INSIGHTS INTO UNCONVENTIONALS IN THE UNITED STATES & BEYOND

INTERNATIONAL ENERGY FORUM

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IEF DIALOGUE INSIGHTS

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MAIN DISCUSSION TOPICS AND FINDINGS

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KEY INSIGHTS

- The rise in unconventional oil and gas production in the US may well maintain its recent momentum, but that outcome is not guaranteed. It may be tempered by low oil prices, an environmental disaster or geological complexities that vary from state to state.

- To sustain the current pace of oil and gas production in the US, companies must find new plays, which will almost certainly be in different states of the American union. Each state has unique characteristics that are not equally attractive for investment.

- Innovation is driving production costs down, giving the US unconventionals revolution more room to run in the event of a lower oil price scenario.

- Good source rocks can be found nearly everywhere. While rocks do not know where they live, governments can shape regulations and policies to either facilitate or impede production.

- It may take a decade until significant unconventional oil and gas production outside the US and Canada comes on stream.

- Outside the US and Canada, the revolution in unconventionals can only be expected to take root where the economics of coal, biofuels or traditional sources of hydrocarbons are relatively less attractive.

- Output of unconventional oil and gas outside North America is more likely to expand faster in Asia than it will in Europe or South America. North Africa and the Middle East are also promising areas, but infrastructure may prove to be a constraining factor for some countries.

- On a global scale, the necessary skills to develop unconventional resources are in short-supply.

- Many countries will have to build their own expert teams to negotiate, regulate, research or perform the type of analysis and drilling techniques required for unconventional production.

- A shift in regional sources of oil and gas supply may spark protectionist pressures in both exporting and importing countries.

- In the advent of a significant upswing in the share of unconventionals in the global energy mix, the relevant question is not whether strategic reserves or spare capacity will be needed, but how to determine their adequate size given their costs and their impacts on shared global energy security.

- In the short- to medium-term the lower limit of gas prices will be determined largely by pressure on companies to recuperate investments in LNG terminals.

- Oil-price volatility is unlikely to decrease as a consequence of greater supply and trade volumes.

- Over the long-term, the current gap in price between oil and gas may not be sustainable, as an abundance of gas may potentially generate incentives for fuel switching in favour of the cheaper alternative.

1. EVENT BACKGROUND

At this IEF Thought-Leaders Roundtable held on 23 January, twenty-one participants hailing from five continents brought their experience in government, the private sector, and research to IEF headquarters in Riyadh.

Their discussions centred on three major subjects:

- What will determine the scale of the increase in shale oil and gas production in the United States?
- How likely is this so-called "unconventional" production to spread to the rest of the world?
- How will the expected incremental output affect trade and the process of price formation?

These questions were motivated by the now widespread expectation that, based on present production levels and current assessments of existing shale deposits, US gas production should be able to satisfy the majority of its domestic demand for decades, if not the next 100 years. What is more, as future US production is expected to outstrip domestic demand, there should be surplus gas available for possible liquid natural gas (LNG) exports within a decade.

The questions also derive from the unprecedented production rise of US crude and natural gas liquids (NGL), with total output currently at 8.8 million barrels per day – its highest level in over 15 years. This growth has been triggered mainly by major breakthroughs in production technology for tight oil resources in the Bakken, Eagle Ford, and Niobrara plays.

One can understand the current optimism linked to the rises in gas, crude and NGL production in the US. What merits further discussion is how long this unconventionals revolution in the US may last, in which other nations it may take root and flourish, and to what extent and in which ways it may impact global energy markets.

Having identified this set of questions, the group of experts set out to explore the various possibilities through an open and informal discussion. What follows is a summary of some of the main ideas they exchanged during the exercise.

The insights contained herein do not represent a consensus view nor can they be attributed to any participant. They are meant to provide "food for thought" and stimulate further conversation on the unconventionals revolution in the US and beyond.

2. GEOLOGY AND POLICY IN THE US UNCONVENTIONALS REVOLUTION

At present, the rise in US unconventional oil and gas production is primarily concentrated in areas where production has flourished thanks to a combination of factors, including easy access to the resource base, favourable regulations, and sufficient take-away capacity – as provided by pipeline and rail. North Dakota and Texas are leading the way; California and New York have yet to join the fray.

Not all US states have the same production potential.

To sustain the current pace of the unconventionals revolution in the US companies must find new plays, which will almost certainly be in different states of the American union. Not all states are equal: their geology is not uniform and each jurisdiction has its own regulations, environmental challenges, political make-up, and infrastructure. Incentives to invest will therefore vary according to the geographic area.

From a resource perspective, this implies that when analysing the potential of unconventionals production at the national level, one must remember to focus on the unique aspects of each state – both below ground and above. For any analysis or forecast to be comprehensive, reserves and decline rates must be taken into consideration alongside a holistic assessment of each state's political and infrastructure topography.

Judging from the experience of the United States, further exploration is still required to identify the type of incentive structure at the state level that is most likely to encourage greater unconventional oil and gas production. State public officials – much like their counterparts around the world – are eager to create jobs and expand the local tax base. Yet they must balance those goals with environmental concerns and the "not in my back yard" mind-set held by some constituents.

As each US state crafts its own approach, other states may find it useful to observe how policy mixes compare and contrast. Competition among the 50 states may prove helpful in determining the type of incentive structure most likely to bring production on stream, and may likewise serve as a reference for the rest of the world.

3. WHAT CAN STALL THE UNCONVENTIONALS REVOLUTION?

Two key factors that could potentially stall US unconventional oil and gas production over the next ten years are:

A lower oil price or an environmental disaster can stall the unconventionals revolution in the US.

- A lower oil price, which would make unconventionals production un-economical.
- An environmental disaster, which might trigger social and political pressures that prompt a ban on fracking.

Some observers suggest that, if prices were to fall below the range of US$50-60 dollars per barrel of WTI, production of unconventionals would be stopped in its tracks. But break-even costs vary from play to play, so it may be too simplistic to generalize that if WTI stays above US$50 all US unconventional oil production should continue.

In addition, decline rates in shale wells are very high. For example, the decline rates for some Bakken wells are estimated to be around 70 per cent in the first year and around 95 per cent in the first five years. The fact that many wells must be drilled to maintain current production levels involves logistical challenges and related costs.

Falling production costs are giving producers a cushion and the US unconventionals revolution more room to run.

On a more bullish note, production costs for unconventional oil and gas in the US have been falling. Moreover, in recent months some producers have apparently been hedging at lower oil prices – presumably because their costs are coming down. This point strengthens the belief that falling production costs are giving producers more of a cushion and are likewise giving the US unconventionals revolution more room to run.

With respect to the environment, there are concerns that an unconventionals production-related accident affecting, say, water, might spark a social or political backlash. Many Americans are still unclear on the perceived dangers of fracking, and any disaster linked to the practice could spark federal policy that might halt or slow the revolution's progress.

Thus far the industry's record on environmental protection appears to be improving and technological advancements are helping to mitigate related risks. For example, water use and the total number of drilling rigs required to maintain production have been declining steadily, with output remaining constant or rising. If this trend continues, then the probability of environmental issues impeding a production increase should remain low.

As an indication of greater confidence in the industry's management of environmental risks, the leasing and production levels in Macondo are now higher than they were before the disaster. In other words, if companies commit to good practices, environmental challenges alone may not pose as much of a threat to US unconventional production as many may assume.

It remains the case, nonetheless, that environmental concerns must be addressed if production from unconventional deposits is to increase.

4. THE UNCONVENTIONALS REVOLUTION IN THE REST OF THE WORLD

While rocks do not know where they live, governments can shape regulations and policies to either facilitate or impede production.

Good source rocks can be found nearly everywhere. There are many promising plays on all continents. While rocks do not know where they live, governments can shape regulations and policies to either facilitate or impede production.

In recent years, numerous experts have argued quite confidently that the unconventional oil and gas revolution could only happen in the US. But is it unthinkable that, if properly motivated, other nations might implement policies to encourage production?

One need only look at the history of conventional oil and gas development to appreciate the potential for almost any nation to embrace rules of the game that would encourage unconventional production. Conventional hydrocarbon resource development has occurred around the world, in countries with contrasting fiscal regimes and differing royalty sharing schemes. This leads us to the question: if so many nations have been able to develop conventional oil and gas, what is stopping them from setting their sights on unconventional resources?

Following that same line of reasoning, what does unconventional mean? The answer, it would seem, is that unconventional means “new”. In ten years, what today is considered unconventional will likely be referred to as conventional. At one point offshore drilling was a new, cutting-edge concept. Today it is a less novel practice, to say the least. Assuming unconventionals join the ranks of conventional production in the years ahead, it becomes easier to envision scenarios in which nations around the globe might try to exploit these resources.

Conventional hydrocarbon resource development has occurred around the world, in countries with contrasting fiscal regimes and differing royalty sharing schemes. Unconventionals can follow a similar path.

If the rest of the world is to produce unconventionals, there will be much work to be done and much can be learned from the US experience. Beyond technological and infrastructure constraints, inconsistent policies, regulations, and environmental concerns, other factors that may influence the growth of unconventional oil and gas output worldwide include: financing, water supplies, support from domestic companies, drilling capacity, and human capital. These factors have been singled out as relevant to the success of the US experience, and may also prove to be so elsewhere.

Based on current trends, it appears that the output of unconventional oil and gas is more likely to expand faster in Asia than it will in Europe or South America. North Africa and the Middle East are also promising areas, but infrastructure networks may prove to be a constraining factor in some countries.

The previous considerations suggest that it may take about a decade before the start of significant production outside the US and Canada. In a few cases this time-frame may be shortened to five years, but many observers expect the longer horizon to apply.

In ten years, what today is considered unconventional will likely be referred to as conventional.

In the final analysis, the revolution in unconventional oil and gas production outside the US and Canada can be expected to take root where these unconventional resources are the cheapest alternative to others that are now in use or easily accessible. For some countries the economics of coal, biofuels, or traditional sources of hydrocarbons are simply more attractive and are expected to remain so for a considerable time. In such cases, one would reasonably expect these conventional energy sources to remain the top priority for public and private sectors alike.

What is more, nations that do not have an urgent need to develop their unconventional resources can afford to watch the industry mature, with the potential benefit of learning from the mistakes of others and letting related technology improve. On the surface, this “wait and see” approach sounds completely rational. Yet in order to capitalise on the unconventionals revolution over the long-term, policymakers would be well advised to give some thought to capacity building in the short-term.

5. THE HUMAN CAPITAL GAP

Scarce human capital can pose a challenge to the rise of unconventional oil and gas output outside the US and Canada. Even though expertise can be provided by global companies, the necessary skills are in short-supply. There are simply not enough skilled workers to go around, and the learning curve is both steep and long. First-movers have an advantage over late-comers in attracting experts. If there is a widespread rush to produce unconventionals across the globe in five or ten years' time, the knowledge and skills constraints are likely to be reflected in rising costs – which will in turn impact investment decisions.

To capitalise on the unconventionals revolution over the long-term, policymakers would be well advised to give some thought to capacity building in the short-term.

Many countries will have to build their own expert teams (fracking crews, geologists) to negotiate, regulate, research or perform the type of analysis and drilling techniques required for unconventional production. While dozens of non-US exploration and production firms have invested in US unconventional plays – presumably to learn from the US experience and bring that knowledge back home – policymakers contemplating production in their respective nations would be wise to take a long-term view toward developing the necessary human capital.

6. SUPPLY SHIFTS, INVESTMENT AND TRADE

The effects of greater US oil and gas production may be felt around the world through increased trade, as long as two pre-conditions are met:

- The US government authorises oil and/or gas exports.
- There is a significant and sustained increase in the global supply of oil and gas – not merely an increase in the US and Canada that offsets lost production from other regions.

For the sake of discussion assume that gas production from the United States and Canada will increase, adding to the expected supply that will come online from Australia. If power companies, manufacturing firms, and the transportation sector in the Pacific Basin cannot absorb this gas and if global demand remains unchanged, the resulting price may not justify exports by the three nations at the same time. The low-cost producers would prevail in this scenario.

A glut of global gas and resulting low prices might indeed discourage export volumes from some countries, but not necessarily for an indefinite period of time. For as the saying goes, "nothing cures low gas prices like low gas prices".

This is relevant because one of the recognised challenges for LNG producers in recent years has been that of a herd mentality where first, many players invested in building out LNG infrastructure, then they all stopped, and then they all started up again. To be sure, a glut of global gas and resulting low prices might indeed discourage export volumes from some countries – but not necessarily for an indefinite period of time. For as the saying goes, "nothing cures low gas prices like low gas prices".

The takeaway message is that the impact of a rise in gas production and available LNG exports on global markets will depend on the extent to which massive supply comes on stream, and on the extent to which demand will be able to absorb that incremental supply to maintain a price level that justifies continued investment in production and exports.

Alternatively, consider a scenario in which the US and Canada export a mix of meaningful volumes of oil, petroleum products and petrochemical products. How might governments on both sides of the competitive coin react?

Some countries might curb flows of technological know-how to safeguard intellectual property or restrict the provision of some professional services.

Protectionist pressures may be a possibility. On the imports side, European petrochemical players may suffer as their US-based competition accesses cheap feedstock and then exports into Europe. On the exports side, some countries might curb flows of technological know-how to safeguard intellectual property or restrict the provision of some professional services currently offered by US-based firms with global operations.

7. STRATEGIC RESERVES AND SPARE CAPACITY

Looking at expected shifts in the global balance of supply and demand, one can ask how the unconventionals revolution might impact decisions related to strategic reserves and spare capacity. For example, will Saudi Arabia reduce its spare capacity – which is costly to maintain – as US crude output increases? Will the United States reduce the size of its strategic reserves as more domestic production comes on line?

The relevant question is not whether strategic reserves or spare capacity will be needed, but how to determine their adequate size.

While there are no definitive answers at present, the relevant question is not whether strategic reserves or spare capacity will be needed. They are a necessary insurance mechanism under any circumstance. Instead, the question is how to determine their adequate size, given their costs and their impacts on shared global energy security.

8. PRICE FORMATION

An open question related to the expected rise in oil and gas trade is how greater trade volumes might impact price formation. This process is central to the price debate in numerous ways: the sustainability of regional price differences in natural gas, the extent to which market actors will be able to exploit arbitrage opportunities, and the expected future range of prices.

An open question related to the expected rise in oil and gas trade is how greater trade volumes might impact price formation.

Looking at natural gas, market actors have yet to take advantage of the arbitrage opportunities between cheap US gas and expensive Asian gas because of current curbs on US exports and the gas industry's complex economics and logistics. Whether greater gas trade will cause regional prices to converge toward one global price (adjusted for various costs, including transportation) depends to a large extent on the Pacific Basin's future trade volumes. The volume levels, in turn, will depend on the region's energy policies, on its capacity to absorb additional supply, and on the levels of supply coming from Canada, Australia, and the United States.

In the short-term, the lower limit on gas prices will be determined largely by pressure on companies to recuperate investments in LNG terminals. The level of demand, no doubt, constitutes another component of the bound, but it does not appear to be a limitation as of now. In the long-term it will depend on the evolution and influence of hubs, most notably Henry Hub prices.

Volatility is unlikely to decrease as a consequence of greater supply and trade volumes.

Volatility is unlikely to decrease as a consequence of greater supply and trade volumes. Supply capacity has increased in the world for decades, together with demand, and this has not eliminated volatility – which to a certain extent is a normal property of the price discovery mechanism. The question is how likely we are to observe frequent and extreme episodes of volatility under these new supply conditions.

9. LINKS BETWEEN OIL AND GAS PRICES

Over the long-term, the current gap in price between oil and gas may not be sustainable.

Over the long-term, the current price gap between oil and gas may not be sustainable, as an abundance of gas may generate incentives for fuel switching in favour of the cheaper alternative. While it is still early, there is growing momentum in the US towards the use of gas to fuel long-haul trucks, with marine and rail expected to follow.

10. CONCLUSION

The takeaway message of the IEF Thought-Leaders Roundtable is twofold:

- The rise in oil and gas production in the US may well maintain the same momentum we have seen recently, but that outcome is not guaranteed. It may stall in the face of low oil prices, an environmental disaster, or geological complexities that vary from state to state.

- The unconventionals revolution may spread beyond the US faster than many currently assume.

Participants in the IEF Thought-Leaders Roundtable on Unconventionals in the United States and Beyond included Thomas Ahlbrandt, Mazighi Ahmed, Ali Aissaoui, Nasser Al-Dossary, Bashir Dabbousi, Aldo Flores, Leonid Grigoriev, Zack Henry, Paul Horsnell, David Knapp, Ken Koyama, Marcus Lippold, Marcelo Pinelli, Thorsten Ploss, John Qualls, Barbara Shook, Adam Sieminski, Henry Wang, Mike Warren, and Richard Westerdale.