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KPMG GLOBAL ENERGY INSTITUTE

Shale Gas: Global M&A Trends

Focus on Argentina,
China and United States

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The *Verdict* is in



Over the past several years, many energy analysts have said that shale gas could revolutionize the energy industry. Shale gas is a low-cost, carbon-friendly alternative to traditional fuels. Significant deposits are being discovered throughout the world. Shale gas is poised to supply a rising proportion of the world's energy needs.

For these reasons, many people have been calling shale gas a “game changer” for world energy markets. Is there really substance beneath all the hype?

In November 2010, during the first in a series of KPMG Global Energy Institute webcasts on the global shale gas industry, we asked oil and gas industry executives, primarily located in the United States, whether they would apply the term “game changer” to shale gas.¹ Over 80 percent agreed with the statement and over 93 percent predict that investment in shale gas exploration and development will significantly increase. Based on an overview of recent merger and acquisition (M&A) activity in the sector, the prediction is right on the mark.

Our white paper *Shale Gas – A Global Perspective*² shared our insights on the state of shale gas development around the

world and our views on the prospects of shale gas as part of the global energy mix. In the following pages, we zero in on factors and issues affecting M&A in the shale gas sector, with special focus on M&A trends in the three countries with the larger known recoverable reserves: United States, Argentina and China.

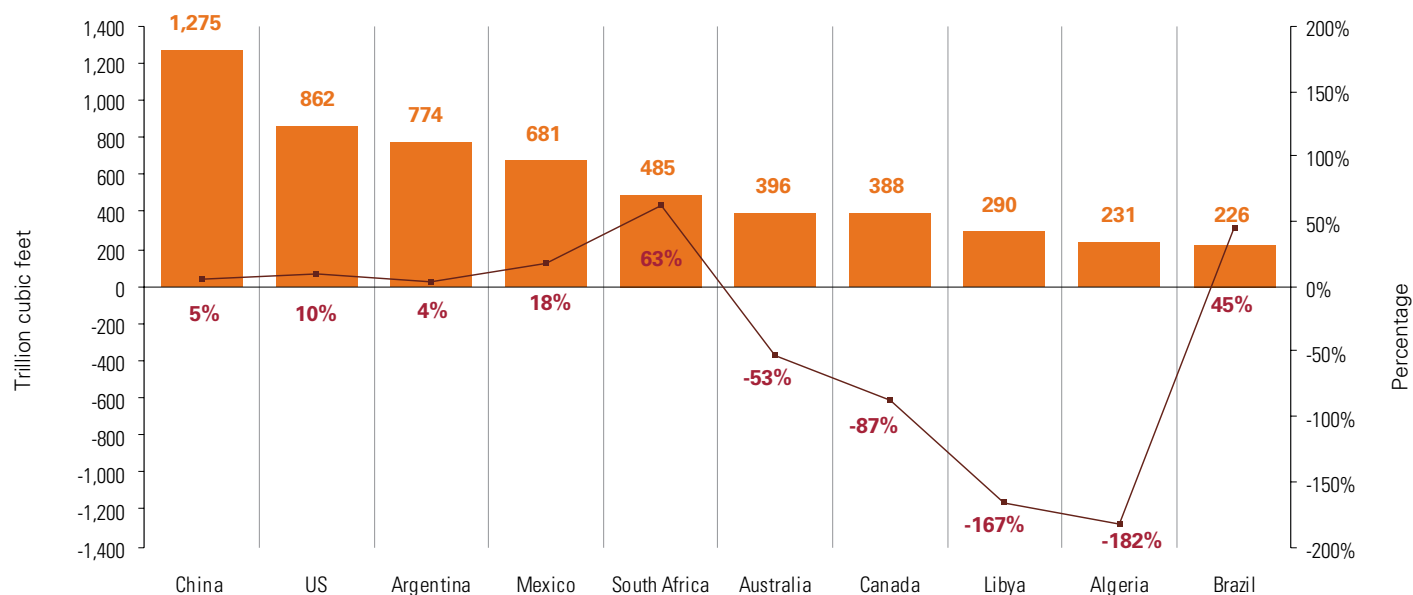
In a world of rising energy prices, pressure to reduce harmful emissions, and geopolitical instability, each of these countries has a huge stake in developing its shale gas production and distribution capabilities – and changing the game for decades to come.

¹ The poll was conducted during the KPMG Global Energy Institute webcast “Shale Gas – A Game Changer for World Energy Markets” on November 10, 2011. To replay the webcast, visit the KPMG Global Energy Institute website at: <http://www.kpmginstitutes.com/global-energy-institute/>

² KPMG International, January 2011. Available from the KPMG Global Energy Institute website.



Top 10 regions by estimated shale gas technically recoverable resources and natural gas imports/(exports) percentages



Source: EIA: World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States, April 2011

For further information please contact:

Wayne Chodzicki

Global Head of Oil & Gas

T: +403 691 8004

E: wchodzicki@kpmg.ca

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on the United States



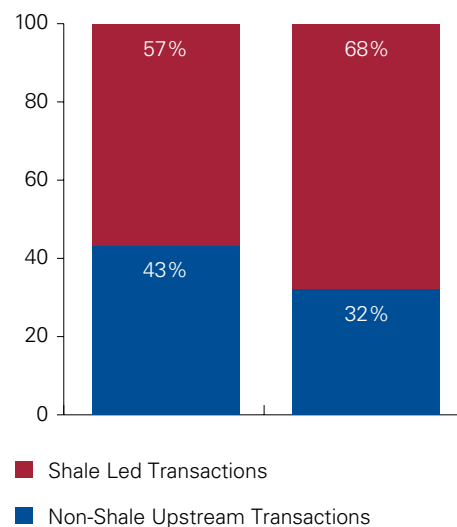
Opportunities

In a relatively short period of time, the U.S. shale gas boom has transformed energy markets within the country and around the world. Current M&A in the U.S. shale gas industry indicates that the industry continues to mature. Major domestic companies are consolidating their shale gas interests in proven reserves, large independents are repositioning into unproven reserves, and the industry is attracting new domestic and foreign investment as the overall risk profile declines.

Consolidation through acquisition

Immediately after the 2008 financial crisis, joint ventures were the most popular means for financing U.S. shale gas development projects. While joint venture activity in the country continues, particularly among Asian investors, it appears to be trailing off. Instead, the industry is seeing a shift to outright purchases, including asset transactions and, more commonly, corporate acquisitions, which is allowing larger companies to deploy more capital and to gain exposure to more than one basin.

U.S. shale-led transactions* as a percentage of total upstream transaction value

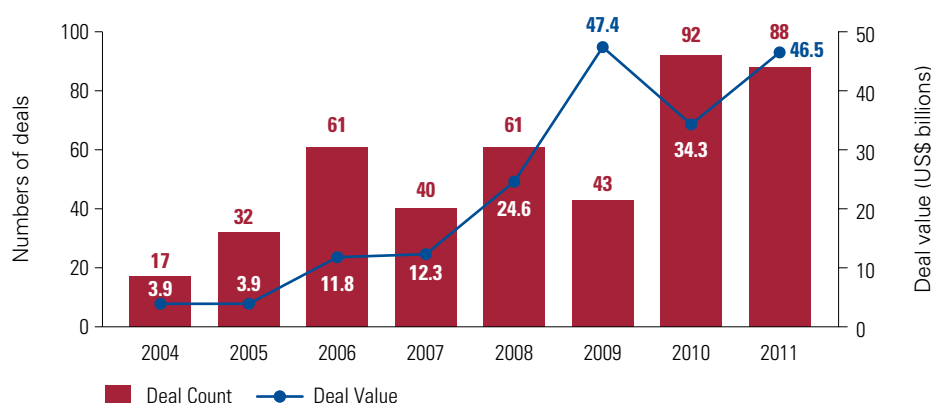


*Includes diversified transactions that comprise a component of non-shale assets.

Source: IHS Herold, KPMG Analysis.



U.S. shale transactions – Value and count (2004 – 2011)



Source: IHS Herold, KPMG Analysis.

Issues

Natural Gas Liquid (NGL) price advantage

Valuations have strengthened, particularly for basins with exposure to liquids. In the past 2 years, given weak natural gas prices, the NGL-crude price linkage offered a higher incentive

for investment in liquid rich shale gas exploration and oily reserves.

Looking ahead, rising NGL volumes are likely to depress NGL pricing relative to oil. While this movement is unlikely to stall M&A activity in the market, it may diminish the attractiveness of “wet” gas shale reserves and cause risk

adjustments to future NGL pricing in valuation models.

Infrastructure bottleneck

The lack of infrastructure in certain basins for transporting and processing NGLs is creating a temporary bottleneck for development. Remotely located basins face challenges in getting the product out of the ground and into the marketplace. Significant investment in infrastructure will be needed over the next 25 years, with capital requirements expected to exceed US\$200 billion countrywide during that period.

Inadequate midstream infrastructure, including gathering systems, processing plants, storage fields, and liquefied natural gas terminals, could trigger price volatility across the industry, leading to stranded gas supplies and slowing investments for development of new, remotely located reserves.

Environmental concerns

The industry faces mounting concerns about the environmental impact of hydraulic fracturing ("fracking"), the drilling technique that makes shale gas extraction possible. Lawsuits have been filed against shale gas producers in at least seven states. Some states have imposed temporary bans on the technique due to concerns over possible groundwater contamination. Though some bans have been lifted, regulatory uncertainty is causing some developers to move their activities to more accommodating locations.

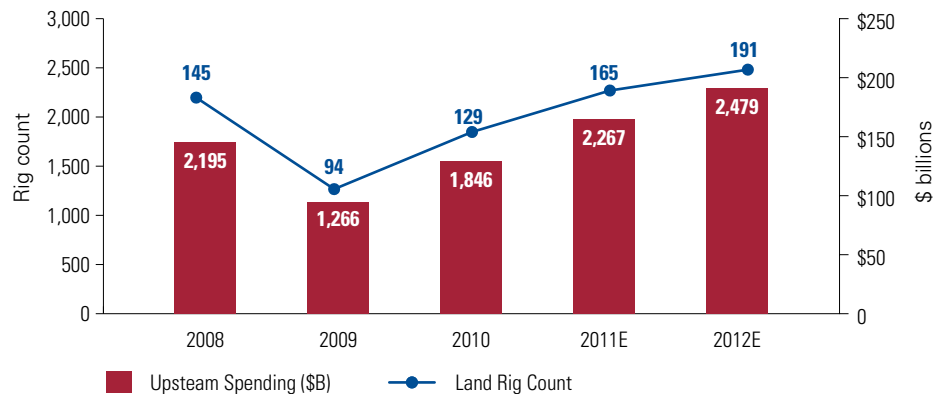
The U.S. Environmental Protection Agency (EPA) is working to standardize and regulate activity at the federal level. In December 2011, the EPA expressed concerns that fracking may have caused groundwater contamination in Wyoming. Efforts to standardize fracking procedures, including disclosure of fracking fluids, continues to evolve at the federal level. Until U.S. federal policy in the area settles, regulatory uncertainty will continue to influence M&A decisions about the viability of shale gas investments in some basins.

M&A Trends

Long-term pricing impact

NGL price movements are expected to continue to influence M&A activity in the United States. In an informal poll conducted during a KPMG Global Energy Institute webcast,³ oil and gas industry executives were asked what they think is primarily driving current M&A activity in the United States. About 46 percent of respondents believe longer-term views of pricing is driving current transactions, while lease drilling terms and protecting existing acreage ranked a distant second at 22 percent.

U.S. land rig count and upstream spending forecasts



Source: Baker Hughes, JP Morgan, IHS Herold

Demand for services

In the short term, investor demand for midstream throughput and storage, as well as oilfield services (OFS), will continue to increase. The U.S. rig count has more than doubled since mid-2009 to over 2,000 rigs, which indicates that production will continue to increase in the short term. Upstream revenue typically outpaces spending, but 2011 was an exception. As the chart shows, upstream spending in North America is closely correlated to revenue for large cap OFS companies.

In 2011, however, OFS revenue was up by 41 percent, compared to a 37 percent increase in spending. We also note that consolidation of shale gas reserves by majors, independents and international companies is shifting demand disproportionately toward large service companies.

We expect that ongoing shale gas development will continue to drive activity from OFS companies that support horizontal drilling and hydraulic fracturing activities. However, consolidation in the industry may be creating more downside risk for smaller service providers.


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A large portion of U.S. shale reserves is now discovered, although not all have been developed. Over the long term, as these reserves are depleted, U.S. investment in domestic shale gas will peak and investors will look cross-border for replacement reserves. In our informal poll⁴ of shale gas industry executives, 52 percent of respondents said they believed this would begin to occur in 5 to 10 years, while 25 percent believe it will happen sooner, within the next 5 years.

Where will these investors set their sights? According to the same poll, 76 percent of respondents see future investment occurring in South America, while 13 percent in Asia and 9 percent in Europe.

³This second poll was conducted during the KPMG Global Energy Institute webcast "Shale Gas Update: M&A Trends" on February 2, 2012. To replay the webcast, visit the Global Energy Institute website at: <http://www.kpmginstitutes.com/global-energy-institute/>

⁴ See note 3.



In our informal poll of shale gas industry executives, 52 percent of respondents said U.S. investment in domestic shale gas will peak and investors will look cross-border for replacement reserves.

For further information please contact:

Brandon Beard
Managing Director, KPMG in the
United States
T: +1 214 840 6402
E: bbeard@kpmg.com

Drew Koecher
Partner, KPMG in the United States
T: +1 214 840 2576
E: dkoecher@kpmg.com

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on **Argentina**

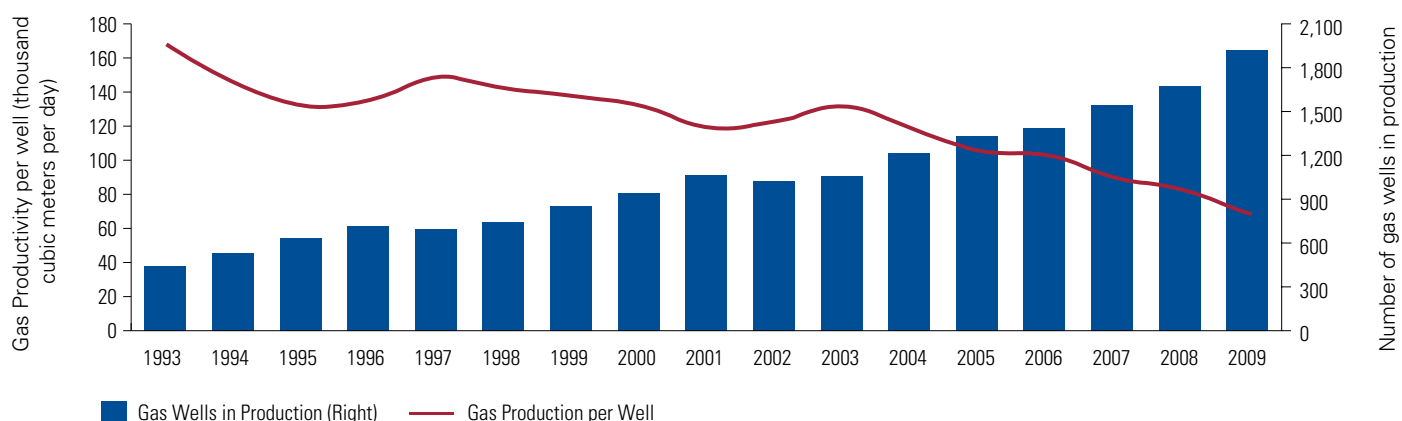


Opportunities

Argentina relies on natural gas for 52 percent of its energy supplies. Over the past few years, domestic production has declined (see chart), and the country has become a net importer of energy as a result. The Argentine government is looking to reverse the trend by encouraging development of the country's sizable, mostly untapped shale gas reserves. According to the U.S. Energy Information Administration, Argentina owns the third largest known resource base of shale gas in the world.⁵

Currently, local shale gas industry is in its development stage, and the true extent of its potential should be revealed within the next 18 months. The country's shale gas basins are located in an accessible central province close to water supplies and far from populated centers, suggesting significant long-term potential.

Natural gas productivity in Argentina



Source: Province of Neuquen owned Oil and Gas company ("Gas y Petroleo de Neuquen")

M&A Trends

Companies worldwide are showing interest in Argentine shale gas projects, and investment in shale gas production is expected to reach US\$1 billion in 2012. Joint ventures are currently the preferred model for financing development activities.

Global strategic players from the India, Netherlands and United States, the and all over the world are seeking to enter the Argentine shale gas sector. The sector is particularly appealing to global technology and service suppliers.

The companies that have expressed interest have named joint ventures with established global players and/or acquisition of junior local players, as their preferred market entry approach. In our Global Energy Institute webcast poll of key industry executives on 2 February 2012, 46 percent of respondents said they would pursue joint ventures with junior players, while 29 percent would pursue mergers and acquisitions. Fewer respondents would pursue technological support (14 percent) or greenfield projects (9 percent).

Issues

Argentina already has a well-developed gas distribution infrastructure from natural gas operations, which has sufficient spare capacity to support new investments in shale gas. However, it lacks the technology, equipment and services required to support large-scale production. The industry's success hinges on the availability of capital, the development of a supplier base, and the growth of a skilled labor pool.

Current natural gas prices in Argentina are low, and prices will need to climb to make shale gas production economically viable. Initial investment costs are high, but margins are expected to improve over the long-term. Argentina's gas-plus regulatory framework promotes better selling prices for new offers of shale gas.

KPMG Insights

Recent discoveries and early data from wells in production show great potential.

Major international oil and gas companies are looking at this market very closely and are creating entry strategies for execution in the near future.⁶

The development of shale gas resources in Argentina has the potential to change the country's energy balance and largely eliminate its need to import gas. Analysts are optimistic that Argentina's shale gas industry is poised to emulate the success of the U.S. shale gas industry.⁷

For further information please contact:

Mariano Sanchez

Partner, KPMG in Argentina

T: +54 11 4316 5774

E: marianosanchez@kpmg.com.ar

⁵ World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States, EIA, April 5, 2011

⁶ Research tool: Emerging Market for Proprietary Intelligence, May 19, 2011

⁷ Research tool: Emerging Market for Proprietary Intelligence, May 19, 2011

FOCUS

on China



Opportunities

Compared to the United States and Argentina, China is a newcomer to the shale gas industry. Over time, the country could become one of the world's largest producers. Current estimates show China's shale gas reserves at up to 1,275 trillion cubic feet of shale gas reserves.⁸ If accurate, China's shale gas reserves are a dozen times greater than its conventional gas reserves and would be the world's largest.

China wishes to diversify its energy mix to improve its energy security and decrease its reliance on supplies from foreign sources, especially the increasingly unstable Middle East. China plans to triple its natural gas use in the coming years so that natural gas will meet 10 percent of the country's energy needs by 2020.

Shale gas exploration and development is a key component of the current 5 year plan, which estimates production will reach 6.5 billion cubic feet in 2015 and 80 billion cubic feet in 2020 from its current production of zero.

Issues

With shale gas development still in its early stages, the success and speed of growth of this market within China depends on a series of unknowns, both below and above the ground.

Below the ground, shale gas has been identified in many locations in China but little is known about its gas composition. Early findings have revealed potential extraction issues that could prove time-consuming and costly.

- Gas reserves in the Sichuan basin tend to contain high amounts of corrosive and potentially lethal hydrogen sulphide, and levels of carbon dioxide and nitrogen could also be high.

- Some of China's shale gas reserves are buried twice as deep as those in the United States, which could hinder drilling and increase its expense as techniques used in the United States may not be appropriate at these sites.
- The country's key gas fields are situated in mountainous regions, making drilling a challenge and increasing the cost of building roads, bridges, pipelines and other infrastructure supports.
- China's key reserves are located in areas with high tectonic activity, which could prevent the use of existing extraction techniques.

Above the ground, water availability may be an issue. The hydraulic fracturing process consumes water in large quantities, but water is scarce around some of China's larger reserves. Other reserves located in areas such as Sichuan have water in abundance; however, China relies on these areas to grow much of its food supplies, including rice, which is also water-intensive.

China's gas infrastructure is less developed than other countries with large shale gas reserves. Some analysts have suggested its pipelines will not be able to handle the capacity if targeted output is reached. Costly, large-scale pipelines may need to be built to convey product from the major gas fields, which presents a barrier to entry for smaller exploration and production firms.

In addition, the Chinese government has not issued legislation or set any clear guidance for shale gas exploration, market application, and strategic planning. Even though shale gas development is part of China's current 5 year strategic plan, detailed guidance has not been provided.

The lack of a national pricing structure is creating uncertainty for potential investors. The government is currently

⁸ World Shale Gas Resources: An Initial Assessment of 14 Regions Outside the United States, EIA, April 5, 2011



investigating the potential structure, and it is expected to take an approach similar to its gas pricing, which some analysts believe puts domestically produced gas at a disadvantage. Arguing that the marginal cost of China's shale gas production is significantly higher than conventional gas, these analysts have called on the government to deregulate gas prices or offer subsidies to make shale gas in China commercially viable.

M&A Trends

China's strategy for developing its shale gas production capacity is to enter into strategic partnerships with foreign companies in order to help China acquire the necessary skills and technologies. Foreign firms are not able to bid or act independently for either extraction or infrastructure projects, but they can work under approved joint ventures with domestic firms. Local companies apply for permits to explore for and develop sites, after which they can strike partnerships with foreign investors.

A first round of bidding for shale gas licenses was held in July 2011, and six companies submitted bids. It is not clear whether the second round to be held in early 2012 will allow private companies to bid.

Back in 2009, China and the United States signed an agreement designed to help China measure its shale gas reserves, encourage technical cooperation, and promote joint ventures between China and the United States. Since then, Chinese state-owned gas producers have entered into major transactions with large international players to develop shale gas reserves in China and to exploit shale gas reserves in western Canada and the United States. In 2011, a major U.S. oil and gas company has said it aims to spend US\$1 billion a year for the next 5 years on shale gas development in China if current explorations prove successful.

KPMG Insights

As China's shale gas production advances through its early development phase, the best opportunities appear to lie in joint ventures between domestic and foreign firms through both inbound and outbound investments for extraction technology and potentially for infrastructure development, both of which are vital to the industry's future.

In light of the uncertainties noted above, the commercial market is in an early stage of the development and it is expected that a fully functioning commercial market will occur over an extended period of time. While government support appears strong, it is difficult to predict how the market will develop until key policy decisions on pricing and subsidies have been announced. Chinese restrictions on foreign investment could also hamper the growth of the Chinese shale gas industry. In our Global Energy Institute webcast poll of key industry executives on 2 February 2012, over half of respondents (52 percent) believe that Chinese government regulations on foreign investment will hold back the industry.

For further information please contact:

David Xu

Partner, KPMG in China

T: +86 10 8508 7099

E: david.xu@kpmg.com

Place your Bets

Key findings

Long-term pricing considerations are primarily driving current U.S. M&A transactions, according to 46 percent of respondents to a KPMG Global Energy Institute poll of industry executives located primarily in the United States.

As the discussions within this document show, the United States, Argentina and China are at quite different stages in shale gas development. Recent M&A activity in each country differs accordingly.

- In the United States, a maturing shale gas industry is seeing consolidation, repositioning and the entry of new domestic and foreign investors into the sector.
- Argentina is on the cusp of large-scale production, and its local producers are looking for joint venture partners to help develop the industry's tremendous potential.
- China is exploring its sizable reserves, seeking equipment and know-how through international partnerships.

The trends towards increasing shale gas exploration, development and production and the related trends toward increasing M&A activity are not confined to the United States, Argentina

and China. They exist elsewhere in the world, including Australia, Brazil, Canada, Eastern Europe, Mexico, the Middle East and South Africa.

Survey respondents believe that investments and M&A activity will soon move from mature markets (e.g., the U.S.) to other markets where shale gas potential has yet to reach its potential. In reality, we believe this transition has already begun. International shale gas investors who have been focusing on the U.S. are already looking beyond its borders. Given the abundance of shale gas reserves, investors have a world of choices as to where they invest next.

So where will these investors place their bets? Based on our survey of primarily U.S. industry executives, more eyes are on opportunities in South American countries like Argentina than in the Asia Pacific and Europe. While industry executives in other countries may have alternative geographic targets, investment dollars typically tend to flow to more investor-friendly locations, and so they are most likely to invest in countries that compete by creating the right conditions to attract investment.

Compared to other locations, China appears less open to foreign investment in shale gas development. Before placing their bets here, investors will likely wait to see what shale gas

pricing policies and government support mechanisms are put in place. Investors seem similarly wary of European shale gas opportunities due to environmental issues and uncertainty over how the industry will be regulated.

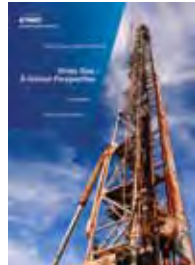
On the other hand, Argentina has actively promoted foreign investment in its shale gas industry and offered enthusiastic government support. Early indications suggest that the country is already drawing a larger share of shale gas investment. While the shale gas industry will continue to create opportunities in the U.S., China and around the world, Argentina seems set to emulate the U.S.' shale gas success in the near term.

Key findings

- According to 76 percent of respondents, South America will become the destination of choice for companies investing in shale gas outside the United States, trailed by the Asia Pacific (13 percent) and Europe (9 percent).
- More respondents would seek to enter the Argentine shale gas industry through joint ventures with junior partners (46 percent) than through M&A deals (29 percent) or technological support partnerships (14 percent).
- More than 50 percent of respondents believe that China's restrictions on foreign investment will hold back shale gas development in the country.



Further insight



Recent KPMG Oil & Gas Thought Leadership

1. **Shale Gas – A Global Perspective:** this publication examines the state of gas development in selected countries and offers views on the prospects of shale gas as part of the world's energy mix and whether this source of energy is a game-changer as some have claimed.
2. **After the Gulf of Mexico Oil Spill:** recent developments in the oil and gas industry. This paper reviews some of the many impacts of the spill, including changes to operating models, contractor relationships, business risks and a number of new and proposed regulations.
3. **Procurement in Oil & Gas,** published by KPMG's Global Energy Institute, focuses on procurement in the oil and gas industry and highlights trends and tools as well as issues and challenges in both up-stream and down-stream sectors of the industry.
4. **Accounting for Carbon** discusses the impact of carbon trading on financial statements. It provides insights and strategies to help organizations understand and manage the business implications of climate change.
5. **Impact of IFRS – Oil and Gas (September 2011)** This publication provides assistance to companies in the oil and gas sector who are considering converting to IFRS. It gives an overview of the IFRS conversion process and looks at the impact of conversion on IT systems, people and business processes.



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Contact us

Michiel Soeting

Global Chairman

Energy & Natural Resources

T: +44 20 7694 3052

E: michiel.soeting@kpmg.co.uk

Brandon Beard

Managing Partner

KPMG in the United States

T: +214 840 6402

E: bbeard@kpmg.com

Mariano Sanchez

Partner

KPMG in Argentina

T: +54 11 4316 5774

E: marianosanchez@kpmg.com.ar

David Xu

Partner

KPMG in China

T: +86 10 8508 7099

E: david.xu@kpmg.com

kpmgglobalenergyinstitute.com

kpmg.com/energy



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Designed by Evalueserve.

Publication name: Shale Gas: Global M&A Trends

Publication number: 120414

Publication date: May 2012