

Needs For and Alternatives To

APPENDIX 14.1

Sustainable Development and Clean Energy

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Sustainable Development and Clean Energy

The terms of reference¹ for the NFAT review require consideration be given to the Manitoba principles of sustainable development, Manitoba's Clean Energy Strategy and *The Climate Change and Emissions Reduction Act*. The appendix is intended to address these requirements.

This appendix begins with an analysis of how the preferred plan compares with alternative development plans relative to the Manitoba principles and guidelines of sustainable development. The emphasis is on hydro-electric development and gas turbines, which are the dominant generation alternatives in the preferred and alternative development plans. The appendix then reviews the Clean Energy Strategy's preferences regarding the resources considered in Manitoba Hydro's preferred and alternative development plans: hydro-electric, gas, wind, imports, new transmission interconnections and demand side management (DSM). The appendix concludes with a short review of *The Climate Change and Emissions Reduction Act* as it relates to those resource options.

Manitoba Sustainable Development Principles and Guidelines

In 1998, the Province of Manitoba enacted *The Sustainable Development Act* to "create a framework through which sustainable development will be implemented in the provincial public sector and promoted in private industry and in society generally" (Government of Manitoba 1998). The principles and guidelines of sustainable development are appended to the act.

The following section presents each principle and guideline in the order in which they appear in the act. In some cases, in order to avoid extensive repetition, responses to some principles and guidelines may not repeat certain data or examples that are presented in other responses.

¹ Sections 1b and 2b of the terms of reference set out the specific requirements regarding the principles, strategy and act.

Therefore, readers are encouraged to review all of the principles and guidelines to gain a fuller appreciation of Manitoba Hydro's approach to sustainable development.

The analysis focuses on Manitoba Hydro's preferred development plan and 'alternatives to' the plan. The 'alternative means' by which a single project could be developed is a matter for review under *The Environment Act*; in the case of the Keeyask Generation Project, the Clean Environment Commission will hold hearings and provide a report and recommendations to the Minister of Conservation and Water Stewardship who will determine whether a licence will be issued.

The Principles

Integration of Environmental and Economic Decisions: *Economic decisions should adequately reflect environmental, human health and social effects. Environmental and health initiatives should adequately take into account economic, human health and social consequences.*

Manitoba Hydro applied a thorough, systematic process that integrates environmental and economic considerations in the selection of its Preferred Development Plan. To begin, the need for new resources was established by considering current load, load growth assumptions for domestic and firm export customers, DSM programs, and existing resources (**Chapter 4 – The Need for New Resources**). With the future requirements to serve domestic load and firm export commitments established, Manitoba Hydro screened 16 resource options against 15 characteristics divided into four conventional categories: technical, environmental, social and policy, and economic (**Chapter 7 – Screening of Manitoba Resource Options**). From this, eight options – DSM, Keeyask, Conawapa, wind, three types of gas turbines, and imports – were selected for further consideration. These resource options were 'mixed and matched' into a variety of development plans, each with the ability to meet expected domestic and firm export requirements. The process also considered various strategic business opportunities, such as the

possibility of developing a new transmission interconnection to incorporate opportunities to serve export customers (**Chapter 8 – Determination and Description of Development Plans**). The 15 plans were then comparatively evaluated against economic and financial criteria (Chapters 9 – 12), which included the costs to avoid and mitigate environmental and socio-economic effects. Through this systematic process, the plan with the Keeyask and Conawapa Generation Stations, North-South Transmission Upgrade Project and 750 (megawatt) MW Manitoba-Minnesota Transmission Project emerged as Manitoba Hydro’s Preferred Development Plan.

A multiple account benefit-cost analysis (MA-BCA) in **Chapter 13 – Integrated Comparisons of Development Plans**, extended Manitoba Hydro’s evaluation of the preferred and alternative development plans to take into consideration consequences for Manitobans that are not reflected in the revenues and expenditures facing Manitoba Hydro. The MA-BCA used a set of evaluation accounts to move from a Manitoba Hydro to broader Manitoba perspective. The objective was to provide a systematic, comprehensive assessment of all of the benefits and costs to Manitobans to address the question of overall socio-economic benefit.

Manitoba Hydro’s analysis of the preferred and alternative plans, including the MA-BCA, is contained in this NFAT submission. As well, the Keeyask Hydropower Limited Partnership has produced a comprehensive, multi-volume environmental impact statement based on technical sciences and Aboriginal traditional knowledge for the federal and provincial environmental review processes, which will include hearings and recommendations by the Clean Environment Commission.

The Public Utilities Board (PUB) is conducting a public process, which will include hearings, regarding the need for and alternatives to Manitoba Hydro’s development plan. The PUB will provide its findings and recommendations to the Minister of Innovation, Energy and Mines. Similarly, the Clean Environment Commission will provide its findings and recommendations

regarding the Keeyask Project's environmental and socio-economic effects to the Minister of Conservation and Water Stewardship. The Ministers and their colleagues in Cabinet (*i.e.* Governor in Council) will consider these reports and recommendations in determining whether to issue Orders in Council required by Manitoba Hydro before it may proceed with a major new project. In effect, the Government of Manitoba, elected by the citizens of Manitoba, is the final arbiter of the integration and accounting of economic, environmental, human health and social consequences.

***Stewardship:** The economy, the environment, human health and social well-being should be managed for the equal benefit of present and future generations. Manitobans are caretakers of the economy, the environment, human health and social well-being for the benefit of present and future generations. Today's decisions are to be balanced with tomorrow's effects.*

The Manitoba Clean Energy Strategy (Manitoba Innovation, Energy and Mines, 2012) notes:

“When Manitoba made the long-term, strategic decision to develop its own northern hydro-electric assets – rather than going for the quick fix of expanding the use of low cost, but imported and polluting coal – it faced potentially higher costs, as well as a series of risks that seemed, at the time, insurmountable...The benefits we enjoy today were built on these decades of hard work and innovation.”

Today, Manitoba Hydro is proposing a plan that – much like the past – benefits Manitobans today and in the future. The MA-BCA (**Chapter 13 – Integrated Comparisons of Development Plans**) noted the following among the benefits to Manitobans:

- The preferred plan offers customers the lowest rates over the long-term and the most reliable supply, with less interruption to supply due to extreme weather, forced outage and other contingencies.

- The preferred plan generates the largest amount of new revenues for government, benefitting all Manitoba taxpayers.
- The preferred plan generates the most amount of employment, particularly in northern Manitoba where alternative opportunities are more limited. These opportunities plus the training that has taken place and the commitments to local hiring and contract awards will generate significant benefits for northern Aboriginal and others, enhancing earnings, job and business experience and capabilities.
- The preferred plan generates the least amount of greenhouse gases (GHGs) in Manitoba and makes the greatest contribution to the reduction of global GHGs. Keeyask in its lifetime will produce less than 1% of the GHG produced by a combined-cycle gas turbine, and Conawapa even less – 0.5%.
- The preferred plan largely avoids local nitrogen oxide and other criteria air contaminant emissions associated with thermal power production.
- The projects in the preferred plan have been or will be designed to minimize adverse environmental and social impacts and ensure that compensation and other measures are undertaken to offset unavoidable residual effects. A lake sturgeon stocking program is expected to produce a sustainable population over the long- term.
- The development agreements for the major projects in the preferred plan will have the potential to provide significant benefits to project partners and other beneficiaries, serving to ensure the value of these major developments are shared by those most directly affected.
- The hydro-electric projects offer the potential for significant bequest values, with significant long-term benefits to future generations that may not be fully reflected in the calculation of the discounted present value of the assets remaining at the end of the planning period.

The Keeyask Cree Nations in their evaluation reports – in which they express their reservations and hopes regarding hydro-electric development – also speak to the importance of future

generations. Noted York Factory First Nation in the executive summary of the environmental impact statement:

“They [York Factory members] especially want to provide opportunities for their youth and future generations who will inherit the larger outcomes of the Project and the Partnership” (page 16).

Shared Responsibility and Understanding: Manitobans should acknowledge responsibility for sustaining the economy, the environment, human health and social well-being, with each being accountable for decisions and actions in a spirit of partnership and open cooperation. Manitobans share a common economic, physical and social environment. Manitobans should understand and respect differing economic and social views, values, traditions and aspirations. Manitobans should consider the aspirations, needs and views of the people of the various geographical regions and ethnic groups in Manitoba, including Aboriginal peoples, to facilitate equitable management of Manitoba's common resources.

The development plans with hydro-electric projects provide the greatest opportunities for engaging people with differing economic and social views, values, traditions and aspirations – in particular, the Cree along the lower Nelson River as well as Aboriginal people in northern Manitoba.

Through a process that began in the 1990s and expanded in the first decade of the new century, the four northern Keeyask Cree Nations (KCNs – Tataskweyak Cree Nation, War Lake First Nation, York Factory First Nation and Fox Lake First Nation) and Manitoba Hydro became partners in the Keeyask Project. The Joint Keeyask Development Agreement establishes key features of the Keeyask Project and the terms of the partnership, including governance, financing and management of the project. Among other matters, the agreement also addresses the KCNs’ potential income earnings, training, employment, business opportunities, and involvement in environmental and regulatory affairs. Through their involvement in the project, the KCNs are also able to develop and expand their local capacity in aspects such as business

development and management, employment skills and experience, and environmental assessment and monitoring, which could be passed on to future generations.

The local First Nations and Métis also took a leadership role in the Hydro Northern Training and Employment Initiative. The Partner First Nations, Manitoba Keewatinowi Okimakanak MKO and the Manitoba Métis Federation were partners with the federal and provincial governments and Manitoba in the initiative, designing and delivering most of the training, largely through community-based programs.

Aboriginal traditional knowledge and the Cree worldview were embedded into project plans and the environmental assessment, with each of the KCNs contributing its own environmental evaluation to the partnership's environmental impact statement. The Cree will continue their contribution during construction and operation of the project through their involvement in project governance and environmental monitoring.

The Cree Nation Partners (Tataskweyak Cree Nation and War Lake First Nation), in their Environmental Evaluation Report, expressed their re-newed empowerment as follows:

“Now, through the vision, guidance and determination of our Elders and leaders and the active participation of our Members, we are in a position to meet our goals of securing the social, economic and cultural benefits sufficient to sustain our people, while protecting the natural environment” (page 77).

Plans and processes are now in place to continue the Cree engagement – with the addition of Shamattawa First Nation – for the Conawapa Project.

According to the MA-BCA, the preferred plan also best addresses the economic discrepancies between northern and southern Manitoba. For example, it generates the largest gross wages for northern Manitobans (\$1.35 billion compared to \$670 million for Keeyask with an

interconnection, \$560 million for Keeyask without an interconnection and nil for the all-gas alternative). When the MA-BCA considered the incremental income and other benefits associated with the hydro-electric options, the magnitude of the differences between the plans increased even more.

Gas turbines would be located in an industrial area(s) in southern Manitoba, possibly at a site adjacent to the TransCanada natural gas pipeline or the existing Brandon gas generating station. The project would undergo an environmental impact assessment. This process could identify aspirations of local people, but the process would not be nearly as intensive, expansive or inclusive as that undertaken with the Cree on the hydro-electric projects; nor would a gas alternative provide the types of local economic opportunities associated with the hydro-electric options.

***Prevention:** Manitobans should anticipate, and prevent or mitigate, significant adverse economic, environmental, human health and social effects of decisions and actions, having particular careful regard to decisions whose impacts are not entirely certain but which, on reasonable and well-informed grounds, appear to pose serious threats to the economy, the environment, human health and social well-being.*

Through an integrated planning process, Manitoba Hydro considers the potential economic, environmental and socio-economic effects of its hydro-electric projects. Fundamental decisions that demonstrate Manitoba Hydro's commitment to incorporating all three criteria into its plans may be taken early in the planning process. For example, Manitoba Hydro has chosen to concentrate its plans on rivers currently managed for hydro-electric development, rather than rivers such as the Seal and Hayes whose designation as Heritage Rivers was supported by Manitoba Hydro. Again, through its integrated planning process, potential adverse environmental and social effects were avoided or reduced on the Keeyask and Conawapa Projects by reducing the size of the projects while respecting the importance of maintaining

their economic viability. As such, the Keeyask Project was reduced from an 1150 MW project that would have initially flooded 180 km² to a 695 MW project that will initially flood 45 km².

As Manitoba continues with its integrated planning process, it undertakes comprehensive environmental impact assessments of its major projects, through which it is able to identify potential adverse effects and take measures to avoid, reduce or mitigate these effects. Notably, agreement with each of the local Cree Nations provide programs to offset unavoidable adverse effects of the Keeyask Project on the practices, customs and traditions integral to each Cree Nation's distinctive cultural identity; water quality and key fish species will be protected; and important ecosystem functions will be retained. As much as attention is given to managing potential adverse effects, attention is also given to enhancing potential benefits. As a result, Manitoba Hydro and the four KCNs created a partnership to develop the Keeyask Project and share in the governance and other potential benefits of ownership; employment preferences and business opportunities were identified; the federal and provincial governments and Manitoba Hydro worked with local northern communities and Aboriginal organizations to fund and deliver a decade-long training program. Environmentally, a stocking program is expected to result in a long-term, sustainable population of lake sturgeon, and cumulative terrestrial effects for all priority habitat types will be maintained below 10%, a key indicator for ecosystem sustainability.

Extensive monitoring programs, including programs by the Cree Nations applying their Aboriginal traditional knowledge, will be implemented. Should these programs identify unacceptable un-anticipated effects, the partnership will then be able to apply adaptive management techniques.

Manitoba Hydro (and its Cree partners) have taken a precautionary approach, first through the thoroughness of the assessment and mitigation measures, and then followed by plans to monitor the project and apply adaptive management practices where appropriate. As an extra

precaution, additional mitigation measures have been identified, should they be required. Notably, the generating station is being designed and constructed so that it can be retrofitted for additional fish passage measures, should that prove necessary.

With gas turbines, the fundamental decision is whether to install heavy-duty simple-cycle turbines, heavy-duty combined-cycle turbines, or aeroderivative simple-cycle turbines. However, gas turbines do not provide the same complexity of environmental and socio-economic challenges and benefits of hydro-electric project. In Manitoba Hydro's experience with its Brandon project, gas turbines are located in industrial areas where effects on the natural environment and local residents may be almost negligible, and environmental matters such as air emissions and water usage are managed at a technical level with provincial regulators.

Conservation and Enhancement: Manitobans should: *Maintain the ecological processes, biological diversity and life-support systems of the environment; harvest renewable resources on a sustainable yield basis; make wise and efficient use of renewable and non-renewable resources; and enhance the long-term productive capability, quality and capacity of natural ecosystems.*

The Keeyask Project adheres to this principle in a number of ways:

- As noted above, the population of the endangered lake sturgeon is expected to increase through habitat enhancements and a stocking program. (For more information about sturgeon enhancement initiatives by Manitoba Hydro, in collaboration with local Cree Nations and government resource managers, see ***Appendix 2.1 - Lake Sturgeon: Mitigation and Enhancement.***)
- The populations of other key fish species will remain stable or will increase over the long-term.

- Cumulative effects for all priority habitat types will be maintained below 10%, a key indicator of ecosystem sustainability; similarly, a benchmark for undisturbed caribou habitat will be maintained.
- Tataskweyak Cree Nation and War Lake First Nation are developing fish and moose harvest sustainability plans.

It is anticipated the Conawapa Project will also meet the terms of this principle.

Gas turbines, with their smaller footprints on industrial sites, are unlikely to directly affect ecological processes, biological diversity and environmental life-support systems. However, generating stations using non-renewable natural gas contribute substantial GHGs, which cause climate change. Climate change will affect ecological processes, biological diversity and environmental life-support systems. The actual magnitude of effects of one gas-fueled generating station would be nominal, but incremental, relative to global emissions.

Rehabilitation and Reclamation: Manitobans should: Endeavour to repair damage to or degradation of the environment; and consider the need for rehabilitation and reclamation in future decisions and actions.

Once the Keeyask and Conawapa Projects are constructed, areas no longer required for operations will be decommissioned and rehabilitated using locally compatible vegetation. A hydro-electric generating station may operate almost in perpetuity. If decommissioning is required at some future date, it will be undertaken according to the legislative requirements, existing agreements (e.g. the 1992 NFA implementation agreement with Tataskweyak Cree Nation, which would require facilities be maintain to continue the water regime existing at that time) and industry standards prevalent at the time.

Gas generating stations would be developed in industrial areas. These sites could be restored for other industrial developments.

***Global Responsibility:** Manitobans should think globally when acting locally, recognizing that there is economic, ecological and social interdependence among provinces and nations, and working cooperatively, within Canada and internationally, to integrate economic, environmental, human health and social factors in decision-making while developing comprehensive and equitable solutions to problems.*

The Keeyask and Conawapa Projects will contribute to substantial reductions in GHGs by displacing fossil fuel electricity generation.

A detailed life cycle assessment was conducted by the Pembina Institute in order to estimate the GHG emissions resulting from the construction, land use change, operation, and decommissioning of the Project. The resulting emissions for Keeyask and Conawapa are extremely low relative to other forms of generation. For example, the Keeyask Project will produce fewer GHGs in a century of operation than an equivalent a combined-cycle gas-fired station in half a year; and for Conawapa, it would be 100 days. In other words, considering all life-cycle GHG emissions, Keeyask will produce less than 1% of a combined-cycle gas turbine, and Conawapa is even less – 0.5%.

At the same time, the hydro-electric projects are being planned to maintain important ecosystem functions.

The Guidelines

***Efficient Use of Resources:** Encouraging and facilitating development and application of systems for proper resource pricing, demand management and resource allocation together*

with incentives to encourage efficient use of resources; and employing full-cost accounting to provide better information for decision makers.

All projects – whether hydro or gas – would be planned with mitigation, compensation and enhancement measures to reduce adverse environmental and social impacts and maximize benefits. By incorporating these measures into the projects' capital and operating budgets, the projects would internalize these costs. Compared to earlier approaches to hydro-electric development, this approach increases the per-unit cost of power, but it also results in a more sustainable project.

The hydro-electric projects would be operated as part of Manitoba Hydro's integrated generation and northern collector system, allowing for peak efficiency and optimum water usage for all plants.

Manitoba Hydro is continuing and, where economically feasible, is expanding its commitment to DSM. The Preferred Development Plan is very compatible with DSM, with a sensitivity analysis determining that increasing DSM also increases the attractiveness of the preferred plan.

Public Participation: (a) *Establishing forums which encourage and provide opportunity for consultation and meaningful participation in decision-making processes by Manitobans; (b) Endeavouring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions; and (c) Striving to achieve consensus amongst citizens with regard to decisions affecting them.*

Discussions about the Keeyask Project began between Tataskweyak Cree Nation and Manitoba Hydro in the 1990s, and were later expanded to the other KCNs, eventually resulting in the establishment of a partnership to own, plan, develop and operate the project. In addition to the

discussions that led to the development of the partnership, the communities have been closely involved with Manitoba Hydro in the environmental impact assessment. As well, a Public Involvement Program was developed and implemented to reach interested Manitobans from other communities and organizations. While the ownership structure of the Conawapa Project has not yet been determined, Manitoba Hydro is committed to extensive local Cree Nation involvement in the planning of that project, as well as the receipt of potential benefits which may include income sharing. A modest stakeholder engagement program was also provided for the NFAT process.

Manitoba Hydro would engage with local residents in the vicinity of a new gas plant. However, such engagement would be much, much smaller than that for a major hydro-electric project. According to the environmental impact statement for a new natural gas-fueled generator in Brandon², less than 10 people attended a public open house.

The Province of Manitoba also provides extensive opportunities for citizen engagement through the PUB's NFAT review and the CEC's environmental review. The NFAT review applies to both hydro-electric and gas turbine development. A gas turbine would also require a public review under *The Environment Act*, although the Minister would decide whether to have the CEC conduct public hearings.

Access to Information: (a) *Encouraging and facilitating the improvement and refinement of economic, environmental, human health and social information; and (b) Promoting the opportunity for equal and timely access to information by all Manitobans.*

In addition to the ongoing communication among the KCNs and Manitoba Hydro, each of the KCNs undertakes on-going communication with its members. The partnership also undertook a

² *Environmental Impact Statement, Manitoba Hydro, Brandon Generating Station – Combustion Turbine Plant, September 2000*

Public Involvement Program for other communities and interested Manitobans, and relevant information is also made available to the public through the regulatory review process.

Manitoba Hydro engages local residents and others with an interest in its project during the planning and regulatory processes for its projects. This would apply regardless of whether Manitoba Hydro was planning projects in its preferred development plan or alternative plans. However, the level of engagement would differ, commensurate to the potential effects of the project and of the needs and interests of local residents, other interests and public.

Engagement with the lower Nelson River communities, where the Keeyask and Conawapa Projects would be developed, has been expansive. Their prime resource area and traditional territory has been greatly impacted by past projects, as attested to by agreements to address those affects. Those agreements also established the framework by which Manitoba Hydro and the communities engage in planning future projects. Manitoba Hydro and the communities went beyond the requirements of those agreements in the establishment of the Keeyask Hydropower Limited Partnership, through which they share in the ownership, governance, and environmental assessment of the project. Although the Conawapa ownership structure has not been finalized, Manitoba Hydro is committed to early involvement and extensive engagement with the local Cree Nations in planning the project, providing a forum for addressing community issues and concerns, incorporating Aboriginal traditional knowledge, and creating understanding of project impacts and benefits.

The development of gas turbines would be expected to attract much less public interest.

Integrated Decision Making and Planning: *Encouraging and facilitating decision making and planning processes that are efficient, timely, accountable and cross-sectoral and which incorporate an inter-generational perspective of future needs and consequences.*

The Government of Manitoba has established three processes that must be fulfilled before it makes decisions regarding Manitoba Hydro's preferred and alternative development plans. One is the NFAT review being conducted by the PUB. The second is the Clean Environment Commission's review of the environmental effects of the Keeyask Project; other major generation projects will also be subject to reviews under *The Environment Act*. The NFAT and environmental review processes provide ample opportunity for citizens to engage in the decision-making process, including access to participant funding for qualified interveners. These processes would be applicable to Manitoba Hydro's preferred and alternative development plans.

In addition to those two processes, the Province will also consult directly with First Nations and Métis in a manner consistent with Section 35 of the Canadian Constitution. It is likely that this process would only be applicable to hydro-electric projects (*i.e.* not to gas turbine projects, which would be developed on private land).

Manitoba Hydro is also engaged directly with the local Cree Nations in the vicinity of the Keeyask and Conawapa Projects, and also conducts Public Involvement Programs for people and organizations in other communities. The leadership in the local Cree Nations, in turn, engages with their members, with special attention paid to the youth. Again, this process would only be applicable to hydro-electric projects.

Waste Minimization and Substitution: (a) *Encouraging and promoting the development and use of substitutes for scarce resources where such substitutes are both environmentally sound and economically viable; and (b) Reducing, reusing, recycling and recovering the products of society.*

The hydro-electric projects use renewable hydro-electric power. The gas turbines use natural gas, which is not renewable. If power from Keeyask and Conawapa is sold into the mid-continent power market, it could replace non-renewable gas-fueled electricity.

Both hydro-electric and gas turbine projects could be encouraged to use appropriate substitutes for scarce resources, as well as reducing, reusing and recovering the products of society.

Research and Innovation: Encouraging and assisting the researching, development, application and sharing of knowledge and technologies which further our economic, environmental, human health and social well-being.

A great deal of research, study and sharing of knowledge is accumulated in the planning and assessment of hydro-electric projects, each of which is customized to the local environment and socio-economic conditions. Associated with the environmental assessment processes, many technical and Aboriginal knowledge studies have been undertaken related to wildlife (including caribou), fish populations (including sturgeon), social and economic conditions, heritage resources, history and culture that will be part of the record of the Project and will be of ongoing benefit far beyond their use in the project's environmental impact statement.

Well over 100 data and technical reports from over a decade of technical scientific studies for the Keeyask and Conawapa Projects have been published and shared with government authorities and local communities. Manitoba Hydro's scientific work continues once construction begins, with extensive monitoring, which again is recorded and reported to regulatory authorities and local communities. For example, Manitoba Hydro has participated in numerous research studies on Southern Indian Lake and is currently funding additional research in cooperation with O-Pipon-Na-Piwin Cree Nation, the Southern Indian Lake Fishermen's Association, and the community, almost 50 years after the community was affected by the

Churchill River Diversion Project. Manitoba Hydro also collaborates with universities and other research organizations. For example, Manitoba Hydro is working with ArcticNet on research in the Nelson River Estuary. ArcticNet's general motivation is to anticipate the environmental and socio-economic consequences of the changing Arctic environment and contributing to policies and adaptive strategies to deal with these changes.

Thousands of cultural artifacts, some as old as 4000 to 5000 years, have been recovered and preserved during the planning and assessment phase and will be accessible to the Cree Nations (and the public), enhancing cultural memory and identity. Through the project, the communities have undertaken many of their own studies and reports that have resulted in a clear enunciation of their Cree worldview. Collectively, these studies have documented the richness and longevity of Cree history in the region – a history that is now available for references by future generations.

Environmental assessments are also undertaken for gas turbine projects. However, these are much more limited scope, dealing with a technology which is well understood and generally applied a consistent manner regardless of its location.

Manitoba's Clean Energy Strategy

This section of the appendix compares the preferred and alternative development plans to Manitoba's Clean Energy Strategy. This section focuses on the two primary resources sources considered in Manitoba Hydro's plans, hydro-electric and gas turbines. The analysis also notes the provincial strategy's approaches to new transmission interconnections with export markets, DSM, and wind generation.

The strategy was released in December 2012 by the Minister of Innovation, Energy and Mines, Dave Chomiak. The Message from the Minister is followed by highlights, an introduction, and then the main body of the 44-page report. The body of the report is divided into five sections:

1. Building New Hydro, 2. Leading Canada in Energy Efficiency, 3. Keeping Rates Low, 4. Growing Renewable Alternatives, and 5. Freedom from Fossil Fuels. The Introduction (page 6) to Manitoba's Clean Energy Strategy states:

“Manitoba’s clean energy strategy is a focused strategy, one which will demonstrate the government’s commitment to build on our underlying and historic comparative advantage in low cost, renewable hydro electricity. It will also build on our newly arrived advantages in ground-source heat pumps, plug-in electric vehicles and other emerging renewable sources. Together, as these energy sources grow, they will offer Manitobans an increasing array of clean, cost effective, non-fossil alternatives for heating our homes, powering industry and fuelling our vehicles. Finally, woven through these power, heating and transportation initiatives is the constant need to increase energy efficiency and reduce the costs of energy waste.”

Strategy Statements Regarding Hydro-electric Development

Hydro-electric development receives ample attention in the strategy, beginning with the following statement in the highlight section:

“Ensure that the planning, design, consultations and negotiations necessary for developing substantial new hydro-electric generation, including Keeyask (695 MW) and Conawapa (1485 MW), proceed through environmental and economic review. These new hydro generation projects are being designed to greatly reduce environmental impacts and will be developed in partnership with First Nations” (page 2).

The introduction notes the benefits of past hydro-electric development, undertaken instead of coal-based generation:

“When Manitoba made the long- term, strategic decision to develop its northern hydro-electric assets – rather than going for the quick fix of expanding the use of

low cost, but imported and polluting coal – it faced potentially higher costs, as well as a series of risks that seemed, at the time, insurmountable...The benefits we enjoy today were built on these decades of hard work and innovation” (page 6).

The first chapter, The Case for Moving Forward and Today’s Priority Actions, underscores the strategy’s support for hydro-electric development:

- “Manitoba Hydro’s performance provides strong evidence for the value of a fossil fuel free strategy. Using made-in-Manitoba, renewable energy, the province minimizes the need for fossil fuels to generate electricity, while creating huge economic and environmental benefits.”
- “Manitoba needs new generation to supply rising domestic load, while export customers wish to buy new hydro from Manitoba. By advancing the construction of new hydro plants ahead of domestic needs, Manitoba can both earn additional export revenues and expand valuable interconnection transmission, while also building the plants it will need to meet its own future requirements.”
- “There are limited windows of opportunity within which Manitoba can sign new, long-term export contracts, and receive vital new transmission links. If these windows are missed, customers will lock in with other suppliers, new transmission along with its market expansion and domestic reliability benefits will not be built and the window will close and be lost” (page 10).

The strategy expresses its preference for made-in-Manitoba hydro-electric development over gas generation:

- “When considering options, Manitoba’s hydroelectricity has clear cut advantages over natural gas:
 - “Construction of new hydro power will create more jobs and more new business activity for Manitoba than natural gas fired imports or local plants.

- “New hydro will emit far fewer GHGs than natural gas over its lifetime.
- “While a natural gas plant has a life of 25 to 30 years, a key advantage of hydro-electric plants is that, once built, they will generate power for 100 years. For example, a new project like Keeyask would likely still be generating power in the year 2100.
- “Locally generate hydro will provide greater energy security for Manitoba than imported natural gas” (page 11).

The strategy maintains its preference for hydro-electric development, despite current natural gas prices:

- “While prices are currently low, natural gas suppliers can’t guarantee today’s prices for the next 10 years, much less for the next 20 or 30 years or beyond – the years when Manitoba wishes to add new power. The difficulties this poses for long-term energy planning in Manitoba can be seen clearly in the forecasts of the major energy planning bodies in North America. These bodies forecast natural gas prices ranging from \$5 to \$11 per GJ in the coming decades. With today’s prices at \$2 to \$3 per GJ, and Manitoba potentially looking at billions of dollars in investments, this uncertainty leaves Manitoba facing the risk of price swings of hundred of percentage points if it chooses natural gas supplied projects.
- “Additional uncertainties surrounding natural gas and in particular shale gas include:
 - “the level of increased demand flowing from natural gas-powered electricity generation, expanded industrial end uses, transportation and Liquefied Natural Gas (LNG) exports
 - “the accuracy of estimates of shale gas reserves, production and depletion rates
 - “the long- term sustainability of today’s exploration and development business model, in the face of extremely low natural gas prices
 - “GHG emissions from shale gas exploration and production.”

- “With Manitoba’s next two major hydro projects potentially coming online from 2019 to 2025, and then earning their major revenues in the decades to follow, natural gas prices in 2012 are of less relevance than the prices in 2032 or 2042. In the long- term, Manitoba expects that hydroelectricity will continue to be the better option. Hydro’s wide and long-lasting range of benefits – lower GHGs, more jobs and business in Manitoba, more stable prices and greater energy security – will still make hydroelectricity the superior choice” (page 12).

The strategy also discusses Manitoba Hydro’s new approaches to Aboriginal engagement and environmental stewardship in Manitoba Hydro’s new hydro-electric projects, plus several economic benefits. The strategy identifies Wuskwatim, Keeyask and Conawapa as specific components of a Clean Energy Portfolio.

While the strategy clearly prefers hydro-electric development over gas or coal generation, it does identify a role for those two fuels, as well as imports:

“The remaining coal fired electricity generator in Brandon will continue to be used only in emergency situations and droughts. The generator will need to be ‘exercised’ on a very limited basis to ensure it is operational when needed in emergencies. Manitoba will also comply with the federal government’s new regulations that will phase out the use of conventional coal generation across the country.

“Manitoba’s existing natural gas generating capacity continues to play a number of complementary roles in the system and will be maintained. Similarly, new natural gas plants will only be added to respond to short-term variations in renewable output, thus allowing Manitoba to integrate more new hydro and wind – or to augment the complementary roles described. Decisions on whether to add natural gas will also depend on consumer demand, renewable supplies and market conditions.

“Imported fuel can provide value to Manitoba during droughts and through sales related to peak shifting and similar variations. However, given the limits of Manitoba’s system to integrate, store, firm and shape energy, these capabilities will be used in ways which do not inhibit the development of Manitoba’s own high priority hydro, wind and other renewable resources” (page 16).

The strategy adopts the province’s previous long-term strategic goal of 1,000 MW of wind energy, equal to 10 percent of Manitoba Hydro’s average annual generation. In the highlights the strategy states:

“Continue to develop 1,000 MWs of wind power as economically viable. In total, 1,000 MWs is expected to generate \$2 billion in new investment and \$400 in lifetime revenues to rural communities” (page 4).

The body of strategy offers the following:

“Manitoba’s 1,000 MW of new wind will add almost 3,000 GWhs of dependable energy to the system – a substantial contribution. Economically, developing 1,000 MWs will generate more than \$2 billion in new investment, and \$400 million in lifetime revenues to rural communities.

“The location, scale and timing of future utility and community scale wind development in Manitoba will be shaped by circumstances such as exchange rates and export prices, federal support, global turbine prices, rural economic conditions and Manitoba Hydro’s evaluation of its supply and demand situation” (page 29).

The strategy is supportive of Manitoba Hydro’s DSM programs, *i.e.* Power Smart. The strategy identifies a series of initiatives being undertaken by the province and Manitoba Hydro, and notes the new *Energy Savings Act* requires Manitoba Hydro to establish energy efficiency targets for the future.

The strategy is also supportive of Manitoba Hydro's exports and plans for additional transmission interconnections. It cites plans for a new transmission interconnection to the United States among the province's transmission priority actions, and adds that transmission projects such as this will boost the range and scale of Manitoba's exports.

The strategy concludes with a vision of "a number of Manitobans being among the first in the industrial world to live their lives without requiring substantial quantities of fossil fuel" (page 39). To achieve that, Manitobans will: use clean renewable systems such as heat pumps to heat their homes; shift to electric or plug-in hybrid vehicles, other non-fossil based transportation, or public transportation; and continue to be supplied by Manitoba Hydro's clean electricity.

Conclusion Regarding the Clean Energy Strategy

Based on this review, the development plans best adhering to the strategy are those that rely on hydro-electric development (*e.g.*, the Preferred Development Plan), rather than gas; and the strategy is also supportive of new transmission interconnections with export markets.

The strategy also favours more wind development. However, that support is dependent upon the economic conditions at the time. Manitoba Hydro will continue to consider the development of wind farms, but wind generation as a major generation supply in Manitoba was determined to be un-economic at this time.

Manitoba Hydro's preferred plan also accommodates DSM (*i.e.* Power Smart programs). Although DSM is not included per se in the preferred plan, economic evaluation sensitivities indicate that increasing DSM significantly increases the attractiveness of the preferred plan. As such, it was not necessary in the NFAT submission to further include different levels of DSM in the detailed evaluations of the different plans to be able to assess the attractiveness of the plans.

The Climate Change and Emissions Reductions Act

The purpose of *The Climate Change and Emissions Reductions Act* “is to address climate change, to encourage and assist Manitobans in reducing emissions, to set targets for reducing emissions and to promote sustainable economic development and energy security.”

Under the act, Manitoba Hydro must not use coal to generate power after December 31, 2009, except to support emergency operations. All of Manitoba Hydro’s development plans adhere to this condition.

The act also has a number of other requirements not directly related to Manitoba Hydro’s preferred or alternative development plans. These include the production of climate change reports in 2010 and 2012. The 2012 report has not yet been released. The 2010 report references the importance of reducing imported fossil fuels by building renewable hydro resources. It also references the role exports play in reducing greenhouse gas emissions by displacing coal and gas turbines in those markets. It singles out DSM as one resource option for meeting the province’s resource needs while reducing GHGs, and it sets out forecasts for future energy savings under Manitoba Hydro’s Power Smart programs.