

## **The Horn River Basin: the Opportunity and Challenges of a Giant Shale Gas Field**

Kevin G. Smith

Vice President

Fort Nelson BU & Canadian Unconventional Gas Exploration

Encana Corporation

kevin.g.smith@encana.com

In early 2003, Encana was drilling a Mid Devonian Keg River test when the well took a kick in the Devonian Horn River Formation. While the primary objective did not yield economic gas rates, this significant gas show in a shale formation intrigued the geologists on the team. A corporate culture of opportunity identification, technology exchange and best practice sharing turned a small, local observation into a major North American shale gas basin. The story of the development of the Horn River Basin (HRB) provides insights into the power of clear strategic direction, technical innovation, organizational capability and prudent financial management.

At the time the gas show was observed in the Trail b-48-A well, Encana was engaged in developing a portion of the Barnett Shale in the Fort Worth Basin in Texas. The Barnett Team had developed significant expertise identifying shale attributes related to large reserves and high producing rates. An impressive body of knowledge was being built and when the Canadian Team came calling with their observations and questions, the Barnett Team shared all their learnings with their colleagues. Using sparse data and rigorous analytical techniques, the key shale attributes of TOC, appropriate thermal maturity, mineralogy, pressure and depth, both teams realized they were onto something and something big.

The use of analogues – the simple concept that zones that look alike should produce alike – was instrumental in moving this play from the concept stage to a lead. The teams carefully compared all aspects and attributes of the Barnett Shale to the Trail b-48-A well and other data from the basin. The lead was confirmed. Encana's strategy of maintaining its low-cost operating environment through early entry into emerging basins was deployed. Time was of the essence.

Encana's corporate standard and exploration strategy incorporates a full risk assessment supported by in-depth peer reviews. Before committing to a major capital investment program, there had to be a comprehensive understanding of the entire basin with whatever data was available but an expectation that all the data would be considered. Mineralogy, TOC, rock mechanical properties, fracture networks and pore pressure were assessed. These measurements would be used to calculate OGIP and RGIP. Preliminary estimates and assumptions were made around deliverability, infrastructure and marketing. The hydrocarbon potential had been staked. It was economic to move ahead.

With this decision, Encana needed to capture the mineral rights in what it considered to be the best areas. Industry intelligence signaled a very competitive, and very costly, land acquisition process. In a move

designed to reduce risk and increase exposure to the play, Encana and Apache Corporation formed a 50-50 joint venture and ended up with a significant net interest over a large portion of the basin for each company. Now, they could pool their resources as they began to explore and develop the play. The merit of this decision became evident when land bonuses dramatically increased at each successive sale.

The land position had been secured and now it was time to definitively assess the reservoir potential. In Encana parlance, this was the pilot stage. Drilling wells would establish type curves, the potential for continuous reductions in drilling and completion costs and the capability of logistically operating in a remote and harsh environment.

Management had to be assured that the play would be economic over the acquired land base. As the drilling program progressed, the demonstration stage, rates and volumes were confirmed and cost reduction was evident. The play was big, it was productive and it was economic.



Demonstration Spring 2008

However, operating at the end of the North American supply chain in a harsh environment coupled with the scale potential being estimated presented challenges that weren't unique to any one operator in the HRB. In response, in the fall of 2007 a meeting of the seven largest operators in terms of land held convened and the outcome was the formation of the Horn River Producers Group (HRPG). If the HRB was to be successful, it made sense for companies to work collaboratively in utilizing the local service sector and share infrastructure where appropriate, thereby allowing for a more orderly development with a reduced environmental and societal impact.

Then everything changed overnight.

In the fall of 2008, the global financial crisis took hold of the world's economies. Encana, while financially very healthy, retrenched while waiting to see and understand what was happening globally. At exactly the same time, the shale gas revolution was underway and in full force. Improving technology, strong financial

hedge positions and lease retention requirements in the US resulted in a flood of natural gas being brought on-stream at a time when North American industrial activity was reduced by slow or negative economic growth. Gas prices plummeted. The economics of the remote HRB were challenged. There was no local infrastructure, no local service sector and very limited marketing options. On top of this, there were social concerns relating to First Nations and local communities. While the situation was difficult, the team rose to the challenge.

The current reality was met with a simple strategy: increase rates and reserves and do it at a reduced cost. At first glance, this was a daunting task but this strategy was behind Encana's Gas Factory approach to resource development. The Gas Factory is a method to most efficiently and cost effectively develop a resource utilizing scale, a repeatable approach and fit for purpose technology. In the Horn River, this has taken the form of multi-well pads with as many as 16 horizontal wells with up to 28 frac stages in each horizontal well. By encouraging collaboration across the entire supply chain, costs are continually reduced while safety and environmental performance is enhanced. Continuous improvement and innovation is expected. The overall impact of this approach was to reduce the cost of adding new reserves at a lower \$/Mcf basis while lowering the cost of added production measured by \$/MMcf/d.



**Horn River Gas Factory: 63-K Concurrent Operations May 2010**

There is now an unrelenting effort to reduce supply cost. Supply cost is the NYMEX gas price required to generate an after tax rate of return of 9% and does not include land costs. The lowest supply cost implies the largest profit margin that ultimately leads to increased market share. Technology and economies of scale will increase production while at the same time reducing the cost of those volumes. Development will be focused in the most productive areas. However, capital and volumes are only part of the profitability story. Through discussions, royalties have been adjusted and incentives are in place to reduce the financial burden on producers. New infrastructure is being built by producers that will create more competition in the mid-stream market. LNG exports to Southeast Asian markets may be an option especially if North

American markets continue to be well supplied by other shale basins. All options are open when it comes to reducing supply costs and increasing margins through premium pricing in new markets.

Reducing supply costs does not mean that personnel safety and environmental stewardship is compromised. At Encana, if the job cannot be done safely, it is not done at all. We strive to build and maintain a culture where there is zero tolerance for unsafe acts and cutting corners. Regard for the environment, especially water resources, is paramount. During the completion of the 63-K pad in 2010, Encana commissioned its Debolt water plant allowing us to utilize saline Debolt water for fracing operations. By the end of the frac campaign, 80% of the water used for fracing operations was sourced from the Debolt Formation. This can be done effectively and efficiently when a Gas Factory development process is used. A social license to operate must be earned through trust.

To accelerate the realization of the value of our Horn River assets, capital from other countries, sometimes with little indigenous resources of their own, is being employed within the HRB. International joint venture capital is initially invested at a predetermined and disproportionately higher level until an earning amount is reached. This difference is compensation for entry costs to the play, the de-risking done by Encana and access to Encana's technical and operational expertise. The result for Encana is significantly improved point forward well economics and improved returns for Encana shareholders. Joint venture partners gain access to a production stream that can be sold into the North American market or shipped to their countries for domestic use. It is a classic win-win scenario

This massive development of a shale gas basin is truly the result of teamwork from the geologist that spotted the opportunity to the financial analyst who structures the deal to access joint venture capital and everyone in between. There are still unknown opportunities and challenges that lie ahead but technology and innovation will lead the way to shareholder value.