The unconventional gas revolution goes global

But replicating the US success is not going to happen overnight

As irritatingly over-used as the cliché has become, there is no disputing that the rise of unconventional gas – and specifically shale gas – in North America is a "game-changer". It doesn't change the rules of the game, but it certainly does change the conditions in which the game is being played and will unquestionably change the final result. And not just in North America. The unexpected surge in US shale gas production in recent years has upset global markets balances and will continue to exacerbate global over-capacity for at least the next couple of years. In the longer term, unconventional production will most likely play an increasingly important role in global supplies as the experience gained and the techniques that have been developed in the United States are applied in other parts of the world. But, for all the hype, this is not going to happen quickly, for a variety of reasons – practical, logistical, economic and regulatory.

For now, the unconventional gas industry is essentially a US industry. In 2009, the United States produced about 290 billion cubic metres of unconventional gas (dry) – coalbed methane, tight gas and shale gas – and probably well in excess of 300 bcm in 2010, or just over half of total US production. This represents roughly three-quarters of all the unconventional gas produced in the world (though the data for other countries is generally less reliable). Outside the United States, Canada is the single biggest producer, producing about 60 bcm in 2010.

What many people do not realise is that unconventional gas has been around for decades, though it is only in the last two decades that it has become an important contributor to the nation's total output of gas. Coalbed methane production took off in the 1990s, helped by federal tax credits. Tight gas production also grew in the 1990s, but accelerated in the 2000s. The shale gas boom started in the second half of the 2000s, quadrupling between 2005 and 2009 to 96 bcm. Today, well over half of US unconventional gas production still comes from tight sands, but the share of shale gas is growing rapidly and is expected to overtake tight gas within the next five years or so. Coalbed methane production, by contrast, appears to have levelled off.

Three factors explain the dramatic growth of US unconventional gas supply over the past two decades:

- Good knowledge of the geology: the country has, after all, been producing oil and gas for over a century and has probably the most mature upstream industry in the world.
- The development and steady improvement of production technology and operations, notably the hydraulic fracturing ("fraccing") and horizontal drilling techniques that are used to produce tight and shale gas.
- The increase of spot prices after 2005, which made shale gas plays in particular suddenly financially attractive.

The rise of unconventional gas was initially dismissed as a flash in the pan. No longer. The industry certainly expects continuing growth in shale gas production, judging by the sums being [paid for assets and acreage. The Department of Energy's Energy Information Administration (EIA) certainly agrees. In its latest *Annual Energy Outlook*, it projects unconventional gas in total to make up almost three-quarters of the country's gas output by 2035, with shale gas alone reaching almost 45%.

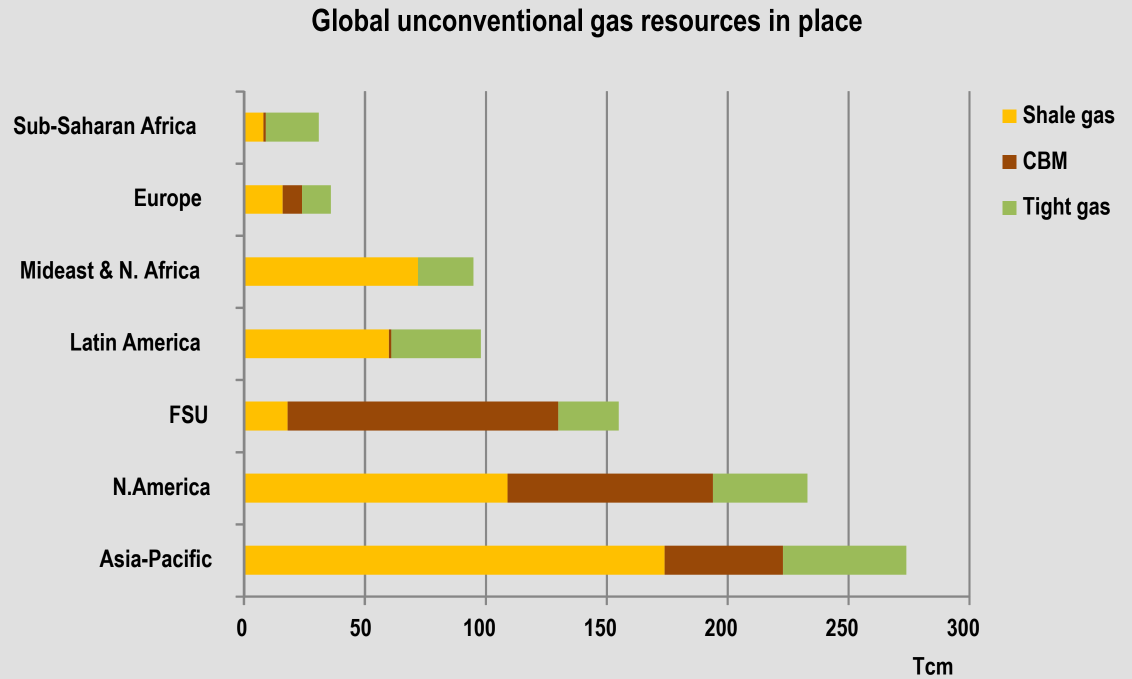
Today, the bulk of shale gas production still comes from the Newark East field in NE Texas, better known as the Barnett Shale. It produced more than 40 bcm last year, which puts it in top ten producing fields in the world. But drilling is shifting to other plays, notably Marcellus, Fayetteville, Hatnesville and Eagle Ford. There is still a lot of uncertainty about the geology of these and other plays around the country, and how that affects the economics of production. Proven reserves of shale gas in the United States remain surprisingly low, at around 61 trillion cubic feet or one-fifth of total gas reserves at end-2009 – albeit double the level at end-2008. But technically recoverable resources are much larger, at 827 tcf (or 23 trillion cubic metres) according to estimates just released by the EIA. The issue is not so much whether shale gas production will grow, but rather how high the price needs to be to attract the required investment.

If the prospects for the US unconventional gas industry remain bright, what about the rest of the world? Although the data is very patchy and unreliable in most cases, unconventional gas resources are known to exist in large volumes in many places around the world. The International Energy Agency (IEA) estimates that there are over 900 tcm of unconventional gas in place, with the largest resources found in the Asia-Pacific region (see the chart below). Shales gas accounts for the lagret share. But it is very uncertain how much of this gas can actually be produced technically and economically at current prices. Assuming current estimated recovery rates in the United States, ultimately recoverable resources could amount to about 380 tcm. That's almost as much as remaining resources of conventional gas.

Given that the technology and the skills developed in the United States are, of course, transferable, there is every reason to think that, in the longer term at least, we could well see significant volumes of unconventional gas being produced outside the United States too. Exploration and production today is still extremely modest in most places, but activity is expanding. The country with the longest history of unconventional gas production outside North America is Australia, which has been producing increasing volume of coalbed methane (or coal seam gas as they call it there) for many years. Production reached about 4 bcm in 2010, or around 8% of the country's total gas output. Significantly, a coalbed methane-based LNG project – the BG-led Gladstone project – was given the greenlight at the end of 2010 and several others plants are planned.

Several Asian countries are also actively looking to exploit their sizeable unconventional resources. China has particularly ambitious goals, with a target to meet 10% of demand by 2020. This implies production of up to 30 bcm. Most of this is expected to take the form of coalbed methane, the production of which today stands at about 5 bcm, but shale gas could play a more important role in the longer term. Elesewhere in Asia, India already produces small amounts of coalbed methane and plans to launch tender for shale gas in 2011. Indonesia is actively encouraging coalbed methane and shale gas exploration and reportedly (and rather optimistically) wants to see 15 bcm of CBM prodn on stream by end of 2011 and a CBM-based LNG project on line by 2014. There is also a lot of interest in Europe, particularly in shale gas in Poland and other parts of Central and Eastern Europe, but there has been very little drilling as yet so prospects are very uncertain.

There's a lot of it about



Sources: IEA, World Energy Outlook 2009; Menecon Consulting analysis.

But there are several reasons why the establishment of a sizeable unconventional gas industry in most countries is going to take a lot longer than was the case in the United States.

- Although the resource base worldwide is unquestionably large, doubts remain as to how profitable it will be to develop them – both in absolute terms and relative to conventional resources. A lot of work still needs to be carried out to delineate reserves in specific basins and to establish the quality of the resource base. In many cases, the resources may be located too deep underground or geological factors may complicate production, rendering them too costly to develop. Europe's shale gas plays, for example, are generally deeper, thinner and more highly pressurised than those in the United States.

- Local opposition is likely to be a big problem in some places, particularly in Europe. Unconventional gas production is a very invasive industry, especially because of the large number of wells that need to be drilled and the large amount of piping and other equipment and materials that need to be shipped in. Local communities are likely to be very resistant to the idea of oil companies coming in to drill on a large scale, with all the disruption that could entail. The United States has a very long history of land drilling – most other parts of the world don't.

- Access is to land and mineral rights could also be a barrier, especially where ownership is fragmented and owners don't have sub-soil rights.

- In the near term, availability of drilling rigs and engineers will undoubtedly also constrain the pace of development in many cases, even where economically attractive resources are found.

Unconventional gas production requires more wells than conventional production and, therefore, more rigs. There are few rigs suitable for drilling horizontal wells and fraccing outside North America, and building such rigs is going to take time.

- Water is another issue. Fraccing requires large amounts of water, which is scarce in some places (such as western China) where shale and tight gas resources are located. What's more, there are growing concerns about the risk of contamination of groundwater, as fraccing also involves the use of chemicals. Such concerns have already led to New York State imposing a temporary moratorium on new shale gas permits and have prompted the Environmental Protection Agency to launch a detailed study of the risks of contamination (the results should be ready soon).
- Finally, the economics of unconventional gas production also depend on the costs of transportation to centres of demand. So, proximity to markets or the possibility to link up with an existing pipeline network will be critical.

To the extent that oil prices continue to drag international gas prices higher, the economics of unconventional gas production will improve. But unconventional gas will not just have to profitable; it also has to be more profitable than conventional gas. In the end, it will be a contest between conventional gas produced (relatively) cheaply in places like the Middle East, Former Soviet Union and Africa and shipped (at significant cost) to distant markets, and more expensive unconventional gas that can be produced close to the market in importing countries, such as in Europe, China and India. That said, energy-security considerations may skew the economics in favour of indigenous unconventional gas.

There are high hopes in the importing countries that unconventional gas can help to meet their rising gas needs and to reduce their dependence on imports. But therein lies a big risk: over-optimism about unconventional gas could lead to less investment in developing conventional gas resources and related transportation infrastructure. This makes it all the more important that the prospects for unconventional gas are kept in perspective. To the extent that unconventional production disappoints, under-investment in conventional gas could result in a squeeze in supply capacity a few years down the line. If so, unconventional gas could ironically prove to be a curse, rather than a panacea.

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