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**Fracking in BC: Integrating climate change issues**

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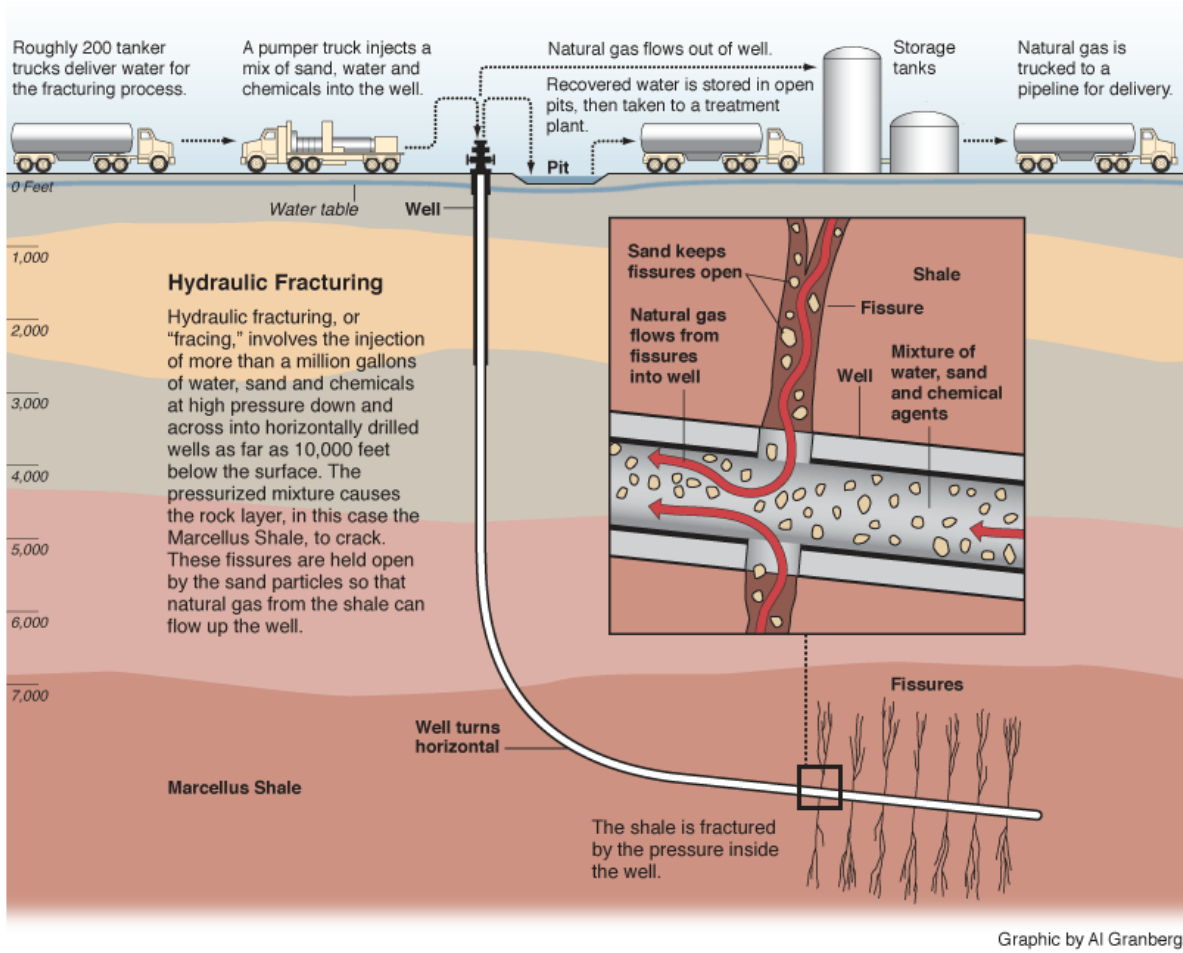
**Issue**

Proponents often praise natural gas because it is abundant, cleaner burning than other fossil fuels, less costly to burn than oil and coal, and domestically produced. Due to North America's path dependence on hydrocarbons and the lack of viable renewable energy alternatives for base-load electricity generation, natural gas is viewed as a bridging fuel to a low carbon energy future. British Columbia (BC) possesses significant natural gas reserves, particularly in the Horn River Basin. A considerable number of these reserves are trapped deep underground in shale-bearing formations. In order to extract these deposits developers must use an increasingly controversial technique - hydraulic fracturing - otherwise known as fracking. However the current controversy regarding fracking, including in the US Congress,<sup>i</sup> requires that caution be used to better understand the trade-offs and possible options to reduce associated emissions, water, and health impacts.

**Background**

Fracking involves shooting a high-pressure mixture of water, sand and chemicals deep underground, to release natural gas in shale rock. This technique extracts gas trapped within underground geological structures and increases the overall output of a well (see Figure 1).<sup>ii</sup> Fracking has vastly expanded access to shale gas reserves throughout North America. This becomes particularly relevant for BC as shale gas development in northeast BC is projected to grow and to become a major economic driver for the province. In 2008 total natural gas extraction in BC for all techniques was 3 Bcf/day (billion cubic feet per day).<sup>iii</sup> By 2015, development of shale gas in the Horn River Basin (near Fort Nelson) alone is projected to produce 1 Bcf/day and by 2020 this is expected to increase to 2 Bcf/day, resulting in substantial provincial royalties over many decades.

**Figure 1: The fracking process: Marcellus Shale in New York**



Source: ProPublica (<http://www.propublica.org/special/hydraulic-fracturing>)

Fracking is a new technology that has become quite controversial. The main criticisms of the fracking process relate to:

**1) Greenhouse gas emissions during extraction** - Shale gas is associated with high concentrations of CO<sub>2</sub>, normally vented to the atmosphere. Other sources of GHG emissions include methane leaks (21 times more potent than CO<sub>2</sub>) from pipelines and CO<sub>2</sub> emissions from combustion at processing plants. A [recent report](#) published by the [Pacific Institute for Climate Solutions](#) finds that shale gas exploration without carbon capture and storage (CCS) is incompatible with BC's greenhouse gas goals of reducing emissions 33% below 2007 levels by 2020. A recent Massachusetts Institute of Technology (MIT) report finds that natural gas must be used only over the short term as direct coal substitute in order for life cycle emissions to be accounted for and to bridge to a low carbon economy.<sup>iv</sup>

**2) Water use and contamination** – Hydraulic fracturing is a water intensive procedure, requiring between 7.5 and 30 million litres of water per well fractured. In the Barnett Shale in Texas, for example, an average of almost 11 million litres of water is used per well, the great

majority of which is used for hydraulic fracturing.<sup>v</sup> The high-pressure mixture of water, sand and chemicals used to unseal gas deep underground contains chemicals that can be toxic to humans and wildlife, including chemicals linked to cancer.<sup>vi</sup> Studies have shown that anywhere between 20-40% of non-biodegradable fracking fluid remains in the ground, contaminating millions of gallons of groundwater.<sup>vii viii</sup>

**3) Public health issues related to compromised aquifers** - Fracking has recently brought the US Environmental Protection Agency (EPA) under fire from local residents in Fort Worth, concerned about fracking agents compromising the water supply.<sup>ix</sup> EPA agrees with Congress that there are serious concerns from citizens and their representatives about hydraulic fracturing's potential impact on drinking water and human health, which demands further study.

## **Recommendations**

The Ministry of Energy is responsible for monitoring gas extraction procedures in BC. Given the known risks of fracking and efforts to expand the operation in the province, the Ministry's new Oil and Gas Activities Act needs to adopt stringent regulations and enforcement protocols. These need to be considered within the context of two climate-related issues:

### ***1. Mitigation: Evaluate life cycle emissions and overall emissions reduction due to displacement of coal***

The PICS study<sup>x</sup> proposed three possible courses of action for BC: 1) abandon its GHG reduction target, 2) ban shale gas development completely, 3) restrict shale gas development so that it is no more GHG intensive than the conventional natural gas industry. The third option requires industry to adopt carbon capture and sequestration (CCS) technologies at natural gas processing facilities<sup>xi</sup>. Shale gas development requires strategic decisions about where and how this resource displaces coal in other jurisdictions.<sup>xii</sup> Greenhouse gas emissions will be included in the provincial inventory.

Ensuring that natural gas acts as a short-term bridge to a diversified energy portfolio requires policies that create a level playing field for alternative energy supplies (e.g. ensuring investment and finance continues to be directed to renewable energy technologies). The shift to a low carbon economy in BC will require appropriate financial incentives that do not subsidize natural gas at the expense of renewable energy technologies.<sup>xiii</sup>

### ***2. Adaptive strategies: Examine the impacts of fracking on water quantity and quality; regulate full disclosure permitting; and provide proximal restrictions***

**(i) Baseline water quantity and quality:** Baseline data on both ground and surface water volumes extracted and water quality needs to be monitored in advance of and during the fracking process. At present, no public agency in BC requires developers to monitor the water extracted from groundwater, rivers and other streams. This baseline information is helpful for four main reasons:

- Provides groundwater and surface water data in order to better understand impacts of industrial use versus climate change on water quantity and quality;<sup>xiv</sup>
- To monitor vulnerabilities and impacts on local biodiversity (e.g. ensuring instream

flow requirements for aquatic species);

- To equip citizens with baseline information from which to determine impacts on community sources of drinking water. For example, Alberta gives the owner of any water well exposed to proposed fracking the right to have water from the well tested at the expense of the gas company before development occurs<sup>xv</sup>; and
- To inform appropriate adaptive strategies.<sup>xvi</sup>

**(ii) 'Full disclosure' permitting for delivery agents and slickwater storage:**

Encouraging producers to use non-toxic drilling fluids, similar to those commonly used by the offshore oil and gas industry.<sup>xvii</sup> This circumvents developers' arguments related to intellectual property rights in delivery agent composition. If developers continue to use toxic chemicals then they could be required to seek to pay substantial fees for special permits.

Currently companies such as Schlumberger recommend that many of its fracturing fluids be disposed of in hazardous waste facilities.<sup>xviii</sup> Using water-based delivery agents would also address disposal issues of toxic wastewater that results from fracking. Typical practice is to store wastewater in lined pits on the surface; however this assurance has been under-monitored and when liners tear, soil and groundwater can be contaminated.<sup>xix</sup> In this situation, wastewater could be contained in steel tanks for disposal at an appropriate water treatment facility.<sup>xx</sup>

**(iii) Proximal restrictions:** Standards should be applied that consider the proximity of wells to aquifers, for both horizontal and vertical drilling, in order to avoid the potential for contamination of valuable water sources. This will help to protect both well operators and government agencies against allegations and legal suits. For instance, 13 families in Susquehanna County, Pennsylvania are filing suit against Southwest Energy Production Company which, they argue, contaminated their water supply by fracking too near the community aquifer.<sup>xxi</sup> There could also be repercussions for the EPA should the citizens express discontent over the EPA's regulatory and monitoring standards.

## **Conclusion**

Natural gas has an important role to play in BC's transition to a low carbon economy. However, the various aspects of fracking covered here are critical to the both the validity of the technology and the province's climate change mitigation and adaptation strategies. It is strongly recommended that specific standards for fracking be reflected in the Oil and Gas Activities Act that address the suite of climate-related issues. The US Congress has requested that the EPA undertake a comprehensive [study of hydraulic fracturing](#) with the aim of creating more robust standards. This is due to be released in 2012.<sup>xxii</sup> It may be prudent for BC to pursue a similar study, emphasizing climate change mitigation, potential implications for adaptation, and a strategic, short-term role for natural gas in the move toward a low carbon economy.

## Further Reading

Shale gas will rock the world, May 10, 2010

[http://online.wsj.com/article/NA\\_WSJ\\_PUB:SB10001424052702303491304575187880596301668.html](http://online.wsj.com/article/NA_WSJ_PUB:SB10001424052702303491304575187880596301668.html)

New Lawsuits filed in fracking country, September 15, 2010

<http://green.blogs.nytimes.com/2010/09/15/new-lawsuit-filed-in-fracking-country/>

Dash for gas raises environmental worries, July 12, 2010

[http://www.nytimes.com/2010/07/12/business/energy-environment/12iht-green.html?\\_r=2](http://www.nytimes.com/2010/07/12/business/energy-environment/12iht-green.html?_r=2)

Texas proposes new rules for shale gas drilling, July 29, 2010

[http://news.yahoo.com/s/ap/20100729/ap\\_on\\_bi\\_ge/tx\\_gas\\_drilling\\_environment](http://news.yahoo.com/s/ap/20100729/ap_on_bi_ge/tx_gas_drilling_environment)

BC's dishonesty on climate change, July 28, 2010

<http://www.vancouversun.com/opinion/dishonesty+climate+change/3331188/story.html>

Hydro fracturing has a lucrative dirty secret, January 28, 2010

<http://www.straight.com/article-282210/vancouver/lucrative-dirty-secret>

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<sup>iii</sup> Jaccard, Mark and Brad Griffin. (2010). [Shale Gas and Climate Targets: Can They Be Reconciled?](#), School of Resource and Environmental Management, Simon Fraser University. Pg 4.

<sup>iv</sup> MIT Energy Initiative. (2010). [The Future of Natural Gas: An Interdisciplinary MIT study](#). Massachusetts Institute for Technology. Pg 4.

<sup>v</sup> Zoback, Kitasei, Copithorne (2010). [Addressing the Environmental Risks from Shale Gas Development](#), Worldwatch Institute, pg.12, July.

<sup>vi</sup> Environmental Protection Agency (2002). DRAFT Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs. EPA 816-D-02-006, August.

<sup>vii</sup> McCallister, Ted. (2002). Impact of Unconventional Gas Technology in the [Annual Energy Outlook 2000](#). Energy Information Administration, U.S. Department of Energy.

<sup>viii</sup> Bredehoeft, John (2003). Letter to Joan Harrigan-Farrelly, Chief, [Underground Injection Control, Prevention Program](#), Environmental Protection Agency. May 22, 2003.

<sup>ix</sup> EPA (2010). [Letter sent by EPA to nine hydraulic fracturing service providers](#). Environmental Protection Agency.

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- <sup>xiii</sup> MIT Energy Initiative. (2010). [The Future of Natural Gas: An Interdisciplinary MIT study](#). Pg 5.
- <sup>xiv</sup> Cohen, S. and T. Neale (eds.). (2006). [Participatory integrated assessment of water management and climate change in the Okanagan Basin, British Columbia. Vancouver](#): Environment Canada and University of British Columbia
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- <sup>xix</sup> Horwitt, Dusty (2010). [Drilling around the law](#), Environmental Working Group. Pg 15.
- <sup>xx</sup> Horwitt, Dusty (2010). [Drilling around the law](#), Environmental Working Group. Pg 6.
- <sup>xxi</sup> [Parker Waichman Alonso LLP vs. Southwest Energy Production Company](#) and its parent, Southwestern Energy Company (14 September, 2010).
- <sup>xxii</sup> Burdeau, Cain. (18 March 2010). [EPA to Study 'Fracking' Gas Drilling Method](#) Associated Press.