Kai Millyard Associates

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August 12, 2015

Ms Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge Street, 27th floor
PO Box 2319
Toronto, ON
M4P 1E4

RE: EB-2015-0049 & 0029 GEC Interrogatory replies

Dear Ms Walli,

Please find enclosed 2 copies of the IR replies from Mr Chernick to APPrO, FRPO, Enbridge and Union Gas, in addition to those filed Monday. This completes interrogatory responses from the GEC witnesses. All will be uploaded to the RES system shortly and emailed to all parties.

Sincerely,

(Mr.) Kai Millyard
Case Manager
Green Energy Coalition

ec: All parties

GEC Response to Enbridge Interrogatory #11

Question:

Reference: L.GEC.2, page 9

Preamble:

Table 1, Estimates of Gas Price Suppression from Reduced Usage, multiple studies using EIA National Energy Modeling System

Request:

Please explain how the fluctuations in $US/Dth per quad can be interpreted. In some instances, the impacts from the same studies have different effects.

Response:

Modeling assumptions (supply curves, base demand levels, amount of load reduction, shape of the demand reductions) in each study are different, resulting in variation in the results. The studies with multiple estimates represent different levels of load reduction.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #12

Question:

Reference: L.GEC.2, Table 2, page 9

Preamble:

"Table 2 lists the AEO cases that change natural gas demand without affecting the gas supply curve. Table 2 also provides EIA's projection of the changes in gas consumption …and Henry Hub price from the AEO reference case in 2020."

Request:

a) Please explain or interpret the results. Why do the same cases in both years have less of an impact in 2014 so that it is "roughly a quarter of the slope in the 2012 sensitivities"?

b) Please explain how low economic growth, "high" and "best" demand technologies would serve to increase prices using the AEO 2014 cases relative to AEO 2012?

c) What are the implications of decay in price-reduction values over time? How would evidence of decay affect the conclusions of the testimony?

d) What are the implications of accumulating effects? How would evidence of accumulation affect conclusions derived?

Response:

a) Mr. Chernick did not create this analysis. EGD should direct this question to the EIA. Mr. Chernick suspects that the differences between the studies are primarily due to changing estimates of the supply resource base.
b) These particular values in 2020 are outliers from the general trend for these cases. For each case, 2019 and 2020 are the only years with increased prices, out of the 27 years modeled from 2014 to 2040. These anomalies may result from excessive suppression of resource development in 2014–2018 as a result of lower prices, or higher gas load due to gas being more attractive with high-efficiency technology.
c) If the price-reduction values decayed over time, the incremental DRIPE benefits would decline over time, and the DRIPE component of avoided cost would be lower in later years.
d) If the price-reduction values rose over time, the incremental DRIPE benefits would rise over time, and the DRIPE component of avoided cost would be higher in later years.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #13

Question:

Reference: L.GEC.2, page 12 (Fig 1), page 13 (Fig 2)

Request:

a) Please confirm that the data used to produce the observations in the above referenced figures used forecast data rather than historical actual data.

b) Please explain in detail how the observations used in the regression analysis were produced from EIA's AEO reports.

Response:

a) Confirmed.

b) Mr. Chernick subtracted the demand in the sensitivity case from the demand in the base case, and subtracted the price in the sensitivity case from the price in the base case.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #14

Question:

Reference: L.GEC.2 page 13

Preamble:

In the above reference, Mr. Chernick discusses how changes to natural gas demand will impact Henry Hub prices. The Company would like to better understand the relevance of this information to this application.
Request:

a) Please identify the Canadian demand centres included in Figure 1 and Figure 2.

b) Did Mr. Chernick conduct a similar analysis for Canadian demand centres? If not why not?

c) Did Mr. Chernick consider any other variables, for example economic or demographic variables in the regression analysis in Figure 1 and Figure 2? If not why not? If he did please provide the regression output and an explanation for the results.

d) Did Mr. Chernick consider fitting different curves in Figure 1 and 2? If not why not? If he did please provide the regression output and an explanation for the results.

e) The slope coefficient differs significantly between the regression analysis in Figure 2 and Figure 3. Please explain why, between the two time periods, the slope coefficient declined by a factor of approximately 76%.

f) Please confirm that EGD does not procure any of its gas supply from Henry Hub.

Response:

(a) Figure 1 and Figure 2 are based on analyses of changes in US demand.

(b) No. Mr. Chernick is not aware of similar sensitivity analyses of North American gas prices as a function of changes in Canadian demand. Since the North American gas market is reasonably well integrated (except at peak periods in some demand areas), reductions in Canadian load should have similar effects to reductions in load in the US.

(c) Mr. Chernick is not aware of any other exogenous economic or demographic drivers that EIA varied among these cases and that would be expected to affect gas prices, other than through gas demand.

Witness: Paul Chernick

(d) Yes. Since the data are quite linear, there is no reason to fit non-linear curves to the data.

(e) See response to GEC.EGDI.12a.

(f) EGD refused to provide any data on its gas procurement modeling, so Mr. Chernick cannot confirm this statement. Changes in Henry Hub prices are used by EIA and Mr. Chernick as an indicator for price changes in supply regions and largely unconstrained demand areas of the North American gas networks.

GEC Response to Enbridge Interrogatory #15

Question:

Reference: L.GEC.2, pages 13 and 14

Preamble:

In the above reference, Mr. Chernick discusses how natural gas supply costs will increase as natural gas reserves are depleted. The Company would like to better understand the impact of natural gas reserves on natural gas supply costs.

Request:

a) Please discuss the trend of forecasted natural gas reserves for North America from 2006 to current date with a focus on proximate supplies to Ontario such as the Marcellus and Utica supply basins.

b) Please discuss the trend of natural gas prices at Dawn and AECO-C from 2006 to current date.

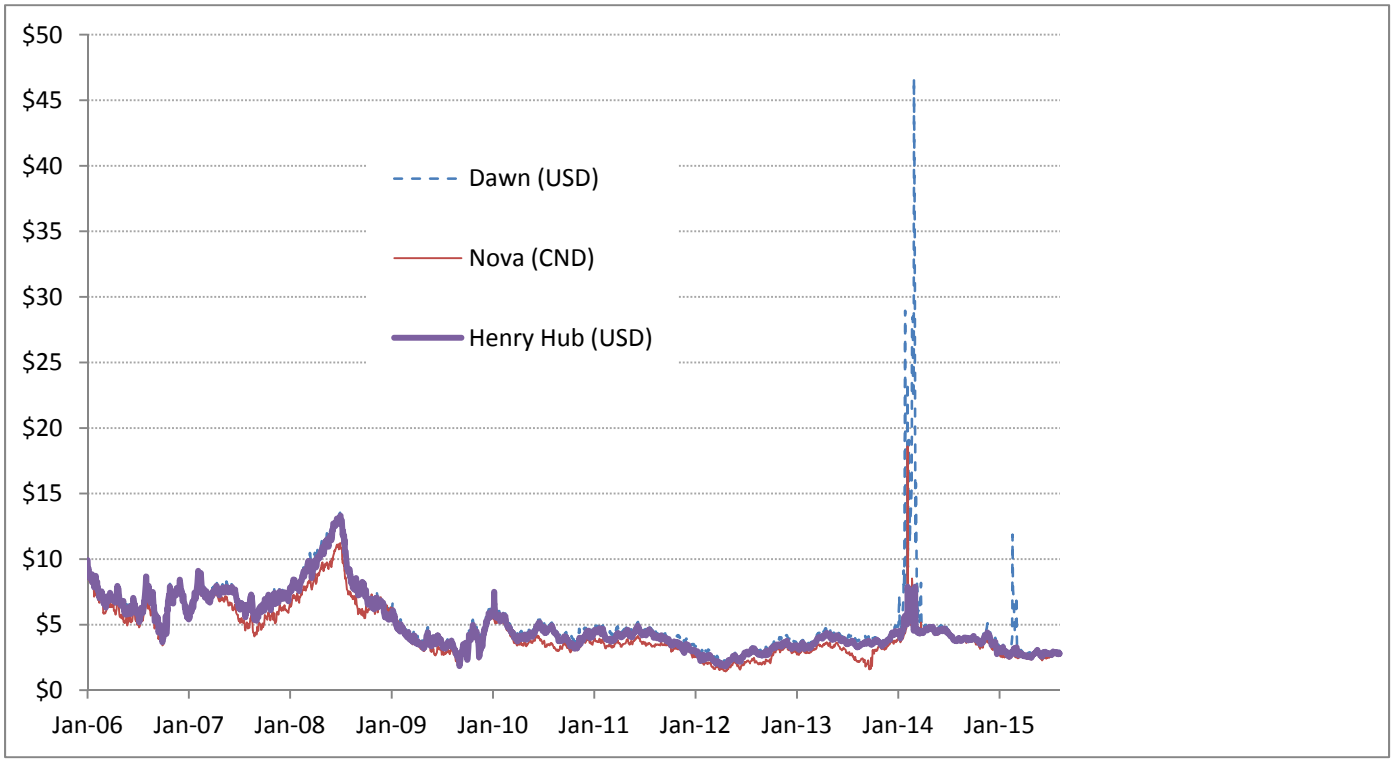
c) Please provide a discussion of the price trends that have been experienced in the Marcellus and Utica shale basins with reference to relevant pricing points within each respective basin.

Response:

(a) This question is not related to the reference, which discusses depletion of the resource that would otherwise be available in a particular year due to higher use in earlier years, rather than a time trend. Mr. Chernick has not conducted the requested analysis. The data are publically available to EGDI.

(b) See Attachment GEC.EGDI.15b for the Dawn, AECO and Henry Hub prices from January 1, 2006 through August 7, 2015. The data are summarized in the following graph. On most days, the prices track one another fairly closely, with AECO being consistently lower than Dawn and Henry Hub (and even lower if the prices were all in the same currency). The general trend in prices since 2006 has been towards reduced prices.

Witness: Paul Chernick



(c) Prices in the Marcellus and Utica shale supply regions tend to fall as production increases and to rise as takeaway pipeline capacity is added. There are several trading hubs in the Marcellus-Utica area, including Dominion South, Dominion North, Leidy, Tennessee Zone 4 (for which three sub-hub prices are reported), the TCO Appalachian Pool. Production in this area has tended to be export-constrained, resulting in prices lower than Henry Hub since about 2013. Construction of additional gas-fired generation in the region and pipeline capacity flowing out of the region will tend to bring Marcellus prices closer to other supply areas.

GEC Response to Enbridge Interrogatory #16

Question:

Reference: L.GEC.2, page 14

Request:

a) Please explain why the $\$0.00027/m^3$ decrease in natural gas price per $10^9 m^3$ saved figure is multiplied by the total annual gas use of Ontario.

b) Please confirm that the 0.76 cents in reduced gas bills per m^3 conserved in Ontario is based on an analysis of Henry Hub prices and total U.S. consumption.

c) Please explain the differences and similarities between Henry Hub price and the Dawn Hub price, and the respective markets they serve.

d) Please compare total Ontario gas consumption to total U.S. gas consumption, displaying annual m^3 consumed for each and expressing Ontario gas consumption as a percentage of total U.S. gas consumption.

e) Please explain if the impact of changes in Ontario demand on Dawn Hub prices would be similar to the impact of changes in total U.S. demand on Henry Hub prices.

Response:

(a) This computation assumes that natural gas consumed in Ontario is purchased at market prices.
(b) Yes. See response to GEC.EGDI.14.
(c) See response to GEC.EGDI.15.b. Henry Hub is a supply-area hub, while Dawn is a demand-area hub with considerable heating load.
(d) In 2013, Ontario consumed about 28.2 10^9 m^3 of gas. The US used about 16 quads of gas; at 28.32×10^9 m^3/quad (http://cdiac.ornl.gov/pns/convert.html), that would be 456 10^9 m^3. Ontario's consumption was about 6.2% of total US consumption.
(e) Yes, or greater. A given volumetric load reduction, in Ontario, New York or California, will reduce prices by about the same amount at all unconstrained hubs. In addition, since Dawn prices sometimes rise above prices in the producing areas, a reduction in load in Ontario would tend to reduce that congestion and reduce Dawn prices relative to continental benchmarks.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #17

Question:

Reference: L.GEC.2 pages 16 and 17

Preamble:

In the above reference, Mr. Chernick discusses how transportation costs will decrease as natural gas demand decreases. The Company would like to better understand the impact of decreased natural gas demand on transportation costs.

Request:

a) Please confirm that virtually all of the Company's supply requirements are delivered to its respective franchise areas through transportation contracts with TransCanada Pipelines Limited and Union Gas Limited.

b) Please discuss the directional impact on transportation tolls that a reduction in demand would have assuming that the costs to operate the transportation systems on which EGD contracts remain relatively constant.

c) Please provide the TransCanada Pipelines Limited transportation tolls from Empress to the Enbridge CDA, Empress to the Enbridge EDA, Union Dawn to the Enbridge CDA and Union Dawn to the Enbridge EDA from 2000 to current.

d) Please comment on the key factors that influenced changes to the transportation tolls over time provided in response to part c) of this question.

Response:

(a) EGD refused to provide any data on its gas procurement modeling, so Mr. Chernick cannot confirm this statement. The transportation from the trading hub closest to EGD's citygates is not the only transportation for which EGD must pay. Since little or no gas is produced at Dawn (for example), if Enbridge purchases gas at Dawn it is paying market transportation rates (or basis) from the production areas to Dawn. The same would be true for purchases of gas at Chicago, Leidy, or whatever other hubs EGD uses for its purchase contracts.

(b) The reference discusses market transportation prices, not "transportation systems on which EGD contracts" for capacity at regulated rates. Regulated transportation rates may increase as sales fall and fixed costs are spread over fewer units of sales, or decrease if load reductions avoid capital investments, but total transportation costs will almost

Witness: Paul Chernick

always be reduce by load reductions. Reduced gas consumption may avoid the need for reconstruction of aging pipes or construction of new pipes to replace gas lines that TCPL converts to oil. See also the response to GEC.APPRO.6(e).

(c) Mr. Chernick does not have these data, but EGD probably does. The TCPL historical tariffs are available at http://www.transcanada.com/customerexpress/4265.html, although the older tariffs do not appear to have all the source and sink combinations requested in the question.

(d) Mr. Chernick has not undertaken this expansive historical review, which would require review of the cost of capital, accumulated depreciation, capital additions, expenses, taxes, NEB ratemaking and cost-allocation policies, and a matrix of throughput volumes by segment and year.

GEC Response to Enbridge Interrogatory #18

Question:

Reference: L.GEC.2, page 17

Request:

Please provide details on the calculation of a 1 cent reduction in Ontario gas bills for each m^3 conserved. Please provide a step-by-step explanation on how this was calculated.

Response:

See GEC.UNION.6f. Note that the 1¢ value should read 0.1¢. This typographical error in an example computation does not affect any other parts of Mr. Chernick's or Mr. Neme's evidence.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #19

Question:

Reference: L.GEC.2, page 27

Preamble:

In the above reference, Mr. Chernick provides data in Table 5 that includes the avoided commodity costs in 2016. The Company would like to better understand how some of the information in Table 5 was derived.

Request:

Please provide the specific calculations that were used to derive the second line in the table which includes the Water Heating, Space Heating, and Water and Space Heating avoided commodity costs in 2016 using the 2015 avoided cost estimate.

Response:

Enbridge provided its 2013 avoided cost estimates broken down into cost components, but not its recently filed 2015 estimates. For Table 5, I derived the avoided commodity cost component of the 2015 estimate by subtracting the difference between the 2013 and 2015 total avoided costs from the 2013 estimate of avoided commodity costs, for each load shape. This calculation assumes that the reduction in Enbridge's 2015 avoided costs reflects only a change in its avoided commodity costs. It is my understanding that the Company updates its avoided costs every year by adjusting only the commodity costs.

Derivation of Avoided Commodity Cost in 2016 (Dollars per Cubic Metre)

	Water Heating				Space Heating				WH+SH			
Avoided Cost in 2016	Supply	Transportation	Storage	Total	Supply	Transportation	Storage	Total	Supply	Transportation	Storage	Total
2013 est. (a)	0.1810	0.0066	0.0006	0.1882	0.1972	0.0016	0.0006	0.1994	0.1947	0.0022	0.0007	0.1976
2015 est. (b)	0.1617			0.1689	0.1762			0.1784	0.1738			0.1767

Notes:

(a) Exhibit I.T9.EGDI.GEC.43(a).
(b) Corrected: 2015-07-22, EB-2015-0049, Exhibit B, Tab 2, Schedule 5, Page 3 of 4.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #20

Question:

Reference: L.GEC.2, general

Preamble:

The evidence suggests that replacement, relocation, and sales costs should be included in the Avoided Gas Costs calculation.

Request:

Please comment on whether this suggestion includes all replacement, relocation, and sales costs or a portion thereof. If it is the latter, please explain.

Response:

No. As Mr. Chernick describes in his evidence, replacement and relocation projects should only be included to the extent that they increase capacity, or that the cost of the project could have been reduced if load were lower. That portion of the replacement and relocation projects can be included by adding the cost of the incremental capacity to the numerator of the avoided-investment computation, or by reducing the denominator by the load growth accommodated by the increased capacity.

As Mr. Chernick describes in his evidence, the load growth accommodated by the sales projects should be removed from the denominator of the avoided-investment computation.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #21

Question:

Reference: L.GEC.2, general

Preamble:

Mr. Chernick's evidence references that Enbridge omitted reinforcement costs.

Request:

(a) Please confirm that Enbridge identified and acknowledged the inadvertent errors and committed to providing a fully revised reinforcement list and associated costs in the Q4 Input Assumption update of Avoided Gas Costs. (See response to GEC Interrogatory #56c at I.T9.EGDI.GEC.56 and Undertaking JT1.28.)

(b) Please confirm that Enbridge stated that the overall impact of the inadvertent errors (resulting in an approximate 27% increase to the reinforcement costs) results in a marginal increase of less than 1% in Water Heating and Industrial load profiles, and an increase of less than 2% in the Space Heating and Space and Water Heating load profiles on the Avoided Gas Costs over a 30 year period. (See response to Undertaking JT1.28.)

Response:

(a) Yes. Even with the limited information that Enbridge provided, Mr. Chernick was able to identify errors in Enbridge's computations that neither Enbridge nor Navigant had identified. Yes, Enbridge has stated its intent to file an "Updated Avoided Distribution Costs Study" in the fourth quarter of 2015, after the conclusion of this proceeding and without specifying any mechanism for review of that filing.

(b) Yes. Enbridge so stated. As explained in Mr. Chernick's evidence, Enbridge has understated many portions of the avoided distribution costs, so the actual effects would be larger than Enbridge has stated.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #22

Question:

Reference: L.GEC.2, page 35, footnote 30

Preamble:

"Lower load growth in the GTA would have avoided the need for Segment B." This subject was discussed during the discovery process of the GTA Project (EB-2012-0451).

Request:

(a) Please confirm that Enbridge stated that only the portion of Segment B from Sheppard Avenue East to McNicoll Avenue is associated with load growth as described in EB-2012-0451 and the response to EB-2015-0049 Undertaking JT1.17.

(b) Please confirm that the north-south portion of Segment B, referred to in Mr. Chernick's evidence as "B2", is 7.6 km (see EB-2012-0451, Exhibit B, Tab 1, Schedule 1, page 3, paragraph 9) and that the distance from Sheppard Avenue East to McNicoll Avenue (paralleling Pharmacy Avenue) is approximately 3.3 km.

(c) Please confirm that Enbridge stated that other portions of Segment B are required for other operational reliability purposes as described in EB-2012-0451. Please see EB-2012-0451 Transcript Volume 5, page 76 lines 27 to page 78 line 22.

Response:

(a) Confirmed with respect to Undertaking JT1.17. Enbridge also stated that "Based on this 10 years of anticipated growth…the minimum pipe required is a build from Sheppard Ave. to McNicoll Ave. paralleling the existing Don Valley line" (EB-2012-0451 Exhibit I.A1.EGD.APPrO.3) and "The 'growth only' component of the GTA Project, namely the extension of the NPS 36 line from Sheppard north to McNicol Avenue is estimated to cost $40M to $50M. [footnote: unclassified estimate]" (EB-2012-0451 Exhibit I.A4.EGD.ED.20).

(b) Confirmed.

(c) Confirmed, in part. In essence, Enbridge's position was that it was already operating parts of its system above safe pressure levels to meet design-peak load. Hence, Segment B2 was required to meet past and forecast load growth.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #23

Question:

Reference: L.GEC.2, page 36

Request:

(a) Please provide the original source and cost per segment used calculate the costs in lines 10, 12, and 13.

(b) Please provide the derivation of the costs in lines 10, 12, and 13.

Response:

(a) The August 1, 2013 letter from Scott Stoll of Aird & Berlis LLP on behalf of Enbridge to the Board states the following cost estimates:

a) Parkway West Gate Station and tie in — approximately $28M
b) Segment A - approximately $356M
c) Segment B (E-W) — approximately $189M
d) Segment B (N-S) — approximately $113M

Note that Segment B (E-W) is Segment B1 and Segment B (N-S) is Segment B2. The total reported cost in this estimate was $686 million.

EB-2015-0122, Exhibit D.1.2 reports “a total project cost of $756 million,” 10.2% higher than the August 1, 2013 estimate.

(b) Increasing the August 2013 estimates by 10.2% produces estimates of $392 M for Segment A, $208 M for Segment B1, and $125 M for Segment B2.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #24

Question:

Reference: L.GEC.2, page 38

Preamble:

The Navigant Report summarizes the methodology in Section 3.1, Overview of Methodology, and the details of the calculations used are provided in Section 3.4, Distribution Avoided Cost Calculation. Specifically, page 21 states "*The benefit associated with the deferred reinforcement cost is shown by the difference between the "No DSM" (i.e., the black line) and the "With DSM" (i.e., the greenline) scenarios. The value is determined by calculating the annual revenue requirement to recover the costs associated with the reinforcement using Enbridge-specific assumptions.*" This is further illustrated in Figure 8 and Figure 9 of the Navigant Report, and a summary of the annual cash flows for 2015 to 2023 is provided in Appendix A.

Mr. Chernick states on page 38 "Navigant uses a nominal 5.9% carrying charge for the distribution investments, which it does not document".

Request:

On what basis does Mr. Chernick conclude that Navigant uses a "nominal carrying charge"?

Response:

Navigant's Figure 8 shows the costs declining over time and the cost of a deferred project being more expensive in the future, as would be true for nominal ratemaking, but not real-levelized costs. Figure 9 shows avoided costs falling over time, and an increase in costs from 2033 on due to DSM in 2013. If Enbridge had provided Navigant's workpapers and communications with Enbridge, Mr. Chernick would be better able to specifically describe Navigant's errors.

Most tellingly, Enbridge uses the Navigant estimates (from Table 7 of the Navigant report) as fixed nominal $\$/m^3$ values through 2044 in EB-2015-0049, Exhibit B Tab 2 Schedule 5 Page 3.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #25

Question:

Reference: L.GEC.1, page 41

Preamble:

In Mr. Neme's evidence, filed at L.GEC.1, he states that "… DSM cannot address every type of infrastructure need. It only has potential value as an alternative to infrastructure projects that are being driven, at least in part, by load growth. Even then it will not always be applicable…"

Request:

Please comment on whether Mr. Chernick agrees with Mr. Neme's statement. If not, please explain.

Response:

Yes. See response to M.GEC.EGDI.20.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #26

Question:

Reference: L.GEC.2, page 41

Request:

(a) Please describe the rationale used to arrive at the recommendation to apply a 20% reduction in load growth for Segment B2.

(b) Please provide all calculations and workpapers/spreadsheets used to derive the recommendation to apply a 20% reduction in load growth.

Response:

(a) The table does not assume a 20% reduction in load growth for Segment B2. It assumes that Segments A and B1 of the GTA Project, plus all other projects that increase capacity or accommodate demand (e.g., sales projects), cover 20% of demand growth. Enbridge has refused to provide the data from which Mr. Chernick could compute the share of load growth met by these projects. The 20% is Mr. Chernick's estimate, considering that the GTA is responsible for a large portion of Enbridge's load growth (much of which would be supported by Segments A and B1) and that new customers (whose contribution to peak load would be accommodated largely by sales projects) are also responsible for a significant share of load growth.

(b) There are no calculations, workpapers and spreadsheets.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #27

Question:

Reference: L.GEC.2, page 41, table 8

Request:

(a) Please provide the derivation of the $17.4M quoted for the "2010-2012 revisions".

(b) Please provide the derivation of the $85M quoted for "Segment B2".

Response:

(a) See Table 7 of Mr. Chernick's evidence.

(b) Enbridge appears to have included $40M for Segment B2. Mr. Chernick's estimate of the entire cost of Segment B2 is $125M (See Exhibit M.GEC.EGD.23). The difference between $125M and $40M is $85M.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #28

Question:

Reference: L.GEC.2, pages 41-42, table 8

Request:

(a) Please describe the rationale used to arrive at the recommendation to apply a 10% reduction in load growth for Segment B1.

(b) Please provide all calculations and workpapers/spreadsheets used to derive the recommendation to apply a 10% reduction in load growth.

Response:

(a) See Exhibit M.GEC.EGDI.26. Mr. Chernick reduced the 20% to reflect the inclusion of Segment B1 in the avoided costs.

(b) There are no calculations, workpapers and spreadsheets.

Witness: Paul Chernick

GEC Response to Enbridge Interrogatory #29

Question:

Reference: L.GEC.2 page 55

Preamble:

Starting on line 8 of the above reference, Mr. Chernick discusses the importance of a daily gas price input in SENDOUT and how daily gas prices tends to vary with load. The Company would like to better understand other considerations that impact daily gas prices.

Request:

a) Please confirm that most natural gas distribution companies, including the Company, contract for storage capacity to facilitate daily and seasonal load requirements.

b) Would the use of storage capacity to facilitate daily and seasonal load requirements have an impact on daily gas prices? If so, please explain the impact.

Response:

(a) Yes. Reduction in space-heating load allows utilities to reduce their storage contracts, or use the storage contracts to support peak-day sales to transportation customers and other utilities.

(b) The "impact" depends on the type of daily gas prices under consideration.

- The existence of storage would tend to reduce the variation of market prices with load, assuming a reasonable level of competition among holders of storage capacity. That effect is reflected in the observed variability of Dawn spot prices.
- Entitlement in storage by a utility might tend to reduce the variability of daily ratemaking costs, depending on the allocation of the storage costs by day. That effect is relevant to allocation of costs among classes, but not to the estimation of avoided costs.
- Those entitlements would not generally reduce the variation in avoided costs, since the utility would have the choice of selling (or releasing or not renewing) the capacity or selling peak-period gas from the storage freed up by load reductions.

Witness: Paul Chernick