



Ethical Reflections on Fracking

KAIROS Discussion Paper

February 2015

The attached paper is intended to facilitate discussion among KAIROS members and their networks on the issue of hydraulic fracturing for shale gas and oil, popularly known as fracking.

Background to the paper:

In October 2013, the KAIROS Sustainability Circle discussed the issue of hydraulic fracturing. Circle members raised concerns about the ecological and Indigenous rights consequences of fracking brought to light by recent developments, including a peaceful blockade against shale gas exploration in New Brunswick. Using the ethical framework previously developed as a tool of reflection on emerging issues, KAIROS staff prepared a discussion paper for the Circle and the Board. Following the February 2014 Board meeting, a draft of the paper was circulated amongst the KAIROS churches for input. Following the receipt of that input from members before and at the October 2014 Board meeting, the paper was revised, with the assistance of the staff and Circle, into a final discussion document. An Executive Summary was also prepared that reflected a broad consensus among KAIROS members on the key issues.

*In KAIROS, eleven churches and religious organizations work together
for ecological justice and human rights*

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Executive Summary

What is Fracking?

Hydraulic fracturing (fracking) involves the injection of water, sand and chemicals deep underground at high pressure to fracture rocks containing natural gas or oil.

Is Fracking Beneficial to the Economy?

The Canadian Association of Petroleum Producers says fracking contributes to job creation, economic growth and the generation of government revenues. However, experience to date and a holistic cost-benefit assessment of environmental, health and social costs raises serious questions about the net benefits to society.

Some Elements to Consider

Hydraulic fracturing raises significant social and environmental justice issues related to the rights of Indigenous peoples, water consumption, air and water contamination, greenhouse gas emissions and the triggering of seismic activity.

Fracking and Indigenous Rights

Fracking projects have been initiated on traditional territories of Indigenous peoples in New Brunswick, British Columbia and Argentina, among other places. Indigenous peoples are asserting their right to be consulted, to be full and effective participants in all aspects of the project, and to be able to grant or withhold free, prior and informed consent before fracking can take place on or near their lands as established by section 35 of the *Constitution Act, 1982* and the United Nations *Declaration on the Rights of Indigenous Peoples*.

Canadian Responses to Fracking

Citizen mobilizations in many countries demonstrate widespread concern for the ecological dangers associated with fracking. A commission set up by the Quebec government concluded that the economic, social and environmental costs of proceeding with the exploitation of shale gas from the lower Saint Lawrence region exceeded the benefits, leading to an extension of a ban on fracking.

A number of other jurisdictions, including Newfoundland and Labrador, Nova Scotia and New Brunswick, have instituted bans or moratoria on fracking. These indicate the importance citizens and governments attach to adhering to the precautionary principle, that is, the precept that an action should not be undertaken if its consequences are uncertain and potentially dangerous.

A May 2014 report by the Council of Canadian Academies asked by the federal Environment Minister to assess research on the impacts of shale gas found that due to a lack of scientific data, many uncertainties remain concerning the dangers of fracking.

Fracking and Water Resources

There are many reports of water overuse and contamination from fracking in a number of jurisdictions. The Council of Canadian Academies notes that “There is reason to believe that shale gas development poses a risk to water resources, but the extent of that risk, and whether substantial damage has already occurred, cannot be assessed because of a lack of scientific data and understanding.” The Council asserts that “The greatest threat to groundwater is gas leakage from wells for which even existing best practices cannot assure long-term prevention.”

Social Impacts of Fracking

New Brunswick's Chief Medical Officer cautions against proceeding with shale gas fracking until further study can be done on its health effects. She notes that in addition to dangers posed by water and air contaminants, other important determinants of health must be considered such as the negative social impacts of the "Boomtown Effect" involving "increases in crime, drug and alcohol abuse, sexually-transmitted infections (STIs), and domestic violence" in places where resource booms occur.

Fracking and Greenhouse Gases

As the petroleum industry correctly maintains, using natural gas as a substitute for coal reduces carbon dioxide emissions at the point of combustion by approximately half per unit of energy produced. However, there is evidence that shale gas is more greenhouse gas intensive than coal or conventional natural gas over a full life-cycle from extraction to combustion due to the leakage of methane, a greenhouse gas 86 -105 times more potent than carbon dioxide over a 20 year period. Availability of low-cost shale gas also delays investments into renewable energy sources such as wind and solar power.

Many climate scientists question the wisdom of extracting shale gas when the amount of carbon in known fossil fuel reserves, including shale gas reserves, exceeds the amount that can be safely burned. The Intergovernmental Panel on Climate Change estimates that existing fossil fuel reserves contain four to seven times as much carbon as the amount that can be emitted without causing global average temperatures to rise by more than two degrees Celsius above pre-industrial levels.

Christian theological principles mandate us to careful discernment concerning our responsibility to care for Creation and to avoid activities, including the excessive consumption of Earth's resources, which imperil human and non-human life. This resonates with the traditional teachings of Indigenous peoples that emphasize our responsibility as humans to respect all life and to ensure our actions and decisions do not harm the Earth and other living things (all our relations).

Conclusion:

While there is currently no consensus among KAIROS member churches on policy options such as calling for a moratorium on fracking, they do share a common recognition of and commitment to the right of Indigenous peoples to self-determination, ecological justice, and human health and well being. There is also agreement that the significant amount of concern in these areas merits further scientific research and until that time a high degree of precaution is essential before fracking can be allowed to proceed. In addition, there is agreement that respecting Indigenous rights requires that decisions on fracking be made at the local level, taking into account the diversity of opinions among Indigenous communities who have the right to free, prior and informed consent over resource development projects on their territories.

KAIROS will remain in contact with Indigenous and non-Indigenous communities affected by fracking and will respond to requests for solidarity actions as they relate to our existing policies, the *UN Declaration* and just and sustainable energy. KAIROS will advocate for further research on the economic, social and environmental issues raised by fracking leading to robust policy discernment towards options that respect human rights, ecological integrity and future generations.

Part One: What is Fracking? What are its benefits and its costs?

Hydraulic fracturing (or fracking) involves the injection of millions of litres of water and thousands of litres of sand and chemicals into coal beds or shale rock formations to break open fissures to release natural gas or oil. Natural Resources Canada notes that fracking has been safely carried out in North America for over 60 years. However, author Andrew Nikiforuk explains how the current practice differs from what took place previously:

[T]he practice of pumping small volumes (1,000 to 10,000 gallons) of toxic fluid into vertical wells (2,400 feet) using about 600 horsepower of pressure is indeed 60 years old. But that's not what is happening in Pennsylvania, Texas or Northern British Columbia today. Now industry injects millions of gallons of water into wellbores two miles deep that then angle or deviate horizontally another kilometre underground. They then break up the rock with up to 40,000 units of horsepower onsite and at pressures so extreme that the practice triggers small earthquakes.¹

The Canadian Association of Petroleum Producers (CAPP) says the economic benefits of natural gas production are significant in terms of job creation, economic growth and the generation of government revenues. For example, CAPP President David Collyer, in an opinion piece in the Halifax *Chronicle Herald*, cites estimates of economic benefits from a report commissioned by the Nova Scotia government and produced by a panel chaired by David Wheeler, president of Cape Breton University. Collyer writes that \$1 billion in annual spending on fracking in Nova Scotia would create 1,500 indirect jobs as one third of that amount would be spent on local procurement.² Economic benefits for the province would also accrue through the collection of royalties.

Michael Bradfield, a retired economics professor and a member of the Wheeler panel, cautions that any assessment of benefits should take into account “all costs, including the environmental, health and social costs ... which are ‘external’ to the industry. A major problem with the [Wheeler] Review Panel’s report is that the ‘benefits’ are over-estimated and the costs underestimated.”³

Bradfield notes that the job creation numbers cited in the panel report are highly speculative. The methodology commonly used to estimate spin-off jobs assumes that 95% of royalty revenues are spent locally. In fact much local procurement, for example for fuel, involves the supply of imported products. He notes that royalty payments would not peak until 40 years after shale gas extraction begins. Moreover, in Nova Scotia royalties only begin “after two years’ production from a lease. For most wells, 85 percent of production occurs in the first year of production – before royalties start!”⁴

In November, 2014 a commission of enquiry into the issues associated with the exploration and exploitation of shale gas in the Utica shale deposits of the lower Saint Lawrence region tabled a report with Quebec’s Ministry of Sustainable Development, the Environment and the Struggle

against Climate Change. The commission considered the economic, environmental, and social costs associated with shale gas in Quebec and concluded that:

It has not been demonstrated that the exploration and exploitation of shale gas in the lowlands of the Saint Lawrence through hydraulic fracturing would be advantageous for Quebec. According to the cost benefit analysis of the EES (strategic environmental evaluation) given present prices for natural gas and the projections for the next 25 years, the exploitation of shale gas [in the region] would not be profitable for the industry. Moreover, it would involve costs and externalities larger than the advantages and therefore a net negative social cost for Quebec.... [Although] around 8,000 jobs per year could be associated with the development of 3,600 wells over 15 years, ... available information does not allow determination ... [of how many] jobs would be held by Quebecois workers. ... Under current legislation, the regions where the activities would take place ... would not receive any of the royalties eventually flowing to the government.⁵

Part Two: Naming the issue: What is the ‘red flag’ that raised this as an issue that needs to be addressed?

On 17 October 2013 the RCMP in New Brunswick enforced a court injunction to end a peaceful blockade by members of the Elsipogtog First Nation and their allies preventing SWN Resources from conducting exploratory seismic testing in search of shale gas on their ancestral territory.

The practice of hydraulic fracturing for shale gas and oil raises significant justice issues. The ecological consequences of fracking and the rights of Indigenous peoples are intimately connected. Indigenous and non-Indigenous civil society groups in numerous jurisdictions have grave concerns about the consequences of fracking for air and water contamination, as well as the exacerbation of climate change.

The Elsipogtog people, and other Indigenous peoples in other parts of Canada, are demanding to be consulted before fracking projects can proceed as established by section 35 of the *Constitution Act, 1982*. They demand respect for their right to be full and effective participants in all aspects of the project, and to be able to grant or withhold free, prior and informed consent before fracking operations can take place on their territory as established by the United Nations *Declaration on the Rights of Indigenous Peoples*. Sections 6 and 7 below elaborate on these rights.

Part Three: What communities does the issue affect?

Indigenous Peoples are at the forefront of resistance to fracking:

Indigenous peoples in North and South America have raised concerns about the ecological dangers of fracking for shale gas and shale oil. Susan Levi-Peters, former Chief at Elsipogtog, says “It is our responsibility to protect Mother Earth, to protect the land for non-natives too.”⁶ Non-Indigenous people from New Brunswick’s Acadian and Anglophone communities support the protest led by the Elsipogtog First Nation.

In British Columbia hereditary chief Na`moks of the Wet’suwet’en First Nation’s Tsayu Clan leads his people “standing in the path of all proposed pipelines through their unceded traditional territory ... [including] several gas pipelines proposed to supply BC LNG terminals – including Chevron and Apache’s Pacific Trails Pipeline. Another clan of the Wet’suwet’en, the Unistòtèn, has been occupying a key pipeline corridor across the Morice River in their territory for a year and a half now and already [blocked some surveying work](#) for the Pacific Trails line.”⁷

Also in B.C. “the Fort Nelson First Nation has been fighting applications for the withdrawal of three billion litres of water per year from the Fort Nelson River for fracking projects.”⁸ The Klabona Keepers of the Tahltan First Nation stopped Royal Dutch Shell from fracking for coal bed methane in the Sacred Headwaters, the birthplace of the Skeena, Nass and Stikine Rivers. In August of 2013 the Tahltan issued an eviction notice to Fortune Minerals. Tahltan elders were arrested while keeping Fortune Minerals out of the Sacred Headwaters a decade ago.⁹

The Fort Francis First Nation in North East B.C. has called fracking on their territories “the largest and most destructive force that our waters have ever known.”¹⁰ In April 2014 the First Nation told the B.C. government to put its LNG strategy on hold. Gitksan Indigenous communities in northwestern B.C. have “declared their traditional territory permanently closed to fracked gas pipeline development.”¹¹ In August, 2014 they began construction of Camp Madii Lii to stand in the way of pipelines. The Lubicon Lake Nation in Alberta has campaigned against fracking by Penn West Petroleum since November 2013.

In July 2013, the Council of Yukon First Nations declared their traditional territories “frack-free” after a Chinese-owned company, Northern Cross, commenced 3D seismic testing.¹²

In Argentina, the Mapuche people continue to resist fracking to extract shale oil from the Vaca Muerta field despite police use of tear gas and rubber bullets to break up their protests. Lefxaru Nahuel, a Mapuche leader in Argentina, explains why he will continue to lead protests asserting: “We’ll continue to fight to defend the land, the water and the air. With fracking, there is no future for us here.”¹³

The Khoi-San indigenous people in South Africa are protesting a lack of consultation concerning shale gas development plans on their lands. The head of the Khoi Ingua community has asserted “You will get a big no from us Khoi people to fracking. You never even consulted us. We will

ask to go before the United Nations, because this oil and gas business means we will never see our land again.”¹⁴

Citizen mobilizations have demonstrated widespread concern

Citizen mobilizations in many countries have demonstrated widespread concern for the ecological dangers posed by fracking. One measure of the extent and the depth of concern these mobilizations reflect is the number of jurisdictions that have instituted bans or moratoria on fracking.

Two countries have instituted outright bans on fracking:

- Bulgaria – In January 2012 the National Assembly voted 166 to 6 to rescind a contract that had been signed with Chevron corporation and banned exploration for shale gas as well as its exploitation.¹⁵
- France – In June 2011 the National Assembly banned fracking. Ex-President Sarkozy said the ban would last until it could be proven that fracking did not damage the environment. After withstanding a court challenge it was upheld by President Hollande.

In Canada many municipalities and four provinces have declared bans or moratoria on fracking:

- Quebec was the first province to declare a moratorium on fracking for shale gas in March of 2011. In December of 2014 Premier Philippe Couillard initially said he would not favour fracking in the Saint Lawrence lowlands after reviewing the report from the commission of enquiry into issues associated with fracking but later indicated he wants to keep the door open for investors.¹⁶
- In November 2013 the government of Newfoundland and Labrador announced that the province will not allow onshore or onshore-to-offshore fracking while it reviews “regulations, rules and guidelines in other jurisdictions and undertakes public consultations.”¹⁷
- In September 2014 Nova Scotia’s Energy Minister Andrew Younger announced that he would “introduce legislation to prohibit high-volume hydraulic fracturing for onshore shale gas” indefinitely in the wake of the public’s overwhelming concern.¹⁸ The decision follows on a report by an independent panel chaired by David Wheeler, president of Cape Breton University, that recommended that fracking not proceed until there is more research into its health, environment and economic impacts and a mechanism is established for community consultations.
- In September 2014 a new government was elected in New Brunswick under the leadership of Premier Brian Gallant who campaigned on a promise to halt fracking until more studies are conducted on its environmental and health effects. Fracking was a major issue in the election in which David Alward, the outgoing premier, “promoted the shale gas industry as a way to revive the province’s slumping economy.”¹⁹

Other jurisdictions that have declared moratoria include Denmark, the Czech Republic, the North Rhine Westphalia state in Germany, Ireland, the Cantabria region in Spain, the Canton of Fribourg in Switzerland, New South Wales and Victoria states in Australia, and Christchurch in New Zealand. In the United States New York, Maryland and Vermont have state-wide bans. On December 17, 2014 New York governor Andrew Cuomo, citing health issues, announced that he will issue an order making a temporary ban in place since 2008 permanent.²⁰ Municipal resolutions against fracking

have been passed in 20 states including California, Michigan, New Jersey, Ohio, Pennsylvania, Colorado, New Mexico and Virginia.²¹

The number of jurisdictions that have instituted bans or moratoria is indicative of the importance citizens and governments attach to adhering to the precautionary principle, that is, the precept that an action should not be undertaken if its consequences are uncertain and potentially dangerous.

Part Four: What are the facts and how are they narrated?

Among the ecological concerns of populations who live on lands where fracking has occurred are its consequences for water use, water contamination, earthquakes and the release of methane, a greenhouse gas 86 to 105 times more potent than CO₂ over a 20-year period.

Water Use

The Canadian Association of Petroleum Producers says water use per well is moderate. An article on its web site states: “Shale gas resources currently developed in New Brunswick using multistage hydraulic fracturing require about 20,000 cubic metres of water per well, depending on geology. ... Most operators use water from rivers, their own freshwater storage pits or saline groundwater. They also use recycled water.”²² Similarly the CAPP data for water use in British Columbia appear modest when presented on a per well basis: “Shale gas resources currently developed in B.C. using horizontal wells with multi-stage fracturing use 5,000 to 100,000 cubic metres of water per well, depending on geology.”²³

However, when the fact that several wells are perforated from a single well-pad is taken into account, the actual water use data from British Columbia’s Horn River Basin indicates that water use has been much larger. Canadian Centre for Policy Alternatives analyst Ben Parfitt writes:

In B.C. industry records have been set for water usages at individual multi-well shale gas pads ... when 980,000 cubic metres of water was pumped underground at a single well pad operated by Apache Canada. ... The water was used in 274 successive hydraulic fracturing procedures performed at 16 wells at a remote site ... named Two Island Lake. The average horizontal wellbore length at Two Island Lake was 1600 metres, a factor that helps to explain the huge volume of water required and why the water level at Two Island Lake declined by 15 centimetres due to continuous drawdown over a nearly four-month period. Apache states that it will drill 1,218 wells in the Horn River Basin by just 2034. If the company matches the standard set at Two Island Lake the total water demand for this company alone ... will be in the neighbourhood of 130 million cubic metres.²⁴

The Fort Nelson First Nation, concerned that there has already been a 12-fold increase in the past two years of water extraction from their territory, is attempting to stop an application for another fracking operation at a B.C. environmental appeal board.²⁵ According to a report in the *Vancouver Sun*, in 2012 “more than 800 deficiencies were found during 4,223 inspections conducted in the oil and gas industry by the B.C. Oil and Gas Commission. Of these, 80 resulted in charges, mainly under the provincial Water Act for the non-reporting of water volumes. Other charges included violations under the provincial Environment Management Act.”²⁶

Three environmental organizations, Ecojustice, the Wilderness Committee and Sierra Club B.C., have filed a lawsuit in the Supreme Court of B.C. alleging that the B.C. Oil and Gas Commission has violated the provincial Water Act. While the law allows water withdrawals to be granted for short-term, low-impact projects for 24 months with little review, the suit alleges that the Commission has been consistently renewing short-term contracts as many as six times and has

granted some permits for more than 24 months at a time thus avoiding a more rigorous review and monitoring process.²⁷

A new study from the World Resources Institute finds that 38% of the areas around the world where shale gas is located are “either arid or under high to extremely high levels of water stress.”²⁸ While China has the largest technically recoverable shale gas reserves in the world, it also has a high level of exposure to water stress in the parts of the country where shale gas is found. Moreover, China’s shale gas “lies deeper underground and in more complex geological formations” than in the United States, requiring “up to twice the amount of water used at American sites to crack open the reserves.”²⁹

The commission of enquiry into the exploitation of shale gas in the lower Saint Lawrence region of Quebec found that, particularly during the summer, available watercourses would not be sufficient to supply the volumes of water needed for fracking and at the same time meet the needs of other users and of the ecosystems.³⁰

Water Contamination

The issue of water contamination is one of the most debated issues surrounding fracking. The CAPP maintains that fracking does not contaminate drinking water: “More than 175,000 wells have been hydraulically fractured in British Columbia and Alberta over the past 60 years without a case of harm to drinking water, according to the BC Oil and Gas Commission and the Alberta Energy Regulator. In New Brunswick, there have been no reports of drinking water contamination related to the 49 hydraulic fracturing operations that have taken place since 1985. This strong safety record is the result of strict regulations and industry best operating practices.”³¹

Many people in northern B.C. say that after fracking commenced they were no longer able to drink their tap water and the water burned children’s skin.³² Journalist Andrew Nikiforuk reports that some Alberta ranchers say that “Alberta Environment now has so many complaints about hydraulic fracturing from landowners in southern Alberta’s foothills that it is completely backlogged.”³³

Jessica Ernst, a former consultant to the oil and gas industry, sued Encana corporation in 2007 for allegedly contaminating her water supply due to its fracking of a shallow coal bed to extract methane near Rosebud, Alberta. In its statement of defence the company claims that it did not frack any coal beds but merely “stimulated” them. While Alberta’s chief justice ruled that Alberta’s Energy Resources Conversation Board, which granted the fracking license, cannot be sued, in November 2014 the Court of Queen’s Bench Chief Justice ruled that a suit launched by Ernst against the Alberta environment ministry could proceed.³⁴

In the United States the Energy Policy Act of 2005 exempted corporations engaged in fracking for natural gas from provisions of the Clean Air Act, the Clean Water Act and the Safe Drinking Water Act. The energy bill contained a provision popularly known as the “Halliburton loophole”, named after then vice-president Dick Cheney, formerly the chief executive officer at Halliburton,

the company that invented hydraulic fracturing in the 1940s. That provision exempted companies from having to disclose what chemicals they use in fracking fluids.³⁵

Government agencies' and university studies confirm that water pollution has indeed occurred where fracking has been carried out in the United States. The U.S. Environmental Protection Agency found that groundwater in Pavilion, Wyoming had been contaminated with toxic fracking fluids and cautioned residents against drinking water from their wells.³⁶ A report from Pennsylvania's environmental protection department documented 243 cases of contamination of water wells due to fracking.³⁷ Across the U.S. nearly 1,000 cases of water contamination due to shale gas fracking have been reported.³⁸

A 2011 study by scientists at Duke University found that 85% of water wells close to shale gas sites in Pennsylvania and New York were contaminated with methane levels that were up to 17 times higher than normal.³⁹ A follow-up study released in 2013 examined 141 private water wells in Pennsylvania and New York.⁴⁰ It found methane in 82% of the wells with concentrations that were six times higher from wells within one kilometer of fracking operations. High concentrations of hazardous ethane and propane were also found in wells near fracking sites. The lead author of the Duke study, Dr. Robert B. Jackson, said the cause of the contamination is likely poor well construction with older wells more likely to leak.

The Council of Canadian Academies, an independent organization that provides science-based assessments on public policy issues, was asked to review the scientific literature on fracking by the federal Minister of the Environment. The council convened a panel of experts to assess peer-reviewed research on the impacts of shale gas exploration, extraction and development. The council's report released on May 1, 2014 and entitled *Environmental Impacts of Shale Gas Extraction in Canada*⁴¹ makes a cautious assessment of the evidence on water contamination.

It asserts that "There is reason to believe that shale gas development poses a risk to water resources, but the extent of that risk, and whether substantial damage has already occurred, cannot be assessed because of a lack of scientific data and understanding."⁴² It also refutes "[a] common claim in the literature ... that hydraulic fracturing has shown no verified impacts on groundwater. Recent peer-reviewed literature refutes this claim and also indicates that the main concerns are for longer term cumulative impacts that would generally not yet be evident and are difficult to predict reliably."⁴³ Significantly it asserts that "The greatest threat to groundwater is gas leakage from wells for which even existing best practices cannot assure long-term prevention."⁴⁴

The box on the next page contains a variety of direct quotes from the Council of Canadian Academies report that argue that too little is known on many important issues. Taken together these observations point to the need for a high degree of precaution in the face of a lack of scientific evidence.

**Excerpts from the Report by the Council of Canadian Academies on
*Environmental Impacts of Shale Gas Extraction in Canada*⁴⁵**

- Leaks: “The assessment of environmental impacts is hampered by a lack of information about many key issues, particularly the problem of fluids escaping from incompletely sealed wells.” (p. xiii)
- Chemical migration underground: “little is known about the mobility and fate of hydraulic fracturing chemicals and wastewater in the subsurface” (p. xiii)
- Flowback: “not enough is known about the fate of the chemicals in the flowback” (p. xiii)
- Well deterioration and impacts of leaks: “Information concerning the impacts of leakage of natural gas from poor cement seals on fresh groundwater resources is insufficient. The nature and rate of cement deterioration are poorly understood and there is only minimal or misleading information available in the public domain. Research is also lacking on methods for detecting and measuring leakage of GHGs to the atmosphere.” (p. xvii)
- Cumulative impacts: “The Panel notes that the research needed to support improved science-based decisions concerning cumulative environmental impacts has not yet begun.” (p. xviii)
- Hydrogeology: “The linkages between groundwater and surface water resources across the country are not well understood, and historical surface water records for all of the areas under development are seldom good.” (p. 96)
- Wastewater injection: “More information on the potential for geological formations in these provinces to receive large volumes of injected fluids without over-pressurizing reservoirs is needed to determine whether this waste disposal option is possible.” (p. 133)
- Safety of fracking chemicals: “The mixtures of chemicals associated with shale gas activities are generally unknown and untested, making it difficult to predict and assess risk from direct/indirect exposures.” (p. 146)

The Quebec commission of enquiry into the exploitation of shale gas in the lower Saint Lawrence sounds a similar note of caution reporting that there is uncertainty concerning the structure of rock layers between the Utica shale rock and deeper aquifers used for drinking water. It says there may be natural fissures through which contaminated water might pass. Accordingly the commission cautions that the disposal of used fracking waters into deep geologic formations is not a valid option.⁴⁶

Another contaminant associated with fracking is highly carcinogenic radium leached from shale rock. A *New York Times* investigation revealed that “fracturing wastewater containing worrying levels of naturally occurring radioactivity was being released into Pennsylvania rivers.”⁴⁷ A study by scientists at Duke University found that treatment of wastewater from fracking does not remove all dangerous contaminants. The study found “elevated levels of radioactivity, salts and metals ... in river water and sediments at a site where treated water is discharged into a western Pennsylvania creek.”⁴⁸ The study revealed radium levels around 200 times greater downstream from the treatment plant as compared to samples taken upstream. Professor Robert B. Jackson stated “The radioactivity levels we found in the sediments near the outflow are above management regulations in the U.S. and would only be accepted in a licensed radioactive

disposal facility.” His colleague Professor Avner Vengosh added that the potential environmental risks will last for “thousands of years to come.”⁴⁹

A report released by the British Department of Health cites a 2011 paper from the Massachusetts Institute of Technology that found that “nearly half of 43 [groundwater] pollution incidents were related to drilling operations - mainly because of faulty sealing of wells.”⁵⁰

The petroleum industry maintains that the steel tubes or casings it inserts into well bores and secures with cement prevent anything travelling through the wellbore from coming into contact with the drinking water aquifers.⁵¹ However, James Northrup, a retired manager at Atlantic Richfield, the seventh largest oil company in the U.S., cites an industry study indicating that 25% of frack wells leak after five years and 40% after eight years. Northrup says “Everybody in the industry knows that gas drilling pollutes groundwater ... It’s not ... whether they leak. It’s how much.”⁵²

Water contamination can also occur when a fracking operation experiences what is known as a “frack hit” or a “downhole communication.” These occur when fracking fluids under high pressure migrate underground to an adjacent well and flow uncontrolled to the surface. The vice-president of an Alberta petroleum company who chairs a task force on frack hits admits that “a fluid spill on the surface or loss of well control underground ... could lead to contamination of a water aquifer.”⁵³ Frack hits have occurred throughout the U.S. and in Alberta and are expected to become more frequent as multiple wells are drilled in close proximity from a single drill pad.

While the Canadian Association of Petroleum Producers maintains that a typical well is fracked only once, Karlis Muehlenbachs, a geochemist at the University of Alberta, explains “They’ll frack each well up to 20 times. Each time the pressure will shudder and bang the pipes in the wellbore. The cement is hard and the steel is soft. If you do that all the time you are going to break the bonds and cause leaks.”⁵⁴

Researchers at the University of New Brunswick have cautioned that “Hydraulic fracturing should not proceed unless there is an environmentally responsible option for waste water disposal.”⁵⁵ They cautioned against sending saline wastewater to public water treatment plants as has been done in some jurisdictions. When the newly elected government of New Brunswick imposed a moratorium on fracking in December, 2014 it specified that the moratorium would not be lifted “unless there is a plan that mitigates the impacts on our public infrastructure and that addresses issues such as waste water disposal.”⁵⁶

Air Contaminants

A study by Public Health England, an agency of the Department of Health, concluded that “potential risks to public health from exposure to the emissions associated with shale gas extraction are low if the operations are properly run and regulated.”⁵⁷

However, the British study recognizes a lack of research exists on the topic. It refers to one US study that found that 75% of the chemicals used in fracking could affect skin, eyes and breathing.

Another 25% are carcinogenic. According to the BBC's science editor "the only detailed peer reviewed study of the impact of air emissions was published last year by the Colorado School of Public Health. That work found that people living within half-a-mile of gas wells had an elevated risk of health conditions including neurological and respiratory effects."⁵⁸

A recent study conducted by community-based researchers and published in the journal *Environmental Health* found evidence of dangerous air contaminants near fracking sites in several areas of the United States. It concluded that "Air concentrations of potentially dangerous compounds and chemical mixtures are frequently present near oil and gas production sites. ... Levels of eight volatile chemicals exceeded federal guidelines under several operational circumstances. Benzene, formaldehyde, and hydrogen sulfide were the most common compounds to exceed acute and other health-based risk levels."⁵⁹

People living downwind from shale gas fracking operations in Texas, Colorado and Pennsylvania typically complain of symptoms including rashes, headaches, intestinal illnesses and difficulty breathing.⁶⁰ Researchers studying communities in Colorado near fracking operations "found that babies whose mothers lived in close proximity to multiple oil and gas wells were 30% more likely to be born with defects in their heart than babies born to mothers who did not live close to oil and gas wells."⁶¹

According to a report from Friends of the Earth Europe:

Fracking fluid can contain as many as 300 chemicals, of which 40 per cent are endocrine disruptors, known to interfere with the hormone system in animals and humans, and a third of which are suspected carcinogens. Over 60 per cent of the chemicals used can harm the brain and nervous system.⁶²

The main sources of air pollution include gas flaring from well heads; leakages from compressor stations where gas is compressed and made ready to transmit in pipelines; and evaporating fracking chemicals (whether before, during or after injection, including from waste water).⁶³

Greenhouse Gas Emissions

The petroleum industry correctly states that using natural gas as a substitute for coal reduces greenhouse gas (GHG) emissions from power plants at the point of combustion. Burning gas to produce electricity emits only about half as much carbon dioxide as coal per unit of energy. However, there is evidence that shale gas production is more GHG intensive than conventional natural gas due to what are called "fugitive emissions." A study led by Robert Howarth of Cornell University published in 2011 concluded that there were "significant greenhouse gas emissions (notably methane) at gas wells as they were fracked and subsequently as they went into production. The Cornell study ... estimated the impact of the routine methane emissions after well development and concluded that there were numerous instances where the venting or leaking of methane at various points in the gas gathering and distribution system would add significantly to the industry's GHG emissions."⁶⁴

The Cornell team found that during the life cycle of the average shale gas well, somewhere between 3.6% and 7.9% of the well's methane escapes into the atmosphere. At this rate, methane emissions from fracked wells are between 1.3 and 2.1 times as great as those from conventional wells. They conclude that the GHG footprint of shale gas is 1.2 to 2.1 times greater than that of coal over a 20-year time frame when expressed per quantity of energy from combustion.⁶⁵

Howarth's research has been challenged by a study that indicates a lower level of methane emissions. The study, paid for by Shell, Exxon Mobil and Chevron among others, was based on the evaluation of sites chosen by the industry at times of their choosing.⁶⁶ Other studies cited in a paper commissioned by the UK Department of Energy and Climate Change find much lower GHG emissions from shale gas wells than the 2011 study by Howarth and colleagues.⁶⁷

A new study by Robert Howarth and colleagues at Cornell examined new data on methane emissions from shale gas and from conventional gas wells that has become available since his 2011 paper. The new study found that when natural gas is extracted from shale formations through fracking about 50% more methane leaks into the atmosphere than during conventional drilling. What is surprising in the study is a finding that in cases where methane emissions from conventional gas extraction are high, conventional gas has a greater warming impact than coal or oil even though it emits fewer GHGs at the point of combustion. Where methane emissions from conventional gas wells are low, using gas instead of coal to generate electricity would result in only a modest reduction in total GHG emissions according to the study. Howarth's overall conclusion is stated as follows:

Using these new, best available data and a 20-year time period for comparing the warming potential of methane to carbon dioxide, the conclusion stands that both shale gas and conventional natural gas have a larger GHG [impact] than do coal or oil, for any possible use of natural gas and particularly for the primary uses of residential and commercial heating.⁶⁸

The Friends of the Earth Europe report cites the US National Academy of Sciences as concluding that "it is likely that leakage at individual natural gas well sites is high enough, when combined with leakage from downstream operations, to make the total leakage exceed the 3.2 per cent threshold beyond which gas becomes at least comparably worse for the climate than coal for at least some period of time."⁶⁹

The Quebec commission of enquiry into the exploitation of shale gas in the lower Saint Lawrence found that, depending on the scale, shale gas development might increase Quebec's greenhouse gas emissions by between 3% and 23.2%. The commission's report adds that fugitive emissions of methane that could occur after wells are shut down were not included in these estimates. These fugitive emissions could be significant since only 15% to 20% of the gas in place in shale formations is extracted before the wells are sealed. The report goes on to state that the quality of the cementing used to seal abandoned wells is a key challenge since "the technical capacity of the gas industry to ensure the integrity of [abandoned] wells over the long term and therefore prevent the escape of gas or of fracking liquids into aquifers or the atmosphere has not been demonstrated."⁷⁰

Earth Tremors

Earth tremors have occurred during actual fracking operations and during the injection of waste fluids underground. Seismic activity may contribute to water contamination when it opens new fissures in rock formations.

Small earthquakes have occurred near sites where fracking fluids are disposed in Ohio, Arkansas, Oklahoma and Texas.⁷¹ In Britain a fracking operation in Lancashire was discontinued after a 1.5 magnitude tremor.⁷² A study published in the *Journal of Geophysical Research* by Jeff Gu, a seismologist at the University of Alberta, and colleagues concluded that “waste-water injection into the ground is highly correlated with spikes in earthquake activity” around Rocky Mountain House, Alberta.⁷³

The CAPP cites a 2012 report by the BC Oil and Gas Commission (OGC) concerning earthquakes in the Horn River Basin that “concluded hydraulic fracturing was the cause of 272 cases of what the OGC called ‘anomalous seismicity.’ But none of these seismic events, the report makes clear, caused any injury, property damage or posed any risk to public safety or the environment. In fact, only one of these seismic events was felt on the surface.”⁷⁴

Low Economic and Net Energy Returns

A report, *La ruina de la fractura hidráulica (The Blight of Hydraulic Fracturing)*, published by Ecologists in Action in Spain, shows how many shale gas fracking operations are neither viable economically nor in their return on the energy expended to extract the gas.⁷⁵ The report says initial estimates of shale gas reserves are often vastly overstated. In the U.S. “shale gas and shale oil reserves have been overestimated by a minimum of 100% and by as much as 400-500% by operators according to actual well production data.”⁷⁶ Another study by Friends of the Earth Europe found similar declines in estimates for shale gas resources in Poland, Mexico and South Africa after new data became available. For example, the U.S. Energy Information Agency reduced its estimates of shale gas resources in Mexico from 681 trillion cubic feet (tcf) in 2011 to 545 tcf in 2013 while Pemex, the national oil company, estimated that only 141.5 tcf of resources were underground.⁷⁷

As production from shale wells declines quickly, new wells must be drilled constantly. Geoscientist David Hughes calculates that in order to maintain U.S. production more than 7,000 shale gas wells must be drilled annually at a cost of US\$42 billion, while “the value of shale gas produced in 2012 was just US\$32.5 billion.”⁷⁸

Andrew Nikiforuk observes how “shale gas and oil fields deplete so quickly that they resemble financial treadmills. In order to maintain constant flows from a play industry must replace 30 to 50 per cent of declining production with more wells.” Nikiforuk cites David Hughes’ analysis of the uneven geology of various shale gas fields that shows that “In every shale play there are sweet spots and unproductive areas and marginal ones. In fact 88 per cent of all shale gas production flows from six of 20 active plays in the United States while 81 per cent of shale oil comes from two of 21 plays.”⁷⁹

In addition Hughes has found that the amount of gas recovered from shale plays is much lower than what can be recovered from conventional wells. Whereas conventional drilling “often captured up to 70 per cent of the gas in the ground... shale barely averages 10 per cent despite deploying more horsepower and water over greater landscapes.”⁸⁰ Given these low rates of recovery, there is ample room for skepticism concerning a joint federal-provincial report’s claim that the Montney basin, straddling the B.C.-Alberta border, containing 449 trillion cubic feet of natural gas, has enough gas to supply Canada’s needs for 145 years.⁸¹ As David Hughes explains:

Pundits and politicians who wax on about “100 years of natural gas” are probably right that there is one hundred years’ worth of recoverable oil and gas at current production rates—it’s just that it may take 800 or more years to recover it. In other words, as our reliance on unconventional oil and gas grows, production rates are increasingly difficult to maintain because tomorrow’s resources are so much more technically challenging to produce than today’s. Falling rates of supply are a much more critical problem in the current economic growth paradigm than “running out”, which is unlikely to ever happen.⁸²

Moreover the Ecologists in Action report states that fracking has a very low energy return on energy investment of between 2:1 and 3:1. This means that only two to three units of usable energy are derived from each unit of energy used to extract shale gas. In contrast a conventional gas well in Russia yields 20 units of energy for each one consumed in their extraction.

Due in large part to an abundance of shale gas on the market, natural gas prices in North America fell by 60% between 2008 and early 2013.⁸³ The Ecologists in Action report estimates that about 80% of U.S. wells are not now viable economically. With prices below the costs of extraction in some instances, many firms have reassessed their investment plans. Some Canadian firms, like Encana Corp, are cutting back on the number of wells drilled and giving priority to gas plays that also produce natural gas liquids, such as propane and butane, which fetch higher prices than dry gas alone.⁸⁴ But in mid-2012 Reuters reported that the surge of investment into natural gas liquid plays in the U.S. had caused a new glut leading to falling prices for these liquids.⁸⁵ Business writer David Olive estimates that some “three-quarters of a trillion dollars invested in shale oil and gas has either gone down the rat-hole or been re-directed away from smarter investments in ... alternative energy and fuel efficiency technologies.”⁸⁶

If the return on investments in shale gas extraction is very low or negative in many instances, why has the industry continued to expand? Financial consultant Deborah Rogers offers a plausible explanation. She attributes the phenomenon to the involvement of investment banks’ with the shale gas industry. Producers driven to meet financial analysts’ targets for production growth needed sales revenues to keep up on debt service payments to their bankers. The investment banks then profited by arranging merger and acquisition deals worth US\$46.5 billion in 2011 alone as the assets of troubled shale companies were sold off to larger corporations.⁸⁷

But why would larger corporations buy up shale properties that are losing money? One reason is that corporations such as Exxon Mobil need to shore up their reserve-replacement ratios. That is, the quantity of reserves they hold relative to the quantity of gas they sell. Another factor may be that the petroleum industry giants with the financial resources to endure losses in the short-term

hope to reap large profits in the future when more gas can be exported to higher-priced markets, particularly in Asia where prices are up to four-times higher than in North America. In early November 2013 natural gas sold for around US\$3.50 per million British thermal units (mmBtu) in North America compared to about US\$16 per mmBtu in Asia. However, Bloomberg news has projected the “difference between U.S. and Asian gas is poised to drop by more than 60 per cent by 2020, leaving exporters facing a loss of as much as \$6 million per tanker.”⁸⁸

As of mid-2013, there were perhaps a dozen proposals for building Liquefied Natural Gas (LNG) export terminals on B.C.’s coast with four industry groups in the lead.⁸⁹ However, one of these, BC LNG, also known as Douglas Channel LNG, in which the Haisla First Nation has an ownership stake, has applied for bankruptcy protection.⁹⁰

An analysis by Friends of the Earth Europe suggests three reasons why gas production was not cut in the U.S. to raise prices. First, “shale gas operators were able to hedge against low prices through financial instruments, ensuring acceptable prices in future markets that left them relatively unscathed from plummeting spot prices. [Second] there was a backlog of uncompleted drills that kept up supply as they were progressively completed. [Third] land lease contracts often force operators to start drilling within five years or lose their leases.”⁹¹

Threat to Action Climate Change

A document prepared for B.C.’s Environment Minister warns that the pursuit of a liquefied natural gas (LNG) industry could double the province’s greenhouse gas emissions imperiling its legislated targets for GHG reductions. The document, obtained under a freedom of information request, says that emissions would rise by a minimum of 16% or as much as 100%. It says “At the high end of that range B.C.’s natural gas sector emissions would be comparable to those from Alberta’s oil sands.”⁹²

A report from the Pembina Institute says that if B.C. achieves its revenue target by exporting four to six trillion cubic feet of shale gas per year by 2020, it would result in the release of an additional 73 million tonnes of greenhouse gases each year. This would be equivalent to 72% of the 101 million tonnes of GHGs expected from the tar sands by 2020. The added emissions would come from the extraction, processing, transportation, liquefying and storage of Liquefied Natural Gas for export, not counting the additional GHGs that would be emitted from burning the gas in Asia. As a result B.C. would fail to meet its legislated target of reducing emissions to below 43 million tonnes by 2020.⁹³

While cheap shale gas is replacing coal in some jurisdictions, it is also crowding out wind and solar alternatives.⁹⁴ In a worrisome development a secret European Union document indicated that subsidies from an €80 billion program intended to promote renewable sources of energy would be made available for natural gas power stations using shale gas. The International Energy Agency’s chief economist, Fatih Birol, warns that “Renewable energy may be the victim of cheap gas prices if governments do not stick to their renewable support schemes. A golden age for gas is not necessarily a golden age for the climate.”⁹⁵ Dr. Birol says the shale gas boom in the U.S. led to a 50% drop in investment in renewable energy.

Since North American gas prices have fallen due to an abundance of shale gas, companies have taken to flaring, or burning off, unwanted gas associated with oil production. Flaring not only wastes gas but also has detrimental effects on air quality and climate change. In response Mercy Investment Services, a fund that manages investments for the Sisters of Mercy, “filed a shareholder resolution calling on Continental Resources, the leading oil producer in the Bakken [field in North Dakota], to adopt clear goals for cutting or eliminating flaring.”⁹⁶

Part Five: What key ethical values and theological principles are the basis for discernment on this issue?

Indigenous peoples' teachings on the importance of living in harmony with Creation are wholly consistent with Christian values. In asserting that the Creator made us caretakers of Mother Earth, Indigenous peoples remind us of our duty to treat all Creation with respect.

As a spokesperson for the Indigenous people of the Wabanaki-Mi'gmaq District of Signitog stated "Creator made us caretakers of Mother Earth. Our goal as the Collective Community of Concerned Members of Signitog is to protect Mother Earth because we're killing her. She's already endured too much. We will lose our clean water if we sit back and allow what the shale gas companies are planning on doing in Signitog. What they are planning is unacceptable. We do not accept the unacceptable."⁹⁷

At KAIROS' 2013 intergenerational gathering *Elements of Justice*, Caleb Behn, an Eh Cho Dene and Dunne-Za and Cree from the Treaty 8 Territory of Northeastern B.C. where extensive fracking is taking place, characterized fracking as a violent act, tantamount to "breaking the bones of Mother Earth."

KAIROS' 2007 paper *Reenergizing the Future: Faith and Justice in a Post-Petroleum World*⁹⁸ affirms five core Christian beliefs that are relevant to the fracking debate:

a) We believe that the world as God's handiwork has its own inherent worth and value.

After each act in the first Creation story (Genesis 1), God "saw that it was good." Following God's lead, we value Creation in its own right, caring for it as would God, its Creator. This teaching calls for a change of worldview from one of unrelenting exploitation.

b) We believe that we share in God's covenanted relationship with all of Creation.

In Genesis 2: 15 we learn that when God created the Garden of Eden, God also charged humans to "till it and keep it." The story of the Garden of Eden reminds us of our human responsibility to do our part in caring for Creation.

c) We believe that the way we treat the poor and the vulnerable and all Creation is a reflection of our faithfulness to God.

The Hebrew Scriptures assert that care of those living on the margins – the widow, the orphan, the stranger – is a requirement of holiness (Exodus 22: 21-27, Deut. 10: 17, Deut. 24: 20-21, Prov. 19: 17). In the Gospels, care of the poor, the sick, or stranger is made analogous to dedication to God (Matt. 25: 31-46).

d) We believe that God wants people to live in mercy, compassion and mutual respect of other humans and all Creation and that this will be the basis for peace and justice.

The basic Biblical call to love our neighbours as ourselves (Lev. 19: 18, Mark 12: 31) along with the Golden Rule where we are urged to do unto others as we would have them

do unto us (Mt 7: 12) counsel us against seeking our own well-being at the expense of other parts of Creation.

e) We believe that God intends restoration through Christ, inviting our collaboration in acts of healing and transformation.

Visions of the restoration of Creation are abundant in the Scriptures, including a renewal of the covenant (Ezek. 47: 1-12, Isaiah 58: 1-12, Isaiah 61: 1-4, Isaiah 65: 11-25, Rev. 21: 1-4).

Out of respect for others and for all of Creation, we are called to discern how we can live within the limits of what the Earth can sustainably provide, and to “live simply so others may simply live” as Mother Teresa has stated so eloquently.

Andean Indigenous peoples’ teachings can guide us in learning how to live in harmony with Mother Earth, taking only what we need, conscious of the impact of our actions on generations to come. David Choquehuanca, the Aymara Foreign Minister of Bolivia, poses a direct challenge to those who consume a disproportionate share of the Earth’s resources: “The construction of *suma qamaña* [an Aymara phrase roughly translated as “the good way of living”]... [requires] ending consumerism, excessive spending and luxury, consuming only what is needed, lowering the global economic bar to levels of production and consumption of energy that the health and resources of the planet allow. In order to achieve this, the countries of the North above all need to change. They have to take responsibility for the damage, stop climate change and the excessive exploitation of natural resources. They must face up to the irrevocable exhaustion of material and energy.”⁹⁹

Part Six: What can guide our decision-making? What principles can be applied?

Indigenous Rights

In 2007, the Canadian churches reaffirmed *A New Covenant Towards the Constitutional Recognition and Protection of Aboriginal Self-Government in Canada*. This pastoral statement by KAIROS member churches calls for a new covenant with Indigenous peoples to uphold their rights to self-determination as distinct peoples with an adequate land base.

Indigenous peoples' rights to self-determination involve the right to be consulted on resource development projects on or near their territories as established by section 35 of Canada's *Constitution Act, 1982*. Recent Supreme Court of Canada decisions, particularly the landmark judgment recognizing the Aboriginal land title of the Tsilhqot'in Nation, have reasserted the duty of federal and provincial governments to consult and accommodate Indigenous peoples prior to permitting any development project to proceed.

One guideline is KAIROS' commitment to promote Indigenous peoples rights as affirmed in the 2007 UN *Declaration on the Rights of Indigenous Peoples*, including the right to free, prior and informed consent (FPIC) before resource extraction projects are allowed to proceed on their territories.

Article 32 of the UN *Declaration* states:

1. Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands or territories and other resources.
2. States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free and informed consent prior to the approval of any project affecting their lands or territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources.

The government of Canada frequently misrepresents FPIC as involving giving Indigenous peoples a veto over resource development projects, implying that Indigenous nations have an absolute right to say "no" to a project regardless of the circumstances. In fact free, prior, and informed consent does not constitute a veto, since Indigenous peoples' human rights exist relative to the rights of others. Legal scholars and Canadian court decisions maintain that the rights of others must be taken into account and a balance maintained. The Supreme Court of Canada has ruled that under some circumstances the rights of others may prevail over Indigenous peoples' right to withhold consent. However, in the Delgamuukw and Haida cases the Supreme Court has ruled that the "full consent" of Aboriginal peoples is necessary on "very serious issues."¹⁰⁰

James Anaya, the former UN Special Rapporteur on the Rights of Indigenous Peoples has written that "as a general rule resource extraction should not occur on lands subject to aboriginal claims ... without the free, prior and informed consent of the aboriginal peoples concerned."

However, there may be circumstances where there may be limitations on Indigenous peoples' right to FPIC provided that "such limitations shall be non-discriminatory and strictly necessary solely for the purpose of securing due recognition and respect for the rights and freedoms of others and for meeting the just and most compelling requirements of a democratic society."¹⁰¹ Anaya observes that "such a valid public purpose is not found in mere commercial interests or revenue-raising objectives, and certainly not when benefits from the extractive activities are primarily for private gain."¹⁰²

In order to achieve genuine reconciliation with Indigenous peoples in a spirit of truth that acknowledges past wrongs, there is an urgent need for Canadians to honour treaties signed with First Nations. When the Mi'kmaq nation, to which the people of Elsipogtog belong, signed a treaty of peace and friendship with the English in 1761, they agreed to allow settlers onto their lands on the condition that the Indigenous people be able to continue to live on their land and derive their livelihood from their lands and waters. While this treaty has not been honoured in practice, the historic 1999 decision by the Supreme Court of Canada in the Marshall case confirmed that the Mi'kmaq have never surrendered their lands. Recognition of the Mi'kmaq peoples' right to free, prior and informed consent with respect to exploration for shale gas would represent the actualization of the peace and friendship treaty.

In November 2009, KAIROS adopted policy positions in relation to the Alberta tar sands. The principles articulated at that time can be applied to the issues raised by hydraulic fracturing with only minor wording changes. The 2009 policy document calls for:

- 1) No further approvals for tar sands projects;
- 2) Support Indigenous communities' and environmental groups' longstanding calls for independent studies, funded by the Alberta and federal governments, on the cumulative impacts of the tar sands development, especially on health, water and ecosystems. These studies must involve Indigenous people and be accessible to them and the public.
- 3) The federal government must develop a clean and sustainable energy strategy, based on conservation and the development of renewable energy as well as a funded transition plan for sustainable jobs in a renewable energy sector. The principles of ecological sustainability and Indigenous Rights must be applied to the development of a renewable energy projects.¹⁰³

Concern for Health and Social Impacts

New Brunswick's Chief Medical Officer, Doctor Eilish Cleary, has cautioned against proceeding with shale gas fracking until further study can be done on its health effects. Her report notes that while media have focused on the impact of fracking chemicals on drinking water and to a lesser extent on air quality, there are other important determinants of health that must also be considered. In particular she points to the negative social impacts of the "Boomtown Effect" involving "increases in crime, drug and alcohol abuse, sexually-transmitted infections (STIs), and domestic violence. An inadequate supply and poor quality of housing along with increased cost of living resulting from the boom can lead to increased community dissatisfaction. These

problems can be further compounded due to inadequate infrastructure and public services capacity (including policing, local government, mental health services, social services, and health care)...¹⁰⁴

Dr. Cleary's report notes how these boomtown effects have been documented at Fort McMurray, Alberta at the centre of the tar sands boom and at the B.C. communities of Fort Nelson, Fort St. John and Dawson Creek where a shale gas boom is underway. She also notes how the inequitable distribution of risks and rewards from a shale gas boom can benefit some outsiders, such as transient workers and non-residents, while vulnerable and disadvantaged local populations are at greater risk of suffering harm from environmental contaminations.¹⁰⁵

The Council of Canadian Academies report makes the following observation concerning the health and social impacts of fracking: "The health and social impacts of shale gas development have not been well studied.... If shale gas development expands, risks to quality of life and well-being in some communities may become significant due to the combination of diverse factors related to land use, water quality, air quality, and loss of rural serenity, among others. These factors are particularly relevant to the ability of Aboriginal peoples to maintain their traditional way of life; several First Nations have expressed concerns about the possible impacts of shale gas development on their quality of life and their rights."¹⁰⁶

The Principle of Subsidiarity

The principle of subsidiarity holds that decisions should be taken wherever possible by the communities most affected rather than by higher levels of government. The application of this principle requires taking into account the diversity of opinions among Indigenous communities, some of whom, after a due exercise of their right to free, prior and informed consent, may choose to allow fracking to occur on their lands under certain conditions. To date we are not aware of any examples of Indigenous peoples agreeing to consent to fracking on their territories.

The Precautionary Principle

The precautionary principle holds that actions should not be undertaken if their consequences are uncertain and potentially dangerous. This is a fundamental tenet of ecological justice.

Part Seven: What is new in this issue? How is this issue different from other related issues?

Supreme Court Decisions Open Up a New Era for Indigenous Rights

At first glance much of the above discussion does not appear to be novel. In the recent past armed force has been used to break up other Indigenous peoples' protests against development projects that infringe on their rights. In 1989 at Oka, Quebec the Canadian military was deployed against members of the Kanestake Mohawk community who were protecting their sacred lands against a proposal to expand a golf course. In 1995 the Anishinaabeg people from Stoney Point Reserve's peaceful encampment calling for the return of Ipperwash Provincial Park was attacked by the Ontario Provincial Police costing the life of Dudley George. In 1995 at Gustafsen Lake more than 400 RCMP marched against the Shuswap First Nation defenders of their sacred site.¹⁰⁷

The 1999 confrontation between members of the Mi'kmaq nation and fisheries officers at Burnt Church, New Brunswick led to several groundbreaking Supreme Court decisions. These decisions, marking a new era of Indigenous rights, emerged after a confrontation over fishing rights that involved the smashing of Mi'kmaq fishing boats.

In the Marshall case concerning Mi'kmaq fishing rights, the Supreme Court not only found that Canada must give Indigenous peoples priority of use of resources such as fisheries, but also look beyond the literal wording of treaties, and take into account other evidence such as historical documents when determining rights and jurisdiction. The *Delgamuukw* decision, another Supreme Court of Canada ruling, "also makes it clear that the Court will consider oral history as well as historical documentation in such a treaty reconstruction process."¹⁰⁸

This recognition of Indigenous peoples' rights to self-determination over the use of resources found on their territories leads to a requirement to consult them before decisions are made on resource extraction projects. In the *Delgamuukw* case the Supreme Court wrote:

...aboriginal title encompasses within it a right to choose to what ends a piece of land can be put. ... There is always a duty of consultation. ... The nature and scope of the duty of consultation will vary with the circumstances. ... In most cases, it will be significantly deeper than mere consultation. Some cases may even require the full consent of an aboriginal nation.¹⁰⁹

Thus these and other court decisions mark a new era of legal rights for Indigenous peoples in Canada. While the courts have yet to define which cases may require the full consent of a First Nation, Indigenous peoples can clearly invoke these legal precedents when faced with dangerous resource extraction projects.

Unfortunately too often Canadian courts do not always act in accordance with the spirit of the Supreme Court decisions cited above. For example, in December of 2013 a Calgary court granted Penn West Petroleum corporation an injunction against the Lubicon Lake Nation Land Protectors who had sought to prevent Penn West from fracking on their land. This is an example of the failure of Canadian courts to respect Indigenous peoples' right to free, prior and informed consent. Sylvia McAdam, a founder of Idle No More who was a keynote speaker at KAIROS'

Elements of Justice gathering, says “We are deeply disappointed with the decisions We strongly condemn the actions of companies and the extractive industry that deny and disregard the rights of Indigenous Peoples, like the Lubicon Lake Nation who are defending their lands for their children and grandchildren.”¹¹⁰

The landmark decision by the Supreme Court of Canada in the case of the *Tsilhqot'in vs British Columbia*, delivered June 26, 2014, recognizing the right of the Tsilhqot'in Nation to own, control and enjoy the benefits of approximately 2,000 square kilometres of land at the heart of their traditional territory in central British Columbia, has set an important precedent with respect to aboriginal rights.¹¹¹ Specifically the Court has ruled that the Crown must obtain the consent of First Nations before resource development projects can proceed on their land, unless there is a “compelling and substantial public purpose” for infringing on Aboriginal title.¹¹²

In light of this Supreme Court decision councillors from the Elsipotog band are working on a legal strategy to prevent further seismic testing for shale gas deposits in New Brunswick.¹¹³ Notably the treaties of peace and friendship signed by the Mi'kmaq and the Maliseet peoples did not surrender aboriginal title. As historian Andrea Bear Nicholas has demonstrated “As a reaffirmation of the 1725-26 Treaty of Peace and Friendship, the Treaty of 1760 [signed with England] contained no land surrender.”¹¹⁴

Climate Change Poses an Unprecedented Threat to Life on Earth

A second new element that sets current struggles over fossil fuel extraction projects apart from earlier struggles is the realization of the extent of the threat to life on Earth from climate change. A recent study by renowned climate scientist James Hansen and colleagues from the Earth Institute at Columbia University and the NASA Goddard Institute for Space Studies, *Climate Sensitivity, sea level and atmospheric carbon dioxide*, warns that continuing to burn fossil fuels at the same rate as at present will render most of our planet uninhabitable.¹¹⁵

Hansen and colleagues point to the particular danger of exploiting unconventional fossil fuels such as tar sands and shale oil and shale gas. They conclude their study with a rhetorical question: **“Humanity stands at a fork in the road. As conventional oil and gas are depleted, will we move to carbon-free energy and efficiency—or to unconventional fossil fuels and coal?”**¹¹⁶

The November 2014 Fifth Assessment Synthesis Report by the Intergovernmental Panel on Climate Change (IPCC) contains estimates on how much fossil fuel we can afford to burn if we are to have a 66% chance of keeping the rise in global temperatures at less than 2°C above pre-industrial levels. Total carbon dioxide emissions after the year 2011 must contain no more than one trillion tonnes of CO₂. At current rates of carbon dioxide emissions, in only 26 years we risk exceeding this amount unless we make significant cuts to our use of fossil fuels.

The November 2014 IPCC report reveals how small this CO₂ budget is compared to fossil fuel reserves, that is the amount known to exist and be recoverable. It states that “Estimated total fossil fuel carbon reserves exceed this remaining amount [of permissible emissions] by a factor of 4 to 7, with resources much larger still.”¹¹⁷ In other words, there is more than four to seven times as much carbon contained in existing fossil fuel reserves than the amount that can be

allowed to accumulate in the atmosphere as carbon dioxide without causing global average temperatures to rise by more than two degrees Celsius above their pre-industrial level. The IPCC's reference to much larger resources refers to fossil fuels known to exist underground that are not yet counted as reserves as they are not recoverable with existing technologies.

Another study by climatologist Andrew Weaver and graduate student Neil Swart at the University of Victoria reveals that unconventional natural gas resources globally are almost nine times as large as those of conventional gas. According to a table in their study the carbon contained in unconventional gas resources is eight times greater than the amount of carbon contained in the Alberta tar sands.¹¹⁸

If burning all known conventional and unconventional fossil fuel reserves literally threatens life on Earth as we know it, then we owe a great deal to the courageous Indigenous peoples who are standing up against their exploitation. As Ryerson University Professor Pamela Palmater, a member of the Mi'kmaq nation, has written:

First Nations, with our constitutionally protected aboriginal and treaty rights, are Canadians' last best hope to protect the lands, waters, plants and animals from complete destruction — which doesn't just benefit our children, but the children of all Canadians.¹¹⁹

The Elsipogtog First Nation is a prime example of an Indigenous people that has considered the common good of the wider society in its decision to resist fracking. Like so many other Indigenous communities in Canada, the Elsipogtog First Nation is impoverished with living conditions below the standards that are the norms in the rest of Canadian society. It has an 80% unemployment rate. As many as 20 people dwell in a single house. The former premier of New Brunswick held out the promise of jobs and prosperity through the development of shale gas. Yet the community judged the price they and their neighbours would pay in destruction of their land and waters and the plants, animals and fish that live there would be too high. Instead of seizing on the promise of jobs or perhaps a share in royalties, the Elsipogtog have responded in a spirit of generosity towards all Creation.

Part Eight: What are the options for KAIROS and its members in this situation?

Some church communities have publicly supported calls for moratoria on fracking. The West District Presbytery of the Newfoundland and Labrador Conference of the United Church declared its support for a moratorium on fracking. Similarly in 2012, the 87th Maritime Conference of the United Church approved a motion urging the four provincial governments within its bounds (New Brunswick, Nova Scotia, Prince Edward Island and Quebec) to place moratoria on onshore shale gas and coal bed methane development until sufficient scientific studies are completed and meaningful consultations are carried out with communities, including Aboriginal and rural communities.

In keeping with the principles of subsidiarity and respect for Indigenous rights, decisions on whether to call for further bans or moratoria on fracking should be made locally in consultation with all the communities most affected, Indigenous and non-Indigenous.

The principles contained in a joint open letter sent to the former premier of New Brunswick on November 1, 2013, by KAIROS together with Amnesty International and the Canadian Friends Service Committee, can also be applied in other situations:

First, it is critical to acknowledge that Indigenous Peoples have rights to their lands, territories and resources that predate the creation of the Canadian state. These pre-existing rights are affirmed in the Peace and Friendship Treaties, in the Royal Proclamation of 1763, and in section 35 of the *Constitution Act, 1982*, as well as in authoritative international human rights instruments including the *United Nations Declaration on the Rights of Indigenous Peoples*. ...

Second, the inherent land rights of Aboriginal peoples cannot be ignored in the day-to-day operations of the government. Doing so is both discriminatory and contrary to the rule of law....

Third, whenever a proposed project has the potential for impacts on the cultures, livelihoods, health and well-being of Indigenous peoples, or where questions remain about the extent of the possible impacts, a very high standard of precaution is required to ensure that no further harm is inflicted... Our organizations call on New Brunswick to acknowledge that shale gas exploration and development on or near the traditional lands of Indigenous peoples is clearly an example where the safeguard of free, prior and informed consent is appropriate and necessary.

Finally, our organizations highlight the need to ensure appropriate police response in the unresolved conflicts over Indigenous lands rights. In all instances, police have a clear responsibility to respect and protect human rights.¹²⁰

Options for other responses by KAIROS include:

- Maintaining a close and ongoing dialogue with Indigenous and non-Indigenous communities affected by fracking and responding to requests for solidarity actions as they relate to our existing policies, the UN *Declaration* and just and sustainable energy. KAIROS and allied groups, such as the Christian Peacemakers Teams¹²¹, may choose to accompany Indigenous and non-Indigenous communities involved in peaceful actions resisting fracking operations.
- Producing popular education materials, such as short videos, concerning the issues raised by fracking.
- Closely monitoring independent inquiries into the safety of fracking operations and studying their results.
- Supporting the call by the Council of Canadian Academies for more research into the economic, social and environmental issues raised by the practice of fracking.
- Redoubling efforts to support energy conservation and renewable energy development programs in order to assure a clean and sustainable energy supply and create employment in local communities. An investigation by Blue Green Canada, an alliance of trade unions and environmental groups, has found that a million dollars invested in energy efficiency creates 14.1 new jobs and the same amount invested in renewable energy creates 15.5 jobs, while a million dollars invested in oil and gas only results in 1.8 jobs.¹²²
- Monitoring the suit initiated by U.S.-based Lone Pine Resources under the investor-state provisions of the North American Free Trade Agreement challenging Quebec's moratorium on hydraulic fracturing. Lone Pine is seeking US\$250 million in compensation for the "expropriation" of its permit to explore for shale gas under the St. Lawrence River.¹²³ If Lone Pine wins this arbitration it will be a setback not only for the people of Quebec but also for Indigenous Peoples across the country seeking to protect their rights against corporations seeking to take advantage of Foreign Investment Protection Agreements as explained in *KAIROS Briefing Paper* No. 36, September 2013.¹²⁴

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