Comparing Options for Routing Bipole III: What are the Key Issues?

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Abstract

There has been a recent routing change for the Bipole III 500 kV transmission project from the east side of Lake of Winnipeg to the west side.[1] In this paper I examine the two routing plans using cost-benefit analysis in the Manitoba context. The relevant parties and their costs and benefits associated with the transmission line will be presented. More specifically, I will discuss the methodology needed to conduct a cost-benefit analysis, as well as suitable measurement methods. This paper does not discuss the rationale for capacity expansion, and it does not select a preferred route. Instead, this paper uses cost-benefit analysis to identify the relevant issues that should be included in any routing assessment, given that expansion of generating and transmission capacity is validated by load growth projections. This paper's contribution lies in its clarification of the decision-making process needed to support the selection of the optimal routing of the transmission line.

Keywords: Bipole III, Manitoba Hydro, transmission line, HVDC, cost-benefit analysis, environmental assessment

Introduction

Hydropower accounts for one fifth of the world's electricity supply (World Bank 2009). Canada is one of the top five hydropower producers [2] (International Rivers 2013), where hydro generates 60 percent of Canada's domestic electricity supply (Canada 2015). There are three key

1. Bipole: a direct current electrical transmission line which utilizes two conductors, consisting of one positive and one negative pole which normally operate at equal current. In the context of Manitoba Hydro's Site Selection and Environmental Assessment process, the term also includes conversion equipment at both ends of the high-voltage direct current (HVDC) line (Manitoba Hydro 2009b, 1).

2. The other four top producers are: China, Brazil, the United States, and Russia (International Rivers 2013).

reasons for this. First, Canada is comparatively abundant in water resources that traverse changes in altitude, which is a basic prerequisite for developing the hydroelectricity industry. Second, hydropower is an extremely flexible source of energy. On the one hand, both run-of-the-river[3] and dam system hydropower plants can be used to respond quickly to variable demand by simply releasing or diverting more water. In the case of dam systems, water can also be reserved when demand is low to generate additional power during periods of peak demand. In effect, this stores energy. On the other hand, hydroelectricity transmission infrastructure can be flexibly integrated with other electricity generated by other forms of energy (Nathwani and Chen 2013). Third, when in use, and post-construction, electricity produced by dam systems does not produce greenhouse gases and other pollutants.

Together with emerging global dynamics, the opportunities and challenges of hydroelectricity projects are complex, and ultimately dependent on the resources, skills, and will to invest responsibly, with due regard to the significant economic, environmental, and social risks. In 2010, Manitoba Hydro released its new preferred route for the controversial Bipole III high-voltage transmission line, which is through the west side of the province; this prevents trespassing through the boreal forest on the east side of Lake Winnipeg. A major factor in this decision was the protection of a proposed UNESCO World Heritage site in that area. In this paper a cost-benefit analysis (CBA) framework is used to identify the relevant issues associated with two different transmission routings, as well as suitable measurement methods. The contribution of this paper lies in clarifying the decision-making process needed to support the selection of the optimal routing of the Bipole III transmission line.

Bipole III Overview

As pointed out in the executive summary of Manitoba Hydro’s Environmental Impact Statement, around 70 percent of Manitoba’s hydroelectric generating capacity is driven to southern Manitoba through the Bipole I and Bipole II high-voltage direct current (HVDC) transmission lines[4] (Manitoba Hydro 2011a, 1). The summary notes that “Bipole I and II share the same transmission corridor, through the Interlake region, for much of their length from northern Manitoba to a common terminus at the Dorsey Converter Station, northwest of Winnipeg” (1). Importantly, the summary also points out that, in 1996, severe winds resulted in the outage of 19 transmission towers (between Bipole I and II) (1). Additionally, in 2007, the strongest confirmed tornado in Canadian history caused immense damage to the rural town of Elie, which is only 30 km from the Dorsey Converter Station (1). Manitoba Hydro warns that

3. Run-of-the-River Hydroelectricity (ROR) is a type of hydroelectric generation whereby little or no water storage is provided.

4. High-Voltage Direct Current (HVDC) – direct current boosted up to high voltages for long distance transmission. This form is sometimes used to carry large amounts of power over long distances and for transmission underwater.

"similar catastrophic events could lead to an interruption of weeks" (1). If such an interruption were to occur, then Manitoba Hydro estimates that in months of peak demand, for example, January, demand would be unable to be met "85% of the time" (1). It is this vulnerability, plus the major consequences of continued major outages, that justifies "a major initiative to reduce dependence on the Dorsey Converter Station and the existing HVDC Interlake transmission corridor" (1). Bipole III is intended as the solution to the risks posed by such possible catastrophic events. That is, Bipole III will serve to improve the overall reliability of the system, as well as Manitoba Hydro's ability to meet domestic demand (1).

Bipole III is a newly proposed 500 kV HVDC transmission project required to improve overall system reliability and dependability. There are two route options for Bipole III: the east side corridor and the west side corridor.[5] The west side corridor originates at the Keewatinoow Converter Station site near the proposed Conawapa Generating Station site located northwest of Gillam. This route would travel southwest towards The Pas and would continue south staying west of Lake Winnipegosis and Lake Manitoba. Finally, the route would pass south of Potage la Prairie and Winnipeg to terminate at the Riel Converter Station on the Riel site in the Rural Municipality of Springfield (Manitoba Hydro 2009b, 1). While the east side corridor originates at the same station (Keewatinoow), it terminates at the Riel site east of Winnipeg (1).

Now, consider the two corridors, or routes, in slightly more detail. First, there is the east side corridor. Routing the Bipole III line along the east corridor of Lake Winnipeg offers the most attractive technical solution for improvement to the security of the existing HVDC north/south transmission system. It is shorter, and consequently reduces exposure to line failure, and is less costly to build. Additionally, the east side corridor provides a closer location for Riel Station to the east side of the Red River Floodway, next to the existing Deacon Reservoir. The advantage of the west side corridor is that routing Bipole III along this route would avoid traversing the boreal forest. But, it would also be more expensive and less useful for emergency operation in the event of the loss of one of the transmission corridors (i.e. Bipole I and II). Moreover, due to its length and geographic mapping, it cannot use the existing Henday Converter Station, rather, it requires the construction of a new converter station. On the other hand, according to CMC Consultants Inc. (2007, 5), if Bipole I and II were lost, the new Bipole III would only be able to carry its rated load (about 50 percent of the available output), thus it would require the advancement of yet another transmission line to meet the load growth projection.

5. For a visual representation of the two route options, see the figure in the following link: http://www.cbc.ca/news/canada/manitoba/bipole-iii-becomes-high-voltage-issue-1.998827.

Issues in Evaluating Benefits and Costs

CBA is a policy assessment method that quantifies, in monetary terms, the value of all consequences of a project, program, or policy to all affected members of the society (Boardman et al. 2010, 2). Two basic first steps are, first, to enumerate the "parties with standing" (those directly affected in terms of income or wealth gains and losses as a result of the project) and, second, to enumerate the losses and gains (costs and benefits). Similarly to the application of CBA to Bipole III, Neudorf et al. (1995) looked at two cases involving alternative routing for power system reliability. The focus was on different circuit volume alternatives, and, in both cases, CBA was applied. However, this study was limited insofar as it omitted the benefit side and other costs related to mapping[6]; mapping is an indispensable factor to make a more exact assessment for the cost-benefit analysis.

As an example of a similar study, Morimoto & Hope (2004) analysed a Sri Lankan hydro program using an extended CBA model which included environmental and uncertainty aspects. In the paper, the authors took the following steps. First, the authors decided benefits and costs where two aspects of benefit include, first, utilization of indigenous and renewable resources to lessen air pollution and, second, economic stimulation. Regarding cost, the authors considered construction costs, resettlement costs, aesthetic losses, economic losses for tea plantation, accidental costs, and costs brought about by sedimentation. Second, the authors identified variables and the framework for CBA, after which, the net present values were computed. Third, a sensitivity analysis was performed by applying variations in the expected increase in economic output due to increased power supply and proportional reduction in annual number of tourists. This allows the analyst to show how the benefits and costs vary with changes in key assumptions and reveals whether findings would be reversed under adjustments, however minor. Finally, the authors computed cumulative net present value[7] (NPV) at various discount rates and concluded that it is likely that a positive cumulative NPV will be obtained. Yet, a possibility of obtaining a negative cumulative NPV exists, particularly at higher rates of pure time preference.

Uniquely for Bipole III, both east and west routings contain traditional land use areas and Treaty Land Entitlement areas of various First Nations in addition to Resource Management Areas and prime farmland. Therefore, any evaluation of the project must incorporate environmental effects (e.g. costs for traversed agricultural land, polarized wildlife habitats and forest, and threatened and endangered wildlife) and socio-economic factors such as the rights of

6. Benefits and costs due to mapping can include: social welfare, environmental sustainability, outage cost, and other system costs.

7. The net present value approach views the project as a stream of net benefits (benefits minus costs) into the future. Net benefits received in the future are adjusted (discounted) because they are valued less than net benefits received now.

First Nations[8] and other community interests besides the usual costs and benefits incurred by the transmission line. An important aspect of this paper is to identify a method for including the preferences of affected residents (both Indigenous and non-Indigenous) and to include the considerations of uncertainty.

A key challenge in benefit and cost valuation is valuing the land used by the transmission line. Lines impede the use of land by limiting agricultural operations, disrupting migration, and creating eyesores. Analyzing changes in the land values is an obvious metric for losses but has limits. Techniques that rely on market observations reflect the *revealed preference* by buyers and sellers. Several impediments exist to using land as a basis for estimating gains and losses to parties, but most important is that land may not be traded frequently enough, or at all, as in the case of First Nation reserve lands. Measures based on changes in land values also encounter double counting issues; increased farming costs because of transmission lines would also be reflected in changes in sales and rental prices. One can count the changed operating costs or the changed land values, but not both.

On the other hand, contingent valuation methodology (CVM) is a survey technique that aims to provide a more direct assessment of value using a consumer's willingness to pay (WTP) (Per-Olov and Kriström 2012). The technique approaches parties directly and asks them to state their WTP. Such *stated preference* methods use a split ballot (i.e. a survey sample divided into randomly assigned subsets), where each respondent in a sub-sample indicates whether they accept the trial price that is offered. The trial prices vary with each sub-sample allowing the researcher to map the value of land under project options.

However, a common problem is strategic bias. This occurs when people offer bids that are too high or two low in an attempt to affect the final price. That is, parties view the survey as part of a negotiation with the project proponent, which affects their estimation of value. To mitigate this effect, the double-bounded CVM approach was first proposed by Hanemann (1985) and first implemented by Carson, Hanemann, and Mitchell.[9] As Hanemann et al. (1991) noted, to the extent that respondents' awareness with multiple bid iterations is a cause of the starting point bias[10], double-bounded models avoid this problem with a single follow-up bid.

8. Increasingly, First Nations rights with respect to resource development are being recognized as meriting payments, which increase the costs of any project that infringes directly on land or affects treaty provisions whether directly or indirectly.

9. "Double-bounded" CVM uses a "follow-up" question to exact willingness to pay (WTP) after first bid-up.

10. Starting point bias results from the starting point of the bidding procedure. If the starting value is too far from the true bid value, then the single follow-up bidding will terminate the game before the true value is revealed.

Another methodological issue is uncertainty, which should be accounted for in CBA. However, as Merkhofer (1987) points out, CBA rarely attempts a comprehensive accounting of uncertainty in the outcomes of a decision; this is because risk is an objective property of the physical world and only repetitive phenomena can be analysed with probabilities. As for analysis of the Bipole III HVDC transmission line, extreme weather uncertainty would make a crucial difference between different routings. Therefore, extreme weather uncertainty should be taken into consideration from the beginning. However, extreme weather, such as wind, lacks frequency distributions or symmetry arguments for estimating probabilities.[11] In an electricity transmission outage study by Koval and Chowdhury (2005), it was found that, among other extreme weather, wind and precipitation outages were not proportional to the physical length of transmission line. On the other hand, lightning outages were strongly correlated with physical length. Thus, for extreme weather, uncertainty could be approximated by the dimensions of the line to show the impacts of specific events. Other studies have attempted to model uncertainty by experimenting with specific probability density functions (PDFs) to simulate extreme weather.

A third issue is that the difference between two transmission alternatives also lies in the varied land use they transverse. For the west transmission line, many farms will be diversely affected since the lines impede farm operations and management. Costs brought by these lines on farmlands could be hard to estimate. On the other hand, the impact of a line across UNESCO-designated land would incur obvious complexities in estimating value.

Applying Cost-Benefit Analysis to Bipole III

Proposed Framework for Bipole III, Scope, and Affected Parties

The first work plan of Bipole III was proposed as the "Transmission Complex Site Selection & Environmental Assessment" in May 1989, followed by an addendum in June 1990. In 2004, the Government of Manitoba asked Manitoba Hydro to cease work on the east side because of the provincial intention to apply to UNESCO for a heritage site designation of 43,000 square kilometres of forest on the east side of Lake Winnipeg and a concern over the habitat disruption for woodland caribou in the area. The comparison in this paper is between the original east side work plan proposed in 1989 with the west side work plan reflected on the Manitoba Hydro website.

The primary affected parties are: Manitoba Hydro, Manitoba Hydro customers (ratepayers), landowners (comprising farmers and non-farm landowners), and the Manitoba government. From an importantly broader perspective, Bipole III also affects additional parties: Indigenous communities, rural communities, and those Manitobans who prefer the preservation

11. Symmetry arguments, developed by early probability theorists, were able to justify the initial assumptions of equiprobability using combinatorial methods (i.e. by simply counting cases).

of wilderness. As the transmission project traverses farmlands, wilderness, and some living areas, soil productivity, integrity of wildlife habitats, and human health are affected. Farm operation is affected directly by limiting the use of the land close to transmission lines. Moreover, non-farmers may suffer losses due to visual effects. The key is that the costs and benefits of Bipole III are held by those whose “enjoyment,” both economic and socio-cultural, is directly affected. The perceptions of non-residents of Manitoba should not be given any standing since they bear none of the direct costs (e.g. construction) or indirect costs (e.g. deprived income and loss of benefits in actual or potential use). These costs (represented by “-”) and benefits (represented by “+”) are summarized in table 1 (where “0” represents neither a cost nor a benefit). For example, mitigation will pose a cost to Manitoba Hydro and ratepayers but would bring monetary benefit to First Nations who will be affected by the project. Considering local landowners will not be affected, in terms of mitigation, Bipole III means a monetary transfer from ratepayer to First Nations via Manitoba Hydro.

Table 1. Stylized cost-benefit framework showing the impacts of Bipole III.

		First Nations	Ratepayers	Local Landowners	Manitoba Hydro
Costs	Cost of the transmission line	-	-	0	-
	Mitigation of affected landowners	+	-	0	-
	Line failure	-	-	-	-
	Environment and plant and animal diversity	-	0	-	0
Benefits	Transmission stability for Bipole I & II	+	+	0	+
	Reduced pollutants	0	0	0	0
	Electricity transmitted	+	+	0	+
	Electricity exported	0	0	0	+

Note: Ratepayers includes households and business corporations. For Manitoban electricity consumers, it is assumed that their WTP is higher than the electricity rate. Therefore, consumer surplus is positive. This assumption is derived from rates among different provinces across Canada.

The Cost-Benefit Analysis

This section provides a comparative evaluation of the specifics of the Bipole III project. In particular, the associated costs and benefits of each proposed Bipole III route to the relevant parties will be discussed. To begin with, the costs to Manitoba Hydro will be presented. These include: construction and maintenance costs, environmental mitigation costs, transmission line failure costs. Next, the benefits to ratepayers will be briefly restated. (Costs and benefits to all parties are represented in table 1.) Finally, a CVM survey is proposed to measure ratepayers’ WTP for a rate increase for the west side route.

Manitoba Hydro faces both construction and maintenance costs. These costs differ depending on the preferred Bipole III routing. First, two main construction differences are the transmission line length and the development of a northern converter station. Regarding the converter station, cost estimation is straightforward, it is the sum of labour costs and equipment-related costs. As for the transmission line, different geographical features require different technologies. However, when comparing the total cost in terms of length, the cost due to different technologies is negligible.

Next, construction costs should be discounted until the end of the construction period and maintenance costs should be discounted until the end of the life cycle for the project. If periodic upgrades are planned, then these become part of the construction cost and need to be discounted appropriately. Vegetation management is one of the more important maintenance issues which involves a variety of methods including: hand-cutting (e.g. utilizing chainsaws, brush saws, or axes), mechanical shear blading, and herbicide treatment. The latter is always controversial, but unless impacts, such as death of wildlife, can be quantified and that loss valued, this is a difficult element to include in a cost-benefit framework. The vegetation maintenance brushing cycle for transmission line rights-of-way typically ranges between 8 and 10 years (Manitoba 2012). Therefore, vegetation maintenance costs should be discounted every maintenance period until the end of the life cycle.

Regarding environmental mitigation costs, Manitoba Hydro uses various ways to mitigate the impact of transmission lines which can be used to approximate welfare loss due to decreased biodiversity. In this framework, the costs have been categorized as: media promotion cost[12], environment-oriented mitigation cost,[13] and land acquisition cost[14]. Because mitigation is done in different geographical segments, and during different stages of the lifetime of the transmission project, it can be calculated using the same method for construction and maintenance. The media coverage cost and the land acquisition cost should be discounted before the construction period; this is especially the case when considering the land lump-sum payment.

Transmission line failure costs are caused by line outages and by major natural events. For transmission line outages, the cost difference between the two routings lies in the length of the transmission lines. To estimate line failure cost, there are two important parameters to consider. First, there is the mean time to failure which, for transmission lines, is 1.25 years per 100 km (Padiyar 1990, 6). Second, there is the mean time to repair to consider which, in this case, is one and a half hours (6).

12. Social media promotion cost is the cost related to public relations necessary to promote policy implementation.

13. Environment-oriented mitigation cost, also known as compensatory mitigation cost, is a cost that intends to offset the known impacts to an existing historic or natural resource.

14. Land acquisition costs refer to the overall costs of purchasing an asset.

On the other side, Bipole III, similarly to other long lines in Canada, will be subjected to severe weather conditions that are expected to be the controlling design loads for conductors and towers. Extreme weather causes line failures across Canada. In January 1998, an ice storm devastated eastern Ontario and southern Quebec's power system (i.e. 120,000 km of power lines and telephone cables, as well as 130 major transmission towers were affected). This resulted in about 900,000 households without power in Quebec and 100,000 in Ontario (Phillips 2002). For Manitoba, the 1996 windstorm that caused the failure of nineteen transmission towers meant that it took four days to restore one HVDC line (Manitoba Hydro 2011b, 4). Manitoba Hydro notes that if this event had occurred a month or two later than it did, then "rotating blackouts would have been unavoidable" (4). Although the probability of extreme weather occurring is relatively low, from an examination of the historical data, the loss brought about by such an event would be huge. This is especially true for transmission lines in different climate regions where the costs of extreme weather could produce a significant difference between the two.

To simulate climate models, it is necessary to select six weather monitoring spots in two transmission study areas. Access precipitation, wind speed, temperature, and lightning data of the past 50 years creates a collection of data from which the probabilities of extreme weather may be derived using numerous techniques. For example, one method is the generalized extreme value[15] distribution. Using such a distribution, risk probabilities may be modelled.

As indicated in table 1, the average Manitoban, as an electricity consumer, benefits from an increased amount of electricity available. It is assumed that the WTP brought by an additional unit of electricity provision is constant and that both the WTP and electricity consumption for the average household is identical between the two alternative lines. In other words, revenues earned by Manitoba Hydro represent the benefits of the service. However, the capital and maintenance costs of Bipole III will need ratepayers to meet these costs through a rate increase. The key issue then becomes whether Manitoba ratepayers are prepared to pay the incremental costs of a west side transmission line, assuming that the revenues (and benefits) are the same in either case.

Cost-benefit analysis can summarize relative value (the cost-benefit ratio). However, it is necessary to measure the preferences of affected ratepayers. A survey of ratepayers represents an effective way to measure the value of two options, in this case the choice of transmission line on the east or on the west. Conventional, single-bound CVM surveys involve asking a ratepayer if they would pay some given amount to have Bipole III move down the west side of the lakes to avoid some harm or gain some benefit.

15. The generalized extreme value distribution is often used to model the smallest or largest value among a large set of independent, identically distributed random values representing measurements or observations.

The survey will randomly enrol respondents from a sample of Manitoba Hydro ratepayers with an incentive to receive a year's free electricity or gas. After the confirmation of participation, respondents will receive a letter which explains the differences in cost between the east and west side routes. This letter will be followed up by a CVM survey where respondents will be asked how much more they are willing to pay for the west side. The first bid option will be asked at three percent extra than the previous year's bill payment.

In double-bounded CVM, participants are faced with a starting bid and will be presented with two sequential prices or bids afterwards (see figure 1). If the initial bid is accepted, a second higher value is presented; if the bid is rejected, then a lower value is presented. The goal is to obtain either a "yes" or "no" response to a range of potential rate increases. In this case, after the first bid question of a three percent rate increase, those that said "yes" were tested with a five percent increase and those that said "no" were tested with a one percent increase. At the second bid offer, those who refused the five percent increase were brought back to three percent and those that agreed at one percent have reached their final answer. For those that said "no" throughout or "yes" throughout, such respondents were asked to give their own offer. At the end of the survey, researchers will be able to determine the WTP for a rate increase for the west side route. This number, multiplied by the population, can give the total WTP for the west side transmission line project.

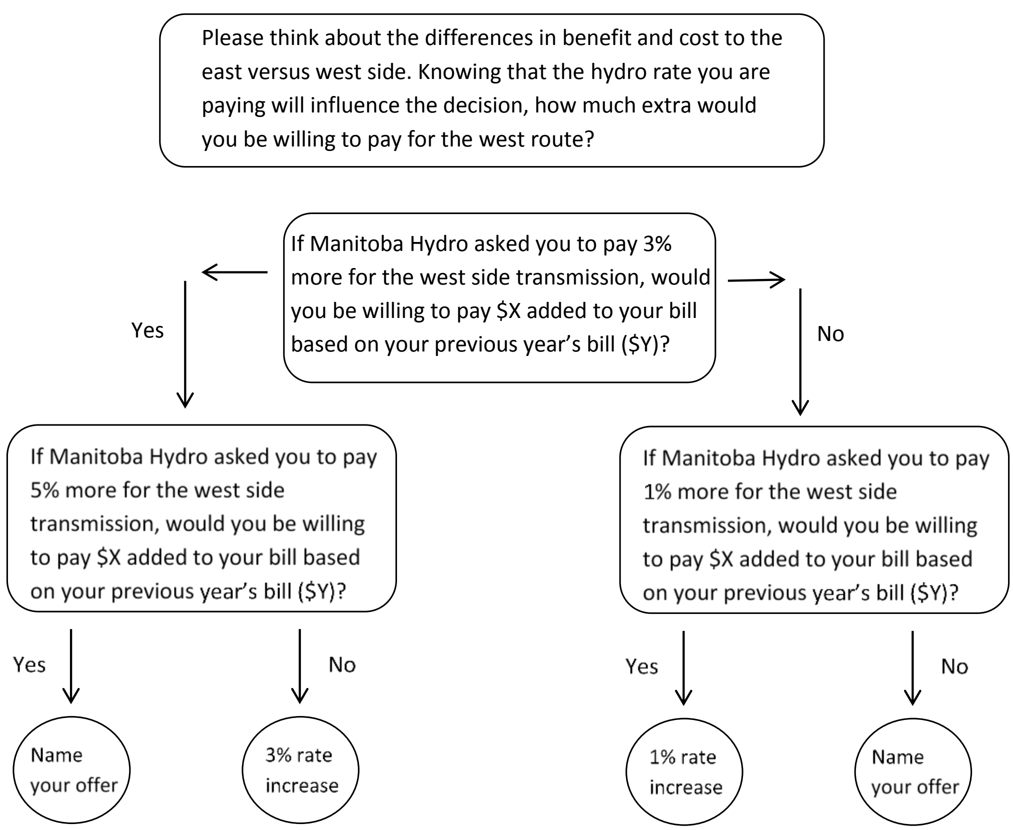

Figure 1. The Structure of the CVM.

Conclusions

There are five points to note from the proposed CBA. To begin with, the WTP value derived from the double-bounded survey tends to underestimate the environmental cost. This arises for three main reasons. First, using land value as an indicator of WTP itself would lead individuals to emphasize commercial value more heavily than environmental value. That is, the negative impact on environmental integrity, Indigenous communities, and wildlife would not be fully reflected. Second, population and economic development pressures often lead to underestimation of the opportunity cost of maintaining the land. Finally, it is immediately apparent that accounting for future ecosystem service values is further complicated by the problem of irreversibility. Due to the increasingly relative scarcity of the ecosystem, the “user cost” for future consumers should also be included. Although, following Brander et al. (2006, 241) who indicate that CVM studies have tended to produce higher value estimates among evaluation methods, adding a shadow price should also be considered.

A second issue has to do with the method used to model extreme weather. The method described is based on a stable weather condition assumption, which is unrealistic. As world climate changes, a higher probability of extreme weather can be expected. Thus, although the line stability of Bipole I and II benefits from the new Bipole III project, it is likely that the costs due to extreme weather will be higher than expected. Additionally, the cost to maintain Bipole I and II will increase. Moreover, due to Manitoba’s dependence on hydroelectric-generated electricity, any outage could induce huge economic losses to society; this makes the probability of extreme weather sensitive to the CBA. Therefore, careful analysis should be conducted regarding the probability of extreme weather.

Third, for the consumer of electricity, WTP is closely related to consumer surplus. In this framework, we assume WTP brought by one additional unit of electricity is constant for the following reasons. First, the transmission line itself is only one part of the hydro project. Second, the increase in hydroelectricity production and transmission ability will minimally affect the electricity rate. Third, there exist different side transmission lines with nearly the same load. Therefore, it is reasonable to simplify consumer surplus.

Fourth, losses in soil productivity and stability is likely to occur due to the construction and operation of the Bipole III transmission line. Regarding any loss in soil productivity, the agriculture market, as the secondary market, will reflect this impact. However, the soil stability loss should be taken into explicit consideration as it is the negative externality produced by this transmission project.

Finally, this analysis does not include settlements that may be necessary if the government determines that those with an interest in the land (e.g. Metis, First Nations) are owed compensation for transmission lines traversing traditional lands. Take Tataskweyak Cree Nation for example. The Bipole III project will need more than 200 km of land through the resource management area for the transmission line. This translates to about 400 towers for the use of hunting, trapping, and other traditional activities. As traditional land is a means of maintaining traditional lifestyles, interruption of such land will also pose a potential cost to the healthcare system. Such important considerations add to the complexity of the assessment of this project.

Conclusion

The proposed cost-benefit study outlined in this paper has attempted to provide a feasible framework for the complex analysis involved in routing the Bipole III transmission line. The presented CVM survey method, used to measure the preferences of affected residents who reside in proximity to the two routes, clarifies WTP assessment. Importantly, this provides greater specification for the routing decision-making process. Therefore, the importance of this proposal should be clear to both policymakers and community inhabitants. Economically speaking, as energy needs change in the main export market (i.e. the United States and, as demand increases, Ontario) the benefit gained by either routing will make a significant difference in future assessments. The importance of costs and benefits to all affected parties has been discussed in this paper but is also important for the future of the Bipole III project. For example, reactions from different First Nations along the transmission line may pose a potential cost, thus, possibly producing a change in decision by policymakers. Moreover, construction cost is forecasted to explode which makes the Bipole III project much more vulnerable to the economic conditions of Manitoba, as well as Canada as a whole.

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