Enbridge Gas Pipeline Hearing EB-2012-0451

Evidence concerning Demand Side Management Potential in GTA

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Executive Summary

This report estimates the Demand Side Management ("DSM") potential for commercial and apartment customers in the GTA area, summarizes the DSM estimates for residential and industrial customers prepared by the consultants retained by the Green Energy Coalition ("GEC"), analyzes the potential DSM against load growth, estimates the present value of the commodity cost savings associated with the efficiency measures, and provides comments on Enbridge's load forecast model. The terms of reference provided to us by Environmental Defence appear at Appendix A to this report.

We conclude that all load growth in the GTA area can be completely offset through commercial and apartment DSM and that overall demand can be significantly *reduced* with the addition of residential and industrial DSM.

Enbridge estimates that its DSM programs will deliver in the order of 12 10^3 m^3 per hour (9 TJ/day) peak demand reduction savings each year. Enbridge also advises that additional peak demand reduction of 25 10^3 m^3/hr (18 TJ/day) is required each year to offset customer load growth. Therefore, a total of approximately 37 10^3 m^3/hr (27 TJ/ day) in peak demand reduction is required.

The forecast annual average peak demand reduction potential through DSM presented in this evidence yields a total of 50 10^3 m^3/hr (37.7 TJ/day) at the top quartile level, which is considered readily attainable in the timeframe involved. The average annual peak hourly reduction presented in the Enerlife model and by the GEC's witnesses is summarized as follows:

Table I. DSM Potential in the GTA Area	
Customer Sector	**DSM Potential (10^3 m^3/hr)**
Commercial (Per Enerlife Model, Top-Quartile Attainment)	31.0
Apartment (Per Enerlife Model, Top-Quartile Attainment)	11.3
Sub Total	**42.3**
Residential (Per Chris Neme)	5.6
Industrial (Per Marbek Report and Chris Neme's Analysis)	2.1
TOTAL	**50.1**

Median-quartile attainment would achieve 18.8 10^3 m^3/hr (14.2TJ/day) for commercial customers and 4.9 10^3 m^3/hr (3.7TJ/day) for apartment customers. The total present value of the avoided commodity costs at 2015 for attainment of the median performance target is $743 million and for the top quartile target is $1,108 million.

The Performance-Based Model presented in this evidence for calculating commercial and apartment DSM potential is derived from Enerlife's substantial and growing database of actual energy performance data for buildings. The approach is consistent with a growing number of provincial and national programs. [1] It takes a different approach from the DSM Potential Study conducted for Enbridge in 2009 by Marbek Resources Consulting Inc.[2] Rather than relying on technologies, assumed penetration levels and engineering calculations, the Performance-Based Model analyzes actual, benchmarked energy use of different building types and establishes the potential savings due to all buildings reaching intensity levels already achieved by one half (median) or one quarter (top-quartile) of the peer group.

Simply bringing high gas use intensity buildings down to meet median base and heating energy levels of existing buildings yields overall percentage savings in the order of 19% for commercial and 12% for apartment buildings. Going further to meet top-quartile performance levels raises the potential to over 32% for commercial buildings and almost 29% for apartments.

It should be noted that attainment of today's top quartile gas use is by no means the greatest savings level that can be planned for and expected within the timelines in question. By definition, one quarter of existing buildings are already performing at or better than this level. Energy efficiency initiatives such as REALpac's 20 by '15 Target and TRCA's Town Hall Challenge and Greening Health Care programs use top quartile gas use to set energy targets.

Measures to improve efficiency in high gas intensity buildings go beyond those included in Marbek's DSM Potential Study and are typically site-specific equipment repairs, upgraded control of buildings systems, and testing, tuning and rebalancing of heating plant and systems. Such projects show generally good Total Resource Cost ("TRC") test values, can be implemented quite quickly, and serve to improve building performance as well as energy efficiency. They require a systematic approach to identify target buildings, engage owners, isolate the inefficiencies, implement the necessary improvements and verify the results.

Enbridge is already starting down the path on this new, data-driven performance-based conservation programming with its Energy Compass and Run It Right programs. The company has also gained experience in this space through its sponsorship of and participation in Toronto & Region Conservation's programs and CivicAction's Race to Reduce. In order to deliver the substantial additional natural gas savings identified herein in an efficient and expedient manner, additional focus and expanded scope should be applied to these new programs. Working with other parties, Enbridge can readily identify and target the largest gas savings potential customers in each sector, and support them in understanding and achieving the considerable energy and cost savings potential in their buildings.

[1] Examples include: Ministry of Education's Utility Consumption Database; REALpac's 20 by '15 Target and Benchmarking; Toronto & Region Conservation's Energy Efficiency Programs of The Living City; Government of Canada's Canadian launch of EPA's Portfolio Manager; CivicAction's Race to Reduce; Ontario Government's Green Energy Act reporting

[2] Exhibit I.A4.EGD.ED.14, Attachment

Part One - Natural Gas DSM Potential in the GTA – Enerlife Model

1.0 Performance-based DSM Forecast Methodology

Enerlife's model to forecast natural gas DSM potential in the GTA is based on established performance from a large multi-year database of energy use by buildings, direct project experience with successful high energy performing buildings and leadership of peer-reviewed initiatives aimed at determining conservation potential by defining how much energy individual buildings need. This differs from the DSM forecast model provided by Enbridge that points to a technology-centric view of DSM programs, rather than a performance-based one. This approach leads to a systematic approach to identifying buildings with savings potential and solution-based measures, often operational, that lead to quicker and greater gas savings.

Enerlife's Performance-based Forecast Model is supported by multi-year national pilot projects conducted by Enerlife on behalf of the Canada Green Building Council in the following building sectors: commercial office, government and utility administration, K-12 schools, retail bank branches, universities and municipal arenas. The pilots proceeded in parallel with and informed the technical development of the LEED standard for Existing Buildings: Operations & Maintenance.

These pilots were incredibly successful, and set the stage for the remarkable pace of market transformation which has taken place since they were completed. They brought awareness of opportunities to green existing buildings, engaged markets and generated interest in building performance. Enerlife's energy benchmarking and target-setting methodology introduced through the pilots has been adopted by the market, as evidenced by the REALpac 20 by '15 energy target, REALpac's Energy Benchmarking program, the reporting of energy intensity distribution of BOMA BESt certified buildings, Greening Greater Toronto's Race to Reduce awards, and others.

1.1 Data sets

For the commercial and apartment building sectors, we have assembled the largest full-year Canadian building data set in our online Green Building Performance System (GBPS) from the years 2009-2012. The GBPS employs IPMVP[3] methodology to weather-normalize gas consumption from different climatic regions to a common Toronto degree day base.

1.2 Building Sector Potential Savings

The graph below is illustrative of the benchmarking results for offices, schools, hospitals, retail, recreation and apartments respectively.[4] Each figure includes the size of the data set, indicates the range of base and heating gas use intensity (m3/ft2), and shows the overall percentage gas savings resulting from reaching median and top-quartile gas consumption levels.

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[3] International Performance Measurement and Verification Protocol

[4] The rest of the benchmarking results are in Appendix B

Figure 1 Example of Building Sector Benchmarking Results

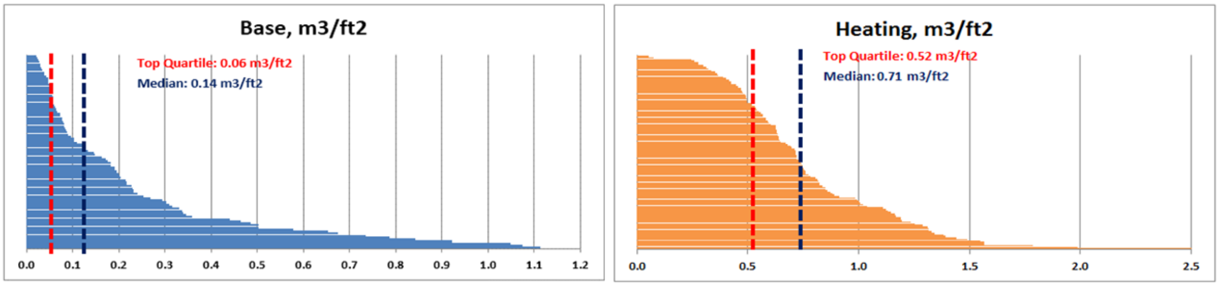
Sector: Office Buildings

Number of buildings: 123

Total building area, ft2: 42,000,827

Gas usage	Savings potential, % at the attainment of	
	Median	Top Quartile
Base	47%	72%
Heating	23%	39%
Total	**27%**	**44%**

Based on 2010 data weather-normalized to Toronto. Data centres have been excluded.



Part Two – Load Forecast Model

The Performance-Based Model was prepared in order to more completely represent the effects of DSM on the peak hour demand forecast. The model applies the DSM savings projected in this report to the baseline (2011-2012) consumption, and then adds the full impact of new customer load growth (as projected by Enbridge) to the net usage. The model includes DSM projections for residential and industrial sectors based on the 2009 DSM report and the analysis completed by the GEC experts.

2.1 Annual DSM Savings Potential

The following table summarizes the total savings potential by sector, illustrating the difference if the median target is reached and the top quartile target.

Figure 2 Total Sector Savings Potential

Conservation Potential

Apartment			Commercial			Industrial			Residential		
Base	Heating	Total	Base	Heating	Total	Base	Heating	Total	Base	Heating	Total
Median Target											
12%	13%	13%	38%	16%	19%	15%	15%	15%*	5.25%	5.25%	5.25%**
Top Quartile Target											
23%	30%	29%	54%	28%	32%	15%	15%	15%*	5.25%	5.25%	5.25%**

**Marbek study of DSM potential indicates the economic potential is 919 million m^3 in the industrial sector by 2017 (i.e. within 10 years, given when they started their analysis). That is relative to a baseline of 2671, or a 34.4% savings. They estimate that they can get 43% of that amount in their financially unconstrained scenario and also in their $40 million annual budget scenario, for a total savings of 14.7%.*

*** Evidence provided in "DSM Potential in GTA" report by Chris Neme and Jim Gravatt is the basis for the residential savings potential by 2025.*

The present value of the avoided commodity costs for attaining the median performance target is $743 million and for the top quartile target is $1,108 million, using a 5.88% discount rate[5] and commodity costs used by Enbridge.[6]

Enbridge's current DSM programs capture 0.6% of their annual volume[7], while the Performance-based Model forecasts capturing 1.2% of the annual volume for the median target and up to 1.9% for the top quartile target as savings.

Commercial Sector breakdown

The following table summarizes the DSM Potential results for the five commercial building types presented in Part One to produce weighted average percent savings for commercial buildings as a whole.

Figure 3 Apartment and Commercial Sectors Savings Potential

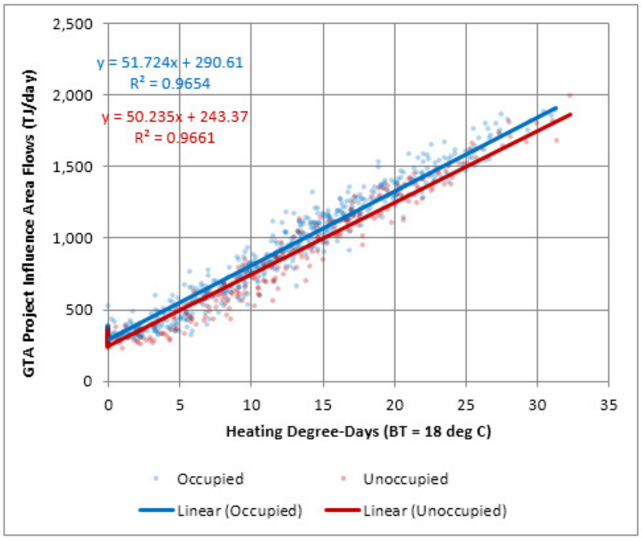
		Total	Savings potential, % at the attainment of					
		building	Median			Top Quartile		
Database by Sector:	**Buildings**	**area, Mft2**	**Base**	**Heating**	**Total**	**Base**	**Heating**	**Total**
Office	123	42.0	47%	23%	**27%**	72%	39%	**44%**
Schools	212	12.0	44%	17%	**21%**	63%	32%	**37%**
Hospitals	77	36.2	22%	12%	**18%**	52%	25%	**41%**
Retail	84	0.7	72%	26%	**37%**	87%	42%	**53%**
Recreation	20	1.4	56%	12%	**32%**	79%	29%	**52%**
Apartments	122	25	12%	13%	**13%**	23%	30%	**28%**

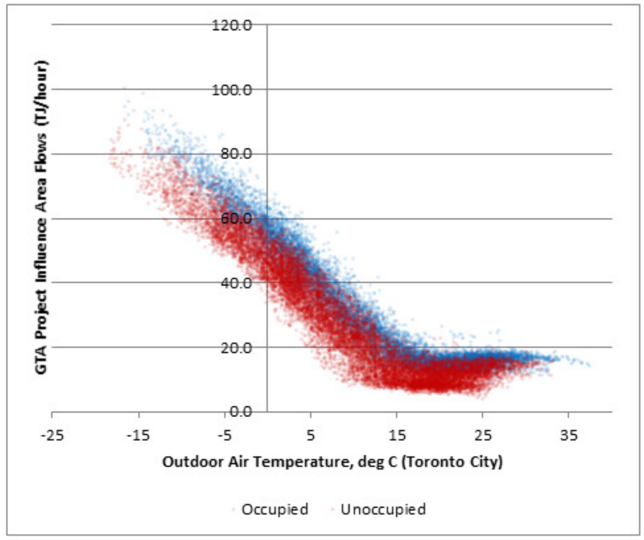
2.2 Peak Hourly Demand Savings

The Peak Breakdown worksheet of the model presents the hourly gas consumption data in 2010, 2011 and 2012 as provided by Enbridge for the GTA Project Influence Area (TJ/hour), relative to outdoor temperature. The analysis yields the breakdown of the base (16%) and heating (84% extrapolated to 41 HDD) on the Peak Breakdown worksheet. This is used to derive the impact of annual DSM savings on the system peak demand.

[5] The model uses the same discount rate as Enbridge uses for the Economic Feasibility. Exhibit E, Tab 1, Schedule1, Attachment, Page 1 of 5.
[6] Exhibit A, Tab 3, Schedule 5, Attachment Page 4 of 5.
[7] Calculated from current DSM estimate from Enbridge Exhibit I.A4.EGD.ED.25, Page 6 of 6.

Figure 4 Peak Hourly Demand





2.3 Peak Hourly Demand Forecast

The previous Peak Breakdown numbers inform the Peak Hourly Demand Forecast graphs below. Since this breakdown is not known for each sector, the same breakdown is used for Apartment, Commercial, Industrial and Residential. The base, heating and total DSM percentage potential for each of the four sectors originate from the Savings Model median and the top quartile scenarios. This also includes Enbridge's breakdown of the total peak demand (m3/hr) for each of the four sectors. Finally, the forecast percent attainment of the total potential is determined for each year from 2011 to 2025 to yield the peak demand reduction for each year.

This model incorporates the incremental gas demand over this period due to new customers coming on stream as projected by Enbridge.[8] However it should be pointed out that performance-based conservation plays an important role in setting design metrics and standards for new buildings, and that significant improvements can be expected over current design practice due to incorporating these into Enbridge's High Performance New Construction program. The potential impact on demand is unknown and was not included in the model.

The graphs below illustrate the variance between Enbridge's forecast of the impact of DSM on peak hourly demand and our performance-based forecast of the impact of DSM for the GTA Project Influence Area and individual building sectors. Included are:

- Baseline (2011-2012) which presents the actual historical peak demand data and simply projects 2011-2012 consumption through to 2025
- Baseline with Full Load Growth as provided by Enbridge

[8] Exhibit 1.A4.EGD.ED.2, Page 1 of 1

- Baseline with Discounted Load Growth which is Enbridge's forecast including the 35% reduction factor
- Baseline with Performance-based Forecast DSM (Median) and Full Load Growth
- Baseline with Performance-based Forecast DSM (Top Quartile) and Full Load Growth

Figure 5 GTA (all sectors) Peak Demand Forecast Model

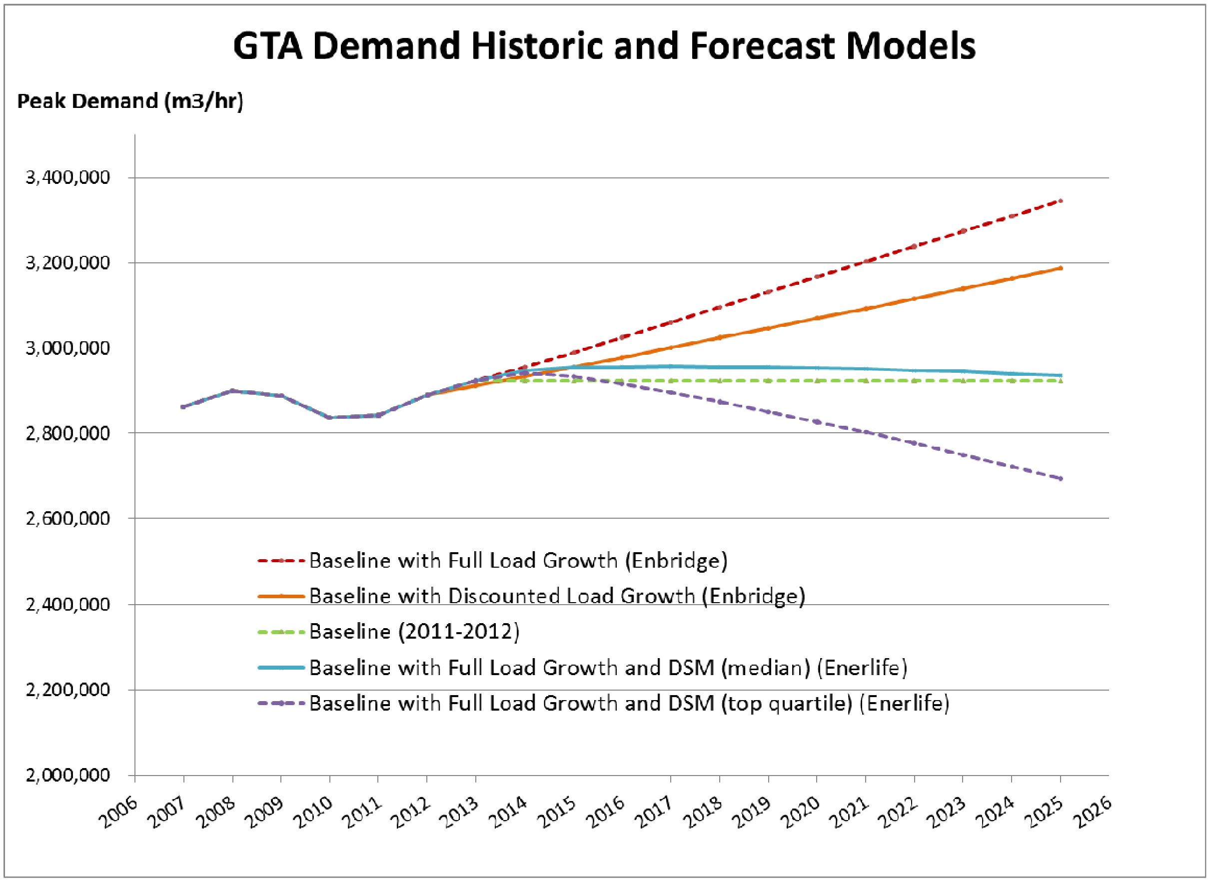


Figure 6 Comparison of savings and increases in gas use by 2025 from 2011 Baseline in the GTA Demand Historic and Forecast Models

% Increase by 2025 from 2012 Baseline	**Apartment**	**Commercial**	**Industrial**	**Residential**	**Total**
Enbridge's Full Growth Model	18.8%	13.6%	0.6%	19.1%	15.8%
Enbridge's Discounted Growth Model	12.2%	8.9%	0.4%	12.4%	10.3%
Enerlife's Forecast with Full Growth and DSM (median)	3.7%	-8.3%	-14.5%	12.9%	1.6%
Enerlife's Forecast with Full Growth and DSM (top quartile)	-15.8%	-22.6%	-14.5%	12.9%	-6.7%
% Reduction by 2025 from Enbridge's Full Growth Model					
Enerlife's median DSM	-12.7%	-19.3%	-15.0%	-5.2%	-12.2%
Enerlife's top quartile DSM	-29.1%	-31.9%	-15.0%	-5.2%	-19.5%

Figure 7 Median and Top Quartile DSM volume

	Median Target		Top Quartile Target	
	DSM per year (m3/hr)	% of annual volume	DSM per year (m3/hr)	% of annual volume
2014	8,929	0.3%	14,287	0.5%
2015	25,654	0.9%	40,995	1.3%
2016	34,321	1.2%	54,518	1.7%
2017	35,075	1.2%	55,751	1.8%
2018	35,761	1.2%	56,859	1.8%
2019	36,477	1.2%	58,019	1.8%
2020	37,192	1.2%	59,176	1.8%
2021	37,921	1.2%	60,349	1.8%
2022	38,653	1.2%	61,527	1.8%
2023	39,376	1.2%	62,696	1.9%
2024	40,099	1.2%	63,864	1.9%
2025	39,687	1.2%	62,783	1.7%

2.4 Building Sector Peak Demand Models

The following are the individual building sector models that inform the GTA Peak Demand Model, utilizing the same methodology.

Figure 8 Apartment Sector Peak Demand Model

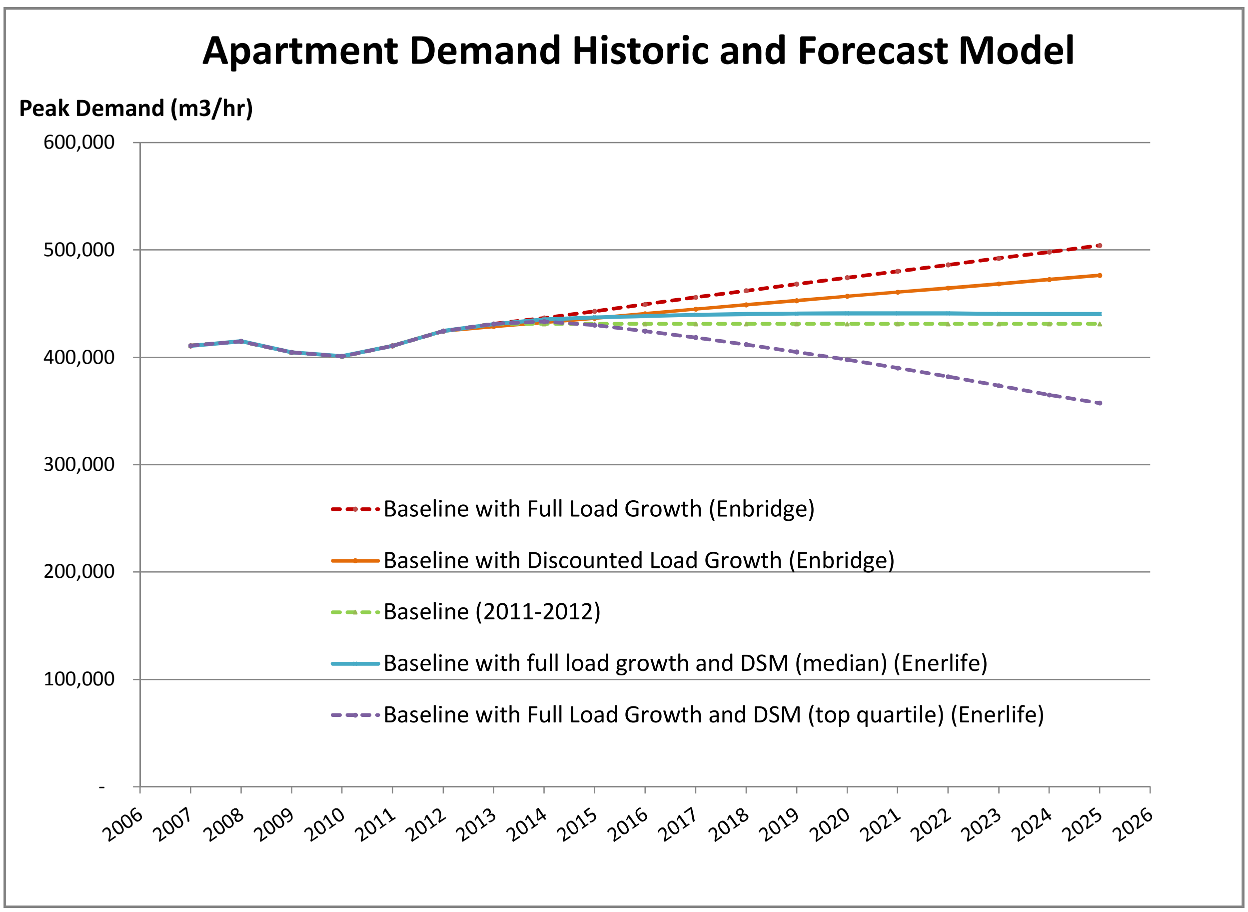


Figure 9 Commercial Sector Peak Demand Model

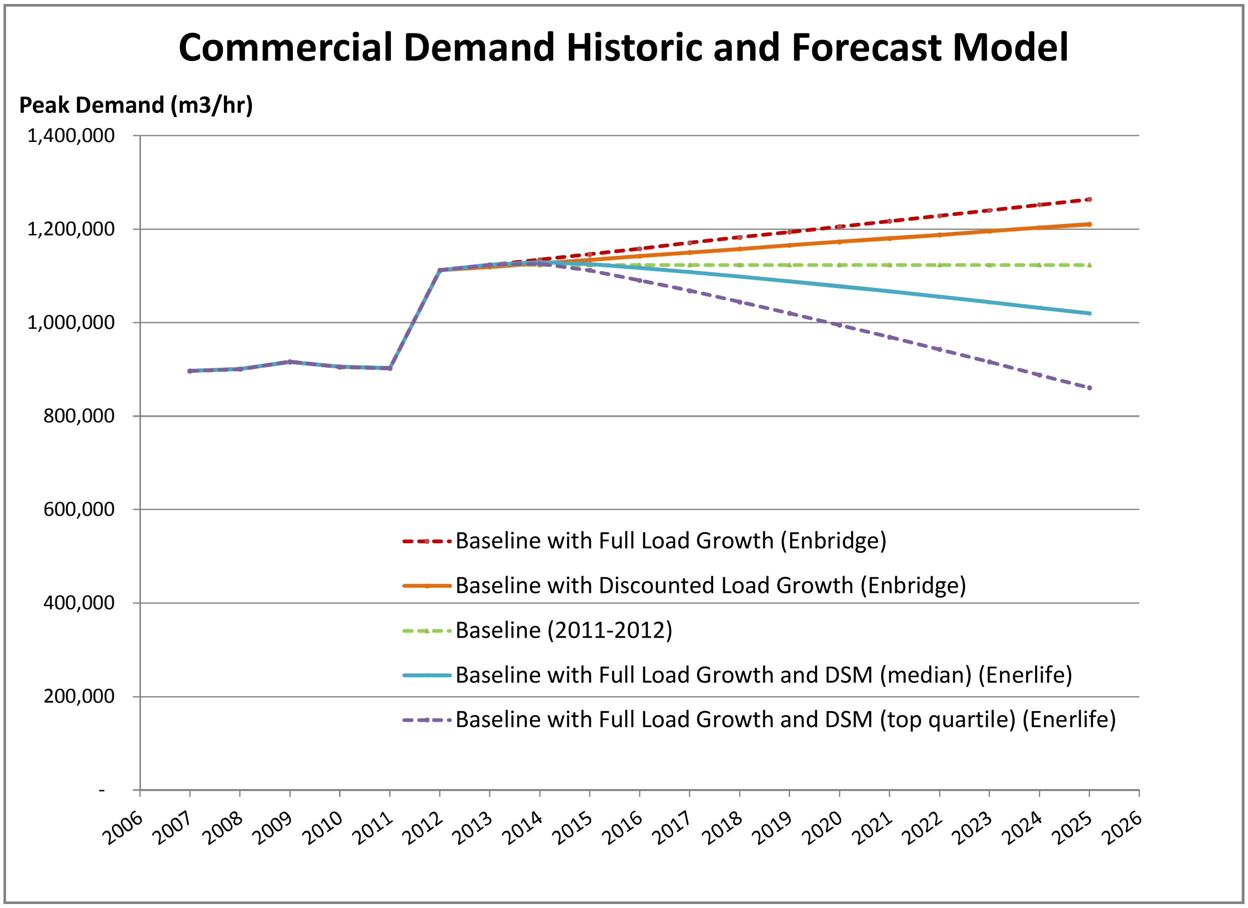


Figure 10 Industrial Sector Peak Demand Model

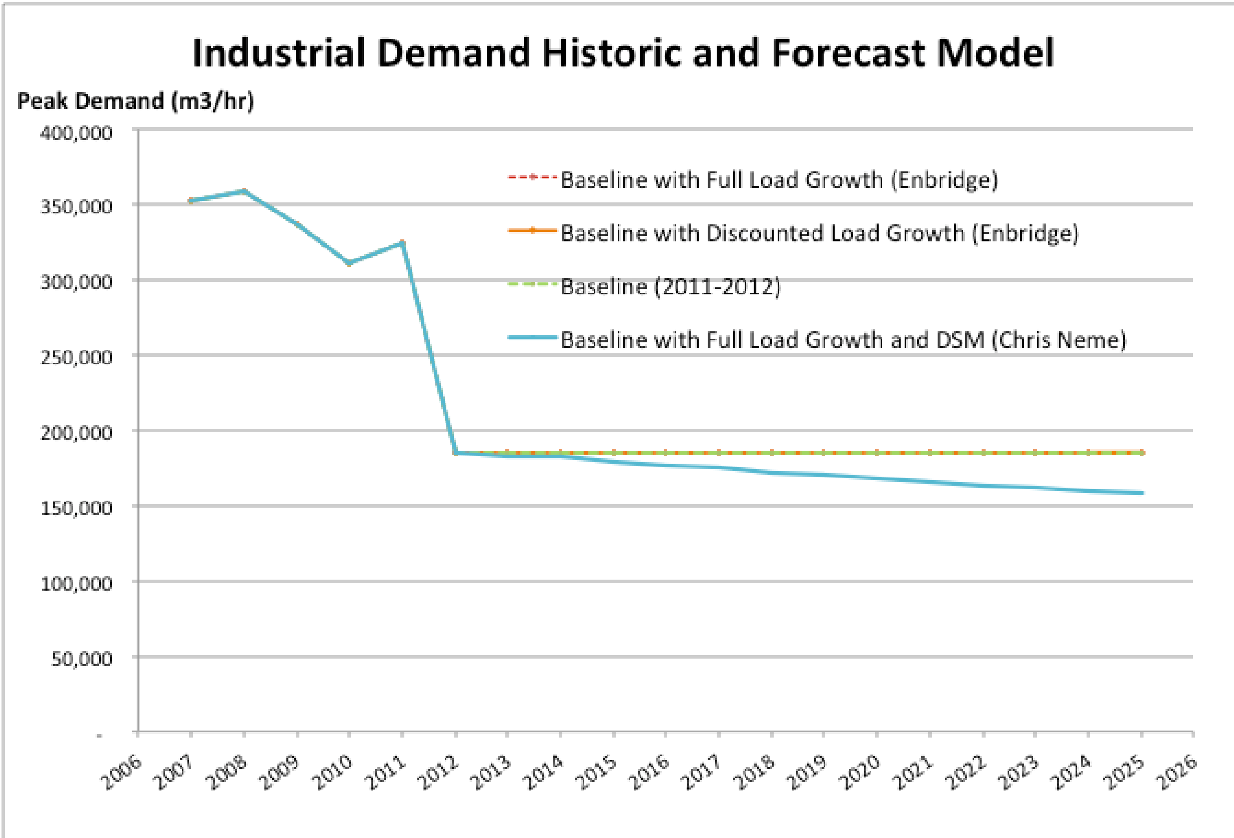
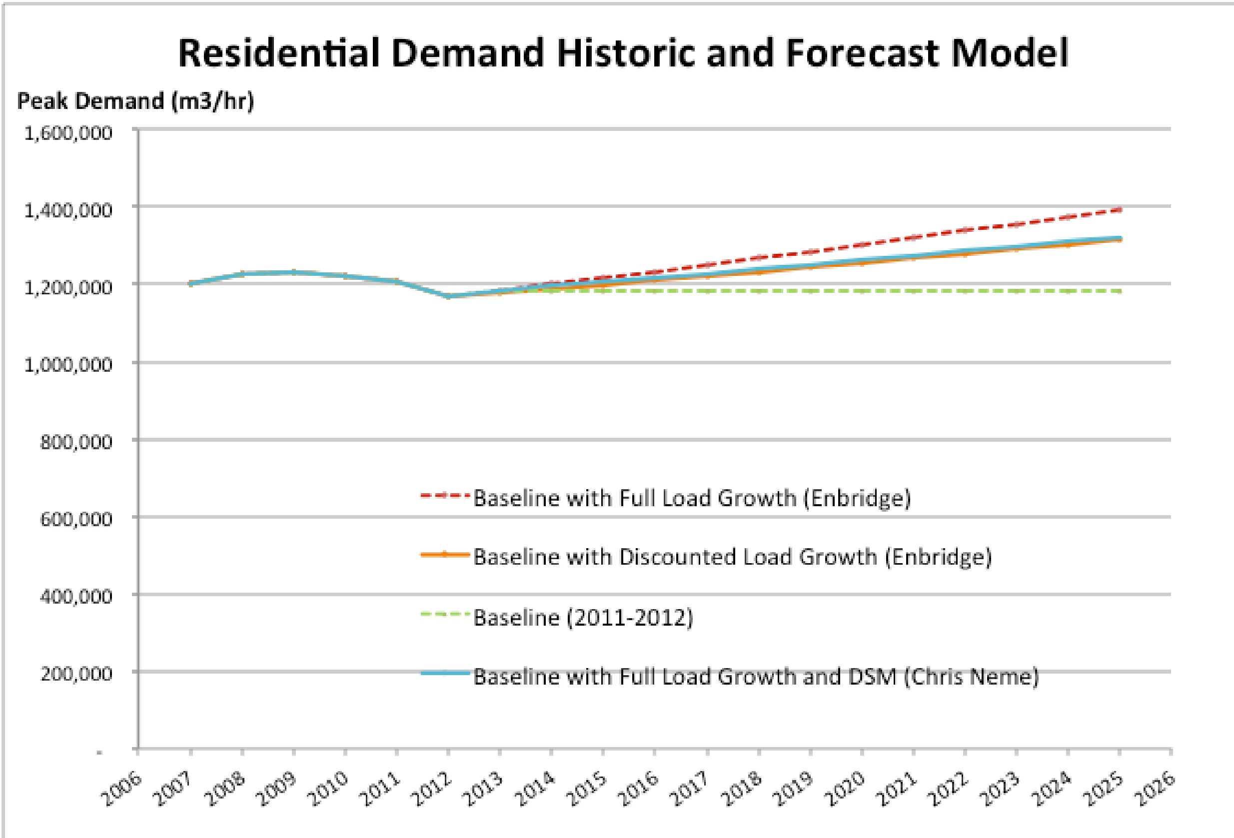


Figure 11 Residential Sector Peak Demand Model



Part Three – Performance-based conservation

3.1 Performance based conservation

Performance based conservation begins with identifying high energy intensity buildings through benchmarking and then works systematically towards identifying and fixing the particular inefficiencies causing the high use in each building. The nature of the inefficiencies runs the range of errors in design and construction, through equipment deterioration over time, to changes in use and operation of the building, and poor performance of controls and automation systems. It is the compound effect of these problems that leads to gas use levels in some buildings which is 3 to 5 times what is needed and already achieved by comparable, more efficient buildings.

Fixing these problems requires a systematic methodology. The work involved in equipment repairs and replacement, right-sizing and rebalancing, refurbishment and re-programming, typically provides relatively short payback periods.

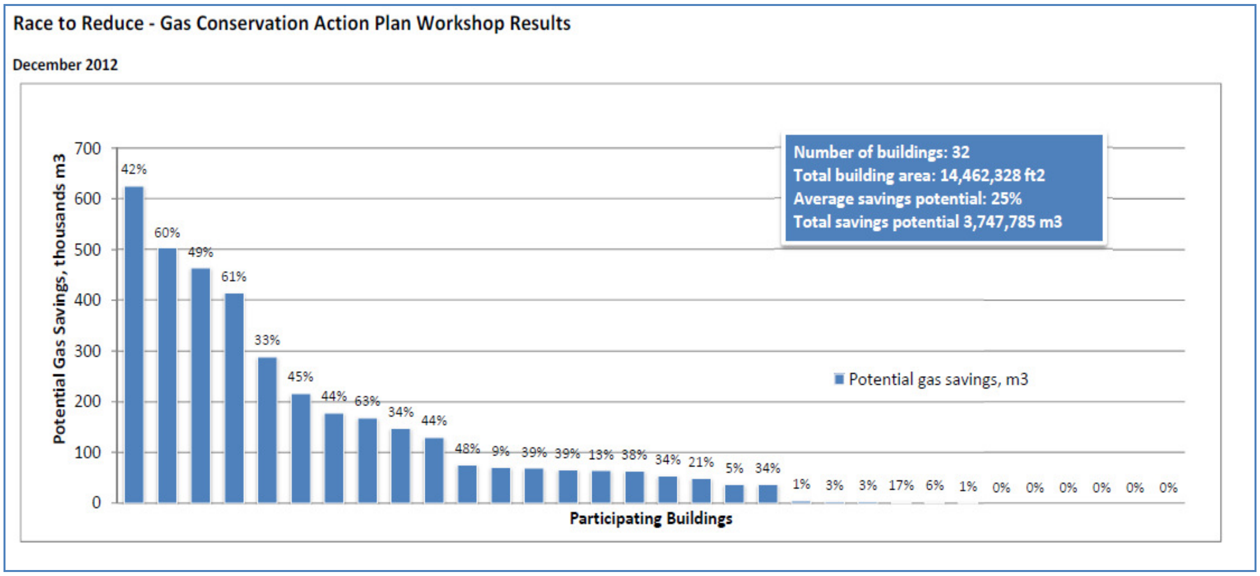
Part Four – Achieving the Additional DSM Savings

4.1 Identify Top Savings Potential Buildings

Performance-based conservation begins with identification of buildings with the greatest potential for savings and level of reduction possible. Enerlife piloted this approach in 2012 on behalf of Enbridge, through a workshop provided to Race to Reduce participants that addressed 31 commercial office buildings with a total area of over 14 million square feet.[9] Benchmarking and target-setting identified the range of gas savings potential shown in the chart below. The analysis for each building was provided to the participant in a standardized energy assessment report. The workshop then provided training in which specific measures were indicated to achieve the targeted savings in each building, enabling each participant to produce their own customized gas conservation action plan, and enabling Enbridge Energy Solutions Consultants to follow up with technical and incentive support to deliver the savings.

[9] Enbridge Energy Efficiency Workshop, November 23rd, 2012

Figure 12 Commercial office building gas savings potential[10]



This illustrates the importance of identifying buildings in each sector with the greatest potential gas savings. Some buildings have significant gas reduction potential while others have little or none at all. Applying a similar approach across each building sector will enable Enbridge to focus its efforts on customers and buildings with the greatest DSM potential, and help them identify the specific actions and measures which will achieve the savings results.

Our proposed plan envisages Enbridge targeting building owners of large buildings and large portfolios of buildings, based on their gas savings potential identified through benchmarking and target-setting. Commercial building owners already collaborate in energy efficiency initiatives such as REALpac Energy Benchmarking, BOMA BESt, Race to Reduce and Greening Health Care, which support awareness and engagement. Once owners are engaged and their buildings assessed, technical support can be provided by Enbridge assisting them in identifying contributing factors to high gas use, implementing necessary improvements and verifying that savings are achieved and maintained over time. Enbridge was unable to provide the requested breakdown of numbers of customers accounting for the largest gas consumption.1

However, consistent with this strategy, we have refined our recommended approach to market engagement and penetration using gas savings potential data for commercial buildings from our database. The strategy is illustrated below, which lays out the first four years of a 12-year market engagement program. The following 8 years of the program would build on this foundation to achieve the modeled top-quartile gas savings of 822 million M3/year in 2025.

[10] Labelled percentages in the graph indicate the gas savings potential for each individual building.

The proposed strategy is to engage buildings in each year of the program with a combined 75 million M3/year of gas savings potential so, by the end of 11 years, the required 2025 top quartile total of 822 million M3/year (as presented in the model) will be achieved.

The first year of the program would target owners of large buildings – typically hospitals, major commercial and government office buildings and hotels, and universities. Our database contains 26 such buildings in the GTA (including office buildings in the Enbridge workshop for the Race to Reduce as shown in Exhibit L.EGD.ED.1, Figure 12, Page 13) owned by 20 different organizations with identified potential savings totaling 24 million M3/year. Based on this, the program would aim to engage approximately 60 owners and identify approximately 80 high gas savings potential buildings to achieve the target engagement of buildings with combined potential for 75 million M3/year.

We estimate our database contains fewer than 20% of the large gas savings potential buildings in the GTA. The market engagement program would engage these buildings and other readily identified owners to meet the first year's target. Gas savings would be realized over the following 2-3 years.

The second year would target buildings with 200,000 M3/year of gas savings potential. Our database of office, government and commercial office buildings contains 25 of these buildings with a combined gas savings potential of 6.6 million M3/year. To meet the aims of the program requires approximately 300 of these buildings. However, large portfolio owners, such as school boards, municipalities and retail chains, would be targeted first so the number of owners to engage is proportionately less (estimated at 50).

The subsequent year of the program would target buildings with 10,000 M3/year gas savings potential, requiring engagement of 500 buildings and 50 new customers (given that some customers engaged in years one and two will have buildings already identified in this range). The fourth year would focus on buildings with 50,000 M3/year gas savings potential, for which we estimate 1000 buildings and 50 new customers. Successful execution of this proposed strategy for the first four years will establish the relationships, processes and capabilities required in subsequent years of the program.

Table 1 Market Penetration Model for Commercial Sector

	Year 1	**Year 2**	**Year 3**	**Year 4**
Gas savings engaged (M3)	75 million	75 million	75 million	75 million
Potential savings per building M3/yr.	> 500,000	> 200,000	> 100,000	> 50,000
# of targeted buildings/year	80	300	500	1000
# of new participants/yr.	60	50	50	50

Target customers	Commercial landlords; major hospitals; universities; major hotels; government	School boards (high schools); municipalities; colleges; large retail; other hospitals, hotels etc	Other retailers; long-term care operators	Banks (branches); school boards (primary schools);

The Apartment sector also has large buildings, large portfolio owners, and collaborative programs in place (including the Federation of Housing Providers of Ontario, and the City of Toronto Tower Renewal Office) so a similar model would apply. A s.

Lower penetration rates are projected in the model for Residential and Industry, but the principles of performance-based conservation may be useful in these sectors as well.

4.2 Finding and Fixing Inefficiencies

Identifying and addressing inefficiencies requires a savings focused approach to DSM. Trained people with similar skill sets to energy analysts, commissioning agents and energy efficiency engineers focused on getting to energy savings as quickly as possible are needed to work with building operation staff. Outcomes-based strategies and incentives prioritize scheduling optimization, ventilation and air flow testing and savings opportunities that use lower cost technology such as zone dampers and variable frequency drives. These typically can be implemented quickly and have short paybacks.

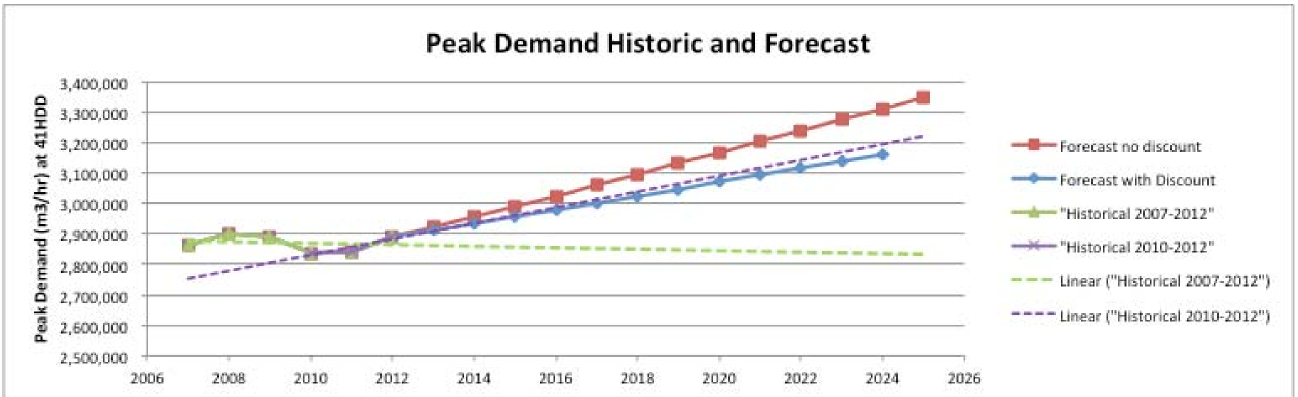
Part Five - Enbridge Peak Demand Forecast Model

5.1 Assessment of Enbridge's Load Growth Forecast Model

Enbridge's argument for a proposed new pipeline to serve the GTA is partially based on the need for additional capacity to meet increased peak hourly demand. To support this, they provided a Peak Load Growth Forecast discounted for gas savings from DSM programs. Due to the short length of review time, we are unable to provide a complete assessment of the load forecast but have the following observations:

a. Insufficient trend information to base projection

Figure 13 Peak Demand Trends



The derived historic peak demand (weather-normalized to 41HDD)[11] from between 2007 and 2012 shows no net growth overall. However, Enbridge's forecast indicates an increase in demand. This is consistent with a shorter data period (2010 to 2012). Given the erratic growth patterns within the Industrial and Commercial sectors during this time, three years would seem insufficient to base a forecast upon. [12]

As illustrated below, the industrial sector demand dropped by 43% between 2011 and 2012 while the commercial sector demand increased by 23% in the same period with no significant increase in the number of customers. Overall there was little total demand growth. This would indicate the difficulty in forecasting future growth based on so little trend data.

Table 2 Number of Customers by Sector (historical)

	Apartment m^3/hr	Commercial m^3/hr	Industrial m^3/hr	Residential m^3/hr	Total m^3/hr
2007	410,758	896,792	352,178	1,203,076	2,862,804
2008	414,932	900,775	358,798	1,225,376	2,899,881
2009	404,701	916,271	336,968	1,230,241	2,888,181
2010	400,992	905,314	311,336	1,220,411	2,838,053
2011	410,716	**902,621**	**324,351**	1,205,503	2,843,191
2012	424,455	**1,112,231**	**184,774**	1,168,523	2,889,983

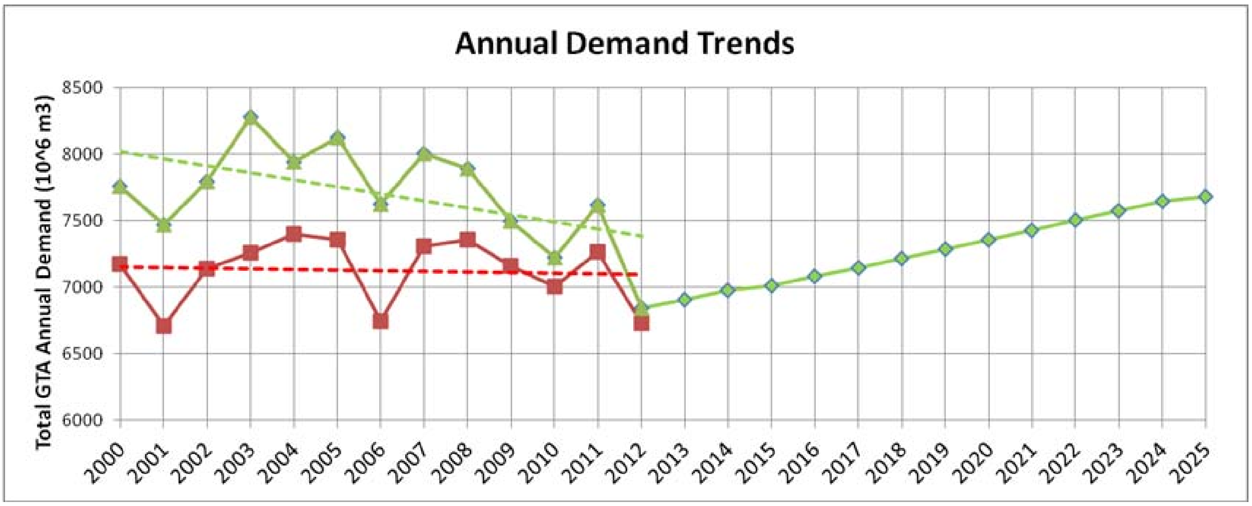
b. Forecast inconsistent with historical peak demand trends

Based on historical annual demand trends, demand has been declining over the past decade but Enbridge has forecast substantial demand growth in the future. As can be seen in the graph below, it

[11] Exhibit I.A4.EGD.ED3
[12] EXHIBIT I.A4.EGD.EGC.ED.3

appears Enbridge provided total GTA annual demand data from two sources. The green line is from actual volumes[13] and the red is measured at the gate station[14]. Neither indicates a growth in demand, while the annual demand is forecast to grow consistently. During the historical period (2004 to 2012) the growth rate of the number of customers is similar to the forecasted customer growth rate, yet there was no peak demand growth. Enbridge uses linear interpolation between annual consumption to derive peak hourly data, which supports the correlation between annual volume and peak hourly demand. Based on this, there is no historical correlation between an increase in number of customers and significant peak demand growth as forecast.

Figure 14 Annual Demand Trends - historic and forecast



c. Inaccurate application of the discount factor

The application of the discount factor in the Enbridge Load Growth Forecast model appears to be misleading. The DSM forecast of 12 10^3m^3/hr reduction each year is 0.4% of the peak hourly load in GTA. The 35% discount factor is applied on the incremental **new** customer growth rate of 1.2% (35 10^3m^3/hr) each year, to account for the DSM load reduction over the entire **existing** building stock. This leads to the misunderstanding that no amount of DSM could offset growth, since even if a 99% discount is applied there will still be a positive growth trend.

It would be more accurate to apply the discount factor directly to the total peak load. The Performance-based DSM model proposed in this report applies it this way, and if DSM reaches 3 times the current level there will be no net growth.

[13] JT2.36 using "actual volumes from Franchise Areas 10, 20, 30 from the billing system to proxy for volumes in the GTA Project Influence Area" for the historical information, and the "2013 Board-approved average use were applied to GTA Project influence area customer growth forecasts to project total annual demands"
[14] Exhibit I.A4.EGD.ED.25, "measured at the gate station"

Appendix A

Terms of Reference

Environmental Defence asks that you:

1. Quantify the demand side management (DSM) potential in large multi-residential, commercial and institutional buildings that can be pursued by Enbridge Gas Distribution Inc. ("Enbridge") to potentially defer or avoid the need for part or all of the proposed GTA pipeline. Please quantify the DSM potential in TJ/day on peak demand day and TJ/year for each year from 2014 to 2025 inclusive, for existing and new buildings, and in the geographical area that Enbridge states in its interrogatory responses that further capacity is required;

2. Quantify the net present value of the DSM potential;

3. Outline how Enbridge could capture this DSM potential (e.g., larger financial incentives for customers that save natural gas);

4. Contrast this potential to the current 'business as usual' DSM offering of Enbridge for these customer groups as set out in its growth forecast and interrogatory responses in this proceeding;

5. Provide an assessment and critique of Enbridge's demand forecast, including of its underlying methodology, assumptions, and inputs; and

6. Prepare an alternative demand forecast that remedies any problems you have identified with respect to Enbridge's forecast (if any), provide an estimate of demand to 2025 based on the amount of DSM assumed by Enbridge in its evidence, and provide an estimate of demand to 2025 based on potential incremental DSM, as discussed above.

Appendix B

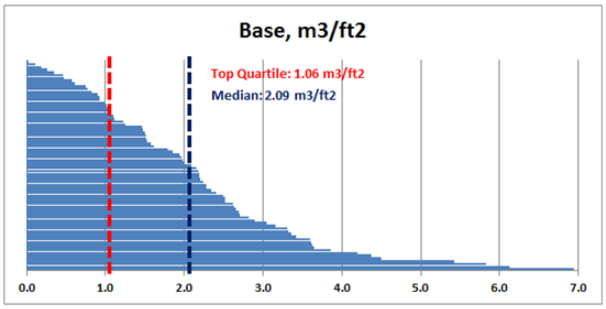
The following are the Building Sector Benchmarking reports:

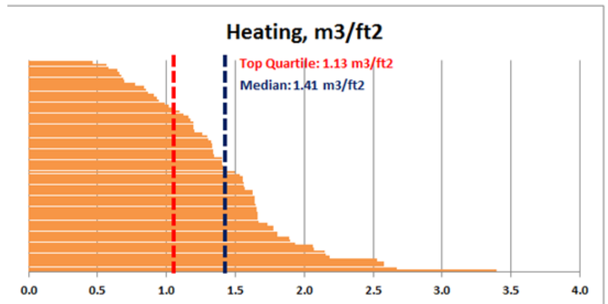
Sector: Hospitals

Number of buildings: 77
Total building area, ft2: 29,888,023

Gas usage	Savings potential, % at the attainment of	
	Median	Top Quartile
Base	22%	52%
Heating	12%	25%
Total	**18%**	**41%**

Based on 2010 data weather-normalized to Toronto.



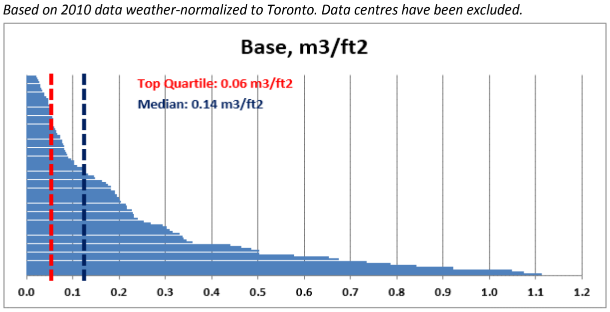


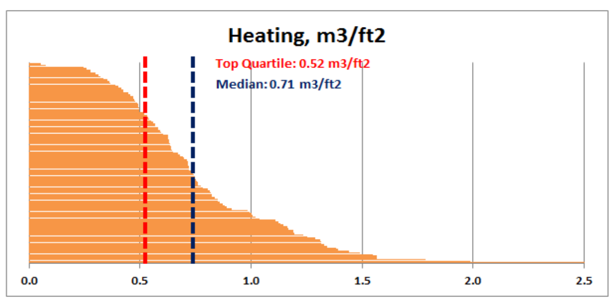
Sector: Office Buildings

Number of buildings: 123
Total building area, ft2: 42,000,827

Gas usage	Savings potential, % at the attainment of	
	Median	Top Quartile
Base	47%	72%
Heating	23%	39%
Total	**27%**	**44%**

Based on 2010 data weather-normalized to Toronto. Data centres have been excluded.



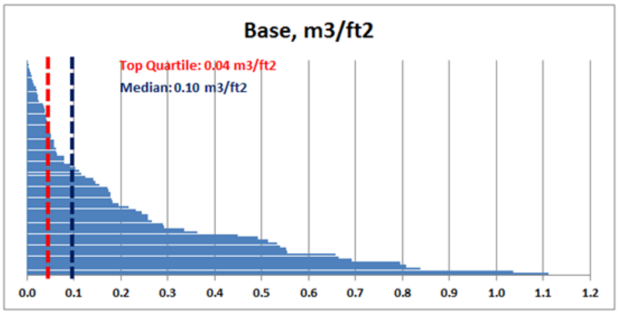


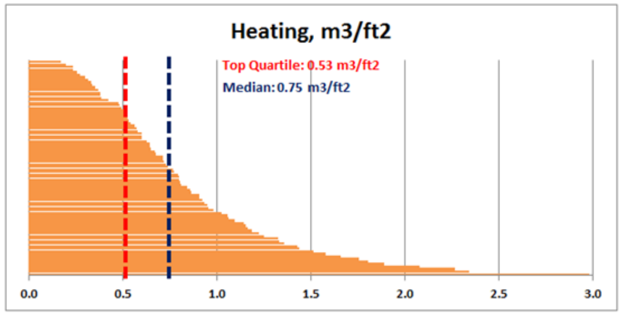
Sector: Retail Branches

Number of buildings: 84
Total building area, ft2: 730,478

Gas usage	Savings potential, % at the attainment of	
	Median	Top Quartile
Base	72%	87%
Heating	26%	42%
Total	**37%**	**53%**

Based on 2009 data weather-normalized to Toronto.



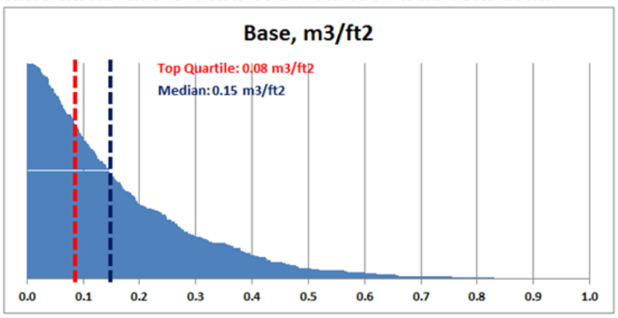


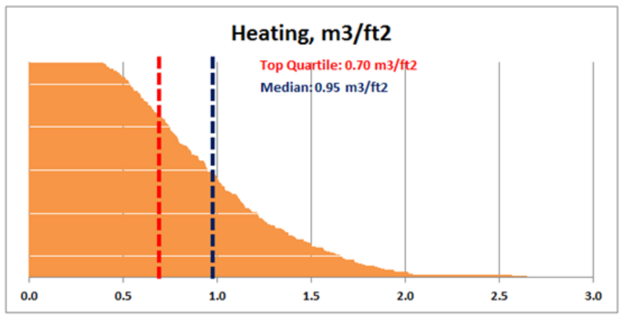
Sector: K-12 Schools

Number of buildings: 212
Total building area, ft2: 12,599,060

Gas usage	Savings potential, % at the attainment of	
	Median	Top Quartile
Base	44%	63%
Heating	17%	32%
Total	**21%**	**37%**

Based on 2010 data weather-normalized to Toronto. All-electric and HP schools have been excluded.



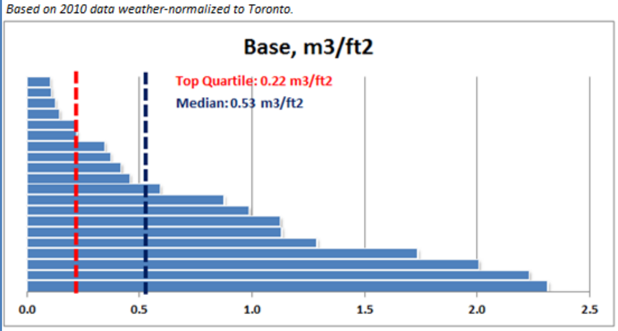


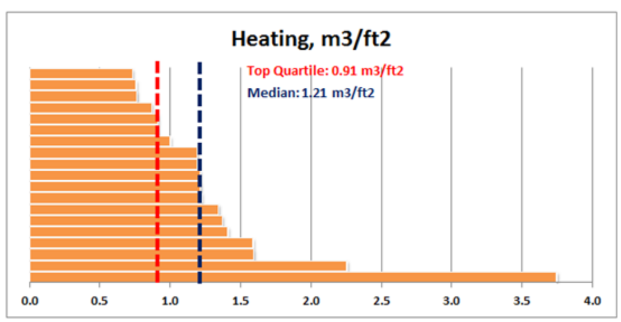
Sector: Recreation

Number of buildings: 20
Total building area, ft2: 1,470,716

Gas usage	Savings potential, % at the attainment of	
	Median	Top Quartile
Base	56%	79%
Heating	12%	29%
Total	**32%**	**52%**

Based on 2010 data weather-normalized to Toronto.



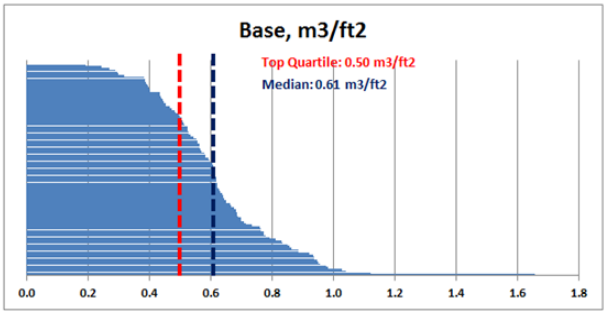


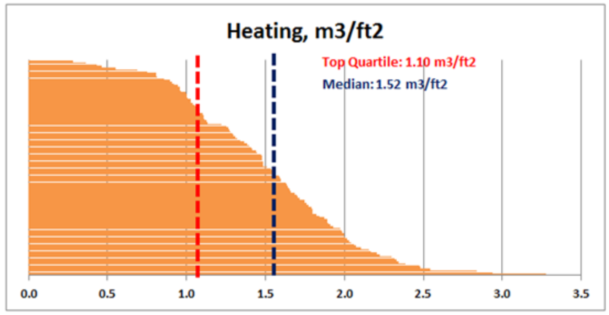
Sector: Multi-Res

Number of buildings: 122
Total building area, ft2: 25,023,702

Gas usage	Savings potential, % at the attainment of	
	Median	Top Quartile
Base	12%	23%
Heating	13%	30%
Total	**13%**	**28%**

Based on 2012-11 data weather-normalized to Toronto.





ONTARIO ENERGY BOARD

EB-2012-0451

IN THE MATTER OF the Ontario Energy Board Act, 1998, S.O. 1998, c. 15 (Schedule B);

AND IN THE MATTER OF an application by Enbridge Gas Distribution Inc. under section 90 and 91 of the Ontario Energy Board Act, 1998, S.O. 1998, c. 15 (Schedule B) for an order or orders granting leave to construct a natural gas pipeline and ancillary facilities in the Town of Milton, City of Markham, Town of Richmond Hill, City of Brampton, City of Toronto, City of Vaughan and the Region of Halton, the Region of Peel and the Region of York;

AND IN THE MATTER OF an application by Enbridge Gas Distribution Inc. under section 36 of the Ontario Energy Board Act, 1998, S.O. 1998, c. 15 (Schedule B) for an order or orders approving the methodology to establish a rate for transportation services for TransCanada Pipelines Limited.

ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is Wen Jie Li and I am a Junior Project Engineer at Enerlife Consulting Inc.

2. I have been engaged by or on behalf of Environmental Defence to provide evidence in relation to the above-noted proceeding.

3. I acknowledge that it is my duty to assist the Board impartially by giving evidence that is fair and objective and to abide by the requirements set out in Rule 13A of the Ontario Energy Board *Rules of Practice and Procedure*. I am aware of and accept the responsibilities set out in that Rule.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date: June 18, 2013 Signature: WJ Li

ONTARIO ENERGY BOARD

EB-2012-0451

IN THE MATTER OF the Ontario Energy Board Act, 1998, S.O. 1998, c. 15 (Schedule B);

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ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is Gillian Henderson and I am a Principal at Enerlife Consulting Inc.

2. I have been engaged by or on behalf of Environmental Defence to provide evidence in relation to the above-noted proceeding.

3. I acknowledge that it is my duty to assist the Board impartially by giving evidence that is fair and objective and to abide by the requirements set out in Rule 13A of the Ontario Energy Board *Rules of Practice and Procedure*. I am aware of and accept the responsibilities set out in that Rule.

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Date: June 18/2013 Signature: [signature]

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EB-2012-0451

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ACKNOWLEDGMENT OF EXPERT'S DUTY

1. My name is Ian Jarvis and I am the President of Enerlife Consulting Inc.

2. I have been engaged by or on behalf of Environmental Defence to provide evidence in relation to the above-noted proceeding.

3. I acknowledge that it is my duty to assist the Board impartially by giving evidence that is fair and objective and to abide by the requirements set out in Rule 13A of the Ontario Energy Board *Rules of Practice and Procedure*. I am aware of and accept the responsibilities set out in that Rule.

4. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

Date: June 18th 2013.

Signature: [signature]