

**Submission
To
Public Utilities Board NFAT Hearings, 2014**

Submitted by: Tim Sale
March 2014

By now this panel will know that there are reasonable and feasible alternatives to the immediate start on Keeyask and a later start on Conawapa, particularly the latter. I would note that Scott Thomson, Hydro CEO, has apparently said that the final decision on Conawapa does not need to be made until 2018, four years from now. This rather begs the question of why this hearing includes Conawapa at all. How can the panel reach a decision that Hydro itself has not yet confirmed?

At the same time, there is no doubt that these two major dams are both feasible and would provide clean, long-term power for probably 100 years or more.

The issue then is whether there is a need for these two dams to begin construction in the immediate future, or whether other alternatives would provide sustainable, clean and affordable power for the medium term future. I have no doubt that at some time, these dams should be built; in a low-carbon future, where there is a real and escalating price on carbon, hydro power is obviously desirable. However, the price of carbon world-wide does not exist, and in Europe has been weak. Nor does it seem that international agreement on a real carbon price is within sight. The issue then is when, and with what level of acceptable risk should major new capital intensive construction occur?

Hydro's submission claims to have canvassed all these alternatives, concluding, not surprisingly, that their plan is best. I believe not only are they wrong, but that in coming to this conclusion, Hydro ignores some of its own studies, especially those on adding wind generation and the Brattle Group study on power prices. The Hydro plan exposes Manitobans to unacceptable risks and certain major rate increases.

Let me first talk about risk. Because of time constraints, I will simply identify some key ones, and ask that the panel use its expertise to flesh these out in detail.

Cost: The closer a project is to completion, the clearer the final capital costs. Hydro has been notoriously wrong in capital cost estimates. When I was minister, Wuskwatim was supposed to cost \$900M. It cost almost \$1.8B, both including transmission. The PUB has created a table of capital cost increases over the past five years, taken from PUB Order 26/13. Today, years before the actual construction of either dam, we see that Conawapa has more than doubled between 2006 and 2013; Keeyask is up over 70%. BP III is up 74%. Point du Bois, outside your terms of reference, but impacting on Hydro's bottom line has risen 162%, with only a tiny improvement in revenues to cover it.

We are 6 years from the earliest start to Conawapa. Interest rates, competition for construction labour and materials etc, are all uncertain, but a quick scan of the horizon suggests high continuing numbers of infrastructure projects, both here and in the USA. Considering the competition in North America for skilled labour and large construction management firms, the picture for capital cost certainty is opaque at best.

Power prices:

Much of Hydro's case ultimately depends on the marginal cost of new power, which is obviously in competition with other power sources, chiefly natural gas. I cannot find any reputable forecast that suggests that the glut of natural gas here and in the USA will diminish within the next decade. Some believe that there are 50 years or more of cheap NG. Currently, new NG power costs less than 5 cents a KWhr even after an assumed \$16/ton for carbon in 2020. (Brattle Group) The PUB says Wuskwatim power costs 10.5 cents, three times the Board's expected average export power price this year. Keeyask's and Conawapa's power can hardly be expected to cost less. With the current capacity surplus in the USA and low NG prices, the current low prices can be expected to continue for some time. (See the Brattle Report)

Technology:

The technology of hydro generation is fixed pretty firmly. Minor new efficiencies may be found, but that cost curve is pretty flat. Compare that with wind, still on a downward, but slowing track; solar, still steeply trending downward, biomass, as in the conversion of large plants such as Atikokan in Ontario, still trending down. Geo-thermal, which is generally priced at about \$24,000 per house, is being installed in First Nations communities by AKI Energy at under \$14,000 per home. The panel needs to take into account the cost curves of competing technology, not simply today's prices.

Interest Rates:

Committing today to build dams without firm sales linked to interest rate changes is suicide for investors, and the citizens of Manitoba are the investors. Ask Manitoba Hydro if the new contracts recently announced are hedged to interest rates related to in-service dates? All we really know about rates is that we don't know where they will be in six months, let alone five or ten years. The world economy is incredibly vulnerable to exogenous shocks of many kinds and interest rates are often the victim of such shocks.

Managing Risk:

Thus, in an uncertain economic framework, with serious risks, project choice becomes in large measure a risk management process. All choices will make power at some cost, and all of the power alternatives are reasonably "green". So what should we do?

I have asked PUB staff to table with this submission a study done in 2010 for Hydro, showing that with no significant costs, Hydro could add 600MW of wind, with minor costs, 900MW with some cost, and with about \$350M in transmission changes, 1200MW. New wind in 2014 with Manitoba's very high wind capacity factor costs about 6-7 cents per kilowatt hour or less at the buss. Given the cost and availability of natural gas and market forces on the wind industry, these costs may be lower today. Some European countries with little water storage routinely have upwards of 15-20% of their power from wind. Manitoba has a system of about 5500MW, with 5,000 downstream of huge storage capacity, suggesting that we could certainly absorb 1000MW of wind without stretching our system's firming and shaping capacity.

The panel needs to understand that Hydro is uncritically and somewhat hysterically opposed to wind generation. The record is clear:

- * Hydro had to be ordered by the government to install wind-testing towers in 2002
- * Hydro senior staff asserted over and over that there was no financially feasible wind resource in Manitoba. In fact, St. Leon has a capacity factor of over 40%.
- * Even after very high quality wind resources were identified and private companies did all their due diligence, Hydro had to be ordered to enter into wind contracts.
- * Hydro denied for years that excess wind energy not needed can be "stored" or firmed by using our enormous water storage capacity, and released to Hydraulic generation when needed.
- * Hydro staff has led their Board to believe that wind power is a money-losing proposition, using numbers and internally applied costs that far exceed what other generators use.
- * Hydro's absurdly brief 6 page appendix on wind still denies wind power has any value. Contrast this with the many references to the growing volume of wind generation and its positive effect on price in the Brattle Report.

I have also provided a copy of a submission showing the extreme levels of charges Hydro suggests are needed to firm and shape wind power. There is a key question to ask Hydro:

"Is Hydro charging American wind power these levels of costs for firming and shaping?"

Why is this a critical question? Because in 2012, Hydro sold some power to an American corporation. One of the little noticed riders was that in return, Hydro would firm and shape American generated wind power, using our storage capacity. In so doing, Hydro has given away our capacity to store new Manitoba wind power, furthering its goal of never again having a wind farm in Manitoba.

For several years, Hydro resisted acknowledging the obvious truth that when wind energy is generated and not needed at that moment, the energy can effectively be "stored" in our huge water storage capacity. Today, they finally acknowledge this and have turned that capacity into Hydro's final argument against further wind development in Manitoba by selling that capacity to American wind generators... we store their power, but in so doing, use storage capacity that could and ought to be used to firm Manitoba wind.

My second major criticism of Hydro's plan is that it fails to take demand side management seriously. Specifically, there are about 120,000 electrically heated homes in Manitoba. Converting these to **Geo-Thermal** over a 10-15 year period would save a Keeyask dam's worth of power, and significantly offset Hydro's unrealistically high estimate of load growth. It would free up this power in the winter, Manitoba's peak demand time.

The panel will hear or has already heard from various presenters on this issue, and I urge the panel to ask its technical staff to pay particular attention to this option. Nor should we be deterred by Hydro saying that we do fewer than 1000 GT installations annually. AKI Energy is showing what economies of scale can do to costs. And let's remember our history of rural electrification. It was a huge project, done over some years, with huge benefits. Ask your experts to examine GT capital costs, assuming economies of scale and the kind of installation costs AKI Energy is experiencing; require Hydro to examine financing options with 100%, 75%, 50% Hydro contribution, and using the PAYS model.

Hydro should come back to the panel with serious DSM options that draw from leading jurisdictions that believe they can grow their economies and even reduce electricity demand at the same time.

So let me make the case for not approving Hydro's plan.

My assessment is based primarily on risk management issues identified above.

In Manitoba's current electric power situation, do the two alternatives - dams or a combination of wind, GT and aggressive DSM both provide the power we need for the next decade? The answer is clearly yes.

So which provides the better risk mitigation?

I think the answer is dams someday, but certainly not now. Here's why.

Risk management in this context is best served by using scalable alternatives, not bet-the-farm options. Wind, Geo-Thermal and DSM are all scalable alternatives.

A wind project, of which there are already a number that have their EIA in place and their capital funding capacity identified, can be ready in 18 months to 2 years, and will generate power at a fixed cost for 20 years. Short-term construction jobs will occur, as with a dam, but can mostly be locally sourced, in part because the work force is smaller for each project. If new wind generation is projected over a ten year horizon, this provides some stability for these jobs. Contrast that with the huge, remote work camps, with many non-Manitoba labourers needed to build a dam.

The finance risk for wind farms is borne in the private sector, avoiding increased Hydro borrowing. Power is generated closer to load, reducing to some extent demands on long-distance transmission.

As for Geo-Thermal energy, it is even more job-friendly, especially if it is seen as a long-term conversion strategy. There are 120,000 electrically heated homes in Manitoba. A medium-term project to switch even half of these to GT would sharply reduce load, especially at our peak load winter period. It would also save homeowners significant heating costs, even if done under the PAYS program. The equipment demands are simple, and if such a strategy were adopted, installation jobs would last for many years, spread across rural Manitoba. New suburban construction should all be GT, and at least one private developer has done drilling research to show that Hydro was simply wrong to oppose this in Waverley West.

DSM in Manitoba has concentrated on industry, with only half-hearted efforts on residential retrofits. Far more can be done, and is being done in other jurisdictions. Hydro should be required to do a "best-practice" assessment from leading North American jurisdictions, and then frame an aggressive DSM program for Manitoba. The Brattle Group uses a .7% load growth in its scenarios.

Summary:

The panel should always bear in mind that Hydro's mandate is to provide power to Manitobans first. If price and cost optimization allows Hydro to sell surplus power to others, that is fine. But that is ancillary, not central to Hydro's legal mandate. If Hydro wishes to add merchant power

generation to its mandate, it needs a new Act, which in fact it needs in any case. When risk is significant, which Hydro agrees is the case here, and the major alternatives are either long-term high cost single projects, or scalable short and medium term projects, choose the lower risk one.

Choose the lower risk one especially if the jobs, and capital costs are even equal. In this case, there are more long-term jobs, and far lower capital costs to Hydro.

Choose the lower risk when it will save many Manitobans money on their heating bills, and virtually eliminate interest rate risk for Hydro, and hence help reduce rate increases for all of us.

I wish the panel well in a difficult task. I am proud to live in a Province where citizens can voice their opinions on major questions of public policy.

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March, 2014