

ABOUT UNCONVENTIONAL GAS

What is Unconventional Gas?

Natural gas is formed over thousands of years by the combination of pressure and heat on organic material trapped in rock. After natural gas is formed, the earth's pressure often pushes the gas into 'pools' or reservoirs until it is released from the ground by a drill bit providing a path to the surface. This is what is known as conventional gas. But not all gas is found in accessible reservoirs. In fact, there are a number of forms of unconventional gas that were created in rock formations without the porous texture necessary to allow movement to a reservoir. Production of unconventional gas generally requires stimulation techniques, horizontal wellbores or a series of wellbores to release the natural gas.

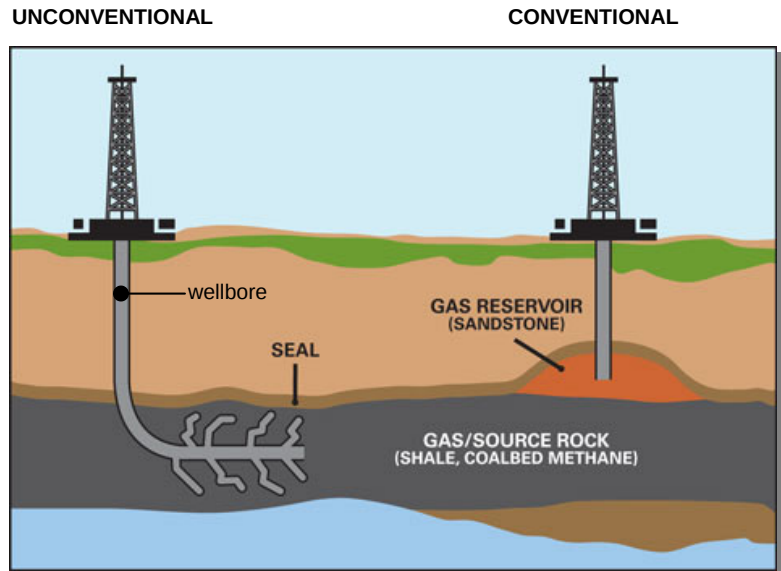


Figure 1 Unconventional and Conventional Gas

Sources for Unconventional Gas

Tight gas, **shale gas** and **coalbed gas** are all forms of unconventional gas found in B.C.

Tight gas refers to natural gas produced from rock formations that have very low porosities (pore space) and very low permeability, hence the term "tight". The host rocks are usually sandstone, but can also be carbonate rocks. Today, tight gas accounts for about 25% of B.C.'s natural gas production.

Shale gas is natural gas produced from the fractures, pore spaces and a matrix of shales, which are very fine-grained mud rocks, formed from clay- and silt-sized particles. Shale can include relatively large amounts of organic material, compared with other rock types, and therefore, has potential to become a rich hydrocarbon source rock.

Coalbed gas (CBG) is natural gas found in most coal seams. CBG is usually comprised of almost pure methane with minor amounts of nitrogen and carbon dioxide. The methane is attached to the coal and it is held on by pressure from the overlying rocks and water in the coal seam. Other names for CBG include coalbed methane (CBM), natural gas from coal (NGC) and coal seam methane (CSM).

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Where do Unconventional Gas Resources Occur?

Tight gas occurs in three regions of northeast B.C. within the Western Canadian Sedimentary Basin – the Deep Basin, the Foothills and the Northern Plains (Figure 2).

Shale gas potential occurs in several parts of northeast B.C. associated with different levels in the rock stratigraphy (Figure 2).

Coalbed gas occurs in coal basins throughout BC. These basins are located in Northeast BC, the Kootenays, Central and Northwest BC and on Vancouver Island (Figure 3).

Important Aspects of Unconventional Gas Operations

While unconventional and conventional gas resources share much of the same exploration, development and production techniques, there are several differences of note, including:

1. Tight Gas and Shale Gas

Reduced gas well spacing may be required to effectively develop shale gas resources across a wide geographic area. The potential for surface impact of required increased well density can be offset by drilling more than one well directionally from a single surface location (well pad).

Stimulation of tight gas and shale gas formations is key to developing these resources by opening up the pore spaces through fracturing (called fracing, see Information Sheet 15) and advanced drilling and completion techniques.

Horizontal and directional drilling techniques can open up long sections of reservoir to move the natural gas from these larger areas.

Under-balanced drilling is drilling strategy that uses low-density drilling fluids, foams, emulsions, and air to enhance recovery of the gas. These techniques reduce and avoid formation damage due to clogging the pore spaces in the rock.

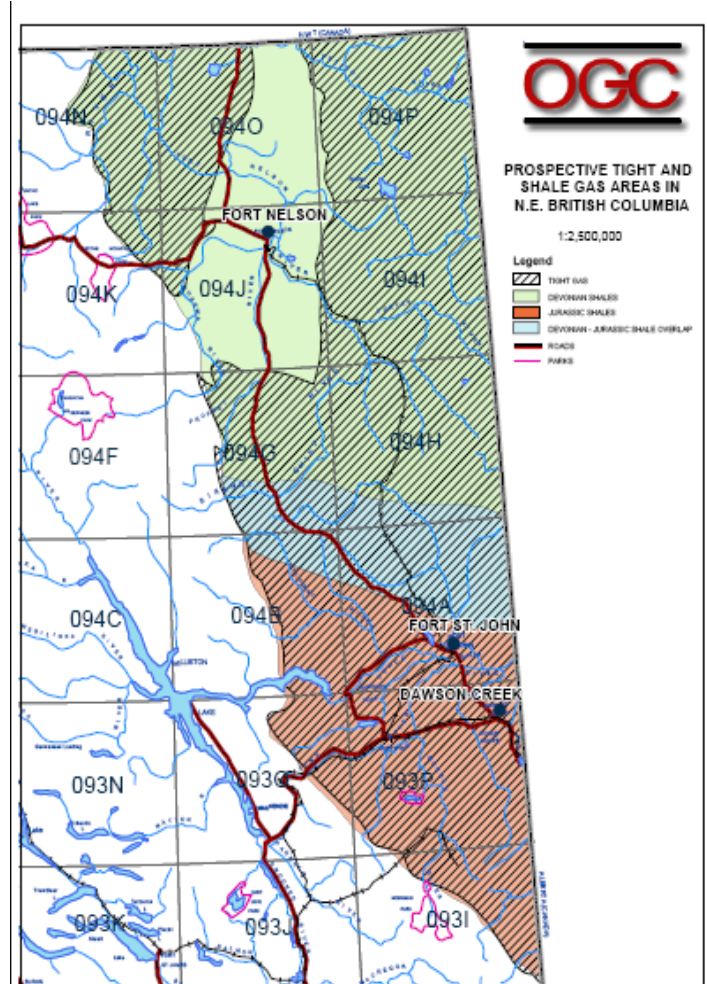


Figure 2: Tight and shale gas areas in B.C.

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Coalfields and Coalbed Gas Potential in British Columbia

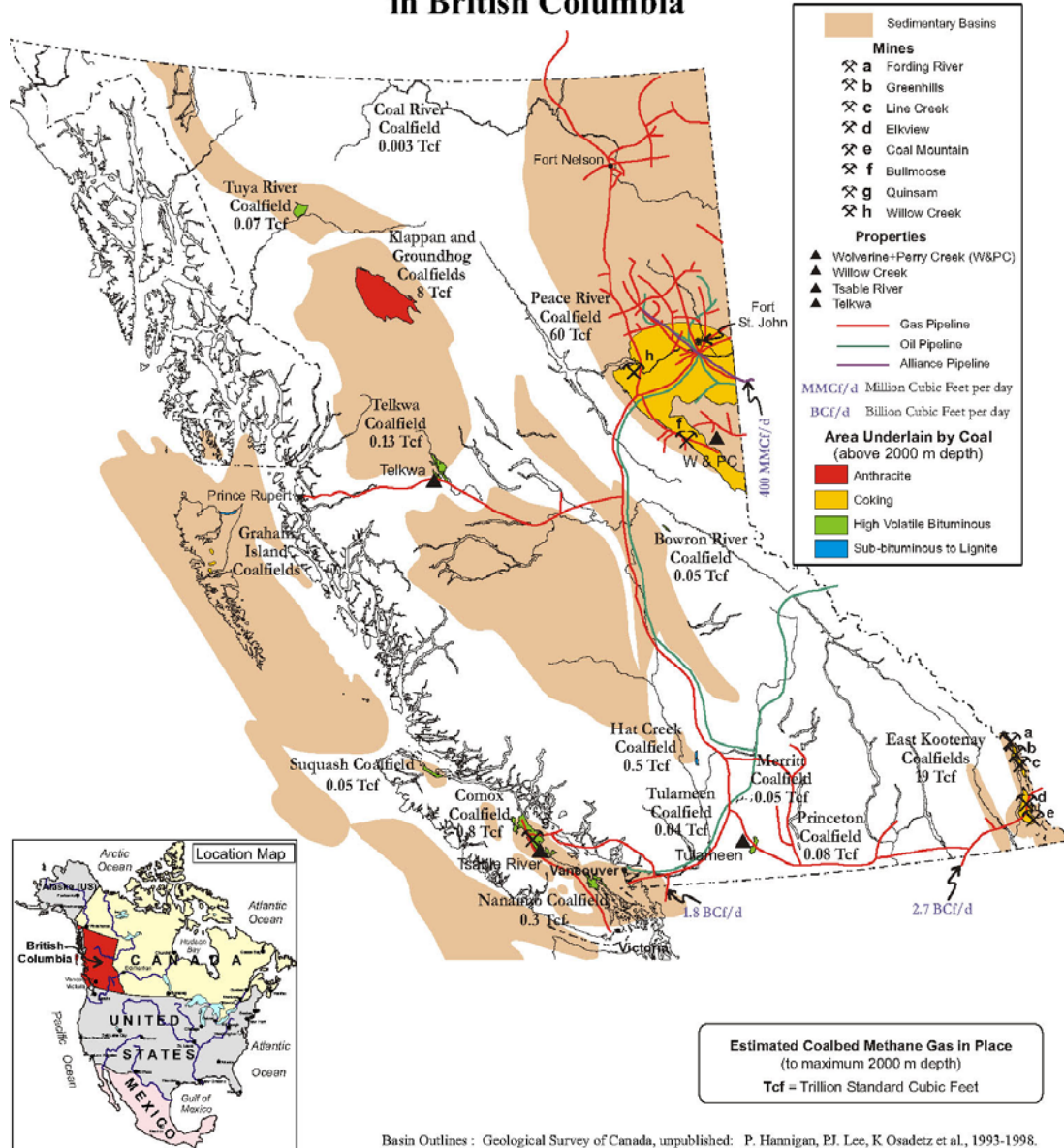


Figure 3: Location of Coal Resources in B.C.

2. Coalbed Gas

Gas well spacing areas are set by regulation and define the subsurface area that can be accessed by one well. Wells are separated from each other by this distance. Conventional gas spacing is currently set at 640 acres, which is about one square mile. Coalbed gas wells may need to be closer together, with one well required every 160 acres or four wells every square mile. This is sometimes referred to as “down-spacing”.



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Produced water – water from the coal seam is produced along with natural gas in most coalbed gas operations. Surface discharge of produced water is not permitted in BC. This produced water from the coal seams may be disposed of down a well in deep geological formations separated from any domestic aquifers by layers of impervious rock (See Information Sheet 14).

Low-pressure gathering systems – low pressure, gathering pipelines carry gas to a central compressor station where it is fed to a larger pipeline and eventually on to market through a main high pressure line. Generally, due the purer quality of coalbed gas, limited processing is required.

Information:

Ministry of Energy, Mines and Petroleum Resources – Coalfield map of BC

http://www.em.gov.bc.ca/subwebs/coalbedgas/Tech_and_Reg_Info/maps.htm#November

Canadian Society of Unconventional Gas <http://www.csug.ca/faqs.html#Un>

Canadian Centre for Energy Information

<http://www.centreforenergy.com/generator2.asp?xml=/silos/ong/UNGOOverview01XML.asp&template=1,2,1>