

Assessing shale gas potential

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Shale gas has been hailed as the next energy revolution, but is controversial for its uncertain economics and feared environmental impacts. Ruud Weijermars* and Crispian McCredie, Alboran Energy Strategy Consultants, explain why European shale gas development is likely to be led by Warsaw and not Brussels.

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Shale gas has been widely hailed as a vast energy resource. But will it help oil companies to replace their profitable but declining legacy reserves with equally profitable new shale gas reserves? Furthermore, when such shale resources occur within a European sovereign territory, will it reduce that nation's need for gas imports and thus improve its security of energy supply?

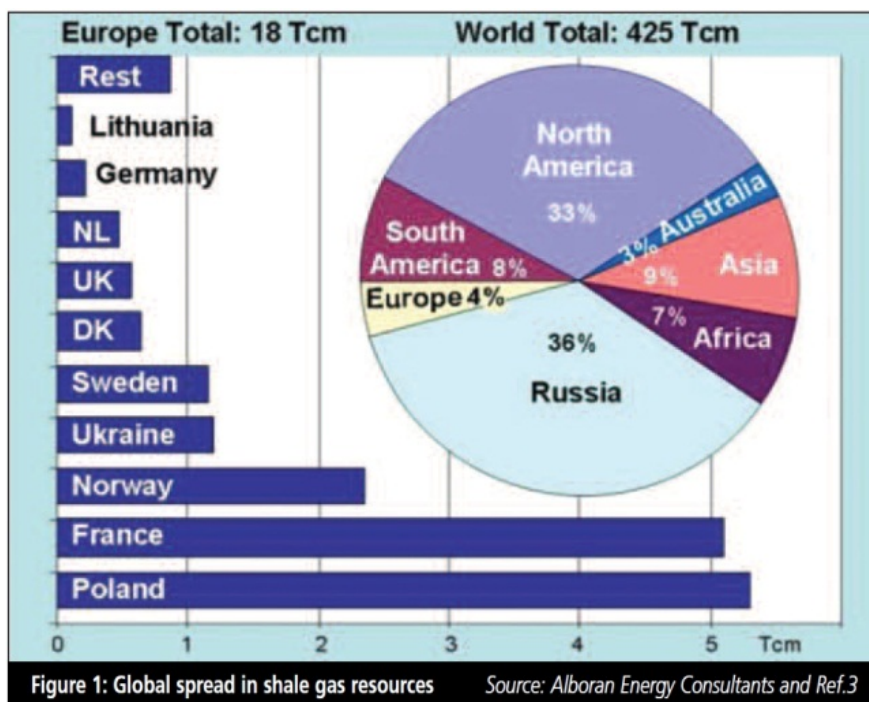
In spite of early success in the US, shale gas production is beset with at least two major drawbacks – the extraction of shale gas is not yet a very profitable business, and the public is skeptical about the environmental impact of shale gas operations.

A number of energy analysts, with US-based Bernstein Research in the lead, have repeatedly raised concern about the financial status of the US independents that drive the US unconventional gas business. A 2010 report entitled *More pain ahead for the 45 operators?*, detailed weakness in their financial bottom lines. The lagging cashflow of unconventional gas companies is now independently confirmed in an academic benchmark study.¹ The study compares the earnings retained by ExxonMobil and Chesapeake for reinvestment in the company over the past decade. ExxonMobil, the world's largest conventional gas producer, shows a \$190bn cumulatively retained earning between 2000 and 2009. In contrast, Chesapeake, a leading producer of unconventional gas in the US, had no cumulative retained earnings; in fact, by 2009 it had an accumulated deficit (ie negative retained earnings) of \$1.3bn.

Potential prospects

Gas trapped in shale currently accounts for 14% of US domestic gas supply.² The rest of the world is eager to follow the US example, hoping to boost domestic gas production from such unconventional sources. Figure 1 summarises the amounts of gas technically recoverable from shale around the world, as recently estimated by Advanced Resource International in a study commissioned by the US Department of Energy.³ This inventory shows that Europe's 18tn cm of shale gas potential is a relatively poor endowment compared to other world regions. However, if fully developed, these resources could still provide Europe with another 25 years of natural gas supplies at projected consumption levels of between 600bn and 700bn cm/y.

But shale gas resources are unevenly distributed within Europe – Poland and France hold the largest



shale gas resource base. Most production acreage in Western Europe is already under production licence by conventional oil and gas companies. In Eastern Europe, the situation is different. New acreage in Poland has been snapped up by major oil companies and smaller independents alike, with the specific purpose to develop shale gas and tight gas reserves.

The economics for shale gas in Europe has been evaluated in several recent studies.^{4,5} A major advantage for European gas producers is that the Continental European gas price is much less volatile and generally higher than in the US. The reason being that the US delivers natural gas at spot market prices under short-term contracts, whilst Continental European gas contracts are still predominantly oil-indexed and long-term.⁶ Over the past three years, European wholesale gas prices have been between two to three times higher than in the US.

There are, however, a number of factors working against rapid exploitation of shale gas in Europe. Operationally there is a lack of land gas rigs and mobile fracking fleets, all of which have to be brought in from US suppliers. This will make their deployment more costly than in the US. But, we believe, over time, gas prices are set to rise⁶ and the cost of shale gas technology will fall to a level that will allow economic development. If shale gas development were to stall in Europe, the dependency on gas imports can only increase.²

Stakeholders

Success for shale gas development in each European country will, in no small part, be determined by the regional stakeholders. Europe's primary energy suppliers defend varied market shares within Europe (Figure 2). Consequently, their interest level in shale gas development will vary considerably from country to country.

Poland is Europe's leading shale gas resource holder (Figure 1). It also has the largest proportion of coal (55%) in its primary energy supply (Figure 2). The production of natural gas from its indigenous shale resources could improve the performance of Poland's coal-fired power stations. This is important for curbing greenhouse gas emissions, as well as reducing Poland's dependency on Russian gas.

France possesses Europe's next largest shale gas resource base (Figure 1), but the local opposition against shale gas development is significant and it is set to maintain its nuclear options. Norway is by far the country best endowed with energy resources, with 41% of its primary energy coming from hydropower (Figure 2) and it remains Europe's major oil and gas producer and exporter even without shale gas. The country has substantial shale gas resources (Figure 1), but development may be slow. Shale gas will have to compete with the much higher margin conventional gas production from the Norwegian continental shelf. Meanwhile, Ukraine holds Europe's fourth largest shale gas deposits (Figure 1), but has an energy policy that is still influenced by Russian energy strategy. As a result, development of shale gas will be politically much more complex than in Poland.

Sweden is Europe's smallest gas consumer, with gas accounting for only 2.6% of its primary energy supply and no gas retail market. The development of shale gas will require the development of a local gas market with the additional infrastructure constraints. Denmark, the UK, the Netherlands and Germany are all major gas consumers, with extensive gas infrastructure and mature retail markets. Their domestic gas supply from conventional sources is declining. These countries are wellplaced to benefit from shale gas, which could delay expensive gas imports.

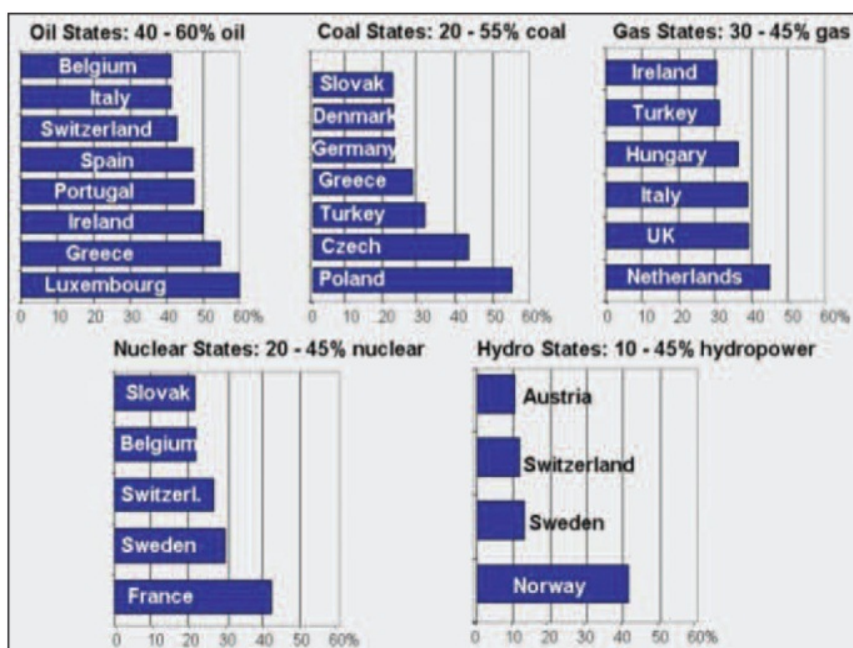


Figure 2: Primary energy sources in Europe

Source: Alboran Energy Consultants and IEA 2010 data

Environmental concerns

Aside from the marginal economics of shale gas development, there is a public relations battle to be won. Drilling of the first shale gas wells in the UK near Blackpool was recently halted following concerns raised by residents that nearby fracking triggered a minor earth tremor in 2010. Drilling has also been postponed in the Netherlands at Boxtel until a Dutch government report has been produced to assess the risk and consider further policy measures. Meanwhile, the US-made film *Gasland* has raised concern about aquifer contamination from gas leaks and probably played no minor role in the French moratorium on shale gas development.

The leakage of gas into the atmosphere is another potent source of greenhouse gas emissions⁷ – whilst considerable for conventional gas operations, it may be even larger in the development stages of shale gas. A US government report on shale gas risks is due before the end of 2011. We anticipate the European and US shale gas reports will be even-handed in considering whether shale gas is a useful energy source.

The way forward

If shale gas development is to be delayed, the larger issues at stake must also be considered. Given the problems now associated with the nuclear option in many countries, especially Germany and Sweden, can we continue to use coal for power production, or must the Arctic be opened in the search for future gas reserves? Will Europe continue to be reliant on imported LNG and Russian gas well past 2020?

A greater level of public understanding and openness by the shale gas industry is necessary to overcome present public perception. Some incidents have occurred in the US, but with over 100,000 shale gas wells drilled in the past five years alone, problems have remained contained and do not appear endemic to the shale gas industry. Being realistic about risks is important and the installment of a claim fund could send a positive signal about industry being serious on remedial measures in case something, somewhere, goes wrong.

The European gas industry is used to a state-backed conventional supply push and a captive consumer demand pull. Historically, the European natural gas

industry itself has undertaken very little marketing. This is going to be a handicap in shale gas development, as the critics of shale gas have already received broad media coverage and shale companies have been slow in putting forward their side of the story. Only in Poland do we observe the classical state-backed supply push for shale gas. If successful, Polish policy is likely to help open up the European playing field for shale gas. As production begins, it may or may not silence shale gas critics.

No less important, it remains critical for unconventional gas companies to restore profitability and provide shareholder returns. They must prove over time that shale gas can be produced at a reasonable profit. The development of unconventional gas reserves can only succeed if the financial returns that lured investors to unconventional gas companies in the first place, begin to materialise sooner rather than later. Eyes are now set on Poland rather than Brussels for a clue.

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