SHALE GAS

As published in the Telegraph Journal May 1, 2010

The 'shale gale' Revolution

Natural resource: The province's shale is uniquely thick. The potential is there to exploit a greater amount of oil and gas from the shale, and this - says one geologist - makes N.B. very attractive

Steven Hinds grabs his rock hammer and hacks away at the flaky rock that lines the gravel road leading to the old Albert Mines near Hillsborough.

via Bloomberg - An undated handout photograph shows the Marcellus Shale natural gas project in Pennsylvania, U.S., provided to the media on Thursday, Feb. 18, 2010. Mitsui & Co., Japan's second-largest trading company by market value, signed a $1.4 billion deal to buy a stake in the Marcellus Shale natural gas project in the U.S. from operator Anadarko Petroleum Corp.

Douglas C. Pizac/The Associated Press
If one were to hold a lit match up to shale rock, especially the paper-thin pieces that flake off, the rock would catch fire before smoking out – its oil fuelling the flame.

Adam Huras/Telegraph-Journal
New Brunswick's shale rock is part of the Carboniferous Maritimes Basin, which covers about 250,000 square kilometres in Atlantic Canada. The basin's oldest rocks are thought to be about 350 million years old.

Adam Huras/Telegraph-Journal
Steven Hinds, senior hydrocarbon resources geologist for New Brunswick's Department of Natural Resources, stands near a closed-in shaft, that once led underground, at the old Albert Mines site near Hillsborough. This part of Albert County put New Brunswick on the map in the mid-1800s when Abraham Gesner discovered how to produce kerosene from a black, shiny rock he named albertite, found amongst the shale. Since then, numerous firms have drilled exploration holes into the oil shale to understand the richness of the rock.

The brownish grey shale - which outcrops from a deposit that likely slopes down hundreds of metres underground - splits apart easily, revealing layers of sedimentary rock.

Grabbing a larger piece, the geologist breaks it into chunks and brings one to his nose.

"Smell that?" he asks, holding it out. "That's the smell of money."

A distinct gassy scent wafts from the rock.

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In the 1990s, a thick, dark brown oil was produced from the shale through a microwave technology process, which turned out to be largely uneconomical.

New Brunswick's shale is once again luring industry to the province.

This time, it's largely the natural gas found in shale rock two kilometres or more below the earth that has Houston-based oil and gas firms and junior companies alike looking to see just how much is there.

In the McCully field near Sussex and Stoney Creek field near Moncton, the Frederick Brook shale is the source rock for the hydrocarbons that have migrated out and become trapped in the shallower Hiram Brook sandstone where oil and gas resources have been found.

Hinds, the senior hydrocarbon resources geologist for New Brunswick's Department of Natural Resources, says the shale here is uniquely thick.

That means the potential is there to exploit a greater amount of oil and gas from the shale, using fewer drilling pads.

"It makes us very attractive," Hinds says.

The renewed interest in shale is thanks to an industry revolution some have dubbed the "shale gale" and others have called the "gas tsunami."

An abundance of natural gas trapped deep below the earth in shale rock reservoirs previously thought to be too challenging to tap has oil and gas executives tripping over themselves to snatch up land across North America.

In the last few years, firms have discovered massive deposits of gas-rich shale in Texas, Arkansas, Michigan, Pennsylvania and a few other states.

As recently as in 2007, experts south of the border believed the United States would soon be a net importer of gas from faraway gas-rich regions.

The industry is now betting North America will have gas to last at least the next 100 years.

North of the border, oil and gas companies are beginning to pour money into surveying, drilling and producing gas from land in British Columbia, Alberta, Saskatchewan, Quebec and the Maritimes in the hopes they'll discover the next jackpot.

In March, New Brunswick issued its largest tender to date for oil and gas exploration - more than one million hectares of land - to Southwestern Energy Co. (NYSE:SW), a Texas firm known for pioneering exploitation of the Fayetteville shale in Arkansas for natural gas.

The Canadian division of Houston oil and gas major Apache Corp. (NYSE:APA) is interested, too, and plans on drilling two wells this summer for shale gas near Elgin.

Steve Mueller, president and CEO of Southwestern Energy, says "gas tsunami" is a good way to describe a paradigm shift he likens to the discovery in the 1970s of seismic surveys - which produce images of the earth through technology that works like an ultrasound scan of the body.

"It's been 30 years since you've had that kind of radical thinking," Mueller says in a recent sit-down interview in Fredericton ahead of a day of meetings with representatives from the government and the Opposition to share his firm's plans.

He says that about 78 per cent of the world's sedimentary rock is shale, though not all of it is prospective for oil and gas.

Now that technology has allowed firms to access reservoirs in shale, interest in developing the resource is spreading from the U.S. to the rest of the world.

U.S. President Barack Obama and Chinese President Hu Jintao signed an agreement late last year whereby Obama pledged his country would help China assess and unlock its shale gas.

The shale gas revolution is a "huge game changer," according to Pete Stark, vice-president of industry relations for Cambridge, Mass.-based IHS Cambridge Energy Research Associates Inc.

"It's completely changing the availability of huge amounts of gas in North America just at a time when everybody in the industry thought we were going to have to start importing significant amounts of natural gas."

Stark's firm, which advises energy firms, governments, financial institutions and technology providers, published a study last month painting a picture of the shale gale revolution.

Shale gas, which accounted for only one per cent of U.S. natural gas supply in 2000, now represents 20 per cent of that supply and by 2035, it could be 50 per cent, the study says.

To Stark, the shift cuts his country loose from a reliance on foreign gas and encourages environmental steps like closing dirty coal plants in favour of natural gas-fired power facilities.

Development of the resource has also been an economic driver: The Barnett shale in northern Texas alone should create 108,000 jobs annually until 2015, according to a report last year by the Perryman Group, an economic analysis firm based in Waco, Texas.

The spotlight on New Brunswick means cash for the government's coffers to the tune of $2.3 million just for handing over exploration rights to Southwestern Energy.

But the industry giant hopes it will unlock a big resource easy enough to exploit so that it will be in the province for the long haul.

"The ideal is that our interpretation of what we've got to date, with the very little data we have, is spot-on correct," Mueller says.

"And that the rock is buried deep enough and that we not only have shale that works but we have some sandstone and some conventional (oil and gas) that work and now we're talking about a very, very large field being developed."

Mueller's company has committed to spending about $47 million over three years exploring on the two licenced areas, which together represent about one-seventh of the province's land mass.

The largest licence spans from the Northumberland Strait near Richibucto past Fredericton and almost down to St. Stephen and the smaller licence is near Cocagne in southeastern New Brunswick.

In late 2009, Apache entered into a farm-in agreement with Corridor Resources Inc. (TSX:CDH) to explore and potentially develop natural gas from the shale near Elgin in an 18-month program that ends in June, 2011.

In a perfect world for Southwestern and Apache, the province's shale gas resource would warrant development, meaning potentially a handsome number of local jobs and royalty revenue for government on the one hand.

But increased industry interest is also likely to fuel political unease over how drilling into the earth and fracturing the rock could affect the environment, among other potential hot-button issues.

The rush to develop shale gas begs the question: Why now?

The earth's sedimentary shale rock was formed as deposits from bits of rock and organic particles such as plants or organisms that settled in the bottom of ancient lakes and oceans.

Over millions of years, the deposits became compressed and buried under layers of younger rock, including the sandstone oil and gas companies have long tapped.

The heat of the earth cooked the shale and transformed the organic material within - into oil if it was shallower or gas if it was buried deeper.

New Brunswick's shale rock is part of the Carboniferous Maritimes Basin, which cuts across portions of northern, central and southeastern New Brunswick and extends offshore, covering about 250,000 square kilometres in Atlantic Canada.

The basin's oldest rocks are thought to be about 350 million years old.

University of New Brunswick geology professor David Keighley, who has a research focus on petroleum geology, says interest in New Brunswick's natural gas potential began after the Maritimes and Northeast Pipeline was built to connect Nova Scotia's offshore gas - and by default New Brunswick - to U.S. northeast markets.

"All of a sudden, gas becomes a lot more profitable once they find any because no one has to build a gas pipeline - it's already there," Keighley says.

But technological advances can be thanked for piquing the curiosity of firms on the hunt for shale gas, Keighley says.

In North America, natural gas has flowed from shale fractured naturally since the late 1800s - albeit at low rates over a long time.

But shale is less permeable than sandstone, which means it has fewer pores or openings that allow gas to pass through.

Now companies, after first drilling down into the earth, are able to continue drilling horizontally to access a larger expanse of shale rock.

Through hydraulic fracturing - a decades-old technique that has advanced in recent years - firms encourage the gas to flow by typically pumping water, sand and additives into the well bore to create little cracks in the tight shale.

It's unclear how much shale gas New Brunswick has and how much of it is economical to develop, which is why Keighley is reassured Southwestern Energy has moved into a largely unexplored region to take a look.

"Finally someone has said, 'We've got this huge area where we know very little about. So let's go and see what might be there,' " Keighley says.

Apache Canada, meanwhile, is trying to tap into reserves of shale gas on a Corridor Resources lease pegged at about 59 times what the junior producer has in conventional gas in same area.

Barbara Shook, a Houston-based researcher and writer for the Energy Intelligence Group, an oil and gas trade publication company, says Apache Canada and Southwestern Energy must have some certainty about the resource in New Brunswick.

"These are two very highly rated companies as far as quality in their respective brackets," Shook says, calling Southwestern a "first mover" on shale gas plays.

"They wouldn't be in there if they weren't very optimistic they had something to exploit."

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