

Manitoba Hydro
2014/15 and 2015/16 General Rate Application
to the Public Utilities Board

a Brief Submitted by

the Bipole III Coalition

<http://www.bipoleiii.coalition.ca/>

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Précis

This Brief observes that Manitoba Hydro has requested the Public Utilities Board to approve rate increases based on a single future scenario grounded on its Preferred Development Plan. In Manitoba Hydro's November 2013 Corporate Strategic Plan, submitted as Appendix 2.1 in this General Rate Application, Manitoba Hydro is very clear on being open to alternative plans. This Brief takes Manitoba Hydro up on its expressed openness to alternate plans by presenting it with a major disruption of electricity supply that looms ahead. So significant is this future disruption that electricity rate increase applications now and in the future are and will be substantially impacted. For over 100 years, Manitoba's successful development of its hydroelectricity resources has given us the lowest electricity rates in Canada. But good things don't always last forever. The future so far as generation of electric energy is concerned is turning away from large utility generators to individuals and corporations or small communities generating their own electricity (microgrids) at lower cost and greater reliability. As a province, we have been so focussed on hydroelectricity as the only viable and economic source of green energy, we have ignored the microgrid developments happening in Europe and the US. This Brief presented by the Bipole III Coalition demonstrates that the times are changing and Manitoba Hydro, in line with its expressed willingness to accept change, must now seriously focus on this impending disruption.

Request to the Public Utilities Board

Manitoba Hydro submitted, in its 2014/15 and 2015/16 General Rate Application, its November 2013 Corporate Strategic Plan as Appendix 2.1. It claimed that this plan “continues to include aggressively pursuing demand side options and developing clean, renewable hydro resources” and that “it also includes new transmission interconnection and distribution infrastructure to deliver power to Manitoba customers with enhanced access to export markets”¹.

The submission also claims that the Strategic Plan “incorporates different pathways to allow for future flexibility in adjusting the plan based on changing conditions” where pathways consist of “examples of alternate plans or changes to the initial plan that can be chosen to respond to emerging realities”. The submission declares: “A pathway represents the initial decision to commit to one

¹ Manitoba Hydro Corporate Strategic Plan, November 2013, p4.

development plan at the outset but not an obligation to rigidly see that plan through regardless of circumstances”².

Despite all this rhetoric of openness and openness, just a single pathway is presented to the Board in justification of the rate increase application. There are other obvious pathways for the future development of the supply of electricity to Manitobans. The Bipole III Coalition will present the most obvious alternative that is conspicuously absent in Manitoba Hydro’s Corporate Strategic Plan. This Brief will outline this ignored pathway. It will take Manitoba Hydro up on its stated willingness to respond to an emerging reality.

The Bipole III Coalition requests the Public Utilities Board (PUB) to require Manitoba Hydro to submit a detailed plan of how the emerging reality of supply of electric energy is to be undertaken as presented herein and to state its impact on electricity rates that will be paid by Manitobans.

Indefinite Deferral of Conawapa

Manitoba Hydro has presented its Corporate Strategic Plan to the PUB (Appendix 2.1) with a rate proposal based on the continued development of Keeyask and Conawapa and featuring annual rate increases of 3.95% for many years into the future.

Changes of great significance are happening in the electric power industry that should result in Conawapa being indefinitely deferred. With no Conawapa, pressure would be relieved on Hydro rate increases.

Why would Conawapa not be required? It would generate clean renewable energy. For over 100 years, we in this province have pioneered great hydroelectric generation projects with bounteous benefits to all, resulting in the lowest electricity rates in the country. It is a great and all-but-unthinkable challenge to even consider developing new generation that is not hydroelectricity

² Manitoba Hydro Corporate Strategic Plan, November 2013, p5

(although two wind farms have been added as a token to other sources of renewable energy).

The reason Conawapa will be indefinitely deferred is there is a strong trend away from large utility generators to electricity being generated more economically by individuals, corporations and small communities (known collectively as microgrids³). A microgrid is a subset of an electric grid (typically at low and medium voltage levels) that can be islanded and still supply, in a controlled and coordinated way, all or part of its customers during emergencies, thus intrinsically enhancing system reliability. A microgrid requires smart technologies to continue delivering power to customers in an islanded mode. A microgrid can be a single residence, the neighborhood on the same distribution feeder, or a community.

Despite that this trend is well established in Europe and developing in the USA, there is not one mention of it in Manitoba Hydro's Corporate Strategic Plan.

It is widely accepted in the industry that the future of electric utilities will be to provide distribution systems and transmission to interconnect microgrids. Existing utility generators with their locational marginal pricing will have to compete with customers or groups of customers generating their own electricity. This will include solar panels, advanced batteries and wind generators as well as low-cost electricity that may be from another province or state, accessible through high capacity transmission interconnections. Every kilowatt hour produced in Manitoba by a solar panel is a kilowatt hour that Manitoba Hydro's generators will not be required to supply.

The microgrid is a disruptive technology⁴ that Manitoba Hydro chooses to ignore in its Corporate Strategic Plan. This technology is going to come to Manitoba

³ A recent publication on microgrids is the IEEE Power & Energy Magazine for electric power professionals. Volume 13, No. 3, May June 2015. See <http://www.qmags.com/2FE1161B166067DF13144BAB11162CB7552FF14ACC4.htm>

⁴ A Solar Battery Knockout? <http://tdworld.com/generation-renewables/solar-battery-knockout&PK=UM>

whether Manitoba Hydro wants it or not, and microgrids will come faster as Manitoba Hydro's rates increase.

In other words, the demand for Conawapa to produce competitive electricity will not materialize. The danger is that, if constructed, Conawapa will become a stranded asset.

The Reducing Cost of Solar Panels as Manitoba Hydro's Rates Increase

By virtue of Manitoba Hydro's rate increases starting from a low value today, there is some time before electricity costs from solar and advanced batteries become competitive and lower than Manitoba Hydro's planned rates. This is evident in Figure 1, a chart which Manitoba Hydro has chosen to ignore in its GRA submission. In this chart, the residential rate increases anticipated by Manitoba Hydro are compared with the expected drop in energy prices generated in Manitoba from photovoltaic solar panels. It is important to note that the latitude of Winnipeg passes through the centre of Germany which has 27 Gigawatts of solar panels, equal to four Manitoba Hydros. So we are not talking pie-in-the-sky here nor are we talking about some untested concept. Besides, Manitoba has more sun than Germany and solar panels are more efficient in the cold.

Grid parity is considered to have been reached when an energy source becomes a contender for widespread development without subsidies or government support. It is widely believed that a wholesale shift in generation to these forms of energy will take place when they reach grid parity. Grid parity was reached in some locations with on-shore wind power around 2000. With solar power, it was achieved for the first time in Spain in 2013. Hawaii and California are moving into grid parity right now. In northern California, served by Pacific Gas and Electric, over 100,000 residences have solar panels and it is expected another 500,000 residences will add solar panels by 2020. And the good news for us all is that the competitors are all renewable.

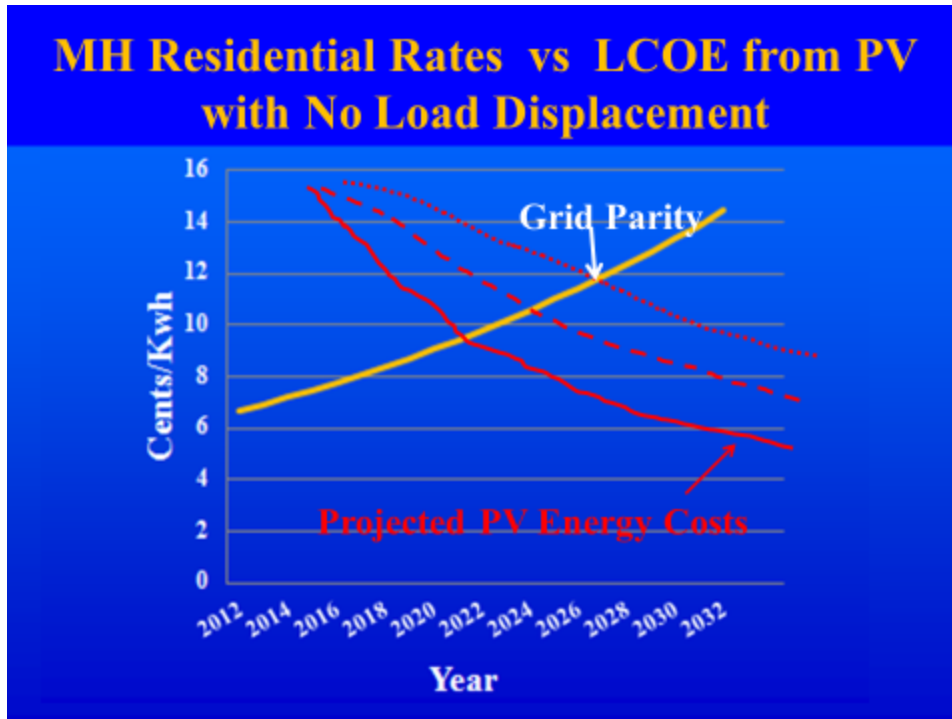


Figure 1: Manitoba Hydro residential rates versus levelized cost of energy (LCOE) generated from solar panels (from a presentation by Manitoba Hydro to a delegation from Alberta)

What is the consequence of parity as shown in Figure 1? Manitoba Hydro needs to be prepared for this development which is definitely going to affect electricity rates that Manitoba Hydro is and will be requesting. While this development may be disruptive to utilities that generate electricity, it is a boon to those that transmit it and to ratepayers.

The US Department of Energy has produced a similar graph for parity in the US (Figure 2). Various mixes of solar energy market growth rates (identified as “G” in the figure) and expected solar cost curve declines (designated “EC” in the figure) are compared with the average electric rates (the black line) in the US. It is apparent that, depending on trends in adoption and cost, grid parity is expected to occur on various years well within the next decade. Building uncompetitive capacity that will come into service during this decade and that will not be paid for until many years later is not a viable strategy.

Solar Parity

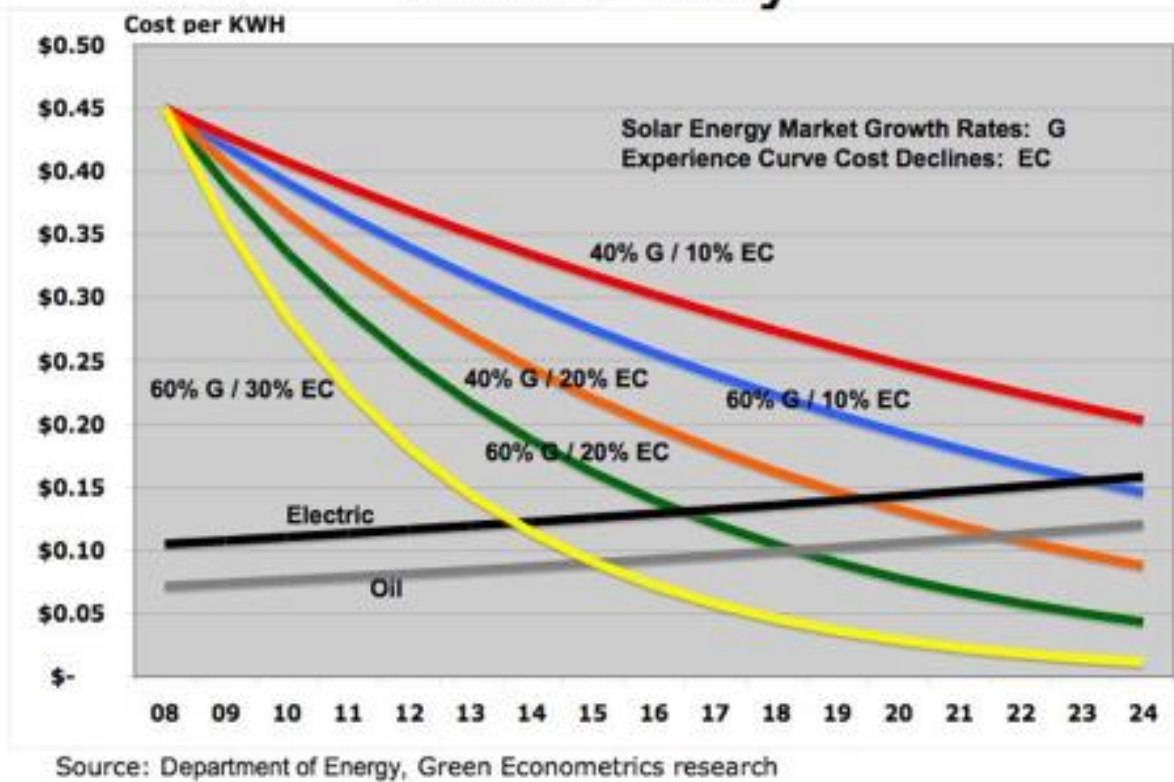


Figure 2: Ranges of solar versus average US electricity cost curves for parity

Electricity Export Markets

It has been anticipated that the electricity markets outside Manitoba will eventually begin to recover so that Manitoba Hydro's generators of Wuskwatim, Keeyask and its ever hopeful Conawapa will be able to eventually make profitable export sales of electricity. Such is not the case now as evidenced by the 2013/14 annual report of Manitoba Hydro which reveals that the average export sale price was 4.18 cents/kilowatt hour when both contract and spot market sales are considered. This 4.18 cents/kilowatt hour is way under the marginal cost of generation from Wuskwatim, and will certainly be under the marginal cost of generation from Keeyask and Conawapa if Manitoba Hydro continues with its Corporate Strategic Plan. Losses on these unprofitable export sales have to be compensated for by Manitoba Hydro's rate payers through continually ongoing rate increases.

Faith in the inevitability that there will be an eventual increase in the sale price for electricity is based on an assumption that fracking from the Bakken shale field will lose its ability to produce low-cost gas. Perhaps some memoranda of understanding with American customers without any definite commitment for future purchase of hydroelectric energy are considered by Manitoba Hydro to be the justification it needs to proceed with its Corporate Strategic Plan.

This questionable anticipation of a rise in shale gas price into a range where profits can be realized is, in itself, too risky and optimistic as an assumption on which to base such a highly expensive hydroelectric development. But there is another even more critical impending change that will keep electricity export prices from rising to profitable levels for Manitoba Hydro's hydroelectricity. Microgrids in the US will keep export market prices low. They are more reliable than large remote generators serving loads, and the predicted dramatically lower prices of solar, wind and batteries will be the major factor preventing US electricity prices from rising to the levels anticipated by Manitoba Hydro.

This inevitable microgrid development will have a negative impact on profit from Manitoba's new expensive hydroelectric generators, leaving a heavy rate burden for Manitobans to shoulder. It may even lead some Manitoba residences and microgrids to disconnect themselves completely from the grid, making costs even worse for those remaining.

It is foreseeable that Manitoba Hydro's expensive generators will become stranded, rates will have to increase to pay for them and more customers will generate more of their own electricity, leading to an upward spiral of rates and a downward spiral in the utility's revenue.

It is important to recognize that several Manitoban engineering companies are already very much involved in microgrid engineering mainly outside the province where monopolies do not exist. These companies include Solar Solutions Inc. based here in Winnipeg, Electranix Corporation active in solar projects and

microgrids in Hawaii and California and RTDS Technologies⁵, the world’s leading manufacturers of real time digital power system simulators that have the capability of testing controllers for wind and solar generators – See Figure 3.

Grid-Connected PV Systems



Figure 3: Capabilities of RTDS Technologies real time digital simulators for studying and testing controllers of microgrids and solar installations (courtesy of RTDS Technologies Inc.)

Figure 4 is a 21-kW three-phase 600-Volt AC advance grid-tied photovoltaic system on an administration building in Portage la Prairie yielding 20-25% more energy than conventional photovoltaic systems. This system has no batteries installed by Solar Solutions Inc. Many of Solar Solutions systems have net-zero results for their clients in Manitoba, fixing their energy cost for 30 to 40 years with good return on investment. Solar Solutions Inc. has also reported that the owner of one residence for whom it has provided solar panels and batteries has chosen to be disconnected from Manitoba Hydro and is electrically self-sufficient.

⁵ Note: The RTDS Technology is owned by Manitoba Hydro and leased to RTDS Technologies. Manitoba Hydro receives millions of dollars in royalties from the success of this world leading technology. Similarly, Electranix Corporation leases the PSCAD/EMTDC software owned by Manitoba Hydro to undertake its studies



Figure 4: Administrative building in Portage la Prairie with 21 kW of solar panels (courtesy of Solar Solutions Inc.)

Bipole III

We know that an Order on Council⁶ prevented the PUB from considering the need for Bipole III. Without Conawapa, there is no need for the Bipole III converters already purchased at a rating of 2,300 MW. Can their rating be favourably re-contracted to a lower level such as 1,000 MW to accommodate Keeyask and refurbishment of the Bipole II converters? If so, this too would reduce costs and pressure on Manitoba Hydro's rate increases.

Further pressure on rate increases would be relieved if the Bipole III overhead transmission line was halted immediately and the Bipole III converters connected to one of the existing Bipole I or II transmission lines. These existing lines each

⁶ Needs For And Alternatives to (NFAT) Review of Manitoba Hydro's Preferred Development Plan – Final Report, June 20, 2014, pp 254 to 261 of 306, Appendix 1, Order in Council and Terms of Reference.

have about 3,800 MW of capacity and are only used at about 2,000 MW maximum, leaving lots of unused capacity for Keeyask's 695 MW.

Manitoba Hydro's reaction to the suggestion of not building the Bipole III overhead transmission line has been that the line is needed for reliability. This is a claim made without the benefit of a detailed probability-based reliability study and a cost/risk analysis tabled to back up the spuriously declared need. Such a reliability study should have been tabled using valid data but it was not. The study would have included the Manitoba/Minnesota Transmission Project (MMTP) which adds reliability to Manitoba Hydro's system. It would also have accommodated consideration of other alternatives.

It is ironic that Manitoba Hydro, in responding to a request from the Public Utilities Board of Newfoundland and Labrador for a review of the application for approval of the development of the Muskrat Falls hydroelectric generating station on the lower Churchill River and the construction of a DC transmission line to St. John's recommended⁷:

"Probabilistic adequacy studies, including considerations related to transmission of reliability of the two options, have not been completed by Nalcor. This is a gap in Nalcor's practices as various Canadian utilities including Manitoba Hydro, BC Hydro, Hydro Quebec and Hydro One in Ontario have adopted these methods of reliability studies for Major projects."

Why didn't Manitoba Hydro table such a study for Bipole III when its justification project to the Clean Environment Commission was based on "reliability", particularly considering its claim that the alternative of not building the Bipole III transmission line is an "unacceptable risk"?

Consequently, without Conawapa, the 2,300-MW converters are oversized and add to the stress on the Hydro rate increases as does the overhead Bipole III transmission line with its growing cost due to its compensation payments to First Nations and the expropriation of land owners. Burgeoning costs that can be

⁷ Manitoba Hydro International Report on Two Generation Expansion Alternatives for the Island Interconnected Electrical System, Volume 1: Summary of Reviews, Page 8, January 2012

expected as a result of the present accelerated construction schedule with its added overtime will also show up in rates.

Conclusion

For centuries, horse and carriage was the main mode of transportation, and then came the disruptive technology of the automobile. In time, we saw the automobile as a beneficial development. Presently, we perceive microgrids as a disruptive technology. But, in time, they will be seen as beneficial. Regrettably, Manitoba Hydro has not indicated any recognition of the inevitability of microgrids in its 2014/15 and 2015/16 General Rate Application.

The Bipole III Coalition requests that the Public Utilities Board require Manitoba Hydro to submit a detailed plan of how the emerging reality of supply of electric energy is to be undertaken as affected by the inevitable transition to microgrids. We ask that such a submission state the impact of microgrids on electricity rates that will be paid by Manitobans.