BOARD STAFF INTERROGATORY #6

INTERROGATORY

Ref: Operating Revenues – Average Use Forecasting Model
Exhibit C2 / Tab 1 / Schedule 3 / Pages 9-10

Preamble:

Enbridge noted that diagnostic test results show that the models are statistically valid and no assumptions appear to be violated at the 95% confidence level except the 'No structural change' assumption for Metro region revenue class 20 (Rate 1) and Eastern region revenue class 73 models. The Chow forecast test result for those two models has indicated the existence of structural change in 2016. Dummy variables have been introduced to those models to correct this.

Question(s):

a) Please provide additional rationale supporting Enbridge's proposal to include a dummy variable in its average use models to address the structural change in 2016.

b) Please advise whether Enbridge has previously introduced a dummy variable in its average use models to address structural changes? If so, please provide the years for which a dummy variable was included and advise whether the OEB approved the use of the dummy variable.

c) Please provide the 2018 average use forecast for Rates 1 and 6 removing the dummy variable designed to correct for the 2016 structural change from the average use model. Please also provide a comparison of OEB staff's requested revised average use forecast and Enbridge's proposed average use forecast.

RESPONSE

a) The use of dummy variables is standard practice in regression estimation particularly where structural breaks and/or outliers are indicated, or when observations within a time series serve to break off well-established trends. A dummy variable serves to nullify that observation, effectively excluding the "noise" from the estimation in order to obtain more reliable results.

Witnesses: H. Sayyan
M. Suarez

As described in Exhibit C2, Tab1, Schedule 3, page 7, diagnostic tests are run on the models to check for incorrect functional forms, parameter instability, structural breaks, omitted variables, and randomness of residuals. Where models fail the diagnostic tests, model modifications are made to ensure the results can be interpreted with confidence. Test results are shown in Tables 6 and 9 for transparency.

Within the average use methodology which has been in place since 2000, dummy variables have been used where diagnostic testing has indicated it appropriate to do so. The Chow Test assesses whether a structural break has occurred. Those breaks can be outliers, level-shifts, or temporary changes. The average use models are corrected in response to a structural break through the inclusion of a dummy variable. Previously, dummy variables have been used to account for recessionary periods and migration impacts over the years. Driver variables have been listed in Tables 4 and 7 of the Average Use Methodology evidence (Exhibit C2, Tab 2, Schedule 1 of each proceeding), with all average use models and corresponding results in Tables 5 and 8. Dummy variables have been shown in these tables and results where they were utilized in the models.

The Company has always maintained that continuous model evaluation ensures that ongoing impacts in the relationship of average use and its driver variables is captured to produce the most accurate and objective forecast as possible. The use of dummy variables is a standard tool that has proven useful in objectively controlling for structural breaks and/or outliers in the data.

b) Given the timelines for EGD, can confirm that dummy variables were used since the 2010 Test year to account for a structural change in 2008 actual results from the recession. For some models, multiple dummy variables were included to control for recessionary impacts in multiple years. For Rate 6 models, dummy variables were included to account for both recession and migration impacts (from contract classes).

The Company's average use methodology was first proposed and approved in RP-2000-0040 and has since been the established methodology applied for average use volumetric forecasting. All variables, model results, and diagnostic testing results have been included in the Average Use Methodology evidence typically shown at Exhibit C2 Tab 1 as part of Rate applications. The OEB has approved average use forecasts and/or volume forecasts inclusive of average uses for each of those years.

c) As shown in the following table, If dummy variables were not included to control for 2016 average uses in Rate 1 and Rate 6, the 2018 average use forecasts would have been 2.4 m^3 and 0.2 m^3 lower, respectively. The total volumetric impact of not controlling for the 2016 break would have been an additional volumetric reduction of approximately 4.8 million m^3.

Witnesses: H. Sayyan
M. Suarez

2018 Average use (m3)	Rate 1	Rate 6
Proposed Models (with dummy)	2,363.0	28,656.0
Requested (excludes DUM 2016)	2,360.6	28,655.8
Difference in Average use (m^3)	(2.4)	(0.2)
Total Volumetric impact (m^3)	(4,755,767)	(34,863)

Witnesses: H. Sayyan
M. Suarez