FINANCIAL TIMES

April 22, 2012 9:40 pm

More on shale: Finds that form a bedrock of hope

By Sylvia Pfeifer

http://www.ft.com/cms/s/0/e04264c8-8a2e-11e1-a0c8-00144feab49a.html#axzz1uqIWrjIa

FT series: Shale could bring energy independence for many nations, freeing them from a reliance on imports

Gateway to the windswept wilds of Patagonia, Neuquén knows the power of oil money. Hydrocarbon riches have helped make the city the biggest in an Argentine region that has been producing oil and gas for roughly a century, with a bustling downtown packed with tower blocks and new four-by-four vehicles.

Now Neuquén is on the brink of a modern-day oil rush. Explorers are looking for oil and gas trapped in shale rock formations thousands of feet below the surrounding plains. Argentina's reserves are believed to be the third biggest in the world, after those of the US and China.

Just as nuclear scientists hoped atomic power was the answer to the world's energy needs in the 1950s, oil and gas producers believe this new resource could bring plentiful low-cost power. Shale could also bring energy independence for many nations, freeing them from a reliance on imports.

More video

More than 50 years ago energy experts began speaking of "peak oil" – the idea that the world was passing the point of maximum production and that supplies would decline. Today, shale calls that assumption into question. In the US new extraction techniques have transformed gas production, opening reserves that some estimate will last 100 years. Liquid-rich shales – ones that also contain oil – have enabled the US significantly to cut its dependence on crude imports.

Shale also has the potential to reshape domestic economies. In this year's State of the Union address. President Barack Obama said experts predicted it would support 600,000 jobs, with more to follow as industries that rely on cheap energy were brought back onshore. Lord Browne, the former chief executive of BP and now a partner at Riverstone – backer of Cuadrilla Resources, a company exploring for shale gas in the UK – is convinced it is a prize worth pursuing.

"Ultimately, shale gas gives us options for the future. It puts our energy supply in our own hands, as well as providing obvious economic benefits. It is clear that shale will be one of the linchpins of global energy supply in the 21st century, alongside nuclear and renewables," he says.

Shales are the most abundant form of sedimentary rock on earth, serving also as the source rocks for hydrocarbons that migrate into conventional reservoirs. Nigel Smith at the British Geological Survey, a research council, uses the analogy of looking for something to eat in a house. "All the food in the kitchen, the cupboards, the fridge and the freezer – that's the hydrocarbon source rock

kitchen. The conventional hydrocarbons that we have used so far have migrated to the dining room. We are going back into the kitchen to see what is still left in the source rocks or shales."

The apparent abundance of riches in the "kitchen" is causing a stir around the world. Aside from Argentina, significant reserves have been identified in Australia, South Africa, northern Africa and eastern Europe as well as in the UK and France. After an assessment of the potential in 32 countries the Energy Information Administration, a US federal agency, has estimated shale could increase the world's technically recoverable gas resources by more than 40 per cent.

Shale is recasting geopolitics and influencing companies' investment decisions. National oil companies and international groups have spent tens of billions of dollars acquiring shale gas resources in North America.
In eastern Europe, the prospect of greater energy independence has spurred Poland and Ukraine to investigate their resources. Washington is watching the developments closely. "Energy security within Europe is important to the US just as energy security in the US would be important to Europe. We have the strongest mutual trade and investment relationship in the world," says Richard Morningstar, the special envoy for Eurasian energy to Hillary Clinton, US secretary of state.

In the longer term, Russia's dominance of Europe's gas market is also in question if countries such as Poland develop commercial resources of shale. This month Vladimir Putin, Russian president, in a speech to parliament called on local energy producers to "rise to the challenge" posed by shale, saying it could "seriously" restructure supply and demand in global hydrocarbons.

The big unknown is China, the world's biggest consumer of energy. Its vast territories are thought to possess rich shale reserves – the government says an extensive appraisal has found potentially recoverable resources of 25tn cubic metres, enough to meet the country's current consumption for nearly 200 years. If China ended its traditional reliance on coal and switched to gas, which is cleaner burning, it could have significant ramifications for carbon emissions and forecasts of global warming.

Just as nuclear power has its drawbacks, however, there are also uncertainties around shale. Chief of these is the potential environmental toll. The industry is dogged by accusations that the technique used to extract the gas from the rock – hydraulic fracturing, or "fracking" – will pollute ground water, plunder water supplies and trigger earthquakes. Further questions surround methane leakage.

So far there is little evidence that fracking automatically causes such damage – but more than enough to suggest poorly constructed wells are a threat and that a clear need exists for more research to establish the practice's impact more precisely. As one review by Massachusetts Institute for Technology researchers concluded last year: "With over 20,000 shale wells drilled in the last 10 years, the environmental record of shale gas development has for the most part been a good one – but it is important to recognise the inherent risks and the damage that can be caused by just one poor operation."

Until those risks are better understood, the techniques are likely to remain contentious, leaving ample room for critics such as Josh Fox, maker of *Gasland*, a documentary about the impact of fracking. "This is a game-changer in terms of escalating the call for renewable energy because now people realise either we put solar panels on our roofs or we're going to get fracked," says Mr Fox.

Amid all this, public anxiety is on the rise. France and Bulgaria have both banned fracking. "The industry has not been quick to acknowledge the concerns of the communities that are impacted by tight and shale gas developments," admits Graeme Smith, vice-president of "tight" gas and oil at Royal Dutch Shell.

Andrew Gould, recently retired chairman of the US-listed Schlumberger and chairman-designate at BG Group of the UK, says the industry needs to make the process more efficient. "Today's approach to shale gas development is unsustainable, being more akin to the use of brute force. As a result it is far from being optimal in terms of resource use, environmental footprint, production efficiency and cost."

Today's gas boom in the US is attributable in large part to George Mitchell, a maverick entrepreneur and son of a Greek immigrant who persisted in his quest despite widespread scepticism. He and his team perfected the technique of hydraulic fracturing, a process of pumping water, sand and chemicals deep underground to allow otherwise trapped natural gas to flow out.

Then Mr Mitchell sold his company in 2002 to Devon Energy, an onshore explorer that specialised in horizontal drilling – sending wells up to a mile sideways as well as more than a mile below the surface. This combination of horizontal drilling and improved fracking meant gas could be extracted in commercially viable quantities.

The rest of the industry began to take notice. But that was partly because the US has benefited from a happy combination of circumstances. First, there was the raw material – good source rock stuffed with gas and oil. But there was also a well-developed, low-cost service industry to drill the wells and provide the necessary equipment. In addition, a network of pipelines permitted the connection of new fields, while accommodating regulation allowed landowners to be offered lucrative compensation in exchange for the use of their plots.

This combination does not exist elsewhere. "In some parts of the world, shale has the potential of becoming significant ... but not all shales are created equal," says Daniel Yergin, author of *The Quest*, an examination of the industry's implications.

One of the greatest challenges the shale business faces is the dearth of accurate data. While the US has decades of data gathered during exploration for conventional hydrocarbons, the knowledge base elsewhere is low. The path from exploration to production will be a long one. Mr Gould predicts that the industry is two to three years away from being able to identify the best producing zones. "It's a question of designing and building hardware," he adds.

Cost is also an issue. Industry estimates suggest drilling a well for shale gas in Poland, for example, is three times more expensive than in the US, given the absence of a competitive service industry. Still, Menno Koch at Lambert Energy, a London advisory company, is one who believes shale will become competitive with gas imports. His best guess for European shale production in 2020 is 25bn cu m – more than 5 per cent of today's European Union gas demand.

While sharing that sort of estimate, Günther Oettinger, EU energy commissioner, says Brussels has to respect the "different development of public opinion" in member states and sees it as too early to become involved in regulation. "Shale gas in the US totally changed the market. In Europe it can't," he says. "It is an additional element, maybe 5-10 per cent."

The policy picture is different in China, where Beijing has earmarked unconventional gas as a bedrock of its future energy policy. It has set a target of 6.5bn cu m of annual output by 2015, equivalent to 2-3 per cent of its projected gas production for that year. "Unconventional oil and gas are the key hydrocarbon resource for China's future development," says Fu Chengyu, chief executive of Sinopec, the nation's largest oil group by revenue.

China's policy environment may be right but there are significant physical difficulties. Many early exploratory projects are in the quake-prone Sichuan basin. The country also lacks the extensive pipeline infrastructure needed to bring the gas to market. Another concern is the availability of water, where China faces growing shortages.

A reminder that energy is a strategically sensitive industry carrying political risks came last week when Argentina acted to renationalise YPF, its biggest oil company, sending shock waves round the boardrooms of the industry worldwide. Given the nature and scale of the resource, expectations were high that Argentina would be the next country to experience the shale revolution.

But there are signs that at least parts of the industry remain undeterred. "Shale resource development has attracted a lot of capital investment the past 12 to 18 months," says Michael Bose, Argentina country manager for Apache of the US, which plans an aggressive shale oil drilling programme there. "As long as the government puts together a solid energy policy with fundamentals that support a fair economic return, these projects will be developed."

In any event, though developments within the US may have demonstrated shale's potential, it is still unclear whether and how fast that success story will spread around the world. Most analysts

do not expect commercial production until the middle of this decade at the earliest. It will take longer for shale to become a significant contributor to energy needs.

Shale's supporters still have to demonstrate conclusively that its benefits outweigh any environmental cost, and it faces opposition from climate change activists opposed to the greater use of hydrocarbons. Yet the tantalising promise of energy independence, job creation and cheaper power will spur many governments to push ahead regardless.

"It is always a good idea to explore for and develop resources within national borders. It increases security, tax take, jobs and it might even reduce power prices," says Lord Browne. "Nothing is perfect. This is pretty good."

Additional reporting by Pilita Clark, Leslie Hook and Jude Webber