

March 16, 2022

Nancy Marconi, Registrar
Ontario Energy Board

VIA RESS AND EMAIL

Dear Ms Marconi:

Re: EB-23021-0002 EGI DSM – GEC-ED Technical Conference Undertaking Responses

Please find below Technical Conference undertaking responses JT3.1 to JT3.5 prepared by Energy Futures Group (testimony of C. Neme and S. Sherwood).

Sincerely,

A handwritten signature in black ink, appearing to read 'David Poch', with a stylized flourish at the end.

Cc: All parties

Undertaking JT3.1: To advise what if any impact free ridership assumptions had on the shape of the graph shown in IR 5.PP.6.

Response:

Mr. Shepherd was specifically asking about the extent to which changes in free ridership or net-to-gross (NTG) assumptions may have been responsible for the drop, from 2019 to 2020, of roughly 20 million annual m3 savings produced by Enbridge's DSM programs. The answer is that free ridership or NTG assumptions do not appear to have been a significant factor in the decline in Enbridge's savings from 2019 to 2020. In fact, a review of the list of evaluations referenced by the Evaluation Consultant in its verification of Enbridge's 2019 and 2020 savings claims suggests that the same free ridership and spillover evaluation studies for both commercial and industrial (C&I) custom projects and C&I prescriptive rebates were used in both years.¹

As the following table shows, more than half of the reduction in net savings was a result of dramatic reductions in savings (84% reduction across both utilities) from Enbridge's and Union's C&I Direct Install program. Based on experience in other jurisdictions, we suspect that the dramatic reduction in savings in the Direct Install program (more than 80% reduction across both utilities) was due – at least in significant part – to the initial reactions to the Covid-19 pandemic. Much of the rest of the reduction was a result of lower savings from the utilities' (particularly Union's) C&I prescriptive program.

Program	2020 (million m3)			2019 (million m3)			Difference (million m3)		
	Enbridge	Union	Total	Enbridge	Union	Total	Enbridge	Union	Total
C&I Custom	21.7	32.0	53.7	24.3	33.4	57.7	-2.6	-1.4	-4.0
C&I Direct Install	1.7	0.3	2.0	7.7	4.9	12.6	-6.0	-4.6	-10.6
C&I Prescriptive	1.6	1.6	3.2	3.0	7.8	10.8	-1.4	-6.2	-7.6
Other C&I	0.2	0.0	0.2	0.3	0.0	0.3	-0.1	0.0	-0.1
Res T-stats	3.1	1.2	4.3	2.3	0.6	2.9	0.8	0.6	1.4
Res Retrofit	7.0	5.0	12.0	8.8	6.2	15.0	-1.8	-1.2	-3.0
Low Income	4.5	3.0	7.5	5.8	3.6	9.4	-1.3	-0.6	-1.9
Large Volume	0.0	12.2	12.2	0.0	7.0	7.0	0.0	5.2	5.2
Total	39.8	55.3	95.1	52.2	63.5	115.7	-12.4	-8.2	-20.6

¹ See Appendix A (p. 42) of DNV-GL, 2019 Natural Gas Demand-Side Management Annual Verification Report, prepared for the Ontario Energy Board, December 3, 2020, as well as Appendix A (p. 42) of DNV-GL, 2019 Natural Gas Demand-Side Management Annual Verification Report, prepared for the Ontario Energy Board, December 2, 2021. Both can be found here: <https://www.oeb.ca/consultations-and-projects/policy-initiatives-and-consultations/natural-gas-demand-side-management>.

JT3.2: Page 1 of 1**To provide a high-level view of any levers the OEB should consider to drive more partnerships.****Response:**

There is no easy or perfect set of tools for ensuring that Enbridge will maximize opportunities for partnerships. Partnerships require the cooperation of two or more parties that may have varying interests and/or reasons to collaborate (or not). Thus, collaboration efforts will likely look different depending on the parties involved. There are also instances when partnerships may not be feasible due to prior experiences or a lack of desire or commonality to pursue collaboration. Recognizing these challenges, EFG provides the following for consideration:

- Create an oversight committee whose mission, at least in part, is to focus on priorities for collaboration/fuel-neutral approaches, to gauge how Enbridge is doing and to report to the Board.
- Tie performance incentives, at least in part, to effective collaboration or even a joint delivery requirement for program areas in which joint electric/gas delivery would be most beneficial – including but not limited to electrification/decarbonization, new construction, etc. Of course, if potentially “logical” parties with which Enbridge might be expected to collaborate are not interested in collaboration, that should not be held against Enbridge. However, Enbridge could be required bear a burden of proof to show why partnerships were not possible.
- Assuming the OEB has the authority, it could require that key programs that may involve fuel switching and/or fuel choice (e.g., new construction) be implemented by a fuel-blind third party, rather than by Enbridge. In one twist on this concept, as discussed during the Technical Conference, the New Jersey regulators have determined that they (the regulators) will oversee (through contracts to qualified firms) a subset of the efficiency programs that utility ratepayers are funding.

It is difficult to develop a catch-all or cookie cutter approach for developing partnerships. While there are opportunities to encourage partnerships and collaboration, ultimately the OEB needs to establish the clear expectation that Enbridge needs to exhaust all reasonable efforts to facilitate collaboration and to reject programs – now and in mid-term reviews – when that has not occurred. The determination of whether Enbridge has exhausted all efforts will need to be subjective. One key might be articulating priority areas where fuel-neutral approaches are expected – fuel-choice programs, electrification, new construction, etc.

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On a best efforts basis, that EFG will seek to address Mr. Weaver's concerns by adjusting as necessary, or indicating where they have already done so.

Response:

In his reply evidence, Mr. Weaver identified four factors, other than spending levels, that he suggested one would need to address in making comparisons between Enbridge savings levels and those of utilities in other jurisdictions:

1. **Net savings rather than gross savings.** Mr. Weaver suggested that EFG's inclusion of the Minnesota utility, Centerpoint, was problematic because Centerpoint's savings are estimated in gross terms (i.e., without adjustments for free ridership and spillover) whereas Enbridge's savings are estimated in net terms (i.e., adjusted for free rider and spillover effects).
2. **Residential behavior program savings.** Mr. Weaver noted that the leading utilities to which EFG compared Enbridge all achieve a significant amount of savings from residential behavior programs which the Ontario Energy Board previously instructed Enbridge not to run.
3. **Residential furnace rebate savings.** Mr. Weaver noted that Canada has a minimum furnace efficiency standard of 95% AFUE, which is considerably higher than the U.S. standard. Thus, he suggested that savings from rebates for residential furnaces biases a comparison of U.S. gas utility savings to Enbridge's savings.
4. **Claiming savings from new construction stretch codes.** Mr. Weaver noted that the Massachusetts utilities are able to claim savings from supporting new construction projects built to the state's stretch code and that it is unclear whether Enbridge would be allowed to do the same in Ontario.

In the following table we show how appropriate adjustments for these factors affects the comparison of leading gas utility savings claims relative to Enbridge's planned savings. The effect of the adjustments we have made is to reduce the annual savings of the comparison utilities by about one quarter. Without such adjustments, their average annual savings was nearly three times Enbridge's planned savings for 2023. With the adjustments, their average savings is a little more than double Enbridge's planned savings for 2023. As discussed further below, that is essentially the same ratio (i.e., a factor of two larger) that we reference in our report when comparing Enbridge lifetime savings to those of the leading gas DSM utilities.

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**Gas DSM Savings Comparisons, with Appropriate Adjustments to Address Ted Weaver's Concerns
(all savings shown in "therms")**

Utility:	Consumers	DTE	N Grid	Eversource	N Grid	Centerpoint	Enbridge 2023 Plan
Jurisdiction:	Michigan	Michigan	Massachusetts	Massachusetts	Rhode Island	Minnesota	Ontario
Reported Total Annual Savings	27,423,890	18,405,870	18,871,000	5,570,000	4,514,660	17,090,461	38,441,700
Subtracted for Enbridge Comparison							
Residential Behavior	2,799,310	2,858,110	5,808,223	1,019,000	1,111,170	1,083,040	-
Residential Furnace Rebates	3,714,420	2,090,570	269,000	116,000	35,011	2,438,215	-
Residential Stretch Codes	-	-	540,000	207,000		-	-
Commercial Stretch Codes	-	-	60,093	1,960		-	-
Total	6,513,730	4,948,680	6,677,316	1,343,960	1,146,181	3,521,255	-
Adjusted Total Annual Savings	20,910,160	13,457,190	12,193,684	4,226,040	3,368,479	13,569,206	38,441,700
Adjusted Savings as % of Unadjusted	76%	73%	65%	76%	75%	79%	100%
Savings as % of Sales							
As reported	1.05%	1.08%	1.30%	1.33%	1.14%	1.14%	0.42%
As adjusted	0.80%	0.79%	0.84%	1.01%	0.85%	0.90%	0.42%

The values in the table above reflect the following adjustments made in response to the concerns expressed by Mr. Weaver:

1. **Net savings.** Mr. Weaver is correct that Centerpoint reports savings on a gross basis, without adjusting for free riders. However, we already adjusted for that in the savings values that we presented in our report. Specifically, we applied a national average net to gross (NTG) ratio that the American Council for an Energy Efficient Economy used when it conducted a similar (though more expansive) effort to compare the savings levels of different U.S. states. Mr. Weaver has suggested that the average (NTG) ratio may not be appropriate for comparing savings to Enbridge because Enbridge's NTG ratio is a much lower 50%. However, that argument is fundamentally flawed. There is no reason to normalize for different NTG ratios because those ratios are primarily a function of program design rather than something that is endemic to a given jurisdiction. Put another way, Enbridge could increase its NTG ratio by changing its program design. Ontario's Evaluation Consultant has actually made recommendations to this effect.² Thus, no additional adjustment is needed (or was made) to address Mr. Weaver's expressed concerns about Centerpoint's reporting of gross rather than net savings. However, we would observe that removing Centerpoint from the comparison would not materially affect the conclusion regarding how much more leading gas DSM utilities have achieved relative to what Enbridge is proposing.

² For example, see the discussion of recommendations regarding free ridership and net-to-gross ratios in Section 5.4 of DNV-GL, 2018 Natural gas Demand-Side Management Annual Verification, prepared for the Ontario Energy Board March 13, 2020 (<https://www.oeb.ca/consultations-and-projects/policy-initiatives-and-consultations/natural-gas-demand-side-management>).

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2. **Residential behavior program savings.** Mr. Weaver is correct that leading gas utilities often include savings from residential behavior programs. Such programs can provide substantial first year savings at modest cost per first year m3 of gas saved. However, those savings are very short-lived. As a result, to the extent that they are included in utility DSM program portfolios, they drive down the average life of the savings achieved. In our report, we made a point of the fact that Enbridge had a longer average measure life than the utilities to which we were comparing them, but that even when one considered lifetime savings – i.e., a metric that effectively adjusts for the inclusion of Residential behavior program savings in other utilities' totals and their exclusion from Enbridge's – the other utilities were still achieving roughly twice as much savings as Enbridge. That said, to allow for a comparison of annual savings (rather than lifetime savings), we have removed all Residential Behavior program savings from our comparison utilities' totals.³ Note that we have conservatively assumed that the budget savings from eliminating Residential Behavior programs would not be re-allocated to other programs from which they could generate additional savings.
3. **Residential furnace rebate savings.** Mr. Weaver is correct that the utilities to which we have compared Enbridge have the advantage of being able to claim substantially more savings than Enbridge can from high efficiency furnaces because of the lower minimum product efficiency standards in the U.S. As a result, we have removed all savings from residential furnace rebates that were claimed by the comparison utilities. That said, this change does not have a huge effect on the bottom line as residential furnace rebates did not account for more than 14% of savings for any of the comparison utilities; for the Massachusetts and Rhode Island utilities, it was only 1-2%.⁴ Note that this is substantially less than Mr. Weaver suggested in both an interrogatory response⁵ and the Technical Conference. Mr. Weaver made the mistake of assuming that 100% of the savings reported by National Grid for its residential rebate program were from furnaces.⁶ The reality is that less than 20% of National Grid's residential rebate program savings in Massachusetts were from furnaces. The largest portion of savings from that program was from the same kinds of smart thermostats that Enbridge is promoting. Note that we have also conservatively assumed that the furnace rebate dollars expended by the

³ The sources for the amount of savings from residential behavior programs are the same as those provided in footnote 15 of our report for the total savings values from each utility.

⁴ Savings from residential furnace rebates for Consumers and Centerpoint are the same as those provided in footnote 15 of our report for the total saving values from each utility. For DTE, the portion of the 2019 Residential HVAC Rebates program savings attributable to furnace rebates was provided in personal communications with DTE staff. For the two Massachusetts utilities, the portion of residential rebate program savings attributable to furnaces was from <https://www.masssavedata.com/Public/MeasuresDetails>. Note that similar measure level data are not available for National Grid in Rhode Island. However, National Grid runs essentially the same programs in with the same program designs in both states, so we have assumed that furnaces provide the same percentage of residential HVAC rebate program savings in Rhode Island as in Massachusetts. That assumption may even be conservative because a 2020 planning tool for National Grid in Rhode Island suggests that furnaces may represent an even smaller fraction of program savings than was the case in Massachusetts in 2019.

⁵ Exh. I.3.EGI.GEC.20(d)

⁶ Ibid. Note that during the Technical Conference he said it was "mostly furnaces".

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comparison utilities would not have been re-allocated to other programs from which they could have generated additional savings.

4. **New construction stretch codes.** Mr. Weaver is correct that Massachusetts utilities can claim savings from advancing code compliance, including savings from meeting the state's stretch code requirements in towns that have adopted the stretch code. In his interrogatory response, Mr. Weaver suggested it would be necessary to remove all residential and commercial new construction program savings from the Massachusetts utilities' totals. However, that is an over-adjustment. First, while most of the Massachusetts residential new construction savings are in towns that have adopted the stretch code, some are not. Second, the commercial stretch code is not much different than the standard state code and participants in the utilities' commercial new construction program are building to efficiency standards that are above the stretch code.⁷ Thus, we have removed all residential new construction savings but only a small portion of commercial new construction savings that have been directly attributed by the Massachusetts utilities to "codes and standards compliance education".⁸

In the Technical Conference, Mr. Weaver also suggested that it would be appropriate to adjust for the fact that Enbridge's portfolio average net-to-gross ratio is lower than those of other utilities. However, for reasons described above in our discussion of Centerpoint's net savings, Mr. Weaver's conclusion on this issue is fundamentally flawed.

Mr. Weaver also suggested in the Technical Conference that another difference between Enbridge and other utilities that EFG did not address is that other utilities get savings from low flow showerheads and faucet aerators which Enbridge "does not include" in its programs.⁹ However, that is incorrect. In fact, Enbridge specifically lists showerheads among the measures it will install in both of its low income programs.¹⁰ Even if that wasn't the case, Mr. Weaver's concern would be a red herring for at least a couple of reasons. First, the portion of savings which leading utilities typically obtain from low flow showerheads and aerators is very small. For example, in 2019 such measures only accounted for 1% of the total Massachusetts portfolio savings from both National Grid and Eversource.¹¹ Second, Mr. Weaver was attempting to identify one measure or set of measures that Enbridge may have promoted in higher volumes in past years than other utilities without accounting for the certainty that other utilities will have done the same with other measures (and therefore would have less remaining savings potential from such other measures than Enbridge would have).

Finally, we can think of at least one important way in which Enbridge has a comparative advantage which Mr. Weaver did not address. Namely, Enbridge has been claiming much higher levels of savings for new C&I boilers than are claimed by utilities in other jurisdictions. That is because the Company attributes savings not only to improvements in the rated efficiency of boilers, but also to a variety of other factors including staging (e.g., single, 2-stage, modulating), pumping (continuous or not), flue damping, purge cycles and other factors whose savings are not fully captured in efficiency ratings. In

⁷ Information provided by the state's evaluator.

⁸ <https://www.masssavedata.com/Public/MeasuresDetails>

⁹ March 1, 2022 Technical Conference transcript, p. 192, line 11.

¹⁰ Exh E, Tab 1, Schedule 3, pp. 12 and 17

¹¹ <https://www.masssavedata.com/Public/MeasuresDetails>

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our experience, utilities in other jurisdictions do not adjust their C&I boiler savings claims upward (i.e., beyond what their rated efficiencies suggest about savings) to account for the potential additional savings that improvements in these other factors can provide – even though the boilers they are rebating often come with those improved features. It would not surprise us if the approach to C&I boiler savings estimation had a bigger impact on comparison of Enbridge’s savings to those of leading gas utilities than both the furnace and stretch code impacts (together) have. Again, to be conservative, we have not attempted to adjust Enbridge’s savings down to account for this difference when making comparisons to leading gas utilities.

JT3.4: Page 1 of 2**To provide a high-level view on cost-effectiveness of home energy program measures.****Response:**

Dr. Higgins was specifically asking about the cost-effectiveness of exterior wall insulation. That measure has not been characterized in the Ontario Gas Technical Reference Manual. Thus, we do not have a readily accessible set of assumptions about savings and costs to use for such an assessment. However, we have endeavored to be responsive and have developed an initial high-level estimate of savings using the following engineering calculation:

$$\Delta m^3 = ((1/R_{old} - 1/R_{new}) * \text{Wall sq. ft.} * 24 * \text{Heating Degree Days}) / (\text{Heating Efficiency} * 35,300 \text{ Btu/m}^3)$$

For purposes of this calculation, we assumed a two-story home with dimensions of 24 x 40 feet. That is 1,920 square feet of living space and 1,741 square feet of insulated wall area assuming 15% of walls are windows or doors.¹² We further assumed 5500 heating degree days relative to a balance point of 60 degrees Fahrenheit, which is approximately the average for the Toronto Pearson airport.¹³ Finally, we assumed an average heating system efficiency of 80%. That accounts for both furnace efficiency losses and ducted distribution system losses.

To monetize those savings, we assumed exterior wall insulation would have a life of 25 years and the weather sensitive avoided costs, value for carbon emission reductions and nominal discount rate used by Enbridge in this proceeding.¹⁴ That yields a net present value (NPV) of \$7.97 per annual m³ saved. With the 15% non-energy benefits adder under the TRC+ test, the total benefit would be \$9.17 per annual m³ saved.

To then estimate the value of exterior wall insulation, one needs to make an assumption about the pre-existing wall insulation R-value and how much the R-value is increased. Based on experience, we assume that an uninsulated wall has an R-value of 4.5.¹⁵ Using the formula above, that would provide annual savings of 1,247 m³ with a TRC+ economic value of about \$11,400 for the addition of R-10 insulation.¹⁶ We have not conducted an extensive assessment of the cost of exterior wall insulation, but did find one reference that (after adjustments for inflation and exchange rates) suggests it may be on the order of \$3 to \$4 CDN per square foot.¹⁷ At that cost, it would appear that insulating an uninsulated exterior wall could be quite cost-effective, with a benefit-cost ratio on the order of about 1.8 to 1. Note that if a real discount rate of 0.5% (the value we recommend in our report) is used instead of the 4.0% used by Enbridge, the benefits would be about 50% greater,¹⁸ leading to a benefit-cost ratio on the order of 2.7 to 1.

¹² $(24+40+24+40)*16*0.85 = 1741$

¹³ <https://www.weatherdatadepot.com/heating-degree-days>

¹⁴ I.5.EGI.ED.16_Attachment 1

¹⁵ That accounts for the insulating value of exterior sheathing, wood studs, interior drywall, etc.

¹⁶ Annual savings would be 1476 m³, with a TRC+ economic value of about \$13,500 for the addition of R-20 insulation.

¹⁷ <https://www.remodelingexpense.com/costs/cost-of-exterior-insulation/>

¹⁸ Even with a real discount rate of 1.0%, the NPV of the savings for this measure would increase by about 40% relative to the use of a 4.0% rate.

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However, it should be noted that the level of savings achieved and, therefore, the cost-effectiveness of the measure, is very sensitive to the assumption regarding the existing wall R-value and measure cost, as well as the discount rate assumption.

With respect to measure cost, we know that exterior wall insulation can sometimes cost more than \$3 to \$4 per square foot. However, customers are often interested in the measure because of the improved aesthetic associated with the addition of stucco placed on the outside of the exterior wall insulation. That raises an important question regarding what to treat as the measure cost in the context of investments often made in significant part for aesthetic or other non-energy reasons.

Finally, it should be emphasized that the calculations we have provided are preliminary and high-level. We would need to more rigorously assess likely savings levels and costs to draw definitive conclusions about the cost-effectiveness of different levels of exterior wall insulation.

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On a best efforts basis, to provide references for the basis for decision-making around the assignment of programs to utilities or third parties.

Response:

Mr. Quinn's question focused on how decisions were made in New Jersey regarding which programs would be run by which entities. The June 10, 2020 New Jersey Board of Public Utilities (BPU) order approving the policy framework for future utility ratepayer-funded efficiency programs summarizes which programs would be utility-led (pp. 9-14), which would be "state-led" (pp. 14-15), and which would be "co-managed" by the state and the utilities (p. 15).¹⁹

With respect to the question of *why* or *how* the BPU determined which types of programs would be best delivered by utilities versus by the state (or by a third part contractor hired by the state), some information can be found in the March 20, 2020 Straw Proposal prepared by BPU Staff.²⁰ Appendix A to the June 10th, 2020 BPU order (starting on p. 49) provides a summary of stakeholder feedback received on different aspects of the Staff's Straw Proposal, as well as BPU Staff's responses to that feedback. In a number of cases that includes discussion of the question of which entity should manage different programs.

¹⁹ New Jersey Board of Public Utilities, Order Directing the Utilities to Establish Efficiency and Peak Demand Reduction Programs in Docket Nos. QO19010040, QO19060748 and QO17091004, June 10, 2020, Agenda Item 8D (<https://www.nj.gov/bpu/pdf/boardorders/2020/20200610/8D--Order%20Directing%20the%20Utilities%20to%20Establish%20Energy%20Efficiency%20and%20Peak%20Demand%20Reduction%20Programs.pdf>).

²⁰ See pp. 21-26 in New Jersey Board of Public Utilities, Division of Clean Energy, Straw Proposal for New Jersey's Energy Efficiency and Peak Demand Reduction Programs, issued for public comment Spring 2020 (<https://www.nj.gov/bpu/pdf/3-20-20%20Final%20EE%20Straw%20Proposal.pdf>).