

Manitoba Public Utilities Board

Manitoba Hydro Keeyask and Conawapa NFAT MH to PE Information Request Responses Public IR's



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132171
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*PREPARED FOR: MANITOBA PUBLIC UTILITIES BOARD
PREPARED BY: POWER ENGINEERS, INC.*

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1 **MH TO PE IR 1**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** None.

6
7 **QUESTION:** Please file the curriculum vitae for each member of your firm who has participated in the
8 preparation of your report and the curriculum vitae of each third party (if any) retained to assist in
9 preparation of your report. Please specify those individuals who intend to appear to give evidence during
10 the oral portion of the proceeding.

11
12 **REFERENCE:** None.

13
14 **RESPONSE:** CV's were provided to Hill Sokalski Walsh Trippier LLP for Ron Beazer (Project
15 Manager), Mark Graham (Project Engineer), Glenn Davidson (Transmission Estimation Expert), Brian
16 Furumasu (HVDC Expert), and Paul Arnold (Systems Expert). Glenn, Brian and Paul are expected to
17 represent Power Engineers to provide oral evidence.

1 **MH TO PE IR 2**

2 **SUBJECT:** Transmission

3

4 **PREAMBLE:** None.

5

6 **QUESTION:** Please provide copies of all documents received from the PUB, PUB advisors, or any third
7 party in connection with your retainer and/or in contemplation of preparing your report in this proceeding.
8 Please provide notes of all meetings with PUB, PUB advisors or any third party in connection with your
9 participation in this proceeding (in confidence if necessary).

10

11 **REFERENCE:** None.

12

13 **RESPONSE:** Other than the weekly project coordination meeting with Hill Sokalski Walsh Trippier LLP
14 and the IEC's, the only other meetings held were with Manitoba Hydro and relevant meeting notes are
15 included in the appendices of the reports.

1 **MH TO PE IR 3**

2 **SUBJECT:** Transmission

3

4 **PREAMBLE:** None.

5

6 **QUESTION:** Please provide details of the experience of each of the contributors to your report with
7 respect to transmission planning.

8

9 **REFERENCE:** None.

10

11 **RESPONSE:** The individual experience is incorporated in the CVs provided to Hill Sokalski Walsh
12 Trippier LLP.

1 **MH TO PE IR 4**

2 **SUBJECT:** Transmission

3
4 **PREAMBLE:** Page 6 of the PE Report states: “This estimate however does not address the increased
5 complexity and cost for Bipole III’s incorporation of the valve sparing capability...”
6

7 **QUESTION:** Please explain PE’s rationale for the view that there is increased complexity resulting from
8 Bipole III’s incorporation of the valve sparing capability.
9

10 **REFERENCE:** PE report, p. 6.
11

12 **RESPONSE:** Incorporating the valve group sparing capability requires multiple series valve groups, so that
13 an outage of a single valve group can allow the remaining intact valve groups to operate, which increases
14 the transfer capability of the DC system over a converter that does not incorporate this feature. Multiple
15 series valve groups will require more equipment to operate than a converter valve that does not
16 incorporate the spare valve group concept.
17

18 Using the survey data we estimated that increasing Bipole III rating from 2000 MW to 2300 MW would
19 be about \$54M. However, MH has indicated that the additional 300 MW of rating for Bipole III uses
20 “inherent” capability of the equipment to be provided and PE agrees this could account for the lower
21 \$38M estimate to achieve the increased rating for Bipole III.

1 **MH TO PE IR 5a**

2 **SUBJECT:** Transmission

3

4 **PREAMBLE:** Page 6 of the PE Report refers to “a recent market survey PE/ TGS provided to a current
5 client.”

6

7 **QUESTION:** Please file a copy of the referenced survey.

8

9 **REFERENCE:** PE report, p. 6.

10

11 **RESPONSE:** The Market survey titled “Celilo HVDC Up-Rate Project” is a confidential report prepared
12 by TransGrid Solutions for work that POWER Engineers (Owners Engineer) and Transgrid solutions are
13 doing for the Bonneville Power Administration on the upgrade of the Celilo Converter Station.

1 **MH TO PE IR 5b**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Page 6 of the PE Report refers to “a recent market survey PE/ TGS provided to a current
6 client.”

7
8 **QUESTION:** When was the market survey conducted?

9
10 **REFERENCE:** PE report, p. 6.

11
12 **RESPONSE:** The survey was completed on September 4, 2011.

1 **MH TO PE IR 5c**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Page 6 of the PE Report refers to “a recent market survey PE/ TGS provided to a current
6 client.”

7
8 **QUESTION** Which specific entities were surveyed? d) If PE is not able to disclose the requested
9 information due to confidentiality restrictions, please provide a general description of the report,
10 including its purpose, what question / questions were posed to the surveyed entities, identify the region(s)
11 in which surveyed participant(s) operate and provide its general conclusions.

12
13 **REFERENCE:** PE report, p. 6.

14
15 **RESPONSE:** The survey included CIGRE WG B2/B4/C1 17 published brochure #388 in 2009 for which
16 the data is a bit dated, however the document provides guidance on using market data to estimate
17 converter stations costs. The purpose of the survey report was to provide BPA’s procurement officer an
18 estimate of the current world market price for HVDC converters prior to receiving vendor proposals. The
19 report did not disclose the HVDC project names that were used to provide updated market pricing. The
20 reports stated: “From recent new awarded projects in 2011, the price per KW ranges between 160 \$/KW
21 and 200 \$/ KW for LCC. With an average of 180 \$/KW”.

1 **MH TO PE IR 6**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Page 7 of the PE Report, referring to MMTP, states:”The projected in- service-date is
6 2026”. Manitoba Hydro provided evidence (NFAT Business Case Chapter 2 , Section 2.4,page 56, line
7 8-9 and NFAT Business Case Chapter 6, Section 6.5.3.4, page 33, line 8) that the in- service date for
8 MMTP is 2020.

9
10 **QUESTION:** Please confirm PE’s understanding that the in service date for the MMTP is 2020. If not
11 confirmed, please provide the basis for POWER’s 2026 date.

12
13 **REFERENCE:** PE report, p. 7.

14
15 **RESPONSE:** We used a 2020 ISD based on Chapter 2, page 56, line 8.

16

MH TO PE IR 7a

SUBJECT: Transmission

PREAMBLE: Pages 7 and 8 of the PE Report contain an analysis of the total in-service year costs for the MMTP transmission line and station upgrades.

QUESTION: Please provide the escalation rate used in this analysis.

REFERENCE: PE report, p. 7.

RESPONSE: The rate used on pages 7 and 8 was intended to combine cost escalation and capitalized interest. The rate we used (incorrectly) is 1.6%/year. We had made other escalation calculations and inadvertently used the wrong multiplying factor (1.25).

Using appendix 11.1, page 10, the Keeyask transmission lines showed a combined escalation and capitalized interest that was equal to 29% of the 2012 cost. In levelized terms, this is a combined rate of about 2.5% for 10 years. ($1.025^{10} = 1.28$). We expect the expenditures for the MMTP Project that occur within the same time frame (2014 – 2019) to be escalated at the same 2.5% combined escalation and interest rate. This is a simplified approach, rather than using year-by-year escalation of the expenses during that year. The construction schedule shows the MMTP Construction ending in the 3rd quarter of 2019 for a 2020 ISD. Over the 7 year period from 2012 to 2019 the combined factor would be $1.025^7 = 1.19$. Using MH's estimates, this would produce a service-year estimate of $\$738,668/\text{km} \times 1.19 = \$879,015/\text{km} \times 234.7 \text{ km} = \206.3M . Assuming the station expenditures would follow the same pattern the escalated value for the stations to the in-service year would be $\$94.0\text{M} \times 1.19 = \111.9M . The combined in-service year cost would be $\$318.2\text{M}$. MH stated an in-service year estimate of $\$350\text{M}$ in 2.4.5 line 22.

POWER's 2012 estimated cost of construction for the 500 kV lines is $\$663,500/\text{km}$. Escalating this estimate by the same 2.5% rate for 7 years (2012 – 2019) gives a 2019 estimate of $\$789,565/\text{km}$. Thus, the MH estimate is 11% higher than POWER's estimate. This is well within the acceptable estimating tolerance.

1 **MH TO PE IR 7b**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** None.

6
7 **QUESTION:** Please provide the interest rate used in this analysis.

8
9 **REFERENCE:** PE report, p. 7.

10
11 **RESPONSE:** Please see the response to question 7a from MH to PE. The interest rate and escalation rate
12 were combined based on the cash flow table for Keeyask, which occurs in the same time period as the
13 MMTP project.

1 **MH TO PE IR 7c**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** None.

6
7 **QUESTION:** Please provide the in service date assumptions.

8
9 **REFERENCE:** PE report, p. 7.

10
11 **RESPONSE:** We used a 2020 ISD based on Chapter 2, page 56, line 8. We used an incorrect escalation
12 rate. Please see response to (7a) for the correct escalation rate and estimate.

1 **MH TO PE IR 8**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Pages 12, 16 and 27 of the PE draft report refer to splitting the HVDC / Northern
6 Collector System into two separate busses.

7
8 **QUESTION:** Please confirm that such statements were intended to mean that the Northern Collector
9 System would be split into two isolated networks.

10
11 **REFERENCE:** PE report, pp. 12, 16, 27.

12
13 **RESPONSE:** Yes, the statement was intended to convey that splitting the Northern Collector System into
14 two separate busses that isolate the ac systems behind each of the busses.

1 **MH TO PE IR 9**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Page 25 of the PE Report states : "The term "Energy Resource" was not found in the MH
6 tariff."

7
8 **QUESTION:** Please confirm that the MH tariff which PE is referencing is the Manitoba Hydro Open
9 Access Transmission Tariff.

10
11 **REFERENCE:** PE report, page 25.

12
13 **RESPONSE:** Yes, the 'MH tariff' referenced in the PE report is the Manitoba Hydro Open Access
14 Transmission Tariff.

1 **MH TO PE IR 10a**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Page 27 of the PE Report states: “POWER is not aware of any specific protocol for
6 assigning non-firm transmission to specific generation.”

7
8 **QUESTION:** Has PE reviewed the provisions of Manitoba Hydro’s Open Access Interconnection Tariff?

9
10 **REFERENCE:** PE report, p. 27.

11
12 **RESPONSE:** Yes, after submitting our report.

1 **MH TO PE IR 10b**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Page 27 of the PE Report states: “POWER is not aware of any specific protocol for
6 assigning non-firm transmission to specific generation.”

7
8 **QUESTION:** Has If so, does PE agree that the provisions of the Open Access Interconnection Tariff
9 related to Energy Resource Interconnection Service contain procedures for non-firm transmission to be
10 assigned to specific generation?

11
12 **REFERENCE:** PE report, p. 27.

13
14 **RESPONSE:** Yes, PE agrees.

1 **MH TO PE IR 11**

2
3 **SUBJECT:** Transmission

4
5 **PREAMBLE:** Page 26 of the PE Report contains Table 12 identifying 200 MW of non-firm transmission
6 service under Bipole II.

7
8 **QUESTION:** Please explain how this value was determined, and indicate any assumptions made by PE
9 related to Manitoba Hydro's HVDC spare criteria

10
11 **REFERENCE:** PE report, p. 26.

12
13 **RESPONSE:** Table 12 in the PE report identifies 200 MW of non-firm transmission for the combined
14 Bipole I and Bipole II path of the existing system. There is a total of 3354 MW of firm HVDC
15 transmission considering the largest valve group outage of 500 MW. There is a total of 3554 MW of
16 generation connected to the existing single Northern Collector System, creating a shortage, or 200 MW of
17 non-firm transmission. This assumes that the Valve Group spare over Generation criteria is applied to the
18 existing single northern collector system. However, as MH subsequently explained, the existing 'Pole
19 over Load' planning criteria will be in place until after Bipole III goes in service. That criteria defines the
20 System Capacity to meet firm load as the sum of the southern system generation plus the HVDC capacity,
21 minus the largest pole.