REFERENCE:

PUB MFR 72 Attachment Pages 54 to 56 of 615

PREAMBLE TO IR (IF ANY):

QUESTION:

a) Please update the chart showing the winter peak demand and available resources in the event of a loss of Bipoles I and II, incorporating the 2017 Load Forecast, updated DSM assumptions, and current resource availability.

b) Please provide a similar chart as in (a) for the summer peak, including firm export commitments. If historical information is not readily available, please provide on a forward basis.

c) Please provide the derivation of the $10 per kWh value of lost load including supporting assumptions.

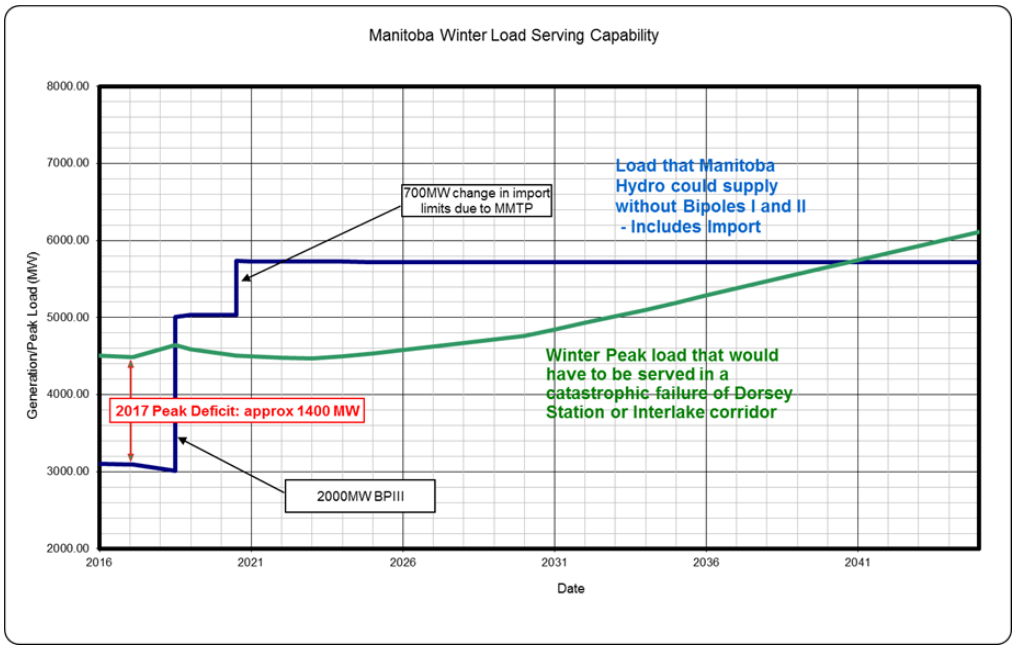
d) Please identify the sources of each of the probabilities listed on page 56 including the dates when the probabilities were developed.

e) Please provide the updated probability of fire at Dorsey converter station following the hardening of the relay building in 2011. Did hardening of the relay building reduce the probability of failure or the consequence of failure, or both?

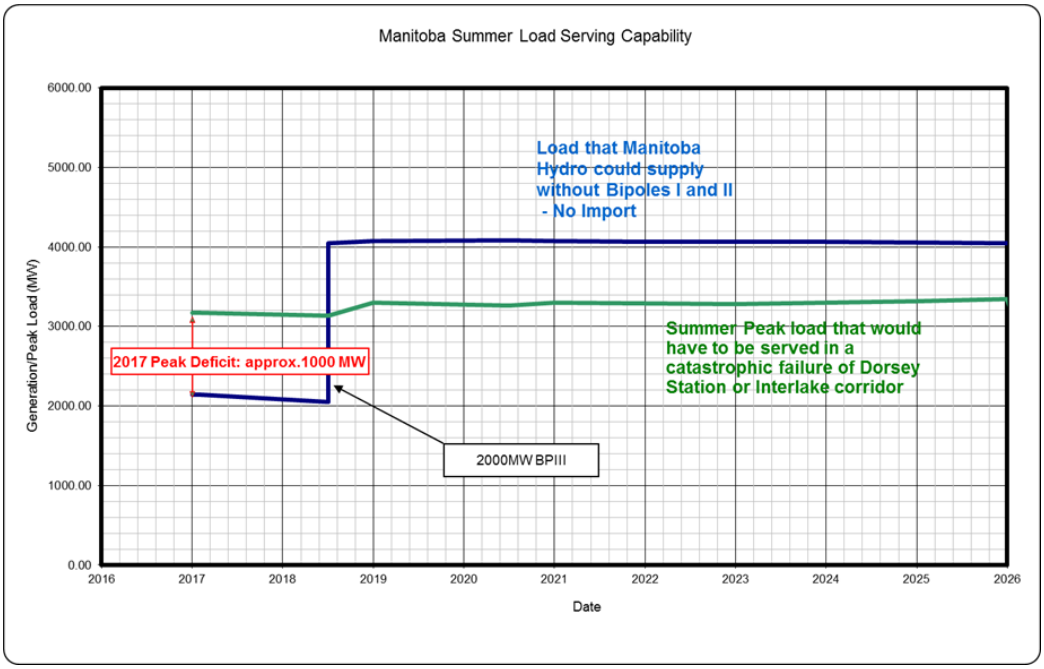
RATIONALE FOR QUESTION:

RESPONSE:

a) The plot below shows supply-demand curves in the event of a loss of Bipoles I and II during the winter peak, incorporating the 2017 Load Forecast, updated DSM assumptions, and current resource availability.



b) The plot below shows the supply-demand curves in the event of a loss of Bipoles I and II during the summer peak, incorporating the 2017 Load Forecast, updated DSM assumptions, and current resource availability. During the summer peak, there is no import available due to the unavailability of external generation resources in summer months.



c) As shown on page 54 of the attachment to PUB MFR 72, the $10 per kWh for the societal cost of unserved energy due to extended outages was based on the study report by Dr. Billington and practices of other utilities, including a 1998 Canada ice storm event. The report, "Manitoba Customer Interruption Cost Evaluation, 2001", by Dr. R Billington, has been filed as evidence in the Bipole III EIS hearing.

d) Manitoba Hydro has worked closely with field experts to evaluate weather hazards (Tornados, wide front wind, ice, etc.) and other risks of losing the existing HVDC system after the 1996 event. Since 2001, three studies (Teshmont 2001, Teshmont 2006, and Teshmont 2012 reports) have been completed incorporating the advancement of study methodology and tools, and availability of extreme weather data. All three reports were filed as evidence in the Bipole III CEC hearing.

The reliability risks associated with Dorsey station, shown under “Dorsey” on page 56 of the attachment to PUB MFR 72, were covered in Teshmont 2001 report, “Probability of Catastrophic Outages of Bipole I and Bipole 2”. The probability of losing HVDC Interlake corridor, shown under “Bipole I &II” on page 56, are based on the 2012 Teshmont report, “Weather Hazard and Reliability Assessment for the Preliminary Preferred Route of the Bipole III HVDC Transmission Line”.

e) As summarized in Teshmont 2001 report, main fire risks at Dorsey station which could cause an outage of both Bipole I and II include the following:
- 230 kV relay building
- Maintenance building between 1 & 2 converter buildings
- Converter building roof
- Control and/or power-cable located in the trenched cable runs.
- Smoke and smoke deposits on insulation resulting from oil fires following transformer failure.
- Substation under the control room in Bipole I converter building

The hardening of relay building was recommended by Teshmont 2001 report as a short-term initiative to reduce the risks of Dorsey station as the relay building is also subject to tornado and wind risks, in addition to significant fire hazards. Loss of the relay

building would also affect all 230 kV, 500 kV ac and 500 kV HVDC transmissions at Dorsey and take years to re-build. The upgrade work of relay building completed in 2011 has significantly reduced the risks of outages of relay building in terms of tornado, wind and fire hazards. It is expected that the probability of losing Dorsey station due to fire risks will be reduced with hardening of the relay building and the consequence due to other contributing factors to fire risks listed above would still be a downtime of Dorsey in weeks to months.