr>
<td>• Manage our operations with <strong>world-class HSSE standards</strong></td>
<td></td>
</tr>
<tr>
<td>• Being <strong>highly profitable and performance driven</strong> enterprise</td>
<td></td>
</tr>
<tr>
<td>• Being <strong>one integrated company</strong></td>
<td></td>
</tr>
<tr>
<td>• Being <strong>employer of choice</strong></td>
<td></td>
</tr>
<tr>
<td>• Being positive <strong>role model for Kuwait</strong></td>
<td></td>
</tr>
<tr>
<td><strong>An effective management tool</strong> to support better decision making</td>
<td></td>
</tr>
<tr>
<td>• A much deeper <strong>understanding of major risks</strong> and how they affect the businesses and Oil Sector's ability to implement the 2030 strategy</td>
<td></td>
</tr>
<tr>
<td>• Suitable <strong>leading risk indicators</strong> and a good understanding how to quantify and assess the impact of a range of <strong>mitigation options</strong></td>
<td></td>
</tr>
<tr>
<td>• Ability to evaluate the investment portfolio from a <strong>risk adjusted point of view</strong> to create increased organizational value both at a KPC level and individual K-co level</td>
<td></td>
</tr>
<tr>
<td>• The <strong>capability</strong> within the organization to conduct risk analysis and provide recommendations</td>
<td></td>
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</tbody>
</table>
KPC ERM objectives

Three key objectives of KPC’s risk journey

- Achieve high certainty that the oil sector will meet the expectations of the State
- Ensure the availability of adequate funding to support oil sector capital expenditure
- Enable the oil sector to make a more fact-based and quantitative assessment of risk vs. return trade-offs in its activities and projects
Risk management should be based on an integrated approach with 5 key elements

1. Risk culture and performance transformation
2. Insight and risk transparency
3. Risk-related decisions and managerial processes
4. Integrated Enterprise Risk management
5. Risk organization and governance

Do you understand your risks (in your current business as well as new businesses)? Can you measure them? Do you have true insight into risks that matter most?

What is your overall capacity and appetite for risk? Which risks are you advantaged to own? Which should you transfer or mitigate?

Are critical business decisions made with a clear view of how they change your company’s risk profile?

Does your culture reinforce risk management principles? What formal and informal mechanisms support the right mindsets and behaviors?

Are structures, systems, controls, and infrastructure in place for you to manage risk across the whole business? Is your governance model robust?

Does your culture reinforce risk management principles? What formal and informal mechanisms support the right mindsets and behaviors?

Are critical business decisions made with a clear view of how they change your company’s risk profile?
We have a comprehensive list of initiatives in our 2030 risk journey to build our capabilities:

1. Defined appropriate at-risk-measures across KPC
2. Aggregate risks across subsidiaries
3. Discuss risk appetite statements
4. Optimize risk financing
5. Quantify KPC Group Risks

- Achieve Quick-hit enhancements
- Build an eminence program
- Define risk governance
- Develop risk management competency
- Embed ERM in KPC day to day business
- Allocate capital according to risk return profile
- Appraise projects according to Risk Adjusted Return on Capital

Integrated Enterprise Risk management
KPC risk journey aimed at enhancing its institutional ability to manage risk exposure in an integrated fashion

<table>
<thead>
<tr>
<th>Initiatives with McKinsey support</th>
<th>Initiatives implemented internally</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Deploy appropriate at-risk measures across KPC</td>
<td><strong>G</strong> Quick hit enhancements</td>
</tr>
<tr>
<td><strong>B</strong> Quantify KPC Group Risks (using measures chosen in A)</td>
<td><strong>H</strong> ERM embedded in business</td>
</tr>
<tr>
<td><strong>C</strong> Aggregate risks within and across subsidiaries</td>
<td><strong>I</strong> Risk governance structure update</td>
</tr>
<tr>
<td><strong>D</strong> Deliver quantitative risk appetite and tolerance statements</td>
<td><strong>J</strong> Optimized risk financing</td>
</tr>
<tr>
<td><strong>E</strong> Perform project appraisal using Risk Adjusted Return on Capital (RAROC)</td>
<td><strong>K</strong> Risk management competency development</td>
</tr>
<tr>
<td><strong>F</strong> Allocate capital based on a risk return profile</td>
<td><strong>L</strong> Eminence building program</td>
</tr>
</tbody>
</table>
Developed and deployed tools to drive KPC’s transformation

1. Cash Flow at Risk reporting

   Risk view of meeting baseline

2. Risk appetite & tolerance statements

   KPC risk statement (1/2)
   Company Objectives and Business Model
   - KPC’s key objective is to maximize the value of hydrocarbon resources and be a prime, reliable and sustainable source of income and energy for the State of Kuwait. To achieve this, KPC continues to maximise its production in both conventional and unconventional oil and gas fields.
   - Will accept and manage only those risks genuinely inherent to the oil and gas business (e.g., oil price volatility, reserve risk).
   - Will manage its portfolio of risks and returns in order to ensure the capability to invest for the long term in a sustainable and diversified manner (i.e., hydrocarbon resources).
   - Must operate according to best practice operational, ethical and safety standards and contribute to developing local talent and capabilities.
   - Each KPC plays an active role in achieving the KPC overall objective, risks are managed accordingly from an overarching oil sector perspective.

3. Capital project risk appraisal

   Overview of risk-based economics for project XYZ

4. Capital allocation based on risk return profile

   Strategic initiatives are combined to define strategic options
While we have made great progress more needs to be done to meet our aspiration

<table>
<thead>
<tr>
<th>Best practice observations</th>
<th>Relative position vs. peers</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Aggregated view of risks <em>(risk taxonomy, risk register, cashflow@risk tools, heat maps and scenario planning)</em></td>
<td><img src="https://via.placeholder.com/15" alt="Peer average" /></td>
</tr>
<tr>
<td>▪ Model validation process by either external parties or risk corporate department</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
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<td>▪ Risk reporting system is aimed at decision support</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
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<tr>
<td>▪ Explicit risk appetite statement</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
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<tr>
<td>▪ Risk appetite statement implications are well understood and agreed</td>
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</tr>
<tr>
<td>▪ Structured contingency plans to cope with major extreme events</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
</tr>
<tr>
<td>▪ Risk management is at the core of company decision process regarding strategic and operational issues</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
</tr>
<tr>
<td>▪ Board is actively involved in risk management beyond “routine” approval of business plan</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
</tr>
<tr>
<td>▪ Operational control and implementation is done at the executive level</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
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<tr>
<td>▪ Regular risk culture assessment</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
</tr>
<tr>
<td>▪ Risk KPIs are built into performance evaluations</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
</tr>
<tr>
<td>▪ Awareness programs to highlight progress of risk development/transformation programs</td>
<td><img src="https://via.placeholder.com/15" alt="KPC Today" /></td>
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</tbody>
</table>

Note: Based on survey with 10 IOCs from Europe and US during H2 2013 conducted by McKinsey & Co.

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**Insight and risk transparency**

1. Aggregated view of risks *(risk taxonomy, risk register, cashflow@risk tools, heat maps and scenario planning)*
2. Model validation process by either external parties or risk corporate department
3. Risk reporting system is aimed at decision support

**Risk appetite and strategy**

4. Explicit risk appetite statement
5. Risk appetite statement implications are well understood and agreed
6. Structured contingency plans to cope with major extreme events

**Risk related decisions and managerial processes**

7. Risk management is at the core of company decision process regarding strategic and operational issues

**Risk organization and governance**

8. Board is actively involved in risk management beyond “routine” approval of business plan
9. Operational control and implementation is done at the executive level

**Risk culture and performance transformation**

10. Regular risk culture assessment
11. Risk KPIs are built into performance evaluations
12. Awareness programs to highlight progress of risk development/transformation programs
Risks, risk modeling and metrics
Risk modeling aims to increase transparency and improve decision making

KPC’s strategic directives (not exhaustive)...

- **Upstream**
  - Increase crude production to 4.0 mmbpd by 2020
  - Increase non-assoc. gas prod. capacities to 2.1 Bcsf/d by 2020
  - ...

- **Downstream**
  - Grow domestic refining capacity to 1.4 mmbpd (new built) and subsequent 1.6 (tbc) mmbpd (enhancement of facilities)
  - Increase refining complexity (CFP)
  - ...

- **Midstream and others**
  - Human Capital attraction and retention
  - ...

KPMs help measure success of these directives....

- **Profitability**
  - Profit margin
  - ROACE
  - ...

- **Costs**
  - Cost of risk
  - R&T spend vs. plan
  - ...

- **Production/capacity**
  - Free gas production
  - Proven reserves
  - ...

- **HSEE**
  - Fatal cases
  - Environmental incidents
  - ...

- **Kuwaitization and stakeholders**
  - Percentage of Kuwaitis in KPC
  - Share of Capex spent locally
  - ...

Ability to attain targets on KPMs are influenced by multiple risks

- Strategic project risk
- Political/regulatory
- Operational/technical

- Portfolio/business risk
- Financial risks (counterparty, liquidity, market)

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Model top risk effects via quantitative risk model

### Risk assessment

**Price**
- $55 Forward Curve

**Technical**
- Capex
- Production disruption

**Political**
- Tax changes
- Nationalization

### Company portfolio

Company-by-company profiles
- Production
- Capex
- Opex

### Growth projects/Strategic initiatives

- NA Arctic gas
- Canada oil and gas
- US Steam flood
- US onshore gas
- GoM DW
- Mexico DW
- NCG redevelopment
- Norway oil
- U.K. oil
- U.K. gas
- Russia non-PSC
- Nigeria DW
- Angola DW
- OECD Frontier Exploration
- Central Africa DW
- Malaysia DW
- Non-OECD Frontier Exploration

Estimated 75% of future hydrocarbon resource types modelled

Industry has a limited set of project growth options. We characterised these with 28 projects covering 75% of industry growth potential.

### Cash flow at risk model

### Project valuation model

### Risk return portfolio model
### Top 10 KPC risks

#### 3 step approach to arrive at list of top 10 risks for KPC

- Evaluate high and very high risks from bottom up KPC risk registry
- Compare with risks most important to Oil and Gas industry in top-down review
- Map risks against KPC strategic directives

#### Top risks

<table>
<thead>
<tr>
<th>Category</th>
<th>Risk Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Political/ regulatory risk</strong></td>
<td>1. External influence on key decisions</td>
</tr>
<tr>
<td></td>
<td>2. War or political instability in the region</td>
</tr>
<tr>
<td><strong>Strategic project risk</strong></td>
<td>3. Large project execution risks</td>
</tr>
<tr>
<td><strong>Portfolio/business risk</strong></td>
<td>4. Disruptions in hydrocarbon market due to demand shifts in import countries</td>
</tr>
<tr>
<td><strong>Financial risk (Counterparty, Liquidity, Market)</strong></td>
<td>5. Global crude/gas price volatility and related country/credit risk</td>
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<td></td>
<td>6. Refining/petrochemical margins and related FX risks</td>
</tr>
<tr>
<td><strong>Operational/ technical risk</strong></td>
<td>7. HSSE and HR risks</td>
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<tr>
<td></td>
<td>8. Operational risks leading to unplanned shutdowns or other supply chain disruptions</td>
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<td></td>
<td>9. New technologies risks</td>
</tr>
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<td></td>
<td>10. Company reserves</td>
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</tbody>
</table>
The impact of risks is assessed by five key measures, in line with KPC and K-Companies KPMs

<table>
<thead>
<tr>
<th>Risk measures</th>
<th>Probability distribution variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial risk measures</td>
<td></td>
</tr>
<tr>
<td>- Cash flow for KPC and Subsidiaries</td>
<td>- Annual cash flow for next year(s) (operating cash flow)</td>
</tr>
<tr>
<td>- Stakeholder and KPC cash flow</td>
<td>- Annual cash flow to both Kuwaiti government and KPC (remaining cash</td>
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<td>flow share)</td>
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<tr>
<td>Non-financial risk measures</td>
<td></td>
</tr>
<tr>
<td>- Crude capacity</td>
<td>- Annual crude capacity</td>
</tr>
<tr>
<td>- Gas production</td>
<td>- Annual associated and non-associated gas production</td>
</tr>
<tr>
<td>- Refining capacity</td>
<td>- Annual refining capacity</td>
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</tbody>
</table>
Architecture: 4 modules centralized at KPC and 7 modules maintained at subsidiaries level

K-companies have option to change shared assumptions for running their own scenarios but the changes will be reflected for other K-Companies only if KPC implement the changes centrally.

SOURCE: Team analysis.
Each K Company has its own risk model; output measures risks modelled both in deterministic and stochastic cases

**Relevant risk factors**
- All relevant risks modeled for all K Companies
- Focused risks modelled in detail for K Companies
- Deviation from base case due to each of these risks modelled separately

**Financial models**
- All 9 K companies deterministic financial cash flows is modelled
- For each of these deterministic, the impact of all relevant risks modelled separately for output

**Model output**
- Cash flow distribution (by each risk type for each K Company)
- Varies by K company
- For KGOC and KOC
  - Oil capacity
  - Gas production
- For KNPC
  - Refining capacity
The risk-return quantification methodology adds probabilistic metrics on top of the current appraisal and strategic metrics

- Stress-test expected economic performance of the project
- Prioritize and assess magnitude of key risks to focus mitigation actions
- Estimate likelihood of project success and the underlying value to the organization

### Metrics previously used for program appraisal

<table>
<thead>
<tr>
<th>Value metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Return metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRR</td>
</tr>
<tr>
<td>Profitability index</td>
</tr>
<tr>
<td>Payback period</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity of NPV to</td>
</tr>
<tr>
<td>CAPEX overrun</td>
</tr>
<tr>
<td>Oil price</td>
</tr>
<tr>
<td>Project delay</td>
</tr>
<tr>
<td>Scenarios</td>
</tr>
</tbody>
</table>

### Additional risk-adjusted metrics introduced by the ERM initiatives

<table>
<thead>
<tr>
<th>Sensitivity/Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected NPV</td>
</tr>
<tr>
<td>Expected IRR</td>
</tr>
<tr>
<td>RAROC (Risk adjusted return on capital)</td>
</tr>
<tr>
<td>Expected payback period</td>
</tr>
<tr>
<td>NPV at risk (NPVaR)</td>
</tr>
<tr>
<td>Probabilities</td>
</tr>
<tr>
<td>To breakeven</td>
</tr>
<tr>
<td>To meet baseline</td>
</tr>
</tbody>
</table>

---

1 Using base case assumptions
Key risks identified specific to the project

<table>
<thead>
<tr>
<th>Key risks identified</th>
<th>Relevance to project</th>
<th>Key parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil price volatility</td>
<td>Exposed to oil price volatility as oil is source of feedstock.</td>
<td>Crude price volatility of ~29% based on historical Brent prices</td>
</tr>
<tr>
<td>Capex overrun</td>
<td>Exposed to capex overrun and execution delay risk. The labor and equipment part of the capex is correlated with execution delay and the plant part is independent of it. The delay in project execution stretches the capex spend profile.</td>
<td>Most likely overrun of 10%, between -5% to 40%</td>
</tr>
<tr>
<td>Project execution delay</td>
<td></td>
<td>Average delay of 11 months with a standard delay of 6 months</td>
</tr>
<tr>
<td>Refining margins volatility</td>
<td>Exposed to refining margins volatility as proceeds from product sales are sources of revenues</td>
<td>Average margin volatility of ~20% for the various refined products</td>
</tr>
<tr>
<td>Availability of feedstock</td>
<td>Uncertainty in feedstock compositions at this stage results in uncertainty over which configuration will be selected.</td>
<td>Based on strategy with delay risk overlaid for each project</td>
</tr>
</tbody>
</table>

SOURCE: Illustrative- interviews with planning team and project team; interviews with SMEs
# 3 interlinked ERM quantitative processes

## Objectives

<table>
<thead>
<tr>
<th>CFaR model</th>
<th>Example output</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Provide a risk perspective on the FYP by introducing major risk factors</td>
<td><img src="image1.png" alt="Output example" /></td>
</tr>
<tr>
<td>▪ Identify key risks for KPC and the State</td>
<td><img src="image2.png" alt="Output example" /></td>
</tr>
<tr>
<td>▪ Monitor evolution of risk exposures over time and against tolerance limits</td>
<td><img src="image3.png" alt="Output example" /></td>
</tr>
</tbody>
</table>

| Program-level risk-return quantification | ![Output example](image4.png) |
| ▪ Provide a risk perspective on Program economics (including RAROC, Expected NPV, NPV@R, probability to break even) | ![Output example](image5.png) |
| ▪ Identify key risks on a program level | ![Output example](image6.png) |
| ▪ Quantify impact of mitigation actions and support creation of action plans | ![Output example](image7.png) |

| Portfolio-level risk-return quantification | ![Output example](image8.png) |
| ▪ Assess the risk return profile of different strategic options for the company portfolio | ![Output example](image9.png) |
| ▪ Support selection and definition of strategic directions | ![Output example](image10.png) |
| ▪ Estimate the impact of strategic decisions on the portfolio | ![Output example](image11.png) |
KPC’s Three challenges to meet ERM aspiration

1. Build the conviction that risk management improves our performance and cost optimization

2. Enhance risk capabilities throughout the organization

3. Break silos to make people work together which strengthens the organization
By the end of the ERM journey KPC would have achieved strategic ERM maturity

- An effective management tool to support better decision making
- A much deeper understanding of major risks and how they affect the businesses and oil sector's ability to implement the 2030 strategy
- Concrete materials with quantification of the risks improving ability to engage the stakeholders in an informed manner
- Attention drawn towards the extreme tail risks facing the oil sector
- Suitable leading risk indicators and a good understanding how to quantify and assess the impact of range of mitigation options
- Ability to evaluate the investment portfolio from a risk adjusted point of view to create increased organizational value both at a KPC level and individual K-co level
- The capability within the organization to conduct risk analysis and provide recommendations
Thank You. Questions?
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