



A new model for unconventional gas

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Good morning everyone.

Thank you for providing the opportunity to participate in this discussion, "A New Model for Unconventional Gas."

By way of a prompt for the discussion, I will outline four topics.

1. BP's view of the world's energy future
2. Lessons from the rapid growth of unconventional gas in N America
3. Considerations and barriers to growth of unconventional gas beyond N America
4. Finally, what is possible

Energy future

BP's Energy Outlook 2035 predicts that global demand for energy will rise by more than 35% to 2035, or by an average of 1.4% a year.

While the primary energy supply mix will evolve, fossil fuels lose market share but continue to dominate the energy mix, holding around 80 percent of market share in 2035, with oil, gas and coal holding equal shares for the first time since the industrial revolution.

There is enough oil and gas in the ground to meet global demand through 2050, with some 45 trillion barrels of oil equivalent in place, according to BP's analysis.

That is a large number when you consider that about 1.7 trillion barrels of oil equivalent have been produced to date.

Or, put it another way, only about 4 percent of the world's in-place oil and gas has been produced.

The most significant change to the hydrocarbon resource base over the past 10 years has been the contribution from unconventional rock.

This has more than doubled total potentially exploitable oil and gas resources.

Lessons from North America

In 2003, there was no global shale oil production. In 2013, global shale oil production was 2.7 million barrels per day.

During the same period, the industry went from 1.4 billion cubic feet per day of natural shale gas to 27.5 billion cubic feet per day.

The rapid production growth from unconventional gas in North America has been driven by several factors – some below the ground but mostly above the ground:

1. Rich resource base
2. Ready access to water
3. Mature regulatory structure
4. Extensive distribution infrastructure



5. Capable service sector
6. Relatively low population density in resource-rich areas
7. Large, liquid market for natural gas; and
8. A mineral rights system that aligns resource owner and resource developer interests.

Most of these factors could be replicated elsewhere in the world.

One aspect though, is unique to North America, and that is mineral rights ownership where private land owner residents have a strong financial interest to allow exploration and production on their land.

Considerations and barriers for global growth of unconventional

Beyond North America, the world's unconventional resource landscape is diverse and massive.

But...the resources are different. One size does not fit all.

Below the ground factors like pay thickness, reservoir pressure, gas to oil ratio, permeability and natural fractures are unique to each play..

And there are significant differences above the ground – barriers to rapid growth, if you will.

There is lack of critical mass in the supply chain. For example, in the entire Middle East, there is less than a handful frac spreads, compared with hundreds here in the U.S.

Because of lower levels of activity, the reinforcing cycle of technology experimentation, learning and resource growth is not in place.

Historical well and field performance data are not freely available to drive rapid learning and technology transfer.

Entry costs are high in terms of access to resources and transportation infrastructure.

Finally, fiscal and regulatory structures tend to favour large, industrial-scale projects requiring proof of significant volumes at project entry.

So, whereas material unconventional resources exist across the globe, the unique combination of above- and below-ground factors that facilitated rapid production expansion in America has not yet been repeated elsewhere.

What is possible?

There is reason to be optimistic about global growth of unconventional, and it is not about simply replicating what has worked in North America but figuring out what will work elsewhere and getting it to work.

BP is in action on this.

In Oman, BP in collaboration with Omani partners, is applying its technology and expertise to develop the Middle East's first mega tight gas project.

The Khazzan project will provide a new gas supply to Oman on a significant scale.

Full field development was sanctioned in late 2013 and will involve drilling about 300 wells over 15 years.

We aim to have first gas in late 2017, with the ultimate production goal of approximately 1 billion cubic feet of gas per day.



This would be equivalent of increasing Oman's total daily domestic gas supply by roughly a third.

For host governments and industry collectively, the path to growing global unconventional resources economically is to improve well cost and ultimate recovery per well, while also addressing some of the above the ground challenges mentioned earlier.

The area of unconvensionals is fertile ground for a collaboration model that leverages a large in-country resource base and the capability and technology of International Oil Companies, to grow local supply chains, local infrastructure and local talent to deliver economic growth.

At BP, we are taking meaningful steps towards making this model work.

Thank you.

I look forward to the discussion.