Building Capacity to Build Trust: Key Challenges for Water Governance in Relation to Hydraulic Fracturing

Decision-Makers' brief[i]

This brief outlines and summarizes the results of a recent in-depth research review on water governance challenges specific to hydraulic fracturing across Canada. It identifies some of the primary concerns associated with the current approach to management and governance and offers specific actions to help address the emerging challenges, including the loss of confidence and trust in the overall decision-making process. This brief is primarily focused on British Columbia, New Brunswick, the Northwest Territories, and Nova Scotia, but also informed by developments in Alberta and Quebec and highlights a number of key actions required for decision-makers to consider when addressing governance challenges. It is based on research undertaken as part of one of five projects within the Canadian Water Network hydraulic fracturing program.[ii]

What is water governance?

Water governance involves three elements:
(1) who decides who may use water and for what purposes;
(2) what standards must be met during that use to protect ecological, economic, social, or cultural values; and,
(3) how that decision process is undertaken.

Hydraulic fracturing – an extraction technique that involves injecting hydraulically pressurized liquid into shale rock to release natural gas –is on the rise in many regions of Canada. For instance, in the Montney Basin shale gas play in B.C., there were 1,100 active horizontal wells drilled between 2005 and 2012. In Alberta, 10 000 horizontal oil and gas wells were completed by fracturing between 2008 and 2014.[1] This fast-tracked expansion has occurred in what critics consider an insufficient regulatory environment that lacks adequate knowledge about the short and long-term impacts for human and ecosystem health.[2]

Hydraulic Fracturing and Mounting Concerns

Hydraulic fracturing is controversial across Canada. Hundreds of national news stories related to the topic have been run over the last year alone, along with several major reports on the topic, including the Council of Canadian Academics' in-depth analysis *Environmental Impacts of Shale Gas Extraction in Canada*.[3] Supporters of hydraulic fracturing view these operations as a low-risk source of economic value and job creation, while opponents consider these developments a significant threat to surface and groundwater, and to broader social and ecological systems. A recent B.C. Environmental Appeal Board (EAB) decision revoking a significant water licence granted to Nexen in Fort Nelson First Nation territory for hydraulic fracturing further highlights the challenges surrounding decisions to use water for hydraulic fracturing.[4]

One of the biggest concerns of hydraulic fracturing is the potential effect on surface and ground water quality and quantity. The extraction technique relies on significant throughputs of water.[5] For instance, one documented case in the spring of 2010 involved Apache Corporation conducting 274 separate fractures on a 16 well pad in the Horn River Basin in Northeastern B.C., which used a total of 980 million litres of water (a mix of fresh and flowback waters), equalling an average of 61 million litres per well.[6]

To further give a sense of the extent of water use, the Canadian Association of Petroleum Producers (CAPP) has indicated that B.C.'s oil and natural gas sector was approved for approximately 20 billion litres of

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[i] Moore, M-L., Simms, R., Brandes, O.M., Shaw, K., and H. Castleden. Decision-Makers' brief on *Regional Snapshot Report Building Capacity to Build Trust: Key Challenges for Water Governance in Relation to Hydraulic Fracturing*. Prepared on October 6, 2015. For full report see: http://www.cwn-rce.ca/project-library/project/not-just-a-license-to-drill-exploring-the-challenges-of-water-governance-and-hydraulic-fracturing-in-canada?u=category%3Dhydraulic-fracturing. This was produced as part of a national research initiative led by the Canadian Water Network (see Appendix A for details on the national initiative and Appendix B for an overview of the methods used in this study). The authors would like to acknowledge the support of the Canadian Water Network for the project upon which the brief is based.

[ii] For the national overview report, see: http://www.cwn-rce.ca/focus-areas/energy-and-resources/water-and-hydraulic-fracturing-report/.

surface water per year through water licence allocations in 2014.[7] An additional 11.3 billion litres was approved for short-term water use, of which CAPP states only 530 million litres was actually used for hydraulic fracturing.[8] While the *total* water demand for hydraulic fracturing in Canada might proportionally be small in some regions, the use is intensive and can create water stresses at times of peak demand, and in different seasons.[9]

New approaches have emerged, such as Alberta's play-based regulations[10] and B.C.'s NorthEast Water Tool[11]. Despite that, controversy remains, fuelled by pre-existing issues in water governance systems across Canada that are prevalent regardless of whether a jurisdiction has a moratorium in place or is actively allocating water to hydraulic fracturing. Specifically, concerns exist that water is, or will be, allocated to hydraulic fracturing ***without***:

- adequate scientific information about impacts on groundwater and surface water;
- sufficient community engagement processes; and,
- meaningful inclusion of Indigenous Nations.

These failures are resulting in a deep public distrust in the decisions that are being made, particularly with respect to the use of water for hydraulic fracturing developments. An urgent need exists to create innovative water governance systems to ensure ecologically, socially, economically, and culturally responsible decision-making about water use.

Key Insights: Hydraulic Fracturing Across Canada

Different provinces and territories in Canada have had vastly different responses to hydraulic fracturing, from moratoriums (such as New Brunswick) to rapid industry expansion (as in the west). The table below summarizes the general status of the industry and the provincial and territorial frameworks for governing water in the hydraulic fracturing context. Comparing these situations and their regulatory regimes indicates four key insights about the current state of governance responses between these regions across Canada:

1. There is a wide span in regional histories with hydraulic fracturing and energy development. While some regions have extensive experience with extractive resource development, many communities located within or near shale plays are new to an oil and gas "culture".

2. There are two opposing responses to hydraulic fracturing development. Jurisdictions have responded primarily in one of two ways to the fast-moving industry, either fully opting in, allowing rapid development in a governance vacuum, or opting out, erecting bans or temporary moratoriums to delay or prevent production. Neither of these create innovations in governance to address the concerns about water use and water decision-making processes.

3. There is a patchwork of governance frameworks. Different provinces and territories have a considerable range of government entities and legislation that deal with hydraulic fracturing. This contributes to a lack of understanding and sense of transparency in decision-making since it is difficult to track who is responsible for decisions, or for addressing concerns once they are voiced.

4. There is a significant range in the volumes of water used. The amount of water used for hydraulic fracturing varies considerably across Canadian operations, depending on both the strategy of a particular company and the characteristics of the shale itself. In some cases, fluids other than water (e.g. diesel or propane) can be used for the fracturing process. These differences mean that it is challenging to understand how much water is being used, since information differs between sites and companies.

Table: Provincial and territorial comparison of the general status of the hydraulic fracturing industry and associated governance frameworks[12]

Province	Status of industry	Overall governance framework
Alberta	Large and well-established oil and gas industry; 10 000 wells fracked since 2008.	• Alberta Energy Regulator (AER) is responsible for all oil and gas development and accepts applications for water licences. • Key legislation: *Water Act*, *Responsible Energy Development Act*
British Columbia	Fast-moving (especially between 2005 and 2009) industry; a key part of provincial economic strategy	• B.C. Oil and Gas Commission (OGC) is responsible for the development of petroleum resources and the management of industry impacts. The OGC has delegated authority to approve water licences. • Key legislation: *Oil and Gas Activity Act*, *Water Act*, and forthcoming *Water Sustainability Act.*
New Brunswick	Long history of oil and gas development but shale gas industry is small; moratorium in place	• Department of Energy and Mines has authority over natural gas; Ministry of Environment regulates water. • Key legislation is the *Clean Environment Act, Oil and Natural Gas Act, Clean Water Act.*
Nova Scotia	Fierce public opposition; moratorium on high volume hydraulic fracturing (except for testing and research)	• Department of Energy holds authority for shale gas and Department of Environment receives application on potential impacts. • Key legislation is the *Water Act; Petroleum Resources Act*; *Environment Act;* and *Environmental Goals and Sustainable Prosperity Act.*
Northwest Territories	Companies exploring in the Canol shale oil play (Central Mackenzie Valley), but development is slow moving	• Governance changing with current process of devolution under Bill C- 15, including the creation of a new eleven-person territorial board in Yellowknife. • All water management is guided by the *Northern Water, Northern Voices* Water Strategy.
Ontario	Starting in 2010, geological researchers identified potentially productive reserves; province currently lacks regulatory framework to govern hydraulic fracturing	• Multiple agencies would be involved in regulation of shale gas development and water governance: the Ministry of Natural Resources, the Ontario Energy Board, and the Ministry of Environment. • Key legislation is the *Ontario Water Resources Act* and the Water Taking Regulation; *Ontario Clean Water Act*; *Environmental Protection Act;* and numerous municipal bylaws.
Quebec	Quebec has a high potential shale gas landscape; the provincial government instituted a moratorium in 2011	• Ministry of Environment governs surface and groundwater withdrawals. • Key legislation is the *Environmental Quality Act*, *Water Act,* Water Policy legislation, and the moratorium bill.

Priority Governance Challenges & Required Actions[iii]

Despite the differences in water governance and hydraulic fracturing development described above, there are several common governance challenges across Canada. Each of the four concerns described below feeds into the primary issue of a lack of trust in existing governance processes. This section also highlights specific action items that are urgently required to begin addressing the identified governance challenges.

1. Limited government capacity and lack of transparency and accountability. There are extensive concerns about governments' limited capacity to effectively and transparently regulate the hydraulic fracturing industry's water use.[13] Questions were raised about how, given capacity constraints, governments could understand the complexity of ecosystem and watershed functions; develop trusting relationships between industry, community, and Indigenous nations; fully understand the operational practices of the industry and how best to regulate those practices; and enforce existing regulations.

[iii] Note: the conclusions and key actions outlined in this section reflect the view of the researchers and brief authors associated with this project, not the Canadian Water Network project more broadly.

KEY ACTIONS NEEDED

- *Commit adequate staff, training, and resourcing to ensure competent cumulative assessment, community engagement, Indigenous Nation relationship-building, and environmental protection and enforcement in all regions where hydraulic fracturing exploration or development is occurring/proposed.*
- *Create opportunities for public input into water allocation processes BEFORE final allocation decisions are made.*
- *Enact regulations requiring hydraulic fracturing water licence holders to report on water-use and adopt consistent standards for data collection, even if monitoring infrastructure is privately owned; make this data publically available, in an accessible format.*
- *Conduct an audit/government capacity needs assessment.*
- *Adopt the precautionary approach to decision-making in areas with high degrees of uncertainty.*

2. Scientific uncertainty and data deficits. In Canada, concern regarding contamination risks is the foremost cause of public opposition to hydraulic fracturing. In B.C., Alberta, and New Brunswick, operators are encouraged or required to report chemical use in hydraulic fracturing fluids on Fracfocus.ca. However, given ongoing concerns, it has been insufficient in providing the transparency needed for trust in decision-making. There is a great deal of scientific uncertainty regarding the water quality and quantity risks associated with hydraulic fracturing. In part, this is due to a lack of baseline data and cumulative assessment and monitoring programs. Little is known about the type and scope of data that industry already may collect about water quantity and quality. There are also major concerns related to the governance of data – its funding, its ownership, and how it is used – resulting in a general mistrust amongst the many groups that report and/or rely on this data.

KEY ACTIONS NEEDED

- *With partners, co-create an independent advisory group that develops rigorous scientific data sets regarding water use for hydraulic fracturing, and which includes multiple ways of knowing.*
- *Ensure data are publically available.*
- *Collaboratively develop a funding model for independent data collection.*
- *Establish long-term environmental monitoring. Fill in key data gaps related to water use for hydraulic fracturing for the following: (1) chemical additives, (2) baseline conditions and changes over time (3) cumulative effects (4) volume-related effects, and (5) broader health and social impacts.*
- *Continue to build upon efforts to develop cumulative assessment processes that have been initiated across Canada, and move to implementation.*

3. Lack of inclusion of Indigenous nations in water allocation decisions. This research found that Indigenous communities often experience a disproportionate burden of the impacts of hydraulic fracturing projects, and that existing water allocation frameworks do not fully recognize and respect Treaty and Aboriginal rights or the spirit and intent of government-to-government relationships.

KEY ACTIONS NEEDED

- *Recognize that every water allocation decision reflects on the overall commitment to Aboriginal reconciliation.*
- *Ensure water allocation decisions are supported by consultation, accommodation, and prior, informed consent that are consistent with current legal frameworks regarding Aboriginal rights and title.*
- *Work with individual Indigenous Nations to co-create shared decision-making processes and protocols regarding hydraulic fracturing in their traditional (or Treaty) territories.*

4. Lack of community engagement processes. Changes to land and water from hydraulic fracturing affect many dimensions of social and community health, sense of place, and wellbeing. However, there is a lack of meaningful community engagement to address these concerns, and a lack of capacity and knowledge about how to address social, ecological, and cultural values in water allocation decision-making. The result is that economic values are prioritized over all other values, even when public input is sought.

KEY ACTIONS NEEDED

- *Adopt the principle of prior, informed, and community consent for water use for hydraulic fracturing development in all watersheds.*
- *Build "traceability" of how community and Indigenous Nation concerns voiced during consultation are used in decisions.*
- *Develop collaborative watershed planning and governance approaches that are suited to rural and remote areas, with intensive industry development, but limited community and government capacity.*
- *Consider the full range and cumulative potential regional-scale impacts in decision-making processes.*

Moving Beyond a Crisis of Trust

All of the factors outlined in this brief have culminated in a crisis of trust in water governance relating to hydraulic fracturing in Canada. Without attention to the governance challenges described above, the hydraulic fracturing industry in Canada will continue to be mired in controversy, with decisions that are made without adequate information and that do not protect ecosystems or align with regional community priorities. This deep-rooted lack of trust manifests in many ways that severely hobble current efforts to promote responsible management, including:

- industry often lacks the "social licence" to operate;
- perceptions of lack of transparency and accountability persist even with current government and industry efforts to regulate and make more transparent decisions using new tools or processes;
- there are costly and time consuming court and tribunal challenges of water-related hydraulic fracturing decisions;[14]
- reconciliation with Indigenous nations is often further diminished; and,
- Canada remains a laggard in terms of its ability to develop water governance innovations that suit its resource-dependent economy.

For water governance to be effective, actions are needed that build capacities for accountability and transparency, for governing with and alongside Indigenous nations, for engaging non-Indigenous communities, and for making decisions informed by science, local knowledge, and Indigenous ways of knowing.

APPENDIX A: Canadian Water Network National Research Program

In 2013, the Canadian Water Network developed a national research program to identify the questions that were of most importance to those involved in decision-making, the knowledge gaps related to these questions, and the key steps towards filling these gaps. The national initiative explored four main areas:

1. Watershed governance and management approaches for resource development, including a focus on Indigenous interests and concerns;
2. Groundwater and subsurface impact issues;
3. Wastewater handling, treatment and disposal; and
4. Landscape impacts of development/operations on surface water/watersheds.

For the full synthesis report from the Canadian Water Network research program, see: http://www.cwn-rce.ca/focus-areas/energy-and-resources/water-and-hydraulic-fracturing-report/.

APPENDIX B: Research Approach

This research involved a three-pronged approach:

1. Researchers analyzed the current state of knowledge on hydraulic fracturing and water governance in Canada through an extensive literature review of academic scholarship, reports by governments, expert panels, and international organizations, and a wide range of other sources.

2. Researchers developed a three-part Delphi study,[15] with the aim of creating a "virtual panel" of non-partisan experts that could define and then establish consensus on the top priority challenges in Canada with respect to water governance in relation to hydraulic fracturing. The three Delphi panels for this study involved between 57 and 112 participants, with diverse representation from all provinces and territories from NGOs, academia, provincial, federal, and municipal governments, industry, Aboriginal organizations, and the consulting sector.

3. Researchers hosted an expert workshop that included twenty-five people from sixteen organizations in five regions: British Columbia, Alberta, New Brunswick, the Northwest Territories, and Nova Scotia. The purpose of the workshop was to build shared understanding on key challenges and knowledge needs related to water governance and hydraulic fracturing and to understand regional differences.

For full results from this research project see: http://www.cwn-rce.ca/project-library/project/not-just-a-license-to-drill-exploring-the-challenges-of-water-governance-and-hydraulic-fracturing-in-canada?u=category%3Dhydraulic-fracturing.

Endnotes

[1] AER staff, personal communication, March 3, 2015.
[2] Council of Canadian Academics. 2014. Environmental Impacts of Shale Gas Extraction, online: http://www.scienceadvice.ca/en/assessments/completed/shale-gas.aspx; Andrew Nikiforuk, "Canadian Fracking Lacks Credible Groundwater Monitoring: Expert" The Tyee (4 June 2014) online: http://thetyee.ca/News/2014/06/04/Fracking-Lacks-Groundwater-Monitoring/.
[3] Council of Canadian Academics. 2014. Environmental Impacts of Shale Gas Extraction, online: http://www.scienceadvice.ca/en/assessments/completed/shale-gas.aspx.
4 *See Chief Gale and the Fort Nelson First Nation v. Assistant Regional Water Manager & Nexen Inc et al* (Decision No. 2012-WAT-013(c). The EAB rejected the licence based on their findings that a) the licence had been granted based on inadequate data, and b) the Province's consultation process with the Fort Nelson First Nation was inconsistent with the honour of the Crown and the overall objective of reconciliation.
[5] Potential hydraulic fracturing impacts on groundwater and surface water include: accidental surface releases of fracturing chemicals and wastewater; changes in hydrology and water infiltration caused by new infrastructure; gas leakage from wells; and upward migration of natural gas and saline waters from leaky well casings, abandoned wells, natural fractures in the rock, and permeable faults. See: Council of Canadian Academics. 2014. Environmental Impacts of Shale Gas Extraction, online: http://www.scienceadvice.ca/en/assessments/completed/shale-gas.aspx.
[6] Campbell, K. and M. Horne. 2011. Shale Gas in British Columbia: Risks to B.C.'s water resources. Pembina Institute, AB, online: https://www.pembina.org/reports/shale-and-water.pdf; See also Apache Corporation, "The Horn River Project — Ootla team celebrates largest completions in North America" media release, July 2010, online: http://www.apachecorp.com/explore/Browse_Archives/View_Article.aspx?Article.ItemID=1130.
[7] Morrison, G. 2014. Hydraulic Fracturing and Water Use. Contributing to Water Canada, June 9, 2015, online: http://www.capp.ca/media/commentary/hydraulic-fracturing-and-water-use-in-british-columbia at para 7.
[8] Morrison, G. 2014. Hydraulic Fracturing and Water Use. Contributing to Water Canada, June 9, 2015, online: http://www.capp.ca/media/commentary/hydraulic-fracturing-and-water-use-in-british-columbia at para 7.
[9] Council of Canadian Academics. 2014. Environmental Impacts of Shale Gas Extraction. online: http://www.scienceadvice.ca/en/assessments/completed/shale-gas.aspx, at chap. 4.
[10] Alberta Energy Regulator (AER). 2015. Play-based regulation: piloting a new approach to oil and gas development. Government of Alberta, online: http://www.aer.ca/documents/about-us/PBR_Brochure.PDF.
[11] B.C. Oil and Gas Commission. 2015. Improved Northeast Water Tool, online: https://www.bcogc.ca/improved-northeast-water-tool.
[12] Note that we include additional provinces here that are not the primary focus of our analysis, as they were included in much of our background research, and participants from across these provinces also participated in the Delphi study and review of the report.
[13] Specific concerns include: governments' low staffing levels in environmental and resource protection agencies; frequent high turnover rates of staff in remote or rural regional offices which limits familiarity with the community and the hydrology of local watersheds; and rapidly advancing technological developments in the industry.
[14] See, for instance: the *Ernst v. Encana, Western Canada Wilderness Committee v. British Columbia (Oil and Gas Commission)*, 2014 BCSC 1919, *See Chief Gale and the Fort Nelson First Nation v. Assistant Regional Water Manager & Nexen Inc et al* (Decision No. 2012-WAT-013(c).
[15]A Delphi study is a research method used to structure an anonymous conversation involving a group of experts, centered on generating ideas and finding common ground between participants who may (or may not) have similar credentials or perspectives on a particular phenomenon. The purpose of engaging with these experts anonymously is to ensure equality and opportunity for panel members to express their independent opinions.