

Quebec quoi?

Recent discoveries of shale gas in Quebec have been generating significant interest. The shale rocks in the St Lawrence lowlands could potentially yield 4.1 tcf (116 bcm) of unconventional gas reserves, much more than the Barnett Shale in Texas.

The depletion of conventional petroleum reservoirs has promoted the exploitation of secondary sources such as shale gas. Like Europe and Australia, North America enjoys vast shale deposits. A 2009 report by Ziff Energy Group predicted that by 2020, shale gas could supply as much as half of North America's natural gas needs. Most of Canada's shale plays are located in Alberta and British Columbia. However, between 2006 and 2009 Forest Oil drilled 24 exploratory wells in the Utica shale deposit, located in Quebec, as well as parts of Ontario and New York State. Forest successfully drilled and fracture-simulated two gas wells at Becancour 8 and Saint Francois du Lac 1. Based on these findings, the US company announced that it had made a significant natural gas discovery in April 2008.

Utica is important for several reasons. From a larger perspective, the revitalisation of North American oil and gas markets through secondary recovery will help limit Russia and the Arab world's hold on the market, thus keeping domestic prices down. At the national level, discovery of natural gas deposits in Eastern Canada will help diversify the nation's energy market, which has been largely dependent on oil and gas resources from Alberta. The proximity of an extensive pipeline network that allows easy gas distribution to local customers also makes the Utica play cost effective. Finally, high oil and gas prices have created the incentive for smaller firms specialising in enhanced recovery techniques to capitalise on discoveries like the Utica play. In the past 10 years tight gas recovery and horizontal drilling techniques have advanced considerably, opening up more resources for feasible and profitable exploitation.

The innovation required to increase output in North America has fostered a favourable market for junior firms with new ideas – a characteristic feature of Canadian oil and gas. One of the big surprises of the Utica shale play has been the role of Questerre Energy Corporation. Questerre began 10 years ago seeking to prove that “finding big oil and gas in North America was still possible.” The company began exploration with five major gas targets in Quebec. The Utica play turned out to be the most viable of these ventures. Few firms initially expressed interest in Questerre's finds but as secondary reservoirs

throughout North America began to pay off, major players began to take notice. In 2005 Questerre signed a deal with Talisman Energy and later with Forest Oil to develop its holdings. Now Questerre is at the forefront of the shale gas industry, poised to put its Quebec wells into production at a commercial level for the first time.

Shale gas extraction presents several unique challenges. Shale has a low matrix permeability, which significantly reduces fluid flow. To compensate, specialists rely on natural fractures in the shale to increase permeability. Artificial fracture processes are used to increase output even further. To do this operators pump water at extremely high pressure into the rock. To keep fractures open they may also add a proppant (sized particles mixed with fluid, such as ceramic spheres). Horizontal drilling is often employed to increase the surface area exposed to the well bore. Wells with a lateral length of as much as 3,050 metres are not uncommon.

One advantage of shale gas over oil is that shale is comparatively easy to find – leading to a more predictable return. Unfortunately, most shale deposits are not commercially viable. The Utica play, however, has several important characteristics. According to Forest Oil's findings, the porosity, mineralogy and maturity of Utica shale are similar to those found at more established deposits like Barnett and Woodford. The shale is a black calcareous organic rock; its average carbon content is 3.5-5 percent by weight and dates to the Ordovician geological strata. The Utica is also of considerable size. The deposit is between 46 and 213 metres thick, located in a massive basin that during the Ordovician period (between 488 and 443 million years ago) was one of a series lining the Palaeozoic coastline. Forest Oil has claimed that its holdings may contain as much as 4 tcf (113.3 bcm).

Currently there are no Utica wells in commercial production. Forest, Talisman and Questerre have drilled five vertical and two horizontal wells. Gastem and partner Utica Energy have also drilled a number of wells. As is the case throughout the oil and gas industry, however, low gas prices have limited the feasibility of shale gas in the short term. As economic recovery raises energy costs, however, production at the Utica play is bound to increase dramatically. ■

FIGURES

UTICA SHALE CARBON CONTENT BY WEIGHT

3.5-5 percent