UNDERTAKING 45:

Daymark panel will review their records and confirm that they have concluded that since 2010 Manitoba Hydro has been over forecasting population growth in Manitoba.

Response:

Daymark can confirm that, on average, Manitoba Hydro has been using over forecasted population in its load forecast. As a response to COALITION/IEC (DAYMARK LOAD) – 7 Part (b), "Daymark reviewed the forecast errors estimated by MH by using actual and forecasted population only after 2010. The forecast errors calculated by MH since 2010 show that N-year ahead error percentages are mostly negative. The negative error percentages denote that actual population is lower than the forecasted population, meaning the since 2010 actual population is lower than the forecasted population used in MH's analysis." Table 1 includes average N-year forecast errors for two cases: (1) estimated by Manitoba Hydro by using data from 1989 to 2016, and (2) estimated using MH's comparison of actual and forecast of population using data from only 2010 to 2016. The negative values in the columns indicate that the MH forecasted population was higher than the actual population in their comparison, indicating that since 2010 MH's population forecasts have over-predicted population which is one of the predictor variables relied on in both the residential and general service forecast models.

Table 1: N-year Ahead population forecast errors calculated using two different time periods

N-year ahead	MH estimated Average Population Forecast Error Percentage; *Using data from 1989 - 2016*	Average Population Forecast Error Percentage - *only using data from 2010 - 2016*
1	0.03%	-0.68%
2	0.04%	-0.84%
3	0.12%	-0.90%
4	0.26%	-0.99%
5	0.50%	-0.76%
6	0.84%	0.07%

UNDERTAKING 46:

Daymark Energy Advisors and particularly Ms. Kelly and Dr. Gautam, advise as to whether the load forecast for those seven (7) former top consumers that have now been put into the general service mass market customer grouping would be greater or less. And if they can quantify it, as a result of the different methodologies that are used for the load forecasting for those two (2) groups. And that the client revisit PUB/Daymark load question number 20 and determine if any additional information is provided as part of that undertaking.

Response:

Manitoba Hydro's 2017 load forecast methodology moved seven Top Consumer customers to the GSMM – Large category. Daymark estimates that load the forecast of these seven customers as developed using the 2017 GSMM – Large methodology will be 332 GWh higher than the 2017 method used to forecast loads for the Top Consumer category customers during the 2017/18 to 2036/37 period.

However, when the annual load forecasts of these seven Top Consumers as estimated by the two different methodologies – Top Consumer methodology (short-term and long-term PLIL) and the regression-based GSMM methodology - are reviewed in more detail, we have divided the forecast into three different periods to assess how the two load forecasts compare with each other. Figure 1 and Table 2, below, include the annual load forecast of these seven customers estimated using independently both the regression-based GSMM[1] and Top Consumer[2] (short-term and long-term PLIL) methodologies. As

[1] As GSMM – Large load forecast is created for all customers included in this category, Daymark employed a couple of steps to estimate the load forecast of only those recently moved seven Top Consumer customers using the GSMM load forecast methodology. Daymark first estimated the GSMM – Large load forecast by excluding the historical load of the seven Top Consumer customers recently moved. The difference between the GSMM – Large load forecast that excludes seven Top Consumer customers and the 2017 GSMM – Large load forecast including the seven Top Consumer customer results in an estimate of load forecast for these seven Top Consumer customers.

[2] The load forecast using the Top Consumer method for these seven customers has two components – short-term load forecast and PLIL load forecast. The short-term annual load forecast of seven customers were gathered from the confidential section of Manitoba Hydro's 2015 Load Forecast Report. Manitoba Hydro had shared the individual historical and forecasted annual load of all Top Consumer category customers with Daymark. The second component of the Top Consumer methodology is the PLIL forecast. The PLIL load forecast of the seven customers was estimated using the difference of the annual PLIL load forecast with and without the historical load of these seven customers. Specifically, it is the difference between MH's 2017 PLIL methodology that does not include the historical load of these seven customers (as they were moved to GSMM category). Daymark then estimated the PLIL load by including the historical load of these seven customers and using the same method used by MH in its 2017 load

shown in Figure 1 and Table 2 below, the annual load forecast created by the two different methods are similar from 2017/18 to 2020/21 period. The load forecast of seven customers in GSMM – Large category is lower than the method used for Top Consumer customers from 2020/21 to 2026/27. However, the load forecast of the seven customers estimated using the GSMM – Large category is greater than the forecast for the seven if they had remained in the Top Consumer customer beyond 2027/28. Keep in mind these are estimates based on the methodologies represented here by Daymark for this undertaking.
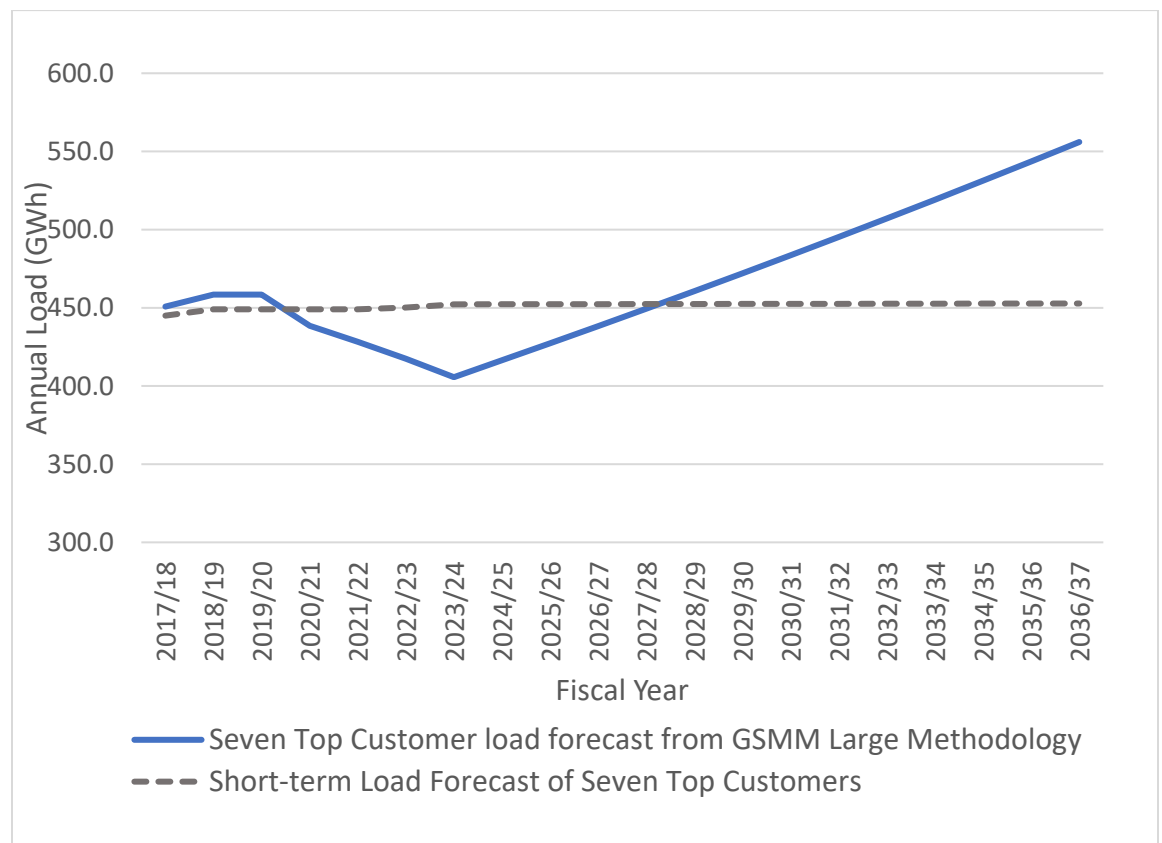
Figure 1: Short-Term Top Consumer Methodology Based Load Forecast Comparison of Seven Top Consumer Customer that were Moved to GSMM Category

forecast analysis. To be consistent with MH 2017 load forecast methodology, Daymark removed the start-up load of any of the seven customers that became part of Top Consumer category after the 1983/84 period.

Table 2: Annual Load Forecast Comparison of seven Top Consumer customers that were moved to GSMM – Large Group in 2017 Methodology

Fiscal Year	Load Forecast of Seven Customers using Top Consumer Methodology			Seven Top Customer load forecast from GSMM Large Methodology (GWh)#	Annual Load Forecast Difference between two methods (GWh)
	Short-term Load Forecast of Seven Top Customers*	Load of Seven Customers from PLIL methodology**	Total Load Forecast from Top Consumer Methodology		
2017/18	445.0	0.0	445.0	450.8	5.8
2018/19	449.0	0.0	449.0	458.5	9.5
2019/20	449.0	0.0	449.0	458.5	9.5
2020/21	449.0	0.0	449.0	438.5	-10.5
2021/22	449.0	0.0	449.0	428.2	-20.8
2022/23	449.0	1.1	450.1	417.4	-32.7
2023/24	449.0	3.3	452.3	405.6	-46.6
2024/25	449.0	3.3	452.3	416.5	-35.8
2025/26	449.0	3.3	452.3	427.3	-25.0
2026/27	449.0	3.4	452.4	438.3	-14.0
2027/28	449.0	3.4	452.4	449.5	-2.9
2028/29	449.0	3.4	452.4	460.7	8.3
2029/30	449.0	3.5	452.5	472.1	19.6
2030/31	449.0	3.5	452.5	483.6	31.1
2031/32	449.0	3.6	452.6	495.3	42.8
2032/33	449.0	3.6	452.6	507.2	54.6
2033/34	449.0	3.6	452.6	519.2	66.5
2034/35	449.0	3.7	452.7	531.3	78.6
2035/36	449.0	3.7	452.7	543.6	90.8
2036/37	449.0	3.8	452.8	556.0	103.3

Notes:
* Collected from individually estimated Top Consumer load forecast available in confidential 2015 Load Forecast Report (GWh)
** Difference between 2017 PLIL methodology with and without historical load of seven Top Consumer customers. If any of these customers became part of Top Consumer category after 1983/84, Daymark excluded their start-up load to be consistent with MH 2017 PLIL methodology.
 # Difference between 2017 GSMM-Large load forecast with and without seven Top Consumer customers that were recently moved to GSMM category.

Daymark reviewed the response to PUB/DAYMARK IR – 20 and believes that there is no need to provide additional information to its Response to IR-20.

UNDERTAKING 47:

Daymark to recalculate this chart that's shown in PUB/Daymark load Information Request 16 and to start it in the year of 2018/'19 and provide it for the five (5) years that the short-term forecasts are being used by Manitoba Hydro.

Response:

Daymark recalculated the short-term load impact for five years starting in the year of 2018/19. The method follows the same method as used to respond PUB/Daymark IR - 16. Specifically, Daymark used the price elasticity estimated by MH from PLIL methodology, difference in recently proposed real electricity price change and previously proposed 3.95% rate increase, and annual short-term Top Consumer load. The table below contains a detailed annual calculation of short-term load decrease in both proposed rate increase scenarios. The final column shows the net annual impact on short-term load of Top Consumers due to the incremental increase in rates in two different proposals. Please note that this load reduction may be in the upper range of short-term load reduction considering that the calculation uses long-term price elasticity estimated via PLIL methodology. The price responsiveness of the Top Consumer category in the short-term may be lower than in the longer term.

Table 3: Short-term impact of proposed rate increase in Top Consumer Customers

Year	Short-term load of Top Consumers (GWh)	Decrease in load with 7.9% proposed rate increase (GWh)	Decrease in load due to 3.95% proposed rate increase (GWh)	Net impact on load with proposed rate increase (GWh)
2018/19	5,440	-165.8	-80.3	-85.5
2019/20	5,475	-116.8	-80.8	-36.0
2020/21	5,502	-117.8	-81.2	-36.6
2021/22	5,943	-127.4	-87.7	-39.7
2022/23	5,951	-126.7	-87.8	-38.9
Total Short-term Load Impact (GWh)		**-654.5**	**-417.8**	**-236.6**
Source of Top Consumer short-term load: MH 2017 Load Forecast Report, Page 21, Table 16 (last column)				