



~~CONFIDENTIAL~~

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**INDEPENDENT EXPERT  
CONSULTANT REPORT:  
SASKPOWER CONTRACT-  
ECONOMIC REVIEW**

**DECEMBER 15, 2017**

**PREPARED FOR**  
Manitoba Public Utilities Board

**PREPARED BY**  
Daymark Energy Advisors

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## LIST OF ACRONYMS AND TERMS

1d, 3a,8a

<b>CPJ</b>	Capital Project Justification
<b>Daymark</b>	Daymark Energy Advisors, Inc.
<b>Daymark IEC Team</b>	Daymark Independent Expert Consultants Team
<b>FCA</b>	Facilities Construction Agreement
<b>GFS</b>	Group Facilities Study
<b>GRA</b>	General Rate Application (2017/18 & 2018/19)
<b>GSIS</b>	Group System Impact Study
<b>MH</b>	Manitoba Hydro
<b>MHEM</b>	Manitoba Hydro's Export Power Marketing function
<b>MHT</b>	Manitoba Hydro's Transmission function
<b>MW</b>	megawatt
<b>MWh</b>	megawatt-hours
<b>OATT</b>	Open Access Transmission Tariff
<b>PSA</b>	Power Sale Agreement
<b>PUB</b>	Manitoba Public Utilities Board
<b>Sale Evaluation</b>	Saskatchewan Power 100/140 MW Sale Evaluation, January 5, 2016
<b>SaskPower</b>	Saskatchewan Power
<b>SMEs</b>	subject matter experts
<b>SPLASH</b>	Simulation Program for Long-term Analysis of System Hydraulics
<b>SVC</b>	Static Var Compensator
<b>Transmission Project</b>	Birtle – Tantallon 230-kV transmission project

## EXECUTIVE SUMMARY

Manitoba Hydro's (MH) 2017/18 and 2018/19 General Rate Application (GRA) seeks approval from the Public Utilities Board (PUB) for an increase in its rates. In January 2016, MH entered a system power sale agreement with Saskatchewan Power (SaskPower) for the 20-year period beginning June 1, 2020. That agreement included commitments to pursue transmission development sufficient to deliver that power. MH entered a Facilities Construction Agreement (FCA) in January 2017 to develop a 230-kV transmission line and related system upgrades – a project that is now in the early stages of permitting and design with a target in-service date of June 1, 2021. The revenues and costs of the power sale agreement and the transmission project are included in the MH GRA financial forecast.

The PUB retained a team of Daymark employees as Independent Expert Consultants (Daymark IEC Team) to conduct a review of MH's economic justification for the power sale agreement and the transmission project and to offer an opinion on the merits of the project and on whether it is in the interest of MH and its ratepayers to proceed with the project.

We conclude that it is in the interest of MH and its ratepayers to proceed with the project.

We conclude that the long-term economic justification for continuing with the contractual commitment to sell system power under the power sale agreement is reasonably [REDACTED] subject to the following qualifications:

1d,4b,8a

- The transmission project is in early stages of development and [REDACTED]  
[REDACTED]  
[REDACTED]

1d,7a,7b,  
8a

- The economic value of the project is currently [REDACTED]  
[REDACTED]  
[REDACTED]  
[REDACTED]

1d,3a,8a

- We tested a few key uncertainties in our analysis: [REDACTED]  
[REDACTED]

4a,4b,  
5a,7b

[REDACTED]

[REDACTED]

4a,4b,  
7b

We observe that the project [REDACTED]:

4a,4b,7a,7b,  
8a

- The cost of the transmission project [REDACTED].

- The pricing of the power sale agreement is [REDACTED].

1d,  
3a,8a

- The economic analysis shows [REDACTED].

1d,  
4b,5a,7b  
,8a

- The near-term value of the project is not at significant risk if the transmission line in-service date is delayed because the power sale agreement provides for interim deliveries for most of the power on the existing transmission system.

We also note that MH has entered into contracts with express commitments to proceed with this power sale. Daymark has examined only the economic basis of the power sale agreement and the transmission project and has not conducted any legal review of MH's

[REDACTED]

1d,  
3a,4a,4b  
,8a

Our report contains our review and findings regarding the commercial terms included in MH's power sale agreement and transmission facilities construction agreement, MH's economic analysis of the plan, the transmission planning analysis, and other factors that bear on the economic value of the plan today.

## I. INTRODUCTION

Daymark Energy Advisors (Daymark) offers this report to describe our review of Manitoba Hydro's (MH) system power sale to Saskatchewan Power (SaskPower) and the associated Birtle – Tantallon 230-kV transmission project (Transmission Project).

On October 25, 2017, the Manitoba Public Utilities Board (PUB) amended the scope of work in Daymark's existing Independent Expert Consultant agreement<sup>1</sup> pertaining to the Export Pricing and Revenues Review to include an additional task, number 8,<sup>2</sup> as follows:

8. *Review and assess the economic justification for the SaskPower 100 MW power sale and Manitoba-Saskatchewan Transmission Project and provide an opinion on the merits of this project and whether it is in Manitoba Hydro's and ratepayers' interests to proceed.*

Many of MH's documents related to the Manitoba-Saskatchewan Transmission Line are highly sensitive and confidential. For this reason, confidential information was shared directly with the Daymark IEC Team and our team was charged with preparing a full, confidential report on our findings for the PUB, and a report suitable for the public record that does not disclose any confidential information.

Our team solicited certain documentation necessary to complete our scope of work and reviewed those materials with the MH subject matter experts (SMEs) that developed them to understand how the economic and system planning analyses was conducted in planning for the project and to assess the current status of the project and the forward-looking economic outlook. MH established a secure file transfer mechanism to provide electronic copies of documents identified in this process to the Daymark IEC Team, with those documents held in a secure file server location with access limited to the members of the Daymark IEC Team.

Throughout this report we footnote all materials sourced from a specific document. At the end of this report, Appendix A provides a full annotated listing of all documents relied upon by Daymark in the production of this report.

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<sup>1</sup> On August 21, 2017, the Manitoba Public Utilities Board (PUB) retained a team of Daymark employees as Independent Expert Consultants (Daymark IEC Team) to conduct reviews and analyses relating to MH's 2017/18 & 2018/19 General Rate Application (GRA). The Daymark IEC Team's "Export Pricing and Revenues Review" report, and the companion "Load Forecast Review" report, were completed on November 16<sup>th</sup> and 15<sup>th</sup>, 2017, respectively, and are available on the PUB's website, "Manitoba Hydro 2017/18 & 2018/19 General Rate Application, PUB Independent Expert Consultants", accessed in November 2017, available at: <http://www.pubmanitoba.ca/v1/proceedings-decisions/appl-current/pub-iec.html>

<sup>2</sup> *Ibid.* The full text of the revised Scope of Work is available on the PUB website.

## II. PROJECT HISTORY AND STATUS

### A. Existing System

At the time when the proposed system power sale was considered, the MH and SaskPower systems were connected by 230-kV transmission facilities. Those facilities established a 225 MW transfer capability between the two systems.

The MH transmission system is operated by MH's Transmission (MHT) function employees under an Open Access Transmission Tariff (OATT).<sup>3</sup> The OATT includes protocols for:

1. Determining available transfer capabilities of the system;
2. Administering the processes necessary to reserve rights for use of the transfer capabilities for transactions;
3. The assessment of the need for any system upgrades to provide sufficient transfer capability for requested service; and,
4. To develop system upgrades.

MH's Export Power Marketing (MHEM) function arranges for export power transactions and seeks transmission service from MHT through the OATT protocols under the terms of Standards of Conduct, which provide assurances that MHEM has the same access to use the transmission system as any other unaffiliated customer of MHT.<sup>4</sup>

Prior to consideration of the MH-SaskPower system power sale, the 225 MW transfer capacity was allocated to MHEM and SaskPower as depicted in Figure 1. The transfer capacity on the MH system side of the interface was allocated as follows:

1. 75 MW were allocated to [REDACTED],<sup>5</sup> 1d, 3a, 8a
2. 60 MW were allocated to [REDACTED]  
[REDACTED]  
[REDACTED]<sup>6</sup>,

<sup>3</sup> "Manitoba Hydro Open Access Transmission Tariff," Version 39, effective January 1, 2018, available at: [http://www.oatioasis.com/woa/docs/MHEB/MHEBdocs/MH\\_OATT\\_v39\\_Final\\_\(Eff\\_1.1.2017\).PDF](http://www.oatioasis.com/woa/docs/MHEB/MHEBdocs/MH_OATT_v39_Final_(Eff_1.1.2017).PDF)

<sup>4</sup> Manitoba Hydro, "Standards of Conduct for Providing Open Access Transmission and Interconnection Services (Standards of Conduct)," effective August 26, 2014, available at: [https://www.hydro.mb.ca/your\\_business/standards/pdf/standards\\_of\\_conduct.pdf](https://www.hydro.mb.ca/your_business/standards/pdf/standards_of_conduct.pdf)

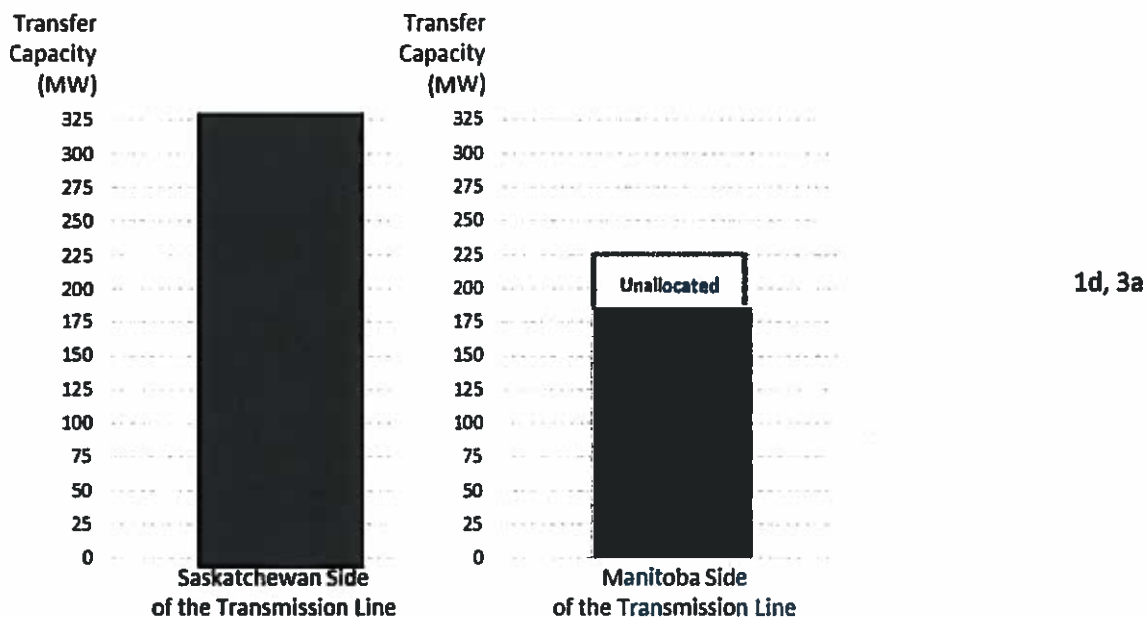
<sup>5</sup> Manitoba Hydro, Transmission Planning & Design Division, System Planning Department, "Report on Group System Impact Study, Manitoba Hydro Export Power Marketing (MHEM) 185 MW Firm Point to Point Transmission Service Requests," dated December 9, 2015, page 10.

<sup>6</sup> "2020 – 2040 System Power Sale Agreement between The Manitoba Hydro-Electric Board and Saskatchewan Power Corporation", dated January 29, 2016, page 23.



- 3. 45 MW were allocated to [REDACTED];<sup>7</sup> and, 1d, 3a, 8a
- 4. 45 MW were unallocated. 8a

The transfer capacity on the SaskPower system side of the interface was allocated as follows:



**Figure 1: 2015 Manitoba Hydro-SaskPower Transmission Transfer Capacity and Reservations**

<sup>7</sup> MHEM indicates this transmission reservation [REDACTED]. Manitoba Hydro, Interoffice Memorandum, "Birtle Transmission Project Rationale," December 6, 2017. 4a, 4b

<sup>8</sup> Manitoba Hydro, Transmission Planning & Design Division, System Planning Department, "Report on Group System Impact Study, Manitoba Hydro Export Power Marketing (MHEM) 185 MW Firm Point to Point Transmission Service Requests," dated December 9, 2015, page 10.

<sup>9</sup> "2020 – 2040 System Power Sale Agreement between The Manitoba Hydro-Electric Board and Saskatchewan Power Corporation", dated January 29, 2016, page 23.

## B. Project Development

MH and SaskPower initiated discussions and studies for expanded transmission capability and power transactions several years ago.

A system study completed in 2012 initially identified the Transmission Project<sup>10</sup> as a necessary network upgrade to accommodate two 50 MW transmission service requests.<sup>11</sup>

In 2015, MHEM and SaskPower executed a term sheet for a system power sale with a 20-year term commencing on June 1, 2020.<sup>12</sup> The companies subsequently formalized those terms by executing the 2020-2040 System Power Sale Agreement (PSA) on January 29, 2016.

Concurrent with the negotiations of the PSA, MHEM initiated the transmission reservation process with MHT to assess the needs for system upgrades to deliver the power to be procured by SaskPower. MHT completed the requested planning studies in January 2017. MHEM and MHT completed a Facilities Construction Agreement (FCA) in May 2017.

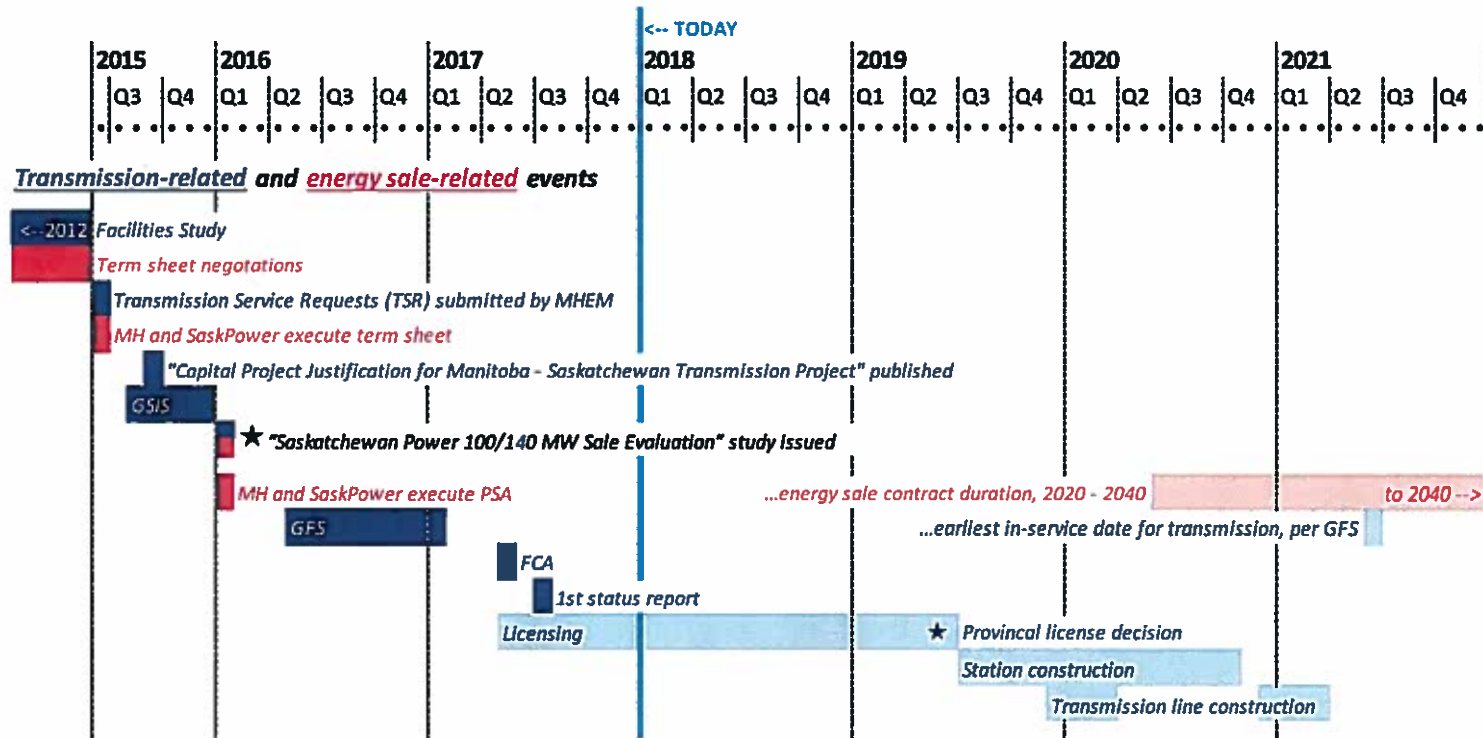
The key milestones in the development of the PSA and the Transmission Project are illustrated in the timeline presented in Figure 2.

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<sup>10</sup> The term "Transmission Project" is used to refer to all facilities included in the system upgrades identified in the facilities construction agreement associated with the new 230-kV transmission line.

<sup>11</sup> PUB MFR 195-CONFIDENTIAL Attachment 1.

<sup>12</sup> *ibid.* MH's Executive and Board of Directors approved the term sheet on June 9, 2015 and June 24, 2015, respectively.



**Figure 2: Energy Sale and Transmission Development Timeline**

Key features of the PSA, the Transmission Project, and the FCA are detailed below.

**System Power Sale Agreement**

The following is a summary of the key terms and conditions of the PSA that bear on the scope of Daymark’s analysis:

**Products to be sold:** The PSA<sup>13</sup> is a sale of Firm Energy and Capacity for the 20-year period beginning June 1, 2020 through May 31, 2040.

- *Capacity (section 2.4)* – [REDACTED] Capacity defined by the amount of Interim Transfer Capability (3.2(5)) 1d, 3a,8a
- *Firm Energy*<sup>14</sup> - MH is to provide firm energy [REDACTED] at the operative Capacity level [REDACTED].
- *Environmental Attributes* – MH is providing environmental attributes from the portion of the energy that is sourced from [REDACTED].<sup>15</sup> 1d, 3a,8a

**Pricing:**

- Capacity pricing is [REDACTED] [REDACTED] [REDACTED].<sup>17</sup>
- Energy pricing is [REDACTED] [REDACTED] [REDACTED].<sup>18</sup> 1d, 3a,8a
- Environmental attributes [REDACTED].

**Transmission provisions:**

- Each party represents that the Transmission Service Requests necessary for delivery of up to [REDACTED] [REDACTED].<sup>19</sup> 1d, 3a,8a

<sup>13</sup> The references in this section refer to the PSA, including both the 2020-2040 System Power Sale Agreement dated January 29, 2016 and the Amendment to the PSA dated December 19, 2016.

<sup>14</sup> *Ibid.*, Section 2.3 (1) at 17.

<sup>15</sup> *Ibid.*, Section 8.1.

<sup>16</sup> Values here and throughout the report are expressed in Canadian dollars unless noted otherwise.

<sup>17</sup> *Ibid.*, Section 4.1.

<sup>18</sup> *Ibid.*, Section 4.1.

- Each party commits to commercially reasonable efforts to complete the transmission upgrades in their respective service territories.<sup>20</sup>
- The parties understood that the transmission upgrades may not be in-service on or before June 1, 2020.<sup>21</sup> Each party represents that the Transmission Service Requests necessary for delivery of 45 MW had been submitted prior to the execution date of the PSA and to use an addition 45 MW for Interim transmission service.<sup>22</sup> This refers to the two 45 MW portions of the then-existing transfer capability noted in the previous section of this report.

Other conditions:

- *System Power* – The energy to be sold will be sourced [REDACTED]  
[REDACTED].<sup>23</sup>
- [REDACTED]  
[REDACTED]  
[REDACTED].<sup>24</sup>
- [REDACTED]  
[REDACTED]

1d, 3a,8a

<sup>19</sup> *Ibid.*, Section 3.1 (1).

<sup>20</sup> *Ibid.*, Section 3.1 (2), (3).

<sup>21</sup> *Ibid.*, pp. 1-2.

<sup>22</sup> *Ibid.*, Section 3.2.

<sup>23</sup> *Ibid.*, Section 2.1, Section 2.3 (3) (b), and Definitions of MH's Energy Resources and MH's System at 10.

<sup>24</sup> *Ibid.*, Section 3.1 (4).

<sup>25</sup> *Ibid.*, Section 2.4.

### Transmission System Facilities Studies

Concurrent with the work on the PSA, MH submitted new transmission service requests to serve the power sale options contemplated in the term sheet. Those requests initiated a Group System Impact Study (GSIS) that assessed the network upgrades required to accommodate transfers up to 185 MW.<sup>26</sup>

At the time those reservations were made, MH and SaskPower were considering up to 140 MW of new transfers (see discussion of options in the PSA above). The GSIS evaluated four levels of incremental transfers totaling 185 MW – a 45 MW increase, an additional 100 MW increase (total 145 MW), and two additional 20 MW increases (totals of 165 MW and 185 MW, respectively).<sup>27</sup>

In December 2015, the GSIS report concluded that no system upgrades were needed to accommodate the first 45 MW, that the Transmission Project was needed to accommodate the 100 MW increase, and that some further system upgrades would be required (e.g., breakers, capacitors) for the two 20 MW increases.

The GSIS report estimated the capital cost of the facilities in Manitoba to cost \$38 million, exclusive of the cost to provide a Static Var Compensator (SVC) (at an estimated capital cost of \$20 million) or, in the alternative, to operated Brandon as a synchronous condenser. The study estimated that the development of the Transmission Project would take five years from the date of a Facilities Construction Agreement, meaning that the facilities would not be completed by June 1, 2020.

The requested 185 MW included requests for the remaining 45 MW of unreserved transfer capability on the existing 225 MW interface and the 140 MW increase.

In March 2016, MHEM contracted with MHT to conduct a Group Facilities Study (GFS) to determine the system upgrades necessary to increase the total transfer capability from 100 MW to a total of 325 MW.<sup>28</sup> Upon completion of the GFS in January 2017, the final configuration of the Transmission Project included:<sup>29</sup>

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<sup>26</sup> Manitoba Hydro, Transmission Planning & Design Division, System Planning Department, "Report on Group System Impact Study, Manitoba Hydro Export Power Marketing (MHEM) 185 MW Firm Point to Point Transmission Service Requests," dated December 9, 2015.

<sup>27</sup> *Ibid.*, pp. 4-5.

<sup>28</sup> Manitoba Hydro, Transmission Planning & Design Division, System Planning Department, "Report on Group Facilities Study, Manitoba Hydro Export Power Marketing (MHEM), 100 MW Firm Point to Point, Transmission Services Requests #81324681 and #81324682," dated January 6, 2017.

<sup>29</sup> *Ibid.*, p. 4.

1. The 230-kV Birtle – Tantallon transmission line, consisting of 91 km total, with 61 km located in Manitoba;
2. Modifications to the Birtle substation; and,
3. An upgrade to an existing 230-kV line.

The GFS provided an estimated capital cost<sup>30</sup> for the Transmission Project of [REDACTED] 1a,1d,7a dollars.

The GFS also concluded that the Transmission Project would necessitate additional VAR support. MHEM elected to supply the VAR support through the conversion and utilization of Brandon Unit #5 as a synchronous condenser. The cost of the VAR support is not included in the [REDACTED] value.<sup>31</sup> 1a,1d,7a

The GFS indicated that the earliest in-service date for the Transmission Project would be June 1, 2021. The GFS also indicated that the conversion of Brandon Unit #5 should be completed by the Transmission Project in-service date and should be maintained for the life of the transmission service request.<sup>32</sup>

#### Facilities Construction Agreement

Following the completion of the GFS, MHEM and MHT entered into an FCA on May 11, 2017.<sup>33</sup> Under the FCA, MHT is obligated to design, permit, and construct the Transmission Project as specified in the GFS.

The following is a summary of the key terms and conditions of the FCA that bear on the scope of Daymark's analysis:

The FCA does not commit to a specific in-service date. The provisions in the FCA provide MHT flexibility on the in-service date.<sup>34</sup> The GFS is incorporated into the agreement by reference, indicating that the planned in-service date is on or after June 1, 2021.<sup>35</sup>

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<sup>30</sup> Capital cost estimates presented in the GFS and GSIS do not include escalation or interest expenses.

<sup>31</sup> *Ibid.*, p. 5.

<sup>32</sup> *Ibid.*

<sup>33</sup> "Facilities Construction Agreement for 100 MW TSRs 81324682 and 81324681," dated May 11, 2017.

<sup>34</sup> *Ibid.*, Sections 3.1 and 3.3, p. 4.

<sup>35</sup> *Ibid.*, Section 2.1, p. 2.

MHEM is responsible for all actual costs of the Transmission Project.<sup>36</sup> The FCA includes non-binding cost estimate totaling [REDACTED] dollars with an associated advanced payment schedule.<sup>37</sup>

1d, 3a, 4b

MHT is required to provide periodic construction status reports, including indications of any material changes to the schedule or cost estimates.<sup>38</sup>

### C. Project Status

With the completion of the PSA and the FCA, the project transitioned from a planning phase to a development phase. Activities under that FCA have begun and the first monthly status report was issued in October 2017.<sup>39</sup>

The October 2017 status report describes the progress in 2017 on siting and environmental studies work, with the goal of completing the environmental assessment by the end of 2017.

The report includes a project schedule targeting a June 2021 in-service date, with project permitting activities proceeding through 2018 into mid-year 2019. Design and procurement activities are slated for 2018, with construction beginning in 2019.

The report indicates that the costs incurred through October 24, 2017 are \$1.6 million, with a control capital cost budget of [REDACTED].

1a,1d,7a

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<sup>36</sup> *Ibid.*, Section 5.1, p. 6.

<sup>37</sup> *Ibid.*, Appendix E-3, pp. 16-17.

<sup>38</sup> *Ibid.*, Section 3.2, p. 4.

<sup>39</sup> Manitoba Hydro Transmission Projects Dept., "Birtle Transmission Project, Status Report," October 2017.



### III. 2016 ECONOMIC EVALUATION OF THE TRANSACTION

MH performed two economic assessments of the PSA and the Transmission Project in 2015 and in early 2016 that provided the economic justification for going forward with the power sale to SaskPower and the related Transmission Project. Those assessments included:

- The “*Capital Project Justification for Manitoba – Saskatchewan Transmission Project*,”<sup>40</sup> (CPI); and,
- The “*Saskatchewan Power 100/140 MW Sale Evaluation*”<sup>41</sup> (Sale Evaluation).

The two economic assessments coincided with Board approvals to initiate the transmission planning studies in 2015 and to execution of the PSA in January 2016, respectively.

MH has not prepared any subsequent formal economic analysis of the PSA and Transmission Project and, as a result, did not have a comparable economic analysis report updated to current planning assumptions.<sup>42</sup> The Daymark scope of work calls for a current assessment and opinion. To make that assessment, we conducted a review of the two assessments performed by MH to serve as the starting point for our assessment of current economics. In the course of our work, MH did conduct and provide a reference case update of the economic analysis for our consideration in this review.

In this Section III, we describe the Sale Evaluation economic assessments conducted by MH. This assessment is the most current assessment prepared by MH and was relied upon in making the decision to enter the PSA as well as informing MH’s current view that the project remains economic today.

In Section IV, we review the changes that have occurred since these analyses were conducted and we assess the additional analysis provided to us by MH and assess the likely changes in the overall economic value to MH and ratepayers today.

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<sup>40</sup> PUB MFR 195-CONFIDENTIAL, Manitoba Hydro, “*Capital Project Justification for Manitoba – Saskatchewan Transmission Project*,” dated October 1, 2015.

<sup>41</sup> PUB MFR 196 CONFIDENTIAL attachment, Manitoba Hydro, Resource Planning Department, Power Planning Division, “*Saskatchewan Power 100/140 MW Sale Evaluation*,” dated January 5, 2016.

<sup>42</sup> MH informed Daymark that [REDACTED].

## A. Overview of the 2016 Sale Evaluation

MH completed the Sale Evaluation, which analyzed the economics of the PSA and the proposed Transmission Project, in January 2016.

The Sale Evaluation was based on the proposed contract agreement between MH and SaskPower for a 100 MW power sale to SaskPower for a 20-year period from June 1, 2020 to May 31, 2040<sup>43</sup>. The evaluation also considered the cost-benefit analysis of an additional 40 MW of power sale to SaskPower because the proposed contract included an option for SaskPower to elect to purchase an additional 40 MW on top of the 100 MW sale.

The economic analysis was prepared by MH's Resource Planning department using its long-term system planning model. The economic evaluation estimated the economic benefits to MH from the sale of system power to SaskPower. Two options for system power sales were evaluated, 100 MW and 140 MW (the two options under consideration at that time). MH used a base case scenario which assumed any future resource needs were met by natural gas-fired resources and used current base case planning assumptions. Two additional cases were evaluated, one with the addition of the 100 MW system power sale and one with the 140 MW System power sale,<sup>44</sup>

The net present value (NPV) of the incremental benefit estimated for SaskPower sales-related development plans was calculated as the difference in revenues and costs between the two SaskPower sale plans and the base case.

MH's analysis also tested the sensitivity of the sale benefit results to certain key input assumptions, [REDACTED]

[REDACTED]

[REDACTED]<sup>4546</sup>

1d,  
3a,5a,7a,  
8a

The analysis calculated the sales benefits using MH's Simulation Program for Long-term Analysis of System Hydraulics (SPLASH) – the principle tool for modeling the specific MH system – and the outputs were used in a spreadsheet analysis that compared the net

<sup>43</sup> *Ibid.*, p. 3. The report refers to a November 26, 2015 draft contract used as the basis for the analysis.

<sup>44</sup> *Ibid.*, pp. 7-8.

<sup>45</sup> *Ibid.*, pp. 8-12.

<sup>46</sup> [REDACTED]

1d,  
3a,5a,7a,  
8a

NPV of each plan. The net NPV was calculated by taking the difference of net revenues and capital costs of each plan. The incremental NPV reported in Sales Evaluation for each SaskPower sale plan is the difference of net NPV between SaskPower Sales plan and 'no sale' plan for the same evaluated scenario.

Daymark obtained and reviewed the Excel workbooks<sup>47</sup> developed by MH for the 2015 Sale Evaluation. Daymark had multiple meetings with the MH team involved in developing the Sale Evaluation analysis to establish our understanding of the MH evaluation methodology and assumptions.

The Sale Evaluation indicated that both power sale plans produced improved NPV results when compared to the "no sale" plan<sup>48</sup>. The study found the benefits, on a net present value basis, to be in the range of [REDACTED].<sup>50</sup> The Sale Evaluation estimated the benefits associated with 100 MW SaskPower sale, [REDACTED], to be [REDACTED].<sup>51</sup> On the basis of these results, MH found the project to be economic.

1d,  
3a,5a,7a,  
8a

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<sup>47</sup> File names: "2015\_SaskPower\_100-140MW\_Sale\_Evaluation\_Economics\_For\_Table2-3\_CONF.xlsm" and "2015\_SaskPower\_100-140MW\_Sale\_Evaluation\_Economics\_For\_Table4-5\_CONF.xlsm"

<sup>48</sup> *Ibid.*, p. 4.

<sup>49</sup> *Ibid.*, p. 4, pp. 9-12.

<sup>50</sup> *Ibid.*, p. 4.

<sup>51</sup> *Ibid.*, Table 4, p. 12.

## B. Review of Key Assumptions in the Sale Evaluation

The Sale Evaluation was prepared in the latter portion of 2015 using then-current planning assumptions. Generally, the analysis was based on MH's July 2015 Resource Planning Assumptions & Analysis for 2015/16 Corporate Planning Report.<sup>52</sup> We describe the assumptions used in the Sale Evaluation for surplus dependable energy and MISO market price forecasts.

### Capacity and Surplus Dependable Energy

MH assessed the impact of both the 100 and 140 MW sales options on their capacity surplus or deficit calculations. As shown in Figure 3, MH determined that the two options moved the capacity deficit [REDACTED]. For the purposes of the economics of the two potential sales, MH presumed that they could [REDACTED]

2a, 3a,  
5b

1d, 4b



2a, 3a,  
5b

**Figure 3: Capacity Surplus and Deficit**

<sup>52</sup> *Ibid.*, p. 7, footnote 2.

<sup>53</sup> *Ibid.*, pp. 5-6.

MH's year of need for dependable energy resources with the 100 MW and 140 MW was then estimated to be 2036/37.<sup>54</sup>

The economic evaluation was based on the assumptions of the 2015/16 "Resource Planning Assumptions & Analysis," which included Keeyask with an in-service date of 2019 and a new 500 kV U.S. interconnection with an in-service date of 2020 as committed resources common to all development plans.<sup>55</sup>

#### MISO Market Prices

MH's pricing assumptions for sales of uncontracted surplus [REDACTED] in 2015 assumed that [REDACTED].<sup>56</sup> In the Sale Evaluation, MH tested the sensitivity of the results to the [REDACTED].<sup>57</sup>

1d,  
3a,5a,7a,  
8a

#### Transmission Costs

MH's assumptions for transmission costs were taken from the 2015 GSIS. \$38 million (2015\$) was assumed for the reference case, with an additional \$20 million (2015\$) assumed for the SVC sensitivity.

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<sup>54</sup> *Ibid.*, p. 5.

<sup>55</sup> *Ibid.*, p. 7.

<sup>56</sup> *Ibid.*, p. 6; PUB MFR 79U-CONFIDENTIAL

<sup>57</sup> *Ibid.*, p. 6.

## IV. UPDATED ECONOMIC EVALUATION

This section assesses the current economics associated with the 100 MW power sale to SaskPower and planned network upgrades. MH has not performed any formal economic analysis since the 2015 Economic Analysis discussed in Section III.C above. Based on our discussions with MH, it is our understanding that no formal analysis was performed because [REDACTED]

1d,7b,8a

[REDACTED]

Since the Sale Evaluation was prepared, MH and SaskPower signed a final contract agreement for the 100 MW Power Sale in late January 2016<sup>58</sup>. As requested by MH Export Power Marketing (MHEM), MHT completed a Group Facilities Study (GFS) to reflect the 100 MW power transfer in January 2017<sup>59</sup>. Additionally, MH and MHEM signed a Facilities Construction Agreement (FCA) for the same 100 MW TSRs evaluated in GFS<sup>60</sup>. The GFS contains updated cost estimates, including interest and escalation. The FCA contains a budget for the timing of expenditures for the transmission build based on the GFS cost estimates.

In response to a request by Daymark, MH provided a revised analysis Excel workbook (2017 Economic Analysis Workbook<sup>61</sup>), updating key input data from its 2015 Economic Evaluation, including two SPLASH runs.

Daymark reviewed the key assumptions in the analysis to determine if there was material risk of the current NPV value being lower than expected due to either known changes that have occurred since 2015, or changes which might reasonably be foreseeable in the future, such as escalating transmission costs. Additionally, Daymark conducted a sensitivity analysis by changing key input assumptions in the 2017 MH model with the goal of evaluating the robustness of the NPV results of that model.

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<sup>58</sup> 2020-2040 System Power Sale Agreement between the Manitoba Hydro-Electric Board and Saskatchewan Power Corporation.

<sup>59</sup> Group Facilities Study - Manitoba Hydro Export Power Marketing (MHEM) 100 MW Firm Point to Point Transmission Service Requests #81324681 and #81324682.

<sup>60</sup> Facilities Construction Agreement for 100 MW TSRs 81324682 and 81324681.

<sup>61</sup> MH provided file:  
"2017\_SaskPower\_100MW\_Sale\_Updated\_November\_FCA\_Capital\_Evaluation\_Economics\_CONFIDENTIAL"

In addition to our review of the robustness of the long-term economics of the project, we reviewed the year-to-year economics of the project to assess the potential for any material short-term pressure on MH retail rates.

### A. Updated Transmission Costs

The Group Facilities Study (GFS) completed in January 6, 2017 revised the cost of network upgrades to [REDACTED], excluding interest and escalation<sup>62</sup>. The revised cost for network upgrades is [REDACTED] than the cost estimated by System Impact Study completed in January 2016<sup>63</sup>. MH Export Power Marketing has opted to self-supply the VAR support required for 100 MW system power sale by converting and utilizing Brandon Unit #5 as synchronous condenser.<sup>64</sup> The total cost of [REDACTED] estimated in GFS does not include the cost required for conversion and utilization of Brandon Unit #5 for VAR support nor [REDACTED].

1d, 4b,  
5a,7a,8a

1d, 4b,  
5a,7a,8a

### B. MH 2017 Updated Economic Analysis

In response to a request by Daymark, MH updated its 2015 Economic Evaluation of the 100 MW system power sales to SaskPower and provided a confidential 2017 analysis excel workbook<sup>65</sup>. In the 2017 excel workbook shared with Daymark, MH updated the inputs and assumptions used in the 2015 Economic Evaluation for both 100 MW SaskPower Sale and 'no Sale' options.

The updated analysis used the 2017 EPF value for opportunity sales price, which excludes the [REDACTED] and excludes [REDACTED]. Further, the evaluation also did not consider the cost associated with building SVC as VAR support. As an alternative to SVC, MHEM elected to self-supply VAR support required by converting and utilizing Brandon Unit #5 as

1d, 3a,  
5a,7a,8a

<sup>62</sup> Group Facilities Study - Manitoba Hydro Export Power Marketing (MHEM) 100 MW Firm Point to Point Transmission Service Requests #81324681 and #81324682, Page 5.

<sup>63</sup> Manitoba Hydro Group System Impact Study Report for MHEM, Page 4.

<sup>64</sup> Group Facilities Study - Manitoba Hydro Export Power Marketing (MHEM) 100 MW Firm Point to Point Transmission Service Requests #81324681 and #81324682, Page 5.

<sup>65</sup> "2020 – 2040 System Power Sale Agreement between The Manitoba Hydro-Electric Board and Saskatchewan Power Corporation", dated January 29, 2016, Page 23, Article 3.1 (4).

<sup>66</sup> Both 100 MW SaskPower sale option and 'no sale' option were modeled in MH's Simulation Program for Long-term Analysis of System Hydraulics (SPLASH) – the principle tool for modeling the specific MH system – and the outputs were used in a spreadsheet analysis that compared the net NPV of each plan. The net NPV was calculated by taking the difference of net revenues and capital costs of each plan. The incremental NPV reported in Sales Evaluation for each SaskPower sale plan is the difference of net NPV between SaskPower Sales plan and 'no sale' plan for the same evaluated scenario.

synchronous condenser<sup>67</sup>. The updated 2017 Analysis used revised network upgrade capital cost of [REDACTED] estimated via the GFS study<sup>68</sup>. The [REDACTED] [REDACTED] (2017\$). The in-service date of Keeyask was also updated to reflect the delayed in-service date. MH mentioned that i only considering the sales benefits of the 100 MW sale with the updated input assumptions, excluding the Systems benefits for this update<sup>69</sup>.

1d, 4b,  
5a,5b,  
7a, 8a

Besides updated 2017 Economic Analysis results for 100 MW SaskPower sales, MH also provided Daymark with updated annual capacity surplus available in both plans – 100 MW power sales to SaskPower and No SaskPower Sales. Figure 4 shows the status of system capacity surplus during the power sales agreement period from June 1, 2020 to May 31, 2040. The figure indicates that the system capacity will be [REDACTED] during the entirety of contract period of 100 MW power sales. It is important to note that MH system [REDACTED] [REDACTED]. For Dependable Energy, Daymark relied upon the information provided in the MH application, Tab 7.3.

1d,  
5a,5b

<sup>67</sup> Group Facilities Study - Manitoba Hydro Export Power Marketing (MHEM) 100 MW Firm Point to Point Transmission Service Requests #81324681 and #81324682, Page 5.

<sup>68</sup> id.

<sup>69</sup> The sales benefit comes from revenue generated via energy and capacity sales. [REDACTED]

[REDACTED]. (Source: Saskatchewan Power 100/140 MW Sale Evaluation – Internal Version – Confidential, Page 9).

1d, 4b





2a, 3a,  
5b

**Figure 4: Annual Capacity Surplus and Deficit Comparison between 100 MW SaskPower Sale and 'No Sale' Plan Estimated in 2017<sup>70</sup>**

Table 2 summarizes the key inputs and assumptions changes between Sale Evaluation and 2017 Economic Analysis Excel workbook produced by MH.

**Table 2: Comparison of Economic Analysis of 2015 with 2017 Update**

ASSUMPTION	2015 ECONOMIC ANALYSIS	2017 UPDATE	
[REDACTED]	[REDACTED]	[REDACTED]	3a, 5a, 5a, 7a
Capital Costs of Network Upgrades	\$38 million (2015\$) for the reference case. \$20 million (2015\$) for the SVC	MH further revised the cost of network upgrades for 100 MW sale to [REDACTED] (2017\$). This cost <u>does not include</u> the cost required for conversion and utilization of	1d, 4b, 5a,7a,8a

<sup>70</sup> MH-provided Excel workbook named, "2017 SPC 100 sale deficits daymark.xlsx."

<sup>71</sup> *Ibid.*, p. 6.



[REDACTED]

1d, 5a,  
4a, 4b,  
7b

[REDACTED]

[REDACTED]

1d, 5a,  
4a, 4b,  
7b

[REDACTED]

[REDACTED]

### D. Findings

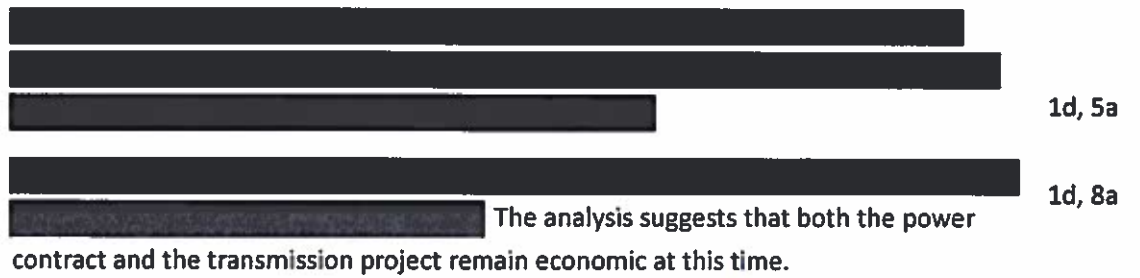
[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

1d, 5a



**Figure 5: Cumulative NPV Curves**



# APPENDIX A

**Daymark Energy Advisors**

**Documents Relied Upon**

Consistent with the agreement between Daymark Energy Advisors and the Manitoba Public Utilities Board, the following appendix provides a reference to the documents that were relied upon to develop this Independent Expert Consultant Report.

This appendix is organized into two sections. The first is a list of the documents relied upon that are already part of the record in this docket. The second is an annotated bibliography of additional documents relied upon that are not already part of the record in this docket.

## Documents in the Record

Document Name:	Confidential or Non-Confidential:
PUB MFR 79U-CONFIDENTIAL	Confidential
PUB MFR 195-CONFIDENTIAL	Confidential
PUB MFR 196-CONFIDENTIAL, MB-SK Transmission Project	Confidential
PUB MFR 197-CONFIDENTIAL, MB-SK Transmission Project	Confidential
PUB MFR 198-CONFIDENTIAL, MB-SK Transmission Project	Confidential

## Annotated Bibliography of Additional Documents

Document Name:	Confidential or Non-Confidential:
<i>"Manitoba Hydro Open Access Transmission Tariff,"</i> Version 39, effective January 1, 2018	Non-confidential
Manitoba Hydro, <i>"Standards of Conduct for Providing Open Access Transmission and Interconnection Services (Standards of Conduct),"</i> effective August 26, 2014.	Non-confidential
MH website, <i>"Control budget for Keeyask Generating Station revised"</i> , March 7, 2017, available at: <a href="https://www.hydro.mb.ca/corporate/news_media/news/2017-03-07-control-budget-for-keeyask-generating-station-revised.shtml">https://www.hydro.mb.ca/corporate/news_media/news/2017-03-07-control-budget-for-keeyask-generating-station-revised.shtml</a>	Non-confidential
<u>File name</u> "Q9_SPC 100 sale deficits Project ISDs.docx"	Confidential
<u>File name</u> "2015 Supply and Demand Tables.xlsx"	Confidential
<u>File name</u> "2015 SPC 100_140 sale deficits daymark.xlsx"	Confidential
<u>File name</u> "2017 Supply and Demand Tables.xlsx"	Confidential
<u>File name</u> "2017 SPC 100 sale deficits daymark.xlsx"	Confidential
<u>File name</u> "2015_SaskPower_100-140MW_Sale_Evaluation_Economics_For_Table2-3_CONF.xlsm"	Confidential

<b>Document Name:</b>	<b>Confidential or Non-Confidential:</b>
<u>File name</u> "2015_SaskPower_100-140MW_Sale_Evaluation_Economics_For_Table4-5_CONF.xlsm"	Confidential
Manitoba Hydro, Interoffice Memorandum, " <i>Birtle Transmission Project Rationale</i> ", December 6, 2017. <u>File name</u> "2017 12 06 Birtle-Tantallon Rationale.pdf"	Confidential
<u>File name</u> "2017_SaskPower_100MW_Sale_Updated_August_Evaluation_Economics_CONF.xlsm"	Confidential
<u>File name</u> "2017_SaskPower_100MW_Sale_Updated_August_Evaluation_Economics_CONFIDENTIAL.xlsm"	Confidential
<u>File name</u> "2017_SaskPower_100MW_Sale_Updated_November_FCA_Capital_Evaluation_Economics_CONF.xlsm"	Confidential
<u>File name</u> "2017_SaskPower_100MW_Sale_Updated_November_FCA_Capital_Evaluation_Economics_CONFIDENTIAL.xlsm"	Confidential
" <i>PROJECTED ESCALATION, INTEREST, &amp; EXCHANGE RATES - P911 Data Table</i> ," draft dated June 20, 2017. <u>File name</u> "Discount Rate (P911) Current dated June 2017.pdf"	Confidential
" <i>PROJECTED ESCALATION, INTEREST, &amp; EXCHANGE RATES - P911-1</i> ," re-issued October 9, 2015. <u>File name</u> "Discount Rate (P911) SaskPower 100 MW Sales Evaluation 2015.pdf"	Confidential
<u>File name</u> "Economic_Workbook_Acronym_List.xlsx"	Confidential
" <i>Facilities Construction Agreement for 100 MW TSRs 81324682 and 81324681</i> ," dated May 11, 2017. <u>File name</u> "MH Saskpower-100 MW - Facility Construction Agreement.pdf"	Confidential
Manitoba Hydro, Transmission Planning & Design Division, System Planning Department, " <i>Report on Group Facilities Study, Manitoba Hydro Export Power Marketing (MHEM), 100 MW Firm Point to Point, Transmission Services Requests #81324681 and #81324682</i> ," dated January 6, 2017. <u>File name</u> "MH Saskpower-100 MW -Final Group Facilities Study Report.pdf"	Confidential
Manitoba Hydro, Transmission Planning & Design Division, System Planning Department, " <i>Report on Group System Impact Study, Manitoba Hydro Export Power Marketing (MHEM), 185 MW Firm Point to Point, Transmission Services Requests</i> ," dated December 9, 2015. <u>File name</u> "MH Saskpower-185 MW -System Impact Study-Report V5 December 10 2015.pdf"	Confidential

Document Name:	Confidential or Non-Confidential:
Manitoba Hydro Transmission Projects Dept., <i>"Birtle Transmission Project, Status Report,"</i> October 2017. <u>File name</u> "Q1_Birtle Transmission Project October 2017 Status Report.pdf"	Confidential
<u>File name</u> "Q2_Interim Period TSRs.pdf"	Confidential
<u>File name</u> "Q3_Requested OASIS printouts.pdf"	Confidential
<u>File name</u> "Q5_Copy of Birtle Transmission.xlsx"	Confidential
EXECUTIVE COMMITTEE RECOMMENDATION, <i>"Use of Brandon Generating Station Unit 5 (BGS U5) generator beyond 2019,"</i> dated August 3, 2016. <u>File name</u> "Q6_2016 08 25 RP BGS U5.docx"	Confidential
<u>File name</u> "Q6_Bdn 5 Generator Maintenance Cost Estimate.xlsx"	Confidential
Manitoba Hydro, dated November 28, 2017. <u>File name</u> "Q6_Brandon Generating Station Unit 5 Synchronous Condenser.docx"	Confidential
<u>File name</u> "Q7_impact of credits on FCA.docx"	Confidential
<u>File name</u> "Revenue_Diffs_Sask100.pptx"	Confidential
<u>File name</u> "Sask 140MW Term Sht Eval (Dec 2015 No Premium)-CONF.xlsx"	Confidential
<u>File name</u> "SaskPower 140 format for outputs _V3.xlsx"	Confidential
<u>File name</u> "TransmissionServiceCosts.xlsx"	Confidential
<b>Q8_Documentation presented to board and EC</b>	
EXECUTIVE COMMITTEE RECOMMENDATION, <i>"Approval of the 2020-2040 System Power Sale Agreement with Saskatchewan Power Corporation,"</i> dated January 5, 2016. <u>File name</u> "Q8_2016 01 ECR Appr 2020-2040 Power Sale Agreement.docx"	Confidential
BOARD RECOMMENDATION, <i>"Approval of the 2020-2040 System Power Sale Agreement with Saskatchewan Power Corporation,"</i> dated January 15, 2016 <u>File name</u> "Q8_2016 01 Board Rec System Power Sale Agreement SaskPower.docx"	Confidential
<i>"867-16-05, Power Sale Agreement with SaskPower"</i> <u>File name</u> "Q8_Board Minute- Power Sale Agreement with SaskPower.docx"	Confidential
Manitoba Hydro, <i>"Manitoba Hydro – SaskPower 2020-2040 Sale Agreement,"</i> MHEB Meeting, January 26, 2016 <u>File name</u> "Q8_Board PP presentation.pptx"	Confidential



<b>Document Name:</b>	<b>Confidential or Non-Confidential:</b>
<p><i>"1557.03, Sale to SaskPower"</i></p> <p><u>File name</u> "Q8_EC minute 1557.03 -Sale to SaskPower.docx"</p>	<p>Confidential</p>
<p>Manitoba Hydro, <i>"Manitoba Hydro – SaskPower 2020-4040 Sale Agreement,"</i> Executive Committee Meeting, January 13, 2016.</p> <p><u>File name</u> "Q8_FINAL MH-SaskPower - 2020-2040 Power Sale Agreement.pptx"</p>	<p>Confidential</p>
<b>Power Contracts</b>	
<p><i>"2020 – 2040 System Power Sale Agreement between The Manitoba Hydro-Electric Board and Saskatchewan Power Corporation"</i>, dated January 29, 2016.</p> <p><u>File name</u> "Saskpower 100 MW 2020-2040 System Power Sale - Fully 2016 01 29.pdf"</p>	<p>Confidential</p>
<p>Amending Agreement between The Manitoba Hydro-Electric Board and Saskatchewan Power Corporation, dated December 19, 2016</p> <p><u>File name</u> "Saskpower 100 MW 2020 - 2040 Conditions Precedent Amend.pdf"</p>	<p>Confidential</p>