

Coalbed Methane

Coalbed methane (CBM), also known as natural gas from coal, is in the early stages of development. More research is necessary before the scale of its contribution to Alberta's natural gas supply is fully understood. Each coalbed basin in the world has proven to be unique, presenting its own set of issues and challenges. This EnerFAQs addresses these issues from an Alberta perspective and explains the Alberta Energy and Utilities Board's (EUB's) role in ensuring that CBM development is conducted in an orderly, efficient, and responsible manner.

What is coalbed methane (CBM)?

CBM is natural gas contained in coal. It consists primarily of methane, the gas we use for home heating, gas-fired electrical generation, and industrial fuel. Hydrogen sulphide (H₂S) is not known to be associated with CBM production. CBM commonly is referred to as an "unconventional" form of natural gas because it is primarily stored through adsorption to the coal itself rather than in the pore space of the rock, like most "conventional" gas. The gas is released in response to a drop in pressure in the coal. If the coal is water saturated, water will need to be extracted to initially reduce the pressure and allow gas production to occur. If the coal is gas saturated, little or no water will be produced, and gas will be produced from the onset of production.

Who regulates CBM development?

CBM is subject to the same EUB drilling, production, and operational rules and regulations as other natural gas. Alberta Energy also treats CBM as natural gas for royalty and tenure purposes. Further information is available in the EUB *Informational Letter (IL) 91-11: Coalbed Methane Regulation*. Alberta Environment and Alberta Sustainable Resource Development also have a role in the regulation of CBM development; they handle CBM issues in a similar manner to other natural gas matters.

Common to all natural gas regulations is the requirement to provide potentially affected parties with an opportunity to understand the proposed development and to have input into decisions. Applicants are required to identify and disclose plans to drill CBM wells.

Is there a difference between CBM and conventional gas?

The term "conventional gas" includes many different types and compositions of natural gas, with wide variations in its associated development and operations. CBM and other unconventional gas resources (e.g., shale gas, tight gas) are not as well defined; generally they are less productive and less economic than conventional gas. Any type of unconventional gas resource can move into the conventional category over time, as the resource is developed.

CBM production may differ from other currently developed conventional gas with relation to factors such as water production, surface disturbance, flaring, and noise.

Water production

Conventional gas wells produce varying volumes of water, depending on factors such as their depth and location, which relate back to the geology of the producing zone. The water produced from almost all conventional gas wells, however, is very saline (salty) in nature. Because appropriate disposal of such water requires disposal into deep wells, neither the production nor the disposal of this water has been of particular issue.

The production of CBM may involve no water production or varying quantities of either saline or nonsaline water. The EUB regulates the production and disposition of saline water produced in conjunction with CBM. Both Alberta Environment and the EUB regulate varying aspects of the production of non-saline water produced with CBM.

If nonsaline water suitable for domestic, farm, or other surface use is identified from any well licensed by the EUB, the production and final disposition of this water is reviewed by both the EUB and Alberta Environment to ensure that it is handled in an environmentally responsible way, representing the best use of the water resource. A groundwater diversion permit may be required from Alberta Environment for nonsaline water produced in conjunction with CBM.

Well drilling and completion practices and requirements in all wells exist to ensure that nonsaline aquifers are protected. Experience from the extensive conventional development to date in Alberta has shown that groundwater protection is being achieved. For shallower wells, this includes particular attention to issues like drilling and the use of completion fluids, fracturing (breaking down a formation by pumping fluid at high pressures), and combining water from different zones. All produced water volumes and produced water analyses must be submitted to the EUB and form part of the public record. The collection of good baseline water quality data, possibly involving multiple analyses on various water producing intervals over time, is encouraged and could be a requirement in some cases.

The EUB and Alberta Environment continue to work collaboratively to ensure that the necessary approvals are obtained and that procedures related to responsible water use are applied. Additionally, the two agencies are actively involved in reviewing procedures concerning the production, use, and disposal of water associated with all shallower zones.

**Surfaced disturbance
(well spacing)**

Resources are typically developed beginning with the highest quality reserves and working progressively towards the lower quality portions of the resource. Natural gas development is no different. As lower quality gas reservoirs are developed, higher well densities are generally required to optimize gas recovery. This is a long-standing trend in Alberta, and CBM continues this trend towards the closer spacing of gas wells.

Although standard gas well spacing for much of Alberta is one producing well per section per pool, a significant portion of the province, notably many shallower gas development areas, have a common spacing of two to four wells per section per pool. Unlike gas wells, standard oil well spacing in Alberta is four producing wells per section per pool, with even greater oil well densities being common in many areas.

To reduce the spacing from these set standards, EUB regulations require that industry file an application in accordance with *Guide 65: Resources Applications*. The application requirements include the need to notify all landowners and occupants in the area proposed for reduced well spacing. Full disclosure and communication of a project's details, impacts, and benefits are expected. The EUB processes hundreds of special oil and gas spacing applications each year with relatively few public concerns being raised.

In areas already producing conventional gas or oil, new CBM development may be able to take advantage of existing infrastructure, including surface installations, to minimize surface impact and disturbance. Good land-use practices, such as drilling multiple wells from a single surface location and alignment of roads or pipelines along natural field breaks, can reduce surface disturbance while allowing the necessary number of subsurface well penetrations of the coal seam for optimum recovery. Such mitigative measures are highly encouraged when well densities increase. These options should be discussed with the landowners.

CBM development that has associated water production can involve tanks on site to store produced water, at least for an initial period before pipelines are installed to carry water to central facilities. The surface impact and appearance of such wells may be closer to that of an oil well site than a traditional gas well installation. However, the full set of EUB regulations and controls pertaining to production lease construction, maintenance, and monitoring, including environmental and safety matters, apply equally to CBM well sites.

Flaring and venting

Flaring (the burning of natural gas that cannot be conserved) and venting (the release of natural gas to the atmosphere where conservation or flaring is not practical) related to CBM development is controlled and reviewed using

methods outlined in *Guide 60: Upstream Petroleum Industry Flaring, Incinerating, and Venting*. Like conventional gas wells, most CBM wells producing low water volumes should be able to limit initial flaring to short durations, particularly if they are close to existing oil and gas facilities. Testing into pipelines may be possible in some cases. Other wells, such as those initially producing larger quantities of water and low volumes of gas, may need longer periods of test flaring.

Venting of gas is strictly regulated in Alberta; where produced gas volumes are too small to burn, venting is permitted under controlled circumstances. Vented volumes from CBM development are expected to be limited.

Flaring associated with CBM tends to be more common for the first few wells in an area, until broader development occurs or an area is deemed to be uneconomic to develop for CBM. Public notice of any extended flare testing is required. CBM flares are similar to the flame in a furnace used for home heating, except that they are larger in scale. For further information on how the EUB ensures that this practice is performed safely and responsibly, refer to *EnerFAQs 6: Flaring*.

Compression and noise

Most gas production requires compression at some time or location to keep it flowing to market in pipelines. The need for compression generally increases as the pressure in producing wells declines over time. CBM wells, which generally are low pressure, will normally require compression throughout their production life. This compression can take different forms depending on existing infrastructure, economics, and production characteristics. Noise associated with compression is regulated in Alberta by the EUB; details are available in *Guide 38: Noise Control Directive User Guide*.

What is Alberta's CBM potential?

The amount of natural gas contained in Alberta's coal is very large. However, there are insufficient data at this time to provide a meaningful estimate of what portion of this resource may be recoverable. Limited production from coal, notably from the Horseshoe Canyon and Belly River zones (see attached map), has established that CBM production is technically feasible in Alberta. The EUB will continue to monitor CBM production in the province and move to reporting on CBM reserves once sufficient data are available.

The need for quality publicly accessible data to better assess Alberta's CBM reserves and to generally understand potential impacts further emphasizes the need for Alberta's CBM developers to continue providing data to the EUB in a timely manner. This includes all CBM test data and water analyses for any cases where water is produced.

**What has been Alberta's
CBM experience to date?**

Over the years, thousands of conventional oil and gas wells have drilled through and collected basic data on coal seams, allowing geologists to map coal over much of the southern half of Alberta. However, data on production and detailed CBM reserves remain limited. Most of the current Alberta-based CBM development is associated with projects in southeastern Alberta that do not produce water. Other CBM development involves some wells in small pilot projects sparsely distributed over a broad area of southern and central Alberta.

Each of the world's coal basins is different and each one accessed for its CBM potential has proven to pose unique development challenges. Coal in Alberta usually occurs as a series of thin seams, compared to the generally thicker coal seams found in the U.S. basins producing CBM (e.g., the Powder River and San Juan basins). Most of the wells drilled so far in Alberta have targeted the middle Horseshoe Canyon/Belly River coal zones (see map), with essentially no water being produced.

Other pilot projects have targeted the deeper Mannville zone and have produced saline water similar to that produced with other oil and gas development in the province, which must be managed using deep well disposal. Test wells targeting the shallower Scollard (Ardley) zone have produced limited amounts of water that varies in quality.

Further updates on Alberta's CBM development are being prepared by the EUB and are expected to be available in the fall of 2003.

What's happening today?

CBM development is proceeding under Alberta's natural gas regulatory framework with few problems and continues to be monitored. However, recognizing that there may be concerns about CBM development, Alberta Energy announced a cross-ministry review and external consultation process in 2002. This process is aimed at determining if changes to Alberta's existing natural gas policies and regulations are required for CBM development.

Alberta Agriculture, Food and Rural Development, Alberta Energy, Alberta Innovation and Science, Alberta Environment, Alberta Sustainable Resource Development, and the EUB are participating in this review. Consultation with key stakeholders to identify and prioritize issues associated with CBM development is expected to begin this fall. Then a broader consultation process will provide input on issues and develop recommendations.

In preparation for this consultation process and to assist in factual information exchange on CBM, a number of fact sheets are being prepared dealing with different aspects of CBM development in Alberta, ranging from the geology of

the resource to how it is regulated to ensure land, air, and water protection. This information will be available to the public in the fall of 2003.

Additional Information

This EnerFAQs is one in a series. The others are

- No. 1 What Is the Alberta Energy and Utilities Board?
- No. 2 Having Your Say at an EUB Hearing
- No. 3 Inspections and Enforcement of Energy Developments in Alberta
- No. 4 All About Critical Sour Wells
- No. 5 Explaining EUB Setbacks
- No. 6 Flaring
- No. 7 Electricity and the EUB
- No. 8 Proposed Oil and Gas Development: A Landowner's Guide
- No. 9 Animal Health

Every year the EUB collects, compiles, and publishes a large amount of technical data and information about Alberta's energy development and resources for use by both industry and the general public. This includes raw data, statistics, information on regulations, policies, and decisions, and hearing materials.

Publications may either be viewed at the EUB library or obtained from Information Services. Both are housed on the main floor of the EUB head office in Calgary. Publications may also be downloaded free of charge from the EUB Web site www.eub.gov.ab.ca.

To obtain a print or CD copy of a specific publication, contact EUB Information Services by phone (403-297-8190), fax (403-297-7040), or e-mail eub.info_services@gov.ab.ca.

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