Undertaking Questions 1 – 25 from the PUB for the Independent Expert Witnesses

(May 17, 2011)

The Board Chairman has raised with KM the question of the "wisdom" of Manitoba Hydro's preferred development plan, one predicated on obtaining new long-term export contracts with U.S. counter-parties (the contracts to extend over a period of time much shorter than the expected service life of the assets and the expected 25-30-year related debt obligations). The concept being that export revenues "pay for" the advancement of projects ahead of the need for additional Manitoba supply.

Would you agree that Manitoba Hydro's preferred development plan:

a) Anticipates the construction of generation and transmission assets in advance of domestic load requirements?

b) Reflects an extension of NSP sales contracts?

c) Is contingent on term sheets (WPS and MP) and associated U.S. transmission upgrades coming into force and service by about 2018, and requiring new generation and transmission assets?

d) Assumes that beyond 2035 market conditions will likely yield higher prices than would be achieved by an extrapolation of term sheet prices, this based on the assumption that significant CO2 pricing will come into effect?

e) Reflects U.S. counterparty unwillingness to commit to more than 10-15 years of fixed prices, suggestive of the counterparties betting against a significant CO2 regime and/or a major change in the pricing of natural gas coming into play ahead of a subsequent renewal of the agreements?

f) Assumes an adequate export revenue stream beyond the termination dates of the sales contemplated in the term sheets?

g) Does not contemplate the now expected slow-down in industrial growth and overall domestic growth.

Ex. # KM-1

Answers to Q1:

A) Yes. MH's top priority is to be able to meet domestic load requirements. Given the length of time it takes to complete this type of construction, it is necessary that the projects are undertaken well in advance of the corresponding full increase in domestic load. On one hand, the capacity to deliver the additional exports assumed by the preferred development plan relies on the availability of transmission capacity. On the other hand, the construction of the new transmission capacity by counterparties is itself contingent on the availability of the new generation assets. The generation and transmission expansions are interdependent and cannot be separated.

B) It is our understanding that the NSP contract is premised on the existence of generation capacity and transmission. NSP would like to be assured of the new generation capacity and MH would like to be assured that NSP and other contractors would deliver the new transmission capacity.

C) As argued in (A) the two issues are interdependent—no new generation capacity without additional transmission and no new transmission without additional capacity.

D) The development of a carbon tax regime will be a crucial factor in determining the future price of electricity. The real question is; however, at what level will this carbon tax be set at before it becomes a major contributor to higher electricity prices. There exist now some calculations that would suggest a carbon level of $80 per ton is required before this tax would make future electricity prices high enough to warrant the future expansion plan. Given the lengthy operational lifespan of the proposed new generation assets, it seems likely that these assets eventually would become very profitable, unless the present pressures to move away from carbon-based energy dissipates, or North America becomes extremely out of line with other regions on this issue.

E) A contract is ultimately a standard mechanism to allocate future risks between the contracting parties. The counterparties would want to make sure that the negotiated fixed prices do not lead to "buyers regret" and MH would also want to be assured that these LT fixed prices do not lead to "sellers regret". Both parties want to be assured that contract prices do not compromise their abilities to get more favourable terms in the future. MH would bet on higher future prices and counterparties would bet on lower future prices, but both would want the flexibility to renegotiate terms.

F) MH is aware that the present value of the net income stream of the preferred development sequence should exceed the capital costs of the plan over some specified time horizon, given a targeted rate of return. Indeed in this calculation, the future revenues and operation costs, the length of the time of the investment horizon and the discount rate are crucial variables. The expected net export revenue stream is a key variable but it is only one variable; the other factors—time horizon, discount rate (TOR), operational costs and capital costs are also critical variables and must be taken into consideration in answering this question. What is also needed is a probabilistic structure and framework that allows for risk and variance in these variables. Given the active participation of MH in negotiating export contracts, it seems likely that there will be more of these contracts signed over the next 25-30 years and onward. It is difficult to build potential future contracts into MH's revenue projections, but it is not unreasonable to expect that such contracts will materialize.

G) A solid economic recovery is implicit in the considerations of the preferred plan.

2. Manitoba Hydro's preferred development plan before the Board was developed ahead of a number of particularly substantive events – those including the global credit crisis and recession, the ascent of the Canadian dollar, an evident slow-down in Manitoba industrial load growth, the development of low-cost shale gas, changes in the U.S. political environment wherein climate change and carbon pricing have become lesser immediate concerns, major increases in the construction estimates for the preferred development plan , a "collapse" in opportunity export sales prices, a delay in the completion of the export term sheets, no indication to-date of construction on the U.S. side with respect to a transmission hook-up to the Manitoba border – required for the major new sales, and, recently, a deferral of the expected in-service dates for Bipole 3, Keeyask and Conawapa.

Do these events suggest that a re-think of the preferred development plan should take place?

Answer to Q2.

The new negative global events are certainly relevant and should be taken into consideration in the formulation of the investment plan. The real issue; however, is the question of the permanence and durability of these negative events. It is necessary that these events and variables should be clearly defined, identified and quantified and ultimately subjected to a number of risk stress tests.

While each determining factor should be considered separately, ultimately it is the way these factors combine is what really influences the final outcome.

Let us begin by enumerating these factors:

Global credit crisis
Global recession/recovery
Appreciation of the Canadian $
Manitoba industrial load
Shale gas discovery and the future natural gas price
Climate change and carbon taxes
Inflation and cost escalation
Delay in the completion of contracts with counterparties
Transmission hook-up completion
Deferral of in-service date of Bipole III, Keeyask and Conawapa.

We would like to suggest that forecasts be made of these using parties with solid track records, and a full risk analysis be performed on all these variables, producing confidence intervals and expected values of the present values of net revenues of the alternative options. At a minimum some high level scenarios could be entertained, and a road map created to respond to these scenarios with several "what-if" options. It would be beneficial to build some drought scenarios in conjunction with these variables.

3. Please confirm or vary Dr. Kurbursi's testimony of May 6th that the rate rider proposed by KM would address inter-generational equity with respect to domestic Manitoba rates.

   Manitoba Hydro has significant pre-build expenditures on its books and projects a decade of rate increases representing perhaps twice the rate of expected inflation for domestic rate classes. In this context, is not the present generation of ratepayers taking on risks that, potentially, future generations of ratepayers would be responsible to "pay for" if the Utility's current financial forecast were not achieved?

Answer to Q3.

Rate payers who pay today to stave off future shortfalls would be protecting themselves only as long as there is good chance that a drought would occur in their present life span and where the funds collected from them would save them from rate shocks. They would be saving for future generations if and when the buffer funds would exceed what is needed to insure against rate shocks. Alternatively, they would be passing to future generations the costs of droughts if the funds fall short of the actuarial value of future losses caused by droughts.

The real challenge is to design the rate riders and total level of accumulated funds in such a way as to not exceed the expected present value of drought losses over a specified life span of the present generation of rate payers.

If MH abandoned these expansion projects, the financial risks borne by future generations referred to in the question would be replaced by the risk of those generations losing out on huge revenues and access to large amounts of cheap energy that could turn out to be one of the main economic strengths of Manitoba. Although the "risk" of losing out on a large revenue stream is less tangible than the risk of being saddled with high debts, both negative outcomes could translate into the same sorts of negative financial implications for Manitoba citizens.

4. Would you agree that Manitoba Hydro has and does pursue sales to U.S. counterparties for three reported reasons: a) to produce profits on the sales, b) to earn revenues sufficient to justify the advancement of new generation before it is needed for domestic load, and c) to secure the opportunity to import power from U.S. MISO market in the event of a drought or another generating problem in Manitoba?

Answer to Q4.

These are good reasons to engage in the export market. There are many other reasons that could also be listed such as to pre-empt any substitute expansions in the export market, in order to secure transmission capacity and to have a say through counterparties in the MISO market.

But good reasons are necessary but not sufficient. A crucial question remains as the price realized. Is it high enough to cover variable and fixed costs per kwh or only the variable costs. The spread between export prices and costs is a real issue and here it is quite important to examine and validate any assignment of fixed costs to exports.

5. Of the three provincially (government) owned hydro-electric utilities in Canada, being Manitoba Hydro, BC Hydro and Quebec Hydro, would you agree that the Utility most dependent upon net export sales is Manitoba Hydro, with Manitoba Hydro selling approximately one-third of its generated power to U.S. counterparties?

Answer to Q5.

The share of export revenues in total revenues is perhaps highest for MH in Canada. But again the question is not about shares but also about all of the attributes and benefits derived from these exports.

6. Would you agree that BC Hydro has been a net importer, and Hydro Quebec sells into a much more lucrative north-eastern U.S. market, and, with respect to those sales, they are representative of a much lower percentage of total generation than Manitoba Hydro's?

Answer to Q6.

We agree that BC is a net importer and that Quebec is a net exporter and is able to sell in a market that fetches higher prices per kWh. HQ is also a major importer of electricity from Newfound and Labrador

and at very favourable terms. These two factors play a significant role in the profitability of HQ imports and exports.

7. From a risk perspective, is Manitoba Hydro's export-reliant approach more risky, for domestic customers, with respect to domestic rate implications, than the strategy of BC Hydro or Quebec Hydro?

It is reasonable to argue that HQ faces fewer risks with respect to its export/import exposure than MH for the reasons enumerated in the answer to Q6, but also because the ratio of exports to total generation is lower in Quebec as well as the fact that the water conditions in Quebec are less variable than those in Manitoba.

8. KM has suggested that new generation and transmission assets would best be amortized over a shorter period than the expected service life of the new assets. Please explain, hypothetically:

   a) How Bipole 3, with an assumed service life of 30 years, representing the average of transmission lines, converters, etc., should be recovered through annual rates if entirely charged to domestic customers – should it occur over a shorter period of time than the service life?

   b) How Keeyask with an assumed service life of 50 years, the average of the concrete, gates, turbines/generators etc., should be allocated against annual exports in the first 10 years of the new station's operations? Assume that Keeyask was built ten years ahead of domestic load needs, this to support a 10 year contract, firm, with opportunity sales in excess of dependable energy?

   c) What is the best amortization approach with respect to exports for the remaining service life of Keeyask?

Answer to Q8.

KM recognize a very long life of hydroelectric generation stations. They also recognize different life-spans of different assets. The long life of dams makes it difficult to amortize over their physical life and raise into question the relevance of this long physical life against a much shorter economic life. KM are not in a position to determine the length of the useful economic life of dams. They are confident, however, that it is shorter than the physical life. This automatically argues for using the shorter life span. Hydro experts could and should be consulted on determining the useful economic life of hydro assets.

More specifically, the 30-year physical life of Bipole III may be equal to its economic life. In that case the 30 years would be appropriate. If, however, this economic life is shorter, it makes perfect sense to use the shorter period. Typically businesses tend to opt to depreciate their assets faster than their physical deterioration as a tax strategy because the opportunity costs of the saved taxes are typically higher the longer the period of deferral. This by itself should be a guiding operational principle—minimize the opportunity costs of assets, if this means faster depreciation and shorter amortization periods then so be it.

Contracts reflect the bargaining advantages of the contracting parties. MH may wish to shift the largest share of the cost of the expansion onto the importers. This capacity is not without limitation. As a guiding principle it would be desirable to assign the largest share possible of the fixed cost to the party that is not assuming the major share of the risks of building the large and long lasting assets, of course to the extent that the market permits.

9. From KM's review of the term sheet prices for WPS or MP, where it considered that the prices appeared adequate to support the investments planned for generation and transmission:

   a) Does KM's view refer to the fixed price component for 5 x 16 peak energy sales?

   b) Does KM's view also take into account the variable price component for 2 x 16 weekend peak energy?

   In short, from KM's perspective, does the "price adequacy" KM has indicated to be present (given KM's indication that it was not then aware of increases in expected construction costs) apply to the average annual price for all energy to be potentially sold, and did that average annual price, as perceived then by KM, fully support the advancement of investment in new generation and transmission?

Answer to Q9.

KM assessment was based on the spread between the contract price and expected MISO prices as well as on the adequacy of the escalating framework. We are not and were not in a position to make any assessment of the adequacy of the spread between prices and average variable cost and average total cost. The reason why KM did not venture into this area is based on their inability to judge the adequacy of fixed cost assignment to exports. KM would feel more at ease in answering the questions raised by PUB when they have validated estimates of the fixed costs assigned to exports.

10. KM has suggested high import prices are not necessarily coincident with a drought:

    a) Would KM agree that high import prices are unlikely when Hydro experiences high water flow conditions?

    b) Would KM agree that high import prices are not common when Hydro is exporting off peak energy?

    c) Did KM observe any evidence that MH did not incur high fuel and power purchase prices during drought events, such as those experienced in 2003/04?

    d) Did KM review Hydro's 2006/07 surplus energy prices, and, if so, note in particular off-peak prices in the 6-8 cent per kWhr during November and December 2006 and February and March 2007, the latter being a time when Hydro received a 2.25% domestic rate increase related to the prior drought?

Answer to Q10.

KM suggested that a correlation or lack of it between high import prices and droughts is coincidental because there are no a priori reasons to suggest that the two are related in the MISO market.

The MISO market is heavily influenced by prices of coal and/or natural gas as the bulk of the MISO generation is produced by coal or gas. There is little or no real dependence in the MISO market on Hydro power. This is why KM were reticent to suggest that a non-spurious correlation might exist between droughts and high import prices. The period 2003/04 was one period where the two coincided, but it is hard to generalize this relationship to other periods.

KM have also noted the events noted in section (d) of the question and do accept the rationale for this occurrence.

11. Reference has been made to so-called Black Swan events. As well, it has been reported that Manitoba Hydro is focused on building sufficient financial strength to withstand a five-year drought. Yet, in its recorded history, Manitoba has "suffered through" a drought that extended over a period of twelve years, a seven year drought, followed by two years of no drought, followed by a five year drought (1928-1942 saw 12 of 14 years of drought conditions).

    Given MH is now in the export business with and planning further firm export commitments, and knowing of a 12-year drought experience, is Manitoba Hydro's preparing for surviving a five year drought reasonable?

Answer to Q11.

KM are aware that MH is preparing to accumulate and had actually accumulated retained earnings in the past as a buffer fund to protect it against short falls in net earnings. KM are not sure about the exact size of this fund and/or its drought duration target. KM have recommended that other sources of funds should be used to supplement the retained earnings and that these accumulated retained earnings should not be earmarked exclusively to deal with drought self-insurance. The size of the funds to be accumulated from all sources should be large enough to cover the expected losses under the most severe stress test and good and profitable allocations of the accumulated funds should be realized.

12. Before Limestone, sales to U.S. counter-parties was not part of the business plan, now it is: does this not increase the financial risks associated with the occurrence of Black Swan event and suggest that building a retained earnings to meet a five year drought in an era where commitments (curtailable at the potential cost of Manitoba Hydro's dependability reputation), increase the financial risk to Manitoba Hydro in the event of a drought extending beyond five years?

Answer to Q12

Retained earnings and the self insurance fund should target all sources of risk exposure. The target is Minimum Regret. This entails being prepared for the worst set of circumstances. The fact that MH will have in the future an expanded generation capacity and larger volumes of exports to deliver will work in opposite directions. The larger generation capacity will reduce the risk of physical and financial shortfalls and the larger volume of firm exports would increase the risk of both shortfalls. Extended droughts will add to the increased risk of shortfall.

13. While Manitoba Hydro has assured parties that its proposed new export sales to U.S. counterparties provide for no penalty if water flows are particularly low and Manitoba Hydro cannot supply the power committed to the Americans, the Utility has also indicated that it has and could in the future meet its obligations for business reasons – to protect its reputation as a reliable supplier.

    Please comment on this issue.

Answer to Q13.

MH must balance its business reputation for meeting long term contractual obligations against its obligation to meet first domestic load and also against its long term financial viability. Curtailment provisions have been negotiated in the new term sheets and new contract with NSP and have succeeded in negotiating an upset heat rate rates on import prices. If these provisions are not sufficient and force majeure cannot be claimed, then indeed any concern about business reputation would have to come at

the expense of either a shortfall in meeting domestic load or financial performance, but indeed it does not have to make these choices.

14. Manitoba Hydro enters into commitments and sells power to U.S. counterparties as part of its overall business plan. Some may hold that these sales are, thus, not by-product sales and that full costing should be applied to the sales to determine whether or not they are profitable.

    Do you agree?

Answer to Q14.

We agree that proper costing and verifiable allocations of cost be made to all components of sales including both domestic and foreign sales.

15. While Bipole 3 is being advanced by Manitoba Hydro for reliability reasons, not for export, the government has suggested that Bipole 3 will be paid for by revenues from export sales. (Manitoba Hydro has also advised that without Bipole 3 Keeyask and Conawapa cannot proceed.)

    Manitoba Hydro's load forecasts, particularly now taking into account the deferral of industrial load growth, may suggest that the present deferral of in-service dates for the new generation and transmission could be extended further, excepting for the pending commitments to supply power to U.S. counterparties.

Given this, is there any justification for not allocating a part, if not all, at least until domestic load requires Keeyask and then Conawapa, of the cost of Bipole 3 against export revenue to arrive at net export revenue?

Answer to Q15.

We are not in a position to answer this question without having more information on the forecast level of domestic load in the future. If the domestic load does not justify building Bipole III, there is good reason to suggest that the export price should reflect these costs to the extent possible.

16. Please provide your view as to the rationale for U.S. counterparties "paying for" Bipole 3, when their options for power include both coal and gas plants much closer to their customers than Manitoba Hydro's northern generating stations?

Answer to Q16.

There are a number of advantages that counterparties see in a long term association with MH. These include access to reliable and clean energy. The environmental attributes have been signed to counterparties and these have significant value to them. Their value will rise with greater awareness about clean energy and the regulatory regimes that would penalize carbon and GHG emissions. Current circumstances may not last long. The future could easily be characterized by high energy prices that buyers would be willing to pay relatively high prices now to avoid paying much higher prices later.

17. Would it be fair to say that the biggest risk the Utility faces is neither drought, which is expected to occur from time to time, nor adding generation and transmission assets to meet forecasts of future domestic load growth, with construction of the assets advanced on the premise export net sales will cover the costs, but equipment or market failure once the new assets are in place?

Answer to Q17.

MH is exposed to multiple risks. The issue is not either this risk or that risk but all of these risks combined. The probability of a string of risks occurring simultaneously is quite low but still positive. Risk management necessitates that these risks are identified and quantified separately and in combinations.

That said, the new risk of stranded assets is a serious concern. If the current market conditions were to prevail in the future and future contract prices are not high enough, there could be serious challenges in realizing any profits. The real issue is the set of conditions that need to prevail to ward off the possibility of stranded assets. This is why it is quite necessary to map the future scenarios with a rich number of possibilities and the necessary mitigation strategies that would be required to deal with them. Moreover, MH must be open to stagger its construction and development plan until such time as favourable conditions are more likely than they are now.

It is also to be noted that these assets are being built ahead of the time of their need to meet domestic load. If the forecast domestic load would indeed require these massive expansions sometime in the near future, the possibility of stranded assets will diminish considerably. What is not needed for export will be needed to meet domestic load.

25. Do Drs. KM believe that Manitoba's commitment to the Western Climate Initiative will expose MH to potential carbon costs arising from imports during drought periods, thereby increasing import price impacts?

Answer to Q25.

This exposure would cut both ways. It would raise the cost of imports and will also raise the price of exports. Since MH exports typically more than it imports, this would work to its advantage. The only time this could be disadvantageous is in the case of a severe drought.