

WATER USE FOR HYDRAULIC FRACTURING IN BRITISH COLUMBIA



WATER USE IN HYDRAULIC FRACTURING

Hydraulic fracturing is a government-regulated technology used safely for more than 60 years to recover shale or tight natural gas that is trapped in deep underground rock. After a well has been drilled, a mixture of mainly water and sand, and a small amount of additives, is injected into the well at high pressure to create tiny finger-like fractures in the rock. The fractures are propped open by the grains of sand to allow the natural gas to flow to the surface. The additives perform different functions such as, limiting bacterial growth or preventing corrosion. Regulations in British Columbia require producers to disclose publicly the additives used in hydraulic fracturing on a well-by-well basis, which can be found on: www.fracfocus.ca.

REGULATING WATER USE

In British Columbia, water used for natural gas development is regulated by the BC Oil & Gas Commission (BCOGC). Short-term use approvals and water licences are typically issued for water withdrawal for hydraulic fracturing operations. Short-term approvals give permission to withdraw surface water or groundwater for a maximum of 24 months. A well is typically only fractured once and will produce for 20 to 30 years without additional water requirements.

Operators are required to report water withdrawals to the BCOGC and monitor the water source to ensure they are sustainable. The BCOGC may suspend water withdrawals to protect the integrity of the water system during low flow periods or drought.

QUANTITY OF WATER USED

About 8.8 million m³ of water, the majority of which was sourced from surface water, was used to hydraulically fracture wells in B.C. in 2017. According to the BCOGC, an average of 15,600 cubic metres of water was used per well hydraulically fractured in 2017.

BCOGC data shows that water withdrawn for oil and natural gas development is small compared to the total amount of water available in northeastern B.C., representing just 0.003 per cent of the total average annual runoff in 2017.

Source: BCOGC, 2018

Flowback:

Fracturing fluid that flows back to the wellbore after hydraulic fracturing is completed.

Groundwater:

Water contained in underground natural aquifers.

Produced Water:

Water naturally present in the reservoir that is recovered along with the hydrocarbon.

Runoff:

The drainage of water over land.

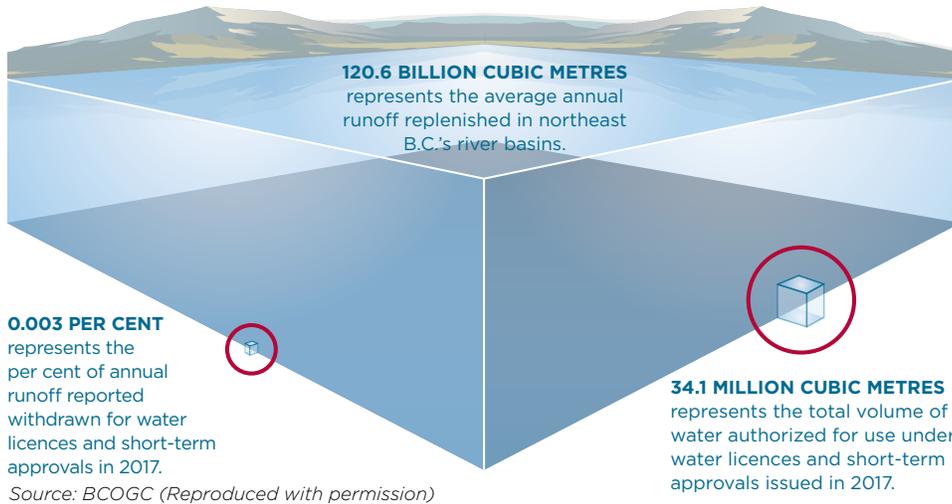
Shale Gas or Tight Gas:

Natural gas developed from low permeability reservoirs using horizontal wells with multi-stage hydraulic fracturing.

Surface Water:

Water collecting on the ground or in a stream, river, lake, sea or ocean.

COMPARISON OF ANNUAL RUNOFF, WATER ALLOCATION AND VOLUMES REPORTED WITHDRAWN IN NORTHEAST B.C. DURING 2017



Protecting water resources during sourcing, use and handling is a priority for Canada's oil and natural gas industry.

MINIMIZING WATER USE

Industry is focusing on increasing use of alternatives and reducing the amount of surface water and fresh groundwater used in hydraulic fracturing. Low-quality or otherwise unusable sources of water, such as saline groundwater, flowback, produced water and municipal wastewater are used where appropriate. New hydraulic fracturing technologies are also being developed that require less water.

Examples of industry working together to ensure fresh water resources are protected include the Montney Water Operators Group, where operators in the area seek opportunities to share water when available. In Dawson Creek, B.C., Encana's commitment to responsible development includes its Water Resource Hub, which significantly reduces fresh water use in its hydraulic fracturing operations. This is achieved by accessing saline water unfit for human or agricultural use from a deep aquifer which meets up to 75 per cent of its water requirements and will save about 2.6 million cubic metres of freshwater over the next five years.

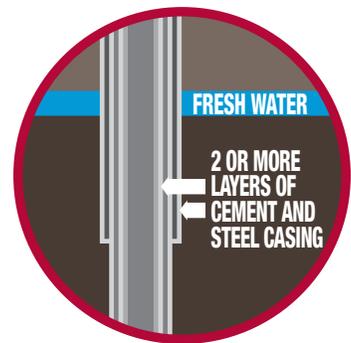
PROTECTING BRITISH COLUMBIA'S WATER RESOURCES

When a well is hydraulically fractured, the natural gas is typically found more than 2,000 to 4,000 metres below the surface. By contrast, drinking water aquifers are typically less than 300 metres from the surface. Wells are constructed to prevent drinking water contamination, with multiple layers of steel casing cemented in place.

The transportation, handling, storage and disposal of all fracturing fluids and produced water are conducted according to regulations to protect the environment.

In addition to following regulations governing hydraulic fracturing operations, water use and water protection, Canada's oil and natural gas industry is guided by CAPP's *Guiding Principles for Hydraulic Fracturing and Operating Practices*.

Visit: www.capp.ca/responsible-development/water



A SOLID BARRIER

Wellbores have multiple layers of steel casing cemented in place to prevent gas or liquid from migrating into groundwater sources.