

# Promoting Natural Gas in British Columbia: Activities of the Resource Development and Geoscience Branch

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## Summary

Interest in the natural gas resources of British Columbia has increased dramatically in the last several years, recently culminating in record land sales (\$2.66 billion) and industry expenditures (\$7.9 billion) in 2008. BC is the the second largest gas producer in Canada (3 Bcf/d or 1.15 Tcf/yr). Reserve additions have more than replaced annual gas production every year for over a decade (Figure 1). The British Columbia Resource Development and Geoscience Branch is the lead unit within the BC Ministry of Energy, Mines and Petroleum Resources supplying energy-related geoscience information and knowledge for the province. The Branch is responsible for identifying, stimulating and facilitating oil and gas resource development opportunities in British Columbia. The Branch mandate is also to provide geological and other scientific expertise in support of the Ministry Service Plan, which aims to make BC the most competitive oil and gas jurisdiction in North America. This paper summarizes the current geoscience activities of the BC Resource Development and Gescience Branch and their results.

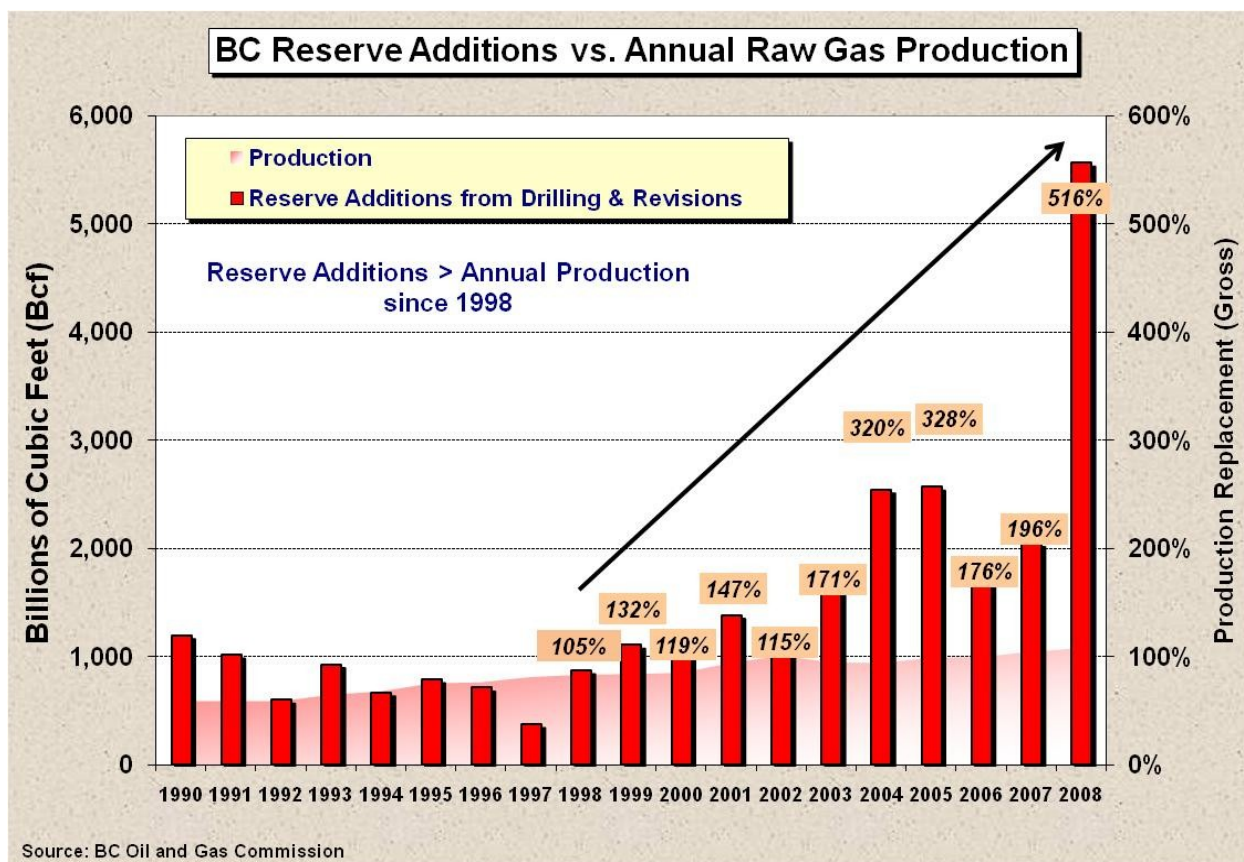


Figure 1: Annual gas production and reserve additions in British Columbia since 1998.

The Resource Development and Geoscience Branch (RDGB) offers a broad cross-section of research programs and other services including:

- conducting hydrocarbon resource assessments and various geological studies of oil and gas potential,
- evaluating and promoting new oil and gas opportunities in British Columbia such as coalbed gas and shale gas,
- conducting aggregate and hydrogeology studies in support of oil and gas development,
- reporting on industry activity and areas of current interest
- providing geosciences support to government, industry and the public
- promoting BC's oil and gas industry through conventions and presentations
- advising on carbon sequestration and other strategies
- producing geological maps and supplying GIS resources and
- managing the Charlie Lake Core Facility.

The RDGB currently has active programs in shale gas, surficial geology, hydrogeology, foothills mapping, carbon sequestration, and the interior basins. Examples of the results from each of these programs are highlighted below.

An excellent example of the utility of resource assessments is provided by Walsh et al. (2006) who presented a detailed analysis of the natural gas potential of the Triassic Montney and Doig formations. Petroleum and natural gas sales in the Montney play trend jumped from \$218 million in 2006, at the time of this report, to over \$1.3 billion in 2008. In 2009, the Montney play continued to account for approximately 50% of the land sales in British Columbia.

The BC coalbed gas (CBG) program has provided numerous studies on the resource potential, desorption, adsorption, permeability, diffusivity and environmental aspects of CBG in British Columbia (e.g. Ryan and Morris, 2006, Ryan and Mannhardt, 2008, Ryan and Wells, 2009, Wells and Ryan, 2009). Since the initiation of the CBG program, the industry has moved from no activity in BC to one with approximately 100 tcf of identified resource and the province has received >\$30 million in direct revenue.

Aggregate studies conducted as part of the surficial geology program also have been highly successful in British Columbia. The identification of new gravel resources allows for the development of year-round access roads into remote areas that otherwise would be too expensive for infrastructure development (Hickin, 2009). The BC program has provided >\$76 million in savings to industry & government to date, a \$30 return to the province for every dollar invested (since 2002). The program received a Province of BC Improvement Award in 2007 with a publication record of >35 maps, reports and papers. The program has resulted in >45 new prospects and several large aggregate mines, the first to open in the region in over 20 years.

Some activities of the BC hydrogeology program include: identification and mapping of groundwater sources (thickness, extent, depth, unconformities); depth to bedrock mapping; review of water disposal practices and locations; analysis of formation injectivity and identification of suitable disposal formations; design of monitoring well programs; tracking of surface water use and availability; compilation of essential information on produced water, porosity, permeability, lithology and stratigraphy; and, provision of scientific advice to industry, government, regulatory agencies, First Nations and the public. Recent examples of these types of hydrogeology studies have been provided by Janicki (2008a, b) and Johnson (2009).

The geological mapping program is designed to help determine the geographic distribution of rock units relative to hydrocarbon resources. Accurate maps showing the distribution of prospective hydrocarbon-bearing formations extend existing plays into new areas, generate industry interest in new opportunities and provide data to promote activity in under-explored areas. In addition, detailed surface geology maps assist with the development of subsurface exploration models and the interpretation of seismic data. Recent RDGB mapping programs have focused on the northern Foothills (Ferri, 2009a, b) and Nechako region (Riddell, 2009).

The BC Carbon capture and storage program has the ultimate goal of reducing GHG emissions by identifying areas appropriate for carbon storage (Hartling, 2008). Other work includes: estimating carbon storage capacity, informing government on sequestration technology and opportunities, providing guidance on appropriate legislation and regulations and assisting project proponents in understanding approval requirements.

Industry activity reports published by the branch provide detailed analyses of government PNG sales as well as industry drilling and production activity (e.g. Adams and Schwabe, 2009). These reports provide government and industry with detailed information on hydrocarbon activity in BC. The overviews of industry exploration activity cover six resource regions: Laird; Fort Nelson; Fort St. John; Northern Foothills; Southern Foothills; and the Deep Basin. Highlights on land tenure sales and recent drilling activities, including CBG and the interior basins are provided. Special publications such as Adams (2009) report on shale gas activity in BC draw industry attention to new provincial hydrocarbon resources. This shale gas report highlights shale gas regions, focusing on the most recent, complete year of industry activity.

The goals of the Interior Basins geology program are to encourage investment by reducing exploration risk and to identify the most prospective areas within these frontier basins (Riddell, 2009). Work in recent years has focussed on the Nechako basin and resulted in refinement of the basin boundary with new data. Studies on source rock quality, thermal history, fossil and radiometric dating, reservoir quality, and rock and magnetic properties have been completed. By combining geological data with new geophysical surveys, a more refined map of oil and gas potential and more accurate resource assessment numbers are being developed.

The Charlie Lake Core Facility is a world class facility, with drill core and cuttings from over 20,000 wells available year-round to government, industry and the public. Drill core is often used to promote new plays. For example, early shale gas studies by RDGB on old drill core were critical in promoting the play to industry (CBM Solutions Ltd., 2005; Walsh et al., 2006; Walsh and McPhail, 2007). The core and cuttings are invaluable resources for attracting investment in BC and are well used by industry to generate data related to hydrocarbon exploration and development. In 2008/09, 320 core removal applications were processed, and 166 viewing days were booked. The facility processes and houses core from 6,650 wells and cuttings from over 22,275 wells.

Other activities of the RDGB include: provision of GIS services to the Oil and Gas Division; preparation and distribution of technical materials to promote new oil and gas resource opportunities to industry; conducting oil and gas and geothermal resource assessments for lands in Treaty negotiations; assessing new alternative energy opportunities such as geothermal resources (Lee, 2009); advising on offshore petroleum geology; providing petroleum geoscience expertise to other divisions and other ministries; and liaising with other geoscience agencies such as the Geological Survey of Canada.

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