



*cutting through complexity*

KPMG GLOBAL ENERGY INSTITUTE

# Major LNG projects: Navigating the new terrain

Focus on Canada, United States,  
East Africa and Australia

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# Overview:

This paper is intended to provide an overview of the issues that the liquefied natural gas (LNG) industry is facing in extending into new terrains during its unprecedented wave of expansion. Many of the issues are not novel – they have plagued other megaprojects. It is the pervasiveness and interlinked nature of these issues that present a compelling opportunity to reinforce lessons learned – and correct course, as informed by experience. We introduce the breadth of considerations needed to successfully navigate the new terrain, drawing on insights from North America, East Africa and Australia. This will provide a platform for a series of LNG papers that will provide deeper insights on specific elements of governance, jurisdiction, stakeholders and opportunity.

# Introduction

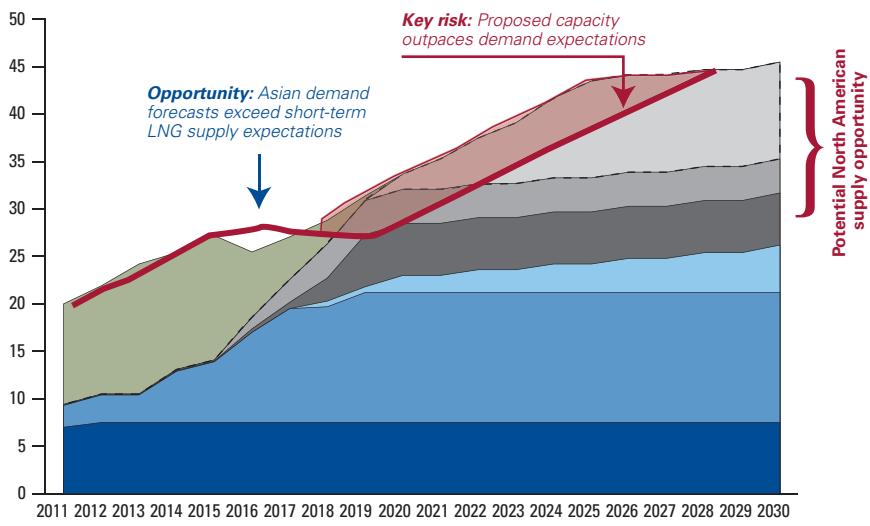


The LNG industry is venturing into uncharted territory as it approaches an unprecedented wave of expansion. While the new landscape poses some major technical challenges – even more important are the non-technical challenges, including remote locations, political sensitivities, new stakeholders and constantly changing joint ventures (JVs), regulatory landscapes and organizational models.

Western Canada (British Columbia), East Africa and the United States (US) Gulf Coast are three of the geographic centers of this next wave of LNG expansion. Each presents unfamiliar ground for LNG export projects and may face competition from new Middle East exporters and others.

## Asian LNG supply and demand forecast

*In billion cubic feet per day, 2011-30*



Source: KPMG analysis of data from various sources, Canadian Energy Research Institute 2013.

Proposed US supply includes all projects aside from Sabine Pass LNG, the only project to make a final investment decision.



These projects face an intense competitive environment. As shown on the chart, supply and demand projections suggest that new sources of LNG, including North America and East Africa, will play an important role in satisfying demand into the 2020s. But proposed capacity targeting Asia exceeds likely longer-term demand – so not all projects may succeed. Projects have to position themselves to secure both markets and scarce engineering and contracting resources.

Buyers are seeking diversification, so projects from different jurisdictions all have a chance to win the LNG supply race. Successful projects will be those that can deliver on the fundamental value drivers within their control: to convince buyers, financiers and investors that they can manage risks, deliver on time and be cost-competitive.

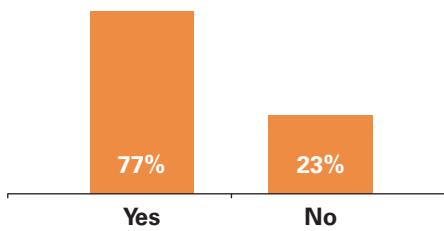
Of the last 12 LNG projects, 10 went over time and/or budget – many by 40 to 50 percent, according to Deutsche Bank. Labor markets in Australia, for example, were heavily stretched by simultaneous LNG and mining booms. Western Canadian projects may encounter similar issues with continuing work on the oil sands in Alberta. East Africa, meanwhile, needs to create investor confidence, develop infrastructure and build a skilled workforce. Over 40 major capital projects are being contemplated across British Columbia in LNG, mining and energy development. The vast majority of these projects are in the north, where populations are thin and skilled work has historically been scarce. At the same time, British Columbia continues to be a net exporter of workers to provinces such as Alberta.<sup>1</sup>

In recent years, most LNG projects have encountered severe difficulties in proceeding and, once sanctioned, in staying on time – and budget.

This is not unique to the energy business. In a recent KPMG survey<sup>2</sup> of executives from 165 leading engineering and construction firms, 77 percent reported projects underperforming due to poor estimation and risk management processes. But the very large size of LNG projects and related infrastructure means any problems have a major impact on share value, project sponsors and customers – and are highly visible (see Australian case study on page 11).

**Out of the last 12 LNG projects, 10 went over time and/or budget – many by 40 to 50 percent.**

#### Presence of underperforming projects<sup>2</sup>



<sup>1</sup> BC Government Major Projects Inventory [http://www.gov.bc.ca/jtst/major\\_projects\\_inventory.html](http://www.gov.bc.ca/jtst/major_projects_inventory.html); KPMG analysis.

<sup>2</sup> KPMG Global Construction Survey 2013: Ready for the next big wave?

# New challenges in LNG

The importance of effective risk mitigation applies even more to LNG export projects in new environments. Key considerations are:

- **New regulatory landscapes:** While Western Canada and the US have well-developed regulatory systems, LNG export projects are a new phenomenon in Canada. As a result, there can be complex layers of local, regional and federal government bureaucracy regarding the obtaining of permits. East Africa (Mozambique and Tanzania), meanwhile, is building an LNG industry and its legal and institutional framework from the ground up.
- **A new spectrum of stakeholders:** As well as government, the new LNG locations feature vocal non-governmental organizations (NGOs), labor unions, local communities, indigenous people (First Nations in Canada) and domestic business lobbies. The link to shale gas exposes North American projects in particular to scrutiny from environmental groups. US projects also have to win and retain support in order to receive approval for non-Free Trade Agreement (FTA) exports and pass the Federal Energy Regulatory Commission (FERC) regulatory process. All of these stakeholders can be supporters or opponents of a project, depending on how developers engage them.
- **Human resources challenges:** As the Canadian oil sands and Australian LNG booms have shown, skilled labor can quickly become a constraint, even in developed economies. Proactive strategic engagement with organized labor, educational establishments, government and business communities can prepare in advance to meet human resource needs at reasonable costs. East Africa, however, faces the challenge of building a corps of capable local talent – requiring a huge program of new university capacity and professional training.
- **Unusual infrastructure needs:** As in Australia, the British Columbia projects feature a number of near-simultaneous developments in the same area. East Africa, meanwhile, is hosting megaprojects in a region of very limited existing infrastructure. In both cases, companies have to determine how to develop the supporting infrastructure including the required ports, air strips, pipelines, power, housing and other systems. This raises questions of who will build and finance these systems, how projects should cooperate and which partners will deliver them. US projects have an advantage in converting existing import terminals because of considerable existing infrastructure and the fact that most of it is being built in traditional oil and gas heartlands.
- **Non-traditional commercial models:** Unlike most traditional LNG projects, the US Gulf Coast will secure gas from the grid rather than from dedicated fields and its price is expected to be linked to the Henry Hub Natural Gas index rather than to oil. Dry gas feedstock presents quality challenges for Asian customers. Non-traditional buyers are emerging, such as the Middle East and Caribbean, who may have special requirements, such as different seasonality or small-volume contracts. North American projects are also being seen in a new geopolitical light as political developments make some traditional gas exporters seem less reliable. Meanwhile, traditional Asian LNG buyers continue to favor security of supply and certainty of timing, but are starting to demand more competitive pricing.



**Successful projects** will be those that can **deliver** on the fundamental value drivers within their control – to **convince buyers, financiers and investors** that they can manage risks, deliver on time and be **cost-competitive.**

## What can be learned from successful and unsuccessful projects?

**While each jurisdiction has its own challenges, winning projects everywhere can be defined by their ability to deliver on those drivers under their control:**

- Capital efficiency
- Timely project delivery
- Securing long-term offtake agreements
- Disciplined and robust processes and systems.

**The industry understands the key concepts for effective execution, however, success is often elusive:**

- Sophisticated risk management systems
- Comprehensive planning and scheduling
- Supply chain management as an integral part of the project
- Proactive stakeholder management
- Robust and disciplined processes and systems.



# Successful project framing

Developers of winning projects will need to have the foresight and will to break out of traditional corporate structures, making internal and external stakeholder management and alignment a core competency. It is hard to recover from early missteps. Those projects that start well are most likely to achieve investment approval and stay on time and budget.

## Successful project proponents get nine things right:

- 1 They do not underestimate project complexity.
- 2 They have strong project governance.
- 3 They have an operating model and culture that goes beyond optimizing within silos to optimizing linkages.
- 4 They align engineering, procurement and construction (EPC) and supplier interests and vest them in the project's success.
- 5 They connect local issues – stakeholders and regulators – when building the team structure and strategy.
- 6 They ensure stakeholder, regulatory and human resource considerations are as central as technical issues in decision-making.
- 7 They engage and bring on board governments, stakeholders, NGOs, environmental groups and indigenous communities from the start to develop mutually beneficial solutions, rather than allowing adversarial stances to emerge.
- 8 They continuously learn and adapt.
- 9 They build with future operations in mind.

## Key lessons from other industries

**Alternative energy** (carbon capture and storage and offshore wind): Aligned a complex supply chain where it was essential that all parts worked together to manage risk in a challenging physical environment.

**Transport** (e.g. UK's Crossrail): Dealt with complex governance structures, including project proponents, government and infrastructure providers.

**Mining**: Many operations demonstrated good corporate citizenship to obtain social licence to operate. Complied with the spirit, rather than just the letter of the law.

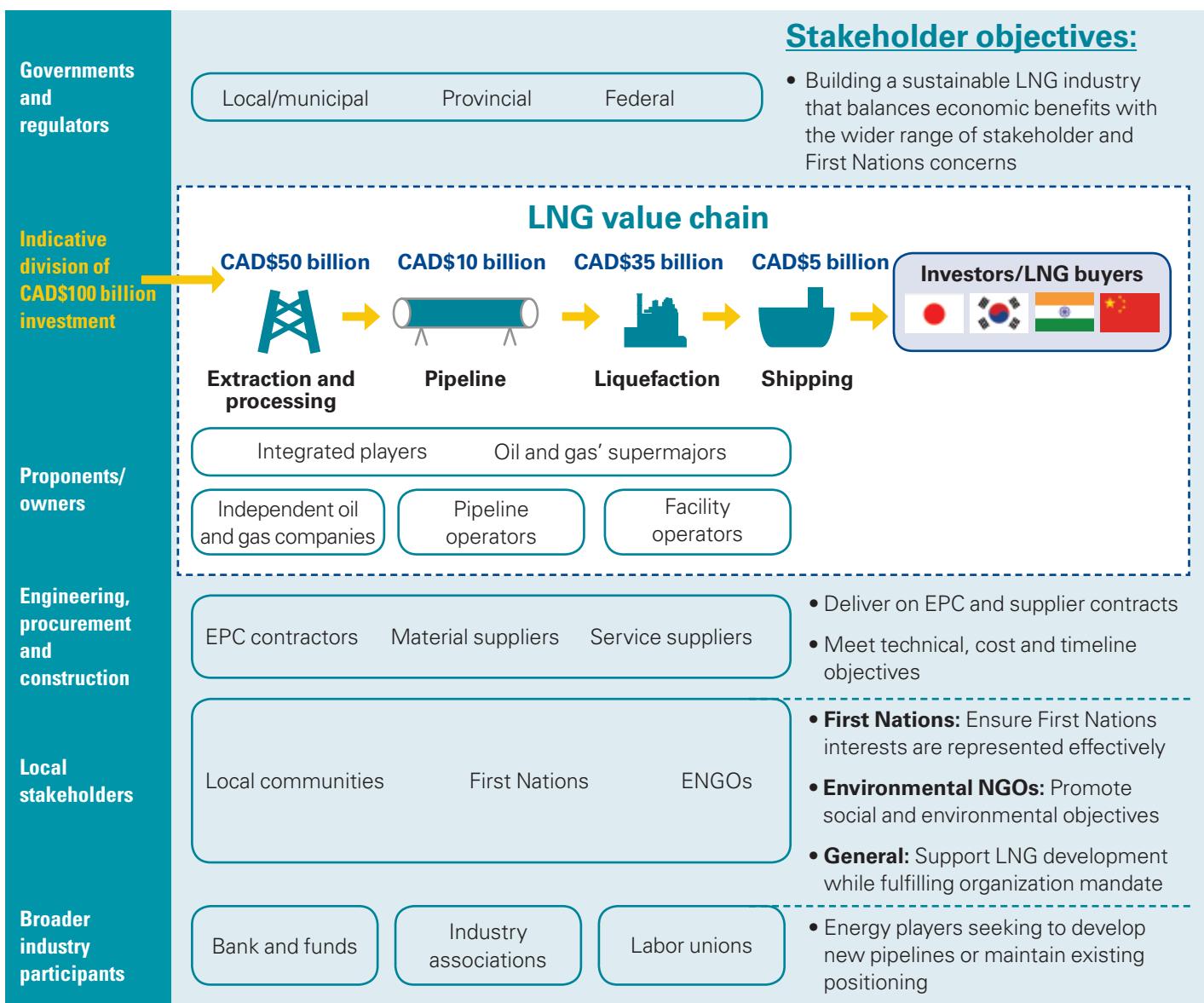
**Projects that start well** are most likely to achieve investment approval and stay on time and budget. 

# Holistic business models

Project developers need to frame projects holistically from the outset. As suggested in Bent Flyvbjerg's classic work, *Megaprojects and Risk: An Anatomy of Ambition*<sup>3</sup>, failure to consider and engage all stakeholders is a major cause of megaproject failure. This can be improved by ensuring proper project accountability in the framing phase. Organizations have to be formed and reformed to avoid silos and apply best practice operational excellence. LNG proponents should look outside their industry for learnings – to industries such as alternative energy, transport and mining.

LNG proponents have to deal with an increasingly diverse ecosystem of stakeholders, each with their own objectives. For Western Canada, this is shown below.

## The Western Canada LNG ecosystem



*Note:* Assuming development of only three LNG facilities – capital investment of 6 years for pipelines and facilities, ongoing capital investment upstream until 2030.  
*Source:* ARC Financial; KPMG Analysis

<sup>3</sup> *Megaprojects and Risk: An Anatomy of Ambition*, (2003) Cambridge University Press.

# Leading practice for stakeholder management

## Projects must create win-win relationships with these key stakeholders

Stakeholder	Desires	Win-win
Local/regional government	Tax revenues	<ul style="list-style-type: none"> <li>Engage on proactive regulation and permitting to ensure project goes ahead on time and budget</li> </ul>
	Competitiveness against other jurisdictions	<ul style="list-style-type: none"> <li>Align on equitable taxation and regulation</li> </ul>
	Development of wider infrastructure	<ul style="list-style-type: none"> <li>Cooperate on public-private partnerships</li> <li>Work with other LNG developers to realize synergies</li> <li>Understand government's financing capabilities and constraints and fill gaps as appropriate with other financing structures</li> </ul>
National sovereign wealth funds and pension funds	Low risk, long-life investments	<ul style="list-style-type: none"> <li>Facilitate investments (debt or equity) in the project and ancillary infrastructure</li> </ul>
EPC/supply chain	Profitable contracts	<ul style="list-style-type: none"> <li>Draw into the project team to achieve alignment and ensure they understand the stakeholder issues</li> </ul>
Labor unions	Well-paid jobs for local people	<ul style="list-style-type: none"> <li>Invest in training to ensure sufficient high-skilled staff</li> </ul>
Local business	Opportunities to supply the project	<ul style="list-style-type: none"> <li>Cooperate on upskilling and technology partnerships</li> <li>Deal with local content proactively, rather than waiting for mandatory requirements</li> </ul>
Indigenous communities	Local economic benefits; respect for traditional rights	<ul style="list-style-type: none"> <li>Engage to understand concerns; minimize environmental negative social impacts; work with regional development corporations</li> </ul>
Environmental NGOs	Minimal local impacts	<ul style="list-style-type: none"> <li>Understand local concerns and work to find solutions</li> </ul>
	Reduced CO <sub>2</sub> emissions	<ul style="list-style-type: none"> <li>Choose low emission/high-efficiency engineering options</li> <li>Explain the advantages of gas as a low-carbon fuel</li> </ul>

LNG buyers have typically taken equity stakes in liquefaction projects. But it may be worthwhile to de-risk projects and further align interests by considering a wider range of equity partners in supporting infrastructure such as pipelines, roads, rail lines and ports. Sovereign wealth funds, infrastructure funds, national pension funds and regional development corporations are all looking for low-risk, long-lived assets to invest in. EPC contractors and equipment suppliers have taken stakes in power, biomass and offshore wind projects, helping to create shared goals. This helps create a critical mass of stakeholder support.

Government support, for example, by direct equity investment or tax incentives, may also be required for major infrastructure such as an Alaskan gas pipeline.

Public-private partnerships can align government and project interests and may be crucial for creating wider economic benefits. This can apply particularly in a country such as Mozambique which requires ports, a domestic gas grid and power generation for its growing coal industry and broader development, as well as LNG. Deep expertise is needed to assess such economic and indirect benefits and therefore, to make a case to government.

Competing LNG projects can benefit from sharing common infrastructure, as in Qatar. Joint gas gathering systems and pipelines can save costs when developing multiple fields in remote shale or coal bed methane plays. Companies can propose such synergies, while governments or regulators may increasingly require it to avoid wasteful duplication.

Of course, such structures introduce additional commercial complexity and the challenges of dealing with different types of partners. Their benefits have to be weighed against the extra demands on project management skills.



**CASE STUDY**

## Australian LNG



**3 operating LNG export facilities**

**Seven LNG projects\*\* currently being built by seven different joint ventures; total capital expenditure**

**US\$200 billion**

**80 million tonnes per annum forecasted total production when all projects are completed**

**Australia has significant advantages over other LNG exporters:**

- significant gas reserves
- low sovereign risk
- proximity to Asia
- contract/market experience.

**The big issue:** Final capital costs are significantly greater than the original estimates Final Investment Decision (FID) and are now estimated to be **40 percent greater than US LNG capex costs.\***

Issue	Cost driver	Potential solution
Escalation of workforce cost – 50 percent increase in cost per hour from FID to completion	<ul style="list-style-type: none"> <li>• Skills shortage</li> <li>• Remote location</li> <li>• Poor labor contracts and union relations</li> </ul>	<ul style="list-style-type: none"> <li>• Workforce planning</li> <li>• Change management</li> <li>• Productivity analysis and management</li> <li>• Long-term union agreements</li> </ul>
Contractors, inability to deliver requirements in cost-effective and timely manner	<ul style="list-style-type: none"> <li>• Complexities of project</li> <li>• Size of contracts</li> <li>• Local content requirements</li> </ul>	<ul style="list-style-type: none"> <li>• Due diligence of contractors</li> <li>• Collaborative contracting model</li> <li>• Real-time cost audits</li> </ul>
Supply chain/logistics challenges are underestimated	<ul style="list-style-type: none"> <li>• Remote locations</li> <li>• Lack of infrastructure to support</li> <li>• Multiple users</li> </ul>	<ul style="list-style-type: none"> <li>• Stakeholder engagement</li> <li>• Effective upfront planning</li> </ul>
Regulatory burden	<ul style="list-style-type: none"> <li>• Federal/state duplication</li> <li>• Multiple approvals between agencies</li> <li>• Environmental concerns</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinated government management plan</li> <li>• Lobby government for efficiencies</li> </ul>
Lack of infrastructure	<ul style="list-style-type: none"> <li>• Complexity (ports, roads, rail, pipelines, storage, etc.)</li> <li>• Multiple ownership and responsibility</li> </ul>	<ul style="list-style-type: none"> <li>• Coordination between different joint ventures/projects</li> <li>• Government engagement to drive common infrastructure</li> </ul>
Passive government engagement on key issues	<ul style="list-style-type: none"> <li>• Slow approval process</li> <li>• No 'big picture' plan on multiple user facilities and field development</li> <li>• Community has difficulty understanding project implications</li> <li>• Underestimate by project proponents of scale of engagement required</li> </ul>	<ul style="list-style-type: none"> <li>• Government management plan</li> <li>• Better upfront community engagement</li> </ul>

\* Public speech by Roy Krzywosinski, Managing Director, Chevron Australia; Australian Petroleum Production and Exploration Association (APPEA) annual conference, Perth, April 2014.

\*\*Project names:

1. Chevron Gorgon LNG 2. Chevron Wheatstone LNG 3. INPEX Ichthys LNG 4. BG Queensland Curtis LNG 5. Santos Gladstone LNG. 6. ConocoPhillips Australia Pacific LNG 7. Shell Prelude FLNG.

# Raising the bar for better project management

## Recommendations for planning major LNG export project success

### Project proponents

Implement strategies described right from the outset of framing a project. Go beyond regulatory 'box-ticking' to achieve and sustain your social license. Understand the needs of governments and communities beyond those embodied in formal regulations. Align development and operations as the basis to seek long-term project support. Plan for infrastructure issues and supply chain from the start and be prepared for competition for resources from other projects in the area, inflation and exchange rate fluctuations. Note that stakeholders are not necessarily easily categorized. The same person may be a local community leader, a business owner and an environmentalist. Seek to align your supply chain and use suppliers' capacity to extend and augment yours.

### Company head office

Understand specific local issues in each jurisdiction and empower and listen to the team on the ground. Strengthen your understanding with additional perspectives from a broader term, including locally-based advisors with deep experience in the local landscape and ecosystem. Avoid getting locked into traditional project management models and silos. Ensure that linkages and interfaces between issues are proactively considered. Tailor the operating model for different environments.

### Supply chain and EPC companies

Become an extension of the proponent's team and stakeholder management approach. Ensure teams are properly prepared and aligned for the client's and project's unique issues. Define systems, processes, roles and responsibilities from the start. Create a true risk management culture. Actively coordinate with the project proponent to leverage import and export finance, where appropriate.

### LNG buyers, financiers and investors

Reduce supply and timing risk by choosing projects that demonstrate discipline in project management, sound governance and proactive stakeholder management.

### Governments

Maximize the value generated from LNG projects in your jurisdiction by creating a cost-competitive investment environment and realize synergies and indirect benefits from infrastructure development. Understand how difficult these projects are and how important a robust yet supportive fiscal and regulatory framework is. Look for opportunities to invest in infrastructure that can be leveraged across multiple projects.



**Go beyond** regulatory '**box-ticking**' to achieve and **sustain** social license.



# KPMG Global LNG Advisory

## Competitive Advantage

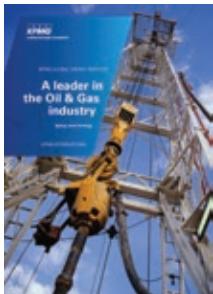
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For today's oil and gas companies, dealing with complexity has become a competitive challenge. Global competition, novel stakeholders and environmental concerns introduce new layers into business decisions. KPMG member firms are some of the leading providers of professional services to the LNG sector. We recognize the importance of sharing our industry insights with clients.

### **KPMG member firms have successfully assisted clients in addressing these major risks:**

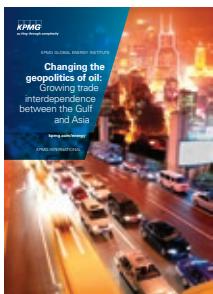
1	Managing capital projects, contract processes and providing assurance are the focus of our Major Projects Advisory groups. Risks can be mitigated through tools and methodologies that address demand planning, supply and inventory management, strategic sourcing and contract management.
2	Organizational effectiveness, business readiness for LNG and operations excellence.
3	Designing or improving current business processes including implementing technology focusing on logistic, supply chain and procurement management are services that member firms' advisory teams have delivered successfully. Implementing appropriately-sized human resource strategies, along with the right enabling technologies, is a key focus area to address labor-related risks. Environmental and safety are the focus areas of our sustainability teams.
4	Local practices are supported by experts from across our global network who can advise clients on implementing governance processes, risk management and ensuring compliance with legislation, including taxation.
5	Over 150 KPMG member firms offer Global Infrastructure Advisory service which encompasses project structuring, raising of development phase equity, transaction advisory, including financial modelling, development of country/project specific contractual frameworks and progressing these to support bankability. This includes advising in gas sales and purchase and power purchase agreements, advisory support during procurement and financing of capital projects. KPMG professionals have specialized skills in logistics (road, rail, seaports, airports), power, oil and gas and are currently advising major public and private sector clients in several countries.
6	Management of relationships between international oil companies (IOCs) and national oil companies (NOCs) is critical to ensure there is a balance between political and commercial objectives i.e. royalty and taxation, security of supply, employment and infrastructure development. We can assist IOCs and NOCs to create a stable and attractive investment environment through the development of policy and governance structures.

# Further insight



## A leader in the Oil & Gas Industry

Summarizes key challenges confronting the oil and gas industry, KPMG's involvement and commitment to the industry and how key executives of energy companies can benefit from KPMG's Global Energy Institute.



## Changing the geopolitics of oil: Growing trade interdependence between the Gulf and Asia

The national oil companies of the Gulf Cooperation Council (GCC) are shifting gears, turning their attention eastwards, where the bulk of their exports will be headed for years to come. This report addresses some of the pressing economic challenges the region faces. Emerging trends point to a closer Gulf-Asia energy relationship.



## No paper chase: Transforming risk management at energy and natural resources companies

Energy and natural resources companies face an ever-growing array of risks. Today's complex business environment requires an even stronger ability than before to master risk management, but companies are falling short in important areas.



## Shale Development: Global Update – Focus on US, China, Argentina, Australia, Indonesia and UK

This report discusses the global shale market and developments in the big three – US, China and Argentina – as well as in Australia, Indonesia and the UK.



## INSIGHT: Resilience

In the latest edition of Insight, we explore some of the world's most impactful stories of resilience. We talk to infrastructure policy makers, owners, developers, analysts and investors to find out what keeps them awake at night and what they are doing to manage risk and enhance resilience.

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# KPMG Global Energy Centers

KPMG member firms offer global connectivity. We have 18 dedicated Global Energy Centers in key locations around the world, working as part of our global network. The Centers are located in Abu Dhabi, Beijing, Berlin, Budapest, Calgary, Dallas, Houston, Johannesburg, London, Melbourne, Moscow, Paris, Perth, Rio de Janeiro, São Paulo, Singapore, Stavanger and Tokyo.

These Centers enable KPMG professionals to transfer knowledge and information globally,

quickly and openly. With regular calls and effective communications tools, member firms share observations and insights, debate new emerging issues and discuss what is on member firms' clients' management agendas. The Centers also produce regular surveys and commentary on issues affecting the sector, business trends, changes in regulations and the commercial, risk and financial challenges of doing business.

## KPMG member firms 18 Energy Centers



## What sets KPMG apart

Our **business model** enables deep **industry experts** to work side by side with **business leaders** to develop and deliver solutions using highly **specialized teams** tailored to the specific **business needs** of **member firm clients**.

### **The KPMG Global Energy Institute (GEI):**

Launched in 2007, the GEI is a worldwide knowledge-sharing forum on current and emerging industry issues. This vehicle for accessing thought leadership, events, webcasts and podcasts about key industry topics and trends provides a way for you to share your perspectives on the challenges and opportunities facing the energy industry – arming you with new tools to better navigate the changes in this dynamic arena.

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### **The KPMG Global Energy Conference**

**(GEC):** The GEC is KPMG's premier event for executives in the energy industry. Presented by the KPMG Global Energy Institute, these conferences are held in both Houston and Singapore and bring together energy executives from around the world in a series of interactive discussions with industry luminaries. The goal of these conferences is to provide participants with new insights, tools and strategies to help them manage industry-related issues and challenges.



#KPMGGEC



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Designed by [Evaluerseve](#).

Publication name: Major LNG projects: Navigating the new terrain

Publication number: 131252

Publication date: June 2014