Final Report

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Framework for Sustainability-based Assessment for the Public Utilities Board's Needs For and Alternatives To (NFAT) Assessment of Manitoba Hydro's Preferred Development Plan and Alternatives

prepared by

Kyrke Gaudreau and Robert B. Gibson

for

the Consumers Association of Canada (Manitoba Branch)

Executive Summary

The purpose of this report is to

- describe the nature, role and basic substance of a framework for sustainability-based decision making that underpins the requirements of the Manitoba *Sustainable Development Act* (1998);
- propose an initial set of evaluation and decision-making criteria that have been specifically elaborated for the Public Utilities Board's (PUB's) Needs For and Alternatives To (NFAT) review of Manitoba Hydro's preferred development plan and potentially reasonable alternatives to it; and
- establish the public interest and legislative basis for undertaking sustainability-based assessments, or their substantive equivalents, in Manitoba in this and subsequent cases.

In the context of the NFAT review, sustainability-based decision making is necessary to ensure long-term improvement in human and natural wellbeing. Whether it is climate change, declining resources, long-term equitable energy pricing, or threats to and opportunities for traditional ways of living, the Manitoba power system touches upon many critical local and larger sustainability issues of the 21st century. Furthermore, the significance of the near term and legacy effects of development options, including the proposed generating projects, makes it imperative that impacts and benefits be fairly shared both within and between generations.

As it currently stands, the Manitoba Hydro NFAT assessment does not provide a full assessment of how the proposed power system alternatives may help Manitoba progress towards sustainability. In the absence of a more comprehensive strategic energy assessment in Manitoba, it is contingent upon bodies such as the PUB to ensure these broader issues are considered with sufficient diligence in the particular cases before them.

The adoption and application of an explicit sustainability-based framework for analyses and decision making should be the foundation for the PUB's judgements in this case, and should be entrenched generally in planning and decision making in Manitoba. This is best accomplished through a comprehensive and participatory assessment that:

- clearly establishes the purpose and need (in this case for the services provided by electricity) through an open and democratic process;
- develops an explicit set of sustainability criteria that have been specified for the particular case and context;
- applies these criteria in a comparative evaluation of the full suite of alternative supply and demand options and power system configurations in a portfolio approach, to determine which package is likely to make the most significant positive contributions to progress towards sustainability while avoiding risks of serious adverse effects; and
- anticipates and prepares plans for necessary change.

The sustainability assessment framework described in this report is designed to provide the integrated approach to evaluations and decision making that will ensure that the Manitoba energy strategy and power systems planning processes are undertaken in a way that promotes progress towards a better future for all. Such a framework, or its substantive equivalent, is also necessary to meet the Terms of Reference for the NFAT review, and legislative requirements set forth in the Manitoba *Sustainable Development Act* (Manitoba 1998), key sections of the Manitoba *Environment Act* (Manitoba 2012a) and the Canadian *Environmental Assessment Act* (CEAA 2012a).

We hope the insights contained within this report, as well as the final recommendations, will serve to inform the particulars of the NFAT proceedings, as well as contribute to the broader agenda of strengthening strategic decision making in Manitoba.

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List of Abbreviations

CAC Manitoba – Consumers' Association of Canada, Manitoba Branch
CDM – Conservation and Demand Management
CEC – Manitoba Clean Environment Commission
COSEWIC – Committee On the Status of Endangered Wildlife In Canada
EIS – Environmental Impact Statement
MPILC – Manitoba Public Interest Law Centre
NFAT – Need For and Alternatives To assessment
PUB – Manitoba Public Utilities Board
SARA – Species At Risk Act

NFAT Supporting Documentation and Other Reports

This study drew primarily from the following documents:

CEAA (2012). Draft Environmental Impact Statement Guidelines for the Keeyask Generation Project proposed by the Keeyask Hdropower Limited Partnership. C. E. A. Agency, Canadian Environmental Assessment Agency

Gibson, R. B. (2006). *Sustainability-based assessment criteria and associated frameworks for evaluations and decisions: theory, practice and implications for the Mackenzie Gas Project Review*, Joint Review Planel for the Mackenzie Gas Project**:** 67.http://www.ngps.nt.ca/registryDetail_e.asp?CategoryID=271

Gibson, R. B., et al. (2008). *An Analysis of the Ontario Power Authority's Consideration of Environmental Sustainability in Electricity System Planning*. Waterloo, Ontario, Green Energy Coalition, Pembina Institute, Ontario Sustainable Energy Association**:** 200.http://pubs.pembina.org/reports/oeb-analysis-sustainability.pdf

Lower Churchill JRP (2011). *Report of the Joint Review Panel - Lower Churchill Hydroelectric Generation Project - Nalcor Energy*. Newfoundland and Labrador. Department of Environment and Conservation, Government of Newfoundland, Government of Canada

Mackenzie Gas JRP (2009). *Foundations for a Sustainable Northern Future - Report of the Joint Review Panel for the Mackenzie Gas Project*, Joint Review Panel

Manitoba (2013). Terms of Reference - Needs For and Alternatives To (NFAT Review, Government of Manitoba.http://www.pub.gov.mb.ca/pdf/nfat/TermsOfReference-Ap25.pdf

Manitoba Hydro (2013). *NFAT (Needs For and Alternatives To) Business Case Submission* Manitoba Hydro

WCD (2000). *Dams and Development - A new framework for decision-making*, World Commission on Dams, Earthscan.

Author biographies

Kyrke Gaudreau
Kyrke Gaudreau is the Sustainability Manager at the University of Northern British Columbia. Dr. Gaudreau completed his PhD in social and ecological sustainability at the University of Waterloo where his research focused on the sustainability assessment of energy systems. He has consulted on various strategic and environmental assessments of energy systems in Canada, and has researched and written about energy systems sustainability in several different countries.

Dr. Gaudreau serves on the editorial board of *Alternatives Journal*, where he writes for a popular audience on a variety of environmental, social and technical issues.

Robert B. Gibson
Robert B. Gibson is a professor in the Department of Environment and Resource Studies at the University of Waterloo, Ontario, Canada, where he has taught since 1981. He mostly works on environmental policy issues and broader sustainability imperatives. His involvement with environmental assessment law, policy and process issues dates back to the mid 1970s and includes work in most provinces and all three territories.

Over the past decade, Dr. Gibson has focused on integrating sustainability considerations in land use decision making in urban growth management, corporate greening initiatives, and special area governance, as well as environmental assessments at the project and strategic levels. Most recent projects focus on application of the principles set out in his book on *Sustainability Assessment,* published by Earthscan in 2005.

Both Dr. Gaudreau and Dr. Gibson participated in the Clean Environment Commission's recent review of the proposed Keeyask Generation project.

1 Introduction

1.1 Purpose of this report

The purpose of this report is to

- describe the nature, role and basic substance of a framework for sustainability-based decision making that integrates and specifies the requirements of the Manitoba *Sustainable Development Act* (1998);
- propose an initial set of evaluation and decision-making criteria that have been specifically elaborated for the Public Utilities Board's Needs For and Alternatives To (NFAT) review of Manitoba Hydro's preferred development plan and potentially reasonable alternatives to it; and
- establish the public interest and legislative basis for undertaking sustainability-based assessments, or their substantive equivalents, in Manitoba in this and subsequent cases.

In doing so, this report aims also to inform the broader debate about environmental and strategic decision making in Manitoba.

Sustainability-based evaluation and decision making (which is often encapsulated in the more concise term "sustainability assessment") is an integrated approach to decision making seeks to promote the long as well as short term public interest. It attempts to improve decision-making processes by ensuring that they address as much as possible the full suite of requirements for sustainability, as well as the interconnections, feedbacks and uncertainties that typify the social and ecological systems to which we contribute and upon which we depend (Gibson et al. 2005). This is best accomplished through a comprehensive and participatory assessment that:

- clearly establishes the purpose and need (in this case for the services provided by electricity) through an open and democratic process that is focused on the lasting public interest;
- develops an explicit set of sustainability-based criteria for evaluations and decision, with care to cover all generic requirements for progress towards sustainability but also to specify these broad concerns for the particular case and context;
- applies these criteria in a comparative evaluation of the full suite of alternative supply and demand options and power system configurations in a portfolio approach, to determine which package is likely to make the most significant positive contributions to progress towards sustainability while avoiding risks of serious adverse effects; and
- plans for necessary change.

In order to enhance the sustainability contributions of the Manitoba power system, this report proposes a set of sustainability criteria that may be applied to the comparative evaluation of the Manitoba Preferred Development Plan and the suite of alternative power systems that represent potentially reasonable alternatives to that plan.

The report recognizes that a more detailed review of the Keeyask dam component has been undertaken by the Clean Environment Commission and that the CEC's findings on

that project and its potential effects should inform the broader inquiry by the PUB. At the same time, the PUB's broader NFAT review of Manitoba Hydro's underlying development plan is needed to inform any final decision on the Keeyask proposal.

1.2 Rationale for applying a sustainability assessment framework in this case

In the context of the NFAT review, there are several reasons why a sustainability-based assessment is appropriate both as best practice for decision making in the public interest and as a means of meeting legislated obligations.

First, the context of the case demands an integrated assessment that addresses the full suite of requirements for sustainability. Whether it is climate change, declining resources, long-term equitable energy pricing, or threats to and opportunities for traditional ways of living, the Manitoba power system touches upon many critical local and larger sustainability issues of the 21st century. Likewise, the significance of the near term and legacy effects of the proposed generating options makes it imperative that impacts and benefits be fairly shared both within and between generations and ultimately improve human well-being.

Second, a sustainability-based assessment framework, or its substantive equivalent, is also necessary to meet the legislative requirements set forth in the Manitoba *Sustainable Development Act* (Manitoba 1998), key sections of the Manitoba *Environment Act* (Manitoba 2012a) and the Canadian *Environmental Assessment Act* (CEAA 2012a), discussed in more detail in Appendix 1. Such a sustainability-based framework for planning would seem also to be an at least implicit requirement for Manitoba Hydro, given its legislated obligations and its commitments as reported in Appendix 4.

Third, the NFAT terms of reference (TOR) also require consideration of sustainability concerns. For example, as noted in the TOR (Manitoba 2013, p.2):

> *The Panel's report to the Minister will address the following items:*
>
> *An assessment as to whether the needs for Hydro's Plan are thoroughly justified, and sound, its timing is warranted, and the factors that Hydro is relying upon to prove its needs are complete, reasonable and accurate. The assessment will take the following factors into consideration…*
>
> > *The alignment of the Plan to Manitoba's Clean Energy Strategy and the Principles of Sustainable Development as outlined in The Sustainable Development Act.*

Finally, as it currently stands, the PUB is being tasked not merely with evaluating a particular proposed power system plan in light of need and alternatives, but also with making more specific judgements on individual components of the preferred plan and effectively with setting the direction of the province's broader energy strategy. That multiple role brings many challenges, not the least of which is determining how much detailed information is necessary for adequately well informed decisions affecting all of these matters. A sustainability-based assessment framework, however, should serve the

PUB well as a basis for consistent and comprehensive attention to the key issues at all levels.

1.3 Outline of the report

This report is organized as follows:

In the first part of this report we describe Gibson's generic framework for sustainability-based decision making. Gibson's framework has previously been applied for electrical energy system planning in a Canadian context, particularly with regard to the Ontario Integrated Power Systems Plan proposed in 2006 (OPA 2006; Winfield et al. 2010).

The discussion in section 2 centres on providing a working definition of progress towards sustainability, describing the importance of clearly establishing the "need" or purpose to be addressed by an electricity plan, defining a full suite of alternatives and assessing the alternatives against an explicit set of sustainability criteria that have been specified for the particular cases.

Section 3 of this report establishes the legislative basis for undertaking sustainability-based assessments, or their substantive equivalents, in Manitoba. This work is summarized in section 3 with the analysis provided in Appendix 1.

Finally, section 4 of this report proposes a preliminary set of sustainability criteria appropriate for determining NFAT in relation to the preferred power system plan. This criteria set, which provides an integrated approach to evaluations and decision making, was developed with the input of several stakeholders involved in the CEC and NFAT hearings, as well as experts in Canadian energy strategy and the Manitoba context.

2 The fundamentals of sustainability-based assessments

This section introduces sustainability assessment as a framework for decision making and why it is critical to take such an approach during NFAT proceedings. It provides:

1. a brief history of sustainability assessment practice in Canada and beyond;
2. a basic definition of requirements for *progress towards sustainability;*
3. a general approach for undertaking sustainability assessment; and
4. a set of basic guidelines for sustainability assessment practice.

2.1 A brief history of sustainability-based assessment practice

In order for humanity to address the interrelated challenges and opportunities facing us we must improve our decision-making processes such that they move beyond narrowly defined considerations towards addressing, as much as possible, the full suite of requirements for sustainability, as well as the interconnections, feedbacks and uncertainties that typify complex socio-ecological systems at multiple scales (Gibson et al. 2005).

For the planning and assessment of major undertakings and associated decision making, sustainability assessment provides a framework for identifying, evaluating and comparing the potential impacts of alternatives and selecting preferred alternatives as they relate to the needs established and as feasible means of moving towards sustainability.

Integrated sustainability-based approaches provide a more efficient and effective means of guiding decision making. These approaches:

- provide a means of avoiding the overlap of scattered, fragmented, and narrowly defined assessments, which better ensures that both the assessment process and the long-term outcomes are comprehensively positive;
- provide an explicit and coherent framework for combining consideration of conventionally quantifiable factors with necessary attention to other social, economic and biophysical factors that may have significant effects on future wellbeing but are not captured in prices or other usual measures;
- seek to provide a better venue for public engagement and public deliberation about overall objectives and the relative merits of options; and
- are forward-looking, and therefore more likely to serve the lasting public interest.

The undertakings that may benefit from sustainability assessment can be at both project and strategic levels, and can be proposals as well as on-going initiatives (Devuyst 1999; Pope et al. 2004; Gibson et al. 2005). Sustainability assessment tries to take into account the full range of significant factors and their interrelations, and looks well ahead when considering needs for and alternatives to – aiming for long term progress towards futures that are more desirable and more secure, for humans and the natural world.

Various approaches to sustainability assessment have been applied in Canadian contexts in recent years in many different venues (growth management planning, resource management, review of institutional practice, and major project assessment, etc.) and under several different names including integrated assessment, comprehensive planning, sustainability appraisal, and triple-bottom-line evaluation (Gibson 2006b).

The first high profile Canadian example of an environmental assessment process explicitly applying a "contribution to sustainability" test was the panel review of the Voisey's Bay nickel mine and mill project, located in northern Labrador (Gibson 2002; Gibson et al. 2005). Subsequent Canadian cases have included reviews by joint review panels of the proposed Kemess North copper-gold mine (Kemess JRP 2007), Whites Point quarry and marine terminal (Whites Point JRP 2007), Mackenzie Gas Project (Mackenzie Gas JRP 2009) and Lower Churchill hydroelectric generation project (Lower Churchill JRP 2011).

Even project proponents have begun adopting sustainability-based frameworks, although with varying degrees of success. Sustainability assessment processes have also been applied internationally, such as in Hong Kong, Belgium, Namibia, Western Australia, South Africa, and the European Union (Devuyst 1999; Pope and Grace 2006).

2.2 Defining progress towards sustainability

One question that often arises in sustainability-based assessments (or in discussions about sustainable development) is what sustainability and sustainable development entail. Many different definitions have been proposed, with the most common being the Brundtland definition, which defines sustainable development as (Brundtland and al. 1987):

> *Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

While this definition was a helpful beginning, it is brief and general, and has been open to diverse interpretations including some that do not reflect serious attempts to understand what a commitment to more sustainable practices means for us as individuals, as members of a society, and as humans sharing this world (e.g. Robinson 2004). Furthermore, confusion about sustainable development has often led to a focus on whether particular undertakings are or will be sustainable or not, when over the long run, few if any particular initiatives are likely to be sustainable. Instead the focus should be on designing and implementing undertakings that have maximally positive sustainability effects (and avoid adverse sustainability effects). What matters is not the sustainability of particular undertakings (many of which have properly or inevitably limited life expectancies) but the extent to which they contribute more broadly to progress towards sustainability.

We define *progress* towards sustainability as

> *a process of building towards futures that are desirable and viable on a single, limited planet where the possibilities for human wellbeing, social justice, and ecological stewardship are deeply entwined and where complexity and surprise are unavoidable.*

Using this definition, we strive to outline how an undertaking may be selected and structured to help society move in a positive direction. This is a journey with the characteristics of desirable futures in mind but no *a priori* defined end goal. As such, the definition and perspective link well with the future oriented principles of sustainability that have been adopted in Manitoba, such as the need to be caretakers of the environment, economy, human health and social well-being for future generations.

The definition of progress towards sustainability embodies certain characteristics, summarized in Table 1 below.

Table 1 – Characteristics of progress towards sustainability

Progress towards sustainability is:
• a challenge to conventional thinking and practice
• about long as well as short term wellbeing
• comprehensive, covering all the core issues of decision making
• a recognition of links and interdependencies, especially between humans and the biophysical foundations for life

- embedded in a world of complexity and surprise, in which precautionary approaches are necessary
- a recognition of both inviolable limits and endless opportunities for creative innovation
- about an open-ended process, not a state
- about intertwined means and ends – culture and governance as well as ecology, society and economy
- both universal and context dependent.

Source: adapted from (Gibson et al. 2005, Box 3.2 p. 62)

Ultimately, however, the definition of progress towards sustainability provided in this section is insufficient for assessing the NFAT of the preferred power system plan because it has not been translated into evaluation and decision criteria based on the essential requirements for progress towards sustainability and because it has not been elaborated to recognize the particular considerations crucial for the case and context at hand.

Section 2.3, below, considers the essential requirements and section 4 proposes a preliminary set of sustainability criteria that attempt to define what progress towards sustainability entails in the specific context of the NFAT case.

2.3 A basic framework for sustainability assessment

This section introduces a basic approach for sustainability assessment based on Gibson's (2006b) generic framework for sustainability assessment. The description provided here is complementary to what is found in other documents (Gibson et al. 2005; Gibson 2006b); the reader is encouraged to consult these other sources as needed.

The basic approach is the development of a sustainability-based framework for assessing the need for and desirability of the proposed preferred development plan in comparison with its alternatives. This framework for evaluation and decision making is centred on a generic sustainability criteria set that must be specified to address the needs and realities of the particular cases and contexts.

In the case of the NFAT, sustainability-based assessment is particularly relevant in terms of four important components of energy decision making in that it:

- clearly establishes a need (in this case centred on need for the services provided by electricity) through an open and democratic process;
- develops the full suite of alternative approaches, policies and technologies and power system configurations;
- assesses the full suite alternatives against an explicit set of sustainability criteria that have been specified for the particular case and context; and
- anticipates and prepares plans for necessary change.

Explicit and principled consideration of trade-offs is also an important component of sustainability assessment. The essential rules for trade-off considerations centre on open deliberations, emphasis on avoidance, and preclusion of trade-offs that displace significant adverse effects to future generations (for details see Gibson et al. (2005, ch. 6

and 7). But as with generic sustainability requirements and criteria, trade-off rules need to be specified for the context. We have accordingly included attention to trade-offs in the specified criteria set presented below in section 4.2, Table 6.

2.3.1 Establish a need

A crucial step in sustainability assessment, as well as most planning processes, is determining the fundamental purpose or need. In the case of the NFAT assessment, the question of need relates to how much electricity must be produced and where it must be distributed in the short, medium, and long-term, so as to maintain and improve the welfare of Manitobans.

In Manitoba, Manitoba Hydro was created for the purpose of meeting the electrical power needs of the province, as noted in Section 2 of the *Manitoba Hydro Act* (Manitoba 2012c, s.2 p.4):

> *The purposes and objects of this Act are to provide for the continuance of a supply of power adequate for the needs of the province, and to engage in and to promote economy and efficiency in the development, generation, transmission, distribution, supply and end-use of power.*

As the quote above makes clear, Manitoba Hydro was created to meet the needs of the province. In order to do so, Manitoba Hydro must have a clearly defined set of needs to be met.

A key question is how are these needs determined? It is fair to say that determining energy needs is not an easy task; discussions surrounding the topic can ultimately require questioning the basic character of human needs (e.g., Maslow 1943), and definitions of the good life (e.g. Higgs et al. 2000; Hall and Klitgaard 2012). Certainly many considerations must be taken into account in relation to need, and this section outlines three basic ones.

See energy as a service and promote end-use matching

First, in order to determine the need for energy, it is important to recognize that electricity is ultimately a means to social ends. People generally do not want energy, or even electricity, but rather the services they provide, including comfortable homes, personal transportation, entertainment, and light (Lovins 1976; 1977; Science Council of Canada 1977; Bott et al. 1983; Brooks and Newman 2004).

Focusing on energy as a means to an end is an instrumental approach that promotes the examining of tasks, and the posing of two basic questions (Lovins 1978):

1. is this task worth doing? and
2. what is the most elegant and effective way to match the quality of energy supply with the quality of the end use?

For the time being, it is helpful to focus on the second question, which Lovins explored through end-use matching (Lovins 1977, ch. 2; Brooks and Casey 1979).

First, at a technological level, responding to needs appropriately may involve matching the quality of the energy to the quality of the end-use (oftentimes known as "end-use matching"). For example, the Manitoba Clean Energy Strategy notes that (Manitoba 2012b, p. 30):

> *[U]sing electricity – a high value energy form – to raise air or water temperatures by only a few degrees is considered a wasteful way to create heat. It is often termed, "using a chainsaw to cut butter." As a result, the conversion of buildings heated all-electrically (many of which are in rural areas) to use geothermal heat pumps, biomass or solar sources of renewable energy can produce multiple benefits (ex: lower energy costs, new local jobs, freeing up more electricity for Manitoba hydro exports).*

In this instance, we can see that there are needs, such as for low-level ambient heat, currently being met by using high quality electrical energy, when a low quality electricity source might be better suited. Given the anticipated expansion in energy demand in Manitoba, it is important to ensure that appropriate end-use matching is promoted.

Proponents of end-use matching argue the approach is a far more efficient and effective means of achieving goals than supply management. Given that a great deal of energy is lost during conversion from one form to another, end-use matching promises to reduce the losses due to energy conversions wherever possible (Lovins 1977, ch. 2). For example, electricity is improperly matched when it is used for tasks – such as heating and lighting – that can be provided through lower quality sources (Holtz and Brooks 2009).

Holtz and Brooks (2009) note that for reasons of analysis, end uses can effectively be grouped into four basic categories:

1. lower-temperature heat – e.g. for household heating;
2. higher-temperature heat – e.g. for industrial applications;
3. electricity – e.g. electronics and electric motors; and
4. transportation

Beginning with the end-use and working backwards also opens up a wider range of possibilities for meeting needs, and tends to increase the diversity of energy related technologies. It is noteworthy that end-use matching is being applied in water studies as well (e.g. Brooks et al. 2009).

Build energy consumer awareness and facilitate access to less demanding options

The second consideration regarding need is that much depends on public awareness and understanding. This is particularly evident in efforts to encourage and facilitate conservation and efficiency initiatives, but it applies more broadly as well.

As has been well demonstrated in the successes of campaigns to discourage smoking, while major shifts in behaviour and underlying ideas about what is appropriate and healthy are possible and can deliver greater individual and public wellbeing, they often

depend on a range of encouragements, work to foster informed individual and community choice and initiatives that make it easer for people to act on those choices.

In energy systems planning, where infinitely continued expansion of generation, transmission and consumption cannot in the end be economically, socially or biophysically viable, a transition to much greater emphasis on efficiencies is clearly needed. Indeed it is already well underway. As Lovins (1976) notes:

> *We might do this because of changes in personal values, rationing by price or otherwise, mandatory curtailments, or gentler inducements. Such "social changes" include car-pooling, smaller cars, mass transit, bicycles, walking, opening windows, dressing to suit the weather, and extensively recycling materials.*

Little if any of this involves profound changes in underlying values. Energy conservation and efficiency efforts are easily linked with widespread and longstanding respect for thrift, simplicity, diversity, neighbourliness, humility and craftsmanship. And conservatives as well as radicals can embrace the notion that requiring large amounts of energy to accomplish social goals should be taken as an indicator of failure as opposed to success (Lovins 1977, ch. 1 and 2; 1978; Franklin 1990, ch. 6).

At the same time, however, a shift in emphasis to demand management, conservation and efficiency does entail some serious attention to the larger costs of ever-expanding consumption, how these costs can best be recognized and how better alternatives in the individual and public interest can be made available and attractive.

An example to illustrate this point is provided in a report prepared by EnerNOC Utility Solutions regarding future electricity demand in Manitoba. The report projects consumption in the category of residential "miscellaneous" electricity to increase by 233 percent from the year 2010 to 2031. As noted by EnerNOC (2013, p. 68-69)

> *Growth in miscellaneous use is also substantial. This use includes various plug loads not elsewhere classified (e.g., hair dryers, power tools, coffee makers, etc.). This end use has grown consistently in the past and we incorporate future growth assumptions that are consistent with historical trends.*

The basic assumption here – that past growth trends can and should simply be projected into the future – has a long if somewhat chequered history, including in electric power planning. But it is a pre-sustainability assumption.

In the coming decades, we might instead expect or take initiatives to ensure that device efficiency improvements keep pace with any rise in demand for more devices, or that appropriately priced energy, access to more efficient alternatives and other measures area adopted to encourage consumers to be more efficient and selective in using these devices. Aware and facilitated citizens may then choose not to continue expanding consumption of electronics and electric devices in light of the balance of attractions and disadvantages involved.

More broadly, energy system planning must include attention to two important questions regarding growth in electricity usage:

1. Is this growth desirable (e.g. do we want more electronics?) given the full range of anticipated benefits, adverse effects and risks?
2. How can we get off this development path (what path would be preferable and feasible and what steps are needed to move us to it?

Considering these questions, however, leads us directly into the third consideration regarding need, which relates to backcasting.

Work backwards from the end goals

The third consideration regarding how to establish a need focuses on backcasting. In strategic planning, future needs can be determined in a variety of ways, with forecasting and backcasting representing two common approaches.

An example of forecasting is provided above with regard to the forecasted increase in consumption of electronic devices that relies on extrapolation along the trajectory of recent and current trends. While there are obvious merits to the forecasting approach, it may be limited in the extent to which it ignores questions of desirability.

The two questions relating to energy growth (being desirable and inevitable) lead to the second general approach to defining a need, that being backcasting, whereby positive visions of the future are developed and then steps required to more towards these more desirable futures are determined (Robinson 1982; Robinson 2003; Loorbach 2007, ch. 4; Kern and Smith 2008).

By undertaking backcasting exercises in a participatory and transparent manner, the legitimacy and representativeness of backcasting may be improved. To this end we note that the World Commission on Dams proposes a participatory approach to needs assessment when it calls for (WCD 2000, p. 264):

> *An assessment based on participatory methods appropriate to the local context resulting in a clear set of development objectives that guide the subsequent assessment of options.*

Compared to forecasting techniques, backcasting provides two important benefits for sustainability assessment. First, backcasting helps avoid issues of overstated demand, which have been a traditional concern for energy planners. As noted by the World Commission on Dams (2000, p.179):

> *The needs for power, food and water are typically identified through sectoral demand forecasts, which have frequently overstated sectoral needs.*

On the same page, the World Commission on Dams notes:

> *Overstating future demand has led to a perceived need for a large incremental response to meet rapidly growing needs. In many circumstances this has militated against a gradual approach of adopting smaller, non-structural options and has pushed decision-makers into adopting large-scale dam projects because they seem to be the only adequate response to the large gap between existing supply and forecast demand.*

Second, because backcasting is an explicitly normative exercise (Robinson 2003), it promotes reflection and deliberation upon unattractive characteristics of present arrangements and trends, such as the currently inequitable use of resources by modern societies (WCD 2000, p. 149). This allows for pursuit of futures we want, rather than acceptance of projections from what we have now.

Proper backcasting is aided by an explicit set of sustainability criteria, by which the various desirable futures can be compared and assessed. In section 4 of this report we outline and propose a set of sustainability criteria for assessing the preferred power system plan. This criteria set may serve as a starting point for a backcasting approach as well, although it would require adjustment for the different context of a backcasting exercise.

Final comments on establishing a need

There are open questions about the extent to which Manitoba Hydro is responsible for detailed elaboration of all the social, economic and biophysical needs and desirable futures that may affect or be affected by its power system planning options.

In general, no boundary separates power system planning from broader policy and strategy. It is clear that in Manitoba power systems planning forms part of economic policy, such as maintaining low electricity rates for industrial customers, and that it can have important effects on social and community development risks, opportunities and related policy matters. Furthermore, it should be evident that determining desirable futures and translating those into energy needs are fundamental requirements in establishing good energy strategy.

In the absence of a more comprehensive strategic energy assessment, it is contingent upon bodies such as the PUB to ensure these broader issues are considered with sufficient diligence – recognizing that the determination of appropriate emphasis depends on the extent to which attention to these issues may affect judgements on the relative desirability of available options and the nature of terms and conditions accompanying any approvals.

2.3.2 Develop alternatives

Once a need has been defined and agreed upon, the next step in a sustainability-based assessment process should be to identify the potentially reasonable alternative approaches to meeting that need. The identification and comparative evaluation of alternatives is crucial to promoting progress towards sustainability.

The assessment of alternatives matters because it helps to overcome our inability to define and measure adequately the thresholds of acceptability for individual proposals. While there are obvious cases where a proposed project or plan is unacceptable, and it is possible to be reasonably well informed about important parameters, there is no possibility of a clear overall delineation of the assumed line between acceptability and unacceptability.

Many of the fundamental limitations and critiques of narrowly conceived project and strategic level assessments result from the application to proposals for undertakings that are presented without alternatives, or alternatives are discounted without due consideration. The associated processes and outcomes are typically required to pretend that there is an identifiable and defensible threshold of acceptability. Moreover, they are not well equipped to address cumulative and synergistic effects, and are focused on harm minimization as opposed to promoting positive steps (Duinker and Greig 2006).

In order to avoid the perils of trying to define a threshold of acceptability, sustainability assessment should be applied primarily in the comparison of alternatives. The premise is that as societies move along choosing the best alternatives, they will progress towards sustainability. A hydro dam or a power system is not sustainable or unsustainable; rather it is a possible means of helping Manitoba progress towards or away from greater sustainability. O'Brien (2001) notes,

> *the assessment of the benefits and drawbacks of a full range of alternatives, not assessment of the acceptable level of a hazardous activity, is not only the heart of an environmental impact statement, it is the heart of wise decision-making in a democracy.*

In its final report, the World Commission on Dams devotes significant time and energy to stressing the importance of defining a full suite of alternatives to meet the agreed upon needs. For example, one criterion proposed by the Commission is the following (WCD 2000, p.223):

> *The range of options being examined at the outset will be broad and go beyond technical alternatives to consider relevant policy, programme and project alternatives. It should also consider: institutional changes and management reforms that could influence consumption patterns, reduce demand, and affect the viability of other supply options; the river basin context, cumulative impacts and interactive effects, including the interaction between surface and groundwater resources; multipurpose functions of alternatives; secondary local and regional development effects of alternatives; subsidies that can distort comparison of alternatives; life cycle analysis to compare electricity generation alternatives; and the gestation period required before benefits are delivered.*

For the purpose of the NFAT assessment, two key issues must be considered with regard to the assessment of alternatives: seeking improvement in current capacity, and identifying the full range of potentially suitable portfolio alternatives.

Seek improvements in current capacity

The first consideration with regard to assessing alternatives is that there are oftentimes many opportunities for improvement on current practice. Before developing new supplies, it is important to ensure that current supplies are being efficiently and effectively used. This generally translates into a preference for conservation and demand-side management (collectively called CDM) opportunities in all areas of the power system (e.g. industrial, residential).

As noted by the World Commission on Dams (2000, p.224)

> *Planning must give priority to making existing water, irrigation, and energy systems more effective and sustainable before taking a decision on a new project. The potential is highly location specific, therefore assessment will require detailed in-country reviews that cut across sectoral boundaries and go beyond technical responses to include consideration of policy options.*

Promoting CDM opportunities is both a technical and social question. As noted above in section 2.3.1 with regard to defining the need, there are often many technical and associated policy and management opportunities for ensuring that the quality of energy supply is properly matched to the end-use.

In Manitoba, heating is an example of an end-use that may be better served by biomass or geothermal options, both of which either eliminate or greatly reduce electricity requirements. A list of possible CDM opportunities proposed in the Manitoba Clean Energy Strategy is outlined in Table 2, and highlights Manitoba's goal to be "[l]eading Canada in Energy Efficiency" (Manitoba 2012b, p.3). At the same time, there are often many changes to societal norms (such as dressing appropriately for the weather) that can lead to significant energy savings.

Table 2 - Sample CDM Opportunities Recognized in the Manitoba Clean Energy Strategy

- Through Manitoba Hydro, implement a new on-meter financing program that overcomes the high upfront costs that prevent households from implementing energy saving retrofit measures.
- Enhance Manitoba's successful low income energy efficiency programming, in partnership with social enterprises, to help build community capacity, create jobs and maximize economic benefits.
- Expand The Green Building Policy so that more government funded building construction, renovation and operations are subject to energy efficiency requirements.
- Expedite adoption of National Building Code energy efficiency updates to ensure Manitoba homes and businesses achieve the lowest lifetime costs for energy.
- Advance vehicle-related efficiency through green fleet purchasing policies, support for higher vehicle fuel efficiency standards and promotion of active transportation.

- Support the expansion of voluntary programs to benchmark, rate and label building energy performance. Manitoba will explore and pilot programs that disclose the energy performance of buildings offered for sale or lease.
- Pursue minimum energy efficiency standards for high-energy consuming products where federal standards are deemed inadequate.
- Develop and publish an annual energy efficiency plan that establishes stronger efficiency targets; identifies an expanded range of programming options; sets out costs and benefits; and reports on performance.

Source: Adapted from (Manitoba 2012b, p.3)

Identify and compare the full range of potentially suitable portfolio alternatives

The second key issue in alternatives assessment is ensuring the full range of potentially suitable alternatives is assessed at the power system level rather than solely at the individual undertaking level. Different generating options can play different roles in the power system and it is difficult, if not impossible, to determine the relative value of a generating technology without considering what position it may occupy in the larger system. What is required then is an assessment of portfolios of power system generation and demand management options.

Applying a portfolio approach also helps to ensure different generating options do not unduly deter one another and rather work in concert. For example, large incremental additions to energy supply have the potential to harm other means of meeting needs such as CDM or biomass heating. As noted by Mahapatra et al. (2007), in Sweden between 1973-1986, an abundance of electricity resulting from an expansion of nuclear power led to the promotion of electricity-based heating systems over biomass heating. As a result few housing units in this period were build to accommodate biomass heat and unfortunately, it is far more costly to retrofit a house for biomass heating than it is to design for biomass in the first place, which ultimately leads to an exclusion of biomass options for heating.

Some generating options can also exclude others due to long lead times or sunk cost. For example, as noted by the World Commission on Dams (2000, p.221):

> *Often dams take a long time to come on stream, delaying the delivery of benefits. Because they are high cost investments they divert resources and can exclude other options that may be able to deliver benefits more quickly. These options include demand side management, alternative supply side technologies and improving and expanding the performance of existing systems.*

Adopting a portfolio approach can also help to overcome the relative limitations of individual generating options. For example, dams may help other renewable forms of electricity, such as wind power, by providing a means of overcoming intermittencies (Manitoba 2012b). Without a full and fair analysis of alternatives at the portfolio level, the potential for such positive synergy is likely to be lost, and the related design and impacts considerations neglected. The result is selection of a development path that precludes or disadvantages viable alternatives both now and in the future.

The assessment of alternatives requires an explicit set of sustainability criteria by which the various desirable power system configurations can be compared and assessed. As noted above, this approach respects the substance and intent of Manitoba laws and policies on sustainability in the public interest. In section 4 of this report we outline and propose a set of sustainability criteria for assessing Manitoba Hydro's preferred power system plan. The essentials of the criteria set are described in the following section.

Together, attention to these two considerations – seeking improvement in current capacity, and assessing portfolio alternatives – should help to ensure a suitably informed, sustainability-oriented identification and comparison of the power systems options most likely to serve the long-term public interest. The resulting approach should allow Manitoba to take full advantage of its opportunities while minimizing exposure the costs and risks of oversupply and overconsumption of electricity.

2.3.3 Develop a set of sustainability-based evaluation and decision criteria

The desired end result of sustainability assessment is the achievement of net gains that are mutually reinforcing, fairly distributed and lasting, and that avoid all potentially significant adverse effects. This begs questions, however, about what are the key benefits to be sought, and what adverse effects are especially to be avoided. Addressing these questions requires the development of sustainability criteria that cover all key issues and are suitably specified for the particular case and context.

Every important decision we make is based on some set of criteria for evaluation and decision-making. The criteria are not always explicitly stated or applied in a consistent manner. They may not even be mutually compatible. But they are always present.

For the purpose of sustainability assessment and proper decision making, the goal is to have a coherent set of explicitly identified and consistently applied criteria. These criteria clarify how to pursue the general goal of contributing to sustainability in a given case and context – in this situation the NFAT considerations. To do this the set of criteria must integrate (Gibson 2006b) the following four elements:

- considerations that are linked across the usual social, economic and ecological categories;
- universally-applicable imperatives and concerns specific to the case and context;
- issues and priorities interacting from local to global levels, and over time from present to future generations; and
- attention to best options as well as improvements over base conditions.

The basic set of generic decision making criteria used in this document are Gibson's sustainability criteria (Gibson et al. 2005, ch. 5), which are shown in Table 3 below. Gibson's criteria represent a synthesis of the main requirements for progress towards sustainability presented in the literature and tested in practice in sustainability implementation initiatives (including early sustainability assessments) over the past few decades (Gibson et al. 2005, ch. 5).

These criteria can be phrased and categorized in various ways. In every application they should be specified for the particulars of the case and context and they should provide an adequate working foundation for that specification task.

Table 3 - Gibson's eight evaluation and decision criteria for sustainability

Socio-ecological system integrity Build human-ecological relations to establish and maintain the long-term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which human as well as ecological wellbeing depends.
Livelihood sufficiency and opportunity Ensure that everyone and every community has enough for a decent life and that everyone has opportunities to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity.
Intragenerational equity Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc.) between the rich and the poor.
Intergenerational equity Favour present options and actions that are most likely to preserve or enhance the opportunities and capabilities of future generations to live sustainably.
Resource maintenance and efficiency Provide a larger base for ensuring sustainable livelihoods for all while reducing threats to the long term integrity of socio-ecological systems by reducing extractive damage, avoiding waste and cutting overall material and energy use per unit of benefit.
Socio-ecological civility and democratic governance Build the capacity, motivation and habitual inclination of individuals, communities and other collective decision making bodies to apply sustainability requirements through more open and better informed deliberations, greater attention to fostering reciprocal awareness and collective responsibility, and more integrated use of administrative, market, customary and personal decision making practices.
Precaution and adaptation Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, plan to learn, design for surprise, and manage for adaptation.
Immediate and long term integration Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.

The generic criteria above provide a basic framework that covers the key sustainability issues and their interconnections. As a basic framework, these criteria should ensure that no big common issues are neglected during NFAT considerations. At the same time, the criteria are clearly both general in nature and broad in scope, and it is important that they be specified and elaborated for the case and its particular context. The process of criteria specification is described in Appendix 5.

Section 4 of this report proposes a set of sustainability criteria for application in the NFAT assessment. A similar sample set of criteria relating to the Mackenzie Gas Project

is provided in chapter 19 of the final report by the Joint Review Panel (Mackenzie Gas JRP 2009, ch. 19).

2.3.4 Anticipate and prepare for necessary change

The final aspect of sustainability assessment is the importance of planning for necessary change. It is generally agreed upon that we need a rather significant change in the structure and function of our societies, for which the energy system plays an important direct and indirect role.

In planning for change to a more sustainable society, it is important to recognize that change takes time; infrastructure must turn over, attitudes must change, and the natural world must heal. Because of this, it is generally helpful to consider system changes in terms of bridges, which may help ease the transition from our current overconsumption of non-renewable resources to renewable supplies (Brooks and Casey 1979; Morrison and Lodwick 1981). The concept of a bridge requires that the gains realized from using non-renewable flows be devoted to the purpose of leading society towards renewability (Schumacher 1973, ch. 1).

There are two important characteristics related to planning for necessary change that will be briefly discussed here, relating to (1) avoiding lock-in and (2) promoting adaptive and flexible technologies and systems.

Avoiding lock-in

Thinking in terms of bridges and transitions brings attention to the characteristics of path dependency and lock-in. As technologies and societies co-evolve, certain technologies become embedded in, and necessary for, the functioning of the society (Ellul 1967; Winner 1986, ch. 1; Arthur 2009). Embedded technologies include infrastructure (e.g. pumps, sewers, power lines), broadly adopted general-purpose technologies (e.g. combustion engines) and even entrenched ways of thinking (e.g. the constant search for efficiency) (Ellul 1967; Rip and Kemp 1998; Arthur 2009).

The more technologies become embedded, the more that structures of support and dependence build up around them, and a dynamic of lock-in is created (Arthur 2009). Table 4 provides a non-exhaustive list of interconnected ways in which lock-in may be manifest.

Table 4 - Some manifestations of lock-in

Financial reasons
• Economies of scale
• Sunk investments in machines, infrastructure and skills
• Ease in obtaining financing and insurance
• Vertical integration within sectors
• Improper pricing signals
Psychological reasons
• Cognitive routines that ignore relevant outside developments
• Organizational commitments, vested interests, and political influence
• Adaptation of lifestyles to technical systems that increase social dependence on new technologies

• Familiarity by customers
Co-evolutionary reasons
• Success breeds imitation
• Tight fight with existing regulatory approaches developed around original technology
• Technologies create their own needs
• Dependence of social and institutional structures (e.g. design of cities, infrastructure)

Source: adapted from (Idenburg and Faber 2008; Verbong and Geels 2008; Arthur 2009; Jordaan et al. 2009; Meadowcroft 2009)

Lock-in is not always undesirable; the stability provided by lock-in can help reduce complexity and uncertainty (Rip and Kemp 1998; Berkhout 2008; van den Bergh and Kemp 2008). Likewise, lock-in can provide increasing-returns to scale through such things as learning by using, imitation, and the bandwagon effect.

Lock-in is, however, not well suited to a world of significant, potentially rapid and minimally predictable change, where flexibility and other characteristics of adaptive capacity are needed. Lock-in is especially problematic where it helps to entrench dependency on social, economic and/or biophysical behaviours and trends that are unsustainable and for other reasons undesirable.

To help avoid lock-in, it is important to promote a wide variety of options and avoid selecting winners too early. In order for this to occur there must be a safe space for innovations to develop, and a level playing field that provides competing innovations with a fair chance of succeeding (Kern and Smith 2008; Rotmans and Loorbach 2008; van den Bergh and Oosterhuis 2008; Loorbach 2010).

Favouring adaptive and flexible technologies and plans

A second way to plan for change is to favour adaptive and flexible technologies (Berkhout 2008). Some technologies such as solar PV are modular and easily scalable, and may be developed in a wide variety of ways (centralized, dispersed, public, private). Other technologies, such as nuclear generation, are more capital intensive, less flexible and characteristically involve large incremental increases in supply and centralized control.

Flexibility is particularly important in electric power system planning given the long lifetimes of many generating options, as technological development brings both opportunities and risks. Positive opportunities include the possibility that technological developments will lower the cost of emerging generation technologies (e.g. wind and solar-PV), making them cost competitive with traditional forms of generation. Likewise, the development of storage technologies and residential (and other) demand response technologies may allow dispatchable and interruptible loads to play a much more active role in power system operations.

At this same time, reasonably anticipated technological development may undermine now attractive options. For example, advances in the technological fields described above could allow north-central US electricity providers to integrate much more effective

use of their considerable wind resources. If this happens, the Americans may require less, and perhaps very little, firm hydropower from Manitoba.

Planning for necessary change means being proactive and innovative. We are not tasking Manitoba Hydro and the PUB with solving all societal issues, but rather to recognize that energy systems are an important component of societal welfare. By ignoring the importance and power of energy systems planning in broader social strategy, we risk making decisions by default, and without proper consideration. Such an approach is both undesirable and perilous at times.

Summary

This section briefly described four basic elements of sustainability assessment, those being:

- clearly establishing a need
- developing the full suite of alternative approaches, policies and technologies and power system configurations;
- assesses the full suite alternatives against an explicit set of sustainability criteria; and
- planning for necessary change.

The following section builds from what was described above by proposing some general guidelines for sustainability assessment processes.

2.4 General guidelines for sustainability assessment processes

The sections above describe the basic approach to sustainability assessment, and implicitly point to a set of guidelines for undertaking proper sustainability assessment practice. This section briefly makes those guidelines explicit. Five guidelines for the design and application of sustainability assessment processes are provided in Table 5 and are elaborated upon below.

Table 5 - Basic procedural guidelines for sustainability assessment

Prioritize contribution to sustainability and apply it in all processes Establish contribution to sustainability as the main test of proposed purposes, options, designs and practices, and must put application of this test at the centre of decision making, not as one advisory contribution among many.
Base decisions on an explicit set of evaluation and decision making criteria and trade-off rules Adopt evaluation and decision making criteria and trade-off rules that reflect the full set of core requirements for progress towards sustainability, recognize interdependencies and seek multiple reinforcing gains on all fronts.
Be open and participatory Provide means of specifying the sustainability decision criteria and trade-off rules for specific contexts, through informed choices by the relevant parties (stakeholders).
Promote transparency and accountability Ensure that the deliberations and decisions are sufficiently open to scrutiny and participation, and sufficiently accountable in law, so that an informed public can push effectively for proper

application.

Promote the process of sustainability assessment as much as the substantive outcome
The process of undertaking a sustainability assessment provides an opportunity to foster social learning, build good will, and allow stakeholders to take ownership and responsibility of the lives and decision. The process of sustainability assessment can be improved by incorporating open participative approaches, respecting different interests, and integrating different kinds of knowledge.

Source: adapted from (Gibson 2006a)

Prioritize contribution to sustainability and apply it in all processes

Ensuring progress towards sustainability must be an integral component of decision making, as opposed to something considered separately and/or after the fact. By centring decisions on the resulting contribution to sustainability, one can help ensure that projects, plans, programs and other undertakings are designed to help society meet needs and preferences that have been identified openly, comprehensively and in an integrated manner.

Bringing sustainability to the centre of decision making requires recognizing that dams, energy system plans and other projects are a means to an end, not ends in themselves. Proper decision making should be centred on how best to move towards those desired ends.

The World Commission on Dams proposes that a set of sustainability criteria should be applied at all important decision points, including the needs assessment, the selection of alternatives, preliminary studies, project preparation, project implementation, and finally project operation (WCD 2000).

As was mentioned in section 2.2, above, sustainability assessment does not seek to define whether or not a proposed undertaking is sustainable, but rather whether or not it is the best option for helping society progress towards sustainability. This point is equally valid here insofar as all decisions should be centred on promoting progress towards sustainability.

Base decisions on an explicit set of evaluative and decision making criteria and trade-off rules

As was previously noted, all decisions are based upon criteria. For clarity and accountability in sustainability assessment, it is important to specify the relevant criteria explicitly.

By their very nature, sustainability criteria serve to define what is considered important, both universally and within a particular case and context. The criteria set proposed in section 4 provides an initial package of sustainability criteria that has been developed for assessing Manitoba Hydro's preferred power system plan and relevant alternative. It draws from sustainability criteria sets for dams prepared by other bodies – such as the World Commission on Dams (WCD 2000) – as well as attention to the conditions and concerns, opportunities and aspirations surrounding the NFAT proposal, alternatives and context.

Be open and participatory

It is becoming increasingly evident that citizens and stakeholders both want to and deserve to be involved in decision-making processes (Martinez-Alier et al. 1998; Munda 2004; Hirsch Hadorn et al. 2006; Funtowicz and Ravetz 2008; Gasparatos et al. 2008; Waltner-Toews and Kay 2008). Funtowicz and Ravetz (1993) provide several of the key arguments for public participation:

> *When problems lack neat solutions, when environmental and ethical aspects of the issues are prominent, when the phenomena themselves are ambiguous, and when all research techniques are open to methodological criticism, then the debates on quality are not enhanced by the exclusion of all but the specialist researchers and official experts. The extension of the peer community is then not merely an ethical or political act; it can positively enrich the processes of scientific investigation.*

Participation is also considered valuable as a means to foster public engagement and local ownership (Reason and Bradbury 2001; Waltner-Toews and Kay 2008; Giampietro and Mayumi 2009, ch. 10), enrich public capacities (Diduck et al. 2012), improve accountability (Kidd and Fischer 2007), help manage uncertainty and unpredictability, foster learning (Lister 2008, p. 99), and increase the legitimacy of decisions (Lovins 1977; Franklin 1990).

In light of the successes and failures of large-scale dam building projects across the world, the World Commission on Dams is firm and explicit in its call for increasing public participation, stating (WCD 2000, p. 215):

> *Decision-making processes and mechanisms are used that enable informed participation by all groups of people, and result in the demonstrable acceptance of key decisions. Where projects affect indigenous and tribal peoples, such processes are guided by their free, prior and informed consent.*

In order to achieve this, the World Commission on Dams notes that effective and open participation requires (WCD 2000, p. 215):

1. "Recognition of rights and assessment of risks are the basis for the identification and inclusion of stakeholders in decision-making on energy and water resources development.
2. Access to information, legal and other support is available to all stakeholders, particularly indigenous and tribal peoples, women and other vulnerable groups, to enable their informed participation in decision-making processes.
3. Demonstrable public acceptance of all key decisions is achieved through agreements negotiated in an open and transparent process conducted in good faith and with the informed participation of all stakeholders.
4. Decisions on projects affecting indigenous and tribal peoples are guided by their free, prior and informed consent achieved through formal and informal representative bodies."

Promote transparency and accountability

The guidelines above all serve to ensure that the decision-making process is both transparent and accountable. Promoting transparency and accountability helps improve the decision-making process by facilitating scrutiny by all stakeholders and empowering them to act effectively to ensure that decisions are made in the proper manner, for the right reasons and with the proper goals in mind. This is the essence and fundamental requirement of democracy.

A sustainability assessment approach, with its focus on developing and defining a set of mutually agreed upon sustainability criteria, provides one possible means of moving towards more transparent and justified decision making.

Promote the process of sustainability assessment as much as the outcome

Sustainability assessment is generally promoted as a means of improving the substance of decision making, ultimately leading to better outcomes. While this is no doubt the central thrust of the approach, particularly with regard to potential developments such as the NFAT assessment, it is important to recognize that sustainability assessment also has value as an approach to ongoing learning.

The process of undertaking a sustainability assessment – including critical examination of needs and purposes, careful identification of potentially reasonable alternatives and specifying the sustainability criteria – provides an opportunity for those involved to reflect on what matters in society, what future we want and what rights and responsibilities we have towards one another.

The NFAT assessment provides an ideal opportunity to apply a sustainability assessment framework and obtain maximum benefits from the process itself. It is clear that a wide range of challenges and opportunities face Manitoba and the world more broadly.

There are substantial benefits in choosing an approach that promotes informed discussion and critical self-reflection in the broader population. It is noteworthy that the federal EIS Guidelines for the proposed Keeyask project – which represents a critical component of the NFAT – speak to this very opportunity, where they require the proponent to describe "how Canadians benefit from the information gathering process undertaken by the proponent as part of the environmental assessment" (CEAA 2012b, p. 26). The guidelines mention the following factor to consider (CEAA 2012b, p. 26):

> *contribution of the EA to support sustainable development: Describe how the EA process for the Project contributed to the concept of sustainable development for a healthy environment and economy.*

The process of applying a sustainability assessment framework would help the proponent – and future proponents – meet these requirements within the existing legislative frameworks.

2.5 Summary

This section introduced sustainability assessment as a framework for evaluation and decision making. It began by providing a brief history of sustainability assessment practice in Canada and beyond, and then provided a basic definition of *progress towards sustainability*. Second, a general approach for undertaking sustainability assessment was described. Third, a set of basic guidelines for sustainability assessment practice was proposed.

Now that a basic framework for sustainability assessment has been provided the next step is to show how it fits with current legislative requirements in Manitoba.

3 The legislative basis for sustainability-based decision making in Manitoba

Thus far in this report the basics of sustainability assessment have been described and an argument for applying sustainability-centred criteria in the NFAT of a preferred power system plan has been presented. What has been suggested but not yet been discussed is whether there exists any legislative basis for incorporating sustainability-centred criteria in decision-making processes in Manitoba.

We understand that the notion of sustainability-based assessment has been discussed at some length in Manitoba through forums such as the Consultation on Sustainable Development Implementation (Sinclair 2002; Sinclair and Quinn 2012) but that there is no particular official Manitoba government document stating that decisions must be made using a sustainability assessment framework.

In order to address this gap, Appendix 1 provides an analysis of the legislative basis for sustainability-based assessment in Manitoba through a review of the Manitoba *Sustainable Development Act* (the SD Act) (Manitoba 1998), key sections of the Manitoba *Environment Act* (the ENV Act) (Manitoba 2012a) and the *Canadian Environmental Assessment Act* (CEAA 2012) (CEAA 2012a). It does so by synthesizing and reorganizing sections of the three Acts and comparing them to the generic sustainability assessment criteria (Gibson et al. 2005, ch. 5). in addition, Appendix 4 reports the sustainability-related obligations and commitments of Manitoba Hydro.

The objective here is not to establish that sustainability-based assessment in this case is mandatory in law, but rather to demonstrate the extent to which the key elements of a sustainability-based approach are already recognized in applicable public policy and legislated commitment as set forth in the three Acts reviewed in Appendix 1 and that the approach is clearly appropriate for application in decision making on a proposed undertaking and its alternatives where, ultimately, the judgment must rest on what best serves the public interest, now and well into the future.

The Appendix 1 review of the positions taken in the three Acts applies Gibson's generic sustainability assessment framework because it is a synthesis of global experience, is widely recognized and has been applied worldwide as a relevant approach to

sustainability assessment (e.g. Pope et al. 2004). Moreover, it has been heavily informed by Canadian environmental assessment practice, and has been applied previously by proponents, experts, and joint review panels in a Canadian context (e.g. for the Mackenzie Valley Gas Project Review) (Gibson 2006b; OPA 2006; Gibson et al. 2008).

Ultimately, if the Acts incorporate the key components of the generic sustainability assessment criteria for sustainability assessment, concerning both substance and process, then it is reasonable to argue that the Acts taken together demand a sustainability assessment approach to planning and decision making on major undertakings.

The results of the analysis lead to three conclusions. First, it is clear that effectively, there is comprehensive overlap in the substantive requirements for sustainable development between the generic sustainability assessment criteria and the three Acts. For this reason, it is fair to say that the Acts effectively support and necessitate application of the full suite of requirements for progress towards sustainability. Taken as a package, the Acts are demanding and rigorous with regard to sustainable development.

Second, the three Acts are in good agreement with the guidelines for sustainability assessment practice proposed in Table 5, with some notable differences. Unlike the guidelines proposed in Table 5, the legislation reviewed includes no direct requirement for application of specified evaluation and decision-making criteria and trade-off rules. Nor do the three Acts explicitly state that contribution to sustainability should be the overarching goal at all stages of decision making and planning.

Arguably, however, application of the "contribution to sustainability" test is implicitly required to satisfy the intent of the Manitoba *Sustainable Development Act* and *Environment Act* to ensure long-term sustainability for Manitoba and its citizens and to serve the stated purpose of CEAA 2012 to promote sustainable development (CEAA 2012a, 4(1)h).

In any event, since both the substantive and procedural requirements of sustainability assessment are already consistent with what is established in the Acts, adoption of a more explicit and more fully elaborated framework for sustainability assessment would be a useful next step in clarifying expectations and facilitating implementation. Furthermore, a sustainability assessment framework would also help ensure decisions are made in the public interest.

4 A set of evaluation and decision criteria for assessing the NFAT in relation to Manitoba Hydro's preferred development plan

On the basis of the foundation established above, we can now provide the proposed set of evaluation and decision criteria for assessing the NFAT in relation to Manitoba Hydro's preferred development plan. The table below presents a basic set of sustainability-based criteria for evaluation of alternative power system portfolios combining various technologies (e.g. supply from hydroelectric installations, wind farms; transmission facilities and CDM initiatives).

The points below identify the main categories of sustainability-related criteria to be addressed in the evaluations and decisions in this case as required by existing law and regulation current in Manitoba (for details see also Appendix 1). Each category includes a set of themes (shown in *italics*) that are then elaborated upon in the relevant criteria. In certain instances, the categories overlap and the particular criteria interact.

The criteria incorporate all of the generic requirements for progress towards sustainability (see Table 4 above) but area specified for electric power system planning and assessment in Manitoba. A draft criteria set was reviewed by several experts with knowledge of Canadian energy strategy, the Manitoba context, and/or the NFAT submission; insights from these reviews have also been incorporated in the revised criteria set below.

The resulting criteria set is meant to ensure that the evaluation and decision criteria fit the particular case and context and include the necessary elements of proper energy strategy. However, a full development of the sustainability criteria set would have involved much broader consultation and public deliberation than was possible in the circumstances.

4.1 Key characteristics of the criteria set

The sustainability criteria presented in Table 6 have five key characteristics that are important for application in the NFAT review.

Designed as a full suite

First, the criteria set must be understood as a full suite. As an integrated set, the categories, themes and criteria provide the basis for evaluations and decisions in planning, assessments and approvals. Their application should ensure proper attention is given to the full interacting set of benefits while avoiding significant adverse effects and trade-offs.

As they are currently presented, the criteria set cannot be used for purely quantitative comparisons of the proposed plan and alternatives. The criteria are deeply interrelated and many of them overlap. Moreover, in specific contexts some criteria will be more important than others. Simple scoring and addition of results would not be appropriate. It would be possible for the PUB or other users to adjust the criteria to minimize overlaps and to assign weightings in light of evidence about issue and effect significance.

Alternatively, and perhaps preferably, the criteria can be used non-quantitatively to clarify the strengths and limitations of the preferred plan and its alternatives – possibly by simply considering for each criterion in each case whether the effects would be clearly positive contributions to sustainability, uncertain or mixed, or clearly adverse. The latter approach was adopted by the Joint Review Panel for the Mackenzie Gas Project and the summary results in the major effects categories are presented in Chapter 19 of the Panel's final report (Mackenzie Gas JRP 2009, Ch. 19).

Includes cross cutting issues

Second, the criteria set includes several cross-cutting issues of concern. Issues of concern are considered cross cutting when they meet one or more of the following criteria:

- are relevant on multiple geographical scales – household, neighbourhood, community, region, province, international, global;
- are relevant on multiple temporal scales – past and future as well as present;
- are relevant across different economic sectors - within the energy industry (e.g., renewables, nuclear, demand-side management), as well as outside (i.e., other economic sectors and other social issues); and
- are relevant to different groups – distinguished by income, gender, ethnicity, rural/urban, etc.

Within the criteria set it is difficult to identify all cross-cutting issues explicitly in a consistent manner. In general it should be assumed that the criteria are relevant at all scales (temporal and geographical), across all sectors and within all groups. That said, at times in the criteria set a specific scale, sector or group will be identified to ensure specific attention is paid to it.

Considers both power system and broader concerns

Third, while the assessment is primarily centred upon the Manitoba power system, it necessarily addresses broader social, economic and ecological issues. We recognize there is often a lively debate about whether energy policy is really also social policy and infrastructure policy and development policy, etc. It is clear that in Manitoba power systems planning overlaps with the economic policy, such as in maintaining low electricity rates for industrial customers.

No obvious line distinguishes power system planning from broader policy and strategy. In the absence of a more comprehensive strategic energy assessment in Manitoba, it is contingent upon bodies such as the PUB to ensure these broader issues are considered with sufficient diligence.

Because the NFAT case involves consideration of broader options and effects than typically arise in project level assessments, the criteria proposed in this section are assessed at a coarser level of detail than what is provided in the environmental reviews of proposed individual projects (e.g. the Environmental Impact Statement for the Keeyask Project). This is similar to the approach taken in other sustainability assessments of large proposed developments (e.g. Gibson et al. 2008; Mackenzie Gas JRP 2009; Lower Churchill JRP 2011).

Focused on progress towards sustainability as opposed to acceptability

Fourth, the criteria set seeks progress towards sustainability rather than defining an acceptability threshold. Where assessment practice fails to include comparison of alternatives, the process is forced to rely on an implicit acceptability threshold, whereby if a project meets a typically ill-defined minimum requirement, it may be approved to proceed. Many of the concerns with environmental assessment – including weak

attention to cumulative and synergistic effects, a narrow focus on minimizing harm without also promoting positive steps – are due in part to reliance on the acceptability threshold approach.

In order to avoid the threshold of acceptability problem, the sustainability assessment criteria should be applied in the comparison amongst alternatives. The premise is that as societies move along choosing the best alternatives available to them, they will move incrementally in the direction of sustainability.

Considers the full suite of possible effects

Fifth, each individual criterion must be considered in terms of its full suite of effects, including (Gibson et al. 2008, p. 53):

- direct effects – e.g., a new dam disrupting navigation and fish movement;
- indirect effects – e.g., provision of electric power from Manitoba to US markets supplanting other power sources with different effects profiles;
- induced effects – e.g., government support for demand management leading to advances in associated techniques and technologies;
- cumulative effects – commonly defined as the "changes to the environment that are caused by an action or set of actions in combination with other past, present and future human actions" (Hegmann et al. 1999); and
- synergistic effects – where two or more factors combine in ways that have effects different from and perhaps greater than the effects of the factors by themselves, e.g. building roads into previously inaccessible areas plus attracting an influx of workers may together lead to significantly increased hunting and fishing pressures.

Likewise, the criteria set adopts a systems approach, which incorporates a broader understanding of what is considered. For example, in all cases the assessment must address (Gibson et al. 2008, p. 53):

- the full life cycle costs and benefits, including upstream (e.g. fuel cycle and construction inputs) and downstream (e.g. decommissioning, long-term waste management) components;
- the opportunity costs (i.e. opportunities foregone by choosing a given development pathway); and
- local, regional, provincial, national and international effects.

With these complexities noted, the following section provides the proposed sustainability criteria set.

4.2 The sustainability criteria set

Table 6 – A proposed set of evaluation and decision criteria for the NFAT analysis of Manitoba Hydro's preferred power system plan

Socio-ecological system integrity Build human-ecological relations to establish and maintain the long-term integrity of socio-ecological systems and protect the life support functions upon which human as well as ecological wellbeing depends.
Maintaining the integrity of our social-ecological systems
• protect and enhance ecological integrity, including attention to direct, indirect and induced effects (e.g. ecological connectivity, biodiversity)
• maintain our ecological life-support systems, including those that deliver ecological services (e.g. water purification), keystone species and culturally important species and ecotypes (e.g. forest cover, wetlands, caribou)
• support traditional livelihoods that depend on habitats and ecological services (e.g. hunting and trapping, medicinal plants) and the regeneration of traditional knowledge
• ensure the power system helps Manitoba to reduce its appropriation of global biocapacity (e.g. by discouraging highly consumptive lifestyle behaviour)
Anticipating and adapting to system dynamics
• anticipate and prepare for social-ecological systems change (e.g. climate induced species migration) through a variety of mechanisms (e.g., a robust monitoring program and response capacity built in the spirit of adaptive management)
• allow ecosystems to move through necessary cycles, including growth, development, collapse and renewal (e.g. fire regimes)
Living within the capacity of our planet
• favour system options that minimize rate of energy and resource extraction such that it stays within local and regional ecological carrying capacity (in all areas where the electricity is consumed)
• ensure the power system contributes to substantial reduction of net greenhouse gas emissions (including upfront emissions) in Manitoba and export markets
• minimize waste generation and manage wastes to avoid adverse social-ecological impacts (e.g. discharge of air and water pollutants, and mercury contamination of water)
• ensure that the net effects of new generation, CDM and substitution of new components for existing ones (e.g. in export markets) reduce overall stresses on biophysical systems and communities
Livelihood sufficiency and opportunity Seek to expand the range and availability of desirable and durable livelihood opportunities while helping to ensure sufficiency for all.
Providing reliable and economical electricity services
• ensure system capacity for reliable provision of affordable energy to meet current and emerging needs and opportunities for lasting benefits without impairing future opportunities or undermining larger socio-ecological system integrity
• design for maximum net benefits over the long term, recognizing both conventionally accounted factors and important benefits and costs that are not included in conventional pricing
Promoting meaningful employment opportunities
• promote respectful and fulfilling employment that respects workers' rights and interests (e.g. fair wages, opportunity for skill development and promotion)
• promote sufficient and desirable livelihood opportunities (number, diversity, quality, accessibility, permanence)
• ensure the anticipated opportunities are directed to and likely to be practically accessible by those now most in need of livelihood improvement (e.g. rural regions, First Nation and Métis communities, youth)

• avoid or smooth boom-bust employment and economic effects; enhance capabilities and opportunities for lasting employment and associated benefits
Maintaining community and economic resilience
• maintain and improve the resilience of the Manitoban economy (e.g. lasting employment opportunities, strong ecological foundations, enhanced social capital, flexible energy system)
• control the pace and scale of energy production and consumption such that it remains within local capacity for management, including capturing opportunities, and reversing adverse effects
Promoting energy transition
• ensure broad exploration and fair comparison of system component alternatives (e.g. renewable energy technologies, CDM, flexible packages of small components)
• favour livelihood and employment opportunities centred on innovative and flexible options (e.g. CDM and diverse renewable technologies) that emphasize continuous learning and lasting potential
• foster positive social and technical innovations (e.g. through funding, research, grid access)
• help Manitobans make a transition to greater efficiencies and reliance on renewable energy sources (e.g. heritage funds, employment retraining, and other bridging provisions) in all sectors of society and the economy
• plan for transition to renewable energy and resources for communities and sectors currently relying on fossil-based electricity
Enhancing First Nations, Métis, and rural community wellbeing and self-determination
• foster First Nations and Métis employment opportunities that allow for and foster traditional ways of living
• promote expansion of lasting economic foundations for rural and remote communities, First Nations and Métis communities (e.g. through partnership in energy and resource development)
• promote First Nations and Métis communities self-governance and self-determination
Ensuring fairness Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc.) between the rich and the poor, both now and in the future.
Fostering equity
• promote energy pricing that discourages excessive consumption (e.g. tiered pricing), with adjustments to respect the barriers facing low income consumers and those with no practical access to alternatives
• promote fair distribution of wealth, income generating opportunities, and influence within and between communities, regions and nations, with particular attention to currently disadvantaged people and places, both now and in the future
• promote equity through initiatives to retain energy and resource consumption within ecological limits
Promoting fair distribution of benefits and risks
• promote fair distribution of risks within local communities and by age, gender and ethnicity, respecting that some groups have less capacity than others to accommodate current as well as prospective risks
• avoid risks likely to fall disproportionally on already stressed ecosystems and/or disadvantaged and otherwise vulnerable communities
• promote equitable distribution of resources and opportunities among and within urban and rural regions, while addressing different urban and rural needs
• promote full cost accounting while meeting the needs of those who are most vulnerable to price increases
Ensuring fairness for the future
• avoid trading off long-term needs and opportunities for short-term gains (e.g. underpricing the cost of energy, discounting future costs)
• plan to leave the local communities, regions and province with resources and opportunities at least

as great and desirable as those available today
• ensure that sufficient resources are reserved for and available to the future generations that will need to address maintenance, decommissioning and rehabilitation needs of power system components
Accounting for past wrongs
• ensure mechanisms are in place to redress past wrongs done to vulnerable groups (e.g. First Nations) including and beyond initiation of resource development partnerships
Promoting equity beyond provincial borders
• ensure that effects of project components and sales outside Manitoba reduce stresses on vulnerable ecosystems and communities there and avoid displacing problems from Manitoba to other jurisdictions.
• promote responsible and equitable practices by the international community (e.g. ISO 14001 and 26000, Global Reporting Initiative)
Avoiding trade-offs
• treat potential trade-offs as a regrettable last resort while seeking mutually reinforcing and lasting cumulative contributions for the most positive overall result and avoiding significant adverse effects
• ensure that no decisions displace adverse effects from the present to the future, unless all alternatives would to displace even more adverse effects to the future
• identify all evidently proposed trade-offs explicitly, facilitate public discussion, and provide public rationales based on evidence that all alternatives involve more regrettable trade-offs
• where adverse effects are anticipated, favour mitigation over compensation
• where trade-offs of some sort are inevitable, avoid options that would add stresses to already vulnerable communities and ecosystems
Resource maintenance and efficiency Provide a larger base for ensuring sustainable livelihoods and energy security for all while reducing threats to the long term integrity of socio-ecological systems by reducing extractive damage, avoiding waste and cutting overall energy and resource use per unit of benefit. Seek equitable and cost-effective supply and CDM technologies and power systems measured in terms of full resource cost (rather than the narrower levelized unit energy cost (LUEC)).
Promoting responsible use of energy and resources
• reduce lifecycle material and energy use, resource depletion (including agricultural lands), extractive damage, demand on carrying capacity and waste generation (including GHG emissions)
• foster more efficient use of energy by large industrial users (e.g. through adjustment to the rate structure, revolving loans, increased load management)
• favour conservation measures that reduce the overall demand for and consequent footprint of energy generation
Promoting end-use matching
• match the quality of the energy supplied to the quality required for the end-use (e.g. promotion of biomass or passive solar for heating purposes)
Developing resilient energy supplies
• build resiliency in energy supply systems through emphasis on sufficient diversity, modularity and redundancy of energy pathways (e.g. biomass heating)
• promote research and development of innovative renewable energy and energy efficient technologies and practices
Managing at the whole electrical power system level
• promote positive synergy between different supply side technologies (e.g. hydro storage for wind variability where storage activities do not introduce river ecology problems) that may overcome seasonality and intermittency concerns
• minimize losses along the entire energy supply system (production, transmission, conversion, final consumption)

• seek opportunities for multiple uses of energy inputs (e.g. cogeneration), particularly with industrial and commercial users
• seek flexible means (e.g. ecologically benign storage opportunities) of allowing for the large-scale integration of intermittent renewable resources (e.g. wind, solar)
• ensure that supply-side investments do not reduce the opportunity for expansion of CDM, low-impact renewables, or substitution of benign non-electric energy supply options (e.g. electric heating infrastructure may discourage passive solar biomass heating) in Manitoba and export regions
• discourage rebound and other effects (e.g. increased frivolous or wasteful electricity consumption due to increased supply)
Developing renewable and adaptable energy systems
• promote energy systems that promise increasingly positive Energy Returns On Investment
• minimize the use of non-renewable resources along the entire lifecycle
• favour options that are minimally vulnerable to possible and unexpected future changes and able to take advantage of emerging opportunities (e.g. economic cycles and technological advances)
• plan for the system integration of alternative energy technologies
Avoiding and addressing waste and contaminant production
• aim to reduce the amount of waste generated and where feasible and desirable, seek productive uses for wastes (e.g. anaerobic digestion of organic wastes)
• avoid generation of hazardous wastes and release of significant contaminants (e.g. mercury)
Ensuring due process and an informed and engaged citizenry Build the capacity, motivation and habitual inclination of individuals, communities and other collective decision making bodies to apply sustainability requirements through more open and better informed deliberations, greater attention to fostering reciprocal awareness and collective responsibility, and more integrated use of administrative, market, customary and personal decision making practices.
Promoting good governance
• promote and build capacities for local decision making and more broadly participative and decentralized local multi-stakeholder governance
• enhance collaborative and transparent governance, accountability and trustworthiness
• ensure participation early in decision cycles
• seek free, prior and informed consent for potentially disruptive activities and facilities
• promote traditional ways of knowing and include them meaningfully in the decision-making process
Fostering responsible and virtuous individuals and societies
• promote respect for marginal members of society
• promote basic human rights (liberty rights, security rights, gender equity)
• promote respect for Constitutional rights, and social and environmental laws, regulations and principles both domestically and internationally
Developing an awareness of needs, ends and means
• promote responsible consumption with consumption understood as an ecologically and socially shared privilege as opposed to an intrinsic right and seek to delink wellbeing from energy and resource consumption
• increase awareness of the services being met by energy supply and CDM and promote constructive dialogue on how to meet those ends in the most effective, elegant and ethical manner
Fostering social capital and learning
• favour supply and CDM options and implementation approaches that enhance social capital and social as well as individual learning (e.g. traditions of shared knowledge and mutual assistance)
• design energy system components and linkages with capacity for catalyzing broader constructive social change (e.g. public transport and urban agriculture)
Developing fair and responsible pricing

• promote fair and full cost resource pricing (including shadow pricing, e.g. of carbon) both in the immediate and long term while respecting that some citizens are more vulnerable to changes in price
• apply full-cost accounting principles, including appropriate valuing of natural and social capital
Prudence, precaution and adaptation Favour the selection, design and implementation of the undertaking (including provisions for monitoring and adjustment), in ways that reflect the application of precautionary approaches, including through respecting uncertainty, avoiding both well and poorly understood risks of serious or irreversible damage to the foundations of sustainability, and acting on incomplete but suggestive information where there may be risks to social and/or ecological systems that are crucial for sustainability.
Fostering resilience, reliability and adaptive capacity
• favour system options designed with adaptive capacity for response to potential and unexpected changes (accidents, technological advances, changes in demand, etc.),
• promote monitoring (using both western science and traditional knowledge) that encourages learning and informs adaptive response
• maintain sufficient resources (financial, material, human, knowledge, social capacity) to respond to minimally predictable and unanticipated future events
Reducing geopolitical risks
• favour options with low vulnerability to geopolitical risks (terrorism, weapons proliferation, other contributions to insecurity)
Managing for climate change and extreme events
• avoid system vulnerability to predicted and potential regional climate change impacts that could impair the power system's viability and performance, and add to adverse economic, social and environmental impacts and risks.
• plan for and anticipate changes in magnitude and probability of extreme weather events (e.g. 1/20 year flooding, droughts, heat waves, cold snaps, ice storms)
Minimizing power system risks
• favour technological systems that are minimally sensitive to human error, and with low cost of technological failure and accidents
• select and design system components to minimize exposure to potential resource shortage (fuel, wind or water flow or other power resource) or programme failure (e.g. poor public or industry response to conservation/demand management initiatives)
• ensure availability of response options, including spare capacity (e.g. storage, back-up generation, additional temporary and longer term CDM), adjustable scale, etc.
Avoidance of economic risks
• minimize risk of component or system failure or higher than expected costs due to technological or management failure, climate change, lack of social licence, or political factors (e.g. by ensuring appropriate and early consultation, well-accepted partnerships, public awareness and engagement)
• minimize vulnerability to system level upsets due to individual project difficulties or technological failures through avoidance of over dependence on individual projects
• minimize exposure to risks related to financial system perturbations
Planning for technological development
• Anticipate and plan for technological advances that may lower the cost of alternative generation technologies (e.g. wind, solar PV) with implications for desirable system components and export market viability
• Anticipate and plan for the development of storage technologies and/or residential (and other) demand response technologies that may allow dispatchable and interruptible loads to play a more active role in power system operations

4.3 Summary

The set of evaluation and decision criteria presented in the table above incorporates attention to the full suite of generic requirements for progress towards sustainability and attempts also to cover the main issues to be faced in a review of electric power system options in Manitoba. The criteria set is meant to provide a comprehensive approach to considering what is in the best long term public interest.

We recognize that some important considerations may be missing or understated. Certainly this criteria set is not the last word. It should, however, illustrate reasonably well the nature of the issues to be addressed and the feasibility of treating these issues in an integrated way as a whole package centred on maximum lasting gains while avoiding significant risks.

We also recognize that application of this criteria set, or an adjusted one with similar aims, may seem a daunting prospect. That is fully understandable. There are many criteria here and most of them are broad enough to raise issues involving multiple specific considerations. Unfortunately, the complexities come with the territory. While a more concise presentation may well be possible, the issues surrounding power system planning in Manitoba (and elsewhere) remain. Neglecting some portion of them is not compatible with the objective of well-considered decision making in the public interest. A more fragmented approach is also unlikely to cover the necessary ground or in the end be an easier route to defensible conclusions.

For practical application, the PUB may find it helpful to begin with the six main criteria categories and the 29 subcategories as a relatively simple framework for locating the concerns raised in the submissions and hearings as well as for elaboration of the key issues beyond what we have been able to provide here. To put this into context, we note the Joint Review Panel in the Mackenzie Gas Project case adopted 5 main criteria categories and 36 issues areas under these categories and found the framework useful as a basis for comparing the range of alternatives before it (Mackenzie Gas JRP 2009).

5 Conclusion

This report set out to achieve three tasks:

1. describe the nature, role and basic substance of a framework for sustainability-based decision making;
2. establish the public interest and legislative basis for undertaking sustainability-based assessments, or their substantive equivalents, in Manitoba; and
3. propose an initial set of evaluation and decision-making criteria that have been specifically elaborated for assessing Manitoba Hydro's preferred development plan.

In the context of the NFAT assessment, sustainability-based decision making is necessary to ensure long-term improvement in human and natural wellbeing. Whether it is climate change, declining resources, long-term equitable energy pricing, or threats to and opportunities for traditional ways of living, the Manitoba power system touches upon many critical local and larger sustainability issues of the 21st century. Furthermore, the

significance of the near term and legacy effects of the proposed generating options makes it imperative that impacts and benefits be fairly shared both within and between generations.

As it currently stands, the NFAT assessment does not provide a full assessment of how the proposed power system alternatives may help Manitoba progress towards sustainability. In the absence of a more comprehensive strategic energy assessment in Manitoba, it is contingent upon bodies such as the PUB to ensure these broader issues are considered with sufficient diligence. Otherwise, important decisions will be made by default.

The adoption and application of an explicit sustainability-based framework for analyses and decision making should be the foundation for the PUB's judgements in this case, and should be entrenched generally in planning and decision making in Manitoba. This is best accomplished through a comprehensive and participatory assessment that:

- clearly establishes the purpose and need (in this case for the services provided by electricity) through an open and democratic process;
- develops an explicit set of sustainability criteria that have been specified for the particular case and context;
- applies these criteria in a comparative evaluation of the full suite of alternative supply and demand options and power system configurations in a portfolio approach, to determine which package is likely to make the most significant positive contributions to progress towards sustainability while avoiding risks of serious adverse effects; and
- plans for necessary change.

The second goal of this report was to establish the legislative basis for undertaking sustainability-based assessments, or their substantive equivalents, in Manitoba. In order to develop this argument, Appendix 1 compares the contents of the Manitoba *Sustainable Development Act* (Manitoba 1998), key sections of the Manitoba *Environment Act* (Manitoba 2012a) and the Canadian *Environmental Assessment Act* (CEAA 2012a) with the requirements for progress towards sustainability incorporated in Gibson's framework for sustainability assessment.

Effectively there is complete overlap in the substantive requirements for sustainable development between Gibson's sustainability-based criteria for evaluations and decision-making and the expectations set out in the three Act. Moreover, there is general agreement between the three Acts and the guidelines for the introduction of the sustainability assessment practice proposed in Table 5.

We hope the insights contained within this report, as well as the final recommendations, will serve to inform the particulars of the NFAT proceedings, as well as contribute to the broader agenda of strengthening strategic decision making in Manitoba

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Appendix 1 – The legislative basis for sustainability-based decision making in Manitoba

This appendix provides an analysis of the legislative basis for sustainability-based reviews and decision making in Manitoba, by analyzing the Manitoba *Sustainable Development Act* ('the SD Act') (Manitoba 1998), key sections of the Manitoba *Environment Act* ('the ENV Act') (Manitoba 2012a) and the Canadian *Environmental Assessment Act* ('CEAA 2012') (CEAA 2012a). It does so by synthesizing and reorganizing sections of the three Acts and comparing them to the generic sustainability assessment criteria outlined by Gibson (2005, ch. 5).

There are several benefits to using the generic sustainability criteria outlined by Gibson for such a comparison. First, these criteria are recognized and applied worldwide as a relevant approach to sustainability assessment (e.g. Pope et al. 2004). Second, these criteria have been heavily informed by Canadian environmental assessment practice, and have been applied previously by proponents, experts, and joint review panels in a Canadian context (e.g. for the Mackenzie Valley Gas Project Review) (Gibson 2006b; OPA 2006; Gibson et al. 2008).

Ultimately, if the Acts are in agreement with the generic sustainability assessment criteria (Gibson et al. 2005, ch. 5), then it is reasonable to argue that the Acts demand a sustainability assessment approach to planning and decision making on major undertakings, insofar as all the basic characteristics of sustainability assessment – both in terms of substance and process – are required.

There is one word of note before beginning the discussion. We understand that the notion of sustainability assessment has been discussed at some length in Manitoba through forums such as COSDI, (Sinclair 2002; Sinclair and Quinn 2012) but that there is no official Manitoba government document stating that decisions must be made using a sustainability assessment framework, be it Gibson's framework or otherwise. What we are looking for instead is to show how sustainability-based assessment is a logical way to implement the existing EA process while addressing the requirements for sustainable development as set forth in the three Acts.

The following section compares the substantive components of Gibson's framework – namely the eight criteria for evaluations and decision making – with the relevant contents of the three Acts. This represents the bulk of the discussion. Following that, the guidelines for sustainability assessment practice are briefly compared with the three Acts.

Substantive comparison of the generic sustainability assessment criteria to the Acts

This section compares the requirements for sustainable development, as found in the Manitoba *Sustainable Development Act* (Manitoba 1998), the Manitoba *Environment Act* (Manitoba 2012a) and the Canadian *Environmental Assessment Act* (CEAA 2012a), with the generic sustainability assessment criteria. This comparison is shown in Table 7

below. The approach taken was to determine how each individual criterion is compatible with the requirements set forth in the three Acts.

Table 7 – Comparing the Acts with the generic sustainability assessment criteria

Socio-ecological system integrity

Build human-ecological relations to establish and maintain the long-term integrity of socio-biophysical systems and protect the irreplaceable life support functions upon which human as well as ecological wellbeing depends.

Manitoba Sustainable Development Act

Principle – Conservation and Enhancement (selected parts)

Manitobans should

- "maintain the ecological processes, biological diversity and life-support systems of the environment"
- "enhance the long-term productive capability, quality and capacity of natural ecosystems."

Principle – Rehabilitation and Reclamation (entire principle)

"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."

Manitoba Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations, and in this regard, this Act…

(e) prohibits the unauthorized release of pollutants having a significant adverse effect on the environment."

Canadian Environmental Assessment Act

Purposes of Act (CEAA 2012a, 4(1))

"The purposes of this Act are

(a) to protect the components of the environment that are within the legislative authority of Parliament from significant adverse environmental effects caused by a designated project;…

(h) to encourage federal authorities to take actions that promote sustainable development in order to achieve or maintain a healthy environment and a healthy economy; and

(i) to encourage the study of the cumulative effects of physical activities in a region and the consideration of those study results in environmental assessments."

Interpretation

"environment" means the components of the Earth, and includes

(a) land, water and air, including all layers of the atmosphere;

(b) all organic and inorganic matter and living organisms; and

(c) the interacting natural systems that include components referred to in paragraphs (a) and (b) (CEAA 2012a, p. 2)

Mandate of Act (CEAA 2012a, 4(2))

"The Government of Canada, the Minister, the Agency, federal authorities and responsible authorities, in the administration of this Act, must exercise their powers in a manner that

protects the environment and human health and applies the precautionary principle."

Comment

There is full overlap between the criterion and the SD Act. Even the terminology is similar (e.g. life support functions and life-support systems). Furthermore, the language of the SD Act – in using the preface "Manitobans should" – indicates the relationship between Manitobans and their natural environment, which is consistent with Gibson's use of the term "human-ecological relations".

In terms of the ENV Act, there is once again considerable overlap, including the recognition of the relationship between social and ecological systems and the importance of maintaining both (*i.e.* social-ecological systems integrity).

Finally, with regard to CEAA 2012, there is once again considerable overlap. CEAA 2012 adopts a reasonably integrated understanding of the biophysical environment, and recognizes links between biophysical and socio-economic effects, though it does not automatically cover direct socio-economic effects.

Livelihood sufficiency and opportunity

Ensure that everyone and every community has enough for a decent life and that everyone has opportunities to seek improvements in ways that do not compromise future generations' possibilities for sufficiency and opportunity.

Manitoba Sustainable Development Act

Principle - Shared Responsibility and Understanding (selected parts)

- "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 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."

Principle – Stewardship (selected parts)

- "The economy, the environment, human health and social well-being should be managed for the equal benefit of present and future generations."

Manitoba Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations…"

Canadian Environmental Assessment Act

Purposes of Act (CEAA 2012a, 4(1))

"The purposes of this Act are…

(h) to encourage federal authorities to take actions that promote sustainable development in order to achieve or maintain a healthy environment and a healthy economy"

Comment

There is basic overlap between the criterion and the SD Act, the ENV Act and CEAA 2012.

Gibson's criterion calls more explicitly for individual livelihood opportunities than do the Acts, which tend to focus on the broader 'economy' (e.g. 'healthy economy in CEAA 2012). However, the ENV Act recognizes the importance of sustaining a high quality of life, which lends more towards the individual. Other Acts may be more explicit about ensuring individual livelihood sufficiency and opportunity.

Intragenerational equity

Ensure that sufficiency and effective choices for all are pursued in ways that reduce dangerous gaps in sufficiency and opportunity (and health, security, social recognition, political influence, etc.) between the rich and the poor.

Manitoba Sustainable Development Act

Principle – Stewardship (selected parts)

- "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."

Principle – Shared Responsibility and Understanding (selected parts)

- "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 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."

Principle – Global Responsibility (entire principle)

- "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."

Manitoba Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations…"

Canadian Environmental Assessment Act

Interpretation

"sustainable development" means development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. (CEAA 2012a, p. 5)

Comment

There is basic overlap between Gibson's criterion of intragenerational equity and the three Acts. Gibson's criterion is more explicit about the gaps between the rich and the poor in terms of access to resources and opportunities. However, the SD Act explicitly recognizes that the economy, the environment and society are shared by all Manitobans, as well as globally.

The SD Act also mentions equity explicitly (e.g. "equitable management of Manitoba's

common resources"), which overlaps well with Gibson's criterion. Likewise, CEAA 2012 adopts the Brundtland definition of sustainable development, which has a strong focus on equity considerations, both within and between generations (Brundtland and al. 1987). In terms of the ENV Act, the focus on sustaining a high quality of life is closely tied in with equality, as recognized by the World Bank (Soubbotina and Sheram 2000).

Intergenerational equity

Intergenerational equity

Favour present options and actions that are most likely to preserve or enhance the opportunities and capabilities of future generations to live sustainably.

Manitoba Sustainable Development Act

Principle – Stewardship (entire principle)

- "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."

Principle - Global Responsibility (entire principle)

- "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."

Guideline - Integrated Decision Making and Planning (entire guideline)

- "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."

Manitoba Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations…"

Canadian Environmental Assessment Act

Interpretation

"sustainable development" means development that meets the needs of the present, without compromising the ability of future generations to meet their own needs. (CEAA 2012a, p. 5)

Comment

There is substantive overlap between Gibson's criterion and the three Acts. This should come as no surprise given the oft-cited Brundtland definition of sustainable development as focusing on meeting the needs of the present without compromising the ability of future generations to meet their own needs (Brundtland and al. 1987).

Resource maintenance and efficiency

Provide a larger base for ensuring sustainable livelihoods for all while reducing threats to the long term integrity of socio-ecological systems by reducing extractive damage, avoiding waste and cutting overall material and energy use per unit of benefit.

Manitoba Sustainable Development Act

Principle – Conservation and Enhancement (entire principle)

Manitobans should:

(d) "maintain the ecological processes, biological diversity and life-support systems of the environment"

(e) "harvest renewable resources on a sustainable yield basis; make wise and efficient use of renewable and non-renewable resources"

(f) "enhance the long-term productive capability, quality and capacity of natural ecosystems."

Guideline – Efficient Use of Resources (selected parts)

(g) "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"

Guideline – Waste Minimization and Substitution (entire guideline)

(h) "Encouraging and promoting the development and use of substitutes for scarce resources where such substitutes are both environmentally sound and economically viable"

(i) "Reducing, reusing, recycling and recovering the products of society."

Manitoba Environment Act

Miscellaneous provisions respecting proposals (Manitoba 2012a, 12.0.2)

(j) "When considering a proposal, the director or minister must take into account — in addition to other potential environmental impacts of the proposed development — the amount of greenhouse gases to be generated by the proposed development and the energy efficiency of the proposed development."

Canadian Environmental Assessment Act

Factors to be considered (CEAA 2012a, 19(1))

"The environmental assessment of a designated project must take into account the following factors:

(d) mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project;

(g) alternative means of carrying out the designated project that are technically and economically feasible and the environmental effects of any such alternative means"

Comment

There is substantive overlap between Gibson's criterion and the SD Act. Both focus on reducing waste, increasing productivity, transitioning to renewable resources, recycling, reusing, etc. The principles and guidelines of the SD Act even help to elaborate what a commitment to resource maintenance and efficiency may entail.

With regard to the ENV Act, there is basic overlap with Gibson's criterion, particularly with regard to energy efficiency and greenhouse gases, which are an important component of Gibson's criterion.

Finally, there is basic overlap with CEAA 2012, insofar as CEAA 2012 recognizes the importance of developing mitigation measures to reduce extractive damage of the proposed project and its alternative means.

Socio-ecological civility and democratic governance

Build the capacity, motivation and habitual inclination of individuals, communities and other collective decision making bodies to apply sustainability requirements through more open and better informed deliberations, greater attention to fostering reciprocal awareness and collective responsibility, and more integrated use of administrative, market, customary and personal decision making practices.

Manitoba Sustainable Development Act

Integration of Environmental and Economic Decisions (entire principle)

- "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."

Principle – Shared Responsibility and Understanding (selected parts)

- "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 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."

Guideline – Efficient Use of Resources (selected parts)

- "Employing full-cost accounting to provide better information for decision makers."

Guideline – Public Participation (entire guideline)

- "Establishing forums which encourage and provide opportunity for consultation and meaningful participation in decision making processes by Manitobans"
- "Endeavouring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions"
- "Striving to achieve consensus amongst citizens with regard to decisions affecting them."

Guideline – Access to Information (entire guideline)

- "Encouraging and facilitating the improvement and refinement of economic, environmental, human health and social information"
- "Promoting the opportunity for equal and timely access to information by all Manitobans."

Manitoba Environment Act

Intent and Purposes (Manitoba 2012a, 1(1))

- "The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations, and in this regard, this Act…

  (a) is complementary to, and support for, existing and future provincial planning and policy mechanisms;

  (c) provides for the recognition and utilization of existing effective review processes that adequately address environmental issues;

  (d) provides for public consultation in environmental decision making while recognizing the responsibility of elected government including municipal governments as decision makers"

Environmental awareness programs (Manitoba 2012a, 2(3))

" For the purposes of increasing environmental awareness in Manitoba, the minister may

- cause the preparation and production of informational material respecting the environment of the province and make the material available to the public;
- undertake, or by means of grants or other assistance, support and encourage the development of educational programs or courses in the public education system, or educational programs for the public at large, respecting environmental management."

Canadian Environmental Assessment Act 2012

Purposes of Act (CEAA 2012a, 4(1))

"The purposes of this Act are

- to promote cooperation and coordinated action between federal and provincial governments with respect to environmental assessments;
- to promote communication and cooperation with aboriginal peoples with respect to environmental assessments;
- to ensure that opportunities are provided for meaningful public participation during an environmental assessment;
- to ensure that an environmental assessment is completed in a timely manner;
- to encourage federal authorities to take actions that promote sustainable development in order to achieve or maintain a healthy environment and a healthy economy"

Comment

There is substantive overlap between Gibson's criterion and the three Acts. All three highlight the need for open and participatory decision-making, and indicate the importance of individuals taking responsibility for decision and actions.

It is noteworthy that the SD Act calls for full-cost accounting to aid decision-making. Likewise, the ENV Act recognizes the importance of raising environmental awareness as part of the mandate of the minister.

Finally, CEAA 2012 and the ENV Act recognize the importance of proper coordination between and integration of existing mechanisms for decision-making. In many regards, the Acts help to elaborate what socio-ecological civility and democratic governance may mean in the Manitoba context.

Precaution and adaptation

Respect uncertainty, avoid even poorly understood risks of serious or irreversible damage to the foundations for sustainability, plan to learn, design for surprise, and manage for adaptation.

Manitoba Sustainable Development Act

Principle – Prevention (entire principle)

- "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."

Canadian Environmental Assessment Act 2012

Purposes of Act (CEAA 2012a, 4(1))

"The purposes of this Act are

(b) to ensure that designated projects that require the exercise of a power or performance of

a duty or function by a federal authority under any Act of Parliament other than this Act to be carried out, are considered in a careful and precautionary manner to avoid significant adverse environmental effects;

(g) to ensure that projects, as defined in section 66, that are to be carried out on federal lands, or those that are outside Canada and that are to be carried out or financially supported by a federal authority, are considered in a careful and precautionary manner to avoid significant adverse environmental effects;

(i) to encourage the study of the cumulative effects of physical activities in a region and the consideration of those study results in environmental assessments."

Factors to be considered (CEAA 2012a, 19(1))

"The environmental assessment of a designated project must take into account the following factors:

(a) the environmental effects of the designated project, including the environmental effects of malfunctions or accidents that may occur in connection with the designated project and any cumulative environmental effects that are likely to result from the designated project in combination with other physical activities that have been or will be carried out;

(b) the significance of the effects referred to in paragraph (*a*);

(d) mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project;

(e) the requirements of the follow-up program in respect of the designated project;

(f) any change to the designated project that may be caused by the environment;

Comment

There is substantive overlap between Gibson's criterion and the Acts. The ENV Act and CEAA 2012 both recognize the importance of precaution and prevention, including concerns such as malfunctions and accidents, as well as impacts of the environment on the project.

The only difference is that Gibson's criterion is a little broader, favouring design for adaptive management, which is not directly referenced in the Acts, although, CEAA 2012 includes indirect mention of adaptive management through references to follow-up programs. However, adaptive management is an increasingly well-recognized concept in areas including resource management and environmental assessment practice, and therefore it is not unreasonable to assume adaptive management, when appropriate, would be promoted.

Immediate and long term integration

Apply all principles of sustainability at once, seeking mutually supportive benefits and multiple gains.

Manitoba Sustainable Development Act

Principle - Integration of Environmental and Economic Decisions (entire principle)

- "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."

Principle - Global Responsibility (selected parts)

- "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."

Guideline - Integrated Decision Making and Planning (entire guideline)

- "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."

Guideline - Research and Innovation (entire guideline)

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

Manitoba Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations, and in this regard, this Act

(a) is complementary to, and support for, existing and future provincial planning and policy mechanisms;

(d) provides for the recognition and utilization of existing effective review processes that adequately address environmental issues;

Canadian Environmental Assessment Act 2012

Purposes of Act (CEAA 2012a, 4(1))

The purposes of this Act are

(c) to promote cooperation and coordinated action between federal and provincial governments with respect to environmental assessments;

Comment

There is substantive overlap between Gibson's criterion and the SD Act. The principles and guidelines of the SD Act even provide some elaboration on how the principles of sustainable development may be integrated both now and in the future, such as through promoting innovation and cross-sectoral decision making, as well as cooperation both in Canada and beyond.

With regard to the ENV Act and CEAA 2012, both refer to the importance of coordination between different governing bodies, as well as the utilization of existing effective processes, both of which are important characteristics of immediate and long-term integration.

As can be seen from Table 7 above, there is generally a substantive overlap between the generic sustainability assessment criteria and the Manitoba S*ustainable Development Act* (Manitoba 1998), the Manitoba *Environment Act* (Manitoba 2012a), and the Canadian *Environmental Assessment Act* (CEAA 2012a). Furthermore, in many instances, the three Acts serve to elaborate on what the generic sustainability assessment criteria may mean in a Manitoba context, and in a manner that is complementary with and in the spirit of Gibson's framework for sustainability assessment.

The only discrepancy that may be found is in the criterion category of "Livelihood sufficiency and opportunity," in which Gibson makes note of the importance of individual livelihood opportunities, whereas the three Acts tend to discuss the economy

as a whole. This does not represent a conflict, however, but rather a different scale of focus.

In summary, when taken as a package, the three Acts effectively call for the full suite of requirements for progress towards sustainability when compared with a rigorous and comprehensive approach to sustainability assessment (*i.e.* Gibson's framework for sustainability assessment).

Procedural comparison of the generic sustainability assessment criteria to the Acts

It is now possible to compare the Act with the general guidelines for sustainability assessment processes, which were described in Table 5. The only guideline not included in this discussion is the fifth ("Promote the process of sustainability assessment as much as the outcome"). The comparison is shown in the tables below.

Table 8 – Comparing the Act with Gibson's procedural guidelines for sustainability assessment

Prioritize contribution to sustainability and apply it in all processes

Establish contribution to sustainability as the main test of proposed purposes, options, designs and practices, and must put application of this test at the centre of decision making, not as one advisory contribution among many

Manitoba Sustainable Development Act

Main Body - Purpose of Act (p. 4)

- "The purpose of this Act is 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."

Principle - Integration of Environmental and Economic Decisions (entire principle)

- "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 Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations…"

Canadian Environmental Assessment Act 2012

Purposes of Act (CEAA 2012a, 4(1))

"The purposes of this Act are

(h) to encourage federal authorities to take actions that promote sustainable development in order to achieve or maintain a healthy environment and a healthy economy"

Mandate of Act (CEAA 2012a, 4(2))

"The Government of Canada, the Minister, the Agency, federal authorities and responsible authorities, in the administration of this Act, must exercise their powers in a manner that

protects the environment and human health and applies the precautionary principle."

Comment

There is basic overlap between Gibson's requirement and the three Acts. As noted, the purpose of the SD Act is to create a framework for implementing sustainability development in the public sector and beyond. The full suite of principles and guidelines indicate the relevance of sustainable development in all facets of decision making and the expectations for integration in planning and decision making imply a commitment to serving social, economic and biophysical objectives together, rather than trading off between or among them.

The three Acts taken as a whole also represent adoption of sustainable development (or contribution to sustainability) as the higher test for all decisions. Although the Acts could have included more explicit language on these matters, the intent seems clear enough.

Base decisions on an explicit set of evaluation and decision criteria and trade-off rules

Adopt evaluation and decision criteria and trade-off rules that reflect the full set of core requirements for progress towards sustainability, recognize interdependencies and seek multiple reinforcing gains on all fronts.

Manitoba Sustainable Development Act

Main Body – Provincial sustainability indicators established 9(1) (p. 11)

- "The minister shall cause sustainability indicators to be established within three years after the coming into force of this Act."

Principle – Integration of Environmental and Economic Decisions (entire principle)

- "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."

Guideline – Integrated Decision Making and Planning (entire guideline)

- "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."

Guideline – Efficient Use of Resources (selected parts)

- "employing full-cost accounting to provide better information for decision makers."

Comment

There is basic overlap between Gibson's requirement and the SD Act. Gibson's requirement explicitly calls for a set of evaluative and decision-making criteria (such as those presented in Table 3 above). The guidelines, principles and main body implicitly demand such criteria, such as through requirements for full-cost accounting. Particularly, the use of indicators as required in the Act presupposes a set of criteria for which the indicators are representing.

More explicit requirements for comprehensive criteria would have strengthened the SD Act, but at least implicitly, the Act supports the application of Gibson's requirement.

In terms of the ENV Act and CEAA 2012, there are no direct references to evaluative and decision-making criteria and trade-off rules, although they are clearly implicit in both Acts. For example, CEAA 2012 requires consideration of "mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project," and this clearly requires a set of criteria for determining feasibility, as

well as trade-off rules for comparing various mitigation options.

CEAA 2012 also provides for approval of undertakings that may have significant adverse effects if these are "justified in the circumstances." Some authorities have taken this to imply a need for explicit, sustainability-based evaluation of the trade-offs involved. See especially Lower Churchill JRP (2011, appendix 8).

Be open and participatory

Provide means of specifying the sustainability decision criteria and trade-off rules for specific contexts, through informed choices by the relevant parties (stakeholders).

Manitoba Sustainable Development Act

Principle – Shared Responsibility and Understanding (selected parts)

- "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."

Guideline – Public Participation (entire guideline)

- "Establishing forums which encourage and provide opportunity for consultation and meaningful participation in decision making processes by Manitobans"
- "Endeavouring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions"
- "Striving to achieve consensus amongst citizens with regard to decisions affecting them."

Guideline – Access to Information (entire guideline)

- "Encouraging and facilitating the improvement and refinement of economic, environmental, human health and social information"
- "Promoting the opportunity for equal and timely access to information by all Manitobans."

Manitoba Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations, and in this regard, this Act…

(d) provides for public consultation in environmental decision making while recognizing the responsibility of elected government including municipal governments as decision makers"

Canadian Environmental Assessment Act 2012

"The purposes of this Act are

(d) to promote communication and cooperation with aboriginal peoples with respect to environmental assessments;

(e) to ensure that opportunities are provided for meaningful public participation during an environmental assessment;

Comment

There is substantive overlap between Gibson's requirement and the three Acts. The SD Act calls for informed choices and open and participatory decision-making, while the ENV Act recognizes the importance of public consultation, and CEAA 2012 requires meaningful public participation.

Once again, Gibson's requirement is more explicit about the specification and use of decision-

making criteria and trade-off rules, which is something a future revision of the Act might usefully address. However, the use of specified criteria and trade-off rules is implicit the substance of the three Acts.

Be transparent and accountable

Ensure that the deliberations and decisions are sufficiently open to scrutiny and participation, and sufficiently accountable in law, that an informed public can push effectively for proper application.

Manitoba Sustainable Development Act

Guideline - Public Participation (entire guideline)

- "Establishing forums which encourage and provide opportunity for consultation and meaningful participation in decision making processes by Manitobans"
- "Endeavouring to provide due process, prior notification and appropriate and timely redress for those adversely affected by decisions and actions"
- "Striving to achieve consensus amongst citizens with regard to decisions affecting them."

Guideline - Access to Information (entire guideline)

- "Encouraging and facilitating the improvement and refinement of economic, environmental, human health and social information"
- "Promoting the opportunity for equal and timely access to information by all Manitobans."

Guideline - Integrated Decision Making and Planning (entire guideline)

- "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."

Manitoba Environment Act

Intent and Purposes of Act (Manitoba 2012a, 1(1))

"The intent of this Act is to develop and maintain an environmental protection and management system in Manitoba which will ensure that the environment is protected and maintained in such a manner as to sustain a high quality of life, including social and economic development, recreation and leisure for this and future generations, and in this regard, this Act…

(d) provides for public consultation in environmental decision making while recognizing the responsibility of elected government including municipal governments as decision makers"

Canadian Environmental Assessment Act 2012

"The purposes of this Act are

(d) to promote communication and cooperation with aboriginal peoples with respect to environmental assessments;

(e) to ensure that opportunities are provided for meaningful public participation during an environmental assessment"

Mandate of Act (CEAA 2012a, 4(2))

"The Government of Canada, the Minister, the Agency, federal authorities and responsible authorities, in the administration of this Act, must exercise their powers in a manner that protects the environment and human health and applies the precautionary principle."

Comment

There is substantive overlap between Gibson's requirement and the SD Act. The SD Act calls for public participation and accountability. The principles, guidelines and body of the SD Act even serve to elaborate on Gibson's requirement in the Manitoba context.

In terms of the ENV Act and CEAA 2012, both recognize accountability and transparency in their calls for meaningful public participation and consultation. Likewise, transparency and accountability is grounded more generally at the government level, such as the Federal Accountability Act (Canada 2006).

In general there is strong overlap between the guidelines for sustainability assessment processes and the Manitoba S*ustainable Development Act* (Manitoba 1998), the Manitoba *Environment Act* (Manitoba 2012a), and the Canadian *Environmental Assessment Act* (CEAA 2012a).

Where the guidelines differ is in the explicit call for a clear set of evaluative and decision-making criteria and trade-off rules that are specified for the context. While such criteria and rules are not explicitly mentioned in the Acts, it is reasonable to argue that they are implicitly required for various reasons. For example, as noted in Table 8, the *Sustainable Development Act* requires a set of sustainability indicators, and indicators must be matched with criteria insofar as indicators help measure progress towards desirable outcomes (or away from undesirable outcomes) and the specification and application of properly comprehensive criteria are effectively needed to move towards the desirable outcomes (and away from the undesirable ones).

With regard to specified trade-off rules, while such a requirement may not be explicitly called for in the acts, the commitments to integration and full-cost accounting in the SD Act, for example, implicitly includes attention to trade-offs. Similarly, as was mentioned in Table 8, CEAA 2012 requires consideration of "mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the designated project," this clearly requires a set of criteria for determining feasibility, as well as trade-off rules for comparing amongst various mitigation options.

On the relationship between the Acts and sustainability assessment

This section set out to compare the Manitoba S*ustainable Development Act* (Manitoba 1998), the Manitoba *Environment Act* (Manitoba 2012a), and the Canadian *Environmental Assessment Act* (CEAA 2012a) with the application of a sustainability assessment framework. Based upon the comparison provided above, a number of closing remarks can be made.

First, it is clear that there is substantial and significant overlap in the substantive requirements for sustainable development between the generic sustainability assessment criteria and the three Acts. For this reason, it is fair to say that the Acts effectively support the application of the full suite of requirements for progress towards sustainability. When understood as a package, the Acts are demanding and rigorous with regard to sustainable development.

Second, it is clear there is strong overlap in the procedural elements of Gibson's framework for sustainability assessment and the three Acts. Gibson's framework is more explicit in its demands for specified evaluative and decision-making criteria and trade-off

rules. Likewise, Gibson's framework explicitly states that contribution to sustainability should be prioritized as the overarching goal, and applied at all stages of decision making and planning.

The Acts are less explicit in this regard, although they implicitly require a higher test, and it is clear that sustainable development is becoming increasingly recognized at the government level. Likewise, the intent of the Environment and SD Acts to ensure the long-term sustainability of Manitoba and its citizens is evidence that sustainability is a long-term and overarching goal (as it should be). Similarly, as has been previously mentioned, one of the stated purposes of CEAA 2012 is sustainable development (CEAA 2012a, 4(1)h).

Finally, implicit in this commentary is the proposal that Manitoba should adopt an explicit framework for sustainability assessment, be it Gibson's or otherwise. Since both the substantive and procedural requirements of sustainability assessment are already consistent with what is established in the Acts, adoption of a more explicit and more fully elaborated framework for sustainability assessment would be a useful next step in clarifying expectations and facilitating implementation.

Even if no framework is adopted, it is clear that the requirements set forth in the Act are consistent with those of a sustainability framework, and therefore the end result in terms of substance and process should be the same.

Appendix 2 - Principles and guidelines from the Manitoba *Sustainable Development Act*

Principles of sustainable development

The following are principles of sustainable development emerging from the *Sustainable Development Act* set out by the Province of Manitoba in 1998 (Manitoba 1998).

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.

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.

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.

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.

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.

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.

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.

Guidelines for sustainable development

The following are guidelines of sustainable development emerging from the Government of Manitoba's principles and guidelines of sustainable development (Manitoba Conservation n.d.).

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.

Public Participation:

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

Access to Information:

- Encouraging and facilitating the improvement and refinement of economic, environmental, human health and social information; and
- Promoting the opportunity for equal and timely access to information by all Manitobans.

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.

Waste Minimization and Substitution:

- Encouraging and promoting the development and use of substitutes for scarce resources where such substitutes are both environmentally sound and economically viable; and
- Reducing, reusing, recycling 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.

Appendix 3 – Federal Sustainable Development Strategy – Goals

The goals set out in Table 9 are from the 2010 document, "Planning for a Sustainable Future: A Federal Sustainable Development Strategy for Canada" (Environment Canada 2010). They are presented also in the Keeyask proposal in a discussion that aims to show how the project addresses each goal (Keeyask HLP 2012, 9-3).

Table 9 - Eight goals of the Canadian Federal Sustainable Development Strategy

Climate Change Reduce greenhouse gas emission levels to mitigate the severity and unavoidable impacts of climate change.
Air Pollution Minimize the threats to air quality so that the air Canadians breathe is clean and supports healthy ecosystems.
Water Quality Protect and enhance the quality of water so that it is clean, safe and secure for all Canadians and supports healthy ecosystems.
Water Availability Enhance information to ensure that Canadians can manage and use water resources in a manner consistent with the sustainability of the resource.
Wildlife Conservation Maintain or restore populations of wildlife to healthy levels
Ecosystem / Habitat Conservation and Protection Maintain productive and resilient ecosystems with the capacity to recover and adapt; and protect areas in ways that leave them unimpaired for present and future generations.
Biological Resources Sustainable production and consumption of biological resources are within ecosystem limits.
Greening Government Operations Minimize the environmental footprint of government operations.

Appendix 4 – Sustainability requirements of Manitoba Hydro

As a Crown corporation, Manitoba Hydro is subject to the Government of Manitoba's *Sustainable Development Act C.C.S.M. c. S270*. Second, Part 6 Guideline 13 of C.C.S.M. c. S270 states:

> *"Each Crown Corporation shall, within two years after the establishment of the code of practice, prepare and adopt a corporate sustainable development code of practice."*

Manitoba Hydro has developed a set of thirteen policies and principles for sustainable development. These are shown in Table 10 below.

Table 10 - Manitoba Hydro Sustainable Development Policy/Principles

MH 1 - Stewardship of the Economy and the Environment
Recognize its responsibility as a caretaker of the economy and the environment for the benefit of present and future generations of Manitobans. Meet the electricity needs of present and future Manitobans in a manner that ensures the long-term integrity and productivity of our economy, our environment, our natural resources and safeguards our human health.

MH 2 – Shared Responsibility
Ensure that Manitoba Hydro's employees, contractors, and agents are aware of our sustainable development policies and guiding principles and encourage them to act accordingly. Encourage the Corporation's employees to share their knowledge of the concepts and practical application of sustainable development.

MH 3 - Integration of Environmental and Economic Decisions
Treat technical, economic and environmental factors on the same basis in all corporate decisions, from initial planning to construction to operations to decommissioning and disposal. To the extent practical, include environmental costs in economic and financial analysis.

MH 4 - Economic Enhancement
Enhance the productive capability and quality of Manitoba's economy and the well-being of Manitobans by providing reliable electrical services at competitive rates.

MH 5 - Efficient Use of Resources
Encourage the development and application of programs and pricing mechanisms for efficient and economic use of electricity by our customers. As well, efficient and economic use of energy and materials will be encouraged throughout all our operations.

MH 6 - Prevention and Remedy
To the extent practical, anticipate and prevent adverse environmental and economic effects that may be caused by Corporate policies, programs, projects and decisions rather than reacting to and remedying such effects after they have occurred. Purchase, where practical, environmentally sound products taking into account the life cycle of the products. Address adverse environmental effects of Corporate activities that cannot be prevented by:

- endeavouring, wherever feasible, to restore the environment to pre-development conditions or developing other beneficial uses through rehabilitation and reclamation;
- striving to replace the loss with substitutes that would enhance the environment and/or associated resource uses while offsetting the type of damage experienced;
- making monetary payments for compensable damages on a fair, equitable and timely basis.

Give preference, where practical, to projects and operating decisions that use renewable resources or that extend the life of supplies of non-renewable resources.

MH 7 - Conservation
To the extent practical, plan, design, build, operate, maintain and decommission Corporate facilities in a manner that protects essential ecological processes and biological diversity. Give preference, where practical, to projects and operating decisions that use renewable resources or that extend the life of supplies of non-renewable resources.

MH 8 - Waste Minimization
Manage all wastes arising from Corporate activities by: first, endeavouring to eliminate or reduce the amount generated; second, striving to fully utilise reuse and recycling opportunities; third, disposing of remaining waste in an environmentally sound manner.

MH 9 - Access to Adequate Information

Share relevant information on a timely basis with employees, interested people and governments to promote a greater understanding of Manitoba Hydro's current and planned business activities and to identify impacts associated with the Corporation's plans and operations.

MH 10 - Public Participation
Provide opportunities for input by potentially affected and interested parties when evaluating development and program alternatives and before deciding on a final course of action.

MH 11 - Understanding and Respect
Strive to understand and respect differing social and economic views, values, traditions and aspirations when deciding upon or taking action.

MH 12 - Scientific and Technological Innovation
Research, develop, test and implement technologies, practices and institutions that will make electrical supply and services more efficient, economic and environmentally sound.

MH 13 - Global Responsibility
Recognize there are no political and jurisdictional boundaries to our environment, and that there is ecological interdependence among provinces and nations. Consider environmental effects that occur outside of Manitoba when planning and deciding on new developments and major modifications to facilities and to methods of operation.

Source: (Manitoba Hydro n.d.)

Manitoba Hydro Act

Purposes and objects of Act (Manitoba 2012c, p. 4.1)
The purposes and objects of this Act are to provide for the continuance of a supply of power adequate for the needs of the province, and to engage in and to promote economy and efficiency in the development, generation, transmission, distribution, supply and end-use of power and, in addition, are

(a) to provide and market products, services and expertise related to the development, generation, transmission, distribution, supply and end-use of power, within and outside the province; and
(b) to market and supply power to persons outside the province on terms and conditions acceptable to the board.

Appendix 5 - Specifying the sustainability criteria for a given case and context

The general process of specifying criteria requires integrating, organizing, and interpreting the collected information concerning the case and context, which provides an opportunity for exploring initial responses to the perceived problems; problem formulation and initial resolution are undertaken in a simultaneous manner (e.g. Rittel and Webber 1973). The sustainability criteria are specified for the case and context with the ultimate goal of choosing the best available alternatives. This section outlines the means by which the sustainability criteria are specified for case and context, with the general steps depicted in Figure 1 below. The description of criteria specification is kept at a general level to better encompass the multiplicity of situations in which sustainability assessment may be applied.

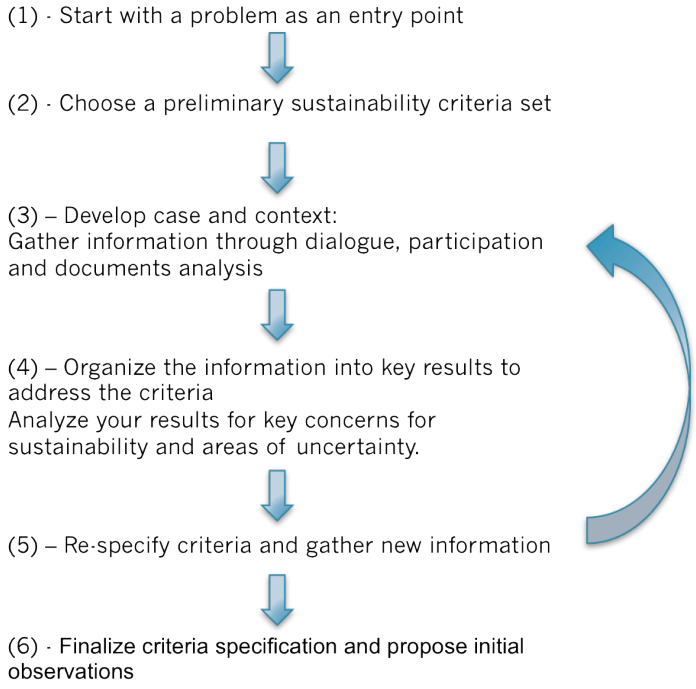

Figure 1 – Criteria specification for sustainability assessment

Step 1 – Begin with a problem and a set of alternatives

The first step in criteria specification is to begin with a problem or purpose, which is an entry point into the assessment. Depending upon the terms of reference the problem may remain fixed (e.g. a formal assessment process) or may change during the assessment process as relevant insights emerge (e.g. a more strategic level approach). The problem or purpose may take many forms, such as:

- an existing entity at the small scale – e.g. a biodiesel operation;
- a strategic large-scale question – e.g. a proposed provincial electrical power systems plan;
- a proposed project – e.g. the Mackenzie natural gas pipeline; or
- a system in crisis – e.g. Senegal's energy and agricultural system (Diop 2009).

In a formal process such as the proposed Keeyask dam, both the problem (the decision on whether or not to allow the dam to be built, and, if so, under what circumstances) is generally fixed. In the case of the NFAT review, comparative evaluation of alternatives to the preferred power system plan is required as per the PUB guidelines (Manitoba 2013).

Step 2 – Choose a preliminary set of sustainability criteria

Beginning with the initial problem, a generic set of sustainability criteria can be adopted to inform the criteria specification process. Gibson's eight evaluative and decision-making criteria for sustainability set out in Table 3 provide one possible starting point. A more expanded criteria set for energy undertakings is provided in section 4, which provides initial themes and areas of concern to guide the assessment process, and indicates important concerns that the alternatives (when they are defined) must address. The preliminary criteria set also offers a means of organizing the relevant considerations of case and context.

For the purposes of this document, the important aspects of case and context are organized in a table with two sets of headings: (1) Gibson's eight categories as the major headings; and (2) relevant themes within each category as a minor heading. Sample headings and a sample criterion are provided in Table 11.

Table 11 - Sample sustainability criterion and headings

Socio-ecological system integrity – Category
GHG emissions and air pollution – Theme
• mitigate GHG emissions, particularly upfront GHG emissions (e.g. soil carbon debt) (criterion)

Source: Adapted from (adapted from Duarte et al. 2013)

The preliminary criteria set is generic and must be updated with the relevant information emerging from case and context (*i.e.* particular areas of challenge or opportunity, relevant cultural history, etc.).

Step 3 – Begin developing the case and context

Once the problem and preliminary set of criteria have been chosen, the case and context must be developed by drawing on the relevant available information. Sustainability assessments can draw from a variety of sources to identify the major case– and context–specific considerations. General sources of information include

- existing policy and planning documents that set out key concerns and priorities at the local, regional, territorial and/or national level;
- considerations that emerged in prior assessments or similar processes dealing with the same context;
- earlier deliberations on the case, especially involving the key stakeholders; and
- other sources of local and/or larger scale information that sheds light on how the various generic sustainability concerns are reflected in the circumstances and issues of the particular case and context.

With regard to the proposed power system plan, the structure and specific contents of the framework are drawn from

- the literature on general principles for assessment of undertakings proposed to serve the long as well as short term public interest, including positive contributions to progress towards sustainability as well as avoidance or mitigation of significant adverse effects;
- the issues globally identified as particularly important in cases of proposed major hydropower undertakings, including in the final report of the WCD (2000);
- precedents established in previous sustainability-based assessments in Canada, especially those involving joint review panels with similar mandates, including criteria applied by these panels;
- the most evident issues concerning the potential positive and adverse cumulative effects of the proposed power system projects in its specific context (e.g. from document such as the EIS); and
- input from the various experts and interveners in the process.

Any proposed listing of these case- and context-specific considerations should be open to public discussion, review, and adjustment. The objective is to identify the key sustainability-related questions raised by the project and its context. While many of these can be identified by informed observers and assisted by specialized experts, the importance of issues is also a matter of public preference and choice.

Ideally the collection of relevant information should cover a comprehensive suite of factors, including but not limited to: demographic trends, economic cycles, legal concerns, political dynamics, social conditions, technological change, and biophysical environmental impacts (including natural forces and disasters).

Given the long lifetimes of many projects, the information should include both the anticipated or potential effects of the proposed project and its alternatives on the factors mentioned above, and the anticipated or potential effects of the factors mentioned in the proposed project and its alternatives.

Given the range of factors involved and the sheer volume of information that is available for reading in the NFAT review (including the Manitoba Hydro submission and its supporting documents, intervener reports and testimony, relevant oral and written traditions, etc.), the factors should be identified and assessed at a coarser level of detail than what is provided in the environmental reviews of proposed individual projects (e.g. the Environmental Impact Statement for the Keeyask Project), providing the necessary summary information to inform decision making. Furthermore, the findings should be based on the detailed existing analyses and the level of confidence about the conclusions ought to be clearly established.

Step 4 – Organize the information into key results to address the criteria

As the case and context are explored, it is possible to begin organizing and interpreting the information to understand the major themes, challenges and opportunities, and their interactions, more clearly.

To help with organization, the information gathered through the exploration of case and context is organized in a table that mirrors the criteria set, so that when alternatives are compared, the relevant information is mapped to the criteria. A sample results table, adapted from Chapter 7, is provided in Table 12.

Table 12 - Sample key results table

Socio-ecological system integrity *Biodiversity and land-use change*	Impact
• Due to fierce competition, sugarcane mills do not reveal where they intend to expand sugarcane plantations. Such secrecy limits the environmental licensing process, and hampers land-use change assessment.	-

Source: Adapted from (adapted from Duarte et al. 2013)

The right hand column could adopt a simple three-point scale, identifying potential positive impact (+), potential negative impact (−), and potential impacts that may be mixed, or positive or negative depending on their characteristics and how they are situated within the broader context (=). The purpose of ranking is not to sum up all the positive and negative aspects in a quantitative test, but rather to gain broad insights into areas of strengths and weakness, and associated opportunities for improving contributions to sustainability.

Step 5 - Re-specify the criteria and gather new information

As the information is organized into the key results table and discussed amongst stakeholders, and interactive effects and boundary crossing considerations are explored, relevant themes will emerge. In some instances the relevant themes are organized within Gibson's eight categories (Table 3), which use terminology generally familiar to assessment professionals.

For practical application in policy and project deliberations, it may be preferable to reorganize the criteria and results into categories and themes that facilitate understanding and informed discussion among the relevant stakeholders and panel members, so long as the criteria set maintains the full suite of requirements for progress towards sustainability (Gibson 2006b).

The process of organizing and analyzing the key results will also indicate what knowledge of case and context are missing and should be further developed. The new information will ultimately be analyzed and organized into the key results.

Step 6 - Finalize criteria specification and begin assessment of alternatives

When criteria specification is complete, the analysis of alternatives may begin. Alternatives should be analyzed against the complete set of sustainability criteria developed in the step above. A practical example of the analysis of alternatives is provided in Chapter 19 (Volume 2) of the report by the Joint Review Panel for the Mackenzie Gas Project (Mackenzie Gas JRP 2009, ch. 19).

The six steps above summarize the basic process of elaborating and organizing the relevant sustainability criteria for the particular case and context.