WESTERN ENERGY CORRIDOR SUMMARY

Western Energy Corridor: Designed and developed to allow for the competitive movement of Canada's valuable resource commodities, with focused environmental and citizen-respected development

Western Energy Corridor Inc.

February 2021

Attachment to Western Energy Corridor Impact Assessment Act Request (Sections 1 - 5)

TABLE OF CONTENTS

Table of Contents

List of Figures:

1 Western Energy Corridor – Who We Are

Western Energy Corridor Inc.
1740 – 10th Street S.W.
Calgary, Alberta
CANADA T2T 3E8
Telephone: 403-245-1499
Website: WesternEnergyCorridor.ca

Western Energy Corridor Inc. is a group of seven senior oil and gas executives who have worked together in the pipeline industry for decades. Both collectively and individually they have successfully initiated, managed, and completed numerous major energy projects in North America. This group of energy specialists exemplifies the best in management, engineering, environmental and regulatory expertise that Canada has to offer.

In the fall of 2017 these like-minded individuals decided to get together to discuss the state of Western Canada's resource industry and the difficulties being encountered relative to getting these resources to other markets outside of North America. Initially, the focus was on moving natural gas from northwestern Alberta and northeastern B.C. to the west coast for eventual liquefaction and shipment to global markets. After over a year of extensive review and analysis of various terminal locations and pipeline alternatives to the west coast, the team concluded that the "risk-reward" implications of any of these options did not warrant further work, or other alternatives were being suitably pursued by others.

In early 2019, the project team decided a more viable option was to pursue a new pipeline corridor extending from east central Alberta to Hudson Bay. Initially, the concept specifically focused on natural gas transmission but ultimately morphed into the potential addition of an oil pipeline, a high-voltage DC power line, and other possible linear facilities co-located within a single geographic and economic corridor.

Following extensive routing work, including ground and aerial reconnaissance, a preferred energy corridor was selected that extends over 1,500 km terminating in the vicinity of Churchill, Manitoba on Hudson Bay. The project team completed this effort and the result is the "**Western Energy Corridor**" (WEC), which is presented and described in more detail within this document.

The following are CVs of each of the Western Energy Corridor Team (WEC Team) members and current owners of Western Energy Corridor Inc.

WESTERN ENERGY CORRIDOR – WHO WE ARE

BARRY SINGLETON
Barry.Singleton@WesternEnergyCorridor.ca

BRYAN SINGLETON
Bryan.Singleton@WesternEnergyCorridor.ca

Singleton Associated Engineering Ltd.

Barry and Bryan Singleton entered the pipeline industry in 1972. In 1979 they incorporated Singleton Associated Engineering Ltd. (Singleton), a successful Calgary-based pipeline engineering firm that provides professional consulting services in the areas of project management, pipeline engineering, conceptual engineering, pipeline route selection, construction planning and estimating, energy project certificate applications, expert testimony, construction management, quality control and assurance and materials handling. Singleton has completed numerous pipeline projects ranging from small gathering lines and distribution systems to major cross country transmission pipelines, including the Alliance Pipeline (2,320 km) in Canada and the Tuscarora Gas Transmission System (370 km) in the U.S. Singleton successfully managed its Alliance capital budget of $1.8 billion ($5 – 6 billion in today's dollars) and a multidisciplinary team of over 400 technical staff and third-party subcontractors and a pipeline contactor workforce in excess of 2,500 personnel. Singleton has also provided professional pipeline consulting services to many of Canada's other major pipeline companies.

DEAN MUTRIE
Dean.Mutrie@WesternEnergyCorridor.ca

Dean Mutrie began his career as an environmental consultant in 1973 and is regarded as a pioneer in the environmental inspection industry. He co-founded the EnForm Pipeline Environmental Inspection course in 1988 and led numerous training courses across Canada and the U.S. for the U.S. Federal Energy Regulatory Commission and others. He is an internationally recognized expert on the environmental impacts of linear facilities and was solicited by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Encyclopedia of Life Support Systems committee to author a chapter entitled "Environmental Conservation" in the "Pipeline Engineering" theme. As a principal and founder of TERA Environmental Consultants for 27 years, he carried out over 300 pipeline and power line projects totaling more than 30,000 km. Dean has served as Project Director or Project Sponsor for several high-profile linear projects in Canada including the Alaska Pipeline Project, Coastal Gas Link, Westcoast Connector, the Trans Mountain Expansion Anchor Loop Project through Jasper National Park, the Mackenzie Gas Project, the Georgia Strait Crossing, and Alliance Pipeline, as well as several projects in the United States.

WESTERN ENERGY CORRIDOR – WHO WE ARE

JACK CRAWFORD
Jack.Crawford@WesternEnergyCorridor.ca

Jack Crawford, a professional engineer, is currently the President of J.R. Crawford & Associates (a private consultancy) a position he has held since 2009. He has held several positions at the senior executive level, with the most recent being President and CEO of Altex Energy Ltd. (a private energy infrastructure company) from 2005 to 2009. From 1996 to 2004, Jack was Executive Vice President and Chief Operating Officer of the Canadian and U.S. divisions of Alliance Pipeline Ltd., during the development, construction, and operation phases of one of North America's largest pipeline systems. Jack holds a B.Sc., Mechanical Engineering, an MBA, and is certified by the Institute of Corporate Directors in Canada. Jack held the position of Chair, Audit Committee, and independent board member of Pacific Northwest LNG, providing him with significant learnings and understandings of prospective LNG facilities in Western Canada. He has also served on various private, charitable, and industry association boards including the Canadian Energy Pipeline Association, the Van Horne Institute, and the Calgary Philharmonic Orchestra Society, where he held the chair in 2007-2008.

NORVAL HORNER
Norval.Horner@WesternEnergyCorridor.ca

Norval Horner has over 45 years of experience in the North American energy industry. He holds an M.Sc., Chemical Engineering and is a professional engineer registered in BC., Alberta, and Saskatchewan. His career has focused on natural gas and NGL marketing and he has held various engineering roles in the design and construction of major energy plants and pipelines. He gained cryogenic experience as Manager of Engineering with Amoco Canada where his team directed a plant and pipeline construction budget of over $100 Million annually and held integrity management responsibilities for over 7,000 km of pipelines. At Alliance Pipeline, Norval was Manager, Facilities Engineering, with responsibilities for public safety, integrity, design, and construction of all above ground facilities including gathering, metering, hydraulic design, compression, and delivery systems. He was also Project Manager for the design and construction of the Aux Sable 2.1 Bcf/d cryogenic NGL extraction and fractionation processing plant located at the terminus of the Alliance Pipeline, near Chicago, IL. He later became VP of supply for Aux Sable and Alliance Canada Marketing. Norval has consulted for the last several years. His most recent role (2016-2017) was expert advisor to the Ontario government assisting them in evaluating the Energy East pipeline project.

WESTERN ENERGY CORRIDOR – WHO WE ARE

PAUL ANDERSON
Paul.Anderson@WesternEnergyCorridor.ca

Paul Anderson is a Calgary-based strategic advisor with over 30 years of professional experience and expertise in regulatory, land, environmental assessment, and approvals within the oil and gas and pipeline industry in western Canada. Paul was the Owner and President of HMA Land Services Ltd., a successful Western Canadian land management company that was subsequently sold to RPS Group, a multinational energy resources and environmental consultancy company. Subsequently, Paul became President of the Canadian division of RPS Group. During his career Paul has had leadership roles for major pipeline assets including Alliance Pipeline and Enbridge's Northern Gateway Pipeline project. Most recently, working with the Canadian Development Investment Corporation, Paul was involved in the due diligence process leading to the acquisition of the TransMountain Pipeline and the Kinder Morgan system in Canada. Paul holds a B.Sc., Biology from the University of Waterloo and a M.Sc. in Watershed Ecosystems from Trent University.

VERN WADEY
Vern.Wadey@WesternEnergyCorridor.ca

Vern Wadey has over 36 years of experience in the energy infrastructure, midstream, power generation, and LNG industries, primarily with TransCanada PipeLines and Veresen Inc. (now Pembina Pipeline). His experience has been concentrated in corporate governance, large-scale project development, acquisitions and, earlier, natural gas marketing. Vern has held various private board positions including Alliance Pipeline, Aux Sable Liquids Processing, Pristine Power, and Alberta Ethane Gathering System. Vern was responsible for the initial development of the Jordan Cove LNG export facility, proposed for Coos Bay, Oregon, and the related Pacific Connector pipeline. As Veresen's Vice President responsible for Jordan Cove's development, he was particularly focused on commercial success of the LNG export business to global energy markets. Vern Wadey graduated from the University of Alberta with a B.Sc., Chemical Engineering, and received his MBA from the University of Calgary. In 2007 he earned a Corporate Directors Designation (ICD.D), from the Institute of Corporate Directors, enhancing his corporate board expertise.

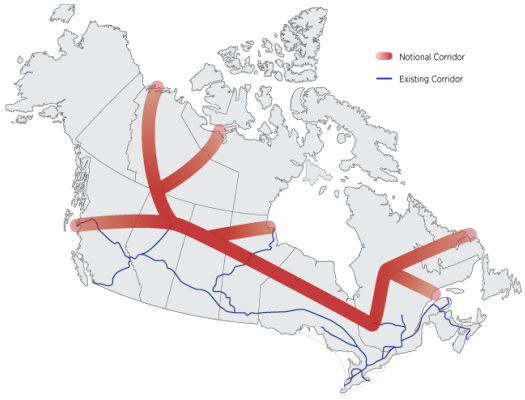
2 Western Energy Corridor – What We Are Offering

Popularized in the late 1960's by Richard Rohmer, Canada's famous visionary, novelist and war hero, Rohmer saw the importance of creating high value corridors intended to: efficiently and economically move Canada's valuable natural resources; to engage its northern communities; protect its sovereignty; and, to promote the creation of substantial wealth for all Canadians. Rohmer recognized the value of joining Canada and its people through his view of promoting the value and use of what he coined as "*Mid-Canada*". Rohmer's work, while visionary, never won over the Canadian population to inherently live, work, and benefit from the resources of "Mid-Canada".

Source: The Walrus: *If You Build it, They will Stay, Sept 2014*

FIGURE 1: RICHARD ROHMER MID-CANADA VISION

The challenge of effectively developing new resource corridors has not gone silent, and in work published by the University of Calgary (U of C) School of Public Policy, conceptual northern corridors provided theoretical and notional routings of resource corridors as shown in Figure 2. Later in mid-2017, a standing committee on Canadian Banking, Trade and Commerce released a report entitled *National Corridor, Enhancing and Facilitating Commerce and Internal Trade*, which provided significant support to the concept of northern and mid-Canada corridors. In a press release, the Standing Senate Committee called the northern corridor concept "a visionary project that could unlock extraordinary economic potential".



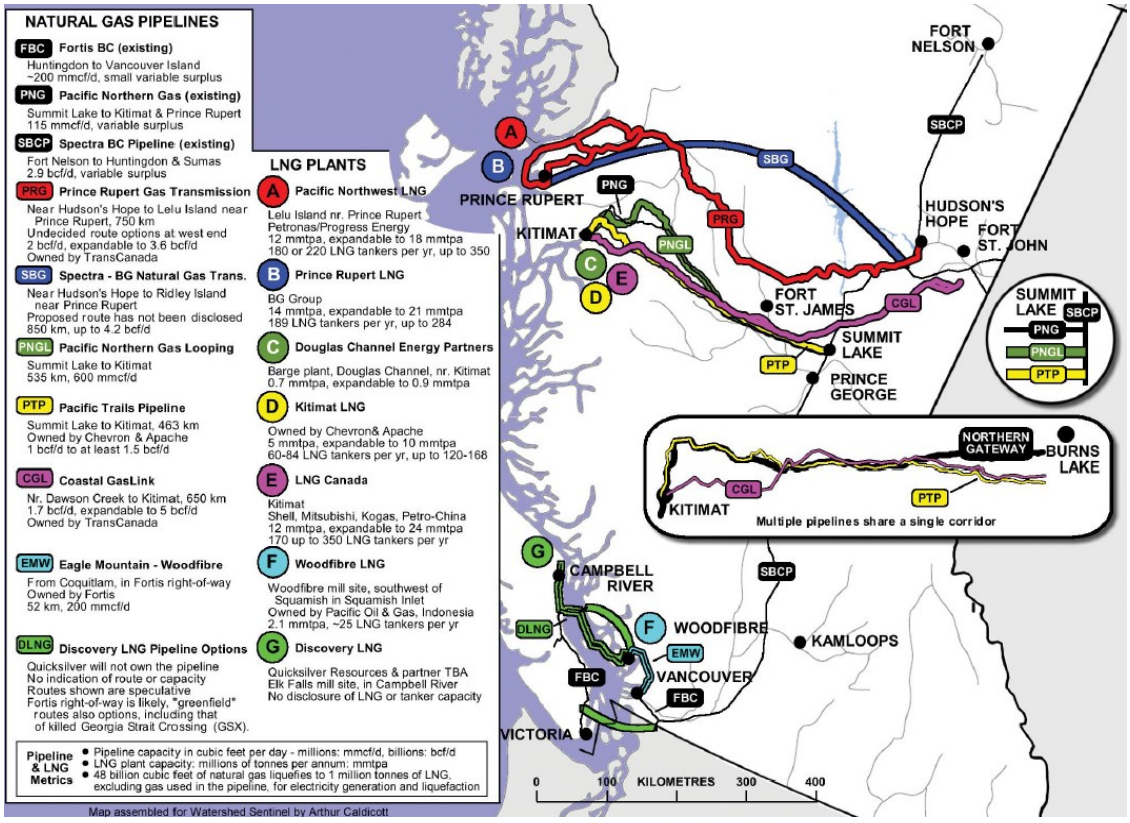
Source: U of C, School of Public Policy

FIGURE 2: U OF C SCHOOL OF PUBLIC POLICY - NOTIONAL CORRIDORS

WESTERN ENERGY CORRIDOR – WHAT WE ARE OFFERING

Canada's corridor development is far from new. Railway leaders, major energy infrastructure developers, and the construction of substantial federal, provincial, and municipal highways provide evidence of the multitude of unique and multi-use corridors constructed in Canada.

From early 2010 to late 2018, Source: Watershed Sentinel, Available from the Internet
Figure 3 shows several energy infrastructure players that sought to develop new project routes to transport natural gas, oil, and NGLs from regions within British Columbia and Alberta to Canada's west coast. Billions of dollars were expended by these developers during that time-period, each believing they could establish a route or corridor across British Columbia to benefit their individual investment requirements. Even with multiple levels of government and investor support, most failed.



Source: Watershed Sentinel, Available from the Internet

FIGURE 3: PROPOSED AND CURRENT OIL AND GAS PIPELINES ACROSS BRITISH COLUMBIA

This free-wheeling competitive experience destroyed tremendous amounts of capital and stressed the limits of those concerned about the environmental impact of new resource development, including causing consultation fatigue amongst Indigenous groups. This experience and the publicly charged part of Canada's political and economic history has caused many to question the value of individual competing resource projects. Our belief is that infrastructure developers, having the opportunity to compete for the use of a predefined, well

planned, multi-use corridor that minimizes environmental impacts, focuses Indigenous and public engagement consultation, and expedites regulatory approval, is a far better alternative. Most importantly, this is intended to be an all-Canadian corridor, which helps to preserve Canada's sovereignty and protect its economic interests in resource development.

Drawing on the experience and knowledge of the Western Energy Corridor Team, a specific, constructible corridor has been identified (see Figure 4 for simplified concept). This corridor will be of high value to infrastructure investors and governments that see the merit in developing a multi-use corridor. The work material prepared by WEC is equivalent in nature to similar feasibility development work products, costing tens of millions of dollars, as shown to be expended by some of the infrastructure players seeking to develop a credible resource route across British Columbia.

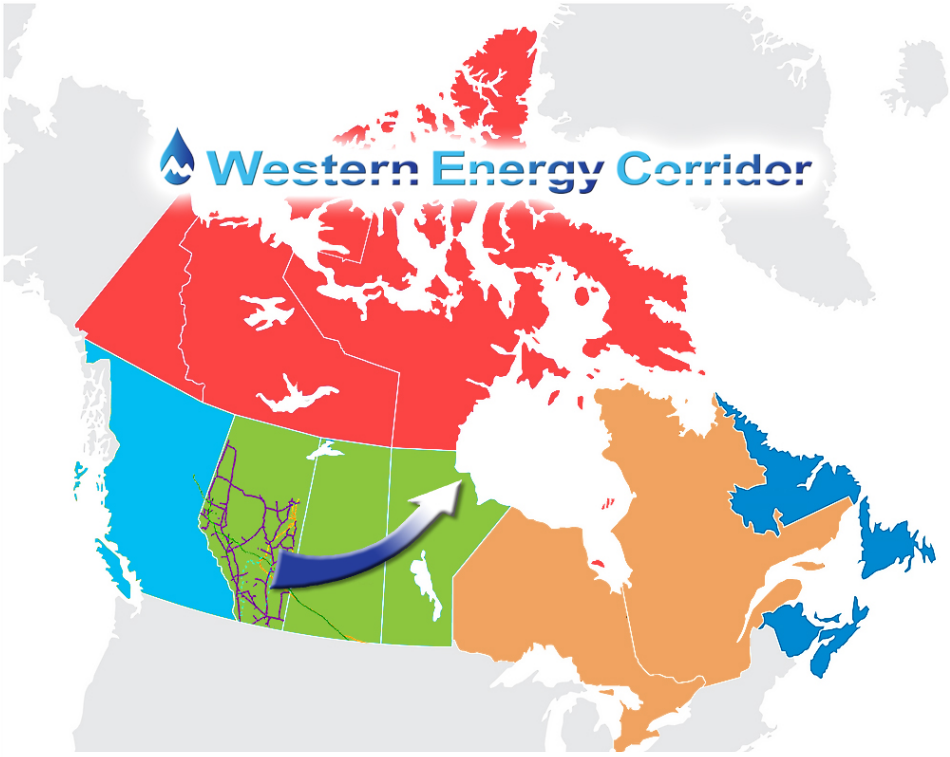


FIGURE 4: WESTERN ENERGY CORRIDOR – ALBERTA TO CHURCHILL

The Western Energy Corridor material is early development work typically completed prior to the more costly regulatory development phase that includes Indigenous and social interaction, detailed environmental analysis and engineering design work, and other high-cost project activities. Based on recent large-infrastructure regulatory work, an experienced developer can anticipate expending at least $200 - $400+ million on the remaining work through to receiving approval to construct. As shown in Figure 5, the WEC Team has completed numerous activities in the development of the work product being made available.

WESTERN ENERGY CORRIDOR – WHAT WE ARE OFFERING

FIGURE 5: PROGRESS AND CURRENT STATUS OF WEC TEAM ACTIVITIES

WESTERN ENERGY CORRIDOR – WHAT WE ARE OFFERING

This report, including sections strictly subject to a Non-Disclosure Agreement (NDA), include:

- Identification of a Preferred Corridor that has been optimized to accommodate multiple types of linear uses, following the evaluation of various Alternative Corridors.
- Evaluation of resource market egress to provincial regions, northern communities, Atlantic and Eastern Canada, and to international markets.
- Early development stage analysis of representative projects that could utilize the corridor (natural gas, oil, hydroelectricity), including technical and economic data and preliminary toll analysis. The report material also considers other alternative potential future uses.

- Detailed photomosaic corridor maps generated using ArcGIS.
- The combination of these materials allows for an *Initial Project Description*, as required by the Impact Assessment Act for large projects proposed within Canada. The Initial Project Description was developed based on a natural gas transmission system utilizing the Western Energy Corridor as a representative project use. Conceptually, this natural gas transmission system would provide natural gas to new and existing gas consuming regions within Canada and for export by way of a world-class LNG export facility.

FIGURE 6: DETAILED WEC WORK PRODUCTS

The detailed information was prepared to clearly define the Western Energy Corridor as a means to develop, transport, and market Canada's high-value resource commodities. Any of these project ventures will represent tens of billions of investment dollars and will return multiples of that amount in total economic return to all of Canada. The Western Energy Corridor is intended

to accommodate one or multiple pipelines (for oil, natural gas, or natural gas liquids), above ground or buried electric transmission lines, and other related infrastructure, such as, fibre optic lines, access and maintenance roads, compressor stations and pump stations. In time, as determined by future developments, the corridor may find use for the movement of hydrogen, potash, or grains (potentially by pipeline) high-speed rail, or even hyperloop transportation, capable of super-speed movement of goods and people.

The Western Energy Corridor is an all-Canadian corridor. Creating a Canadian corridor to tidewater at Churchill, provides for a major, new export facility for Canada's resources, without being impacted by foreign politicians or interest groups that typically are promoting their own best interests.

3 Western Energy Corridor

The Western Energy Corridor may include one or a combination of potential uses:

Natural Gas Pipeline and LNG Export:

A natural gas pipeline starting at the western end of the Western Energy Corridor, within Alberta, and connecting the massive gas supply and long-lived natural gas fields of British Columbia, Alberta, and Saskatchewan through to Churchill, Manitoba will provide tremendous benefits. Large amounts of natural gas supplies transported by way of the Western Energy Corridor will provide an opportunity to gasify cities, towns, and regions across Saskatchewan and Manitoba. This will dramatically increase energy supplies for home heating, commercial and industrial usage with larger regions such as The Pas, Thompson, and Churchill, Manitoba, benefiting from low-cost, environmentally acceptable energy supplies. The terminus of a natural gas pipeline at Churchill will require the siting of a world class liquefied natural gas plant and export terminal. Once operating, this LNG export terminal will allow for Western Canada's natural gas to be transported by small to mid-size LNG carriers to meet Canadian requirements including energy needs within Canada's northern communities and territories. Large scale ice-breaking and conventional LNG carriers will allow for LNG deliveries to Canada's Atlantic and Central provinces, and for export of Canada's natural gas to diverse global markets in Europe, Southeast Asia, South America, and Asia. Delivery of Western Canada's natural gas to markets such as Canada's northern regions, Atlantic and Eastern Canada, and globally, will generate economic and social benefits for all of Canada.

FIGURE 7: MARKET ACCESS FROM CHURCHILL TO CANADIAN AND GLOBAL MARKETS

Crude Oil Pipeline and Oil Export:

A crude oil pipeline within the Western Energy Corridor will provide for the most substantive economic benefit to all of Canada. With the construction of a specially designed crude oil pipeline that operates between Hardisty, Alberta and Churchill, Manitoba, Canada's environmentally preferred crude oil supplies can be exported to Atlantic Canada and to global petroleum markets from an oil export terminal constructed near Churchill.

High-Voltage DC Power Line:

The Western Energy Corridor will allow some of Manitoba's existing and future hydroelectric sources to be provincially exported to other areas of Western Canada. A new, high-voltage DC electric transmission line could fully open electrical power trade between Manitoba and the rest of Western Canada and would substantially benefit Western Canada and Canada's GHG emission goals. Power from the proposed electric transmission line could possibly drive electric motors for compressor or pump stations co-located within the Western Energy Corridor. The concept of expanding Manitoba's immense hydroelectric resources and utilizing the Western Energy Corridor to transport green electricity to Saskatchewan and Alberta will greatly assist in Canada's electrification through interprovincial, green commodity trade.

Exports of Other Western Canada Products

This report discusses various traditional and well-known uses of pipeline rights-of-way or energy corridors. However, there are other potential future uses of an energy corridor, some of which are well understood and some that are in early development stages. Both traditional uses and potential uses are discussed later within this report.

Types of prospective uses of an energy corridor might also include:

- Hydrogen transported as a blend within a natural gas pipeline, or as a discrete product.
- Potash shipped as a liquid slurry through a pipeline (possibly in a hydrocarbon carrier such as crude oil).
- Expanded fibre optic transmission and communications system.
- All weather road from Gillam to Churchill, Manitoba.
- Railway improvements, either new, direct rail line construction or enhancement of existing rail.

High level benefits of the Western Energy Corridor

Formal establishment of the Western Energy Corridor will:

- Minimize environmental impacts by eliminating multiple corridors.
- Allow for multiple types of pipelines, electric transmission lines, and commodities to economically move within Western Canada, and to and from a high-quality tidewater port that can deliver products to other regions of Canada and to global markets.
- Reduce the cost and duration of environmental assessments.
- Focus Indigenous consultation and public engagement to a single corridor to secure lands for multiple uses, thereby reducing consultation fatigue.
- Increase Canada's energy supply security with an all-Canadian corridor.
- Expedite regulatory approvals for large-scale development projects.

- Allow for large scale, multi-billion-dollar infrastructure investment providing economic stimulus and employment opportunities throughout all of Canada.
- Strengthen Canadian sovereignty over vast Arctic regions.
- Provide important infrastructure investment under Canada's Arctic and Northern Policy Framework.
- Increase investment certainty for investors and taxation revenue for governments.

4 Export of Western Canada's Energy Resources

Originally formed in November 2017, the WEC Team initially spent considerable time examining opportunities for the transmission and export of both oil and gas resources to the west coast of British Columbia. Through to and until February 2019, we reviewed and analyzed the work of other energy developers that cumulatively represent an estimated $9 - $12 billion of development work undertaken by credible international and Canadian-based energy players that were seeking the opportunity to bring energy pipelines to Prince Rupert, Kitimat, Squamish, Vancouver, Vancouver Island, and other coastal sites. We also examined our own unannounced greenfield right-of-way and coastline facility sites, including our speaking with Indigenous land holders. From this evaluation, the WEC Team ultimately determined that attempting to develop a long-distance corridor to the coastline of British Columbia, and to a respective coastal land site, would represent an ineffective use of time and eventually another financial waste, as has been the case for so many proponents. It is important to note that this decision process is not due to an inability to physically construct a British Columbia pipeline or coastline facility respectfully and environmentally. Our decision was more so due to Canada's unresolved issues with Indigenous rights, land titles in British Columbia and to other parties pursuing British Columbia options. We believe our decision has been, in-part, confirmed by risks and events of rail and road blockades and other protests against new development infrastructure construction.

This decision by the WEC Team was not taken lightly since many of the team members have substantial knowledge and have participated in various past and current energy infrastructure development within British Columbia. Collectively, the WEC Team includes experienced industry representatives that can make this commonsense decision. It is hoped that this decision can be revisited at some future time since it is obvious that a pipeline originating from Western Canada's production fields to the west coast of British Columbia provides for an excellent market opportunity for Canada's energy resources and, in the long run, would provide for substantial economic advantages and wealth.

Not wanting to give up on the prospect of improving Canada's wealth by efficiently and prudently exporting its high-value resources, we examined other coastal ports and areas and determined that port prospects within the Churchill area, on Hudson Bay, provides an undeveloped opportunity. This conclusion is driven by several economic and constructability factors, but an overriding feature is that valid treaties cover all of the proposed corridor. Creating a Canadian energy corridor that links Western Canada to Churchill provides access to Atlantic tidewater, benefiting both domestic and foreign markets. It is important to note that large-scale investment project(s) through Hudson Bay would provide significant collateral benefits to Canada's northern development and sovereignty, as well as diversifying Western Canada's market access to Canadian and global markets.

EXPORT OF WESTERN CANADA'S ENERGY RESOURCES

4.1 Environmental, Social, and Governance Considerations

With a total length of approximately 1,560 km, the Western Energy Corridor should aid renewable energy projects in Alberta, Saskatchewan, and Manitoba. The corridor, containing pipelines and power lines, will support the expansion of renewable energy resources, such as hydro, wind, solar or geothermal energy, that is within the vicinity of the Corridor. Optimally, the Western Energy Corridor will allow for renewable energy transport to consumption markets or even for it to be consumed within the corridor (for operating the compressor stations and/or pump stations on the proposed pipelines).

Commercially viable renewable energy resources, such as wind, solar, and large-scale hydro power are present in the proximity of the corridor and can be developed in connection with the corridor. Specifically, natural gas and/or oil moving eastward from Western Canada to Churchill, with large-scale hydroelectricity moving westward to Saskatchewan and Alberta, will offset substantial carbon emissions and aid in reducing Canada's overall greenhouse gas emissions and meeting its commitments under the Paris Accord.

Canada has a surplus of oil and natural gas available for export. Further broadening its energy trade beyond North America will be a major step towards improving economic netbacks to Western Canada's energy producers and expanding the Canadian energy market to include Europe, Asia, South America, Southeast Asia and, of course, other regions of Canada. All of this can be achieved while providing an environmental corridor that would assist in moving green energy within Canadian markets.

The Western Energy Corridor has the potential of bringing new, greener energy resources to Canada's northern citizens and communities that, today, must often rely on high carbon intensive energy, high-cost energy, or, in some cases, no reliable energy forms at all.

Canada's *Impact Assessment Act* and *Canadian Energy Regulator Act* of 2019 require an applicant to understand and quantify the environmental effects of both new energy projects and linear corridors utilized to transport energy and other resources. These thorough assessments take multiple years to complete or to bring to a point that regulatory and public acceptance are met. Even without knowledge of future economics or marketability of an energy form, it is important for the federal and provincial/territorial governments to work to coordinate an environmental assessment of a prospective corridor such that Canada is more prepared and more capable at minimizing timelines to competitively monetize its high-value resources.

Undertaking the task of having a pre-established energy and resource corridor, such as WEC, will enhance the likelihood of these major infrastructure projects being completed. Otherwise, such projects may be viewed as too risky, too late, too cumbersome, or as seen from the view of international markets and financiers, as being too high of a risk burden with Canada being unable to compete on the global stage. This was exemplified by the multitude of industry participants that were encouraged by British Columbia's provincial government to pursue large-scale

development projects, only to have the investors curtail activities due to high-costs, time delays, and unforeseen risks.

The Western Energy Corridor was selected and designed to have minimal impact as it crosses approximately 1,560 kilometres of land. Considerable portions of the corridor lands are held by provincial governments, with other potions being private landowners, Indigenous peoples' lands, or municipal lands. While intended to be benign over the long-term, all rights-of-way will impact lands within the corridor and adjacent lands. Consultation with governments, Indigenous people, landowners and concerned citizens is an important doctrine in seeking Canadian regulatory approval. Where possible, short- and long-term considerations must be given to create partnerships and benefits to those impacted to make Canada's overall economy stronger and to equitably distribute the benefits of such development.

Developing a large-scale infrastructure project, one that will easily surpass $30 - $40 billion in ultimate capital cost, yet will provide hundreds of billions of dollars of long-term financial benefits, begs the question of who pays and who takes the development risk?

Once a large-scale infrastructure project is approved, the costly detailed engineering and design, materials, construction, and owners' costs, which ultimately make-up more than eighty percent of the total budget, will begin. However, the first hundreds of millions of potential development dollars spent to secure the regulatory approvals often represents the most significant and greatest amount of risk, far surpassing the risk associated with expenditures that take place after a government authorization to construct is issued.

Construction within the Western Energy Corridor will require domestic and international financing involving both public and private sources on the basis that the infrastructure project(s) has appropriate contracts and regulatory approvals. But who pays for initial work and completion of the Western Energy Corridor to obtain regulatory approval, when this work represents the very highest capital investment risk? Private and publicly traded companies might be keen to participate in this early development to receive a future risk-adjusted return. It is also possible that a large portion of the initial funding dollars needed to reach regulatory approval (for the designation of the corridor) may be best earmarked for funding by federal and provincial governments, pension funds, or equity investors that can accommodate the risk. An investment return on these dollars can then be recovered from the future users of the corridor.

Western Energy Corridor Inc. believes there is value in requesting the Canadian federal government to conduct a Regional Assessment of an interprovincial economic corridor from Alberta through to Hudson Bay, including marine shipping in Canadian waters. The assessment request, from Western Energy Corridor Inc. to the federal government, will be filed by way of the Canada Impact Assessment Act.

The overall purpose would be to expedite project specific impact assessments, identify and manage cumulative effects, and advance concept approval.

EXPORT OF WESTERN CANADA'S ENERGY RESOURCES

As outlined by the Government of Canada, Regional Assessments are intended to inform and identify:

- A baseline against which to assess the incremental impact of a discrete project.
- Thresholds to support future project decisions.
- Standard mitigation measures for future projects.
- Potential impacts on rights and interests of Indigenous peoples.

In addition to the assessment of the land-based corridor concept, we believe the Regional Assessment should include the effects of Arctic marine shipping within, and to and from, Hudson Bay. This would include development of strategies for maintaining ice-free shipping lanes, marine interaction, and emergency and spill responses in Arctic waters.

Our recommendation is that the Government of Canada, under Sections 92 and 93 of the *Impact Assessment Act*, authorize the Impact Assessment Agency to conduct a Regional Assessment of a corridor from Alberta through to tidewater in Manitoba. Given that the corridor traverses a wide variety of lands of varying ownership, uses and sensitivities, the federal government, under Section 93 of the *Act*, may see value in entering into agreements with the provinces of Alberta, Saskatchewan, and Manitoba, the Nunavut territorial government, and Indigenous peoples to obtain their respective involvement and collaboration on the assessment.

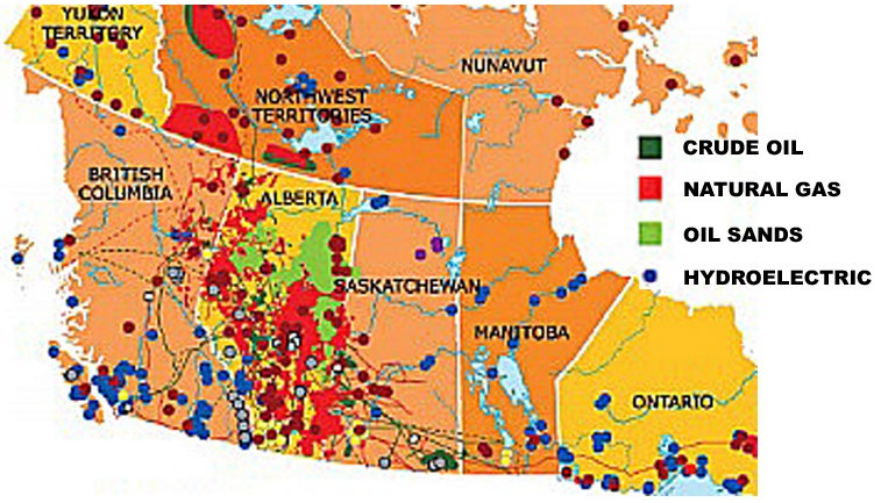
5 Overview

5.1 Western Energy Corridor

Different from other energy proponents, the Western Energy Corridor team first examined the merit of multiple energy corridors prior to determining any specific commodity or market usage. The Western Energy Corridor, linking Western Canada to Churchill, Manitoba, has been designed and intended to contain one or more combinations of a natural gas transmission system, an oil pipeline, a fibre optic line and a high-voltage electric transmission line. Western Energy Corridor Inc. intends to make the corridor and related information available to governments or infrastructure investors that are financially knowledgeable and technically capable of the means to initiate, evaluate, and complete a project.

While concepts for a corridor from Alberta to Manitoba have been suggested several times during the last 60 years, this is the first serious effort at creating a defined corridor that has been conceptualized and planned with the purpose of following through to development including, but not limited to, terrain analysis and regulatory requirements. Conceptual project designs were developed with estimated capital and operating costs to illustrate some of the example projects that would make use of such a corridor. All areas of Canada are expected to materially benefit from the implementation of the Western Energy Corridor.

Feasibility assessments for the Western Energy Corridor by the WEC Team began in early 2019. Five alternative conceptual corridors were identified, and analysis undertaken by the WEC Team led to the selection of one of the preliminary corridors. Subsequently, a Study Corridor was determined within that preliminary evaluation. The Study Corridor, which has a width that varies between 25 km to 70 km, was delineated, among other things, to best benefit landowners and communities, rights holders, and to avoid environmentally sensitive areas.



Source: Canadian Centre for Energy Information

FIGURE 8: ENERGY LOCATIONS BY TYPE IN WESTERN CANADA

As shown in Figure 8, most of Canada's oil and gas is in Alberta, B.C., and Saskatchewan, with hydroelectric power being more plentiful in Manitoba. Alberta and Saskatchewan have large

wind and solar potential, enabling movement of additional electricity along the corridor or to be used to drive pipeline compressors and/or pumps.

The following example projects show potential uses and benefits of the Western Energy Corridor. For key uses include movement of natural gas and crude oil eastward, and green hydroelectricity westward.

5.2 Natural Gas Transmission System and Facilities

For the construction and operation of a natural gas pipeline, it is anticipated that a minimum 2.0 Bcf/d natural gas transmission system would connect various natural gas receipt points in Western Canada to a final delivery point near Churchill, Manitoba. Planned natural gas interconnections would include interconnections to TC Energy (NOVA Gas Transmission Ltd.); Alliance Pipeline's mainline; and, if beneficial, a new, high-pressure supply pipeline that interconnects with gas gathering systems in Northeast B.C. and Northwest Alberta. A natural gas transmission system located within the Western Energy Corridor would connect to a natural gas liquefaction facility, LNG storage, and an export facility located near Churchill, Manitoba. Such a project could provide natural gas to large Canadian markets and to remote northern communities (concepts might include transporting compressed natural gas (CNG) or small-scale LNG). An overriding goal, of course, would be to export Canada's natural gas resources to global LNG markets.

5.3 Oil Pipeline and Facilities

For an oil pipeline, our example project is based on an initial throughput of 650,000 bbls/d delivered from Hardisty, Alberta, to a delivery point near Churchill, Manitoba. With oil storage located at Churchill, Manitoba, and with the ability to access global markets, it is conceived that marine-based delivery systems would also be capable of delivering oil to refineries located in Quebec and Atlantic Canada. Currently, Eastern and Atlantic Canada imports and consumes over 650,000 bbls/d of oil from world sources other than from Canada, and yet Western Canada is unable to find markets for its expanding crude oil production. A disconnect currently exists between the lighter oils historically used by the importing Canadian refineries located in Eastern and Atlantic Canada, and with heavier oils that Western Canada exports. However, this could be corrected with more upgrading in either Western Canada, prior to shipment, or at refinery locations. Like many oil pipelines, our example oil pipeline would be capable of transmitting discrete "batches" of different oil types to meet the quality requirements of specific markets. Doing so requires breakout storage at both ends of the line, it allows for better market flexibility and reach.

5.4 High-Voltage DC Power Line

A third possible usage of the Western Energy Corridor, in combination with both, or either of a natural gas or oil pipeline, is to connect the massive hydroelectric sources and new potential hydro sources within Manitoba, to the rest of Western Canada. A new, high-voltage direct current (HVDC) electric transmission line could fully open electrical power trade between Manitoba and other regions of Western Canada and would substantially benefit Canada's GHG emission goals. Power from the proposed electric transmission line may also drive electric motors for compressor and/or pump stations within the Corridor.

5.5 New, All Season Road: Gillam, Manitoba to Churchill, Manitoba

Along the majority of the proposed Western Energy Corridor from east central Alberta to Churchill there is sufficient existing transportation infrastructure (i.e., highways, roads, and railways) that will facilitate the construction of oil pipelines, gas pipelines and power lines. However, the northern 250 km of the proposed energy corridor from just north of Gillam, Manitoba, to Churchill, Manitoba, only has access by the Hudson Bay Railway, which is currently incapable of meeting anticipated construction materials movements.

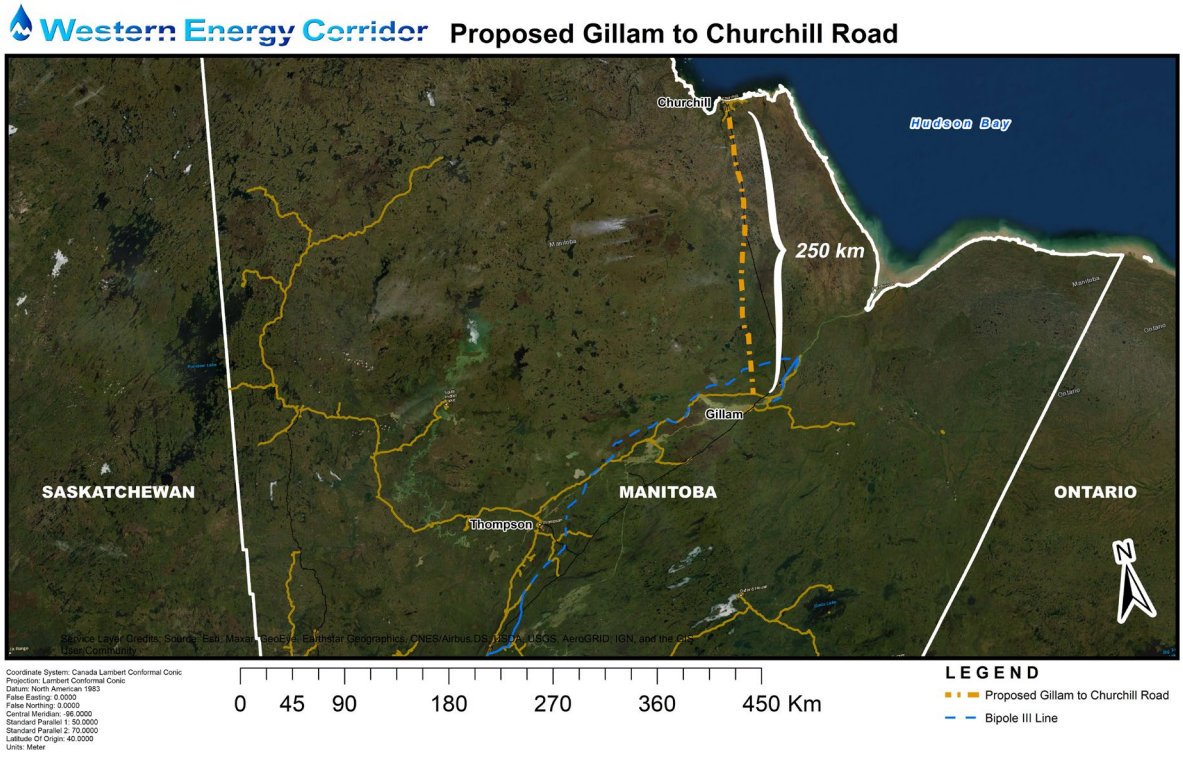


FIGURE 9: WESTERN ENERGY CORRIDOR PROPOSED GILLAM TO CHURCHILL ROAD

Our WEC proposal suggests that a new all-season road be built parallel to the existing 138 kV transmission line that runs from the vicinity of Gillam to Churchill, a distance of approximately 250 km. Increasing Canada's sovereignty to its northern lands, enabled by an all-season road to Churchill, and an expanded world-class port, provides an opportunity for federal and provincial governments to participate in these specific, but vitally important, initiatives.

From a federal government and sovereignty prospective, an all-season road to Churchill will reinforce Canada's northern sovereignty and reinforce its land and sea defence. For Canada's northern citizens, an all-season road to Churchill, and its access to a northern seaport, will allow for significantly improved transportation and distribution of primary goods including food, energy supplies, materials, and health care. Consequently, it is anticipated that the current rail line to Churchill will continue to be upgraded to support larger and heavier rail loads.

5.6 Other Potential Economic Initiatives

Once a valid, high-use, economic corridor is established and available, it is possible for the Corridor to be "updated" and include either economic change-outs or inclusion of new economic initiatives. The following are "ideas" that might be included for future use – many other initiatives are of course possible.

Some prospective uses of an energy corridor might include:

Hydrogen transported as a blend within a natural gas pipeline

Some studies suggest that hydrogen transported as a blend within a natural gas pipeline could be a viable solution for early adoption of transporting this potential next-generation fuel source. Natural gas pipelines are used to deliver hydrogen by mixing it in certain proportions with natural gas and then separating and purifying it for use by an end consumer. An LNG liquefaction plant would provide a mechanism to recover the hydrogen. Transportation of hydrogen to Churchill and then onward by ship may develop as an alternative to monetize Canada's energy resources. Research and development initiatives are evaluating shipping advancements to allow for cost effective transportation of hydrogen to domestic and international markets (in forms similar to LNG).

Expanded fibre optic transmission and communications

A long-distance fibre optic transmission system is a commonsense addition to any high use corridor. Fibre optic communication systems are typical for pipeline operating control systems. However, installation of fibre optic facilities can also provide enhanced services to new and growing communities, providing for better industrial product communication, and enabling advanced international communications.

Potash, or other goods, shipped through a pipeline as a liquid slurry

Like any slurry product that can move through a pipeline, an example concept is to transport potash as a liquid slurry through a pipeline to Churchill. The product would be exported in either

a dried granular form or as a liquid slurry. Research and technology development suggest the possibility of transporting potash via long-distance pipelines with a hydrocarbon carrier fluid, such as crude oil. Waste heat from an available source, such as an LNG liquefaction process, could assist in evaporating the water in the potash solution if markets prefer a dried granular form of potash.

Railway improvements, including new, direct rail line construction and/or enhancement of existing rail

Establishing a wider corridor could allow for installation and operation of new rail systems on improved rail beds. With technology advances in transportation sectors, such as high-speed rail and hyperloop, products, goods, resources, and people could all move to and from an expanded Churchill port.

5.7 Churchill, Manitoba: Access to Markets

The Western Energy Corridor is an all-Canadian link between natural gas, oil and other resource supplies in Western Canada and respective export terminal facilities at Churchill, Manitoba. It can also be the path to increase renewable hydroelectricity exports from Manitoba to other Western Canada markets. For each of these resources, the opportunity will exist to serve Canadian markets and the ability to reach high-value energy markets in Europe, Asia, Southeast Asia, South America, and other parts of the globe. Likewise, other energy products or commodity supplies (hydrogen, potash, fibre optics, etc.) could utilize the Western Energy Corridor to reach Canadian and global markets.

Source: Teekay Corporation Website

FIGURE 10: ICE BREAKING LNG SHIP

As a specific example, a natural gas transmission line located within the Western Energy Corridor would provide access to natural gas for local distribution companies along the corridor in Saskatchewan and Manitoba. Marine transportation services from Churchill would potentially allow for either liquified or compressed natural gas service to remote communities located within Nunavut and the Northwest Territories (NWT), and to other Canadian provinces from Manitoba through to the Atlantic provinces. Service to remote Nunavut, NWT, Manitoba, and Quebec markets may be served by small-scale LNG barges or ships to allow for displacement of fuel oil or diesel. Once liquified, whether serving Canadian or international

markets, it will allow for Western Canada LNG to replace more carbon intensive sources of energy such as fuel oil, coal, and diesel.

5.7.1 Churchill's History as an International Export Port

Churchill Manitoba has an amazing long-term history. Reaching well back from the initial times of European exploration, the lands and waters from the high Arctic to and around Hudson Bay were a thriving landscape of trade, production, food, and culture by Canada's Pre Dorset people, from 2000 BC to 800 BC. Transitioning to the Thule people circa 1000 BC, the Thule were skilled harpoon hunters of large marine animals such as whales, seals, and walrus, which over time led to the long-lasting Inuit culture. Significantly after the Thules, close to 500 AD, the path was set for larger market development by the Dene, Cree, and Inuit, through sophisticated and orderly structures of politics, economics, and diplomacy. Over time, these strengths merged with the trading networks of the early European traders that exchanged Europe's early industry goods for Canadian furs and other resources. By his namesake, Henry Hudson was the first European explorer to enter Hudson Bay. Moving quickly through time to the late 1700's, forts, trading posts and lands were transferred between the French and English in their respective pursuit of colonial domination. Completion of the Hudson Bay Railway in 1929 laid the tracks for transition of the Churchill region to more modern ways. The railway led to the international export of Canadian grains to overseas markets. Churchill's massive grain elevator was built in 1929 and was the second largest in the world at the time of construction. Its capacity was doubled in 1955.

In 1956, the Churchill Rocket Research Range was built by the United States Army under the auspices of Canada's Defence Research Board. Over the years, Canadian programs participated increasingly in rocket research and it became a National Research Council of Canada (NRC) facility in 1964. During that era, the facility was utilized by both Canada and the United States and it became known for sub-orbital launches of rockets to study the upper atmosphere. Over 3,500 sub-orbital flights were launched from the site, which was located 13 km east of Churchill.

Source: Gordon Goldsborough

FIGURE 11: CHURCHILL'S INTERNATIONAL PORT

The International Port of Churchill is located on the southwest coast of Hudson Bay, in Manitoba. Existing port facilities are located at the Churchill Harbour, on the west side of a strip of land that extends northwest from the town of Churchill to Cape Merry. The

Port's primary freight in recent years continues to be Canadian grain, and between 1997 and 2014 an average of 500,000 tonnes of grain was exported each year. In addition to grain, the Port of Churchill also handles roughly 10,000 tonnes of re-supply freight each year.

The Town of Churchill has a permanent resident population of roughly 900 people, but this population grows substantially during the warmer months and, thanks to earlier industrial use, the town has infrastructure for 2,000-3,000 people. The economy of the Town of Churchill is currently based on three main economic pillars including The Port of Churchill, healthcare facilities, and tourism. Efforts are underway to strengthen and develop research and education as a fourth economic pillar, by way of new research underway at the Churchill Marine Observatory.

Developing the Western Energy Corridor, along with the potential of billions of dollars of investment, revenue, and tax base, will build upon the long-term trading history of the Thule, the Inuit, Dene, and Cree, the early European traders, exporting grain to global markets, and the history of Churchill's contribution to rockets, space, and technology development.

<u>NOTE</u>:

The above five sections describing the concept of the Western Energy Corridor are not confidential.

The sections within this report form part of a more detailed report containing confidential and proprietary information, which is owned by Western Energy Corridor Inc.

The confidential and proprietary information will not be made available to any party unless a non-disclosure agreement has been executed.

1 Appendix: Common Units

All terms and data are from the Canada Energy Regulator website.

1.1 Common Units

1.1.1 Crude Oil and Natural Gas Liquids

Abbreviation	Description
b/d	barrels per day
bbl	barrels
m^3	cubic metre
m^3/d	cubic metres per day
Mb/d	thousand barrels per day
MMb	million barrels
MMb/d	million barrels per day

1.1.2 Natural Gas

Abbreviation	Description
Bcf	billion cubic feet
Bcf/d	billion cubic feet per day
Btu/cf	British thermal units per cubic foot
cf	cubic feet
m^3	cubic metre
m^3/d	cubic metres per day
Mcf	thousand cubic feet
MMBtu	million British thermal units
MMcf	million cubic feet
MMcf/d	million cubic feet per day
Tcf	trillion cubic feet
t	tonne (1000 kilograms) equivalent to metric ton
MMt/y	Million Metric tons per year

1.1.3 Electricity

Abbreviation	Description
MW	megawatt
kW.h	kilowatt hour
MW.h	megawatt hour
GW.h	gigawatt hour

*****