NAVIGANT

Natural Gas Energy Efficiency Potential Study

Final Report

Prepared for:

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ENBRIDGE

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Table 5-20. Cumulative (10-Year) Budget* and Achievable Potential by Sector & Budget Scenario in 2024

Scenario	Commercial		Industrial		Low Income		Residential	
	Budget ($ million)	Savings (million m3/yr)	Budget ($ million)	Savings (million m3/yr)	Budget ($ million)	Savings (million m3/yr)	Budget ($ million)	Savings (million m3/yr)
A	65	425	23	300	74	39	32	118
Base Case	77	438	27	308	87	44	40	130
C	88	449	30	316	99	48	48	141
D	99	461	33	323	114	52	55	152
E	111	472	37	330	130	56	63	163
F	124	483	40	337	150	61	71	174
G	137	495	44	344	175	66	80	184
H	150	506	48	351	204	71	90	195
I	164	517	52	358	232	76	100	206
J	227	532	70	365	256	78	144	222
K	401	574	133	388	256	78	317	264
L	564	608	201	409	256	78	542	319

* Excludes portfolio-level administrative costs

Source: Navigant analysis, 2014

5.4.2 TRC Screening Threshold Sensitivity

As requested by Enbridge, Navigant explored several approaches aimed at increasing cumulative cubic meters (CCM) potential, which is the first-year gas savings potential of each measure multiplied by the measure's lifetime. The first approach adjusted the incentives levels on a levelized $/m^3 basis, while keeping the cumulative 10-year budget equivalent to the base case ($350 million). Adjusting the incentives levels to maximize CCM led to an increase of 0.27 percent in total CCM (2015 through 2024). This modest increase in total CCM was expected because incentivizing measures on a levelized $/m^3 basis already tends to favor measures with high CCM savings potential. The second approach allowed non-cost-effective, but high-CCM, measures to be considered in the market adoption routines, while using the same incentive approach as the base case. This method was not able to provide higher CCM potential at equivalent cost to the base case, and increases in CCM were only achieved at considerable cost. To supplement the insights gained from these results, Navigant performed an additional sensitivity analysis, discussed below, that investigate the TRC screening threshold's impact on savings and budgets.

Section 5.3.3 shows that the base case achievable potential scenario has high TRC ratios, which indicates that the TRC screening threshold (0.7 for the low income sector and 1.0 for all other sectors) can be reduced while still maintaining a cost-effective portfolio. In this sensitivity analysis, Navigant reduced the TRC screening threshold to zero, effectively allowing all measures to be considered in economic and achievable potential, to explore the impact on the portfolio-level TRC ratios, forecast gas savings and budgets. With the TRC screening threshold reduced to zero, Navigant repeated the same incentive scenarios detailed in Section 5.4.1.

3.6 Operational Improvements Measure

Comment

I cannot find in Appendix C what is supposed to be included in "operational improvements." If it is intended to encompass the range of low/no cost changes for getting buildings to run right – identifying and correcting faulty dampers, valves and sensors, adjusting operating schedules, HVAC system re-balancing, smart automation system programming etc – then in our experience both the absolute amount and proportion of total DSM potential are far greater than indicated. I believe the actual savings reported to Enbridge on behalf of our clients and program members over the past ten years would support this assessment.

Response

The characterization of the "Operational Improvements" measure is based on experience with the Enbridge "Run it Right" initiative. That initiative identifies operational improvements based on a review of baseline consumption over a two-year period and provides support for implementation of a wide range of building operational improvements. The level of savings used in modeling this measure therefore reflects actual program experience.

4. Jay Shepherd Comments

On December 10, 2014, Jay Shepherd sent an email to Enbridge that included several comments. Those comments are addressed in the following sections.

4.1 Cumulative Cubic Meters vs. First-Year Savings Potential

Comment

I was very concerned with the focus on annual as opposed to cumulative cubic meters. Without measure lives, persistence, and similar factors, it is difficult to assess the value of the budget dollars at any given level. In effect, the focus on annual savings – which I know is quite common – assumes that once savings are achieved, they last forever. This is not the case.

Response

This question is very similar to that posed in Section 2.3. We therefore refer the reader to the response provided in Section 2.3.

4.2 Non-Optimal Acquisition

Comment

There is a lack of optimization analysis, which I would have considered critical in a study like this. I have attached a spreadsheet showing the incremental cost of annual cubic meters based on tables ES-3 and 5-19. Note that the latter table does not include administrative costs, so you have to add about 22% to the unit costs. What this appears to show is that, at a certain level, it no longer makes a lot of sense to spend incremental dollars to chase additional savings. Clearly incremental annual cubic meters aren't worth spending $4.00 per, unless they last for a very long time. If we had cumulative modeling, of course, we could analyse this more precisely.

I also note that these incremental calculations show some counterintuitive results, where incremental budget gets savings at lower costs than the previous increment. This would normally suggest suboptimal programs. I understand that this can happen, but it would be valuable to understand what aspects of the model are causing this unusual result to occur.

Response

As discussed in Section 5.1.6 and 5.4.2 of the draft report, an incentive strategy based upon each measure's levelized cost of savings accounts for each measure's longevity of savings, which results in incentives being directed towards measures with higher cumulative cubic meters (CCM) savings. This incentive approach leads to budget scenarios that show increasing $/CCM acquisition costs as a function of increasing budget levels, meaning that the cheapest measures (on a $/CCM basis) are harvested first. Please see the response to overarching comments in Section **Error! Reference source not found.** for an explanation of why we have focused on annual incremental savings.

Navigant reviewed the results and acknowledged that the marginal acquisition costs (in $/m³/year) were not monotonically increasing with the budget levels. Further exploration revealed that the marketing effectiveness parameters, which impact the adoption of efficient measures in the achievable potential calculations, were not ramping linearly as a function of the budget scenarios as Navigant originally intended. The non-linearity of marketing effectiveness parameters led to situations where the increase in adoption due to marketing (a lower cost strategy) outpaced the increase in adoption due to incentives (a higher cost strategy), which resulted in marginal acquisition costs that did not always increase as a function of higher budget levels.

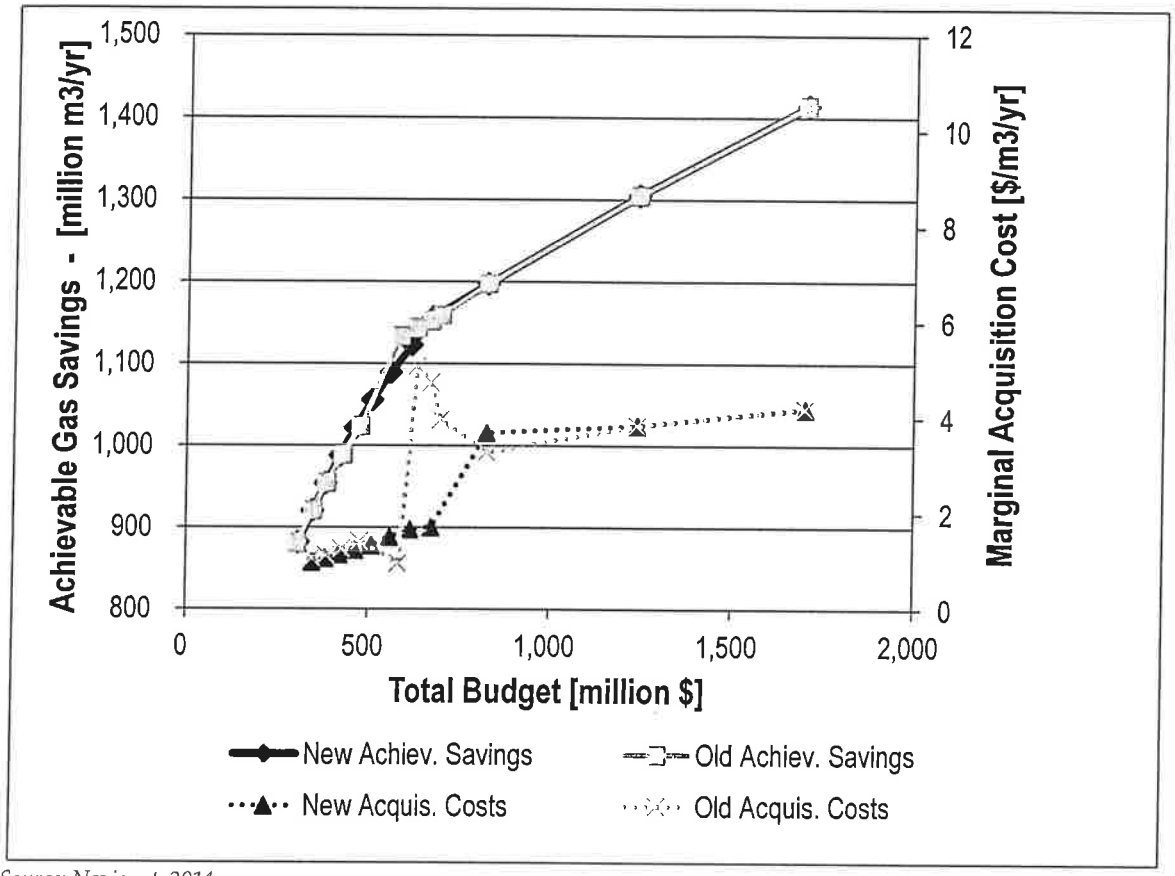
Navigant has remedied this issue by ensuring that marketing effectiveness parameters ramp linearly as a function of budget levels for scenarios A through I (marketing effectiveness has reached its highest realistic value by Scenario I and is held constant for the remaining scenarios). This change to the model has a minimal impact on overall results and does not change the base case at all, but it does ensure that marginal acquisition costs increase as budget levels increase. Table 4-1 provides comparisons of corrected portfolio-level results to the results included in the draft report. Figure 4-1 shows that the new results smooth out the gas savings curve and remove the "kink" caused by the non-linearity in market effectiveness parameters. Additionally, Figure 1 shows that the marginal acquisition costs for the new results are always increasing as budget levels increase. The jump in marginal acquisition costs between Scenarios I and J is caused by a dramatic increase in the incentive levels that was required to produce the desired budget levels described in Section 5.4.2 of the draft report. Lastly, Table 4-2 provides the new budgets, savings, and marginal acquisitions costs by sector.

Table 4-1. Cumulative Budgets, Achievable Gas Savings & Marginal Acquisition Costs for the Portfolio by Budget Scenario

	Results After Correction			Results from Draft Report		
Scenario	Budget ($ million)	Savings (million m3/yr)	Marginal Acquisition Cost ($/m3/yr)	Budget ($ million)	Savings (million m3/yr)	Marginal Acquisition Cost ($/m3/yr)
A	312	882		307	881	
Base Case	350	920	0.98	350	920	1.07
C	385	954	1.06	388	954	1.13
D	424	987	1.14	431	988	1.25
E	465	1,021	1.23	479	1,023	1.41
F	510	1,055	1.33	585	1,134	0.96
G	562	1,089	1.52	634	1,143	5.07
H	618	1,123	1.67	672	1,151	4.74
I	676	1,156	1.72	700	1,158	3.96
J	827	1,197	3.70	827	1,197	3.29
K	1,241	1,305	3.84	1,240	1,305	3.84
L	1,700	1,414	4.20	1,699	1,414	4.20

Source: Navigant, 2014

Figure 4-1. Cumulative Achievable Gas Savings and Marginal Acquisition Costs



Source: Navigant, 2014

Table 4-2. Cumulative Budgets, Achievable Gas Savings & Marginal Acquisition Costs by Sector and Budget Scenario

	Commercial			Industrial			Low Income			Residential		
Scenario	Budget* ($ million)	Savings (million m3/yr)	Marginal Acquisition Cost* ($/m3/yr)	Budget* ($ million)	Savings (million m3/yr)	Marginal Acquisition Cost* ($/m3/yr)	Budget* ($ million)	Savings (million m3/yr)	Marginal Acquisition Cost* ($/m3/yr)	Budget* ($ million)	Savings (million m3/yr)	Marginal Acquisition Cost* ($/m3/yr)
A	65	425		23	300		74	39		32	118	
Base Case	77	438	0.90	27	308	0.40	87	44	2.93	40	130	0.66
C	88	449	0.97	30	316	0.43	99	48	3.21	48	141	0.70
D	99	461	1.02	33	323	0.46	114	52	3.52	55	152	0.71
E	111	472	1.07	37	330	0.49	130	56	3.95	63	163	0.73
F	124	483	1.08	40	337	0.50	150	61	4.37	71	174	0.76
G	137	495	1.17	44	344	0.54	175	66	4.87	80	184	0.83
H	150	506	1.21	48	351	0.56	204	71	5.26	90	195	0.90
I	164	517	1.26	52	358	0.58	232	76	5.55	100	206	0.96
J	227	532	4.00	70	365	2.56	256	78	11.12	144	222	2.79
K	401	574	4.17	133	388	2.76	256	78	#DIV/0!	317	264	4.02
L	564	608	4.78	201	409	3.20	256	78	#DIV/0!	542	319	4.15

*Sector-level budgets do not include portfolio-level administrative costs.

Source: Navigant, 2014

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4.3 TRC Screening Thresholds

Comment

There is a discussion of the TRC calculations, and the portfolio impacts (p.117) of reducing the screening threshold. This is emblematic of the lack of optimization analysis. If you are able to buy something worth $1.00 for $0.50, that doesn't mean that you should go out and spend $1.50 to get another one. The second transaction is still a bad idea, because it is still paying more than full value for something. What this report brings to the fore is the underlying flaw in portfolio-level cost-effectiveness testing. Incremental programs should be self-justifying. They should not rely on the previous programs being so good that there is room to spare. The material Kai has requested should help understand this a little better. If you could provide it, not just for the base case, but for each of the A-I scenarios, that would be great.

Response

Please refer to the discussion in section 4.2 regarding the suggestion of "non-optimal" output. Additionally, we note that the sensitivity analysis conducted in this section was a) prescribed by the RFP, b) consistent with OEB guidelines for administering DSM programs, and c) were merely meant to illustrate the likely savings and budgets by investigating all options to driving higher savings. Thus, this sensitivity goes a long way toward addressing concerns raised about the level of avoided costs assumed, since reducing the TRC threshold has a similar effect on savings as increasing avoided costs would have. Additionally, as noted in Section 6.1 , we have provided the data Kai Millyard requested for four separate budget scenarios.

4.4 Administrative Costs

Comment

Table 5-16 has some assumptions for administrative costs ($7.9 million plus 3.3 cents per cubic meter). I wasn't able to figure out where they came from. Could Navigant or Enbridge provide us with the calculations?

Response

The administrative cost estimates were based in part on historical non-incentive spending (provided by Enbridge) as well as a judgment-based estimate of how that spending would likely scale up with program growth. We assumed that roughly 50% of the historic non-incentive spending would be subject to "scaling" with added savings, with the other 50% considered to be a "fixed" administrative cost that did not scale with spending.

4.5 Market Transformation Costs

Comment

One of the tables shows about $60 million in Market Transformation costs included as assumptions, but "provided by Enbridge". It would be useful to know how those costs, and the impacts, were factored into the study.