Assessing the Mackenzie Gas Project's Contribution to Sustainability

Why Wise Use Matters

Jaisel Vadgama

Matt Gray

September 2007

Prepared for the Sierra Club of Canada for Submission to the Joint Review Panel for the Mackenzie Gas Project

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1st Edition, published September 2007
Printed in Canada

Editor: Matthew Gray
Layout: Matthew Gray

The Pembina Institute
Box 7558
Drayton Valley, Alberta T7A 1S7 Canada
Phone: 780-542-6272
E-mail: info@pembina.org

Additional copies of this publication may be downloaded from our website, http://www.pembina.org.

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About the Authors

Jaisel Vadgama, MA

Jaisel is a Policy Analyst and Senior Assistant to the Executive Director of the Pembina Institute. He first worked with Pembina in 2002-2003 as an analyst, investigating life cycle impacts of different electricity generation options and supporting community energy planning. He has since worked on sustainable development policy for Natural Resources Canada, on urban water and sanitation issues for an NGO in Senegal, and as a project evaluator in Southern Madagascar. He rejoined the Pembina Institute in 2006. Jaisel holds bachelor's degrees in Chemical Engineering and in Urban Studies and Planning from MIT, and a master's degree in Anthropology from the University of Sussex.

Matt Gray, MA

Matt is the Arctic Program Coordinator for the Pembina Institute's Energy Watch Program. Matt's work with the Arctic Program includes helping to transition communities, industry and government to sustainable energy; minimizing the negative impacts of energy development; and providing insight on practical measures and policy alternatives to fight climate change. Matt recently completed his Master's thesis on Aboriginal consultation and the Mackenzie Gas Project. A central concern in his work has been the enfranchisement of Aboriginal peoples in the regulatory review of the proposed pipeline.

Acknowledgements

The authors would like to acknowledge Steve Kennett for providing comments on previous drafts of the report.

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Why Wise Use Matters

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1. Introduction

The emergence of concerns about sustainability follows from a growing realization that development – the way in which we strive to improve our quality of life – often has serious unintended consequences, for present and future generations.

Although sustainability is a "slippery" term for practitioners and academics,[1] it can be understood as a proactive response of intellect and conscience in the face of uncertain and complex decisions that fully involve environment, economy and society. Sustainability assessments help us to systematically and thoughtfully orient individual projects and actions in order to satisfy broader, notional sustainability criteria in concrete ways.

The authors of this report warmly applaud the Joint Review Panel for setting itself the high standard of conducting a sustainability assessment, and of using "sustainability as an important framework to evaluate the evidence and argument on the issues and the questions that are before it."[2] As outlined in the next section of this paper, we believe that this direction, and other aspects of the Panel's terms of reference, mean that it is within the Panel's mandate to evaluate whether the Mackenzie Gas Project (MGP), as a whole, makes a *positive contribution to sustainability* – and to use this determination as the overarching context for its conclusions and recommendations.

As such, we concentrate the bulk our analysis on the MGP's potential for positive contributions to sustainability – and focus in particular on contributions to *sustainable energy systems*. As we show in the third section of the report, achieving reduced-impact means of producing and using energy is an urgent sustainability imperative, given our need to reduce greenhouse gas emissions quickly and dramatically, in order to avoid dangerous climate change. The fossil fuel dependence of today's energy systems is the most important contributor to escalating greenhouse gas emissions, and must be curtailed as part of a transition towards low-impact energy.

In the fourth section of this report, we argue that producing gas from the Mackenzie Valley can – despite its being a non-renewable fossil fuel – help to facilitate this transition towards sustainable energy systems under the right conditions. In part, this is because gas is a versatile fuel that can displace dirtier fossil fuels in those parts of the energy economy where low-impact alternatives are least practical in the short term. It is also because the MGP will be a significant node in Canada's energy network and will have an influence on the development of related and associated energy systems in the North and across Canada. For instance, in 2015, the MGP will be associated with 7-8% of Canada's total gas production, and over 90% of the Territories' total energy production.[3]

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[1] Gibson (2006) writes: "Of all the notions, buzzwords and catchphrases circulating in the academic and policy worlds, sustainability may be the most slippery. Researchers have devoted years pursuing the Holy Grail of the robust definition, with diverse and often conflicting results. Hundreds of definitions have been proposed and thousands of variations have been applied in practical initiatives" Gibson, R. et. al (2006). Sustainability Assessment: Criteria, processes and Applications. Sterling: EarthScan. (p. 39).

[2] Joint Review Panel Determination on Sufficiency. 18 July 2005. pp. 5. Retrieved August 11 from http://www.ngps.nt.ca/Upload/Joint%20Review%20Panel/050718_Determination_on_Sufficiency.pdf

[3] Figures derived from two sources: National Energy Board's "Consultation Sessions: Commodities," Retrieved August 17, 2007, from http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/cnslttnrnd1/cnslttnsssn02-

The right conditions, we argue, would be wise reinvestment of resource revenues generated from nonrenewable resource development and wise end use of the gas that is produced. However, we find that there are insufficient means to direct Mackenzie gas towards the end uses that will reinforce sustainable energy systems, and away from those that entrench current practice. We suggest that until these means are available, gas from the Mackenzie Valley will likely be used in ways that *hinder* the transition to sustainability, and thus should not be produced at present. The full potential of this resource – both for wealth creation and transformation of energy systems – may be much better realised in the future.

In our recommendations to the Panel, we focus on the policy options that might help to guarantee wise end use; these policy might be considered as a "test" for future decisions on developing the Mackenzie resource. However, it is important to clarify that we consider these as necessary, but not sufficient tests for the overall sustainability and appropriateness of the project. Many other factors which we are unable to discuss here – from cumulative impacts, to the question of First Nations empowerment and involvement in decision-making – will also need to be addressed in creative and significant ways.

eng.html; and "Environmental Impact Statement for the Mackenzie Gas Project," Retrieved August 3, 2007, from http://www.ngps.nt.ca/registryDetail_e.asp?CategoryID=51

2. The test of “contribution to sustainability”

As the Panel and observers of the regulatory process know well, making decisions about such a significant project is a complex endeavour. In fact, the MGP’s environmental impact review may be the greatest challenge ever faced by a Canadian Panel of this kind. In part, this is due to the high standards that the Panel has set for itself.

In order to focus the scope and direction of its work on sustainability, the Panel has both adopted existing precedents and solicited the help of specialist advisors to develop unique guidelines. These are described in a number of documents, including the *Agreement for an Environmental Impact Review of the Mackenzie Gas Project, Determination on Sufficiency, Guidance Document on Hearings (Revised July 13, 2007)*, and the *Environmental Impact Assessment Terms of Reference for the Mackenzie Gas Project.*

Notably, the Panel has formally declared that it will:

> *... evaluate the specific and **overall sustainability effects** of the proposed project and whether the proposed project will bring lasting net gains and whether the trade-offs made to ensure these gains are acceptable in the circumstances.*[4]

A bold statement of regulators’ commitment to sustainability is also found in the JRP agreement itself. This agreement compels the Panel, in its review of the MGP, to protect the well being of citizens and the environment:

> *The Environmental Impact Review shall have regard to the protection of the environment from the significant adverse impacts of proposed developments, and to the protection of the existing and future social, cultural and economic well-being*[5] *of residents and communities.*[6]

The following aspects of *The Guidance Document for Hearings (Revised July 13, 2007)* are of particular salience to the analysis in this report. The Panel is asked to consider, “trade-offs among anticipated gains and losses” and “government preparedness and plans to achieve existing sustainable development policy commitments through the proposed MGP.”[7] In addition, the document requires the Panel to consider:

> *Is the Project and the gas it will transport needed more now (taking into to account the probable effect of the project on other hydrocarbon activities in the Northwest Territories*

[4] ibid.

[5] Note that the authors, in keeping with sustainability literature, interpret the notion of ‘well being’ broadly; for the purposes of this report, well being extends to all Canadians and also to future generations.

[6] Agreement for an Environmental Impact Review of the Mackenzie Gas Project” retrieved August 22, 2007, from http://www.ngps.nt.ca/jrpa_final_e.htm

[7] *The Guidance Document for Hearings (Revised July 13, 2007, p. 36. Retrieved August 13,2007 from http://www.ngps.nt.ca/Upload/Joint%20Review%20Panel/070713_Guidance_Document_for_Hearings.pdf*

*and **the expected use** of the extracted and transported gas) than it might be in the future.*[8] *(authors’ emphasis)*

As the analysis in this report demonstrates, different scenarios of expected use generate very different sustainability results, notably with regard to greenhouse gas emissions and impact on climate change. This underscores the importance of considering probable effects of expected use as an aspect of evaluation.

Dr. Robert Gibson, Specialist Advisor to the Panel on sustainability, writes that sustainability assessments may also require a revision of terms, an expansion in scope, or a shift in focus in response to learning:

> *Progress toward sustainability requires broad expansion of understanding, involves public choices and relies on building mutually supportive, positive links among many activities. A sacrifice of public opportunities to learn and to choose, or a restriction of attention to possibilities outside the narrow boundaries of an individual undertaking, will compromise prospects for sustainability.*[9]

In this context, we invite Panel members to fully consider the role that the MGP will play in transitioning towards or away from a sustainable energy future. This will mean, in some cases, revisiting the question of costs, benefits and trade offs which have already been considered locally, and factoring in the dimension of end use, no matter where this takes place.

In addition, as we will argue later in the paper, the idea of end use is already a common extension of sustainability or stewardship thinking for other precious resources such as forests, water and land. It also flows from Dr. Gibson’s concept of “bridging” which is explored in the next section.

Taken together, the explicit direction in the Panel’s mandate, precedents in other resource domains and principles encouraging an unrestrictive engagement with sustainability provide a compelling case for considering end use. We hope that the panel will explicitly address the project’s impacts with respect to a sustainable energy future when evaluating the proposal and considering trade-offs.

Finally, we draw attention to the *Environmental Impact Assessment Terms of Reference for the Mackenzie Gas Project* which require the Panel to follow the “precautionary principle” when approaching uncertain aspects of the project. Section 12.9, “Application of the Precautionary Principle,” advises the Panel that “a precautionary approach may be relevant in circumstances where it is identified that a Project activity could cause serious or irreversible adverse impact on the environment and the cause and effect relationships cannot be clearly established.”[10]

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[8] *The Guidance Document for Hearings (Revised July 13, 2007, p. 36. Retrieved August 13,2007 from http://www.ngps.nt.ca/Upload/Joint%20Review%20Panel/070713_Guidance_Document_for_Hearings.pdf*

[9] Gibson, R. et. al (2006). Sustainability Assessment: Criteria, processes and Applications. Sterling: EarthScan. (p. 126)

[10] Environmental Impact Statement Terms of Reference for the Mackenzie Gas Project, pp. 39. Also see section 5.5 Precautionary Approach. “Identify elements of the EIS where the application of a precautionary approach may be warranted. For those circumstances, discuss whether the potential serious or irreversible adverse impact to the environment related to the Project can be avoided. Where potential adverse impacts cannot be avoided, describe ways to reduce the risk to the environment, including a discussion of Project design and available technology with respect to effectiveness and cost.” Retrieved August 16, 2007, from http://www.ngps.nt.ca/documents/tor_final_e.pdf

Our analysis suggests that the precautionary principle may be particularly appropriate when considering wise use of gas – as the conditions that could ensure appropriate use are not in place and contributions with regard to sustainable energy cannot be established.

3. “Bridging” and the Imperative of a Sustainable Energy Future

3.1 The Mackenzie Gas Project’s Potential to Act as a Bridge

Dr. Robert Gibson, in his report to the Joint Review Panel[11], introduces the concept of “bridging” as one way of specifically operationalising sustainable development. The idea proves particularly useful for thinking about the sustainability of a non-renewable resource project.

Taken in isolation, this kind of project is unsustainable by definition. Tapping finite reserves of natural gas satisfies some of the needs of present generations, but as the resource is depleted, it is clear that future generations’ ability to meet their needs in the same way is compromised.

Gibson, however, argues that non-renewable resource developments can lead to a more sustainable set of circumstances, provided we extend the scope of our sustainability assessment to consider where projects will lead. In the context of economic sustainability, Gibson suggests that non-renewable resource developments “can make a contribution to sustainability only if the limited period of economic viability serves as a bridge to a more lasting economic base.”[12]

The same holds true for other aspects of sustainability – whether environmental or social or seen from the perspective of energy. In other words, the MGP can make a contribution to sustainability if the limited period of energy production serves a bridge to a more lasting, lower-impact system of energy supply.

The importance of sustainable energy arises because we increasingly understand that the ways in which we currently meet our energy needs have direct – and often dire – consequences for people living now and in the future. Change means minimizing negative impacts to life and livelihoods, but also encouraging energy systems with complementary benefits such as local autonomy and self-sufficiency through the use of distributed power.

The urgency of reducing energy-related impacts is particularly acute with regard to climate change, which is largely due to a reliance on fossil fuels for meeting energy needs. A growing chorus of opinion leaders outside of the scientific community (including Canadian business leaders and politicians) are joining climate scientists in declaring climate change to be the most significant challenge of our time.

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[11] Sustainability-based assessment criteria and associated frameworks for evaluation and decisions: theory, practice and implications for the Mackenzie Gas Project review, Jan 26, 2006, with amended appendix dated Feb 22, 2006

[12] Gibson, R. et. al (2006). Sustainability Assessment: Criteria, processes and Applications. Sterling: EarthScan. (p. 3)

Intergovernmental and governmental documents such as the Stern Review are also unequivocal: "The scientific evidence is now overwhelming: climate change presents very serious global risks, and it demands an urgent global response."[13]

Peer-reviewed scientific work suggests that severe impacts to ecosystems and human livelihoods can only be avoided if global average temperature rises are kept to within 2 degrees Celsius of pre-industrial levels. Bramley (2005) advises that:

> *Detailed trajectories of annual emissions over time...suggest that to stabilize the atmospheric GHG concentration at 440 ppmv CO_2e, global emissions must be limited to no more than about 15% below the 1990 level by 2020 and fall to at least 30-50% below the 1990 level by 2050.*[14]

In accordance with equity principles, such as polluter-pays, historical responsibility and ability-to-pay, this translates into more stringent targets for industrialised countries such as Canada – with reductions to at least 85-90% below 1990 levels necessary 2050.[15] In other words, climate sustainability requires a dramatic transformation towards sustainable energy systems with greatly reduced greenhouse gas emissions, over the course of about forty years.

The North is particularly sensitive to the impacts of climate change.

There are other quality of life drivers for a shift away from fossil fuels, including local and regional air pollution; related health problems such as respiratory diseases (e.g. asthma and chronic obstructive pulmonary disease), cardiovascular disease, allergies and even neurological effects; and land impacts (e.g. linear disturbances from oil and gas exploration and oil sands developments). Added to these reasons, there is a pressing need to maximise efficiency for reasons of equity and conservation.

Historically, traditional energy development has also exacerbated existing disparities, not only across generations, but also within generations, with some populations extracting maximum benefit and others shouldering the burden of impacts. In Canada, these include the displacement of Aboriginal peoples from lands flooded by hydro-electric projects (e.g. James Bay) and social problems often fed by boom-and-bust cycles that accompany non-renewable resource extraction. One participant testifying in the JRP hearings, for example, describes how his community's short term benefits derived from the Enbridge pipeline (officially known as the Norman Wells Pipeline Expansion Project) have run out, yet the pipeline continues to transport oil for Imperial:

> *This last pipeline went through. It don't seem like it help anybody; for me, anyways. Me, I work a little bit on there, too. I did some slashing, I did some seeding; that's about it. Right now, it is still right behind our town. Nobody is working on there. It is still hauling fuel, oil. Nobody is making money right now*[16,17]

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[13] Stern, N. (2006). The economics of climate change, p. i. Retrieved August 22, 2007, from http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

[14] Bramley, M. (2005). The case for deep reductions: Canada's role in preventing dangerous climate change, p. 3.

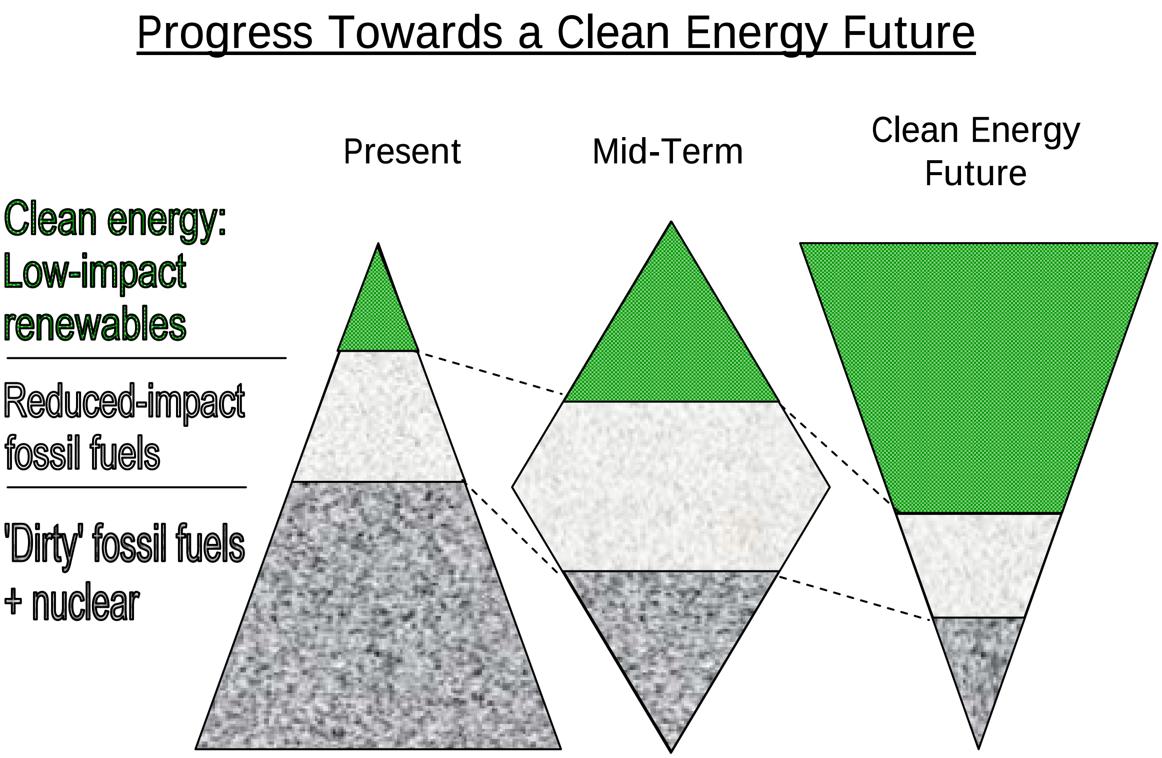
[15] Bramley, M. (2005). The case for deep reductions: Canada's role in preventing dangerous climate change, p. 3.

[16] Joint Review Panel for the Mackenzie Gas Project -- Public Hearing 2006, p. 1790

[17] Asch (2004) comments that "approval was given, although it was agreed that the Native people would bear the highest cost and gain the fewest benefits; in a period of high oil prices and economic recession, it was seen to be in

None of these impacts can be eliminated overnight. Instead, the transition away from high-impact energy systems will occur through a gradual conversion of systems and infrastructures. Taking sustainability seriously implies that significant and influential projects such as the MGP should be required to play this “bridging” role – by creating conditions for ever more sustainable projects to follow in their stead.

The authors envision one of the main features of the transition to sustainable energy as being a move away from high impact fossil fuels and towards minimal-impact renewable sources. The diagram below shows this shift, with the proportion of low-impact renewable energies increasing as the share of dirty fossil fuels declines.



In the transition phase, reduced-impact fossil fuels like gas will have a particularly crucial bridging role to play. In part, this is because natural gas is clean burning (it generates fewer air pollutants than other fuels), and also because natural gas has a lower greenhouse gas emissions intensity than oil or coal. For example, generating one megawatt-hour of electricity using gas (in a combined cycle operation) will produce roughly half the life-cycle emissions of one megawatt-hour generated from coal.[18]

the national interest” from The Slavey Indians: The relevance of Ethnohistory to development. In R. B. Morrison & C. R. Wilson (Eds.), *Native peoples: The Canadian experience* (3rd ed., pp. 178-197). Toronto: Oxford University Press, p. 193.

[18] The exact comparison will depend on the quality of coal, the combustion technology used, and specifics of upstream operations. Some representative emissions figures, calculated for generation scenarios in Manitoba are: coal (standard technology) – 1.1 t/MWh; coal (integrated gasification combined cycle) – 0.96 t/MWh; natural gas (simple cycle) – 0.84 t/MWh; natural gas (combined cycle) – 0.51 t/MWh. Source: *Life Cycle Evaluation of GHG Emissions and Land Change Related to Selected Power Generation Options in Manitoba*. Pembina Institute, 2003.

Gas is also valuable in transitioning because it is a relatively versatile fuel – with easy application to several different sectors. Currently, the main consumers of gas in Canada are the residential and commercial heating sectors (about 40% of total demand), the industrial heating and chemical sectors (about 35% of total demand), electricity generation (about 10% of total demand), and transportation (about 15% of total demand).[19]

In each of these sectors – heating, electricity generation, chemical manufacture and transportation – gas can replace dirtier fossil fuels, and in turn be replaced by fossil fuel-free alternatives. This creates scope to develop a detailed hierarchy of fuel uses by sector (based on a full sustainability assessment), and dynamically direct gas to those sectors where the sustainability returns are greatest.

In practice, given the urgency of the climate change imperative, sustainability returns and bridging to sustainable futures will often be measured in terms of emissions intensity. On that basis, it is possible to map out a rough hierarchy to give a sense of the role that gas can play in each of the sectors described above. (It is beyond the scope of this paper to investigate these rankings in more detail).

Electricity Generation – A Schematic Hierarchy of Supply Options	
Least sustainable System	— Coal-fired electricity (approx. 1.1 t/Mwh CO_2e)
↓	— Natural gas combined cycle (approx 0.5 t/MWh CO_2e)
	— Natural gas simple cycle coupled with wind power (approx 0.4 t/Mwh CO_2e) or — Clean coal technology (approx 0.1 – 0.2 t/Mwh CO_2e after capture and storage)
Most sustainable system	— Wind power coupled with battery technologies, solar and other low-impact options (approx 0.1 t/MWh CO_2e)

Space Heating – A Schematic Hierarchy of Supply Options	
Least sustainable System	— Oil or other liquid fuels — Fossil fuel-generated electricity
↓	— Natural gas furnace
	— High efficiency natural gas furnace
	— Substantial building energy efficiency measures, solar hot water and/or shallow geothermal heating with some

[19] NRCan. (2006). "Canadian Natural Gas: Market Fact Sheet," p. 4. Retrieved August 12, 2007, from http://www2.nrcan.gc.ca/es/erb/CMFiles/Market_Fact_Sheet209NII-06032006-6190.pdf

	natural gas for residual requirements
Most sustainable system	— Net zero buildings not requiring fossil fuel combustion

Transportation – A Schematic Hierarchy of Supply Options	
Least sustainable System	— Liquid fuels with high upstream emissions intensities (e.g. from oil sands)
	— Liquid fuels
	— Natural gas
	— Next generation biofuels (cellulosic ethanol)
	— Substantial vehicle efficiency (including hybrid technology) with limited fuel use
Most sustainable system	— Urban and regional planning that reduces transportation needs, along with substantial vehicle efficiency and limited fuel use

These examples are merely illustrative, in order to show the transitional role that gas can play in replacing dirtier fossil fuels as low-impact alternative technologies become increasingly feasible.

For instance, whereas low-impact technologies for space heating and electricity are relatively well advanced, the options for transportation are farther from implementation. Notionally, this might suggest that dirtier fossil fuels can be replaced more directly by low-impact alternatives for heating and electricity while gas is best used, transitionally, in transportation.

Before drawing any definitive conclusions, life-cycle analysis of much greater depth would be required, and several other technology options would need to be considered. The key principle, however, is that there are certain sectors or end uses where natural gas may currently be the best available fuel, *and the wisest choice*. As the bottlenecks shift, these will fade, and others will emerge.

4. Bridging in Practice

Up to this point, our discussion has focused on the precious versatility of gas in general and its particularly suitability as a transition fuel that can be applied to a wide range of wise uses, which may change over time. However, the MGP and Mackenzie Valley gas, when situated within the particular energy contexts of Canada and the North, also have a number of more specific bridging opportunities.

There are at least three major ways in which a seminal energy project such as the MGP can contribute to the foundations for future energy development, and thus, promote or hinder a shift towards sustainable energy systems.

First, there is the creation of new infrastructure. What further development does this help (or hinder)? Second is the reinvestment of revenues generated by the project. Will royalties, for example, be invested in low-impact energy infrastructure? Third is the use of the energy produced by the project. What new infrastructure construction, production or service provision does the gas literally power?

The question of infrastructure raises the issue of induced development, which has already been considered extensively at the hearing on cumulative effects. These considerations are beyond the scope of this paper and will not be pursued here.

The question of reinvestment provides an impressive arena of opportunity given that many elements of an ideal, maximised sustainable energy system have relatively high up-front costs, but very low or negative operating costs. For example, energy efficiency retrofits may require substantial initial capital investment, but then generate energy cost savings indefinitely. Similar circumstances hold true for low-impact electricity and other energy sources such as wind and solar. As such, this kind of investment is well suited to a boom project like the MGP that will generate immediate financial benefits but will likely fail to sustain them. Gibson’s (2006) comment on the boom of natural resource extraction projects is a common concern, especially among Northerners:

> *Often the boom is closely followed by a bust, and the lasting local effects – economic, social, and ecological – are largely negative. This has frequently been accepted as the nature of the industry, though busts usually inspire some last ditch efforts by local residents and relevant governments to encourage further exploration in hopes of life extending discoveries, or to attract some other employer to the area.* [20]

The JRP has already heard this concern among community members. During the hearings, some asserted that the pipeline threatens social stability because in the past, oil and gas work was a boom and bust industry:

[20] Gibson, R. et. al (2006). Sustainability Assessment: Criteria, processes and Applications. Sterling: EarthScan. (p. 2)

> *We had a boom and a bust -- a boom and a bust, and I saw it. I saw -- I saw what it was to live with all your brothers that's working, going out, coming back, having all this money, and then all of a sudden, everything slowed down and nothing comes out of it.*[21]

This commonly shared experience underlies a concern that something similar will happen in the future. In addition, Kassam, characterizes Northern development as Staples development[22], where the North is looked upon to supply resources such as energy to feed Southern and often foreign consumption. He describes the disruption that boom and bust effects, caused by "instabilities due to variations in international market prices and variability in supplies,"[23] bring to Northern communities:

> *In each instance, the promise of Staples development is replaced by the reality of the impacts on families and individuals. Communities are left with very few resources and many broken individuals in the wake of unstable staples development. Demand for Staples production is controlled from outside the region where most of the benefits accrue. Whether it's the fur industry, oil and gas development, or mining, the results are much the same. The common thread is that the impact of development is short-lived with considerable social costs. Communities are left weakened by the boom and bust cycles of staples exploitation.*[24]

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[21] Joint Review Panel for the Mackenzie Gas Project, 2006, p. 287)

[22] Staples theory posits that the political development of Canada was formed by its role as natural resource hinterland serving the benefit of Europe and its trading partners. The trend extends to the political development of the North. Kassam (2001) writes that Innis's staples thesis "is particularly relevant in understanding the persistence of the view of the three territories [of the Canadian North] as a frontier" (p. 440). The Canadian Government historically supports this staples enterprise by sinking vast sums of money into infrastructure to support large-scale resource extraction projects funded by foreign capital. Resources are withdrawn and processed outside of Canada, leaving the government with only royalties collected on extraction, and none of the value added from processing activities. In this sense, the policy of staples development is held to be short-sighted.

A further problem with the policy is the manner in which large-scale resource development projects impose themselves on a region. This imposition creates a major problem. Large developments suck resources away from other parts of a regional economy. Economic activity comes to revolve around the development of a specific resource. But extreme variances characterize commodity markets, and a region's reliance on a single resource extraction industry leaves it susceptible to boom and bust cycles. The social consequences of these cycles leave regional communities devastated. As Kassam (2000) points, staples development removes economic control from local or even national authorities (p. 440).

This condition characterises the history of northern development. The Fur trade, mining, and oil and gas activity involved foreign owned companies extracting Canadian resources as it suited them, with the support of government. In the current pipeline proposal, the situation is hardly different, despite some developments that might suggest otherwise. After all, many land claims have been settled, and aboriginals have been offered an opportunity for pipeline ownership. These circumstances seem to have increased aboriginal control, especially in the case of their presence on co-management boards which help regulate natural resource development (a result of land claims settlements). However, Aboriginals and government still remain subject to foreign terms for the development of the North's resources. It is astonishing to consider that despite the extraordinary mobilization of tax dollars to support the review of this project, the government has secured no legally binding commitment from the Producers to actually build the pipeline if it is approved.

[23] Kassam, K. (2001). North of sixty: homeland or frontier. In D. Taras and B. Rasporich (Eds.) *A passion for Identity*: Canadian Studies for the 21st century (4th Ed). Scarborough: Nelson Thomson Learning. (p. 442).

[24] Kassam, K. (2001). North of sixty: homeland or frontier. In D. Taras and B. Rasporich (Eds.) *A passion for Identity*: Canadian Studies for the 21st century (4th Ed). Scarborough: Nelson Thomson Learning. (p. 443).

In this context, investing resource revenues in local, community-based energy projects may provide bridges to sustained economic opportunities, as well as dramatically reducing energy-related environmental impacts, and notably greenhouse gas emissions.

Existing electricity systems in the North are relatively inefficient, given that diesel is flown in at great cost and great emissions intensity to operate generators. However, many off-grid communities have access to excellent wind or run-of-river hydro resources, which have already been characterised. The key barrier is cost, which could be overcome through investment of resource royalties.

The text box below provides a case of the kind of energy systems that have been developed in off-grid Alaskan communities and equivalent opportunities in Canada's North.

Northern Communities moving toward a sustainable energy future

Several communities in Alaska have adopted wind energy technologies to harness a renewable resource in high supply. Currently, the total installed wind energy capacity in the state has risen to almost 2 MW since 1997. Kotzebue generates one megawatt of wind power using 17 wind turbines. The community's goal, however, is to reach 2-4 MW, or 'high-penetration' wind levels – enough wind capacity to be able to shut off diesel generators for extended periods of time. In 1999, St. Paul's Island began pursuing high penetration using a single 225 kW turbine that also provides additional heating to the local school. Similarly, in 2002, Wales installed two wind turbines totalling 100 kW of wind power, also in a high-penetration configuration. Finally, Selawik installed wind energy to their remote grid in 2004 adding 150 kW of capacity. As recently as this summer (2007), Toksook Bay and Kasigluk have begun installing 400 kW and 300 kW high penetration systems respectively.

In Canada, six wind turbines (65 kW each) were installed in the remote fishing village of Ramea on the south shore of Newfoundland in 2003. These turbines have been operational ever since, demonstrating that this technology can also work in the Canada. At least 8 communities in the Canadian Arctic are currently monitoring their wind resources with the hopes of developing wind energy projects. The community of Tuktoyaktuk, NWT, is hosting a conference in November of this year in order to help foster this development. In addition to wind energy, many communities in the Canadian Arctic have also participated in community energy planning processes in order to reduce their local financial and environmental costs from energy consumption. Examples of this planning in the Yukon include Old Crow's plan for a district heating system and in the Northwest Territories, a small-hydro project in the community of Wha Ti. However, without financial investment, capital and operating costs continue to be difficult barriers for these and other remote communities to overcome.

As a prerequisite to effective investment, the North requires a royalty regime which captures maximum value for the resource owners – the citizens of the NWT. There are several salient case studies of royalty governance, including Alberta, Alaska and Norway, that could be examined for best (and worst) practice.

For example, Alberta set oil sands royalties at a low rate in order to encourage new investment in the 1990s, when the goal was to reach a production rate of 1 billion barrels per day by 2020.[25] That benchmark was passed 16 years early, in 2004, leaving Albertans with a royalty system that favours resource developers unnecessarily. Recent modelling work shows that citizens are capturing only 47% of the available resource rents.[26] In fact, they could be capturing 70% while still maintaining an attractive return on investment for companies. Alberta's current endowment is less than $40 billion.[27]

By contrast, Norway manages to capture 78% of its resource revenues and has accumulated a fund of over $300 billion over a period of fifteen years, through sound investment and a commitment to achieving maximum revenue for its citizens.[28]

In the North, resource revenues could be used to support renewable energy development through direct investment, or through indirect mechanisms such as feed-in tariffs.

<u>The question of end use</u> also offers important opportunities for bridging.

The first consideration, noted as part of the transition discussion, is that natural gas is a relatively clean-burning, low emissions-intensity fuel. There are some areas where fossil fuels can be replaced quickly and dramatically (for instance in the electricity generation sector, where wind, solar and micro-hydro alternatives are highly viable). For others, where technologies are not as readily available (transportation), natural gas may often be the most effective alternative until technology advancements are made.

If an effort is made to reduce emissions as quickly as possible, this would involve maximum deployment of low-impact renewables and efficiency and conservation measures, as well as a shifting of natural gas to "best uses", where its attributes are most needed.

By contrast, using natural gas to produce dirty fuel from the oil sands is a "waste" of this fuel. Whereas it is difficult to say whether MGP gas molecules would actually end up in the oil sands, there is no question that oil sands expansions are one of the major factors in Canada's growing natural gas demand, which the MGP is being proposed to meet. In addition, the geographic proximity and resulting reductions in transport costs certainly make it more likely to end up there.

The graph below suggests that even under the peak production scenarios anticipated under the MGP Environmental Impact Statement, the project will never be able to supply an amount that is greater than 40% of the gas demand projected for the oil sands.

Between 2000 and 2020, Alberta Energy Utilities Board projections suggest that oil sands gas use will increase from 0.8 Bcf/d to 5.2 Bcf/d, while MGP supply will reach no more than 1.9 Bcf/d under a maximum supply scenario.[29] Given NEB projections for an overall decrease in

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[25] Taylor, A. (2007). Reform Solutions: Delivering a Fair Share of Oil Sands Revenues to Albertans and Resource Developers. pp. 1-2.

[26] Ibid.

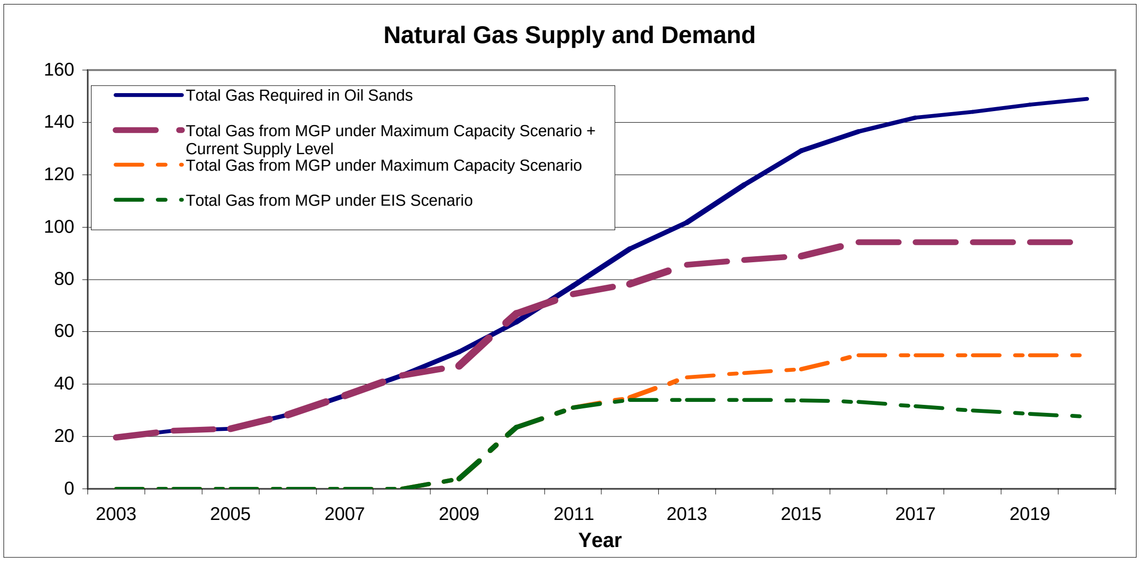
[27] Ibid.

[28] Ibid.

[29] Jameson, A. (2006). Life cycle greenhouse gas emissions from various natural gas end uses for the Mackenzie Gas Project. The Pembina Institute (unpublished), p. 25.

Canadian production from 17.1 Bcf/d to 13.4 Bcf/d over the same period, oil sands' consumption share of the total amount of gas produced in Canada will increase from 5% to 39%.[30]

Gas that flows the oil sands is used to produce bitumen which is in turn upgraded and refined to produce crude oil and eventually, petroleum products including transportation fuels. Driving one kilometre with fuel produced in this way is associated with 0.25 kg in carbon emissions. By contrast, if the gas were used to *directly* fuel a CNG vehicle, the emissions would be 48% less, about 0.13 kg CO_2e per kilometre. Effectively, by directing gas through the oil sands, our energy system regresses on the hierarchy of transportation fuels – and generates worse sustainability impacts.



In addition, every cubic foot of gas directed at the oil sands helps to facilitate production, encourage expansion and entrench infrastructure that will keep Canada producing some of the world's most emissions-intensive fuels for forty to fifty years. There's a risk that Mackenzie gas simply "feeds the beast" and allows the current energy systems to be maintained.

By contrast, as the hierarchy analysis indicated in the previous section, natural gas power generation is an effective counterpoint and complement to wind electricity, helping to smooth out the fluctuations in supply that arise from the variability of wind. Gas could be used to support wider deployment of wind – and get turbines built – effectively bridging until the arrival of better options, such as new battery technologies, which can store wind power and completely eliminate the inconveniences related to variability. Battery technologies are being pioneered in Ireland and other European countries and are a viable medium-term alternative. In this sense, gas can help to build tomorrow's infrastructure, rather than entrenching yesterday's technology.

Ultimately, this is a discussion about the wise use of natural gas – and about understanding that it is a precious resource which has tremendous value in the possibility of helping to bridge towards sustainable energy systems.

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[30] : National Energy Board's "Consultation Sessions: Commodities," p. 133. Retrieved August 17, 2007, from http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyftr/cnslttnrnd1/cnslttnsssn02-eng.html

We already treat other resources in a similar way.

For instance, most people would likely recognize that using timber from old-growth forest for pulp and paper is an inappropriate use. In the same way, we recognize that different kinds of land are valuable for different uses and need to be zoned accordingly.

Increasingly, we think about water in a similar way, especially as serious scarcity problems loom. Freshwater is already reserved largely for potable uses. We still use it for cleaning and for toilets, although there is growing recognition that this is inappropriate. And jurisdictions, in the US and elsewhere, are understanding the groundwater at slightly greater depths, with slight salinity, is a valuable commodity – that can be much more easily desalinised for human consumption in times of drought than fully brackish, deep water – and as such, should be conserved for those uses.[31]

Now, it's time to think about energy in a similar way. The more that we can find ways to allocate MGP gas to bridging uses which promote immediate emissions reductions and help to deploy low-impact and renewable energy infrastructures, the more of a contribution to sustainability this project will make.

[31] Griffiths, M. (2007). Protecting Water, Producing Gas: Minimizing the Impact of Coalbed Methane and Other Natural Gas Production on Alberta's Groundwater. pp. 98.

5. Recommendations

The authors' concern, however, is that there is currently no way of ensuring wise use. This means explicit risks to sustainability, such as the generation of greenhouse gas emissions in gas-powered oil sands, but it also means that it may make sense to leave the resource in the ground until a later date when we can be sure that it will make a positive contribution to building sustainable energy systems.

In this context, there are three opportunities that we see for realising some of the best use potential:

— First, a comprehensive national energy strategy (not unlike the water strategies or the forest strategies or the land use strategies that help us to consider best use and provide best use context for individual project decisions in each of those cases.)

— Second, a certain set of market conditions – like comprehensive carbon pricing – that signals that the overall market is moving in the direction of sustainable energy systems. In other words, conditions that give confidence that if MGP gas enters the pool, it will, on balance contribute to sustainable energy bridging (along with all the other gas in the pool...)

— Third, explicit requirements on the wise use of MGP gas.

Effectively, we conclude that until these conditions are in place, the panel has no basis to find that the project will make a contribution to sustainability. If the panel is serious about a test that requires major energy projects to play a bridging role to a sustainable future, it should recommend that this project not go ahead until these wise use conditions are in place.