Mapping the Policy Landscape: Considering Northern Gas Pipeline Options

Prepared by:

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PREFACE

Rising prices and a growing continental demand for natural gas have sparked renewed interest in North American markets for natural gas reserves in Alaska and the Canadian Arctic. There are two main reasons why the potential movement of northern gas to southern markets raises important public policy issues for Canadians. First, there are substantial proven gas reserves and much larger potential gas reserves in the Canadian Arctic. The expedient development of those reserves will force us to address a host of public policy issues including environmental protection, pipeline financing, and the economic impact on the northern and national economies.

Secondly, there are even larger proven reserves in Alaska. Not only would Alaskan gas have to be routed through Canada, but different route options for Alaska gas have very different potential impacts on the development of Canadian natural gas reserves. In short, Canadians have an immediate public policy stake in the marketing of Alaskan gas.

It is therefore time for Canadians to become engaged in the emerging public policy debate surrounding the potential movement of northern gas to southern markets. More specifically, it is important to understand the implications for Canadian interests of various routes for Alaskan and/or Mackenzie Delta gas. This report has been prepared by the Canada West Foundation in order to help Canadians understand the public policy implications of marketing northern gas, a possibility that has suddenly become a probability in light of market trends.

Disclaimer

The intention of this report is to provide a framework for thinking about the issue of pipeline routing in the North. The Canada West Foundation does **NOT** endorse any particular route option.

Information in this report is based in part on a technical analysis of potential natural gas pipelines in the North by the Canadian Energy Research Institute (CERI). The pipeline route considerations – including capital costs, fiscal impacts, employment impacts, and environmental implications – utilize information from the CERI report. The Canada West Foundation does not assume responsibility for the accuracy of CERI's analysis, as this is beyond Canada West Foundation's research expertise.

INTRODUCTION

North American demand for natural gas as a preferred energy source continues to increase at a rapid rate. Unlike oil, natural gas is not generally shipped between continents, creating North American dependency on continental sources. Because the current available North American supply is being depleted, natural gas prices in Canada and the United States are rising (CERI, 2000). While American industry is the primary driver for natural gas demand, Canada faces the same supply "crisis."

There are several reasons why natural gas is an increasingly important Canadian public policy issue:

- Canadian demand is increasing;
- international standards have made natural gas the preferred energy source;
- revenues generated from northern natural gas development will affect governments, business, and Aboriginal groups, and will create employment for Canadians; and
- governments have a regulatory role in the oil and gas industry, and in environmental protection.

In response to increasing demand, Canadian and American producers are interested in tapping Arctic and sub-Arctic reserves of natural gas. Large reserves are located in Prudhoe Bay, Alaska, and in the Mackenzie Delta and Beaufort Sea, Northwest Territories (NWT). As well, a large sedimentary basin extends the length of the Mackenzie River, providing potential for further gas discoveries. In order to develop and tap into northern natural gas potential, a pipeline is needed to move the gas to southern markets. Pipeline construction, however, inevitably raises public policy issues, in part because economic spin-offs are directly linked to northern economic development. Governments, moreover, play a role in the regulation of pipelines and in the mitigation of any negative environmental impacts.

Pipeline routing often entails a complex interplay among the oil and gas industry, various levels of government, Aboriginal groups, public interest groups, regulatory agencies and environmental groups. The choice between pipeline route options has become the central issue. Several pipeline route options have entered into the public agenda through the media. Spring 2000 business headlines proclaimed the renewed interest in building a natural gas pipeline in the Canadian North: "Pipeline giants form alliance to bring gas from the far North"; "Arctic looks for pipeline partners"; "N.W.T. premier expects pipeline within 10 years"; and "Gas demand could spark two pipelines."[1] Clearly, pipeline route options have emerged as a key Canadian public policy issue, and it is expected that interest in the topic will continue to grow.

The central question for consideration is which of the pipeline options best serve(s) Canadian interests? This question rests on the assumption that a pipeline will be built. Although natural gas producers will ultimately make the routing decision, various levels of government have a role to play in both reducing barriers and providing incentives to development.

In May 2000, Canada West Foundation was commissioned by the Government of the Northwest Territories (GNWT) to write a background report that outlines the various pipeline route options and examines the policy questions surrounding natural gas pipeline development. An extensive review of the literature on northern pipelines, and interviews with government and corporate representatives were completed. While the interviews were not representative of the various stakeholders involved in this debate, they did provide necessary context.

The CWF report summarizes the physical terrain, infrastructure, political factors and environmental considerations of pipeline development in the North. Fiscal benefits, tolls, netbacks to producers, and employment impacts are discussed in terms of pipeline construction, field development, pipeline operation, and natural gas production. This report is strongly informed by a technical analysis of northern pipeline route options prepared by the Canadian Energy Research Institute (CERI) for the GNWT. The objective of CERI's analysis is to provide a comparison of economic benefits related to a representative range of pipeline projects from the North. In other words, CERI asks what is the most economically efficient route? CERI's analysis led to the conclusion that any pipeline

route that taps Mackenzie Delta gas will have large potential economic and fiscal benefits to the NWT and other residents of Canada. CERI also concludes that Canada and natural gas producers are better off with a pipeline that would ship both Alaskan and Canadian natural gas and transport it down the Mackenzie Valley. This conclusion and the subsequent implications for the public policy debate are outlined in this report. (For specific conclusions regarding GDP, employment, and government and producer revenues please see a summary of CERI's conclusions on pages 25 and 26 of this report.)

It must be stressed that CWF does not advocate any particular route option. Renewed interest in frontier natural gas has created the need for proactive action on the part of governments, business interests and other stakeholder groups. As part of CWF's mandate to provide research that informs and stimulates public discussion, this report will act as a guide to the broad policy questions that need to be considered during the impending northern pipeline debate.

Socio-Demographic Overview of the Northwest Territories and Yukon Territory

A small total population, with a proportionately large Aboriginal population, relatively high unemployment, and high levels of government employment define both territories. It should also be noted that the North's Aboriginal population has significantly higher levels of unemployment and significantly lower levels of education than do non-Aboriginals.

Data presented below are the most recent available. The data for the NWT and the Yukon Territory are from 1999 unless otherwise indicated. When different collection periods are noted, data are not directly comparable and should be used for reference only.

Northwest Territories	Yukon Territory
Population: 42,100 (NWT 2000)	Population: 31,070
Largest city: Yellowknife 17,702 or 43% of total population (NWT 2000)	Largest city: Whitehorse 22,879 or 74% of total population
Other communities: 5 with populations between 1,000 and 4,000 (NWT 2000)	Other communities: only 3 with populations greater than 500
Aboriginal population: 51% of total population	Aboriginal population: 20.1% of total population (Census 1996)
Unemployment rate: 13.7%	Unemployment rate: 12.1%
Aboriginal unemployment rate: 26.7%	Aboriginal unemployment rate: not available
Non-Aboriginal unemployment rate: 5.7%	Non-Aboriginal unemployment rate: not available
Employed by government: 43%	Employed by government: 35%
GDP 1999 (in millions) $ 2,167 (GNWT, 2000f)	GDP 1999 (in millions) $ 1,080 (GNWT, 2000f)
Main industries: government, mining, oil and gas	Main industries: government, mining, tourism
Education: total population grade 9 completion 87% Aboriginal grade 9 completion: 74% Non-Aboriginal grade 9 completion: 98%	Education: total population grade 9 completion 94.4% (Census 1996) Aboriginal grade 9 completion: not available Non-Aboriginal grade 9 completion: not available
Source: GNWT, 2000b (unless otherwise stated) (includes 1999 and 2000 data)	Source: Statistics Canada, 1996 Census Government of the Yukon Territory, 1999

In contrast to the Yukon Territory and the Northwest Territories, the Alaskan economy is driven by oil, tourism and fishing. The population of Alaska in July 1998 was 621,400, which is significantly larger than the two Canadian territories (Government of Alaska, 2000).

NATURAL GAS IN THE NORTH

Exploration and Development

Oil and gas exploration in the Canadian North has historically revolved around changing economic and political factors. There have been several stages of oil and gas exploration since the development of the Norman Wells oil property shortly after World War II. In the 1960s the Government of Canada opened areas in the NWT for oil and gas exploration. Rising oil prices in the 1970s placed even greater focus on the NWT. By the late 1980s interest in natural gas was centred on both the Yukon Territory and NWT. Finally, from the 1990s to present, favourable market conditions for natural gas have led to increased exploration and concentration on the Mackenzie Delta and the sedimentary basin embracing the Mackenzie River (CERI, 2000).

These five stages of exploration have led to important findings. Although smaller than discovered Alaskan reserves, significant natural gas resources have been discovered in the Canadian North, and it is estimated that additional reserves are present. According to CERI, proven reserves of approximately 15 trillion cubic feet (tcf) are located primarily in Fort Liard area, the Mackenzie Delta and Beaufort Sea, NWT (see Table 1). Total natural gas reserves in the NWT and Yukon Territory are predicted to be in the range of 65 tcf (CERI, 2000). CERI analysts state that over 55 tcf of natural gas is estimated in the Beaufort Sea and Mackenzie Delta, the two largest areas of Canadian natural gas reserves.

Table 1: Proven and Estimated Natural Gas Reserves

	Proven Reserves	Proven + Unproven Estimated Reserves
American North		
Alaska	38.0 tcf	64.0 tcf
Canadian North		
Yukon	0.09 tcf	2.1 tcf
NWT	15.0 tcf	63.9 tcf

Source: CERI, 2000.

Proven gas reserves in Alaska are approximately 38 tcf with total reserves predicted at 64 tcf (CERI, 2000). Natural gas production from fields in northern Alaska (North Slope) have been used to fuel the state's oil field equipment and operations. Most of the gas that is produced with the oil is separated from the oil and injected back into the reservoir. In 1998, gas production was 3.2 tcf; of this, 92% was injected back into reservoirs (Government of Alaska, 1999).

Forecast Growth

The growth in gas production and exports over the last 10 years has been extraordinary. Canadian gas exports have risen from less than 1.8 tcf in 1991 to 2.9 tcf in 1997, a growth rate of more than 11% per year (Brackman, 2000). Over the next 20 years, forecasts are calling for continued growth in gas demand; CERI calls for an average per annum growth of 2.2%, while the National Energy Board (NEB) calls for 2.1% growth (CERI, 2000). This is due, in part, to the increasing importance of gas as the preferred energy source, the growth in the continental market, and increased demand due to factors such as the Kyoto Agreement, electricity deregulation in North America, and increasing consumption in the United States as well as Canada (GNWT, 2000e). The rise in US consumption is driven by a demand for electrical power, partly due to the growth in new technologies. Virtually all new electrical generation in the US planned for the next decade is based on the assumed availability of natural gas supplies (Gray, 2000). The price of natural gas rose by over 50% in 1999 and is forecast to move as high as $8 per gigajoule (g/j) in the winter of 2000 (from a May 2000 high of $5.13 g/j) (Calgary Herald, 2000a).

Current growth in natural gas supply, future growth expectations, and record high gas prices have created a demand-driven market and subsequently interest in northern pipeline development.

Pipelines: Moving Natural Gas

One of the greatest restrictions to developing natural gas markets is the ability to move gas (take-away capacity) from the northern reserves to southern markets. A pipeline is the most efficient means of

moving gas because the cost of moving liquid natural gas via tankers is prohibitive, and natural gas needs to link to existing infrastructure. There are two key reserves of natural gas in the North: Prudhoe Bay, Alaska and the Mackenzie Delta, NWT. A pipeline will need to be built to move gas from either source.

A key question facing Canadian governments regarding pipeline development is how best to tap into Canadian natural gas. This question is not new and was explored during the pipeline debates in the 1970s.

Pipeline Debates: Historical Context

In the 1970s, US demand for natural gas motivated pipeline companies to explore options for transporting northern gas to US markets in the south. These options included transport routes that followed the Dempster Highway, the Alaskan Highway and the Mackenzie River.

In 1974 the Government of Canada instructed Mr. Justice Thomas Berger, a judge on the Supreme Court of British Columbia, to "Inquire into and report upon the terms and conditions that should be imposed" on any pipeline up the Mackenzie Valley, "having regard to the regional, social, environmental and economic impact."

The main recommendations of the Berger Commission were:

- a ten year moratorium on building a pipeline down the Mackenzie Valley;
- settlement of Aboriginal land claims before planning a pipeline; and
- a ban on construction of a pipeline across the coastal plain of the Yukon Territory because a pipeline and energy corridor would do irreparable harm to caribou herds, birds and other wildlife, and to the people who relied on those herds to sustain their way of life.

A second commission was chaired by Mr. Kenneth Lysyk in 1977 in response to a proposal to construct a pipeline across the southern Yukon Territory following the Alaskan Highway. The Lysyk Commission offered recommendations similar to the Berger Commission. Most notably, it was recommended that pipeline construction across the Yukon Territory should not start until after August 1981.

From 1977 to 1994, a moratorium on the issuance of exploration rights for oil and natural gas was in place in the Mackenzie Valley and the southern NWT; this was in part a response to the recommendations of the Berger Commission and Aboriginal opposition to pipeline development. However, exploration licenses issued before the imposition of the moratorium were still honoured and resulted in several significant discoveries of natural gas in this area in the late 1970s and 1980s.

During the same time period, the Alaska Natural Gas Transmission System (ANGTS) pipeline route received approval for construction. This pipeline would move gas from US reserves in Prudhoe Bay, Alaska and had possible connections to Canadian reserves in the NWT. In 1977, the Governments of Canada and the US executed an "Agreement on Principles Applicable to a Northern Natural Gas Pipeline." This agreement provided the framework for the construction and operation of ANGTS. As well, certificates were granted that provided regulatory approval for the project. By 1982, southern portions of the ANGTS were constructed in order to provide US consumers the opportunity to obtain surplus Canadian gas in advance of Alaskan gas. This is referred to as the *pre-build*. At the same time, however, adverse market conditions forced the sponsors of ANGTS to put construction of the northern portion of the project on hold.

There are a number of reasons why pipeline development has not already occurred. These include a softening of gas prices in the early 1980s, the distance of northern reserves from southern markets, and the availability of closer resources.

Currently, pipeline route options are back on the agenda and open for debate. These will be discussed shortly; however, prior to any discussion of pipeline routes, it is important to understand the context of the Canadian North and the regulatory environment in which pipeline construction must occur.

NORTHERN PIPELINES: REGULATORY AND POLITICAL CONTEXT

Oil and Gas Regulation

All territorial and inter-provincial pipelines in Canada are subject to regulation by the Government of Canada and the particular territorial jurisdiction that the pipeline crosses. Oil and gas regulation in the Canadian North entails a myriad of acts and regulations overseen by several different governing bodies including:

- the Government of Canada through the Department of Indian Affairs and Northern Development (DIAND) and the National Energy Board (NEB);
- the Yukon territorial government; and
- more than 20 separate Aboriginal First Nations.

The regulatory environment is markedly different in the two territories, with the Yukon Territory having full responsibility and the GNWT having little responsibility for oil and gas development.

Northwest Territories

The Government of Canada, through both the NEB and DIAND, controls over 90% of the petroleum subsurface rights in the NWT (GNWT, 1999a). The GNWT has been negotiating with the Government of Canada for the devolution of responsibility of oil and gas since the late 1980s, but little progress has been made. Notably, the one exception lies in settled Aboriginal land claims where individual groups have settled responsibility for subsurface rights and royalty regimes. In all other cases DIAND and the NEB share oil and gas development.

The NEB controls engineering integrity and safety of oil and gas operations, from exploration to development and production. It is essentially responsible for the regulation of all petroleum activities. DIAND, through the Northern Oil and Gas Directorate, is responsible for managing the issuance of all crown petroleum rights, ensuing licenses, and overseeing oil and gas royalties in the NWT. There are five main legislative Acts that pertain to northern oil and gas in the NWT. They are:

- *Canada Oil and Gas Operations Act (COGOA):* promotes safety, the protection of the environment, the conservation of oil and gas resources and joint production arrangements with respect to the exploration for and exploitation of oil and gas; falls under the umbrella of the NEB.
- *Canada Petroleum Resources Act (CPRA):* regulates interests in petroleum in relation to frontier lands; falls under DIAND.
- *Northwest Territories Waters Act:* regulates management of rivers, lakes, streams or other bodies of water; falls under DIAND and applies in particular to the Mackenzie Valley area (excluding Aboriginal lands).
- *Territorial Lands Act (TLA):* deals with the sale, lease or other disposition of territorial lands; falls under DIAND.
- *Mackenzie Valley Resource Management Act (MVRMA):* provides for an integrated system of land and water management in the Mackenzie Valley; falls under the rubric of DIAND (Consolidated Statutes of Canada, 1985, 1985, 1992, 1985, and 1998 respectively).

Yukon Territory

Until 1998, the Government of Canada supervised oil and gas development in the Yukon. In November of that year, the responsibility for oil and gas was devolved to the Yukon government and First Nation governments. As a result of devolution, responsibility and administrative authority for oil and gas were transferred to the Yukon government. The Yukon Common Oil and Gas Regime enables "all parties to manage and administer oil and gas activity more effectively" through a regulatory framework of policies, legislation, regulations, programs and processes (Government of the Yukon Territory, 2000b). It is comprised of 15 governments - the Yukon government and 14 separate Aboriginal First Nations groups.

Central to this new regime is the Yukon Oil and Gas Act (YOGA). The Yukon government, through YOGA, is responsible for disposing of oil and gas rights, overseeing and regulating exploration and development, licensing, regulating pipelines, collecting royalties and protecting the environment. YOGA

prevails except in instances where an Aboriginal group chooses to replace a Yukon territorial law with Aboriginal law regarding its own settled land.

Environmental Regulation

The Canadian North is characterized by a diversity of physical landscapes, climates, and ecosystems. The tundra, sub-arctic forests, coastal plains, mountains, freshwater lakes and rivers, and Arctic seas support a rich variety of wildlife and plant life. Certain species, especially birds and some marine mammals, migrate long distances and link the Arctic with temperate, tropical, and even Antarctic regions. The Arctic is also a breeding ground for millions of migratory birds. In short, the Arctic is a region of global environmental importance (Environment Canada, 2000).

Protection of the environment – including the physical landscape, wildlife, and plants – is a major concern in the face of resource development. For this reason, strategies have been put in place to protect the northern environment. For example, the purpose of the *Protected Area Strategy* in the Yukon Territory and the NWT is to not only protect areas with important traditional, cultural and religious significance, but also to protect specific natural and cultural features, maintain ecosystems and bio-diversity, protect wilderness, and preserve species and genetic diversity. In addition, National and Territorial Parks have been designated to protect environmentally unique and sensitive areas of the North, and numerous territorial, national and international legislative provisions that apply to the protection of specific environmental concerns are also in place.

A major consideration in developing the North's oil and gas resources is the risk of environmental damage due to oil spills, air pollution, or the construction of roads through sensitive wilderness areas.

Northerners want to safeguard their traditional activities and the pristine northern landscape. Consistent and predictable legislation, strategies, and practices that are supported by all stakeholders to safeguard the environment, have been, or are in the process of being, established.

There are key measures that are emphasized by interested stakeholders to prevent environmental damage in the North. These include:

- setting environmental standards;
- licensing oil and gas activity;
- conducting environmental reviews and approving oil and gas activity;
- setting financial and legal liability;
- monitoring self-regulation by industry;
- setting offences and penalties;
- establishing standards and practices based on industry best practices, best available technology, research and consultation; and
- establishing consistent reporting requirements and ongoing monitoring programs.

Natural gas development and subsequent pipeline construction will have environmental impacts on the North. The responsibility for and management of the degree of these impacts will be shared by the territorial governments and the Government of Canada. *The complexities of environmental regulation are one of the key areas of public policy consideration.*

Major Environmental Protection Acts Specific to the NWT: The *Mackenzie Valley Resource Management Act* (MVRMA) establishes guidelines for the sharing of decision-making responsibilities for resource development with Aboriginal organizations. Together with the *Canadian Environmental Assessment Act*, it creates a system for ensuring that the cumulative effects of projects be determined during the environmental assessment process. The MVRMA sets up a three-tiered impact assessment process: preliminary screening, environmental assessment if necessary and, again if necessary, environmental impact review (Far North Oil and Gas Review, 1999/2000, GNWT, 2000a).

Major Environmental Protection Acts Specific to the Yukon Territory: The underlying premise for environmental protection in the Yukon Territory is that activity in nearly every sector, including oil and gas, will be subject to the *Yukon Environment Act* and the *Development Assessment Process*. In addition, YOGA and its regulations cover specific technical aspects of

environmental protection, such as well abandonment and spills (Government of the Yukon Territory, 2000b).

Land Claims in the North

As stated earlier, one of the primary recommendations of the Berger Commission was to suspend pipeline development down the Mackenzie Valley until Aboriginal land claims were settled. Land claims have a direct bearing on pipeline development for the following reasons:

- Many of the land claim agreements include rights to some of the royalties from the development of natural resources.
- Aboriginal groups must give permission for a pipeline to run through their land claim.
- Unsettled land claims may stall pipeline negotiations.

Land claims resolve Aboriginal rights to land and resources, and are seen as a way to promote the economic growth and self-sufficiency of Aboriginal groups. Land claim agreements may address a wide range of rights and benefits including: rights to hunt and fish; guaranteed participation in land, water, wildlife, heritage resources, parks and environmental management; financial compensation; a share of resource revenue; and measures to stimulate economic development. Self-government may also be included in the land claims negotiation, although it may also be negotiated separately.

To date, four land claims in areas linked to possible pipeline routes have been settled:

- *Inuvialuit Final Agreement* (NWT) – Settlement region of 435,000 km^2 (91,000 km^2 of settled land) in the Mackenzie Delta, Beaufort Sea, and Amundsen Gulf area.[2]
- *Gwich'in Comprehensive Land Claims Agreement* (NWT) – Settlement region of 59,800 km^2 (4,299 km^2 of settled land) in the Mackenzie Delta region.
- *Sahtu Dene and Metis Comprehensive Land Claim Agreement* (NWT) – Settlement region of 280,238 km^2 (41,437 km^2 of settled land) in the Mackenzie Valley and Great Bear Lake region.
- *Council for Yukon Indians Agreement* (Yukon Territory) – Settlement region includes the entire Yukon Territory. Thus far a total of seven Yukon First Nations have completed settled land claims totaling 27,299 km^2 (approximately 5.6% of the Yukon Territory land mass). One additional agreement is in the process of ratification and six other agreements remain in negotiation.

In addition to the settled land claims, there are a number of unsettled claims currently in the negotiation process: Dogrib Treaty (in the North Slave region of the NWT), Treaty 8 Dene (South Slave region of the NWT), the Deh Cho First Nations (in the southwest region of the NWT), and six unsettled individual agreements within the Council for Yukon Indians Agreement.

In the 1970s, there was strong Aboriginal opposition to northern pipeline development. Almost 25 years after the Berger Commission, Aboriginal groups represent one of the primary interest groups, negotiators, and beneficiaries involved in pipeline development. Today, in the NWT, in particular, there is support for pipeline development as evidenced by the creation of an Aboriginal Pipeline Group. This said, unsettled land claims create a potential hurdle, in terms of ease and timing of development, in the pipeline debate.

Summary

The preceding sections provide contextual information that is necessary to understand pipeline development. The northern oil and gas regulatory approval process, and protection and regulation of the environment have a bearing on the complexity of the various pipeline route options. Although there is growing Aboriginal support for pipeline development, and new institutions and programs have been established to ensure that Aboriginal people will benefit from development, unsettled land claims and challenges within political systems have a unique bearing on the various pipeline options. These will be shown in the next section that examines each of the pipeline route options.

Political Context of Canada's North

As Territorial governments, the NWT and the Yukon have, for the most part, the same powers and responsibilities as provinces with respect to taxation and program delivery in areas such as health care, education, transportation, etc. However, their powers are limited in that:

- they do not have the power to amend their constitutions;
- they do not control the management and sale of public lands;
- the power to borrow money is subject to the approval of the Governor-in-Council;
- they have limited powers to incorporate companies (certain companies such as those in the telephone or air transportation business cannot be incorporated under a Territorial Act); and
- in order to become a province, the territory must obtain the consent of the Parliament of Canada and seven of the ten provinces with at least 50 per cent of the population of all the provinces.

Differences between the regulatory environments in the NWT and the Yukon Territory relate to variations in their territorial political systems. As well, the process of devolution of powers from the federal government to the territorial government is more advanced in the Yukon Territory. These differences are relevant to and impact potentially upon northern pipeline development. The structure of the political system, degree of power over land and resources held by the territorial government, and the relationship with Aboriginal groups combine to create unique political environments, as outlined below.

Northwest Territories	Yukon Territory
no party system	political parties
non-partisan legislature (operates by consensus)	adversarial legislature similar to other Canadian provinces
Aboriginal self government important	Aboriginal self government important
Government of Canada controls non-renewable resources and receives revenues generated from their development	Yukon government controls oil and gas resources and receives a large portion of oil and gas revenues

PIPELINE OPTIONS

There are a number of pipeline route options for transporting natural gas from the North. The route options examined in this report are interdependent and entwined in a very complex manner. The basic question posed is which pipeline route(s) is/are the most viable to supply gas to the North American market? There are five different options for moving natural gas:

- move Mackenzie Delta gas independently using a **Mackenzie Valley Stand Alone** route option that would transport gas from the Beaufort Sea and Mackenzie Delta following the Mackenzie River;
- move Mackenzie Delta and Alaskan gas together using the **Mackenzie Valley with an Alaska North Slope Offshore connection**;
- move Mackenzie Delta and Alaskan gas together using the **Mackenzie Valley with an Alaska North Slope Onshore connection**;
- move Mackenzie Delta and Alaskan gas together using the **Dempster Lateral** route option that connects with the Alaska Natural Gas Transmission System (ANGTS). ANGTS would transport gas from reserves in Prudhoe Bay, Alaska following the right-of-way of the Alaska Highway;
- move Alaskan gas independently using the **Alaska Natural Gas Transmission System (ANGTS)** route option.

The ensuing discussion of route options includes building considerations (physical terrain, infrastructure and political factors) and impact considerations (fiscal, employment and environmental) of pipeline development in the North. The information used is based on CERI's technical analysis of the different route options and the Canada West Foundation is not in a position to assess these data. Other organizations may arrive at different conclusions and estimates regarding the building and impact considerations of the pipeline routes.

CERI's analysis presents the fiscal impacts from pipeline development in four stages: 1) benefits from the construction of the pipeline; 2) benefits from initial field development; 3) benefits from pipeline operation; and 4) benefits from natural gas production. Readers should attempt to keep these stages in consideration throughout the remainder of the report.

It should be noted that, generally speaking, as pipeline construction costs increase, GDP and employment increase while revenues to producers and governments decrease. The production stage provides the most substantial impacts and is heavily influenced by the pipeline route chosen. These impacts will be important considerations to both producers and governments when assessing the route options.

The route options that are described in this section are largely hypothetical (i.e., with the exception of ANGTS the route options have not been surveyed). CERI's methodology to estimate the capital costs for the routes is based on other recent projects in North America. The methodology adjusted for increased costs due to transportation and the northern construction and operating environment. The purpose of the costing estimates was to provide input data in order to calculate the potential economic impacts of each of the routes (CERI, 2000).

A subsequent section takes a closer look at which route best serves Canadian interests and is based on CERI's economic analysis and long-term fiscal and tax benefits of the various options. The route options are considered **from a Canadian perspective only**.

One of the employment considerations that affects all route options is the nature of employment. During the exploration phase, the oil and gas industry does not provide long-term employment opportunities; instead, high levels of employment activity occur over short periods of time. Once exploration and construction of the pipeline are completed, the employment prospects for local workers can be limited. Few opportunities exist for operating the facilities and monitoring production. Seasonally sensitive activities such as barging, winter road construction, and winter airfield construction create tight windows for employment. Despite these employment concerns, a pipeline that is built through an area that may contain further natural gas reserves can transform the economics of the gas industry in these areas. Positive large-scale economic activity may create an ongoing industry and therefore different types of ongoing employment.

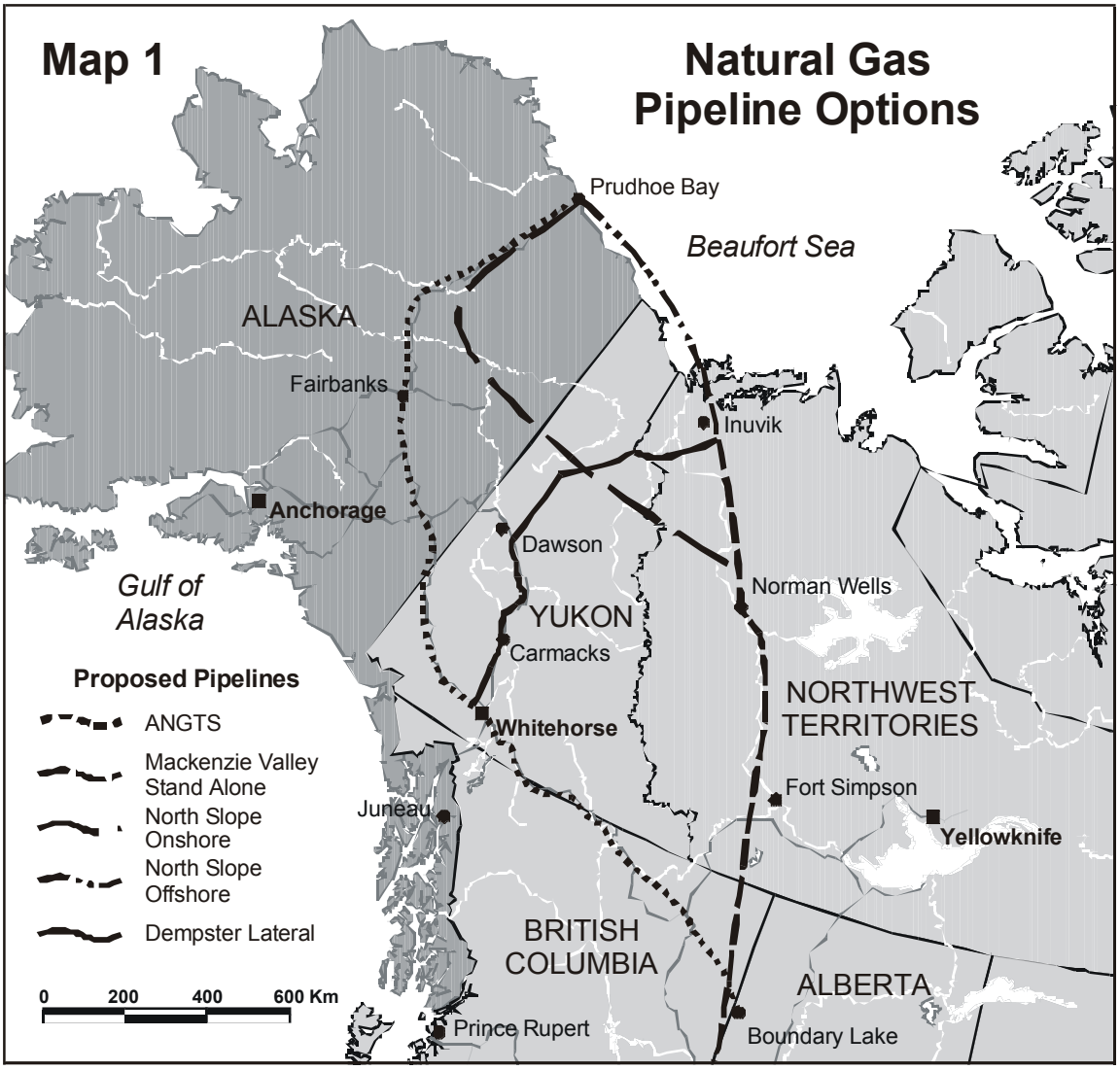
Map 1
Natural Gas Pipeline Options
Prudhoe Bay
Beaufort Sea
ALASKA
Fairbanks
Inuvik
Anchorage
Dawson
Norman Wells
Gulf of Alaska
YUKON
Carmacks
NORTHWEST TERRITORIES
Whitehorse
Fort Simpson
Juneau
Yellowknife
BRITISH COLUMBIA
ALBERTA
Prince Rupert
Boundary Lake
Proposed Pipelines
ANGTS
Mackenzie Valley Stand Alone
North Slope Onshore
North Slope Offshore
Dempster Lateral
0 200 400 600 Km

TABLE 2: Pipeline Route Considerations

	Mackenzie Valley Stand Alone	Mackenzie Valley + Offshore	Mackenzie Valley + Onshore	Dempster Lateral (+ ANGTS)	ANGTS
Capital Cost (Cdn $)[1,2,3]	• $2.3 billion	• $5.5 to $6.8 billion	• $5.4 to $6.7 billion	• $2.1 billion ($8.1 to $9.2 billion including ANGTS)	• $ 6.0 to $7.1 billion
Length of Pipeline	• 1,360 km	• 1,964 km	• 2,330 km	• 1,210 km Dempster Lateral • 3,947 km combined with ANGTS	• 2,737 km
Capacity of pipeline	• 1.6 billion cubic feet/day	• 4 billion cubic feet/day	• 4 billion cubic feet/day	• 1.6 billion cubic feet/day	• 2.5 billion cubic feet/day
Areas of Natural Gas Presence	• Beaufort Sea and Mackenzie Delta, NWT	• Prudhoe Bay, Alaska • Beaufort Sea and Mackenzie Delta, NWT	• Prudhoe Bay, Alaska • Beaufort Sea and Mackenzie Delta, NWT	• Prudhoe Bay, Alaska • Beaufort Sea and Mackenzie Delta, NWT • Eagle Plains, Yukon	• Prudhoe Bay, Alaska
Unsettled Aboriginal Land Claims	• Deh Cho in southwestern NWT	• Deh Cho in southwestern NWT	• 8 land claims in the Yukon Territory and the Deh Cho in the southwestern NWT	• 8 land claims in the Yukon Territory	• 8 land claims in the Yukon Territory
Status of Route	• initial stages of examination	• initial stages of examination	• initial stages of examination	• ANGTS 1977 approval	• 1977 approval
Regulatory Environment	• complex • measures are in place to increase clarity, consistency and transparency	• complex • measures are in place to increase clarity, consistency and transparency	• complex • measures are in place to increase clarity, consistency and transparency	• less complex • advanced measures regarding negotiations between various interest groups in place	• less complex • advanced measures regarding negotiations between various interest groups in place
Physical Environment [4]	• flat plain • continuous and discontinuous permafrost	• sea ice scour problems • water quality damage	• Onshore information not available	• mountain terrain • see physical environment description of ANGTS	• earthquake prone zones • high number of water crossings
Wildlife and Plants	• various protected and endangered species of birds impacted • sensitive habitat area	• critical habitat area for various migratory species including bird populations, beluga whales and porcupine caribou • see Mackenzie Valley Stand Alone route	• Onshore information not available • sensitive habitat area for wildlife and birds • see Mackenzie Valley Stand Alone route	• Porcupine caribou herd migration routes impacted • see description of ANGTS	• significant displacement of Dall sheep, various other land mammals and bird species • interference with fish and aquatic fur bearers • disturbance of unique plant species
Parks and Special Places	• designated bird habitat areas	• International Biological program sites • natural regions as defined by Parks Canada • see Mackenzie Valley Stand Alone route	• Onshore information not available • see Mackenzie Valley Stand Alone route	• see description of ANGTS	• traverses northern boundary of Kluane National Park • in close proximity to International Biological Program sites
Infrastructure	• no year round road • isolated and remote region	• no year round road • isolated and remote	• Onshore information not available • isolated and remote	• existing infrastructure - Dempster highway	• existing infrastructure - Alaska highway

[1] The capital cost is paid for by private oil and gas companies.

[2] Variances in capital cost are due to differences in pipe diameter and the cost of double pipelines versus a single pipeline.

[3] Cost includes pipe materials, installation of pipe materials, operation and maintenance facilities, land costs, engineering costs, logistics and material transportation costs, management, compressor stations, metering stations, and contingency percentage (CERI, 2000).

[4] Each of the proposed routes impact, and are potentially impacted by, the geology, hydrology, climate, and biological habitats of the North. These environmental concerns address only the areas that are *unique and sensitive* to each of the proposed routes.

TABLE 3: Employment, GDP and Fiscal Impacts of Pipeline Construction for Canada

	Mackenzie Valley Stand Alone	Mackenzie Valley + Offshore	Mackenzie Valley + Onshore	Dempster Lateral (+ ANGTS)	ANGTS
Employment Impacts from pipeline construction (person-yrs) [1,2]					
Impacts on NWT & Nunavut	6,290	10,820	11,080	2,380 (2,400 including ANGTS)	20
Impacts on Yukon Territory	70	2,270	1,800	6,450 (10,720)	4,270
Total Impacts on Canada	31,190	60,020	59,430	28,610 (71,970)	43,360
GDP Impacts from pipeline construction (millions of $ Cdn.)					
Impacts on NWT & Nunavut	$607	$1,064	$1,077	$216 ($218)	$2
Impacts on Yukon Territory	$4	$230	$167	$612 ($1,020)	$408
Total Impacts on Canada	$2,132	$4,159	$4,078	$1,886 ($5,117)	$3,131
Fiscal Impacts from pipeline construction (millions of $ Cdn.) [3,4]					
Net Revenues GNWT	$6	$11	$11	$2 ($2)	$0
Net Revenues Gov't Yukon	$0	$1	$0	$2 ($3)	$1
Net Revenues Gov't of Canada	$204	$392	$390	$180 ($475)	$295

[1] For example, 30 person-years could be 30 people working for one year, or one person working for 30 years or 60 people working for half a year. The number of people multiplied by the length of time in years must equal 30.

[2] An assumption of 20% capture of direct labour income for each project in the NWT and Yukon Territory.

[3] It is assumed that 20% of direct labour income and 100% of indirect labour income in the NWT is attributable to NWT residents. A similar assumption is made for Yukon Territory labour income.

[4] NWT and Yukon Territory tax revenues include: personal income tax, payroll tax, and fuel taxes. Federal tax revenues include: personal income tax, employment insurance premiums, and fuel taxes.

Source: CERI, 2000.

TABLE 4: Long-term Fiscal and Producer Impacts of Natural Gas Production ($ millions Cdn.)

	Mackenzie Valley Stand Alone	Mackenzie Valley Dual 30 inch (includes North Slope gas)	Mackenzie Valley Single 48 inch (includes North Slope gas)	Dempster Lateral + ANGTS	ANGTS
Revenues (for producers)	$15,849	$17,106	$18,292	$13,265	n/a
After-tax cash flow (for producers)	$4,365	$4,884	$5,321	$3,294	n/a
Federal Corporate Income Tax plus Grant Offset	$2,994	$3,414	$3,811	$2,131	n/a
Federal Crown Royalties	$2,160	$2,590	$3,050	$1,280	n/a
NWT Corporate Income Tax minus Grant Offset	$209	$239	$266	$149	n/a

Source: CERI, 2000.

MOVING MACKENZIE DELTA GAS INDEPENDENTLY

Mackenzie Valley Stand Alone

Description

This route originates in the Mackenzie Delta and extends to the Northwest Territories/Alberta border for a total distance of 1,360 km (see Map 1). This pipeline has a capacity of 1.6 billion cubic feet (bcf) per day (CERI, 2000).

Background

Several pipelines were proposed during the 1970s to transport gas from the Mackenzie Delta. However, concerns surrounding northern development and Aboriginal land claims resulted in a moratorium on exploration and development. Although interest in the Mackenzie Valley as a pipeline route remained high during the 1980s, deregulation, natural gas discoveries further south, and falling gas prices halted further exploration of this area until recently. It is important to note that the proven reserves in the Mackenzie Delta are sufficient to support a stand-alone pipeline route that would move Canadian natural gas only.

Building Considerations

Physical Terrain: Although this route has not been definitively surveyed, it would roughly parallel the Mackenzie River. The northern portion of this proposed route lies within the zone of continuous permafrost, which changes to discontinuous as one moves south. Terrain issues include construction in permafrost zones and water crossings.

Infrastructure: Although there are few permanent inhabitants along this route, thus minimizing human disturbance, this also means that there is little existing infrastructure. A key area of concern is the lack of year round road access along the Mackenzie River, connecting Wrigley to the Dempster Highway just south of Inuvik – a distance of 825 km. There is winter road access along part of the route, but the upper part of the Mackenzie Delta is only accessible by air or through the Yukon Territory. There are a number of options for transporting construction materials: year-round roads could be built; materials and equipment could be flown into staging areas at a higher cost; or equipment could be transported by barge down the Mackenzie River. A combination of infrastructure options may, in some respects, prove to be less costly than a road only option. Road access would, however, make exploration easier. At this point in time, the GNWT does not have jurisdiction over new road construction in the NWT, which is the responsibility of the Government of Canada. As well, the lack of sizeable communities with existing services could also hamper the ease of construction.

There is existing pipeline infrastructure in the NWT. A crude oil pipeline reaches 866 km from Norman Wells, NWT to Zama Lake, Alberta. Constructed in the early 1980s, the pipeline follows the Mackenzie River valley to Fort Simpson and then runs south to Zama. There is also natural gas pipeline infrastructure in service. A raw gas transmission line runs from northeast British Columbia through the southeast Yukon and into the Pointed Mountain gas processing plant in the Ft. Liard region of the NWT. An additional small gas pipeline project has recently been completed and includes a 50 km transmission line and gas distribution system in Inuvik. Paramount Resources also operate the Shiha Energy Pipeline that ships gas from the NWT's Fort Liard area into West Coast's pipeline system. These indicate that the foundation for pipeline development in the NWT has begun.

Political Factors: Significant concerns surround the complexity of both oil and gas regulation and environmental regulation in the NWT. The GNWT does not have the resources or the ability to orchestrate regulatory issues since this is the responsibility of the Government of Canada. The various Aboriginal stakeholders involved in regulation also present challenges for producers. Clarity is needed regarding the level of regulatory uncertainty.

Another political factor is land claim issues. Great strides have been taken in the NWT, Yukon and Canada to ensure successful and mutually beneficial completion of land claim negotiations. The majority of the Aboriginal land claims that would be affected by pipeline development are settled, although a few are still in the process of negotiation. The Deh Cho have the only unsettled land claim that would be affected by

a possible pipeline route in the Mackenzie Valley. The stakeholders are still in initial stages of discussion and as a result this claim is several years away from settlement. Although there is precedent for resource development to proceed in an unsettled claim area, the terms and conditions of development may be more complex. This route would traverse three other Aboriginal settlement regions: Inuvialuit, Gwich'in, Sahtu Dene and Metis.

There is also interest expressed by Aboriginal groups in having equity participation in Mackenzie Valley pipeline options by becoming investors. This notion needs to be explored in more detail as there are questions related to the high investment costs and business skills required to pursue this type of investment. However, it may be an advantageous incentive for producers.

Support for non-renewable resource development in the NWT has changed since the Berger Commission. Currently, there is clear political support for a pipeline along the Mackenzie Valley. As well, Aboriginal groups have voiced strong support for pipeline development (Calgary Herald, 2000c). There are expectations that a pipeline would assist in promoting economic self-sufficiency and create a more stable and diversified economy. One of the barriers the NWT faces to acquiring fiscal benefits is that the GNWT does not control its own resources – the Government of Canada controls and receives benefits from resource development.

Impact Considerations

Fiscal: The Mackenzie Valley Stand Alone route has a total GDP impact from pipeline construction on Canada of approximately $2 billion. The Mackenzie Valley route would have a significant GDP impact on the NWT and Nunavut at $607 million. Comparatively, there is very little impact on the Yukon at $4 million. In terms of net revenues generated for the Government of Canada, this route would generate over $200 million, with $6 million for the GNWT and no revenues for the Yukon Government (see Table 3).

There is positive long-term fiscal economic development from natural gas production over the projected 30-year life of this pipeline. Fiscal benefits accruing to the Government of Canada are significant with corporate tax and royalties totaling $5 billion. The GNWT would receive a net corporate income tax benefit of $209 million. Revenues for Mackenzie Delta producers are almost $16 billion (see Table 4).

Employment: This route would have a total Canadian employment impact of over 30,000 person-years, with significant impacts in the NWT (over 6,000 person-years) and limited impacts in the Yukon (70 person-years).

Environmental: Sections of the Mackenzie Valley terrain are sensitive to construction disturbance. CERI indicates that potential impacts are primarily associated with the construction stage of the pipeline. The northern part of the route lies within a zone of continuous permafrost. Construction could influence permafrost integrity, stability and erosion potential. Hydrological features could also be impacted in terms of drainage disruption and modification to river channels.

The proposed pipeline route provides habitat for numerous wildlife species. Wildlife can be potentially impacted through habitat loss or modification, and increased access to the area by hunters. Staging and nesting sites for a variety of bird populations also face potential disturbance. Although clearing a pipeline right of way will alter preferred habitat for some species it may also create new habitat for others (CERI, 2000). The route has also been designed to avoid sensitive vegetation communities such as wetlands, major drainage areas, and steep topography (CERI, 2000).

MOVING ALASKAN AND CANADIAN GAS TOGETHER

Mackenzie Valley with North Slope Options

Description

There are two route options – the North Slope Offshore and the North Slope Onshore. Both options connect to the Mackenzie Valley pipeline.

North Slope Offshore: This route extends 604 km underwater from Prudhoe Bay to the Mackenzie Delta

by way of the Beaufort Sea, and then connects with the Mackenzie Valley pipeline for a total distance of 1,964 km (see Map 1). This route would link the Alaskan reserves with reserves in the Beaufort Sea and Mackenzie Delta. CERI has calculated the capacity of the Offshore route combined with the Mackenzie Valley at 4 bcf per day.

North Slope Onshore: This route extends south from Prudhoe Bay, around a wildlife preserve, then east to meet up with the proposed Mackenzie Valley pipeline. This route has a distance of 970 km from Prudhoe Bay to the Mackenzie Valley and when combined with the Mackenzie Valley pipeline, the distance would total 2,330 km (see Map 1). As above, the Mackenzie Valley pipeline capacity is 4 bcf per day when it receives gas from the North Slope Onshore pipeline.

Mackenzie Valley: This route was previously described as the "Mackenzie Valley Stand Alone". It extends from the Mackenzie Delta to the Northwest Territories/Alberta border for a total distance of 1,360 km.

Background

A North Slope link is necessary to connect Alaskan gas to the Mackenzie Valley pipeline; without a North Slope link the Mackenzie Valley pipeline would only have access to Canadian gas. Canadian Arctic Gas Pipelines Ltd. originally examined the onshore link from Alaska to the Delta during the 1970s. Unlike the onshore route currently being proposed, the original route crossed the coastal plain of the Yukon following the Beaufort Sea. This route received a great deal of attention from environmentalists because it would have crossed the Arctic National Wildlife Refuge in Alaska and was routed directly through the calving range of the Porcupine Caribou herd (Bregha, 1979). One of the recommendations of the Berger Commission halted further examination of this route. The background for the Mackenzie Valley portion of the route was described previously.

The current Mackenzie Valley with North Slope options would link proven reserves in Alaska to estimated large reserves in the Mackenzie Delta and Beaufort Sea. According to CERI, the proven reserves in the Mackenzie Delta would reach southern markets more cheaply if they were combined with American natural gas. As the route descriptions indicate, there are different considerations for the North Slope Offshore and North Slope Onshore options.

Building Considerations

1. Physical Terrain

North Slope Offshore: The single most significant aspect of this proposed pipeline is that it would be built under the sea ice and laid along the bottom of the Beaufort Sea. The state and availability of technology to construct this route have not been determined. The Beaufort Sea is completely ice covered for most of the year and floating ice scours the sea floor, which may create construction problems (CERI, 2000). A second construction issue relates to the spacing of compressor stations, which are usually found at regular intervals along a pipeline. This would not be possible, and one large compressor station would have to be built for the entire route.

North Slope Onshore: CERI does not include environmental implications for this route option and therefore information related to the physical environment is not available.

Mackenzie Valley: This route roughly parallels the Mackenzie River through the Mackenzie Valley. The northern portion of this proposed route lies within the zone of continuous permafrost that changes to discontinuous as one moves south. Building considerations related to terrain include permafrost zones and water crossings.

2. Infrastructure

North Slope Offshore: This route faces infrastructure challenges for construction, as it is located in an isolated and remote region of northern Canada and would require substantial infrastructure support.

North Slope Onshore: Information not available.

Mackenzie Valley: Refer to the infrastructure section for the Mackenzie Valley Stand Alone route.

3. Political Factors

North Slope Offshore: There are jurisdictional questions regarding the rights of the Yukon Territory over waters off their northern coast. The Government of Canada controls these waters and would have influence over potential construction in this area. The regulatory environment for any pipeline construction in the NWT is very complex. However, new measures are in place to increase the clarity and transparency of the process. The time needed to fulfill regulatory requirements, conduct necessary environmental assessments, and public consultations must be factored into the expected completion date for this option.

North Slope Onshore: One of the questions that should be asked is whether the Alaska Government and Yukon Government would allow this route to cross Alaska and the Yukon Territory and thus enter the NWT. This route faces regulatory considerations similar to those in the NWT. The main difference is that the regime in the Yukon is clearer.

Mackenzie Valley: The political climate in the NWT was discussed in detail in the Mackenzie Valley Stand Alone route option.

Impact Considerations

1. Fiscal Impact from Pipeline Construction

North Slope Offshore and Mackenzie Valley: The CERI report combines the Offshore route with the Mackenzie Valley pipeline in order to show the potential economic benefits of the total pipeline. The route has one of the largest GDP impacts on the NWT from pipeline construction as well as very large GDP impacts on the rest of Canada, at over $4 billion. The GDP impact on the NWT is over $1 billion. GDP impacts on the Yukon are over $200 million (see Table 3). This pipeline's construction has a Canadian fiscal impact of over $390 million, with the NWT and the Yukon territories experiencing $11 million and $1 million impacts respectively. (The fiscal revenues for the NWT are higher with either North Slope option than with any other option.) CERI's report notes that this option also provides the lowest transport cost for natural gas from the Mackenzie Delta to market, due to the larger volume of gas being moved.

North Slope Onshore and Mackenzie Valley: The construction of the Onshore Mackenzie Valley route has total Canadian GDP impacts of over $4 billion. The NWT would experience its largest GDP impacts (over $1 billion), while the Yukon would receive $167 million in GDP impacts. In terms of fiscal revenues from pipeline construction Canada as a whole would experience a $390 million impact and the NWT $11 million. The Yukon would have a zero dollar fiscal impact with this option.

Long-term Fiscal and Tax Impacts: CERI's analysis of natural gas production impacts for these routes are described in terms of two different pipeline sizes that would transport gas down the Mackenzie Valley. A link with Alaskan gas would be established, however the actual route for this link has no impact on production benefits for Mackenzie Delta producers, the GNWT or the Government of Canada.

The first option examined includes dual 30 inch pipelines constructed down the Mackenzie Valley to carry production from the Mackenzie Delta and Prudhoe Bay. Total fiscal impacts from production are $6 billion for the Government of Canada and $239 million for the GNWT. In both instances, there is an increase in tax and royalties over the Mackenzie Valley Stand Alone route. By combining Canadian and American gas, higher pipeline economies of scale are achieved and netbacks to producers are increased. Producers also benefit in this case with estimated revenues of $17 billion and a $519 million increase in cash flow over the Mackenzie Valley Stand Alone route (see Table 4).

The second scenario for moving Alaskan and Mackenzie Delta gas is calculated based on a single 48 inch pipeline down the Mackenzie Valley. Even greater improvements are found in this scenario. Government of Canada taxes and royalties reach almost $7 billion, and the GNWT has tax revenues of $266 million. Revenues to producers are also higher at $18 billion, with an increase in cash flow over the Stand Alone route of $956 million. Again, these increases are attributable to increased economies of scale of a larger pipeline combined with Alaskan throughput (see Table 4).

2. Employment

North Slope Offshore and Mackenzie Valley: Since this route would be built in the NWT, employment benefits are significantly higher for both the territory and Canada than the routes that do not combine Alaskan and Canadian gas. Canada would experience its second largest employment benefits with the Offshore route (greater benefits are seen with the Dempster Lateral-ANGTS pipeline).

Employment considerations including the type, length and suitability of potential jobs are the same as previously discussed.

North Slope Onshore and Mackenzie Valley: The employment impacts for this pipeline are almost identical to the impacts for the Offshore route (see Table 3). The NWT would experience its largest employment benefits with the Onshore pipeline.

3. Environmental

North Slope Offshore: As previously stated, the primary environmental concern affecting this route option is related to ice scour and the potential threat of damage to an underwater pipeline. The northern terminus of the Mackenzie River, called the Mackenzie Delta, is dominated by thousands of lakes and basins. These water bodies play a significant role in the ecology of the Delta. Pipeline development could have potential environmental impacts on the distribution of permafrost, fish populations, waterfowl and mammals, and the movement of water and sediment in the Delta.

The second principal area of concern is the zone at the edge of the ice in the Beaufort Sea. This area provides critical habitat for migrating birds, polar bears, seals, and beluga and bowhead whales. The calving grounds for beluga whales, off the waters of the Delta, are a critical area for concern. Aboriginal groups in Alaska and Canada are very sensitive to these potential environmental problems. It is important to highlight the fact that the magnitude of this concern could drive a new agenda for environmental groups.

North Slope Onshore: Information not available.

Mackenzie Valley: Environmental considerations were described in the Stand Alone route description. Again, the terrain is sensitive to disturbance due primarily to permafrost. Potential impacts on wildlife and bird populations must also be mitigated against.

Dempster Lateral

Description

This proposed route would approximately follow the Dempster Highway from Inuvik to Dawson City in the Yukon, where it would follow the Klondike Highway to Whitehorse – approximately 1,210 km. At Whitehorse it would connect to the Alaska Highway pipeline (ANGTS) – making the total route approximately 3,947 km (see Map 1). The capacity of the Dempster Lateral portion of the route is 1.6 bcf per day.

Background

This pipeline route would move Canadian natural gas, but is dependent on the construction of ANGTS. When regulatory approval was given to the ANGTS route to transport American gas through Canada, the Government of Canada may have been concerned with the accessibility of Canadian natural gas, resulting in the idea of the Dempster Lateral option. One perspective is that this route was brought into play as a political concession. The same changes in market conditions that created the delay in construction of ANGTS also delayed any serious further exploration of the Dempster route.

The exact routing for this project was never completed as it had been for the ANGTS route, and therefore the specifics of engineering and route construction are not well known. Due to the connection with ANGTS, fiscal and employment impacts combine both routes. Although some of the following considerations will show that this route has positive fiscal and employment impacts, in present day terms it is not considered by some to be a viable pipeline option.

Building Considerations

Physical Terrain: The Dempster Lateral crosses three broad physiographic regions: the Arctic Coastal Plain, the Interior Plains, and the Cordillera. This particular route creates a variety of technical problems for pipeline construction. Possible challenges for a buried pipeline include mountainous terrain, intermontane

valleys, areas of bedrock, steep slopes and variable soil types. An alternative option would be an above ground warm pipeline. A number of water crossings also have the potential to create significant design and construction challenges due to the potential for frost heave (CERI, 2000).

Infrastructure: The proposed route does closely parallel existing transportation infrastructure. It follows the unpaved Dempster Highway from Inuvik, NWT to a point approximately 100 km south of Dawson City in the Yukon Territory. From this point it follows the Klondike Highway to Whitehorse. With the exception of Whitehorse, the population in other Yukon communities is very small and may not immediately possess adequate services to equip a construction project of this magnitude. Better and existing infrastructure does exist in the southern Yukon Territory and northern portion of British Columbia.

Political Factors: Although this decision has large fiscal benefits for the Yukon Territory, like the other route options it is ultimately a producer decision. The Yukon Government is currently focused on supporting and promoting the ANGTS route independently of a Dempster Lateral option.

One of the drawing features of this route is that there is a set of rules for industry based on a common regulatory regime jointly developed by the Yukon and Aboriginal governments. The *Yukon Oil and Gas Act* has aided in creating an attractive climate for oil and gas investment. The perceived clarity of the regulatory regime in the Yukon Territory is important because the Dempster Lateral route does not have final regulatory approval.

There is strong support by Aboriginal groups and environmentalists to protect the Porcupine Caribou that would be potentially impacted by this route. As a result, environmental approvals for this route may be difficult.

The route also presents an option for northern economic development and security of Canadian supply, but the necessary stakeholders, including the Government of Canada, Yukon Government and pipeline producers, have not examined it in a serious manner.

Impact Considerations

Fiscal: When combining the impacts of the Dempster Lateral and ANGTS pipelines, the total Canadian GDP impact from construction is over $5.1 billion. For the NWT and Nunavut it is $218 million (see Table 3). It also has the largest Yukon GDP impact, at over $1 billion. It represents both Canada's and the Yukon's largest fiscal impact from pipeline construction, at $475 million and $3 million respectively. The NWT would experience a $2 million fiscal impact.

In terms of long-term fiscal impacts from natural gas production, the Government of Canada tax and royalty revenues are $3.4 billion and the GNWT revenues are $149 million. These values are significantly lower than the other routes. As Table 4 indicates, tax and royalty revenues for the Government of Canada range from $2 billion (Mackenzie Valley Stand Alone route) to $4 billion (Mackenzie Valley single 48 inch pipeline) higher than with the Dempster Lateral route option. The GNWT revenues range from $50 million (Mackenzie Valley Stand Alone route) to $115 million (Mackenzie Valley single 48 inch pipeline) higher than with the Dempster Lateral option. For the producers, revenues are again lower at $13 billion, a decrease of $2.5 billion below the Mackenzie Valley Stand Alone route (see Table 4).

Employment: Construction requirements for each of the pipeline routes examined are likely to require resources beyond the current capacity of the northern economy. A significant number of workers will likely be imported from other regions of Canada during the construction period. As Table 3 indicates, the construction of the ANGTS with Dempster Lateral will result in very significant employment impacts in person-years on Canada and the Yukon Territory. (71,970 and 10,720 person-years respectively. This is the largest Yukon employment impact.) The NWT would have a 2,400 person-year employment impact.

Environmental: Potential environmental concerns include the effect of construction on terrain stability, river crossings, frost heave, and drainage and erosion control. As previously mentioned, the mountainous terrain creates difficult construction challenges.

Continuous and discontinuous permafrost is also present along part of the route.

Perhaps the most significant biological concern along this proposed route is the potential impact on the Porcupine caribou herd. The route would traverse the winter range, and spring and fall migration routes of the herd. Any pipeline along the Dempster Highway has the potential of dissecting the caribou's winter range, which is considered unique and sensitive. An additional concern is related to the disruption of critical sheep habitats and sensitive bird species (CERI, 2000).

MOVING ALASKAN GAS INDEPENDENTLY

Alaska Natural Gas Transmission System (ANGTS)

Description

This route extends from Prudhoe Bay, Alaska to Boundary Lake, Alberta - approximately 2,737 km. The route follows the Alaska Highway through the southwestern Yukon Territory and northeastern British Columbia (see Map 1). CERI reports an assumed pipeline capacity of 2.5 bcf per day.

Background

As previously noted, the ANGTS route received regulatory approval for its construction in 1977, and parts of the route were constructed by Foothills Pipe Lines Ltd. (The regulatory approval for this route is a contentious issue and will be discussed further in the subsequent sections.) The Northern Pipeline Agency (NPA) was created in 1978 to facilitate the planning and construction of the Canadian portion of the Alaska Gas Pipeline. The Agency regulates the project and is responsible for ensuring that the pipeline system yields maximum benefits with the least amount of social and environmental disruption. The NPA "gives effect to the Agreement between Canada and the US on principles applicable to a Northern natural gas pipeline" (Northern Pipeline Act, 1978), and acts as the negotiating body between the Government of Canada, Foothills group of pipelines, provincial and territorial governments, and the Government of the United States (Northern Pipeline Agency, 2000).

Due to changes in market conditions only southern segments of ANGTS were constructed and this pre-build has been moving natural gas since 1982. The ANGTS route, if completed, would link to the existing segments of pipeline.

A large investment in infrastructure has been made for the reserves of natural gas in Prudhoe Bay, Alaska. This route option follows an existing and well-developed transportation corridor that includes the Alaska Highway, railway access, and an oil pipeline.

Building Considerations

1. Physical Terrain

The ANGTS route passes through zones of continuous, discontinuous and sporadic permafrost that can affect ease of construction. The proposed pipeline will be buried. Sections of the proposed route in the Yukon Territory must contend with a variety of water crossings that will require a different type of construction to reduce environmental impacts. Concern was expressed by CERI analysts with regard to the pipeline route passing through known earthquake-prone areas. The greatest construction challenge along the route is the Atigun Pass in the Brooks Mountains. Although construction costs will be significantly higher for this section, it is only a few kilometers in length. Another consideration is that the producer's total pipeline construction costs increase as the pipeline increases in length. Table 2 indicates that ANGTS is the longest pipeline route and has the highest capital cost.

2. Infrastructure

The all weather Alaska Highway represents a critical piece of infrastructure that the entire length of the pipeline route would follow. Easy access to an existing right of way is important in reducing pipeline construction costs and environmental disturbance. The highway is advantageous for movement of personnel, material and equipment for construction. There is railway access into central Alaska and British Columbia at the southern end of the route. Numerous major airports and the existence of an oil pipeline that moves oil from Prudhoe Bay to Valdez on the south coast of Alaska combine to create a well-established transportation corridor.

3. Political Factors

The ANGTS was subjected to environmental scrutiny and assessment during the 1970s and does have the advantage of completed environmental impact assessments. It has regulatory approval to be constructed in the form of Certificates of Public Convenience and Necessity that have been issued from the Governments of Canada and the US. There are two very divergent opinions regarding the regulatory status of the ANGTS route. One holds that the route has definitive pre-approved status and due to legislation is the only route allowed to tap into Alaskan gas. As a result, the regulatory environment that it would be built under is well advanced and would not hinder pipeline construction. A divergent viewpoint maintains that although the certificates for approval were obtained under the Northern Pipeline Act, a number of conditions pertaining to these certificates have not been met. As well, environmental assessments, even ones approved over twenty years ago, may be more contentious in the current political climate given the globalization of environmental organizations. These objections to the validity of the approved status raise questions and as a result further investigation is required.

The ANGTS pipeline route would have a fundamental impact on the population of Alaska (Anchorage Daily News, 2000a). The state of Alaska has a strong interest in the development of natural gas, and demands benefits, in the form of royalties and employment, from the exploitation of natural resources in the state. One viewpoint is that it is unlikely that the population would accept a different route option. In particular, the city of Fairbanks would benefit from an alternative source of energy and potential for further industrial development. The Aboriginal population in Alaska is well positioned to take advantage of business opportunities stemming from pipeline development. This particular population has connections with Aboriginals in Canada, large royalties from other development, and business expertise. Both Alaskan senators and the Yukon Government strongly support this route (Calgary Herald, 2000b). From this perspective, this route option is one over which Canadian interests have limited leverage.

Another perspective is that Alaska's interests are better served by moving Alaskan gas with Canadian gas. In comparing the ANGTS route (which moves Alaskan gas alone) with the Mackenzie Valley North Slope route options (which move Alaskan and Canadian gas together, as discussed in a later section), CERI calculates that netbacks to producers, and therefore royalties to the Alaska government, are higher with a Mackenzie route option. The higher netbacks and royalties result from a shorter pipeline route and lower construction costs. Higher wellhead prices will also stimulate exploration and development in Alaska. Some believe that the long-term benefits of sustained ongoing development and state revenue will be lost if the focus remains on short-term benefits, such as job creation from the pipeline's construction, that would result from the ANGTS route option (Anchorage Daily News, 2000b).

Impact Considerations

1. Fiscal

As Table 3 demonstrates, CERI estimates that ANGTS would have total Canadian GDP pipeline construction impacts of over $3 billion. As the route crosses through the Yukon Territory and completely bypasses the NWT, over $400 million of the Canadian GDP impacts would be directed at the Yukon and only $2 million would be directed at the NWT. In terms of fiscal impacts, ANGTS's construction would generate almost $300 million in net revenues for Canada, and $1 million for the Yukon. The ANGTS has a zero dollar revenue impact on the NWT. Long-term fiscal and tax implications of natural gas production were not calculated by CERI for this route option. Only American gas is being developed and therefore it would have no production impacts for Canada.

2. Employment

The employment impacts calculated by CERI are based on the construction of the pipeline. Since pipeline construction is often seasonal and length of employment variable, employment data are based on a three-year construction period and are measured in person-years or the total years that one person could be employed. This route would generate significant

employment in Canada as a whole (over 43,000 person-years), with a large Yukon employment impact (over 4,000 person-years). However, it would only generate 20 person-years in the NWT.

3. Environmental

One of the largest technical challenges to pipeline construction in the North relates to the zones of continuous, discontinuous, and sporadic permafrost. The ANGTS would cross all three zones. Frozen and partially frozen soil can be damaged if it thaws during construction. The potential environmental effects of burying the pipeline and cooling the gas are related to slope instability, erosion, and disturbance to vegetation along the proposed right of way. However, the existence of an established transportation corridor means that environmental disruption will not occur in more remote and pristine wilderness areas.

Potential impacts from water crossings include interference with fish habitats and spawning. Other potentially significant wildlife impacts are habitat loss through displacement during construction for Dall Sheep, grizzly bears and woodland caribou. The pipeline right of way also traverses the northern boundary of Kluane National Park and is in close proximity to some International Biological Program Sites that contain wildlife particularly sensitive to human disturbance.

PIPELINE OPTIONS AND CANADIAN INTERESTS

Until this point the report has considered options for moving Canadian and American gas either together or independently. If we assume that development in Canada's north is best pursued through the expansion of the gas industry, then the Mackenzie Delta gas must be tapped. This section will examine specifically which pipeline route best serves Canadian interests. In so doing, the section will restate some of the previous information, with an emphasis on summarizing CERI's economic analysis. The caveat is that we must also consider the political context and concerns and the environmental issues related to each of the pipeline route options. These issues have been raised in the previous section but not in a way that weighs their importance against economic considerations.

Cost-Effective Movement of Gas

What is the most cost-effective way of getting northern gas to southern markets? The answer depends on the tolls and netback prices for each of the pipeline options. The tolls are the average transportation costs over the first ten years of pipeline operation. This can also be thought of as the cost needed to transport a unit of natural gas. Tolls vary with the size of the line, and are influenced by the capital cost of the pipeline. Netbacks are the price a producer would receive for the gas net of transport costs to the end user. Given that producers bear the costs of tolls and benefit from the netbacks, it should be clear that producers desire the lowest toll and highest netback price possible.

CERI calculated tolls and netbacks for four route options (ANGTS was excluded because Canadian gas is not tapped).[4] According to CERI, a netback of approximately $2.00/gj would make development of Mackenzie Delta resources feasible. As Table 5 demonstrates, CERI found that the Mackenzie Valley Stand Alone and North Slope options provide a sufficient netback for the projects to proceed, with either of the Mackenzie Valley North Slope options being the most cost-effective.

Simply put, the Mackenzie Valley pipeline alternative that ships both Mackenzie Delta and Prudhoe Bay gas simultaneously allows shippers to take advantage of economies of scale. These scale economies reduce the per unit cost of gas transportation.

Fiscal Impacts

As the discussion of the individual pipelines revealed (see Tables 3 and 4 for reference), a pipeline will have significant potential fiscal impacts on and benefits to the residents of the NWT and the Yukon, as well as residents of Canada as a whole. Fiscal benefits accrue to the federal and territorial governments from pipeline construction, field development, the operation of the pipeline, and natural gas production. It is important to note that fiscal impacts of construction are small relative to taxes and royalties associated with the operation of a pipeline and production of natural gas.

Table 5: Calculated Tolls and Netbacks

	Total Tolls	Netbacks
For Mackenzie Delta (NWT) Natural Gas		
Mackenzie 48" pipeline + Alaska North Slope Offshore	$0.53	$2.62/gj
Mackenzie 48" pipeline + Alaska North Slope Onshore	$0.53	$2.62/gj
Stand Alone Mackenzie Valley 30" pipeline	$0.88	$2.27/gj
Dempster Lateral + ANGTS	$1.26	$1.89/gj
For Prudhoe Bay (Alaska) Natural Gas		
Mackenzie 48" pipeline + Alaska North Slope Offshore	$1.05	$2.10/gj
Mackenzie 48" pipeline + Alaska North Slope Onshore	$1.07	$2.08/gj
Dempster Lateral + ANGTS	$1.28	$1.87/gj

Source: CERI, 2000.

Construction Impacts

The building of a pipeline yields economic benefits in the form of higher GDP, net revenues, and employment. These were previously outlined in the route descriptions. CERI found that the GDP impacts from pipeline construction on the NWT and Nunavut that would connect Alaskan gas with Mackenzie Delta gas could range from $218 million to $1 billion, depending on the route chosen. The Yukon could realize GDP benefits that range from $167 million to over $1 billion, again depending on the route. Canada as a whole could see GDP impacts between $4 billion and $5 billion.

Field Development Impacts

Field development is the construction of natural gas processing facilities. Each of the pipeline routes that involves the development of Mackenzie Delta natural gas will require an investment in field development. (Costs and benefits for field development in Alaska were not calculated. In Alaska, the incremental costs associated with production has, for the most part, already been incurred.) These costs do not vary by route option. CERI's data exclude any current exploration expenditures or exploration expenditures that might occur once a pipeline is constructed.

CERI calculated that the GDP impacts of field development that would accompany a Mackenzie Valley pipeline are approximately $675 million for the NWT and Nunavut and $1.4 billion for Canada. Initial field development would contribute $8 million in net revenues to the GNWT. The Government of Canada would receive an additional $150 million in net revenues. CERI's data show that labour income impacts of initial field development create an additional $900 million for Canada and over $400 million for the NWT and Nunavut. Initial field development also adds another 7,200 person years of employment for the NWT and Nunavut and 21,000 for all of Canada.

Operation and Production Impacts

The operation of a pipeline and production of natural gas create long-term fiscal and tax implications for the NWT and Canada as a whole Revenues are accrued from taxes associated with shipping natural gas over the thirty year life-span of the pipeline. As well, the highest fiscal impacts, in the form of taxes and royalties, are from the actual production of the natural gas.

Operation Impacts

In terms of ongoing operations, a pipeline can generate revenues to provincial and territorial governments as well as the Government of Canada. CERI calculated the income tax revenues associated with ongoing operations over a thirty year period. The tax revenues generated are proportional to the capital cost of a pipeline and to the portion of the route that lies in Canada. The Mackenzie Valley Stand Alone route, which has the smallest total capital cost, also shows the smallest total income tax benefit to all of Canada at approximately $500 million. The Mackenzie Valley North Slope options reveal potential income tax revenues ranging from $1 to $1.3 billion for Canada and $235 to $323 million for the NWT. The ANGTS route has a zero dollar operational impact on the NWT, however it does impact the Yukon ($174 million), British Columbia ($342 million), and Canada at $905 million. Finally, the ANGTS plus Dempster Lateral shows the greatest income tax benefit from operations since it has the largest capital cost. It has a $1.2 billion impact on the Government of Canada, and over $300 million each for the Yukon and British Columbia. The impact of this route on the NWT is only $26 million (see CERI, 2000).

Pipeline operations are only a small portion of the total long-term fiscal impacts. Production impacts are more substantial and are discussed next.

Production Impacts

CERI used a model to estimate and compare the long-term fiscal and tax implications of natural gas production for moving Mackenzie Delta gas (see Table 4).[5] The route options presented by CERI include (1) the Mackenzie Valley Stand Alone, (2) a Mackenzie Valley North Slope pipeline with a 30 inch diameter, (3) a Mackenzie Valley North Slope pipeline with a 48 inch diameter, and (4) an ANGTS with Dempster Lateral pipeline. CERI's model calculated all corporate income taxes and royalties applicable to each route, based on current tax and royalty regimes. These fiscal

impacts were presented in the earlier section describing the pipeline route options. All figures are presented in Tables 4 and 5.

When calculating the fiscal impacts on governments, CERI assumes that natural gas development will impact federal transfer payments to the North. Approximately 80 percent of the NWT corporate income taxes from natural gas production would be offset by a reduction in the NWT's Formula Financing Grant. Simply put, the long-term fiscal impacts are beneficial to both the Government of Canada and the GNWT. The Government of Canada receives revenues in the form of royalties, taxes and reduced grant payments to the NWT. The GNWT receives tax revenues, but at a reduced net benefit due to the reduction in the Grant from Canada.

Using their model, CERI found that the Mackenzie Valley case with a 48 inch diameter pipeline was the most efficient case, the best option in terms of fiscal and tax impacts, and provided the highest netback prices to producers "due to the realization of economies of scale in combining Alaskan and Mackenzie Delta throughput right at the Delta" (CERI, 2000). Dual Mackenzie Valley pipelines with a 30 inch diameter were found to be the next best option, followed by the Mackenzie Valley Stand Alone route, while the ANGTS Dempster Lateral case was not a feasible option for Mackenzie Delta gas.

CERI's analysis shows that when comparing the best case (48 inch pipeline) and the worst case (ANGTS Dempster Lateral) the difference in federal revenues from natural gas production is $3.45 billion more in favour of the 48 inch pipeline. Federal taxes and royalties to be realized through the other two scenarios are also considerably higher than the ANGTS Dempster Lateral case. Government of Canada revenues are $1.6 billion more under the Mackenzie Valley Stand Alone route and $2.6 billion more under the Mackenzie Valley dual 30 inch pipeline scenario.

The GNWT would realize $117 million more in fiscal and tax benefits under the best case (48 inch pipeline) than the worst case (ANGTS Dempster Lateral). Greater revenues for the GNWT would also be realized for the Mackenzie Valley dual 30 inch pipeline case ($90 million more than the ANGTS Dempster Lateral) and the Mackenzie Valley Stand Alone case ($60 million more than the ANGTS Dempster Lateral). For the producers, the best case results in $5 billion more in additional revenue and $2 billion more in additional cash flow over the worst case.

Canadian Energy Research Institute's Conclusion

CERI's report documents that demand for natural gas is expected to grow substantially over the next twenty years. Given that the resource base in Northern Canada is expected to total greater than 60 tcf, "this places Northern gas in a promising position to fill some of the required demand" (CERI, 2000).[6] Based on their analysis, CERI concludes that the projected capital costs show that there is the potential to supply northern gas to southern markets. They also note that potential exists for either a stand alone Mackenzie Valley pipeline or a combination of a Prudhoe Bay and Mackenzie Valley gas pipeline.

CERI concludes that any pipeline route that taps Mackenzie Delta gas will have large potential economic and fiscal benefits to the NWT, the Yukon, and other residents of Canada, with the level of benefits varying with the route chosen and pipeline capacity. Looking at construction alone, the GDP impacts could range from $218 million to $1.1 billion for the NWT and Nunavut, from $4 million to over $1 billion for the Yukon, and from $2.1 billion to $5.1 billion for Canada as a whole. Employment impacts from pipeline construction show significant employment creation in the NWT, Yukon, and all of Canada. A pipeline could create between 31,000 and 72,000 person years of employment for Canada depending on the route chosen. Once a pipeline is in place, further exploration and development would mean increased economic and employment benefits above these initial calculations.

In terms of fiscal impacts, the net government revenues from pipeline construction could range from $6 million to over $11 million for the GNWT and from $204 million to $475 million for the Government of Canada, depending on the route. Once a pipeline is in place, ongoing impacts from natural gas production and the

operation of a pipeline have the potential to generate large income tax revenues for all governments. Income tax revenues from pipeline operation range from $670 million to over $1.9 billion. As well, combined income tax and royalty revenues from producers could be as great as $7.1 billion, depending on the route chosen.

CERI found that environmental impacts for all the pipeline routes are moderate for the construction phase and low to negligible for the pipeline's operation. They found little difference between the proposed routes with regard to the magnitude of environmental impacts. All routes have the potential to affect geology, hydrology, climate and wildlife populations. The magnitude of environmental impacts is only significant to the extent that mitigation factors may be more applicable to some routes than others.

CERI also concludes that while any pipeline that taps Mackenzie Delta gas would be beneficial to Canada, the routes that follow the Mackenzie Valley (i.e., Mackenzie Valley Stand Alone or either of the North Slope options) are preferable. From a volume of gas perspective the Mackenzie Valley North Slope options are the most attractive. Given the projected capital costs of each route, and the cost of tolls, the netbacks to producers are at a level that makes developing northern gas the most profitable (CERI, 2000). From a producer's perspective, "revenues from a Mackenzie Valley route over the ANGTS with Dempster Lateral range from nearly $2.6 billion greater for the Mackenzie Valley Stand Alone route to over $5 billion more for the 48 inch Mackenzie Valley route" (CERI, 2000). And, from a government perspective, "Canada is better off, from a fiscal standpoint, with any route down the Mackenzie Valley" (CERI, 2000). Taken together, based on their environmental and economic analysis, CERI found that clearly Canada is better off with any route down the Mackenzie Valley.

PIPELINE SEQUENCING

An issue raised in the media recently concerns questions of pipeline sequencing and timing. As noted earlier, pipeline decisions are not independent of one another. If a decision is made to build one route, the demand for and interest in other routes will invariably be considered in a different light.

There are three main questions surrounding pipeline sequencing. The first concerns the timing of tapping the natural gas reserves. *Will one pool of gas (either Alaska or Mackenzie Delta) be tapped first, or will both be tapped together?* Most (but not all) stakeholders agree that Alaskan gas will be the first gas moved. If this is true, the pipeline debate can be seen as a two-stage process. In this first stage, a choice must be made between moving Alaska gas alone (via ANGTS) and moving Alaska gas in conjunction with Mackenzie Delta gas (via one of the Mackenzie Valley North Slope options.) If a Mackenzie Valley North Slope pipeline is constructed, this would mean that both Alaskan and Canadian gas sources are tapped, and there would be no further pipeline sequencing questions. However, if the ANGTS route is chosen, this would leave Mackenzie Delta gas untapped. Should interest in tapping this gas still exist, a second stage choice would need to be made between moving the Mackenzie Delta gas through either the Dempster Lateral (which would connect to ANGTS) or through the Mackenzie Valley Stand Alone route.

The second sequencing question concerns potential delays. Assuming that Alaskan gas is tapped first, the concerns surround the subsequent tapping of the Mackenzie Delta gas. The key question is, *would development of NWT natural gas be delayed indefinitely if the ANGTS route were built?* (For example, if the ANGTS route is built first, will either the Dempster Lateral or Mackenzie Valley Stand Alone be built at the same time, at a later time or not at all?) There are two different opinions regarding the timing of the routes and potential delay of Canadian gas. One perspective is that if ANGTS is built, given the market demand, it is unlikely that a delay would be indefinite, and more likely would be fairly short. A more pessimistic view is that the construction of ANGTS means that Mackenzie Delta gas will never be tapped. ANGTS represents a large incremental supply for the North American marketplace and could also negatively affect the price of natural gas.[3] For those who believe that tapping the Mackenzie Delta is vital to northern economic development, this scenario is seen as very detrimental to the future of Canada's North.

This brings to the fore the third sequencing question: *is the development of a Canadian pipeline necessarily linked to the export of American natural gas?* One of the advantages of moving Alaskan gas through the NWT is that due to the larger volume, Canadian gas could be moved at a lower cost and create higher revenues for producers.

When considering all three sequencing questions, it is important to remember that natural gas producers have a large role to play in these decisions. While producers will not follow a non-economic route, political factors will also play an important role in the debate. The role of public policy in infrastructure projects such as pipeline construction is not as clear as it was during the 1970s. We currently operate under a deregulated energy system and the role of governments in driving that system has been reduced. Nonetheless, although governments cannot make pipeline routing decisions, they are in the position to remove potential barriers for producers and create incentives. The Government of Canada has the ability to influence decisions if it wishes to pursue a strategy to encourage development of Canadian natural gas.

Clearly there is a great deal to be considered when examining the stages of decision making and weighing the various route options. As noted at the outset of this report, CWF is not in a position to endorse any of the route options presented. However, key public policy questions that should be addressed prior to the construction of a northern pipeline are outlined in the next section.

OUTSTANDING PUBLIC POLICY QUESTIONS

Although natural gas development will ultimately be driven by producer decisions, Canadian governments have an obligation to ensure that any pipeline development meets two objectives:

1. development should minimize any environmental, social, political, and economic damage; and
2. development should provide economic and social benefits to Canada and the Canadian North.

Minimizing harm can be met through regulatory conditions, but maximizing potential benefits will require more active engagement that is beyond the capacity of territorial governments acting alone. The Government of Canada has an important and indeed indispensable role to play with respect to training and infrastructure support, both physical and social. After all, it is the Government of Canada that will be the primary beneficiary of enhanced tax revenues stemming from pipeline development. It is the Government of Canada that is best positioned to ensure that development will not only reduce the financial dependency of the North but will also benefit all Canadians. The national implications of northern pipeline development are inescapable, as are the opportunities.

To meet these objectives, answers must be found to the following questions and used to inform decision making. Although these policy considerations have yet to be resolved, they should be clearly addressed by all relevant governments prior to the development of any natural gas pipeline route.

Economic Development

- What strategies are in place to ensure that pipeline development will result in a net benefit to the territory?
- Are policies in place to support the development of spin-off industries that will in turn create employment and economic diversification?
- Does one route have a stronger stimulus on the northern economy than other routes?
- How will economic gains be assured for the North?

Employment

- Have strategies been put into place to determine the availability of the workforce in the North?
  - Of this available workforce, how many are trained and educated for jobs directly related to natural gas development?
  - What strategies are in place to promote careers for northerners in the oil and gas sector?
  - Is a trained and skilled workforce, specific to pipelines, beneficial to the long-term goals of northern development?
- What strategies are in place to ensure that employment opportunities do not end when pipeline construction is finished?
- Taking all of the above policy questions into consideration, what strategies are in place to ensure Aboriginal participation?

Regulatory

- Have the potential benefits and drawbacks of a single regulatory process been explored?
- What guarantees are there to ensure that pipeline negotiations will not encounter unnecessary regulatory delays?

Stakeholders

- Do mechanisms exist to ascertain the strength of Aboriginal consensus and support for pipeline development?
- Are strategies in place to circumvent the potential complications of unsettled land claims in areas of possible pipeline development?
- What plans or processes exist to address agenda items such as reasonable consultation timelines and mediation plans?
- Are strategies in place that outline a clear plan for public consultation?
- What strategies have been put in place to communicate with the myriad of interest groups?

National and International Interest

- What strategies have been put in place to track national and international interest in pipeline development?
    - What plans and procedures have been identified to address problems that may occur due to outside interest?
- What long-term risk management strategies are in place to inform and educate the Canadian population and international community regarding the current and ongoing events associated with pipeline development?

Northern Environment

- What strategies are in place to promote non-renewable resource development so that it is in line with the goals of sustainable development?
- How do governments work with business interests in the North to ensure a balance between economic development and the preservation of the northern environment?
- What specific outcome measures will be used to determine an acceptable level of environmental impact?
    - How are these measures prioritized?
    - Is there a need to assess short-term and long-term impacts?
- How will Aboriginal groups and environmental groups be involved in the policy process?
    - How are their concerns mitigated?

Political Context

- What strategies have been put in place in the NWT to promote greater devolution from the Government of Canada in order to promote local control and improve the quality of development decisions?

CONCLUDING REMARKS

The growing demand for natural gas and the subsequent need to move this gas from supplies in the North has placed northern gas pipelines on the policy agenda. As this report indicates, the construction of a pipeline creates complex issues.

There are many factors to consider when discussing where and when a pipeline should be built. Although a producer driven decision, the public policy concerns span a number of governments in the NWT, Yukon, Alaska, Canada and the United States. The merits of the various route options presented in this report must be weighed against the policy objectives of minimizing damage and maximizing benefits. Factors to be examined in greater detail include the environmental repercussions of each of the proposed routes, implications for Aboriginal groups, and the suitability for long-term development of Canadian natural gas. All of these factors should be considered in ongoing debates.

Although we live in an era of deregulated natural gas markets, there is still an important role for public policy when it relates to the construction of pipelines to move Arctic gas to southern markets. This role stems from the important impact that pipeline financing, construction and operations will have on northern development. We cannot detach the consideration of route options from a broader discussion of the economic future of Canada's northern territories. If we do not begin the public policy debate immediately, and consider carefully the appropriate roles to be played by the various governments, an important opportunity will have been lost. Northern Canadians, and all Canadians, cannot take this risk.

Endnotes

[1] The following headlines were taken from the Calgary Herald: "Pipeline giants form alliance to bring gas from the far north," (June 3, 2000, C2) "Arctic looks for pipeline partners," (June 14, 2000, D2) and "N.W.T. premier expects pipeline within 10 years" (April 11, 2000, D2). "Gas demand could spark two pipelines" is from the Globe and Mail (June 7, 2000, B2). Increasing coverage of northern pipelines occurred in June 2000 in the Calgary Herald and Globe and Mail due to the coverage of the World Petroleum Congress being held in Calgary and a broader interest in the oil and gas industry.

[2] The term settlement region refers to the total area claimed by an Aboriginal group. Settlement lands are specific parcels of land negotiated in a final land claim agreement either within or outside of the settlement region.

[3] There is some debate over whether the market can absorb a major gas increase in the short-term. Conversely, any northern pipeline remains several years away from operation and conventional gas supplies will continue on a flat or declining rate. The high projected market growth will necessitate gas from the frontier. CERI indicates that northern gas will be needed in the future and that prices are sufficient for profitable development of the resource.

[4] CERI calculated tolls for each of the routes based on projected volume of gas, an 85% capacity, and a standard cost of service tolling approach. To generate netback prices for Mackenzie Delta gas for each route option, CERI used the transport costs, projected intra-Alberta transport costs of $0.35/gj, and an assumed AECO-C price of $3.50 per gj.

[5] CERI's case studies are based on multiple assumptions. For instance, the same price is used for all scenarios at $3.15/gj Cdn., development costs are grossed up estimates of costs in the 1989 Gas Export applications, and downstream pipeline transportation was assumed to be sufficient to handle throughput. For a fuller explanation of the model and its underlying assumptions see CERI, 2000.

[6] In Canada, there are four areas that can combine to fill the need for natural gas: conventional WCSB production, coalbed methane, Eastern Canada Offshore projects, and Northern gas. However, doubt has been placed on the ability of the WCSB basin to fulfill requirements; coalbed methane is relatively undeveloped; and expectations for Eastern Canada Offshore projects are modest.

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