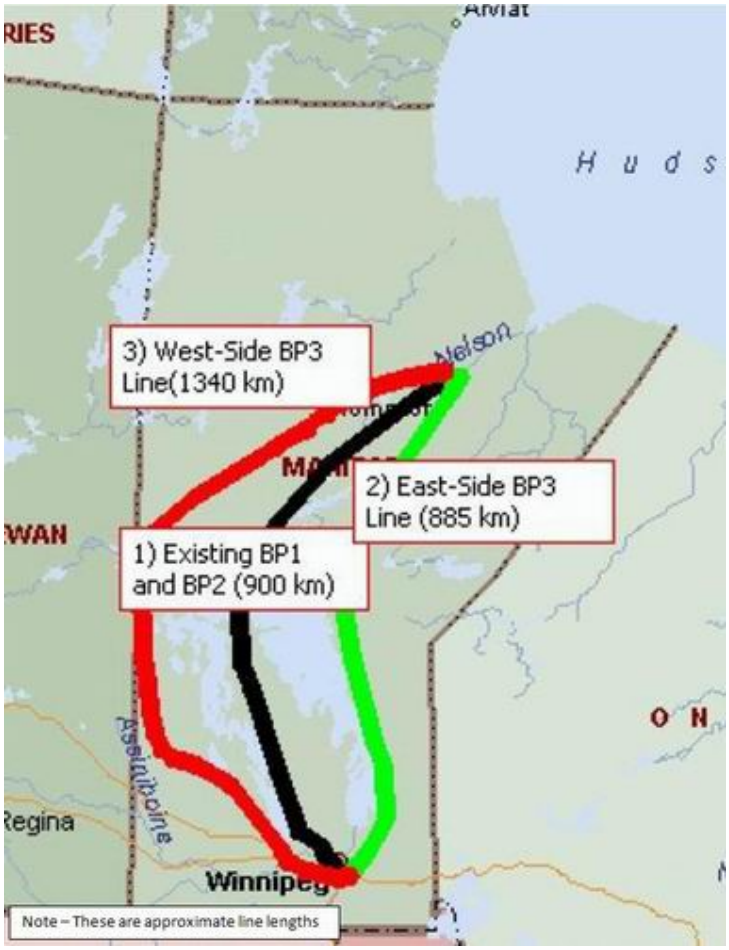
FRONTIER CENTRE POLICY SERIES

No. 36

A Thread Down a Football Field

Why a West Side Manitoba Hydro Transmission Line is Bad Environmental Policy



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December 2007

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POLICY SERIES NO. 36

A Thread Down a Football Field: *Why a West Side Transmission Line is an especially anti-environment policy*

The Frontier Centre for Public Policy is an independent, non-profit organization that under-takes research and education in support of economic growth and social outcomes that will enhance the quality of life in our communities. Through a variety of publications and public forums, the Centre explores policy innovations required to make the eastern prairies region a winner in the open economy. It also provides new insights into solving important issues facing our cities, towns and provinces. These include improving the performance of public expenditures in important areas like local government, education, health and social policy.

The authors of this study have worked independently and the opinions expressed are therefore their own, and do not necessarily reflect the opinions of the board of the Frontier Centre for Public Policy.

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Date of Issue: December 2007
ISSN 1491-78

A Thread Down a Football Field - Why a West Side Manitoba Hydro Transmission Line is Bad Environmental Policy

EXECUTIVE SUMMARY

Manitoba Hydro is Manitoba's largest Crown corporation and is responsible for providing low cost electricity to Manitobans. It is also a major exporter of hydroelectric power to the United States. Since the turn of the 20th century, Manitoba Hydro has been developing hydroelectric resources by building power generation facilities on a number of major rivers. Producing electricity requires a means to transport it, and Manitoba Hydro is responsible for the construction and operation of transmission facilities such as power lines and converter stations.

To keep up with demand, Manitoba Hydro must constantly increase both generation and transmission capacity. There are two major lines coming down from Northern Manitoba, BiPoles I and II. BiPole III is in the planning stage, and the original intention was to run that line down the east side of Lake Winnipeg (ESLW). Due to pressure from a select group of environmentalists, this plan was shelved in favour of a line down the west side of Lake Winnipegosis (WSLW) near the Saskatchewan border.

The WSLW line is much longer, and the extra distance will result in a line loss of at least 28 megawatts (MW) per year, which is enough to power 25,000 homes, about equivalent to all the residences in Brandon. The export value of this line loss is in the hundreds of millions of dollars over the expected 50-year life of the transmission line.

The environmental impact of BiPole III on the ESLW would have been minimal and easily mitigated. The land under the power line would have provided excellent wildlife habitat and would have introduced plant diversity into an area with little. Certain species of wildlife would have thrived in this new habitat.

It is evident that such poor quality decisions are only possible because the government of Manitoba is the recipient of generous equalization payments from have provinces that are net contributors to the Equalization Program.

Introduction

The development of Manitoba's vast hydroelectric resources is fraught with controversy. This is to be expected given the massive alterations to waterways and landscapes that can be the result of some types of hydroelectric development. The environmental impact from Manitoba's hydro development ranges from the relatively benign run-of-the river power dams on the Winnipeg River to the serious and devastating results from the building and operation of the Grand Rapids hydro facility on the Saskatchewan River. In terms of severity, the impact of hydro development on the Nelson River falls somewhere in between. These large dams required significant water diversion from the Churchill River into the Nelson River, and the dams have turned the old, mighty Nelson into a series of flowing lakes that largely still provide significant fish and wildlife habitat and a functioning ecology. It is not pristine, but a rough balance has been achieved. Manitoba's approach to hydroelectric development has been logical by developing the easiest and most accessible sites on the Winnipeg River to supply Winnipeg and the surrounding agricultural areas, followed by the more massive and technologically challenging northern hydro development.

Power dams are but one-half of the equation, with transmission lines being the other half. Power generation is obviously useless without transmission lines. Transmission lines require land to traverse and ongoing vegetation management programs. (The purpose of vegetation management within a hydro line ROW is to maintain the vegetation in the early succession phase so tall trees do not interfere with the operation of the line.) The construction phase of a transmission line creates a temporary disturbance to fish and wildlife, but once the line is in place and the crews depart, the landscape quickly reverts to a natural early succession state. Ecologists use the term "succession" to describe the slow process of vegetation change from one state to another after a disturbance such as a fire or a forestry clear-cut. A power line right-of-way (ROW) is such a disturbance. Typical early succession plant species in a disturbed boreal forest include fast-growing grasses and shrubs that quickly colonize the vacant area. These are followed by the faster-growing broadleaf trees such as aspen and birch. This forest is eventually replaced by a climax forest composed of coniferous trees such as spruce and pine, which persist until the next disturbance occurs. Spruce-pine climax forests often result in open forest bottoms with little food for wildlife. However, it is clear that many species depend upon these forests, with woodland caribou being the most obvious example.

The bird and animal populations change with the state of the vegetation. Interestingly, in terms of the wildlife species of most concern to people, the ones we hunt, trap and eat, most of these are creatures of the early succession forest. Moose prefer the young shrubs that develop in disturbed areas while grouse gravitate to the patches of low-growing berries that proliferate in early succession forests. White-tailed deer quickly colonize these young forests and are among the most opportunistic of species. Furthermore, disturbances such as fires, clear-cuts or ROWs create habitat diversity and more edge in what was formerly a homogeneous forest. “Edge” describes the boundary between one habitat type and another. The end of the forest at a ROW and the beginning of the grass-shrub within the ROW is such an edge. This type of diversity is attractive to many wildlife species such as those most desired by humans; knowledgeable hunters quickly discover the edges and concentrate their efforts there. Of course, edges are also areas of vulnerability for these species, but the overall population increase that edge habitat creates can compensate somewhat for that. It is clear that a straight edge habitat along a power line is not as natural or as desirable from a wildlife standpoint as are patchy, irregular openings caused by forest fires. Nevertheless, power line ROWs do provide habitat resources where there was none before. Figure 1 illustrates the vegetation that exists below a power line in eastern Manitoba near Pine Falls, and Figure 2 is a similar situation but in the Parkland Region of Manitoba south of Riding Mountain National Park.

The Two Route Options

Another major power line, BiPole III, is required in order to export additional clean energy from Manitoba’s northern hydro dams and to provide geographic separation from the existing lines to reduce the vulnerability of the transmission capacity due to local weather conditions that could compromise the lines. There is a corridor through Manitoba’s Interlake Region, but for security and reliability, it is imperative the next proposed power line be located away from the existing corridor. The narrow bottleneck between Cedar Lake-Cross Lake and Lake Winnipeg is a risky location for an additional power line.

Thus, routing options for BiPole III were reduced to two choices: the short route along the east side of Lake Winnipeg or a much longer route along the west side of Lake Winnipegosis. While figures vary since the exact routing of both options has not been finalized, the western route is approximately 1,340 kilometres and is almost 50% longer than the ESLW route, which is estimated to be 885 kilometres. (Figure 1*)*

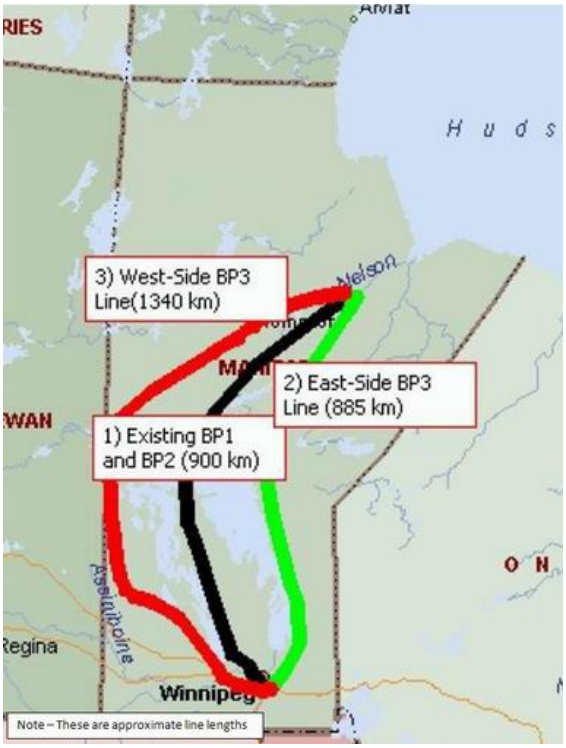

Figure 1

In addition to being a longer route, the WSLW corridor will require much more land. Based on a 65 metre ROW, the ESLW route at 885 kilometres would cover about 58 square kilometres of land. A similar calculation for the WSLW corridor results in 87 square kilometres. Both numbers are quite insignificant in relation to Manitoba's land area of 649,950 square kilometres. Furthermore, the land within the ROWs is still available for other uses such as wildlife habitat, travel corridors and limited agriculture in the case of the WSLW route.

In terms of actual land affected by the ROWs, it is apparent that the 58 square kilometres used by the ESLW line is an overestimate. That is because much of the ESLW line is in the Canadian Shield, and there are many stretches where the support structures could be placed on bare rock outcrops. It is certain that a route could be devised where the line hops from rock outcrop to rock outcrop with essentially no disturbance to any vegetation. That cannot be said of the WSLW line, which by necessity must affect the vegetation along every kilometre of any proposed route since there are no rock outcrops, and the support structures must be on bare, and cleared, ground.

The ESLW line can truly be compared to a "thread down a football field."

Furthermore, it is highly unlikely that the WSLW route will be able to avoid traversing Riding Mountain National Park, which supports and protects aspen parkland, one of the rarest ecosystems in North America. The aspen parkland outside of protected areas has been greatly modified by human use, primarily agriculture. Large, intact aspen parkland apart from Riding Mountain and some small parks and wildlife management areas, is scarce. Contrast this with the boreal forest in Manitoba, which covers nearly 40% of the province and is largely intact. The ESLW Planning Initiative covers an area in that region of 83,000 square kilometres. Riding Mountain is 2,973 square kilometres, and an additional power line through the park (there are already two) would have proportionately a much greater impact.

The Line-Loss Issue

According to an October 6, 2007, article in the *Winnipeg Free Press*: "Building the new line down the east side of Lake Winnipeg was the cheapest, most efficient option. Estimates have shown building it on the west side of the lake will cost $550 million more and be 400 kilometres longer, which means an additional 70 megawatts of power will be lost just in general line losses as power is transmitted from one place to another."

Then electricity is transmitted along a power line, there is resistance along the line, which reduces the amount of electricity that is delivered to the destination compared to what is provided at the origin of the line. This is line loss. Line loss is a function of the length of the transmission line where the further the power is transmitted, the higher the line loss. Line loss is a non-linear function of the total power transmitted along the line; as the total power transmitted increases, the efficiency of the line decreases. As such, the line loss is related to both the length of the line and the amount of electricity being transmitted down the line.

This is a serious consideration when comparing the ESLW and WSLW lines, as the line loss along the WSLW route is considerably higher than on the ESLW. The value of the losses is not simple to calculate, as there are many variables involved. Given the two routing options, of primary interest are the incremental losses with the longer WSLW route versus the shorter, more direct ESLW route. The government quoted 16 MW as the extra losses due to the longer route. This value is misleading, as it represents the incremental losses when one assumes that only existing generation is split amongst the three lines equally. This is not reasonable, because of the new hydroelectric generation projects underway. If one assumes that the maximum line capacity of 2,000 MW is transmitted and that the line

properties are equivalent to those of the existing lines, then the losses would be in the order of 56 MW.

To put this into meaningful terms, if one assumes the losses are 50% of the maximum (28 MW), then the export value of the power lost or the number of homes that could be powered by those losses can be estimated. Based on the average power consumption of a new residential dwelling, the losses are equivalent to the power used by 25,000 homes. The current market value of exported power as stated on the MSIO Web site is approximately $40 per MW-hr; therefore, the export value of the 28 MW would certainly be in the hundreds of millions of dollars based on 2007 dollars and assuming a 50-year life cycle for the line .

Landscape under the hydro line near Pine Falls, Manitoba illustrating vegetation succession under power lines in the boreal forest.

Not only can the losses be viewed in terms of export value, they can also be examined in terms of potential greenhouse gas emissions that could have been replaced with the lost power. With the increased export capacity to the United States, the existing coal-fired generation could be reduced by replacing it with the wasted power. Documents published by the U.S. Department of Energy say a conventional coal-fired generation plant produces one tonne of CO_2 per MW-hr of power produced. Twenty-eight megawatts over 365 days is approximately 245,000 MW-hr of lost power. Multiplying that by one tonne per MW-hr gives the equivalent of 245,000 tonnes of CO_2 that could be avoided by replacing it with the lost power. The U.S. Department of Energy also provides average annual values of

CO_2 production for a number of standard vehicles. A 2004 Honda Civic, for example, produces approximately 6.1 tonnes of CO_2 a year. The lost power represents an additional 40,000 Honda Civics on the road every year. The lost power that could reduce green house gas emissions could also be a revenue source for the province! Such a blatant refusal to acknowledge the potential reduction in CO_2 emissions is the antithesis of a green policy.

The increased line loss on the WSLW line might make it incompatible with the two existing lines in terms of paralleling the power in the event a line is damaged. Paralleling is the ability to temporarily increase the power transmission along one or more lines when necessary. This is a critical consideration given that one of the primary reasons for the new line is to improve the redundancy of the power system when lines are damaged. This is not something that should be thought of as remote given that in September 1996 BiPoles I and II were damaged by a local microburst. Fortunately, it was not during peak usage and temporary purchases from U.S. providers were able to supply power to Manitoba while the lines were repaired. This was the wake-up call that drove the desire for a line that is geographically separated from the other two.

One way the redundancy is accomplished on the existing lines is that they can carry twice as much power (paralleling) as they do under normal operating conditions. In the event of a line being lost, the remaining line can pick up the load and deliver it to converter stations. Since the ESLW line would be approximately the same length as the existing lines, it would be compatible with the converter stations currently in use and would be able to load-share with the existing lines. With no additional generation, in the event of the two BiPoles being disrupted, the ESLW line would be able to carry all the existing power coming down the two BiPoles, thus providing the much-needed redundancy. The resistance along the WSLW line is too large to allow for compatibility with the existing lines given the current transmission technology. As such, the line could not be used to load-share in the event of a disruption of the two existing lines. The WSLW line would be able to carry half of what could be transmitted along the ESLW line. Depending on the time of year, if an event were to occur where BiPoles I and II were damaged, the WSLW line might mean rolling blackouts in parts of the province if the demand for electricity cannot be met. Although the WSLW line does improve distribution redundancy and security, it provides only half of what the ESLW line would offer.

Roads versus Hydro Lines

The government of Manitoba promised to build a road for the residents of the ESLW and this road has been in the planning stages for decades. The ESLW communities are at a major economic disadvantage, as they are served by winter roads and ferries to some communities in summer. The cost of goods and services in these disadvantaged communities is far higher than in comparable communities that are served by roads. The ESLW communities have been pressuring governments for a road, and the current Manitoba government has expressed some interest in an all-weather road.

While it is obvious the time has come for such a road, it is equally obvious that the environmental impact of even the most environmentally benign road dwarfs any impact that could be ascribed to a power line. Roads use land, and this land is precluded from other uses. Significant quantities of earth must be moved to build a road and natural drainage patterns are interrupted, as water is diverted through culverts. The damming effect of a road results in significant erosion, as new areas are flooded. Furthermore, poorly designed stream crossings have the potential to block fish migration, and fisheries are an important part of the economy of the ESLW region. There are techniques to mitigate these effects, and thousands of kilometres of roads have been built in Canada's boreal regions, but once an area has permanent road access it is never the same. One effect that cannot be mitigated is the increase in human traffic in an area. This generates resource conflicts and has the potential to deplete some fish and wildlife populations along the road.

The people in the region deserve a road, but the impact of a road is an order of magnitude greater than any power line could ever be.

The Economic Value of a World Heritage Site

One of the reasons, ostensibly, for rejecting the ESLW power line is that a large part of the region could then be considered for designation as a World Heritage Site (WHS) under the United Nations Educational, Scientific and Cultural Organization (UNESCO). Whether the region becomes a WHS or a wilderness park, proponents of such designations often claim significant economic benefits from such lands. These benefits are difficult to assess, but the Canadian Parks and Wilderness Society (CPAWS) recently published an analysis of the economic impact of Kluane National Park and the expansion. This is not an exact comparison since

there is established road access to Kluane and the adjacent service centre, Haines Junction. Nevertheless, a broad comparison is instructive.

The CPAWS' study shows Parks Canada will spend about $2.11 million to manage Kluane Park. Further economic benefits include 28.5 person-years of employment and total visitor spending of $3.21 million.

These are small numbers compared to the ESLW where thousands of people are unemployed, especially since there are no roads in the proposed WHS. The economic benefits for the ESLW communities of a WHS designation would be minuscule and probably negative, since once an area is designated a WHS, all other land use is prohibited.

Policy Issues and Concerns

The decision to route the transmission line on the WSLW presents a number of questions that need to be addressed before a line is built. Such questions include:

- How will Manitoba Hydro's customers be affected in terms of the increased and unnecessary costs associated with the WSLW route?
- Will the Public Utilities Board be required to review the project, especially in light of potential rate increases to consumers?
- What federal environmental processes will be triggered because of a possible routing through Riding Mountain National Park?
- Has consideration been given to the very sensitive lands along the WSLW route?
- What consultation will be required with local communities that will be affected by the WSLW route?
- What effect will the WSLW route have on agricultural communities? Will this route disrupt traditional farming practices and result in more compensation costs?

A Comment on Equalization

The Frontier Centre for Public Policy has published studies that explore the pernicious effect on public policy decision-making brought about by Manitoba's growing reliance on federal transfer programs, particularly the Equalization Program. In 2007, federally mandated transfer payments made up about 37% of the Manitoba provincial budget. This "free money" removes the need to justify spending to Manitoba taxpayers, allowing the province to make lower quality policy decisions as demonstrated by relatively higher staffed and costly public services and now the scope to make very fiscally irresponsible decisions such as the choice of the WSLW route. One wonders how the taxpayers in provinces that contribute to equalization, primarily Alberta and Ontario, would react if they were fully aware of the poor quality nature of Manitoba's WSLW power line routing decision.

Continued reliance on these transfer payments is a dangerous situation for Manitoba. Given the federal government's control over the formula and the process for disbursement of the transfer funds, we are in constant jeopardy of having changes made to the program that might affect future transfers, changes that might have a negative effect on our province. The most responsible approach to take is to focus on economic strategies that reduce Manitoba's reliance on federal transfer funds, so that we can eventually directly control our financial position. BiPole III, for example, provides an opportunity to bring improved prosperity to our province for future generations if we make the right decision.