Royal Dutch Shell (Shell) holds a tenure to develop a significant amount of coalbed methane in the Klappan-Groundhog coalfields, a remote area in the northwestern province of British Columbia (B.C.), Canada (the “Klappan Project”). Several factors may impact the financial viability of this project. These include: operational delays due to community opposition (which has already resulted in a moratorium being imposed); increasing political and public concern about the impacts of hydraulic fracturing, or fracking; high development and production costs because of the remoteness of the area and the lack of infrastructure relative to the possible value of the resource; and the impact of carbon pricing and other climate-change regulation over the 15-year lead-in period before commercial development is expected to begin. This briefing will provide information about these risks and highlight specific questions for Shell to address.

WHAT IS UNCONVENTIONAL GAS?

Unconventional gas is natural gas (typically methane) found in difficult to access rock formations, requiring different or specialized techniques to release the gas. Unconventional sources of gas are trapped under the pressure of water that has permeated the rock.\(^1\) To produce gas from such formations, water must be drawn off first to lower pressure, allowing methane to flow out of the rock and into the well.\(^2\)

Examples of unconventional gas include coalbed methane, tight gas (from sandstone), and shale gas.\(^3\) A common technique to extract these sources of gas is hydraulic fracturing, also known as fracking (or fraccing). See sidebar What is hydraulic fracturing.

Around 12 percent of global gas production comes from unconventional sources, the majority of which is from North America.\(^4\)
LACK OF CONSENT FROM LOCAL COMMUNITIES

The Klappan, also known as the Sacred Headwaters, is the source of three major wild salmon rivers: the Skeena, Nass, and Stikine Rivers. Several species of salmon make the journey of several hundred kilometres from the Pacific Ocean to spawn at the headwaters. The headwaters region is the heart of one of the few remaining intact wilderness areas in the world, which is critical habitat for a diversity of large mammals and where predator-prey relationships persist. Because of its size and intactness, this is one of the few areas large enough to act as refuge for species to adapt to climate change.

For many First Nations (Canada’s indigenous peoples), the Klappan is culturally significant. The fish and wildlife from the Klappan has sustained indigenous cultures and livelihoods for millennia.

Canadian Supreme Court decisions have affirmed that First Nations, such as the Tahltan, who have never ceded land through treaty, have constitutionally protected aboriginal title to their territories. This includes the right to make decisions as to how their lands and waters are used, in addition to other aboriginal rights. Without proper consultation, conflict resulting in delays, as Shell has experienced, is likely.

Since Shell was awarded this tenure in 2004, the project has been fraught with conflict and delays due to lack of consent from First Nations and communities living within the watersheds downstream from the Klappan. Strained relations between Shell and affected communities, coupled with increasing public scrutiny of fracking, will make it difficult for Shell to gain any social license to develop the Klappan Project.

In 2004, after the British Columbia government granted Shell a permit to explore for coalbed methane, Shell signed a Memorandum of Understanding (MOU) with the elected leaders of the three Tahltan governing bodies (Tahltan Central Council, Tahltan Band Council, and Iskut Band Council). The MOU outlined how Shell would interact with the Tahltan (e.g., communication protocols, job creation). The three leaders wrote letters to the British Columbia Oil and Gas Commission stating simply that the leaders had “no objection to Shell Canada and the project going on at Klappan.”

However, by 2005, events indicated that affected First Nations did not believe they had been adequately consulted in the decision-making process. In 2005, the Iskut band withdrew from the Tahltan Central Council due to community concerns about Shell’s plans. The Tahltan Band Council Chief was forced to resign after members of the Tahltan Band occupied his office for 254 days, protesting his decisions to endorse the development proposals. Shell announced the company would defer its plans to drill in the area for the year.

In 2006, Shell attempted to obtain endorsement from the Tahltan Central Council and Tahltan Band Council for a Benefit Agreement. The two Tahltan governing bodies said they did not have the support of their communities to form such an agreement with Shell. Shell was again forced to cancel its proposed activity for the season.

“I GIVE THE GENERAL UNREST IN TAHLTAN COMMUNITY IN AUGUST 2005, SHELL DECIDED NOT TO PROCEED WITH ITS PROPOSED 2005 ACTIVITIES.”

- SYLVIE TRAN, FORMER SHELL PROJECT MANAGER


II. Note that the MOU and letters from elected leaders are not to be construed as indicators of Free, Prior, and Informed Consent (FPIC). FPIC would require meaningful engagement of First Nations in the decision-making process with government and with Shell regarding whether and how a project should proceed.
Communities who live a few hundred kilometres downstream from the Klappan, in the watersheds of the three rivers, have significant concerns regarding the impacts of Shell’s project. In 2008, seven First Nations band councils, four cities/towns, and two regional districts – all representing the various levels of governments within the three affected watersheds – as well as the Union of B.C. Municipalities passed resolutions calling for a suspension of coalbed methane exploration in the Klappan. The resolutions also called for comprehensive consultations with all residents of the Skeena, Nass, and Stikine watersheds.

Rallies and public forums were held in all downstream communities. Loggers, ranchers, and hunters united with environmentalists – unlikely allies – against Shell. First Nations communities, who had a long-standing history of disputes, stood together in solidarity on the one road that accesses the Klappan.

National and international attention from environmental groups and media was garnered. Ads were placed in newspapers such as the Financial Times of London to raise the profile of the issue. International environmental groups protested outside the Shell Annual General Meeting (AGM) in The Hague in 2008. Fourteen groups, representing regional, national, and international environmental organizations, wrote letters to Shell regarding the Klappan Project in 2007 and again in 2010. Protestors were present at the World Energy Congress in Montreal in 2010 and at Shell-hosted Gastech in March 2011 in Amsterdam. The International League of Conservation Photographers spent six weeks photographing the region during the summer of 2010, and a book will be published in Fall 2011 featuring their photos. Concerns regarding the Klappan Project will also be raised at this year’s AGM.

In response to the widespread attention and opposition, the British Columbia government was forced to reconsider the tenure and impose a moratorium on Shell’s activities in the region in 2008. In order for the moratorium to be discontinued, the British Columbia government must be satisfied that communities have been provided with sufficient information about coalbed methane and that water quality data is gathered to determine the potential impacts of coalbed methane development on regional water quality over time. The British Columbia government announced that the moratorium “had to continue through 2012 until there is consultation and agreement with local communities,” and while the Tahltan also welcome the extension, it is unclear what, if anything has been done to meet the terms of the moratorium.

Communities in northwestern British Columbia are increasingly wary of large-scale energy projects that pose significant risks to salmon ecosystems and provide few jobs. Sixty-one First Nations communities, the Union of B.C. Indian Chiefs, and the Union of B.C. Municipalities have publicly opposed Enbridge’s Northern Gateway Pipeline and the tankers that would transport tar sands fuel from Alberta to Asian markets. Shell can expect it to become more difficult to garner any support for its Klappan project.

“B.C.’S CURRENT TENURE ALLOCATION AND REGULATORY REGIME FOR COALBED METHANE DOES NOT CONSIDER CUMULATIVE REGIONAL IMPACTS, THE INTERESTS OF DOWNSTREAM COMMUNITIES OR MEET THE CROWN’S OBLIGATION TO CONSULT AND ACCOMMODATE ABORIGINAL RIGHTS AND TITLE.”

– B.C. FIRST NATIONS SUMMIT RESOLUTION ON A MORATORIUM ON COALBED METHANE DEVELOPMENT IN BRITISH COLUMBIA

DISCLOSURE REQUIRED FROM SHELL:

What is Shell’s role in meeting the terms of the moratorium?

What progress has Shell made toward meeting the conditions to lift the moratorium?
WHAT IS HYDRAULIC FRACTURING?

In order to extract coalbed methane and other forms of gas trapped in rock formations underground, the rock must be stimulated, or fractured, to release the gas. Fluid (mostly water but sometimes oil or methanol) is mixed with sand and other additives, and injected underground at high pressure to fracture the rock. Fracturing allows groundwater to be pumped out, reducing the pressure that holds the gas underground, and facilitates the flow of gas to a well where it is captured at the surface.

In British Columbia, as with most jurisdictions in the United States, there are no regulations requiring companies to disclose the chemical constituents of fracking fluids. Examinations of the constituents of frack fluid have found many chemicals can impact respiratory and nervous systems and organ functioning. Some chemicals have been identified as carcinogenic while others would impact birds, fish, and other species.

After fracking, fluid is pumped or “flowed back” and collected at the surface, but it is estimated that between 50 to 90 percent of frack fluid is recovered. The EPA’s study in 2004 found that frack fluids can remain trapped underground and flow beyond the area that was targeted for fracking.

NATURAL GAS MARKET TRENDS

Production trends

Analysts studying the production levels of shale gas projects in Texas have found that estimates of productivity and thus profitability of new sources of unconventional (shale) gas in the United States are not as promising as companies have touted. These studies found that less than half of the wells drilled were productive enough to break even.

The British Columbia government auctioned the Klappan tenure with its own estimated availability of eight trillion cubic feet (tcf) of gas in place. Shell, however, has said the company does have enough data to understand the resource.

Shell staff stated that commercial-scale development in the Klappan Project would not commence for at least another 15 years. World natural gas production is forecast to peak in 2045, and the demand for natural gas may significantly decrease over the next few years, as oil and gas companies become more familiar with the true costs of developing the resources. By the time Shell is ready to develop the resources in the Klappan, the timing for optimal return on investment may have passed.

Production costs

The remote location of the Klappan, as well as the lack of infrastructure and British Columbia regulations regarding the disposal of water, mean there are significant costs associated with bringing the Klappan Project to full production.

“…THE ECONOMIC VIABILITY OF UNCONVENTIONAL GAS IS AT THE MERCY OF SERVICE, RAW MATERIAL AND ENVIRONMENTAL MANAGEMENT COSTS, ALL OF WHICH ARE INCREASING.”

Efficiencies in drilling, fracturing, well recovery, and water disposal are required for unconventional gas to be economically feasible. In the United States, where a more mature pipeline network exists, unconventional gas production is able to ramp up relatively quickly and economically. By contrast, in remote areas such as northern British Columbia, little or no infrastructure exists, making production less financially viable.
COSTS TO DEVELOP THE KLAPPAN:

- Nearly 3000 kilometres of roads
- More than 4000 wells
- Pipelines to connect wells and pipeline to connect to nearest transmission pipeline (several hundred kilometres away)
- $9.2 million in rent for tenure (for eight-year exploration tenure, approximately $9.2 million)
- $14 million spent in 2004 for seismic testing and drilling of three exploratory wells
- Between $1500 and $72,300 per well for wastewater disposal

Except for an upgraded railgrade, which is used as road access to the Klappan, no infrastructure exists. The nearest major centre to the Klappan is some 400 kilometres away. To develop the resources in the Klappan, Shell will need to bear the capital costs of building a significant number of roads, several thousand wells and associated pipelines to connect wells to the nearest transmission pipeline, which is several hundred kilometres away. Disposal of the large quantities of water produced with unconventional gas extraction also carry potentially significant costs. In British Columbia, companies are required to re-inject water underground, or truck the water offsite for to a licensed treatment facility. Both are expensive options for disposal.

DISCLOSURE REQUIRED FROM SHELL:

Given the remoteness of the Klappan Project, lack of infrastructure required, projected continued low prices of natural gas, and increasing prices of carbon, what does Shell estimate to be cost of production versus value of the resource in the Klappan?

Oversupply of gas affecting natural gas prices worldwide

The increased production of unconventional gas sources has created a worldwide glut in gas supply. This has significantly depressed gas prices, which in turn make the economics of developing unconventional sources of gas challenging. In British Columbia, natural gas prices have been reduced to less than half what they were worth five years ago, from $14 to $4 per gigajoule. One portfolio manager suggests that high volumes of production will maintain excess supply, keeping prices low. While the International Energy Agency predicts a continued increase in supply through 2011 before a “hesitant decline,” as discussed above, production costs will remain an important factor of the economic viability of extracting unconventional gas.

Costs of implementing climate change policy trends

As governments worldwide implement policies and regulations moving into the era of low-carbon economies, a concomitant rise in the cost of developing oil and gas is expected. Policies to be developed include greenhouse gas reduction targets; carbon markets; and phase-out of fossil-fuel subsidies, as agreed to by G-20 leaders in 2009. Shell will have to incorporate these additional costs into operational costs, which will likely increase over time.

In 2008, British Columbia became the only jurisdiction in North America to implement a carbon tax. Industrial users are required to pay the tax on any fossil fuels purchased, and on flaring. The British Columbia government will increase the carbon tax to its maximum rate of $30 per tonne in 2012. The United States Environmental Protection Agency estimates that each completed well produces 192,675 tonnes of CO2e. In British Columbia, with a tax of $30 per tonne, this would equal over $5.7 million per well. The Canadian National Roundtable on Energy and the Environment forecasts the price of $54/tonne CO2e in the US and $78/tonne CO2e in Canada in order to achieve 2020 greenhouse gas reduction targets. Shell has previously disclosed that it uses an assumed carbon price of $40 per tonne. While the estimated 2012 British Columbia carbon tax is below Shell’s assumed carbon price, given that Shell staff predict the Klappan Project will not enter into production prior to 2026 – by which time carbon pricing may have increased significantly – investors would benefit from understanding whether Shell has assumed a higher carbon price for the Klappan Project.

Canadian federal subsidies amounted to $1.38 billion in 2008. Worldwide subsidies are estimated at over $300 billion in 2009. Removal of such subsidies and tax incentive to corporations will result in higher operating costs for oil and gas companies.

With increasing costs due to climate policies, the return on investment of Shell’s project in the Klappan decreases over time.

ENVIROMENTAL RISKS OF COALBED METHANE

While Shell acknowledges public concern regarding fracking, the company feels it has strong safety standards and a well-trained staff. However, because of inadequate information on coalbed methane extraction and hydraulic fracturing, many risks are not fully understood.

“THE NATURAL GAS WE PRODUCE LIES FAR BELOW THE FRESH WATER LAYERS. AS AN EXTRA PROTECTION MEASURE, WE LINE THE WELLS WITH STEEL BARRIERS AND CONCRETE. THIS IS NOT TO SUGGEST THAT NOTHING COULD EVER GO WRONG. WE’VE RECENTLY BEEN REMINDED THAT THINGS SOMETIMES CAN AND DO GO WRONG.”

– PETER VOSER, CEO ROYAL DUTCH SHELL

The United States Geological Survey (USGS) has commented that environmental concerns associated with coalbed methane development include water production and disposal, methane migration underground, and climate impacts. In Pennsylvania, several companies are facing litigation for water contamination, and have been fined hundreds of thousands of dollars for gas migration from wells, gas and wastewater leakage, and frack fluids contaminating a watershed.

In 2004, the United States Environmental Protection Agency (EPA) conducted studies on the impacts of hydraulic fracturing and drinking water. The EPA is currently undertaking a more thorough examination of the impacts to public health and drinking water. This study is expected to be completed in 2012.

Studies conducted by the USGS have found that produced water (the water found within the rock formation that holds gas under pressure) can contain high levels of salts and chemicals including arsenic, lead, and mercury. The USGS recommends that better information regarding the volume of produced water and its composition is required so that communities can make informed decisions about CBM development. In 2009, the British Columbia Auditor General released a report stating that not enough information is available to adequately protect groundwater supplies.

Researchers at Cornell University compared the emissions generated from unconventional gas to conventional natural gas and coal. According to the study, while less CO2 is emitted per unit of energy generated when comparing natural gas versus coal, the emissions are much higher if the footprint of extracting unconventional gas is considered. The study found evidence that unconventional gas sources leak 1.3 to 2.1 times more fugitive methane emissions than conventional gas during the fracking process. The study recommended stricter regulations and employing technologies to reduce methane emissions. As public scrutiny increases on the impacts of developing natural gas, stricter regulations could result in increased costs to extract unconventional gas.

The unknowns associated with fracking have fueled public concerns about the technique. As a result of public pressure, law-makers and politicians are taking action. France, the State of New York, the Canadian province of Quebec, and a growing number of cities in the U.S. have banned fracking until the practice and its impact are better understood. Members of the New Democratic Party, the opposition party in British Columbia, have positioned themselves against fracking. Such decisions create delays in operations. Any accidents associated with fracking would pose a reputational risk to Shell’s brand.

DISCLOSURE REQUIRED FROM SHELL:

What is Shell’s perspective on the studies that raise questions about the impacts of fracking on health and the environment, and what measures does Shell implement in operations to address such findings?
IMPACTS TO WATER AND WATER SUPPLIES

As the Klappan Project is only in the exploration phase, no numbers specific to the impacts on water and water supplies are available. However, the following statistics are available from coalbed and shale projects of similar size in other parts of North America:

Shell’s Groundbirch operations in northeastern British Columbia, a shale project, which has similar government-estimated potential to the Klappan Project of eight trillion cubic feet, requires 2 - 3 Olympic-sized swimming pools of water (5-8 million litres) per well.66

Between 55-330 fire trucks (55,000-300,000 gallons) of frack fluid are used for each coalbed methane well in San Juan Basin, Colorado,67 of which between 10 and 96 trucks would remain stranded underground.66

Some of the more productive coalbed methane projects in the U.S. (approximately 3000 wells drilled, similar to the estimated number of wells for the Klappan)68 produce up to 17 fire trucks full of produced water per day (25 and 400 barrels per day).

IV. Based on assuming 68-82% recovery, as referenced in United States Environmental Protection Agency Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs. 2004.

IMPACTS OF DEVELOPMENT IN NORTHWEST BRITISH COLUMBIA

Predicted impacts of this type of development at the landscape scale include:69

- Fragmented wilderness essential to large mammals like grizzly bears and caribou
- Altered predator-prey relationships, resulting in changes to species composition and population sizes due to roads and pipelines
- Methane contamination of shallow ground water or percolation of methane to surface through soil or waterways
- Large quantities of produced water to be disposed of, and uncertainty about how groundwater will be affected by regulation to re-inject or truck off site
- Altered hydrological cycles, affecting groundwater and surface water flows and temperature. These changes to water cycling may result in dewatering of fish egg beds and increased juvenile fish mortality in winter.

In addition to investment risks, the Klappan Project carries significant potential environmental impacts. To conduct exploration activities, Shell has estimated between four and 14 additional wells in addition to the three already drilled will be required.70 71 Shell staff estimate between 1,500 to 10,000 wells will be required to develop the Klappan Project.72 Simulations based on average coalbed methane well density from commercial developments in the U.S., as well as coalbed methane development best-management practices and road-building regulations in British Columbia, show that, at full scale development, nearly 3000 kilometres of roads would be built and more than 4000 wells would be drilled. The total infrastructure footprint from roads and well pads (exclusive of pipelines and compressor stations) would be 20,500 hectares – or twice the size of Bristol.73
CONCLUSION

The Klappan Project carries risks for Shell and its shareholders. Community opposition has already led the British Columbia government to impose a moratorium. Continued community objections, together with increasing political and public scrutiny of fracking, are likely to result in further delays and a threat to Shell’s social licence to operate in the region.

Questions remain about the financial viability of the Klappan Project. Shell has acknowledged that it has not yet been able to gather enough data to determine the Klappan Project’s potential output. Exploration, development, and production costs will be high because of the remoteness of the area. Shell has also acknowledged that this project would not be ready for full development for at least 15 years. Within this time, oil prices will continue to rise, and carbon pricing and other climate-change mitigation policies are likely to have a negative impact upon the financial viability of the Klappan Project.

DISCLOSURE REQUIRED FROM SHELL:

- What is Shell’s role in meeting the terms of the moratorium? What progress has Shell made toward meeting the conditions to lift the moratorium?
- Given the remoteness of the Klappan Project, lack of infrastructure required, projected continued low prices of natural gas, and increasing prices of carbon, what does Shell estimate to be the cost of production versus the value of the resource in the Klappan?
- What is Shell’s perspective on the studies that raise questions about the impacts of fracking on health and the environment, and what measures does Shell implement in operations to address such findings?
ENDNOTES


8. Letters to British Columbia Oil and Gas Commission from Louie Louie, Curtis Ratray, Jerry Asp, dated 17 August 2004

9. Letter from Shell to Tahltan Nation, dated 19 August 2005

10. Supreme Court of British Columbia Between Shell Canada and Rhoda Quock et al., 2007. Affadavit #1 of Sylvie Tran, dated August 21 2007.


17. British Columbia Oil and Gas Commission, Undated. Fracturing (Fraccing) and Disposal of Fluids.


20. B.C. Oil and Gas Commission, Undated. Fracturing (Fraccing) and Disposal of Fluids.


30. Ibid.


33. Ibid.

34. Ibid.

35. Supreme Court of British Columbia Between Shell Canada and Rhoda Quock et al., 2007. Affadavit #1 of Sylvie Tran, dated August 21 2007.


