

**Manitoba Hydro's Response to  
Supplemental Cost of Service  
Recommendations of  
Christensen Associates Energy Consulting**

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**MANITOBA HYDRO'S RESPONSE TO  
SUPPLEMENTAL COST OF SERVICE RECOMMENDATIONS  
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## **MANITOBA HYDRO'S RESPONSE TO SUPPLEMENTAL COST OF SERVICE RECOMMENDATIONS**

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### **I. INTRODUCTION**

This document constitutes Manitoba Hydro's response to the *Review of Cost-of-Service Methods of Manitoba Hydro: Supplemental Report* prepared by Christensen Associates Energy Consulting ("CA") of Madison, Wisconsin.

Manitoba Hydro retained CA to conduct a review of its Cost of Service methodologies to confirm they were consistent with best practices and to address a number of issues that arose out of previous PUB proceedings including the treatment of Export Revenues and the role of Marginal Costs. That report and Manitoba Hydro's response to it were filed with the PUB in July 2012 in conjunction with the Corporation's 2012/13 & 2013/14 General Rate Application. The external review of COS was deferred at that time.

Since the preparation of those reports, there have been changes in the business environment in which Manitoba Hydro operates. The required approvals for investment in new Generation and Transmission including Keeyask, US Interconnection and Bipole III have been obtained. Construction of Keeyask and Bipole III are well underway with approximately \$3 billion having been invested as of September 30, 2015. In addition, the market value of electricity has declined from the very high levels experienced during the mid-2000 period, although export revenue still represents approximately 20% of revenue today.

In late 2014, Manitoba Hydro undertook to meet with Stakeholders and Intervenor representatives to facilitate the sharing of views regarding COS methodology. This process provided parties who had not engaged in a COS review since 2008 an opportunity to refresh themselves on Manitoba Hydro COS principles, review the significant differences in perspectives between the various parties on COS assumptions flowing from Order 116/08 as well as the changing environment in which Manitoba Hydro is operating.

As part of that process Manitoba Hydro agreed to commission CA to prepare a supplemental COS report. The review was undertaken to evaluate Manitoba Hydro's COS methodology with consideration of its robustness in light of Manitoba Hydro's current business environment, to address new COS issues arising from the finalization of investment decisions, and taking into account the discussion and perspectives shared through the Stakeholder Engagement process.

The key issues for which supplemental recommendations were provided include:

1. Export related topics, including the assignment or allocation of costs against export revenues and the allocation of the benefits of Net Export Revenue among domestic revenue classes of service.
2. Functionalization, classification and allocation of Generation and Transmission facilities:
  - a. Bipole III
  - b. Dorsey and Riel convertor stations
  - c. Transmission interface with the U.S.
3. Demand related components included in the allocator used for Generation costs.

Manitoba Hydro has considered the advice and recommendations of CA. In some cases, evaluation of supplemental recommendations along with current perspectives of Stakeholders shared through the meetings held in 2014 has caused Manitoba Hydro to reconsider prior COS perspectives as reflected in its response to the CA Report prepared in 2012. Manitoba Hydro's COS views are discussed in Section II. COS methodology changes have been incorporated in PCOSS14-Amended and the overall impacts of the changes are discussed and attached to Manitoba Hydro's COS Submission.

## **II. MANITOBA HYDRO'S RESPONSE TO THE RECOMMENDATIONS**

### **EXPORT CLASS AND TREATMENT OF COSTS AND REVENUES**

**Recommendation from Section 2.2:** It is recommended that Manitoba Hydro continue to allocate both fixed and variable costs to Dependable export sales and only variable costs to Opportunity sales. Hybrid sales which are not backed up by Manitoba Hydro resources should be classified as Opportunity sales. (Pages 5-7)

**Manitoba Hydro's Position and Rationale:** Manitoba Hydro supports the recommendation and the rationale to continue to utilize an export class that differentiates between the costs attributed to Dependable versus Opportunity exports. Manitoba Hydro agrees that this approach is reasonably robust to withstand the broad range of market conditions in which Manitoba Hydro operates and also the substantial facility additions finalized in the last several years.

In the Supplemental Report, CA uses the term "hybrid" to represent export sales which are long term and firm but are not backed up specifically by Manitoba Hydro resources. CA concludes therefore that hybrid sales do not influence embedded Generation and Transmission cost and should only attract variable costs consistent with the costing treatment of Opportunity sales.

Manitoba Hydro agrees with CA that hybrid sales can be firmed if necessary by resources outside of Manitoba and do not alter Manitoba Hydro's development plans in that no new energy and/or capacity is needed to be built to serve the sale. Manitoba Hydro recognizes the reasonableness of CA's rationale for assigning only incremental cost against these sales.

However, Manitoba Hydro also recognizes that while the specific characteristics of hybrid sales may suggest a lower reliance on Manitoba Hydro generation resources, Manitoba Hydro intends to support these sales under low flow conditions although the means of supplying these sales may not exclusively consist of Manitoba Hydro resources. As such, Manitoba Hydro believes it reasonable to treat these sales as Dependable and assign fully embedded cost responsibility. For COS purposes, Manitoba Hydro will continue to reflect a five-year forecasted average split between Dependable and Opportunity sales based on energy available under dependable water flows compared to average water flows for years 3-8 of the IFF. The result is that approximately 50% of Export sales are considered Dependable, 50% are considered Opportunity sales.

While this approach to hybrids likely results in an over-assignment of embedded cost responsibility to Dependable sales, Manitoba Hydro accepts that in low-water conditions additional cost may be incurred to support these sales that may not be sufficiently reflected in the median flow conditions that underpin revenue requirement and COS. From a longer-term cost responsibility perspective, this is a conservative approach to determining Net Export Revenue and avoids the complexities associated with the classification of specific export sales.

Manitoba Hydro has also re-considered past export related COS treatments of natural gas, coal, and wind purchases. For COS purposes, Manitoba Hydro intends to aggregate these generation resource costs to be allocated to all Domestic and Dependable load. This longer-term cost responsibility perspective takes into account the fact that these resources serve all loads under some conditions. Past extensive, complex and costly reviews of each of these resources has also driven this simpler yet reasonably cost causative methodology.

Similarly, power purchases, trading desk and MISO fees support all load under some conditions and Manitoba Hydro intends to assign these costs proportionately to all load.

Coal-fired generation, by virtue of Bill 15, can no longer be used to support exports and is therefore appropriately assigned only to Domestic load. However, to avoid introducing additional complexity with only minimal RCC impact, Manitoba Hydro is prepared to include these costs in the generation pool to be allocated to both Domestic load and Dependable exports.

**Recommendation from Section 2.3:** CA continues to endorse the allocation of Net Export Revenue on the basis of total cost to serve as a reasonable approach that has accommodated export prices under a variety of circumstances. (Pages 7-8)

**Manitoba Hydro's Position and Rationale:** Manitoba Hydro agrees with CA's recommendation and rationale. Manitoba Hydro agrees that the current approach moderates the illogical effect of reducing some customer class' revenue requirements below short-run marginal cost. This approach provides a reasoned and transparent method to address the fairness issue associated with the sharing of Net Export Revenue. As such, Manitoba Hydro will continue with its current Net Export Revenue allocation approach. Manitoba Hydro notes also that this approach recognizes the significance of exports to investment plans and operations and has achieved a degree of acceptance by Stakeholders



## **GENERATION AND TRANSMISSION COST ALLOCATION**

**Recommendation from Section 3.4:** CA recommends that the Bipole III facilities be functionalized as Generation and allocated using the Weighted Energy allocator, consistent with the cost allocation approach for existing Bipole I and II facilities. (Pages 11-12)

**Manitoba Hydro's Position and Rationale:** Manitoba Hydro agrees with the recommendation and the rationale that supports it.

**Recommendation from Section 3.6:** CA recommends that at least 75% of the costs of inverter facilities located at Dorsey and Riel Stations be assigned to Generation; Transmission should be assigned no greater than a 25% cost share. The recommendation is based on the incremental utilization of Manitoba Hydro's bulk power system, including power generation and transport, facilitated by HVDC Reduction Special Protection System ("SPS") and related controls within the inverter facilities. So equipped, the inverter facilities provide the capability to maintain system stability at both typical and fairly high levels of load. (Pages 13-14)

**Manitoba Hydro's Position and Rationale:** As part of CA's initial 2012 Report, Manitoba Hydro committed to reviewing its COS approach of Dorsey converter station which functionalized those facilities as 100% Transmission.

Manitoba Hydro developed northern hydraulic resources in combination with HVDC technology as part of a least cost generation portfolio, which offered cost savings compared to developing and operating thermal resources near the southern load centers. Once implemented, the HVDC technology improved the AC transmission network stability and offered savings on future networked transmission expansion to the US, as a result of the flexibility in control associated with the HVDC system. The current functionalization of Dorsey was selected to recognize these transmission-related benefits.

Manitoba Hydro has examined its cost allocation approach and agrees with CA that the primary role of the DC facilities situated at Dorsey (and Riel) are dedicated to the Bipole facilities which inject power to the Transmission system, a Generation function:

- A catastrophic loss of Dorsey (Riel) could cause an outage that shuts down the HVDC system for up to three years and energy supply that flows through Dorsey is critical to more than just serving peak loads;
- Inverters are analogous to step-up transformers (which are included in the

Generation function) in that they are needed to transform the voltage control to a useable level for the networked Transmission system; and

- The SPS is essentially another form of voltage control (albeit a much more efficient form) which is provided by generators and included in the Generation function

Notwithstanding the fact that the combination of northern generation and HVDC Transmission including Dorsey (and Riel) provides a benefit to the AC Transmission system, this was not the primary intent of the investment. A cost allocation approach that considers the primary role of the investment is the superior cost causal approach. Manitoba Hydro intends to functionalize 100% of the DC facilities situated at Dorsey and Riel to the Generation function to be allocated on the basis of Weighted Energy.

**Recommendation from Section 3.7:** CA recommends that Manitoba Hydro's US interface be allocated according to Weighted Energy on the basis that these facilities provide, simultaneously, joint capability in the form of reliability and energy transfer capability. CA states that supply-side contingency events, which network reinforcement investments are designed to minimize, potentially impose large power outage costs on retail consumers and will likely occur with a strong random component. Weighted energy-based allocation accurately captures the time pattern of foregone value of the consumption of electricity (outage costs) as a consequence to supply-side events. (Pages 14-16)

**Manitoba Hydro's Position and Rationale:** Manitoba Hydro accepts CA's recommendation to classify US interconnections as Energy and to allocate according to Weighted Energy.

While these interconnections' design and construction costs are related to firm transfer capability and may be used during peak hours, the intent of this infrastructure is to move energy over longer periods and drives the investment in these facilities. Interconnections provide an important source of supply during off-peak hours when there is ample excess capacity in the adjacent predominantly thermal system; such off-peak purchases allow water/energy to be conserved in Manitoba to meet loads in future periods. In addition, due to higher domestic loading conditions during peak load hours, the US interface loading cannot necessarily follow peak hours. These interconnections also provide significant reliability benefits to load in Manitoba including:

- sharing of generation contingency reserves
- sharing of capacity resources due to load diversity

- importation of energy during drought conditions or extreme supply loss in Manitoba
- ability to supply cross-border load when this load is isolated from its system.

**Recommendations from Sections 4.3 & 4.4:** CA recommends that Manitoba Hydro include capacity cost as well as operating reserves in its marginal cost-weighting of energy consumption for purposes of generation-related cost allocation. CA concludes that implicit capacity costs in energy market prices are highly variable and may not adequately be captured in the differential between peak and off-peak prices. CA also reaffirmed its previous recommendation that since the Surplus Energy Program (SEP) prices do not include the cost of maintaining operating reserves<sup>1</sup>, it may be conceptually appropriate to include the value of reserves in the weighting factors, even if the impact is modest. (Pages 16-21)

**Manitoba Hydro's Position and Rationale:** Manitoba Hydro accepts that due to changes in market conditions, the capacity component of energy supply may not be adequately reflected in the differential between on-peak and off-peak energy prices. Manitoba Hydro has reflected an additional capacity component in its Weighted Energy allocator by utilizing the value of capacity as represented by the Reference Discount used in the Curtailable Rate Program (CRP) in the weighting factors. For use in the COS this capacity value is converted to an energy basis by dividing the Reference Discount by the monthly on-peak hours, and adding the hourly capacity costs to the on-peak energy prices.

Manitoba Hydro views that including MISO operating reserves in weightings may be theoretically superior but its impact would be negligible. The CRP reference discount incorporated in the weightings is well in excess of current market prices for capacity and therefore Manitoba Hydro does not intend on incorporating value of reserves into energy weightings.

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<sup>1</sup> Types of Operating Reserves:

1. Regulating Reserve – Allows MISO to physically balance supply and demand on real-time basis. Must be online, 5 minute response time.
2. Spinning Reserve – Provides energy to meet demand in the event of an unexpected loss of generation transmission resource. Must be on-line, 10 minute response time.
3. Supplemental Reserve – Similar to spinning reserve, but can be served by off-line resource. 10 minute response time.