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15 May 2009

Ms. Kirsten Walli, Board Secretary
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street, 27th Floor
Toronto, ON
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Dear Ms. Walli:

Re: EB-2009-0102 and EB-2009-0103 – GEC submissions

Further to my letter of May 11th, attached please find the VEIC report on showerhead savings assumptions.

Sincerely,

David Poch

cc: all parties

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Comments on Enbridge/SAS Analysis of Showerhead Savings

By: Chris Neme & Nick Lange, VEIC

5/14/09

In late 2007, Enbridge and Union Gas commissioned an engineering evaluation of low flow showerhead savings. That evaluation was conducted by Summit Blue, completed in early 2008 and, reviewed during the 2007 auditing process. The savings estimates from it formed the basis of the Company's 2008 prescriptive savings values. Over the objections of members of the Evaluation and Audit Committee (EAC) because of concerns about the design of the study, Enbridge subsequently commissioned a second evaluation, this time a statistical analysis of savings from low flow showerheads. It is our understanding that Enbridge staff did all of the data gathering from a sample of homes, including gas consumption data from both before and after installation of low flow showerheads. It then hired SAS Institute in either late 2008 or early 2009 to analyze the data and develop a savings estimate.

The SAS report was completed on March 26, 2009. Data from the report were apparently provided to the OEB as feedback on Navigant's proposed draft 2010 savings assumptions. The report suggested average savings were substantially higher than previously assumed by both Enbridge and Union. However, the report has not, until now, been reviewed by either members of the Company's Evaluation and Audit Committee or an auditor.

This document is a summary of VEIC's review of the SAS report on behalf of the Green Energy Coalition, conducted as part of Chris Neme's role as a member of Enbridge's EAC. Key comments are as follows:

- The document states that data from a sample of 69 homes were analyzed. However, it provides no discussion of how the sample was created. Thus, there is no way for a reviewer to pass judgment on whether the sample is reasonably representative of likely program participants and, therefore, whether the savings from the sample are appropriate for estimating Enbridge's program impacts. For example, on page 6 SAS lists descriptive household statistics and their average values for the study sample. The degree to which these factors, and others not considered in the study such as location, building system characteristics, household income and others, align with the program participation population could affect the applicability, and proper estimation of the program impact.
- The report suggests that the average household in the sample had 2.1 showers (p. 6) We do not know how many shower fixtures the average home treated by the Company's program has. However, we do know that the program has averaged between 1.2 and 1.3 showerheads distributed per home – and 1.1 showerheads installed per home – over the past three programs years. While the study states that "there is little effect of number of showers…" on the magnitude of

consumption or savings (p. 14), that presumably assumes that you replace all of the showerheads. Thus, it would appear that either (1) the sample is not representative because it has a higher average number of shower fixtures than the program population; or (2) the sample got a different treatment (i.e. all shower fixtures replaced) than the program population (just a portion replaced). Either way, it would appear that the savings estimate from the sample may not be appropriate to apply to the program population.

- It is not clear from the report what consumption data were analyzed and how they were analyzed. Was it total gas consumption from which non-heating consumption was estimated through correlations with heating degree days? If so, how were such correlations made and, to the degree that water heating energy use is also correlated to weather, how were such effects addressed? Or did the utility actually have consumption data associated with just water heating for the sample homes?
- P. 4: The report documents that approximately 550 days of consumption data were analyzed for the sample homes, 400 from before low flow showerheads were installed and 150 from after installation. Because there was less than a full year of post-installation data, Enbridge and SAS had to rely on some statistically manipulation to adjust for seasonal effects. However, no explanation for how that was done – other than to say such adjustments "were calculated from non-heating billing information" – is provided in the report. Thus, it is impossible to assess whether the approach used was reasonable or not. Because there appears to have been a downward trend in gas use from showers both before and after low flow showerheads were installed, it is possible that the seasonal adjustments were misleading or distorted (i.e. for some months there would have been two years worth of data, with the second year's data for the month lower than the first, and for other months only one). It is impossible to assess what the impact of such problems might be on savings estimates. Note that SAS states a couple of times in the report that having a year of post-installation data would have led to a more accurate result.
- P. 7 and elsewhere: a graph of the seasonally adjusted consumption seems to show a downward trend in consumption starting about 350 days before low flow showerhead installation. It appears to be at least possible that the lower consumption after the low flow installation is just a continuation of this trend. This is perhaps the most troubling aspect of the report as it raises questions about the reasonableness of the conclusion that savings were quite substantial. That conclusion was reached by averaging the 150 days of post-installation consumption with 400 days of pre-installation consumption. However, it appears as if factors other than installation of a low flow showerhead could have been at play. It could be, for example, that changes in the economy or weather or a myriad of other factors was leading to less showering. Put another way, if one compared seasonally adjusted consumption for the 100 days prior installation of the low flow device to consumption for the 300 days prior to that, it appears as if one would show savings at least as great as (if not greater than) those estimated by comparing the post installation 150 days with the pre-installation 400 days. Again, this suggests something other than installation of low flow showerheads

was affecting consumption. A comparison group for which data were gathered over the same period (but with no showerhead changes), would have allowed the study to control for such effects. However, the study did not have a comparison group – again something SAS recommends be included in the future.

- P. 8: A graph of consumption over time for participants in the sample who had high flow showerheads and participants who had medium flow showerheads shows what one might expect in the pre-installation period: that there were similar, gradual downward trends over time, but with the graphic line for the medium flow households holding steadily below that for the high flow homes. However, the graph of the post-installation results is counter-intuitive. If both sets of households were to switch to the same low flow rate showerheads, one would expect the post-installation graphic lines to merge into one. They do not. If the study controlled for everything else, the only difference between the two sets of households should be that one started with higher flow devices than the other. Thus, at the point where they have the same flow rates, their consumption patterns ought to become essentially the same. Again, they don't. This suggests that there are other factors at play which SAS did not discuss in its report (perhaps including sampling bias), but which call into question the use of the analysis as the basis for savings estimates.

The bottom line from our perspective is that the study design is seriously flawed. Moreover, the report presents information that raises fundamental questions about the reasonableness of any conclusions about showerhead savings. Thus, the report should not serve as the basis for any savings estimates.