NEEDS FOR AND ALTERNATIVES TO (NFAT) REVIEW OF MANITOBA HYDRO'S PROPOSAL FOR THE KEEYASK AND CONAWAPA GENERATING STATIONS

Supplemental Report B Observations

La Capra Associates

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This report contains information that has been deemed Commercially Sensitive Information and is, therefore, subject to a protective order.

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Supplemental Report B- Observations based upon Manitoba Hydro's Updated Analysis

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I. Introduction

La Capra Associates (LCA) filed its main report for the Need For and Alternatives To (NFAT) review in two parts: Part A on January 24, 2014 and Part B on February 28, 2014. The LCA reports were supported by the filing of ten Technical Appendices (TA), including *Technical Appendix 9 – Review of Economic Analysis*, and *Technical Appendix 10 – Review of Financial Analysis*, which were also filed in two parts, A and B. In addition, as new information emerged on the capital cost estimates for the Keeyask and Conawapa Hydroelectric Stations, LCA filed an Addendum to TA 9A and TA 9B to capture the higher capital costs impacts.

Manitoba Hydro (MH) simultaneously conducted an analysis of Demand Side Management (DSM) program potential and economics during the NFAT review process. Manitoba Hydro has:

- Endorsed a substantial increase in its DSM Program Level 2 spending and comprehensiveness, and
- Concluded that it would be an economic benefit to add DSM Level 2 resources to all potential resource development plans.

As a result, MH provided significant information on several resource development plans in order to capture how these plans would change with DSM Level 2. This modeling included the updated capital cost estimates for Keeyask and Conawapa for the reference scenario assumptions used in the 2013 Update section that was part of the NFAT Application filed in August, 2013. The Plans updated include 1, 2, 4, 5, 6, 12 and 14.

In response to these updates, the NFAT Review Panel has requested that LCA update specific figures from the figures shown in TA 9A and 10A. Supplemental Filing Part A provided the updated figures.

LCA has also prepared in this Part B a summary of any changes in LCA's observations made in the LCA's main report Part A and Part B, discussed above.

II. Information Sources

In order to make these updated observations, LCA relied on Manitoba Hydro's detailed analysis of annual costs for Plans 1, 2, 4, 5, 6, 12, and 14 which were included in their economic analysis. Data and analysis provided in MH exhibits 104-4, 104-6, 104-4-3, and 104-4-4. While this information was provided in parts as available by MH, LCA received all of it by May 1, 2014. Our understanding is that these plans incorporate the following inputs:

- Reference Scenario Only – 2013 modeling assumptions for discount, energy prices, load forecast (prior to DSM adjustment) as used by MH in their 2013 Update Analysis within the August 16, 2013 NFAT Application.
- The Plans all include the cost and load reduction effects of DSM Level 2 as modeled by MH.
- The Plans have the new March, 2014 vintage updated capital cost estimates for Keeyask and Conawapa.
- The timing of resource additions may have been changed by MH in the some Plans due to lower Peak Load and Dependable Energy requirements from DSM Level 2.

We note that these analyses do not address the uncertainty analysis on Energy Prices, Discount Rates, or Capital Costs and, therefore, the expected value results and the uncertainty comparison profiles (S-Curves) are not available. Our insights gained from these additional Reference Case analyses are offered being mindful that much of our prior work was based on 2012 assumptions with the benefit of the associated uncertainty analysis.

III. Updated La Capra Associates' Observations

We have structured this section to provide new comments based upon the updates MH has made in their analyses. We have organized these observations in four areas; *DSM – A Game Changer, Resource Plans Sub-Optimality, Transmission – Repurposed,* and *Resource Plan Economics*.

A. DSM – A Game Changer

MH has updated its resource plan reference scenario economic comparisons to include the DSM level MH have concluded is economic under all resource plans. There are several observations that LCA believes need to be clearly stated in order to help the partied in this NFAT Review see where the options for resource plans reside.

1. The current lower load forecast and Level 2 DSM implementation approved by the MH Board would now push the year of need for energy or capacity to serve domestic customers out to 2030 or beyond.
2. DSM implementation would push the need for Conawapa well beyond 2030, essentially taking it out of today's resource development requirements even if Keeyask and Conawapa are the endorsed next additions to the MH system.
3. Any advancement in the timing of new hydroelectric capacity to earlier than the year of need would only prove economic if export revenues fully offset the increased costs.
4. The DSM implementation allows for time to examine the current economics and risks of all resource plans, including the Preferred Development Plan.
5. DSM improves certain resource plans more than others, improving the economics of Plan 1 All Gas the most, and Plan 14 the Preferred Development Plan the least. However, while DSM Level 2 has been shown to have positive economics for all plans, it has not been shown that it is the optimum level for each plan.
6. DSM creates opportunities for increasing export sales revenues through increased firm and dependable energy based sales, potentially including the current MP250 contract.

These observations are supported by MH's own analysis and its plans to implement significant DSM activity and programmatic expenditures. The MH Reference Scenario economic analysis has brought the Preferred Development Plan to have essentially the same costs as the All Gas Plan. There is a need to draw from the uncertainty/risk analysis performed in 2012 or conduct an updated uncertainty analysis. The LCA observations from the 2012 uncertainty/risk analysis focused on the MH's request for commitment to Keeyask and also to their plan to continue with Conawapa. While the uncertainty around each input parameter is that either higher or lower values are possible futures, the factors that negatively affect the Preferred Development Plan (PDP) and its large investments have not been re-examined.

- Lower domestic load growth
- Lower energy prices for its exports into MISO
- Higher interest rates
- Escalating Hydroelectric Capital Costs
- Technological and cost reducing advancements in alternative resources such as wind, solar and combustion turbine based combined cycles
- Lower prices for natural gas
- Delays in transmission development and construction, or further increases capital costs

B. Resource Plans Sub-Optimality

As discussed above, DSM has significantly changed the timing of the need for new generation resources within Manitoba. LCA has maintained throughout this review that while MH has examined 15 resource development alternative plans, there is still optimization needed to settle on a final resource plan when all the learning is captured from MH and LCA analyses. This learning includes:

- A detailed examination of the full uncertainty and risk analysis performed by MH in 2012 which was a key part of the MH NFAT Application,
- A detailed examination the 2013 update analysis also included by MH in its NFAT Application,

- The results of the sensitivity analyses performed by LCA in Technical Appendices 9A and 9B, as well as all the detailed breakdown of the issues and factors affecting assumptions and economics within all the Technical Appendices filed by LCA,
- A detailed examination of SPLASH model output for its 99 scenarios of water years used in modeling each plan under each scenario condition in order to understand the opportunities and limitations of Export Revenues stemming changes in generation and transmission resources and MH domestic loads,
- Examining the results of the alternative resource development plans, No New Generation and All Combined Cycle, modeled by MH at the request of LCA and the Public Utilities Board (PUB) Panel, and, finally,
- The MH updates provided throughout the hearings.

The 2012 analysis had not included significant DSM resources in creating the resource development plans. Based upon its review of information prior to the recent MH updates, LCA developed information signifying a lack of optimization in the resource plans. Now, by including the DSM Level 2 resource in all plans the rank order of lowest cost to highest cost plans has changed. A summary of the information LCA suggests that the PUB Panel consider are provided below:

1. Combined Cycle generation can be extremely beneficial in low water flow conditions to maintain MH exports, minimize more expensive imports or free up transmission pathway capacity for increasing imports and reliability.
2. MH limitation place on transmission/imports contribution to dependable energy for reliability planning is dated and not supported by any reliability studies.
3. MH natural gas generation optimization process does not provide a strong indication of the value of combined cycles under low water flow conditions.
4. DSM program implementation significantly changes the timing of MH experiencing a need for dependable energy resources and capacity.
5. The breakeven years for all updated resource development plans with Keeyask or Keeyask and Conawapa are all beyond the detailed modeling period of 38 years and thus rely on extrapolation assumptions to show benefits. The PDP

breakeven period is over 70 years. (Figures 9-15S and 9-21S in Part A of this Supplemental Report)

These fact-based pieces of information all suggest, to differing degrees, that the resource plans as initially studied and that have been quickly updated during the hearings period are not optimized nor do they cover enough resource development combinations and timings. LCA observations lead to the following pathway related questions:

1. What is the potential capital cost penalty of significant delay in Keeyask development activities?
2. What are the short term implications in terms of electric prices to MH domestic customers if any contingencies develop and natural gas generation, either combined cycles, or combustion turbines are built first even in scenarios that favor the long term economics of hydroelectric development? What are the long term economic impacts?
3. Can MH rely on temporary generation options such as leased combustion turbines as contingencies?
4. How can MH obtain actual costs for wind turbine development in Manitoba? Should there be an RFP to build for MH to own?
5. Can MH rely on more imports for dependable energy without creating unacceptable levels of reliability?
6. Is the 250 MW transmission a real or hypothetical resource option?
7. Does added transmission have value in the current system or in an All Gas Resource Plan?

The Panel should be mindful that even with the additional analysis of the resource plans that includes DSM Level 2, there are gaps in the information that would be necessary to conclude that the PDP is a development plan that should be approved.

C. Transmission – Repurposed

MH includes additional transmission capacity between the province and the US in many of the alternative resource plans. There have been questions raised within the review by LCA regarding the use of existing intertie capacity with the US, the 250 MW Line option feasibility and economics, and the need for the 750 MW transmission line. Transmission provides value in several ways:

- A 'road' for energy exports into the MISO energy market and to US utility counterparties.
- Some dependable energy for MH to rely upon under its worst historical drought conditions.

MH has sought US utility partners in the development of the portions of the transmission lines that are located within the US. MH maintains that:

- Export Market to the US opportunities can be captured only if new hydroelectric capacity is development, accompanied by new transmission,
- Lucrative export contracts are dependent upon Keeyask and new transmission coming in service, and
- Counter-parties in contracts require investment in both Keeyask and new transmission.

The analysis presented by MH and reviewed by LCA, including the most recent analyses with higher capital cost estimates for Keeyask and Conawapa as well as MH's commitment to implement DSM Level 2, leaves LCA with observations and questions on transmission's role as part of various resource development plans. These questions differ depending upon whether we are considering the near term or the long term role for new transmission development.

Near Term Transmission Issues

1. Would existing transmission and additional excess hydroelectric output created through DSM implementation allow MH to economically fulfill all its existing contracts, including the MP250? Would the counterparties accept fulfillment

without additional hydro capacity and new transmission? Does the MP250 contract allow MH to waive Keeyask related conditions precedent and hold MP to the terms of the MP250 contract?

2. Can the existing 500 kV (750 MW) transmission application with MISO be amended to a 250 MW line? Will counterparties involved in the transmission projects participate in the smaller transmission project?
3. Has the commitment to DSM Level 2 implementation changed the need for the timing of new transmission capacity?
4. Does it make sense to proceed with a transmission line and/or the MP250 contract independent of Keeyask?

Longer Term Transmission Issues

1. Can MH increase its reliance on dependable energy from imports with existing transmission? With transmission expansion?
2. Is the 250 MW line economics superior to the 750 MW line even in Conawapa is someday developed? (Figure 9-98S in Part A of this Supplemental Report)
3. Under what development plans and scenarios would it make sense to build transmission with its primary benefit to increase imports?

D. Resource Plan Economics

MH's updated analysis has changed the comparative economics of the resource plans. Plan 14, the Preferred Development Plan was initially presented in the NFAT as providing nearly $1.5 Billion in economic benefits versus Plan 1 All Gas at reference conditions or $1.1 Billion as expected value. These economic advantages even under the reference scenario, updated for 2013 assumptions, have completely disappeared. The commitment to implement DSM Level 2 and the increase in Keeyask and Conawapa capital cost estimates are driving this change. (Figure 9-99S in Part A of this Supplemental Report) This results in these basic additional observations by LCA.

1. It is uneconomic to add Conawapa to plans with Keeyask.
2. Plans with Keeyask will take 40–50 years to breakeven versus All Gas.

3. New resource development plans without or with much later development of Keeyask need to be evaluated in earnest by MH, not just to provide a base case for other analysis. The primary options in these new plans should be DSM, Imports, Transmission and peaking resources, either peak reducing demand response or combustion turbine generation.