

BOARD STAFF INTERROGATORY #18

INTERROGATORY

Reference: Exhibit A, Tab 1, Schedule 3, p. 41

Preamble:

Enbridge states: A further concern shared by Enbridge regarding the EC's NTG findings related to the requirement, as outlined for the NTG study, that the sampling methodology should be designed to achieve a 90/10 precision target ("90/10" precision is a statistical standard for which there is 90% confidence that sample results are within +/- 10% relative precision). However the relative precision of some of the ratios did not come close to meeting this expectation.

Questions:

- a) Which NTG ratios did not reach the targeted 90/10 precision target?
- b) What level of absolute precision did these NTG ratios achieve?
- c) For what reasons was the EC not able to achieve the targeted 90/10 precision for these NTG ratios?
- d) In their report, did the EC suggest that the application of the NTG ratios which achieved less than the targeted absolute precision should not be applied and/or would result in an inaccurate/unreliable estimate of program impacts?

RESPONSE

- a) The EC's Scope of Work, dated December 14, 2016, states that the objective of the sample design is to "Achieve 90/10 precision<sup>18</sup> at the desired stratification segment levels." It further describes the Enbridge free ridership program segments to be Custom Commercial, Custom Industrial, and Run it Right. Footnote 18 in the above quote states "90/10 precision refers to 10% **relative** [*emphasis added*] precision with 90% confidence." <sup>1</sup>

Table 8-48 from the Custom Savings Verification and Free-ridership Evaluation, shown below, identifies that the relative precision for Custom Industrial was 15%

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<sup>1</sup> EB-2017-0324, Exhibit B, Tab 5, Schedule 2, page 19

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(representing 42% of program savings) and the relative precision for Custom commercial was 26% (representing 58% of program savings). Neither of these segments achieved the 90/10 precision target.

**Table 8-48: Targeted Sample Domain for Enbridge Custom C&I programs**

Domain	n		Ratio	90% Confidence Interval			Error Ratio	% Program Savings	
	Measures	Clusters		+/-	Lower Bound	Upper Bound			Relative Precision
Custom Industrial	60	50	32%	5%	27%	37%	15%	0.65	42%
Custom Commercial	101	62	27%	7%	20%	35%	26%	1.20	58%
<b>Overall</b>	<b>161</b>	<b>112</b>	<b>29%</b>	<b>4%</b>	<b>25%</b>	<b>34%</b>	<b>15%</b>	<b>0.97</b>	<b>100%</b>

Table 6-2 from the Custom Savings Verification and Free-ridership Evaluation, shown below, identifies that the relative precision for Run it Right was 27%. The Run it Right program segment did not achieve the 90/10 precision target.

**Table 6-2: NTG ratio for Enbridge RunitRight**

Domain	n		Ratio	90% Confidence Interval			Error Ratio	% Program Savings	
	Measures	Customers		+/-	Lower Bound	Upper Bound			Relative Precision
RunitRight	16	10	50%	14%	36%	64%	27%	0.47	100%

APPENDIX M describes the criteria used for determining the domains used for ratio application and reporting. Clusters reported in this table are unique customers per stratum: one customer may be in multiple strata, so the count of clusters is greater than the number of customers contacted.

Further, Table 5-4 from the Custom Savings Verification and Free-ridership Evaluation, below, shows the domains at which the net to gross ratios were applied to the Enbridge projects in order to determine the net savings. This table shows that in all domains with the exception of Custom Multi-Residential Other, the relative precisions ranged from 16% to 76%, and as a result, the 90/10 precision target was not achieved.

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**Table 5-4: NTG ratio for Enbridge Custom C&I programs**

Sector	Domain	n		NTG Ratio	90% Confidence Interval			Error Ratio	% Program Savings	
		Meas.	Custs.		+/-	Lower Bound	Upper Bound			Relative Precision
Custom Industrial	Etools Ventilation	8	7	15%	10%	5%	25%	70%	0.95	10%
	Heat Recovery	13	10	55%	9%	46%	64%	16%	0.27	10%
	Other	39	34	31%	7%	24%	38%	24%	0.81	22%
Custom Commercial	Etools Boiler and Boiler Add-on	25	20	24%	11%	13%	35%	47%	1.22	12%
	Etools Ventilation	15	15	5%	4%	1%	8%	72%	1.58	8%
	Steam Trap	14	6	27%	5%	22%	33%	19%	0.23	2%
	Other	12	8	18%	14%	4%	32%	76%	1.14	16%
Custom Multi-Residential	Etools Boiler	11	8	26%	14%	12%	40%	54%	0.80	13%
	Etools Ventilation	7	7	20%	14%	6%	34%	71%	0.97	3%
	Other	17	7	97%	3%	94%	100%	3%	0.05	3%
<b>Overall*</b>		<b>161</b>	<b>112</b>	<b>29%</b>	<b>4%</b>	<b>25%</b>	<b>34%</b>	<b>15%</b>	<b>0.97</b>	<b>100%</b>

Other Industrial: Controls, Etools boiler, Etools boiler add-on, Etools insulation, steam trap, other (increase mechanical dewatering, VFD, infrared heater and programmable thermostat, low temp catalytic oxidizer, air curtain, industrial roll-up doors, evaporator system, water heater, reduce powder paint curing oven exhaust, dock seal, aquathermat heating system, insulated panels, greenhouse double polyethylene walls)

Other Commercial: Etools insulation, controls, other (dock seal, building shell, steam chiller, high speed door, boiler – hydronic high-efficiency)

Other Multi-res: Etools boiler add-on, Etools insulation, heat reflector panels

APPENDIX M describes the criteria used for determining the domains used for ratio application and reporting.

Clusters reported in this table are unique customers per stratum: one customer may be in multiple strata, so the count of clusters is greater than the number of customers contacted.

\*Overall ratio in this table is the sample weighted average and is not used in calculating net savings for the programs.

b) Since the stated objective for the Study was to achieve 90/10 precision and was defined, as referenced in part a) to mean 10% **relative** [emphasis added] precision with 90% confidence, this question is moot. For additional clarity, the EC’s Scope of Work dated December 14, 2016 defines Relative Precision as “The relative precision is calculated as the absolute precision divided by the ratio itself. By convention, relative precisions are the statistic that are targeted in sampling (i.e. 90/10 is a relative precision metric).”<sup>2</sup> The absolute precision is identified in the “+/-” column.

c) The Custom Savings Verification and Free-Ridership Evaluation stated the following:

By collecting data on all measures at a site rather than only the first selected, the evaluation fell one short of the targeted number of units despite collecting data from 50% fewer sites than targeted. The study had a 52% customer response rate and achieved a NTG ratio with absolute precision of +/- 5% and relative precision of 16% at 90% confidence (shown in Table 5-4). Relative precision is relative to the ratio result, which for sampling purposes was assumed as 50%. The achieved absolute precision (+/-) of 5% would have met the 90/10 relative

<sup>2</sup> EB-2017-0324, Exhibit B, Tab 5, Schedule 2, page 111

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precision target had the NTG ratio been at or above the assumed ratio.<sup>3</sup>

In addition, in response to an Enbridge comment on the Custom Savings Verification and Free-Ridership Evaluation, the EC stated the following:

The 10% accuracy in the SOW referred to the target precision at 90% confidence. The difference between precision and accuracy is bias, which is not measurable. The sample was designed to achieve this level of precision for estimates of X, based the best information at the time. We did/didn't achieve that confidence / precision goal, due to (smaller than attempted sample sizes) (higher than anticipated variability).

The above excerpts show that EC has confirmed that as the results of the study, i.e., the NTG ratios, decrease they also become less precise. Further, the EC has confirmed that they were not able to reach their 90/10 goal due to smaller than attempted sample sizes and higher than anticipated variability. In comments provided to the Custom Savings Verification and Free-ridership Evaluation, Enbridge expressed similar concerns that the smaller sample size post stratification and high variability among samples resulted in lower confidence in the results.

It is Enbridge's opinion that as a result of study design and execution, the results of the NTG study are not robust. Enbridge does not have the expected level of confidence in the results in line with the stated 90/10 objective, and in Enbridge's opinion, the Board should not have confidence in the results either.

- d) Board Staff asks "In their report, did the EC suggest that the application of the NTG ratios which achieved less than the targeted absolute precision...?" Enbridge wishes to clarify that the EC's Scope of Work outlined the objective of achieving a targeted 90/10 precision using relative precision, not absolute precision, as discussed in part a) above.

Enbridge is not aware that the EC suggested that the NTG ratios achieving less than the targeted precision should not be applied and/or would result in an inaccurate / unreliable estimate of program impacts. However, given the objective of the study in this regard, specifically, achieve 90/10 (relative) precision, this would have been appropriate.

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<sup>3</sup> EB-2015-0245, 2015 Natural Gas Demand Side Management Annual Verification, DNV-GL, December 20, 2017, Appendix P, page 31.

Witnesses: D. Bullock  
D. Johnson