

**Needs For and Alternatives To
MH/CAC - Simpson-001**

SUBJECT: Experience and qualifications

QUESTION:

Please identify any judicial or administrative proceedings in which Dr Simpson has been qualified as an expert witness or testified regarding risk analysis assessments of resource alternatives in the energy sector

RESPONSE:

Manitoba Hydro has inadvertently mistated my area of expertise.

My professional expertise in applied microeconomics and applied econometrics provides a foundation for the analysis of issues related to the management of risks by firms and to the assessment of risk using modern economic and statistical techniques.

I have given evidence relating to good practice modern risk analysis on three separate occasions before the Manitoba Public Utilities Board.¹

The expert evidence was related to modern risk analysis and the Manitoba Public Insurance Rate Stabilization Reserve. On the first two occasions, my evidence was prepared in collaboration with Professor Derek Hum. On the third occasion, I was solely responsible for the evidence. Please refer to PUB Orders 157/12, 157/08 and 156/06.

In the proceeding leading up to PUB Order 5/12, I served as an expert consultant on issues relating to risk with particular reference to the evidence of the Independent Experts retained by the Public Utilities Board. I did not provide expert evidence in that proceeding but the cross examination of CAC MB was instrumental in convincing the Independent Experts to redo their calculations of drought risk. For more information on the recommendations of CAC MB based upon my advice, please see PUB Order 5/12, p. 201.

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Hum and Simpson, *On determining an Appropriate Rate Stabilization Reserve for MPI: Critique of Methodology and Related issues* (September 2006). Hum and Simpson, *On determining the Target RSR for MPI and Corporate Risk Management Tools*, (September 2009), Simpson, *Manitoba Public Insurance Rate Risk Management and the Rate Stabilization Reserve*, (September 2012)

**Needs For and Alternatives To
MH/CAC - Simpson-002a**

SUBJECT:

Experience and qualifications

QUESTION:

Please provide details of the experience of Dr. Simpson with respect to: conducting risk analysis assessments of energy utilities and specifically utilities that predominantly rely on hydro–electric based generation.

RESPONSE:

Manitoba Hydro has inadvertently misstated my area of expertise.

My professional expertise in applied microeconomics and applied econometrics provides a foundation for the analysis of issues related to the management of risks by firms and to the assessment of risk using modern economic and statistical techniques.

I have given evidence relating to good practice modern risk analysis on three separate occasions before the Manitoba Public Utilities Board.¹

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**Needs For and Alternatives To
MH/CAC - Simpson-002b**

SUBJECT:

Experience and qualifications

QUESTION:

Please provide details of the experience of Dr. Simpson with respect to: risk analysis assessments of resource alternatives in the energy sector.

RESPONSE:

Manitoba Hydro has inadvertently misstated my area of expertise.

My professional expertise in applied microeconomics and applied econometrics provides a foundation for the analysis of issues related to the management of risks by firms and to the assessment of risk using modern economic and statistical techniques.

I have given evidence relating to good practice modern risk analysis on three separate occasions before the Manitoba Public Utilities Board.¹

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In the proceeding leading up to PUB Order 5/12, I served as an expert consultant on issues relating to risk with particular reference to the evidence of the Independent Experts retained by the Public Utilities Board. I did not provide expert evidence in that proceeding but the cross examination of CAC MB was instrumental in convincing the Independent Experts to redo their calculations of drought risk. For more information on the recommendations of CAC MB based upon my advice, please see PUB Order 5/12, p. 201.

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Hum and Simpson, *On determining an Appropriate Rate Stabilization Reserve for MPI: Critique of Methodology and Related issues* (September 2006). Hum and Simpson, *On determining the Target RSR for MPI and Corporate Risk Management Tools*, (September 2009), Simpson, *Manitoba Public Insurance Rate Risk Management and the Rate Stabilization Reserve*, (September 2012)

SUBJECT: Uncertainty Analysis

REFERENCE: Page 2

PREAMBLE: Dr. Simpson said on Page 2 – “Manitoba Hydro....restricts its risk analysis to what it determines to be the three most important risk factors—energy prices, the discount rate, and capital costs—out of a group of ten risk factors. Their approach thereby ignores some potentially important risk factors, such as load and its determinants, some of which are then considered separately in a “sensitivity analysis” in chapter 10.”

QUESTION:

Assuming it is not feasible to include all potential risk factors in the probabilistic analysis, what process does Dr. Simpson suggest for selecting those factors to examine in detail? Please explain.

RESPONSE:

I do not assume that it is not feasible, given modern risk assessment practices and computing technology, to limit risk factors to three.

REFERENCE: Page 2

PREAMBLE: Dr. Simpson said on Page 2 – “Manitoba Hydro....restricts its risk analysis to what it determines to be the three most important risk factors—energy prices, the discount rate, and capital costs—out of a group of ten risk factors. Their approach thereby ignores some potentially important risk factors, such as load and its determinants, some of which are then considered separately in a “sensitivity analysis” in chapter 10.”

QUESTION:

Please identify which additional risk factors Dr. Simpson suggests be included in the probabilistic analysis and why?

RESPONSE:

There appear to be a number of additional factors that are important to the outcomes, such as load, and their integration into the risk analysis would improve our understanding of their impact on plan selection.

**Needs For and Alternatives To
MH/CAC - Simpson-004**

SUBJECT: Uncertainty Analysis

REFERENCE: Page 2

PREAMBLE: Dr. Simpson said on Page 2 – “Second, the “probability distributions” describing the range of possible outcomes for each of the remaining three risk factors are limited to three points, representing low, reference (expected) and high outcomes or scenarios. The NFAT refers the reader to Appendix 9.3 for details of the formation of these scenarios and their associated probabilities, but the details are sketchy.”

QUESTION:

Assuming the logic behind the probability assignments is sound, does Dr. Simpson believe that the use of a three-point distribution methodology is inherently inadequate or is he simply indicating preference for greater granularity? Please explain.

RESPONSE:

Inadequate is a strong word but it is very difficult to capture the range of risks associated with any factor with only three points.

SUBJECT: Uncertainty Analysis

REFERENCE: Page 3

PREAMBLE: Dr. Simpson said on Page 3 – “At this point measures of risk (the variance or other measures of spread of the NPV outcomes) could also be calculated to assess the riskiness of the plan in a more conventional way, but Hydro now uses what I would consider to be a less conventional S-curve methodology of risk assessment instead.” Manitoba Hydro considered a variety of ways of representing and displaying the risk of the alternative plans. We believe S-curves are a very powerful tool and have a variety of advantages over other measures such as standard deviation.”

QUESTION:

Other than being less conventional (as Dr. Simpson indicated), does Dr. Simpson see any significant drawbacks to the use of S-curves for representing and displaying risk?

RESPONSE:

The limitations of the analysis seem to be primarily the limited number of outcomes assessed (3) for a limited number of risk factors (3).

SUBJECT: Uncertainty Analysis

REFERENCE: Page 5

PREAMBLE: Dr. Simpson said on Page 5 – “Risk is measured here as the gap (divided by 2) between the P90 and P10 outcomes, or the interdecile range, which constitutes one conventional measure of risk that incorporates both upside potential (reward) and downside risk (risk) in the terminology of the NFAT....An alternative two-way comparison can be made between downside risk (difference between P10 and expected value in Table 14.2) and return (expected value).”

QUESTION:

Both the interdecile and the 10th percentile-mean ranges referenced by Dr. Simpson have limitations in this context. Does Dr. Simpson see any significant drawbacks to the use of the 10th percentile value as a measure of downside risk? Please explain.

RESPONSE:

The conventional measure of risk is the second moment of the distribution of outcomes, i.e. the variance or standard deviation. For downside risk, I would think that this would be the (one-sided) variance of outcomes below the mean. The value of this measure is that it considers all points of the distribution, not just P50 and P10. I used the P10, P50 and P90 outcomes because they were provided by the NFAT Report.

Needs For and Alternatives To

MH/CAC - Harper 7 a)

Subject:

Question: Please explain the organizational structure of Econalysis Consulting Services and your position within that structure.

Response:

Econalysis Consulting Services is an Ontario Corporation owned by Ms. Jennifer Anne Ginder. The company currently has four associate consultants, one of whom is Mr. Harper.

Elenchus Research Associates and Econalysis Consulting Services are successor companies resulting from the separation of the two corporate entities in 2003.

MH/CAC - Harper MH 7 b)

Subject:

Question: Please identify the principals of Econalysis Consulting Services.

Response:

See response to MH/CAC-Harper 7 a).

MH/CAC - Harper 7 c)

Subject:

Question: When attempting to contact Mr Harper regarding provision of written materials, Manitoba Hydro noted that the contact information for Econalysis is listed in the Canada 411 directory as "Econalysis Elenchus Consulting Services Inc". Please explain the relationship (current and past) between Econalysis Consulting Services and Elenchus Research Associates.

Response:

See response to MH/CAC-Harper 7 a)

MH/CAC – Harper 8 a)

Subject: Resource Alternatives

Reference: At p. 11 of his report Mr Harper postulates that stress tests are not a full substitute for including alternative levels of DSM as options in the initial design of the development plans and suggests that it would have been practical to consider development plans to meet domestic needs plus current export commitments in where with enhanced DSM Conawapa is the first new major generation placed into service or where new opportunities come into play such as solar.

Question: Mr Harper appears to be suggesting Manitoba Hydro consider proceeding with Conawapa without any new export commitments. Is this correct?

Response:

Mr. Harper notes that, in its NFAT Application, Manitoba Hydro has considered alternative plans that involve the construction of gas-fired generation (either CCGTs or SCGTs) or Wind prior to the Conawapa (i.e. Plans #7, #8 and #9). What Mr. Harper is suggesting in his evidence is that with a sufficient level of DSM the need date for new generation could be delayed such that it is feasible to consider Conawapa as the first major new generation resource and that the implications of such a “plan” were not assessed as part of the current NFAT Application. In this context, Mr. Harper notes that none of Plans #7, #8 or #9 include new export commitments and it would be reasonable to assess the viability of a DSM/Conawapa-based plan on a similar basis.

MH/CAC – Harper 8 b)

Subject: Resource Alternatives

Question: If correct, please comment on the risks to Manitoba Hydro ratepayers of proceeding to construct a large hydro-electric generating station without corresponding commitments to an expanded interconnection and a sale of dependable energy excess to the needs of Manitoba ratepayers during the early years of Conawapa.

Response:

Yes, there are risks associated with proceeding to construct a large hydro-electric generation station without corresponding commitments to an expanded interconnection and a sale of dependable resources. However, it is important to note that, even under Manitoba Hydro’s Preferred Development Plan, a commitment to proceed with construction Conawapa is not required for a number of years and this timeframe could well be longer if future DSM levels were materially increased above currently planned levels (see NFAT Appendix 4.2,

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page 172). It is also important to note that the currently proposed intertie expansion is not likely to be the only opportunity for new interties over the next 10-15 years. Indeed, the Province has recently indicated that Manitoba Hydro is entering into discussions with Saskatchewan for exports of up to 500 MW that would require new inter-ties with that province. Similarly, the contract currently being negotiated with WPS is not the only market arrangement Manitoba Hydro is pursuing (LCA/MH I-018). Finally, while there may be risks associated with a DSM/Conawapa plan, Mr. Harper notes that such a plan would insulate ratepayers from the risks associated with future natural gas prices that the initial construction of gas-fired generation under Plans #7 and #8 exposes them to.

Overall, Mr. Harper's Evidence is that there would be merit in considering such a plan as part of a NFAT review. To recognize some of the aforementioned risks one could consider alternative versions of such a "plan" that did/did not include a firm export contract for any dependable surplus energy. Please also see the response to MH/CAC-Harper 8 a).

MH/CAC – Harper 8 c)

Subject : Resource Alternatives

Question: Please elaborate on the statement regarding solar generated power that it is expected to become increasingly cost competitive over time. Please identify the basis for your statement, whether it is a general comment or if you have conducted independent analysis. Please comment on whether the projected decline in costs is dependent on the realization of innovations and improvements to the technology which are not currently available nor guaranteed to be available.

Response:

The comment that solar (either utility or customer scale) while currently not competitive is expected to become increasingly so with time is not based any independent analysis but rather a general comment based on sources which include Manitoba Hydro's NFAT Application, Appendix 7.1, page 44. Please also see the evidence of Mr. Dunsky in this proceeding and the evidence of La Capra Associates.

MH/CAC – Harper MH 8 d)

Subject: Resource Alternatives

Question: Please comment on the prudence of an electric service provider charged with providing economical power relying, for current decision-making purposes, on a source of power which at present is significantly more costly but

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who's costs may reduce over time to the point where costs could be in the same range as more traditional power sources such as hydro-electric or gas generation.

Response:

Mr. Harper agrees that it would not be prudent to implement a plan that relied on such sources of power. However, it would be prudent for an electric service provider to implement plans that included the flexibility to react and accommodate such opportunities if and when they arise. One of the purposes of effective integrated resource planning should be to avoid locking in excessively costly sources of supply and to avoid locking out potentially more cost effective offerings.

MH/CAC – Harper 9

Subject: Approach to Economic Evaluation

Reference: Page 19, “Manitoba Hydro’s approach to economic evaluation is generally consistent with accepted practice”

Question: Please advise whether Mr Harper has experience with the use of S curves in performing economic evaluations in other jurisdictions. If so, please comment on whether Manitoba Hydro’s methodology is consistent with that used in these jurisdictions. If not, please explain.

Response:

Mr. Harper has been involved with reviewing supply plans/integrated resource plans with respect to electricity supply in Quebec, Ontario and BC. The use of S-curves has not been a feature of the economic evaluations performed in support of those plans. However, Manitoba Hydro’s application of S-curves does conform with Mr. Harper’s understanding of how S-curves are used and interpreted for decision making purposes.

MH/CAC – Harper 10

Subject: Uncertainty Analysis

Reference: Mr. Harper said at Page 40 – “However, Manitoba Hydro’s overall probabilistic-based risk assessment is fairly simplistic in that only three factors (albeit the three most significant ones) were utilized in the uncertainty analysis and, in each case, only three possible outcomes assigned. In reality there are virtually an infinite set of outcomes for each of the factors and considerably more factors that could be included in the analysis. While the simplicity of Manitoba Hydro’s approach makes it easier for parties to follow the analysis and understand the results (e.g. Manitoba Hydro’s probabilistic quilt) the resulting probability distributions for each Plan are not as robust as they could have been.”

Question:

Recognizing that it is not practical to include all potential risk factors in complete detail, does Mr. Harper see any significant drawbacks to choosing the three most impactful sets of factors and identifying three cases for each set of factors? If yes, please explain.

Response:

There are potentially two drawbacks to choosing only the three most impactful factors and identifying three cases for each. The first is that with only three cases associated with each factor the choice of the specific probability (which in some cases is based on judgment) becomes more important. The second drawback is associated with the fact that the probabilities used for the S-curves are calculated by interpolating between the various cumulative probability values (e.g. if the 2nd lowest value in the cumulative distribution curve is \$100 with probability of 15% and the lowest value has a probability of 10% - then the S-curve is calculated assuming that \$100 has a cumulative probability equal to 17.5% (i.e. $10\% + \frac{1}{2} \times 15\%$). Clearly the more probability observations there are the smaller the span over such interpolations will need to be done and the greater the robustness of the S-curves. This issue only becomes important when the resulting S-curves for the various alternatives come out “close” to each other which is the case for many of the plans assessed in the NFAT.

MH/CAC – Harper 11

Subject: Uncertainty Analysis

Reference: Mr. Harper said at Page 41 – “This use of different discount rates for the different scenarios means that the cash flows are not being assessed using a common view as to the time preference of costs/benefits and that the NPVs calculated are no longer comparable. The scenarios should all be evaluated using the same discount rate (i.e. time preference). If there are concerns regarding the appropriateness of the time preference value used then this should be addressed through sensitivity analysis whereby all of the scenarios are reassessed using a different discount rate and a determination made as to whether or not this changes the overall conclusions of the economic evaluation.” See also page 63

Question: Mr. Harper recommends using sensitivity analysis instead of probabilistic analysis for evaluating the discount rate. However, if the appropriate discount rate is not known with certainty over the entire time horizon and if different discount rate possibilities are identified, isn't it reasonable to assign likelihoods to them? Please explain what methodology Mr. Harper would suggest for dealing with discount rate uncertainty in the economic analysis?

Response:

For the reasons outlined in his evidence (pages 40-41), it is Mr. Harper's view that assigning likelihoods to differ discount rates and including them as a “factor” in the economic uncertainty evaluation distorts the NPV results such that they are no longer directly comparable.

Please see the response to MIPUG/CAC-Harper 2 for Mr. Harper's suggestions for dealing with discount rate uncertainty in economic analysis.

MH/CAC – Harper 12 a)

Subject: Uncertainty Analysis

Reference: The values for plans 6 and 12 seem inconsistent between Table 7 and Tables 10, 11 & 12, pages 43-45

Question: Please confirm which Table has the appropriate values for plans 6 and 12, and comment as to the effects on the observations and conclusions that rely on the Tables as required.

Response:

In several of the Tables and Figures in Mr. Harper's evidence the Plan numbers assigned to K19/Gas31/750 MW and K19/C31/750 MW were inadvertently reversed. The specific tables and figures affected are:

- Figures #6, #7, #9, #12, and #13
- Tables #7 and #9.

In each case the data/curves shown are with respect to the "plan" as described by its title (and not its number). This mislabelling has no effect on the observations or conclusion presented in the Evidence.

MH/CAC – Harper 12 b)

Subject Uncertainty Analysis

Reference: Pages 49-55

Question: Please provide and explain the detailed assumptions and calculation steps to obtain the values for Opt 250 and Opt 750 in tables 10 & 11.

Response:

Please see the response to MIPUG/CAC-Harper 4

MH/CAC – Harper 12 c)

Subject: Uncertainty Analysis

Reference: Pages 49-55

Question: Please provide and explain the detailed assumptions and calculation steps to obtain the values for the various Paths in tables 12 & 13.

Response:

Please see the response to MIPUG/CAC-Harper 4

MH/CAC – Harper 13

Subject: Multiple Account Benefit Cost Analysis, Residual Asset Value

Reference: The report states: “Costs and benefits in years after 2047 are translated into a residual value and also present valued to 2014 using the 6% discount rate. However...the residual value was calculated using Manitoba Hydro’s 5.05% WWACC as opposed to the 6% discount rate deemed applicable to the Market Valuation account.” . Page 59

Question: Does Mr Harper agree that MANITOBA HYDRO's post 2047 projection's of revenues and expenditures relative to the all gas case is a reasonable way to estimate the 2047 residual value of assets relative to the all gas case? If not, please explain.

Response:

Mr. Harper agrees and notes that this was not the basis for his concerns regarding the market valuation calculations performed by Manitoba Hydro. See the response to MH/CAC-Harper 14.

MH/CAC – Harper 14

Subject: Multiple Account Benefit Cost Analysis, Residual Asset Value

Reference: The report states: “Costs and benefits in years after 2047 are translated into a residual value and also present valued to 2014 using the 6% discount rate. However...the residual value was calculated using Manitoba Hydro’s 5.05% WACC as opposed to the 6% discount rate deemed applicable to the Market Valuation account.” Page 59

Question: Does Mr. Harper agree that calculating the PV of those post 2047 revenues and expenditures at MANITOBA HYDRO’s discount rate reflects the residual value from MANITOBA HYDRO’s perspective? If not, please explain.

Response:

Mr. Harper agrees that Manitoba Hydro’s calculation of the residual values for the various plans at 5.05% reflects the residual value from Manitoba Hydro’s perspective. Mr. Harper’s issue is that this value (based on Manitoba Hydro’s perspective) is being used in the determination of the Market Valuation for each alternative. However, according to Manitoba Hydro’s NFAT Application (Chapter 13, pages 5 and 22) this account is meant to be valued using a 6% real discount rate reflecting a provincial perspective as opposed to Manitoba Hydro’s WACC.

MH/CAC – Harper 15

Subject: Multiple Account Benefit Cost Analysis, Residual Asset Value

Reference: The report states: “Costs and benefits in years after 2047 are translated into a residual value and also present valued to 2014 using the 6% discount rate. However...the residual value was calculated using Manitoba Hydro’s 5.05% WWACC as opposed to the 6% discount rate deemed applicable to the Market Valuation account.” Page 59

Question: Does Mr. Harper agree that all of the other cash flows in the market value account are an attempt to measure benefits and costs from MANITOBA HYDRO's perspective? If not, please explain.

Response:

Mr. Harper does not agree. As noted in response to CAC/MH I-153 a) the costs and benefits in the market valuation account are from the point of view of Manitoba Hydro and its project partners. Furthermore, the costs and benefits are then discounted at a rate that is meant to reflect “the weighted average societal opportunity cost of capital from a provincial perspective” (Chapter 13, page 22). See also the response to MH/CAC-Harper 14.

MH/CAC – Harper 16 a)

Subject: Multiple Account Benefit Cost Analysis, Residual Asset Value

Reference: Mr. Harper calculates the residual value at a 6% social opportunity cost of capital discount rate. Page 59

Question: Is Mr. Harper aware of recent literature that suggests longer term intergenerational effects should be discounted at lower rates?

Response:

Yes, Mr. Harper is aware of the recent literature. Mr. Harper is also aware that there are varying opinions on the use of such an approach. As an example please see to the 2011 Burgess and Zerbe article referenced in the NFAT Application, Chapter 13, footnote #7.

MH/CAC – Harper 16 b)

Subject: Multiple Account Benefit Cost Analysis, Residual Asset Value

Reference: Mr. Harper calculates the residual value at a 6% social opportunity cost of capital discount rate. Page 59

Question: What impact would applying a lower intergenerational rate have on the residual value (e.g. 3.5% or 2.5% real)?

Response:

The following table sets out the impact of discounting the cash flows after 2047 back to that year at a rate of 3.5% or 2.5% and then discounting this value plus the cashflows up to 2047 back to 2014 at 6%. In preparing this response, it was noted that ECS Table #15 required correction. The revised values based on 6% over the entire period are set out below. Furthermore, ECS has been unable to replicate the values reported by Manitoba Hydro based on its 6%/5.05% discount rates. The Table reports both Manitoba Hydro's values and the values calculated by ECS. All values are based on the Reference case.

Needs For and Alternatives To

MH/CAC-Harper 16 b): Table A – Market Valuation Using Alternative Discount Rates

| Market Valuation Relative to Preferred Plan (Millions 2014\$ - NPV) | | | | |
|--|-----------------------|-----------------------|----------------|----------------|
| | Preferred Plan | K19/G24/250 MW | K22/Gas | All Gas |
| Manitoba Hydro's Market Valuation | - | \$17 | (\$270.5) | (\$654.1) |
| Valuation Based on 6% for Entire Planning Period – per ECS Evidence | - | \$214 | (\$105) | (\$214) |
| Valuation Based on 6% for the Entire Planning Period – Revised | - | \$414 | \$98 | (\$187) |
| Valuation Based on 6%/5.05% | - | \$292 | (\$27) | (\$404) |
| Valuation Based on 6%/3.5% | - | \$24 | (\$304) | (\$878) |
| Valuation Based on 6%/2.5% | - | (\$210) | (\$545) | (\$1291) |

MH/CAC – Harper 17

Subject: Multiple Account Benefit Cost Analysis

Reference: Mr. Harper asserts that "it is not clear to what extent this hybrid use of discount rates" [in the market valuation account] "was employed in evaluating the other Multiple Accounts." Page 60

Question: Does Mr Harper accept that a 6% real rate was used in calculating the monetized present value of the government, employment, greenhouse gasses (GHG), and Criteria Air Contaminant (CAC) net benefits or costs presented in Chapter 13 and summarized in Table 13.9? If not, please explain why and what discount rate does Mr. Harper believe was used?

Response:

It is Mr. Harper's understanding that a 6% real rate was used to calculate the monetized present value for the above factors. Mr. Harper's concern is that this was also his understanding as to the basis for the calculation of the market valuation account based on the descriptions provided in the relevant sections of Chapter 13 (i.e. sections 13.1.2 and 13.3.1) that dealt specifically with this account as well as the response to CAC/MH II-047 a). Assuming the inference in the question is that 6% real was used as the discount rate for these other factors for the entire study period, Mr. Harper accepts that as being the case.

MH/CAC – Harper 18 a)

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms, particularly since this was the approach used in Manitoba Hydro’s NFAT Application regarding the Wuskwatim Project105”. In the footnote 105, Mr. Harper indicates the reference is “Manitoba Hydro, Submission to Manitoba CEC, NFAT the Wuskwatim Project, Chapter 7, page 11”. Page 60

Question: Please confirm your understanding that the analysis in chapter 7, page 11 of the Wuskwatim submission is a financial analysis and not comparable with a multiple-account benefit cost analysis?

Response:

Mr. Harper understands that the analysis in Chapter 7 of the Wuskwatim submission was a financial analysis. However, Mr. Harper notes that the stated purpose of this financial analysis was “to ascertain whether the advancement of the Wuskwatim project would adversely affect Manitoba Hydro’s financial stability during the start-up years and to determine the degree to which the economic benefits could ultimately translate into domestic customer rate savings (*emphasis added*)” (Chapter 7, page 1). This stated purpose for the financial analysis in Wuskwatim submission (as it pertains to customer bill/rate impacts) and reliance on financial analysis to do so is very similar to the stated purpose/approach for the Customer Account in the current NFAT Application as set out in Chapter 13 (page 6):

“This account assesses the consequences of the different plans for Manitoba Hydro customers. It relies on the financial analysis in Chapter 11 that provides estimates of the rate increases in the short to medium and long term that would be required to recover net system costs and meet corporate financial targets.”

MH/CAC – Harper 18 b)

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms, particularly since this was the approach used in Manitoba Hydro’s NFAT Application regarding the Wuskwatim Project105”. In the footnote 105, Mr. Harper indicates the reference is “Manitoba Hydro, Submission to Manitoba CEC, NFAT the Wuskwatim Project, Chapter 7, page 11” Page 60

Needs For and Alternatives To

Question: Please confirm your understanding that the document filed in the Wuskwatim application M. Shaffer & Associates Ltd., “Social Net Benefits of Advancing the Wuskwatim Project”, August 2003, which is comparable to the multiple-account benefit cost analysis in chapter 13 of the current NFAT submission, does not express customer rate/bill impacts in NPV terms?

Response:

Not confirmed. Unlike Chapter 13 in the current NFAT Application, the referenced document by M. Shaffer & Associates Ltd. did not include a “Customer Account” and therefore did not address the issue of how to express customer rate/bill impacts.

MH/CAC – Harper 19

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms,…” Page 60

Question: Does Mr Harper agree that the present value of the revenues and expenditures to Manitoba Hydro provides an indicator of the present value implication for customers, since rates are determined to recover costs? If not, please explain.

Response:

Mr. Harper agrees it provides an “indicator” but, by no means, an accurate one. Indeed, the referenced quote from Chapter 7 of the Wuskwatim Submission provided in the response to MH/CAC-Harper 18 a) supports the view that economic benefits are not perfectly aligned with customer bill/rate savings. Reasons for this are that while rates are determined so as to recover costs, the impact of accounting policies (e.g. capitalization policies which use rates that differ from the discount rates in the economic analysis) and financial policies (e.g. net income setting policies that focus on financial integrity) will lead to differences between the NPV derived from the economic analysis and the NPV implications for customers’ bills.

MH/CAC – Harper 20

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms,…” Page 60

Question: Please confirm that it is standard practice in the economic valuation of alternative generation and transmission expansion plans or projects to calculate the net present value of utility expenditures less export sales revenues to capture the impact for customers?

Response:

Mr. Harper agrees that it is standard practice in economic evaluations of alternative generation and transmission expansion plans or projects to calculate the net present value of utility expenditures (i.e. costs) less export sales revenues (i.e. benefits). The response to MH/CAC-Harper 19 addresses the question of whether the results of such economic evaluations capture the bill impact for customers.

MH/CAC – Harper 21

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms,…” Page 60

Question: Can Mr Harper point to any utility practice in other jurisdictions that would calculate a present value impact to customers plus a present value net costs to the utility and combine them to determine overall net benefits? If so, please provide.

Response:

No. Mr. Harper also notes that his evidence does not propose that overall benefits be calculated in this way.

MH/CAC – Harper 22

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms,…”

Question: Please explain the difference between distributional and efficiency effects in benefit-cost analysis. Page 60

Response:

As discussed on pages 15-16 of Mr. Harper’s evidence, economic evaluations (i.e. benefit-cost analyses) are carried out from a particular perspective and serve to identify the most efficient alternative from that particular perspective. When the perspective taken is that of a particular stakeholder, the analysis only takes into account the costs and benefits attributable to that stakeholder and the results could be different if the alternatives were viewed from a different (stakeholder’s) perspective. In order to determine the overall economic efficiency benefits of different alternatives, decision makers (particularly those associated with government-related decisions) generally undertake benefit-cost analyses from a fairly broad (e.g. societal) perspective. However, what such an approach does not do is consider that the distribution of the costs and benefits and the resulting net benefits to the various stakeholders involved may differ amongst the alternatives. These distributional effects can lead to situations where the alternative that is best from an overall (societal) perspective is not the best from the perspective of particular stakeholders and, indeed, may have negative overall consequences despite there being overall net benefits from the alternative, such that there are winner and losers. In principle, the winners should be able to compensate the losers such that everyone is better off. However, in practice this may not occur.

MH/CAC - Harper MH 23 a)

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms,…”

Question: To the extent that the rate impacts in Chapter 13 were being used to illustrate distributional effects, does Mr. Harper agree that the cumulative effects on rates over time as shown is a better indicator (provides more information) than a single present value number. If not, please explain. Page 60

Response:

No, Mr. Harper does not agree. In Mr. Harper’s view comparing the NPV of customer bills over a period of time for various alternatives is a better indicator (i.e. provides more information) than comparing the cumulative rate increase associated with each alternative over the same time period. The cumulative rate impact/increase measure only looks at the level of rates at the end of period under consideration and allows for no distinction as to when the increases occur during period of time in question. For example, consider two alternatives that both result in 25% rate increases over 10 years. The first alternative involves rate increases of 5% per annum (ignoring for simplicity the impact of compounding) in each of the first five years but no increases thereafter. The second alternative involves no rate increases for the first five year but 5% per annum increases in each of the last five years of the period. The cumulative rate impact measure will be the same for each (25%) even though customers will have paid significantly more in total bills over the 10 year period under the first alternative. In contrast, the NPV calculation does recognize when the rate increases occur during the period and, therefore, is a better measure of the bill/rate impacts over the period being considered.

MH/CAC – Harper 23 b)

Subject: Multiple Account Benefit Cost Analysis, Customer Account

Reference: Mr. Harper stated the following with respect to the Multiple Account Benefit Cost Analysis, customer account: “It is not at all clear why customer rate/bill impacts were not expressed in NPV terms,…” Page 60

Question: What discount rate would Mr. Harper recommend for the present value calculation he suggests should be calculated and why?

Response:

Ideally any discounting of customer bill/rate impacts for purposes of assessing customer impacts would be done at the time preference for money applicable to

Needs For and Alternatives To

Manitoba Hydro's domestic ratepayers. Mr. Harper is not aware of any authoritative work related to the determination of such a value or, more broadly, for electric ratepayers in general.

A review of the relevant references cited by Manitoba Hydro in NFAT Chapter 13 indicates that time preference rates are frequently linked to interest rates for savings. Marvin Shaffer, in his Multiple Account Benefit-Cost analysis text (pages 122 and 126) cites various values for time preference rates in the 1.5% to 4.1% range. This range is generally consistent with the 3.5% savings rates used by Burgess & Zerbe (NFAT Application, Chapter 13, Footnote #7), although these were derived on a different basis. The Ontario Power Authority, in its 2007 IPSP filing with the OEB, used a 4% real discount rate, which was meant to be reflective of resident savings rates (EB-2007-0707, Exhibit D/Tab 3/Schedule 1/Attachment 1)

One of the principles underlying the aforementioned approach is that consumers are net savers and therefore receiving/not receiving funds sooner versus later will impact on savings. However, there are segments of society (and also ratepayers) where this is not case. For residential customers, this could include low income households and indebted households where the time preference rate is likely to be higher. Indeed, in such cases the "rate" could be considerably higher if based on the interest rate charged on credit cards or late payment of hydro bills. Also, it overlooks the fact that in the case of electricity ratepayers a large portion of the revenue comes from businesses (e.g. in Manitoba Hydro's case – over 50%) and not households where delayed "consumption" may well be represent delayed investment in business activities. The real return on equity used in ECS's revised Manitoba Hydro WACC calculation is in the order of 8% real and reflects the return expectations for a relatively low risk investment.

Overall this would suggest that the appropriate time preference rate is somewhere in the range of 3% - 8%. For purposes of an initial calculation a discount rate of 5.5% would seem reasonable. However, given the range some sensitivity analysis would be in order.

Gunn and Olagunju, Macro-Environmental

Manitoba Hydro's NFAT Review of Keeyask and Conawapa Generating Stations

MH-CAC Information Request Responses, Round 1

February 20, 2014

| No | Preamble | Question | Response |
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| 24 | We note that Dr. Gunn is well-published with her colleague, Dr. Bram Noble, on the areas of strategic environmental assessment and cumulative effects assessment. | Please elaborate on Dr. Gunn's and Ayodele Olagunju's practical, hands-on experience leading and/or undertaking strategic assessments of alternative policy options, as proposed in their technical report. | <p>Dr. Gunn and Mr. Olagunju are academic process experts for strategic environmental assessment and cumulative effects assessment, with a combined 12 years of scholarship, advisory, and training services provided in these areas. Neither Dr. Gunn nor Mr. Olagunju have led strategic environmental assessment exercises: this is generally the responsibility of project proponents and/or governments. Rather, their role would typically be to ensure that a strategic environmental assessment or cumulative effects assessment process conforms to established national and international best practice standards as closely as possible.</p> <p>Notably, however, Dr. Gunn was involved in the Saskatchewan Great Sand Hills Regional Environmental Study (a strategic environmental assessment) as the lead researcher on governance instruments and institutional arrangements. Her work in developing best practice methodologies for regional strategic environmental assessment (that accounts for cumulative effects) has been endorsed by the Canadian Council of Ministers of the Environment, the Government of Alberta, and by the International Association for Impact Assessment.</p> <p>Mr. Olagunju is currently a PhD Candidate studying regional strategic cumulative effects assessment and completed a masters degree in cumulative effects assessment in 2012.</p> |
| 25 | The CAC, through the reports | Please describe the differences | Gunn and Olagunju (2013) do not suggest that the PUB adopt a particular |

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| <p>prepared by Gunn and Olagunju and Gibson and Gaudreau, has presented and recommended that the PUB adopt two different decision-making frameworks for assessing the Preferred Development Plan and its options.</p> | <p>between these two frameworks and outline the advantages and disadvantages of each approach.</p> | <p>framework for decision-making, per se, rather, they suggest that because the selection of the preferred energy supply package for Manitoba is an inherently a strategic exercise with cumulative effects implications, some strategic questions tailored to the NFAT review might be useful to guide dialogue and decision-making (p. 40): (1) What is the preferred future direction for long-term energy infrastructure investment in Manitoba?; (2) What is the vision for the Nelson sub-watershed region, and can or should it sustain further development?; (3) What are the values and/or performance indicators against which the Plan and its alternatives are being assessed?; and (4) What are the likely macro or cumulative environmental impacts of the Plan and each alternative and how well does each perform with respect to the broad vision, values and performance indicators that have been identified? The four questions suggested in the report are thought to be complementary to those suggested by Gibson and Gaudreau.</p> <p>Should the PUB wish to adopt a structured strategic environmental assessment framework to determine a preferred development option (which Gunn and Olagunju would support), there is an excellent example to follow, demonstrated recently by White and Noble (2013), which successfully incorporates the kinds of sustainability principles espoused in the Gibson and Gaudreau report. Sustainability assessment, while contributing a robust framework of core sustainability principles to help guide decision-making about a wide range of development initiatives, is still developing methodologically and therefore not yet typically applied as a 'stand-alone' assessment framework to development projects in Canada. However, some strategic environmental assessment and project-based environmental assessments, when thoughtfully designed, have displayed some of the desirable characteristics of a sustainability assessment.</p> <p>White, L. and Noble, B. (2013) Strategic environmental assessment in the electricity sector: an application to electricity supply planning,</p> |
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| | | | Saskatchewan, Canada. <i>Impact Assessment and Project Appraisal</i> , 30(4): 284-295. |
| 26 | <p>Gunn and Olagunju note on page 7 of their report that one of the objectives of their review was to:</p> <p>“Provide a high-level review of the strengths and weaknesses of the power supply options associated with the Plan and its alternatives from a macro environmental perspective”</p> <p>Then in small footnotes on page 15, they note that their review “may inadvertently misinform as it is a high-level review based primarily on academic literature” and that “the discussion is not context-specific to Manitoba”. They also cite a number of other reports in footnotes on this same page where the macro environmental impacts of Manitoba Hydro’s preferred plan and alternatives can actually be found. The report does provide an academic overview of the pros and cons of different development options, but many of the issues identified are clearly not applicable to the Manitoba context, including things like the inundation of agricultural land, the resettlement of communities and seismic risks (see page18). This makes it challenging to appreciate the value of this report in the context of the</p> | <p>Please elaborate on the rationale for not reviewing and commenting on the macro-environmental and social effects of the actual Preferred Development Plan and its alternatives. If such a review has been undertaken, please provide this review.</p> | <p>The Gunn and Olagunju (2013) report responds to a specific need of the Consumers Association of Canada (CAC) (Manitoba Branch), a client of the Public Interest Law Centre of Manitoba, which is to understand at the outset of the NFAT review the broad-scale environmental impacts and benefits of various power supply technologies such that they are able to engage in a constructive dialogue with Manitoba Hydro and the Public Utilities Board about the various alternatives being considered and how to determine a strategic direction for future power supply in Manitoba. It also offers the CAC (Manitoba) a foundation and framework to critically analyze any reported macro-environmental and social effects of the actual Preferred Development Plan and its alternatives.</p> <p>The intent of the Gunn and Olagunju (2013) report was not to critique the reported macro-environmental and social effects of the actual Preferred Development Plan and its alternatives: this work was deliberately left to other subject-area experts with specific training in the areas of wildlife, fisheries, human health, etc. Moreover, the macro-environmental deliberations of the PUB were not to duplicate the detailed review of the EIS.</p> |

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| | current review process. | | |
| 27 | On page 13-14 of their report, Gunn and Olagunju note that their review of the Preferred Development Plan and its alternatives is based on La Capra and personal communication with Harper. | Please explain why Gunn and Olagunju chose not to review the actual NFAT submission made by Manitoba Hydro so that they could provide expert advice based on their own reading of the filing. | Gunn and Olagunju were advised by the CAC to consult with Harper and refer to the LaCapra report and others to determine the types of power technologies involved in Manitoba Hydro's Preferred Development Plan and its major alternatives. The recommendation was made for reasons of efficiency. It should also be understood that Dr. Gunn undertook an extensive review of Keeyask for the EIS. |
| 28 | In the discussion of hydro-electric development, the environmental and social impacts of development are emphasized. 'Gas' turbines, however, are largely analyzed in contrast to coal generated energy. | Please analyze hydro in contrast to coal generated energy. | <p>Both coal and hydro have their benefits and burdens both socially and environmentally. The greatest selling point for coal is its reliability; while energy production via hydro can be affected by factors such as seasonal variation in precipitation, coal energy supply is often secure throughout the year. Costs to the environment in terms of CO₂ emissions, groundwater and air pollution, and resource depletion and their implications for climate change, biodiversity, and human health are disproportionately greater for coal in comparison to hydro. Both are socially controversial: while downstream and in-stream effects are common both locally and regionally with hydro development, coal mining provides the single largest anthropogenic contribution to global warming which in turn has been described as the 'biggest' health threat of the 21st century (BZE 2014). Evidence of comparatively higher rates of mortality and diseases such as cancer, heart, lung and kidney disease, and birth defects, to minor respiratory complaints have been reported in coal mining communities (see for instance: Colagiuri et al. 2012, pp. iv, 11).</p> <p>As of 2010, the share of global electricity generation attributed to coal is still significantly high – over 40%– in comparison to 16% for hydro (IEA 2012). The dominant share of fossil fuels (including coal) for energy production is projected to continue at the current rate till 2040 (IER 2014), however stiffer regulatory measures to curb CO₂ emissions globally and the growing relevance of renewable alternatives could make construction of new coal plants more controversial. On the whole, however, hydro is a more environmental-friendly option when compared to coal (Varun and Prakash 2009). In the Varun and Prakash (2009) study,</p> |

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| | | | <p>the life cycle emissions level for coal is computed to be several times higher than hydro's.</p> <p>Beyond Zero Emissions (BZE) (2014) Health and social harms of coal mining in local communities - research report. Available at: https://bze.org.au/repower-port-augusta/coal-and-health</p> <p>Colagiuri, R., Cochrane, J., Girgis, S. (2012) Health and Social Harms of Coal Mining in Local Communities: Spotlight on the Hunter Region. Melbourne: Beyond Zero Emissions. Available at: http://media.bze.org.au/coal_health_Report_FINAL.pdf</p> <p>International Energy Agency (2012) 2012 Key World Energy Statistics. Paris: International Energy Agency. Available at: http://www.iea.org/publications/freepublications/publication/kwes.pdf</p> <p>Institute for Energy Research (2013) EIA Forecast: Fossil Fuels Remain Dominant Through 2040. Available at: http://www.instituteforenergyresearch.org/2013/12/17/eia-forecast-fossil-fuels-remain-dominant-through-2040/</p> <p>Varun, B., and Prakash, R. (2009) LCA of renewable energy for electricity generation systems—A review. <i>Renewable and Sustainable Energy Reviews</i>, 13: 1067–1073.</p> |
|--|--|--|--|

1 REFERENCE: General

2

3 QUESTION:

4 For what major resource developments has the CEAA or provincial regulator used
5 this approach as the foundation for their EIS guidelines issued to the proponent (i.e.,
6 issued for EIS development by a proponent, as opposed to being used by panel
7 reviewers)?

8

9 RESPONSE:

10 The approach has not been adopted as the basis for structuring the any detailed
11 federal or provincial EIS guidelines for proponents to our knowledge, though we
12 have not done a comprehensive review of provincial and territorial EIS guidelines to
13 check. Very broadly, the approach has evidently influenced basic initial guidance in
14 some cases. See, for example the “contribution to sustainability” principle set out
15 in the *Environmental Impact Statement Terms of Reference for the Mackenzie Gas*
16 *Project* (August 2004), pages 3-4. Less detailed requirements for consideration of
17 sustainability or sustainable development effects have been included in EIS guides
18 in many other cases – e.g. Whites Point Quarry and Mariine Terminal EIS Guidelines
19 (2005), Kemess North Mine EIS Guidelines (2005), Donkin Coal EIS Guidelines
20 (2012). The extent to which the drafters had in mind the approach we have
21 developed and applied is not known.

22

REFERENCE: General

PREAMBLE: The bulk of Gaudreau and Gibson's report appears to be a repeat or re-packaging of their report for the CEC hearing on Keeyask with one section being notably different. In some places PUB/NFAT has simply replaced Keeyask; in others, they have changed the lead in sentence but kept the same paragraph. The first 24 pages (out of 34) are a repackage of the CEC report; the only new section is Section 4 (pgs. 24-34)• Several appendices are identical.

QUESTION:

Why did the reference list at the outset of your paper fail to recognize your comparable paper presented at the Keeyask hearings? Please confirm (yes or no) that this report and its recommendations are in fact the same as those presented by these authors during the course of the CEC Process.

RESPONSE:

The suggestion cannot be confirmed.

We recognize there is clearly overlap between the report submitted to the CEC and the one we have submitted to the PUB. There are good reasons for this. As noted in our report to the CEC, we believe that a decision regarding approval of the Keeyask Dam would be inappropriate prior to completion of the Need For and Alternatives To assessment review because Manitoba Hydro's filing to the CEC provided neither a justification of need nor an assessment of alternatives. Furthermore, the sections that Manitoba Hydro identifies as being repackaged relate to describing the basic framework for

sustainability assessment, which was specified for the Keeyask/NFAT context. Even so, our NFAT report expands on the basic framework presented in the CEC to match the purposes of the NFAT review.

The recommendations in our NFAT report are not the same as those in our CEC report. First, the sustainability criteria set proposed in the NFAT report differs from the criteria set proposed in the CEC report. This should be evident based on the themes and criteria presented. Second, as noted above, our recommendations to the CEC (beyond the proposed criteria set) were the following:

Based upon the above, we recommend the following to the Clean Environment Commission:

1. that the CEC suspend or defer its decision about the acceptability of the proposed Keeyask project until these deficiencies and those noted by other experts have been addressed and the overall analysis revisited.
2. that for future assessments the CEC require proponents to adopt from the outset an integrated sustainability assessment framework that includes a full justification of need, a full and fair analysis of alternatives, and application of an explicit set of sustainability criteria specified for the case and context.
3. that the CEC apply an explicit sustainability criteria set in its assessment of the Keeyask proposal as a first step would be beneficial, although it cannot provide a basis for concluding that the project is acceptable, because the review does not include comparative evaluation of alternatives. A full criteria set included in Appendix 5 of this report is provided as an option for this purpose, with a summary of the set provided at the end of the Executive Summary.

Given that Manitoba Hydro has been required to justify the need for and alternatives to the proposed Keeyask dam (as well as the proposed power systems plan of which the Keeyask project is a component), it is reasonable to expect that this information could be included within the CEC hearings. These arguments are the foundation upon which the EIS rests.

By contrast, the primary recommendation provided in our NFAT report is the following:

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).

Ultimately, while we are happy to note in our NFAT report that there are areas of overlap with our CEC report, we reject the claim that they make the same recommendations, beyond the basic recommendation that a sustainability assessment framework, or its substantive equivalent, be applied in both the CEC and PUB decision making processes.

1 REFERENCE: Page 3 & 25

2

3 PREAMBLE: **The authors reference input from "several stakeholders**
4 **involved in the CEC and NFAT hearings, as well as experts in Canadian**
5 **energy strategy and the Manitoba context."**

6

7 QUESTION:

8 Who are these stakeholders & experts?

9

10 RESPONSE:

11 The note quoted above was included to give some recognition to our advisors. They
12 cannot be named because a condition of their recruitment was that their anonymity
13 be protected.

1 PREAMBLE: **The authors reference input from "several stakeholders**
2 **involved in the CEC and NFAT hearings, as well as experts in Canadian**
3 **energy strategy and the Manitoba context."**

4

5 QUESTION:

6 Please provide expert CVs,

7

8 RESPONSE:

9 As noted in our response to IR 31a, our advisors cannot be named because a
10 condition of their recruitment was that their anonymity be protected. We therefore
11 cannot provide the CVs.

1 PREAMBLE: **The authors reference input from "several stakeholders**
2 **involved in the CEC and NFAT hearings, as well as experts in Canadian**
3 **energy strategy and the Manitoba context."**

4

5 QUESTION:

6 and please provide the expert's information used by the authors in their report.

7

8 RESPONSE:

9 As noted in our response to IRs 31a and 31b, we are not at liberty to provide the
10 names of the stakeholders and experts, or their comments.

**Needs For and Alternatives To
MH/CAC - Simpson and Gotham-032**

QUESTION:

Please describe the role and contribution of each of Dr. Simpson and Dr. Gotham with respect to the preparation of their report “Standard Approaches to Load Forecasting and Review of Manitoba Hydro Load Forecast for Needs For and Alternatives To (NFAT)”

RESPONSE:

Dr. Gotham and Dr. Simpson are jointly responsible for the report and its conclusions. Dr. Gotham was the primary author for PART 1. Dr. Simpson was the author for much of PART 2, with input from Dr. Gotham on examples from his experience in Indiana.

**Needs For and Alternatives To
MH/CAC - Simpson and Gotham-033**

1 SUBJECT: Experience and Qualifications

2

3 QUESTION:

4 Has Dr. Simpson participated in the preparation of a load forecast for an energy
5 utility? If so, please indicate in what capacity (eg. forecaster, researcher, advisor).

6

7 RESPONSE:

8 Dr. Simpson has extensive experience with econometric forecasting but has not participated in
9 the preparation of a load forecast for an energy utility.

10

SUBJECT: Load Forecast

REFERENCE: Page 2, paragraph 3

PREAMBLE: "...a load forecast based on the past five years, which saw a significant economic recession, would produce a very different result than one based on the last twenty years."

QUESTION:

Does CAC feel that using a short recent period dominated by a recession would produce a better forecast than using a longer period that included both recession and high growth periods?

RESPONSE:

Not necessarily. The point here is that forecasts produced by trend models can be biased by the choice of data, not to say that one choice is better than another. In this case, if someone wanted to produce a low forecast, a model could be used based on only the recent data. If a high forecast was desired, a model using more data could be used.

SUBJECT: Residential Basic Forecast

REFERENCE: Page 6, paragraph 3

PREAMBLE: “The number of occupants per household will be affected by not only the number of people but the relative ages of the population. For instance, if the fastest growing segment of the population is over 50 there will usually be fewer people per household in the future. Another factor affecting the number of occupants per household is personal income. As income increases, the number of occupants per household generally decreases.”

QUESTION:

Please confirm that the factors cited would result in a higher number of households for a given population projection.

RESPONSE:

For these particular examples, it is confirmed that these factors would result in a higher number of households. For the counter examples (the fastest growing segment of the population is under 18 or if income is decreasing), the factors would result in a lower number of households.

SUBJECT: Load Forecast

REFERENCE: Page 9, paragraph 4

QUESTION:

Please provide the basis for choosing Indiana as a comparable jurisdiction to Manitoba, specifically outlining how they compare in terms of degree days heating, % of electric space heating, % of electric water heating, forecast population growth, forecast GDP growth, per capita income, per capita GDP, current electricity rates and projected rate increases, primary industrial sub-sectors and number of customers within individual industrial sub-sectors.

RESPONSE:

Indiana is chosen as an example because of its experience with electricity prices. Indiana experienced a period of low, stable electricity prices until the early 2000s. From 2003 to 2011, real electricity prices increased by 21 % and are continuing to rise. Thus, Indiana has real life experience that is directly relevant to what Manitoba is projected to experience in the future – substantial electricity price increases after a period of low, stable prices.

The referenced paragraph acknowledges that Manitoba is different than Indiana. “While one would expect the actual price elasticities to be different in Manitoba than they are in Indiana, there still should be a dampening of electricity demand as real prices rise.”

**Needs For and Alternatives To
MH/CAC - Simpson and Gotham-037**

SUBJECT: General Service Top Consumers

REFERENCE: Page 7

QUESTION:

Please advise whether Dr Gotham and Dr Simpson agree that industrial load forecasting is more challenging when there is a small number of customers within each industrial sub-sector.

RESPONSE:

It is agreed and noted that separating the top customers from the rest of the general service customers results in a small sub-sector.

- 1 REFERENCE: Simpson and Gotham Page 9,
2 http://www.e3network.org/ElasticitySurvey2_Matt.pdf
3
4 QUESTION:
5 Please file a copy of the US estimate referred to at page 9.
6
7 RESPONSE:
8 Please see attached.
9

A Review of the Literature on the Price Elasticity of Demand for Electricity

The results of this review are shown in three tables. Table 1 summarizes the results of several surveys of the academic literature on the price elasticity of electricity. Bohi (1981) was a particularly good early survey, while Espey and Espey (2004) have the most recent and comprehensive list of estimates. I haven't looked at all the surveys listed - a few were referred to in other papers, and I included that information in the table.

Based on a review of these surveys, the numbers that come up most often are 0.2 for the short run elasticity, and 0.7 for the long run. These come up several times, and are in the same range as other potential estimates, such as the medians from the Espey (2004) survey (0.28 and 0.81) and the results of the study preferred by Bohi (0.25 and 0.66).

These results are mostly for residential demand. There are fewer commercial and industrial studies to work with, and their results are even less consistent, so it might make sense to use the same estimates in all three sectors. There doesn't seem to be a consistent pattern as to which sectors show higher elasticities – possibly commercial elasticities could be slightly higher than residential or industrial, but it's not clear.

Since most of the studies reviewed in these surveys were old, I also looked at several recent studies, reviewed in Table 2. The results were not very consistent, and don't provide much basis for changing the conclusions from the earlier surveys.

Table 3 shows elasticities from energy models used by the EIA and other organizations. These tend to be a little lower than the averages from the academic literature. The simulation results from AEO2003 look like they could be good numbers to use, maybe an average of the results for the residential and commercial sectors: 0.15 for short run elasticity and 0.47 for long run.

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1 REFERENCE: Page 3

2

3 PREAMBLE: **The evidence of Mr. Stevens and Dr. Simpson states that it**
4 **addresses the impact of proposed electricity rate increases (4%/year over**
5 **a 17 year period from 2015-2032) (p.3).**

6

7 QUESTION:

8 Please confirm that the evidence of Mr. Stevens and Dr. Simpson does not provide
9 any assessment of: the difference in the magnitude and significance of the
10 estimated average annual rate impacts for low and near low income households in
11 the Preferred Development Plan as compared to alternative resource development
12 plans.

13

14 RESPONSE:

15 The evidence presented does **not** provide any assessment of the said differences.
16

1 REFERENCE: Page 3

2

3 PREAMBLE: **The evidence of Mr. Stevens and Dr. Simpson states that it**
4 **addresses the impact of proposed electricity rate increases (4%/year over**
5 **a 17 year period from 2015-2032) (p.3).**

6

7 QUESTION:

8 Please confirm that the evidence of Mr. Stevens and Dr. Simpson does not provide
9 any assessment of: the impacts of rate increases for any development plan over
10 the longer term (post 2032).

11

12 RESPONSE:

13 The evidence presented does **not** provide any assessment of the said differences.

14

1 SUBJECT: Low-Income

2

3 REFERENCE: Page 8-9

4

5 PREAMBLE: **The Response of Households to the Changing Real Cost of**
6 **Electricity**

7

8 QUESTION:

9 Please provide the working papers used in the development of this analysis,
10 including all model specifications, underlying data and calculations, for the
11 regression analysis discussed in pages 8 to 9.

12

13 RESPONSE:

14 The output from the regression analyses are attached in hard-copy form.

15

1 SUBJECT: Low-Income

2

3 REFERENCE: Page 10-11

4

5 PREAMBLE: **At page 10 of the report “Impact of Increases in Electricity**
6 **Rates on Low and Non Low Income Households in Manitoba”, H. Stevens**
7 **and W. Simpson indicate that the impact of annual electricity rate**
8 **increases was estimated holding all other factors (including real**
9 **household incomes) unchanged.**

10

11 QUESTION:

12 Please confirm if the analysis considered whether prices for some of the other
13 Goods and Services identified in Table 1 may increase above the rate of inflation
14 over the period 2015-2032. If not, please explain.

15

16 RESPONSE:

17 The analysis did **not** consider the said matter as the authors had no reliable information on what
18 those price increases might be.

19

20

1 SUBJECT: Low-Income

2

3 REFERENCE: Appendix 2

4

5 PREAMBLE: **Appendix 2 - Methodology for Setting the Average Annual**
6 **Electricity Rate**

7

8 QUESTION:

9 Please specify what data in Appendix 2, pages 23-26, was provided by Manitoba
10 Hydro, including the specific source reference, and what data was calculated by Mr.
11 Stevens and Dr. Simpson.

12

13 RESPONSE:

14 On page 23, **Item 1** - Hydro Rates - came from MH's website "Historical Residential Electricity
15 Rates." **Item 2** - distribution of residential customers by monthly basic charge and energy use -
16 came from the documents "CAC/MH II-124" and "CAC/MH II-125". **Item 3** came from the tables
17 contained in CAC/MH I-191b & CAC/MH I-192b showing average annual usage along with the
18 tables in CAC/MH I-193b showing number of electric and non-electric heat billed customers in
19 Winnipeg and Total Province by ownership status. Item 3 in Appendix 2 are weighted averages.
20 **Item 4** on page 23 comes from the Survey of Household Spending. The information on pages
21 24 to 26 are calculations of the weighted average costs of electricity based on the information
22 presented on page 23.

23