K5.2

EB-2015-0049

Green Energy Coalition

Cross-examination Materials

For Enbridge Panel 1

Overall, many stakeholders were of the view that annual DSM spending was likely to increase in order to achieve a greater level of natural gas savings, although there were some stakeholders who cautioned that increased spending must be supported by evidence that clearly displayed the incremental benefits the additional expenditures will produce.

4.2 Board Conclusions

The Board's objectives with respect to natural gas include the requirement to protect the interests of consumers with respect to prices, reliability and quality of gas service. The Board also has an objective to promote energy conservation and energy efficiency, but doing so having regard to the consumer's economic circumstances. In approving any budget amount, it is necessary for the Board to consider the rate impacts, or overall cost impacts, to customers, as all DSM costs are recovered through distribution rates. As noted earlier, since all customers share the total cost of DSM activities undertaken by the gas utilities, the Board must be mindful of the cost impacts to the non-participating customers. Many customers in all rate classes will likely not participate in a DSM program over the course of the new DSM framework. This is due to a number of reasons, including the inherent limits of DSM programs, primarily driven by the lack of opportunities a customer has to upgrade space or water heating systems. Although non-participating customers will enjoy some of the non-energy benefits that result from the program, including environmental benefits, the Board is centrally concerned with two factors that must be balanced: ensuring the gas utilities have sufficient funding available to pursue all cost-effective natural gas savings in their franchise areas and that the costs to undertake such efforts are reasonable for those customers who will not participate in a program.

Therefore, the Board has determined that for DSM activities between 2015 and 2020, the gas utilities' annual DSM budgets should be guided by the simple principle that DSM costs (inclusive of both DSM budget amounts and shareholder incentive amounts[15]) for a typical residential customer of each gas utility should be no greater than approximately $2.00/month. The current bill impact for a typical residential customer is just under $1.00/month. The budget guidance for the new multi-year DSM plans is in the order of double the cost impacts to residential customers from the 2012 to 2014 DSM period. Based on a $2.00/month cost impact to a typical residential customer and considering the general historic program mix and the relative size of each utility, the Board has estimated total annual DSM amounts of $85M for Enbridge and $70M for

[15] Shareholder Incentives are further discussed in Section 5 below.

Union (these amounts are inclusive of the maximum annual shareholder incentive[16]). The Board is therefore establishing this as the maximum budget guideline for the new framework. NRG is encouraged to prepare and file a DSM plan with Board. Given that this is a new activity for NRG, the Board concludes that it should start initially with a DSM budget lower than a budget based on NRG's relative size to EGD and Union, and a bill impact for residential customers more in line with EGD and Union's from the previous framework.[17] This can be reviewed at the time of the mid-term review.

To reach the annual budget levels of $75M for EGD and $60M for Union (exclusive of maximum annual shareholder incentive), utilities will need to propose cost-effective DSM plans with results in gas savings, benefits to customers, program participation and implementation of key priorities (outlined in Section 6.2 below) commensurate with the proposed spending. The Board expects that the multi-year DSM plan applications will propose a plan to phase in increases to the annual budget amounts. While the program mix going forward has not been prescribed, the Board is of the view that a bill impact of $2.00/month for a typical residential customer, combined with the total budget amounts discussed above, provides a reasonable guideline for the gas utilities to prepare their DSM plans. The Board notes that this is a guideline, and the utilities can propose alternative budgets for approval by the Board, appropriately supported by evidence.

The budget amounts outlined above assume a general program mix where 40% of ratepayer funding for DSM activities is dedicated to the residential class. The gas utilities should ensure that overall cost increases to all other rate classes are generally proportional with the guidance outlined relative to residential customers, and that any proposed increases are reasonable and supported by significant benefits, including both natural gas savings and prospective bill reductions for customers. The gas utilities should include a forecast of the number of participants (customers, not measures installed) for each proposed program in each year. For each program proposed by the gas utilities, they should also include anticipated overall cost impacts (budget and shareholder incentive) for a typical customer in each rate class, and projected monthly and annual bill reductions for a typical participant and the overall costs borne by a typical non-participating customer.

[16] This is made up of maximum annual budgets of $74.5M for EGD and $59.5M for Union with maximum annual incentives equal to $10.45M for EGD and Union.

[17] The Board does not have historic DSM information for NRG. A budget based on NRG's relative size to both EGD and Union would be $0.35M, and therefore the budget for NRG would be expected to be lower than this. NRG will be expected to fully support any application for rate funding to support DSM activities similar to that which is expected of both EGD and Union.

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Exhibit I.T3.EGDI.GEC.28
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GEC INTERROGATORY #28

INTERROGATORY

Reference: Exh. B/T2/S4

Regarding Tables 2, 4, 6, 8, 10 and 12

a. Please confirm that the average bill impacts shown in the last three columns are only the impacts from program spending and shareholder incentives.
b. Please confirm that the average bill impacts shown in the last three columns do not include the downward pressure on bills resulting from efficiency programs' energy savings.
c. Please confirm that the average bill impacts shown in the last three columns do not include the downward pressure on bills resulting from deferred capital investment in gas transmission and/or distribution, price suppression effects, or reduced future costs of complying with carbon dioxide emission regulations.

RESPONSE

a. The values in the last three columns include impacts based on the DSM Budget and shareholder incentives.

b. The average bill impacts shown in the last three columns do not incorporate any downward pressure that may result from efficiency programs' energy savings.

c. The average bill impacts shown in the last three columns do not include any downward pressure that may result from deferred capital investments in gas transmission and / or distribution, price suppression effects, or reduced future costs of complying with carbon dioxide emission regulations.

Witnesses: K. Mark
S. Mills
F. Oliver-Glasford
B. Ott

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Exhibit I.T8.EGDI.GEC.34
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GEC INTERROGATORY #34

INTERROGATORY

Topic 8 - Cost Effectiveness Screening

Reference B/T1/S1 Enbridge states that its DSM programs since 1995 have helped customers save 8.8 billion m3 of natural gas.

a) Is the 8.8 billion cubic meters of gas savings the sum of the incremental annual savings from the 1995 through 2013 programs, the annual persisting savings in 2015 from programs run since 1995, the sum of the lifetime savings from each year's worth of programs from 1995 through 2013, or something else? If something else, please explain.

b) Please provide the annual (first-year) and cumulative gas savings for each year from 1995 to 2014.

c) Please provide the TRC net benefits associated with each year's savings, indicating what avoided costs were used to calculate those TRC results.

d) Please provide, in original electronic form with formulas intact, the computations used to arrive at both the net benefits and gas savings totals cited.

e) Please provide Enbridge's annual in-franchise total throughput volumes for each of the corresponding years.

RESPONSE

a) The 8.8 billion cubic meters of gas savings represents the sum of the lifetime gas savings m3 (aggregate of all years from 1995) assuming a 12 year lifetime.
b) Annual and cumulative gas savings:

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Fully Effective Annual Net Gas Savings (million m3)	3.87	18.82	18.60	36.18	52.05	58.86	79.60	78.76	77.54	62.70
Year	2005 (15 months)	2006	2007	2008	2009	2010	2011	2012	2013	2014**
Fully Effective Annual Net Gas Savings (million m3)	91.42	89.52	91.92	80.29	74.32	65.65	77.43	60.14	47.74	43.54

***Note: 2014 DSM results are pre-clearance and are not final. As a result, 2014 DSM results could be subject to change.*

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Cumulative Cubic Metres (million CCM)	58.06	282.29	278.95	542.69	780.70	882.88	1,193.98	1,181.42	1,163.17	940.45
Year	2005 (15 months)	2006	2007	2008	2009	2010	2011	2012	2013	2014**
Cumulative Cubic Metres (million CCM)	1,371.27	1,342.80	1,214.10	1,153.32	1,051.80	967.09	1,276.12	1,068.98	826.91	719.84

***Note: 2014 DSM results are pre-clearance and are not final. As a result, 2014 DSM results could be subject to change.*

862,000,000 m3 last 12 yrs of DSM
12.1 billion m3 throughput 2015
= 6.7% savings as % of total volume

Witnesses: K. Mark
S. Moffat
B. Ott

- The Company's estimates of the volume of additional participation and savings it could achieve from increase rebate levels for its home retrofit program are unsupportable. In its base budget, the Company has estimated that it would only have 5000 participating homes in 2020. In contrast, Enbridge exceeded that number with its home retrofit program in 2014 and is forecasting that it will have approximately 13,500 participants in 2020. Even after adjusting for the fact that Enbridge has roughly 50% more residential customers, Enbridge's forecast participation is nearly twice the participation rate Union has forecast for its own program with comparable incentive levels. Thus, Union should be able to achieve significant additional participation in this program without raising rebate levels.

2. Enbridge's Sensitivity Analyses

Enbridge also analyzed three budget sensitivity scenarios – one that represented 25% less spending than in its base plan, one that represented 25% greater spending than in its base plan and a third that represented 50% greater spending than in its base plan. Enbridge appeared to approach the sensitivity analysis in a more structured way than Union. In particular, it started by assessing each of its programs to determine which were "scalable" (i.e. could grow with additional funds) and which were not. Nine different program offerings were deemed to be scalable.[44]

The Company then developed estimates of how much of the increased budget would be allocated to different functions and programs. To Enbridge's credit (and in contrast with Union), only a small portion of the increased budget was assumed to be needed for additional overhead costs (e.g. evaluation and administration), so the 25% budget increase was assumed to be more like a 30% increase for programs. Note that because only a portion of programs are assumed to be scalable, the percent increase for the scalable programs is estimated to be even larger than that.

For the programs that generate trackable savings, Enbridge then developed and applied a formula that was supposed to correlate increased spending with increased savings. The formula was supposedly based on the relationship between changes in spending and changes in savings from Enbridge's recently completed potential study. Unfortunately, there are numerous and important problems with the approach that Enbridge took that render its sensitivity scenarios virtually useless:

- Additional budget is allocated to "scalable programs" in the same proportion as it was allocated to those programs in the Company's base budget. No effort was made

[44] Exh B/T1/S5.

to optimize how additional spending would be allocated – either to maximize additional savings or to address other strategic goals. Again, this is somewhat understandable given the very limited time the Company had to develop a complex filing of which the sensitivity analysis was only one part. However, the fact that it is understandable does not change the fact that it is problematic.

- Related to the point above, Enbridge assumed that its market transformation budget would increase in the same proportion as its resource acquisition and low income budgets – all to support the existing base budget programs. For example, of the roughly $32 million increase in spending in 2016 under the 150% budget scenario, Enbridge assumed that nearly $7 million would go to market transformation programs (none of which produce immediately quantifiable savings). That does not make sense. For the programs that are truly designed to transform markets (e.g. the residential and commercial new construction programs),[45] the base budget should already have been designed to be sufficient to put the targeted markets on a path to market transformation.
- Any formulaic reliance on its potential study estimates of declining yield per dollar spent is problematic. First, even well done efficiency potential studies are inherently conservative.[46] Second, the potential study estimated gross savings potential, not net potential after adjusting for free riders. However, free ridership typically declines as financial incentives for efficiency measures – one of the key drivers to increased budgets – increase. Thus, the relationship of increased savings to increased spending that Enbridge tried to derive from the potential study results inherently understates the magnitude of increased *net* savings (the only metric that matters). Third, and probably most importantly, Enbridge's recent potential study is fraught with so many methodological problems that it has almost no value for informing conclusions regarding achievable savings potential. A few illustrative examples are as follows:
    - In analyzing efficiency potential at the time that new products are being purchased, one needs to estimate how many products are sold each year. Typically, potential studies develop such estimates by assessing the number of a particular type of product in use and dividing by the average measure life for that product. For example, if there are 100,000 commercial boilers in use and the average boiler has a measure life of 25 years, then approximately 4000 boilers are being replaced each year and efficiency programs have the opportunity to influence whether the most efficient boilers are being

[45] Enbridge has some programs in its "market transformation" portfolio that are not really about transforming markets. They are arguably more like resource acquisition programs, or customer education programs (e.g. OPower and Run it Right).

[46] Goldstein, David, "Extreme Efficiency: How Far Can We Go If We Really Need To?", Proceedings of the 2008 ACEEE Summer Study on Energy Efficiency in Buildings, Volume 10, pp. 44-56.

purchased at the time of those replacements. However, Navigant's potential study makes what I consider to be a mathematical error that implicitly leads it to assume that the number of replacement products being sold each year is declining.[47] The result is that it understates the size of equipment replacement markets in the 10th year of its analysis by about 33% for measures with 25 year lives, by about 50% for measures with a 15 year life and by more than 60% for measures with a 10 year life. Needless to say, those underestimates lead to significant under-estimates of savings potential.

- Navigant estimates that economic potential in the commercial and industrial sectors is 96% of technical potential. In other words, virtually all efficiency that is technically feasible is also cost-effective under current (relatively low) avoided costs. That conclusion strongly suggests that the analysis did not truly look at a full range of potential efficiency measures; rather, it just looked at the measures that the utilities were already pursuing and/or anticipating that they might pursue and which are already known to be cost-effective. Put simply, it is not plausible that the supply curve of efficiency is a gradual upward slope to the current cost-effectiveness threshold and then becomes almost vertical.
- Navigant does not appear to have analyzed potential from industry-specific and/or facility-specific custom industrial measures. Indeed, in reviewing the stratified random sample of industrial projects analyzed under Enbridge's 2014 Custom Project Savings Verification process I found that approximately half of the projects employed measures that do not appear to have been addressed in the Navigant study. I should note that is not uncommon for potential studies. They tend to assess only relatively common measures. However, that is an important limitation that makes such studies' conclusions regarding efficiency potential very conservative.
- Navigant appears to have estimated the maximum technical potential for

[47] Rather than taking the entire existing stock of equipment and dividing it by the measure life to get an annual turnover rate for each year of its analysis, Navigant apparently does that only for the first year. For the second year it adjusts the size of the existing stock downward by the number of units replaced in year 1 and divides that smaller number by the measure life, producing a smaller eligible market in year 2. The farther out in time one goes, the smaller the eligible market becomes under this flawed approach. Navigant suggests this approach is reasonable because not all equipment lasts exactly the same amount of time (JT1.22). I concur with that statement. For equipment that has an average measure life of 25 years, a very small number will last only a few years (the "lemons"), some will last 15 years, some 20, some 30 and some 40 or 50 or more. However, what Navigant fails to realize in its analysis is that distribution applies to all products installed 10, 20, 30, 40, and 50 years ago. Thus, all other things being equal (the climate, the economy, etc.) the turnover this year, and next and the year after are all likely to be very similar. There is absolutely no basis for thinking the number of units sold for use in existing buildings will decline over time (except to the extent the existing building stock is demolished, which is only a very small fraction of buildings per year). More importantly, there is no evidence from sales data of major appliances, HVAC equipment, etc. that sales of replacement products decline over time.

operational efficiency improvements in commercial buildings to be no more than about 3%.[48] That is implausibly low.[49]

- Navigant's estimate of savings from do-it-yourself residential air sealing measures (e.g. caulking, weatherstripping, outlet gaskets, etc.) is implausibly high. The level of savings estimated is achievable, but only through more sophisticated blower-door guided air sealing by professionals. In other words, Navigant got the savings about right, but grossly under-estimated what it would cost to acquire.

- Even if one were to ignore all of the concerns about the use of the potential study, Enbridge made a basic mathematical error in developing the formula it used to apply the decline in savings yield per additional dollar spent derived from its potential study (what the Company calls its "decay factor"). The Company starts by noting that at the level of its base plan budget, the potential study suggests that for every 9% increase in budget there is approximately a 4% increase in savings.[50] It then makes the mistake of using those assumptions in a formula that not only adjusts savings from new spending but adjusts the base level of savings as well. The result is a formula that mistakenly suggests that it is impossible to achieve more than 17% more savings than Enbridge has forecast and that savings would actually start to decline once budgets were increased by about 70%. Those conclusions are inconsistent with the results of the flawed potential study that Enbridge's formula was designed to represent. More importantly, they are inconsistent with the experience of the leading jurisdictions discussed above.

3. Opportunities for Utilities to Acquire Substantial Additional Savings

There are a number of ways in which the utilities could acquire significant additional cost-effective savings. These include:

- **Beginning to use "upstream incentive" program designs.** Upstream incentives – that is, incentives paid to manufacturers, distributors, contractors and/or other key players in the supply chain rather than to the end use customers – can have several advantages. Most importantly, they typically lead to much higher market penetration rates for efficient equipment. That can be seen in Figure 3, which shows that a commercial cooling equipment upstream incentive program (blue bars) run by Pacific Gas and Electric in California for over a decade achieved nine times the level of participation that its former "downstream" customer rebate program design

[48] Exh C/T1/S2 p. 18.
[49] See EB-2012-0451, Exhibit L.EGD.ED.1
[50] Enbridge response to GEC.42.

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Exhibit I.T13.EGDI.GEC.36
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ENBRIDGE
Life Takes Energy™

27 March 2015

The Honourable Glen Murray
Minister of Environment and Climate Change
c/o Kathy Hering
Climate Change and Environmental Policy Division
77 Wellesley Street West
10th Floor
Toronto, ON M7A 2T5
Email: kathy.hering@ontario.ca

Dear Minister Murray,

RE: Ontario's Climate Change Discussion Paper 2015

Please find enclosed a copy of Enbridge's submission to the Ontario government's 2015 public consultations on climate change. Our submission outlines some of the actions that Enbridge has taken and is currently taking to reduce greenhouse gas emissions. It also discusses some of the ways Enbridge can work with the province to help meet Ontario's 2020 and 2050 greenhouse gas emission reduction targets.

We appreciate the opportunity to provide comment and believe that the implementation of these recommendations will help secure Ontario's position as both an economic and environmental leader into the future.

We also appreciate your ministry's specific mention of Enbridge as one of Ontario's sustainability leaders, noting that in 2014, Enbridge was named one of the *Global 100 Most Sustainable Corporations* for the sixth year in a row. We share your conviction that the test of a successful Ontario climate policy is one that also enhances our province's competitiveness and long-term prosperity.

We look forward to the release of the province's climate change strategy and action plan to be released this year.

If you have any questions or would like further information from Enbridge, please do not hesitate to contact our team at 416-758-7966.

Regards,

Glenn Beaumont, P. Eng.
President, Enbridge Gas Distribution Inc.

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Ontario Climate Change Discussion 2015:

Climate Change Submission from Enbridge Inc.

27 March 2015

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Introduction

Enbridge Inc. (Enbridge) recognizes that climate change is a critical global issue. As a company that operates in many different jurisdictions in Canada and the US, we support the idea that governments at all levels should have the ability to establish climate change, carbon policies and instruments that will meet their unique economic needs. We also acknowledge that carbon reduction is a shared responsibility with implications for citizens, governments and business. We are committed to being part of collaborative solutions that accelerate progress, equity, efficiency and competitiveness.

Our corporate Climate Change Policy focuses on reducing greenhouse gas emissions from existing operations, designing new facilities with a view to reducing emissions and on developing new renewable and alternative energy sources. This is in keeping with our overall commitment to protect the environment, while enhancing our position as one of North America's leading sustainable energy delivery companies.

We have contributed to the climate change challenge through our actions that have led to verifiable GHG reductions within our operations and at our facilities. Enbridge understands that meaningful GHG reductions at an economy-wide scale will require governments to collaborate with industry, and the consuming public to establish clear, realistic GHG emission objectives, and the corresponding policies and regulations to achieve them.

The issues around carbon and climate are complex. For this reason we believe they are best addressed on a 'portfolio' basis that includes the following issues: regulation; carbon pricing; energy efficiency and conservation; technology and innovation; renewables; and business development and competitiveness. As stated above, we believe different provinces and states should build and evolve their systems to meet their own jurisdictional realities, while keeping an eye open to the benefits of coordination over time. On an issue such as carbon pricing, cross-jurisdictional alignment around a common set of principles will lead to further gains in both reduction and efficiency.

It is important for government to encourage the development of GHG mitigation policies and regulations across all sectors of the economy; and engage energy consumers, the HVAC community, energy transporters and energy producers. Government policies must be tailored to our energy intensive and export-based economy, and must enable us to remain competitive while making meaningful reductions in GHG emissions. Energy regulators should also be encouraged to consider societal benefits of proposals before them, including GHG emission reductions.

At Enbridge, our approach has been to:

Build the Foundation

- Develop and implement an enterprise-wide plan including an internal GHG reporting system that ensures we understand the sources, types and magnitude of all GHG emissions within our operations.
- Identify, implement, and monitor the success of GHG reduction within our operations.

Lead by Example

- Set GHG performance improvement targets and publicly report on our progress in achieving these targets.
- Invest in alternative and renewable energy sources that will play an important economic and environmental role in the transition to a lower carbon economy.
- Look for opportunities to educate the public, our consumers and our employees about climate change and what we can all do about it.

Work with Others

- Collaborate with key industry associations and non-government organizations to assist governments in establishing clear, economically sound rules to reduce GHGs and to conduct research and deploy new GHG reduction technologies where appropriate.
- Share information on current and emerging "best-available technologies that are economically achievable" and partner with key stakeholders to ensure governments are aware of, and understand these technologies and opportunities.

Enbridge: Reducing Emissions, Growing Renewables and Investing in New Technologies

As previously mentioned, a focus on reducing GHG emissions from existing operations, designing new facilities in a way to reduce emissions, and developing new renewable and alternative energy sources are the hallmarks of Enbridge's Climate Change Policy.

Since the early 1990s, Enbridge Gas Distribution Inc. (EGD) has undertaken many initiatives to reduce GHG emissions from its natural gas distribution operations. The largest of these initiatives has been the multi-year, multi-million dollar cast iron pipe replacement program, which EGD started in the early 1990s and completed in 2012. Through this program, EGD replaced approximately 1,800 kilometres of aging—and leaking – cast iron and bare steel pipe with coated steel and plastic pipe. As a result, EGD has reduced the risk of leaks and, consequently, its annual fugitive GHG emissions by approximately 144,000 tonnes of carbon dioxide equivalent (CO_2e).

There has also been a continued decline in methane losses from pipeline damage incidents due to industry efforts such as the implementation of a province-wide, "One Call" locate system, which EGD helped to establish in Ontario. Over the past several years, EGD has also installed excess flow shut-off valves on new service line installations, which reduces the amount of natural gas released when service lines are damaged.

EGD's extensive asset integrity program which involves preventive maintenance on equipment and piping with higher risk of leaking also helps to reduce methane leaks. Begun in the early 1990s, this initiative has reduced methane emissions released from distribution pneumatic valves by approximately 95 per cent. In fact, since that time EGD has replaced the majority of high-bleed-rate pneumatic valves in service.

As of 2013, approximately 75 per cent of EGD's fleet vehicles (648 vehicles) run on natural gas, reducing EGD's GHG emissions by more than 400 tonnes of CO_2e per year compared to operating them on gasoline and diesel. EGD continues to show leadership through continued efforts to have its buildings become LEED-compliant, as is the case with its new Training and Operations Centre located in Markham, Ontario.

As well as minimizing emissions, Enbridge is one of the largest renewable energy generation companies in Canada, and to date has invested about $4 billion in renewable and alternative energy projects across North America. In fact, in 2009 following its expansion, Enbridge's 80MW Sarnia Solar Project was the world's largest photovoltaic power station and today remains the largest in Canada.

In Ontario, Enbridge is the province's largest solar power generator and second largest wind power generator. Along with wind and solar assets, Enbridge also operates a turbo-expander, that together have a current generating capacity of more than 490 megawatts, enough to meet the needs of approximately 160,000 homes and result in the avoidance of approximately 440,000 tonnes of GHG emissions each year. However, our target is to nearly double the amount of net generation capacity in

our renewable and alternative energy portfolio from 2014 levels of more than 1,600 MW to over 3,000 MW by 2018 across North America.

Enbridge's 'turbo-expander' generator operates at its EGD Toronto headquarters. A turbo-expander generator harvests the energy which is usually wasted when gas pressures are reduced at pressure reduction stations for commercial and residential use. The turbo-expander converts this energy into low-impact electricity as the natural gas continues to flow to homes and businesses. In 2014, the turbo-expander provided EGD's Toronto head office with 61 per cent of its annual electricity requirement. EGD's head office has also invested in a number of equipment upgrades which have reduced its energy requirement from 12.4 million kWh (1990) to 2.2 million kWh (2014). Together these initiatives have resulted in a cumulative savings of $8.4 million from 2004 to 2014.

Enbridge's Renewable and Alternative Energy Assets in Ontario:

Project Name	Type	Total Generating Capacity	Location	Service Date
Turbo-expander	Expansion Turbine	1 MW	Toronto, Ontario	2008
Cruickshank	Wind	8 MW	Bruce County, Ontario	2009
Underwood	Wind	182 MW	Bruce County, Ontario	2009
Sarnia Solar Project	Solar	80 MW	Sarnia, Ontario	2009-10
Talbot	Wind	99 MW	Chatham, Ontario	2010
Tilbury Solar Project	Solar	5 MW	Tilbury, Ontario	2010
Amherstburg II Solar Project	Solar	15 MW	Amherstburg, Ontario	2011
Greenwich	Wind	99 MW	Dorian, Ontario	2011
Wasdell Fall's Hydro-electric Project (partnership with Coastal Hydropower Corp.)	Hydro	1.65 MW	Washago, Ontario	April 2015

Enbridge has also partnered up with Hydrogenics to develop a pilot Power-to-Gas plant with a 2 MW design rating in the Greater Toronto Area. This plant has an in-service date of 2016 and will be North America's first Power-to-Gas site. Power-to-Gas is an emerging technology which uses low cost power largely produced from renewable sources (wind power, solar power and hydro-electric power) to make hydrogen through electrolysis. The hydrogen then can be used either as a transportation fuel or in relatively low concentrations it can be injected into the existing natural gas system displacing traditionally sourced natural gas and also creating a form of energy storage. The benefit of blending hydrogen with natural gas is similar, in some respects, to that of the introduction of biogas into the natural gas pipeline system as a means of providing a renewable natural gas product to consumers. However, cutting edge technology in Germany suggests that in future, this hydrogen could also be 'methanized', through a process which involves hydrogen, carbon dioxide and a catalyst to create synthetic natural gas, which could then be injected into Ontario's natural gas system.

Five Steps to Achieving Ontario's 2020 and 2050 Targets

As Enbridge endeavors to become North America's leader in energy delivery through all forms of energy distribution and transmission, we remain committed to protecting the environment and growing our position as a leader in sustainable energy delivery. As such, we are pleased to have been recently recognized as one of three Canadian energy companies on the 2015 Global 100 List of Most Sustainable Corporations, and one of three Canadian energy companies on the 2014 Dow Jones Sustainability World Index. Both of these independent rating systems assess corporate performance on key social, economic and environmental indicators.

As mentioned above, Enbridge regularly invests in new innovative technologies to help reduce GHG emissions in generation, conservation, transportation and delivery. It is from our own experience, as well as lesson-drawing from other utilities across the continent, that we provide the following five recommendations to help Ontario meet its 2020 and 2050 targets. (Strategies related to these recommendations are identified in further detail in the sections that follow.)

1. Ontario should adopt a broader clean transportation policy that supports a range of low carbon vehicles, including, electric, hybrid (primarily light duty applications) and natural gas (primarily medium/heavy duty vehicles). The transportation sector accounts for 34 per cent of Ontario's total emissions and is the province's fastest growing source. Of these emissions, around 30 per cent are attributed to over-the road heavy-duty vehicles. Converting heavy-duty and medium-duty fleet vehicles from diesel to natural gas would result in a 20 per cent reduction in GHG emissions from these vehicles.

2. Ontario should support the establishment of a renewable natural gas market (produced from landfills or organic waste from sewage, agriculture and forestry or other renewable such as hydrogen blends and methanization from surplus wind and solar energy), which would result in creating local supply, employment opportunities and lower GHG emissions through the reduced use of traditionally sourced natural gas in the province. Natural gas is Ontario's cleanest fossil fuel, however over the long-term; a recent study suggests that upwards of 30 per cent of Ontario's natural gas usage could be replaced with a renewable input fuel ('green gases').[1]

3. Ontario should explore further cooperation with willing natural gas utilities and electricity distribution utilities to expand their Demand Side Management Programs to include emission reductions targets and incentives. Demand Side Management (DSM) utility conservation programs continue to play a key role in the market adoption rate of newly commercialized energy efficient technologies and best practices.

4. Ontario should establish a clear policy which endorses combined heat and power (CHP) as the preferred option for large industries, condominium buildings or large institutions such as hospitals, universities etc. Localized CHP electricity generation is not only more efficient and would reduce the province's GHG emissions, but as seen in Europe, it increases grid resiliency and has the added potential to reduce the need for future transmission assets. To encourage industrial customers to invest in the Province, a definitive policy should be established that clearly endorses CHP as a favourable application to reduce GHG emissions in thermal-based processes.

5. Ontario should consider ways to ensure that any carbon pricing mechanisms or instruments are conducted in a transparent and equitable manner. The province should also consider directing a portion of these collected revenues towards an innovation fund. The fund could support the development and commercialization of higher efficiency technologies which could in turn be jointly funded by the utilities through their Demand Side Management (DSM) conservation programs.

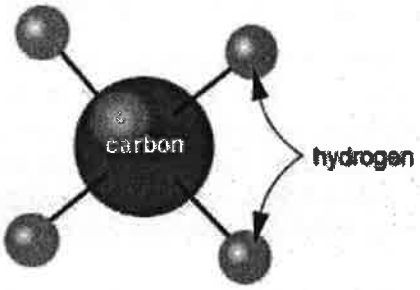
Catching Up: Natural Gas, a Cleaner Transportation Option

According to the Environmental Commissioner of Ontario's 2012 Climate Change Report, while the electricity and industry sectors have experienced an overall decline in GHGs since 1990, transportation has witnessed an equally significant increase. The commissioner said: "There remains a significant amount of untapped low- and medium cost- GHG emissions reduction potential in Ontario, particularly in the manufacturing and freight transportation subsectors."

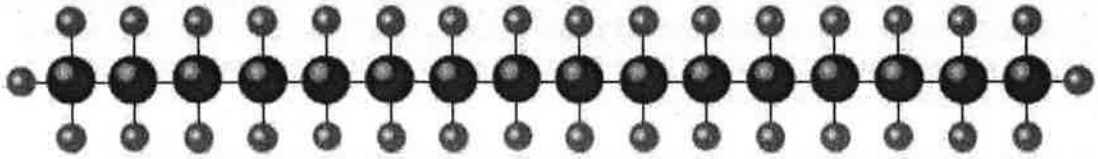
[1] *Potential Production of Renewable Natural Gas from Ontario Wastes,* Alberta Innovates Technology Futures, May 2011.

Not only is the transportation sector responsible for the largest increase in GHG emissions of all sectors, transportation now represents the greatest share of provincial emissions. For medium- to heavy-duty vehicle applications, natural gas can reduce emissions over diesel by 20 per cent. Natural gas vehicles also fight against poor air quality, such as smog, by significantly lowering NOx and SOx emissions as well as particulates compared to diesel and gasoline fuels.

Government support for a range of lower emission transportation options could see diesel vehicles, such as regional and municipal transit (rail and buses) as well as inter-lake ships and freight trains converted to natural gas for a 20 per cent emission reduction. If only 10 per cent of on-road diesel and gasoline consumption was replaced by natural gas, Ontario would reduce GHG emissions by over 4,250 million tonnes CO_2e per year; while the use of natural gas to fuel locomotives and lake freighters will add significantly to these reductions.



methane molecule - CH_4



typical diesel chemical composition
cetane, or n-hexadecane is typical of diesel fuel - $C_{16}H_{34}$

Other provinces have already recognized the immediate benefits to GHG emission reductions that natural gas transportation can provide. For example in Quebec, the provincial government supports 30 per cent of the additional cost (up to a maximum of $75,000), for the purchase of vehicles running on natural gas. The province also provides an accelerated capital cost allowance for 2010-compliant transport truck tractors.

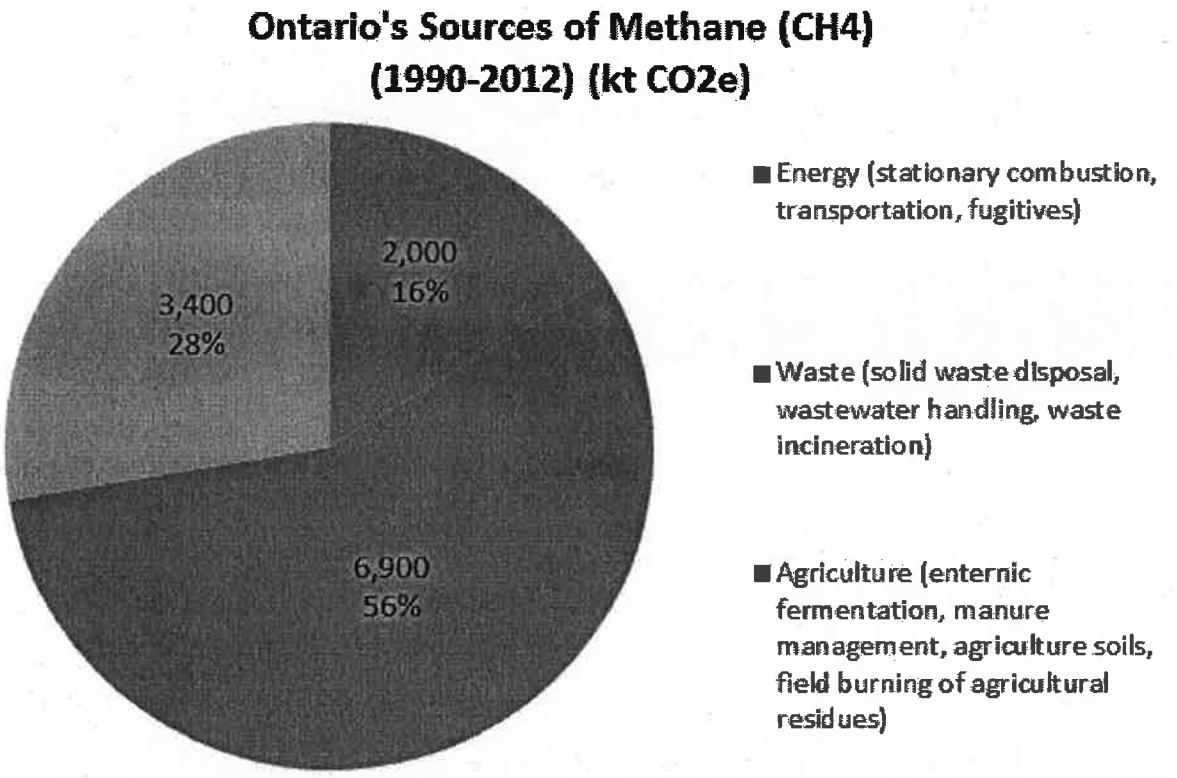
In British Columbia, FortisBC's Natural Gas for Transportation program provides incentive funding of up to 80 per cent of the difference in cost, for eligible medium and heavy natural gas vehicles. This incentive is available to commercial return-to-base fleet vehicles including highway tractors, vocational trucks including refuse trucks, and school and transit buses.

For remote communities where natural gas is not available and where homes and businesses are heated primarily by oil and propane, liquefied natural gas plants can be established along with small-scale natural gas systems to serve these communities. These plants would not only provide fuel-switching opportunities for rural communities but would also further support the conversion of diesel based local transit and serve as a base to serve long haul heavy duty vehicles and rail all contributing to lower emissions.

Greening the Natural Gas Grid: Powering Ontario on Waste

In 2014, natural gas accounted for 67% of the total energy distributed in Ontario by natural gas and electricity utilities. Moreover, on an energy equivalent basis, EGD's 2014 winter peak demand day was more than twice (210 per cent) the province's winter electricity peak day. However, over the long term, up to 30 per cent of Ontario's natural gas usage could be replaced with a renewable input fuel, leveraging the current infrastructure and customers' end use technologies.

Renewable natural gas (RNG), biogas or 'green gas' is a mixture of different gases produced in the breakdown of organic matter. RNG can be produced from raw materials such as agricultural waste, manure, municipal waste, plant material, sewage, green waste or food waste. It is a renewable energy source and in many cases exerts a very small carbon footprint. RNG can be produced by anaerobic digestion with anaerobic bacteria, which digest material inside a closed system, or fermentation of biodegradable materials. Just like natural gas, RNG can be compressed and used in the province's natural gas system and requires no capital cost to the customer as requires no additional equipment or appliances.



* Environment Canada, "National Inventory Report 1990–2012: Greenhouse Gas Sources and Sinks in Canada" (2014).

It is estimated that about 30 per cent of Ontario's natural gas consumption could be replaced with RNG.[2] Today, if simply all RNG from various wastes was captured, 18 per cent of current residential, commercial and industrial natural gas usage could be replaced with RNG over the long-term. Moreover, with gasification process capabilities becoming available over the long-term, it would be possible to offset an additional 12 per cent.

Partnerships with Ontario's agricultural and forestry sectors as well as waste water treatment plants and municipal solid waste centres could help the province to support the establishment of a renewable natural gas market, significantly reducing the emissions produced from traditional natural gas.

In future, synthetic natural gas produced by 'methanized' hydrogen in Power-to-Gas plants may also displace traditional natural gas.

[2] *Potential Production of Renewable Natural Gas from Ontario Wastes*, Alberta Innovates Technology Futures, May 2011.

Achieving 'Conservation First': Demand Side Management (DSM)

Utilities continue to be an effective avenue for accelerating the market adoption of higher efficient technologies and filling the technology funnel. In fact, in the Environmental Commissioner of Ontario's 2014 Annual Energy Conservation Progress Report, the Commissioner mentioned that conservation initiatives funded by Ontario's natural gas utilities continue to offer good value for society. "Each dollar spent on energy efficiency (by customers and utilities combined) yielded approximately $2.43 in savings (largely through savings on gas costs) for Enbridge's resource acquisition programs, and $1.53 for Enbridge's low-income programs, as measured using the Total Resource Cost test."

Over the last two decades, EGD has become a leader in conservation with expertise in many complex conservation markets (e.g., commercial greenhouses, boilers, ovens and industrial furnaces). Cumulatively, between 1995 and 2013, EGD's energy efficiency (DSM) programs have collectively saved 8.8 billion cubic metres of natural gas, roughly enough natural gas savings to serve nearly 2.9 million homes; in emissions, this translates to a reduction of 16.5 million tonnes of carbon dioxide emissions or equal to removing 3.2 million cars from the road for a year.

Demand Side Management (DSM) utility conservation programs continue to play a key role in the market adoption rate of newly commercialized energy efficient technologies and best practices. Ontario should explore cooperating with willing natural gas utilities to expand their DSM Programs to include emission reductions targets.

DSM frameworks that allow for deep (long lasting & highly energy efficient) measures (such as windows, insulation and condensing water heaters) to be implemented into existing building stock will allow long lasting measures to be installed in a larger number of existing buildings.

The design of future urban developments to encourage the integration of local thermal and electricity generation (combined heat and power) and allow for inputs of renewable energy (electricity and gas); energy storage and waste heat recovery from waste water and garbage; are key to an economical long term approach to energy conservation and meaningful GHG reductions. Moreover, approaches towards 'net-zero' energy or emissions should focus at the community or neighbourhood level rather than individual structures; in order to make use of various available tools (such as CHP, district energy, renewables etc.) and to achieve these goals in a cost effective manner.

A regulatory framework continues to be an effective; rate based, cost-effective and regulated way to deliver on government energy policy. Utilities provide trusted, unbiased information in the energy marketplace that can help customers make informed decisions.

Managing Energy Better: Combined Heat and Power

Combined Heat and Power (CHP) allows large industries, condominium buildings or large institutions (hospitals, universities etc.) to generate electricity internally alongside their boiler and heating systems. This can enable businesses and institutions to better manage their energy costs by significantly increasing energy efficiency and reducing GHG emissions through capture and utilization of heat that would otherwise be wasted. Due to its localised nature, CHP can eliminate the need for transmission infrastructure and new transmission lines or public power generation facilities; it also has a small footprint and can be sited within existing structures, making it an efficient solution to urban electricity supply constraints. Moreover, an increased number and decentralized locations of CHP units diversifies and enhances grid resilience and better prepares the province for major grid outages and emergencies. As climate change increases the likelihood of extreme weather events, CHP's advantage of increased

grid resiliency and the added potential to reduce the need for future transmission assets, only establishes it further as an attractive option.

To encourage industrial customers to invest in the province, a definitive policy should be established that clearly endorses CHP as a favourable application to increase efficiency and reduce GHG emissions in thermal-based processes. Today, the Independent Electricity System Operator (IESO)'s procured behind-the-meter CHP Conservation Demand Management (CDM) program has an electricity-reduction target of 7TWh by the end of 2020. Enbridge estimates that if 25 per cent of this goal was accomplished through CHP, the total GHG reduction over conventional large, central gas-fired generation plants and end-use gas-fired boilers would be 240,000 metric tonnes of CO_2e.

All multi-story buildings (e.g. multi-family, hotels, and commercial towers) in congested urban centers under construction, expansion or major renovation, should include in their designs the ability for the premise to reduce on-demand no less than 25 per cent of the facility's peak-design energy needs by either load-curtailment or on-site generation or some combination of the same.

All multi-family high-rise buildings should also include a minimum set of non-life-safety emergency loads connected to the facility's emergency generator for resilience in order to "Sustain Habitation" during times of wide-scale power outages when there are in fact no immediate emergencies. Designs that include integrating CHP into the building's emergency generator design, which include connection to these "Sustained Habitation" loads, should be strongly encouraged to improve operational efficiency.

In order to achieve the environmental benefits of CHP the province should consider:

- Making CHP a requirement whenever possible in congested urban areas of the provincial electricity grid, to provide heat and electricity for large businesses, multi-family residential buildings and other large institutions (hospitals, universities etc.);
- Work with industry to identify and remove barriers to CHP (e.g. requirements for technical interconnection solutions, uncertainty around future treatment of the Global Adjustment, etc.);
- The inclusion of CHP as an eligible natural gas DSM measure to account for the thermal attributes that the technology brings to the province's energy grids.

Furthermore, to help to broaden the reach of CHP in the marketplace, Ontario should allow the eligibility of third party ownership with IESO-procured CHP programs, in particular those that are included in the Conservation First framework (e.g. Process and System Utilization Improvement).

Pricing Carbon

Enbridge continues to be prepared to work with all levels of government and industry associations to encourage the energy sector to be a proactive participant in the development and implementation of climate change solutions. We support jurisdictionally-appropriate approaches to carbon pricing through market-based mechanisms as an element in a broader portfolio-based strategy that includes other policy levers, such as ones identified in this submission.

To be effective, government policies on carbon pricing must be tailored to our energy intensive and export-based economy, and must enable Ontario to remain competitive while making meaningful reductions in GHG emissions. Policies need to establish a defined price for carbon. Compliance options should focus on promoting both near-term reductions and the advancement of technology for larger future reductions over time. In our view, technology development and commercialization is critical to the creation of a lower carbon economy in Ontario.

Filed: 2015-06-23
EB-2015-0049
Exhibit I.T13.EGDI.GEC.36
Attachment
Page 12 of 12

The market mechanism involved must also protect our gas distribution customers against rate volatility which could result from a fluctuating emissions credit or tax market. Long term energy rate stability will help promote the province as an attractive place for economic investment for industry and manufacturing.

Conclusion

As the province's largest energy distribution company, 2-million customers strong, and as a provincial leader in natural gas distribution and both wind and solar generation, we appreciate the opportunity to provide the Government of Ontario with a summary of the actions we are taking to reduce our emissions, grow the renewable energy sector in Ontario, and invest in new technologies and programs that advance energy conservation and efficiency.

We also welcome the opportunity to continue to work with the Government of Ontario and share our knowledge and experience in the energy sector. We believe that the following recommendations represent significant, achievable and tangible ways to help Ontario meet its 2020 and 2050 greenhouse gas emission reduction targets, the principles contained within Ontario's Long Term Energy Plan and secure its position as both an economic and environmental leader. Accordingly, we ask the Government of Ontario to:

1. Adopt a broader clean transportation policy that supports a range of low carbon vehicles, including, electric, hybrid (primarily light duty applications) and natural gas (primarily medium/heavy duty vehicles).

2. Support the establishment of a renewable natural gas market (produced from landfills or organic waste from sewage, agriculture and forestry or other renewable such as hydrogen blends and methanization from surplus wind and solar energy) in Ontario to generate a supply of renewable natural gas which could replace 30 per cent of Ontario's natural gas demand.

3. Collaborate with willing natural gas utilities and electricity distribution utilities along with the IESO to expand Demand Side Management Programs to include emission reductions targets and incentives.

4. Establish a clear policy which endorses combined heat and power (CHP) as the preferred option for large industries, condominium buildings or large institutions such as hospitals, universities etc.

5. Ensure that any carbon pricing mechanisms or instruments introduced are conducted in a transparent and equitable manner and that a portion of any revenues collected are directed towards an innovation fund.

Filed: 2015-06-23
EB-2015-0049
Exhibit I.T2.EGDI.GEC.31
Page 1 of 1

GEC INTERROGATORY #31

INTERROGATORY

Reference: Exh. B/T3/S5:

The Ontario government has indicated that it favours a cap and trade carbon pricing mechanism and that it will direct a portion of revenues from the sale of emission permits toward efficiency improvement. Should the government apply carbon cap and trade revenues toward energy efficiency, what mechanism does the company propose to consider amendments to the plan's energy savings targets and budgets if the government's mechanism initiation does not happen to align with the three year review?

RESPONSE

Without greater detail on the Ontario government's recent decision to participate in a Cap and Trade system pursuant to Western Climate Initiative guidelines, it would be premature to speculate on alignment between Enbridge's savings targets or budgets and the timing, breadth or scope of this initiative. As it stands, the current cycle for Cap and Trade compliance under the Western Climate Initiative expires on December 31, 2017. At the outset, this would not be totally incongruent with the timing of the proposed mid-term review of Enbridge's DSM Plan (to be completed by June 1, 2018, per EB-2014-0134).

Witnesses: F. Oliver-Glasford
B. Ott

Greenhouse Gas Emissions Reductions Consultation on Cap and Trade

Ministry of the Environment and Climate Change

May 7, 2015

Confidential

Program Design

- Ontario will be designing a program that can link to the joint Quebec/California program
  - Linking will create access to a larger pool of low-cost abatement opportunities
  - Larger market is more stable, and Ontario can realize savings from sharing implementation costs with other jurisdictions.

Implications for Ontario

- Distribution of allowances to facilities is left to individual jurisdictions, but linking could require harmonization of some rules, including:
  - Price stability mechanisms (e.g., reserve prices for allowance auctions).
  - Trading rules to ensure transparency (e.g., reporting trades within a specified time).
  - Market rules (e.g., disclosure requirements on corporate affiliations, limits on number of allowances that a company can hold).
  - Limits on the use of offsets (e.g., 8% of compliance obligation).
  - Enforcement provisions (e.g., administrative penalties) to ensure compliance since non-compliance would weaken the program for all participating jurisdictions.

Cap and Trade

- Key Areas of Program Design
  - Scope: Sectors and Emissions
  - Cap Stringency, Decline and Timing
  - Offsets
  - Distribution of Allowances
  - Recognition of Early Action
  - Emissions Reporting and Verification
  - Linking

Scope: Sectors and Emissions

What sectors should be covered by the cap and trade program?

What types of emissions should be covered?

Sectors Covered

- An economy-wide approach ensures the maximum environmental benefit and supports market stability
- Quebec and California started with electricity and industry and expanded to cover heating and transportation fuels in 2015
- An Ontario program is proposed to cover:
  - Large emitters (>25,000 t): industry, institutions, waste management, utilities
  - Electricity generators and importers
  - Liquid petroleum fuel distributors and importers
  - Natural gas distributors

Combustion Emissions

- Emissions from burning fuel for heating or industrial furnaces

Process emissions

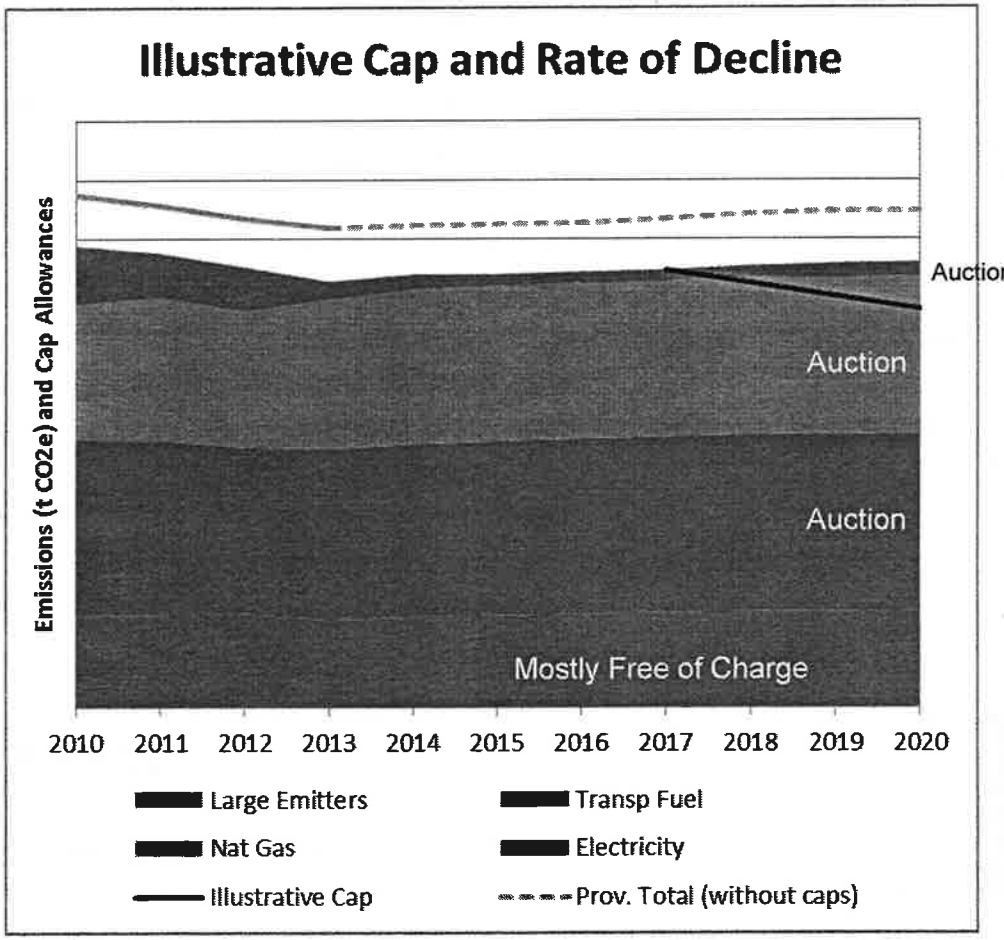
- Emissions from chemical or physical reactions as part of production
- California and Quebec cover both combustion and process emissions.
- Alberta covers only combustion emissions.

- An Ontario program is proposed to cover both types of emissions to create and maintain an incentive to reduce emissions from all sources

Cap Stringency and Rate of Decline

What should be the rate of decline towards 2020?

- An economy-wide cap decline between 2-3% per year could put Ontario on track to meet its 2020 emissions target (exact figures to be confirmed)
- Caps in Quebec and California programs decline at more than 3% per year
- Other climate critical elements included in Ontario's Climate Change Strategy will also support achievement of provincial targets



Ontario

Offsets

What are the most important project types for Ontario?

- Offsets are projects undertaken by entities outside of the covered sectors that either reduce emissions or remove carbon from the atmosphere.
  - Examples in Ontario include manure management and destruction of ozone-depleting substances
- Offsets can be sold to covered facilities to use for compliance purposes, in place of allowances, providing another low cost compliance option.
- Quebec and California impose limits on the amount of offsets that can be used by entities for compliance, ensuring reductions occur within their borders

Distribution of Allowances

How can the allocation of allowances help address potential competitiveness concerns?

How should allowances be distributed to fuel suppliers (gas and liquid petroleum) and electricity generators?

How should new emitters be treated under the program?

- Allowances to be distributed free-of-charge and at auction
- Methods for allocating allowances will be the focus of sector-specific stakeholder consultations.
  - Allocation free of charge can help address competitiveness impacts on trade exposed emitters.
  - Auctions for sectors that are not trade exposed, including fuel distributors and electricity generators
  - A strategic reserve of allowances can also be made available for sale (at predetermined prices) to maintain price stability
  - Quebec and California both provide free allowances to large emitters through a combination of product benchmarks and energy usage methods.
- Allocations will also need to consider how growth can be accommodated, including new entrants.

Timing and Recognition of Early Action

Should Ontario have specific provisions for reward for early action?

- Quebec has rules for awarding early action allowances to facilities that improved their performance prior to the start of a program (California does not).
- Benchmarking can reward early reductions as part of the allocation process
  - Facilities that have taken early action will receive more allowances, relative to their emissions, than facilities that have not.

Emissions Reporting and Verification

- Changes to the emissions reporting regulation will be required to accommodate the creation of a cap and trade program
- Quebec and California reporting requirements have lower reporting thresholds and broader coverage:
  - 10,000 tonne threshold (25,000 tonnes for Ontario)
  - Includes additional sources - liquid petroleum and natural gas fuel suppliers, electricity importers, electricity transmissions, oil and gas pipeline (methane emissions), magnesium production
- Allocation of many allowances will be based on facilities' production
  - Third party verification for all *production* data, used to support allowance allocation
  - The scope of the current verification requirements need to encompass the verification of all production values since these are used as the basis for distribution of allowances free of charge

Proposed Key Timelines

Spring/Summer 2015:

- Consultations on program design, focussing on allowance allocations methods and common understanding of any competitiveness implications

Fall 2015:

- Regulatory proposal posted on the Environmental Registry for comments

Summer 2016:

- Final regulation posted on the Environmental Registry

VII. Shareholder Incentive Mechanisms and Metrics

1. Enbridge

A. Resource Acquisition

Enbridge has proposed separate lifetime savings metrics for large customers and smaller customers, as well as for numbers of home retrofit participants. Given its intention to shift greater attention to smaller customers that have historically not participated as substantially in its programs, it seems appropriate to have such metrics. However, given that savings per dollar that it is forecasting for large C&I customers is three times as great as for small C&I customers and six times as great as for residential customers, there is potential for the Company to "game" the system by shifting resources from the more expensive smaller customers to larger customers once the plan is approved. Thus, it may be appropriate to consider whether the metric for larger C&I customers should be part of a separate scorecard.

An alternative would be to refine the way that scorecard scores are calculated. Specifically, if a performance metric has a weight of 40%, the score for that metric could be capped at 60% (i.e. 150% of the target level). That mitigates the "gaming" risk discussed above. It also mitigates the risk associated with a metric that is inadvertently set far too low, as has clearly been done on occasion in the past.[73]

With respect to the specific proposed metric values, Enbridge's proposal for large C&I customers appears consistent with its historic experience in terms of savings per budget dollar (in real, inflation adjusted, terms).[74] The same is true of the home retrofit program savings forecast.[75]

However, the cost per unit of lifetime savings that the Company is forecasting for its small C&I customers is more than three times what it achieved in the past.[76] A big part of the reason is the launch of its Direct Install program, which is always a more expensive way to generate savings but which is also widely viewed in the industry as a necessary vehicle for addressing many smaller businesses that would otherwise not participate in DSM programs. Enbridge's cost per lifetime m^3 saved from its proposed program (a little more than $0.08) appears to be roughly 20% greater than what other gas utilities are paying for small business direct install savings.[77] That difference could be a function of the mix of measures included

[73] Consider, for example, Enbridge's 2014 resource acquisition scorecard. The utility achieved only 67% of its lifetime savings target, falling well below even the lower bound of performance for a metric that was assigned 92% of the scorecard weight. The other metric in the scorecard – participation in its home retrofit program – was assigned the other 8% of the weight. However, because the Company exceeded the home retrofit participation target by a factor of more than 12 (i.e. it achieved more than 1300% of the goal), its overall scorecard score was 138%. Put another way, even though its home retrofit program participation metric was assigned only an 8% weight, its result for that program alone produced 106% of the total 138% scorecard score (the other 32% of the score came from the lifetime savings results).

[74] JT1.36 Attachment 1.

[75] JT1.36 Attachment 1.

[76] JT1.36 Attachment 1.

[77] This conclusion is based on a search for actual results for gas small business direct install programs on E-

in the program. I have not analyzed the other programs to determine whether that is the case.

B. Low Income

Enbridge's proposed low income single family (part 9) savings metrics implicitly assume savings will cost 10-15% more than in 2014. It appears as if that is because Enbridge used the average cost per unit of savings over the three-year 2012 to 2014 period.[78] The 2012 savings were considerably more expensive than either 2013 or 2014 savings. It is unclear why that is the case. It is also unclear why the 2012 experience is as applicable to future results as the more recent 2014 experience. Absent an explanation, the savings target would appear a little low.

Enbridge's proposed multi-family (part 3) performance metrics appear to implicitly assume that savings will cost 10-20% more than in 2014.[79] Enbridge suggests that this is predicated on the presumption that a greater emphasis on private multi-family buildings will increase average costs. That is consistent with my understanding of the utility's recent experience.

C. Market Transformation and Energy Management

Enbridge includes eight different initiatives in its Market Transformation and Energy Management (MTEM) portfolio. Each of those, except for the residential new construction program (Residential Savings by Design) are assigned a single performance metric as part of the Company's proposed MTEM scorecard; Residential Savings by Design is given two metrics. Of the eight initiatives, only three really appear to be intended to transform markets: Residential Savings by Design, Commercial Savings by Design and Home Ratings. The other five programs appear designed to either educate consumers and/or to test new program design concepts.

I have several concerns regarding both the design of the scorecard and/or the specific metrics proposed. My biggest concern is that there is no clear rationale for providing a performance incentive for the five non-market transformation programs. If the principle purpose of those programs is to either directly or indirectly drive savings, then they belong in the Resource Acquisition portfolio supporting the Resource Acquisition performance metrics. If their purpose is primarily to provide general education to key customers groups, as may be the case with Home Health Reports and the School Energy Competition, then they might be better put into a new "general education" portfolio for which it may not make sense to establish shareholder performance metrics. Alternatively, if their principal purpose is to test and/or refine a new program concept to the point where it may make sense to launch full scale and include in the Resource Acquisition portfolio – as may be the case for the Run It Right, Comprehensive Energy Management and New Construction

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Source's "DSM Insights" database and dashboard (which parties can access with an annual subscription). Results for several different years were found for five different utilities: Nicor Gas, North Shore Gas, Peoples Gas, National Grid (RI), and Minnesota Energy Resources Corporation. Results for those utilities were converted to 2015 Canadian dollars.

[78] Response to GEC.16, p. 5 of 10.

[79] JT1.36 Attachment 1

Commissioning programs – then it would seem more appropriate that they be put into a new "pilot program" portfolio for which it would not make sense to establish shareholder performance metrics.[80] I say that because when testing a concept one should not be driven by a performance metric that may not be important to figuring out how best to make the concept work. For example, it is probably less important to get larger numbers of participants in RIR, CEM and commercial new construction commissioning than to invest in deeper levels of exploration with a smaller number of customers regarding what works and what does not work well with a given program approach.

Beyond that high level concern, I have several concerns about the specifics of Enbridge's proposed metrics:

- If it is to be kept, the CEM target seems very low, especially in later years (growing to only 10 participants by 2020)
- The market share for commercial new construction projects starts off reasonably after the new code is introduced – 15 projects in 2017 out of roughly 170 annual projects,[81] or close to 10% - but hardly grows at all. In fact, three years later, in 2020, the target is only 21 projects. That is not a path to market transformation.
- The number of home ratings in 2016 (596) is lower than what was actually achieved in 2014 (662).[82] That clearly makes no sense. Moreover, it is only projected to roughly double by 2020. Again, that is not a path to market transformation.

2. Union

A. Resource Acquisition

Union's forecast resource acquisition spending per unit of savings over the 2016 to 2020 period is projected to be approximately 115% greater than what it experienced in 2014.

A significant portion of that increase is associated with its expansion of its home retrofit program (ramping up from 1000 participants in 2014 to 5000 per year by 2018) which produces savings at a higher cost than its historic C&I programs. However, that only explains about 35% of the difference in 2018. Another portion of the difference is the inclusion of the residential behavior program, which has a very high cost per unit of lifetime savings (on the order of six times the cost of the home retrofit program), at an annual budget of $3.3 million.[83] However, that only explains about another 20% of the difference.

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[80] Note that I am not suggesting that the total allowable performance incentive should change, only that there are categories of spending that may not warrant performance metrics. That spending can get allocated to the other scorecard categories for the purpose of allocated shareholder incentive dollars.

[81] JT1.12.

[82] JT1.36 Attachment 1.

[83] As suggested in the Enbridge discussion above, I am not suggesting that such behavior programs should not be included in the utility's portfolio. Such programs can and do play useful roles in DSM portfolios, both by enabling larger portions of customers to participate and reap benefits of DSM, by providing some marketing support or leads to other programs and by supporting the general objective of educating consumers about their energy use. However, they are generally not very effective – per dollar spent – generating (lifetime) savings.

BOARD STAFF INTERROGATORY #3

INTERROGATORY

Topic 2 – DSM Targets

Ref: Exhibit B / Tab 1 / Schedule 4

Questions:

a) Please provide the scorecards that were in place in 2012, 2013 and 2014.

b) Please provide the percentage of the target level achieved for each metric on each scorecard in 2012, 2013, and 2014.

c) Please provide the shareholder incentive received related to each scorecard for each year over the 2012-2014 period.

d) Please provide the total shareholder incentive received for each year over the 2012-2014 period.

e) Please provide the percentage of maximum shareholder incentive received for each year over the 2012-2014 period.

Response:

a) On the following pages, please find the scorecards from 2012 to 2014.

Witnesses: K. Mark
S. Moffat
F. Oliver-Glasford
B. Ott
J. Paris

Filed: 2015-06-23
EB-2015-0049
Exhibit I.T2.EGDI.STAFF.3
Page 2 of 8

2012 SCORECARD

Program Type		Performance Band		
Resource Acquisition Total	**Weight**	**Lower**	**Middle**	**Upper**
Resource Acquisition	92%	615.30	820.40	1025.50
Residential Deep Savings	4%	120	160	200
Commercial/Industrial Deep Savings	4%	40%	45%	50%
Low Income Total	**Weight**	**Lower**	**Middle**	**Upper**
Single Family - Part 9	50%	12	17	21
Multi-Residential - Part 3	50%	33	45	56
Part 3 - RIR	---	---	---	---
Market Transformation Total	**Weight**	**Lower**	**Middle**	**Upper**
DWHR - Units Installed	44%	3,000	4,000	5,000
SBD Residential Top 20 Builders	15%	1	2	3
SBD Residential Top 80 Builders	15%	7	9	18
SBD Commercial New Construction	20%	6	8	15
Home Rating	7%	-	5,001	10,001

***In 2012 MT was one single scorecard**

Witnesses: K. Mark
S. Moffat
F. Oliver-Glasford
B. Ott
J. Paris

2013 SCORECARD

Program Type		Performance Band		
Resource Acquisition Total	**Weight**	**Lower**	**Middle**	**Upper**
Resource Acquisition	92%	729.46	972.61	1215.76
Residential Deep Savings	8%	549	732	915
Commercial/Industrial Deep Savings	---	---	---	---
Low Income Total	**Weight**	**Lower**	**Middle**	**Upper**
Single Family - Part 9	50%	17.3	23.1	28.8
Multi-Residential - Part 3	45%	45.0	60.0	75.0
Part 3 - RIR	5%	30%	40%	50%
SBD Residential Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
Builders Enrolled	60%	11	14	18
# of Completed Units	40%	675	900	1125
SBD Commercial Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
Commercial New Construction	100 %	6	8	15
Home Labeling Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
Number of Committed Realtors	70%	-	5,001	10,001
Ratings performed	30%	250	500	750
DHWR Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
# of Units Installed	100 %	2,813	3,750	4,688

***In 2013 MT was 4 separate scorecards**

Witnesses: K. Mark
S. Moffat
F. Oliver-Glasford
B. Ott
J. Paris

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2014 SCORECARD

Program Type		Performance Band		
Resource Acquisition Total	**Weight**	**Lower**	**Middle**	**Upper**
Resource Acquisition	92%	744.05	992.06	1240.08
Residential Deep Savings	8%	560	747	934
Commercial/Industrial Deep Savings	---	---	---	---
Low Income Total	**Weight**	**Lower**	**Middle**	**Upper**
Single Family - Part 9	50%	17.7	23.6	29.5
Multi-Residential - Part 3	45%	48.15	64.2	80.25
Part 3 - RIR	5%	30%	40%	50%
SBD Residential Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
Builders Enrolled	60%	12	16	20
# of Completed Units	40%	750	1000	1250
SBD Commercial Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
Commercial New Construction	100 %	8	12	19
Home Labeling Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
Number of Committed Realtors	70%	-	5,001	10,001
Ratings performed	30%	750	1,500	2,250
DHWR Total (MT)	**Weight**	**Lower**	**Middle**	**Upper**
# of Units Installed	---	---	---	---

***In 2014 MT was 3 separate scorecards (DWHR program was no longer offered in 2014)**
****2014 results include CPSV and Auditor (Optimal) adjustments**
*****However, 2014 results are Pre-Audit Committee values and could still be subject to change**

Witnesses: K. Mark
S. Moffat
F. Oliver-Glasford
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b) Please see below the % achieved for each metric on Enbridge's DSM scorecards from 2012 to 2014.

2012 SCORECARD

Program Type Resource Acquisition Total	Score
Resource Acquisition	144%
Commercial/Industrial Deep Savings	-103%
Residential deep savings # customers	161%
Weighted Score	135%
	$ 5,265,185

Low Income Total	Score
Single Family - Part 9	196%
Multi-Residential - Part 3	93%
Weighted Score	145%
	$ 2,228,489

Market Transformation Total	Score
DWHR - Units Installed	152%
SBD Residential Top 20 Builders	150%
SBD Residential Top 80 Builders	100%
SBD Commercial New Construction	107%
Home Rating	136%
Weighted Score	134%
	$ 1,323,855

Witnesses: K. Mark
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2013 SCORECARD

Program Type	
Resource Acquisition Total	**Score**
Resource Acquisition	58%
Residential Deep Savings	351%
Weighted Score	81%
	$ 1,545,045

Low Income Total	Score
Single Family - Part 9	186%
Multi-Residential - Part 3	-9%
Part 3 - RIR	325%
Weighted Score	105%
	$ 1,117,939

SBD Residential Total (MT)	Score
Builders Enrolled	150%
# of Completed Units	115%
Weighted Score	136%
	$ 765,221

SBD Commercial Total (MT)	Score
Commercial New Construction	157%
Weighted Score	157%
	$ 235,572

Home Labeling Total (MT)	Score
Number of Committed Realtors	830%
Ratings performed	28%
Weighted Score	589%
	$ 309,438

DHWR Total (MT)	Score
# of Units Installed	245%
Weighted Score	245%
	$ 564,973

Witnesses: K. Mark
S. Moffat
F. Oliver-Glasford
B. Ott
J. Paris

2014 SCORECARD*

Program Type Resource Acquisition Total	Score
Resource Acquisition	34%
Residential Deep Savings	1296%
Weighted Score	135%
	$ 5,202,419

Low Income Total	Score
Single Family - Part 9	118%
Multi-Residential - Part 3	-7%
Part 3 - RIR	272%
Weighted Score	69%
	$ 375,059

SBD Residential Total (MT)	Score
Builders Enrolled	188%
# of Completed Units	112%
Weighted Score	157%
	$ 1,055,385

SBD Commercial Total (MT)	Score
Commercial New Construction	150%
Weighted Score	150%
	$ 410,068

Home Labeling Total (MT)	Score
Number of Committed Realtors	450%
Ratings performed	44%
Weighted Score	329%
	$ 604,311

*2014 results remain subject to change due to audit, discussions with the Audit Committee and a Clearance of Accounts proceeding before the Board.

Witnesses: K. Mark
S. Moffat
F. Oliver-Glasford
B. Ott
J. Paris

c, d, e) Below please find charts outlining the shareholder incentive available and received from 2012 to 2014 as well as the percentage of the maximum Demand Side Management Incentive Deferral Account ("DSMIDA") received.

Shareholder Incentives

Resource Acquisition	2014 DSMI	2013 DSMI	2012 DSMI
Middle (100%) DSMI	$2,542,252	$2,485,008	$2,576,346
Maximum DSMI	$6,355,631	$6,212,521	$6,440,865
Actual DSMI Achieved	$5,202,419	$1,545,045	$4,607,962

Low Income	2014 DSMI	2013 DSMI	2012 DSMI
Middle (100%) DSMI	$978,714	$966,468	$950,000
Maximum DSMI	$2,446,785	$2,416,169	$2,375,000
Actual Achieved DSMI	$375,059	$1,117,939	$2,228,489

Market Transformation	2014 DSMI	2013 DSMI	2012 DSMI
Middle (100%) DSMI	$827,906	$812,124	$653,654
Maximum DSMI	$2,069,764	$2,030,310	$1,634,135
Actual Achieved DSMI	$2,069,764	$1,875,204	$1,323,855

Total Portfolio	2014 DSMI	2013 DSMI	2012 DSMI
Middle (100%) DSMI	$4,348,872	$4,263,600	$4,180,000
Maximum DSMI	$10,872,180	$10,659,000	$10,450,000
Actual Achieved DSMI	$7,647,242 (70% of max)	$4,538,188 (42% of max)	$8,160,306 (78% of max)

**2014 results are Pre-Clearance and could be subject to change*
***2012 Actual DSMI Achieved includes DSMI writedown of $657,223 from large industrial*

Witnesses: K. Mark
S. Moffat
F. Oliver-Glasford
B. Ott
J. Paris

IX. Consideration of DSM in Infrastructure Planning

1. Overview

In its December 2014 gas DSM framework and filing guidelines the OEB required three things of both Enbridge and Union with respect to consideration of the role DSM could play in potentially serving as a cost-effective alternative to future infrastructure projects:

1. Conduct a study of "the effects that DSM can have on deferring, postponing or reducing future capital investments."[86]
2. "Propose a preliminary transition plan that outlines how the gas utility plans to begin to include DSM as part of its future infrastructure planning efforts."[87]
3. "Provide evidence of how DSM was considered as an alternative at the preliminary stage of project development" for all leave to construct projects.[88]

Both a scope of work for the study (to be completed in time for the mid-term review) and the preliminary transition plan were to be included in the utilities' 2015-2020 DSM plan filings.

In general, Enbridge has been much more responsive to this guidance than Union. A discussion of each utility's approach is provided below.

2. Scope of Work for Study of the Role of DSM in Infrastructure Planning

Union did not provide what could reasonably called even a preliminary scope of work for its study of the use of DSM resources to defer or avoid infrastructure construction. A scope of work is effectively the "meat" of what one would put in an RFP to hire a contractor. It typically:

- Articulates the study objectives;
- fleshes out in detail the information expected to be collected and analyzed;
- provides a summary of information and/or resources that are available to the contractor, including utility staff that will be involved in the study;
- identifies specific tasks it expects the contractor to perform in collecting and analyzing the information; and
- specifies the form in which the results of the study will be presented.

In contrast, all Union has provided is a list of high level questions the study would attempt to answer. At best, that might be analogous to the articulation of study objectives. However, most of the other information one would expect in a scope of work has not been provided.

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[86] Ontario Energy Board, "EB-2014-0134 Filing Guidelines to the Demand-Side Management Framework for Natural Gas Distributors (2015-2020)", December 22, 2014.
[87] Ontario Energy Board, "EB-2014-0134 Report of the Board: Demand Side Framework for Natural Gas Distributors (2015-2020)", December 22, 2014.
[88] Ontario Energy Board, "EB-2014-0134 Report of the Board: Demand Side Framework for Natural Gas Distributors (2015-2020)", December 22, 2014.

Moreover, even some of the questions that Union indicates the study will be designed to address are problematic as currently framed. For example, it makes no sense to generically ask the question "What is the required load reduction that would lead to deferral of infrastructure?" The answer to that question will necessarily be specific to each infrastructure project. The same is true of the question "Could DSM programs be designed and implemented to achieve the necessary impact?" Put simply, Union has either invested little effort in attempting to address this issue or it is being intentionally vague about its intentions. Either way, the Company may be sending a disconcerting signal that it is not likely to be serious about even-handedly considering DSM as a potential alternative to more expensive infrastructure investments.

In contrast, and to its credit, Enbridge has fully developed and presented a preliminary scope of work for its study. That said, I do have some concerns about that proposed work scope. Specifically, in the third part of the work scope – what Enbridge calls "Intersection #3: Targeted DSM and Reinforcement Projects" – the Company asks some of the same kinds of generic questions that critiqued Union for asking. Examples include:

- "Is it technical feasible?"
- "Is it possible?"
- "Is it cost-effective"

Unlike Union, and again to its credit, Enbridge has indicated in its scope of work that it intends to address these questions through analysis of specific case studies. That addresses the concern I expressed about Union's approach because the questions are not being asked generically. However, it raises an entirely different set of issues regarding how the case study examples will be selected. As I have noted in two different reports I have written on the electric utility experience with using geographically-targeted DSM to defer T&D investments,[89] 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 – either because the load reduction required is too great, or because it is needed too soon, because the economics of a particular application are not favorable, etc.

My experience with assessing the role that geographically-targeted DSM could play in cost-effectively deferring infrastructure investments – and I have studied every major example of such electric utility efforts over the past two decades, conducted trainings for system planners on how to integrate consideration of DSM into system planning, and am currently working on a pilot project with a Michigan utility – suggests that the key piece of new information most gas utilities would need to assess the potential role of efficiency in deferring infrastructure investments are hourly peak day load shapes (and/or an estimate of

[89] Neme, Chris and Rich Sedano, "U.S. Experience with Efficiency As a Transmission and Distribution System Resource", published by the Regulatory Assistance Project, February 2012 (see: www.raponline.org); and Neme, Chris and Jim Grevatt (Energy Futures Group), "Energy Efficiency as a T&D Resource: Lessons from Recent U.S. Efforts to Use Geographically Targeted Efficiency Programs to Defer T&D Investments", published by Northeast Energy Efficiency Partnerships, January 9, 2013 (see: http://www.neep.org/initiatives/emv-forum/forum-products#Geotargeting).

the relationship between peak hour savings and annual savings) for each potential efficiency measure. That is a question that could and should be addressed generically and immediately.

Once that generic question is answered, it would be very appropriate to pursue case study assessments as Enbridge has suggested. However, great care must be taken in selecting the case studies. As noted in my reports on efficiency as a T&D resource make clear, the first step in that process is to develop a long-term forecast of potential infrastructure needs. That forecast should be for at least 10 years. Again, to its credit, Enbridge has stated that it will select its case studies from a list of potential infrastructure projects that it will develop (or already has developed). However, it is not clear that that it is planning to comprehensively assemble a 10 year forecast of such projects. (As noted above, Union has not even suggested it is thinking about such a forecast.)

The list of projects in a 10-year forecast should then be put through an initial high level screen to winnow the list down to candidates that would be worth a closer look. Several jurisdictions now require such a high level screening process for all electric infrastructure projects, typically using variants of the following criteria:

- **Is the project driven – at least in part – by load growth?** Only those that are should be considered.
- **How many years before the infrastructure is needed?** Typically, the infrastructure need must be at least three years into the future to be considered. More sophisticated approaches relate the minimum years before the need to the magnitude of the load reduction needed (the larger the reduction, the further out in time the need must be). That relationship is potentially one that an assessment of several gas case studies could inform.
- **What is the maximum load reduction required?** For electric system planning, the maximum typically assumed possible is on the order of 20-25% (relative to forecast future demand). That might be an appropriate starting point for gas as well, though this question is also one that the Enbridge and Union studies, particularly if they include several case studies, could better inform for gas.
- **What is the cost of the infrastructure project?** It does not make sense to invest in detailed assessments of alternatives to very inexpensive infrastructure projects. Thus, most jurisdictions now required consideration of DSM as a potential alternative if the infrastructure project costs at least $1 million.

A summary with more specifics of how different jurisdictions now routinely use such criteria is presented in a table in my most recent report on this topic which I have copied below.

Table 4: Criteria for Requiring Detailed Assessment of Non-Wires Solutions

	Must Be Load Related	Minimum Years Before Need	Maximum Load Reduction Required	Minimum T&D Project Cost	Source
Transmission					
Vermont	Yes	1 to 3 4 to 5 6 to 10	15% 20% 25%	$2.5 Million	Regulatory policy
Maine	Yes			>69 kV or >$20 Million	Legislative standard
Rhode Island	Yes	3	20%	$ 1 Million	Regulatory policy
Pacific Northwest (BPA)	Yes	5		$3 Million	Internal planning criteria
Distribution					
PG&E (California)	Yes	3	2 MW		Internal planning criteria
Rhode Island	Yes	3	20%	$ 1 Million	Regulatory policy
Vermont	Yes		25%	$0.3 Million	Regulatory policy

The Michigan utility with which I am currently working considered each of these criteria in selecting the pilot project that will be pursued.

Again, to its credit, Enbridge has clearly considered at least the second of these criteria as it has indicated that it will only consider those for which the lead time is at least 4 to 6 years. That is an eminently reasonable place to start. However, it hasn't indicated what other criteria it will use or consider.

Once candidate projects have been selected, more detailed assessments need to be conducted. For example, over the past several months the Michigan utility with which I am working has been assessing the mix of customers in the targeted region (residential, small business, larger customers), how the customers may differ from the average customers in the Company's broader service territory (e.g. in income levels, education, levels, etc.), the types of loads being served (e.g. through review of location specific responses to saturation surveys), historic participation in the utility's different efficiency programs, and other relevant factors. All that information is being used to develop a DSM program strategy for the area. That very same approach should be used for tailoring the assessment of the potential for targeted DSM for case studies for both Enbridge and Union.

3. Transition Plan for Integrating DSM into Infrastructure Planning

If anything, Union's approach to transition planning is worse than its approach to the development of the scope of work for its study. In fact, the Company has said that it did not develop a transition plan because such a plan is premature.

In contrast, Enbridge has put forward a transition plan. In a nutshell, its transition plan is to use real world case examples in the scope of work for the study described above. At a high level, that would be a reasonable approach if (1) the approach to identifying case studies is refined as I suggest above; and (2) the case studies are more than just paper studies. Only so

collection. However, relying on existing information, I have estimated market shares for a diverse selection of efficiency measures which both utilities could or already do include in their prescriptive commercial and industrial rebate programs. The measures addressed include a water heating measure, a ventilation measure, a building envelop measure and Energy Star commercial cooking equipment.[16]

The results of my analysis are presented in Tables 1 and 2 below. As the tables show, both Enbridge and Union are proposing participation levels for each of the measures analyzed that represent less than 15% market penetrations in every case and less than 5% in several cases. These results further support the notion that the utilities' proposed plans will leave enormous amounts of cost-effective savings untapped.

Table 1: Market Shares for Selected Enbridge C&I Measures

Measure	Potential annual market	2017 participants proposed	2017 participation rate
Commercial roof insulation when reroofing[17]	4,680	0	0.0%
Commercial condensing hot water tanks[18]	2,964	0	0.0%
Demand controlled kitchen ventilation[19]	1,793	143	8.0%
Commercial cooking equipment[20]	2,286	278	12.2%

[16] I also attempted to estimate market shares for one or more space heating technologies but that proved to be impossible given data that were readily available.

[17] Enbridge's roughly 156,000 commercial customers ("Commercial Market Segmentation" provided during Enbridge March 2015 Consultations). If roof insulation has a 25 year replacement cycle this would be 4% or an annual market of 6,240. However Union's Conservation Potential study used ~3% of the commercial customer base for this measure (Union's Achievable Potential (EB-2011-0327, Exhibit A, Tab 1, Appendix K) so I do the same. No participation is specifically forecasted in Enbridge's C/I program (I.T5.EGDI.GEC.22). It is possible that some jobs may occur within custom projects. However, my experience in reviewing custom projects as part of the Enbridge Audit Committees suggests such cases are likely to be extremely rare.

[18] NRCan indicates 13,000 commercial tank type water heaters are sold annually in Canada. (http://www.nrcan.gc.ca/energy/regulations-codes-standards/bulletins/7191) With 38% of Canada's population in Ontario (http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm), and Enbridge serving ~60% of Ontario's population the market is roughly 2,964 units per year. Participation from I.T5.EGDI.GEC.22 b (i) and b (ii).

[19] Market size for Demand Controlled Kitchen Ventilation starts with the Consortium for Energy Efficiency's estimate that 89,000-125,000 new kitchen ventilation systems are sold in the US each year. I use 100,000. (http://library.cee1.org/sites/default/files/library/6091/CEE_CommKit_ProgramDesignGuidanceCKV_5Oct2010.pdf.) Canada has 11% of the US population and Ontario is 38% of Canada, suggesting 4,180 may be sold in Ontario annually. NRCan shows 72.3% of Ontario households are gas heated (http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=res&juris=on&rn=14&page=0). Enbridge's share of these is assumed to be proportional to the Union/Enbridge residential customer count of 1.3 million / 1.9 million. 1.9/(1.3+1.9) = 59.4% * 72.3% * 4180 = 1793.

[20] Cooking equipment measures include fryers, convection ovens, broilers and steam cookers. Potential markets are derived from the ratio of Enbridge's to Union's commercial customer counts and Union's potential market as shown in Table 2. Union's 114,355 commercial customers (See Union Exh A/T1 Appendix A Sch 5) and Enbridge's 156,021 from "Commercial Market Segmentation" provided during March 2015 Consultations suggests Enbridge has a 36.4% larger market. 2017 participants from I.T5.EGDI.GEC.22 b (i) and b (ii).